Nov. 27, 1951 E. C. OBERSTAR ET AL 2,576,887

EDGING SHEETS AND PLATES

Filed Sept. 9, 1948 2 SHEETS—SHEET 1

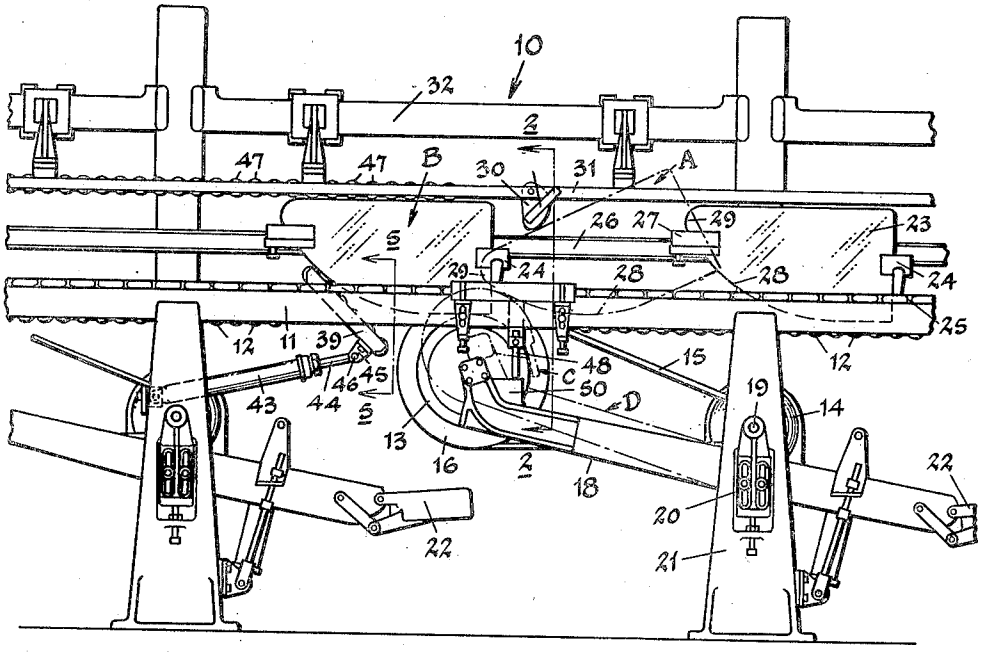


Fig. 1

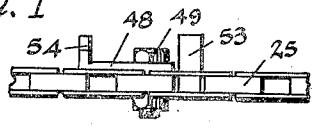


Fig. 4

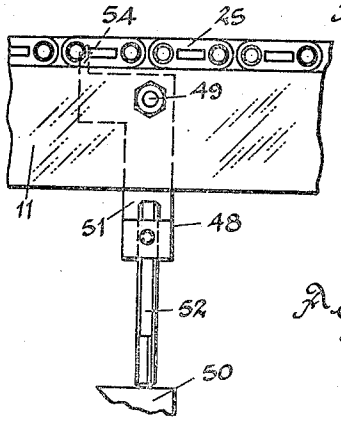


Fig. 3

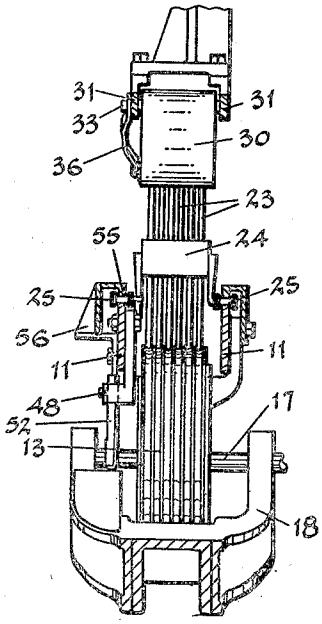


Fig. 2

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EDGING SHEETS AND PLATES

Filed Sept. 9, 1948 2 SHEETS—SHEET 2

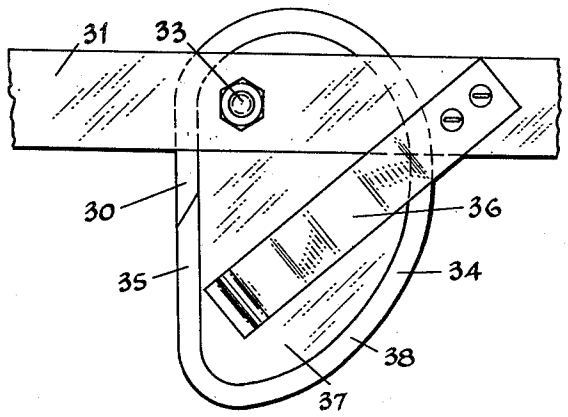


Fig. 6

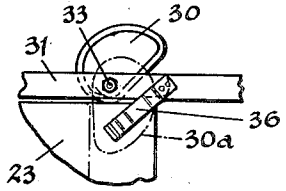


Fig. 7

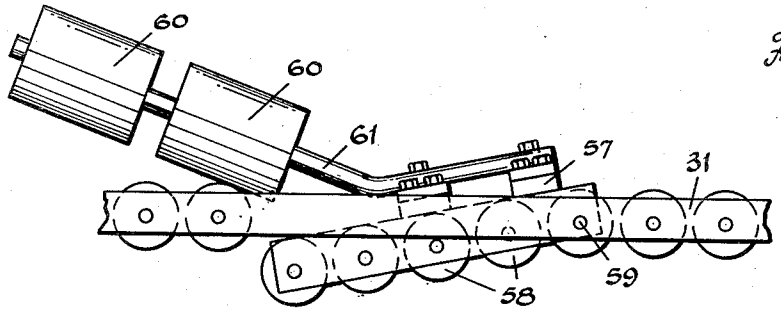


Fig. 8

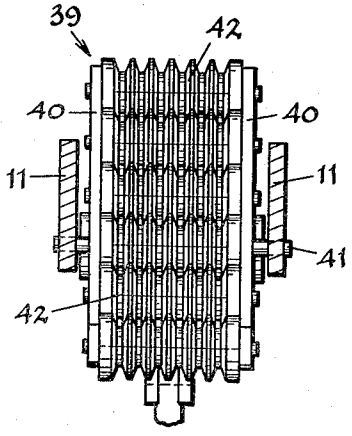


Fig. 5

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EDGING SHEETS AND PLATES

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5 Claims. (Cl. 51—74)

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The present invention relates broadly to the edge treatment of sheets and plates, and more particularly to improvements in edging machines which are adapted to maintain the sheets or plates being edged in proper contact with the edging tool.

In the glass grinding art, for example, it is customary to use a continuous type of machine for the grinding and/or finishing of the edges of glass sheets. Briefly stated, in connection with such a machine, a plurality of sheets of glass to be edged are usually vertically disposed side by side in spaced relation relative to one another and passed substantially horizontally over and in contact with one or a plurality of successive surfacing elements whereby to grind the lower, and in some cases the curved side, edges of the sheets. It has heretofore been exceedingly difficult, however, to satisfactorily grind the edges of glass sheets having certain irregular contours due to the fact that the sheets, when approaching a surfacing element, have not been received thereagainst so as to adequately grind or finish one side. This is particularly true when grinding a long side of the sheet which side comprises a substantially large curved portion developing gradually to a straight line portion.

