

## AN INDUSTRIAL EXPERIMENT AT SOUTH MANCHESTER.



THE OLD HOMESTEAD.

A FEW miles from the city of Hartford, in the State of Connecticut, lies the village of Manchester, which has a reputation in industrial history as being one of the places in New England in which cotton spinning by machinery was first introduced in this country. Taking the railroad from Hartford to this little town, we continue our route, upon a branch railroad, to the village of South Manchester, lying only two or three miles distant. This little village is the seat of the successful introduction of silk weaving in the United States. The old farm-house is still standing in which the family of brothers were born whose lives of labor have been devoted to the successful introduction of this industry; and seventy-two members of the family were gathered together here at last Thanksgiving.

Here in this little village are gathered the materials to furnish an epitome of the industrial and social development of the country during this century. On his farm the father of the present firm of Cheney Brothers passed such a life as was usual among the farmers of New England in his generation. The energy of a little stream which ran through the farm was made use of to drive a grist-mill. His crops were such as were generally raised at that time, and his corn, his oats, and other cereals were carted to market in Hart-

ford along the post-road from Boston to New York, which ran just beyond the borders of the farm. Intercommunication was slow and laborious in those times. One of his sons remembers that during his boyhood he was working with his father in the vegetable garden, which then occupied a portion of the ground now made into a lawn sweeping down from the mansions of the present proprietors to the office of the works and the mill, when a neighbor came hurrying up, and, swinging his hat, cried out the great news that peace was declared. This was the peace which ended the first war of the United States, that of 1812. "Come, my son," said the father; "there will be no more work to-day."

This post-road was the only means of communication then with the outside world, and over it the way lay to Boston or New York, distant a week or a fortnight's journey, according to the speed of the traveler's horse. Now the silk-mill on the old farm draws its supplies of the raw material from China and Japan across the continent by the Pacific Railroad, and receives them in less time than it would then have taken to get them by wagon teams from either of the before-mentioned cities, had silk weaving then been a branch of American industry.

It is well, in the hurry and turmoil of our

modern life, to sometimes pause for a moment and consider the changes which have been brought about in the methods of our daily life, and in the social, the moral, and the industrial conditions of the people, during little more than half a century. The isolation of the hamlet life of New England has disappeared almost as entirely as the wigwams of the aboriginal Indians. The race of farmers who wrung from her sterile soil, by ceaseless toil, a moderate support is no longer to be found. Before the hurry and bustle of our modern life their contented independence has also passed away with the conditions which created it. The rapidity and ease of intercommunication have increased the scope and the activity of our sympathies, and the new spirit of modern times is nowhere more strikingly illustrated than in the changes it has produced in the social and industrial relations of New England. The spirit of unrest is abroad through the length and breadth of the land; and the insatiable desire for activity, which has made the "Yankee" ubiquitous, has destroyed the quiet contentment with the isolation of village life as it was only two generations ago. When Benjamin Franklin, in his capacity of colonial postmaster-general, proposed the startling innovation of a weekly stage-coach between Boston and Philadelphia, a coach to start from each end of the line, he was thought to be in advance of his times. Now, however, even our village gossips are disappointed if their morning paper does not contain full telegraphic advices from all parts of the world.

With this change in the activity of our social relations the industry of New England has undergone an analogous transformation, and her villages have become the seats of various manufactures. The traveler by railroad sees here and there a specimen of the spacious old farm-house, surrounded with its colony of barns, which formerly was the home of the well-to-do farmer, with his cattle, and formed the chief object of interest to the casual passengers of the stage-coach. But these are now rare, and his attention is chiefly attracted by the villas of the successful manufacturers, with their pretentious variety of Americo-Italian, transatlantic Tudor, and nineteenth-century Gothic styles of building.

