Dec. 14, 1926. 1,610,419

C. BROWN

PROCESS FOR SURFACING SHEET MATERIAL

Filed August 23, 1923 3 Sheets-Sheet 1

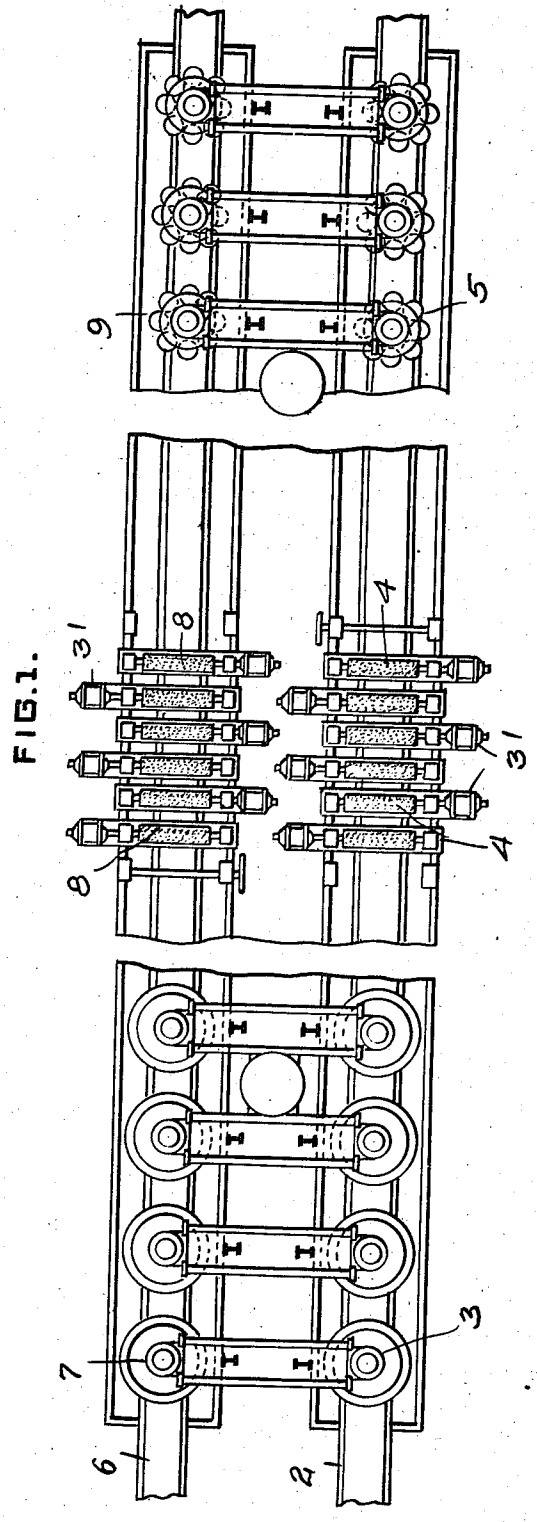


FIG. 1.

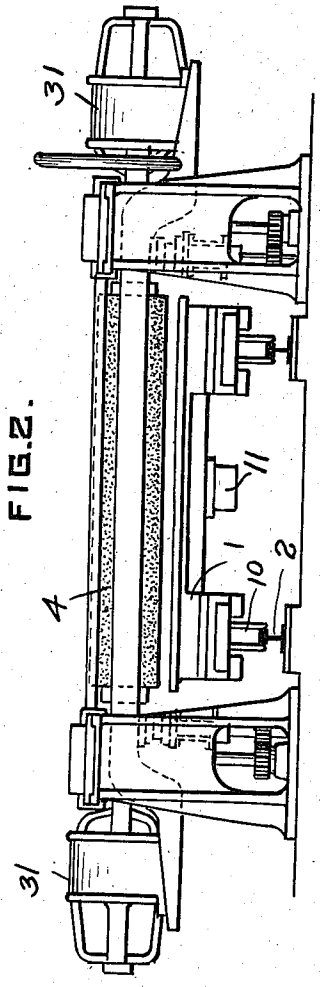


FIG. 2.

INVENTOR
Christopher Brown
by
James C. Bradley
atty.

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C. BROWN

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FIG. 3.

