MALLEABLE GLASS.

It has long been the effort of the glass-makers to produce a glass that would have all the clearness and beauty of ordinary glass, and at the same time possess a toughness which would render it as little liable to fracture as many of the other manufactured articles of use and beauty. It is well known that the ancients discovered and made use of a process of manufacturing malleable glass; and in the glass-making world, it has naturally been expected that it would be in the old world that the process would sooner or later be reinvented. It is to an American, however, that the

CRIMPING LAMP CHIMNEYS OF MALLEABLE GLASS.

credit of having discovered the method of making malleable glass is due. Mr. Louis Kauffeld, of Matthews, Ind., has succeeded after many years of endeavor in producing a glass which will withstand extremely rough usage without breaking. Although the process is not known to anyone except the inventor, he has stated that the lime and lead which are used in the manufacture of ordinary glass do not enter into the composition of his malleable ware. The secret lies principally in the chemicals which are used and the proportion of ingredients which form the compound, although the furnaces and crucibles play an important part in the process.

The two chief things to be avoided in connection with the crucible are intense and prolonged heat from without and the corrosion of the raw materials within —two dangers of which nearly every glass-maker knows the ruinous effect. The effect of corrosion is readily proved by heating for a long time in a small crucible such substances as borax, red lead, or potassic or sodic carbonate. After a crucible has been in constant use for several months, and especially if it has contained flint or lead glass, the back and body will be found to be covered with innumerable small dents, which have undoubtedly been formed by corrosion.

The complaint so commonly heard of specky glass arises from the presence in the glass of white particles of an infusible aluminate formed by the combination of the alkaline or metallic ingredients of the glass with the alumina of the crucible. If the corrosion becomes concentrated at one point and prolonged for a considerable period a breach is formed, through which the molten glass escapes into the furnace.

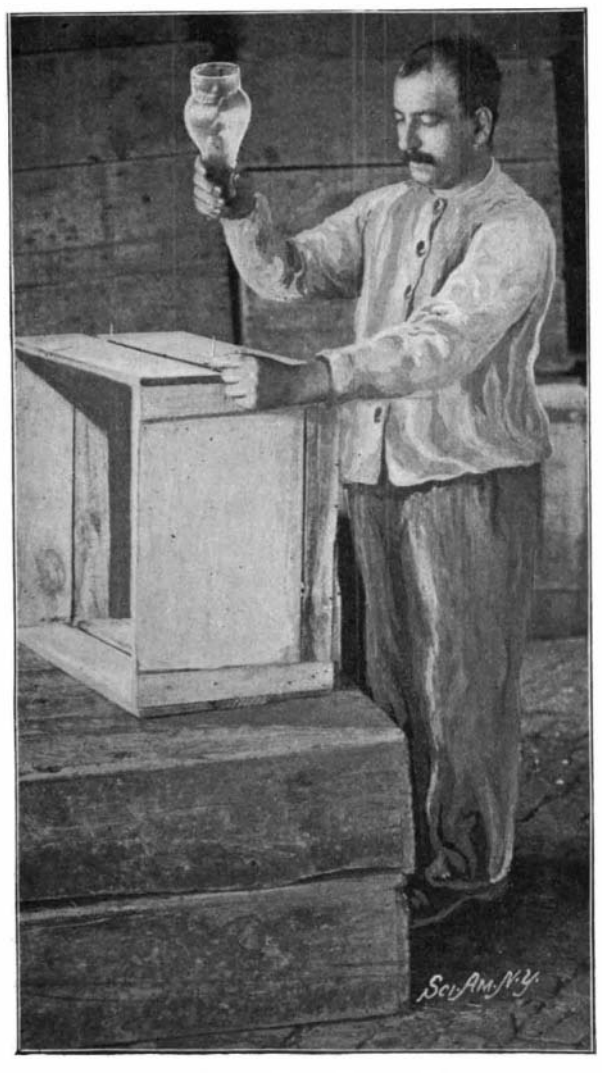
Knowing the dangers that have to be encountered in this way, Mr. Kauffeld is extremely careful in the selection and preparation of the clay as well as in the construction of the crucibles. The finely sifted raw clay, on its arrival at his manufactory, is mixed with a proportion of burnt clay considerably coarser in grain, varying in amount from one-ninth to one-fifth of its weight. The coarser particles tend to bind the clay and render the finished crucible less liable to crack from variation of temperature. Only those who have lost in this manner a valuable compound can appreciate what an important part the crucible plays in the glass-maker's success.

