April 17, 1934. C. E. HENDERSON 1,955,128

GLASS GRINDING APPARATUS

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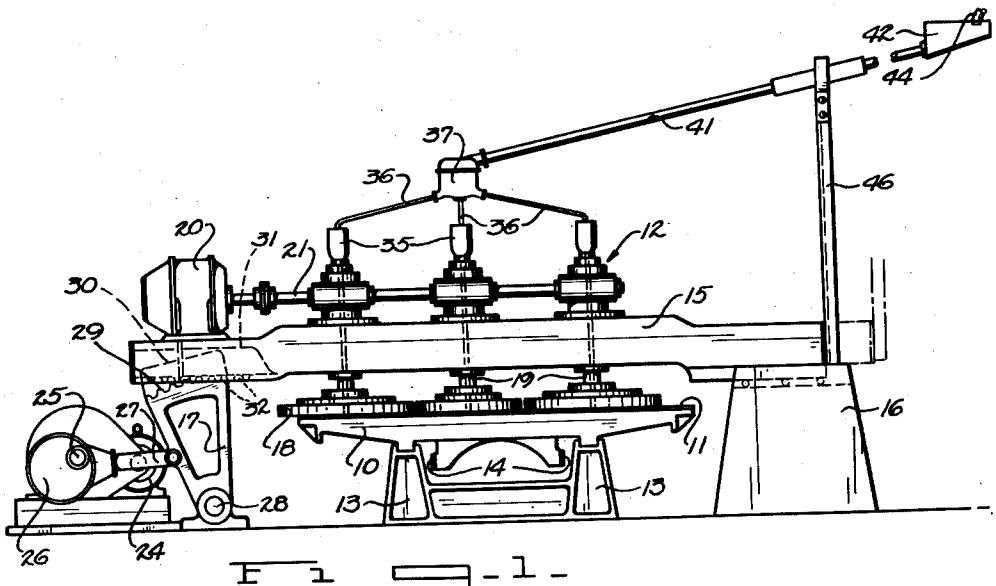



FIG. 1.

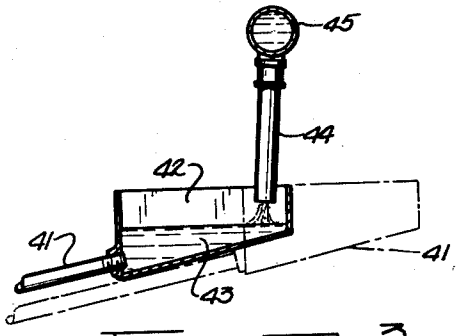



FIG. 3.

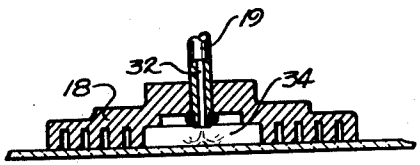



FIG. 4.

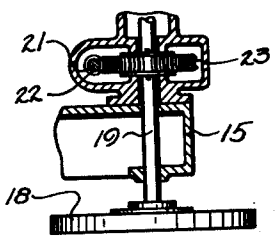



FIG. 2.

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# UNITED STATES PATENT OFFICE

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## GLASS GRINDING APPARATUS

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3 Claims. (Cl. 51—263)

The present invention relates to apparatus for grinding flat sheets of material such as glass and the like.

In the continuous system for surfacing sheet glass, a plurality of sheets to be treated are secured upon a series or train of cars or tables and passed in a definite substantially horizontal path first beneath a series of grinding units and then beneath a series of polishing units to finish one side of the sheets, after which the said sheets are turned over, again secured to the tables, and the second surface thereof ground and polished in the same manner. This invention has been especially designed for and probably finds its greatest utility when used in such a system as described above wherein the grinding units are adapted to be reciprocated transversely with respect to the path of travel of the glass while the grinding runners are also simultaneously rotated to the end that the glass is subjected to both a reciprocatory and a rotary grinding action. Obviously, however, the invention is not restricted to use in such connection.

An important object of this invention concerns the provision of novel means for feeding the desired abrasive material to the grinding runners in such a manner that a steady, uniform flow of material to said runners may be had at all times.