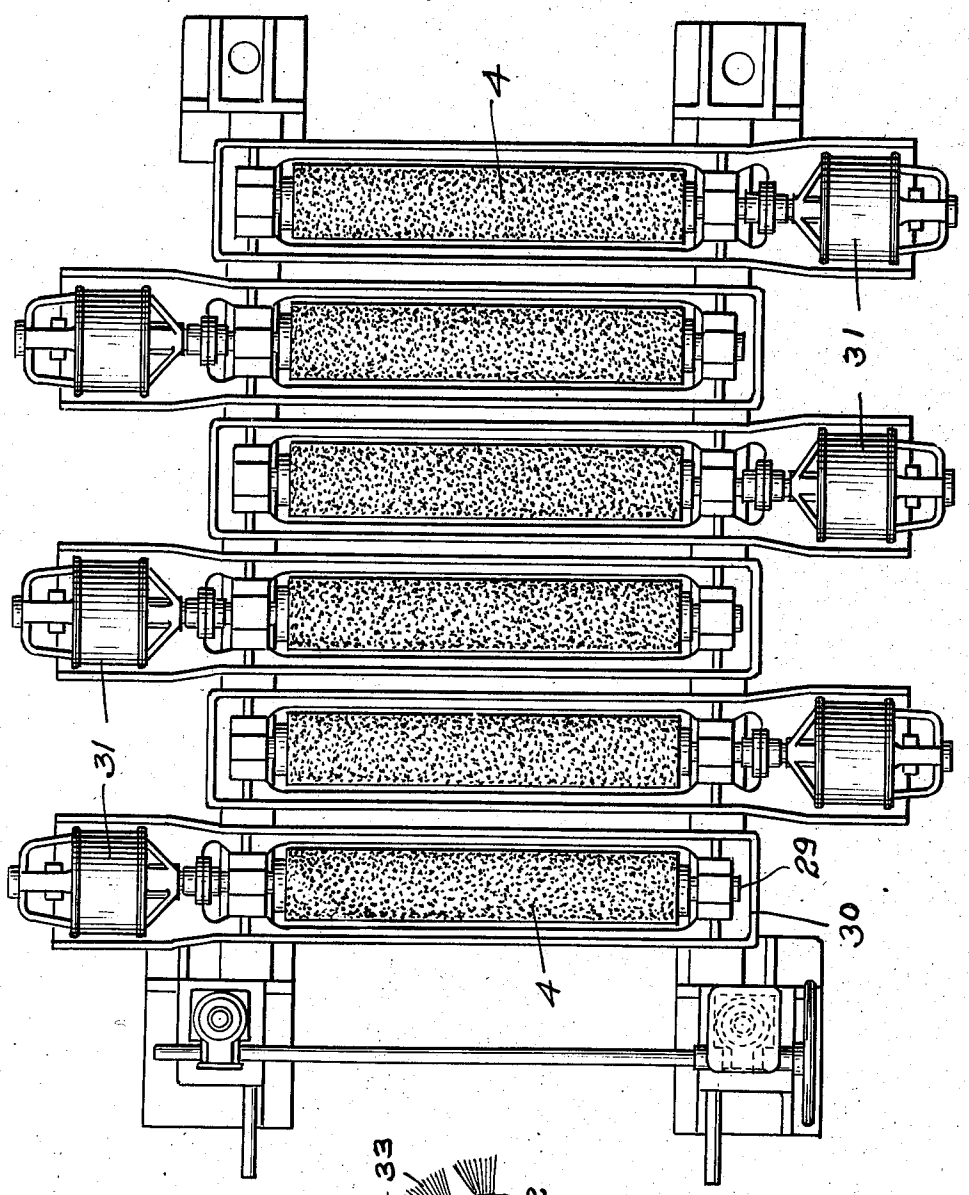
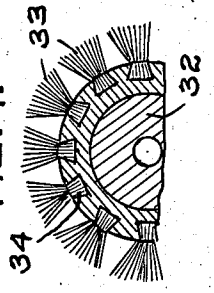


FIG. 4.



INVENTOR
Christopher Brown
by
James C. Bradley
Atty.

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C. BROWN

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FIG.6.

