The Margin of Profit.

Edward Atkinson lectured on Sunday, May 1, in New Era Hall, Boston, before the Central Labor Union. He said in part:

Even to those who make the Sunday more of a holiday than a holy day, I may give a text to this sermon on labor: Do justly. Love mercy. Walk humbly. These are the laws of humanity, however they originated. There are none who need to think of them more than some of you who try to prevent other men from getting their living in their own way, who would deprive them of their liberty of action, and who put a bad name upon them if they don't do what you undertake to tell them to do.

A great many of you work too hard and too long. No one can deny that. You don't get as good a living as you might have. There is no doubt about that. You don't want to work more than eight hours a day if you can help it. Neither do I. I don't work more than eight hours a day in order to get a living, and you do. Why should you not control your own time as well as I? You can if you choose to.

There is one kind of work that I know all about, and that is making cotton goods in a mill. I have been working about cotton mills in one way and another ever since I was a boy. When I first went into a store in 1842, the men and women who worked in the cotton mills worked thirteen or fourteen hours a day, and they could not begin to make as much cloth in a day as they do now, while they only earned half as much wages. The owners took a bigger slice out of every yard for their profit than they do now; but the product was so small that even the big slice out of each yard did not make them very rich.

It was just the same in every other kind of work then as it was in the cotton mill, longer hours, harder work, poorer pay; too long, too hard; but it took all that time and all that labor to raise food enough, or to make cloth enough, or to get fuel enough to go around. Where it took thirteen or fourteen hours then, it now takes but ten. You older men remember. Am I not giving you facts? By and by it will take less. I think it very likely that your children will be able to get just as good a living, and perhaps a better one than you do, by working eight hours a day; but they won't get it by acts of the legislature.

Nothing has become so cheap as cotton cloth. When you buy 40 yards of cotton cloth at $2.50, you pay the owner of the mill 15 cents profit, but you also pay about 15 cents more to other people for profit, that is 30 cents profit in all; and you pay $2.50 directly for labor.

Five men and women—two carding, two spinning, and one weaving—can in one day make eight yards of cloth, a great deal coarser than this; this is equal to one person's work for five days; 40 yards would take five times as much, or 25 days; and when you had the cloth you wouldn't wear it any more than you would wear a crash towel if you could get anything else, because it would be so coarse and so rough; therefore you pay a capitalist 15 cents profit on 40 yards of cloth, in order to save yourselves 23 days' work (mighty hard work at that) in getting good, smooth, soft factory cloth instead of coarse, wiry, rough homespun. Who gets the best of that bargain? If your work is now worth $1.50 a day, and you save 23 days, I make it out that the capitalist who owns the mill saves you $34.50 and charges you 15 cents for doing it. I have taken cotton cloth as an example, and it is the worst example that I could take to prove the service of capital.

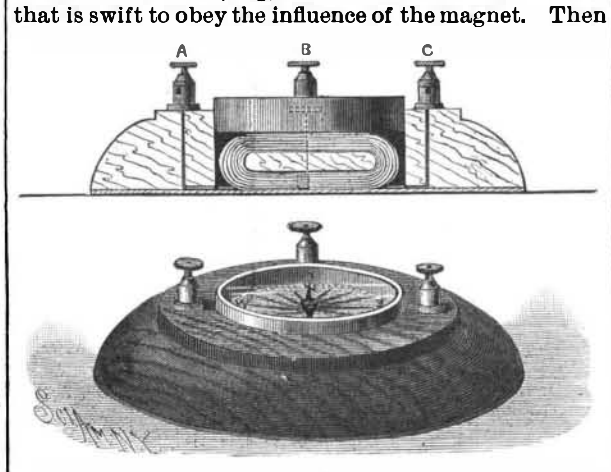
I wholly approve of the organization of labor. What is needed now is a club of "scabs," that is a liberty club, a mind-your-own-business club. If you have Knights of Labor, why not have Squires of Work? It is a great blunder to say that while the rich are growing richer, the poor are growing poorer; it is only the poor who can't work well or who won't work well who grow poor while the rich are growing rich in this country. The best times for the manufacturer are the times when he makes the most money, and they are always when the wages are highest and not when they are the lowest, because wage earners are their principal and most important customers. Therefore, I tell you, organize, organize; but organize the squires of work; call in all the "scabs" to join, and don't refuse any man who works for his living, either with his hands or his head, with his own capital, or his own tools, or his own brains, if he is an honest and a true man.

