Dec. 27, 1932. W. O. AMSLER 1,892,326

APPARATUS FOR GRINDING AND POLISHING GLASS

Filed June 12, 1926 3 Sheets-Sheet 1

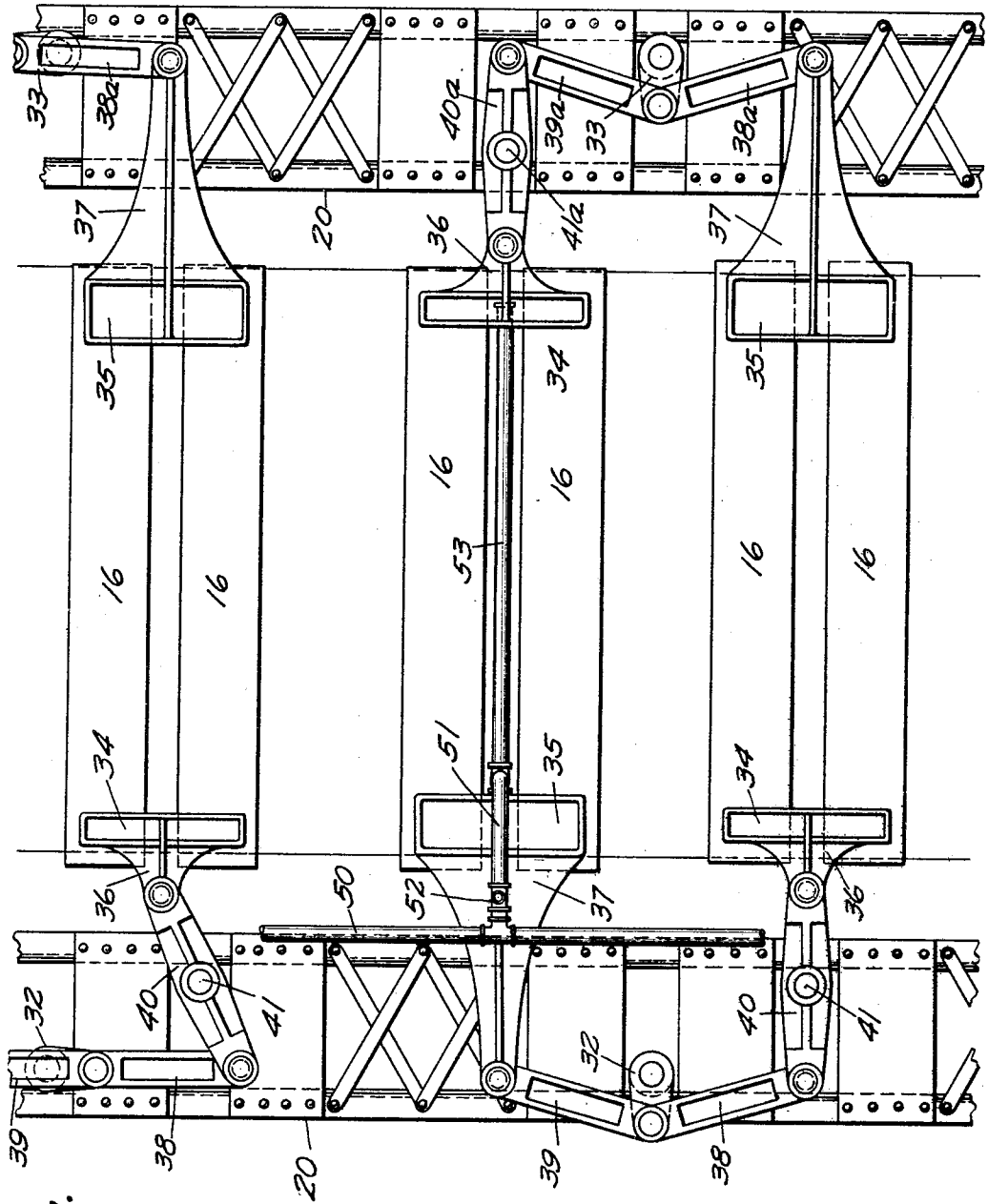


Fig. 1.

