

No. 682,744.

Patented Sept. 17, 1901.

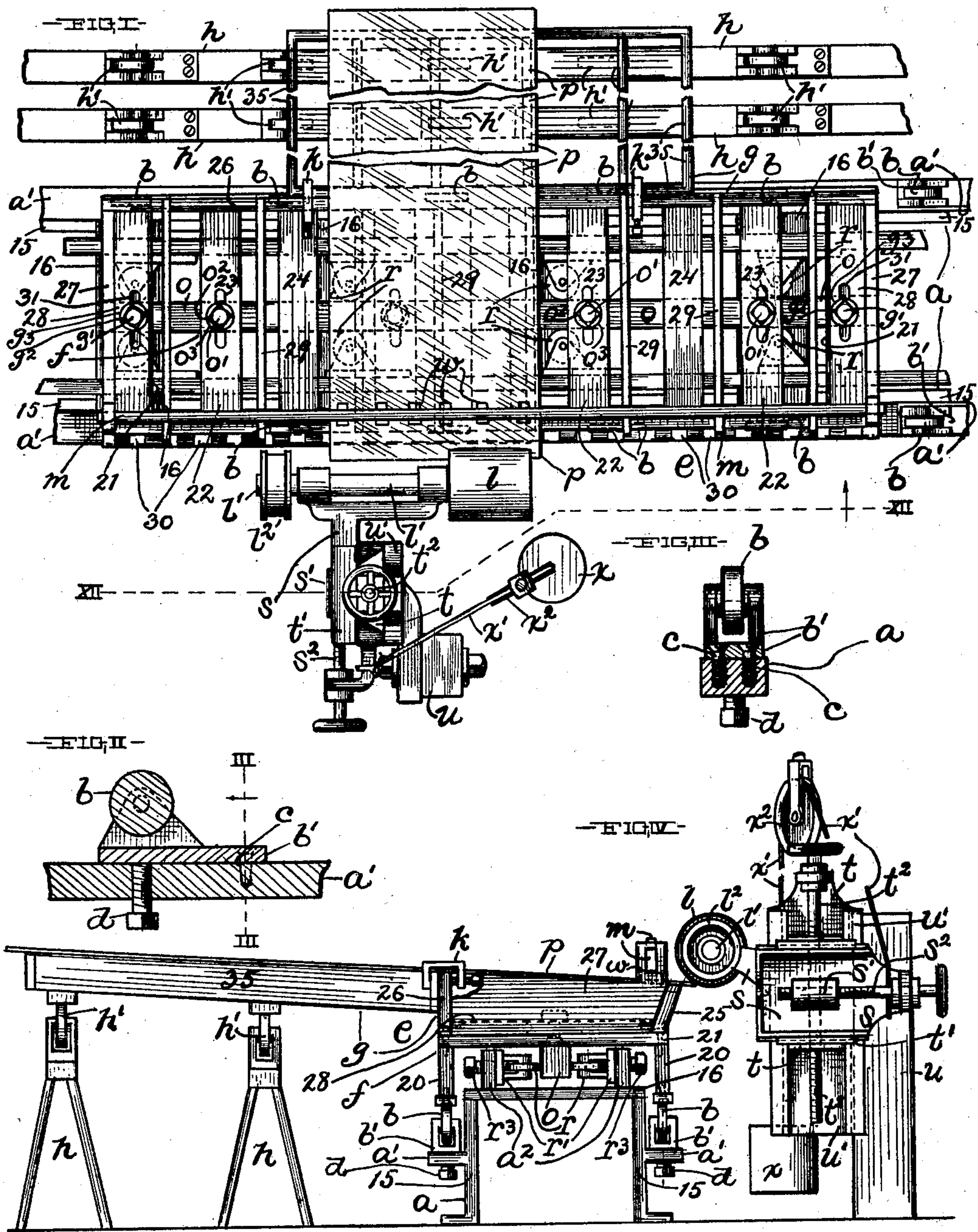
F. POLLARD.