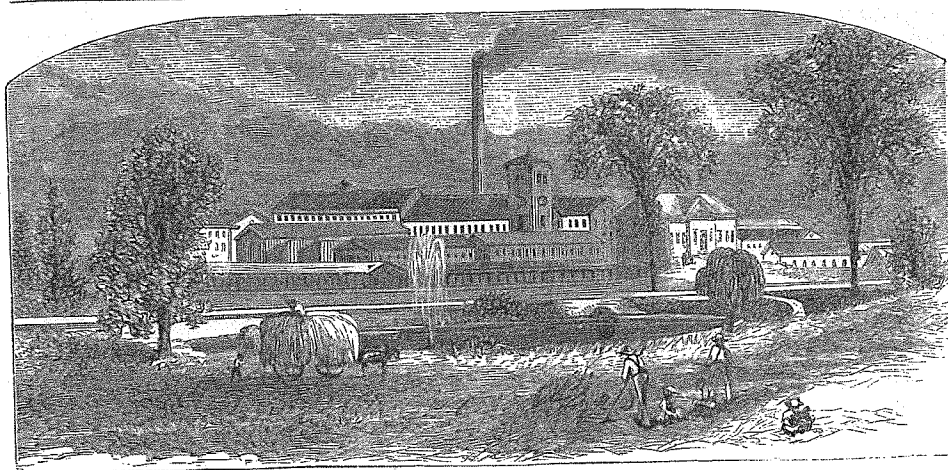
If, however, our supposed traveler is a person who is in the habit of observing closely, and is interested in the condition of the people, knowing full well that the comparative comfort of the labor of a country, rather than the display of its wealthy class, is the only sure criterion for judging of its real progress, his experience will at the first glance lead him to question whether this era of industrial activity is an unmixed blessing. Clustered about the mills, with their ugly uniformity of brick and their tall

chimneys, he will see collections of squalid cottages, or rows of tenement-houses redolent of poverty, and disfiguring the landscape like blots upon an otherwise fair page. These are the homes of the operatives. These are the structures, crowded, unventilated, undrained, infectious, with no proper sanitary regulation, which have replaced the cottages in which the labor of seventy years ago found its home. As in the olden times about the castle stronghold of some feudal lord were gathered the huts and hovels of the peasants, who sought within the shadow of its walls safety and protection from the predatory incursions of some neighboring robber knight, so in this age, which threatens the introduction of an industrial feudalism, labor gathers about these chimneys and these "iron-mills," in search of the means of living.

It is unquestionably a fact that the industrial advance of the last seventy years has been a most necessary and important step in social evolution. The organization of production and the application of steam, together with scientific methods, have secured to society the ability for a more universal distribution of the material conditions for well-being and comfort than the world has ever before enjoyed. But the truth of Goldsmith's lines is none the less applicable for us to-day than it was for his contemporaries.

"Ill fares the land, to hastening ills a prey,  
Where wealth accumulates and men decay."

The best evidence that the industry of New England is fairly open to the charge that it is following this course is to be found in the report of the Bureau of Statistics of Labor of Massachusetts for 1871. It is to be regretted that as yet Massachusetts is the only State in the Union which has such a bureau, since the work done by it is absolutely necessary for obtaining the facts from which alone the truth can be obtained, and the material gathered for dealing justly and sympathetically with this most important social necessity. We have the space here for only an extract or two from this volume, which from cover to cover is worthy of the earnest and careful study of all who are interested in social questions, and desirous to maintain our republican organization. Speaking of the change which has been brought about in the manufacturing industry of Massachusetts, the report says, at page 462: "Every body now knows that the educated American operative of the primary period of manufacturing (with its *Lowell Offering*—a periodical conducted by factory girls, and discontinued in 1848) has become paleozoic and extinct, and that a secondary period long ago succeeded it, furnishing a low grade of European operatives, congeners of a class which at home has been for centuries pauperized and kept in a state of most



THE SILK WORKS.

deplorable and stultifying ignorance. It would seem that experience in factory life caused the exodus of an intelligent and thinking class, and that an ignorant and witless one came to fill its place; that these, affected, perhaps, by the educational influences of our institutions, are themselves undergoing a change, and getting to be thinkers and readers, perhaps overmuch; and so demanding, as all thinkers and readers are apt to do, more time for each of these instructive operations. These influences are deemed disastrous to the business, and a still lower grade of laborers must be utilized; and so the process must be indefinitely extended, of replenishing a better by a worse, provided the worse can be had at a cheaper rate, thus applying the element of shoddy to the operative class. That is, that there must be, for the sake of cheapness, an eternal retrograde in their intellectual status, and that, Christian laborers becoming too expensive, the 'heathen Chinese' must be brought in for the double purpose of running looms and becoming Christianized by the operation. But it must not be forgotten that all this is at the expense of the growth of the older tenants of the country, and perhaps at the peril of institutions the security of which depends on the education of the people who really rule the country, and who by education alone can be enabled to rule it well."

