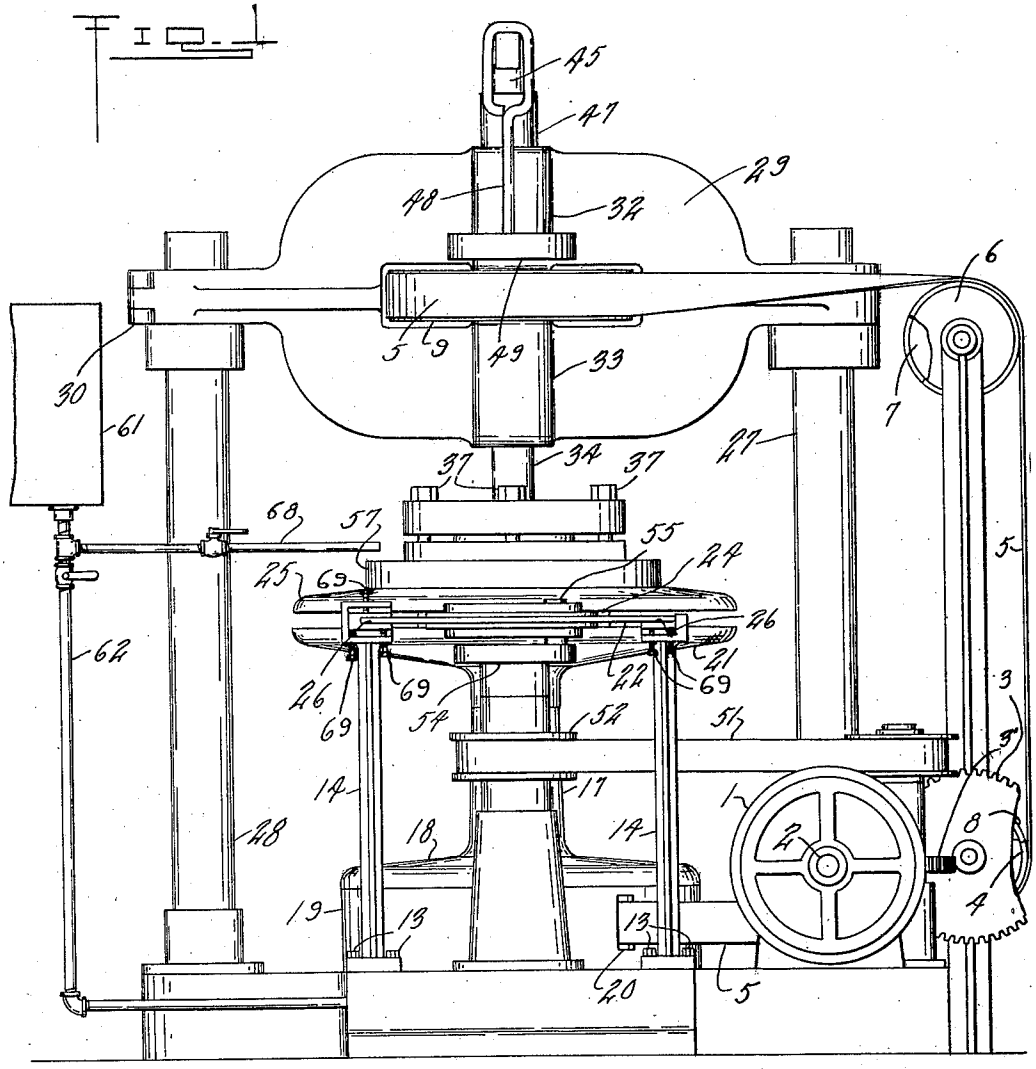
Dec. 29, 1931. A. KADOW ET AL 1,838,553

PARALLEL RESURFACING

Original Filed Aug. 17, 1925 2 Sheets-Sheet 1

