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THE APPRENTICESHIP SYSTEM

IN ITS RELATION TO

INDUSTRIAL EDUCATION

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LETTER OF TRANSMITTAL.

DEPARTMENT OF THE INTERIOR,
BUREAU OF EDUCATION,

Washington, September 17, 1908.

SIR: The interest in industrial education which has arisen in this country has brought into new prominence the whole system of training for trades by a regular course of apprenticeship. Education by apprenticeship and education by schools have gone on for many generations side by side as two entirely distinct and unrelated forms of education. The newer movements are concerned with bringing these two kinds of education together and making of them a new kind of education which shall train equally for skill and for intelligence.

This new movement is attended with obvious difficulties. It is clear that among other things a better knowledge of the apprenticeship system as it is to-day is urgently needed. With a view to meeting this need, Dr. Carroll D. Wright, who is known everywhere as a foremost authority in matters relating to trade education, has prepared at my request an account of the apprenticeship system, which I have the honor to transmit herewith. I beg to recommend that it be published as the sixth number of the Bulletin of the Bureau of Education for the current year.

There can be no doubt that the desired combination of schooling and apprenticeship must be approached from many sides and will be accomplished in many ways. The treatment of apprenticeship presented by Colonel Wright describes certain ways in which this combination may be effected, as shown by recent experience in a few of our leading industries. It will throw light also upon the subject as a whole, and will doubtless be of value even in those undertakings in which the problem is approached by altogether different ways.

Very respectfully,

ELMER ELLSWORTH BROWN,
Commissioner.

The SECRETARY OF THE INTERIOR.

INTRODUCTORY NOTE.

The bulk of the information or material on which this bulletin is based is the result of correspondence with parties throughout the country and of personal investigation of concerns employing the various types of apprenticeship systems. This original material has been supplemented in some degree by the meager information already to be found in publications and addresses.

In this work I wish to acknowledge the assistance I have received from Mr. Arthur D. Dean, a gentleman fully acquainted with all the elements of industrial education. He has made many personal investigations for this publication.

CARROLL D. WRIGHT.

CLARK COLLEGE,
Worcester, Mass., July 11, 1908.

THE APPRENTICESHIP SYSTEM IN ITS RELATION TO INDUSTRIAL EDUCATION.

A COMBINATION OF APPRENTICESHIP AND ACADEMIC EDUCATION NEEDED.

There are three well-known methods of securing greater skill in our industries. First, the apprenticeship system; second, trade schools; third, industrial schools. The first means the indenturing of apprentices in any given trade for the purpose of giving instruction to young men in the art and mystery of the trade involved. This system, which is very old, reaching back to ancient times, was developed very largely in mediæval times in connection with the old guilds, and under various modifications extends to the present.

Nearly all writers and speakers on industrial education state broadly and definitely that the system is dead. In one sense this is true. Yet the old type of apprenticeship is not quite dead, because it exists very largely in this and in other countries, but it is decadent, while what may be called the modern system, involving very broad lines of general instruction, has largely taken its place, and is being developed in such a way that its influence in general industrial education must be recognized. Yet the propagandism for industrial education which now occupies the thought of the public is likely to obscure to some extent the advantages of the apprenticeship system. This is quite natural, because that system, as it occupies the public mind, does not play a very great part in industrial training. This is because it is not the subject of public indorsement through legislation and other movements to secure modern industrial schools.

As intimated, when this system is mentioned one is apt to think of the old apprenticeship system as it existed prior to the introduction of the modern factory or the aggregated system of labor and the subdivision of labor; yet credit must be given to the old system, even as it grew up during the middle ages, because it really produced workmen in various branches possessing the highest skill.

The old guild fostered the apprenticeship system, for it was difficult for anyone to become a member of a guild who had not passed through all stages of development; and while the guild itself became

unjust and arbitrary and gradually declined, the apprenticeship system, which had furnished the skill lived, for the laws and customs of western Europe especially required that any person desiring to exercise certain branches of skilled labor must serve an apprenticeship. During the continuance of the apprenticeship the labor of the apprentice belonged to the master, and he received oftentimes, no wages during the first years of his indenture, and very meagre wages until he became a journeyman, when he was expected to reimburse himself for the years spent in learning his trade.

The industrial revolution which took place in the latter part of the eighteenth century, resulting in the introduction of labor-saving machinery and the subdivision of labor, was the beginning of the decline of the apprenticeship system. From that time to this the need of apprentices has not been felt in such powerful degree as it had been previously; but with the modern development of industry there comes the absolute necessity of securing skilled workmen in all branches of labor, and this necessity has brought to the attention of the public the desire for industrial education; for the evidence is overwhelming from all parts of the country that the demand for skilled labor is not met by the supply. It is this demand, the facts concerning which are strong enough to induce any State to secure by appropriation and authorization public industrial education. The schools have been devoted almost entirely until within a very few years to cultural training. Now the demand comes that vocational studies shall be introduced, and that separate industrial schools shall be organized for the purpose of instructing young persons in various trades.

The old apprenticeship system did not comprehend this idea, nor, conversely, do the advocates of industrial education fully appreciate the advantages to be gained through some adherence to or the perpetuation of the virtues of the old system. This old system, as intimated, has largely become obsolete. Its essence remains, but it is unwarrantable to argue that the apprenticeship system answers the whole demand for industrial education. It does not, but it may do so to a large degree. It is also thought needless to argue that the industrial schools furnish everything in the way of vocational equipment that can be gained by a thorough apprenticeship system. What is needed in regard to this system is some coordination that shall secure nearly all that can be gained from the apprenticeship system and much that can be gained from modern schools for trade and industrial education generally.

Herein lies the problem, for it is generally conceded by educators who are interested in industrial education that the industrial school per se does not and can not result in turning out a full-fledged skilled mechanic ready to take up his trade.

It is also recognized that the apprenticeship system on the whole, especially as it was conducted formerly, possesses many features that are unjust and uneconomic, and some features that may be called unmoral. That is, the ethical side of the apprenticeship system of the olden times is now a satisfactory one. Under it the apprentice found that he was doing quite as good work after a while as the journeyman ahead of him, but must be tied to an apprentice's wages a term of years. This was an unmoral situation in itself and helped to demoralize the apprentice. He became, when he graduated, a man who would slight his work because he had been unjustly treated economically. At least this was the case in many instances, and this tended to make a bad workman as well as a man given to loafing.

Now, the modern idea is to perfect him in the theory, and, to a large extent, the practice of his trade in the shortest possible time commensurate with efficiency and adequate skill. If he could serve as an apprentice for such time as might be absolutely required to perfect himself as a journeyman, and at the same time acquire the rudiments of an education, that system might be applauded.

Employers therefore looked the field over broadly and carefully, and those engaged in great industries are recognizing not only the difficulties of the old system, but some of the difficulties of the new, while recognizing also the advantages of both. They are therefore establishing their own apprenticeship schools, where a youth is not only taught all that he would be taught in an independent industrial institution, but where he is given the equipment he would have acquired under the old apprenticeship system, with the faults and objections of that system quite fully eliminated.

The apprenticeship system pure and simple would not teach the apprentices, as would the industrial school properly equipped, all the science and art of the trade in which they were enlisted. In order to become a thoroughly skilled mechanic a young man ought to understand not only the science and mathematics of his work, but something of the art itself. This knowledge of the art he would gain as an apprentice in one of our great modern manufacturing establishments, so that he would secure from his apprenticeship system and from the industrial school, or from the two combined, the very best possible equipment that would lead to the greatest efficiency. This is the need of the day and the work that is progressing.

The propagandism that is being carried to all parts of the country will sooner or later, and the sooner the better, produce a unified, coordinated system of apprenticeship work and industrial education that will give the United States the standing it needs, and which it must have to preserve its industrial supremacy. The development of

the apprenticeship system, however, will not take from the influence of other methods any of their peculiar and important work.*

DESCRIPTION OF THE SYSTEMS WHICH HAVE DEVELOPED.

The trade school as it is now carried on is a school to provide instruction in the mysteries and technique of special trades. Thus we have trade schools for carpenters, brick masons, machinists, etc. These trade schools supplement the trade instruction with the rudiments of an education, if the pupil does not already have them. He is taught reading, writing, arithmetic, and how to apply his knowledge of elementary mathematics to the particular trade which he is studying. He may get some other instruction which involves practice in a shop connected with the trade. Such schools flourish in Europe and America.

Trade unionists object to them because they do not and can not, in their estimation, turn out the full-fledged artisan, the man ready to go to work on his graduation. They also fear that the trade school will in many instances furnish recruits to take the places of strikers, thus aiding in the breaking of strikes. Unfortunately for this attitude, some prominent manufacturers have stated that this would be the result of any extended system of trade-school instruction. It is purely and simply an apprehension, but an apprehension has great weight until the minds of those holding it are disabused of their fear.

Those who believe in broad industrial education are also of the opinion that the trade school pure and simple is inadequate, that it does not go far enough, that it often teaches a single trade, and that adequate teaching of trades can only be fostered in large schools devoted to mechanical instruction. Nevertheless, the power and influence of the trade school must be recognized, and the fact that it has taken its place as one of the modern means of securing that skill which is overwhelmingly demanded everywhere, especially as a means of training our own boys how to work and training them in the best possible way.

The best equipped public industrial schools have all the machinery and appliances necessary for the instruction of the students, and teachers competent to instruct them in the branches of general education. Probably, too, often in large degree, they help to bridge over that dangerous period in the lives of young persons before they are old enough to enter upon an apprenticeship. This age is, accord-

* The foregoing section has been taken, with some alterations, from *The Apprenticeship System as a Means of Promoting Industrial Efficiency*. An address by the writer before the National Society for the Promotion of Industrial Education, Chicago, Ill., Jan. 24, 1908.

ing to the laws of most of the States, from 14 to 16. Fourteen is the usual limit of the compulsory school age for those who are at work. Boys, and in many instances girls, coming out of school at that age are in a peculiar position. They are not old enough to enter upon specific trade education, either in trade schools or industrial schools, nor are they old enough to be desirable as apprentices under the apprenticeship system. They therefore take the line of least resistance in the nonskilled vocations and work from hand to mouth, and are too apt to remain as unskilled workers throughout their lives.

The report of the Massachusetts Commission on Industrial and Technical Education, known as the Douglas Commission, in its exhaustive investigations, found that in the State of Massachusetts alone there were at least 25,000 children between 14 and 16 who were in this precarious condition. This is undoubtedly true, and must be true throughout the country. Thus there are many, many thousands, reaching into the hundreds of thousands, that are in adverse conditions and must remain therein, because there is no adequate means for their entering upon well organized and fairly skilled trades. Here elementary industrial training in the public school has a large field for most useful activity.

The industrial school, so called, can not be definitely differentiated from the trade school, yet it is in fact distinct. It is not designed to teach any one trade, but groups of trades, plus rather advanced work on academic lines.

The industrial school must be equipped with machinery, tools, and all the appliances of the trades it undertakes to teach. It must have well organized class-room work, so that the students can secure all the results of education necessary for the practical working of their trades. It helps also to fill the gap between 14 and 16 years of age in rather a better way than does the trade school pure and simple. The industrial school or industrial education involves not only separate schools for the purpose, but industrial courses in the common schools, the idea being that by this method boys and girls will be kept in high school work longer in many instances than they would be under the public school system without vocational training.

It is also asserted and thoroughly proved that in industrial schools, as distinguished from pure and simple trade schools, the academic work will be all the more valuable because allied to industrial training. The advocates of this system also believe that it is practically an extension of the manual-training idea which spread over the country so rapidly a few years ago. It is not aimed under manual training to teach boys or girls any definite line of work, but to familiarize them with the use of tools and some of the art of mechanical work.

The industrial school advances this proposition and makes it a practical means of developing skill along specific, practical, and useful lines, and it is this idea that is holding the public attention at the present time. As already intimated, it combines shop work with academic work. Thus the graduate of an industrial school is in a position to enter upon the trade selected with a degree of equipment that could not be obtained by the trade-school method alone, although the two forms are very closely connected and associated. Whether the apprenticeship system can under certain conditions and in particular localities take the place of either of these depends upon the development of the modern apprenticeship idea, as will be shown. This work, therefore, will deal specifically with the apprenticeship system in its relation to other systems of industrial training and education, but it must be understood that in this consideration there will be no effort made to belittle the trade school or the more advanced industrial school in any respect whatever. The writer is a warm advocate of industrial training and education, but it has seemed to him that the time has come to consider the apprenticeship system in relation to these other methods as one that should be brought to the attention of the public.

ORIGIN OF THE MODERN APPRENTICESHIP SYSTEM.

The old legal indentures of 1840 and before in England and America have very generally passed away in this country. In 1864, at a convention of employing printers, the apprenticeship system was generally spoken of as in disuse for twenty years; some insisted that it was entirely gone, and all writers and speakers of that period made similar statements. Excepting the case of isolated employers who used it for dishonest purposes in the acquiring of boy labor under conditions of practical contract slavery, it may be said that the English legal indenture system had at that time quite disappeared. So at that time also the apprenticeship system of America was in a state of chaos. Individual trades or individual employers attempted to meet the situation in varying ways as best subserved their private interests, but of established, permanent, and general apprentice systems it is quite true that they were nearly gone, certainly obsolescent.

All parties then agreed as to the evils of the situation. Employers and employees alike bewailed the general decline of mechanical skill and the flooding of skilled trades with half-skilled labor. The employees insisted, and with bitter voice, against the competition of half-skilled, cheap labor, which was reducing wages. The labor papers discussed the low standard of mechanical skill, the advantages of the European form of apprenticeship, and the danger to the American

industrial world of a decline in the quality of American workmanship in the face of the maintained quality of European workmanship. These conditions were intimately connected with the transition in various trades due to the introduction of machinery and the division of American labor. So the period of the sixties found the country with the old American system either in disuse or seriously depreciated, while the modern system was yet unborn. But it is in the struggles of the sixties that there is to be found something of the origin of the modern system.

It was found in the hide and leather trade that there was one subject connected with the industrial interests of the United States which needed to be considered, debated, and studied over to a greater degree than any other subject pertaining to domestic wealth creation, and that was the apprentice system. The *Daily Evening Voice*, Boston, January 29, 1867, voiced the sentiment of that time when it ventured the assertion that there was not a single tradesman or master mechanic in Europe who would employ a journeyman at the age of 21 who had been allowed to stride through his apprenticeship in two or three years, and in that time had been under the instruction of perhaps three or four masters.

The employing printers came quite near to the desires of the labor unions, and they felt (1) that the decline in the quality of printing skill must be stopped; (2) that under such excessive competition as existed it could only be stopped by a legal system of apprenticeship which would prevent the competition of partly trained workmen with the journeymen, and compel thorough training of apprentices. They favored quite generally a five-year apprenticeship.

Employers in other trades took a different position, opposing rather than favoring a binding system of apprenticeship, and favoring rather than opposing the introduction of partially skilled labor into the various trades. By "partially skilled" they meant labor skilled in a single part of a trade, i. e., a division of labor system. They felt that this kind of labor took less time to train and could in many instances take the form of boys, and was much cheaper than journeyman labor.

The employing plasterers, iron founders, glass manufacturers, leather manufacturers, and others contended for unlimited apprenticeship. The printers and the Illinois Central Railroad officials, who were most favorable at that time to regular apprenticeship, made no specifications as to limiting the number of apprentices. The employers were profiting by the cheap labor incident to wage competition in the skilled trades through a flooding of those trades by men and boys who had picked up a single line of the trade, and so they opposed any established system of apprenticeship which compelled

them to thoroughly teach the boys and limited the number of apprentices.

The position of the laborers upon the question of apprenticeship was such that it has seemed advisable to divide the whole matter into two parts, (1) the general labor attitude with regard to apprenticeship, and (2) the position of certain trades with regard to apprenticeship.

In regard to the general labor attitude, there were four main principles upon which the laborers of the sixty period seemed almost unanimous, and these were: (a) The limitation of the period of apprenticeship, in almost every case, to not less than five years. The strength of this five-year movement may be judged from the fact that in at least four States they attempted to make a legal limit of five years. (b) The limitation of the number of apprentices. The unanimous feeling among mechanics was that the cause of low wages, lack of work, and powerlessness of workers to withstand oppression by employers was due to an excessive number of workers in the various skilled trades, and that the outlook for the future was getting increasingly darker because of the continual pouring in of more boys. (c) The compelling of the employer to teach the whole trade to the apprentice. The workers continually complained, and the employing printers at least acknowledged the justice of their complaint, that at the end of the apprenticeship period a boy no longer knew his trade, but had been specialized upon some one part of it. (d) That a legal system of indenturing, very similar to the decadent system but purified of its abuses and adapted somewhat to modern conditions, was the only remedy for the situation. In Massachusetts, Pennsylvania, New York, Illinois, and Ohio efforts were made toward apprentice laws, and in Massachusetts a law was actually passed. The laws urged in Massachusetts, Pennsylvania, and New York were practically, if not quite, identical, the Pennsylvania agitation of 1864 being the first, Massachusetts following in 1865, New York and Illinois in 1869. The law of Illinois differed from the others in allowing a three to five year instead of a five-year period, and in requiring the consent of any minor over 15 years of age to his indenture.

The petitions which were presented to legislators in various parts of the country demanded, (1) that the apprentice should be legally bound for five years; (2) that the master should be compelled to teach him the entire trade and provide necessary schooling; (3) that the master should be responsible for his moral training; (4) that the number of apprentices should be limited.

The labor papers of the time had much to say upon the whole subject. The Chicago Workingmen's Advocate, Fincher's Trade Review, and the Daily Evening Voice, perhaps three of the most representative labor papers of the sixties and seventies, were thoroughly

in favor of the system of apprenticeship established by law, rigidly controlling master as well as boy, and strictly limiting the number of apprentices in accord with the actual needs of the trade and at a number that would enable the maintaining of a good scale of wages.

The position of individual trades at the time is interesting. The hatters and granite cutters found the conditions in those trades were the same as in others, and the general attitude to the apprentice question was the same. The National Railroad Engineers were not working for an apprenticeship system of the nature of that demanded by the other trades but they demanded what amounted to the same thing, namely, a State board to oversee the training of and to examine engineers. The machinists, blacksmiths, stove molders, shoemakers, cigar makers, printers, bricklayers, plasterers, and stone cutters all stood for a definite time limit, for the limitation upon one basis or another of the number of apprentices, and the prevention of competition between journeymen and boy helpers. The machinists, blacksmiths, and stove molders favored a law upon the subject, and so far as ascertained all the above-named organizations backed the petitions in various States for laws regulating apprentices.*

It will be seen from the foregoing very brief summary that in the period from 1860 to perhaps 1872 the seeds of the modern apprenticeship system were planted. That system has been of slow growth comparatively, and yet its growth has effected a revolution in the form of apprenticeship, clearly marking the present aspect of it in all its elements from the old system which prevailed for so many hundred years.

EXTENT OF THE APPRENTICESHIP SYSTEM.

THE UNITED STATES.

In round numbers there are 225,000 manufacturing establishments in the United States. It is impossible, without taking a census of the whole number, to ascertain how many have adopted any form of apprenticeship, but from all that can be learned there must be many, many thousands. It would be well if at the next (13th) census of the United States, there could be introduced into the manufacturers' schedule one or two simple questions that would bring out facts as to the extent of the application of the apprenticeship system. The census need not go into details, but an inquiry as to the existence of such system would furnish the Bureau of Education, or any other instrumentality, the opportunity to examine into the methods, character, and elements of the system as it now prevails. Undoubt-

* This information as to the attitude toward the apprenticeship system in the sixties was prepared by Mr. Lecohier for the Bureau of Economic Research.

edly such an inquiry would show that while the old system, which is now objected to, exists in large degree, it is very quietly but quite rapidly giving way to what may be known as the modern system of apprenticeship. There are a few facts, however, which entirely disabuse the mind of the idea that the apprenticeship system as such is dead. These facts are quite meager, but they are indicative.

The report of the apprenticeship committee of the National Machine Tool Builders' Association throws some light upon this question. This report, printed in the *American Machinist* of November 22, 1906, states that in order to make a thorough analysis of the apprenticeship systems now in use throughout the United States the committee addressed 100 representative concerns throughout the country. Fifty-nine of these letters were addressed to machine tool builders, and 41 to other manufacturing concerns, such as electrical manufacturers, engine builders, automobile manufacturers, etc., who represented what the committee termed the "allied trades."

Replies were received from 51 machine-tool builders and from 26 concerns engaged in other lines. Eighty-two per cent of the concerns replying who had apprentices under the indenture system were machine-tool builders, and 18 per cent were from allied trades. The replies from various sections of the country showed that a large percentage of the concerns employing apprentices were located in New England, the Middle Atlantic States, and the Central Western States, and the majority of them enter into formal agreements to properly instruct the apprentices during a stated period of service.

In the Twenty-seventh Annual Report of the Massachusetts Bureau of Statistics of Labor there is a very excellent part devoted to the apprenticeship system. From replies to an inquiry sent to employers and officers of trade unions asking if there were a system of apprenticeship in the trade represented it was found that out of 58 employers engaged in different industries 31 had a system of apprenticeship and 27 had no such system, while from 104 officers of trade unions 55 represented trades in which the system was applied and 44 trades where it was not applied. These trades represented boots and shoes, carriage and wagon builders, clocks, watches, clothing, cotton goods, electrical apparatus and appliances, food preparations, furniture, hosiery and knit goods, jewelry, machinery, metals and metallic goods, paper, printing, railroad construction, rubber goods, scientific instruments, shipbuilding, and other trades.

President Charles S. Howe, of the Case School of Applied Science, Cleveland, Ohio, in 1907, sent a letter to 400 manufacturers in the State of Ohio making certain inquiries relative to the apprenticeship system, and received replies from 124, including nearly all the large concerns among the 400 addressed. Of the 124 who answered 44 had no apprenticeship system and were not especially interested in

it; 24 had no system, but were interested. The superintendents of these 24 stated that they had no apprenticeship system because they had very few men employed, but they hoped, as soon as their facilities increased and their work expanded, to establish such a system, at least to a limited extent. Fifty-six companies answered that they had apprenticeship systems more or less complete, but most of them gave the apprentices nothing more than was absolutely necessary to enable them to do their work in the particular trades engaged in with fair success.

The results of an inquiry by Messrs. Cross and Russell, of the New York Central lines, as to how far the large railroads have adopted apprenticeship systems, are given on p. 43.

The present investigation, undertaken in view of the magnitude of the subject, the great number of manufacturing concerns in the country, and other conditions, took into account the actual extent to which the apprenticeship system is applied, and information was received from nearly every State in the Union that the system was in vogue. The descriptions of the system show that it varies as local conditions vary and as conditions accompanying industry vary. The object of the investigation was not so much to ascertain the number of manufacturing concerns adopting some form of apprenticeship system as to determine the kind of system which is prevailing, with the point always in view of the relation of such system to industrial education, broadly speaking; but incidentally the investigation has developed the fact that the apprenticeship system is a power to be reckoned with, and that it exists in all parts of the Union, and not only that, but that law protects to some extent the employment of apprentices, although in many instances, of course, such laws are practically dead letters. But the conclusion that the system does prevail in all parts of the Union and under varied conditions, and to an extent that has not been realized, is thoroughly warranted.

Not only here in the United States is the apprenticeship system in process of being resuscitated along expansive lines, in order to meet modern conditions of production in great manufacturing establishments, but many countries in Europe have for some years been perfecting this process, coordinating the apprenticeship system with general trade and industrial instruction.

AUSTRIA.

Austria, while perfecting her system of industrial schools, has not abandoned the apprenticeship system as a valuable means for imparting trade training. On the contrary, the effort has been made to perfect this system, and this effort constitutes one of the most important and interesting phases of the modern movement for the

making or developing of skilled workmen. It has been shown in that country that the chief means by which the apprenticeship system can be preserved and brought into harmony with existing industrial conditions is through the formation of trade associations after the models of the old guilds.

These guilds, for many years declining in importance, had, at the time of the enactment of the industrial code of 1859, reached the last stages of decay. This code, as one of its main purposes, attempted to restrict the power of these associations. But it made it obligatory upon employers to maintain their relations, or to restore them when they had been discontinued. Further efforts to reorganize the guilds, so as to bring them more in harmony with the change in industrial conditions, were made in the laws of 1883 and February 1897. The first of these laws is of special importance. It established the guilds upon a new basis, which exists at the present time, as the law of 1897 introduced but slight modifications.

The most important feature of the law of 1883 was that whereby the fundamental difference between conditions in the large industrial establishments or factories and those in the handicraft trades was recognized. The functions of these guilds show to how large an extent they are bodies to look after the training of apprentices. Their duties are, (1) to maintain harmonious relations between employers and their employees, especially in respect to the organization of the labor force, the provision of guild shelters or lodges, and the securing of employment for persons out of work; (2) to provide for a satisfactory apprenticeship system by the preparation of regulations regarding the technical and moral instruction of apprentices, the length of their terms of service, their examinations, etc., and watch over the compliance with these regulations; also to determine the conditions required for the keeping of apprentices, and the number of apprentices in proportion to the number of other employees; (3) to create arbitration committees for the adjustment of disputes between members of the guilds and their employers arising out of their relations; (4) to further the establishment of, and themselves to establish and maintain trade schools; (5) to care for sick employees through the creation of new or the support of existing sick funds; (6) to care for sick apprentices; and (7) to make an annual report of the work of the guild which may be of use in the preparation of trade statistics.

They have other duties of a general character. The employer, under a contract made in accordance with the code, must interest himself in the industrial education of the apprentice and must not deprive him of the time and opportunity necessary for this purpose by using him for other purposes. The employer or his representa-

tive must look after the morals and deportment of the minor apprentices both inside and outside the workshop. He must see that the apprentices are not required to perform work, such as transporting burdens, etc., which is beyond their physical strength. He is further required to allow apprentices who have not yet been absolved from the obligation to attend an industrial continuation school the necessary time for attendance at the existing general industrial continuation schools, as well as the trade continuation schools, and also to see that they do attend such schools.

These provisions are by no means a dead-letter. They set forth the actual conditions under which most of the handicraft trades are learned at the present time.

BELGIUM.

In Belgium there are several apprentice shops for girls. They are perhaps the least important of all the classes of institutions for girls, but they have a direct bearing upon the relation of the apprenticeship system to general industrial education.

An apprenticeship workshop for girls was created at Jemelle in 1877 through the joint action of the commune, the province, and the State. In 1890 a housekeeping school was annexed to it. In this school are taught hand and machine sewing, garment making, knitting, the washing, mending, and ironing of linen goods, culinary operations, and all the accessory work which must be done by a good housekeeper or working woman in this country.

In 1873 the communal council of Écaussines-d'Enghien, upon the solicitation of the master quarrymen, decided to open a shop in which young boys could receive instruction in the trade of stonecutting. This action was taken, because there was a distinct lack of workmen capable of doing other than the most ordinary work of stonecutting. The apprentices in this shop worked on stone brought in by the various master quarrymen who adhered to the shop idea. There were some grave defects in this institution, as, for instance, the great difficulty found in securing continuous work for the apprentices, which caused a change of system. Until 1890 there was but one shop of this kind. In that year, however, a thorough reorganization was effected and the multiple shop system was adopted. Shops belonging to employers were established in the quarries and the time formerly lost in transporting the stone was thus saved. The apprentices were brought into immediate touch with quarrying and cutting operations of all kinds. The work executed by the boys is paid for according to the rate prevailing in the quarry.

The effort is made to bring the apprentices to a higher perfection of skill rather than to exploit them in their labor.

GERMANY.

In Germany there have been considerable development and supervision of the apprenticeship system, but to understand this there must be some knowledge of the great efforts that have been put forth for the preservation of that system in those trades in which it has been adopted, and it must be remembered that in Germany, as in no other country, the people have been unwilling to break with the past.

Nowhere else, with perhaps the exception of Austria, has the contest between the two systems, namely, that of handicraft, or production upon a small scale, and that of the factory, or production upon a large scale, been more bitterly fought. The attempt to preserve the handicraftsman and the small trades is one of the features of labor legislation in Germany during recent years. It has had as its result the formulation of two distinct industrial systems—the handicraft and the factory—and the enactment of labor codes for each. The legislation regarding the factory trades follows in all essential particulars that of other industrial countries. The legislation regarding the handicraft trades is utterly unlike that of England and the United States, and is closely followed only by the Austrian system, the central feature of which is the restoration to power and influence of the old guilds, and through them of the apprenticeship system, with all the features of training of boys by masters for whom they are working. The history of this legislation in relation to apprenticeship, the guilds, and the handicrafts generally may be very briefly summarized.