The report also prints the testimony of a "clergyman long resident in a factory town, who has devoted a great deal of time and of careful observation for twenty years to the study" of this subject, from which we make the following extract: "The *tenant-houses*: who has not seen their fine array on sloping hill-side, in seeming order, and with fair show of external comeliness of form, suitably adorned by paint? But he who stops to observe and stoops to learn may clearly and easily perceive that this glitter of external

show but imperfectly covers the misery and want, degradation and wrong, within that call loudly for redress.

"I have stood where I could see the rustling throng issue from a mill as the bell rang and the gates were thrown open; and what I saw were no longer manly men, but men of stooping forms and hopeless faces; women dispirited, slovenly, and aimless; and children, 'the hope of the country,' only such forlorn hope as those whose elasticity was early gone, whose childish merriment was collapsed, whose eyes were dull and whose cheeks were pale—the embryos of an emasculated adulthood—the whole crowd, where once were seen fine specimens of manhood, now a sorry spectacle of overtaken, exhausted, and despondent humanity—veritable 'mud-sills of society.' Such is now the sight where I have looked. The improvements have been of machinery, and not of humanity. They have benefited the capitalist, and not the laborer. The operatives' houses, also, which have fallen under my observation, and of which I have read loud praises, do not merit the commendation, being ill-contrived, cramped for room, unventilated, uncomfortable, and no fit resting-place for persons fatigued by long hours spent over exacting machinery. They seem to be managed with almost no regard for the comfort or health of those who live in them, and whose labor is measured out to them by steam or water power unremittedly, day after day, through the continuous year. One hardly wonders at it when he hears instances of intentional hurt to some limb as a cheap purchase for relaxation from work. Humanity must be cheap, with men made for machinery and not machinery for men, where such a system is fostered, and fostered at the expense of manhood, which itself should be of the very noblest, if the State would preserve its own nobility."

Concerning the education of the children

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in the manufacturing towns, the report says: "Now we know, indeed, that there is a compulsory statute of the Commonwealth in relation to the schooling of its children, but, like a great many other statutes on the books, it is paralytic, effete, dead—killed by sheer neglect. It was never enforced, and never supposed to be any body's duty to enforce it. In fact, we are inclined to believe that it is not generally known that such a law was ever enacted. Nobody looks after it, neither town authorities, nor school committees, nor local police, and the large cities and many of the towns of the State are swarming with unschooled children, vagabondizing about the streets, and growing up in ignorance and to a heritage of sin. The mills all over the State, the shops in city and town, are full of children deprived of their right to such education as will fit them for the possibilities of their after-life."

