SUBSTITUTE FOR PIPE TONGS.

The man who is full of expedients is the one who gets along in the world. If what he wants is not at hand, something else is substituted, and matters progress as though every facility were available.

This applies especially in mechanics, where it is impossible to provide a tool for everything, and when just the tool required—even though there be such a tool—is not at hand.

Our artist recently saw a mechanic who, desiring to unscrew a pipe, and not having pipe tongs or any of the usual appliances for such work, picked up a wrench and a piece of a round file and applied them in the manner shown in the cut. In an instant, and without difficulty, the pipe was loosened.

SUBSTITUTE FOR PIPE TONGS.

Waterproof Cellars.

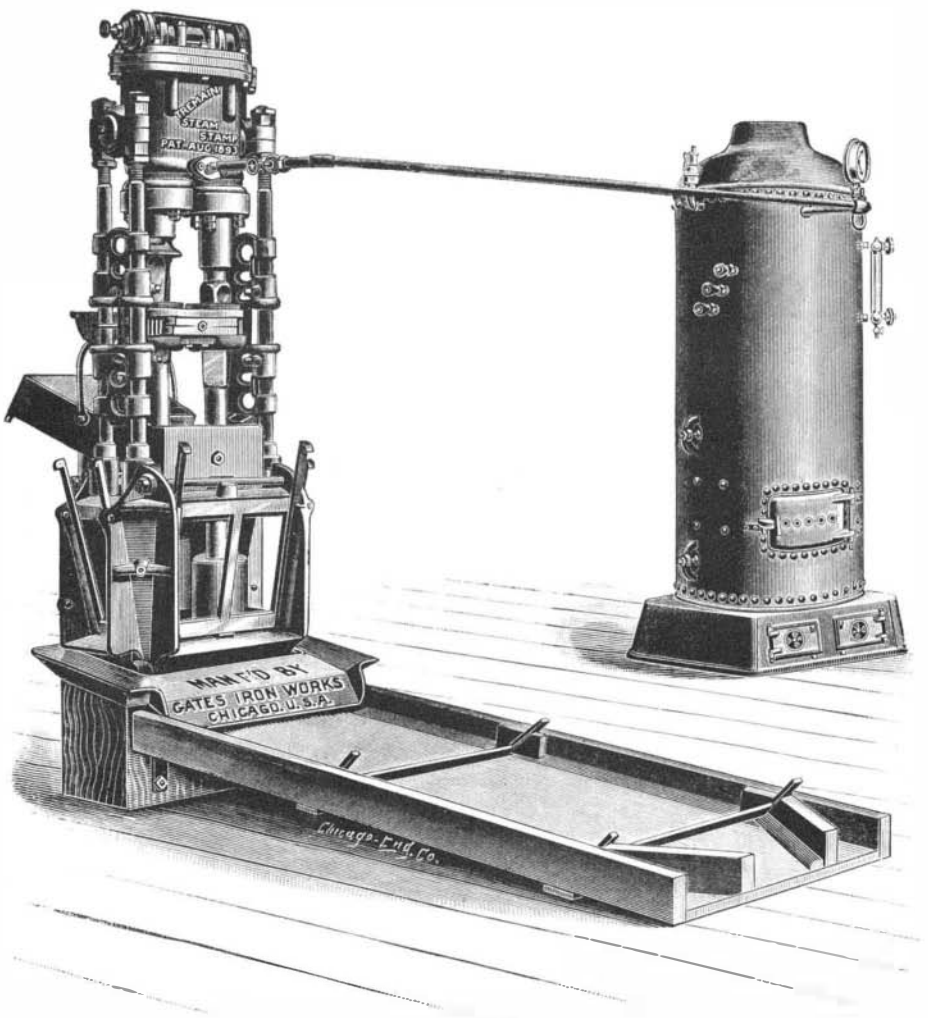
A cellar can be so constructed as to be waterproof, if the bottom or the floor is first covered with cement, the walls built thereon laid in cement and the exterior of the walls covered with cement.

This makes practically a water-tight basin. The cement used must be the best Portland cement, one part; clean sharp sand, one part. After a cellar is built it is not so easy to make it waterproof. Still it can be done. Cover the exterior of the wall with the above cement, ditto the bottom, and work the cement in under the bottom of the wall.

If these directions are followed, you will succeed. But if cheap materials are used and the work badly done, you will be sure to fail. A drain put around the outside of the wall, or even inside, below the cellar floor, may be efficient in carrying off the water if you can give it a good delivery.—*The National Builder.*

A PRACTICAL STEAM STAMP MILL.

A mill designed to supersede the old style cumbersome and expensive stamp mills, requiring a large expenditure of power for their operation, is shown in the accompanying illustration. The machine crushes to fine powder the gold or metal bearing quartz or rock, so that the minerals may be easily collected by concentration or amalgamation. Its height is 7 feet 6½ inches and its base 18 by 22 inches, and yet it has a capacity equal to the ordinary five stamp mill, and can be introduced and put in operation at less than half the cost. It has one screen 14 by 18 inches and two 14 by 7 inches, and the weight of the complete mill with feeder is only about 2,700 pounds. The mill is made in sections, easily put together, the heaviest piece weighing only 340 pounds, to facilitate transportation by pack animals to mining localities difficult of access. The mill has two stamps, each with a stamp stem, and weighing, with piston rod and other attachments, about 300 pounds each. The stamp is raised by the admission of steam to the under side of the piston, after which the steam is conducted to the top side of the piston, by a novel arrangement of parts, and its pressure applied over a much larger area, whereby the blow struck by the stamp is given a largely multiplied force. The steam is made to do the work directly, thus adding greatly to the efficiency of the machine, and effecting a saving of at least three-fourths of the cost of fuel as compared with former methods. The foundation is easily prepared, preferably by setting timbers on end to reach bed rock, or by setting them eight to ten feet in the ground, upon timbers arranged to form a solid foundation. The machinery runs independent of a building, and may be set up under a shed. When run with a boiler which gives a hundred pounds steam pressure, the blow struck will equal that of a thousand pound stamp, but the force of the blow may be regulated in a manner similar to that of the steam hammer. About five horse power is sufficient to run the stamp. This machine has been in successful operation for about two years, and its simplicity and great efficiency have earned for it the high commendation of experienced miners. It is manufactured by the Gates Iron Works, of Chicago, manufacturers also of a large line of general mining machinery.