The tests which the inventor will make for anyone who cares to visit him in his shop in Matthews are certainly conclusive.

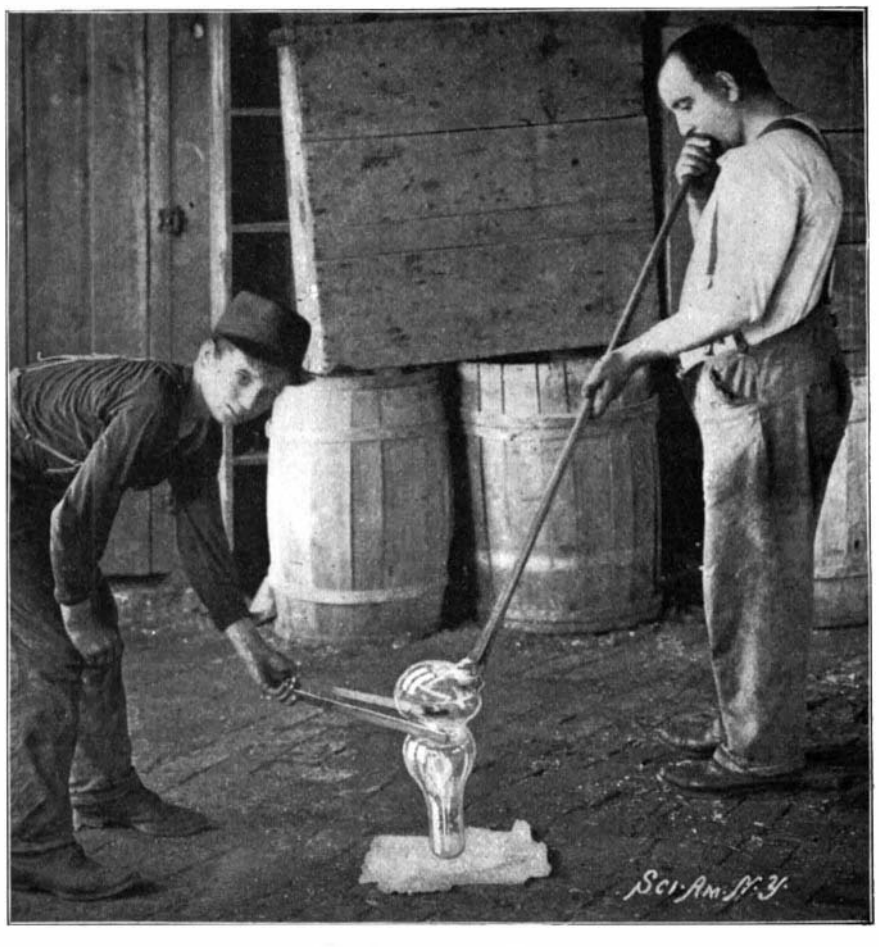
For instance, a chimney was placed in a pail of ice water, and after having remained a sufficient length of time to become as cold as the water, was taken out and immediately placed on a lamp with the blaze turned as high as possible. The blaze on the wick was turned so as to flow directly on the chimney, and the smoke which collected on the chimney ran down with the water without injuring the chimney. Next a chimney was placed over a small gas stove containing clay bricks used in heating such stoves. The fire was turned on full, the chimney remaining on the bricks. The fire finally brought the temperature to such a stage that one side of the chimney was drawn in and dropped down, and no crack was shown in the glass; but for a slight roughness on the outside, the glass was as clear as when placed in the fire.

Another test which was made was to place cold water in the chimney and hold the same over a fire until the water boiled. A large bulb was blown from the glass and filled with about one pint of water. It was then placed over the fire and allowed to remain there until it had boiled dry without apparent effect on the glass. Four chimneys were taken from the packing room and dropped one by one into a pail of boiling water. The chimneys were then hastily shifted into a pail of cold water that had just been drawn from a well, and the glass was not broken.