There are two things very much needed in these days: First, for rich men to find out how poor men live; second, for poor men to know how rich men work. I despise this talk about the rights of labor. The poor man has no more rights than the rich man. What you want to think about are the rights of man, whether he be rich or poor. I tell you here and now that by the acts of the legislature which you have tried for, and some of which have been passed, and by way of by-laws of your Knights of Labor, your clubs, and your associations, which you have tried to force people to adopt, you are driving capital out of the State of Massachusetts. The "scabs" of this country have managed their own affairs fairly well, without much regard to your meddlesome acts. The result of that has been that the men of special skill, who are at the head of their trades, are 100 per cent better off to-day than they were twenty years ago and more.

A SIMPLE GALVANOMETER.

A useful galvanometer, and inexpensive, may be constructed as follows:

A hardwood base, a few inches in diameter and about an inch in thickness, carries a small pocket compass, set firmly into the base over a silk-insulated wire, the ends of which are attached to binding posts on the upper side. The writer has made a neat instrument at a cost of 80 cents—better than he could buy under $5. The compass may be bought at hardware stores for 30 cents. It is well for the purchaser to test the compass, before buying, with a magnet. Select the one that is swift to obey the influence of the magnet. Then



A SIMPLE GALVANOMETER.

mark out upon the upper side of the base the outline of the compass. With a knife sink the circle thus outlined an eighth of an inch, as a pocket for the compass.

Cut the wood so as to form a bobbin, upon which is wound wire, as shown in the upper sectional view. This should be laid carefully, one end being left for attachment to binding post A, and the wire being wound about the core by passing the other end through the openings, and then attaching it to the binding post, C. About 20 feet of good quality, silk-covered wire, of size between 26 and 32, is amply sufficient. After the wire has been wound upon the core there may be attached to it, with a little care, at its middle, a short piece that will connect with a third binding post, B. This will make a short circuit of one-half the length of the wire, when terminal A or C is connected with terminal B. A fine gimlet hole will serve to carry each end to its binding post, where it is best attached to the foot of the post, leaving the holes in the posts for other connections. A circular piece of tin may then be fastened to the base, so as to cover the wire, and the whole base may then be varnished or oiled to suit the fancy. The compass may be firmly united to its receptacle with a bit of Chatterton compound or glue, care being taken to set it perfectly level.

An instrument thus constructed will be sensitive to delicate currents, and forms a useful galvanoscope for amateur and professional electricians.

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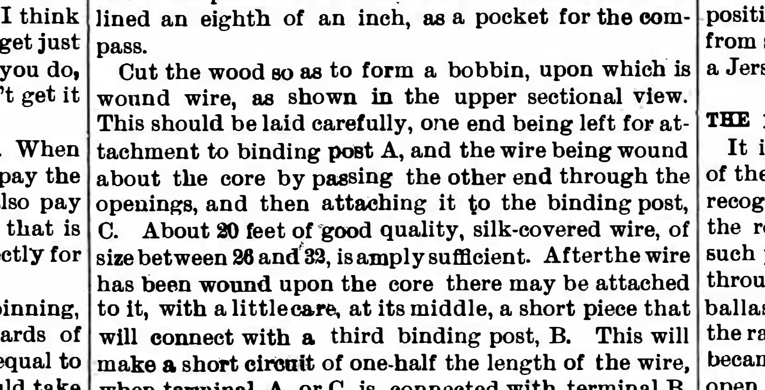
EXPERIMENT IN MAGNETISM.

Material, a horseshoe magnet and a common sewing needle. Insert a light thread in the needle, tie, and cut off one end, leaving a single thread 6 or 8 inches long. Lay the magnet on a table, with poles in front;



EXPERIMENT IN MAGNETISM.

magnetize the needle by rubbing it several times, always in one direction, by one pole of the magnet, after each stroke returning the magnet in an arc through the air. Take the end of the thread between thumb and finger, and suspend the needle over its attractive pole, allowing the point to come within one-fourth of an inch of the magnet, then, with a circular sweep of the hand, to keep the point in position, draw the eye of the needle down toward the other pole. This, if carefully done, will bring the needle to a horizontal position, where it will remain, floating or in suspension, as long as the thread is held steadily. The magnetic forces operating to produce this effect appear to be, first, the attraction of the left pole for the point of the needle; second, the repulsion of the right pole for the same point; and third, the attraction of the right pole for the eye of the needle, which is resisted by the thread supporting the needle; the latter also is held from approaching the left pole by the same means.

WM. SALISBURY.

