A Floating Sawmill.

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vice versa,

The Kaiser and the Steam Hammer.

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A Long Tunnel.

PORTABLE MAGIC LANTERN.

T. O'CONOR SLOANE, PH.D.

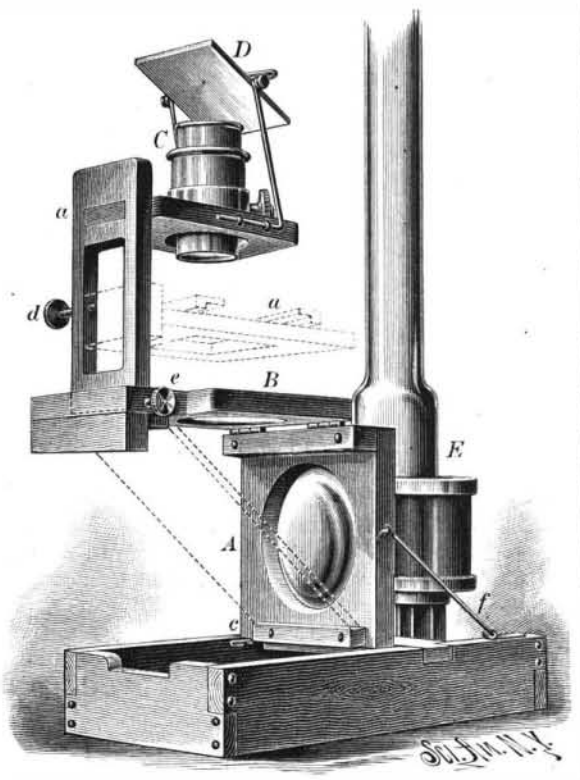

Fig. 3.—LANTERN ARRANGED FOR VERTICAL PROJECTION.

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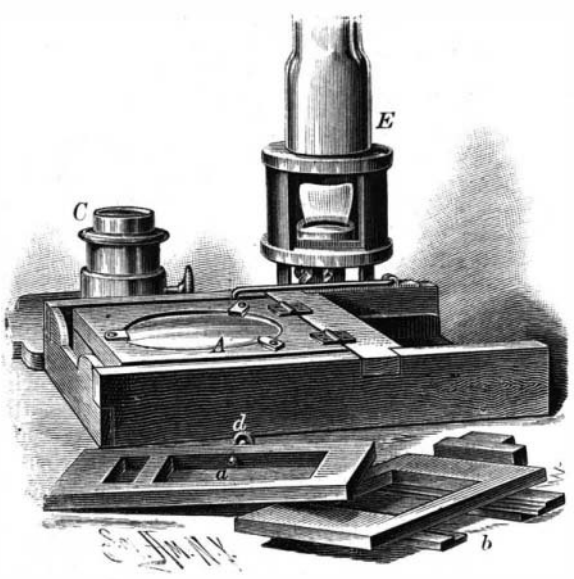

Fig. 1.—PORTABLE LANTERN TAKEN APART.

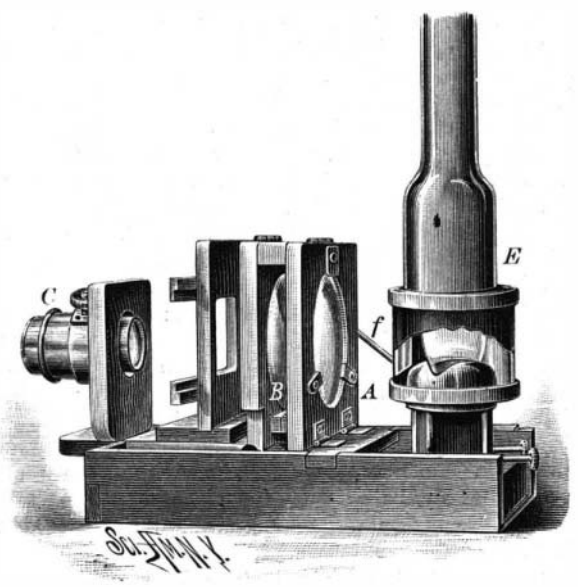

Fig. 2.—LANTERN ARRANGED FOR HORIZONTAL PROJECTION.

