

"Similarly to all theories, conditions are here supposed to exist, which, in numerous instances, are probably wanting. In the experiments upon a wrought iron beam, from which these results have been deduced, the dynamical load was accurately proportioned to the ultimate power of resistance; but there is no question, that in some of the earlier built iron bridges no such proportion obtains. Certainly the majority of wrought iron girders are in excess, so far as their strength is concerned, of the quarter ratio between their working and breaking load; but, if we may judge from failures that have taken place, some are comparatively weaker than they ought to be. Unfortunately, in these experiments, with the exception of those confined cast iron bars, in which the load applied was of a static and not dynamical character, the element time does not enter into the calculation, and the inevitable deterioration it produces upon everything exposed to its influence, is altogether disregarded. It is one thing to rivet up a beam, and then subject it immediately in the plenitude of its strength to so many alterations of state, before the corroding action of wind and weather has the least chance of exerting its destructive power; but it is a very different affair to allow a beam, which is yearly becoming weaker, to be submitted to the passage of heavy rolling weight. In the one case the strength of the girder, so far as extraneous causes are concerned, is constant; in the other it is variable.

"A difference will obviously present itself respecting the ultimate durability of cast and wrought iron girders individually. When the former fail they fail completely; there is no repairing a fractured cast iron beam, whatever shape it may possess; it is only fit for the cupola or the puddling furnace. The same circumstances do not attend the dissolution of wrought iron girders provided they are well watched and the 'first symptoms' attended to. The Menai Bridge, for example, might be replaced piecemeal, accordingly as every plate, angle iron, or other portion of it becomes deteriorated to an extent sufficient to imperil the safety of the structure. In this sense a wrought iron bridge is practically indestructible, since it admits of any and every degree of partial repair, and after the lapse of its first hundred years of life, may be completely rejuvenated and commence a fresh career. Lattice bridges—those constructed upon the open web system—in general afford special facilities for this process of gradual reconstruction, since a bar can be taken out and replaced without in any manner jeopardizing the safety of the remainder. The external effects, or visible appearance of the influence of time, must not be confounded with that invisible and inexplicable action that is incessantly in progress in connection with the molecular composition of the material. For similar reasons that the wrought iron girder, as a structure, can be preserved by successive reparation from the results of visible corrosion and decay, so is it also independent, in some degree, of any atomic alteration, unless we imagine the whole girder to be equally affected, and to fracture precipitately like one of cast iron. It has always been a puzzle to engineers to satisfactorily account for the sudden fracture of cast iron, whether in the form of girders, axles, or engine beams, under a much smaller strain, than what they had previously borne with impunity for a long period of time. A ready and apparent, though by no means necessarily a true, explanation of the fact is that it is owing to a change having taken place in the internal structure of the material. This is equivalent to the specious and clever manner in which members of the faculty extricate themselves from their professional dilemmas by ascribing the fatal termination of any unknown complaint to 'disease of the heart.' The experiments made by Mr. Fairbairn upon cast iron bars, although interesting and valuable so far as a mere static load is regarded, present no analogy to the case of a cast iron bridge undergoing the transit of some couple of hundred trains per diem. Whatever the exact nature of the change may be, or the rate at which it progresses, until the cohesive power of the material is injured, it is impossible to assert; but we are nevertheless certain that the continual repetition of severe strains on a girder, must ultimately impair its powers of resistance. In a word, then, upon this hypothesis, every cast iron girder is doomed to break at some time or another, and what is worst, break suddenly, the precipitation of the passing load into the gulf beneath being the first sign of danger. This is not a very consoling reflection to a people who travel so much by rail as ourselves; but immunity from accident begets indifference, and although the contingency is possible, yet it is of an occurrence so rare that it is out of the sphere of probabilities.

