

July 8, 1941.

C. B. WILLIAMS, JR

2,248,263

EDGE GRINDING MACHINE

Filed May 31, 1939

3 Sheets-Sheet 1

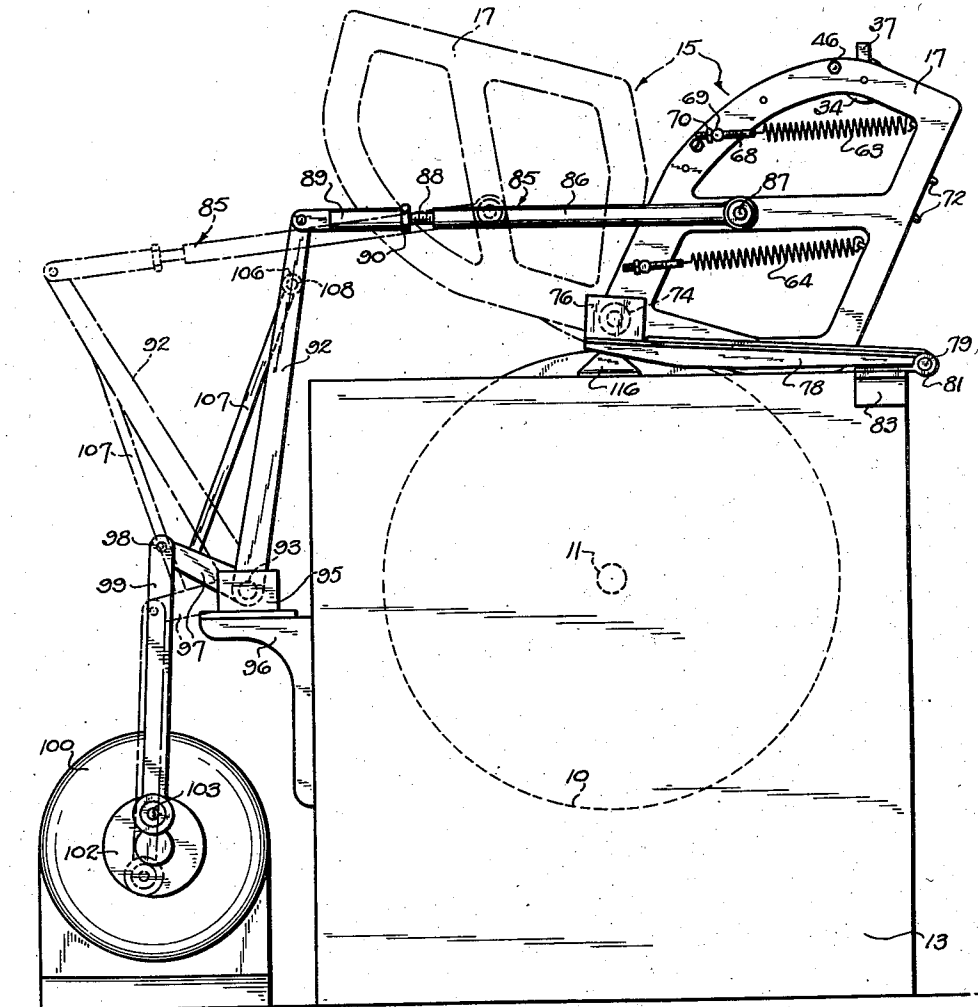


Fig. 1.

Inventor
CARL B. WILLIAMS JR.

