THE SIEVERT PROCESS OF MECHANICAL GLASS BLOWING.

Every maker of glass utensils knows the effect of cold metallic surfaces upon the superficial ductility of glowing plastic glass. The sudden absorption of heat causes the upper layers of glass to harden in innumerable ridges and lumps. Blown glass, on the other hand, coming as it does in contact only with the atmosphere as it hardens, preserves the mirror-like gloss

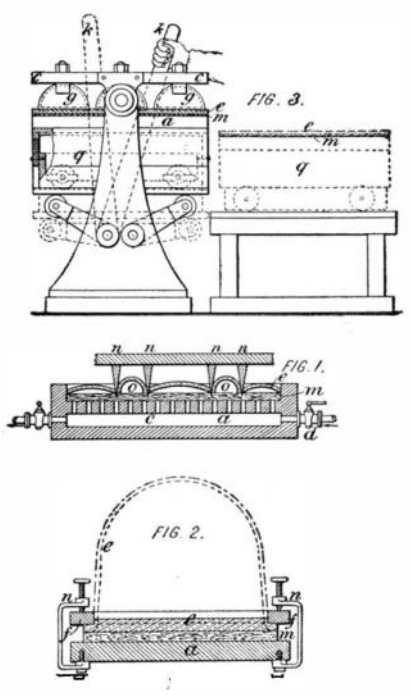
Bas-Relief of Emperor William II. Blown in Glass.

of a fluid that has congealed, undisturbed. It is likewise well known to the glass-maker that if the tools with which the glowing glass is handled be moistened, a layer of steam is formed between the glass and the tool, which layer conducts away but little of the heat. The principles which underlie these phenomena have been practically utilized by Mr. Paul T. Sievert, of Dresden, Germany, in the glass-blowing process which we described in our issue of May 10, 1902, and also in a process which was there referred to, but which will in this article be more particularly described.

Mr. Sievert's attempts to roll out molten glass into plates by means of rollers and rolling tables, the surfaces of which consisted of water-soaked fibrous material such as wood, paper, asbestos, and the like, were at first not altogether crowned with success. During the rolling process the injurious effect of the cold metallic surface was particularly marked. Here then was a most excellent opportunity for utilizing not a metallic surface, but a layer of vapor in direct contact with the congealing glass. The water-soaked rolling-tables, however, were found to be defective in certain important respects. The steam generated between the moist bed-plate and the molten glass must be allowed to escape. If the glass surface be very large, and the bed-plate more humid at some points than at others, steam will be generated in larger quantities in such places and will there have a greater expansive force, with the result that a bubble will be formed. This peculiar effect caused by variable humidity has been turned to good account by Mr. Sievert. If the glowing layers of glass resting upon the moist bed-plate, or rather upon the layer of steam generated, be tightly forced into contact with the bed-plate at its edges so that the steam cannot escape, it follows that the steam generated must force the superposed glass layer upward into a huge bubble. In Mr. Sievert's earlier patents we find these principles practically applied for the first time.

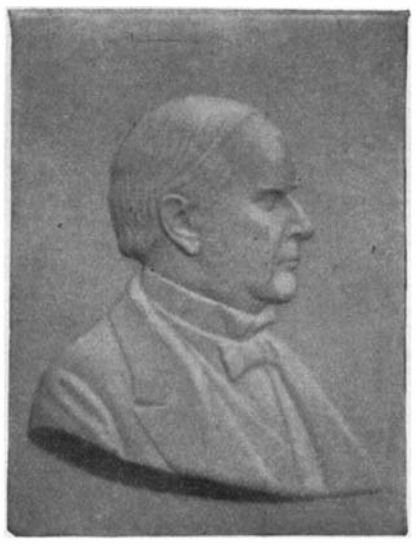
The plastic layer of glass *e* (Fig. 1) is laid upon a layer of asbestos *m*, which is fed with water through the inlets *c*, in the upper surface of the hollow plate *a*. The layer of steam generated forces the glass upward by reason of the fact that the glass layer is pinned down to the bed-plate by fingers *n*, so that the steam cannot escape. A second application of the same principle is somewhat broader in its scope. A plastic layer of glass *e* (Fig. 2) is placed on a layer of asbestos, which is kept moist by a supply of water. Upon this layer of glass a frame *f* is superposed, and held down tightly by clamps *n*. The layer of steam formed beneath the glass cannot escape, because the edges of the frame and the sheet of asbestos form an air-tight joint. Hence the steam must act upwardly, and the layer of glass is blown into a hollow body. The pressure of the steam, and consequently the size of the bubble formed, can be regulated by adjusting the clamps *e*. A third patent discloses the fact that the upward blowing of the layer of glass by means of a layer of steam is but a single instance of the practical application of a general process. It is recognized that molten glass can be spread upon the bed-plate, pinned down by a clamp frame having the shape of the body which is to be formed, and forced into a mold by means of compressed air, steam, or other elastic fluid. It is this particular process which has been described in the issue of the SCIENTIFIC AMERICAN previously referred to.

