An Old Chinese Printing Establishment.

A correspondent of the North China *Daily News*, of Shanghai, describes a printing establishment which he found in a village in the interior, about 150 miles from Shanghai. The printing was being temporarily carried on in the village temple, and movable type only was used. In the large central hall of the temple were placed about 20 ordinary square tables, on which the cases of type were spread out, very much after the English method, only taking up much more room.

At the time of the visit one man was engaged in setting up type, another was printing. The former stood before a table, on which was what may be called the Chinese "case." It was a solid block of hard wood, about 22 inches long by 15 inches broad, and perhaps 3 inches deep. The inside was hollowed out to a depth of about ¼ inch, this depression being still further hollowed out into grooves about ¾ inch deep. The block had 29 of these grooves, each filled to the depth of ¼ inch with ordinary stiff clay. With his copy before him, armed with a small pair of iron pincers, the compositor began his work; character after character was transferred from the case and firmly pressed into the clay. When the "form" was complete, a flat board was placed on the top and the characters pressed perfectly even and level with the surface of the wooden block, the edge of which was cut to form the border generally found round every Chinese page.

The printer now received the form, and carefully brushed his ink over the type. Taking a sheet of paper, he pressed it down all over the form, so that it might be brought in contact with every character. He then removed the sheet and examined each character, carefully adjusting those which were not quite straight with the pincers, and apparently never touching the type with his fingers. After sufficient copies had been struck off, the type was distributed, each character being returned to its particular box. The type in the form was of three sizes, each character being kept in place entirely by the clay in which it stood. They were cut out of some hard wood, and were perfectly square. The writer was told that the art of printing in this way had been handed down in the same family since the Sung dynasty, more than 600 years ago.

No strangers were ever taught, apprentices being always taken from the same clan. They were open to take any work at the rate of about a shilling a day, which included the two men, type, and ink, but not paper. They were then printing family registers. The custom in that part of the country is to hire the printers, who bring their type and set up their printing establishment on the spot. In this way the same business has been carried on in one family for six centuries, and during all this time movable type only had been used in the manner here described.

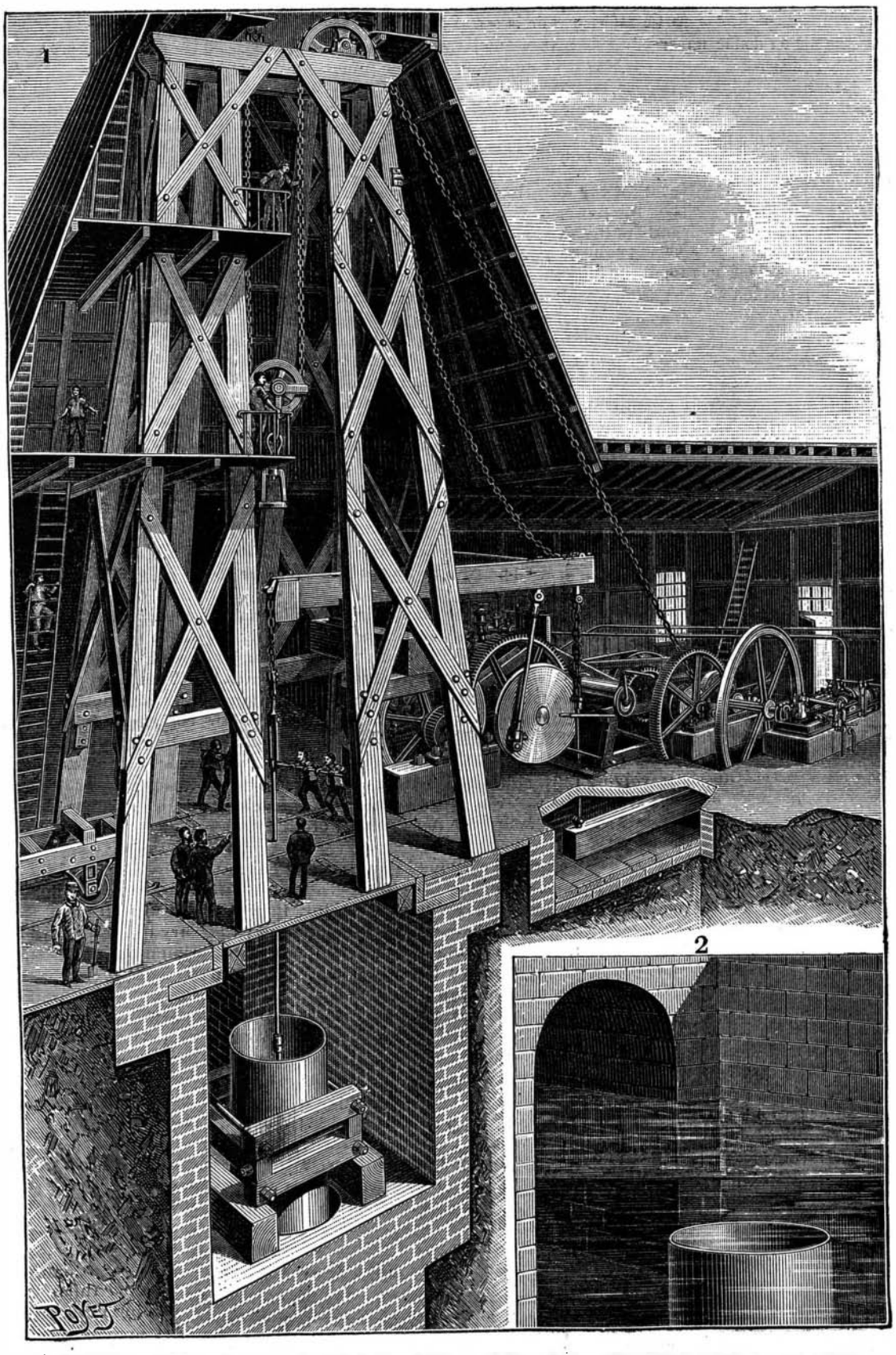
Whitening Linen with Potatoes.