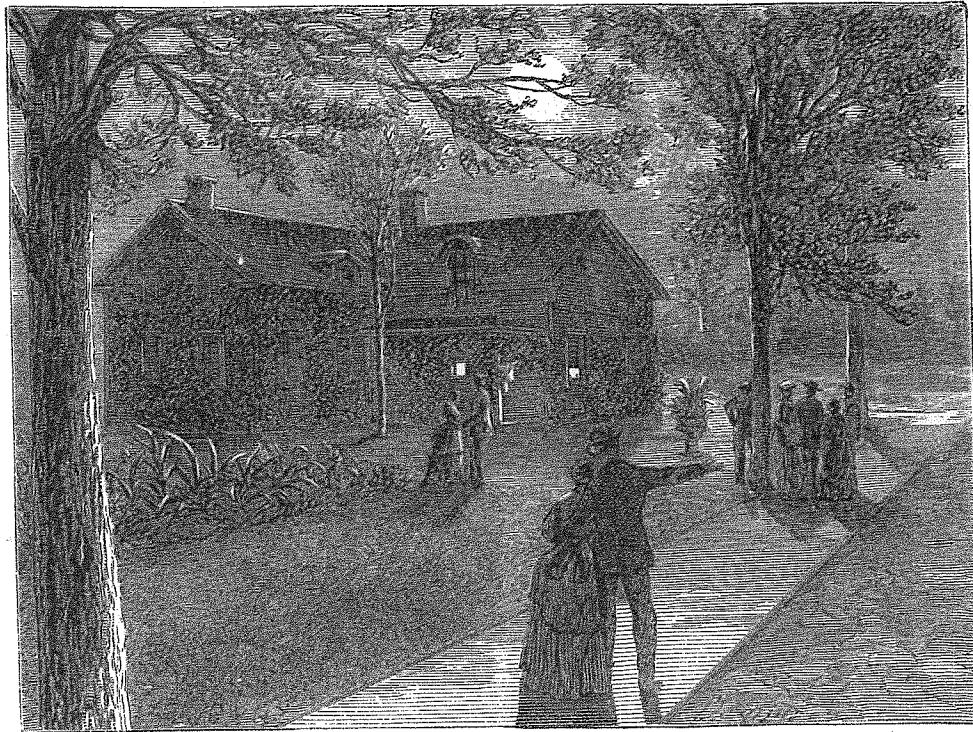
The picture these extracts present is appalling, and would be disheartening for the well-wishers of our institutions, were it not evident that the cure for the evils here described is simple. It only requires that manufacturers should be made aware that their business can be carried on upon an entirely different system, and that the pecuniary results of a sympathetic interest in the condition of their workmen are as marked as is the improvement in the moral and physical well-being of the workmen themselves. The conclusive evidence of this is to be found in the industrial enterprise carried on at South Manchester, Connecticut, under the proprietorship of the brothers Cheney. Here is a most successful enterprise, which has been built up by the patient and persistent energy of forty years. Its specialty, that of silk

weaving, has been so frequently tried in this country without success that it has been generally supposed that it could not be introduced here. Numerous unsuccessful experiments have been made by the brothers Cheney themselves. They have tried raising the silk; they have imported the workmen; they have tried the various experiments which any one who is at all familiar with the difficulties in the way of successfully introducing any new industrial process knows it is necessary to try. But with patient perseverance they have steadily persisted until success has been achieved. Great as is the credit due to every one who has increased the wealth of the country by the establishment of any new industrial process—and perhaps in this peculiarly commercial age we are too apt to overestimate this—and prone as we are to worship success, we are too prompt to recognize it, regardless of the means by which it is attained or of the effects it has produced upon others; yet the credit due is the greater when, as in this case, the success arrived at has not been merely a pecuniary one, and the methods used to attain it have been such as were consistent with an elevated sense of the responsibilities of wealth, and a large-hearted sympathy with those who have aided in attaining it.

One of the overseers in a Massachusetts factory testified before the Bureau that in his opinion there was no claim upon the employer to regard the condition of the operative; that if any one engaged in the work broke down under it, the company looked upon it as an accident which might happen to any one of their machines, and replaced the unfortunate with another. A different conception of the duties we owe



THE HALL, DÉPÔT, AND HOUSES OF EMPLOYERS.



THE FAVORITE WALK.

our fellow-men, and a different method for practicing them, have presided over the management of the enterprise at South Manchester. With a wise confidence in the inherent morality of human nature, the proprietors have known that the golden rule is more than a mere dictum, suitable perhaps for our Sunday professions, but wholly inapplicable to the practical business transactions of the other days of the week, and from the commencement of their enterprise they have sought to apply it. The grounds about the mill are laid out like a park. The firm consists of six brothers, and their houses are arranged suitably about the grounds. Fences, which are always so ugly in a landscape, unless by their decay they please a sentimental love of the picturesque, and which are morally so objectionable for the isolation and selfish distrust of our neighbors which they suggest, are abolished all over the domain. The effect of this simple piece of common-sense arrangement is shown more strikingly in the streets built up with the houses for the workmen than it is elsewhere in the grounds, from the greater contrast which these afford to the structures devoted generally to the same purposes. One of the first things which the rich feel necessary for their country houses is that the view should extend over the landscape without the ugly interruption of a fence. This natural feeling is shared by those who are not rich, but, like many other things which exist simply

from the prejudice of habit, it has heretofore been considered impossible to realize. To-day, however, by the slow process of generations, civilized men have become so imbued with a love of order and law that the fence should disappear from the landscape, as the draw-bridge and moat have disappeared from the modern mansion.