Now, it is an aim of this invention to provide an improved form of edging machine of this same general character, but which will efficiently finish curved edges of different contours and also straight edges or a combination of both straight and curved edges.

Another object is the provision, in edging machines of this type, of special equipment for presenting and maintaining sheets of varying contours in proper operative relationship with respect to the edging elements.

Another object is to provide, in such special equipment, means adapted for rolling contact with the upper edge of a sheet being finished to maintain another edge in operative engagement with the edging tool.

Another object is the provision of supporting means adapted for rolling engagement with one portion of an edge being finished to maintain another portion of said edge in operative engagement with the edging tool.

Still another object is the provision of a retarding means for the finishing element or tool of machines of the above character for arresting movement of said tool in one direction when it has assumed a desired position during the finishing operation.

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 drawings.

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In the drawings, wherein like numerals are employed to designate like parts throughout the same:

Fig. 1 is a side elevational view of a sheet glass edging machine as constructed in accordance with the invention;

Fig. 2 is a sectional view taken substantially on the line 2—2 indicated in Fig. 1;

Fig. 3 is a detail view of the retarding mechanism;

Fig. 4 is a fragmentary top view of the retarding mechanism;

Fig. 5 is a view of a section taken on the line 5—5 in Fig. 1;

Fig. 6 is a detail view of the eccentric hold down member for positioning of the glass sheets with respect to a surfacing element;

Fig. 7 is a schematic view of the eccentric hold down member showing its relative movement with reference to a sheet of the glass passing through the machine; and

Fig. 8 is a view of a modified construction of supporting means for positioning the glass sheets.