According to *L'Industrie Parisienne*, a laundryman in the vicinity of Paris has discovered a very ingenious method of cleaning linen without soap. He uses no soap, nor lye, nor chlorine, but replaces these substances by boiled potatoes, with which he rubs the linen.

This curious process, it appears, is much superior to those hitherto employed, and the worst soiled cotton, linen, or silk, cleaned by this method, are made whiter than they could be by the use of an alkali. Besides, the method has the advantage that brushes can be dispensed with, and well water be used.

THE ARTESIAN WELL IN THE PLACE HEBERT, PARIS.

Well boring, in spite of the many applications which have been successfully carried out in many parts of the world, has recently attained a notable success in Paris. A new artesian well, the work on which has been in progress for a long time, has at last reached, at the depth of 2,359 feet, the water supply which it is designed to raise to the surface. The work has been watched with as much curiosity by the public as by scientists. The public sees in it the acquisition of a powerful supply of hot and pure water, which may be used for the various industrial and hygienic requirements of the city. The scientists, whether geologists or engineers, see in it a new investigation as to the constitution of terrestrial strata, the methods and systems to be employed, the composition of subterranean water, and finally the results of the various processes of boring, which specialists are constantly trying to improve.



1. General arrangement of the machinery for operating the drill. 2. General view of water flowing into subterranean conduits.

Fig. 1.—ARTESIAN WELL IN THE PLACE HEBERT, PARIS.

The work of sinking the artesian well in the Place Hebert at La Chapelle (Paris) was commenced, carried on, and successfully completed by the firm of Lippmann, of Paris. The greater part of the work is accomplished, and it simply remains to complete the final storage of the water. In the meantime the water is conducted through a subterranean gallery into the sewers of the city. After the work has been completed, Paris will possess an artesian well whose dimensions will place it in the first ranks of works of this kind, owing to its depth of 2,359 feet and its enormous diameter of 3½ feet. It may be remarked that similar wells in France and elsewhere are seldom more than from 4 to 8 inches. The enormous difference between these is noteworthy.

The soil of Paris, as in all cases where useful and interesting experiments in artesian wells have been made, contains various subterranean strata of water superposed one above the other between sedimentary formations which are alternately permeable and impermeable. The ascensional force of these different supplies depends upon the altitude of their original source.

The water supply which is reached by the boring in the Place Hebert is between 2,309 and 2,362 feet below the surface in water-bearing sand, and its origin is apparently in Champagne. It has great purity; it does not exceed 8 degrees hydrotimeter, which renders it suitable for industrial uses. It is well known that the legal requirements prescribe that it should not exceed 15 degrees hydrotimeter. Too great purity, much below 8 degrees, would be prohibitory, for water which is excessively pure, as for instance distilled water, attacks metals and corrodes them. The enormous natural filter of the strata of water-bearing sand at which the new artesian well terminates naturally determines its degree of purity.