During the early years of the nineteenth century the main purpose of the industrial legislation of Germany was the freeing of industry from the many restrictions that had been imposed upon it in the past. In 1845 this legislation culminated in the enactment of a general labor code. In removing many restrictions, however, the effort was made to maintain the old guilds. The reason for this action was chiefly the desire to preserve the apprenticeship system. It was thought that the education of apprentices was a matter that should not be left to the hazard of purely private contract. At the same time the Government was not ready to introduce a system for the official examination and regulation of apprentices. The law therefore defined anew the duties and rights of guilds, and assigned to them the care of the interests of their trades, the regulation of apprenticeship, and the establishment and maintenance of relief funds for their members.

Though many years of agitation accompanied the movement in Germany, the agitation was not productive of any results until 1881. While failing to establish the principle of compulsory guilds, the law of July of that year gave voluntary guilds a privileged position. It made them organizations of employers and journeymen carrying

on a trade on their own account, with an authority of their own, and power to enact certain regulations, especially as regards apprenticeship, which should have all the force of law, even in respect to journeymen not affiliated with the guilds. Finally, after a long series of laws, the efforts culminated in the very important law of July 26, 1897, in which were consolidated all the legal provisions regarding guilds, journeymen, and apprentices.

The constitutions of nearly all guilds provide that the members of the guild obligate themselves to require of their apprentices attendance upon a trade school recognized by the guild, and to encourage them to arrive promptly at the school and to apply themselves with sustained zeal. As regards the instruction given, everything is subordinated to making it as practical as possible. The courses are in no sense those of institutions preparing for secondary technical schools. Their purpose is solely that of making the students more efficient workmen in the trades in which they are at the time apprenticed. These schools are thus trade schools in the fullest sense of the word, and accordingly show the alliance between the apprenticeship system and the broader industrial education.

SWITZERLAND.

In Switzerland there is provision for the supervision of the apprenticeship system. The regulations are quite minute but very comprehensive. Their aim is to elevate apprenticeship and develop the professional value of workmen in the various arts and trades, etc. Among other things apprentices must be given instruction; the employer either himself instructs or causes the apprentice to be otherwise instructed in a gradual and complete way in the profession, art, trade, or branch of trade which is the object of the apprenticeship contract; for each apprentice must be allowed during the work period such time as is necessary for the performance of his religious duties and the scholastic instruction required by law.

The laws of the different cantons provide for the supervision of apprentices, their examination, penalties for breach of contract, duties of the master, duties of the apprentice, civil duties, etc.

FRANCE.

In France much progress has been made in the resuscitation of the apprenticeship system. Evidence of this is observable in the apprenticeship school of the Industrial Society at Nantes. Practical work in this school is all done in the shops where the apprentices are employed, while the studies are both technical and general. The subjects taught are free-hand, linear, and ornamental drawing, French language, arithmetic, algebra, geometry, descriptive geometry, book-

keeping, physics and chemistry, and mechanics. The society possesses a library of several hundred volumes relating to industrial and economic subjects, apparatus for physical and chemical demonstrations, and a collection of designs and models for the use of pupils. This school is supported by contributions from the State, from the department in which located, from the city, from the chamber of commerce, from trade unions, and from various individuals.

There is at Paris a school for cabinetmaking maintained by the Association for the Protection of Apprentices, in which the modern idea of the development of the apprenticeship system is clearly marked. The aim of the association is to give the apprentices a theoretical training which they do not obtain in the shops, to further the progress of the industry by creating through manual competitions a rivalry among apprentices and young workmen, and also to stimulate designers through competitions to the development of new ideas in decoration, etc. The courses are open for ten months each year, the programme of theoretical work comprising drawing from relief, technical drawing, elementary geometry, descriptive and applied geometry, perspective, and modeling.

HUNGARY.

In Hungary industrial education is organized in a complete system, all the parts of which are organically connected. Its organization is uniform, though it makes allowance for local conditions and needs. It is divided into two parts—apprentice schools and technical schools proper. The former are under the control of the department of education, the latter under that of the department of commerce, this department having a special bureau for industrial education. Teachers of apprentice schools are usually teachers of common elementary and high schools, who teach in these evening and holiday schools for a small additional salary. The complete system of industrial schools consists of (1) apprentice schools; (2) journeymen's schools; (3) trade schools; (4) industrial technical schools; (5) higher industrial schools; (6) women's industrial schools; (7) industrial drawing schools, or schools of design; (8) one public lower industrial school; (9) schools of general culture, in which some industrial branches are taught; (10) industrial museums.

From this classification it is seen that the lowest step of the system is the apprentice school, under the control of the minister of education. The branches of instruction are (1) the mother tongue; (2) geography, history, and nature study; (3) penmanship; (4) arithmetic and bookkeeping; (5) drawing and sketching. Thus the Hungarian schools are in direct line with modern efforts to secure general industrial education.

In England there has been no such development of the apprenticeship system as is found in the United States and in the countries to which reference has been made. In these countries many more examples might be cited, but the above seem sufficient to indicate the course of events. It will be seen, when descriptions and types of apprenticeship systems existing in this country are given, that we are quite up in line with the foremost endeavors of educators elsewhere in the field of industrial methods.

STATUTORY REGULATIONS RELATING TO APPRENTICES.

Forty-three of the 46 States in the Union have laws relating to the employment of apprentices. The three States having no such laws are Idaho, Nebraska, and Wyoming. The District of Columbia, governed by Federal legislation, has laws relating to the subject. Nearly all these laws protect the minor apprentices, and all require that masters shall teach the apprentices the trades in which they are engaged, while 38 States provide that in addition to the trade, its art and mysteries, the apprentice must be taught the common English branches of education in some public or other school, or through such other means as the employer may provide. Thus these laws in 38 States result in an alliance between pure trade education and such schooling as every youth entering business should have.

As a rule the branches to be taught are reading, writing, and the rules of arithmetic to a certain degree. The States that have no schooling provision in their apprenticeship laws are Connecticut, Maine, New Jersey, Oklahoma, Pennsylvania, South Carolina, Vermont, and Washington. While the apprentice laws of the different States are somewhat voluminous and it is not worth while in this work to print them in full, a very brief digest appears in the appendix.

THE ATTITUDE OF TRADE UNIONS TO THE APPRENTICESHIP SYSTEM AND TO INDUSTRIAL EDUCATION.

As already stated, trade unionists are as a rule opposed to trade schools, and for the reasons stated. They do not oppose broad general industrial education and are very favorable to night or continuation schools, the latter furnishing opportunities for men already in trades, journeymen and others, to acquire information concerning the science and art of the trades in which they are working. The resolutions adopted at the last annual convention of the American Federation of Labor were most encouraging in this respect, and indicated clearly that there was no deep-seated prejudice on the part of the unions. Everywhere they are beginning to understand that industrial education does not injure those already engaged in industry.

The limitation of the number of apprentices in each trade is something of a bugbear. So far as the facts are concerned, it is quite true that the number of apprentices agreed to by the unions is ordinarily in excess of the number that the trade could absorb. Up to about 1840 no attempt had been made by any local union to limit the number of apprentices other than the mere requirement that applicants seeking membership must have completed their terms of service, nor is any regulation of apprenticeship found in the written constitution adopted by any of the unions prior to 1840 or thereabouts.

The Typographical Society of New Orleans was the first local printers' union to place a limit upon the number of apprentices, and this practice by the New Orleans union was extended to other local unions, and finally adopted as a fixed policy by the International Typographical Union.

The president of the International Union of Bricklayers, at its second annual convention, announced its policy as follows: "The system of apprenticeship is the very cornerstone of our institution, and it received the earnest attention of the previous convention, and if the article in our constitution is carried out, it will be a monument that we will be proud of."

Following the organization of international unions the apprenticeship question was developed along distinctive lines. So in the cigar making and building trades and others rules were adopted, while in other trades, such as iron molding and glass blowing, the international union early formulated detailed apprenticeship regulations which every local union in any way connected with the international organization was bound to accept and enforce.

As a rule apprenticeship is very largely determined by trade agreements, i. e., by agreements between the employer and employees. Doctor Motley in his excellent work, *Apprenticeship in American Trade Unions*, just quoted, in concluding a chapter on apprenticeship determined by trade agreement, says:

The general purpose of the apprenticeship system, namely, to provide an adequate supply of competent workmen, has been practically the same from the beginning of the trades in this country to the present time, but special phases of it have been emphasized at different periods. During the early period the master was not restricted in employing apprentices, and often engaged a large number in order to receive the benefit of their low wages. The opposite tendency was emphasized by the union; for the interest of the journeymen was largely considered, and a rigid limitation made of the number received. The feature greatly emphasized at the present time, especially in those trades in which the finished product enters into keen competition, is the uniform ratio for all competing shops. In securing this object, conciliation has been the method most generally adopted.

* See *Apprenticeship in American Trade Unions*, by James M. Motley, Ph. D. Johns Hopkins University Studies in Historical and Political Science, Series XXV, Nos. 11-12 (Nov.-Dec., 1907).

Doctor Motley states that of the 120 national and international trade unions, with a total of 1,676,200 members, affiliated in 1904 with the American Federation of Labor, 50 unions, with a membership of 766,417, did not attempt to maintain apprenticeship systems. The remaining national unions, i. e., about 70 of the 120, with a membership of 900,000, together with some half dozen unaffiliated national unions, attempted more or less successfully to enforce apprenticeship regulations.

It is quite true that in many trades the union regulations relative to the employment of apprentices are disregarded wholly or in part by both the unionists and their employers. The prejudice against any form of industrial education, which still exists, as has been said, toward the trade schools, is disappearing, and in many instances boards of management of local schools have upon them representatives of the unions involved. Unionists are also beginning to understand that an increase in skill, as well as increase in numbers of skilled workmen, is to be found that stability of wage and other conditions to be desired, rather than in the reverse.

In Massachusetts, where the State has already been committed to the subject of industrial education by positive statutory provision, the antagonism of the unionist is rapidly fading away, and he is taking an honorable part in the projects for industrial schools and industrial training in the public schools.

The relation of the apprenticeship system to industrial education must be considered in the light of the attitude of trade unions, for without thorough cooperation between employer and employee, as reciprocally interested in industrial training, there can be little progress. Manufacturers desire industrial education for many reasons. They demand skilled workmen more and more, and wish to see the industries of the country put upon a strong, solid basis so far as skill is concerned. The employee, on the other hand, should, or ought to, desire the same results, and at the same time have in view for his children the opportunity of securing a higher place than he himself has been able to attain.

It is a reciprocal question; it does not belong wholly to the employer or wholly to the employee, but to both of them; but, more than all, it belongs to the great public; and as the agitation proceeds and the establishment of industrial schools and trade schools and the expansion of the apprenticeship system become more effectual, all prejudice will cease and the great work will be harmonized. When the wage receiver learns that increased skill means increase in wages and thus enhanced consuming power by which demand for goods will increase, he will be an ardent advocate of general industrial education.

TYPES OF SYSTEMS.

I.—TYPE IN WHICH SHOP AND SCHOOL ARE INTIMATELY CONNECTED.

Each establishment that has some form of apprenticeship system has its own type, although the general features are the same for all. As already stated, there are a great many concerns in this country that still adhere to the old form of apprenticeship, with indentures specifying all the conditions under which the apprentices are employed. This type is not dead but is going out of use. The second type, which exemplifies modern conditions, is that which makes provision for the education of apprentices both in the shops and in the class rooms. The third type is where manufacturers control the individual apprentices, to some extent, outside of working hours.

It does not seem necessary to describe the old type of apprenticeship system, but the new types should be described, and this can best be done by giving an account of a few typical concerns, or concerns that have made the most of the various educational features connected with the employment of apprentices.

THE GENERAL ELECTRIC COMPANY, LYNN, MASS.

Seven years ago or more this company established an apprenticeship system based on new methods of procedure, with a view of accomplishing the very best results. The system comprehends a machine shop, tool making, pattern making, and a foundry. Four years of apprenticeship are required. Apprentices are paid 9 cents per hour the first year; 12 cents the second year; 14 cents the third year, and 16½ cents the fourth year, and a cash bonus of \$100 is given. Graduates of high schools, or those who have completed a three-year course in such schools, may have their apprenticeship period reduced one year.

The significant feature in the General Electric Company's system is the practical training of apprentices in large "training rooms." The boys are in these rooms for two years, after which they are placed in different departments of the factory. This is considered the great point of advantage in the General Electric Works. Educational courses are provided by the company in academic branches which will assist the apprentices to obtain a better understanding of machines and machine parts, and will make them acquainted with the problems and calculations connected with the reading and comprehension of mechanical drawings, and with the sketching and designing of auxiliary tools needed in modern manufacture. The school sessions are held during the working hours, and the apprentices are paid the same wages during these hours which they would receive if they were working in the shops.

Of course some foremen object to this method, because, as they say, it interferes with production, but the company insists that on the whole it is for the best interests of all. The course of study in the school sessions comprises arithmetic, elementary algebra, mensuration, elementary trigonometry, elements of machines, power transmission, strength of materials, mechanism, elementary electricity, mechanical drawing, machine designing, and jig and fixture designing.

Mr. Magnus W. Alexander, the engineer in charge of apprentices, General Electric Works, at Lynn, Mass., emphasizes the importance of having the leaders of industries more interested in the question of the insufficient supply of skilled mechanics, and he believes that manufacturers should be more thoroughly aroused to the necessity of reviving the apprenticeship system and adapting it to meet the new industrial conditions.

Great care is exercised in selecting applicants, as well as in the weeding-out process during the trial period. The company insists that instruction in the class room is a necessary part of the apprenticeship system. Six hours a week of this instruction are given for ten months of the year. About one-fifth of the apprentices at the works are at school at one time, and the services of one man are required to give them the academic instruction. The plan of paying the boys while receiving this education makes them feel the importance of the education, as well as being an inducement for those who might otherwise not be willing to obtain it at the sacrifice of wages.

The teacher in the school must be a man who has had engineering experience and has the pedagogical qualities of a good teacher besides. He must be acquainted with the needs of the factory industries in general, and know how to adapt theoretical school training to the educational needs of the machine trades. The work in science and mathematics is very concrete, and applies to the factory conditions of the General Electric Company. The problems are carefully selected and are based upon actual occurrences in the factory. This method has the double advantage of initiating the apprentice into the technicalities of the business, making him acquainted with the various kinds of apparatus manufactured and the different material used for each, and at the same time familiarizing him with the solution of the same class of problems which he will meet later on as journeyman and foreman.

Mechanical drawing is not taught for the purpose of developing mechanical draftsmen, but as a means of teaching designing of tools, jigs, and fixtures needed for manufacturing on a large scale. The boys are taught to sketch out special tools, jigs, and fixtures which may be required from time to time for labor-saving purposes. This is not considered a question of executing fine drawings, but rather of

sketching quickly for the immediate use of the machinist and tool-maker a required tool, which, when once made, is liable to remain in use for a long period. The teaching of mechanical drawing in this respect differs from instruction in reading mechanical drawings.

A feature which belongs to the General Electric Company alone, so far as ascertained, consists in examinations in the school work, which are held frequently during the year, with a final examination at the end of the course to determine to some extent the standing of each apprentice and the wages which the company considers commensurate with his value as a journeyman.

Mr. Alexander considers that the methods of training employed are of paramount importance in considering the degree of skill which will be acquired by the apprentice through his shop work, and that here there is naturally a conflict between the purpose of the apprentice and that of the foremen in shops which have an apprenticeship system different from the one carried out at Lynn.

Usually, under the old system, the boy comes for shop training, and wants to procure all possible information in the shortest time, and desires a variety of work in a department and an opportunity to work in all departments. The foreman, on the other hand, representing the company, strives for economy, for cheapness of production, and feels that he can better further his ends by keeping the apprentice on one class of work and in one department for a long time. Few foremen combine a legitimate care of their own interests with a proper appreciation of the boy's objective.

As an illustration, the average foreman utilizes the apprentice at first for an errand boy or for some such nonskilled labor. He then gives him simple work at the bench, such as chiseling and plain filing, cleaning of small castings, or assisting the stockkeeper in the handling of small tools and stock-materials. While there may be a certain value in this class of work—for it makes a boy familiar with factory life and system, accustoms him to the factory atmosphere, and gives him an elementary knowledge of his trade—the General Electric people feel that after a time the bend in the efficiency curve is reached, and any further expenditure of time gradually becomes more and more disproportionate to the additional advantage gained. Bright, ambitious boys realize when this point in the curve is reached, and begin to press the foreman for a higher grade of work, especially work at machines.

This position of the General Electric Company is borne out by nearly all concerns whose systems were investigated for the purpose of this bulletin. The result of this condition is that the apprentice is forced to push himself forward in order to learn the different classes of work, while the foreman is usually slow to respond and give him the advantage of a variety of training, because if the boy is inefficient

in some particular branch of work he will naturally be held at that work for improvement, and, on the other hand, if he is efficient, the foreman is likely to keep him for an undue length of time in order to get the greatest commercial advantage from him.

So the General Electric Company has attempted to equalize the opportunities for all apprentices and to offer them expert instruction in the practical work of the trade, especially during the first part of their course, through what is called the "apprentice training room." This feature makes the apprenticeship system of the company unique, and a far different proposition from that of any other concern so far as known.

Where teaching is carried on in connection with shop work, many manufacturers have gone no further than to employ a suitable man to look after the apprentices and to assist the foreman in giving the boys industrial training. This superintendent of apprentices jointly represents the interests of the employer and the apprentice. He may go so far as to inaugurate classes for the study of mechanical drawing, mechanics, and kindred subjects, but the apprentice in his shop training is a pupil of whoever happens to be foreman and assistant foreman, or leading journeyman in the department to which he has been assigned. These men are skilled, but may not have any special fitness for imparting instruction. Moreover, the boy may be handicapped by being assigned to a department which has only a small amount of work on hand, and this of such a nature as not to add to his skill and knowledge, while other departments may be crowded with work of instructive and interesting character, and so the boy who happens to be assigned to the first department is put at a decided disadvantage with respect to the apprentices of the other departments, where productive conditions offer a fine opportunity for further advancement.

The mechanic of the General Electric Company in charge of the training room possesses the ability and patience to instruct beginners, and during the trial periods studies each boy's mental and moral make-up and his native ability for a chosen trade. The instructor emphasizes the need of developing in his training room the best and most efficient methods, and this can be done in such a room better than in the regular shops, because the boys will not be hampered by the hostile attitude which may be encountered in factory departments on the part of regular workmen. For example, the boy may be shown the highest practical cutting speeds of modern steel without any reference to the traditions which may exist in the mind of an old workman. Moreover, those in charge at the General Electric Company's works believe in having an apprentice who has thoroughly learned a certain operation impart that knowledge to a new apprentice before he himself is taught another operation. In this way apprentices are pupils to-day and teachers to-morrow. This develops

in the apprentice the faculty to impart the knowledge he has already received and thus brings out the best efforts of the individual.

The product of the training room is of commercial value. The psychological influence of commercial work is of great importance. It takes a boy out of the sphere of theory and into that of practice. It clinches his interest, and makes him realize that the product of his work is to be a part of some interesting machine.

The "training room" is primarily for the machinist apprentices. The smaller number of students in pattern making and foundry work do not permit of so elaborate a system.

After the students have spent from one and a half to two and a half years in the training room they are given an opportunity to specialize in die making, tool making, or laying out machine work. The apprentices are then under the charge and discipline of the respective shop foremen.

This feature obtains in some other cases, especially in the system as carried out by the Yale & Towne Company, at Stamford, Conn., as will be seen later on.

Of course the General Electric Company encourages graduate apprentices to remain in its service. The number who do remain in the service of the company is fairly satisfactory, but the temptation of the graduate apprentice with \$100 in his possession to see something of the world is not uncommon, though a number of them, after seeking employment elsewhere, sooner or later return to the company.

Brown & Sharpe, at Providence, R. I., have had a similar experience.

The efforts of the General Electric Company to establish a new, up-to-date apprenticeship system have met with results satisfactory to the company, and the system has been copied in some degree by others. Certainly the company has shown its desire to connect the science of apprenticeship with the science of industrial education and, so far as this investigation shows, they have succeeded.

FORE RIVER SHIPBUILDING COMPANY, QUINCY, MASS.

The apprenticeship course of this company has been laid out on a solid basis. The apprentices have a special man to look after them and a special academic teacher to give them instruction. There is no special instructor in mechanical drawing, but the method of teaching mathematics brings out the subject, one or two boys being taken at a time and given instruction in the drawing room.

The work of the boys in the different trades connected with shipbuilding is varied by giving them a working knowledge of all branches, although there is no definite time schedule arranged beforehand, except in the yearly division of work. Boys have a school

period covering twenty-two weeks, from October to April. Those selected are required to attend two hours a day each for two days a week, this time being accounted for in that of the regular time of service, the service time of the boys being shortened if they stand well in their class or do outside studying. The superintendent of apprentices visits each boy daily to see that he gets proper instruction, and keeps all records of his time and efficiency. The general manager reports that the apprenticeship system has given them an efficient basis for a corps of skilled workers.

The applicants to become indentured must not be less than 16 years of age and are not wanted when more than 17 years old. They must be graduates of public schools. The first forty-eight days constitute the term of trial. Apprentices are not expected to work overtime, but when they do they are credited with the number of hours of such time in their service. This is very popular with the boys. They are allowed to do piecework, and are given the difference between the regular wage per hour and their piecework earnings reduced 20 per cent. At the present time the apprentice force employed by the company is about 5 per cent of the whole. In some departments the employees are 40 per cent apprentices, while in others they constitute only about 1 per cent.

The boys are anxious to enter apprenticeship in the machinist and carpenter trades, for they can make use of this knowledge in other places than the Fore River Company. The superintendent of apprentices does not feel that industrial education could meet the needs of the company, in that there could never be a special school for ship-building in Quincy, so they must always give the training themselves. There are at the works in Quincy, 14 apprenticeship departments, chiefly those of blacksmiths, coppersmiths, electricians, foundrymen, carpenters, pattern makers, joiners, machinists, etc.

As a rule the course runs for four years. Taking the apprenticeship machinist course as an example, it is found that during the first six months work is given on the bolt machine, milling machine, and other small tools, the second six months on general bench work, such as shaping and filing; the third six months the boys are assigned to the different machinists and work under their direction on drills, planers, grinders, lathes, and boring mills. The fourth six months they are given work on slotters, planers, and shapers. At the beginning of the third year the apprentice is placed at whatever tool he has shown himself to be most efficient and is given work which will develop his special ability. If apprentices are particularly well qualified, they may specialize in laying out, setting up, and finishing work in the tool room; or in erecting and installing engines and auxiliary machinery on ships.

After the first six months school work is required of the apprentice, unless he shows that he is already proficient therein. The company always selects a few boys for the engineering and electrical drafting rooms each year, and this encourages the brighter ones to study up on mechanical drawing and mathematics, and to do well in their book work, in order that they may become draftsmen. Some of the apprentices attend the Y. M. C. A. classes in addition to the regular class-room work.

During the first two months of probation the apprentices are required to serve as messengers, in office work, or helping in any miscellaneous service.

A fine feature of the system in force by this company consists in a set of blanks furnished by it and the method of recording the advancement of apprentices. This shows that they intend to carry the apprentice through a regular shop system. The quarterly apprentice report, which the foreman is obliged to make to the superintendent of apprentices, also shows that the apprentice is followed closely in regard to his improvement, etc. The company also publishes a special text-book, called a note book of arithmetic and geometry, for the apprentices. This is a testimony to the high grade of apprenticeship system which the company is attempting to carry out, and exemplifies not only the possibility of coordination, but testifies to the efficiency and good results of the attempt.

NEW YORK CENTRAL LINES.

The New York Central lines have established what is called by those responsible for it "a rational apprentice system." Their efforts parallel the methods of the General Electric Company, already described, but they reverse the process. While the General Electric Company has training rooms or class rooms where theory is taught for the first year or two of the apprentices' experience, and then transfers the apprentices to the shops for the practical results of their class-room studies, the method of the New York Central lines reverses this. Instead of working from theory to practice, they work from practice to theory, as illustrated by Mr. Cross, of the New York Central lines. They take an old steam pump, run it by compressed air in the school room, and let the apprentices see the way it works, take it apart and examine into the valve motion, make drawings of the various parts, calculate the cubical contents of the cylinders, study the various mechanism, and then go out into the shop and grind the valves. In other words, starting with the pump, they work down through the various subjects of arithmetic, geometry, mechanical drawing, mechanics, etc., as applied to the action of the pump.

The authorities of the railway lines interested in this unique experiment do not feel that trade schools meet their needs. They claim that the technical requirements of a railroad position are such that no special trade school could meet them. They even go so far as to minimize the value of the railway engineering courses in technical colleges. They feel that the trade school graduate comes into the shops with a more or less exalted opinion of his capacities, that they would have to spend a couple of years making him over, and that those years would be more or less wasted.

This experience of the New York Central lines is of so great importance as illustrating the most advanced type of apprentice systems, that considerable space is here given to a description of it.^a

Prior to the inauguration of the new plan there had been some apprentice schools established by the New York Central, but these schools for some time had been carried on by the local management at four points—Elkhart, Ind.; Jackson, Mich.; Oswego, N. Y., and McKees Rocks, Pa.

About three years ago an apprentice school was started at the Elkhart, Ind., shops of the Lake Shore and Michigan Southern Railway. Sessions were held in the evening; the school was intended primarily for the apprentices, although anyone in the employ of the company was eligible to membership. In 1886 evening class work for the apprentices had been started at the Jackson shops of the Michigan Central Railroad, and in 1901 an apprentice school was organized at the Oswego shops of the New York Central Railroad. Attendance in this and the previously mentioned school was compulsory for the apprentices, and they were paid for their time in the class, thus making it possible to enforce somewhat rigid discipline. About three years ago an evening school was organized at the McKees Rocks shops of the Pittsburg and Lake Erie Railroad, where classes met twice a week, and the attendance of the apprentices was made compulsory.

The new plan now in operation was not put in force until March 1906; under it the first apprentice class was started at the West Albany shops in May of that year.

The apprentice department of the New York Central lines is under the direction of Mr. C. W. Cross, superintendent of apprentices, having an office at the Grand Central station in New York. He is assisted by Mr. W. B. Russell, who has charge of the educational features. The central organization deals with the general problems affecting the apprentice work, outlines the different courses, looks

^a The writer is greatly indebted to Mr. R. V. Wright for his various articles on the New York Central lines, which appeared as a reprint from the American Engineering and Railroad Journal for June, July, September, October, and November, 1907. In a pamphlet entitled "A Rational Apprentice System," which is used by his permission. Mr. Wright's descriptions have been supplemented by personal investigation of the work of the New York Central lines.

after the educational features, organizes new schools, and keeps in close touch with all of the schools.

Thus far apprentice schools have been established at nine points on the system, including West Albany, Depew, East Buffalo, and Oswego on the New York Central; Elkhart and Collinwood on the Lake Shore and Michigan Southern; Brightwood on the "Big Four"; Jackson on the Michigan Central, and McKees Rocks on the Pittsburgh and Lake Erie.

The system adopted may be summed up under the following three heads: (1) It provides for a close supervision and instruction of the apprentices in the shop by the apprentice instructor; (2) a school is conducted by the company during working hours, the apprentices being paid for attendance, at which mechanical drawing is taught in a practical way; (3) a course of problems carefully arranged to suit the needs of the apprentices has been prepared, which they are expected to work out during their own time. This system, which differs radically in many respects from anything that has been done in this country, follows more or less closely the general principles governing the educational system of the British Admiralty, which has been in operation more than sixty years, and, according to Sir William H. White, has produced the majority of the men who are now occupying the most prominent positions in the shipbuilding industries of Great Britain. Sir William White has said: "It has given to private shipbuilding its leaders, who have risen from the ranks, while it has produced men holding many important and influential positions in all parts of the world."

So the New York Central authorities hope that through their expanded apprentice system they will train up the men who will be the leaders in railroad work on their lines. Their work, therefore, and that of the General Electric Company, already described, must stand as the two great systems on a large scale for the purpose of securing general industrial training. While the two systems have the same end in view, they find it essential to proceed from different points of initiative. They thus constitute together most interesting experiments.