By

Frank Fraser
Attorney

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3 Sheets-Sheet 2

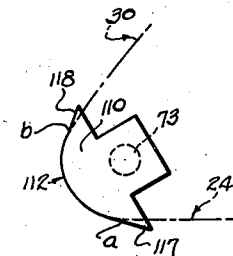
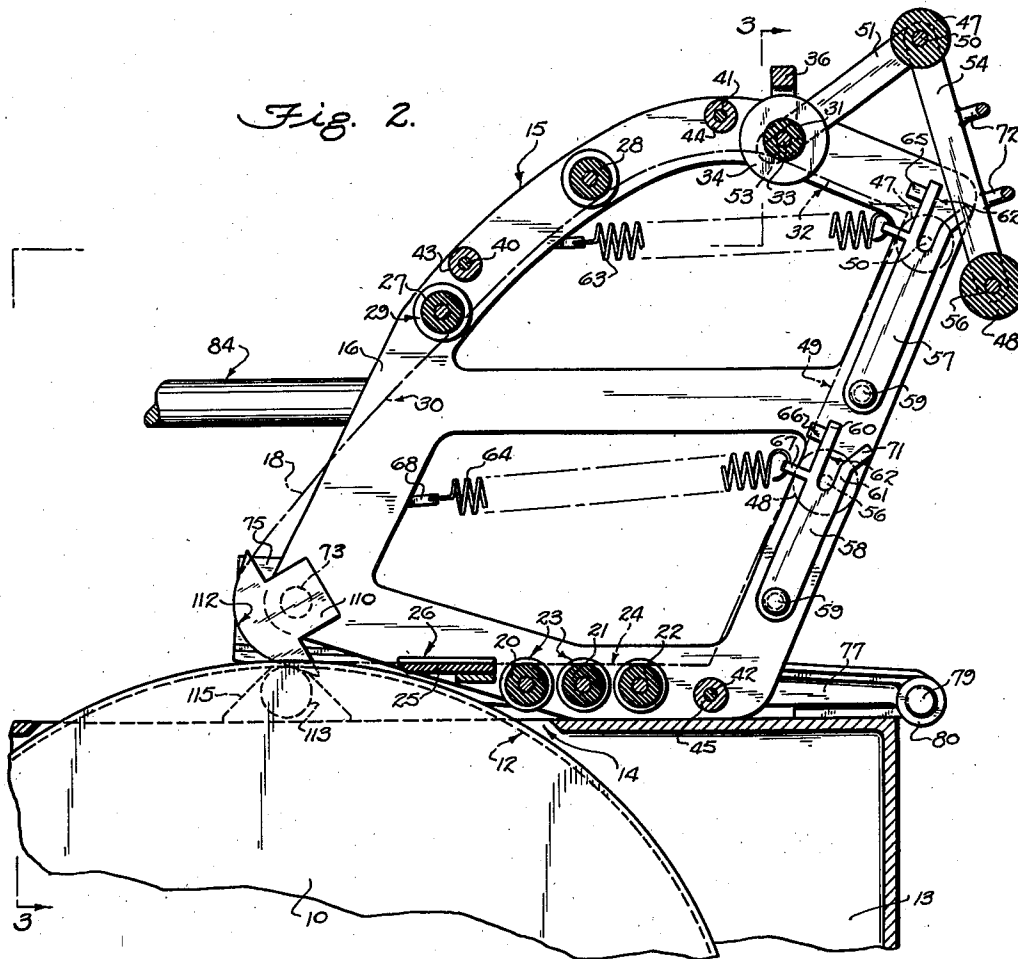


Fig. 5.

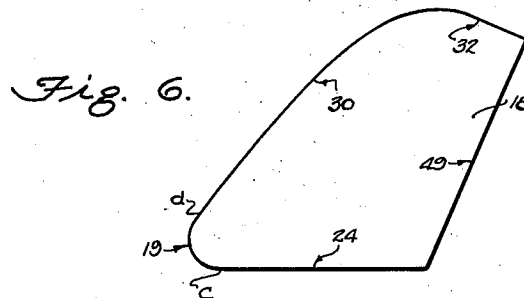


Fig. 6.

Inventor
CARL B. WILLIAMS JR.

Frank Fraser
Attorney

July 8, 1941.

C. B. WILLIAMS, JR

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3 Sheets-Sheet 3

Fig. 3.