APPARATUS FOR GRINDING LARGE PLATES OR SHEETS OF GLASS.

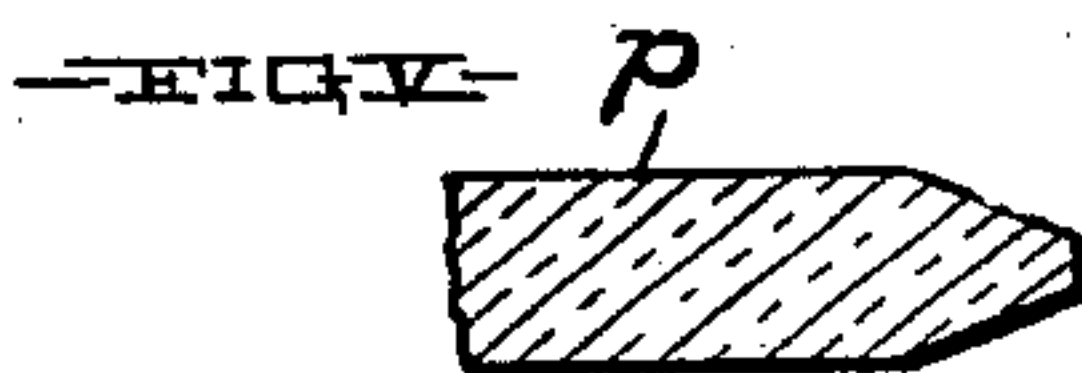
(Application filed Mar. 13, 1901.)

(No Model.)

2 Sheets—Sheet 1.



WITNESSES:  
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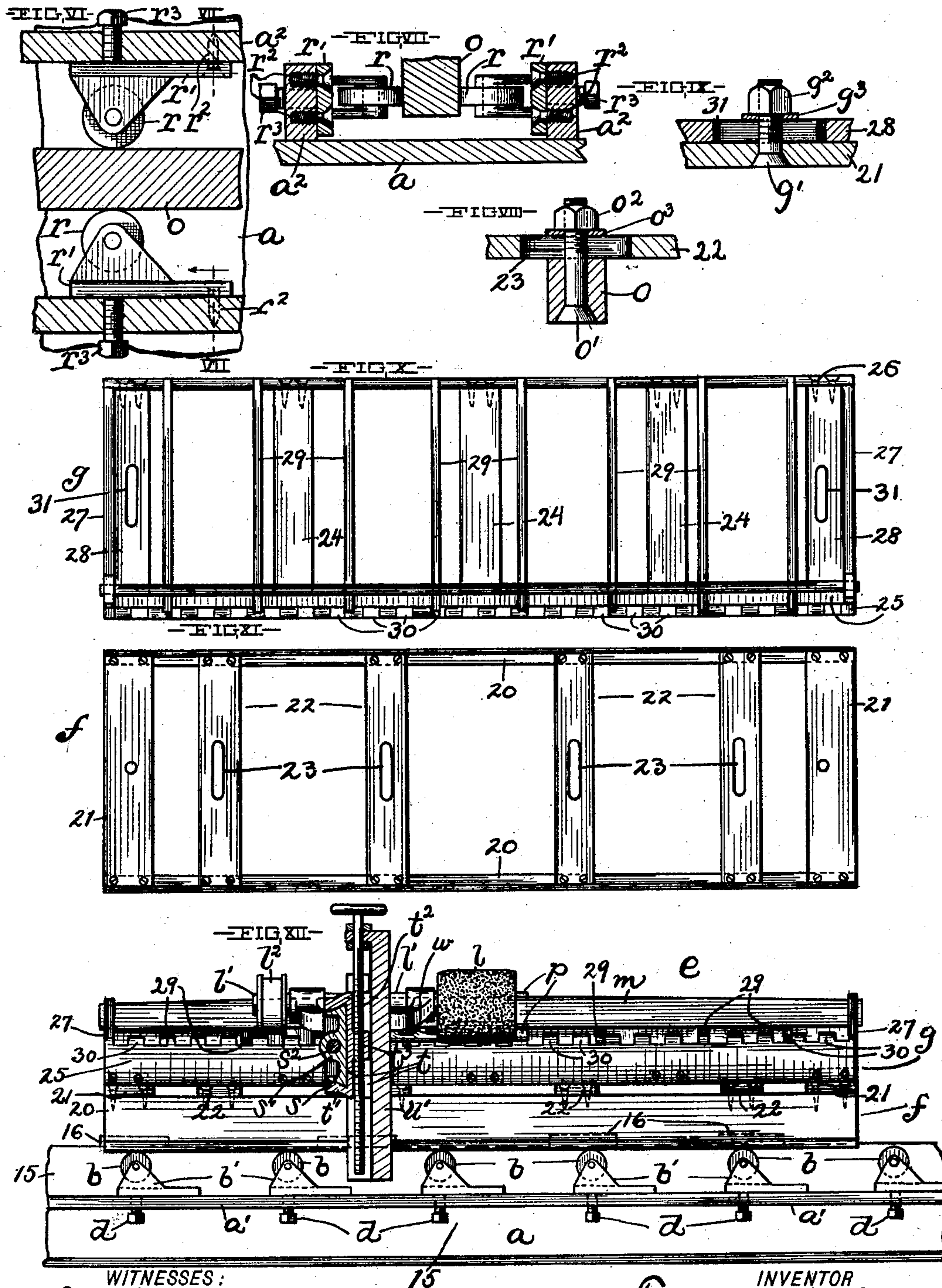
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(Application filed Mar. 18, 1901.)

