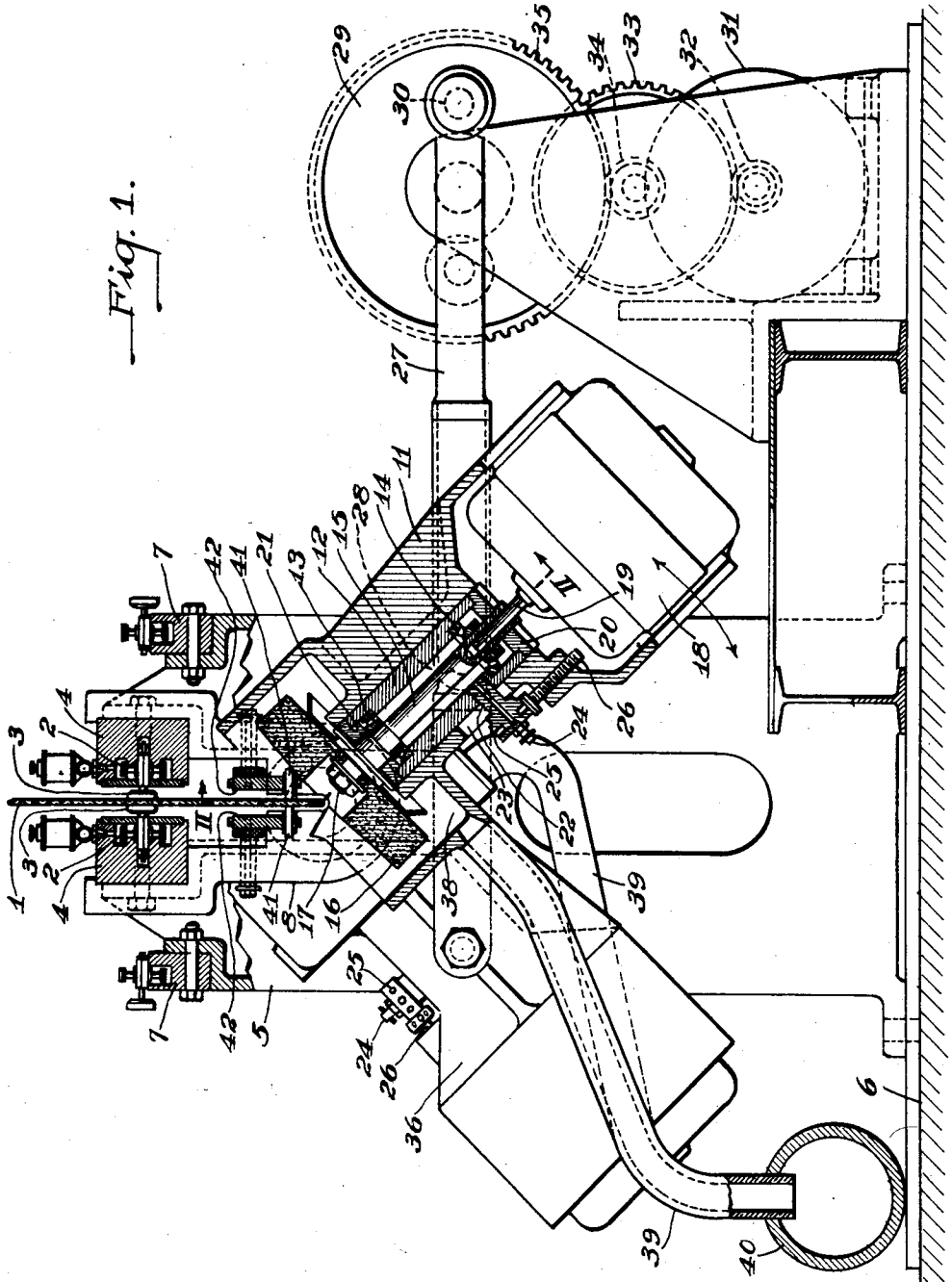
Aug. 13, 1929. W. OWEN 1,724,677

EDGE ROUNDING MACHINE

Filed March 30, 1928 2 Sheets-Sheet 1

Fig. 1.