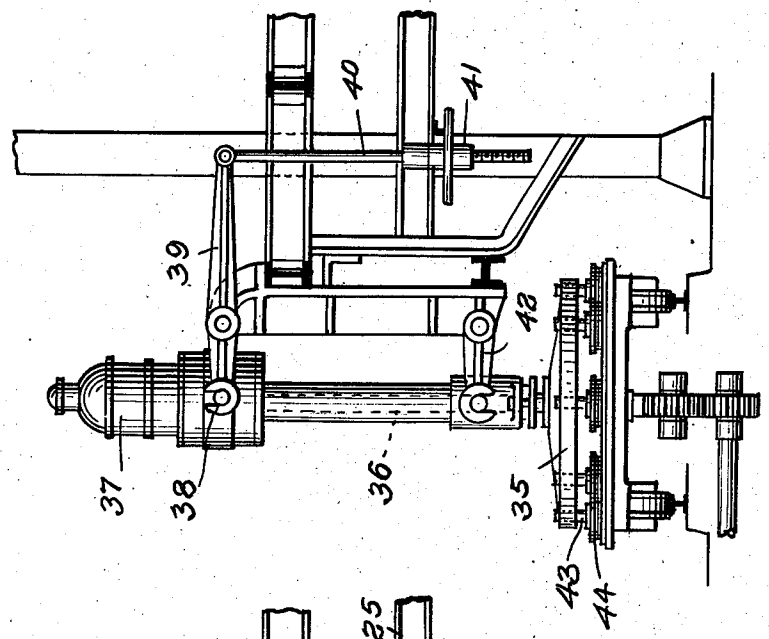
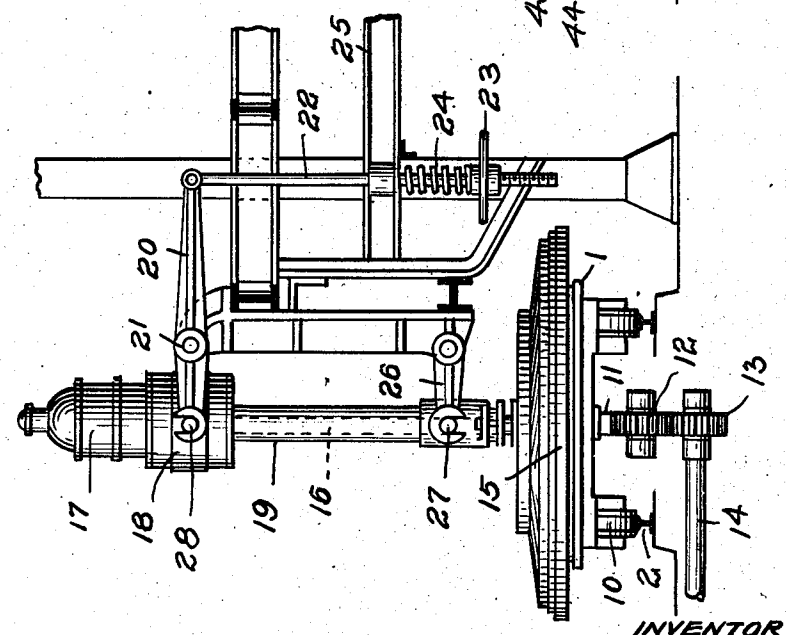


FIG.5.



INVENTOR

Christopher Brown

by

James C. Bradley

Atty.

Patented Dec. 14, 1926. 1,610,419

UNITED STATES PATENT OFFICE.

CHRISTOPHER BROWN, OF CHARLEROI, PENNSYLVANIA, ASSIGNOR TO PITTSBURGH PLATE GLASS COMPANY, A CORPORATION OF PENNSYLVANIA.

PROCESS FOR SURFACING SHEET MATERIAL.

Application filed August 23, 1923. Serial No. 658,889.