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The Gold Mines of Manchuria.

Wanted, an Engineer.

W. H. WAKEMAN.

Wanted, an engineer, to run a stationary engine. Address X.

Whenever we see the above notice appear in the "want" column of a newspaper, or when it becomes known by any other means that a man will be needed for this purpose soon, it is sometimes surprising to see the number that will apply for the place, and to note the experience and capabilities of some of the applicants. One has been employed by a railroad company, and his duty has been to wipe up the locomotives after they have been run into the roundhouse. He has run them back and forth, a few yards at a time, as occasion demanded, and from the knowledge acquired here he feels that he is competent for the position, and can run any kind of engine, or do all repairs and care for an entire steam plant.

Another is called the "sub" in the shop where he is now employed, and one of his duties is to stay in the fireroom for an hour or two at a time, or perhaps to shovel coal and watch the pump for half a day occasionally during the absence of the engineer. Feels at home around an engine, and is satisfied that he can do the work. Will work for a low price.

Another has run an engine for four years or more, has a recommendation from his last employer, saying that he is a sober man, etc. He asks for a fair rate of compensation, but thinks that he can earn it.

Still another is one of those nice young men who alway wear a "boiled shirt" and stand-up collar. Some folks would call him a dude. He has read something about steam, and wants to be an engineer. The next one is a machinist by trade.

The next has been a fireman for several years. He has cleaned his boilers himself, understands the principles that cause his pumps to work, and when they refuse to deliver water, soon finds out the cause and applies a remedy. He starts and stops the engine during the absence of the engineer, and helps to wipe it up every night, and when any repairs are to be made on it, he is sure to be there, trying to learn all that he can about its construction. The last one is an industrious, competent engineer, and has been for years, but for reasons which he is not ashamed to give, he wishes to secure a situation where his services will be appreciated. He asks a fair price for his work and will take no less. Now let us follow the fortunes of these men, and see which of them succeed and which fail, for these are no fancy sketches, but refer to actual occurrences, as they all succeed in obtaining a situation, but, of course, in different places. Let us consider them in the order above named. The first gets along very well for a few weeks, as minor shortcomings are overlooked, until one day the engine, which is an automatic one, with the disengaging type of valve gear, refuses to run, and our man is in great tribulation. It is impossible for him to even locate the trouble, to say nothing of being able to remedy it, and as there is no engineer near to help him, and the shop must not be shut down any longer than is necessary, the proprietor sends to another city, about fifty miles distant, and secures the services of a consulting engineer, who comes, looks at the engine, takes a wrench, loosens a small set screw, moves one of the parts a fraction of an inch, and tightens the set screw again, when, "Eureka!" and the trouble is not only found, but it has also disappeared, and the engine is all ready for business again. As to the expense of the operation, the reader can estimate that for himself.

Our embryo engineer is now operating two implements that he seems to understand perfectly, namely, a pick and a shovel.

The one that had learned to be an engineer by running occasionally for another man found that the engine that he had taken charge of was different from the one that he was familiar with. It was of the automatic type, with a stop motion so arranged that whenever the governor balls were allowed to fall to their lowest position for any cause, the steam valves would not open, and the engine would soon stop for want of steam to run it.

Well, our friend was settling himself down and expecting to take some comfort, when one day the engine slowed down and finally stopped. He examined the throttle valve and found it wide open; there were no hot boxes to cause the stoppage, and to him there appeared to be no reason why it should not go. By this time the proprietor and a majority of the operatives were in the engine room inquiring what he had shut down for, and as it was one of those places where the power cannot be shut down (except at certain times) without causing serious loss, he was in a great deal of trouble, and regretted that he had enlisted.

