No. 731,230. PATENTED JUNE 16, 1903.

E. C. SCHRADER.

GRINDING MACHINE FOR GLASSWARE.

APPLICATION FILED NOV. 22, 1901.

NO MODEL. 3 SHEETS—SHEET 1.

Fig. 1.

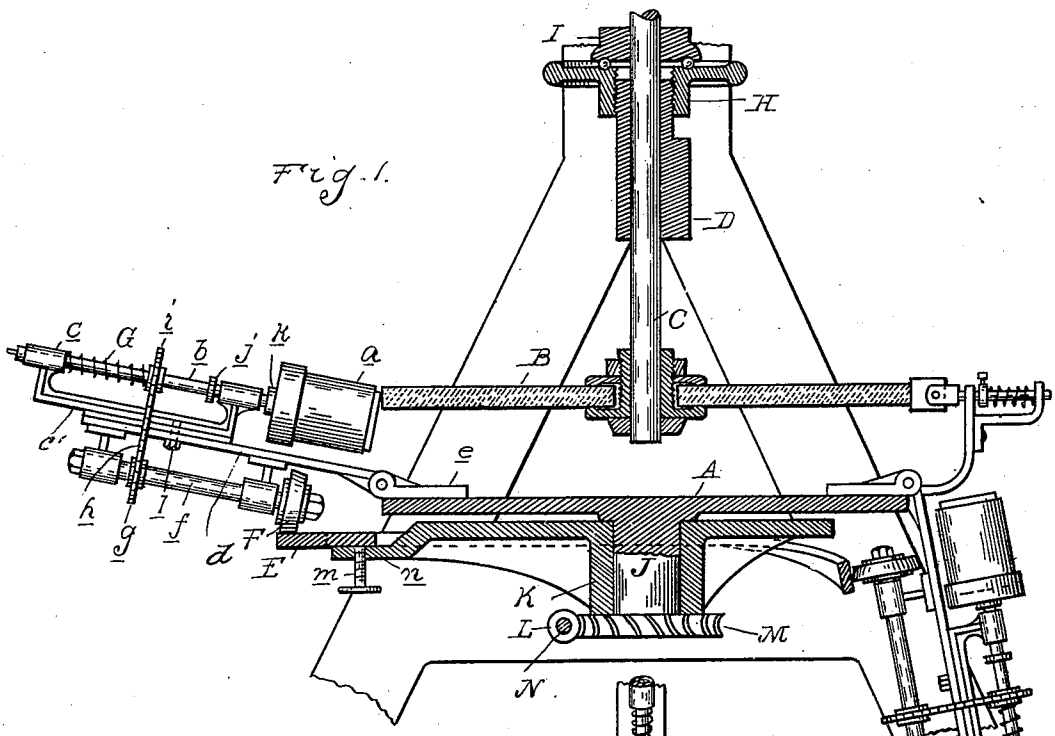
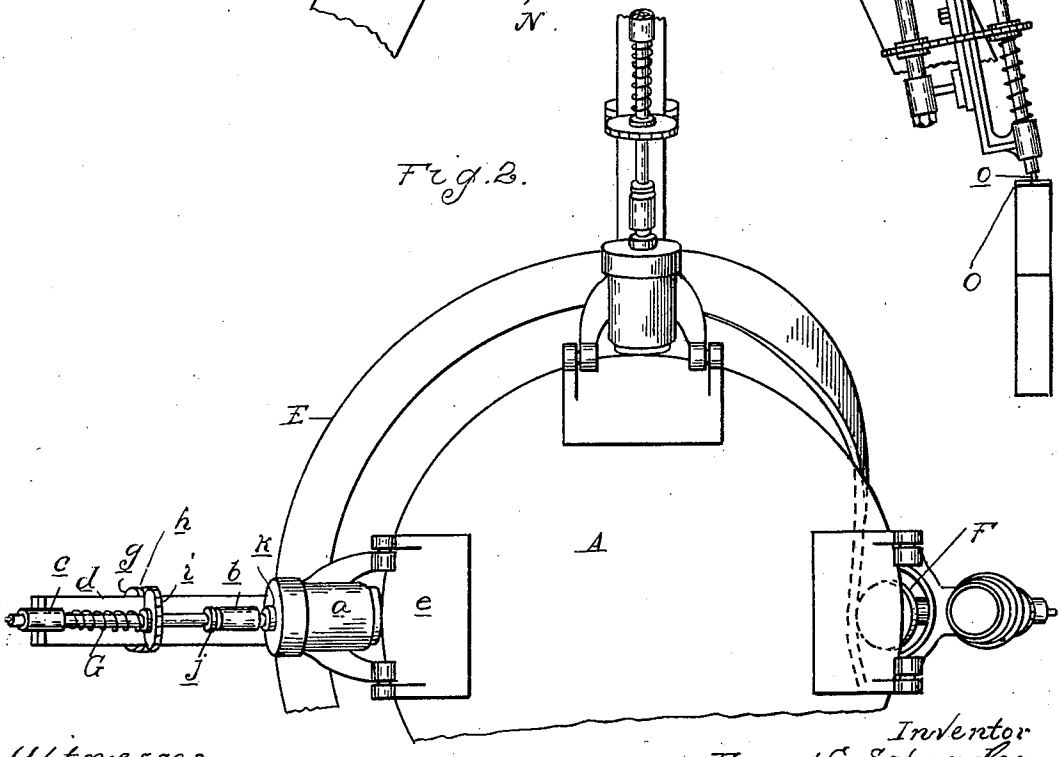


