THE FIREPROOF BUILDING CONSTRUCTION OF THE NEW JERSEY WIRE CLOTH COMPANY.

Fireproof building construction, as usually executed, involves the use of a very heavy mass of material. By this weight nothing is really gained and the building has to be made of additional strength to support the fireproof elements. Another feature of such construction is, if we may so express it, the inflexibility of the materials used, which do not lend themselves to any variety of design for special cases. Everything has to be fixed before the materials leave the factory. In the cut accompanying this article we present the fireproof method of construction introduced by the New Jersey Wire Cloth Co., of Trenton, N. J., methods which are now being employed to great advantage in the new Broad Street station of the Pennsylvania Railroad in Philadelphia, Pa. Our illustrations represent principally the work actually executed in that building and show how admirably the system lends itself to ornate and massive design.

Figs. 1, 2, and 3 show floor and ceiling construction. A curved piece of wire cloth, stiffened by transverse and longitudinal ribs of light iron rod, spans the interval between two wall beams. On the wire cloth thus established cement concrete is deposited and hardens, giving a floor of very great strength and far lighter than the usual construction. The ceiling may be treated in several ways. In Fig. 1 the flat ceiling is shown, on which a flat sheet of wire cloth is supported by tension rods extending from Ib to Ib, which rods are stiffened by suspending wires running from the arch above them. The wire cloth is fastened to the supporting rods by short pieces of wire, and its surface is plastered, giving a flush ceiling. Fig. 2 shows an arch plastering where the flat sheet of wire gauze is dispensed with, and a ceiling consisting of a series of arches results.

In Fig. 3 a modification of the design is shown, in which an angle iron running longitudinally and suspended rigidly from the arch above is used to support and stiffen the wire cloth. The transverse rods are attached by clips to the lower flange of the I beams, and in the small cut of "materials" this clip arrangement is shown. If tension rods are used instead of the clip rods, special clips are employed for their ends. Such a tension rod with its clips is also shown among the cuts of material.