Another object of the invention resides in the provision of abrasive material feeding means of the above character, the proper functioning of which will be in no way adversely affected by the reciprocatory movement imparted to the grinding units.

Other objects and advantages of the invention will become more apparent during the course of the following description when taken in connection with the accompanying drawing.

In the drawing forming a part of this application and wherein like numerals are employed to designate like parts throughout the same,

Fig. 1 is a transverse elevation of a grinding unit showing the present invention incorporated therewith,

Fig. 2 is a section taken substantially on line 2—2 of Fig. 1,

Fig. 3 is a detail section of a portion of the invention,

Fig. 4 is a vertical section of one of the grinding runners, showing the manner in which the abrasive material is supplied thereto.

Referring more particularly to the drawing, 10 designates one of a series of tables which are adapted to be arranged end to end and movable in a definite substantially horizontal path to carry the glass sheets 11 mounted thereupon first beneath a series of grinding units, one being shown and designated in its entirety by the numeral 12, and then beneath a series of polishing units (not shown). The tables 10 are slid forwardly upon fixed guides 13 and may be driven in any desired manner such as by means of suitable drive pinions which may engage the rack bars 14 upon the underside of said tables.

Each grinding unit includes a hollow supporting cross-beam 15 arranged transversely above the tables and supported at one end upon a fixed guide 16 and at its opposite end upon a rocker 17. Each grinding unit also includes a plurality of grinding runners or disks 18 arranged transversely of the table, each runner being secured to the lower end of a vertical spindle 19 which extends upwardly through the cross-beam 15 and is journaled in bearings carried thereby. The several grinding runners of each unit may be driven from a single motor 20 mounted upon cross-beam 15, with the shaft 21 thereof carrying a plurality of worms 22, one for each grinding runner and adapted to mesh with a worm gear 23 keyed to the respective vertical spindle 19.

As pointed out above, a series of grinding units 12 are adapted to be employed and such units are all reciprocated transversely of the tables simultaneously but are so connected with their operating mechanism that the alternate units move in opposite directions. The mechanism for effecting this transverse reciprocating movement of the grinding units may comprise an electric motor 24 connected to drive a suitably mounted horizontal shaft 25 arranged parallel with but below and to one side of the tables 10, said shaft carrying a series of eccentrics 26, one individual to each unit, and disposed in the vertical plane thereof, each eccentric being connected with one of the rockers 17 by means of a pitman rod 27, the said eccentrics 26 being so positioned on shaft 25 as to produce the requisite movement of alternate units in opposite directions as explained above. The rocker 17 is in the form of a vertically arranged sector secured at its lower end on a suitably mounted shaft 28 and the upper end of which is provided with two spaced sets of gear teeth 29 with an intermediate upstanding projection or rib 30, said rib being received within a guide recess 31 formed in the lower face of the beam 15, and the gear teeth meshing with corresponding sets of teeth 32 at the opposite sides of recess 31 so that the oscillating movement of the rocker will impart a horizontal reciprocating movement to the cross-beam and hence to the grinding tools mounted therein, the opposite end of the said cross-beam sliding upon the fixed guide 16.

To assist in the grinding of the glass, a suitable abrasive material such as a mixture of sand and water in proper proportions is adapted to be fed upon the surface of the glass and this may be accomplished by utilizing a vertical spindle 19 of hollow construction and in feeding the abrasive material downwardly through the open-

ing 23 therein and discharging it into the cavity 34 formed at the center of the grinding runner. Associated with the upper end of each vertical spindle is a trough or the like 35, and feeding into each trough is a pipe 36 leading from the header 37.

Heretofore, in such system above described, the feeding of the abrasive material to the header has been accomplished by means of a flexible hose connected at one end with said header and at its opposite end to a stationary supply receptacle extending longitudinally of the line of tables 10 and receiving the abrasive material therein from one or more pipes. However, this method of feeding the abrasive material to the grinding machines has not proven entirely satisfactory in all respects, the principal objection being that the said material was not delivered to the machine in a steady, uniform stream but rather in a more or less intermittent fashion. In other words, as the grinding machine was moved to the left, the flexible hose 38 would be extended, with the result that the abrasive material would flow quite readily from the receptacle to the header. However, when the machine was moved to the right, the hose would sag downwardly, with the result that the flow of abrasive material to the machine would be partially, if not entirely, cut off. Thus, the flow of abrasive material to the grinding machine, instead of being in a steady, uniform stream, would be more or less intermittent since each time the machine was moved to the right, the flow of material to said machine would be practically cut off. This constituted an undesirable condition and one tending to adversely affect the grinding operation.