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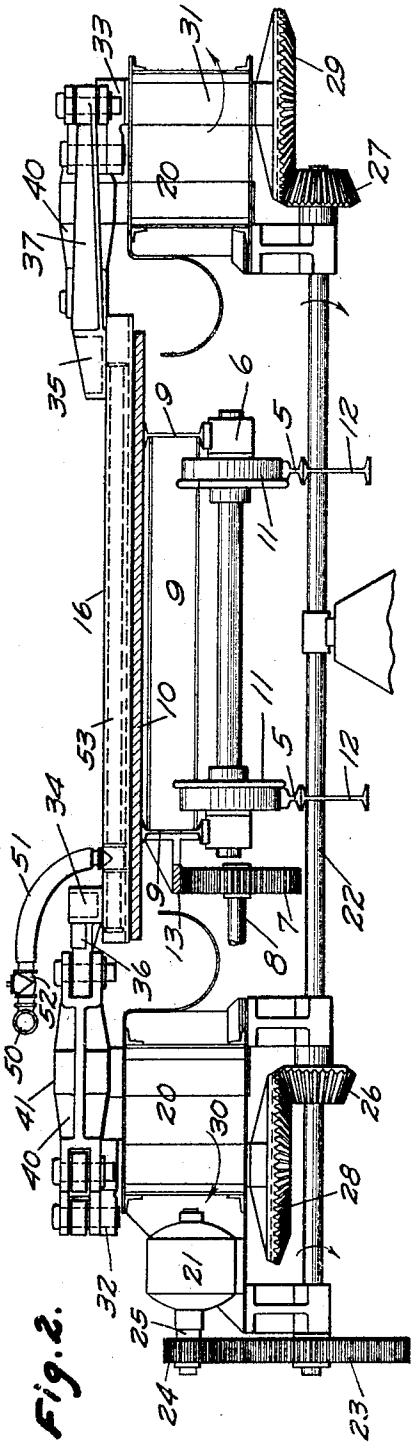


Fig. 2.

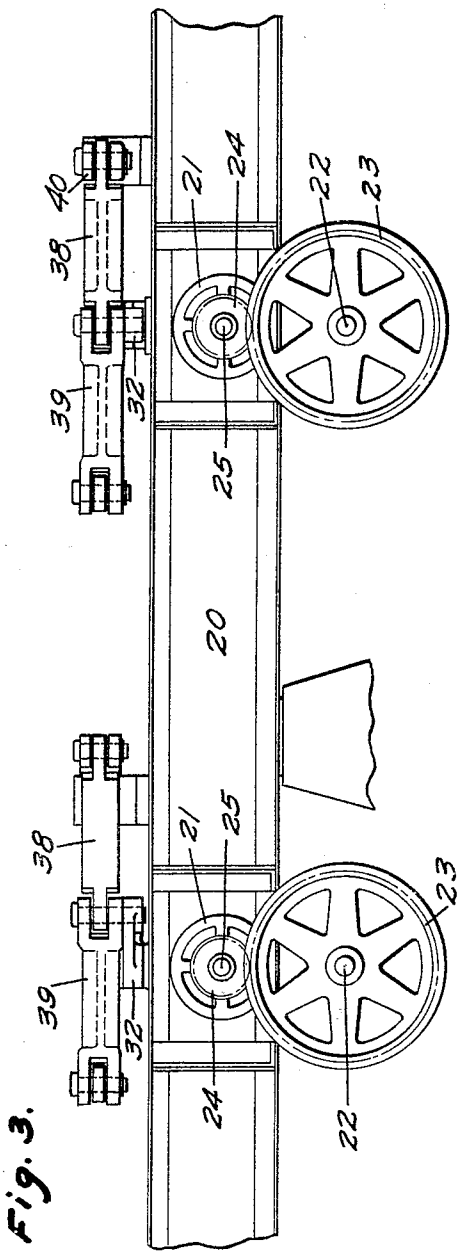


Fig. 3.

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Fig. 4.