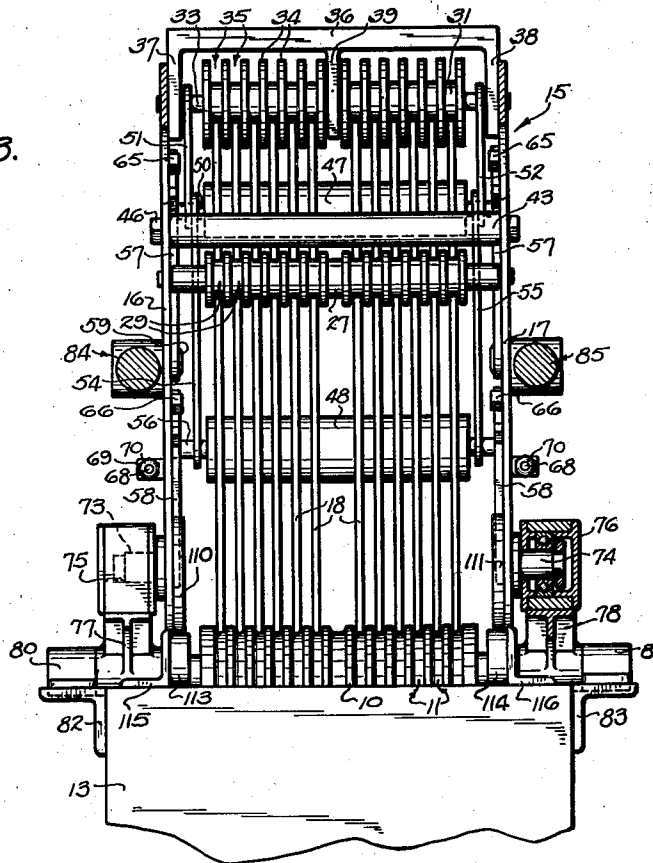
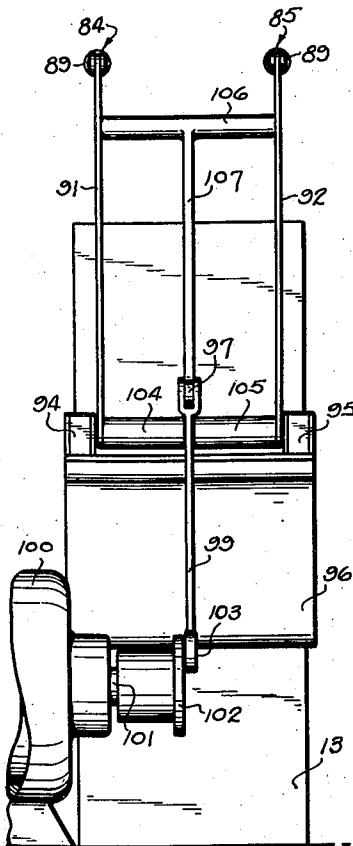


Fig. 4.



Inventor

CARL B. WILLIAMS JR.

By

Frank Fraser

Attorney

UNITED STATES PATENT OFFICE

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EDGE GRINDING MACHINE

Carl B. Williams, Jr., Toledo, Ohio, assignor to
Libbey-Owens-Ford Glass Company, Toledo,
Ohio, a corporation of Ohio

Application May 31, 1939, Serial No. 276,570

9 Claims. (Cl. 51—100)

The present invention relates to edge grinding machines in general and more particularly to an improved machine for grinding curved edges of sheets or plates of glass and the like.

An important object of the invention is the provision of a grinding machine of relatively simplified and inexpensive construction primarily designed for use in grinding the rounded corners of sheets or plates of glass which are to be employed as door and/or window lights in automotive vehicles, although it is of course in no way restricted to such use.

Another object of the invention is the provision of a grinding machine of the above character which will finish the rounded corners of the glass sheets or plates rapidly, accurately, and economically and with a minimum amount of effort and attention on the part of the operator, whereby uniformly rounded edges with well-finished surfaces may be secured.

Another object of the invention is the provision of a grinding machine of the above character capable of grinding rounded corners of different contours, such as those defining regular, irregular, or compound curvatures, and also including means whereby curved edges of different lengths may be ground with facility and accuracy.

A further object of the invention is the provision of a grinding machine of the above character embodying a rockably mounted work holder for supporting the glass sheets or plates to be ground, together with novel means for maintaining the said sheets or plates in proper position within said work holder during rocking movement thereof.

A still further object of the invention is the provision of a grinding machine of the above character including novel means for supporting the work holder for free vertical floating movement during the rocking thereof and for also raising the work holder at the end of its rocking movement in either direction to move the glass sheet or plate out of contact with the grinding wheel.

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.