Fig. 2.



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NO MODEL. 3 SHEETS—SHEET 2.

Fig. 3.

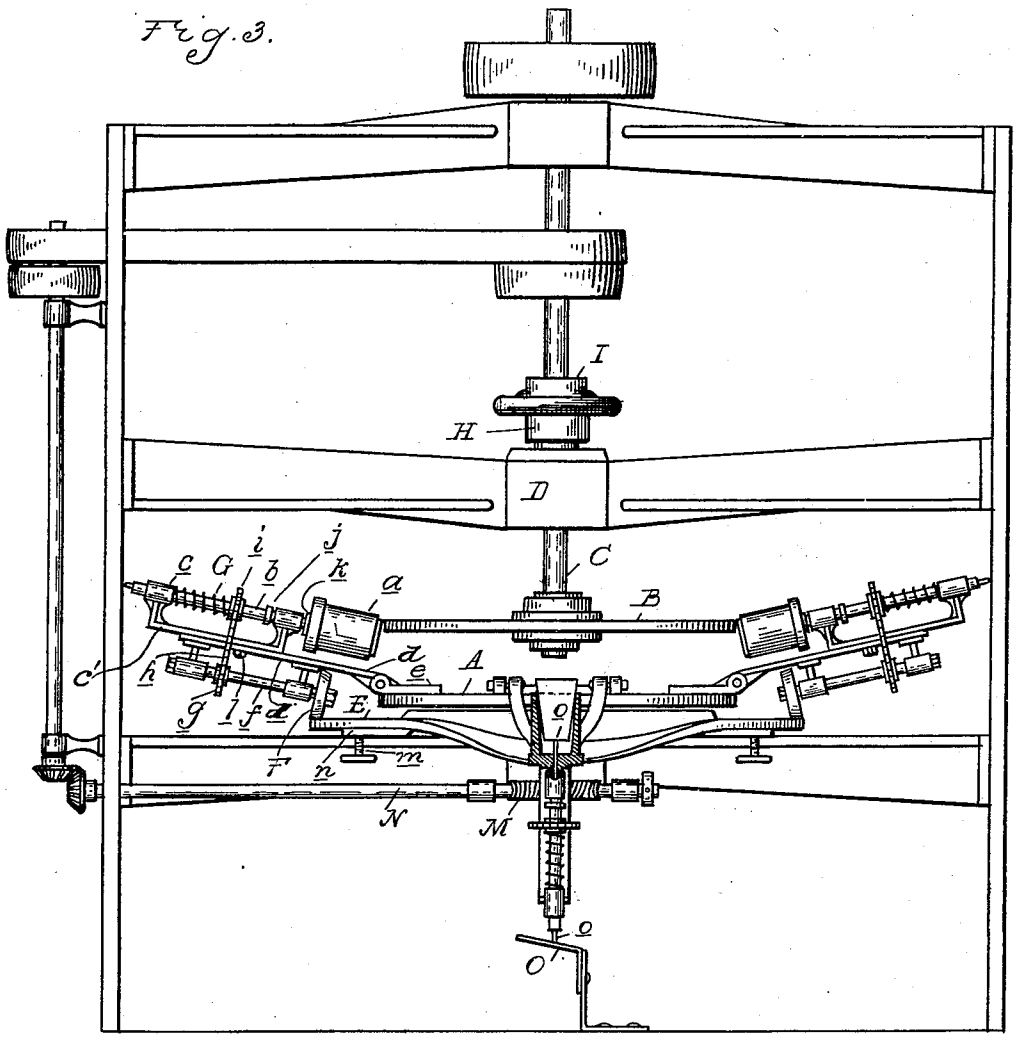
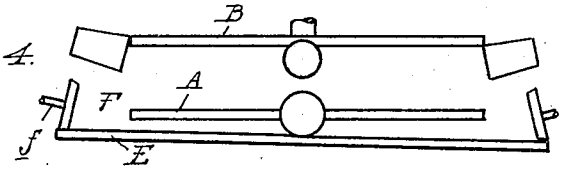