With reference now more particularly to the drawings, and especially to Fig. 1, there is disclosed an edging machine including a supporting framework, designated in its entirety by the numeral 10, and upon which is carried horizontally arranged side rails 11, having positioned therebetween sheet supporting grooved rolls 12. Also carried by the framework 10 are a plurality of glass grinding wheels 13, only one of which has been shown. Each wheel is adapted to be rotated by its individual motor 14 through a belt 15 trained about the motor pulley and pulley 16. The driven pulley 16 is mounted on the shaft 17 which supports the grinding wheel 13 and is journaled in the ends of a substantially horizontal arm 18. The arm 18 is conventionally pivotally mounted on a shaft 19 that is carried by bearing brackets 20 on a pedestal 21 of the framework. Also as is customary the arm 18 is provided with suitable counter-balancing mediums, as indicated at 22, in order that the grinding wheel is directed to the work, such as the glass sheets 23, within a desirable range of pressure.

The sheets or plates of glass 23 are adapted to be moved continuously forward along the supporting rolls 12 and, in the present instance, above the grinding wheel 13. Any suitable means may be provided for propelling the glass sheets

forwardly, and the means herein shown by way of example comprises a pusher block 24 engaging the rear edges of the glass sheets. The pusher block is carried by a pair of sprocket chains 25 which slide along upon the upper edge of the side rails 11. Arranged above one of the side rails 11 and on the pedestals 21 of the framework 10 is a longitudinally extending channel 26 which carries a guide member 27 for each sheet or sets of glass sheets 23.

As the sheets approach the grinding area of the wheel 13, they are induced to tilt forwardly so as to present their curved edge portion 28 to said wheel at a point at which the edge portion 28 emerges or the contour of the sheet changes from the smaller radius of the corner 29. This forward inclination of the sheets affords the maximum extent or length of surface comprising the immediate side of said sheets and it is for this purpose that the eccentrically formed hold down cam member 30 engages the glass.

The eccentric member 30 is pivotally mounted, as shown in Fig. 2, between rails 31 depending from beams 32 that extend between the pedestals 21. The cam member has a substantially kidney-shaped outline and is carried on a pintle 33 so that its major body portion hangs, in a normal disengaged position, therefrom. Preferably, the pintle is disposed within the cam member to position the cam surface 34 in the path of the sets of sheets and the relief surface 35 out of said path. In other words, the form of the cam member is such as to admit a pressure influence during its rolling engagement with the upper edges of the glass sheets followed by a readily induced fall-over into a position of disengagement as best seen in Fig. 7. As shown therein, as the rear edge of the glass sheets approach, to pass beneath the member 30, it has been revolved to the shortest radius of its generated cam and freely allows movement of the glass therebeneath. When the sheets 23 have moved sufficiently forward, the cam member will, by reason of its unabalanced support, complete its revolution as indicated by the phantom outline 30*a*.

In order to retain the cam member 30 in the preferred position for engagement and to develop a progressive resistance to its revolution with the glass sheets, a leaf spring 36 is secured to one of the rails 31 and is formed to engage the side of said member.

The cam member 30 may be formed having a core 37 of wood or any other desired material and is provided with a peripheral facing 38 of rubber or equivalently compressible sheeting to prevent injury to the contacting edges of the glass sheets. Thus, as the sheets are moved toward engagement with the grinding wheel 13, the upper leading corners thereof are received against the cam surface 34 of member 30 and the sheets are caused to tilt gradually downward until and as the motivating pressure of the pusher block 20 at their rear edges has urged them into engagement with the wheel 13. The subsequent eccentric influence of the member forces the edges of the sheets to the wheel and as the expanse of the sheet between the cam member 30 and wheel 13 progressively increases, the resistance of the spring 36 is overcome and the member revolves in contact. At the same time, the wheel 13 descends, swinging about the fulcrum of the arm 18, into position to grind the straight lower edge of the sheet.

As the sheet moves forwardly from the inclined position as indicated by the phantom outline and letter A and to the position indicated in full line as at B, the leading edges are gradually received on a tiltable sheet supporting section 39 of the runway which serves to properly present the straight portion of the bottom edge of the sheet to the grinding wheel and to maintain it in contact therewith. The section 39 comprises a pair of bars 40 pivoted on a pin 41 which also supports one of a plurality of rolls 42 disposed between the bars.

This section 39 is maintained in an angular position by means of a compressive force, such as the cylinder 43, the piston 44 of which is connected to said section at a yoke 45 by the pin 46. The pressure of the cylinder normally urges the section into its position of angularity to receive the sheets of glass and to overcome the tendency of the grinding wheel 13 to tilt the sheets by reason of its required action of grinding and the incidental pressure.