The cottages for the workmen in South Manchester have all been designed with an artistic taste, while considerations of their interior convenience have not been overlooked. They are all furnished with a constant supply of water, drawn from springs upon the domain, and also with gas. Thus two most important conditions for comfort are guaranteed, and in these respects the dwellings provided compare most favorably with such as are usual in small manufacturing towns in New England. Plenty of water and plenty of light, with abundant ventilation, simple necessities as they are, are sadly wanting in the homes of industry, though it requires so little foresight to provide for these, especially in villages where the supply of them is practically infinite. It has been found advisable to locate the homes of the different nationalities at points remote from each other, thus avoiding any possible turmoil which might grow out of petty discords. Cattle and chickens are prohibited, as either would be detrimental to the unfenced garden patches.

The rent for these cottages is low, avera-



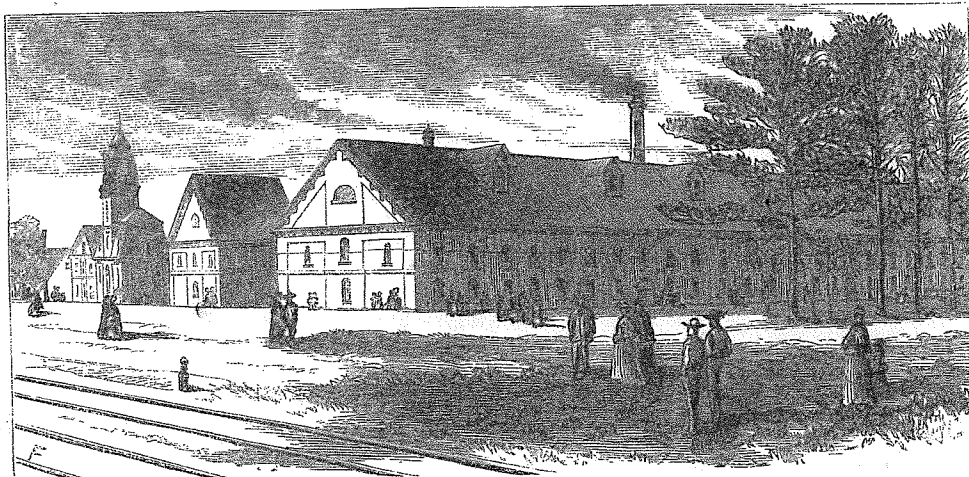
ging rather under than over one hundred dollars a year. The brothers Cheney have recognized the fact that the charge of rent is an onerous one to wages, and that the operative can not afford to pay a high price any more than the proprietor can afford to charge one. The workman, to be self-respecting, must be surrounded with the material conditions of self-respect; but it is a very short-sighted policy upon the part of the manufacturer who makes such conditions for his workmen a matter of pecuniary speculation. Yet it appears to be as hard to convince the proprietors of this simple fact as it was to convince the slave-holders that slavery was a more expensive system than free labor.

By the economy which always results in operating at wholesale, these cottages are built at a cost upon which the rent, cheap as it is, affords, not a profitable, but a satisfactory interest. The domestic supplies for the families of the operatives are furnished at a store in which the proprietors of the factory have no interest, but over which they exercise a supervision, seeing that the materials furnished are good of their kind, and that the prices charged are just. This arrangement is a much better one than that of a "company store," which is so common elsewhere, especially with joint-stock companies, and in which the greed for large dividends makes the supply of the operatives' wants only another opportunity taken advantage of by the owners to make a further profit from their necessities.