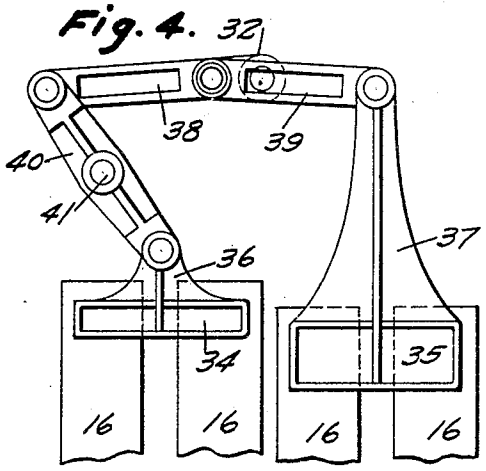


Fig. 6.

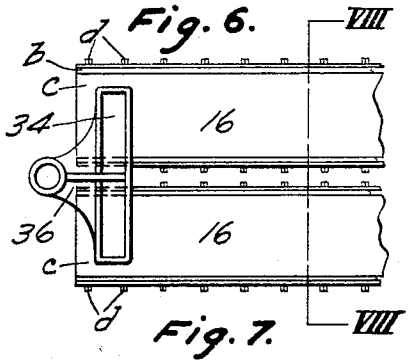


Fig. 7.

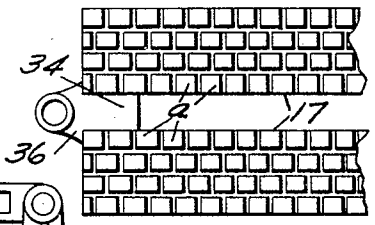


Fig. 5.

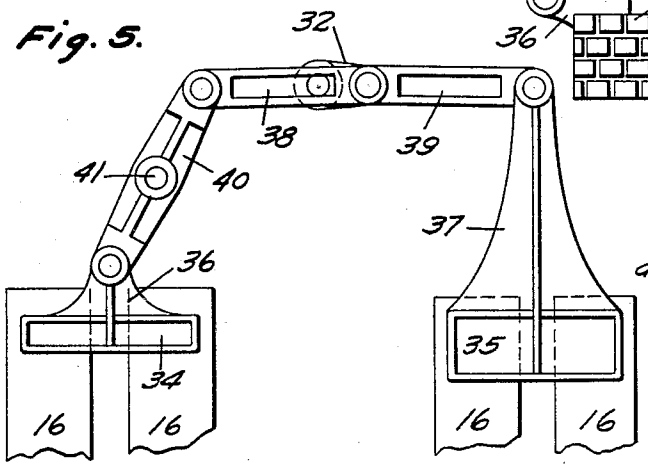


Fig. 8.

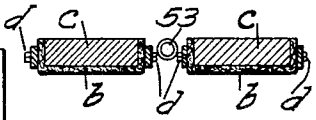
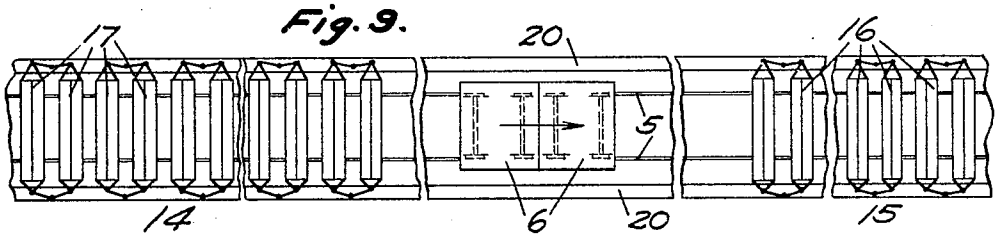


Fig. 9.



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UNITED STATES PATENT OFFICE

WALTER O. AMSLER, OF TOLEDO, OHIO, ASSIGNOR TO SIMPLEX ENGINEERING COMPANY, OF WASHINGTON, PENNSYLVANIA, A CORPORATION OF DELAWARE

APPARATUS FOR GRINDING AND POLISHING GLASS

Application filed June 12, 1926. Serial No. 115,505.