Continuous forward movement of the sheets, however, reduces the influence of the cylinder and causes the section to assume a horizontal position substantially in the plane of the rolls 12 so that said sheets are eventually received thereon.

The upper edges of the sheets of glass, when in position B, are also adapted to be engaged by a plurality of rolls 47, carried by the rails 31; the rolls 47 cooperating with the rolls 42 of the section 39 to urge the straight lower edges of the sheets into desired engagement with the wheel. The wheel 13 thus grinds: (1) a suitably rounded edge along the curved lower side of the sheets, (2) the straight lower edge thereof, and, in the event that the following corner is rounded, may (3) finish off the grinding operation as the wheel follows up along said corner until separation of the sheets therefrom is complete.

If, however, and as shown in the drawings, and found in many shapes or outlines of template cut glass sheets, the following corner of the sheet partakes of a distinct sharp angle which is to be retained, the wheel must be supported in the plane of the straight portion of the lower edge until the corner has passed over the wheel, and a subsequently moving set of sheets is approaching, in order to prevent the wheel from "breaking" or objectionably rounding this following corner.

To this end, the grinding wheel 13 is held against the action of the counterbalanced mounting of the arm 18 by a pivoted lever 48 interposed between the framework 10 and the arm 18 to support the wheel in its last position of grinding engagement after the sheet has passed therebeyond. The lever 48 is pivotally carried on one of the side rails 11 by a stud bolt 49 and depends into engagement with a portion of the arm 18 such as the pad 50. The lever comprises a body portion or plate 51 and a pin 52 adjustably mounted therein. During the grinding cycle, the pin contacts the vertical side surface of the pad 50 as shown by the phantom lines indicated at C in Fig. 1. Gradual descent of the wheel during said cycle permits the lever to swing about the bolt 49 and to finally arrive at a substantially vertical position, when the wheel is in engagement with the straight portion of the lower edge of the sheet, in which position the pin will engage the top surface of the pad 50 thereby preventing upward movement of the arm 18 and the wheel journaled thereon. The wheel will thus be restrained from rising and the sheet will pass be-

yond the grinding area without rounding or spoilage to the sharply angled corner.

The lever 48 is moved to release the arm 18 by means of a finger 53 carried by and protruding from the sprocket chain 25 which propels the sets of sheets along the rolls 12 comprising the runway of the edging machine. Preferably, the finger 53 is located in the chain so as to be considerably in advance of an oncoming, subsequent set of sheets in order that it may engage the lever 48 at its extending projection 54 and cause it to swing about the axis of the bolt 49 and to displace the pin 52 from the pad 50. When released from engagement with the lever, the grinding wheel 13 and arm 18 rise again to assume their position as indicated by the phantom lines and letter D in Fig. 1, and be ready for engagement with the next group of sheets.

During movement of the finger 53 with respect to the projection of the lever to cause rotation of said lever on the bolt 49, elevation of the chain 25 from its normal course is resisted by a rail 55. The rail is mounted by means of a bracket 56 above the upper surfaces of the component parts of said chain so as to induce a downward pressure on the chain while the finger carried thereon is actuating the lever 48.

In practice, the above-described operation usually encompasses the required edge grinding along but one side of a sheet of glass and consequently may be advantageously utilized in one or more areas of a continuous machine line. The sets of sheets 23, as they are propelled along by the pusher blocks 24, are inclined forwardly upon engagement with the cam member 30 so that the curved contour of their leading edges will be effectively ground to the desired rounded or "pencil" edge. Subsequently, and as the forward half of the sheets are passing over the wheel 13, the leading edges are received by the rolls 42 of the tiltable section 39 and, by reason of the cylinder 43, the upward thrust of the grinding wheel will be compensated for during the edge grinding along the edge of the rear half of said sheets. The position assumed by the grinding wheel 13 and arm 18 throughout the latter phase of the grinding cycle is maintained after the completion thereof by the lever 48 when the pin 52 rides onto the pad 50. The grinding wheel therefore cannot follow upon the rear corner of the sheets and will remain in such a sustained position until, previously to a subsequent grinding cycle, the finger 53 engages the said lever to remove its pin 52 from such engagement.

Forward inclination of the sets of glass sheets 23 may also be produced as is shown in Fig. 8, wherein the modified form of hold down means comprises a frame 57 carrying a series of rolls 58. The frame is pivotally mounted in rails, such as the pair of rails 31, and rod 59. Preferably, the rod 59 also supports one of the rolls 58. The frame 57 is disposed in a downwardly extending angular position by means of a counterweight or pair thereof 60; said weights being located on a rod 61 attached to said frame. Inclination of the frame may be varied according to the demands of the operation and also the amount of downward thrust imposed by the weights 60.