(No Model.)

2 Sheets—Sheet 2.



WITNESSES:

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# UNITED STATES PATENT OFFICE.

FREDERICK POLLARD, OF CLEVELAND, OHIO.

APPARATUS FOR GRINDING LARGE PLATES OR SHEETS OF GLASS.

SPECIFICATION forming part of Letters Patent No. 682,744, dated September 17, 1901.

Application filed March 13, 1901. Serial No. 50,928. (No model.)

*To all whom it may concern:*

Be it known that I, FREDERICK POLLARD, a subject of the King of Great Britain, and a resident of Cleveland, in the county of Cuyahoga and State of Ohio, have invented a certain new and useful Improved Apparatus for Grinding Large Plates or Sheets of Glass; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use the same.

This invention relates to improved apparatus for grinding large plates or sheets of glass, and more especially to apparatus readily capable of straightening and squaring the edges of the said plates and beveling the plates.

The object of this invention is to provide apparatus which is exceedingly simple in construction and operated with facility, reliable and accurate in its operation, and equally well adapted for different sizes of large plates of glass.

In the accompanying drawings, Figure I is a top plan of apparatus embodying the invention. Fig. II is a section in detail, showing the means for supporting and adjusting one of the rollers employed in supporting the glass-carrier. Fig. III is a vertical section on line III III, Fig. II. Fig. IV is a left-hand elevation of the apparatus. Fig. V shows an enlarged view of a portion of a glass plate having been operated upon. Fig. VI is a top plan, partly in section, showing a pair of rollers affording lateral bearing for the glass-carrier and illustrates also the means for supporting and adjusting the said rollers. Fig. VII is a vertical section on line VII VII, Fig. VI. Fig. VIII is a detail in section, illustrating the manner of adjustably securing the lower section of the glass-carrier to the bar or beam which is engaged by the rollers, affording lateral bearing to the glass-carrier. Fig. IX is a detail in section, illustrating the manner of adjustably securing the upper section of the glass-carrier to the lower glass-carrier section. Fig. X is a top plan of the upper glass-carrier section detached. Fig. XI is a top plan of the lower glass-carrier section isolated without the beam or bar *o*. Fig. XII is a front side elevation in section on line XII XII, Fig. I.