This invention relates to improvements in grinding and polishing apparatus, and more particularly to apparatus of the class designed for surfacing or grinding and polishing plate glass, and of the continuous type of apparatus.

Apparatus of the character to which this invention relates, as heretofore constructed, has included means for moving the sheets of glass to be treated under a series of rotary grinding machines and a series of rotary polishing machines, said machines employing rotary surfacing devices comprising circular blocks designed to move in circular paths over the glass being treated. Considerable trouble has been met with in the use of such apparatus, due to the uneven abrasive actions produced by the rotating surfacing means, thereby causing a great amount of breakage of the treated plates or sheets of glass. This uneven or non-uniform abrasion mentioned may be somewhat lessened by running the rotary surfacing devices at a low rate of speed, but this is objectionable owing to the reduced capacity and un-economical operating conditions.

An object of my invention is to provide simple and efficient means, in apparatus of the character above specified, for overcoming the disadvantages heretofore encountered, and provide means whereby the sheets of glass and the like may be uniformly abraded and properly surfaced at a considerable reduction in cost.

A further object of the present invention is, to provide means for uniformly surfacing sheets of glass by causing a compound longitudinal and transverse movement of the surfacing elements over the sheets of glass and the like.

Other objects of my invention are, to provide a construction in which the surfacing elements are movable in such a manner relatively to the work as to not over-grind or over-polish or over-heat certain portions of the work; to provide new and improved means for the distribution of grinding and polishing materials; and to provide an apparatus wherein it may be operated at a considerable saving in power.

In the accompanying drawings, which illustrate an application of my invention,

Fig. 1 is a plan view showing a portion of my invention, particularly the surfacing elements and their operating connections;

Fig. 2 is a part sectional view and a part elevational view, especially showing the driving means employed for moving the carriers and the surfacing elements actuating mechanism;

Fig. 3 is a side elevational view showing the driving and actuating means for the surfacing elements positioned at spaced intervals in the apparatus;

Figs. 4 and 5 are detail plan views, showing parts of the surfacing elements moving means;

Fig. 6 is a detail plan of a polishing element;

Fig. 7 is a bottom plan of a portion of a grinding element;

Fig. 8 is a sectional view taken on line VIII—VIII of Fig. 6; and

Fig. 9 is a diagrammatic view of the apparatus, particularly showing the positions of the two sets of surfacing means.

Referring to the drawings, 5 designates a track on which the glass conveying cars or carriers 6 are adapted to travel for the purpose of carrying the sheets to be treated under the surfacing machines. Located at desired intervals along the track, I provide a plurality of geared driving wheels 7, said wheels being mounted on drive-shafts 8, which latter may be driven by any suitable means, not shown.

As illustrated, the carriers include a structural frame having members 9 and 10, mounted on wheels 11, the latter being designed to travel on the rails comprising the track 5. 12 designate longitudinally extending I-beams, on which the rails are supported. The carrier frame is provided with racks 13 formed on member 9, and are adapted to engage the teeth of wheels 7, whereby the cars or carriers are propelled along the track. The sheet of glass or the like may be secured to the plate-like member 10 by plaster, in the usual manner, or other means may be employed for this purpose.

The surfacing machines or apparatus are arranged in two sets, one set comprising the grinding machines and the other set the polishing machines. In the form of my invention as illustrated, I have shown diagrammatically by Fig. 9 the manner of arranging the said machines, in which 14 designate the grinding machines and 15 the polishing machines. It will be understood that the said grinding and polishing machines are very similar, both in construction and operation; the main difference between them residing in the surfacing elements employed for making contact with the sheets passing through the apparatus.

The construction of the said surfacing elements or the grinding and polishing blocks 16 and 17, is particularly shown by the detail views Figs. 6–8 inclusive. The said units of each set of surfacing elements are arranged and operable in pairs; the bottom or contacting surface *a* of the grinding elements or blocks is shown by Fig. 7; and the sheet contacting surfaces of the polishing blocks 17 by Fig. 8. As shown by Fig. 8, *b* designates the polishing surfaces which are formed of pieces of felt or other suitable material passed over plate members *c*, and held in place thereon by bolts *d*.