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

Fig. 1 is a side elevation of a grinding machine constructed in accordance with the present invention;

Fig. 2 is a vertical longitudinal section through the work holder mounted for rocking movement above the grinding wheel;

Fig. 3 is a vertical section taken substantially on line 3—3 of Fig. 2;

Fig. 4 is an inner end view of the machine showing the means for rocking the work holder;

Fig. 5 is a detail view of one of the cam members for supporting and guiding the work holder during rocking movement thereof; and

Fig. 6 illustrates one of the sheets or plates of glass ground upon the machine.

In the embodiment illustrated in the drawings, the grinding machine includes a grinding wheel 10 rotatable about a horizontal axis 11 and provided with one or a plurality of grooves 12 in the periphery thereof. The grinding wheel is arranged within a receptacle 13 adapted to contain a suitable abrasive material within which the lower portion of said wheel is adapted to be immersed in a manner well known in the art. The top of the receptacle 13 is provided with a slot 14 (Fig. 2) through which the upper portion of the grinding wheel projects.

The means for supporting the glass sheets to be ground comprises a work holder designated in its entirety by the numeral 15, said work holder being mounted above the grinding wheel 10 for free vertical and rocking movement as will be more fully hereinafter described. The work holder 15 comprises a pair of spaced vertical side members or frames 16 and 17 between which one or a plurality of glass sheets 18 to be ground are adapted to be received, said sheets being disposed on edge in a vertical position. The side frames 16 and 17 are adapted to be of such size and so shaped that the rounded edges 19 (Fig. 6) at the inner lower corners of the glass sheets project therebeyond, as indicated in Fig. 2, so that upon rocking of the work holder, the said edges 19 will be moved backward and forward over and in engagement with the grinding wheel 10.

Arranged transversely between and carried by the side frames 16 and 17 of work holder 15 at the lower end thereof are the three horizontally disposed supporting rollers 20, 21 and 22 for supporting the glass sheets thereon; each of said rollers being provided with a series of grooves 23 within which the bottom edges 24 of the glass sheets 18 are received. Also positioned between and carried by the side frames 16 and 17 of the work holder at the lower end thereof is a substantially horizontal, rectangular plate member 25 also provided with grooves 26 aligning with the grooves in rollers 20, 21 and 22, and adapted to receive the bottom edges 24 of the glass sheets therein.

Also arranged between and carried by the side

frames of the work holder are the positioning rollers 27 and 28 each being provided with grooves 29 for receiving the inner edges 30 of the glass sheets 18 therein. An additional roller 31 is carried at the upper end of the work holder to engage the upper edges 32 of the glass sheets. This roller 31 is carried by a shaft 33 mounted at its opposite ends in the side frames 16 and 17 of the work holder and includes the relatively large discs 34 which provide relatively deep grooves 35 therebetween for receiving the upper edges of the glass sheets therein.

The side frames 16 and 17 of the work holder are connected together at their upper ends by an inverted U-shaped bracket including a horizontal portion 36 and downturned end portions 37 and 38 which are received between and secured to said side frames. The horizontal portion 36 of said bracket is also provided with a depending web 39 through which the shaft 33 of roller 31 extends. In order to assist in maintaining the side frames of the work holder in properly spaced relation, there are provided the bolts 40, 41 and 42 which extend between said side frames and carry the spacing sleeves 43, 44 and 45 respectively, said bolts passing through the side frames and being secured by nuts 46 (Fig. 1).

The glass sheets 18 are adapted to be inserted into the work holder 15 from the outer end thereof and after being properly positioned are adapted to be secured therein by the rollers 47 and 48 which yieldably engage the outer edges 49 of the sheets. The roller 47 is carried by a shaft 50 supported at its opposite ends by links 51 and 52 carried at their inner ends by the shaft 33 of roller 31. The links 51 and 52 are provided with slots 53 through which the roll shaft 33 extends to permit a limited longitudinal movement of the links 51 and 52 relative to said shaft. Also pivoted to the opposite ends of shaft 50 of roller 47 are the inner ends of links 54 and 55 which carry at their outer ends the shaft 56 of the roller 48.

