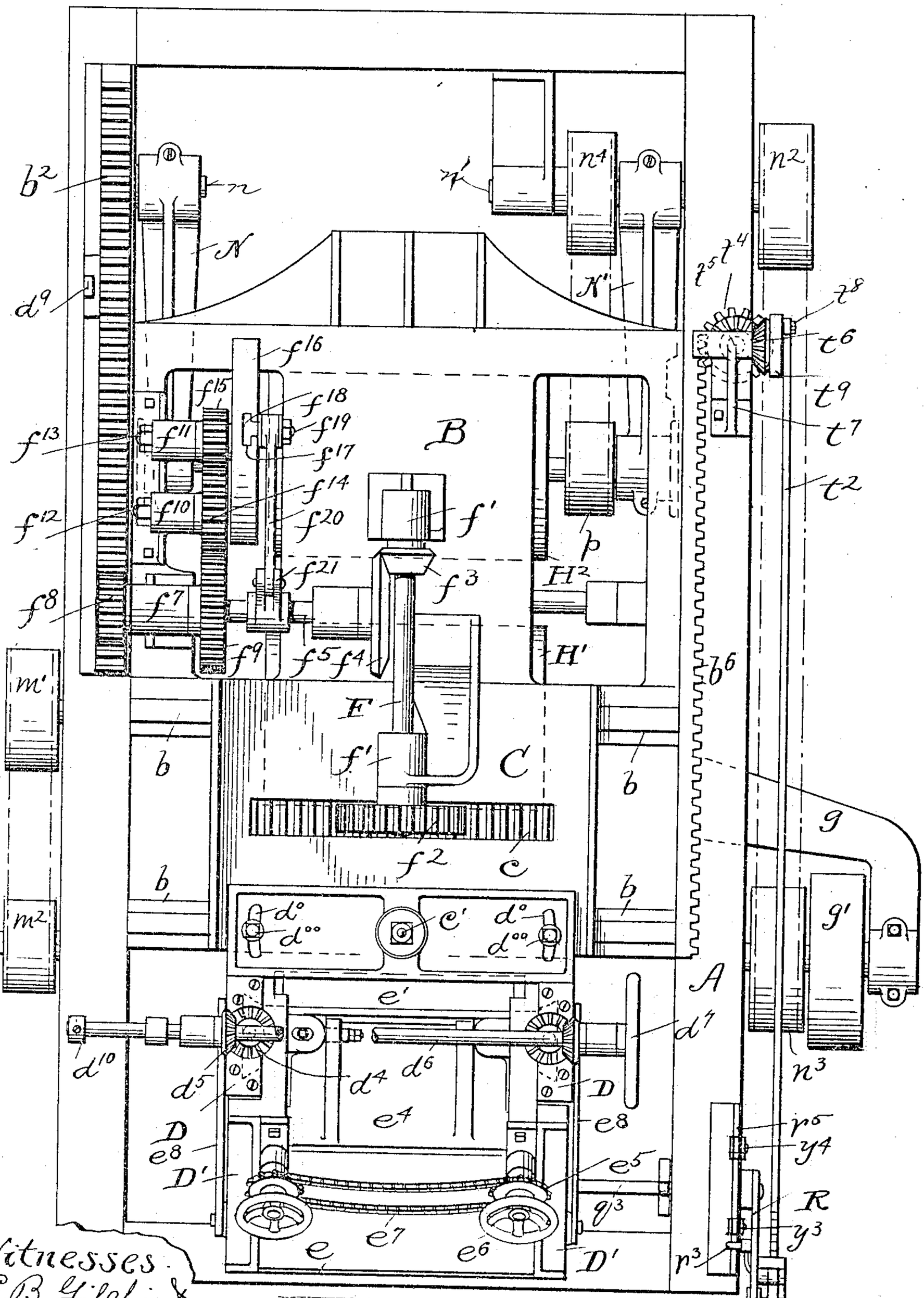
No. 766,084. PATENTED JULY 26, 1904.

P. E. WELTON.

GLASS BEVELING MACHINE.

APPLICATION FILED JUNE 29, 1903.

NO MODEL. 5 SHEETS—SHEET 1.