Extending longitudinally of the track and on each side thereof, I provide a structural frame work designated generally by the numeral 20. This frame work is designed to support a number of electric or other motors 21, the actuating mechanism driven by the said motors, and the intermediate gearing and parts for operating the surfacing elements.

As shown, I have positioned the motors on one side only of the apparatus, and have provided drive shafts 22 extending transversely under the apparatus from one side frame to the other. The said drive shafts are each provided with a gear wheel 23, adapted to mesh with and be driven by a spur 24 located on the ends of the respective motor shafts 25. 26 and 27 designate bevel pinions fixedly carried on the shaft 22, and respectively adapted to engage bevel drive wheels 28 and 29 located on the lower ends of vertically extending shafts 30 and 31. Each of the shafts 30 and 31 at its upper end has a crank arm 32 or 33 thereon, the said cranks being adapted to be coupled up with the ends of a pair of the surfacing elements by means hereinafter specified.

As above mentioned, the surfacing elements of the grinding set are of substantially the same construction as the said elements of the polishing set. This is also true as to the actuating mechanisms therefor, and a detailed description of one pair of surfacing elements and their operating means will, it is believed, be sufficient to clearly describe these features.

As illustrated, the surfacing elements are designed to be operated in pairs, and a unit of each pair includes two transversely extending members connected together at opposite ends by plate members 34 and 35 respectively. The plate members 34 are relatively narrow and have a rather short projecting portion 36, while the plate members 35 are wide and have a long projecting portion 37. Said portions 36 and 37 are designed to be connected with the actuating mechanism for moving the various pairs of surfacing elements. These surfacing means are designed to have a compound longitudinal and transverse movement relatively to the work and the apparatus, or a compound parallel and oscillating movement.

The actuating mechanism for imparting this compound movement to the surfacing elements includes a crank, lever and link assembly arranged on opposite sides of the track, As shown, this assembly includes the crank arm 32 which, at its outer end, is pivotally connected with links or connecting members 38 and 39, said member 38 in turn being pivotally connected with a lever 40 rotatably mounted on a pivot post 41, the latter extending upwardly through one of the side frames. The opposite end of lever 40 is movably joined to the projecting portion 36 of plate 34. Link or connecting member 39, extending from the crank arm 32, is connected at its other end with the outwardly extending portion 37 of plate 35.

It will be understood that similar parts constituting the actuating mechanism just described are employed on the opposite side of the apparatus; that is to say, between the crank arm 33 and the plate 34, I employ a connecting member or link 38*a*, a lever member 40*a*, the latter being pivotally carried by a pivot post 41*a*, and between the plate 35 or its extension 37 and the crank arm, I provide a link or connecting member 39*a* corresponding with the link member 39 on the opposite side of the apparatus.

In operating the machine, sheets of glass, having been previously cut to the desired size, are deposited upon the carriers and are conveyed through the apparatus by means of the conveyor mechanism above described, or by other suitable means at the desired rate of speed.

As the sheets of glass move along between the frame structures disposed on both sides of the track, the surfacing elements are moved with a compound motion, including a movement parallel or longitudinally with the traveling sheets and with a slight oscillatory movement transversely of the sheets. It will be noted that these surfacing elements extend entirely across the sheets being treated, so that they will cover and grind or polish the entire surface of the sheets passing therebeneath. This result is attained with the ma-

terial having merely a single rectilinear movement and with the elements at opposite ends swinging on arcs of different radii so that the movement or stroke of the surfacing elements longitudinally or in the line of advance of the material is considerably greater than the transverse movement or stroke. The said longitudinal movement enables the surfacing elements to abrade over maximum area with minimum transverse or lateral movement as aforesaid, avoiding undue projection of the elements beyond the edges of the sheet of glass. This insures engagement of the entire abrading surfaces of the elements with the glass and thus even wear on such surfaces and even abrading of the entire surface of the glass sheet. Owing to the continuous movement of the sheets beneath the surfacing elements and the compound movement of the surfacing elements just described, a very desirable uniform grinding and polishing action is effected, and at a considerably less time and expense than under the old methods.