FIG. 1



August Kadow
David G. Smith
INVENTORS
BY
ATTORNEY

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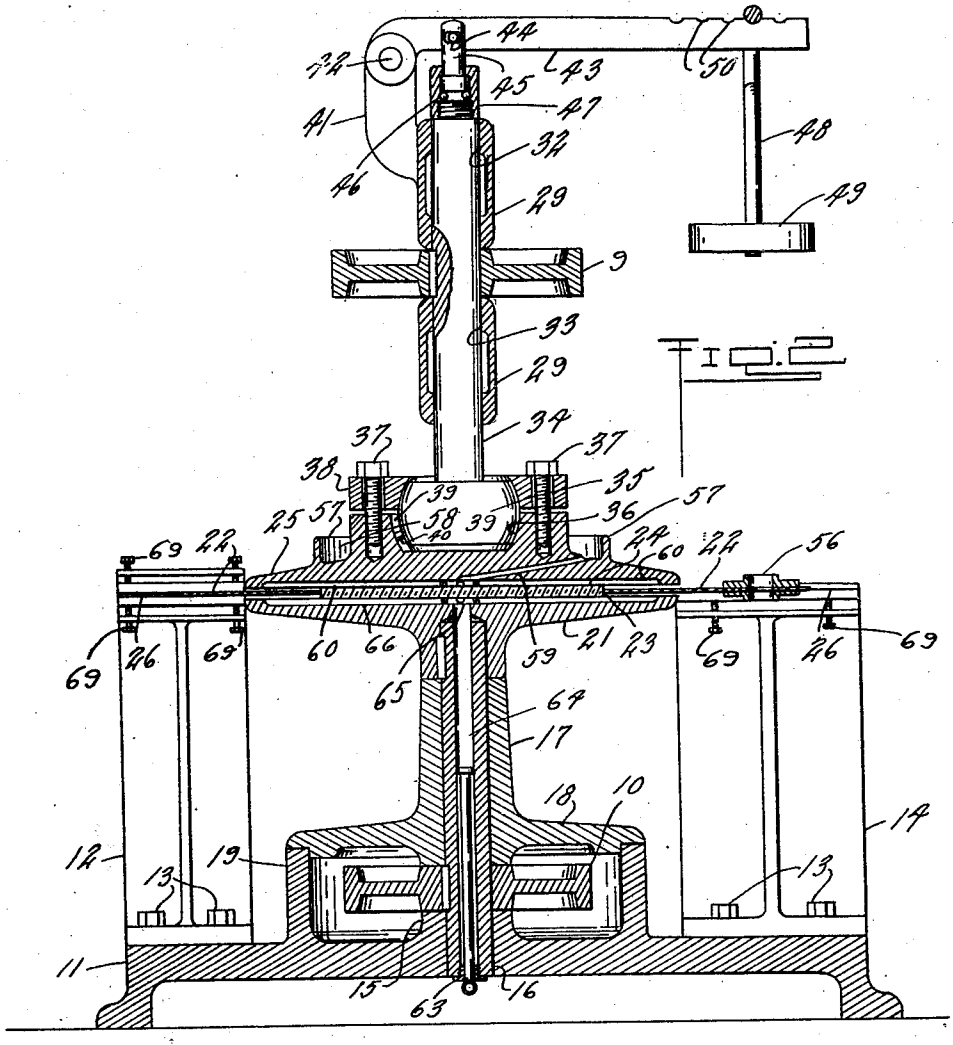