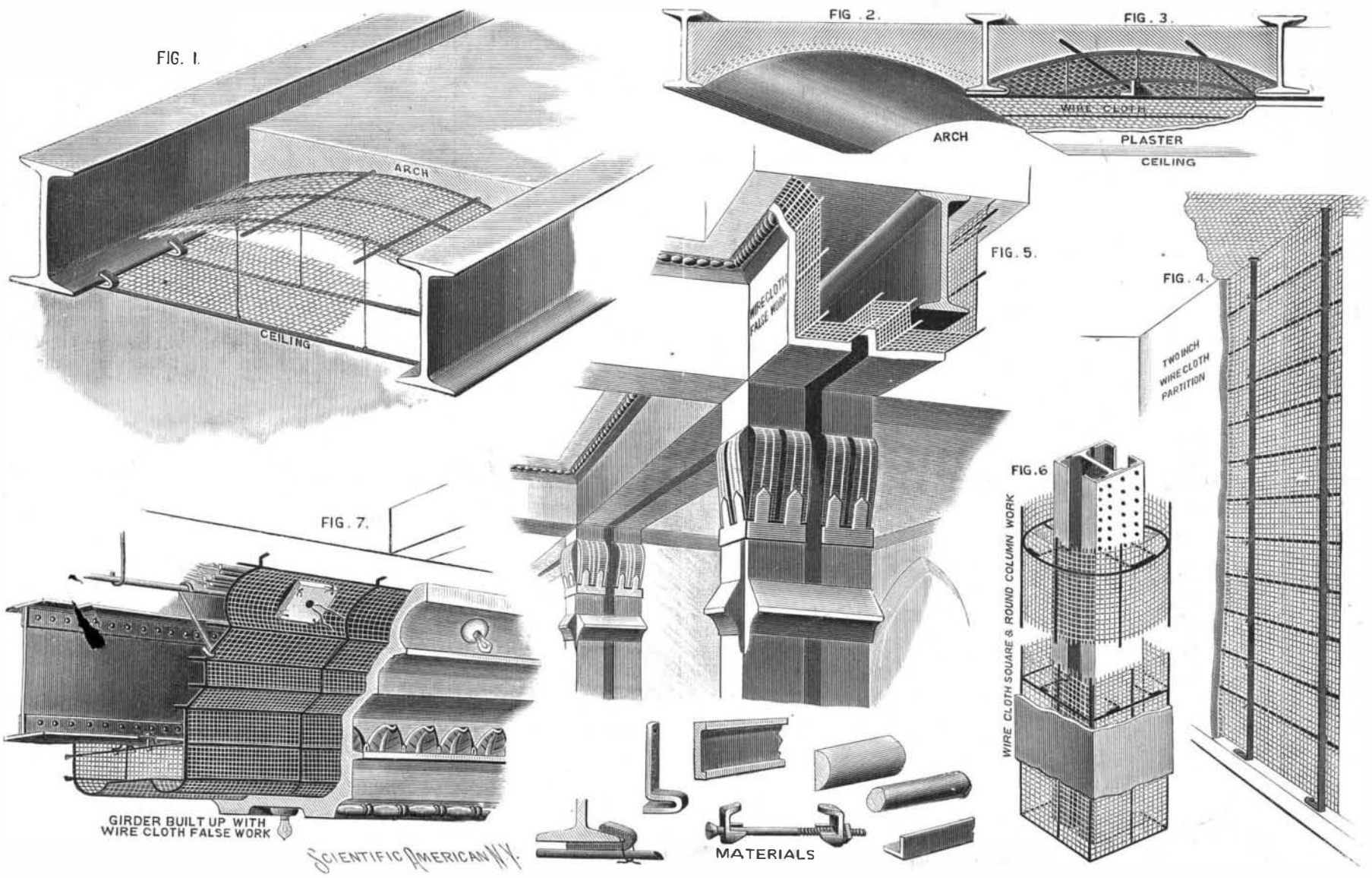
Fig. 4 shows a fireproof partition consisting of angle iron risers, wire cloth with rods woven into it at intervals of 7½ inches, and plaster. Such a partition, 2 inches thick, is amply thick for all purposes and involves a great saving of space.

Fig. 5 shows a more elaborate piece of construction. Here the actual frame of the building includes a single horizontal I beam. By longitudinal rods, by cross section rods bent to the proper profile and by wire gauze laced thereto, a framework is produced for plastering by which the heavy double ceiling beam is produced, whose massive effect is so well rendered in the cut.

In Fig. 6 is shown round and square column work, the wire gauze with cross section rods and longitudinal rods being studded off from the iron column by special clips. The large columns of Fig. 5 are built up from the iron core by the methods illustrated in this cut.

Fig. 7 shows a construction of a heavy cornice, where is shown in detail the use of the cross section rod or profile piece. It is made of light iron, bent by hand and in the building on a shaping plate to the desired outline. It takes but a few seconds to make one of these profile pieces. They are held in place by clamps attached to the beams and by suspension pieces. Longitudinal rods are fastened to their angles; on this framework wire gauze is placed, and all is then ready for the plaster, which in part of the cut is shown applied.

Another interesting feature of the work appears in this cut, which is its adaptability to electric light work. At the desired intervals in the cove of the cornice holes are cut, through which wires for lamps are laid. Back of the wire cloth is ample room for the cables. This square board shown in the cut serves for the attachment of the lamp socket. It is entirely concealed by the application of the plaster. In the cut of the materials are shown the sections generally employed, which, it will be observed, are of ordinary merchant iron. The Pennsylvania station presented an admirable field for the system, and its capabilities have been taken full advantage of by the architect.



THE FIREPROOF BUILDING CONSTRUCTION OF THE NEW JERSEY WIRE CLOTH COMPANY.

The Gastrograph.