The invention relates to a process for surfacing sheet material, such as a continuous ribbon of glass, or a series of separate sheets of glass, marble or other material, the apparatus being here particularly described and illustrated as applied to surfacing a series of plates of glass. The invention has for its principal object the provision of an improved straight away system, wherein the time and power required for giving the desired finish is reduced to a minimum. In practicing the invention, I make use of the process set forth in my Patent No. 1,480,542. The present invention involves the use of a plurality of brushes arranged in series intermediate a set of grinding machines and a set of polishing machines, the brushes acting upon the glass after it is smoothed by the grinding machines and giving it a semi-polish so that the work and power required for the polishing machines is greatly reduced. By using this expedient only about one half the number of polishing machines, which would otherwise be required, are necessary. One embodiment of the invention is shown in the accompanying drawings wherein:

Figure 1 is a plan view of the apparatus. Fig. 2 is an end elevation of the brushing mechanism. Fig. 3 is a plan view of the brushing mechanism. Fig. 4 is an enlarged section through a portion of one of the brushes. Fig. 5 is an end elevation of one of the grinding machines. And Fig. 6 is an end elevation of one of the polishing machines.

In carrying out the invention, the glass to be surfaced is mounted upon a series of tables 1, which is carried along the track 2, beneath the series of grinding machines, then beneath a series of brushes 4, and finally beneath a series of polishing machines 5. The glass with one side thus finished is then brought back upon the cars to the left hand end of the track 6 by means of a return track and suitable transfer devices, not shown, and the glass is reversed upon the tables to bring the unsurfaced side up. The operation as above described is now repeated, the tables being carried beneath the series of grinding machines 7, the series of brushes 8 and the polishing machines 9. The sets of machines above the two tracks 2 and 6 are the same so that a description of one set will be sufficient.

The tables 1 are provided with wheels 10 engaging the rails of the track 2 and in practice these tables are placed end to end and suitably coupled together. A continuous uniform movement is given to the tables to carry them beneath the surfacing machines by means of the rack bars 11 secured to the bottoms of the cars and driven by the spur gears 12 which are in turn driven by suitable pinions 13 on driven shafts 14, the mechanism for driving the shafts 14 not being shown. The glass is preferably secured to the upper surface of the table by means of plaster in the usual way, and the spaces between the ends of the sheets on the various cars are filled with plaster of Paris so that a continuous, unbroken surface is presented to the series of surfacing machines.

The grinding machines comprise suitable runners 15 carried by vertical spindles 16 driven by electric motors 17 through the intermediary of suitable reduction gearing in the casing 18. The runners 15 are of ordinary construction having cast iron or cast steel runner bars on their lower faces for engagement with the glass, the abrading action being accomplished, however, by means of a mixture of sand and water which is supplied intermediate the runners and the glass. Suitable sand grading apparatus (not shown) is employed for separating the sand into a series of grades ranging from coarse to very fine, and these grades are applied in order, the coarsest abrasive being applied to the first grinders beneath which the glass passes and tapering off to finer and finer grades as the glass progresses beneath the runners. The last few grinding runners are preferably supplied with emery or alundum which is somewhat finer than the fine sand and serves to give the glass its final smoothing treatment preliminary to the action of the brushes thereon, the term "emery" being used broadly in the claims to designate both emery or alundum, the first being the natural product and the latter being the artificial product.

The runner spindle in each grinding machine is journaled in a suitable casing 19 and this is supported by means of a lever 20 pivoted at 21 and having at its rear end the adjusting rod 22. This adjusting rod is screw threaded at its lower end so that the rod may be adjusted vertically to vary the pressure of the runner upon the glass by

means of the hand wheel 23 whose hub is screw threaded internally to engage the threads on the rod 22. In order to cushion the movements of the runners, the spring 24 is provided intermediate the hub of the wheel 23 and the framework 25. The lower end of the casing 19 is held in position by means of the arm 26 having a hook at its lower end fitting around laterally projecting lugs 27 on the casing. The inner end of the lever 20 is similarly releasably connected to the casing by means of its hook shaped ends which engage laterally projecting lugs 28.

The surface of the glass is reduced by the grinding machines so that it is flat and true corresponding in finish to what is referred to as ground glass, more or less cloudy in appearance or non-transparent, due to the minute scratches incident to the final finishing with the emery. The next step in the operation is the reducing of this ground glass surface to a semi-polish so that it has what may be termed a dull polish, after which it may be very easily given a full polish by the regulation polishing machine. The brushes 4 are shown as six in number, but this number may be varied depending upon the conditions involving, one consideration being the rate of travel of the glass beneath the brushes. These brushes are mounted upon suitable shafts 29 carried in bearings upon the framework 30 and driven by means of direct connected motors 31 arranged as indicated in Fig. 3. Any suitable means may be employed for adjusting the bearings of the rolls or the framework itself to give the right degree of contact between the brushes and the glass and to compensate for wear in the brushes.