THE TREMAIN STEAM STAMP MILL.

The Ice Rink.

Skating on real ice in summer attire is rapidly becoming one of the most popular indoor amusements in San Francisco. To native sons and daughters who have never experienced the rigors of an Eastern winter, it is a thrilling novelty. To those who have enjoyed the exhilarating sport in a land of blizzards and frosts, it is made more enjoyable by the fact that winter dress is unnecessary.

These are only a few of the reasons why the frozen lake in the big Mechanics' Pavilion, with nearly 10,000 square feet of polished surface, is visited daily by hundreds who can skate and many who are speedily learning. The sheet of ice is five inches in thickness, 160 feet long, and 60 feet wide. At least 500 persons can skate with comfort at a time, but it was a trifle crowded on the opening night, for no less than 811 glided or struggled over the slippery surface, according to the respective skill of the skate wearers.

"This idea of a big skating rink with natural ice," said W. W. Donaldson, "is not exactly a new one in this country. Right here in this city it has been tried three times, but each attempt failed because the organizers did not master the intricate mechanical appliances. This is the first natural ice skating rink operated in the United States, and the fourth in the world. There is one in Paris, another in Berlin, and a third in Southampton, England. Therefore this is the fourth in the world, and the first in the United States. The successful construction of this rink is the result of ten years of careful study and experiments on my part while engaged in the cold storage business. I was preparing a similar rink in Chicago when the disastrous fire destroyed the big cold storage building at the World's Fair. The plant being destroyed, we had to abandon the project.

"How is this natural ice produced? There is no secret about it. The ice is produced by a machine of the ordinary type employed in cold storage work. The difference here is in the manner of freezing. In cold storage it is done in tanks and insulated rooms. Here the ice is frozen three times a day, and the refrigerant used is anhydrous ammonia. This is employed to cool the strong brine. After the brine is cooled it is pumped through a system of pipes 40,000 feet in length, which run through the water that is turned into ice. The cold brine absorbs the heat. The floor beneath is insulated and made up of dead air cells and covered with lead to make it watertight.

"In the placing of the pipes lies the principal secret. The pipes run in three centers from a header at each end of the tank. These headers are six inches in diameter, and the pipe is taken out of each header at six inch centers. This admits of circulating the brine from both ends at the same time. The return is also taken from both ends and carried back to the brine tank. By this means we have a cooling surface exposed to the outside air. In this way we outwit nature, and our ice surface has an even temperature all over. Through inch pipes leading from the headers the brine is kept in constant motion.

"Of course, after being used several hours the surface of the ice becomes cut up and somewhat rough. That is why we have three sessions daily—morning, noon, and night. During the intervals the snow is swept off the ice, and with a hose or orchard sprayer a thin coating of water is spread over the ice to fill up the cuts. In this manner we have a perfectly smooth surface three times a day. The water is frozen at a temperature of about ten degrees above zero, which would be as cold, probably, and as hard as ice frozen in any cold country when the temperature is about zero.—*San Francisco Call.*

An Important Patent Suit.

The case of the Bate Refrigerating Company was recently argued before the United States Circuit Court of Appeals, C. E. Mitchell and J. C. Carter appearing for the appellant and W. H. Peckham and Edmund Wetmore for the appellees.

The point at issue is in regard to the meaning of the part of the paragraph of section 4,887 of the Revised Statutes reading as follows: "But every patent granted for an invention which has been previously patented in a foreign country shall be so limited as to expire at the same time with the foreign patent," the appellant contending that it should be construed to read "an invention which has been patented previous to the application for a patent therefor in the United States shall be limited," etc., while the appellees contend that the meaning is plain as it is.

The main argument of the appellant is that in the revision of the law on the subject the language had been so changed as to thwart the plain intent of the original framers of the law, and that the statute is therefore open to interpretation, and should be construed as above in harmony with the original law, and thus prevent great injustice to patentees. The appellees dispute the right to enter upon an inquiry as to the supposed intention of Congress, show that the courts have invariably maintained their view, and argue that if the construction claimed is allowed, it will result in gross injustice to the public.

The System of Algol.

An elaborate discussion of the inequalities in the period of Algol recently led Mr. Chandler to conclude that there is a distant dark body around which the bright star and the dark companion producing eclipses revolve in a period of 130 years (*Nature*, vol. xlv., p. 446). This conclusion has been greatly strengthened by recent investigation by Mr. Searle of the relative places of Algol and comparison stars from observations made with the meridian circle at Harvard College (*Annals*, vol. xxix., 1893). The right ascension of the star appears to be increasing in general conformity with Chandler's prediction.

THE "digue," or breakwater, of Cherbourg is one of the boldest engineering feats ever preformed.