May 16, 1950 | A. LECRON | 2,508,276

METHOD AND APPARATUS FOR POLISHING GLASS

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FIG. 1.

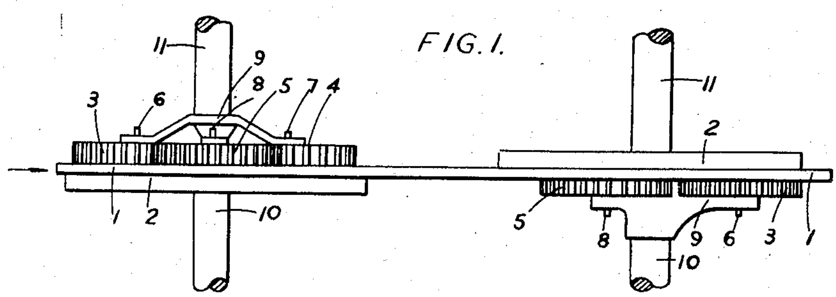



FIG. 2.

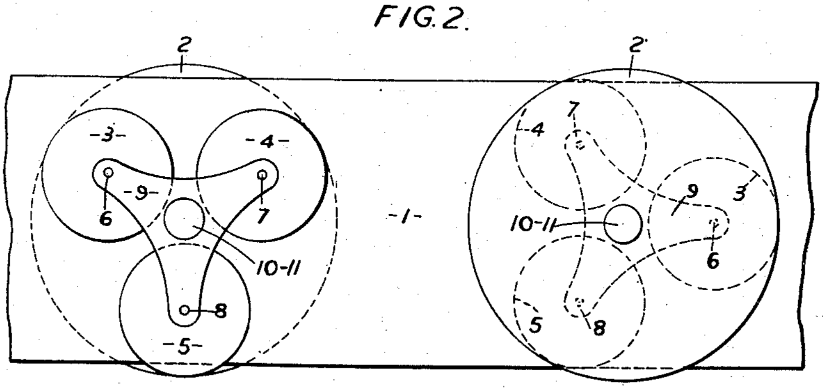



FIG. 3.

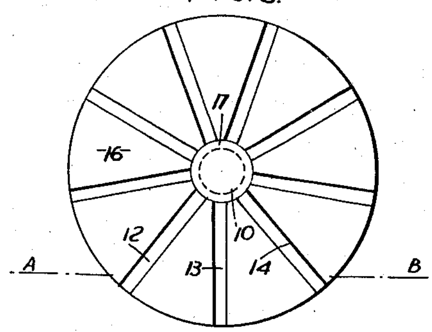
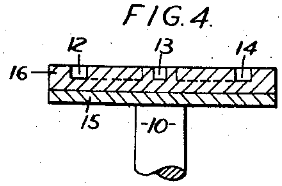



FIG. 4.

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## METHOD AND APPARATUS FOR POLISHING GLASS

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10 Claims. (Cl. 51—112)

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This invention relates to the polishing of glass, in which the glass, in the form of a continuous ribbon, is moved horizontally between polishing tools set in pairs, one tool of each pair being adapted to operate on one surface of the glass and the second tool of said pair being adapted to operate, simultaneously with said first tool, on the opposite surface of the glass.

As is known, the polishing of glass is generally done by tools faced with felt which is fed with the polishing agent, and is moved rapidly across the surface of the glass under a certain pressure.

In the various methods hitherto proposed for enabling the glass to be polished simultaneously on both surfaces, the tools working one surface or the other consist of discs called pads which can rotate on vertical spindles attached to arms of the framework, itself rotating about a principal vertical axis. In this arrangement the pads themselves on their spindles acquire a rotating motion. The effect of this double rotary movement is that the paths of the various points on the felt pads intersect in all directions, which tends to produce a high standard of polish.

Polishing tools of this type, as has just been said, are grouped in pairs, the tools in one pair being arranged opposite to each other on the same main axis. They rub, one on each side of the glass, the pressure being exercised by the upper tool only, whilst the lower one supports the glass and resists the pressure. The most simple method, from the mechanical point of view, is to work the tools forming a pair, each from a separate motor. Under this arrangement, as a general rule, the pads of one polishing tool of a pair are only momentarly opposite the pads of the other. The rest of the time, the relative positions of the tools are such that the pads of the one are displaced angularly in relation to the pads of the others. In consequence, the pressure exercised by these pads above and below the glass combine to form a couple which causes varying bending moments. These bending moments make it necessary to limit the pressure applied to the polishing pads, thus leading to the use of a relatively large number of polishing tools, and, consequently, to a much larger apparatus to secure a sufficiently good polish.