Each brush is preferably constructed as indicated in Fig. 3 having an outer sleeve 32 in which the brush elements 33 are carried. The surface of the sleeve is provided with recesses into which members 34 are fitted and in which the brush elements are securely clamped. The brush elements 33 are preferably made from wood or cane fiber, which is relatively hard and tough, in order to secure a maximum wearing period. In operation, the brush is preferably run at a speed from one to two thousand revolutions per minute.

The degree of pressure between the brush and the sheet of glass is an important factor in securing a proper polish. In order to secure the best results, the ends of the brush elements should only touch the surface of the sheet lightly, so that only the extreme ends of the brush elements strike the surface of the glass. The action of the brush elements, is therefore, one of impact with a limited period of contact with the glass as opposed to a wiping or rubbing action, such as would be the case if the brush were pressed down upon the glass and each brush element remained in contact therewith for a considerable period of travel. When the brush is pressed down too tightly upon the glass in a manner just described, the polishing action takes longer and is not so uniform, and the wear upon the brushes is greater. In order to secure any effective smoothing action, it is necessary to use a very fine abrasive in connection with water, such abrasive and water being preferably applied to the sheet in front of the first brush and between each pair of brushes, such mixture spreading out over the glass by the time the brush is reached. The abrasive employed approaches a polishing powder in fineness, powdered pumice being preferably used, although other materials might be employed. The smoothing action is apparently due to the impact of the particles of abrasive carried by the ends of the brush elements upon the glass surface or by the impact of the brush elements upon particles of abrasive which are distributed over the surface of the glass. By the time the glass passes the last brush, it has received what may be termed a semi-polish, such polish not being sufficient to permit the glass to be used for glazing purposes, but it approximates this condition to such an extent that only a limited amount of polishing beneath standard polishing machines employing rouge is required.

The polishing machines 5 beneath which the glass passes after the brushing action are quite similar in construction to the grinding machines heretofore described except that the runner frame carries polishing felts instead of grinding runners. As indicated in Fig. 6, the runner frame 35 is carried by a spindle 36 driven from the motor 37 through the intermediary of suitable reduction gearing in the casing 38. The runner and its drive mechanism is supported from the lever 39 as in the grinder construction and the position of the runner is adjusted by means of the rod 40 threaded at its lower end and carrying the adjusting hand wheel 41. The lower end of the casing in which the runner spindle is mounted is held in position by means of the pivoted arm 42. The runner blocks 42 are provided with spindles 43 extending up through the runner frame 35 and carry on their lower sides the usual felts 44 for engaging the glass. In order to give the necessary polishing action, a mixture of rouge and water is applied to the glass, and by the time the glass has passed from beneath the last polishing machine, it has been given the necessary degree of finish, fitting it for glazing or other purposes in which plate glass is used. If it were not for the additional polishing effect given by the brushes 4, a large number of polishing machines would be required in order to give the desired finish, but by the use of the brushes,

I have found that the number of machines may be reduced by about one half. The power required for operating the brushes is only a small fraction of that required for operating the additional polishing machines which would be necessary if the brushes were not used. The cost of operation is, therefore, substantially reduced by the use of the brushes and the length of the system is cut down to a large extent, this being an important consideration because of the great length which is ordinarily required for a straight away system of this kind.

What I claim is:

A process for surfacing a sheet of material, which consists in supporting it and moving it forward horizontally in a right line, and during such movement, first, abrading the surface with an abradant carried under pressure in a circular direction over the surface until a flat smooth surface is secured; second, further abrading the surface with an abradant of a finer grade carried over the surface in the direction of movement of the sheet, but with decreased pressure and at an increased speed as compared with the pressure and speed of the first abradant so as to produce a semi-polish; and third, polishing the surface with rouge applied in a circular direction.

In testimony whereof, I have hereunto subscribed my name this 20th day of August, 1923.

CHRISTOPHER BROWN.