Witnesses.
E. B. Gilchrist
N. L. Brennan

Fig. 1.

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attys.

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5 SHEETS—SHEET 2.

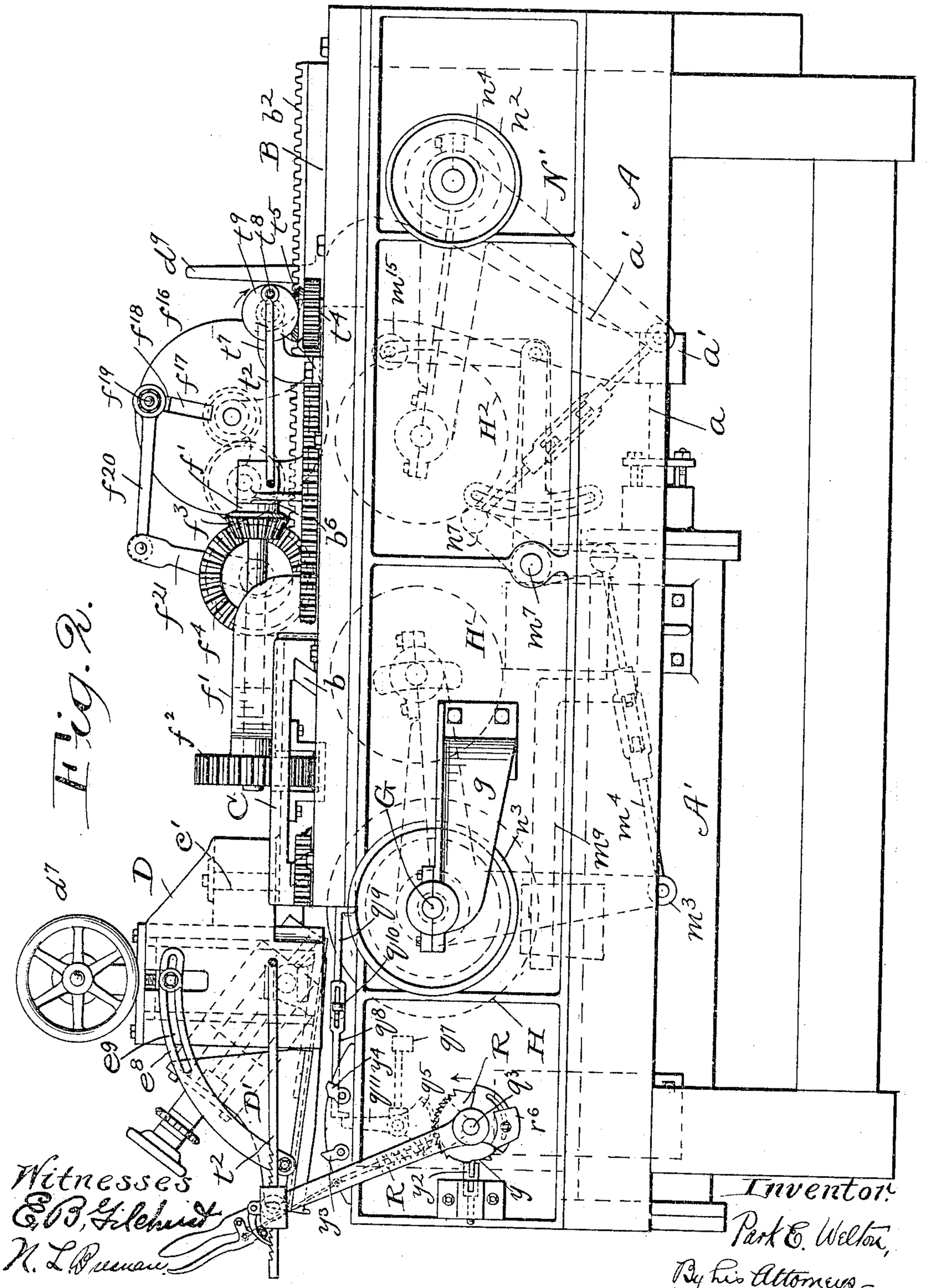

Fig. 2.