In practically carrying out these processes the system illustrated in Fig. 3 is adopted. The figure in question illustrates an amplification of the apparatus outlined in Fig. 2. Upon the carriage *q* the bed-plate *a* is placed, and upon the bed-plate a wet layer of asbestos *m* is superposed. Upon the asbestos plate in turn the layer of glass *e* is spread. The carriage *q* is now pushed beneath the plate *c*, so that it assumes the position indicated by dotted lines. By means of



Figs. 1-3.—Sievert Process of Glass Blowing.

a lever *k*, the carriage and the plate *c* are raised sufficiently, as shown by the full lines, to enable the molds *g*, secured to the frame *s*, to force their edges into the layer of glass. Thereupon, the steam arising from the asbestos forces the layer of glass into the molds *g*. The carriage *q* is then lowered and withdrawn together with the objects which have been formed, tied together by surplus glass. By means of the apparatus shown it is possible to produce no less than twelve tray-like utensils at a time. It is with this apparatus that the



Glass Bas-Relief of President McKinley.

glass bas-reliefs of Emperor William II. and of the late President McKinley, herewith reproduced, were made.

Rules Adopted by Wireless Telegraph Conference.

The conclusions of the international wireless telegraph conference held in Berlin last month have been made public, and the protocol signed at the conference will probably be made the basis of a treaty for the regulation of international wireless telegraphy.

Rules were adopted applying to the exchange of messages between vessels at sea and coast stations. These rules are said to be as follows:

"Any fixed station whose field of action extends to the sea is styled a coast station.

"Coast stations are bound to receive and transmit telegrams originating from or intended for vessels at sea without any distinction of wireless telegraph system used by the latter.

"The contracting parties shall publish any technical information likely to facilitate or expedite communications between coast stations and ships at sea.

"The wireless station must, unless there should be absolute impossibility, accept in preference requests for help that may come from vessels.

"The service of the wireless-telegraph stations must be organized as far as practicable so as not to interfere with the service of other stations."

It is expected also that a universal system of charge is to be introduced.

The protocol was signed by the United States, Germany, Austria, Spain, France, and Russia. The general feeling of the congress seemed to be decidedly against the monopolization of the wireless-telegraph business by any one company.

The maximum draft allowed for ships using the Suez Canal was raised in 1902 from 25 feet 7 inches to 26 feet 3 inches, or 8 meters, and 123 ships availed themselves of this increased depth.