Portions are broken away and in section in

the drawings to reduce their size and to more clearly show details of construction. Figs. II, III, IV, V, VI, and VII are drawn about twice as large as the corresponding parts in the remaining figures.

Referring to the drawings, *a* designates a stationary frame, which is of any suitable length. The frame *a* comprises, preferably, two vertically-arranged parallel side walls 15 and 15, arranged a suitable distance apart laterally and extending longitudinally of the frame and tied together in any approved manner, being connected together at the top by several cross-pieces 16, arranged at suitable intervals longitudinally of the said frame. The frame *a* comprises two bars *a'* and *a'*, which extend longitudinally of and at opposite sides, respectively, of the frame *a* and are arranged parallel and in one and the same horizontal plane. Each bar *a'* is provided upon its upper side with a series of horizontally-arranged rollers *b*, placed at suitable intervals longitudinally of the bar and arranged with their axes parallel and at right angles to the bar. The rollers *b* correspond diametrically. Each roller *b* is supported from a plate *b'*, which rests upon the respective roller-supporting bar *a'* and is secured at one end by means of screws *c* to the said bar and has its under side at or near its opposite end and below the roller engaged by a set-screw *d*, which extends through a correspondingly-threaded hole in the said bar. A roller-bearing plate *b'* and the portion of a bar *a'* supporting the said plate are shown in Figs. II and III, to which reference is made for a thorough understanding of the application and attachment of the said plate. The rollers *b* afford bearing for the glass-carrier *e*, which comprises, preferably, a lower section *f* and an upper section *g*. The lower section is shown detached in Fig. XI. The said section *f* comprises two bars 20 and 20, arranged at opposite sides, respectively, of the said carrier-section and resting upon the different series of roller *b*, respectively, of the frame *a*. Roller-bearings are employed, therefore, between the carrier *e* and the stationary frame *a*, and the wear between the rollers *b* and the bars 20 is readily taken up by slightly withdrawing the screws *c* to accommodate a readjustment of the rollers by a proper manipu-



lation of the set-screws  $d$ , whereupon the said rollers are again secured in the desired adjustment by tightening the screws  $c$ . The bars 20 and 20 are connected together at the top by two end cross-bars 21 and by several intermediate parallel cross-bars 22, arranged at suitable intervals longitudinally of the path of the glass-carrier.

The upper carrier-section  $g$  is shown detached in Fig. X. The said section  $g$  comprises two side bars 25 and 26, extending longitudinally and arranged at opposite sides, respectively, of the said section, and the said carrier-section  $g$  comprises also end pieces 27 and 27, connecting together the ends of the side bars 25 and 26. The carrier-section  $g$  comprises also two end cross-bars 28 and 28 in addition to intermediate cross-bars 24. The end bars 28 and 28 are arranged at the bottom of and contiguous to the inner surface of the different end pieces 27 and 27, respectively, of the carrier-section  $g$ , and each cross-bar 28 is instrumental in connecting together the side bars 25 and 26 of the said carrier-section. The carrier-section  $g$  comprises, furthermore, a plurality of intermediate cross-pieces 29, connecting together the side bars 25 and 26 at the top. The forward side bar 25 of the carrier-section  $g$  is provided upon the forward portion of its upper surface with a series of blocks 30, which correspond in dimensions and are secured in any approved manner to the said bar 25. The blocks 30 are arranged at short intervals longitudinally of the bar 25. The cross-pieces 29 of the carrier-section  $g$  are arranged parallel and transversely of the said section, as already indicated, and rest upon the top of the bars 25 and 26. The upper surface of each piece 29 is flush at the forward end of the said piece with the upper end of a block 30. The blocks 30 and the cross-pieces 29 afford a desirable bearing for the glass plate  $p$  which is to be operated upon, and the bearing-affording upper surfaces of the said members 29 and 30 slope preferably somewhat downwardly and forwardly to render them capable of holding the plate or sheet of glass at a slight inclination, so as to enable any water or grinding material lodging upon the plate during the grinding operation to gravitate toward the forward side of the glass-carrier and run off at the said side of the carrier. The carrier-section  $g$  comprises also a frame 35, which extends rearwardly of the rear bar 26 of the carrier-section  $g$  a suitable distance and has the upper side thereof flush with and forming a continuation of the upper surfaces of the aforesaid cross-pieces 29. The frame 35 is instrumental in affording an adequate support for a large plate of glass. The frame 35 projects rearwardly from the bar 26 at approximately right angles to the path of the glass-carrier.