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Filed March 30, 1928 2 Sheets-Sheet 2

Fig. 2.

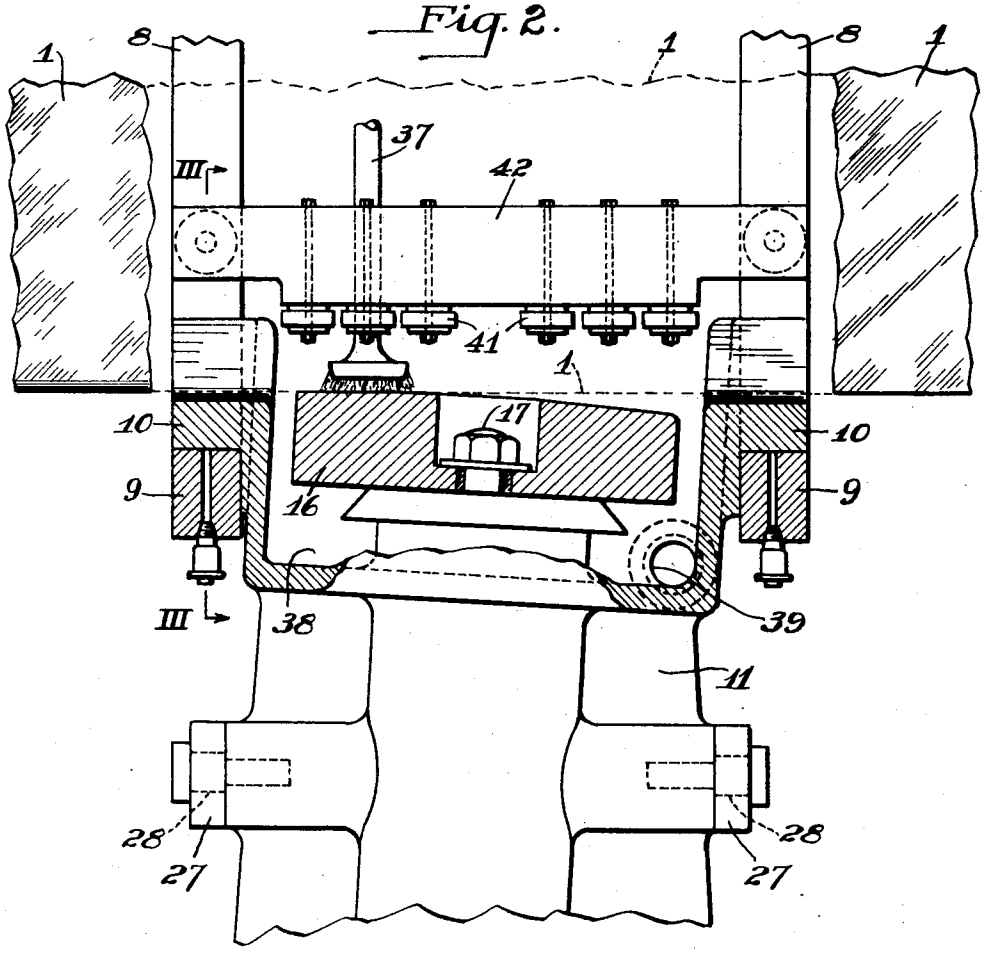
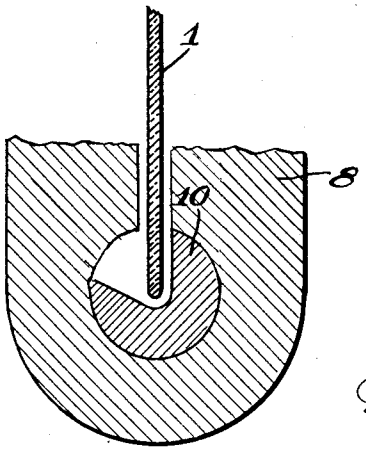


Fig. 3.