The present invention was designed primarily to overcome the above objectionable features and to assure a constant uniform flow of abrasive material to the grinding runners at all times, irrespective of the transverse reciprocating movement of the machines. To this end, the flexible hose has been eliminated and in its stead there is utilized a rigid inclined conduit or pipe 41 secured at one end to the header 37 and carrying at its opposite end a supply receptacle 42 movable therewith and adapted to receive the abrasive material 43 therein from a vertical branch pipe 44 leading from the main supply conduit 45. The pipe or conduit 41 is disposed at such an angle that the material 43 will freely flow downwardly therethrough under the influence of gravity from the supply receptacle 42 to the header 37 from which it will pass through pipe 36 into the troughs 35 and thence through the vertical spindles 19 to the grinding runners. The pipe 41 may be supported adjacent its outer end by a vertical member 46 secured to and movable with cross-beam 15. The branch pipe 44 is preferably received at its lower end within the supply receptacle 42, whereby to prevent spilling of the abrasive material so that the length of said receptacle must be at least slightly greater than the distance of travel of the grinding machine as it reciprocates transversely over the glass.

From the above, it will be readily apparent that a steady, uniform flow of abrasive material to the machine is at all times assured and that such flow will be in no way adversely affected by the reciprocating movement of said machine. Since, in the continuous system for surfacing sheet glass, the length of time required for the grinding operation and also the quality of finish given to the glass depends to a large extent upon the proper feeding of the abrasive material thereto, it will be seen that the present arrangement is highly desirable.

It is to be understood that the form of the invention herewith shown and described is to be taken as the preferred embodiment of the same, and that various changes in the shape, size and arrangement of parts may be resorted to without departing from the spirit of the invention or the scope of the subjoined claims.

I claim:

1. In the continuous system for surfacing sheet glass wherein the grinding machines are adapted to reciprocate transversely with respect to the glass carrying tables, means for effecting a steady uniform flow of abrasive material to the machine at all times irrespective of the transverse reciprocatory movement thereof including a rigid supply conduit connected to and movable with said machine, said conduit being disposed at such an angle that the abrasive material will be caused to freely flow downwardly therethrough to the machine under the influence of gravity, a receptacle carried at the end of said conduit remote from the grinding machine and movable therewith to deliver the abrasive material thereto, and a supply pipe having its lower end received within the receptacle and adapted to discharge the abrasive material thereinto, the length of said receptacle being relatively greater than the distance of travel of the grinding machine during its transverse movement.

2. In the continuous system for surfacing sheet glasss wherein the grinding machines are adapted to reciprocate transversely with respect to the glass carrying tables, means for supplying abrasive material to said machines during the reciprocatory movement thereof including a rigid conduit supported upon and movable with said machine, a receptacle carried by the upper end of the conduit and in communication therewith, and means for discharging the abrasive material into said receptacle from which it flows to and through the conduit by gravity to the said machine, the length of the receptacle being at least as great as the distance of travel of the grinding machine during its transverse movement.

3. In the continuous system for surfacing sheet glass wherein the grinding machines are adapted to reciprocate transversely with respect to the glass carrying tables, means for supplying abrasive material to said machines during the reciprocatory movement thereof, each of said grinding machines embodying a plurality of surfacing runners, said abrasive supplying means including a header, a plurality of pipes leading from said header for feeding an abrasive material to said runners, a rigid conduit in communication with the header at all times irrespective of the transverse reciprocating movement of the machine, said conduit being dispersed at such an angle that the abrasive material will be caused to freely flow downwardly therethrough to the header under the influence of gravity, a receptacle carried by the upper end of the conduit, the length of said receptacle being relatively greater than the distance of travel of the grinding machine during its transverse movement, and means for discharging the abrasive material into said receptacle.

CHESTER E. HENDERSON.