"One is apt to regard the breaking down of a railway bridge in the light of a possible, but very remote contingency; to believe in such an occurrence in a vague, uncertain manner as an event that might or perhaps would take place 'some day,' but which, at present, is not worth thinking about. There is a little of the Mahometan doctrine of fatalism in all this, and although we do not exactly sit down, fold our hands, and cry 'Bismillah,' as the sole preparation and defence against a coming danger, yet we require it to be brought pretty well home to us before we are thoroughly aroused to action. From the experiments we have quoted, it was ascertained that the strength of cast iron to resist repeated alterations of strain was much greater than what has usually been accorded to it. At the same time we have no data upon which to base the life of a cast iron girder, unless we assume it to be equal to that of a wrought iron one. It has already been shown that the facilities offered by structures of the latter description, for gradual repair and actual reconstruction, leave no cause for anxiety on their behalf. We are in possession of the true elixir vite as regards them, and all that is required is to watch the time for making use of it. On the other hand, the 'first symptoms' of approaching rupture in the case of a cast iron girder cannot be perceived, and it is questionable whether the most careful and minute 'surveillance' which

can be exercised over every cast iron bridge upon a line, would be able to detect the 'internal change of structure,'—that invisible dissolution which precedes the visible downfall. Taking for granted, therefore, that the natural life of a cast iron railway bridge is, for a minimum, one hundred years, some of our oldest examples have about sixty years to run, supposing that they die literally of old age, and their demise is not accelerated by accidental injury."

#### THE SHOEBOURNNESS EXPERIMENTS.

During the months of June and July, a series of experiments in artillery practice have been made at Shoeburyness, England, to test the modern improved artillery, and its effect upon iron plating. The tests were of the most severe character, the plates being of a great thickness and of a superior quality of iron. One of the targets had a porthole in its center, and its condition at the end of the experiments, as illustrated in the English journals, gives evidence of the enormous efficiency of the guns used in the experiments. The most formidable shot at this target was from a 10-inch gun, at a range of 1000 yards. The effect of this shot was to carry away, for a considerable area, the whole of the plating above and to the left of the porthole, driving with it masses of iron, converted by the projectile into missiles more deadly than the shot they were designed to resist. We have waited for the conclusion of these important experiments, which have extended through a much longer period than was at first anticipated, that we might lay their results before our readers. We shall only refer to the most important of them, as described in the *Mechanics' Magazine*.

The first experiment we shall notice was a 12-inch shell, with full charge, aimed at the upper part of an extra plate, placed on the front of the shield, and which it broke into several pieces. It penetrated 16 inches, and exploded backward, doing no damage at the rear of the shield, beyond fracturing another horizontal plank. The Rodman gun, with a full charge, was then brought to bear on the upper part of the shield. It struck the curved plate at the left hand top corner, a portion of which was already knocked off, and it broke in two, doing no further damage. A shell from the 12-inch gun was fired with a charge equivalent to 1,000 yards range. The shell struck the second plate from the left hand, carrying away a piece from the corner, and bursting; the explosion lifting up a large triangular fragment of the adjoining plate previously broken, and hurling it on the roof of the building. This mass of iron was about 6 feet base by 5 feet sides, and remained pivoted on one of the large roof bolts, which held it without breaking. Inside the casemate at the rear, the ironwork in connection with the roof was much distorted, and a great cavity, admitting daylight, was formed through the plates, the head and point of the shot remaining jammed among the debris of the cavity.

The firing was afterward directed against the granite base on which the target stood. This forms a plinth about 4 feet high, projecting about as much from the surface of the shield, the step being rounded off. The shot—a 450-pounder, from the Rodman gun, with full powder charge—struck the granite toward the right hand, plowing a furrow some 5 feet wide and 3 feet deep, smashing the granite to powder, and scattering a cloud of fragments and dust around. After this shot, two rounds were fired at Sir John Brown's solid rolled 15-inch plate, which merely stood against some iron standards and a few balks of timber. This target had already had three rounds fired at it, with a result highly creditable to the plate, considering the conditions under which it was tested. The first was a 12-inch shell, with 76 pounds of powder, and which struck the shell about 2 feet from the end, which it broke off and hurled about 6 feet to the rear. The second shot, which was from the Rodman gun, with full powder charge, struck the plate near the center of the original length, and close to where it was hit by the two shots of the previous day. The plate at this point was already severely cracked, and the result of the last shot was to complete its destruction, the plate separating into four pieces. The fractures showed a splendid quality of iron, although here and there symptoms of bad welding were visible, and this was all the most adverse criticism could pronounce against it. In its favor there was everything to be said. Considering its unsupported position, and the widely different conditions under which it was fired at to those of a fort where it would be fixed as a defence, it stands out at once as a great success. Although the Plymouth fort stood a good amount of battering, it is to be remembered that it has been improved upon by replacing some of the bars by plates. These were just the points that withstood the firing the best, and this strengthens the conclusion that a mighty strength of resistance would result from the use of a single solid plate, instead of a compound laminated plating.