One or more stationary frames  $h$  are arranged rearward of and parallel with the line of travel of the carrier  $e$ . The apparatus

illustrated comprises two frames  $h$ , arranged a suitable distance apart. Roller-bearings  $h'$  are provided between the frame or frames  $h$  and the frame 35 of the carrier-section  $g$ . The frame or frames  $h$  are instrumental, therefore, in supporting the carrier-frame 35. The plate of glass shown as being operated upon is large enough to require the support of the two frames  $h$ , but obviously an enough shorter carrier-frame 35 would require the support of only one frame  $h$ , and consequently the said frame  $g$  is detachably secured to the bar 26 by a pair of hand-clamps  $k$ .

The plate of glass to be operated upon is laid upon the carrier-section  $g$  and rests upon the members 29, 30, and 35 of the said section and projects a short distance forwardly of the said section, where a peculiarly arranged and adjustable grinding-wheel  $l$  is capable of straightening and squaring the aforesaid edge and capable also of beveling the plate at the top or at the bottom, or both top and bottom. Means for holding the plate of glass downwardly upon the glass-carrier is provided and comprises a bar  $m$ , arranged far enough above the glass-carrier to accommodate the interposition between the glass and the said bar of wedges  $w$ , placed at short intervals. The said bar  $m$  is arranged in close proximity to the forward side of the carrier-section  $g$  and extends longitudinally of and over and from end to end of the said section and is secured at its ends in any approved manner to the said section.

To prevent displacement of the glass-carrier  $e$  laterally of the frame  $a$ , the carrier-section  $f$  is provided centrally between the sides of and above the frame  $a$  with a bar  $o$ , which is arranged longitudinally of the said section parallel with the path of the glass-carrier and extends between and engages two series of vertically - arranged antifriction - rollers  $r$ , which are suitably supported from and on top of the frame  $a$ . Preferably each series of rollers  $r$  is supported from a bar  $a^2$ , forming a member of the frame  $a$  and arranged longitudinally of the said frame  $a$  and parallel with the travel of the glass-carrier, and each roller of the said series of rollers  $r$  is supported, as shown more clearly in Figs. VI and VII, from a plate  $r'$ , which is secured at one end to the respective bar  $a^2$  by screws  $r^2$  and engaged at or near its opposite end opposite its roller by a set-screw  $r^3$ , extending through a correspondingly - threaded hole formed in the said bar. By slightly withdrawing the screws  $r^2$  the rollers  $r$  can be readily readjusted by a proper manipulation of the set-screws  $r^3$  to take up wear between the rollers and the bar  $o$ , and the said rollers are secured in the desired adjustment by tightening the screws  $r^2$ .

The grinding-wheel  $l$  is arranged horizontally at the forward side of the glass-carrier and longitudinally of and parallel with the line of travel of the said carrier. The wheel  $l$  is operatively mounted upon a correspond-