At a meeting of the Medical Society of the County of New York, held in the Academy of Medicine, on Monday evening, May 28, Dr. Max Einhorn read a paper entitled "Demonstration of the Gastrograph."

The gastrograph, in appearance, bore a resemblance to a stock indicator, but was constructed to record the motions in the stomach of a patient under treatment. The movements of the food while it is undergoing chemical action are carefully and minutely recorded by means of electricity.

Two of Dr. Einhorn's patients were brought before the members of the society. A dry electric battery was connected with the apparatus, and a brass ball at the end of an electric wire was put into the mouth of one of the subjects and swallowed. A connection was then made with the electric wire from the patient's stomach and the apparatus.

The patient first operated upon was a healthy medical student, who swallowed the electric coil and a bulb like one used to such experiments. When the electric current was turned on the gastrograph gave a "whirr-tick-tick" like a stock indicator and a long paper tape was unrolled on which the motions were recorded by long or short lines.

The second man operated upon was a patient who was under treatment for catarrh of the stomach. This patient swallowed the brass ball and the coil of electric wire with difficulty, and took frequent draughts of water. The gastrograph was set in motion and the slow action of this patient's digestive organs was apparent.

The medical men were invited from their seats to inspect the indicator at short range. The novelty of the apparatus and the experiment caused the members of the society to crowd around the operating physician and his willing subject. The taking of the brass ball from the patient's stomach was no easy task, but the doctor pulled with care, and the bulb was finally extracted from the man's throat, much to his apparent relief.

A Fraudulent Mat.

A new cheat in the form of a floor mat has been introduced recently, and owing to the attractive appearance of the mat it is meeting with ready sale. But the whole thing is a fraud. The mats are supposed to be made of textile materials, but nothing else than cheap wood stock paper yarns are used in their construction. The mats are selling for $1.50 apiece for the common door size, but in reality they are not worth 25 cents.

The mats are intended for use in front of door in sitting rooms, libraries, etc. They are made as follows:

The cheapest of wood pulp is procured from the pulp mill and taken to the establishment in which the mats are made. The pulp is run off into strands through tubes and rendered about the size of common weaving yarns. These strands are polished and coated with an application consisting of tallow, glue, borax, and one or two other ingredients, so as to make the threads elastic. Then the yarns are woven into the form of a mat.

Around the edges of the mat is sewn a fairly good border of substantial textile material, evidently so as to help deceive. The border costs more than the mat. The paper stock is very cheap. Such mats can be made for a few cents apiece. They are selling for $1.50. The mats look well, but they will not last. A little water turns the material back to pulp. Dampness affects the texture. When trod upon, the strands, if dry and stiff, break and become worthless. The mats are still in the experimental stage, but may get into the general market soon.—*Commercial Bulletin.*

Culture of Plants Under Colored Glass.

The influence exerted by colored glass upon the development of plants is a subject that has attracted attention for a long time. All luminous radiations are far from presenting the same efficiency in forcing the growth of plants. The most recent work done in this line of research is due to Mr. Villon, who, in the first place, instituted a series of laboratory experiments. He placed some potted plants in a large, well ventilated case, presenting all the conditions beneficial to their proper development. The panes of glass of this case could be easily replaced by others of different colors. His experiments were made upon the following kinds of glass: (1) White glass; (2) uranium glass absorbing light; (3) blue glass colored with cobalt, allowing only the red and ultra-violet to pass; (4) blue glass colored with copper, allowing the ultra-violet to pass and absorbing the extreme red rays; (5) red glass colored with protoxide of copper, absorbing all the colors of the spectrum between red and blue; (6) glass made orange color by a coating of bichromate of potash and allowing only yellow and red to pass; (7) violet glass colored with manganese, absorbing the yellow and blue; (8) green glass colored with protoxide of iron, absorbing the red rays; and (9) glass covered with a thin layer of silver, allowing only the blue rays to pass. The results obtained are found in the following table, where the growth of the plants under white glass is represented by 100:

Culture under white glass	100
" " bichromated orange glass	150
" " manganese violet glass	150
" " cobalt blue glass	140
" " copper blue glass	120
" " silvered glass	60
" " uranium glass	40
" " gilded glass	40
" " red (protoxide of copper) glass	15
" " green (protoxide of iron) glass	10

It must be concluded from these figures that the light that favors vegetation best is the orange light of the chromic glass and the violet light of the manganic; and, as the radiations that these glasses allow to pass are the red ones, it is, in definitive, red that is most favorable to the development of plants.

Mr. Villon has made some new experiments, whence it results that the best light is that which traverses manganese violet glass, that is to say, that which contains the red, the violet and the calorific rays. These latter experiments were made upon the grapevine, ornamental flowering plants, the useful ferments (yeast of beer, ferment of wine, butyric ferments, etc.), and, finally, upon silkworms, which are more vigorous when they are raised in a room lighted by violet glass. —*Magasin Pittoresque.*

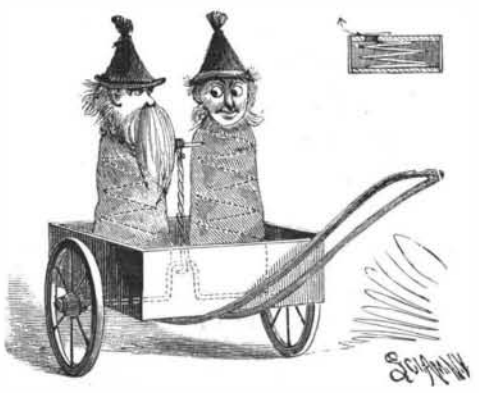
Evolution of the Match.

The lucifer match has attained its present high state of perfection by a long series of inventions of various degrees of merit, the most important of which resulted from the progress of chemical science. Starting from the ingenious tinder box and lyrstan of our Saxon ancestors, the first attempt, so far as I know, to improve on the old sulphur match was made in 1805 by Chancel, a French chemist, who tipped cedar splints with a paste of chlorate of potash and sugar. On dipping one of these matches into a little bottle containing asbestos wetted with sulphuric acid and withdrawing it, it burst into flame. The contrivance was introduced into England some time after the battle of Waterloo, and was sold at a high price under the name of Prometheans. I remember being struck with amazement when I saw a match thus ignited. Some time after this a man named Heurtner opened a shop on the Strand, opposite the church of St. Clement Dane. It was named the Lighthouse, and he added this inscription to the mural literature of London: "To save your knuckles, time and trouble, use Heurtner's euperion."

An ornamental open moirée metallique box containing fifty matches and the sulphuric acid asbestos bottle was sold for one shilling. It had a large sale, and was known in the kitchen as the Hugh Perry. Heurtner also brought out vesuvians, consisting of a cartridge containing chlorate of potash and sugar, and a glass bead full of sulphuric acid. On pressing the end with a pair of nippers, the bead was crushed and the paste burst into flame. This contrivance was afterward more fully and usefully employed for firing the gunpowder in the railway fog signals. We now come to Walker. He was a druggist at Stockton-on-Tees, and in 1827 produced what he called congreves, never making use of the word lucifer, which was not yet applied to matches. His splints were first dipped in sulphur and then tipped with the chlorate of potash paste, in which gum was substituted for sugar, and there was added a small quantity of sulphide of antimony. The match was ignited by being drawn through a fold of sand paper, with pressure; but it often happened that the tipped part was torn off without igniting, or, if ignited, it sometimes scattered balls of fire about, burning the carpet and even igniting a lady's dress. These matches were held to be so dangerous that they were prohibited by law in France and Germany. The first grand improvement in the manufacture took place in 1833 by the introduction of phosphorus into the paste, and this seems to have suggested the word lucifer, which the match has ever since retained. When phosphorus was first introduced to the match maker its price was four guineas a pound, but the demand became so great it had to be manufactured by the ton, and the price fell to half-a-crown a pound.—*Notes and Queries, London.*

A TOY CART.