Carried upon the inside of each side frame 16 and 17 of the work holder are the upper and lower bracket arms 57 and 58, with which the retaining rollers 47 and 48 are removably associated. Each bracket arm 57 and 58 is pivoted to the respective side frame at its lower end as at 59 and provided at its upper end with the spaced fingers 60 and 61 to provide an upwardly opening slot 62 therebetween. The bracket arms 57 and 58 are normally drawn inwardly by tension springs 63 and 64 respectively, with the inward movement thereof being limited by stops 65 and 66 carried by the side frames. Each tension spring 63 and 64 is connected at one end to a lug 67 on the respective bracket arm and at its opposite end to a bolt 68 passing through a boss 69 on the respective side frame and having threaded thereupon a nut 70.

After the glass sheets 18 have been inserted within the work holder 15, so that the inner edges 30 thereof engage the fixed rollers 27 and 28, the rollers 47 and 48 are moved downwardly so that the opposite ends of the shaft 50 of roller 47 are received within the slots 62 in the upper ends of bracket arms 57, while the opposite ends of the shaft 56 of roller 48 are received within the slots 62 in the upper ends of bracket arms 58, as shown in broken lines in Fig. 2. The upper end of the finger 61 of each bracket arm may be bent outwardly as indicated at 71 to facilitate the insertion of the roll shafts 50 and 56 therein. The actuation of the rollers 47 and 48 may be

facilitated by means of handles 72 carried by the links 54 and 55.

The work holder 15 is rockably mounted upon the top of the receptacle 13, and to this end there are provided at the lower inner corner of said work holder the outwardly projecting trunnions 73 and 74 (Fig. 3) which are rotatably mounted within bearing blocks 75 and 76 respectively. These bearing blocks are carried at the inner ends of substantially horizontal supporting arms 77 and 78 which are pivotally mounted at their outer ends upon a transverse shaft 79 supported at its opposite ends in bearings 80 and 81 mounted upon brackets 82 and 83 respectively carried by the receptacle 13. With this construction, it will be seen that the work holder can be rocked about a substantially horizontal axis defined by the trunnions 73 and 74 and simultaneously permitted a free vertical floating movement due to the pivotal mounting of the supporting arms 77 and 78.

The means for rocking the work holder 15 includes a pair of substantially horizontal connecting rods 84 and 85, each comprising a sleeve 86 pivoted to the respective side frame of the work holder as at 87 (Fig. 1) and carrying at its outer end a screw 88 upon which is threaded a relatively shorter sleeve 89 and nut 90. Pivoted to the outer ends of the sleeves 89 are the depending links 91 and 92 pivoted at their lower ends upon a horizontal shaft 93 mounted in bearing blocks 94 and 95 carried by a bracket 96 secured to the receptacle 13. Keyed to the shaft 93, intermediate its ends, is a link 97 pivoted as at 98 to the upper end of a vertical pitman 99 driven from the motor 100. The drive shaft 101 of the motor carries an eccentric 102 to which the pitman 99 is pivoted at its lower end as at 103.

The lower ends of the links 91 and 92 are maintained in properly spaced relation by collars 104 and 105 carried by shaft 93 at opposite sides of link 97. Arranged between and carried by the links 91 and 92 adjacent their upper ends is a T-member including a horizontal portion 106 and a depending leg 107. The horizontal portion 106 of the T-member is pivoted upon a rod 108 fixed at its opposite ends to links 91 and 92, while the vertical leg 107 thereof is connected at its lower end to the link 97 intermediate the ends thereof. Upon operation of the motor 100 to rotate the eccentric 102, the work holder 15 will be rocked through the linkage mechanism above described first in a counter-clockwise direction to the position indicated in broken lines in Fig. 1 and then in a clockwise direction back to starting position as shown in full lines.

For the purpose of supporting and guiding the work holder through the desired path during rocking thereof, depending upon the curvature of the corner 19 of the sheet to be ground, there are carried upon the inner faces of the side frames 16 and 17 of the work holder the two supporting and guiding cam members 110 and 111, each cam member being provided with a curved outer edge 112 conforming to the curvature of the rounded corner 19 of the glass sheet to be ground. The cam members 110 and 111 are adapted to engage circular supports 113 and 114 respectively carried by the brackets 115 and 116 secured to the top of the receptacle 13. Upon rocking movement of the work holder, the curved edges 112 of the cam members slide over the circular supports 113 and 114 to cause the inner lower corner of the work holder to travel through a path corresponding to the contour of the

rounded corner 19 of the glass sheet to be ground.

