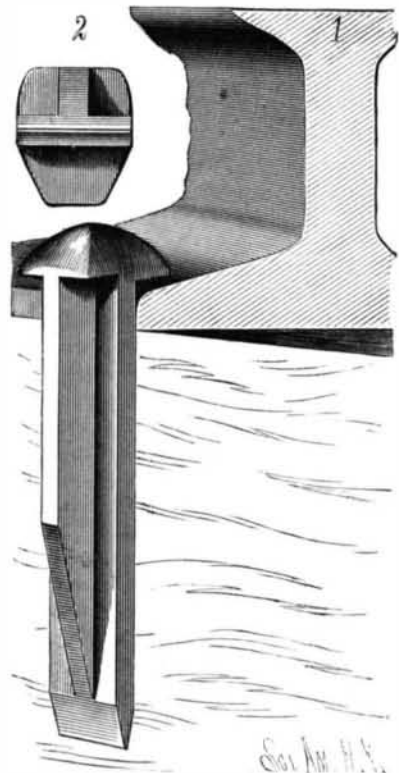


IMPROVED RAILROAD SPIKE.

The engraving represents an improved railroad spike patented by Mr. Joshua B. Barnes, of Fort Wayne, Ind. It has much greater strength and rigidity than the ordinary spike, and is capable of being used over and over again, as it is not bent by the operation of drawing it from the tie. It has a broad bearing surface, and consequently holds the rails with great firmness, preventing them from spreading. The strengthening rib at the back or outer side stiffens the spike so that it is not bent in driving or extracting. This rib also strengthens the head, so that it is not liable to break off in cold weather. The inventor informs us that it takes



NEW RAILROAD SPIKE.

1,600 pounds more than the common spike to draw it out of the tie, while it weighs less than the standard spike.

Further information in regard to this improvement may be obtained by addressing Messrs. Barnes & Lincoln, Fort Wayne Ind.

IMPROVED FURNACE FEEDER.

The engraving represents an improved device for feeding sawdust, shavings, and other finely divided fuel to boiler furnaces. It receives the fuel from the chute or conveyor and introduces it into the furnace, and also spreads it out upon the grate so that it will burn to the best advantage. The machine is exceedingly simple, and not liable to derangement. It is capable of application to any kind of furnace, and secures all of the advantages obtainable by regular and continuous feeding.

The invention consists of a reciprocating feeder moving forward toward the furnace door and retreating therefrom, and two spreaders connected with the feeder and reaching into the furnace above the grate. The feeder carries a hopper which receives the fuel from the carrier or chute, and delivers it to the feeder. The spreaders move forward with the feeder, and at the same time are spread apart by an arrangement of rollers engaging with the bottom rear ends of the spreader bars.

The feeder is driven by a crank shaft driven by connection with suitable power. This is generally accomplished by means of belts and pulleys connecting with one of the shafts of the mill or factory.

The inventor states that the machine is in daily use in large mills, where it is giving great satisfaction, saving labor, and at the same time increasing the steaming capacity of the boilers. For further information address Mr. Israel Erickson, Whitehall, Mich.

Phosphorescent Paint.

At a recent Thursday evening meeting of photographers, London, a question from the box was read: "Why is gas of poor quality whenever the barometer is low? This is asked with reference to the use of gas as a standard light for plate testing." Mr. A. Haddon said that, although the gas might be of the same quality, the light given out was less when burnt in low than in high pressure. Oxygen and hydrogen, which give, under ordinary circumstances, a flame with very little light, will burn with great luminosity when both are condensed.

A screen covered with Balmain's phosphorescent paint

was then set up, and a gentleman posed in profile in front of it. A few inches of magnesium wire were then burned in such a position as to throw the shadow of the sitter upon the screen. When the gentleman quitted his seat his shadow remained distinctly visible. The part of the background not screened by him glowed with characteristic phosphorescence. Several cameras which had previously been focused upon the screen were now uncapped, and exposures of five and ten minutes were given. On developing, distinct images were seen upon the plates exposed upon the screen, as well as upon those which had been exposed upon the sitter himself while the magnesium was burning.

Capacities of Lungs.