Under the New York Central system boys come into contact with actual shop conditions from the very first. The chief special features of the system are that the apprentices are instructed in drawing and in shop problems by a man already in the service of the company, on the shop property, during working hours, and while under pay. This, it must be observed, is an important element in the modern apprenticeship systems, without which there probably would not be satisfactory results. The apprentices are instructed in the trade in the shop by a special instructor, who gives the whole or part of his time to this work and who is responsible to the local shop manage-

ment. This is an important feature. Under the old apprenticeship system the apprentices lacked instruction, as foremen and others were not willing to give their own time in the interest of the apprentices. Instruction in the trade is given in the shop on the regular tools and in the regular line of shop work. Apprentice schedules are followed, assuring a thorough training in the trade and giving the necessary variety of work.

The drawing and the problem courses are arranged to allow each apprentice to progress as rapidly as he desires, but so as to enable a single instructor to handle classes with as many as 24 students in a class. The character of the courses is such as to fit the standards of the road, to read in the language of the shop, and to suit the special conditions existing locally. The method of instruction differs radically from the ordinary method in the following points: Text-books are not an essential part of the plan; there is no subdivision into subjects; all principles are clothed in problem form; there is no arbitrary standard of the amount of ground to be covered; no examinations are held. The progress and marks of the apprentices are based on the close personal touch maintained between the instructors and the apprentices.

The apprentice work can be installed at a greater number of the shops than would be otherwise practicable, by using talent already in the service of the company.

There are other interesting features connected with the system, especially the arrangement for evening classes for employees other than apprentices. The men in the shops, both foremen and workmen, have evinced considerable interest in the apprentice schools, and there has been a demand for evening schools to give them the same advantages. In response to this sentiment on the part of employees evening schools have been started at McKees Rocks, Elkhart, Jackson, West Albany, Brightwood, Oswego, and Collinwood. These classes are open to all the employees. At all of the points except Elkhart and McKees Rocks the men meet for an hour and a half or two hours directly after the shop whistle blows in the evening. The men are more regular in attendance and take a deeper interest in the work when the meeting is held directly after the shop closes. The make-up of these classes is very interesting. At several of the schools where there is a full quota of apprentices and a waiting list, the boys take places as helpers until there is an opening for them in the apprentice department. These boys usually enroll in the evening classes, and boys who have finished their apprenticeship also follow up their studies in connection with the evening classes. The men who attend them take the same course as the apprentices, but if they desire may skip the easier portions. As a

rule they prefer to take all the work, reviewing that part with which they are familiar. These classes give the more ambitious men an opportunity to become more proficient and to fit themselves for better positions. They are especially valuable for foremen and assistant foremen who may desire to brush up their knowledge of drawing and mathematics. As a result of the classes the shop men are becoming more familiar with the company standards and being drawn into closer touch with the shop draftsmen.

The advantages thus far apparent from the brief experience of the New York Central lines are that a better class of boys is secured. With the greater opportunities that are being offered this is the natural result. Formerly it was difficult to keep up the full quota of apprentices at most of the shops. Now there is a waiting list for some of the trades at several of the shops, and apprentices are being secured for trades formerly without them. In many instances high school graduates have enrolled themselves as apprentices. At shops where there is a waiting list, as just stated, the boys frequently take places as helpers or wipers and enter the evening classes until an opening occurs in the apprentice department. This service is a sort of probation period, and those who are unsatisfactory are sifted out.

The boys under this system take a greater interest in their work, and because of the principles learned in connection with their educational studies, are better able to understand the instructions given them and carry them out intelligently. Their earning power is thus increased.

From a productive point of view the work of the shop instructor is especially satisfactory. There is a greater output when the apprentice is shifted to a new class of work. The instructor stays right with him until he understands it thoroughly. Under the old system of apprenticeship the foreman was supposed to instruct the apprentices. He would almost invariably be interrupted a number of times, and would probably hurry off after he had half instructed the boy, expecting perhaps to return shortly. The chances were that he would forget all about it and the boy would be left to shift for himself. As one shop superintendent tersely put it, under the old system a boy, after working on a machine for two or three weeks, might get to a point where he could produce one-half of a mechanic's output, now he can on an average turn out seven-eighths of a mechanic's output after three or four days. When a workman does not report for duty an apprentice can be put on the job under the direction of the instructor, and the output does not suffer to any great extent. The increase in the apprentice's output due to the cause mentioned more than offsets the loss of time due to class work, which amounts on an average to forty minutes a day for each boy.

Another advantage is that the amount of spoiled work has been very greatly reduced, a saving due to the advent of the shop instructor.

At the end of each year the instructors draw up an estimate of the personality and progress of each apprentice. This is made up of answers to the following questions.

1. Does he work overtime on drawing or problems?
2. Is he the type of boy we wish to have in our employ?
3. Is his attitude toward his employers good?
4. Does he spend his time well outside of shop hours?
5. Have you, or has the shop instructor, succeeded in gaining his confidence; i. e., would he come to you first in trouble of any kind?
6. Can you recommend him at present to start in the company drafting room, or will he qualify during the next year? (Give probable date.)
7. What is his strongest point, or for what type of work is he best fitted?
8. What is his weakest point, or for what type of work is he least fitted?
9. Does he live at home or board?
10. What is his address?

There are many incentives to encourage the apprentice in his work. The drawing and problem courses are made as interesting as possible; they deal with no abstract theories, but all the exercises and problems are in connection with the practical work in the shop. In most instances there is more or less rivalry among the apprentices as to their progress in this work.

It is quite probable that after the schools have been established for a period long enough for the apprentices to have had time to complete the course in drawing and problem work, a few of the brighter graduate apprentices will, as an additional incentive, be sent, at the company's expense, to a technical school for a year to finish off their course. Such men will then be admirably prepared for work in the motive power department. This is a most encouraging feature under modern apprenticeship methods. If students can only have the experience of a technical school after all their training as apprentices, the problem of industrial education will, to a very large degree, not only be simplified, but placed on a footing no other method would secure.

The New York Central is also adopting another method in this very direction. At two of the shops the apprentices have been taken in a body, under the direction of instructors, to visit neighboring shops or large manufacturing establishments; as, for instance, the apprentices at West Albany have visited both the American Locomotive Works and the General Electric Company's works at Schenec-

tady. At some of the smaller shops, where the boys are not able to round out their courses to advantage, they will be assigned to larger shops for their fourth year; as, for instance, the company contemplates giving the boys in the car department at East Buffalo an opportunity of spending a year at the West Albany shops, in order to get experience in repairing passenger cars. This is an added incentive.

The shop superintendents encourage the boys by occasionally assigning them to special work where they can apply the knowledge in drawing or mathematics which they have gained in the class room. One shop superintendent, who is very much interested in the apprentices, makes a point of occasionally stopping and asking an apprentice something about the work which he is doing that will make him appreciate the application of what he is learning in the class room, his aim being to attract the attention of the apprentice and induce him to put his very best efforts into his work.

The experience of the New York Central lines under their unique system answers a few questions which advocates of industrial education might advance; as, for instance, What is the attitude of the men under this system? Those who have charge of the system under the New York Central answer through their experience, and the facts gained through inquiry are that their workmen are taking a great deal of interest in the new development and that they look upon it with considerable favor. There has been very little incentive during the past few years for boys to enroll themselves as apprentices, and the men are glad to have an opening for their sons by which they can be assured of a thorough training, which will make them first-class mechanics, and which, if properly followed up, will fit them for positions of authority and responsibility. On account of the neglect of a proper system for recruiting men the percentage of skilled mechanics has very sadly decreased, and the good all-round mechanic has almost been lost sight of. A system, therefore, that will build up men of this kind, and thus add dignity and importance to the position of the mechanic, is to be welcomed.

As to the attitude of the officers of the road, they, from the gang boss to the superintendent of motive power, seem to be much pleased with the new system. It means from their point of view and observation that they are going to have more efficient men under them, and that the problem of issuing and executing orders will be simplified. The boys, coached by the shop instructor, are doing better work and more of it, and the amount of spoiled work, which is always an item where there are many boys in the shop, is being reduced to a minimum. The problem of securing and holding apprentices has been solved, and in a few years the problem of securing good all-round mechanics will, to some extent at least, also be solved. A point

blank question addressed to various officers as to whether such a system was worth while and really paid, was met by a very enthusiastic response that of course it did, and in most cases they were ready to advance good reasons as to why this was so.

It is interesting to note the attitude of the different officials as they enter the schoolroom when a class is in session. One superintendent of motive power always promptly removes his hat, as he considers that the schoolroom is on the same plane as a college recitation room and deserving of the same respect and dignity.

At every point questioning brought out the fact that the higher officials quite often stop in at the schoolroom, and usually examine the work the boys are doing, occasionally asking questions or in some way showing their interest in the work.

An extension of the system is contemplated relative to the car department. It has usually been considered impossible to maintain an apprenticeship system in this department, and recruit the force other than the laborers and helpers on the repair track from its ranks. It was said to be impracticable to introduce such a system, but there were last year five regular apprentices at East Buffalo, and the indications are that this number will be considerably increased in the near future.

With this expanded system in successful working order on the New York Central lines, the question may be asked, What is the attitude of other roads to it? The general criticism has been made that the New York Central is educating apprentices for other roads, and this statement is probably true to some extent. The awakening of interest, however, in industrial education and the inquiries and observations from all directions indicate that other railroads are now giving this matter the consideration it deserves, and in some instances have taken action with a view to inaugurating some phase of the plan. The fact is being appreciated that no outside system of instruction, such as trade schools, correspondence schools, or even the Y. M. C. A. classes, can fully meet the needs of the apprentice, and that the control and direction of the instruction must be coincident with the control and direction of the shop. The indications point to a day not far distant when each railroad will have a fully equipped apprentice system organized as an integral part of its motive-power department. Before such work can start, the management must be convinced that, for its own safety in the future, it must be provided with skilled, intelligent, native workmen, men who can stand on their own merits and do the work which is needed to keep this country commercially ahead of the world; men who command the respect of their employers; men who can and will bring skill and judgment to their work, so that they may command compensation commensurate with their increased ability.

Thus the New York Central lines are contributing largely to the advancement of the purest forms and methods of industrial education.

MORGAN'S LOUISIANA AND TEXAS RAILROAD AND STEAMSHIP COMPANY,
AND LOUISIANA WESTERN RAILROAD COMPANY.

The apprenticeship system of these lines is practically the result of many years' experience, and, in addition to the necessity of providing skilled labor, has been largely due to a desire to assist in the practical education of the sons of employees of the companies, thereby assisting them in securing the proper means of livelihood, and giving them the opportunity of learning a useful trade and fitting them for the battle of life.

The chief element which warrants a description of the system of these lines at this place is the establishment of class-room work. When an apprentice has served one year he is permitted to enter the class of mechanical drawing, which is taught two nights each week by a competent instructor from the drafting department. The course of instruction begins with the first elements of mechanical drawing and simple geometry, gradually followed by a more difficult quality of work with descriptive geometry, which is continued in an ascending grade until the apprentices or students are fairly good draftsmen, and able not only to read a drawing intelligently, but also to make their own series of drawings from the first rough pencil sketch to the finished print.

In this connection it may be said that it is required by the companies that when the apprentice once enters the drawing class he shall be constant in his attendance, and this requirement is one of the conditions of his apprenticeship. This school of drawing is regarded as one of the most important and essential features of the lines mentioned. Aside from its undoubted value to the graduates in providing for their future career, it enables the companies to turn out of their own apprentice schools strictly first-class mechanics and young men who are far above the average of those who ordinarily seek the class of employment involved. Many of the very best men that the companies have had in their shops and of those who still remain began with them as apprentices, and a number of those who have left are now occupying responsible positions with other lines which, not pursuing a similar system, are glad to take advantage of the opportunities these lines provide.

In addition to the opportunities which the companies provide for their own regular apprentices who have not had the advantages of college or manual training schools, they are encouraged to take courses in mechanics, special or general, with correspondence schools of recognized standing, as the technical information and instruction thereby gained can be illustrated and fixed in their minds by the details of daily work in the shops.

GRAND TRUNK RAILWAY.

The Grand Trunk Railway has had an efficient apprentice system in force in its shops for several years and with very satisfactory results. It includes a thorough shop training and a course in mechanical drawing, simple mathematics, and applied mechanics. The applicant must be not less than 15 nor more than 18 years of age. After successfully passing his entrance examinations, both physical and other, the apprentice may be assigned to either the blacksmith shop, boiler shop, or any shop other than the machine and erecting shop, where he is required to remain for a period of from six to nine months. He is given a text or instruction book which covers his entire apprenticeship and contains the questions which he will be required to answer correctly before being promoted from one class of work to another. There are quite elaborate rules for examinations, and general rules relative to marking, etc.

Apprentices in machine work and fitting are required to serve five years; others serve only four years. All are required to attend evening classes twice a week from October to April. These are in charge of competent instructors, and the course includes a thorough training in mechanical drawing, arithmetic, and applied mechanics. This instruction, together with the necessary material (excepting the drawing instruments, which must be provided by the apprentices), is furnished free of charge by the company. The boys are not paid for the time spent in the class room. Apprentices who do not attend the classes regularly and who do not have a good excuse for being absent are discharged.

While the system on the Grand Trunk works satisfactorily, it is not as broad, comprehensive, and expansive as that in vogue on the New York Central lines.

OTHER RAILROADS.

Messrs. Cross and Russell, of the New York Central lines, have recently been making an investigation of the apprenticeship systems of the large railroads of the United States, and as a result have found that 55 railroads have 7,053 apprentices in 368 shop plants, while 67 plants answering have no apprentices. Thirteen railroads pay apprentices to attend school, 15 make attendance compulsory; on 13 railroads the schools are held in working hours, while on 5 the school is held in the evening.

The Santa Fe Railroad system now has 10 schools in operation with 347 apprentices. The Pittsburg and Lake Erie has a school at McKees Rocks with 36 apprentices. The Minneapolis, St. Paul and Sault Ste. Marie has a school at Minneapolis, with 29 apprentices.

The Union Pacific has two schools, one at Omaha with 71 and one at Cheyenne with 12 apprentices. The Delaware and Hudson has two schools, one at Green Isle with 25 and one at Oneonta with 33 apprentices.

Schools mean in this connection the number of branches of an apprenticeship system on the various divisions of a railroad where apprentices work in the shop and also work in the schoolroom.

LUDLOW MANUFACTURING COMPANY, LUDLOW, MASS.

This company maintains a school for the purpose of training apprentices in the special branch of the textile trade concerned with the manufacture of jute goods. It has a purpose outside of this, for an attempt is made to develop desirable, law-abiding citizens. The conditions prevailing in the village which makes this school possible are peculiar, the manufacturing company having built the sewer, constructed the streets, and supplied the village with water, light, and power. This varied activity of the company offers a very particular field of work for boys educated in the company's school.

The school was started on the discovery that of the fifty or more overseers and second hands employed by the company, not one had in forty years been educated in the village schools, and most of them had received their technical training in Scotch mills. This discovery made it evident that the company must depend upon men trained abroad or else give boys growing up in the village an education which would fit them for responsible positions in their mills.

The instruction is of two kinds—the practical part, which is given in the mill, and the theoretical part, given in the school. Each boy spends five hours every working day caring for some machine or performing such work as is assigned to him in the mill. The mill work the first year consists in sewing trolley bands, doffing, tending creels, supplying different machines with bobbins of the proper kind of yarn, packing cans, running lappers, running calendar, making reels of twine, taking care of finished card, and making tests of yarn for weight and strength. Every three months every apprentice is transferred to another machine or to other duties representing additional stages in the process of manufacture.

The mill work of these apprentices is under the supervision of the regular mill overseers, some of whom are members of the evening classes in the textile school, which fact has an important bearing on their treatment of the apprentices, in that they feel themselves to be a part of the school and thus more interested in the welfare of the school while in the mill overseeing the work of the boys. The apprentices attend school three hours each day and receive three-fourths of what they would receive if they worked that time in the

mill; in other words, each apprentice is paid for his mill work at the regular rate per hour, amounting to one-half day, and in addition receives one-fourth pay for his school attendance.

The boys are divided into two classes, so arranged that the work performed in the mill in the morning by one class is continued by the other class in the afternoon. The class which attends the morning session of the school and works in the mill in the afternoon during one week reverses this arrangement the following week. The results show that better work is done in the school by the morning class.

The boys must be between the ages of 14 and 16, in good physical condition, and of good moral character when entering. They must possess a fair knowledge of English and arithmetic. The apprentices do not sign a contract, but leaving the employ of the company means severing their connection with the school; thus there is a bond which holds the apprentices. The school work, conducted in a separate building devoted to school purposes, commences in September and continues for eleven months, with a short recess at Christmas. All expenses are paid by the Ludlow Manufacturing Associates. The majority of the pupils are of Scotch descent. A large proportion of the workers in the mills are Poles and Italians, but none of them attend the school.

The moral influence of the school is already apparent, although it has been but a short time in operation. In personal appearance and cleanliness the boys have greatly improved. They have learned that soiled hands mean soiled drawings, and they have thus seen the benefit of soap and water. It is a common remark about the beautiful town of Ludlow that the increased interest and intelligence shown by the boys in the textile school have to some extent spread to other boys, and it is believed that, apart from turning out foremen, the school will in this way be a benefit to the village as well as of practical value to the company.

The outline of the course of study at present is tentative, but it will probably embrace four years' work. Some special features projected are of interest. A special shop arithmetic, covering all the operations, calculations, and duplications performed in the mills, is provided. This book has been prepared by the mill overseers and the director of the school. In manual training the boys make parts of looms and other models which have reference to the machinery. Jute and hemp seeds have been planted near the school; it is proposed to study the plants at different stages of their growth, making sketches of the parts and attempting to extract the fiber. In geography particular reference is made to the United States and those countries where fibers are produced.

In the history work the boys study the history of the textile industry; the savage and semicivilized beginnings, developing into modern textile machinery and the steam engine; industrial development in the United States and in England; the growth of the factory system and the factory acts of England, etc. In connection with their studies in physics they examine and grade fibers, use the calibrating scales, measure and weigh rove and yarn, test the strength of fibers, make tests for moisture, tabulation, etc. In English they have a certain amount of required reading, writing of business letters, study of business forms, writing of shop English, etc. Special emphasis is placed upon that side of each subject which is related to mill work.

They are solving at Ludlow a peculiar problem, and one which belongs emphatically within the realm of industrial education of a high order.

WESTINGHOUSE AIR BRAKE COMPANY, PITTSBURG, PA.

This company combines shop and school work. The only requirements for entrance are that the applicant must be 16 years of age or over, of good moral character, mentally bright, and have completed his school studies through decimals in arithmetic. In connection with its system the company has a day school at which attendance on the part of the apprentices is compulsory, the time devoted to educational work averaging about seven and one-half hours weekly, the apprentice being paid the regular rate per hour for the time spent in school. The school period extends from the middle of September to the middle of June.

In connection with the day school the company has a night school, at which the attendance of the apprentices is not compulsory. The courses, other than those directly concerned with the trade itself, are, for the first year, arithmetic, algebra, business English, industrial composition, freehand perspective and mechanical drawing; for the second year, algebra, mechanics of physics, industrial composition, shop problems, mechanical drawing; for the third year, algebra, geometry, chemistry, mechanical drawing, shop problems; for the fourth year, geometry, electricity, shop problems, mechanical drawing.

D. A. TOMPKINS COMPANY, CHARLOTTE, N. C.

This company feels disposed to reduce the age of the apprentices as much as possible, on the kindergarten plan. Their experience shows that an apprentice of 12 years will make a better machinist at 16 or 17 than an apprentice of 16 can make by 20 or 21 years. In the case of young apprentices the company appoints a journeyman

workman as a sort of foster father, with instructions that the young apprentice shall not be worked for profit, nor at all except in a sort of kindergarten way. The company finds that this requires a well-balanced judgment for the proper result, but that the undertaking is not too difficult. It is trying to work out the problem of school and shopwork coordinated.

CINCINNATI MILLING MACHINE COMPANY, CINCINNATI, OHIO.

This company has an apprenticeship system where they take boys 16 years of age or older, employ them for a probation period of several months, and then if they are willing and have shown themselves well they are taken under a full apprenticeship contract.

In addition to the training in one of the three or four branches of the machinist trade, to be decided on by agreement between the employer, the apprentice, and his guardian, the boys have an opportunity of attending an apprentice school established by the company. They are formed into classes of 18 or 20 each, and meet with a special instructor one evening a week for two hours. Their schedule of work consists chiefly of shop arithmetic and the solution of those problems with which they come in contact in their shop work. There is no class work and the boys are not asked to recite, the entire object of the company being to teach the boys to use things and to think.

This school has been in operation for over a year, and the results have been highly satisfactory: the boys take an intense interest in their school, with the immediate result of a greater interest in their shopwork, and the mental development which they acquire, coincident with their shop manual training, has resulted in marked improvement in their everyday work.

DAVID LUPTON & SONS COMPANY, PHILADELPHIA, PA.

This company is engaged in the manufacture of architectural sheet-metal work. It has an apprenticeship system established in 1900. During the first two years of its experience each apprentice was requested to register with some institution of learning where he could study the technical branches of the trade, but this effort proved to be an absolute failure. While the boys would register, they would not attend and apply themselves; but in the fall of 1907 the company made arrangements with the Philadelphia North-East Branch of the Young Men's Christian Association, under which the company pays the boys' membership fee of \$5 and \$1 for class fee for each apprentice, the branch employing instructors suggested by the company and furnishing a class room two nights a week for a term of twenty-six weeks. The company has in its employ two foremen, eminently fitted for the position, and they have worked as instructors.

At the close of this investigation, in May 1908, the company had just concluded the first school term under the above arrangement, and stated that it was more than pleased with the results, both as to instructors and apprentices. The instruction was confined to arithmetic, geometry, and drawing pertaining to the sheet-metal trade in all its various branches.

Of course, the curriculum is peculiar to the work done. The company insisted at the inception of the class that it was just as necessary for an apprentice to be punctual in attendance and diligent in his studies as to report every day for work, and that any violation of this requirement would be sufficient cause for dismissal. By suspending a number, with the understanding that they could not report for work until their home tasks were submitted satisfactorily, it broke up a concerted action to defeat the purpose of the school work of the company. Now the general results are not only satisfactory, but extremely gratifying. The company has succeeded in getting apprentices interested, so that they are, by the information they have acquired, enabled to get better results.

SOUTHERN BELL TELEPHONE COMPANY, ATLANTA, GA.

This company maintains at Atlanta an operators' school, completely equipped with all the apparatus necessary for giving local and long-distance service. The school is conducted by an instructor and two assistants. While in the school the students are paid 50 cents per day and are at no personal expense whatever, as the company furnishes all charts, books, apparatus, etc. It also furnishes regular work for the graduates of the school.

INTERNATIONAL HARVESTER COMPANY, CHICAGO, ILL.

This company has equipped a special machine shop as a technical school for evening classes in shop practice, and the results during the past two or three years warrant it in continuing the plan. There are carried on three or more lines of work in which lads may enter for training, the company teaching some classes in elementary mathematics, reading, and writing during the working-day period, which classes the boys are expected to attend, they being paid for the time so employed.

THE WILLIAM TOD COMPANY, YOUNGSTOWN, OHIO.

This company, engine builders, has an apprenticeship system on a progressive basis. It starts a boy on the first of every month. For the first year he is moved from one tool to another every month, working on small tools which are regularly devoted to apprentice work. He serves here a sufficient length of time to acquire some

knowledge of the various operations, such as drilling, turning, and planing; then for eighteen months he is put on the floor as a fitter, or on such work as he can do satisfactorily and efficiently, the idea being that he will acquire a knowledge of the various operations and a general idea of the trade. The last eighteen months he is again put on machine tools, being moved every two months from one tool to another, and he is expected to acquire considerable accuracy and speed. This is rather a novel plan, but it works satisfactorily.

The company states that, by planning exactly where each apprentice is to be during his entire apprenticeship, it is able to work a large number of apprentices without requiring an extraordinary amount of attention from the foreman, as it is expected that each boy will do considerable toward breaking in the boy who follows him.

The company is also doing something in the way of school education. It is its practice to offer to pay half the expense incurred by any of the apprentices in an approved night school bearing on the apprentice's trade, provided he does satisfactory work. Under these conditions about a third of the boys are taking up various lines of educational work.

WESTERN ELECTRIC COMPANY, CHICAGO, ILL.

This company has an apprenticeship system combining shop and class-room work. Applicants for apprenticeship are required to pass an examination in arithmetic before their names are placed on the list of eligible candidates. Every apprentice attends two classes a week, one in mathematics and one in drawing. The class work comes the last working hour of the day, and the apprentices are paid for the hour at their regular shop rate. Apprentices are divided into two classes: First class, mathematics 1, drawing 1; second class, mathematics 2, drawing 2. Mathematics 1 consists of arithmetic problems, attention being given to their application to shop problems. Four or five problems for home work are given each week. Mathematics 2 includes algebra and plane geometry. Drawing 1 takes up geometrical problems, drawing 2 orthographic projection and the making and reading of shop drawings.

In the class of mathematics the boys are furnished small notebooks, in which they are expected to keep definitions, rules, etc. The company has decided to give two lectures a month to all indentured apprentices; these lectures are given by heads of departments, the subject-matter to be elementary in character, and as far as possible to consist of Western Electric methods of manufacture, illustrated by examples of the work and by blackboard sketches. It is proposed to have each speaker, whether he speaks on manufactur-

ing or other work, bring out clearly the relation between the department with which he is connected and the department in which the apprentice is employed. The idea is to teach the apprentice to see the relationship between the work he is engaged in and that of other departments. If he is repairing a jig or fixture he should, by virtue of his knowledge of where and how the tool is used, be able to exercise the necessary judgment in making the best possible job of repairing. He must be taught to place himself in the position of the man who is to use the tool, and look at it from the other man's view point. In short, he must be taught the value of good judgment. It is important that he recognize the necessity for such requirements as the keeping of his time on each job, and keeping it accurately, it not being possible to determine the cost of a job without this information.

By giving the apprentice thorough instruction in the trade he is learning and a general knowledge of other branches of the business, the company hopes to obtain far better workmen than has been possible heretofore.

R. K. E. BLOND MACHINE TOOL COMPANY, CINCINNATI, OHIO.

This company has an apprenticeship system which has been running under the universal contract approved by the National Metal Trades Association. It has had various kinds of apprenticeship systems in its plant, but as a rule they have not proven entirely satisfactory. The company thinks that the old method of apprenticeship has not proved to be just what is needed; that the best method of instructing young men in the machinist trade, in which this company is engaged, is to establish a separate department for this purpose, where the young men can be taught the trade in an atmosphere that is removed from the rush and hurry of the shop, and also where they can receive instruction in mathematics, mechanical drawing, and kindred subjects. The company is of the opinion, and stated it as a fact, that if to instruct a young man be the sole object, more can be accomplished by such a system in one year than in three years by the old method of apprenticeship. The company also believes that a school department would relieve the shop foremen of the trouble, labor, and expense of instructing the apprentices, and place it in the hands of one man. This man would have to be one of the best men employed in the plant and of a high order of intelligence, and its opinion is that, after the apprentice had spent about three years in the school department, he could be taken into the shop and put at regular manufacturing operations as a journeyman. This, it believes, would be a far cheaper method, as well as more efficient and fairer to the apprentices than the old one.

GEORGE V. CRESSON COMPANY, PHILADELPHIA, PA.

This concern, which manufactures iron work, such as hoisting engines, cranes, etc., and thus has an excellent opportunity of utilizing the apprenticeship system, employs a supervisor of apprentices, who engages the boys throughout the works. The system in vogue here is in a way along the same lines as that in vogue at the General Electric Company.