ingly-arranged shaft  $l'$ , which is provided with a driving-pulley  $l^2$  and supported from a slide  $s$ , movable horizontally toward and from the path of the glass-carrier. The slide  $s$  engages a horizontally-arranged slideway  $t'$ , formed upon and extending forwardly and rearwardly of a vertically-arranged slide  $t$ , and the last-mentioned slide engages a correspondingly-arranged slideway  $u'$ , formed upon a standard or stationary object  $u$ . A vertically-arranged screw  $t^2$ , which is rendered stationary in any approved manner, so far as endwise movement thereof is concerned, engages a correspondingly-threaded nut  $t^3$ , formed upon the slide  $t$ , and a horizontally-arranged screw  $s^2$ , which is rendered stationary in any approved manner, so far as endwise movement thereof is concerned, extends forwardly and rearwardly of the machine and engages a correspondingly-threaded nut  $s'$ , formed upon the slide  $s$ . The arrangement of the slides  $s$  and  $t$ , the slideways  $t'$  and  $u'$ , the screws  $s^2$  and  $t^2$ , and the grinding-wheel is such relative to the edge of the plate of glass to be operated upon that the said wheel can be readily shifted by a proper manipulation of the screws  $s^2$  and  $t^2$  to bring the said wheel in position to straighten or square the said edge and to bevel the glass at the top or at the bottom, or both top and bottom. The forward side bar 25 of the upper carrier-section  $g$  inclines upwardly and outwardly, and the inclination of the said bar 25 accommodates the movement of the grinding-wheel somewhat in under the plate of glass, as required in beveling the bottom of the plate. Work capable of being done with facility by the apparatus hereinbefore described is shown in Fig. V. The glass-carrier is moved by hand longitudinally of the frame  $a$  during the operation of the grinding-wheel, and the abrading material is fed in any approved manner between the working peripheral surface of the said wheel and the glass being operated upon. Manual power is applied to the bar  $m$  in shifting the glass-carrier longitudinally of the frame  $a$ . The grinding-wheel is preferably gradually reduced in diameter at each end and toward the adjacent extremity to render the operation of the wheel upon the glass gradual.

To prevent a comparatively rapid impairment of the mutually-engaging threads of the vertical screw  $t^2$  and engaging nut  $t^3$  by the cutting or wear or mutilation of the said threads by the weight of the laden grinding-wheel-carrying slide  $s$ , a counterbalancing-poise  $x$  is suspended by a cable  $x'$ , which leads upwardly to and over a sheave  $x^2$ , supported in any approved manner overhead, whence the cable leads downwardly and is attached to the said slide  $s$ .

To accommodate the adjustment of the glass-carrier laterally of the path of the said carrier upon the rollers  $b$ , supporting the carrier, so as to render the path of the carrier parallel with the axial line of the grinding-wheel preparatory to the commencement of

the grinding operation, the following is provided: The bar or beam  $o$  is secured to the cross-bars 22 of the lower carrier-section  $f$  (see Figs. I and VIII) by bolts or screws  $o'$ , nuts  $o^2$ , and washers  $o^3$ . The bolts or screws  $o'$  extend upwardly through the bar  $o$  and the engaging cross-bars 22 of the carrier-section  $f$ . The nuts  $o^2$  are mounted upon the bolts or screws  $o'$  at the upper sides of the cross-bars 22 and the washers  $o^3$  are interposed between the said sides of the bars 22 and the nuts. The bolt-holes 23 in the cross-bars 22 are elongated longitudinally of the bars, and consequently transversely of the path of the glass-carrier, so that upon loosening the nuts  $o^2$  the glass-carrier is free to be adjusted laterally of the path of the carrier upon the rollers  $b$ , supporting the carrier, without interfering with the adjustment of the rollers  $r$  relative to the bar or beam  $o$ . After the apparatus is ready for operation or during the operation of the apparatus a discovery that the carrier is still not entirely accurately adjusted from end to end of the carrier relative to the grinding-wheel is sometimes made. For instance, the carrier may be found to be out of adjustment a small fraction of an inch, and the upper carrier-section  $g$  is therefore made adjustable upon the lower carrier-section transversely of the path of the carrier for the purpose of enabling the correction of any slight inaccuracy in the adjustment of the glass-carrier relative to the axial line of the grinding-wheel after the apparatus is in condition for operation or has commenced to operate, and to accommodate this adjustment of the upper carrier-section upon and independently of the lower carrier-section the upper carrier-section is secured to the lower carrier-section (see Figs. I and IX) by bolts or screws  $g'$ , nuts  $g^2$ , and washers  $g^3$ . The bolts or screws  $g'$  extend through the end cross-bars 21 of the lower carrier-section  $f$  and through the end cross-bars 28 of the upper carrier-section  $g$ . The nuts  $g^2$  are mounted upon the said bolts or screws  $g'$  at the upper sides of the last-mentioned bars, and the washers  $g^3$  are interposed between the nuts and the said sides of the bars. The bolt-holes 31 in the said bars 28 are elongated longitudinally of the said bars, and consequently transversely of the path of the carrier, to accommodate the aforesaid adjustment of the upper carrier-section upon the lower carrier-section upon loosening the nuts  $g^2$ , and the said upper carrier-section is secured in the desired adjustment by tightening the said nuts.