This simple toy for the diversion of children has been patented by Mr. Paxton Pollard, a deaf mute

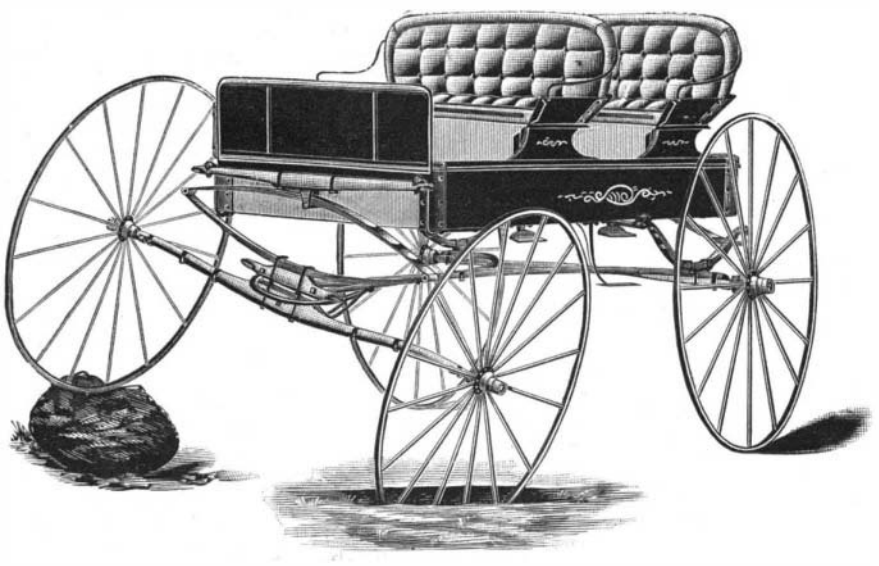


POLLARD'S TOY CART.

printer, of No. 89 Main Street, Norfolk, Va. When the cart is drawn along, either forward or backward, the figures are caused to bend or bow simultaneously, and at the same time, by the compression and escape of air, through drum-like pedestals beneath the figures in the cart body, a whistling or squawking noise is made. The figures may be of any desired grotesque shape, formed of paper or other suitable material, and in each is a spiral spring, normally holding the images upright. The pedestals, of which a sectional view is shown in the small figure, have each an upper and lower head and a covering of thin skin or something similar, and in each is a coil spring, while in each upper head is a small opening covered by a thin metallic tongue, arranged to vibrate rapidly on the passage of air through the opening. The upper portions of the two figures are connected by a transverse rod, and this rod is centrally connected by cord or rod with a crank in the central portion of the axle, whereby the figures are made to bend or bow as the cart is drawn along.

AN OSCILLATING DEVICE FOR VEHICLES.

Mr. E. M. Crane, of the Thompson Carriage Company, Oshkosh, Wis., has patented a device adapted to permit the tilting of the axle and spring of a vehicle, when a wheel passes over an obstruction or into a depression, without disturbing the equilibrium of the carriage body, as shown in the illustration. The ordinary crossbar is attached to the front end of the body by loops, permitting the low hanging of the body, and the bar is rigidly attached centrally to a bifurcated pendent connecting and guiding device embracing the leaves of the upper half of the spring. The bottom plate of the device, on which the upper half of the spring bears, has at its center a downwardly depending lug, in which is an eye for the passage of a bolt, the plate forming a pivotal support or means of oscillation. The whole construction is designed to bring the pivotal bearing as low as practicable, permitting maximum oscillation of the gear part.



CRANE'S OSCILLATING DEVICE FOR VEHICLES.

Ants as Bridge Builders.