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Patented Aug. 13, 1929. 1,724,677

UNITED STATES PATENT OFFICE.

WILLIAM OWEN, OF PITTSBURGH, PENNSYLVANIA, ASSIGNOR TO PITTSBURGH PLATE GLASS COMPANY, A CORPORATION OF PENNSYLVANIA.

EDGE-ROUNDING MACHINE.

Application filed March 30, 1928. Serial No. 265,895.

The invention relates to machines for rounding the edges of sheets of hard material, such as glass, marble and the like and constitutes an improvement over the machine shown in my Patent No. 1,660,350. The invention has to do with the roughing units, and the improved roughing unit of the present application may be substituted for a part only of the individual roughing units or machines of said patent, or may take the place of all of said roughing units of the patent. When used in conjunction with the roughing units of said patent, the present units will follow such other units and remove the lines of demarcation between the various flat surfaces left by the first units, and round such surfaces into a continuous curve. The invention has for its principal objects the provision of an improved unit, which is simple and positive in operation and permits the grinding wheels to be used indefinitely without resurfacing or replacement; in which the grinding wheels may be easily adjusted to compensate for any wearing away of the grinding surfaces; whose use eliminates any requirement for subsequently finishing the edges of the sheets by passing them over the edges of grooved wheels as is done in said patent; and which will round the edges of the sheets without chipping them even when the machine is used upon composite glass reinforced with celluloid. One embodiment of the invention is illustrated in the accompanying drawing, wherein:

Figure 1 is a vertical section through the apparatus. Fig. 2 is a section on the line II—II of Fig. 1. And Fig. 3 is a section on the line III—III of Fig. 2.

The glass sheets 1, whose edges are to be ground, are carried along horizontally by means of a pair of endless belts 2, 2, constructed and operated in accordance with said patent heretofore referred to, said belts being provided with a plurality of clamping members 3 which yieldingly engage the opposite sides of the sheets and hold them securely against vertical movement. The chains carrying the devices 3, 3 are supported in the guideways 4, 4 extending longitudinally of the path of movement of the sheets and supported at suitable intervals by the standards or frame members 5 which rest upon the floor 6. The outer sides of the frame members carry the guides 7, 7 for supporting the return flights of the chains 2, 2. Bolted to the members 4, 4 are the U-shaped members 8 which act as the supports for the grinding machines, such members each being provided with a pair of segmental bearings 9, 9 in which the trunnions 10, 10 of the grinder frame 11 are journaled for oscillation back and forth, as later described.

The grinder frame 11 is an integral casting having its center bored out longitudinally and carrying the sleeve 12, such sleeve being mounted for longitudinal adjustment in the frame. The sleeve is provided with two sets of roller bearings 13 and 14 and in these roller bearings are journaled the axle 15 of the grinding wheel 16. This grinding wheel is of cup form in that it has its center cut out and is releasably secured to the end of the axle by means of the nut 17. The center of the wheel is substantially in alignment with the center lines of the trunnions 10, 10, so that in the operation, as later described, the axle oscillates around the center line of the trunnions and around the edges of the sheets of glass 1 to be ground as they travel along this center line. The axle 15 of the grinding wheel is tilted slightly with respect to the center line of the trunnions 10, 10, and with respect to the line of travel of the edges of the sheets, as indicated in Fig. 2, so that in operation only one side of the wheel engages the glass, it having been found that chipping results when both sides of the wheel engage the glass at the same time.