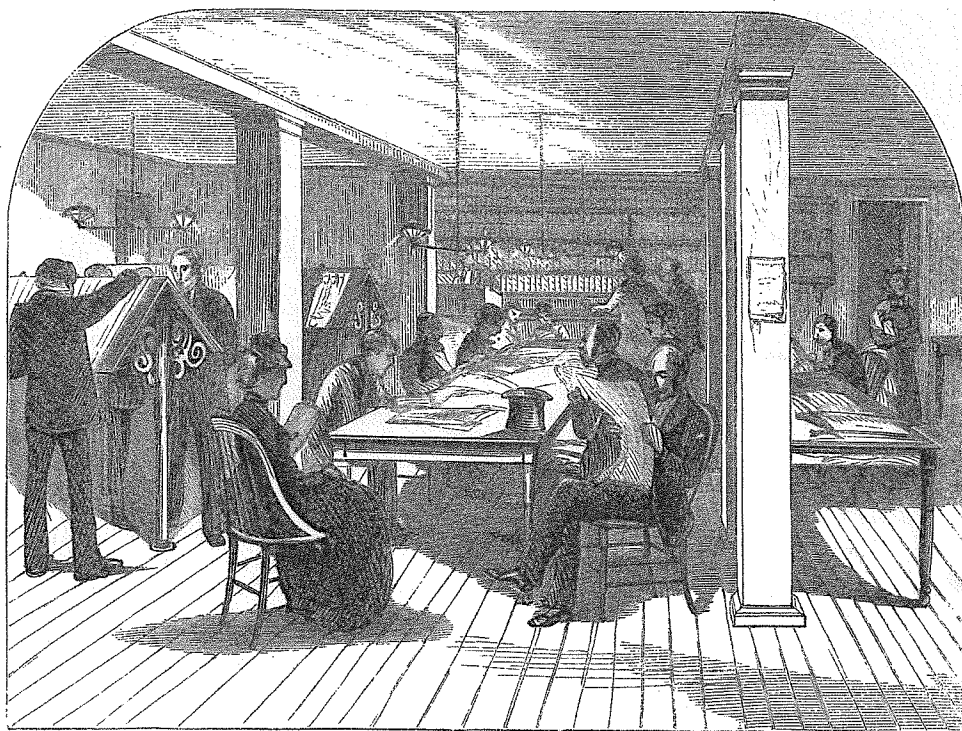
The process of silk weaving, though similar in many respects to weaving other materials, has yet special peculiarities of its own. The electric condition of the atmosphere, and possibly other causes which have not as yet been sufficiently examined, affect the sensitive material, so that one of the most difficult problems in the introduction of this industry was how to provide the conditions.

Our climate and our atmosphere are so different from those of Europe that foreign experience was of but little value here, and the whole matter had to be settled by experiment. Then, too, the weaving in this country must be done with the power-loom, in order to be made in any way profitable. The activity of our industrial life could not stand the slow process of hand-weaving which even yet prevails quite generally in Europe, and entirely in the East. Silk weaving, therefore, as it is carried on in South Manchester, is almost a new art. The dyeing is also a process which requires the greatest care, together with both practical and theoretic skill. To invent a pattern which shall strike the popular taste, and then to organize its production, are problems requiring artistic and scientific knowledge of no mean order. To-day the "base mechanic arts," as they were ignorantly called a few generations ago, offer scope and verge sufficient for the display of the best intelligence of the time; and the art and science of industry, properly comprehended and put in practice, deserve to be ranked higher than the art or science of war, which has heretofore been considered the first, and to be honored accordingly, since they demand brains of a better quality, and a heart of a larger grasp.

In the new mill, just erected, every appliance which experience has shown to be needed is secured. The ventilation of the long rooms, filled with the rows of looms, is carefully provided for. The enormous machinery which furnishes the power needed for driving the looms and for carrying on the dyeing processes is itself a marvel of modern industry. A grand industrial organization like this, the various parts of which are so fitted as to work together harmoniously to the attainment of one result, has the charm which all organization has to the human mind; and the generation which grows up



THE NEW FACTORY.



THE LIBRARY AND READING-ROOM.

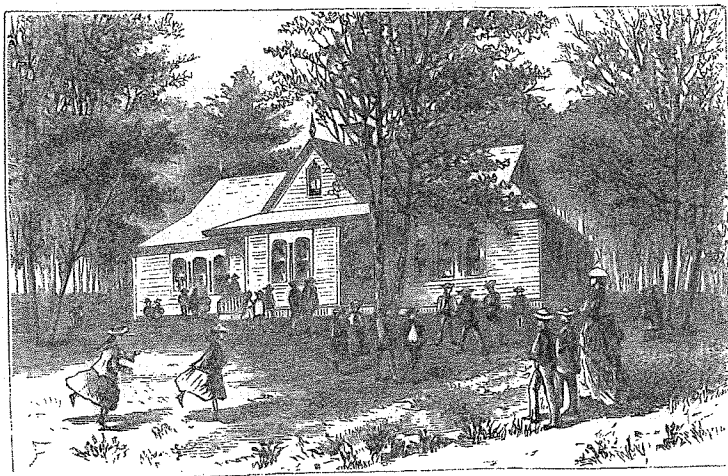
surrounded by such influences must have its love and desire for social harmony stimulated by them, as a savage child has his love of destruction fostered by the daily surroundings of his life.