A further test was made by nailing up a box containing glassware, every nail being driven in by hitting it with a chimney. The most remarkable feat of all was the making of a perfect lamp chimney by using a chimney as a mold and blowing hot glass into the same. Both the new chimney and the mold came through the test perfectly whole, uncracked and unscarred. In appearance this malleable glass is much like the common product; it is, if anything, a little clearer than the glass now in use and in its molten state is much more elastic. It can be made of the thickness of a sheet of paper or as heavy as any in use, but in every instance it is tough—a dainty table glass could be handled as roughly as a skylight and no harm result. The advantages conferred by this toughness, in the wide variety of glass utensils for domestic use, are very numerous.



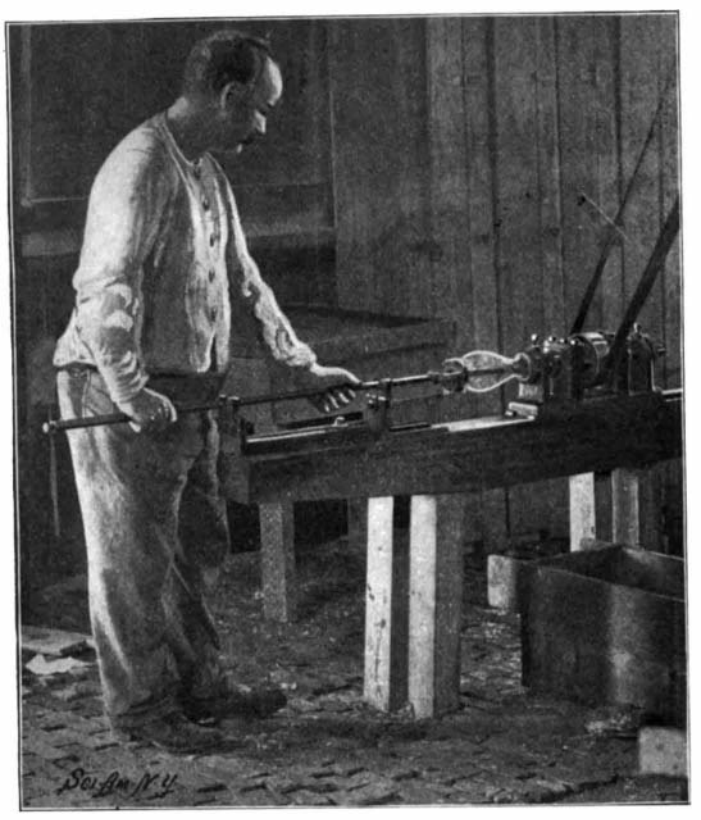
USING A CHIMNEY AS A HAMMER.



FORMING A CHIMNEY.

German Naval Marksmanship.

If reports which reach us from Europe are to be credited, the German sailor is not far behind our own American bluejacket in marksmanship. In target-practice the "Kaiser Friedrich III." opened with her 15-centimeter quick-firing guns on a floating target towed by the cruiser "Hela." Hitherto five or six shots a minute, with four or five hits, have been held to be a good record for each gun. But the "Kaiser



TURNING A MALLEABLE GLASS CHIMNEY.

Friedrich III." fired eight shots a minute, and all were hits. Then the two ships steamed away from each other at full speed, while the battleship opened fire with her 24-centimeter guns, her 8.8-centimeter quick-firing guns, and with her machine guns. The results were almost equally satisfactory, as there were only isolated misses, and the target was very soon knocked to pieces; a second target was then brought up, and also at once destroyed. The "Kaiser Wilhelm II." fired on August 19, and the winner of the Kaiser's prize will not be settled until the fleet maneuvers are at an end.

What is said to be the largest and heaviest anchor ever made was recently forged at the Charlestown, Mass., Navy Yard. It weighs over eight tons and cost nearly $2,000. It is 15 feet long over all and 9 feet 6 inches wide over the points. The palms are 32 inches wide. The cable for this anchor is unique also, as regards weight, each link weighing 60 pounds; 360 fathoms (2,160 feet) of it are to be supplied.