More specifically, the curvature of the edges 112 of the cam members 110 and 111 from the points *a* to *b* (Fig. 5) corresponds to the curvature of the rounded corner 19 of the glass sheet 18 to be ground from *c* to *d* (Fig. 6). Beyond the points *a* and *b* of the cam members 110 and 111, the corners 117 and 118 of said cam members project beyond the edges 24 and 30 respectively of the sheet 18 and serve to effect the raising of the sheet from the grinding wheel when the work holder reaches the end of its rocking movement in either direction. This is desired in order to prevent burning of the sheet edge. As shown in Fig. 2, the bottom edge 24 of the glass sheet is raised out of contact with the grinding wheel and at such time the work holder is supported upon the top of the receptacle 13.

By using cam members of different shapes and sizes, it will be readily appreciated that corners or edges of varying curvature may be ground upon the machine. Thus, the outer edges 112 of the cam members may be shaped to define either regular, irregular, or compound curves. Also, by changing the size of the eccentric 102 to vary the degree of rocking movement of the work holder, the length of edge contour ground upon the machine can be increased or decreased as desired. Further, the initial starting position of the work holder can be regulated by adjustment of the length of the connecting rods 84 and 85. Thus, as shown in Fig. 1, the work holder 15 is supported upon the top of the receptacle in its initial starting position. However, by shortening the length of the connecting rods 84 and 85, the work holder can be turned in a counter-clockwise direction and lifted from off the receptacle. This adjustment will change the point on the sheet edge at which the grinding begins, although the length of edge ground will remain the same with any given size of eccentric.

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 a machine for grinding the curved edge of a sheet or plate of glass or the like, a rotary grinding wheel positioned to rotate about a substantially horizontal axis, a work holder positioned above said wheel for supporting the sheet to be ground on edge in a substantially vertical position, substantially horizontal supporting arms pivotally associated at their inner ends with the work holder adjacent the lower end thereof and upon which said work holder is rockably mounted, means for pivotally mounting said supporting arms at the opposite ends thereof so that the said work holder is capable of free vertical movement, means independent of said supporting arms and pivotally connected with said work holder above the said supporting arms for rocking said work holder to move the curved edge of the sheet to be ground over and in engagement with said grinding wheel, and cam means for supporting said work holder during the rocking movement thereof and for controlling the contour ground upon the curved edge of said sheet.

2. In a machine for grinding the curved edge of a sheet or plate of glass or the like, a rotary grinding wheel positioned to rotate about a substantially horizontal axis, a work holder posi-

tioned above said wheel for supporting the sheet to be ground on edge in a substantially vertical position, substantially horizontal supporting arms pivotally associated at their inner ends with the work holder adjacent the lower end thereof and upon which said work holder is rockably mounted, means for pivotally mounting said supporting arms at the opposite ends thereof so that the said work holder is capable of free vertical movement, means independent of said supporting arms and pivotally connected with said work holder above the said supporting arms for rocking said work holder to move the curved edge of the sheet to be ground over and in engagement with said grinding wheel, and cam members carried by said work holder and rocking therewith for controlling the contour ground upon the curved edge of said sheet.

3. In a machine for grinding the curved edge of a sheet or plate of glass or the like, a rotary grinding wheel positioned to rotate about a substantially horizontal axis, a work holder positioned above said wheel for supporting the sheet to be ground on edge in a substantially vertical position, substantially horizontal supporting arms pivotally associated at their inner ends with the work holder adjacent the lower end thereof and upon which said work holder is rockably mounted, means for pivotally mounting said supporting arms at the opposite ends thereof so that the said work holder is capable of free vertical movement, means independent of said supporting arms and pivotally connected with said work holder above the said supporting arms for rocking said work holder to move the curved edge of the sheet to be ground over and in engagement with said grinding wheel, cam members carried by said work holder and having curved edges corresponding to the curvature of the edge of said sheet being ground, and means for rockably supporting said cam members during rocking of the said work holder.

4. In a machine for grinding the curved edge of a sheet or plate of glass or the like, a rotary grinding wheel positioned to rotate about a substantially horizontal axis, means mounted above said wheel for supporting the sheet to be ground on edge in a substantially vertical position, means for rocking said supporting means to move the curved edge of the sheet to be ground over and in engagement with said grinding wheel, and cam members carried by the said sheet supporting means and rocking therewith for controlling the contour ground upon the curved edge of said sheet, said cam members having portions operating to raise said sheet supporting means at the end of its rocking movement in either direction to move the sheet out of contact with the grinding wheel.