It has already been proposed, to overcome these bending moments, that the upper and lower polishing tools should be synchronised and made to rotate in the same direction, so that the pads working one above and one below the sheet of glass should remain constantly opposite to each

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other. This solution necessarily introduces mechanical and electrical complications.

The present invention overcomes this difficulty whilst allowing the correct pressure to be applied without risk of breakage, and, as a result, produces a satisfactory polish using fewer tools.

The method comprised in this invention consists of making a pair of polishing tools, to work one on each surface of the glass, but constructed differently from each other, the one made in the ordinary way, of several small units, the other consisting of a single large unit. Preferably, the pressure should be applied by the tool made of several small elements, which must therefore be mobile upon its axis, whilst the function of the tool made in a large single unit is to resist the pressure and to see that the ribbon of glass is maintained at a certain level which can be regulated.

The large-sized tool is big enough to allow the working area of the small-sized polishers, projected upon the plane of the glass, always to lie well within the working area of the large tool, projected on the same plane.

Assuming that one tool in each pair is constructed differently from the other, it is advisable, in order to secure an equal polish on both surfaces, to alternate the positions of the tools in the pair in their contact with the two surfaces of the glass. In other words, one particular type of tool will be placed alternatively above and below the ribbon of glass.

In one method, which has given good results, the large-size polishing tool is circular, with a diameter at least equal to the width of the ribbon of glass.

The applicant has proved that, as a result of using the above-described method, it is possible to work the polishing surfaces on the glass with a greater pressure, without risk of breakage and consequently, to secure a satisfactory standard of polish with fewer tools. A less cumbersome and more economical apparatus can thus be made than hitherto.

One form of apparatus according to the invention is described below with reference to the attached drawings in which.

Fig. 1 is an elevation of one section of the polishing apparatus according to the invention, showing two adjacent pairs of polishing heads.

Fig. 2 is a plan of the same section of the apparatus.

Fig. 3 is a plan of the large-size polishing head.

Fig. 4 is a cross-section on the line AB in Fig. 3.

It is to be understood that this description is to be taken only as an example and not necessarily to be followed closely. In particular, the number and size of the polishing surfaces, and their arrangement in relation to each other, can be varied.

The ribbon 1 of glass to be polished is moved in the direction of the arrow between the polishing heads by means not shown.

The pair of tools shown on the left in Figs. 1 and 2 consists of a lower tool 2, circular in shape, and slightly larger in diameter than the width of the ribbon of glass; and an upper tool composed of several discs 3, 4 and 5 of smaller diameter and turning on vertical axes 6, 7 and 8 attached to the frame 9. In other words, the lower and upper tools are, respectively, the large, single unit and the one with smaller polishing surfaces.

These tools are driven respectively by the shafts 10 and 11, whose vertical axes are in alignment. To avoid or at least reduce the twisting couple which is exerted on the glass in its own plane as a result of the friction of the polishing tools, and which tends to displace it laterally, it is better to rotate the shafts 10 and 11 in opposite directions. Similarly, each pair of tools can be rotated in the direction opposite to that of the following pair of the same type.

In the pair of polishing tools shown on the left, the lower one—the one of large diameter—determines the level of the ribbon of glass, whilst, by a means not shown, the right pressure is applied yieldingly by the upper tool with multiple elements which is movable vertically.

The next pair of polishing tools, shown on the right, is identical with the preceding one, but in an inverted position, i. e. the large single tool is placed above the glass, whilst the smaller one works upon the under-surface of the glass. In this case it is the upper tool which resists the pressure of the lower, and controls the level of the glass.

All the pairs of tools are arranged thus, the positions of the two types alternating.