FIG. 2

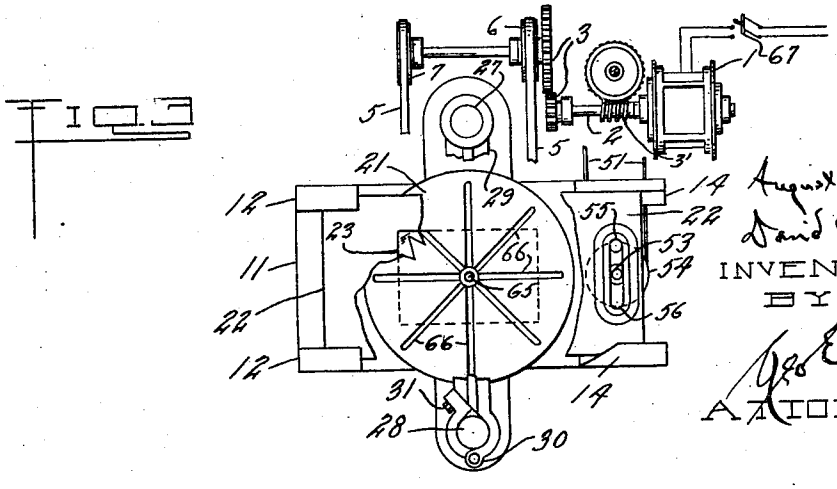


FIG. 3

August Kadow
David C. Smith
INVENTORS
BY
Geo. E. Kirk
ATTORNEY

Patented Dec. 29, 1931

1,838,553

UNITED STATES PATENT OFFICE

AUGUST KADOW AND DAVID C. SMITH, OF TOLEDO, OHIO, ASSIGNORS, BY DIRECT AND MESNE ASSIGNMENTS, TO OWENS-ILLINOIS GLASS COMPANY, A CORPORATION OF OHIO

PARALLEL RESURFACING

Application filed August 17, 1925, Serial No. 50,690. Renewed April 10, 1928.

Our invention relates to surfacing machines and more particularly to machines for grinding and polishing sheet or plate glass.

An object of the invention is to provide improved means for applying and distributing the pressure of the grinder or grinding surface on the surface of the work-piece in a manner to avoid excessive pressure at any one point and thereby avoid chipping or breaking of the work-piece. With grinding machines in common use at the present day, considerable difficulty is experienced on account of chipping or breaking of the work-piece and particularly the corners thereof. The application of pressure on the work-piece by the grinder as it rotates, is often concentrated at one point on the surface of the work-piece, frequently at a corner, resulting frequently in chipping or breaking of the work-piece. In the present invention, this difficulty is overcome by providing adequate means for distributing the pressure of the grinder and for causing it automatically, during its rotation, to maintain a proper adjustment to the surface of the work-piece.

The invention further provides suitable means for adjusting the pressure so that it is comparatively light when the danger of breakage is greatest and may be gradually increased as the work progresses.

A further object of the invention is to provide a grinding mechanism which will operate automatically to reduce the thickest portion of the work-piece most rapidly, thereby tending to reduce it to a uniform thickness throughout, while at the same time providing for proper distribution of the pressure to avoid excessive presure at any point on the surface of the work-piece.

To this end, the work-piece and grinding plate are horizontally disposed and the grinding plate has a universal joint connection with a vertical drive shaft, permitting the plate as it rotates, to tilt in any direction necessary to maintain a proper distribution of the pressure to different points on the surface of the work-piece.

Owing to the rapid rotation of the grinding plate, there is always a tendency for it to assume a position perpendicular to the axis of rotation, that is, a horizontal position, so that the pressure is greatest on the highest side or portion of the work-piece. The grinding action is, therefore, always concentrated on the higher or thicker portion of the work-piece, thus tending to a reduction to uniform thickness.

A further feature of the invention relates to the provision of improved means for conveying and distributing to the surfaces of the work-piece, the abrading and polishing materials which are ordinarily held in suspension in a liquid.

Other objects of the invention will appear hereinafter.

Referring to the drawings:

Fig. 1 is a side elevation of an embodiment of the invention in a surfacing machine for glass plates;

Fig. 2 is a vertical section through the apparatus of Fig. 1; and

Fig. 3 is a plan of the plate holder and support of the apparatus of Fig. 1.