What I claim is—

1. Apparatus of the character indicated, comprising a stationary frame  $a$  of suitable length, a glass-carrier mounted upon and movable endwise of the stationary frame, vertically-adjustable roller-bearings between the said frame and the carrier, means for preventing displacement of the carrier laterally of the path of the carrier, means for holding



the sheet or plate of glass to be operated upon down upon the carrier at the forward side of the carrier, a grinding-wheel arranged to operate upon the sheet or plate of glass, and means whereby the said wheel is adjustable toward and from the said path and up and down, substantially as shown, for the purpose set forth.

2. In apparatus of the character indicated, the combination, with a stationary frame *a* of suitable length, and a glass-carrier mounted upon and movable endwise of the stationary frame, of rollers interposed between the frame and the carrier and arranged with their axes parallel and at right angles to the path of the carrier, plates bearing the rollers, set-screws in the stationary frame and engaging the under sides of and arranged to vertically adjust the roller-bearing plates, and other means for securing the said plates in the desired adjustment, substantially as and for the purpose set forth.

3. In apparatus of the character indicated, the combination, with a stationary frame *a* of suitable length, which frame comprises parallel bars *a'* arranged in the same horizontal plane and longitudinally of the frame, and a glass-carrier mounted upon the said bars, of rollers interposed between the upper sides of the said bars and the carrier and arranged with their axes parallel and at right angles to the path of the carrier, plates bearing the rollers, suitably-applied set-screws engaging the plates and arranged to adjust the rollers vertically, and other screws for securing the roller-bearing plates in the desired adjustment.

4. In apparatus of the character indicated, the combination, with a stationary frame *a* of suitable length, and a glass-carrier mounted upon the stationary frame, of rollers *r* arranged to prevent displacement of the carrier laterally of the path of the carrier, plates bearing the rollers and supported from the stationary frame, suitably-applied set-screws for adjusting the said roller-bearing plates laterally of the aforesaid path, and other means for securing the said plates in the desired adjustment, substantially as and for the purpose set forth.

5. In apparatus of the character indicated, the combination, with a stationary frame *a* of suitable length, and a glass-carrier mounted upon the stationary frame and provided, upon its under side, with a bar or beam extending longitudinally of the carrier, of a series of rollers engaging the said bar or beam at one side and arranged with their axes perpendicular to the line of travel of the carrier, a series of correspondingly-arranged rollers engaging the opposite side of the said bar or beam, plates bearing the rollers and supported from the stationary frame, suitably-applied set-screws arranged to adjust the plates bearing one of the said series of rollers, relative to the aforesaid bar or beam, and other

screws for securing the said adjustable plates in the desired adjustment, substantially as and for the purpose set forth.

6. In apparatus of the character indicated, the combination, with a grinding-wheel arranged in a horizontal plane, and means whereby the said wheel is rendered adjustable laterally and up and down, of a stationary frame *a* of suitable length, a glass-carrier mounted upon and movable longitudinally of the stationary frame at one side of the grinding-wheel and adjustable laterally of the path of the carrier, and means for securing the said carrier in the desired adjustment, substantially as and for the purpose set forth.

