(No Model.)

A. D. BROGAN & A. M. MALLOCH.

APPARATUS FOR ROLLING GLASS.

No. 522,961. Patented July 17, 1894.

Fig. 2.

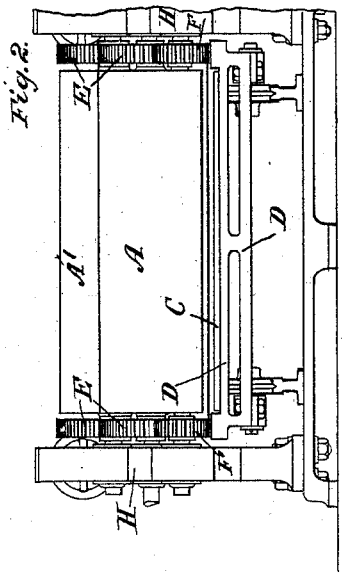


Fig. 4.

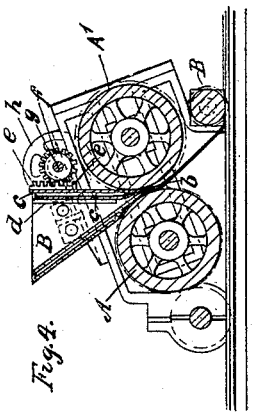


Fig. 5.

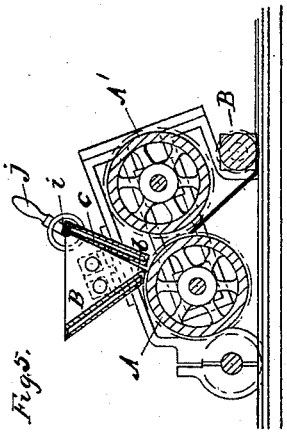


Fig. 1.

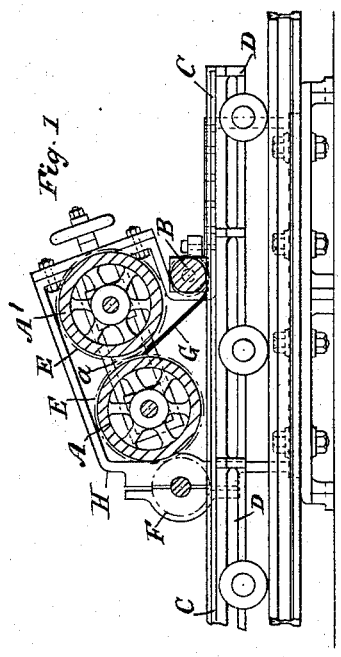
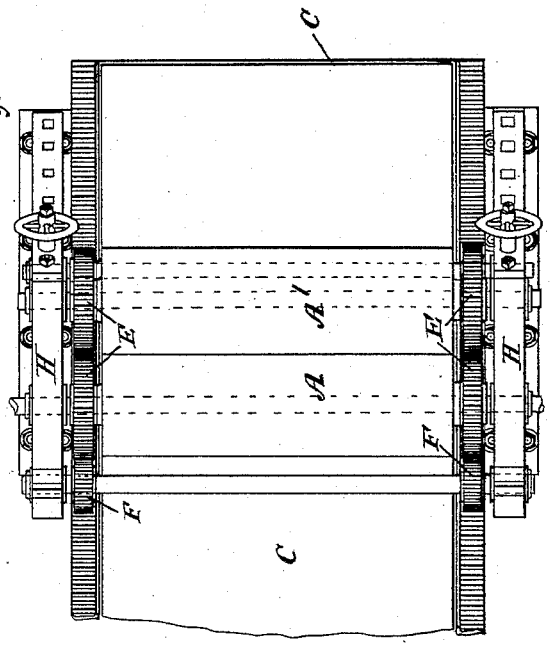


Fig. 3.



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By Richards & G

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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

ANTHONY D. BROGAN AND ANDREW M. MALLOCH, OF GLASGOW, SCOTLAND.

APPARATUS FOR ROLLING GLASS.

SPECIFICATION forming part of Letters Patent No. 522,961, dated July 17, 1894.

Application filed May 3, 1894. Serial No. 509,972. (No model.) Patented in England April 28, 1893, No. 8,555, and September 16, 1893, No. 17,439.