It will, of course, be understood that, in connection with my invention, means are provided for conveying grinding and polishing materials to the glass sheets. In the drawings, I have shown a supply pipe 50 leading from a source of supply, said pipe having branches 51 in communication therewith through suitable coupling means 52. Said branches 51 lead to transversely extending pipes 53, located adjacent to the surfacing elements and just above the sheets of glass to be treated, and by which the grinding or the polishing material, as it may be, is delivered as desired.

By arranging the surfacing elements in pairs and in the manner shown, and by providing a separate actuating mechanism for each pair, the parts react against each other in the movement of the surfacing elements toward and away from one another. Each pair is independently operable from any other pair, and, while I have shown a separate motor for each pair of surfacing elements, this is not necessary.

Attention is called to the fact that the transversely extending surfacing elements are of a greater length than the width of the sheet or plate being treated, so that the surfacing blocks always present a continuous and uniform contacting area to the sheet, thereby maintaining also a uniform temperature condition in the glass while covered by a surfacing element.

What I claim is:

1. In grinding and polishing apparatus, a plurality of surfacing elements arranged substantially in line, means to move material in said line in engagement with said elements, said elements being of a width to engage the material completely throughout the width thereof at all times, means to move said elements transversely with respect to said line to a less extent than longitudinally in said line to insure even wear on the surfacing elements and even grinding.

2. In glass grinding and polishing apparatus, the combination of glass-supporting carrier means having a continuous rectilinear motion, means for imparting motion to the said carrier means, a frame for supporting surfacing elements, surfacing elements carried by the frame in operative position with respect to sheets of glass disposed upon said carrier means, said surfacing elements being substantially rectangular and associated in pairs, crank members, links connecting said crank members to an opposite end of each one of the surfacing elements of each pair, means connecting said crank members and the other ends of the surfacing elements of each pair to impart a different motion to said elements than is imparted by said links whereby a compound longitudinal and transverse motion is imparted to the surfacing elements for evenly grinding the glass.

3. In surfacing apparatus, the combination of work-supporting carrier means having a work-advancing motion, means for imparting motion to the said carrier means, a frame having surfacing elements thereon in operative position with respect to the work disposed upon said carrier means, said surfacing elements being substantially rectangular and associated in pairs, crank members for imparting an oscillatory motion to said surfacing elements, links connecting said crank members to an opposite end of each one of the surfacing elements of each pair, links and levers connecting said crank members and the other ends of the surfacing elements of each pair, said links and levers being so proportioned that adjacent ends of the surfacing elements are rotated through arcs having different radii whereby a compound longitudinal and transverse motion is imparted to the surfacing elements for evenly grinding the work.

4. In surfacing apparatus, the combination of work-supporting carrier means having a work-advancing motion, means for imparting motion to the said carrier means, a frame having surfacing elements thereon in operative position with respect to the work disposed upon said carrier means, said surfacing elements being substantially rectangular and associated in pairs, crank members for imparting an oscillatory motion to said surfacing elements, links connecting said crank members to an opposite end of each one of the surfacing elements of each pair, links and levers connecting said crank members and the other ends of the surfacing elements of each pair, said links and levers being so proportioned that the elements have a greater longitudinal than transverse motion with respect to the path of advance of the work whereby a compound longitudinal and trans-

verse motion is imparted to the surfacing elements for evenly grinding the work.

5. In surfacing apparatus, the combination of work-supporting carrier means having a work-advancing motion, means for imparting motion to the said carrier means, a frame having surfacing elements thereon in operative motion with respect to the work disposed upon said carrier means, said surfacing elements being substantially rectangular and associated in pairs, crank members for imparting an oscillatory motion to said surfacing elements, links connecting said crank members to an opposite end of each one of the surfacing elements of each pair, links and levers connecting said crank members and the other ends of the surfacing elements of each pair, being so proportioned that the surfacing elements in operation always contact with the edge portions of the sheet whereby a compound longitudinal and transverse motion is imparted to the surfacing elements for evenly grinding the work.