Motor 1 is shown as having shaft 2 effective through gearing 3 for driving pulley 4 about which extends belt 5 over idler pulley 6 adjacent idler pulley 7. Adjacent the pulley 4 is idler pulley 8. This belt 5 is provided with reaches from the pulleys 6, 7, for rotating pulley 9, and reaches from the pulleys 4, 8, for actuating approximately coaxial pulley 10 in an opposite direction from the rotation of the pulley 9. Base 11 is provided with uprights 12 assembled therewith by bolts 13 near one side, and at the opposite side uprights 14 assembled with the base 11 by bolts 13. Centrally this base 11 is provided with bearing 15 for tubular shaft 16 upon which the pulley 10 is mounted. Additionally, guide bearing 17 is provided for the upper portion of this shaft 16. This guide bearing 17 provides cover plate 18 partially housing, with upwardly extending flange 19, the pulley 10. Openings 20 through this flange 19 provides ways for the driving belt 5.

Sustained by this guide bearing 17 is support or lower table 21 fast with the tubular shaft 16 for rotation therewith. Disposed clear of this table 21 is frame or holder 22

having seat or opening 23 therein in which may be loosely disposed a plate or sheet 24 of the material to be acted upon, said plate 24, as of glass, protruding through this opening 23 to be supported upon the rotary table 21 below the frame 22 and also extending above this frame 22 to be engaged by opposing upper table or loading device 25.

The frame 22 extends to be guided by ways 26 carried, by the respective uprights 12, 14, in a common plane. Upwardly extending from the base 11 are columns 27, 28. Supplemental frame 29 is mounted on the column 27 and has connection by hinge 30 and clamping bolt 31 with the column 28. This frame 29 provides bearings 32, 33, for shaft 34 approximately in alignment with the shaft 16. Splined on this shaft 34 is the pulley 9. This shaft 34 at its lower terminus, is provided with spherical portion 35 coacting with seat portion 36 of the table 25. Bolts 37 mount supplemental seat portion 38 for assembling this spherical portion 35 as a rocking bearing with the table 25. There is a recess 39 in the seat 36 with which keying pin 40, protruding from the spherical portion 35, may engage thereby holding the table 25 for rotation with the shaft 34 while still allowing freedom for self-adjustment of the table 25 and plate 24 slightly out of the plane perpendicular to the axis of the shaft 34.

From the frame 29 upwardly extends auxiliary bracket 41 providing fulcrum 42 for lever 43 carrying pin 44 coacting with extension 45 effective through anti-friction bearing 46 in cap 47 in applying the load on the shaft 34. This load is mounted on the long arm of this lever 43 by depending rod 48 carrying weight 49. This rod 48 is adjustable to various seat positions 50 in the lever 43 for varying the loading action of the table 25 as resting upon the plate 24.

From gearing 3′ extends driving belt 51 to pulley 52 on shaft 53 as upwardly extending and carrying disk 54 having crank-pin 55 coacting with slot 56 in the holder or frame 22.

The holder 22 with the work-piece 24 therein is therefore reciprocated while the supporting table 21 and the loading table 25 are rotating simultaneously in opposite directions. This insures the traverse of the relative actions upon the plate 24 with a dressing operation occurring simultaneously upon the opposite sides of the plates to approximate parallel resurfacing in a dressing whether it be grinding or polishing or other resurfacing. The speed of operation is preferably above 150 R. P. M. in closed circle or orbital actions. The speed is such that the load applying table 25 may accommodate itself to the face of the work due to the rocking joint connection with its driving shaft 34. At the speed of operation, there is a tendency for adjusting as to unevenness in the plate with an insured excessive action upon the extreme out-of-plane portions as projecting, independently of severe strain upon the structure.