Especially is this so when care is taken that the education of the children shall not be neglected. The report of the Massachusetts Bureau of Labor gives a sad but truthful picture of the immediate necessity for the adoption of measures of some kind to prevent the neglect of education which is so common in the manufacturing towns of New England. In South Manchester, however, the Messrs. Cheney support for the children of their operatives an excellent school, and make it an invariable rule that the operatives in their employ must send their children to it. The effects produced by this course show how wise it is. The children are benefited, and their parents can not escape the influence. Even as a speculation, manufacturers would find it for their advantage to see that the educational interests of those dependent upon them were attended to.

Beside the school, Messrs. Cheney Brothers have also built a Hall for the social entertainment of the operatives. The lower story of this building is intended for a reading-room. The hall itself is one of the most simply effective interiors to be found. It is provided with a stage and with side scenes for theatrical representations. On Sundays services of a religious character are generally held here, at which clergymen of all denominations suc-

cessively preside. During the week occasional exhibitions of all kinds are held here—lectures, theatrical representations, and the various exhibitions which travel through the country. The hall is never let, but the expenses of the entertainments are paid by the firm. Provision of this or a similar kind for the entertainment of the operatives is one of the most crying necessities in the manufacturing districts. The nervous and mental exhaustion caused by a day's labor in a mill, surrounded with the din and active motion of machinery, while the attention is necessarily kept confined to the monotonous uniformity of some one operation, can be realized only by those who have undergone it. And when, too, this is continued day after day, without some relaxation and change it becomes almost unbearable. It is the terrible *ennui* caused by such a life which produces almost all the intemperance and the low moral condition of the population in our manufacturing towns, where no healthful recreation is organized.

The basement of the Hall building is divided into rooms designed for the meeting of temperance lodges. The library and reading-room are temporarily located here. The Library Association numbers between four and five hundred members, who assess themselves one dollar each per annum, the aggregate of which is far from sufficient to meet the expenses of the association. The members are of all ages, and about equally divided in sex. Some of the reading-tables are



THE SCHOOL-HOUSE.

strewn with the numerous magazines and weeklies from Europe; others are devoted to those of America, including complete files of the leading journals of nearly all the principal cities of this country.

In the third story of the Hall an armory is fitted up for the color company of the First Connecticut Militia. A Zouave company of boys also keep their Quaker rifles here.

Two boarding-houses are provided, one of which is patronized chiefly by married couples, and is well kept. The other is the abode of single men, and is not especially remarkable for neatness, though the price charged is certainly low, and the rooms, generally speaking, are comfortable. The unmarried among the women operatives prefer to board at the cottage of some friend, and thus secure congenial homes.

The sale of liquor is prohibited by the Cheney Brothers, and the entire police labor is performed by one deputy-sheriff, whose office is almost a sinecure.

Some months since the Cheney Brothers purchased a wooded knoll, which has been left an unchanged natural forest, traversed by picturesque walks. A spacious dancing-floor, surrounded with comfortable seats, is located here, and at seasonable times a good band is in attendance.

From the failure to provide the proper conditions for the moral and intellectual development of those most of whose waking hours are

passed in toil, the results predicted in a document, No. 44, printed by the Senate in 1869 are sure to follow: "A helpless crowd of workers, the oppression of low wages, inevitable poverty, and a disguised serfdom; a rich master, a poor servant, and a mean population. Such is the story of manufacturing in old England, and such is the story of manufacturing in New England."

It needs, however, but a glance at the condition of the operatives in South Manchester to see that the measures which have there been taken to prevent this result have attained their end, and it would seem that the simple sentiment of self-interest would lead other manufacturers to imitate in their own localities the method of discharging their duties to their operatives which has here produced such desirable results. Up to this time, however, public attention has been so much absorbed in wondering at the remarkable industrial advance of the last forty years that the cost at which it has been produced has been too generally lost sight of. Production has been organized, but the producer has been neglected.