[We illustrate this very interesting experiment. It can be performed with quite a small magnet. A 2 inch magnet answers perfectly. In using a small magnet, the point of the needle should be broken off to reduce it in length. The thread may be held close to the needle; an inch length of free thread is enough. The experiment may be made more effective by covering the magnet with a sheet of paper, thus concealing it.—ED.]

Protecting Animals from Flies.

At this season of the year the annoyance caused to animals by flies and mosquitoes often amounts to positive agony, and at all times, in what is called good corn weather, it is sufficient to prevent the stock eating enough to keep them in good condition. The animals will stand in the water or pass the greater part of the day in the shade, rather than expose themselves to the sunshine, going out to eat only when driven by hunger. They quickly lose flesh, the flow of milk shrinks, and a loss is incurred that cannot be easily made good again. At all times a good feed of grain is beneficial to stock, but it is especially so when flies are very annoying, since it will do much to prevent shrinkage of flesh and milk. Horses and milch cows may be protected, in a great measure at least, by wiping them all over with a sponge dipped in soap suds in which a little carbolic acid has been mixed. Bulls confined in stables often suffer enough from the attacks of flies to drive them half mad, and there is no doubt that the continued fretting caused in this way develops a savage disposition. The most satisfactory results have followed from sponging with soap suds and carbolic acid mixed a Jersey bull confined in a stall.—*Chicago Tribune.*

THE MECHANICAL WORKING OF BALLAST QUARRIES.

It is more than fifteen years ago that the engineers of the Paris-Lyons-Mediterranean Railway Company recognized the necessity of keeping the ballasting of the roadbed thoroughly permeable, and of restoring such permeability to ballast that has lost this quality through long use. They adopted as a principle that ballast should be kept in just as good a state as are the rails and ties. This principle once admitted, it became necessary to replace the old ballast, and to open up vast quarries in the gravel deposits that are found in the vicinity of several lines of the above named railway system. But, since this gravel is usually mixed with a somewhat earthy sand, and furnishes a ballast that quickly becomes as impermeable as that which is to be replaced, it has to be given greater hardness by freeing it of its sand through a rapid screening. This operation is now performed mechanically.

When ballast quarries first began to be worked mechanically, the machine used consisted of an excavator, which emptied the contents of its buckets upon inclined screens, through whose bars the sifting was effected. But, in the presence of the enormous cubage of the ballast to be furnished, not only for the construction of new roads, but for the repair of old ones, contractors soon had to modify their mode of operating, and to often substitute new and more powerful machines for their old ones.

In 1885, Messrs. Martin & James, having taken the contract for ballasting the line from Arron to Nogent, adopted the following interesting arrangement. A pump actuated by the excavator engine threw a continuous stream of water into a horizontal hopper, and as this water carried along the sand mechanically, nothing remained but the broken stones, which fell perfectly clean into the cars. These stones were afterward sorted out by means of screens, and the ashlar separated from stones at least two inches in diameter, or else the whole was allowed to fall pell-mell into the cars. The water charged with sand returned to the excavation from whence the ballast had been taken by the excavator buckets.

It took twelve minutes to fill a car with siliceous ashlar of all dimensions, and two minutes to load a car with 35 cubic feet of the material. Messrs. Delamare & Pautz, who recently contracted with the Paris-Lyons-Mediterranean Railway Company to furnish 2,800,000 cubic feet of ballast for the line from Lyons and St. Etienne, placed in the Pierre Benite quarry an excavator (Figs. 1 and 2) provided with a mechanical device designed for effecting the screening. In this machine, the usual chute was replaced by a rotary cylindrical sieve, designed to free the gravel from the sand and earthy matter that it contained. The bucket chain of this excavator was actuated by a 25 horse power engine. The number of buckets was 16, and the capacity of each was 2½ cubic feet. The rotary sieve was 7 feet in length and 3¼ feet in diameter, and was formed of steel rods ½ inch in diameter, and spaced four-tenths inch apart. It was actuated by a cogwheel and a pinion that were driven by the gear wheel of the excavator. Its inclination, which was variable, was determined by the more or less earthy nature of the gravel. Its velocity was 30 revolutions per minute. By means of cams actuated by a motion derived from the sieve axis, four hammers alternately struck the sieve bars, and thus prevented the sieve from getting choked up. Owing to the rapid rotary motion of the sieve, and to the action of the hammers, each of which gave 50 blows per minute, the gravel came from the cylinder sufficiently freed from sand and earthy matter, and dropped into the iron plate receiver of the elevator, which latter consisted of a second chain of buckets, actuated by a 6 horse power engine, and elevated enough to empty the sifted gravel on a bank 22 feet in height. The detritus that passed through the sieve entered a chute placed beneath, and fell into cars that carried it away. A part of this detritus formed a deposit, and another part of it served to fill in the cutting made by the excavator, and to constitute a platform for the latter, which had to move forward in measure as the gravel was removed.