In the actual form of the large-size tool, shown in Figs. 3 and 4, the shape is circular. It consists of a plate 15 integral with the rotating shaft 10. To this plate is attached a felt 16 with a circular hollow 17 in the centre, with a diameter at least equal to that of the circle not covered by the polishing surfaces 3, 4 and 5. The felt is grooved with small channels 12, 13 and 14, extending from this central hollow to the edge. The purpose of these channels, which may be either straight or curved, is to facilitate the distribution of the polishing agent over the surface of the felt. The larger the unbroken surface area of felt, the less likelihood there is of a satisfactory distribution of the polishing agent.

The polishing agent is fed to the felt, as is known, either from the centre through the shaft 10, or from the periphery of the polishing head.

In the construction of the above-described apparatus, one pair of polishing heads is, of course, enough to work on the entire width of the ribbon of glass. The size of the larger single-unit polishing head is, however, limited by, amongst other things, the difficulty of manipulation and the regular feeding of the polishing agent. It follows that where the width of the ribbon of glass is greater than the diameter of the large single-unit polishing head, it would be advisable to employ two or more pairs of tools of the type according to the invention.



I claim:

1. A method of simultaneously polishing both surfaces of a ribbon of glass movable continuously between pairs of polishing tools disposed along the ribbon, which comprises applying a polishing action over a working area on one surface of the glass by means of one single rotatable polishing element, and simultaneously applying on the opposite surface of the glass, within a working area which, when projected on to the plane of the ribbon of glass, falls wholly within the projection on to the same plane of the working area of said single polishing element, a polishing action by means of a plurality of polishing elements.

2. In an apparatus for simultaneously polishing both surfaces of a continuously movable ribbon of glass, means for advancing a continuous ribbon of glass progressively through the apparatus, and pairs of co-axial rotatable polishing tools, one tool of each said pair comprising a single polishing element adapted to operate on one surface of the ribbon of glass and the second tool of said pair comprising a plurality of polishing elements adapted to operate, simultaneously with said single element, on the opposite surface of said ribbon of glass within a working area which, when projected on to the plane of the ribbon of glass falls wholly within the projection on to the same plane of the working area of said single polishing element.

3. In an apparatus for simultaneously polishing both surfaces of a continuously movable ribbon of glass, means for advancing a continuous ribbon of glass progressively through the apparatus, pairs of co-axial rotatable polishing tools, one tool of each said pair comprising a single polishing element adapted to operate on one surface of the ribbon of glass and the second tool of said pair comprising a plurality of polishing elements adapted to operate, simultaneously with said single element, on the opposite surface of said ribbon of glass within a working area which, when projected on to the plane of the ribbon of glass falls wholly within the projection on to the same plane of the working area of said single polishing element, and yieldable mounting means for the said tools to permit of movement of said tools perpendicularly to the plane of the ribbon of glass for the purpose of exercising a yielding pressure by the said tools on the said ribbon.

4. In an apparatus for simultaneously polishing both surfaces of a continuously movable ribbon of glass, means for advancing a continuous ribbon of glass progressively through the apparatus, and pairs of co-axial rotatable polishing tools, one tool of each said pair comprising a single polishing element adapted to operate on one surface of the ribbon of glass and the second tool of said pair comprising a plurality of polishing elements adapted to operate, simultaneously with said single element, on the opposite surface of said ribbon of glass within a working area which, when projected on to the plane of the ribbon of glass falls wholly within the projection on to the same plane of the working area of said single polishing element, and the said pairs of tools being so arranged that in each successive pair the tool comprising the said single polishing element acts on the opposite surface of the ribbon of glass as compared with the single element of the preceding pair.

5. In an apparatus for simultaneously polishing both surfaces of a continuously movable ribbon of glass, means for advancing a continuous rib-

bon of glass progressively through the apparatus, and pairs of co-axial rotatable polishing tools, one tool of each said pair comprising a single polishing element of circular shape adapted to operate on one surface of the ribbon of glass and the second tool of said pair comprising a plurality of polishing elements adapted to operate, simultaneously with said single element, on the opposite surface of said ribbon of glass within a working area which, when projected on to the plane of the ribbon of glass falls wholly within the projection on to the same plane of the working area of said single polishing element.