In the machine shop the apprentice is placed for two years in what is called the manual training school, which forms a special department planned for this particular purpose, under the sole charge of one instructor. The boys are moved from machine to machine, but before being assigned to a new machine they are, if required, to instruct a new boy coming on. After two years the apprentice is assigned to the main shop and placed under a regular foreman. He is transferred from position to position in the shop, and if he shows a liking for any particular machine or work he is allowed to finish his term on that. The works have a school connected with the shops. In this school are taught mathematics and drawing during working hours. The boys are divided into two classes, with mathematics in the morning for one class, drawing in the afternoon for the other, alternating each day during the week. The term in this school lasts from September 1 to May 1. The company encourages outside study by giving the boys home work, which counts in their general average at the end of the term. The superintendent, in the course of this investigation, stated very frankly that he had adopted the General Electric Company's idea, with certain modifications. He is very particular in the sort of entrance examination which he gives. There is also required a physical examination. The shop instructor is a practical man who was himself an old-time apprentice; the school instructor is taken from the engineering department. In order not to break into the regular factory work the school classes are held the last hour of the morning and the first hour of the afternoon.

The company has taken great pains to study carefully the various apprenticeship systems, and believes that the one which has been adopted is the best for its business. It believes that a better public school system would result from a return to fundamentals, including the teaching of subjects in a more practical way.

YALE AND TOWNE MANUFACTURING COMPANY, STAMFORD, CONN.

For a number of years this company has educated apprentices in the trades of tool-making, metal-pattern making, and blacksmithing. In addition to this it has given a few young men an all-round mechanical business training. Up to quite recently they were educated in the shops, working along as regular journeymen and being under the

charge of various foremen, which was a method similar to the old apprenticeship system, except that an apprentice instructor was delegated to have general oversight of the work of the apprentices. This plan did not prove satisfactory to the company, as the boys did not receive the amount of education which was believed to be necessary to obtain the best results:

The company makes a "specialty" and must have skilled men, so recently it has installed a "training room," where apprentices are under the immediate supervision of the director, who devotes his entire time to the work. This idea was taken from the General Electric Company's training room.

Each apprentice is required to pass a preliminary examination in order to ascertain his fitness and general education. He then enters the training room on three months' probation, and during this time his habits and aptitude are very carefully watched. The term of apprenticeship is four years, two of which must be spent in the training room. At the end of the second year the apprentice is transferred to the shop, and remains under the supervision of the director until the end of his term of apprenticeship.

Parts of machinery from the regular shops are sent to the training room and the boys work on them there. This means that the boys are engaged on the regular product and receive varied training. The company has found it impracticable to lay out a definite time schedule in advance for each kind of machine for each apprentice. This is due to the fact that the boys differ considerably in aptitude, some requiring nearly double the time that others take in learning a given operation.

THE ALLIS-CHALMERS COMPANY.

The Allis-Chalmers Company, at its Bullock Works, Cincinnati, Ohio, conducts a graduate student system, the purpose of which is to educate young men to successfully fill positions which develop from time to time in its sales, erecting, and engineering departments. The company cooperates with the University of Cincinnati, as described hereafter.

This system embraces three different courses, namely, mechanical engineering, electrical engineering, and mining engineering. Each course covers a period of two years (5,500 shop hours) and the students' work is so arranged as to give them the best possible experience and training which the large facilities at hand afford.

The company are builders on a very large scale of a complete modern line of machinery as follows: Steam engines, pumping engines, gas engines, blowing engines, hoisting engines, air compressors, steam turbines, hydraulic turbines, air brakes, electrical machinery of all kinds; flour mill, sawmill, and transmission machinery; crushing

and cement machinery, mining machinery, etc. This scope of manufacture offers exceptional opportunities to the student who desires to procure the necessary shop training to qualify for the higher positions that are offering in the engineering field.

To be eligible to the graduate course an applicant must be a graduate of a school of technology. The rates of wages paid to the student are as follows: For the first 1,375 hours, 15 cents per hour; for the second 1,375 hours, 18 cents per hour; for the second 2,750 hours, 20 cents per hour.

In addition, at the end of the entire term of service, for the faithful performance of his duties throughout the course, the student is paid a bonus of \$100, which is prorated in case the student is permitted to shorten his course to enter the company's regular employ. No bonus is paid to the student who, before the end of his course, leaves the company's employ, either on his own volition or at the instigation of the company for misconduct or unsatisfactory progress.

The students ordinarily serve the regular shop time of the company's works, which consists of fifty-four hours per week. All overtime actually worked by the students is counted on the course and paid for at the same rate proportionately as journeymen employees are paid for overtime, i. e., for every hour overtime served by students they are paid in wages for an hour and a half.

The students are subject at all times to all shop and office rules. They are required to provide themselves with the ordinary tools necessary for mechanics, such as rules, scales, calipers, etc., or if employed in the drawing office, with a reasonable supply of drawing instruments. If the students so elect, the company will furnish these necessary tools and instruments to them at cost to the company, and deduct such cost from the wages of the students in installments.

The courses involve work progressing at intervals in the various departments as follows:

Mechanical engineering.—Iron foundry, Corliss engine machine and erecting shops, steam turbine machine and erecting shops, gas engine machine and erecting shops, hydraulic turbine machine and erecting shops.

Also when opportunity affords, the mechanical students are, toward the latter part of their course, sent out in the field with experienced erecting engineers to assist in the erection of machinery, during which time a reasonable allowance is made by the company for traveling and living expenses; and such students as qualify for the responsibility are sometimes given full charge of erecting work in the field before completion of their course.

Mining engineering.—Iron foundry, mining department machine and erecting shops, Corliss engine machine and erecting shops.

Electrical engineering.—Commutator department, controller department, assembling department, shop erecting department, testing department.

Students in all three courses engage in the actual work of the various departments mentioned under experienced machinists, and in this way learn to perform the various classes of shop and erecting work in a competent and skillful manner. They at the same time apply their theoretical knowledge to actual practice and become thoroughly familiar with the lines of machinery on which they work.

OTHER CINCINNATI COMPANIES.

The Houston, Stanwood & Gamble Company has an apprentice system with a school of its own, and cooperates with the University of Cincinnati in its cooperative courses, as do several other Cincinnati concerns. These illustrate the system, however.

THE COOPERATIVE COURSES IN ENGINEERING AT THE UNIVERSITY OF CINCINNATI.

The experience of the great manufacturing concerns and railroad companies as given above exemplifies most emphatically the types of modern apprenticeship systems in which shop work and class-room work are coordinated in such a way as to secure the very highest results in industrial training. Other examples could be given, but enough systems have been described to illustrate the trend in the resuscitation of apprenticeship.

It will be noticed that in nearly all the cases cited the concerns pay the apprentices while in the schoolroom the same as while in the shop. This is an essential feature of the whole modern arrangement and offers an inducement to a high grade of apprentices that does not enter into any other method.

There is going on in the city of Cincinnati, Ohio, an experiment that is being watched with great interest by educators, whether they are simply interested in academic work or in industrial training. That experiment is known as the "cooperative courses in engineering" at the University of Cincinnati, established in that university by Prof. Herman Schneider, of the department of civil engineering, and dean of the college of engineering in that institution.

In an address before the Fifteenth Annual Convention of the Society for the Promotion of Engineering Education, in July, 1907, Professor Schneider stated that he began what might be called a pedagogical research into the problem of engineering education six years before the time of his address; that in due course he sifted the problem to three questions: (1) What requirements should the finished product of an engineering school fulfill? (2) Where and how shall we get the raw material to make the required finished product? (3)

Through what processes shall we put the raw material in order to obtain the required finished product?

Professor Schneider carried on his investigations for six years through visits to the largest manufacturing concerns in the Eastern and Middle States in order to obtain from employers of engineers their views on the subject, and he still considers his investigation in progress. The results of all his study, observation, and inquiry culminated in an attempt to make an actual demonstration of a system of education which should be the natural outgrowth of his investigations.

Fortunately for him, opportunity was offered for the experiment at the University of Cincinnati, resulting in cooperative courses in mechanical, electrical, and chemical engineering, now in operation at that institution. The courses adopted are so planned that the students taking them work alternate weeks in the engineering college of the university and at the manufacturing shops of the city. Each class is divided into two sections, alternating with each other, so that when one class is at the university the other is at the shops. In this way the shops are always fully manned, and thus the manufacturers suffer no loss and practically no inconvenience by the system.

The length of these courses is six years. The entrance requirements are precisely the same as for the regular four-year courses, and the university instruction under the cooperative plan is just as complete, thorough, broad, and cultural as that in the regular courses; indeed, the university people feel that, as a matter of fact, it is broader and more cultural.

The cooperative students work alternate weeks in the shops of the city throughout the scholastic year, and in the summer full time, but are given several weeks' vacation. The practical work of the shops is as carefully planned as the theoretical work at the university, and in all cases the students follow as near as possible the path of the machine manufactured, from the raw material to the finished product sold. At the Bullock Electric Company, Cincinnati, the students spend the first year in the foundry, the next two years in the graduate apprentice course. A contract is signed in triplicate by the student, the university, and the firm. In all cases the dean of the engineering college and the professor of electrical, chemical, or mechanical engineering, as the case may be, confer with the manufacturers in planning the course of shopwork, so that the young men get a logically and carefully planned shop and business training.

The students are paid for their services on a scale of wages beginning at 10 cents an hour and increasing at the rate of 1 cent an hour every six months. A student's total earnings in the six years will amount to about \$2,000.

A comparison of the work of the four-year freshmen who did not take the alternate shopwork with that of the six-year freshmen who

did during one year is significant. The six-year cooperative students, although working but half the time, did three-quarters of the work of the regular students, including all the mathematics and sciences of the freshman year, and their average grades were 25 per cent higher than those of the four-year freshmen. As a matter of fact, the cooperative students have taken all the university work excepting three hours of English and three periods of shopwork, but, of course, they have received more shopwork at the city plants than they would have covered at the university.

The question is sometimes asked relative to this plan in vogue at Cincinnati, How do the manufacturers themselves view it? The fact that they enter into the cooperation is sufficient evidence that they believe in it. But the evidence is positive, through the Cincinnati Milling Machine Company, in a paper presented by Mr. Charles S. Gingrich, mechanical engineer of that company, at the Fifteenth Annual Convention of the Society for the Promotion of Engineering Education, July 3, 1907. Mr. Gingrich stated in his address:

It is our good fortune to have the University of Cincinnati centrally located among us. When it proposed to us Professor Schneider's plan of a cooperative engineering course, it appealed at once to the business sense of each individual manufacturer. The plan looked attractive from the business standpoint. It promised us an immediate supply of boys of a much higher grade than those who take up the regular apprenticeship. It held out the prospect of our getting in a few years engineering graduates with a practical shop experience. We have all tried to give a shop training to young men from the colleges, but it is never entirely successful. * * * The cooperative engineering course plan practically brings the school into the shop. Our present schedule of half time during the school year and full time in the shop during vacations puts the boy in the shops eight months out of the twelve. In other words, during the six years that he is taking the course we have him in the shop four years, the same length of time that is served by our regularly indentured apprentices. The fact that these students are capable of taking the university course is in itself proof of their high quality, and men of their class will grasp the principles, as well as the details of shopwork, very much more quickly than our regular apprentices. We expect, therefore, to give them a very broad shop training in the four years they will be with us.

This university is demonstrating the wisdom of the suggestion now made by various educators, that the ordinary college student would be greatly benefited by breaking a year out of his college course and entering upon some actual practical labor.

In this connection Mr. Frederick W. Taylor, consulting engineer, Philadelphia, has had some experience, and contributes valuable evidence. He has been very much interested in endeavoring to so educate young engineers who graduate from technical schools that they may be more useful immediately after graduation than they have been in the past. His personal observation has been that those young men who, either from necessity or otherwise, have had a year or two of practical work before graduating from college are a great deal more

useful than those who have not. They profit much more by their college course and are much better developed by such treatment.

Mr. Taylor has made a start in attempting to demonstrate the usefulness of this type of education by having young men leave the college at the end of their freshman year, take a year in a machine shop, and then return to the college for the balance of their course. His experiments in this line with young men of his city are most encouraging, all the young men giving the greatest satisfaction to their employers, and they decide themselves that they are getting great benefit from their practical work. Mr. Taylor therefore calls the experiment a distinct success.

These experiments open the way to a new feature of coordinate work, and they will be watched with great interest.

II.—TYPE OF INDUSTRIAL EDUCATION UNDER WHICH APPRENTICES ARE CONTROLLED TO SOME EXTENT OUTSIDE OF WORKING HOURS.

There are some establishments having a peculiar form or type of apprenticeship where the manufacturer or employer controls the individual apprentice, to some extent, outside of working hours. This system has both the elements of the old apprenticeship system and the elements of the type involving school and shop work, or that which has just been described and exemplified. There are not many examples of this third type, nor can it be ascertained to what extent it is being carried out, but the experience under it is interesting, for it shows a method of industrial education which may have some important bearings in the future on the whole subject of industrial training.

NORTH END UNION, BOSTON, MASS.

This organization is peculiar in its nature. It undertakes to teach the art of printing, and at the same time secure some employment for its apprentices. The apprenticeship indenture at the school carried on by the union consists of an agreement by three parties, the master printer, the pupil apprentice, and the North End Union School of Printing.

The boy is bound to the master printer for a term of four years, with the express understanding that one year of the term shall be devoted to school training, and if the apprentice fails to perform the work of the school of printing in a satisfactory manner, or proves idle, unteachable, or disobedient, the master printer has a right to be released from all obligations under the apprenticeship contract.

The school of printing, which has been in operation about nine years, is under the supervision of a board of master printers. This board consists of some of the best-known printers in the country. The pupils at the start were young men who were at work in printing

offices during the day, the school being in session three evenings each week, the object being not to make more but better printers. This method did not work satisfactorily, because the average boy, after laboring in a printing office all day, was not an ambitious student at night. His term of employment and prospect of advancement seemed to him so uncertain that the extra effort on his part was not by him deemed to be worth while, and so his enthusiasm, if he ever had any, soon waned.

After four years' trial of the evening school it was decided to turn it into a day school and make the term one year. Its prospectus stated that the aim was simply to give the pupil an intelligent start in his trade and instruct him in the essentials of good printing, so that with subsequent practice he could become a successful workman. To give him some training in the school and then set him adrift to find his place in the trade was not considered as fair to him, or of any benefit to the trade itself. Consequently an indenture form was adopted, drawn up along modern lines, with terms and conditions such as would attract any ambitious boy who wished to learn the printing trade.

This apprenticeship agreement covers a term of four years, the first year of the term being spent in the school of printing. No wages are paid the first year, while a tuition fee of \$100 is charged, and a close scrutiny of a boy's qualifications for the work is constantly exercised. At the beginning of the second year the apprentice enters his employer's workroom and receives \$9 a week for the first six months, then \$10 a week for the next six months, and is gradually advanced until the last half of the fourth year he receives \$16 a week. The working time of the school is the same as in the regular workshop, and the apprentices are responsible to their employers for regular attendance and faithful performance of the work in the school.

The superintendent of the union school emphasizes the direct connection which this school has with the employing class, and states that the exploitation of a boy in the interest of the employer, or vice versa, has never actuated the conduct of the management, and that the gentlemen who constitute the advisory board give much time and thought to the problem of the apprentice trade school. The superintendent also made strong statements, in the course of this investigation, relative to an apprenticeship system of the right sort, to the effect that it was an agreement between two persons to perform certain acts which are of mutual advantage, and that an apprenticeship indenture is essential to the success of trade training, if the shop is to supplement in any large measure the school training. He believes that the problem of trade training is made very complex by the system of specialization and that the shorter the time required for a beginner to learn a process the quicker he is apt to be made a pro-

ductive unit in the factory, so that unless an apprenticeship system had some indenture scheme guaranteeing to the boy an opportunity to learn his trade as a whole at a fixed wage with steady increase, resulting in more rapid advancement in trade training, it would not be, after all, a proper system. This is also the view of the General Electric Company.

The peculiar indenture at the North End Union, in the opinion of the directors of that interesting scheme, will guarantee to the employer continuous service of a boy for a definite time, and a better grade of boys (for an employer will not enter into a contract covering several years with a boy not selected with care), while the employer will get more faithful service, because the boy realizes that his interests are bound up with those of his employer, and that his advancement depends upon how he improves his opportunity.

Mr. Samuel F. Hubbard, the superintendent, states that it depends largely upon the employing class to provide facilities in the shop so that a boy can utilize the education which he received in the training school, and that, on the other hand, when he enters the school he ought to get into some relationship with the trade. This is the principle carried out at the North End School. Mr. Hubbard doubts the value of a part time idea, on the ground that employers have informed him that they could not be bothered by such a scheme, yet we see that on an advanced basis such a scheme works well in Cincinnati.

An apprentice at the North End School is allowed to give a note for \$100 for his tuition, the superintendent not believing in having an outside party pay the boy's tuition fee.

The following data are interesting as showing the practical workings of the union from a money point of view:

North End Union, Boston.

INCOME FOR FIVE YEARS, ORDINARY APPRENTICESHIP, WITHOUT THE SCHOOL.

First year:	
26 weeks at \$4.....	\$104
26 weeks at \$5.....	130
Second year:	
26 weeks at \$6.....	156
26 weeks at \$7.....	182
Third year:	
26 weeks at \$8.....	208
26 weeks at \$9.....	234
Fourth year:	
26 weeks at \$10.....	260
26 weeks at \$11.....	286
Fifth year:	
26 weeks at \$13.....	338
26 weeks at \$15.....	390

2,288

APPRENTICESHIP AND INDUSTRIAL EDUCATION.

INCOME FOR THE SAME TIME, ONE YEAR OF WHICH IS SPENT IN THE SCHOOL.

First year in the school.....	000
Second year:	
26 weeks at \$9.....	\$234
26 weeks at \$10.....	260
Third year:	
26 weeks at \$11.....	286
26 weeks at \$12.....	312
Fourth year:	
26 weeks at \$14.....	364
26 weeks at \$16.....	416
Fifth year:	
26 weeks at \$18.....	468
26 weeks at \$18.....	468
	2,808
Income, five years, one year in school.....	2,808
Income, five years, shop apprenticeship.....	2,288
	520
Less tuition.....	100
Net advantage of one year in school.....	420

R. HOE & CO., NEW YORK CITY.

Another interesting example of this third type of apprenticeship is the school established about thirty-six years ago in New York City by Messrs. R. Hoe & Co., manufacturers of printing presses. The need for a school of this kind grew out of the fact that the constantly increasing demand for improved machinery made it necessary to have a more intelligent class of workmen in the construction department in order to bring about the desired results, and the company decided to establish a school where the boys and young men employed in the shops during the day might spend a portion of the time in the evening in acquiring a knowledge of such things as would enable them to better understand the work in which they were engaged, and which might ultimately result in training up a superior class of workmen.

Admission to the school is restricted to the apprentices who are serving their time with the company, and tuition in the school is entirely free. The course of instruction covers a period of four years, and is carried on in conjunction with practical work in the shop during the day. It includes English, mathematics, geometry, and free-hand and mechanical drawing, opening the first week in September and closing the last week in May; sessions are held three nights each week, and the school is under the general management of the company. As the course of instruction is arranged to continue during and terminate with the regular period of apprenticeship in the shops of the company, all the graduates are competent to do prac-

tical work as full-fledged journeymen. The school has proved satisfactory in every respect, and has fully attained the end for which it was established.*

BROWN-KETCHAM IRON WORKS, INDIANAPOLIS, IND.

The directors of this company have decided that all boys taking advantage of the special night school organized by the Y. M. C. A. during the term of their apprenticeship shall receive credit on the last day of their apprenticeship for six months' time. The boys themselves pay the expenses of the special night drawing class, but this is only \$6 a year.

LAIDLAW-DUNN-GORDON COMPANY, CINCINNATI, OHIO. 2

This company employs apprentices at the age of 17 on a four-year contract. While its system has no special educational features outside of shop instruction, it encourages apprentices as far as possible to attend the night classes of the Ohio Mechanics' Institute in Cincinnati. A limited number of special apprentices who are students at the University of Cincinnati are also employed, these apprentices working in pairs and alternating each week between the University and the shop. This particular feature, which is unique and of great importance, will be referred to later on.

III.—MIXED TYPES OF THE APPRENTICESHIP SYSTEM.

The two types of apprenticeship just illustrated, (1) that where school and shop are intimately connected, and (2) that where the management has some control outside of the shop, are those where the elements of industrial education in the broader sense are most conspicuously emphasized. There are many other examples, where there is no connection between the works (or shops) and the schools, that give valuable information relative to the extent and importance and real influence of the apprenticeship system as such, and also plainly show the friendliness of the managers of such concerns to general education along industrial lines. A few of the more prominent and characteristic types are therefore given.

BALDWIN LOCOMOTIVE WORKS, PHILADELPHIA, PA.

Under the system at these works the apprentices are divided into three classes. The first class is composed of those who have had a grammar school education and who are not over 16 years of age. They serve four years, or until they are 21, at wages of 5, 7, 9, and

* Seventeenth Annual Report of the United States Commissioner of Labor.

11 cents per hour for each respective year of their term, and receive a bonus of \$125 at the end of their term. They are obliged by the terms of their indenture to attend night school three evenings a week during three years of their term, and study geometry, arithmetic, elementary mechanical drawing, and shop practice, in order to become familiar with the technical language used in the shops and be able to readily interpret the working drawings in daily use.

The second-class apprentice serves three years. This class includes those who are at least 18 years of age and have had a more advanced education than those of the first class. They are paid 7, 9, and 11 cents per hour for each respective year, and receive a bonus of \$100 at the end of their term. They also attend night school for the first two years of their term. Many of them take up advanced studies, such as chemistry, higher mathematics, and mechanical drawing.

The company provides for changing them from one shop to another, and from machine to machine, once every three months, or oftener if necessary, until they have been all over the works, thus giving them a thorough knowledge of the entire plant. The firm is also bound by the indenture to retain the apprentice in service until he has completed his term. They retain the right, however, to dismiss him for good and sufficient reasons.

The third class of apprentices is composed of young men, 21 years of age and over, who are graduates of colleges, technical schools, or other advanced institutions, and who have taken courses in higher mathematics, natural sciences, and mechanical drawing. They are not indentured as are the boys of the first and second classes. They serve two years, receiving 13, 16, 18, and 20 cents per hour for each respective six months of service. They are not required to attend school, although many of them do so, but instead must read a technical journal and turn in a synopsis of all the articles in it, which matter is used for indexing the articles in the publication.

The course for the first-class apprentices is likely to develop men who will be first-class mechanics and fitted for positions of minor responsibility; the second grade is likely to develop men who will graduate into the positions of subcontractors and foremen; and the men of the third class are likely to become foremen and heads of departments and members of the executive staff of the company.

There is also another class of apprentices called "specials." This class is composed of young men who, on account of their age, can not be placed in either of the three regular classes. Their term of service is voluntary and they have no fixed rate of wages, this being arranged by the particular foreman under whom they may be working.

Of the 399 apprentices in the works at the end of 1906, 204 attended various night schools, as follows: 126, Central High School; 32, Spring Garden Institute; 11, Drexel Institute; 1, Franklin Institute;

17, Young Men's Christian Association schools, and 17, various district public schools. This shows that about 89 per cent of the boys attend formal schools. In addition to the apprentices who are obligated by their indentures to attend school, there is a large attendance at various schools and institutions of specials and other young men who attend voluntarily. The superintendent of apprentices of the Baldwin Locomotive Works, Mr. Semple, who furnished the information for this investigation, stated that while the boys are expected, and, as far as possible required, to attend evening schools, there is no way of finding out how well they do attend, or how they progress, except through the return blanks of the principals of the schools; but these blanks do not furnish the exact information the works desire. Nor is the work which the boys do in the public evening school satisfactory, because of the large size of the classes. Some of the teachers have as many as 60 students in a room at the beginning of a term, and by the time the roll has been called half an hour has been lost. A good many boys wish to drop out because they are not getting enough individual attention.

The instruction in the public evening school is free, but of such a character that those boys who can afford it take up work in private schools, such as the Spring Garden Institute, Drexel and Franklin institutes, and the Young Men's Christian Association schools. The average attendance of the boys taking the public school work was 84 per cent. The average attendance taking private school work was 89 per cent, showing that where these boys had to pay for instruction themselves they did better work than where instruction was furnished free.

The feeling at the works is that there must be better elementary schools and better evening schools; the first for a more efficient preparation for the apprenticeship system, and the second for better opportunity for working boys to supplement their daily experience through evening study. The superintendent has a system of blanks to show the progress of the apprentices in the shops and the quality of their work, their conduct, and the statements of the foremen. At the Baldwin Locomotive Works they do not believe in lectures, outside socials, or any of those features which prevail at the General Electric Works. The company is conservative and has made a success in a conservative way, but it believes in the thorough training of its boys, and its belief has been strengthened by the fact that many of the men in directory positions at the works have come up from the ranks.

BROWN & SHARPE MANUFACTURING COMPANY, PROVIDENCE, R. I.

This company, engaged in the manufacture of machinists' tools, has at present about 150 apprentices. Applicants must not be less than 16 or more than 18 years of age, and have had a grammar school

education. They are required to serve for a term of four years. The company believes in evening instruction for the boys, and that the more outside instruction they can get the better for them on general principles, and if the young man is getting ready for work as an engineer it is necessary for him to have this instruction. The firm recommends and helps young men to the evening schools, but does not require attendance. The superintendent states that some of the young men have gone for a short period to evening schools, others have gone for the whole four years of their term of service. He says also that the boys make good use of the Rhode Island School of Design, where the chief draftsman of the company is on the advisory board of some of the courses of instruction. The superintendent is of the opinion that the only way of furnishing good all-around workmen is to have boys indentured for four years to some well-conducted, up-to-date concern, where they may learn their trade, for in this way they are not only bound to the concern, but the concern also becomes bound to them; accordingly no foreman, on account of some ill feeling or spite against a boy, can discharge him, as the whole matter must be brought before the manager, by whom the case is investigated thoroughly before being decided.

Mr. Luther D. Burlingame, chief draftsman of the Brown & Sharpe Manufacturing Company, who has written on the subject of apprentices, stated in the course of this investigation that he felt there should be a careful selection of boys fitted for the work, with a period of trial, during which they may be tested as to their intelligence, application, accuracy, interest, and other desirable qualifications, and where candidates were found lacking they should be weeded out; that the work given to the boys should be so diversified as to give the most varied training possible. The apprentice and his future should be considered, as well as the profit to be derived from his services. If possible, outside study and auxiliary training should supplement the work in the shop and be a part of every boy's training. When evening schools are not available or suitable, private instruction or home study should be resorted to, as such study, in addition to the knowledge gained, gives confidence to the boy, and enables him to take for himself that social position that some claim is not accorded to the mechanic or other manual workman.

Mr. Burlingame emphasizes the fact that apprentices should be in charge of a competent man, whose duty it should be to see that a proper selection is made in hiring new boys. This man should look after their general welfare, both inside and outside the shop, encouraging, correcting, and teaching them, without showing a paternalism which would take away the boy's self-reliance, but working in sympathy with him and keeping such watchfulness over him as to see

that he gets a fair deal. This is especially essential in large works, where a great number of apprentices are employed.

One of the faults of the old apprentice system, when employed in modern times, is that there is no one to care anything for the apprentice. The journeymen can not stop to instruct him, and he is, as has already been shown, largely dependent upon chance for learning any of the art or skill required. Every shop, however small, should be looking to the future in the training of boys by a system of apprenticeship, and it is through the wide extension of such a policy that we can anticipate a great future development of skill.

The Brown & Sharpe Manufacturing Company considers that the apprenticeship system is not a mere detail incident to the conduct of the business, but is one of the corner stones on which its prosperity and permanence rest. Some of the most important positions in the factory are held by men who have been apprentices in it. They have learned the company's methods of doing work, and are interested in the welfare of the business as well, and while technical and manual training schools are of great importance, the management believes that nothing can take the place of the boy indentured to some first-class concern.

Mr. Burlingame emphasizes the value of apprenticeship over that of the trade school, especially where the apprentice adds to his experience in the shop school knowledge which he gets by evening study. The boy coming from the school shop, no matter how good his training, must start as an unknown quantity with his new employer and win his way from the beginning. A boy already four years in the service of an employer may have won his confidence and esteem, and developed such ability and loyalty as to place himself in line of promotion even before he completes his apprenticeship.

This firm is an advanced one, broad and liberal, and believes in all forms or methods which will produce an increased amount of skill and skilled labor, and its experience is that this can be done better through a modern up-to-date apprenticeship system than by any other method.

BULLARD MACHINE TOOL COMPANY, BRIDGEPORT, CONN.