Fig. 4.



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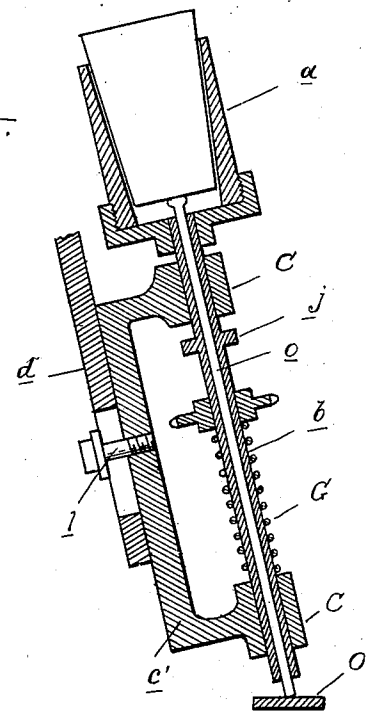
E. C. SCHRADER.

GRINDING MACHINE FOR GLASSWARE.

APPLICATION FILED NOV. 22, 1901.

NO MODEL. 3 SHEETS—SHEET 3.

Fig. 5.



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No. 731,230. Patented June 16, 1903.

UNITED STATES PATENT OFFICE.

ERNEST C. SCHRADER, OF PITTSBURG, PENNSYLVANIA, ASSIGNOR OF ONE-HALF TO HARRY C. WOOD, OF TOLEDO, OHIO.

GRINDING-MACHINE FOR GLASSWARE.

SPECIFICATION forming part of Letters Patent No. 731,230, dated June 16, 1903.

Application filed November 22, 1901. Serial No. 83,260. (No model.)

To all whom it may concern:

Be it known that I, ERNEST C. SCHRADER, a citizen of the United States, residing at Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Grinding-Machines for Glassware, of which the following is a specification, reference being had therein to the accompanying drawings.

The invention relates to machines for grinding articles of glassware, and more particularly to that class employed for grinding and trimming the edges of blown-glass articles after they have been "cracked off" from the blank.

Among the objects of the invention are, first, to render the operation more nearly automatic, so as to dispense with the necessity of skill on the part of the attendant; second, to diminish the breakage of work incidental to the operation of the machine; third, to preserve the grinding-wheel by grinding equally upon all portions of its periphery, to dispense with the necessity of axial movement of the grinding-wheel, and to provide adjustments by means of which the machine may be readily adapted for different kinds of work.

The invention consists in the peculiar construction of a machine comprising a rotary grinder and means for causing the work to travel therearound while being operated upon; further, in the means employed for limiting the pressure of the work against the grinding-surface, so as to reduce breakage; further, in the peculiar construction of mechanism for causing the travel of the work and for feeding it into and out of contact with the grinder, and, further, in the peculiar construction, arrangement, and combination of parts, as more fully hereinafter described and claimed.