To all whom it may concern:

Be it known that we, ANTHONY DIXON BROGAN and ANDREW MURRAY MALLOCH, subjects of the Queen of Great Britain and Ireland, residing at Firhill, Glasgow, in the county of Lanark, Scotland, have invented new and useful Improvements in and Relating to Apparatus for Rolling Glass, (which have not been patented in any country except Great Britain and Ireland, by Letters Patent dated April 28, 1893, No. 8,555, and Letters Patent dated September 16, 1893, No. 17,439;) and we do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art or manufacture to which it relates to make and use the same.

This invention which relates to apparatus for rolling glass has for its object the production of such glass direct from the molten or plastic state with a smooth surface resembling polished plate on the side which is usually roughened or dimmed by contact with the rolling table while the opposite surface is either made smooth or has a design or pattern impressed upon it by means of a pattern roller.

In the accompanying drawings Figure 1 is a sectional side elevation, Fig. 2 an end elevation and Fig. 3 a plan of the improved apparatus. Fig. 4 is a vertical section and Fig. 5 a modification of a like view of a hopper adapted to be used in conjunction with the rolling apparatus.

As shown by Figs. 1, 2, and 3 the improved apparatus comprises a pair of smooth rollers A, A′, carried on horizontal axis in stationary framings H, one roller being preferably at a lower level and of the same or of a greater diameter than the other so as to form a hopper at *a* whereinto the molten or plastic glass is laid and thence carried between the rollers by their rotation. A third roller B, which is either smooth or has a pattern formed upon it is fitted at the discharge end of the apparatus and under it is fitted a smooth traveling plate or slab C of metal between which and the auxiliary roller the glass rolled by the first pair of rollers A, A′, passes and is carried upon or along with the plate C at the same surface speed as the rollers toward an annealing kiln into which the glass plate is drawn or pushed.

The first pair of rollers A, A′, in rolling out the glass cools the surface only to such an extent as to permit of the auxiliary or pattern roller B properly impressing the upper surface while the under side retains the smooth surface imparted to it by the plain roller A during its contact with the smooth metallic slab or plate C on or with which it travels in passing under the auxiliary roller B.

The traveling slab or plate C carrying the glass is or may be supported by or may form the top of a wheeled framing D, and may be simply carried along with the moving glass plate or it may be traversed from the gear E, E, actuating the rollers by means of pinions F engaging the teeth of racks on the sides of the wheeled framing D or by like means. The glass in passing from the rollers A, A′, to the auxiliary roller B and slab C is guided by an inclined plate G.

In order that the molten glass may be acted on uniformly or approximately so by the rolls over their entire width, so as to avoid the waste consequent on the formation of a narrow end on the plate, we secure a hopper I as shown by Fig. 4 over and between the pair of rolls A, A′, through which the molten glass is carried. The hopper I has closed ends and sides inclined to each other which meet at the lower end *b* or terminate there in a narrow slit in contact with or in close proximity to the surface of one of the rolls. One of the sides *c* of the hopper I is fitted to slide like a sluice in guides *d* as illustrated by Fig. 4 this side being provided with racks *e* which gear with pinions *f* secured on a horizontal shaft *g*, said shaft being operated from either side of the machine by hand wheels *h*.

In lieu of the rack and pinion arrangement and as shown by the modification Fig. 5 the side *c* may be fitted to swing upon a center *i* and the slit or outlet at the bottom of the hopper may be opened more or less by means of the hand levers *j* or equivalent devices or these levers may be brought down and connected together underneath the table where they may be operated to open the hopper by

means of a treadle or otherwise. By this means the molten glass which is poured into the hopper B is first allowed to spread over the length of the hopper after which the outlet from the latter is opened more or less to permit the uniform discharge of the glass thus insuring that it will pass through the rolls in a uniform stream extending over the width of the rolls.

If necessary the hopper may be jacketed and a stream of water caused to circulate therein for the purpose of keeping the hopper from overheating.

Having now described the invention, what we desire to secure by Letters Patent is—

In combination, the reciprocating plate or slab, the inclined frame above the same, the rollers A A′ journaled in the frame and adjustable toward and from each other, the auxiliary roller B journaled in the elevated end of the frame but beneath the roller A′ and the inclined deflector G extending from roller A and terminating beneath roller B, substantially as described.

In witness whereof we have hereunto set our hands and seals the 21st day of March, 1894.

A. D. BROGAN. [L. S.]
A. M. MALLOCH. [L. S.]

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