The experience of this company leads to conclusions opposite to those drawn from the experience of the General Electric Company, the New York Central lines, and others adopting their type of apprenticeship, yet it is carefully considering them and in a friendly spirit.

The conditions which led to the attitude of this company are those which are universal, namely, an apparent lack of skilled workmen, and the difficulty of procuring boys who wanted to learn the trade

of machinist. There were other contributing circumstances, such as the differentiation of machine processes, the low wages paid apprentices, which were not sufficient to encourage a boy to elect a four years' apprenticeship, and other economic elements.

Mr. Bullard, the head of the company, is chairman of the apprenticeship committee of the National Association of Machine Tool Builders, and that association is adopting his ideas. The general terms of the apprenticeship system recommended by this association are practically the same as those that characterize the systems in use by firms and manufacturers generally. A distinctive feature, however, is what is known as a "special apprenticeship" contract, for boys 17 years of age, providing for a trial period of two hundred and forty hours, with pay at a rate ranging from 12 to 15 cents an hour, then a term of service ranging from one to two years, depending upon the department; that is, the specialization of work by apprentices is emphasized. This system has been in operation about two years, and already over 150 diplomas have been given out by the association.

While the firm does not in any way antagonize the methods described under the school and shop type, it feels that some of the firms that take up that method can afford to do it, while the machine-tool builders as a whole can not bear the expense. The association has many small shops where they have not many apprentices, and so must adopt a system suited to their needs. Where the number of apprentices is large enough and the financial resources are ample, Mr. Bullard and the association he represents would have a broader plan than the one he now advocates.

This company has an excellent scheme for following out the progress of the apprentices. Records are kept of individual work, the piecework and the time work of every boy, which give the quality of work done, productiveness, and punctuality of every boy. These records go to show whether a boy's judgment is good. His personality and character are determined by observation.

Before Mr. Bullard recommended this special form of apprenticeship to the association he made a thousand trials in all departments to determine whether apprentices were worth while, commercially speaking. He would give a job to a journeyman and then the same job to an apprentice, keeping account of material spoiled, time, and inspectors' reports, etc. The result was that he found apprentices' work paid.

The company is very much interested in the matter of trade schools. It would like to see the public schools fit for something besides college. It does not care to employ a boy until he is 17 and has reached the age of discretion, and it thinks that the schools ought to teach more practical subjects, which would fit in with the industrial life which an apprentice is bound to meet, and while strongly favoring and

advocating special apprenticeships, it is also a strong advocate of industrial schools. Probably the action of Mr. Bullard through the National Association of Machine Tool Builders in advocating the training of specialists, will do much to call the attention of the public to the needs of industrial education. Moreover, this action, representing nearly 100 prominent firms which control the machine-tool output of the United States, so directly in the interest of this form of education, offers strong evidence that the apprenticeship system and industrial education are allied forces.

REED & BARTON, TAUNTON, MASS.

Among the other well-known manufacturers of the country adopting a liberal apprenticeship system, and proving by their experience under it that such a system must be dealt with when considering industrial education in any form, is the firm of Reed & Barton, Taunton, Mass., silversmiths, which is uniting its shopwork with a course in mathematics, mechanical drawing, etc., conducted during the regular hours. Such instruction is in addition to the regular instruction in mechanical drawing which it has been giving its apprentices. The "training room" has been in operation but a short time.

GORHAM MANUFACTURING COMPANY, PROVIDENCE, R. I., AND OTHER ESTABLISHMENTS.

The system of this concern comes into the category under consideration. So does that of John A. Gledhill, patternmaker, Providence, R. I., although here the boys must take mechanical drawing and arithmetic during two or three evenings a week in some of the evening schools of Providence. They are also sent on visits to different shops and factories.

Pratt & Whitney, Hartford, Conn., the Underwood Typewriter Company, Hartford, Conn., and many, many others in the whole country might be cited to show that the apprenticeship system is not dead, that it exists not only in its old-fashioned type, but in its modern up-to-date type, and is constantly progressing toward the highest form of trade and technical instruction.

GENERAL CONSIDERATIONS AND CONCLUSIONS.

If industrial education means the sort of education which relates to the industries and attempts to prepare our workers for them, it is proper to examine the needs of these industries and the manner in which they are endeavoring to meet these needs.

One of the greatest needs is for skilled workers. This has been a very acute problem in days of prosperity and a serious phase of the labor question at all times, due to the rapid development in processes of manufacture, which has required an adaptability on the part of the workers that has been hindered in its development by the very nature of the evolution of manufacturing methods.

Advocates of industrial education, in their presentation of the needs of such education, have overlooked some very important developments in factory management along the very lines of the improvement in labor conditions which they so strenuously urge upon the general public. These advocates claim that the apprenticeship system has passed away, and that some form of public education must be provided in order that the workers in our industries may be trained for their work.

It is fortunate for these workers that the old form of apprenticeship is passing away. It does not meet the present industrial conditions. It may be very picturesque to look back upon olden times, and think of the boy who was indentured to a master craftsman as binding himself for a term of seven years, of living in his master's house, of sitting at his master's table, and attending his master's church, and being started out at the completion of his term of service on life's road with a new suit of clothes and a word of God speed.

There is another side to the picture, however. The boy served a term of seven years, when it would have been possible, through a more definite training, to have taught him his trade in much less time. Although he lived in his master's house, he performed many times certain domestic duties. "Learning the trade" meant a long period of shop sweeping, running errands, and other labor which bore little or no relation to the trade itself.

To be sure, he had the opportunity of working under one master craftsman, and eventually absorbed all of the skill and knowledge of his master. But the shop conditions of that time were different from what they are to-day. The master knew the whole of his trade and practiced it every day. There was little subdivision of labor, little differentiation of the industry into subdivisions, no elaborate factory system such as exists to-day.

Fortunately there can be no general return to the old apprenticeship system. The present industrial conditions will not allow of it, and it would be absurd to consider present social conditions meeting the old relations between apprentice and employer. No one with a right understanding of present industrialism, its spirit, purpose, and methods would advocate for a moment a return to the old system of manufacturing. Without a return to this older industrialism one could not expect to have any regard for the experience of the former apprenticeship system.

The proprietors of industrial establishments at the present time are not blind to the necessity of training labor in their own works. There is hardly a manufacturing firm to-day, especially in machine trades, in jewelry trades, in shipbuilding trades, which does not have some form or other of apprenticeship system whereby the boys are indentured for a term of years to the trade.

As in olden times some boys were fortunate in living and working for good employers, who cared for them physically and ethically and taught them the trade in which they promised to serve, so to-day one finds varying phases of apprenticeship agreements and fulfillments. The present systems range from those which merely indenture the boy for a term of years, with a gradual increase of wages, but without a very definite system of shop training, which is so necessary for the keeping of the agreement made by the employer that the "boy shall be taught the art and mysteries" of the trade, to the system employed by some of the best industrial establishments in the country, where definite facilities are given for the boy to learn the trade, and where he may go to a school connected with the factory, and where his daily trade work and his personal life are carefully supervised by a salaried officer whose special business is to look after the apprentices.

The point for consideration by the student of industrial education is, to what extent do these modern apprenticeship systems meet the arguments advanced for the introduction of industrial education as a part of the public school system. All employers realize the importance of this kind of education. Those who can afford it prefer their own system. More, not able to maintain schools in connection with their works, are in favor of the public supply of the facilities. But it is very rare to find an employer opposed to some scheme of industrial education.

In the careful investigation of the apprenticeship systems of the country for the purposes of this publication, it has been found that there is a wide variance in their procedures. For example, in the machine trades, very few industrial concerns have no system; the majority have a system of indenture for a term of years, while a few have a very elaborate scheme, whereby they give a trade training which will compare favorably with the best public industrial training which can be offered. The building trades have a system of trade training more like that of former times, due to the nature of the trade, as their materials are still put into position by hand, and boys can be assigned to work under master mechanics as of old. On the other hand, any apprenticeship system which may have formerly existed in the textile industry would be entirely out of question under modern factory conditions.

In the shoe industry there has been such an enormous growth in the use of machinery and such a consequent subdivision of labor, that no apprenticeship system worthy of the name can be introduced. This will be clearly recognized by the statement that there are over 100 operations in the making of a shoe, while the industry itself has been subdivided into last making, leather working, shoe making, shoe machinery manufacture, shoe fixings, finishes, etc.

The printing and book-making trades have an apprenticeship system in common with other less important industries.

It is readily seen that some industries have great possibilities in their own works for the proper training of employees, while other industries must look to public industrial education to meet their needs for skilled and intelligent workers. The point to bear in mind in this connection is that industrial education must be adjusted to the labor requirements of these various industries. In some cases the public school system must actually supply, as far as any such system can supply it, the demand for skilled workmen. In other cases training in a school must be supplemented by the training in the shop; and finally, the public school may have as its function simply the proper preparation of boys and girls for the practical and efficient training received under an excellent apprenticeship system.

It is worthy of note in this connection that an intelligent comprehension of the needs of a modern apprenticeship system exists in a great majority of those industries where such a system is possible. The last ten years of unprecedented prosperity have made the need for skilled workers so acute that every industrial concern of note is alive to the necessity of some plan of training industrial workers through a factory system. Instead of a decadence of the practice of indenturing apprentices there is a marked revival of a definite system of training labor, and it is but a question of time before industrial education as it exists in theory will confront the apprenticeship system as it exists in fact.

The tendency toward the general adoption of some form of apprenticeship is decidedly marked in all trades and industries where such a system is practicable; indeed, it is but a question of time when all concerns will have as good a system as a few now have, and these few will have a system far superior to the one now existing. In view of this fact it is worth while to examine the principles and methods of some of the best of these systems.

A careful selection is made of boys fitted for the particular work in view. They pass a physical, mental, and moral examination, which corresponds to a school-entrance examination. Allowance is made for previous shop experience or academic training. Graduates of manual training schools and technical colleges have their period of apprenticeship shortened.

Their rate of pay is determined beforehand and increases frequently enough to make the boys feel that they are getting ahead. Some firms advocate a deposit as a guarantee of good faith and to assist the parent in taking the matter of indenture more seriously. Other firms retain the money earned during the trial service until the term of indenture has been completed. The majority of firms give a bonus varying from \$50 to \$150 at the completion of the term of service to those boys whose conduct, both moral and technical, warrant it. This procedure has the same effect as school ranking and certificates.

The length of service is definitely agreed upon when the indenture papers are signed, and usually is four years, depending, however, upon the particular trade and the age at which the candidate enters it. The older the boys, the less time is available for this service.

The kind of work the boys do is varied, and in this way the future of the apprentice is considered, as well as the profits to be derived from his service. A schedule is arranged beforehand, so that the boy may know how much time he will be expected to give to certain processes and machines. In brief, it is a shop course of study such as any industrial school would be expected to have. At least three large concerns have special shops set aside for the first two years of training of apprentices, which practice guarantees to every boy an equality of opportunity, and affords him expert instruction in the practical work during the most important part of his course.

This plan makes a close approach, in its spirit and purpose, to industrial education, in that there is a special shop instructor qualified to teach a definite shop course—a man who teaches the boys the best principles of manufacturing, and prepares them for the other work which comes in the regular shops in the last two years of service.

There can be no question raised as to the value of the instruction received in such a training room. The shop methods are up-to-date, and the learning of them is not dependent upon master workmen in the regular shops, whose methods may be more or less obsolete or who may be indifferent to imparting knowledge.

Nearly all of the best concerns which have the modern apprenticeship system "arrange for" academic work to supplement the work in the shop. They recognize that the object of the system is to teach the boy a trade, and that the trade can not be learned unless the boy knows the mathematics, mechanics, and business methods which accompany the trade. This instruction is given by some establishments in a schoolroom connected with the factory. When the teacher of these subjects is a master of pedagogical principles, and has an interest in boys and a knowledge of the industry, it is readily seen that this supplemental academic instruction, combined with shop training, is a very strong competitor of the best industrial education under public auspices that could be devised.

The phrase "arranged for" has been used advisedly, for no two concerns agree as to the method they employ for this academic instruction, and unfortunately the methods adopted sometimes lack in definiteness. The public industrial or trade school will always be a better place for a boy to receive the proper academic instruction, unless the industrial establishments make an effort to arrange means of imparting more definitely this instruction.

A few manufacturing concerns, such as the General Electric Company at West Lynn, Mass., the Fore River Shipbuilding Company at Quincy, Mass., the Yale & Towne Manufacturing Company at Stamford, Conn., and the George V. Cresson Iron Works at Philadelphia, together with three large railroads, have each provided definite instruction in the theory as well as the practice of the trade it represents. In each case one of the engineering staff has been chosen as the academic instructor, and through special text-books and notes the boys are shown the reason for shop processes and the application of principles of mathematics and science. None of these concerns give instruction in English or history except such as may incidentally be called for in class discussion. The special text-books and notes on mathematics and mechanical drawing which are used are exceedingly practical, and furnish an object lesson for any student of industrial education. In cases of advanced apprenticeships the boys are taught on "company time," being paid for the time consumed. This is an essential feature of modern apprenticeship systems.

The majority of the concerns having an apprenticeship system fail to provide in their works definite instruction in the related subjects of mathematics and science. An investigation shows that they "encourage" boys to attend public evening schools, mechanics' institutes, and the Young Men's Christian Association classes. Careful investigation shows that this encouragement lacks definite results. The effort of the boys is not followed by definite reports from the school authorities, and in only one instance, the Baldwin Locomotive Works, do the factory managers know definitely how many boys attend the evening schools. The Baldwin Locomotive Company require those apprentices who are deficient in school training to attend the public evening schools, and last year 143 out of 338 who were serving their time were required to attend.

To "encourage" boys to take correspondence school work and evening school instruction without following them up or offering definite inducements for so doing by a shortened apprentice course, while it may show a tendency on the part of employers to recognize the efficiency of education, will not bring the results that public industrial education would produce where book instruction was a required part of the course for every boy. In this respect the appren-

ticeship system as now carried on is in marked contrast to the work which would be done in the regular industrial or trade school.

In all the better apprenticeship systems the boys are in charge of a competent man, whose duty in whole or in part is to see that a proper selection is made in engaging new boys and in looking after their general welfare. He is expected to encourage clean personal habits, inculcate right ideals of work, and exert a wholesome influence on the boy both inside and outside the factory.

There are certain well-defined advantages of a proper apprenticeship system over almost any industrial school system which is likely to be devised. A good shop system assures the boy a practical training in actual shop processes and methods, for every apprentice is employed on the regular factory product. The psychological value of commercial work is of great importance. It takes a boy out of the sphere of theory and into that of practice. It clinches the boy's interest, and makes him realize that the product of his work is to be a part of some useful machine. It makes him familiar with factory life and system. It may save the time of the boys, for the boy coming from the school shop, no matter how good his training, must start as an unknown quantity with his new employer and win his way from the beginning, while a boy already four years in the service of the company may have won their confidence and esteem, may have developed ability and a spirit of loyalty, so as to put himself in line for promotion even before he completes the apprenticeship term of service.

The apprenticeship system of a large factory which is the chief industrial concern of a city, will naturally be considered by the public as the substitute for a trade school, as both parents and boys will argue that as long as the boy is eventually going to work for the concern, it would be just as well to start at once after leaving the grammar school and not "waste" time by attending a special school, in view of the fact that the concern would not recognize the preparation of the trade school graduate by deducting more than a year or two from his term of indenture.

The apprenticeship course gives a boy a chance to earn as well as learn. This has an important bearing upon industrial education, for the class of boys which will be attracted, in the minds of the advocates of apprenticeship, are just the ones who can not afford to spend four years in a trade school where no opportunity is presented to earn money. The idea of earning money is strongest in a boy in his early teens, and in his desire to be a producer the apprenticeship course will appeal to him.

In so far as the apprenticeship system does not overemphasize academic instruction, and there is no evidence that it ever will, it will offer great inducements to the boy who does not want to study.

Those who favor industrial schools make a special point of the appeal which schools of this character will make to boys of this type. Indeed, every industrial school programme published at the present time places less emphasis on academic instruction than now exists in our manual training high schools, but at the same time the school side overshadows the shop side. The apprenticeship system stands for shop first and the school afterwards.

The apprenticeship appeals to the parents of boys as being very practical. The prevailing opinion among the majority of people that a trade can only be learned in a shop, is one that a trade school will have difficulty in meeting in the face of definite shop training presented in the form of the modern apprenticeship system. It is not intended to convey the impression that the parents are correct in their assumption, but merely to point out that such an impression exists and will have a marked bearing on the problem of trade school education.

Apprenticeship systems appeal to the employer because he can train boys in processes and methods peculiar to his business, or in what, rightly or wrongly, he considers as being peculiar to him. Even in the case of the best of trade schools the employer would have to adjust his methods to those employed in the school, or else the school would have to fit its courses to meet the needs of the manufacturer, and the latter would be impossible where a large number of concerns of similar character existed in the same city. Moreover, the employer can afford to teach a boy who is inexperienced if he is an apprentice, as he can make a profit on him. If the boy were a trade-school graduate, he would want more pay at the start than the employer could afford to pay him, in view of the fact that the boy would require time to adjust himself to shop conditions.

The apprenticeship system most certainly appeals to the majority of workingmen, in that it starts the boy at the bottom round of the industrial ladder, and through a natural process of the "survival of the fittest" eliminates the undesirable elements. The trade school might give its graduates an impression that they were predestined to be foremen, and aside from causing hard feelings on the part of shop-trained boys, would tend to close the door of advancement to those who were not graduates of trade schools. It is of social and industrial significance that our head workers should rise from the ranks if we are to get the best results from the mass of industrial workers. On the other hand, the apprentice would advance through a deserved promotion gained by experience to positions of responsibility. His personal contact with the rank and file would leaven the entire mass of his fellow employees. The experience of men now foremen and superintendents who have risen from being apprentice boys points

out that they get along better with those under them because they were "one of them."

A proper apprentice system is the only way to give trade training in lines of industry located in small cities and towns where there are not enough industrial workers to warrant a special public trade school, or in those industries, located in large cities, which have a special line of manufacturing which no public school would be warranted in teaching to boys, because of the expense of special courses of instruction for one industry which was not typical of the majority of the other industries.

The impression must not be given that all apprenticeship systems are a substitute for the trade school, for there are at the present time, as has been pointed out, but a few concerns which carry on an apprenticeship system that meets the entire social and trade problems as would a good trade school. Given a practical sort of trade school with the emphasis on the shop side and a system of academic instruction well correlated with the shop instruction, and, on the other hand, a first-class apprenticeship system with thorough shop training and a reasonable amount of academic instruction, it might be hard to see which would be the better for the boy. With a poor apprenticeship system, with the exploitation of the boy at the expense of shop and academic training, there would be no question of the advantage of the public trade school.

It is to be noted that not all the boys of a community work in a shop which has a complete apprenticeship system such as has been outlined. There are some shops which have merely an indenture system without definite shop training, and no academic training. There are others which are engaged in a line of work where no apprenticeship would be possible, and still others which are too small to have more than a half a dozen apprentices and in which it would not be feasible to have any elaborate shop and school training in their works. Under such conditions these industries must look to public trade schools to supply their need for skilled labor. Investigation shows that there are few cities where there would not be need for public industrial education which would have two purposes in view, one the preparation of boys for the advanced type of apprenticeship system, represented in a few of the local factories, and the other a trade training which would be a substitute for the lack of first-class shop training which might exist in the remaining shops.

There is still a large number of shops in which there is a so-called apprenticeship system that exists in name only, and this condition is worthy of more than a passing notice.

The apprenticeship system should have as its basis a mutual agreement between two persons, the employer and the boy, to perform certain acts which are of mutual advantage, the employer agreeing to

teach the boy a trade, and the boy in return agreeing to be faithful in the performance of his duties and to continue his services for a certain definite time. No contract can be worthy of the name if it is one-sided, and no apprenticeship system will succeed where the interests of the boy are not bound up with those of his employer.

The problem of trade training is made very complex by the present system of specialization, and owing to the short time required for a beginner to learn a single process and become a productive unit in the factory. A proper apprentice system will guarantee to the boy the opportunity of learning his trade as a whole, at a fixed wage with a steady increase.

The employer must provide shop facilities so that the boys can receive this all-round training, and so avoid the exploitation of the boys. Unless great care is exercised such exploitation is very probable, for the foreman and the boy are working at cross purposes. The boy expects definite shop training, wants to procure all possible information in the shortest time, and desires a variety of work and opportunity to work in all departments. The foreman, on the other hand, representing the company, strives for economy, for cheapness of production, and he can better further his ends by keeping the apprentice on one class of work and in one department for a long time.

Few foremen combine a legitimate care of their own interests with a proper appreciation of the boy's objective. The average foreman utilizes the apprentice at first for an errand boy. Then he gives him simple work at a bench, such as chiseling and plain filing, cleaning of small castings, or assisting the stockkeeper in handling small tools and stock materials. While this procedure accustoms the boy to the factory atmosphere and gives him an elementary knowledge of his trade, it does not take long before the bend in the efficiency curve is reached, and any further expenditure of time gradually becomes more and more disproportionate to the additional advantage gained.

This forces the apprentice to push himself forward in order to learn different classes of work, and the foreman is usually slow to respond by giving him the advantage of a variety of training, because if the boy is inefficient at some particular work he will naturally be held at that work for improvement, and, on the other hand, if the boy is efficient, the foreman is likely to keep him for an undue length of time on it in order to get the greatest commercial advantage from him.

Sweeping floors, piling castings, and running errands may try out the boy and test his ability to stick to his job, but these qualities would be tested just as well by assigning him to definite bench or machine work, for the shop management ought to be ascertaining the boy's ability to make a good mechanic.

When the shops are in control of narrow-minded workmen the apprentice labors under a great disadvantage, in that the workmen fail to show the boy anything. Either through ignorance or maliciousness the workmen fail to point out to the boy the best method of doing the shop work. They would have him "pick it up" as they did. In some cases the workmen themselves do not know the latest principles in shop work. Through special shop training rooms the General Electric Company has been able to develop a standard of labor-skill which would not have been possible if the boys had been thrown in contact with the mass of mechanics. When these boys graduate from the apprentice course they set a standard for the whole factory organization.

Another disadvantage of some apprenticeship systems is that certain establishments are so large, have so many departments and so many operations and processes, that the capacity and time of the boy are fully employed in mastering the details of one department to the exclusion of all other departments. This tends to keep the boy in that department after he has finished his term of apprenticeship service, and prevents him from working in any other department in another factory should he desire to leave the employ of the firm. Public industrial or trade schools should never become so narrow in their scope as to prevent an all-round shop training.

Up to this point the argument has concerned itself with two phases of the apprenticeship system, one a definite and complete system, which may or may not be a substitute for the trade school, depending upon conditions both civic and industrial; the other an indefinite and incomplete system, which lacks the fulfilling of a mutual obligation, which is very essential to a properly conducted apprenticeship course. There is yet another form of apprenticeship system now in existence which has a very important bearing on the whole subject of industrial education. It represents just as definite and complete a system as the one first referred to, except that it indentures apprentices to one department, and one department only, for a term varying from one to two years. It is called the special apprenticeship system. It has been adopted by the National Association of Machine Tool Builders. This system takes into account the changing conditions in the machinery manufacturing business with regard to the increasing specialization which runs through the industry. It assumes that, if the vast majority of workmen are to be specialists, the apprenticeship system should recognize the fact and train boys for the work which they are going to do. The managers in these concerns state that it is a condition and not a theory which confronts them. They state that it is difficult to obtain boys for the general shop courses through the low rate of wages which can be offered them, because when boys are transferred from one department to another there is for the time

being a loss of efficiency as far as output is concerned. High enough wages to attract boys can not be paid without a loss in profit.

Under the special apprenticeship plan boys attain a good degree of efficiency in a comparatively short time, deliberate instruction in one department being reflected in an immediately increased efficiency, and the plan is furthered because it is found to be immediately profitable to the employer to give it.

These manufacturers have been hindered in their production by the lack of skilled men and the difficulty of procuring boys to learn the trade of machinist, for these boys could go right into the shop as machine hands and earn good wages at automatic machines.

The only way these firms could meet the problem was to give the boys, as special apprentices, the sort of work which paid a definite profit to the firm from the start. This plan appeals especially to boys from the country who, away from home, can not live on the small wages paid the general apprentice.

The special apprenticeship contract covers a trial period of two hundred and forty hours, and then an indenture to one of 11 departments—turning, vertical boring mill, horizontal boring mill, planing, milling, drilling, grinding, erecting, turret, vise, scraping. Not less than 12 cents an hour is paid the beginner, and at the end of one or one-half years he can earn as much as 20 cents per hour. The general apprentice course in many factories has frequently a maximum wage at the end of four years of service not approaching what is paid under the special apprenticeship plan at the end of a year's service.

As a rule, specialization limits capacity and narrows the mind. It is right as it secures special skill, but there should be something more in order to train the broad man.

Careful investigation shows that the demand for trade schools comes from employers who have no systematic, definite method of training their apprentices. These men are of the opinion that a public trade school would furnish them with a supply of skilled mechanics. Generally they have no more realization of the probable results of a public trade school, as far as producing skilled mechanics is concerned, than they have of the possibilities of a first-class apprenticeship system in their own works.

Those managers of industrial concerns who have now in operation a broad, comprehensive form of apprenticeship are in favor of trade schools, not because they will meet their special needs, but rather because they are in favor of all forms of industrial education, and the success of their apprenticeship system has proved to them that trade instruction can be made practical and effective. Moreover, these men desire to see the general introduction of trade schools to meet the needs of concerns which do not and can not have a system of apprenticeship as elaborate as their own.

In general it may be said that the superintendents of those industrial organizations which have this advanced type of apprenticeship, combining shop and academic training, do not feel that local schools will meet the needs of their own factories. They claim that the technical requirements of their business are such that no special public trade school could ever fill the requirements. This feeling exists very strongly among the managers of the various railroads which have adopted an apprenticeship system. Some of these men feel that the trade-school graduate would come into the shop with a more or less high opinion of his economic value, and the company would have to spend a couple of years making him over, and those years would be somewhat wasted as far as both parties were concerned.

Moreover, they feel that it is far better to train boys right in the shops in such a way that they can eventually become foremen and superintendents, than to train them outside the shops and then expect them to have the same influence on their shopmates that they would have if they had been taught in the same manner as the other boys. It is not to be understood that any of the industrial managers are opposed to trade schools "per se." They simply do not see the need for them in connection with their own concerns, but they do wish to have them for the "other fellow," who has no definite system of training skilled mechanics.

The Douglas Commission on Industrial Education emphasized the need for industrial schools which would provide for the boy and girl of from 14 to 16 years of age, who leave the grammar school and "waste two years" before they are wanted in the industries. This statement is reinforced through recent interviews with manufacturers. The terms of the indentures which these men have adopted do not provide for a boy before he is 16 or 17 years of age. These men find that many of the applicants have left school as soon as the law allowed, that they have been in all sorts of work, and that they have not improved mentally or morally and have forgotten many of the precepts taught in school. While they emphasize the fact that they prefer to give trade instruction to these boys in their own way, they would like to have boys better prepared in the lines of general intelligence, in hand training, with a better mental grasp of industrialism, a better understanding of practical mathematics, simple mechanical drawing, etc., and hence believe firmly in public industrial education.

While the question may arise as to the value of the trade school as compared with a first-class apprenticeship system, there is no doubt of the need for industrial training in our public schools as a definite preparation for the special shop training which is being

generally adopted in all modern shops, as well as for employment in those concerns which have only a mediocre system of training.

The unwillingness of manufacturers to employ a boy until he is 16 or 17, and so has reached the age of discretion as well as more physical maturity, makes it imperative that public education provide facilities for meeting this condition. The recent developments of the special apprenticeship system in the machine tool builders' trade only emphasize the need for this type of school. The tendency is toward specialization. There is no getting away from the fact. The rapid increase in the number of divisions of the various industries into related industries, the ever-increasing subdivision of processes and operations within a single department of an industry, mean that no worker can master the whole of an industry unless extraordinary effort is made, either by trade schools or by manufacturers through complete apprenticeship systems, to offset the prevailing tendency.