Dr. Nagorsky, having measured the capacities of lungs of 630 boys and 314 girls in the schools of the district of St. Petersburg, now publishes the results of his investigation in a Russian medical paper, the *Surgeon*. He has found that the capacity of lungs, in relation to the weight of the body, is 65 cubic centimeters for each kilogramme of weight in boys, and 57 cubic centimeters for girls. The law of Quetelet being that, with children below fifteen years of age, the weight of the body is proportionate to the square of the height, Dr. Nagorsky has found that it is proportional to 2.15 of the same; while the capacity of lungs is proportional to 2.4 of the height for boys, and to the square of the height for girls. Dr. Nagorsky's researches will soon be published as a separate work. As to the relation between the weight of man and the capacity of lungs, it is tolerably permanent, and its variations are mostly due to differences in the amount of fat in the bodies of different men.

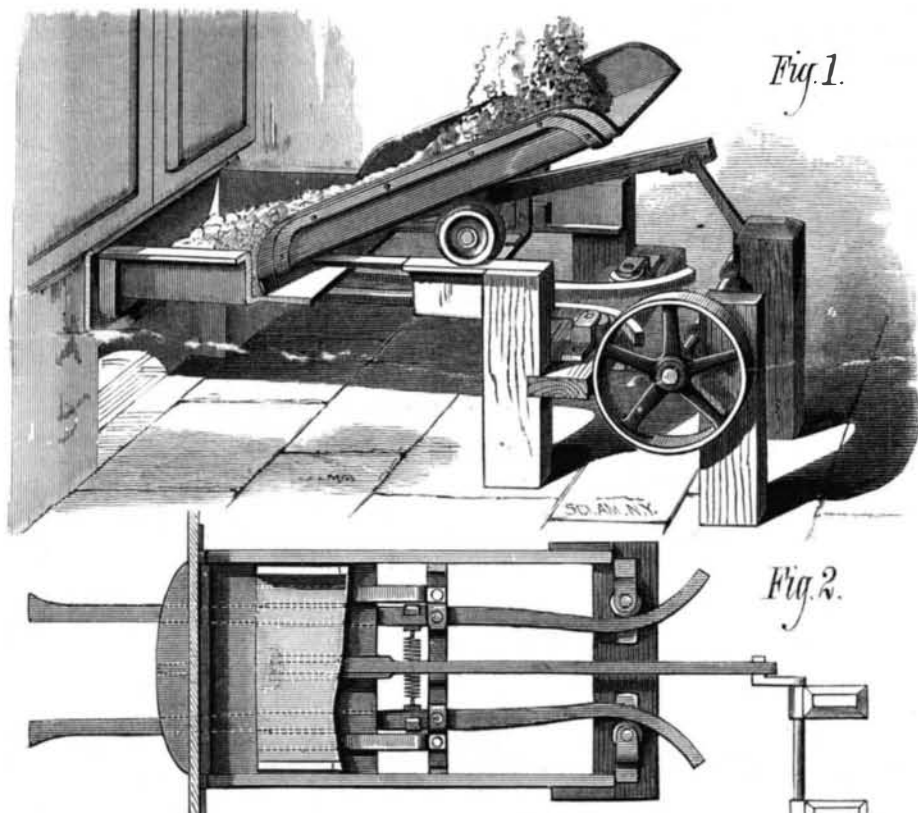
Photo-Engraving Process.

M. Gobert gave recently to the Photographic Society of France a very interesting demonstration of a photo-engraving process which has been given to the public by M. Stroubinsky, of St. Petersburg. The great authority on these matters of M. Gobert will certainly draw much attention to this process, which he (M. Gobert) describes as giving excellent results in his hands. He has slightly modified the process of M. Stroubinsky, which I here give for the benefit of the readers of the *Journal*. The modification I will describe afterward.

A copper plate is covered with the following solution:

Water.....	100 c.c.
Gum arabic.....	5 grammes.
Bichromate of ammonium.....	2 "

The plate is allowed to dry in the dark. It is then exposed under a *chiché* of which the blacks of the line design are rather dense. When sufficiently exposed another solution is poured over its surface composed of bitumen dissolved in benzoline, to which is added a little drying oil (*linile siccativo*). This is allowed to dry; the plate is then put into a tray of water, and left for five or six hours. The water penetrates this slight varnish and dissolves the gum which has not been influenced by the light. When all the soluble gum has been dissolved the plate is immersed in a solution colored by aniline. All the design can now be seen; and if any gum remain which ought not to be there it is easily detected, and the plate replunged into the water until it is eliminated. It



ERICKSON'S FURNACE FEEDER.

is then plunged again into the coloring solution to see if the design is perfect and pure; if so, the plate is ready for the chemical engraving.