The axle is driven from the electric motor 18, whose drive shaft 19 is in alignment with the axle 15. The drive shaft fits inside the axle and has a splined engagement therewith, so that the axle may be adjusted longitudinally to reposition the wheel as its face wears away during the course of a long period of operation. A closure plate 20, provided with suitable packing, is located at the lower end of the sleeve 12 and serves to hold lubricant and keep dirt away from the bearings. A similar plate 21 is employed at the upper end of the axle. Threaded into the side of the sleeve is the member 22 which extends through a slot 23 in the motor frame 11. This member is provided with a passage closed by a fitting 24 through

which lubricant may be forced into the space around the axle for lubricating the bearings. The member 22 is provided with a head having the series of recesses 25 for the insertion of a turning tool and by rotating this head, the member 22 can be tightly clamped against the frame, thus holding the sleeve 12 against movement. The sleeve 12 may be adjusted longitudinally by means of the screw 26 threaded through a lug on the motor frame and having its head in engagement with the head of the member 22. The head of this screw 26 is provided with perforations in which a turning tool may be inserted. The members 22 and 26, therefore, provide an adjustment and a holding means for the sleeve 12 so that this sleeve may be moved longitudinally of the motor frame and securely held in position. This provides a means for adjusting the axle 15 longitudinally and the wheel 16 carried thereby to compensate for the wearing away of the face of the wheel.

The motor frame 11 is oscillated back and forth by means of the connecting rod 27 pivoted at one end to the frame 11 at 28 and at its other end to the crank 29 at the point 30. The crank is rotated from the motor 31 through the intermediary of the reduction gears 32, 33, 34 and 35, the latter being mounted to turn with the crank. The throw of the crank is such that the motor frame and its axle are moved from the position shown in Fig. 1 as one extreme of movement to a position in which the center line of the axle is substantially vertical as its other extreme of movement. The grinding wheel 16, therefore, rounds off one-half of the edge of the sheet 1, while the other half is rounded off by a second grinding wheel similar to the wheel 16 and carried by the grinder frame 36. This grinder frame and the parts carried thereby are the same throughout as the one already described and its path of movement is such that it grinds off the portion of the edge of the sheet to the left of the vertical center line of such sheet. These two grinding wheels might be used to do the entire rounding of the series of plates, but it is preferred to distribute this work among a larger number of machines, each pair of machines doing a portion of the work. The increase in number of machines merely increases the capacity of the apparatus and the speed at which the sheets may be carried past the wheels. It is also quite feasible, as heretofore pointed out to partially grind the edges of the sheets by grinding wheels such as those shown in my patent heretofore referred to before the glass reaches the oscillating grinding machines of the present application. With this method of operation, the oscillating wheels merely act as finishing wheels for truing up the edges and removing the lines of demarcation between the surfaces ground by the fixed grinding wheels.

Since the edge of the glass sheet being ground constitutes the center of oscillation of the axle of the grinding wheel, it is necessary to provide clearance through the bearings 9 and trunnions 10 for the passage of the glass sheets, and this is accomplished, as indicated in Figs. 2 and 3, by cutting away segments of the bearing and trunnions to provide the necessary space. The segment which is cut out depends upon the amount of oscillation required, and it is quite possible to vary the extent of this oscillation through a wide range. For instance, the throw of the crank might be so modified that the wheel would oscillate through an arc of 90 degrees instead of only 45 degrees, in which case, the one wheel could be made to round off the entire edge. This would, of course, require a corresponding increase in the amount cut out of the trunnions and the bearings. Water is supplied during the grinding operations from a pipe 37, the jet being directed so as to engage the wheel where it contacts with the glass. This water is collected in the recess 38 in the top of the grinding frame and is carried away by the flexible pipe 39 leading to the drain 40. The glass is steadied at its lower edge during the grinding operation by means of the wheels 41, which are carried by the bars 42 bolted to the members 8 (Fig. 2).

What I claim is:

1. In combination in an edge rounding machine, means for supporting a glass sheet and carrying it ahead, a grinding unit in the line of travel of one of the edges of the sheet comprising a driven abrading wheel having its axis of rotation extending approximately at right angles to the line of movement of the edge of the sheet to be ground and mounted for swinging movement around a center within such edge, and means for giving the wheel such swinging movement as the edge of the sheet moves across it.

2. In combination in an edge rounding machine, means for supporting a glass sheet and carrying it ahead, a grinding unit in the line of travel of one of the edges of the sheet comprising a driven abrading wheel having its axis of rotation extending approximately at right angles to the line of movement of the edge of the sheet to be ground and mounted for swinging movement through an angle of approximately 45 degrees around a center within such edge, and means for giving the wheel such swinging movement as the edge of the sheet moves across it.