Considered simply with regard to the material results, the success attained during the past forty years has been marvelous. The invention, the arrangement, the organization and adaptation of means to ends which have been displayed are justly subjects of congratulation. The history of this enterprise at



THE BOARDING-HOUSE.



South Manchester, for example, shows a progress in these respects of which we may justly be proud, while at the same time it shows that it needs but a sympathetic comprehension on the part of the manufacturer of the duties of his position to avoid the evil results which inevitably follow from an opposite course.

Those who have read in a former number of this magazine the description of the Social Palace at Guise, and the admirable results which have been there reached by the large-hearted comprehension of the problem of organizing labor in this new phase of the development of industry, will have noticed the use which M. Godin has made of the collective moral force of the population in stimulating and securing their own advancement. There he has socially as well as in-

dustrially solved the problem of the organization of industry. And it is the solution of this portion of the problem which is the most immediate duty of the manufacturers of this country.

We have succeeded in developing material production. This has been the work of the generation now passing from the scene. Upon the next the more intricate and difficult problem of organizing the moral force of industry so as to add a moral advancement to our material progress devolves. The history of South Manchester shows that this is possible, and from all sides crowd the manifestations that it is necessary, if we hope to hand to our successors the heritage of free institutions which we have received from our fathers.

## THE SIREN OF SCIENCE;

### OR, THE MODE OF NUMBERING SONOROUS VIBRATIONS.

IT is generally well known that the sensation of sound in the human ear, or rather in the human *mind* through the instrumentality of the ear, is produced by a quivering or vibratory motion transmitted through the air, or through some other medium capable of receiving and transmitting such motion, and that the musical pitch of any sound depends upon the rapidity of succession in the pulsations. The ingenious devices, however, by means of which scientific observers have contrived to ascertain precisely the number of vibrations in a second produced by any given sound are not so generally known. Some of these we propose to explain.

Sounds differ from each other, it is obvious, in various ways. They differ in quality, in intensity, and in pitch. In quality, as, for example, when two voices sing, with the same force, the same note. Hearers can distinguish one voice from the other by a very perceptible, but generally indescribable, peculiarity or quality, by which every individual voice is marked. Another example is where the same note is sounded with the same force upon two different instruments, as upon the violin and the clarinet; in which case the sounds are clearly distinguishable from each other, although both in pitch and in intensity they may be precisely the same. Sounds differ, too, in intensity, as when the same voice sings the same note with a greater or less degree of force or loudness. These two characteristics of sound depend upon other peculiarities in the vibrations that produce them than their *frequency*. The *musical pitch* of the sound, however, depends wholly upon the *frequency* of the pulsations emitting it, or rather upon the rapidity of succession with which the pulsations strike the ear.

For sound, it must be remembered, is not, strictly speaking, a phenomenon of external nature, but simply an affection of a human or animal sensorium. There is no *sound* in the outer material world, but only that which produces the sensation of sound in the mind of a sentient being.

The vibrations which produce sound, as well as those somewhat analogous to them which are supposed to exist as the causes of other sensations, such as light, heat, taste, smell, and the like, are, of course, subject to an infinite variety of modifications in respect to character, intensity, amplitude, and mode of action; but there is one very remarkable law or principle that seems to pertain, within certain limits and restrictions, to vibrations of all kinds—one which expresses a mode of action the reverse of what one might have anticipated, and yet which, in its relation to sound, seems alone to render any thing like *music* possible in such a world as ours. This law is that vibrations produced by the same elastic force are isochronous through all variations of amplitude in the oscillations.

To make this plain, let us consider the case of a slender bar of steel, held firmly at one extremity, as shown in the engraving, and made to vibrate by springing the free end. It may be held in a vise or in a joiner's clamp. The elasticity of the steel resists any effort to draw the end, D, out of its natural position. If this elasticity is overcome by any external force, and the extremity, D, is drawn into the position D', and then released, it will be carried back by the elastic force toward its original position. But in consequence of the momentum which it will acquire on its return it will not stop at the central position, but will pass on to D'', from which point it will be again brought