6. In an apparatus for simultaneously polishing both surfaces of a continuously movable ribbon of glass, means for advancing a continuous ribbon of glass progressively through the apparatus, and pairs of co-axial rotatable polishing tools, one tool of each said pair comprising a single polishing element having a central recess and channels extending from said recess to the periphery of the element and adapted to operate on one surface of the ribbon of glass and the second tool of said pair comprising a plurality of polishing elements adapted to operate, simultaneously with said single element, on the opposite surface of said ribbon of glass within a working area which, when projected on to the plane of the ribbon of glass falls wholly within the projection on to the same plane of the working area of said single polishing element.

7. In an apparatus for simultaneously polishing both surfaces of a continuously movable ribbon of glass, means for advancing a continuous ribbon of glass progressively through the apparatus, pairs of co-axial rotatable polishing tools, one tool of each said pair comprising a single polishing element adapted to operate on one surface of the ribbon of glass and the second tool of said pair comprising a plurality of polishing elements adapted to operate, simultaneously with said single element, on the opposite surface of said ribbon of glass within a working area which when projected on to the plane of the ribbon of glass falls wholly within the projection on to the same plane of the working area of said single polishing element, and the said pairs of tools being so arranged that in each successive pair the tool comprising the said single polishing element acts on the opposite surface of the ribbon of glass as compared with the single element of the preceding pair, and yieldable mounting means for the said tools to permit of movement of said tools perpendicularly to the plane of the ribbon of glass for the purpose of exercising a yielding pressure by the said tools on the said ribbon.

8. In an apparatus for simultaneously polishing both surfaces of a continuously movable ribbon of glass, means for advancing a continuous ribbon of glass progressively through the apparatus, pairs of co-axial rotatable polishing tools, one tool of each said pair comprising a single polishing element of circular shape adapted to operate on one surface of the ribbon of glass and the second tool of said pair comprising a plurality of polishing elements adapted to operate, simultaneously with said single element, on the opposite surface of said ribbon of glass within a working area which, when projected on to the plane of the ribbon of glass falls wholly within the projection on to the same plane of the working area of said single polishing element, and yieldable mounting means for the said tools to permit of movement of said tools perpendicularly to the plane of the ribbon of glass for the purpose of exercising a yielding pressure by the said tools on the said ribbon.

9. In an apparatus for simultaneously polishing both surfaces of a continuously movable ribbon of glass, means for advancing a continuous ribbon of glass progressively through the apparatus, pairs of co-axial rotatable polishing tools, one tool of each said pair comprising a single polishing element adapted to operate on one surface of the ribbon of glass and the second tool of said pair comprising a plurality of polishing elements adapted to operate, simultaneously with said single element, on the opposite surface of said ribbon of glass within a working area which, when projected on to the plane of the ribbon of glass falls wholly within the projection on to the same plane of the working area of said single polishing element, a first spindle supporting said single polishing element, a second spindle supporting said plurality of polishing elements, means for rotating said first spindle, and means for rotating said second spindle in a direction opposite to the direction of rotation of said first spindle.

10. In an apparatus for simultaneously polishing both surfaces of a continuously movable ribbon of glass, means for advancing a continuous ribbon of glass progressively through the apparatus, pairs of co-axial rotatable polishing tools, one tool of each said pair comprising a single polishing element adapted to operate on one surface of the ribbon of glass and the second tool of said pair comprising a plurality of polishing elements adapted to operate, simultaneously with said single element, on the opposite surface of said ribbon of glass within a working area which, when projected on to the plane of the ribbon of glass falls wholly within the projection on to the same plane of the working area of said single polishing element, a first spindle supporting said single polishing element, a second spindle supporting said plurality of polishing elements, means for rotating said first spindle, and means for rotating said second spindle in a direction opposite to the direction of rotation of said first spindle, and the said pairs of tools being so arranged that in each successive pair the tool comprising the said single polishing element acts on the opposite surface of the ribbon of glass as compared with the single element of the preceding pair.

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## REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS


| Number | Name | Date |
|---|---|---|
| 1,724,703 | Fox | Aug. 13, 1929 |
| 1,803,752 | Ford | May 5, 1931 |
| 2,197,104 | Griffin | Apr. 16, 1940 |
| 2,285,318 | Waldron | June 2, 1942 |
| 2,308,976 | Indge | Jan. 19, 1943 |
| 2,419,926 | Waldron | Apr. 29, 1947 |