It will thus be seen that the universal joint connection between the driving shaft 34 and the surfacing element or grinder 25 performs two definite functions. In the first place, it permits universal tilting movement of the grinder relative to the drive shaft, sufficient to accommodate the grinder to any projections or unevenness of the surface of the work-piece, thereby distributing the pressure and avoiding excessive pressure or strain at any particular point which would result in chipping or breaking of the work-piece. In the second place, owing to the weight of the surfacing element or grinder and its rapid rotation about the vertical axis of the drive shaft 34, there is a tendency for it always to maintain a horizontal position, or, in other words, for its axis of rotation to assume a vertical direction and position coinciding with the axis of the drive shaft 34. As a result, the pressure of the grinder on the highest point of contact with the work-piece is always considerably greater than at other points, so that the highest points or portions of the work surface are ground down most rapidly. The grinding action, therefore, always tends toward reduction of the work-piece to a uniform thickness.

In practice the opening 23 in the frame 22 may be preferably for a single plate, and approximately the size of said plate so that the frame is effective in definitely controlling all shifting of the plate relatively to the opposing tables.

In conducting these dressing operations, it is desirable that a flushing occur with an adhesive or polishing medium. To this end, upper table 25 is provided with an annular flange 57, thus providing an annular reservoir 58 into which the emery grit in suspension, the tripoli, or the rouge, may be poured to flow by duct 59 into position centrally of the plate 24 there to be distributed by radially extending grooves or ducts 60 formed in the lower surface of the table 25. Reservoir 61 (Fig. 1) above the plane of the supporting table 21 has duct 62 therefrom connected by gland 63 with tubular way 64 in the shaft 16 to connect with opening 65 in the table 21, from which extend radial grooves or ducts 66 formed in the upper surface of the table 21 below the plate 24. Accordingly, in the operation of this machine, there is a maintained supply of the material in suspension in aid of the grinding or dressing operations. As a plate is dressed down to the parallel planes, or desired thickness, switch 67 (Fig. 3) may be operated to shut off the motor 1. The bolt 31 may be run back to permit swinging of the hinge 30 in opening the clamp so that the auxiliary frame 29 may be

swung upon the column 27 to have the table 25 clear of the frame 22 thus permitting access to such frame for removal of the dressed sheet or plate 24 and substitution of a subsequent sheet for a repetition of this cycle of operations by again throwing in the switch 67 after the auxiliary frame 29 has been reassembled to have the table 25 in position over this new piece of work. The dressing composition for the upper side of the work is supplied from the reservoir 61 by ducts 68 to the reservoir 58. The distributing grooves in the tables 21, 25 are similar.

The apparatus of this disclosure may be designed to handle readily different thickness of finished plate. To this end, the frame or holder 22 may have its position as to the lower table 21 adjusted by set screws 69 acting upon the guides 26.

It is to be noted in the operation of the dressing or treating machine of this disclosure, that the material acted upon is preferably entirely covered at all times by the abrading or active surfaces. This is a factor against plate fracture. The plate irregularities are neutralized as to reflecting back upon the machine, due to the rocking joint mounting for the upper table. The adjustment of the loading of this upper table or device may be advantageously adopted for slight pressure application as the dressed area is small, with increase of the loading as the area builds up, thus to reduce plate disturbance tendencies with the resulting increase in merchantable product.

What is claimed and it is desired to secure by United States Letters Patent is:

In a machine for grinding and polishing sheet or plate glass, the combination of a work holder consisting of a thin sheet of flat material of less thickness than the work-sheet, said work holder having a rectangular opening to receive a correspondingly shaped work-piece, horizontally disposed stationary guides arranged to receive the edges of the work holder and hold the latter in a horizontal position, grinding plates above and below the work-piece, a motor, driving connections between the motor and said plates for rotating them simultaneously in opposite directions for simultaneously grinding the upper and lower surfaces of the work-piece, and automatic means operated by the motor for reciprocating the work holder and work-piece during the grinding operation, said grinding surfaces being of sufficient extent and arranged to substantially cover the entire upper and lower surfaces of the work-piece throughout the grinding operation.

In witness whereof we affix our signatures.

AUGUST KADOW.
DAVID C. SMITH.