6. In a surfacing apparatus, in combination with means to advance work, a surfacing element substantially of rectangular form disposed across the path of advance of said work and engageable with the latter, means adjacent one end of said element operatively connected thereto and having a portion movable in an arc to correspondingly swing the element, and means adjacent the other end of said element having a portion operable in an arc of different radius from the first mentioned arc and operatively connected to the element to correspondingly move the same, whereby the element will be moved longitudinally in said path of advance of the work to a greater extent than it will be moved transversely with respect to said work to thereby insure even grinding.

7. In a surfacing apparatus, in combination with means to advance work, a crank at each side of the path of advance of the work, a substantially rectangular surfacing element disposed transversely of said path for engagement with the work, a link extending from each crank, means connecting one of said links substantially directly to one end of said element, and a lever pivoted to the other link and to the other end of said element, whereby the element will be moved longitudinally with respect to said path to a greater extent than it will be moved transversely with respect to said path to insure even grinding.

8. In grinding and polishing apparatus, the combination with a continuously movable carrier for the material to be treated, means for moving the carrier, a movable elongated surfacing element arranged above and adjacent the carrier to engage the work, and actuating means for imparting to the surfacing element a compound longitudinal and transverse oscillatory movement relatively to the path of advance of said material, said oscillatory movement being through arcs of different radii at the opposite ends of the surfacing element so that said longitudinal movement is considerably greater than the transverse movement to insure even grinding.

9. In grinding and polishing apparatus, the combination with a continuously movable carrier, means for moving the carrier, a movable substantially rectangular surfacing element having a continuous glass-contacting surface arranged above and adjacent the carrier to engage the work, and actuating means for imparting to the surfacing element a compound rectilinear and oscillating movement with respect to the path of advance of the work with the oscillatory movement at the opposite ends of the surfacing elements being from arcs of different radii, said surfacing element extending transversely over the path of the carrier and adapted to make continuous contact throughout the width of a sheet on the carrier, said longitudinal movement being considerably greater than the transverse movement to insure even grinding.

10. In a grinding and polishing apparatus, the combination with a carrier having a continuous movement for a sheet, a track for the carrier, a frame work disposed on each side of the track, means for continuously moving the carrier with a sheet of glass thereon between the frames, a series of substantially rectangular surfacing elements arranged and operable in pairs, a motor mounted on one of the frames, actuating mechanism for a pair of surfacing elements including a crank, lever and link assembly interposed between the motor and the ends of the surfacing elements for imparting a compound longitudinal and transverse movement to the surfacing elements with the oscillatory movement at the oppostie ends of the surfacing elements being from arcs of different radii, and said longitudinal movement being considerably greater than the transverse movement to insure even grinding.

11. In a grinding and polishing apparatus, a continuously movable carrier for a sheet, a surfacing element of a length sufficient to cover the entire width of the sheet being treated thereby providing a continuous contacting surface throughout the width of the sheet, and means for imparting a compound longitudinal and transverse movement to the surfacing element relative to the path of advance of the sheet with the transverse movement at the ends of the element being through arcs of different radii so that said longitudinal movement is considerably greater than the transverse movement to insure even grinding.

12. In grinding and polishing apparatus, in combination with means for moving work, a plurality of substantially rectangular surfacing elements disposed across the path of

advance of the work to engage the latter, and means to operate the alternate ends of said elements in arcs of different radii to insure even grinding.

13. In grinding and polishing apparatus, mounting structure defining a path between parts thereof for the advance of material in a line, means for moving said material in said line, a plurality of surfacing elements of a width slightly in excess of said path arranged transversely thereof to engage the material, and means supported on the mounting structure operable to swing the alternate ends of said elements in arcs of different radii to impart transverse and longitudinal movements to said surfacing elements with the longitudinal movement being greater than the transverse movement so that the surfacing elements will always be in engagement with the material throughout the width thereof to insure even grinding.

14. In a grinding and polishing apparatus, a surfacing element, and means for imparting a compound longitudinal and transverse movement to the surfacing element relative to the path of advance of the material with the transverse movement of the ends of the element being through arcs of different radii so that said longitudinal movement is considerably greater than the transverse movement to insure even grinding.

In testimony whereof I affix my signature.

WALTER O. AMSLER.