5. In a machine for grinding the curved edge of a sheet or plate of glass or the like, a rotary grinding wheel positioned to rotate about a substantially horizontal axis, means mounted above said wheel for supporting the sheet to be ground on edge in a substantially vertical position, means for rocking said supporting means to move the curved edge of the sheet to be ground over and in engagement with said grinding wheel, cam members carried by said sheet supporting means and having curved edges corresponding to the curvature of the edge of said sheet being ground, and means for rockably supporting said cam members during rocking of the said sheet supporting means, said cam members having projecting end portions engaging said last-named

supporting means for raising said sheet supporting means at the end of its rocking movement in either direction to raise the sheet out of contact with the grinding wheel.

6. In a machine for grinding the curved edge of a sheet or plate of glass or the like, a rotary grinding wheel positioned to rotate about a substantially horizontal axis, a work holder rockably mounted above said wheel for supporting the sheet to be ground on edge in a substantially vertical position including spaced side members between which the sheet is received, means arranged between and carried by said side members for engaging one edge of the sheet, pivotally mounted bracket arms carried by said side members, means extending between and removably carried by said bracket arms for engaging another edge of the sheet to maintain it in position, means for urging said bracket arms inwardly to hold the said removable means in yieldable engagement with the sheet edge, and means independent of said bracket arms for pivotally connecting said removable means to said work holder so that the said removable means may be completely disengaged from the said bracket arms without disassembly thereof from the said work holder.

7. In a machine for grinding the curved edge of a sheet or plate of glass or the like, a rotary grinding wheel positioned to rotate about a substantially horizontal axis, a work holder rockably mounted above said wheel for supporting the sheet to be ground on edge in a substantially vertical position including spaced side members between which the sheet is received, fixed means arranged between and carried by said side members for engaging one edge of the sheet, pivotally mounted bracket arms carried by said side members, rollers removably carried by said bracket arms for engaging another edge of the sheet to maintain it in position against said fixed means, spring means acting to urge said bracket arms inwardly to hold the said rollers in yieldable engagement with the sheet edge, and means independent of said bracket arms for pivotally connecting said rollers to said work holder so that the said rollers may be completely disengaged from the said bracket arms without disassembly thereof from the said work holder.

8. In a machine for grinding the curved edge

of a sheet or plate of glass or the like, a rotary grinding wheel positioned to rotate about a substantially horizontal axis, a work holder rockably mounted above said wheel for supporting the sheet to be ground on edge in a substantially vertical position including spaced side members between which the sheet is received, fixed means arranged between and carried by said side members for engaging one edge of the sheet, substantially vertical bracket arms pivoted at their lower ends to said side members and provided at their upper ends with spaced fingers forming upwardly opening slots therebetween, a roller having its opposite ends removably received within slots in said bracket arms and engaging another edge of the sheet to maintain it in position against said fixed means, and means independent of said bracket arms for pivotally connecting said roller to said work holder so that the said roller may be completely disengaged from the said bracket arms without disassembly thereof from the said work holder.

9. In a machine for grinding the curved edge of a sheet or plate of glass or the like, a rotary grinding wheel positioned to rotate about a substantially horizontal axis, a work holder rockably mounted above said wheel for supporting the sheet to be ground on edge in a substantially vertical position including spaced side members between which the sheet is received, fixed means arranged between and carried by said side members for engaging one edge of the sheet, substantially vertical bracket arms pivoted at their lower ends to said side members and provided at their upper ends with spaced fingers forming upwardly opening slots therebetween, a roller having its opposite ends removably received within slots in said bracket arms and engaging another edge of the sheet to maintain it in position against said fixed means, spring means acting to urge said bracket arms inwardly to hold the said roller in yieldable engagement with the sheet edge, means for limiting the inward movement of said bracket arms, and means independent of said bracket arms for pivotally connecting said roller to said work holder so that the said roller may be completely disengaged from the said bracket arms without disassembly thereof from the said work holder.

CARL B. WILLIAMS, JR.