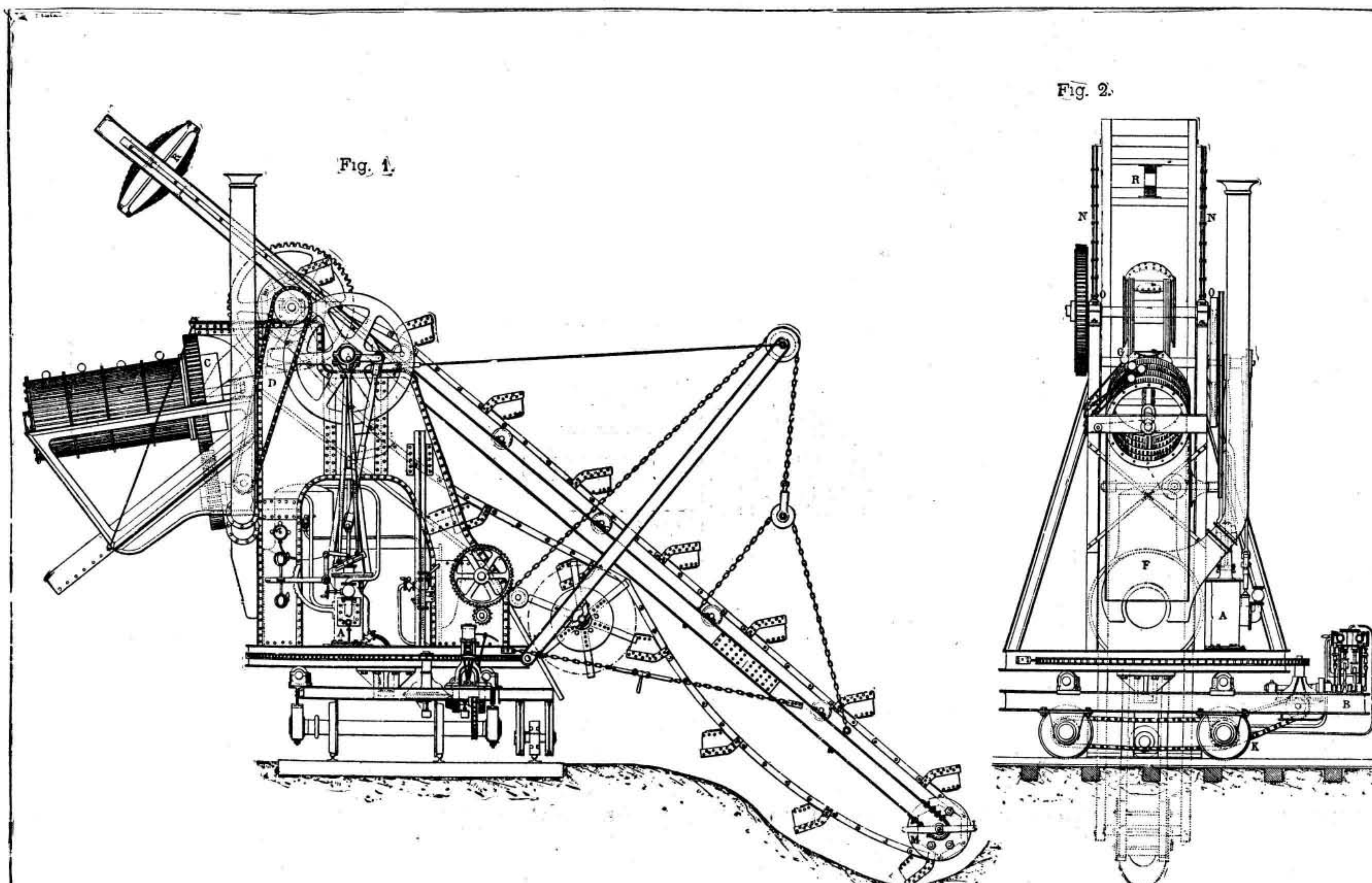
The excavator, which was mounted on a pivot fixed to a truck, was capable of running forward or backward, or of describing about a third of a circle, through the intermedium of a small motor carried by the truck. Motion was transmitted through pitch chains. At the top of the bucket frame there were two strong springs, which were connected by chains with the frame of the excavator, and which, in case of resistance, permitted of a to and fro motion, so as to prevent those breakages that inevitably occur when the bucket of an excavator comes into contact with a very hard object. The rotary sieve was so adjusted that it could, in a short time and at slight expense, be removed, and a chute be substituted for it in ordinary excavating.