Specialization tends to narrow the field of vision of the worker. If this condition is likely to continue, and there is no reason to think this will not be the case, it means that the boy must receive some all-round academic and hand training before he goes to work, for it will be impossible for the majority to rise above the conditions imposed by the prevailing industrial organization. It is the common experience that few boys who enter upon the special apprenticeship system ever take up the full apprenticeship course afterwards. The pay at the end of the special apprenticeship service is too large in proportion to that which a boy would receive if he started over again in another department, to make it a sufficient inducement for him to continue a scheme of training which would make him a master of the details of all departments, of which there are as many as 11 in the machine tool industry.

The action of the National Tool Builders' Association in boldly stating that they expect to train specialists will do more to call to the attention of the public the necessity for broad industrial training before the age of 17 than any other procedure. The public must face the question as it stands.

There is a need for more practical application of mathematics and science in our public schools, whether they be the regular public schools as now conducted or the special industrial schools to come. The excellent work being done by the superintendents of apprentices in the large industrial establishments along lines of practical teaching, by shop problems bearing upon the formal subjects of arithmetic, algebra, geometry, mechanics, and chemistry, will have a great influence on the courses of study in the regular and special schools conducted under public auspices. It is a revelation to see the manner in which the teachers in these apprentice courses approach the problem of the application of theory to practice. Each example is a

concrete illustration of some mechanical or other principle of the daily shop practice. In some instances the teaching covers arithmetic, elementary algebra, mensuration, elementary trigonometry, elements of machines, power transmission, strength of materials, elementary electricity, mechanical drawing, and machine design. The apprentice learns a valuable lesson of the monetary value of such a training by the mere fact that the company is willing to pay his regular wage during the period that he is receiving this academic instruction.

No provision is made by many firms for academic teaching in connection with the apprenticeship system. Many firms do not feel that they can afford to do it, and express the conviction that either the public day school ought to meet this requirement or else the apprentices should attend a good evening school. But whenever a concern can have the boys engaged on productive work and at the same time give them academic training, all on a profit-paying basis, it is to be hoped that it will adopt the scheme of combined shop and school training.

As the matter now stands, the public evening schools and other agencies of supplemental education are the only ones to provide facilities for this school instruction for boys who have not received sufficient training to enter the trades. A few managers do not favor the evening school plan, as they believe that the boys are not in a physical and mental condition to do the best work. The majority are in accord with supplementary evening instruction, and believe that the principle of the survival of the fittest will serve to eliminate the boy who has not sufficient perseverance and patience, and leave the boy who is worthy of promotion to a higher position.

It appears that evening schools will have an important bearing on the future apprenticeship system. Doctor Balliet states that the problem of efficient evening school instruction is to-day one of the most serious educational questions. It is interesting to note that the apprentices themselves oftentimes prefer to attend evening schools conducted under private auspices rather than take public evening courses. In one concern which compels apprentices to attend some evening school, 42 per cent go to private schools where they are obliged to pay a fee and furnish their own text-books. They state that they receive more individual attention in these schools, and that the courses of instruction are more closely adapted to their needs.

Such a statement is seen to be undoubtedly true, if one considers that the majority of public school-teachers are regularly employed in the day schools and naturally use the methods and texts prescribed for day students. Private educational institutions which are available to these apprentices are usually open only nights, and have a

special corps of teachers selected from the various factories. While this is done for the sake of economy, as no institution could afford to pay a teacher at the rate of a full day's work for a few hours in an evening, it serves a pedagogical and industrial purpose by providing competent men who are fully alive to the requirements of modern industry.

It is but a question of time before public evening schools will offer opportunity for all classes of workers. Much of the instruction at the present time is adjusted to meet the needs of the commercial class. The time must come when the facilities of our manual training high schools and technical schools will be open to the apprentices of the community. The excellent example of the Springfield Technical High School in throwing open its doors to the mechanics of the city, whereby they can use the shops and drawing room, is worthy of emulation by other cities. The well-equipped Stuyvesant Technical High School in New York City will be open soon to the mechanics of the city. Other cities are contemplating a similar course. In this way whatever evils result from shop specialization can be met.

A differentiation in the teaching of the various subjects will eventually come about. In the German continuation schools one finds that there is "arithmetic for the machinist," "arithmetic for the carpenter," "chemistry for the textile worker," etc. There is no reason why a group of 75 apprentices now divided into three sections in our public evening schools without regard to occupation should not be formed into the same number of sections, but with each section made up of men in allied trades. Moreover, the teacher could be selected for his knowledge of that particular phase of the subject which his section was concerned with. It would not cost the school department any more to employ a man outside the corps of regular teachers, and the result would be more efficient service.

The varied experiences of manufacturers under the different types of apprenticeship which have been described lead to certain general considerations and conclusions regarding the relation of apprenticeship systems to general industrial education, including of course in the latter term trade schools.

Facts that have been given prove without question that the apprenticeship system, as is the case with trade schools and the more general industrial schools, is designed to train for a trade and to develop the mind. Thus the aim and purpose of all three methods are the same, each to be applied and developed in accordance with the conditions of industry and the opportunity of securing pupils or apprentices.

The facts also show conclusively that it can not be assumed that a trade or industrial school of some kind is the only agency by which an increased amount of skill can be obtained or secured. In the opinion of all educators who are advocating some system of education

by which there shall be secured this increased amount of skill, the apprenticeship system in its modern form must be reckoned with as a powerful element. The apprenticeship trade school and the half time trade school should not be neglected.

The main difference between these types of school and the general apprenticeship system of the better order lies in the former placing upon a separate department of industrial organization the duty of training apprentices in those features of a trade which can be best taught in a school. There are nearly as many expressions of these types of school as there are firms or industries in which an attempt is made to conduct them. These schools approach closely the supposed purpose of trade schools, and are at the same time closely allied to the apprenticeship system for two reasons: (1) in some cases they bear a direct relation to an apprenticeship system, as in the case of the North End Union, where one year is deducted from the regular indenture of the boy who attends the school; (2) because in other cases they are carried on by the concern itself as a part of the regular apprenticeship system.

The main difference between the public trade school and the schools that have been described is that the first is initiated by the public and may bear but little relation to the specific needs of employers, and may also have little direct supervision by them, while the second depend upon the initiative and oversight of the employing class. This class does not delegate its duties and attempt to place the responsibility of training efficient workmen upon the public. The advocates of these schools claim that it is not possible to teach trades well without virtually carrying on the business which each trade represents. Furthermore, they solve the perplexing questions raised by trade unions, whether trades should be taught to others than those already actually at work in the trades represented.

The North End Union School, an account of which has already been given, is an illustration of one kind which has a definite connection with the practical work outside of the school, even before the school instruction has commenced. It is a very marked example of the connection which may exist between school authorities and the employing class. It is unique in that a number of employers are interested. It is the training room for a number of printing offices, and is devoted to a single idea—a school of printing. But the principle of this school might be easily applied in other trades. It is a type of school for communities where there are many small concerns in the same line of work.

The Ludlow Textile School is of another order, embodying, however, the same general principles. It is controlled by one set of employers; it is an excellent illustration of the half-time school, and deals with a class of people who would never be encouraged to enter

a trade school where no opportunity was given to earn while learning. Again, the composition of the population at the Ludlow works must be considered, they being largely Poles, Italians, etc. The school is of a type for an isolated factory village having a large number of workers all engaged in one industry, and that of such a nature that a general textile school like those at Lowell and Philadelphia would not serve its ends.

Still another type, yet embodying some of the essential principles under discussion, is exemplified in the school of R. Hoe & Co., already described in detail; this school is conducted at the expense of the company, but after working hours; or perhaps more accurately stated, the apprentices stop work at 5 o'clock, wash up, have a little supper provided at the company's expense, then go to the school room, and for an hour and a half study those subjects which fit them to become expert machinists.

Educators can learn much from these three experiments. While the apprenticeship system, or the several systems, have a direct bearing upon industrial education, broadly speaking, there are some disadvantages as well as the great advantages that have been specified. Among the disadvantages there may be considered the following:

(1) Boys are hired by the employment department and not by specialists who understand boys. After selection, boys assigned to shop foremen are too often utilized as errand boys, to sweep floors, pile castings, and for other work having no relation to the processes of manufacture. It is claimed that this is done to "try out" a boy, yet it is for nothing more than to test his ability to "hang on," his neatness, promptness, politeness, etc. All these qualities could just as well be tested by assigning him to definite bench or machine work, or to the tool room or stock room, where he would become familiar with the stock, organization, etc.

(2) The apprenticeship ideal and the action of the foreman are often at cross purposes. The apprentice desires to learn a trade, while the foreman wants to cheapen the cost of production, and has a tendency therefore to exploit the boy. The placing of boys under the direct charge of journeymen and their acting as helpers to men who are on piece work are examples of this practice. The assigning of boys to automatic machinery and holding them there from the beginning of their course discourages them.

(3) In some shops where the foremen and workmen are somewhat narrow-minded, the apprentice labors under an enormous disadvantage, in that the workmen will not show him or teach him methods. Some of the older men have served their seven years, and they say, "Let the kid pick it up as I did." In one shop it was related during this investigation that a workman, when asked why he

did not show a young apprentice how to do a piece of work, replied, "Do you think I am a teacher?" It would seem as though it would be possible in every shop, no matter how small, to place the boys under the best workmen, those who would have the greatest interest in boys, even if these men were paid 25 cents a day more for special service. Of course the systems that have been described above provide for special instructors, and this sort of thing with them is entirely eliminated.

(4) In the departmental system which prevails in very-large concerns to a considerable extent, the boys are apprenticed to one department and can not obtain knowledge of any other. These departments are so large in themselves and have so many operations that they can easily employ all the capacity of a boy for the full term of his indenture. This is all right as long as the boy remains in the company's employ, but if he leaves and does not enter a competing company dealing in the same product he finds his being unsuited for general work a bar to further employment.

Some of the specific advantages and disadvantages of apprenticeship training and trade school training have been very briefly but positively summarized by a writer in *The Apprenticeship Bulletin*, published by the North End Union, Boston, Mass., for March 1907. They are brought in here because this work is an advocate of trade schools and modern indenture apprenticeship, and the statements are perfectly fair-minded. Some of the reasons why a trade school can render better service than the shop in developing a competent compositor are stated to be: (1) The school can help to make a profitable workman in a shorter time by giving him at once, under instruction, legitimate shop practice in the work of the trade, while in the shop a period of weeks, usually months, is devoted to sweeping, running errands, and similar work, and there is little or no opportunity given to practice the work of the trade. (2) The school can give a series of graded lessons, general and fundamental, upon which other work may be based and further efficiency more certainly developed, while in the shop there is no sequence in the kinds of work given to the learner, in that it is all alike routine work, or it is all so radically unlike to his untrained mind that he gets lost and flounders around in a maze of uncertainty. (3) The school can give the opportunity to do a task over and over again until it is done right, the opportunity to study each problem closely and deliberately, while in the shop there can be little or no chance to try again. The work must be thrown away or allowed to go imperfect. (4) The school can give a broader, more intelligent idea of the relation of parts to the whole. Where there is an opportunity to practice all the usual operations of production, the beginner learns the depend-

ence of each part upon the others. When he locks up a form on the stone he learns why it is important that the composition in the stick or on the galley should be accurately justified. When he puts a form on the press he learns why the work on the stone should be done so that the lock-up is firm and square. In the shop, on the other hand, the tendency to make him do one thing may permit him to become a tolerably good workman, but he is helpless in emergencies and can not grasp any unusual problem. (5) In the school the instruction is direct and personal, given by one who is selected not only because of his superior qualities as a craftsman, but because of his ability to teach. In the shop the instruction is haphazard and accidental, given by a foreman who is already harassed by a multiplicity of details, not to mention his temptation to exploit the boy for the sake of profit to his department.

The same writer gives a few reasons why the school can never take the place of the shop. The shop emphasizes the value of time, on which cost of production is based. A clear perception of how a piece of work should be done is necessary at the outset in order to avoid waste of time and a consequent money loss. Also while a degree of skill and efficiency can be acquired in a school, it needs the incentive of the commercial demands of the shop to develop them to a higher degree. The writer closes by saying that on the whole the shop gives opportunities of putting into practice the principles which have been learned in the school.

These points are apropos not only to the printing trade, but to all others, and the wisdom of the reasons for and against any particular form of trade education, must appeal to all who are looking for the best results of industrial training. With a wise coordination all these various elements lead to the most satisfactory results. It is too late to advocate any particular form of industrial education as the only one. As already intimated, the point should be emphasized in closing this study, that the broad-minded educator on industrial lines must reckon with them all if he hopes to win the public, or gain the great objects sought both by educators and by manufacturers. Narrowness, jealousy of systems, special advocacy of one or the other are prejudicial.

The advocates of the trade school pure and simple must be broad enough to see the benefit of the wider industrial training, and the advocates of this kind of training must acknowledge the great results secured by trade schools and by a modernized up-to-date apprenticeship system.

**LIST OF REFERENCES RELATING TO THE EDUCATION OF
APPRENTICES.**

- Albertson, Ralph. The decay of apprenticeship and corporation schools. *Charl-
ties and The Commons*, 19: 814-20, October 5, 1907. Illus.
- Banes, Charles H. Manual training and apprenticeship schools in 1890. Phila-
delphia, George H. Buchanan and co., 1890. 81 p. 8°
- Barter, Frank. Training apprentices. *Cassier's magazine*, 21: 16-21, November
1901.
- Becker, O. M. Modern adaptation of the apprenticeship system. *Engineering
magazine*, 32: 169-76, November 1906.
Systems by representative American employers.
- Modern adaptations of the apprenticeship system. *Engineering magazine*,
32: 321-37, December 1906. Illus.
- Burk, Addison R. Apprenticeship as it was and is, with some suggestions about
industrial schools for the training of workmen. Philadelphia, Philadel-
phia social science association [1882?]. 26 p. 8°
- Burlingame, Luther D. An example of the modern development of the appren-
ticeship system. *Engineering magazine*, 26: 511-19, January 1904.
The author is chief draftsman of the Brown and Sharpe manufacturing com-
pany, Providence, R. I.
- The apprenticeship system in America. Its relation to trade schools and
the influence of each on American exports. *Cassier's magazine*, 31: 72-77,
November 1906.
- Cárdullo, Forrest E. Apprenticeship and industrial education. *American ma-
chinist*, 29-1: 244-46, February 22, 1906.
- Carlton, Frank T. The apprenticeship question in America. *Cassier's magazine*,
27: 498-501, April 1905.
- Function of the school in the training of apprentices. *School review*, 12:
631-34, October 1904.
- Cheroumy, Henry W. The burial of the apprentice . . . New York, The Cheroumy
printing & publishing co., 1900. 193 p. 8°
- Goss, William Freeman Myrick. Graduate apprentices. *Engineering magazine*,
27: 257-59, May 1904.
- Hampson, Thomas. The apprenticeship question and industrial schools. In
National education association. *Journal of proceedings and addresses*,
1885. New York, 1886, p. 151-59.
- Hayward, John A. Apprenticeship schools for the young . . . Washington,
Gibson bros., printers, 1887. 11 p. 8°
- McArthur, Arthur. Apprenticeship. *In his Education in its relation to
manual industry*. New York, 1884, p. 178-95.

- Mack, John G. D.** Trades training for non-technically educated men. *In Society for the promotion of engineering education. Proceedings, 1901.* p. 310-20 (29)
 Summer school for apprentices and artisans, at the University of Wisconsin.
- Massachusetts.** Board of statistics of labor. The apprenticeship system. *In its Thirty-seventh annual report, January 1905.* p. 1-86.
 ——— [Separate] Boston, Wright & Potter printing co., 1906. 86 p. 8°
- Minnesota.** Bureau of labor statistics. The apprentice system. *In its Fourth biennial report, 1894.* St. Paul, Pioneer press, 1895. p. 126-382.
- Parks, E. H.** The question of apprentices: How it is solved in the United States. *Cassier's magazine, 23:* 190-201, November 1902.
Editorial, with forms of indentures, p. 201-204.
- Paterson, Robert.** Instruction of apprentices. *Engineering magazine, 26:* 438-40, December 1903.
- Rawson, S. G.** The Nation, the apprentice, and the polytechnic. *Contemporary review, 80:* 584-98, October 1901.
- Reynolds, J. H.** Technical training of the schools as a substitute for apprenticeship. London, 1895. 15 p. 8°
- Schurz, Carl.** Technical instruction versus apprenticeship. . . . New York, 1886. 18 p. 16°
- Stratton, George Frederick** (Carling, George, *pseud.*) A rising industrial problem: the new apprenticeship. *Engineering magazine, 34:* 401-13, December 1907.
- Thompson, Langdon S.** Decay of apprenticeship: its cause and remedies. *In National education association. Journal of proceedings and addresses, 1881, p. 246-51.*
- Thompson, Silvanus Phillips.** The apprenticeship of the future. *American architect, 8:* 148-50, 162-63, September 25, October 2, 1880. *Also in Contemporary review, 38:* 472-85, September 1880.
 ——— Apprenticeship: Scientific and unscientific. *Society of arts. Journal, 28:* 34-42, December 5, 1879.
Discussion, p. 42-47.
 ——— Technical education: Apprenticeship. London, 1879. 56 p. 8°
- Thurston, Robert Henry.** Apprenticeship question. *Science, n. s. 5:* 299-300, February 10, 1897.
- Trade apprentices in public schools.** *World's work, 5:* 3306-67, April 1903.
- Weyl, Walter E., and Sakolski, A. M.** Conditions of entrance to the principal trades. *In United States. Bureau of labor. Bulletin no. 67, November 1906, p. 681-780.*

APPRENTICESHIP LAWS.

France. . . .

Décret du 17 mars 1888, portant règlement d'administration publique sur les écoles manuelles d'apprentissage. *In Ministère de l'Instruction publique et des beaux-arts. Classement général des écoles primaires publiques. Paris, Imprimerie nationale, 1888. p. 45-52 (Musée pédagogique. Mémoires et documents scolaires. no. 79)*

Germany.

Hoffman, F. Die organisation des handwerks und die regelung des lehrlingswesens auf grund des reichsgesetzes vom 26. Juli, 1897. Berlin, C. Heymann, 1902. viii, 383 s. 3. aufl.

Kell, K. Die neuordnung des handwerker- und lehrlingswesens. Eine gemeinverständliche darstellung der vom geltenden rechte abweichenden vorschritten des reichsgesetzes, betreffend die abänderung der gewerbeordnung vom 26. Juli, 1897. Leipzig, E. Avenarius. xvi, 120 s. 8°

Great Britain.

Austin, E. Law relating to apprentices. London, 1890. 216 p. 8°

United States.

United States, Commissioner of labor. Digest of apprentice laws. Special report, Washington, 1904. p. 13-30.

INDENTURES.

[Forms of indentures] Casster's magazine, 23: 201-204, November 1902.
Editorial, following article by E. H. Parks.

Bache, Alexander Dallas. Regulations of Heriot's Hospital [Edinburgh, Scotland; for the apprenticeship of pupils leaving school] In his Report on education in Europe to the Trustees of the Girard college for orphans, Philadelphia, 1830. p. 644-45.

TRADES UNIONS AND APPRENTICESHIP.

Bemis, Edward Webster. Relation of labor organizations to the American boy and to trade instruction. American academy of political and social science. Annals, 5: 200-41, September 1904.

— Relation of trades unions to apprentices. Quarterly journal of economics, 6: 76-93, October 1891.

Motley, James M. Apprenticeship in American trade unions. Baltimore, Johns Hopkins press, November-December 1905. 122 p. 8° (Johns Hopkins university studies in historical and political science. Series xxv, nos. 11-12)

APPRENTICESHIP OF GIRLS.

Garsault, T. École d'apprentissage de filles. In his Histoire de l'enseignement primaire au Havre . . . Havre, 1880. p. 302-441.

[Oakshott, Mrs.] The écoles professionnelles of Paris (For girls) In London, County council. The apprenticeship question. Report of the section of the education committee appointed to consider the question of apprenticeships. [London, 1900] James Truscott & son. p. 40-45.

EDUCATION IN SPECIAL TRADES.

Bookbinders.

Massachusetts. Commission on industrial education. Industrial continuation schools for bookbinders' apprentices. Munich, Boston, Wright & Potter printing co., 1907. 11 p. 8° (Bulletin no. 5)

Building trades.

Slies, George C. Apprentice system in the building trades. *Journal of political economy*, 2: 397-423, June 1894.

Electrical engineers.

Downton, Charles Edward. The training of apprentices in an engineering works. *Engineering magazine*, 26: 380-89, December 1903. Illus. Westinghouse electric and manufacturing company.

School for apprentices of the General electric company, Lynn, Massachusetts. *Engineering magazine*, 32: 625-28, January 1907.

Stratton, George Frederick (Carling, George, *pseud.*) The improvement of opportunity for the young workman. *Engineering magazine*, 33: 774-79, August 1907.

Foundrymen.

Kreuzpointer, Paul. What can our schools do for our foundry apprentices? *American foundrymen's association. Journal*, 10: 141-53, February 1902.

Lane, H. M. Making a moulder. *American machinist*, 28-2: 130-32, July 27, 1905.

Plan for a school for foundry apprentices.

Gardeners.

Massachusetts. Commission on industrial education. Industrial continuation schools for gardeners' apprentices. Munich. Boston, Wright & Potter printing co., 1907. 6 p. 8° (Bulletin no. 6)

Jewelers.

Massachusetts. Commission on industrial education. Industrial continuation schools for jewelers' and gold and silver workers' apprentices. Munich. Boston, Wright & Potter printing co., 1907. 12 p. 8° (Bulletin no. 1)

Mechanical engineers.

Apprenticeship in machine construction. *Engineering magazine*, 12: 852, February 1897.

Brocklehurst, Frederick. What Manchester is doing for engineering apprentices. *Engineering magazine*, 33: 247-54, May 1904.

Estep, H. Cole. The technical student and the engineering apprenticeship course. *Engineering magazine*, 27: 165-69, May 1907.

Gates, Philetus W. Apprenticeship system of the Allis-Chalmers company. *Engineering magazine*, 27: 23-26, April 1904.

Massachusetts. Commission on industrial education. Industrial continuation schools for machinists' apprentices. Munich. Boston, Wright & Potter printing co., 1907. 12 p. 8° (Bulletin no. 3)

Industrial continuation schools for mechanics' apprentices. Munich. Boston, Wright & Potter printing co., 1907. 15 p. 8° (Bulletin no. 4)

Status of apprenticeship in the trades concerned with the production of machinery. *American machinist*, 19-2: 1184-1203, December 24, 1906.

One hundred and sixteen letters from representative machine-building establishments and railway shops.

Vauchin, Samuel M. The system of apprenticeship at the Baldwin locomotive works. *Engineering magazine*, 30: 321-33, June 1904. Illus.

Printers.

[Hoe apprenticeship school] A successful factory school. *Review of reviews*, 34: 322-23, September 1906.

Railroadmen.

Barnard, W. T. Technical instruction in the Baltimore and Ohio railroad service. *In his* Service report on technical education, with special reference to the Baltimore and Ohio railroad service. October 1, 1886. Baltimore, 1887, p. 139-68.

Clarke, Isaac Edwards. The technological school of the Baltimore and Ohio railroad company. *In his* Art and industry. Washington, 1898, pt. 4, pp. 129-47.

Exhibits, p. 147-70.

Creighton, G. W. Apprenticeship system on the Pennsylvania road. *Scientific American*, 97: 223, September 28, 1907.

Cross, C. W. and Russell, W. B. Railroad apprenticeship system. *Engineering magazine*, 33: 786-88, August, 1907.

Eaton, J. Shirley. Railroad apprenticeship. *In United States*. Bureau of education. Report of the Commissioner for the year 1898-99, v. 1, p. 907-19.

Warman, Cy. A school for railway apprentices. *World to-day*, 10: 90-100, January, 1906.

Grand trunk railway system.

Woodworkers.

France. Ministère du commerce, de l'industrie, des postes et des télégraphes. Apprentissage industriel. Rapport sur l'apprentissage dans les industries de l'ameublement. Paris, 1905. 654 p.

EDUCATION IN FOREIGN COUNTRIES.

France.

France. Ministère de l'instruction publique et des beaux-arts. Programmes généraux des écoles manuelles d'apprentissage. Paris, Imprimerie nationale, 1888. 24 p. 8° (Musée pédagogique. Mémoires et documents scolaires, no. 74)

— Ministère du commerce, de l'industrie, des postes et des télégraphes. Apprentissage industriel. Rapport sur l'apprentissage dans l'imprimerie, 1880-1901. Paris, Imprimerie nationale, 1902. 96, 320 p. 8°

Garsault, T. École d'apprentissage de garçons. *In his* Histoire de l'enseignement primaire au Havre . . . Havre, Imprimerie du commerce, 1890, p. 347-91.

Salleis, G. Enseignement primaire et apprentissage. Paris, Sandoz & Fischbacher, 1878. 100 p. 2. ed. 12°

Thompson, Silvanus Phillips. Apprenticeship schools in France. London, Hampton, Adams & Co., n. d. 74 p. 8°

List of schools in workshops, p. 13-14.

- Tolain, H.** Rapport sur la création d'écoles d'apprentissage. Paris, 1883.
Reprinted in Pennsylvania. Commission on industrial education. Report
 Harrisburg, 1880, p. 430-43.
- United States.** Commissioner of labor. Manual apprenticeship schools . . . *In*
his Eighth annual report, 1892. Industrial education. Washington, Gov-
 ernment printing office, 1893. p. 243-65; 275-86.

Germany.

- Fritzsche, Gustav.** Ansprachen bei lehrlingsaufnahmen, lehrlingsentlassungen
 und meisteraufnahmen der innungen. Ein hilfsbuch . . . 2. aufl. Leip-
 zig, Breitkopf & Härtel, 1898. vi, 85 s. 8°
- [Klemin, L. R.]** Education of apprentices in Central Europe. *In Industrial edu-*
cation in Germany, Austria, and Switzerland. United States. Bureau
of education. Report of the Commissioner for the year 1895-96. v. 2,
 p. 1222-31.
- Scheven, P.** Die lehrwerkstätte. Tübingen, H. Laupp, 1894. xxx, 570, 143 s.
 8°

Great Britain.

- Howell, George.** Trades unions, apprentices, and technical education. *Con-*
temporary review, 30: 833-57, October 1877.
- London.** County council. Education committee . . . The apprenticeship ques-
 tion. Report . . . London, Printed for the London county council, 1906.
 45 p. F° (London, County council.) [Publication no. 925]
- Parsons, James.** Apprenticeship. *Society of arts. Journal*, 55: 303-12, Feb-
 ruary 1, 1907.
- Sanger, C. P.** The fair number of apprentices in a trade. *Economic journal*,
 5: 616-36, December 1865.
- Stratton, George Frederick** (Carling, George, *pseud.*) London prentice, his con-
 temporaries and successors. *Cassier's magazine*, 33: 621-26, April 1908.
- T., S. M.** London 'prentices. *New monthly magazine*. (London) *Second*
series, 5: 172-78. 1822.
- What should replace the apprenticeship system?** *Saturday review*, 101: 227-
 28, February 24, 1906.

APPENDIX.

DIGEST OF APPRENTICE LAWS.*

In the following digest, the apprentice laws are considered by States, the statutory provisions in all States being considered as nearly as possible in uniform order and not in the order in which they appear in the statute books.

ALABAMA.

A minor may be bound out by the parents, and when parents are unable to provide for his support, by the probate judge of a county.

A male may be bound out until he is 21 and a female until she is 18 years of age.

The master is required to see that the apprentice is taught his trade and to read and write, to provide him with good and wholesome provisions, necessary clothing, washing, lodging, and medical attendance, and at the expiration of the term of service, to furnish him with two new suits of clothes. He may enforce obedience and good behavior by such moderate corporal punishment as at common law a father or guardian is allowed to inflict.

It is unlawful to entice, decoy, or persuade an apprentice to leave the service of his master, to employ him, to furnish him food or clothing, or to give or sell him ardent spirits, without the written consent of the master.

Source: Code of 1897, sections 496 to 507, 5504 to 5509.

ARKANSAS.

A minor may be bound out by the father with the written consent of the mother; by the guardian if an orphan, without sufficient estate for its maintenance, and by the mother if the father is dead and no guardian has been appointed. In any case the indentures must be approved by the judge of the county court. A minor may also be bound out by the judge of the county court in case the parents have not the means, or neglect to maintain said minor.

A male may be bound until 21 and a female until 18 years of age.

The master is required to teach the apprentice a trade and to send the apprentice to school at least one-fourth of his time after he is 7 years old, and the apprentice must be taught reading, writing, and arithmetic to the rule of three, inclusive.