The chemical employed for this purpose by M. Stroubinsky is the perchloride of iron dissolved in alcohol in the following proportions:

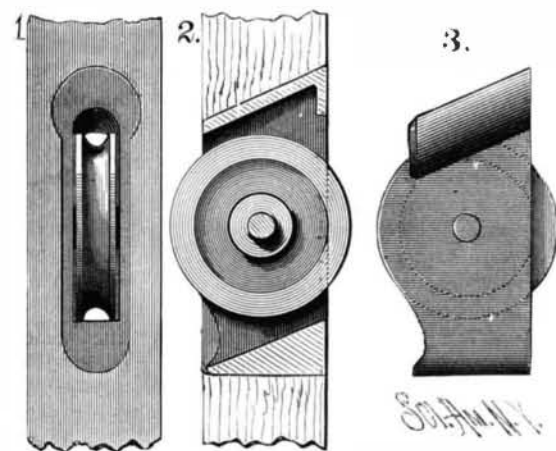
Alcohol.....	100 c.c.
Iron perchloride.....	30 to 50 grammes.

M. Stroubinsky thus gives his process. M. Gobert informed the society that, instead of employing gum arabic, he had succeeded much better by using albumen. The thinner the coating the better the results. In order to obtain a very thin coating, M. Gobert places the plate upon a pneumatic holder, to the handle of which is attached a hook. This hook is also attached to a string hanging from the ceiling. As soon as it is covered with the sensitizing solution the plate is turned topsy turvy and hooked on to the string. A circular motion is then given to it, and by revolving it throws off any excess of liquid, and thus a very thin and even coating is obtained.

M. Gobert developed a proof by plunging it into water, then into the coloring solution, and passed round for the inspection of the members a number of copper plates of bank notes, etc., which he had obtained by the aid of M. Stroubinsky's modified process. A vote of thanks was unanimously given to M. Gobert.—*Prof. E. Stebbing, in Brit. Jour. Photography.*

IMPROVED SASH-CORD GUIDE.

The annexed engraving shows an improved sash-cord guide lately patented by Mr. Alexander Millar, of 305 East



MILLAR'S SASH-CORD GUIDE.

John Street, Baltimore, Md. This guide or pulley can be more cheaply made than other styles of pulley, and can be placed in a mortise made by hand or in a machine.

The mortise required for this guide is made almost entirely by boring with bits, and requires very little paring or cutting with chisels. The mortise can be readily made on a machine, and to facilitate making it by hand the inventor has devised a bit guide that holds the bit at the proper angle.

The sheave is mounted on a pivot in the casing as usual; the casing is made in a single casting. The bottom of the casing is of semicylindrical form to adapt it to a mortise made with a bit, and the top, which is also cylindrical, is inclined and made somewhat thicker than the casing.

To insert the device by hand, a hole is bored, with an ordinary bit, of a size to fit the upper or cylindrical part, and at an angle with the face of the window frame equal to that at which the upper edge of the casing meets the face. A second hole is bored at the proper distance below the first, of a width equal to that of the casing, and the wood between the holes is chipped out with a mallet and chisel. The swell is fitted in the top or larger hole, and the sheave casing is pushed downwardly and rearwardly until the bottom abuts against the base of the mortise, when the face of the casing will necessarily be flush with the window frame.

It will be seen that the entire weight of the sash and balance is sustained by the base of the casing, and there is no tendency to cause the casing to project from the face of the frame and in the way of the sash.

The mortise may be cut by means of a laterally cutting bit in a suitable machine.

All communications in regard to this invention should be addressed to the inventor, or F. H. Davidson & Co., 158 Franklin street, Baltimore, Md.

An Electrical Stature Alarm.

A curious application of electricity is described in *La Lumière Electrique*. It consists in a device to prevent military conscripts practicing fraud as to their stature by bending their knees.

When the youth stands erect against the measuring post, the hind parts of the knees press on electric contacts, causing two bells to ring; the ringing ceases when there is the least bending. The sliding bar which furnishes the measure has also a contact, which is pressed by the head, whereby a third electric bell is affected. For a correct measurement, the three bells should ring simultaneously. This system, the invention of M. Cazala, is now employed in the Spanish army.