In the drawings, Figure 1 is a vertical central section through the machine. Fig. 2 is a plan view of the rotary work-carrier. Fig. 3 is a front elevation thereof. Fig. 4 is a diagram of the mechanism for feeding the work across the grinder. Fig. 5 is a longitudinal section through one of the chucks and spindles, showing the manner of disengaging the work.

Upon a suitable framework is mounted a rotary work-carrier A and a rotary grinder B, arranged in axial alinement with each other. The grinder is preferably in the form of a disk-wheel mounted upon a vertical arbor C, which is journaled in bearings D upon the frame. The carrier A preferably comprises a disk or rotary head of substantially the same as the maximum diameter of the grinder-wheel and having secured thereto a series of radially-extending work-holders of the following construction.

a is a socketed holder or chuck adapted to receive the work, which in the drawings is represented as a tumbler. *b* is a spindle upon which said chuck is mounted, which is journaled in bearings *c* upon an arm *d*. The latter is secured to and projects radially from the margin of the carrier-head and in one position is adapted to hold the edge of the glass in contact with the periphery of the grinder. In order to permit of readily placing and removing the work from the holder *a*, the arm *d* is adapted to be swung into an upright position, and to this end is preferably connected to the carrier by a hinge *e*.

E is a track secured to the frame below the arm *d*, and F is a wheel or roll upon the arm *d*, running upon said track and adapted to support said arm. The track E is variable in elevation and is of such a shape that at one point the arm *d* is permitted to drop into a substantially vertical position, thereby holding the socket so that the work may be readily dropped therein. From this point the track ascends until the arm *d* is swung upward slightly beyond the horizontal, as shown on the left in Fig. 1, for the purpose of giving a bevel to the edge of the glass.

For the greater part of the distance around the track E is of a height to hold the edge of the glass in the holder in contact with the periphery of the grinders. The track is not, however, level or parallel to the plane of rotation of the grinder, but is inclined, so as to cause the work to travel across the entire periphery of the grinder during its travel therearound.

The track-wheel F in addition to its function of supporting the arm also serves to impart rotary motion to the holder. As shown, the drive connection between the wheel and

holder comprises a shaft *f*, upon which the roll is mounted, a sprocket *g* thereon, and a chain *h*, connecting said sprocket with a corresponding sprocket *i* on the spindle *b*. The spindle *b* has a longitudinal movement in its bearings between the collars *j* and *k*, and G is a spring sleeved upon the spindle between the outer bearing and the sprocket *i*, which serves to yieldingly press the work against the grinder.

To permit of adjustment to various sizes of work, as well as to take up the wear in the grinding-wheel, the holders *a* and their bearings are preferably longitudinally adjustable upon the arms *d*. As shown, this adjustment is made by attaching the bearings *c* to a plate *c'*, which is secured to the arm *d* by a bolt *l* passing through a slotted bearing, permitting of longitudinal adjustment. The bevel of the edge ground may be changed by raising or lowering the track E, which to this end is supported upon adjusting-screws *m*, passing through lugs *n* on the frame. The grinding-wheel is also preferably vertically adjustable, and, as shown, this adjustment is made by providing a screw-threaded collar H upon the bearing D, which may be raised or lowered by turning. This collar supports the collar I on the arbor, and to reduce friction balls are preferably interposed.

The rotary carrier A has a shank J, which is journaled in a bearing K on the frame, and motion is imparted to this shank through a worm-gear L, meshing with a worm M on a horizontal shaft N.

For disengaging the work from the sockets of the holders *a* the spindle *b* is preferably hollow and has a sliding shank *o* therein, which at its inner end bears against the bottom of the work.

O is a fixed cam adapted to strike against the shank *o* when the arm *d* is in its upright position and cause it to lift the work in its socket, so that the attendant may remove it.