3. In combination in an edge rounding machine, means for supporting a glass sheet and carrying it ahead, a grinding unit in

the line of travel of one of the edges of the sheet comprising a driven abrading wheel of cup form having an axle lying transverse to the line of travel of the edge of the sheet to be ground and mounted for swinging movement around a center within such edge and means for swinging the axle back and forth as the sheet moves across the grinding surface of the abrading wheel.

4. In combination in an edge rounding machine, means for supporting a glass sheet and carrying it ahead, a grinding unit in the line of travel of one of the edges of the sheet comprising a driven abrading wheel of cup form having an axle lying transverse to the line of travel of the edge of the sheet to be ground and mounted for swinging movement around a center within such edge and means for swinging the axle back and forth as the sheet moves across the grinding surface of the abrading wheel, such axle being tilted slightly with respect to the line of movement of said edge, so that the face of the wheel engages said edge on one side only of its center of rotation.

5. In combination in an edge rounding machine, means for supporting a glass sheet and carrying it ahead, a grinding unit in the line of travel of one of the edges of the sheet comprising a driven abrading wheel of cup form having an axle lying transverse to the line of travel of the edge of the sheet to be ground and mounted for swinging movement around a center within such edge between a position in which said axle is in approximate alinement with the plane of the glass sheet and one in which such axle is inclined to such plane at an angle of about 45 degrees.

6. In combination in an edge rounding machine, means for supporting a glass sheet and carrying it ahead, a grinding unit in the line of travel of one of the edges of the sheet comprising a driven abrading wheel carried by an axle lying transversely of said line of travel of the edge of the sheet to be ground, a frame in which said axle is journaled having a trunnion whose center of rotation is approximately in alinement with said line of travel, a bearing for said trunnion, and means for swinging said frame back and forth on its trunnion, a segment of said trunnion and of said bearing being cut away to give clearance for the passage of said edge of the glass sheet therethrough.

7. In combination in an edge rounding machine, means for supporting a glass sheet and carrying it ahead, a grinding unit in the line of travel of one of the edges of the sheet comprising an abrading wheel having an axle lying transversely of said line of travel of the edge of the sheet to be ground, a frame in which an axle is journaled having a trunnion whose center of rotation is approximately in alinement with said line of travel, a bearing for said trunnion, an electric motor carried by said frame in driving engagement with said axle and means for swinging said frame back and forth on its trunnion, a segment of said trunnion and of said bearing being cut away to give clearance for the passage of said edge of the glass sheet therethrough.

8. In combination in an edge rounding machine, means for supporting a glass sheet and carrying it ahead, a grinding unit in the line of travel of one of the edges of the sheet comprising an abrading wheel having an axle lying transversely of said line of travel of the edge of the sheet to be ground, a frame in which an axle is journaled having a trunnion whose center of rotation is approximately in alinement with said line of travel, a bearing for said trunnion, an electric motor carried by said frame with the driving shaft in alinement with and connected to said axle, and means for swinging said frame back and forth on its trunnion, a segment of said trunnion and of said bearing being cut away to give clearance for the passage of said edge of the glass sheet therethrough.

9. In combination in an edge rounding machine, means for supporting a glass sheet and carrying it ahead, a grinding unit in the line of travel of one of the edges of the sheet comprising an abrading wheel having an axle lying transversely of said line of travel of the edge of the sheet to be ground, a frame in which an axle is journaled having a trunnion whose center of rotation is approximately in alinement with said line of travel, a bearing for said trunnion, an electric motor carried by said frame with its driving shaft in alinement with said axle, a slip connection between the shaft and axle permitting the longitudinal adjustment of the axle relative to the shaft, and a sleeve mounted in the frame for longitudinal adjustment therein, in which said axle is journaled.

In testimony whereof, I have hereunto subscribed my name this 15th day of March, 1928.

WILLIAM OWEN.