7. In apparatus of the character indicated, the combination, with a suitably-supported grinding-wheel arranged in a horizontal plane, and a stationary frame arranged at one side and longitudinally of the grinding-wheel, of a glass-carrier mounted upon and movable longitudinally of the stationary frame and provided, upon its under side, with a bar or beam *o* extending longitudinally of the carrier, which carrier comprises cross-bars *22* extending across the top of the said beam or bar *o* and having elongated holes or slots *23* arranged longitudinally of the cross-bars, means instrumental in rendering the aforesaid bar or beam *o* rigid with the carrier and comprising suitably-applied bolts or screws *o'* extending through the aforesaid slots *23*, and rollers *r* arranged to prevent displacement of the aforesaid beam or bar *o* laterally, substantially as and for the purpose set forth.

8. In apparatus of the character indicated, the combination, with a suitably-supported grinding-wheel arranged in a horizontal plane, and a stationary frame arranged at one side and longitudinally of the grinding-wheel, of a glass-carrier comprising a lower section *f* mounted upon and movable longitudinally of the stationary frame, and an upper section *g* mounted upon the lower carrier-section and adjustable laterally independently of the lower carrier-section, and means for securing the upper carrier-section in the desired adjustment.

9. In apparatus of the character indicated, the combination, with a suitably-supported grinding-wheel arranged in a horizontal plane, and a stationary frame arranged at one side and longitudinally of the grinding-wheel, of a glass-carrier comprising the following: a lower section *f* mounted upon and movable longitudinally of the stationary frame, and an upper section *g* mounted upon and adjustable laterally and independently of the lower carrier-section and comprising cross-bars having elongated holes or slots *31* arranged longitudinally of the said bars, and means instrumental in securing the upper carrier-section in the desired adjustment to the lower carrier-section and comprising bolts or screws *g'* extending through the aforesaid slots.

10. In apparatus of the character indicated,



the combination, with a suitably-supported grinding-wheel arranged in a horizontal plane, and a stationary frame arranged at one side and longitudinally of the grinding-wheel, of  
 5 a glass-carrier comprising the following: a lower section *f* mounted upon and movable longitudinally of the stationary frame and adjustable laterally, means for securing the lower section in the desired adjustment, an  
 10 upper section *g* mounted upon and adjustable laterally and independently of the lower carrier-section, and means for securing the upper carrier-section in the desired adjustment, substantially as and for the purpose set forth.

11. Apparatus of the character indicated, comprising a stationary frame *a* of suitable  
 15 length; a glass-carrier mounted upon the said frame; means for preventing displacement of the carrier laterally of its path; a grinding-wheel arranged at one side of and longitu-  
 20 dinally of the path of the carrier, a suitably-operated slide *s* carrying the said wheel and movable in a horizontal plane toward and from the aforesaid path; another suitably-  
 25 operated slide *t* movable up and down and having a slideway for the slide *s*; a standard or stationary object having a slideway for the slide *t*; a counterbalance for the slide *s* and its load, and means for holding the sheet or  
 30 plate of glass to be operated upon down upon

the carrier near the grinding-wheel, substantially as and for the purpose set forth.

12. Apparatus of the character indicated, comprising a stationary frame *a* of suitable  
 35 length, a grinding-wheel arranged at an elevation above and at one side and longitudinally of the stationary frame, means whereby the grinding-wheel is rendered adjustable laterally and up and down, a glass-carrier  
 40 mounted upon and movable longitudinally of the stationary frame alongside of the grinding-wheel and having the external surface of its forward side sloping upwardly and outwardly toward the grinding-wheel, which carrier is adjustable toward and from the grind-  
 45 ing-wheel and has a plurality of upward-facing surfaces arranged to afford bearing for the sheet or plate of glass to be operated upon and sloping downwardly toward the grinding-wheel, and means for holding the  
 50 sheet or plate of glass down upon the said plurality of surfaces near the grinding-wheel, substantially as and for the purpose set forth.

Signed by me at Cleveland, Ohio, this 4th day of March, 1901.

FREDERICK POLLARD.

Witnesses:

C. H. DORER,  
 A. H. PARRATT.