As soon as the 2,800,000 cubic feet of ballast were obtained, the chute was substituted for the screen, and the excavator was used for loading the railway cars with the material.

The elevator, which was mounted on a truck, was moved by hand, through the intermedium of a winch, followed all the backward and forward motions of the elevator. It was provided with 27 buckets, having a capacity of 1,400 cubic feet, and 21 of these were discharged per minute.

During the eight hours of effective work, about 10,500 cubic feet of screened ballast were put upon the pile. The force consisted of two enginemen, one stoker, one foreman, two carmen, ten laborers, and four horses.

In order to extract 10,500 cubic feet of gravel, and screen it by hand, and deposit on a pile to a height of 22 feet, it would have taken 6 pickmen, 25 screens, 8 men for removing the detritus, 20 for taking up the screened ballast and putting it into the cars, 4 laborers for unloading the cars and keeping the tracks in order, and 10 horses. This would have entailed a daily expense of at least $96.



EXCAVATOR WITH ROTARY SCREEN. (Scale 1-60)

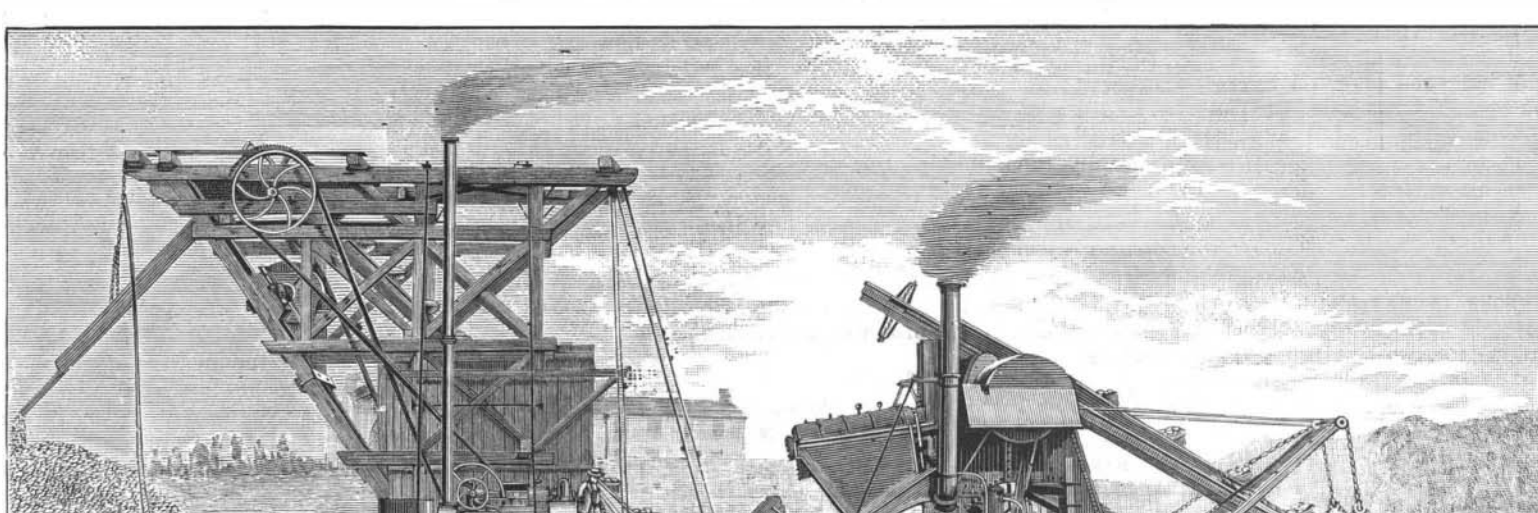


Fig. 3.—GENERAL VIEW OF AN EXCAVATOR AND ELEVATOR AT WORK IN A BALLAST QUARRY.

DESCRIPTION OF FIGS. 1 AND 2.

A, motor for actuating the bucket chain. B, motor for giving the excavator a rotary and alternating motion through the pitch chains, J and K. C, screening cylinder. D, pitch chain for actuating the screen. E, gearing for giving the screen a rotary motion. F, chute. G, hammers actuated automatically by the belt, H, and the cams, I. L, knife to prepare a passage for the tumbler, M. R, springs for giving elasticity to the bucket frame. N, chain connecting the springs with the frame at the point, O.—*Abridged from Le Genie Civil.*