It is unlawful to entice, persuade, or induce an apprentice to leave the service of the master or to conceal him after leaving such service.

Source: Digest of 1894, sections 249 to 258, 1463, 4950.

CALIFORNIA.

A minor of 14 years of age or over may be bound by his father, or by his mother or guardian in case of the father's death or incompetency, or where he has willfully abandoned his family for one year without making suitable provision for their support, or is habitually intemperate or is a vagrant; by an executor who by the will of the father is directed to bring up the child to a trade or calling; by the mother alone if the child is illegitimate; and by the judge of the superior court if the minor is poor, homeless, chargeable to the county or State, or an outcast who has no visible means of obtaining an honest

* From Tenth Special Report of U. S. Commissioner of Labor (1904). An examination of recent legislation has failed to reveal any changes of importance to be made in the statutory provisions there given.

livelihood. If a minor has no parent or guardian competent to act he may, with the approval of the superior court, bind himself. The minor's consent must be expressed in the indenture and testified to by his signing the same.

A male may be bound until 21 and a female until 18 years of age.

The master must cause the apprentice to be taught reading, writing, and the ground rules of arithmetic, ratio, and proportion, must give him the requisite instruction in the different branches of his trade, and, at the expiration of his term of service, must give him \$50 in gold and two new suits of clothes to be worth in the aggregate at least \$60. In all cases the master must pay and deliver to the apprentice the money, clothes, and other property to which he is entitled under the indenture.

It is unlawful to entice, counsel, or persuade an apprentice to run away, or to employ, harbor, or conceal him, knowing him to be a runaway. A master may not remove his apprentice out of the State, but he may be discharged from the indenture by the superior court, if he wishes to leave the State.

Source: Acts of 1901, chapter 157, sections 51 to 63.

COLORADO.

A minor may be bound out by his father, or by his mother or guardian if the father is dead, incompetent, has willfully abandoned his family for six months without making suitable provision for their support, or has become a habitual drunkard; by the mother alone if the child is illegitimate, but subsequent marriage defeats her power to bind a child during marriage, whether illegitimate or not. In the above cases the consent of the minor, who is over 14 years of age, is necessary, and must be expressed in the indentures and testified to by his signing the same. A minor may also be bound out by a superintendent of the poor of the county if either the minor or his parents are, or may be, chargeable to the county or shall beg for alms; if the parents are poor and the father a habitual drunkard, and if the father is dead and the mother is of a bad character or suffers the minor to grow up in idleness, etc. A minor may bind himself if he has no parents competent to act and no guardian.

A male may be bound until 21 years and a female until 18 years of age or until marriage within said age.

An apprentice must be taught his trade and must be instructed in the common English branches of education, in some public or other school, at least three months in every year until he shall have arrived at the age of 14 years, and until he shall have received a common school education. He must be furnished with suitable clothing, food, and attention in sickness and health. Upon the expiration of his term of service, the master must furnish him a new Bible, and two new suits of clothes, to be worth, respectively, \$15 and \$25.

A master may not remove an apprentice out of the State, but the court may dissolve the indenture and again bind out the child, if the master wishes to leave the State. The death of the master discharges the apprenticeship.

Source: Statutes of 1891, chapters 6 and 26.

CONNECTICUT.

A minor may be bound out by the father or guardian, in which case the consent of a minor who is over 14 years of age is necessary; this must be expressed in the indentures and testified to by his signing the same. The selectmen of a town may, with the consent of a justice of the peace, bind out the children of any person who, having had relief from said town, allows his children to mispend their time and neglects to employ them in some honest calling, and of any person who does not provide competently for his children, whereby they are exposed to want; also any poor children who live idly or are exposed to want and have no one to take care of them. The trustees of the State Reform School may, with the consent of the boy or his parents or guardian, bind out any boy who is committed to said school during his minority. The directors of the Industrial School for Girls may bind out any girl committed to said school. The overseers of an Indian tribe may, with the consent of two justices of the peace, bind out children of said tribe who are poor, idle, and unprovided for. A minor, when of the age of 14, may, with the consent of the selectmen of his town, bind himself if he has no father or guardian within the State.

Males may be indentured as apprentices until 21 and females until 18 years of age, or until their marriage within that age. In the case of Indian children, males may be indentured until 18 and females until 16 years of age, or until

married within that age. Inmates of the Connecticut Industrial School for Girls may be indentured only for the terms of their commitment.

It is unlawful to elope or entice any lawfully bound minor from the service or custody of his master.

Source: General Statutes of 1902, sections 1250, 2828, 2829, 2841, 4427, 4684 to 4690.

DELAWARE.

A minor may be bound out by the father; by the guardian if there be no father residing in the State; by the mother if there be no father residing in the State and there is no guardian; by any two trustees of the poor if the minor is living in the almshouse, and by any two justices of the peace acting together if the minor has no parents residing in the State and has not sufficient property for his maintenance, or if his parents are not able to maintain and bring him up to industry and suitable employment. A minor when of the age of 14 may also bind himself if he has no parents and no guardian residing in the State, and in this case the consent of a justice of the peace is necessary.

The term for which apprentices may be bound is until 21 years of age in the case of males, and until 18 years of age in the case of females. Immigrants of full age may be bound out for a period of not more than five years.

Apprentices must be given a reasonable education in reading and writing, and must be furnished with proper support and clothing. Upon the expiration of the term of service the master must provide his apprentice with two new suits of clothing. The master has power to enforce obedience and good behavior by moderate correction and by suitable and sufficient means.

It is unlawful knowingly to harbor, conceal, or employ an apprentice who has run away from service; to deal with an apprentice without the consent of his master, or knowingly to encourage him to disobey his master's lawful orders or to neglect his business. An apprentice may be assigned from person to person by assignment executed under seal by both assignor and assignee, with the approval of any judge of the State or any two justices of the peace, whose approval must appear on the assignment, if bound to a person and his executors, administrators, and assigns. An assignee, executor, or administrator must take a minor upon the terms of the original agreement and be liable for all unperformed covenants.

Source: Revised Code, edition of 1893, chapter 70.

DISTRICT OF COLUMBIA.

A minor child may be bound as an apprentice by his guardian; or, if he has none, by his father; or if he has neither father nor guardian, by his mother, with the consent, entered of record, of the probate court, or without such consent if the minor, being 14 years of age, agree in writing to be so bound. The probate court may bind out an orphan child or any child abandoned by its parents or guardian; any child of habitually drunken, vicious, or unfit parents, when such child is not in the custody of a person who is providing for its maintenance and education; also any child habitually begging or kept in vicious or immoral associations.

The utmost term of apprenticeship is until the apprentice attains the age of 21 if a boy, and 18 if a girl. The term of a child bound out by the probate court is in the discretion of the court.

The master is required to teach the apprentice a trade, and also reading, writing, and common arithmetic; to supply him with suitable clothing and maintenance, and to pay such amount, if any, as may be agreed upon in the contract.

It is unlawful for any person to conceal, harbor, or facilitate the running away of an apprentice, or for a master, except in the case of mariners, to send or carry his apprentice out of the District. The contract of apprenticeship may, with the approbation of the court, be assigned by the master, or after his death by his personal representatives on such terms as the court may prescribe.

Source: Code of 1901, sections 173, 402 to 411.

FLORIDA.

A minor may be bound out by any court or by a guardian. If the minor is under 16 years of age the approval of the judge of the county court of the county of which his parent or guardian is a resident is necessary, and if said

minor is of the age of 16 or over, his own assent, evidenced by his signature to the indentures, is required. Poor orphans, without estate sufficient for their maintenance out of the profits, shall be bound out by order of the judge of the county court. When a person having control of a child under 16 years of age is adjudged a vagrant, said child shall be bound out by the court rendering the judgment. When a person applies to be placed on the pauper list of a county, the board of county commissioners, in granting said application, may in their discretion require that the children of such applicant under the age of 16 be bound out. When a child under the age of 16 is abandoned by the father, who fails to provide it with support and maintenance, it may be bound out by the judge of the county court, but not without the assent of the mother, unless she is unable or neglects to provide for its support and maintenance.

Male apprentices may be bound until they arrive at the age of 21 and females at the age of 18 years.

The master is required to teach the apprentice, in addition to his trade, the elements of reading, writing, and arithmetic. He must give the apprentice a new suit of clothes, shoes, and a blanket immediately upon the expiration of the term.

It is unlawful for any parent, guardian, or other person to entice, take, carry away, or harbor a child duly apprenticed to another, or to cause the same to be done.

Source: Revised Statutes of 1891, sections 2112 to 2116; 2404.

GEORGIA.

Minors may be bound out by their parents, and those whose parents are dead, or residing out of the county and whose estates yield profits insufficient for support and maintenance, or those whose parents, from age, infirmity, or poverty, are unable to support them, shall be bound out by the judge of the county court or the ordinary.

Minors may be bound out until they are 21 years of age, or for a stated period. A person of full age may bind himself for a valuable consideration for a limited number of years, not exceeding five.

It is the duty of the master, in addition to teaching the apprentice a trade, to teach him to read English, to furnish him with protection, wholesome food, suitable clothing, necessary medicine and medical attendance, and to teach him habits of industry, honesty, and morality. The master is permitted to use any such degree of force to compel obedience as a father may use with a minor child. At the expiration of the term of service the master must give the apprentice a small allowance with which to begin life, the amount to be left to the master's generosity. If he offers less than \$100, the apprentice may decline it, and cite the master before the judge of the county court or the ordinary, who, after a hearing, fixes the sum to be paid.

The master has a right of action against any other person who, after notice, employs his apprentice.

Source: Code of 1895, Volume II, sections 2542, 2598 & 2606; Volume III, sections 119 to 122.

ILLINOIS.

Only a minor under the age of 16 years may be bound out as an apprentice. Such a minor may be bound out by the father with the consent of the mother, or, in case of her death, habitual drunkenness, prostitution, imprisonment in the penitentiary, incapacity, or willful desertion of the family for six months, without her consent; by the mother, in case of the death, habitual drunkenness, imprisonment in the penitentiary, or incapacity of the father, and by the guardian in case neither father nor mother is living and free from above objections. An illegitimate minor may be bound by his or her mother. A minor may also be bound out by the executor or executors who are directed by the father's last will and testament to bring the child up to some trade or calling. A minor who habitually begs for alms, who is or whose parents are chargeable to the county or town, or who is supported in whole or in part at the charge of the county or town, may be bound out by the county board or overseers of the poor, as the case may be, with the approval of the judge of the county or circuit court. A boy committed to a training school for boys, or a girl committed to a girls' industrial school or to the State Home for Juvenile Female Offenders, may be bound out by the officers of said institution.

Apprentices may be bound out until they arrive at the age of 16 years.

An apprentice must be taught reading, writing, and the ground rules of arithmetic. Upon completing the apprenticeship the master must give the apprentice a new Bible, two complete suits of wearing apparel suitable to the condition in life of the apprentice, and \$20 in money. The above must be given only in case the apprentice has served one year or more, and they must be secured to and for the sole use and benefit of the apprentice.

It is unlawful for any person to counsel, persuade, or entice an apprentice to run away or absent himself from the service of his master, or for an apprentice to rebel against or assault his master. The master may not remove an apprentice out of the State without the consent of the county court. The death of the master discharges the apprenticeship.

Source: Annotated Statutes of 1886, chapter 9, sections 1 to 19; chapter 23, sections 121, 135, 136.

INDIANA.

A minor may be bound out by the father; by the mother, if there be no father, or if he be incompetent; by the guardian, if there be neither father nor mother. If the minor is over 14 years of age his consent is necessary, and must be expressed in the indentures and attested by his signature. The overseers of the poor (township trustees) may, with the consent of the county judge, indorse on indentures, bind out the child of any pauper supported in whole or in part by the county, and any child whose parents abandon or neglect or are unable to support it. They may also bind out a child having neither father, mother, nor guardian, and having no sufficient means of support or education; and any white child taken from any asylum in any other State and brought into the State of Indiana to be bound. Children so bound out by the overseers of the poor must be under 16 years of age. The superintendents of county asylums may bind out such poor children as from time to time fall under their care and charge. The board of children's guardians of a county may, by leave of the circuit court of the county, bind out children abandoned, neglected, or cruelly treated by their parents; children begging on the streets; children of habitually drunken or vicious or unfit parents; children kept in vicious or immoral associations; children known by their life and language to be vicious and incorrigible, and juvenile delinquents and truants. Any association for the purpose of establishing and maintaining an asylum and home for the care, support, discipline, and education of orphan children may bind out any inmate who has neither father, mother, nor guardian, or one whose parents have granted to the corporation the authority to bind the child. A minor may be bound out by manual-labor schools organized and incorporated under the laws of the State. The superintendent of the female reformatory of the State may bind out a girl committed there during her minority, but only with her consent. The superintendent of the Reform School for Boys may bind out a boy during minority, but only with his consent. A minor over the age of 14, having no father, mother, nor guardian, may bind himself, but the consent of the probate judge of the county, to be indorsed on the indentures, is necessary.

Children may be bound for a term not extending beyond the age of 21 years if males and 18 if females, but the marriage of a female annuls her indenture.

The indenture is not assignable.

An indenture binding a white apprentice, who has more than three years to serve must contain an agreement on the part of the master to cause the apprentice to be taught reading, writing, and the rules of arithmetic to the double rule of three, inclusive, if practicable. All valuable agreements on the part of the master must be for the benefit of the apprentice and may be sued on and recovered in his name.

It is unlawful for a master to compel an apprentice to work more than ten hours per day without additional compensation. An absconding apprentice may by order of court be returned to the master or if he refuses may be committed to jail. The master's death discharges the apprentice. In case the master removes from the State the discharge is optional with the apprentice.

Source: Annotated Statutes of 1901, sections 8180a, 8180c, 8183, 7200 to 7317, 8168, 8235, 8310.

IOWA.

A minor may be bound out, with a written consent appended to or indorsed on the indentures by the father; if the father is dead, has abandoned his family, or is for any cause incapacitated, then by the mother; if she is dead, or incapacitated, then by the guardian; or, if there be no guardian, then by the clerk

of the circuit court. If the minor is more than 12 years of age, the indentures must be signed by him of his own free will. A pauper minor may be bound out by the clerk of the circuit court without obtaining his assent. Poor children under 16 years of age in a poor house or house of refuge may be bound out by the board of supervisors of the county until 18 years of age or such earlier time as may be fixed, or until married before that time. Children in the State Reform School may, with the written consent of their parents or guardians, if any, be bound out by the trustees thereof until the end of their term or an earlier time.

The terms of apprenticeship, except as above indicated, may continue until the attainment of the age of majority, which is 21 years in the case of males, and 18 years in the case of females, or until marriage.

It is the duty of the master to send the apprentice who is 6 years old or over, to school, if there is one in the district, at least four months in each year, and he must clothe him in a comfortable and becoming manner and provide him with suitable and sufficient food.

The death of the master or his removal from the State dissolves the indenture unless otherwise provided or unless the apprentice elects to continue in his service.

Source: Code of 1897, sections 2704, 3229 to 3249.

KANSAS.

A minor may bind himself with the consent of the father, indorsed on the indentures, or, if he is dead, has no legal capacity to give consent, has willfully abandoned his family for six months without making suitable provision for their support, or has become an habitual drunkard, then of the mother or guardian, and if there is no parent or guardian, then of the probate court. An orphan or minor who has no estate sufficient for his maintenance may be bound out by his guardian with the consent of the probate court. An executor who is directed by the last will of a father to bring up a child to some trade or calling, has the power, with the consent of the mother, if living, to bind the child out. A poor child who is or may be chargeable to the county or shall beg for alms, whose parents are poor and the father an habitual drunkard, or, if there be no father, whose mother is of a bad character, or suffers her children to grow up in habits of idleness without any visible means of obtaining an honest livelihood, may be bound out by the probate court. Overseers of the poor of townships and cities and superintendents of county asylums may bind out such poor children as fall under their care and charge. The trustees of the State Reform School may bind out any boy committed thereto with his consent. An inmate of the Industrial School for Girls may be bound out by the trustees of said school.

Male apprentices may be bound until they reach the age of 18 years and females 16 years. Inmates of the State Reform School and of the State Industrial School for Girls may be bound out during their minority or for a shorter period.

An apprentice must be taught reading, writing, and the ground rules of arithmetic, the compound rules, and the rule of three. At the expiration of his term of service, the master must give him or her a new Bible, two new suits of clothes of the value of \$40, and \$10 in currency.

It is unlawful to counsel, persuade, entice, or assist any apprentice to run away or absent himself from the service of his master, or to harbor or conceal such an apprentice, knowing him to be a runaway. The master may not take his apprentice out of the State, but the probate court may discharge the apprentice from the service of such master, and again bind him, if necessary, to some other person.

Source: General Statutes of 1901, sections 295 to 318, 6088, 7120, 7130, 7151.

KENTUCKY.

A poor orphan and any other child whose relatives or parents, in the judgment of the court, will not bring them up in moral courses, may be bound out by the county court. Any orphan minor may be bound out by his guardian, or, if he has no guardian, by his mother, with the consent of the county court. Children of a man sentenced to the penitentiary may be bound out by the courts in their discretion. The board of trustees of the State House of Reform for Boys and the State House of Reform for Girls may also bind out inmates of these institutions.

The term of apprenticeship is until the apprentice attains the age of 21 years if a boy, and 18 years if a girl.

The master is required to furnish the apprentice proper medical attention, food, and clothing, and to treat him humanely. At the end of the term of service the master must pay the apprentice, if a boy, \$100, and if a girl, \$50, but if the master has taught the apprentice to read and write he is not bound to pay any money at the end of the term.

It is unlawful to entice an apprentice from his master or knowingly to conceal, harbor, or employ an apprentice who has left the service of his master. A runaway apprentice may, by order of the county court, be arrested and returned to his master or confined in jail for not more than twenty days. It is unlawful to take or send an apprentice out of the State, or to sell his term of service or any part thereof, to any person, or to give another person the right to control such child. If the master dies the apprentice may be bound again to another by order of the county court.

Sources: Statutes of 1891, sections 2594 to 2610; Acts of 1896, chapter 33, sections 11, 18.

LOUISIANA.

A minor may bind himself as an apprentice. The consent of a parent, tutor, or curator is necessary, or, if there be no such person in the parish where the minor resides, then the consent of the mayor of New Orleans, in the parish of Orleans, or of the parish judges of their respective parishes throughout the State.

The term of apprenticeship expires at the age of 21 years in the case of males and of 18 years in the case of females, unless an earlier period is stipulated. Persons who have attained the age of majority may bind themselves to service for a term of five years.

Apprentices under 21 years of age must be taught reading, writing, and the fundamental principles of arithmetic.

The death of the master or his removal from the State dissolves the contract of apprenticeship.

Source: Revised Laws of 1897, page 18, sections 40 to 84.

MAINE.

A minor may be bound out by the father, if living; if not, by the mother or legal guardian. The consent of a minor, who is over 14 years of age, is necessary, and if a minor is bound out prior to that age the indenture will not continue in force beyond that age unless the minor upon reaching it shall give his consent. A minor, having no parent or guardian, may bind himself out with the approbation of the municipal officers of the town where he resides. Overseers of the poor of a town may bind out the minor children of parents chargeable to the town or of those who, in the opinion of the overseers, are unable to maintain them, and minor children who are themselves chargeable. The trustees of the State Reform School may bind out boys committed thereto, and the trustees of the Industrial School for Girls, girls committed thereto, for a period not exceeding the term of confinement.

Males may be bound until the age of 21 years and females until 18 years or until married.

All considerations allowed by the master or mistress in any contract of apprenticeship must be secured by the indenture to the sole use of the minor.

The master may not transfer the apprentice to another person or remove him out of the State. The death of the master dissolves the contract of apprenticeship.

Source: Revised Statutes of 1903, chapter 27, sections 22 to 29; chapter 64, sections 1 to 7; chapter 143, sections 1, 10, 11, 23, 24.

MARYLAND.

The orphans' courts in the several counties and the city of Baltimore, or any two justices of the peace, or in Somerset County a single justice of the peace, may bind out any orphan child, the increase or profits of whose estate is not sufficient for his maintenance, support, or education, children who are suffering through the indigence or poverty of their parents, children of beggars, illegitimate children, and children of persons out of the State to whom sufficient sus-

tenance is not afforded. The trustees of the poor in any county may, in the recess of the orphans' court, bind out the child or children of any pauper or vagrant, but the indentures must within two months thereafter be approved by the orphans' court by indorsement thereon. A minor may be bound out by his father. The directors of the penitentiary and the managers of the house of correction, or any three of them, may bind out the children of female convicts who are brought to or born in said institutions. The House of the Good Shepherd of the city of Baltimore may, with the children's consent, bind out such white female children as are committed to the institution. The managers of the House of Reformation, the managers of the House of Refuge, and those of the Industrial Home for Colored Girls may, with similar consent, bind out the minors committed to these respective institutions. In Baltimore city the president and board of managers of the Children's Aid Society and the managers of the Home for the Friendless may apprentice male and female minors committed to their care. In Allegany County the trustees of the almshouse may bind out any minor child under their charge and dependent on the county for support.

Male apprentices may be bound until 21 and female apprentices until 18 years of age.

The master or mistress is required to give the apprentice a reasonable education in reading, writing, and arithmetic, to teach the apprentice a useful trade, and to supply suitable clothing and maintenance.

It is unlawful for any person to entice an apprentice from the service of a master or knowingly to harbor any apprentice so enticed.

Sources: Public General Laws, 1903, article 6, sections 1 to 30; article 27, section 454; Public Local Laws, 1898, article 1, sections 3, 4; article 20, sections 29 to 31; Acts of 1898, chapter 123, sections 891, 898.

MASSACHUSETTS.

A minor may be bound out by the father; if he is dead or incompetent, by the mother or legal guardian, and if illegitimate, by the mother. If the minor is over 14 years of age and is bound out by his parent or guardian, his consent is necessary and must be expressed in the indentures and testified by the signature of the minor. A minor child who is, or either of whose parents is, chargeable to a town, may be bound out by the overseers of the poor. A minor who has no parent competent to act and no guardian, may, with the approbation of the selectmen of the town where he resides, bind himself out.

A child under 14 years of age may be bound as an apprentice until that age. A minor over that age or a child of any age bound by the overseers of the poor may be apprenticed to the age of 18 years if a female or to the time of her marriage within that age, and to the age of 21 years if a male.

A minor bound out by the overseers of the poor must be taught reading, writing, and arithmetic, and must be given such other instruction, benefit, or allowance, either within or at the end of the term, as the overseers, in the contract of apprenticeship, may require. All considerations of money or other things paid or allowed by the master upon a contract of apprenticeship must be paid or secured to the sole use of the minor.

The death of the master discharges the apprenticeship.

Source: Revised Laws of 1902, chapter 156, sections 1 to 20.

MICHIGAN.

A minor may bind himself out with the consent of the father indorsed on the indentures, or, if the father is dead, not in legal capacity to give his consent, or shall have abandoned and neglected to provide for his family, then of the mother; or, if she is dead or not in legal capacity to give or refuse such consent, then of the guardian; or, if there is no guardian, then of any two justices of the peace of the township, of the recorder of the city, or of the circuit or probate judge of the county. The county superintendents of the poor may bind out a child who may be sent to any county poorhouse, who is, or who may become, chargeable in whole or in part, to the county, or whose parent or parents may become so chargeable. Minors may also be bound out by officers of State institutions acting under the provisions of law authorizing them to place children in families by indenture, etc.; by officers of incorporated asylums or institutions authorized by law to receive, care for, and dispose of minor children; by the father and mother residing in the State, and if either be dead, or of legal incapacity, or has abandoned the child, then by the other, and if the child be

illegitimate, then by its mother; and by the guardian duly appointed if there be no father or mother of legal capacity.

A male may be apprenticed until 21 years and a female until 18 years of age, or until her marriage within that age, or for a shorter time.

A pauper minor bound by the county superintendent of the poor must be given a suitable education. All considerations of money or other things paid or allowed by the master must be paid or secured to the sole use of the apprentice.

The death of the master discharges the apprentice.

Source: Compiled Laws of 1897, sections 2020, 2199, 2213, 2261, 2262, 5559 to 5562, 5568 to 5570, 8292, 8748 to 8755.

MINNESOTA.

A minor may be bound out by the father; if the father is dead or incompetent, by the mother or legal guardian, and if illegitimate, he may be bound out by the mother. The consent of a minor who is over 14 years of age is necessary and must be expressed in the indentures and testified by his signing the same. If there is no parent competent to act and no guardian, a minor may bind himself, but must have the approbation of the county commissioners of the county where he resides. A minor chargeable upon a county for support may be bound out by the board of county commissioners of said county. The managers of the State Reform School may, with his consent, bind out a minor committed to their care.

Children under 14 years of age may be bound as apprentices until that age. Minors above the age of 14 years may be bound as apprentices, males to the age of 21 and females to the age of 18 years or to the time of their marriage within that age.

Provision must be made in the indenture for teaching the apprentice reading, writing, and the general rules of arithmetic. All considerations of money or other things paid or allowed by the master must be paid or secured to the sole use of the apprentice.

The death of the master discharges the apprentice.

Source: General Statutes of 1894, sections 1966, 3523, 4750 to 4762.

MISSISSIPPI.

The law provides only for the binding out of poor orphan children and children whose parents are unable to support them. They may be bound out by the supervisor of the proper district under the direction of the board of supervisors of the county.

Males may be bound out until 21 and females until 18 years of age.

The person to whom the apprentice is bound is required to provide the latter with sufficient good and wholesome food, necessary clothing, washing, and lodging; to treat him humanely, and to send him to school until he learns to read, write, and perform the ordinary calculation incident to the business of the master. At the expiration of the apprenticeship he is to furnish the apprentice with two suits of new clothing, including hats and shoes.

Source: Annotated Code of 1892, sections 3159 to 3163.

MISSOURI.

A minor may be bound out by the father, or, in case of the father's death, incompetency, or willful abandonment of his family for six months without making suitable provision for their support, or if he has become an habitual drunkard, then by the mother or legal guardian. If illegitimate, a minor may be bound out by the mother. When a minor who is over 14 years of age is bound out by a parent or guardian the consent of said minor is necessary and must be expressed in the indentures and testified by his signing the same. An executor who is directed in the will of the father to bring up a child to some trade or calling may bind said child out in like manner as the father could have done. A poor child who is, or may be, chargeable to the county, or who shall beg for alms, or whose parents are poor and the father is an habitual drunkard, or whose father is dead and the mother is of bad character or suffers her children to grow up in habits of idleness without any visible means of obtaining an honest livelihood, may be bound out by the probate court. An orphan minor who has not estate sufficient for his maintenance may be bound out by his guardian under direction of the probate court.

Males may be bound as apprentices to the age of 21, and females to the age of 18 years, or until marriage within that age.

The master is required to cause the apprentice to be given a common school education, and at the expiration of the apprenticeship he is to give the apprentice a new Bible, two new suits of clothes worth \$50, and \$20 in money. Apprentices are to be defended by those who bound them from cruelty, neglect, and breach of contract on the part of their masters.

It is unlawful for any person to counsel, persuade, entice, or assist an apprentice to run away or absent himself from the service of his master, or to entertain, harbor, or conceal an apprentice knowing him to be a runaway, or for an apprentice to rebel against or assault his master. It is unlawful for a master to remove an apprentice out of the State. The death of the master discharges the apprenticeship.

Source: Revised Statutes of 1899, sections 4794 to 4821.

MONTANA.

Every minor may bind himself in writing to serve as an apprentice provided he obtains the consent, indorsed on the indenture, of the following person or persons: The father and mother; the mother, if the father lacks capacity to consent, has abandoned or neglected to provide for his family, or is dead and no testamentary guardian or executor has been appointed by him; the father, if the mother is dead or lacks capacity to consent; the testamentary guardian or executor, if the father is dead. If there is no parent of capacity to consent and no such executor or guardian, then consent must be given by the county commissioners of the county, by any two justices of the peace of the town, or by the district judge. The county commissioners may bind out minors who have become chargeable to the county.

Apprentices may be bound out until their majority, which is 21 years in the case of males and 18 years in the case of females.