This was the conclusion of the third day's experiments, and at this point we may pause to notice the recorded details of the practice, as regards the force and velocities of the shots fired, and which are as follows: The Woolwich 12-inch rifled 600-pounder, with 76 pounds of pellet powder, 5,588 foot-tuns, 1,159 feet per second velocity. The 10-inch rifled 400-pounder, with 60 pounds 1 gr. powder, 4,431 foot-tuns, 1,264 feet velocity. The 15-inch smooth-bore Rodman, with 50 pounds English powder, equal to 60 pounds American, 4,215 foot-tuns, 1,161 feet striking velocity. In the same gun, with 83½ pounds charge—equal to 100 pounds American powder—the velocity was above 1,400 feet, and the total energy about 4,000 foot-tuns.

The "War Office Casemate" was next made the object of attack. This casemate was manufactured at the Millwall Iron Company's works, and was designed with the view of testing the resistance offered by a given weight of iron plate, disposed in various thicknesses and positions. It is divided

into six sections, each one of which represents a different system. The first section consists of an 8 inch solid plate, placed direct upon the 2-inch skin, which is common to all the series. The second is of 4½-inch plate upon a backing 7 inches deep, formed of channel-iron placed back to back. The third is a 6-inch plate, with backing 7 inches deep of Hughes' hollow stringers. The fourth is a 4-inch plate, with 7 inch backing of channel-iron; the fifth is a 4½ inch plate resting partly upon 7-inch backing of channel-iron, and partly, with only the interstices between itself and the inner 2-inch skin, filled up with 7 inches of concrete, forming the sixth section. The structure was roofed in with brick arches and concrete, as in ordinary casemates. The firing was from the 7-inch, 9-inch, and 10-inch rifled guns, and the Rodman 15-inch smooth-bore gun, with battering charges, and at the same range as the Plymouth shield, viz., 200 yards. Only Palliser shells were used, these having established their superior penetrative power over the Palliser shot.

Twenty rounds were fired in all at this target, the first being a 7-inch shell, which struck the 8-inch plate, penetrating about 8½ inches, but doing no damage to the rear. The second round, a 7-inch shell, struck the 4½-inch plate supported by 7-inch channel-iron backing. It penetrated 14 inches into the target, but caused no damage to the rear. The third shell struck on the vertical junction of the last plate fired at, with the 6-inch plate backed by hollow stringers. The result was a penetration of 8½ inches, the head of the shell remaining in the hole, and the rear remaining undamaged. The above three portions are marked A, B, and C, respectively, and they are backed with a massive tapering concrete pier. The fourth shell struck the last named section (C) where it has behind it 2 feet 6 inches of concrete, strengthened by iron girders. The penetration was 10½ inches, with half a dozen nuts stripped off in the rear. The fifth shell struck that portion of the target covered by 4-inch plates upon 7-inch channel iron. The plate buckled ½ inch for about two feet around the shot-hole, and the total penetration was 13½ inches, the head of the shell remaining in the hole. Seven more nuts in the rear were stripped off the bolts. The sixth shell struck the 4½ inch plate on concrete backing, penetrating 14 inches into the structure.