And now ready hands seize the fly-wheel and main belt and turn the engine several times, with the throttle valve wide open, but when they cease their exertions, it goes no better than before. So the proprietor gets into his wagon and drives to another part of the city, and brings out an engineer, who looks at the engine for about fifteen seconds, closes the throttle valve, raises the governor balls up, and blocks them there with a piece of iron made for that purpose, hoops up the cut-off valves and gives steam, when the machinery starts slowly, and increases its speed as more steam is admitted, until all is again running smoothly; but the engineering days of the substitute are numbered, and an experienced runner succeeds him at thirty-three per cent more salary.

Let us now call on the engineer that has had four years' experience. does not take a very long time to find out that he has run a throttling engine and understands no other, but he has charge of a new Harris-Corliss in this place. Everything is running smoothly now, but soon one of the crab claws refuses to "catch on," the engine runs slower and very unsteady, and it becomes necessary (so he thinks) to shut down.

He has not the least idea what to do, but soon a happy thought suggests itself, and seizing a wrench, he proceeds to loosen the jam nuts on the "right and left" connection between the steam valve and the wrist plate, and then lengthens it until the crab claw hooks on again, and concludes at once that he is a genius.

Soon the power is running at full speed, but why does it still run so unsteady? Our engineer thinks that he has discovered the cause. So, shutting down again, he attacks the valve gear for the second time with his wrench, and soon it is completely demoralized.

A few days afterward we saw a friend, who informed us that he left the shop one night, promising to report for duty the next day at o'clock, but he has not been seen there since.

We next turn our attention to the dude engineer, and find that he is running a small horizontal engine and a vertical boiler, and as it is a very clean place, the work is light, and he has time to read stories, he appears satisfied. Bnt after a time everything does not run as smoothly as it did once, and he has trouble with his plant, and cannot tell where it is, or what to do.

This is concealed from his employer for a little while, but at last it is too plain to be overlooked. He is found to be deficient, and told that his resignation will be thankfully received; and as no one cares to recommend him as a competent engineer, he soon finds employment in an entirely different business.

Some steam users appear to think that if a man has learned the machinists' trade, he must of necessity be an engineer.

Why this is so is not clear, any more than if a blacksmith should be expected to know how to shoe a horse, but it is so, and as this machinist applies for a certain engine to run, he is engaged at once. He knows enough to open the throttle valve and start the engine, but when he attempts to put on the steam to heat the shop, which is a medium sized one, with several different kinds of radiators and traps, he is at a loss to know what to do, and instead of tracing the pipes from the boiler through all of their windings and turns, until they terminate at the traps, he only learns from the man who is instructing him that when he comes in the morning he must open this valve and shut that one, etc., just as a monkey learns to do one trick after another when his master begins to play the hand organ, and with no clearer idea of what he is doing it for.

Soon there is complaint made that the shop is not heated as it should be, but as our machinist has played all of his tricks to no purpose, some one else is called upon to set matters right.

He notices that the engine pounds a little, and as he knows little or nothing of the steam engine, he thinks that it must be because there is lost motion somewhere, and proceeds to drive the key on the cross-head end of the connecting rod. Result: a hot box, a scored wrist pin, the engine has to be shut down three times in one day, and he is obliged at last to put the key back where it was before and to try something else. But before he gets the pound out he is informed that his services are no longer required, and he gathers together his tools and takes his departure, giving vent to his wrath in such language as is seldom seen in print, and which we will omit here.

As to the two last ones, no one will be surprised to learn that they run their plants economically and well, that their engines start up on time, and are not shut down through any fault of theirs until the proper time at noon or night, that everything is neat and clean in their engine and fire rooms, that they give their employers satisfaction, and are considered valuable men.

These are days of close competition and small profits in many kinds of business, and it will make a great difference whether a competent man is in the engine room or a man who does not thoroughly understand his business, or what is much worse, a man who does not have the interest of his employer at heart.