The temperature of water at the surface is 12 degrees, that of the new artesian well is about 30 degrees, in compliance with the well known law which gives a sensible increase of temperature of one degree Centigrade for every 98 feet of increased depth. Therefore, when in an artesian well various superposed supplies are met with, the deepest is generally the most powerful, and it is best to use this, completely shutting off all the others. Experience shows, in a word, that the power of consumption of the supply is at least equal to its power of delivery. If the upper supplies remain in communication with the lowest one, the latter simply delivers what the others have left. It is better therefore to shut off all the other supplies which are traversed before the supply to be used has been reached. Remarkable work in artesian engineering executed by Mr. Lippmann at the general hospital at Tours has demonstrated this. This boring traversed three upper strata or supplies, which were completely shut off. The fourth, which was reached at a depth of 558 feet, gave a discharge at the surface of 1,056 gallons of water per minute, while another boring which had previously been made at the same establishment, having the same diameter, the same level, and the same depth, and having traversed the same strata, which, however, were left to communicate with one another, only gave a delivery of 264 gallons per minute. It is for this reason that attention is directed to the supply of a well having a depth of 2,359 feet; that is to say, that the best processes were studied to shut off the subterranean supplies met with in the tertiary formations and at the beginning of the cretaceous formations.

We will now briefly review the processes of boring which are actually used, a detailed description of which would be too extensive. These processes are known under the names of boring by the Chinese method, boring with a hollow instrument, and boring with a black diamond, which latter method was introduced by the engineer Leschot. These methods, however, were used only for making bores of small diameters; when large diameters of from one to two feet and more are required, which, according to the improved processes, are economical, the system of boring with a rigid instrument is employed, which instrument is very powerful, and the skillful use of which has given to our French scientists a well earned reputation.

The rigid shafts are made of wood or iron, and the perforation is made by means of an auger which crushes the rocks by concussion. The apparatus used by Mr. Lippmann are of this kind, but with a free fall. The shaft of the instrument is balanced, and the blow

© 1888 SCIENTIFIC AMERICAN, INC.

on the bottom to be crushed is made by means of a catch which permits the drill to fall, the lower part of the instrument being provided with a heavy weight. In that manner the force which is necessary to operate the auger at a depth of 2,624 feet, 2,952 feet, or 3,280 feet is no greater than at 328 feet. It is only necessary to remove the instrument from the bottom of the hole in case of some accident.

It was Œynhausen who first conceived the idea of balancing a portion of the drill, and this was the first step in the application of the free fall, which is now in use in a great number of the systems that are constantly being improved.

The instruments to be used in driving artesian wells form almost an arsenal. Our engraving (Fig. 2) reproduces the principal types of these cyclopean instruments which are used for boring, for cleaning, for extracting the rubbish, for enlarging the bore, etc.

The reader will find in the description placed under the cuts the necessary explanations. By means of samples, the large cylindrical blocks of rock which are brought to the surface, it is possible, with the help of science and past researches, to form geological charts giving the exact position of the strata traversed by the boring instrument. The drill, by alternating and repeated blows, crushes and grinds the hard rock at the bottom of the boring. The rubbish is brought to the surface by a cleaning instrument. When a friable stratum is met with, it is sustained by iron tubes, and when the artesian supply is reached) the tubes which serve to conduct the water to the surface are put in place.

The tubing is run in large iron sections, 3, 9, 12, and 7 feet in length, riveted together in such a way as to form a smooth interior bore and constitute a single rigid column from the top to the bottom of the well. The thickness of the tubes varies from 0·118 to 0·787 in., according to the diameter of the bore. It is curious to see the tubes superposed one above the other with perfect precision, while in their interior the enormous drill works with regularity and almost noiselessly. The instrument employed at the Place Hebert weighs 8,000 pounds, but those used by Mr. Lippmann in the wells at Konigsborn and Gelsenkirchen weighed 50,000 pounds. The drill is lifted from 1 foot to 1 foot and 6 inches, ten or fifteen times a minute, and falls by its own weight on to the bed, which it reduces to powder.

Sometimes accidents happen, and the tubes are crushed and flattened out at enormous depths. It is then necessary to withdraw them and bring them to the surface. It required nine years to remove tubing 328 feet long and weighing 120,000 pounds, which had been placed in the well in the Place Hebert.

Sometimes dynamite is used for breaking the formations which have defied the powerful weight of the tools, but dynamite does not act effectually at such great depths under the enormous pressure of water. Charges of 30 pounds of dynamite simply lift the column of water, and let it fall again, without accomplishing any useful end. A pressure of 2,000 feet of water or more is so great that a wisp of straw carried to the bottom of the well by the instrument, and then brought up to the surface by the cleaning device, was found twisted and contracted in such a way that it was as heavy as metal, and fell to the bottom of a dish of water like lead, although it preserved its original appearance and form.