The following story, told by an eyewitness to the *Rocky Mountain News*, is entitled to a place among the instances of intelligence among the lower animals. A cook was much annoyed to find his pastry shelves attacked by ants. By careful watching it was discovered that they came out twice a day in search of food, at about seven in the morning and four in the afternoon. How were the pies to be protected against the invaders? He did not have long to wait, for at 6:50 o'clock he noticed that off in the left hand corner of the pantry was a line of ants slowly making their way in the direction of the pies. They seemed like a vast army coming forth to attack an enemy. In front was a leader, who was larger than any of the others, and who always kept a little ahead of his troops. They were of the sort known as the medium-sized red ant, which is regarded as the most intelligent of its kind, whose scientific name is *Formica rubra.*

About forty ants out of five hundred stepped out and joined the leader. The general and his aids held a council, and then proceeded to examine the circle of molasses. Certain portions of it seemed to be assigned to the different ants, and each selected unerringly the points in the section under his charge where the stream of molasses was narrowest. Then the leader made his tour of inspection. The order to march was given, and the ants all made their way to a hole in the wall, at which the plastering was loose. Here they broke ranks, and set about carrying pieces of plaster to the place in the molasses which had been agreed upon as the narrowest. To and fro they went from the nail hole to the molasses, until, at 11:30 o'clock, they had thrown a bridge across. Then they formed themselves in line again, and marched over, and by 11:45 every ant of the foraging expedition was contentedly eating pie.

Compressed Air Devices.

Mr. F. M. Twombly, master mechanic of the Old Colony at Roxbury, Mass., related some of his experiences with compressed air devices in shopwork at the May meeting of the New England Railroad Club, as reported in the *National Car Builder.* He said: I commenced the use of compressed air some two and a half years ago. The first thing I did was to make a hoist out of brass tubing, using for a piston rod cold-rolled steel shafting. I constructed the hoist for experimenting. At that time we were taking up our rails on the Providence division, and they were to be shipped to Cape Cod for a second track. We had to drill two holes in each end of the rail, and two men were employed with a suspended drill for this purpose, one man receiving $1.50 a day and the other one $1.75 a day, and at night they were pretty tired with their work. The rails were raised with a chain and fall, which had a one ton lift, and cost $35. The hoist which I constructed and put upon this work cost $28. I kept an account of the whole matter, and found that the hoist paid for itself in 15 days. I put up hoists all over the shop for lifting all kinds of machinery and 42 inch passenger wheels. I rigged a radial run hoist for various uses, and I propose to put up one in place of the derrick we have been using. I have used the air for elevating purposes, for lifting a cab through the floor, laying the hoist horizontally. The power can be multiplied or divided, as on any block and fall. The one we use for lifting through the floor has a cylinder 15 feet long. In the first hoist I spoke of, the diameter of the tube was six inches and its capacity 1,500 pounds. I put a cylinder under the floor of the room to lift up wheels. I force oil out of the barrels into the tank by means of this power, using a sliding pipe, letting a little compressed air on top of the oil in the barrel, and it is forced into the tank. A barrel of water can be emptied very quickly in that way. I am constructing a machine to take sand into a tank the same as water. In the tank shop, where we build tanks for the whole system, we construct a great many, and they are built upside down. We have formerly turned them over with a block and fall, but now we have got some hoists to handle those tanks by means of air. I use this power on a copying press; also to force oil onto a bolt when cutting it. I take an auxiliary reservoir and fill it with oil, letting a little compressed air onto the oil, and it can be applied to the work as you like, and when you want to run it into the tank again you remove the pressure and let it run back by gravitation.

There are thousands of things it can be used for, and there is no difficulty in running it up and down the yard; it is only the cost of the pipe and the slight labor of putting it down. I have an overhead railroad in the yard, with hoists to load and unload cars, and for taking ashes out of tubs into cars, and I use this power in many other ways. I am indebted to Mr. Medway for the plans for a pit for a pneumatic turntable.