The practice now commenced with 9-inch shells, the first round striking section A of the target, penetrating 13 inches. The second shell struck the B section, penetrating 21½ inches, the plate buckling considerably, and seven nuts twisted askew in the rear. The third shell struck on a bolt in section C, causing a buckle of ½ inch at the top edge of the plate, the penetration being 18½ inches. The fourth shell struck the same section, penetrating 14½ inches, and clearing off five small nuts in the rear. The fifth shell hit on section D, the penetration being 9 feet 8 inches. At the rear the ½ inch iron skin mantlet was driven back 3 inches, and twenty small nut heads were stripped off. This portion was driven back by a bolt, and the mantlet skin was turned up also beside the port, the whole forming a considerable smash. The sixth round struck upon the E section, penetrating 22½ inches, and causing no damage in the rear. The 10-inch gun was then brought into play, the first shell from which struck the A section, buckling the plate, and penetrating 32 inches. The second round struck the B section, causing a buckle, and penetrating 4 feet 9½ inches. The shell was supposed to have burst in the concrete backing. One of the vertical channel irons lifted up a few inches through the concrete roof. The ½ inch skin at the back of the pier opened slightly at the joints. The third shell struck the section C, penetrating 6 feet, and passing into the concrete pier. At rear, the covering slip at the angle of the pier, ripped open over a length of 5 feet 8 inches, with ten rivets sheared, and a bulge of 5 inches in the ½-inch skin on the back of the pier.

The next shell struck the C section in another place, and completely penetrated the structure, clearing everything before it, the point of the shell being carried 200 feet to the rear. Some pieces of the ¾-inch skin were thrown 20 feet away. The point struck was a weak one, being near a joint which was not covered by the backing. This points out the necessity of placing the stringers so that the joints of the plates should be supported by them, instead of having them at right angles to the line of the plates, as at present. The fifth round, with the 10-inch shell practice, struck the D section, making a clean penetration. One of the ¾-inch mantlet plates in the rear was blown 20 feet away, and the timber screen was smashed up. There was an opening in the back of the target 4 feet in height and of considerable width. The angle iron of a vertical girder on the left of the shot-hole was curved 3 inches out of the straight, a 2-inch bolt was broken off, and the concrete was blown out. The sixth and last 10-inch shell also struck upon the D section, and drove the whole side of the target back from its brick-work setting about half an inch. It penetrated 4 feet 11 inches, lodging in the concrete backing, and bulged the cover plate in the rear, stripping some more small nuts, and cracking the roof slightly all round. After this shot the Rodman gun was fired, a round shot striking the junction of the 6-inch plates above the porthole. It caused an indent 7 inches deep, and sheared off a bolt head 6 inches from the face of the target. At the rear the angle iron supporting the ¾-inch skin over the port bent three inches, thirty small screw nuts were knocked off, and the whole skin ¾-inch plate, was knocked out a distance of 9 inches. One rivet was knocked out from the top of each port jamb. The second round from the Rodman gun struck the A section of the target, making an indent of 4½ inches, but doing no further injury.

From the above the nature of the subsequent experiments may be sufficiently inferred, as well as their general results. *Engineering* says that the protective points of the Plymouth Breakwater Fort have been well tested in this trial, and found

wanting, and nothing more conclusive is required to prove the fallacy of opposing to heavy ordnance a rigidly unyielding iron wall.

#### THE PACIFIC MILLS MANUFACTURING ESTABLISHMENT AT LAWRENCE, MASS.

In connection with the French Exhibition of 1867, the Emperor Napoleon proposed ten awards of 10,000 francs each (nearly \$2,000 in gold) to ten different individuals or associations, who, in a series of years, had succeeded in securing a state of harmony between employers and their workpeople, and most successfully advanced the material, intellectual, and moral welfare of the employes. In response to this appeal, the "Pacific Mills," at Lawrence, Mass., devoted to the manufacture of ladies' cotton and wool dress goods, prepared and forwarded to the jury a statement concerning the operations of their establishment. The jury awarded the third place on the list to the Pacific Mills, together with a prize and a gold medal.

We have before us the printed statement, which embodies many very interesting facts about the organization and management of this model establishment, some extracts from which will interest our readers.