The master must agree in the contract of apprenticeship that he will cause the apprentice to be instructed to read and write, to be taught the general rules of arithmetic, or in lieu thereof that he will send the apprentice to school three months each year of the period of indenture. The indenture may be annulled for cruelty or maltreatment of the apprentice by the master.

It is unlawful willfully and knowingly to aid, assist, or encourage an apprentice to run away or to harbor or conceal him.

Source: Codes and Statutes, Sanders's Edition, 1895, Civil Code, sections 360 to 360; Penal Code, section 1154.

NEVADA.

A male person under the age of 18 years and a female person under the age of 15 years may be bound out until they arrive at these ages respectively, or for a shorter period, by the father, or, in case of his death or inability, by the mother or guardian. An orphan or destitute child may be bound out by the board of county commissioners of the county or by the district judge of the district in which the child resides. The board of directors of the State Orphan Asylum may also indenture apprentices, and reserve the power to cancel the indenture at any time.

A male apprentice, being bound to serve five years or more, must be taught reading and writing, the rules and principles of common English grammar, and arithmetic to and including the single rule of three. A female apprentice, being bound to serve four years or more, must be taught reading and writing, and the first four rules of arithmetic. The master must furnish substantial food and decent wearing apparel to a male minor bound to serve five years or more, and an ample supply of decent clothing and wholesome food to a female minor bound to serve four years or more.

Upon completion of the term of apprenticeship the master must give two suits of clothing, each suit being of the value of not less than \$25, and \$100 in money to a male bound to serve five years or more; and two full suits of wearing apparel and \$50 in money to a female bound to serve four years or more. All money and property stipulated to be delivered or paid by the master or mistress must be secured to and for the sole use and benefit of the minor.

It is unlawful to counsel, persuade, entice, aid, or assist any apprentice to run away or absent himself from the service of his master, or to harbor or to conceal an apprentice, knowing him to have run away.

Source: Compiled Laws of 1899, sections 620 to 635, 1492.

NEW HAMPSHIRE.

A minor may be bound out by the father, or, if he be dead, by the mother or guardian. If the minor is over 14 years of age his consent is necessary and must be expressed in the indentures and testified by his signing the same. If a minor has no parent or guardian he may bind himself out, with the approbation of the selectmen or overseers of the poor of the town where he resides. Overseers of the poor in any town may bind out all children who are not employed in some lawful business and whose parents are unable or neglect to maintain them. The county commissioners may bind out any minor chargeable or likely to be chargeable to the county. Trustees of the Reform School may bind out any scholar of said school.

Males may be bound until 21 years, and females until 18 years of age or until their marriage within that age. Children under 14 years may be bound out without their consent until that age. Inmates of the State Industrial School may be bound out for the term for which they were committed to the institution.

The master is required to teach his apprentice the art or trade for which he was bound. Pauper minors bound out by the overseers of the poor must be taught to read, write, and cipher, and must be given such other instruction as the overseers may deem reasonable.

It is unlawful to entice or persuade away an apprentice from the service of his master, or to seduce, convey, or send off an apprentice or in any way to cause him to leave such service. The master may recover damages against the parents or guardian of an apprentice for leaving his service without sufficient cause, or if an apprentice uses violence toward him. No indenture is binding after the death of the master, except that if the apprenticeship has nearly expired, the apprentice may choose to complete his term of service with the widow, executor, or administrator of his master, in which case he is entitled to all the benefits of the indenture.

Source: Public Statutes of 1891, chapter 84, sections 5, 6; chapter 180, sections 1 to 13; chapter 284, section 20.

NEW JERSEY.

A minor may bind himself out of his own free will and accord with the consent of the father or, if he is dead, of the mother or guardian. The consent of the mother is necessary also where the consent of the father or guardian is obtained. Said consent must be expressed in the indentures and testified by the party signing and sealing the same. The overseers of the poor or any two of them, with the approbation of two justices of the peace of any county or township, may bind out any poor child, children who have no parents, children whose parents shall apply to the overseers for relief, and the child or children of any poor parents who shall bring up their said children in sloth, idleness, and ignorance, and who, upon advice and direction given by the overseers, shall for three months after said advice and direction refuse or neglect to bind out their children. The trustees of the Reform School may bind out boys committed to said school. The trustees of the Industrial School for Girls may bind out girls therein. The president of a board of trustees of a poorhouse, with the consent of a majority of the board, or, where no trustees are appointed, the director of the board of chosen freeholders, with the consent of a majority of said board, may bind out poor children who are chargeable upon the county. An orphan asylum association may bind out any child under its care for more than one year, but if the parents pay anything toward its support their consent must first be obtained.

Males may be bound out until the age of 21 and females until the age of 18 years.

It is unlawful for any person knowingly to counsel, persuade, entice, aid, or assist an apprentice to run away, or absent himself from the service of his master, or to harbor or conceal an apprentice knowing him to have run away.

Sources: General Statutes of 1895, page 15, sections 1 to 10; page 2505, sections 12, 20, 51, 70; page 2525, sections 107 to 110; page 2721, section 8; page 2728, sections 79, 81, 100; Acts of 1898, chapter 181, section 10.

NEW MEXICO.

A minor may be bound out by the father, or, if the father is dead and no guardian has been appointed, by the mother. Guardians, under direction of the probate court, may bind out orphan minors who have not sufficient estates for their maintenance and education nor friends or relatives willing to incur the expense of the same. In the above cases the indentures must be approved by the probate court. The judge of probate may bind out children who are poor orphans or whose parents have not the means of maintaining them or who willfully neglect to support and educate them, and children who are poor and whose parent or parents shall have been sentenced to confinement in jail or prison for a term of five years or more.

Males may be bound out until 21, and females until 18 years of age.

The master is required to teach the apprentice some useful and reputable art or trade, to send him to school at least three months each year after the age of 9 years, to clothe, feed, and lodge him, and to treat him humanely.

Source: Compiled Laws of 1897, sections 1472 to 1475, 1478 to 1487.

NEW YORK.

A minor may bind himself out as an apprentice for a term of not less than three nor more than five years. The indenture must be signed by the minor; by the father of the minor unless he is legally incapable of giving consent or has abandoned his family; by the mother of the minor unless she is legally incapable of giving consent; by the guardian of the minor, if any; in the absence of either parent or guardian, by the county judge of the county or a justice of the supreme court of the district, whose consent is also necessary to the apprenticing of a minor coming from a foreign country, or of the child of an Indian woman; and by the master. The poor officers of a municipal corporation may apprentice any minor whose support has become chargeable to such corporation, in which case the indenture is signed by the officer apprenticing the minor, by the master and by the county judge if the support of the child was chargeable to the county, by two justices of the peace if chargeable to the town, or by the mayor and aldermen or any two of them if chargeable to the city. Orphan asylums and charitable institutions may apprentice dependent or indigent children committed to their charge, in which case the indenture must be signed and sealed in the corporate name of such institution by the officer or officers thereof authorized by the directors, and by the master, and it may be signed by the child if over 12 years of age. A county court may authorize the county superintendent or overseer of the poor to apprentice any disorderly person until of age; or if of age, to contract for his services as an apprentice for not more than one year. The superintendent of State and alien poor may apprentice males under 21 and females under 18 years, committed to any State almshouse, until they become of age. The managers of State reform schools may apprentice inmates during the term for which they have been committed.

The master must agree in the indenture that he will teach the apprentice, or cause him to be taught, every branch of the business to which the apprentice is indentured, and that at the expiration of the term he will give him a certificate in writing that such apprentice has served the full term at such trade or craft. If the minor is indentured by the poor officers of a county, city, or town or by the authorities of an orphan asylum, penitentiary or charitable institution, the indenture must contain an agreement that the master will cause such child to be instructed in reading, writing, and the general rules of arithmetic, and that at the expiration of the term he will give him a new Bible. The indenture must in all cases contain a statement of every sum of money agreed to be paid in relation to the service and an agreement that suitable and proper board, lodging, and medical attendance shall be provided either by the master or by the parent or guardian. The master may use reasonable and moderate force or violence to restrain or correct an apprentice.

It is unlawful for a master to accept from an apprentice any agreement or to cause him to be bound by oath that, after his term of service expires, he will not exercise his trade, profession, or employment in any particular place, or to exact from him, after his term of service expires, any money or other thing for exercising his trade, profession, or employment in any place. It is unlawful to take a person as an apprentice without having obtained the consent of his legal guardian, or unless a written agreement has been entered into as prescribed by law. On the death of a master to whom a person is indentured by the poor

officers of a municipal corporation, the personal representatives of the master may, with the written consent of such person, assign such indenture; or if such consent is refused, the assignment may be made by the county judge of the county after fourteen days' notice to the person indentured.

Source: Revised Statutes of 1901, page 150, section 7; page 982, section 18; page 1055, sections 70 to 77; page 2034, section 48; page 2773, section 250; page 3274, section 126.

NORTH CAROLINA.

A minor above the age of 14 and under 21 years being a male, and under 18 being a female, whether indigent or not, may be apprenticed to learn any trade or craft by the father, or, if he is dead, incompetent, has willfully abandoned his family for six months without making suitable provisions for their support, or has become an habitual drunkard, by the mother or legal guardian. If illegitimate, such child may be bound by the mother. If said minor has no parents competent to act and no guardian, he may bind himself, with the approbation of a superior court clerk of the county where he resides. The consent of such minor is necessary and must be expressed in the indenture and testified to by signing the same. A minor over 14 may also be apprenticed to learn a trade or craft by orphan asylums or charitable institutions organized and incorporated for the purpose of taking care of indigent children. Indigent children, among which are included all orphans whose estates are of so small value that no person will educate and maintain them for the benefits thereof; all infants whose fathers have deserted their families and been absent six months, leaving them without sufficient support; poor children who are or may be chargeable to the county or shall beg alms; any child who has no father and the mother is of bad character or suffers her children to grow up in habits of idleness without visible means of obtaining an honest livelihood, and all children whose parents do not habitually employ their time in some honest, industrious occupation, may be bound out by the superior court clerk of the county where they reside.

Apprentices may be bound for a period of not less than three nor more than five years, except in the case of indigent children bound out by the clerks of the superior courts, whose terms continue until majority, which in the case of males is 21 years and in the case of females 18 years of age.

Masters are required to teach apprentices their trade or calling, and in the case of indigent children, the masters must cause them to be taught reading, writing, and the rules of arithmetic to the double rule of three. Apprentices must be furnished with medical attendance, lodging, and clothing. At the end of the term of apprenticeship the master is required to give the apprentice a certificate in writing stating that he has served a full term at the specified trade or calling.

It is unlawful for any person to entice or persuade an apprentice to leave the service of his master, or knowingly to harbor, conceal, or employ an apprentice who has run away from his master.

Source: Acts of 1880, chapter 403, sections 1 to 26.

NORTH DAKOTA.

A minor may bind himself out. The consent is necessary of both the father and mother; if the father is dead, of the testamentary guardian or executor; or if no such guardian or executor has been appointed, then of the mother; if the father lacks capacity to consent or has abandoned or neglected to provide for his family, of the mother; if the mother is dead or lacks capacity to consent, of the father; if there is no parent of capacity to consent and no executor, of the guardian; if there is no such parent, executor, or guardian, then of the officers of the poor of the town or county, of any two justices of the peace of the county, or of the probate judge. A child who is, or whose parents are, chargeable to a county or city poorhouse, or who is in such poorhouse, may be bound out by the proper officers of the poor with the written consent of a justice of the peace. No child of an Indian woman can be bound except in the presence of and with the consent of a justice of the peace.

Male apprentices may be bound until 21 years and female apprentices until 18 years of age, or for a shorter time. A minor capable of becoming a citizen of the State or Territory, and coming from any other country, State, or Territory, and binding himself out for the purpose of paying his passage, may be bound for a term not exceeding one year, although such term extends beyond his majority.

An apprentice must be taught reading, writing, and the general rules of arithmetic, or must be sent to school three months in each year for the period of the indenture. At the expiration of his term the master must give him a new Bible.

It is unlawful to accept from an apprentice any contract or agreement, or to cause him to be bound by oath or otherwise that, after his term of service expires, he shall not set up his trade, profession, or employment, in any particular place, shop, house, or cellar, or to exact from an apprentice, after his term of service expired, any money or other thing, for using and exercising his trade, profession, or employment in any place.

In case of the death of the master the executors or administrators may assign the indenture with the written consent of the apprentice, acknowledged before a justice of the peace. If the apprentice refuses such consent, the probate or district court may authorize such assignment without his consent.

Source: Revised Codes of 1890, sections 2837 to 2849.

OHIO.

A minor may be bound out by the father, or, in case of his death or inability, by the mother or guardian. An orphan or destitute child may be bound out by the trustees of a township or by the officers of an orphan asylum wherein he is placed.

Males within the age of 21 years and females within the age of 18 years may be bound out as apprentices until they arrive at these ages, respectively.

The master is required to send the minor to a common school for at least twelve weeks in each year during the apprenticeship, and at the expiration of the term of service he must furnish the apprentice with a new Bible and two good suits of clothes. All money or property stipulated to be paid by the master must be secured to and for the sole use and benefit of the apprentice.

It is unlawful for any person to counsel, persuade, entice, aid, or assist an apprentice to run away or absent himself from the service of his master, or to harbor or conceal any such apprentice, knowing him to have run away.

Source: Annotated Statutes of 1900, sections 757, 781-11, 950-2, 3118 to 3135.

OKLAHOMA.

Minors committed to any reform school may, with their own consent, be bound out as apprentices during minority, or for a shorter period, by the management of such school to learn such trade or employment as may tend to their future benefit.

Source: Acts of 1895, chapter 28, section 5.

OREGON.

A minor may be bound out by the father, or, if he is dead or incompetent, by the legal guardian; if illegitimate, by the mother; and if there is no parent competent to act and no guardian, he may bind himself out with the approbation of the county court of the county where he resides. The consent of the minor who is above 14 years of age, bound out by a parent or guardian, is necessary and must be expressed in the indentures and testified by his signing the same. The county court may bind out a child who is, or whose parents are, chargeable to the county. The superintendent of the reform school may, with the consent of the minor, bind out any minor committed to said institution.

Apprentices may not be bound for a longer term than until majority, which in the case of males is 21 and of females 18 years of age. Children under 14 years of age may be bound out until that age without their consent.

A pauper minor bound out by the county court must be taught to read, write, and cipher, and must be given such other instruction as the court may deem reasonable.

The death of the master discharges the apprentice.

Source: Annotated Codes and Statutes of 1902, sections 5291 to 5315.

PENNSYLVANIA.

Minors may be bound out with the assent of a parent, guardian, or next friend. The justices of the orphans' court in the respective counties shall have full power, at the instance and request of executors, administrators, guardians, or tutors, to order and direct the binding out of minors. The overseers of the

poor may, with the approbation and consent of two or more magistrates of the same county, bind out any poor child whose parents are dead or are found by said magistrates to be unable to maintain it. All corporations organized for the purpose of providing homes for friendless or destitute children may bind out a child committed to their charge, whose maintenance is unprovided for by its parents or guardians. The directors of almshouses may bind out any child in their charge. The managers of the House of Refuge of Philadelphia and of the House of Refuge of Western Pennsylvania may bind out, with his consent, any minor committed to their care. The courts of common pleas and the orphans' court of any county may decree, to officers of any benevolent or charitable institution that may have cared for and maintained a minor child for a period of one year either wholly or partly at its expense, power to bind out the same, provided that due notice must first be given to the parent, guardian, or next friend.

Males may be bound out until 21 and females until 18 years of age.

It is unlawful for any person knowingly to harbor and conceal for more than twenty-four hours an apprentice who has run away from the service of his master.

Sources: Brightly's Purdon's Digest, 1895, page 95, section 6; page 117, sections 1 to 15; page 998, sections 8, 25; page 1704, section 45; Brightly's Digest, 1903, page 55, sections 1, 2.

RHODE ISLAND.

A minor may be bound out by the father, or, if he is dead, by the mother when sole; or, being under the age of 14, by the legal guardian. A minor, if he is 14 years of age and has no parent, may bind himself out with the approbation of his guardian, or, if he has no guardian, by and with the approbation of the town council of the town where he resides. The overseers of the poor of a town, with the advice and consent of the town council, may bind out children of parents who are lawfully settled in and have become chargeable to the town; children of parents so settled whose parents, whether they receive alms or are chargeable or not, shall be deemed by said overseers unable to maintain them; children of parents residing in the town who are there supported at the charge of the State; children of parents or a parent, residing in a town, who have no legal settlement in the State and are adjudged by the town council to be unable to maintain them, and children in a town without estate sufficient for their maintenance, who have no parents residing therein, and who have no legal settlement in the State. Such children may be bound out to any citizen or to any incorporated institution for the care of children within the State or within the States of Massachusetts or Connecticut, to the Providence Children's Friend Society, to the Home for Friendless Children in Newport, or to the Providence Shelter for Colored Children.

Minors may be apprenticed until 21 years of age in the case of males and 18 years in the case of females, or until married within that age.

The master must obligate himself to cause the apprentice to receive instruction in reading, writing, and ciphering, and such other instruction as may be fit and reasonable. All considerations of money, clothes, etc., must be given to or secured to the sole use of the apprentice.

The death of the master discharges the apprenticeship.

Source: General Laws of 1900, chapter 79, section 14; chapter 193, sections 1 to 20.

SOUTH CAROLINA.

A minor may be bound out with the approbation of the father, mother, or guardian, or, if the minor has neither father, mother, nor guardian, of the grandfather, grandmother, or brother, sister, uncle, or aunt of mature age, in the order as above, or, if the minor has none of the above relatives, of the trial justice. Said approbation must be certified on the indentures by a trial justice under his hand and seal. A poor child chargeable to a county, and an illegitimate child likely to become chargeable to a county or to become demoralized by the vicious conduct and evil example of its mother or other person having charge of it, may be bound out by the county commissioners.

Males may be bound as apprentices until the age of 21 and females until 18 years of age or until married within that age. Poor children bound out by the county commissioners may be apprenticed until the age of 18 years in the case of males and 14 years or until married within that time, in the case of females.

Source: Civil Code of 1902, sections 788, 2705 to 2714.

SOUTH DAKOTA.

A minor may bind himself out. The consent is necessary of both the father and mother; if the father is dead, of the testamentary guardian or executor, or, if no such guardian or executor has been appointed, then of the mother; if the father lacks capacity to consent, or has abandoned or neglected to provide for his family, of the mother; if the mother is dead or lacks capacity to consent, of the father; if there is no parent of capacity to consent and no executor, of the guardian; if there is no such parent, executor, or guardian, then of the officers of the poor of the town or county, of any two justices of the peace of the county, or of the probate judge. A child who is, or whose parents are, chargeable to a county or city poorhouse, or who is in such poorhouse, may be bound out by the proper officers of the poor with the written consent of a justice of the peace. The State board of charities and corrections may bind out inmates of the State Reform School for Juvenile Offenders.

Male apprentices may be bound until 21 and female apprentices until 18 years of age, or for a shorter time. A minor capable of becoming a citizen of the State and coming from any other country, State, or Territory, and binding himself out for the purpose of paying his passage, may be bound for a term not exceeding one year, although such term extends beyond his majority.

An apprentice must be taught reading, writing, and the general rules of arithmetic, or must be sent to school three months in each year for the period of the indenture. At the expiration of his term the master must give him a new Bible.

It is unlawful to accept from an apprentice any contract or agreement, or to cause him to be bound by oath or otherwise that, after his term of service has expired, he shall not set up his trade, profession, or employment in any particular place, shop, house, or cellar, or to exact from an apprentice, after his term of service has expired, any money or other thing, for using and exercising his trade, profession, or employment in any place. Upon the death of the master, the executors or administrators may assign the indenture with the written consent of the apprentice, acknowledged before a justice of the peace. If the apprentice refuses such consent, the probate or district court may authorize such assignment without his consent.

Source: Revised Codes of 1903, Civil Code, sections 163 to 181; code of criminal Procedure, section 705.

TENNESSEE.

The county court may bind out, in the name of the State, an orphan whose estates are of such small value that no person will educate or maintain him for the profits thereof, a base-born child, and any child totally abandoned by the father and for whom he fails to provide support and maintenance. In the last case above, the consent of the mother must be given in open court unless she is unable to provide for the maintenance of the child.

Orphan children may be bound out until the age of 21 years if males and 18 years if females. In the case of base-born children the age limit is 21 years for either sex.

Masters are required to teach orphan apprentices, or cause them to be taught, to read and write and cipher as far as the rule of three, and to make fit and necessary provision for their diet, clothes, lodging, and accommodations. Upon the completion of the apprenticeship the master is required to pay his apprentice \$20 in addition to the stipulations in the contract, and to furnish him with one good suit of clothes.

A master is not permitted to remove an apprentice out of the State without the assent of the court.

Source: Code of 1884, sections 2129, 3422 to 3437.

The county court may bind out an orphan who is without sufficient estate for his maintenance and education, a child whose parents have suffered him to become a charge upon the county, and a child whose parents, not being a charge on the county, shall consent in writing to his apprenticeship, which consent shall be signed by them and filed and entered of record in such court.

Males may be bound out until 21 and females until 18 years of age or until married within that age.

An apprentice must, if practicable, be sent to school at least three months in each year during the continuance of the apprenticeship and while he is within the scholastic age. Sufficient food and clothing and the necessary medicine

and medical attention must be furnished. Moderate chastisement, as may be necessary and proper, may be inflicted upon the apprentice by the master.

It is unlawful for a master to take an apprentice out of the county without the order of the county judge.

Source: Revised Civil Statutes of 1895, articles 23 to 46/7

UTAH.

A minor may be bound out by a parent or guardian, and if the minor is over 12 years of age the indentures must also be signed by him. The probate court or selectmen may bind out an idle, vicious, or vagrant minor child without its consent and without the consent of its parents or guardian, if said parents or guardian neglect, refuse, or otherwise fail in properly controlling the actions and education of such child, and do not train it up in some useful avocation; also a child whose parents, from habitual drunkenness and vicious and brutal conduct, etc., are not deemed suitable persons to retain the guardianship or control the education of it. The board of trustees of the State Industrial School may bind out children as apprentices with their consent or the consent of their parents or guardians.

Apprentices may be bound until the attainment of the age of legal majority, which is 21 years in the case of males and 18 years in the case of females.

The master is required to send the apprentice to school while between the ages of 8 and 14 years, at least twenty weeks in each year, and to clothe him in a comfortable and becoming manner.

The removal of the master from the State discharges the apprenticeship.

Source: Revised Statutes of 1898, sections 74 to 83.

VERMONT.

A minor may be bound out by the father, or, if he is dead or incompetent, by the mother or legal guardian; or, if there is no parent competent to act and no guardian, he may bind himself, with the approbation of the selectmen of the town where he resides. If illegitimate, he may be bound by his mother, but the power of a mother to bind out her children, whether legitimate or illegitimate, shall cease upon her subsequent marriage. The overseers of the poor may bind out the minor children of a poor person who has become chargeable to a town, or who is supported in whole or in part at the charge of such town, and minor children who are themselves chargeable to the town. The trustees of the reform school may bind out children committed to said school.

Children under 14 years of age may be bound out until that age. A minor over 14 years of age, whose consent is expressed in writing in the indenture, may be bound during minority, or if a girl, until married before becoming of age. The age of majority is 21 years for males and 18 years for females. Inmates of reform schools may be bound only for the terms for which they were committed.

Considerations of money or other things paid or allowed by the master upon a contract of apprenticeship must be paid or secured to the sole use of the apprentice. Parents, guardians, selectmen, and overseers are required to inquire into the treatment of apprentices bound by them respectively, and defend them from cruelty, neglect, and breach of contract on the part of the master.

No indenture of apprenticeship is binding upon the minor after the death of the master.

Source: Statutes of 1894, sections 2820 to 2854, 3187 to 3189, 5180.

VIRGINIA.

A minor may be bound out by the guardian, or, if there is no guardian, by the father, or, if there is neither guardian nor father, by the mother. The consent, entered of record, of the court of the county or corporation in which the minor resides is necessary, unless the minor, being 14 years of age, gives his consent in writing. An incorporated association, asylum, or school instituted for the support and education of destitute children, may bind out such children as have been placed in its charge. Overseers of the poor of a county or corporation may, if allowed by order of a court thereof, bind out any minor found begging in such county or corporation, or who is likely to become chargeable thereto.

The term of apprenticeship must continue until the apprentice attains the age of 21 years if a boy and 18 years if a girl. In the case of a minor placed in an asylum, school, etc., he can only be bound for the period for which he was placed in such institution.

An apprentice must be taught, in addition to his trade, reading, writing, and common arithmetic, including the rule of three. The money which the master is to pay for any year except the last, must at the end of the year for which it is payable, be paid to the father or mother, or part to each as the court may direct, or it may be reserved to be paid to the apprentice at the end of the term with interest. The money which the master is to pay for the last year must be paid at the end thereof to the apprentice.

It is unlawful for any person to entice, take, or carry away an apprentice, or knowingly to employ, conceal, or harbor an apprentice who has deserted the service of his master. No apprentice may be taken out of the county by the master without the leave of the county court. If a master takes an apprentice out of the county and remains more than one month, the apprentice ceases to be bound by the indenture.

Source: Code of 1888, sections 2581 to 2596.

WASHINGTON.

The county commissioners may bind out a minor likely to become chargeable to the county, either because of its being an orphan or because its parents or other relatives are unable or refuse to support it.

Source: Codes and Statutes of 1897, section 379.

WEST VIRGINIA.

A minor may be bound out by the father; if there be no father, by the guardian, or, if there is neither father nor guardian, by the mother. The consent, entered of record, of the county court of the county where the minor resides is necessary, unless the minor, being 14 years of age, gives his consent in writing. The clerk of a county may bind out any minor who is found begging therein or who is likely to become chargeable thereto. Male inmates of the reform school may be bound out by the directors of said school.

The term of apprenticeship must be until 21 years of age in the case of a boy and 18 years in the case of a girl.

Besides teaching the apprentice a trade the master is required to instruct him in reading, writing, and common arithmetic. The money which a master is to pay for any year except the last must, at the end of the year for which it is payable, be paid to the father, the mother, or part to each as the court may direct, or it may be reserved to be paid to the apprentice at the end of his term with interest. The money for the last year must be paid to the apprentice.

It is unlawful to conceal or harbor an apprentice who has deserted his master. The master is not permitted to take the apprentice out of the county without the leave of the county court, and if he does so without leave and keeps the apprentice out of the county for more than one month, the continuance of the apprenticeship is optional with the apprentice.

Source: Code of 1860, chapter 81, sections 1 to 14.

WISCONSIN.

A minor may bind himself out of his own free will with the consent of the father, or, if he is dead or not in legal capacity to give consent or shall have abandoned and neglected to provide for his family, and such fact be certified by a justice of the peace of the town and indorsed on the indentures, then of the mother; if she is dead or not in a legal capacity to give consent, then of the guardian; if there are no parents living or none in legal capacity to give consent and no guardian, then of the supervisors or any two justices of the peace of the town where the minor resides. If a minor is illegitimate the consent of the mother is necessary whether its putative father is living or not. Minors who have become or are likely to become chargeable to any town may be bound out as apprentices by the supervisors. The managers of the industrial school for boys may bind out those committed to their care with the consent of their parents or guardians, if they have any.

An apprentice may be bound, if a male, until the age of 21 years, and if a female, until the age of 18 years, or until her marriage within that time, or for any shorter period.

The master must obligate himself, in the indenture, to provide for instructing the apprentice in some trade or profession, for teaching him to read and write, for instructing him in the general rules of arithmetic, and for such other instruction, benefit, and allowance as may be agreed upon. At the end of the term he must give the apprentice a new Bible. All considerations of money or other things paid or allowed by the master upon any indenture of apprenticeship must be paid or secured to the sole use of the minor.

It is unlawful to accept from an apprentice any contract or agreement, or to cause him to be bound by oath or otherwise that, after his term of service has expired, he shall not set up his trade, profession, or employment in any particular place, or to exact from an apprentice, after his term of service has expired, any money or other thing for using and exercising his trade, profession, or employment in any place. No indenture is binding upon the minor after the death of the master.

Source: Annotated Statutes of 1898, sections 1511, 2377 to 2394, 4901, 4904.

UNITED STATES.

A Federal act passed January 12, 1895, authorizes the Public Printer to employ such number of apprentices, not to exceed 25 at any one time, as in his judgment is consistent with the economical service of the office.

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