The frame 57 and rolls 58 carried thereon are positioned to receive the upper leading corners of the set of sheets and, as said sheets are moved forwardly, to angle or tilt the sheets downwardly in a manner comparable to the action of the cam member 30. The frame is swung upward and into a substantially horizontal plane as the dimensional expanse of the sheets increases or, more particularly, as the contour of the said sheets reaches the straight portion in the rear half thereof. When the pusher block 24 has moved the sheets 23 sufficiently forward, the frame 57 will be released to drop downward by reason of the counterweights 60 until engaged by a succeeding set of sheets.

It is to be understood that the form of the invention herewith shown and described is to be taken as a preferred embodiment of the same, but 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.

We claim:

1. In an apparatus for grinding the edges of sheets or plates having a curved leading edge and a bottom edge with a straight portion terminating at a sharp following corner, a runway for supporting said sheet on edge in a vertical position, a pusher for advancing the sheet forwardly in a generally horizontal direction along said runway, an edging tool located beneath and in alignment with said runway and over which said sheet is adapted to pass for finishing the leading and lower edge thereof, means for pivotally mounting the edging tool so that is is free to follow the contour of the lower edge of the sheet, means associated with said mounting means urging said grinding wheel upwardly and normally maintaining it in the path of travel of the forward edge of said sheet for downward movement by the sheet passing thereover, a pressure member located in the path of the upper edge of the sheet and engaging said edge during forward movement of said sheet to tilt the leading edge thereof downwardly into engagement with said edging tool, a support normally positioned in the path of and adapted for rolling engagement with the leading edge of the sheet after it leaves said edging tool and mounted for subsequent movement by said sheet out of the path of said edge, and means for maintaining said edging tool in the last grinding position it assumes until the following edge of the sheet passes therebeyond.

2. In apparatus for edging sheets or plates, a runway for supporting a sheet to be edged on edge, a pusher for moving said sheet along a horizontal path over said runway, and edging tool mounted below said runway and in alignment therewith for movement into and out of the path of travel of said sheet and depressible by the sheet upon movement of the sheet over said edging tool, a hold down member mounted above and in the plane of said edging tool for rolling contact with an upper edge of said sheet as a leading edge thereof moves toward engagement with the tool, a pivotally mounted support normally positioned in the path of the leading edge of the sheet and swingable by said sheet out of the path of said edge, said support being adapted to engage and support the leading edge of the sheet after said edge leaves the grinding tool, means for resiliently urging said support into the path of the leading edge of the sheet and for resisting the tendency of the sheet to move the same, and means movable into engagement with the tool mounting means only when said tool has reached the lowermost position in which it is still in edging engagement with said sheet for retaining said tool in said position until the sheet passes completely thereover.

3. In apparatus for edging sheets or plates, a runway for supporting a sheet to be edged on

edge, means for moving said sheet along a horizontal path over said runway, an edging tool mounted below and in alignment with said runway for movement into and out of the path of travel of said sheet and depressible by the sheet upon movement of the sheet over said edging tool, and a hold down member in the form of a substantially kidney-shaped block mounted for eccentric rotation above and in the plane of said edging tool and adapted to rollingly engage an upper edge of said sheet as a leading edge thereof moves toward operative engagement with said tool.

4. In apparatus for edging sheets or plates, means for supporting a sheet to be edged on edge, means for moving said sheet along a horizontal path over said supporting means, and edging tool mounted for movement into and out of the path of travel of said sheet and depressible by the sheet upon movement of the sheet over said edging tool, supporting means in advance of said tool in the form of a series of rollers pivotally mounted to swing as a unit into and out of the path of travel of the leading edge of the sheet, and means for normally and resiliently urging said series of rollers into an angular position relative to said leading edge and in the path thereof to receive and support the sheet by said edge at a point beyond said tool.

5. In appartus for edging sheets or plates, a runway for supporting a sheet to be edged on edge, means for moving said sheet along a horizontal path over said runway, an edging tool mounted below and in alignment with said runway for movement into and out of the path of travel of said sheet and depressible by the sheet upon movement of the sheet over said edging tool, a depending member mounted for swinging movement into restraining engagement with the tool mounting means only when said tool has been depressed to a predetermined position by said sheet for maintaining said tool in said position, and a finger carried by said sheet moving means for swinging said depending member out of engagement with said tool mounting means and permitting said tool to move into the path of travel of the sheet.

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