#### THE ORGANIZATION.

The management is confided by about one hundred and fifty stockholders, to nine directors, chosen annually.

The original number of shares of the company was one thousand, costing \$1,000 each, making a total capital of \$1,000,000. The cost of the buildings and machinery having exceeded this sum, fifteen hundred shares more, at same cost, were issued, making the total number of shares to be twenty-five hundred, and the cost of the capital stock \$2,500,000.

They commenced operations near the close of the year 1853, but no goods were ready for market until the spring of 1854. The amount of machinery then consisted of one thousand looms, with carding, spinning, and dressing machinery sufficient to supply them, together with combing machines and spinning for worsted yarn, used in the manufacture of mixed fabrics, and was equal to the production of about two hundred thousand yards weekly, of calicoes and mousseline delaines, with ten printing machines for preparing these goods for the market.

The buildings and machinery have since been increased, so that there are now in operation about one hundred thousand spindles for spinning cotton, with cleaning, picking, and carding machines to supply them, and about sixteen thousand spindles for worsted, with all the necessary preparing machines to occupy thirty-five hundred looms for weaving the two classes of goods above-named, and others, together with twenty-two printing machines, producing a weekly average of about seven hundred thousand yards. The machinery is propelled by eight turbine wheels, six of them being seventy-two inches in diameter, with a fall of water equal to twenty-six feet, yielding fifteen hundred horse-power.

The average sale of the manufactured goods of the company, for a few years past, has exceeded \$7,500,000.

About thirty-six hundred work-people are now employed by the company; of these there are sixteen hundred and eighty men, fifteen hundred and ten women, eighty boys between ten and twelve years, one hundred and forty boys from twelve to eighteen years, forty girls from ten to twelve years, and one hundred and fifty girls from twelve to eighteen years.

In the origin of the establishment the principle was adopted by the managers that there was to be a mutual dependence between employers and employed, each having rights which the other should respect, and that inasmuch as the success of the proprietors must depend much upon the cheerful and intelligent co-operation of the work-people, certain plans were adopted to secure "the material, moral, and intellectual welfare of the workmen," both as a duty to them, and one of self-interest to the proprietor.

#### MATERIAL.

For the material well-being of the laborers, special care was used in the original construction of the work-rooms, to make them cheerful, comfortable, and well-ventilated, so as to avoid as far as possible, the unpleasant drudgery of work, and to secure order and neatness throughout.

Houses were constructed for dwellings, which should give to families residences at moderate cost of rent, that would secure the health and comfort of the work-people, while they were cheerful and attractive. Men pay for these houses a weekly rent about equal to one-eighth of their wages. Large buildings were erected for the use of single females whose residences were at a distance, and divided into seventeen large apartments, capable of accommodating eight hundred and twenty-five persons in the aggregate. The rooms are arranged for two persons each; well ventilated and lighted, and comfortably furnished. Unmarried men are never allowed to lodge in these houses, nor in any case a married man, excepting he is accompanied by his wife, and even then but rarely. Females pay about one-third of their average wages for rooms in these boarding-houses, including food, lights and washing. Fuel for fires in the rooms is an extra expense.

It is common to provide coal, and sometimes flour, for the work-people, at the cost price of large quantities.

Another effort for the material welfare of the operatives was adopted in the earliest history of the enterprise, and has been continued for nearly thirteen years, with marked success, doing much to promote "harmony among all those co-operating," and to establish a bond of sympathy and union.

An association was formed, called "Pacific Mills Relief Society," of which each person employed by the company must be a member, the entire management thereof being in the

hands of the work people, each officer being chosen by themselves from their own number, excepting the president, which office has always been filled by the resident agent or manager, who seldom acts, however, excepting as counsellor or umpire.

Each person, on commencing service, elects whether he will pay two, four, or six cents per week to the relief fund—the lower sum being a little more than one-hundredth part of the weekly averages of those who are the youngest, and consequently least paid, and the highest sum, six cents weekly, bearing the same proportion to the average weekly wages of the entire body of work-people. When the sum in the hands of the treasurer of the society, who is always the confidential clerk of the company, and keeps the deposit with the company for protection, has reached the sum of \$1,000, the weekly subscription of all persons who have been employed by the company three months ceases, while it continues with the new comers.