You cannot buy gold dollars for seventy-five cents; and many a competent engineer has resigned his position, not because he could not get fair wages, but on account of the contemptible policy persisted in by his employers in the management of shop affairs.—*Manfrs. Gazette.*

THE largest collection of coins, in number, is in the cabinet of antiquities, Vienna.

Improved Railway Appliances Greatly Needed.

The railroad commissioners of the State of New York report that during the year ending September there were railroad employes killed and more or less severely injured in the performance of their duties. These accidents are classified as follows:

	Killed.	Injured.
Fell from train, engine, or cars, or getting on or off trains	48	162
Striking low bridges, switches, tunnels, etc.	8	9
Coupling or uncoupling cars	20	437
Walking or being on track	102	88
Catching foot in frog or between rails	4	7
Derailment	1	19
Collisions	6	40
Other causes	10	144
Total	199	896

According to "Poor's Manual," the number of locomotives owned by railroads in the State of New York in was and in the whole country It will be quite safe to say that there were ten times as many locomotives in the whole country as there were in New York during the period covered by the railroad commissioners' report. If the average number of persons killed or injured per locomotive is the same elsewhere, the number of casualties to railroad employes in the whole country would be ten times the above figures, or a total in round numbers of killed and injured.

No pretense is made that this estimate gives the number of employes killed and injured with anything more than an approximation to accuracy. It must be remembered, though, that whatever errors there may be in the reports of accidents to the railroad commissioners, and of the number of locomotives in the country, are errors of omission, and that probably both the number of accidents and of locomotives are greater than reported, which would make the above estimate too low, rather than too high. Nevertheless, with any reasonable deduction, the record of frightful suffering, pain, and sorrow will be more than sufficient to emphasize the following inquiries, the aim of which is to elicit information that will indicate how the number of such accidents may be diminished.

All railroad officers and employes, whether members of the Master Car Builders' Association or not, are therefore requested by the committee of the association to send answers to the following questions to M. N. Forney, Broadway, New York:

What defects are there in the present construction of cars and locomotives which cause accidents to railroad employes by falling from trains, engines, or cars, or of accidents of getting on or off trains?

What changes could be made in cars or locomotives which would diminish the number of such accidents?

What kind of couplers and dead-blocks are the most dangerous to employes in coupling cars?

What kind of couplers and dead-blocks do you think are the least dangerous to employes?

Has the introduction of automatic couplers thus far lessened the danger of coupling cars?

Would the general introduction of automatic couplers, in your opinion, diminish the danger of coupling cars?

Can you suggest any way of lessening the number of accidents to employes from "walking or being on the track"?

How can employes be prevented from "catching their feet in frogs or between rails"?

what way may any other kinds of accidents to employes be prevented or the number lessened?

All railway officers and employes who see this circular are earnestly solicited to answer it, and thus add the weight of their testimony in helping to reduce the terrible sacrifice of life and limb which is annually exacted from our railroad employes.

Great Chances for Three Inventors.

Prof. R. H. Thurston, in the May *Forum*, states that the world is awaiting the appearance of three inventors, greater than any who have gone before, and to whom it will accord honors and emoluments far exceeding all ever yet received by any of their predecessors. The first is he who will show us how, by the combustion of fuel, directly to produce the electric current; the second is the man who will teach us to reproduce the beautiful light of the glow worm and the firefly, a light without heat, the production of which means the utilization of energy without that still more serious waste than the thermo-dynamic now met with in the attempt to produce light; while the third is the inventor who is to give us the first practically successful air ship. The first two of these problems are set for the electrical engineer, and we may be pardoned excess of faith, should it prove to be such, when, contemplating the enormous gain to humanity which must come of such inventions, we look confidently for the genius who is to multiply the wealth of the world to an extent beside which even the boon conferred by the creators of the steam engine and the telegraph will not appear overshadowing. When this inventor comes forward, and most probably not till then, it is very likely that we shall see steam superseded by a rival.