Our other drawing (Fig. 1) represents the position of the well at Place Hebert, the surroundings of which have not yet been completed. This abundant supply of hot water throws a spout 114 feet high. The water will be conducted to reservoirs, where it will be at the disposal of factories and, perhaps, employed for private purposes. Very little remains to be done to complete this important work and to gather in the fruit of success. Science and the arts will have learned many useful and important lessons, which will be of benefit to posterity.—*La Nature.*

1. Drill, 4 feet 6 inches in diameter, having 6 arms provided with channels, allowing a free fall. This instrument is used for sinking the well and for cutting out specimens at a depth of from 1,400 to 1,800 feet. When it is desirable to remove a sample, the large transverse blade is replaced by two small ones. 2. A drum having 7 valves serving to remove the earth which has been ground by the drill with the transverse blade. 3. Drum with an interior pump. This drum serves to remove the sand which is met with at a great depth. 4. Drum composed of 8 tubes having valves at the bottom; this is used when it is desirable to remove a specimen of a stratum. It serves to clean the annular space made by drill No. 1 without the transverse blade. 5. A specimen cut out and ready to be clamped and raised by drill No. 6. 6. This tool is used for cutting the base of the specimen and removing it from the bore. 7. Machine having 8 rollers for straightening tubes of 5 feet in diameter, and for grinding up a section of tube which has been broken.

Fig. 2.—INSTRUMENTS USED FOR BORING THE ARTESIAN WELL IN THE PLACE HEBERT, PARIS.

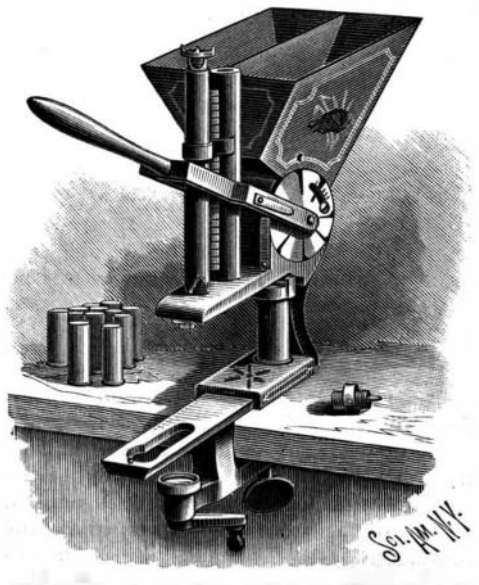
ROMER'S SAW GUMMER.

AN IMPROVED SAW GUMMER.

A saw gummer which admits of ready adaptation and quick adjustment for work on a variety of saws is illustrated herewith, and has been patented by Messrs. John P. and Nicholas Romer, of Gowanda, N. Y. To the side faces of the lower portion of the body are riveted upwardly extending diagonal plates, above which is adjustably held a die holder, the adjusting screws holding the die in any desired position, while the die rests directly on the upper endsof the diagonal braces. In the die is formed a V-shaped opening corresponding with the desired interdental spaces of the saw. Side plates are secured above the die, between which is mounted a movable bar, the lower end of which is formed to correspond with the opening in the die, the bar being normally upheld by a spring. Above the bar is a double-faced eccentric, having a rigid handle made integral therewith, the eccentric being pivotally supported by a bolt extending through the upper portions of the side plates. A bracket is adjustably connected to the right hand side of the body, so that it may be moved toward or from the front of the gummer, the bracket forming a support for a gauge, upon the point of which is a toe to enter the recesses between the saw teeth and regulate their size and slant as they are formed by the gummer. The construction is such that the gummer may be readily secured to a bench or other stationary support, and allow the saw body to be swung over the bench when the dies are used for shearing, giving a greater range of motion than would be possible if the gummer were supported at points above the die.

AN IMPROVED CARTRIDGE LOADER.

A combination tool for loading the ordinary form of paper shell cartridges, and which will load both No. 10 and No. 12 shells, is illustrated herewith, and has been patented by Mr. Francis P. Devens, of No. 1306 Forest Avenue, Kansas City, Mo., the invention covering an improvement on a cartridge loader by the same inventor described in our issue of April 21. Upon the main standard is mounted a cylinder, above which is a centrally divided hopper, with one compartment for shot and the other for powder, the internal mechanism of the cylinder being such that, by the raising of the bifurcated lever a certain distance, a regulated discharge of powder will be effected and, the lever having been lowered and again raised in like manner, a similar discharge of shot will be made. The base of the shell tube is adapted to slide on a plate extending forwardly from the clamp, and having an elongated aperture, through which the shell to be filled is passed into the shell tube, the latter being then moved to the position beneath the hopper where it is shown in the illustration. The powder having been supplied, the tube, as it is drawn forward, engages a tongue at the lower end of the wad tube, whereby a wad is placed on the powder, and the shell tube with its partially filled cartridge is moved further forward to a position just beneath the plunger, when a depression of the lever forces the wad home upon the powder. The same operation is then repeated in loading the shell with shot. A capping and decapping device, adapted to screw into the lower end of the plunger, has a convex face on one end for capping and a pin projection on the other end to removed an exploded primer. The crimper, beneath the forward end of the clamp plate, has an annular groove



DEVENS' IMPROVED CARTRIDGE LOADER.

© 1888 SCIENTIFIC AMERICAN, INC.