This condition of funds occurs so often that for nearly one-half the time the older employes are not assessed, and the real sum withdrawn from their wages annually is a very small proportion of their wages, and is far from being a burden to the poorest.

When a person has been in the employment of the company three months, and consequently for that time paid his elected sum to the funds of the relief society, he becomes a full member of that society, and entitled to certain privileges. If sickness occurs, preventing him from labor, and he sends notice to the overseer or head workman of his room, one of the appointed stewards is sent to learn the nature of the illness, and the sick one becomes the special charge of this steward, who for a man is one of his own sex, or if a female, a woman; and it is this steward's duty to see that a nurse and physician, are secured, if necessary, and to draw from the wardrobe of the society such changes of personal and bed linen as the circumstances demand.

Each sick person, if the illness continues one week, is thenceforward granted an allowance from the funds of the society. He who has paid two cents per week for at least three months, receives \$1 25 weekly for the period of twenty-six weeks, if sick so long. Double this sum is allowed if four cents have been paid; and \$3 75 when the amount paid has been six cents weekly. In cases of special need the officers of the society are authorized to make an extra allowance, though great care is used in such a dispensation. Those who die poor have their funeral expenses paid, and are respectfully buried in the beautiful lot in the city cemetery belonging to the society. In some cases the deceased has been sent to his native town, by the desire of his friends without cost to them if they were poor.

Sick members are often accompanied to their friends by a steward, or the overseer of their workroom, when too feeble to go alone, or the friends too poor to come for them. The blessings of this society are thus made known to parties at a distance, and it often induces persons of excellent character to seek employment of this company, while those who have secured the benefits of the relief society retain it in warm remembrance. More than one poor mother, whose only child, while a member of this society, has been disabled by sickness, has found the weekly allowance an invaluable aid to her slight income, and called loudly for blessings upon its officers and the institution engaged in such a work of merciful kindness. Many a father or mother, or other relative, whose child or friend has been sent to this company, have besought the blessings of heaven upon the members of this society who have cared for their absent ones in time of sickness, and soothed them as they have faded away from life.

Though there is not space for details of great interest, it must be seen that this plan has a direct tendency to promote sympathy for each other among the work-people, and to secure a bond of union. Most surely those who daily observe its workings see it.

It will also be noticed that a very important feature of this plan is that it is an association of the work-people themselves, wholly controlled by them, and consequently sure of permanency, while favored to its present extent by the employers. This is likely to continue, because they witness its important influences and usefulness.

The total amount of money expended for the benefit of sick members in twelve years of its existence, ending in April 1866, has been \$25,530 68 to eighteen hundred and sixty-eight persons, and the amount paid to the fund has exceeded this sum about \$1,200. The corporation contributes weekly to this fund, and also to meet individual cases which are especially aggravated.

#### MORAL.

To meet the protection of the large number of single females employed by the company, who, as is often the fact in the manufacturing establishments of the United States, and perhaps elsewhere, are away from the guardianship of their friends, the boarding-houses referred to above are controlled by persons carefully selected for their ability to influence this class of work-people, of established good character, who will take an interest to secure the comfort of their boarders, and save them from bad moral influences, acting really, as far as possible, in the place of guardians. If a young female is known to visit places of evening amusement of doubtful character, or gives any reason for suspicion that she is guilty of immorality, or even of careless unguarded conduct, she is admonished, and if reform is not immediate she is discharged from the house and from employment.

The doors of the house are locked at ten o'clock at night, and no one allowed to be out after that hour without a satisfactory excuse. Doubtless persons of immoral character secure employment by the company, and by superior secrecy retain their connection. Among so large a number some will be

impure, but it is believed that very few of these females are led astray while connected with the mill, if virtuous when commencing work. It is impossible for an openly vile person to retain connection with the company.