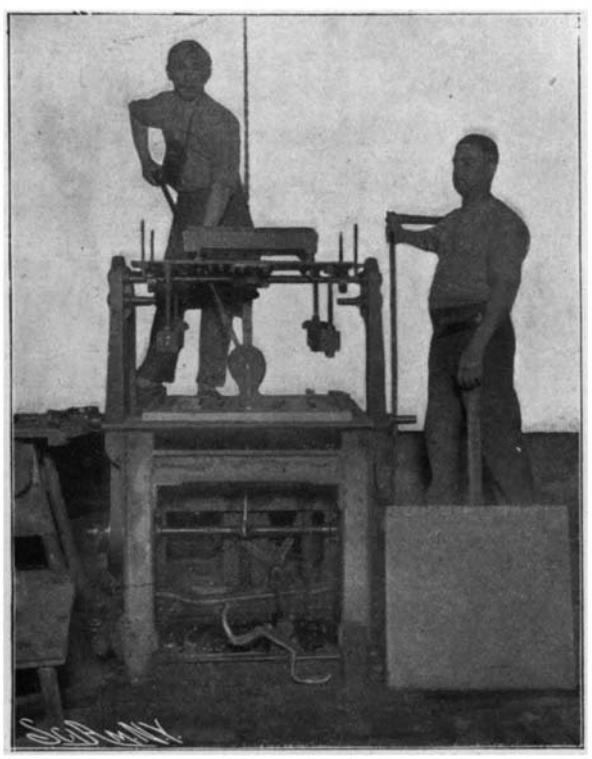


Fig. 4.—Spreading the Molten Glass on the Asbestos Plate.

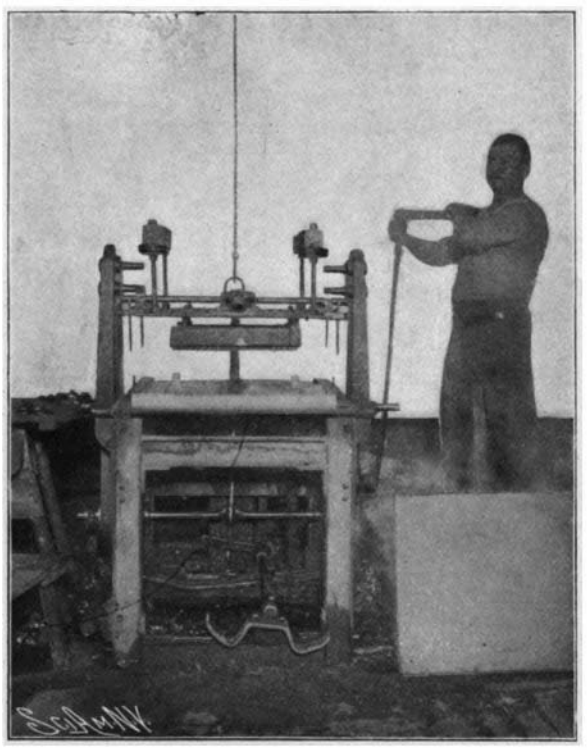


Fig. 5.—Blowing the Glass into the Mold.

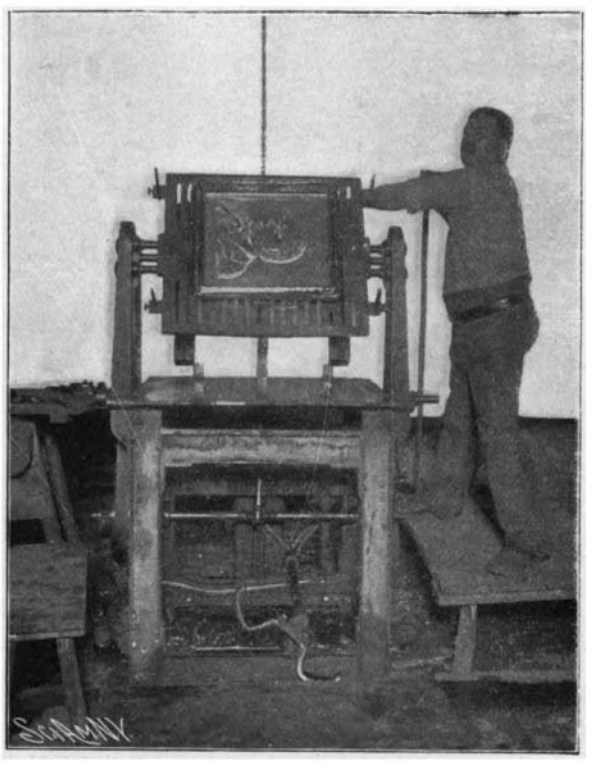


Fig. 6.—Lifting the Plate and Tipping the Mold with the Blown Product.

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