The construction of parts being as described, in operation motion is imparted to the carrier A from the shaft N through the worm-gear connection L and M. At the same time the arbor C and grinder B are rapidly revolved by a suitable drive connection. (Not shown.) The attendant then places the tumblers or other work successively in the holders *a* as the arms *d* pass the front of the machine and are in upright position. The wheels F will then mount the incline of the track E and throw the upper edge of the work into contact with the periphery of the grinder, against which it is then held by the uniform tension of the spring G until the circuit of the grinder is completed and the arm is again dropped into an upright position. During the travel around the grinder the contacting edge of the glass will be moved across the periphery of the wheel in the manner and for the purpose before described. Just before the starting-point is again reached the shank *o* will strike against the cam O and disengage the work from the holder, so that it may be removed and replaced by an unground glass.

With a machine constructed as above described the wear of the grinding-wheel will be very uniform, both on account of the uniform pressure of the work thereon and because of the travel of the work across the periphery of the wheel. Should it be necessary to provide additional means for keeping the periphery even, a truing device, such as P, may be arranged between the points where the work enters and leaves contact with the grinder.

What I claim as my invention is—

1. In a machine for grinding glassware, the combination with a rotary grinder having a fixed plane of rotation, of a holder for the work in contact with the periphery of said grinder, and means for causing said holder to travel around said grinder in a path at an angle to the plane of rotation whereby said work is fed across the peripheral grinding-surface.

2. In a machine for grinding glassware, the combination with a grinder having a fixed plane of rotation, of a holder for the work in contact with the periphery of said grinder, a carrier upon which said holder is mounted revoluble about the axis of said grinder and a track upon which said carrier is supported inclined to the plane of rotation of said grinder.

3. In a machine for grinding glassware, the combination with a rotary grinder, of carrier revoluble around said grinder, a rotary chuck for holding the work in contact with the grinding-surface, movable upon said carrier, a track-wheel for supporting said carrier having a drive connection with said chuck, and a track upon which said wheel travels.

4. In a machine for grinding glassware, the combination with a rotary grinder, of a carrier revoluble around said grinder, a rotary chuck for holding the work in contact with the peripheral surface of said grinder, a track-wheel for supporting said carrier having a drive connection with said chuck, and a track over which said wheel travels arranged at an angle to the plane of rotation of said grinder whereby the work is fed across the periphery thereof and is simultaneously rotated.

5. In a machine for grinding glassware, the combination with a rotary grinder, of a rotary work-holder adapted to revolve the edge of the work in contact with the periphery of said grinder, a carrier for said holder adapted to revolve about said grinder, and an arm hinged to said carrier upon which said holder is mounted the angle of said arm being adapted to be adjusted to alter the bevel at which the edge of the work is ground.

6. In a machine for grinding glassware, the combination with a rotary grinder, of a rotary holder adapted to revolve the edge of the work in contact with said grinder, a carrier revolving about the axis of said grinder, an

arm hinged to said carrier to swing in a vertical plane and having said holder mounted thereon, a wheel supporting said arm and having a drive connection with said holder, and a track around which said wheel travels, vertically adjustable to alter the inclination of said arm.

7. In a machine for grinding glassware, the combination with a rotary grinder, of a rotary work-holder, a carrier upon which said holder is mounted revoluble around said grinder, and means automatically operated by the rotation of said carrier for moving said rotary work-holder from a position adapted to receive the work into a position for holding the work in contact with the grinding-surface.

8. In a machine for grinding glassware, the combination with a rotary grinder, of a rotary holder having a socket for receiving the work, a head revoluble around the axis of said grinder, an arm hinged to said head to swing in a vertical plane, and having said rotary holder mounted therein, and a track for supporting said arm, a portion of said track being depressed to permit said holder to assume an upright position for receiving the work and said track then inclining upward to swing said arm into a position where the work is in contact with the grinding-surface.

9. In a grinding-machine for glassware, the combination with a rotary grinder and a rotary work-holder, the latter having its axis in the same plane with but at an angle to the axis of the former, and a mechanical feeding device for automatically moving the work in said holder into contact with the periphery of said grinder.

10. In a grinding-machine for glassware, the combination with a grinder and the work-holder, of a mechanical device for moving the same into operative relation, adapted to gradually press the work in contact with the grinding-surface.

In testimony whereof I affix my signature in presence of two witnesses.

ERNEST C. SCHRADER.

Witnesses:
JOHN SENDELBACH,
ALBERT G. WALTER.