Men of intemperate habits, or of general bad character, are excluded from the company's service, though patience with them is encouraged, with the hope of securing reform, and this forbearance and attendant labor has often been rewarded. It is an established principle that all profanity or other bad language, any bad example, or even abuse of authority among the head workmen, must be strictly avoided, especially when these overseers have in their charge females or young persons. More than one such responsible workman has been removed for using improper words, or ill-treating subordinates. It is absolutely demanded of these persons that they treat those under them as they would desire to be treated themselves if in their position.

The directors have placed their associate, the manager at the works, to represent their feelings to the work-people; to show them sympathy in their trials; to counsel them in their need of advice, and to be their *Friend*.

Careful efforts have been made by him to secure their confidence, and he has cultivated the conviction that they could ever find in him a father, a brother, or friend. Many hearts have been moved to earnest gratitude for the aid which they have thus secured in their time of need. It requires a vast amount of patient listening to complaints; to tales of sorrow and want; but it has had its reward in seeing so many relieved and made glad and hopeful. The real moral effect and the real satisfaction in such a relation between employer and employed cannot be written. The spirit of the employer is imparted to the more responsible and influential workmen, and to those under them, while a healthy moral condition is secured.

#### INTELLECTUAL.

When the company was first established, the directors appropriated \$1,000 for the purchase of suitable books for a circulating library, and provided a suitable room for it on their premises. The work-people have always been required to pay one cent each week during their services, and they thus become members of the Pacific Mills Library Association, which is managed entirely by themselves, they choosing their own officers for the control of its affairs, and for the selection of books, but selecting one resident manager for the president and chairman of the library committee. This weekly payment secures the privilege of the use of the library and reading-rooms of the society. One room is appropriated to males, and is supplied with the local newspapers of the city, and of Boston and New York, together with numerous serials of a scientific and literary character, and is open from six o'clock A. M. till nine P. M., warmed and lighted. It is in close proximity to the other room containing the library, now exceeding four thousand volumes, and also a cheerful, airy, comfortable apartment for the females, which is carpeted, and made attractive by daily and weekly publications, specially adapted to their wants, and stereoscopes with numerous slides, all in charge of an intelligent and cultivated young lady. It is open from nine o'clock A. M. till nine o'clock P. M., and is much frequented and valued.

A large number of volumes of the library are in constant circulation, as the number of the work-people who cannot read or write does not exceed fifty in one thousand, and these are principally of foreign birth. All new publications adapted to this class of readers are bought as soon as published. The privilege of taking books from the library is extended to members of families whose head is a member of this association.

The funds of the society are also used to purchase tickets of admission to lectures, and suitable popular amusements, which are distributed among the members. This association, as well as the relief society, it will be seen, is supported and managed by the work-people themselves, who secure a valuable return for their small outlay, and also the permanency of its operations, avoiding the dependence for existence and usefulness upon the life or even connection of any one person of special prominence.

The law of the State forbids the employment of children under ten years of age, and requires that children employed between ten and twelve years of age shall be in school sixteen weeks of each year, and those between twelve and sixteen years, eleven weeks. The company contribute annually to the support of an evening-school for both sexes.

#### SUCCESS.

It has often been stated that care of employers for the education and welfare of their operatives, especially to the extent herein shown, is incompatible with pecuniary success. Facts prove that this is not true with the Pacific Mills, but others must determine how much of this is due to the principles of action established and maintained. It is also believed that the work-people have received great benefit. Some of the evidences of this are the following:

1. There have been no strikes among the work-people, which are their curse and the dread of employers. They have been encouraged to feel that any grievances will be patiently listened to, and frankly discussed, and the result has always been favorable to good order. By no means has every uneasy spirit been quieted, but the mass has been satisfied.

2. A higher class of workmen has been secured. Those best able to appreciate the privileges enjoyed in connection with this company have been drawn thither for employment. Specially is this true among the overseers who engage the laborers in their different departments, and give character to the mass. Their intelligence and hearty co-operation in the plans for the material, moral, and intellectual advancement of the operatives, mold the whole and secure a higher stand-