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NO MODEL. 5 SHEETS—SHEET 3.

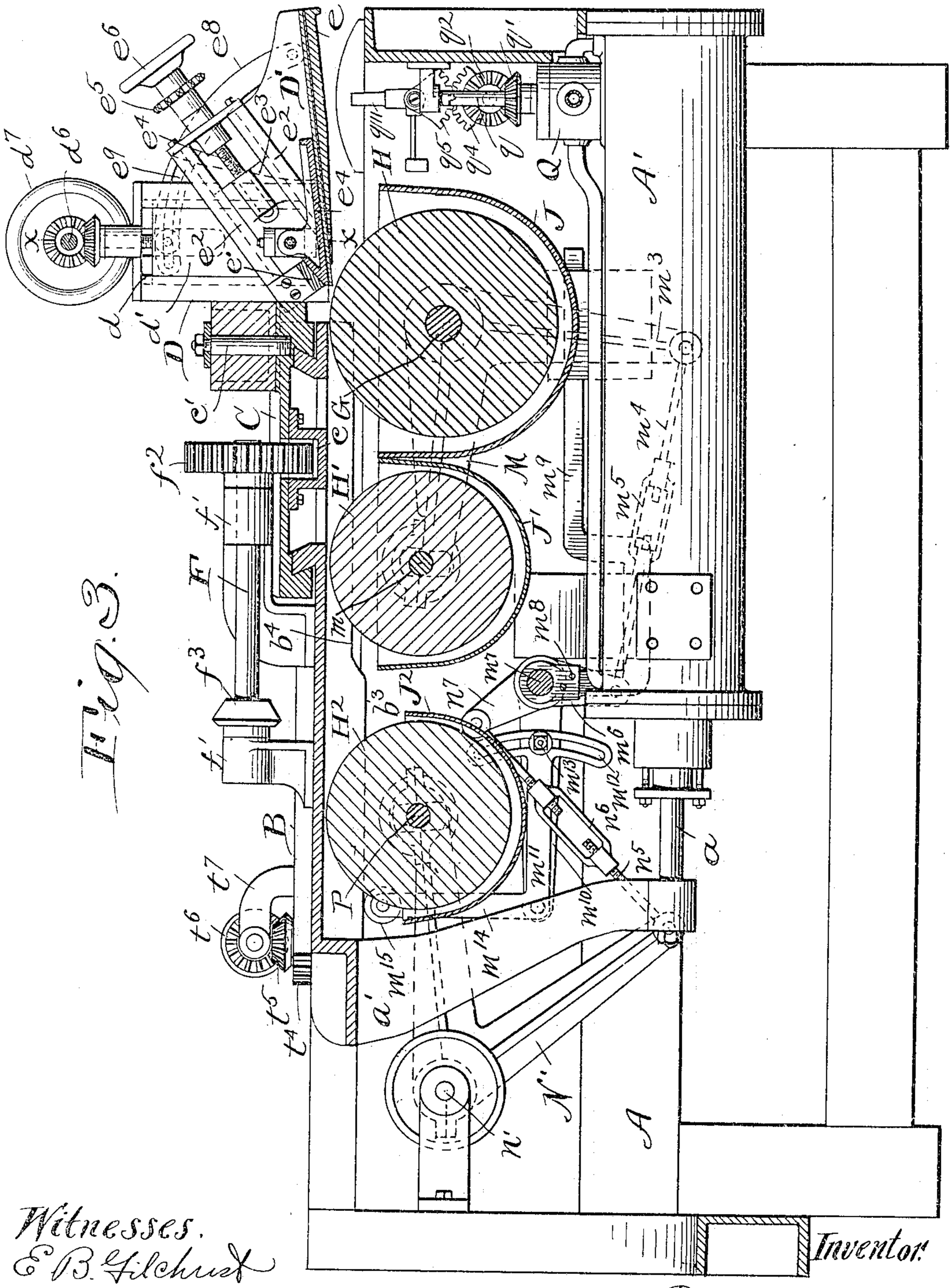

Fig. 3.

Witnesses.
E. B. Gilchrist
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Thurston & Bates

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NO MODEL. 5 SHEETS—SHEET 4.

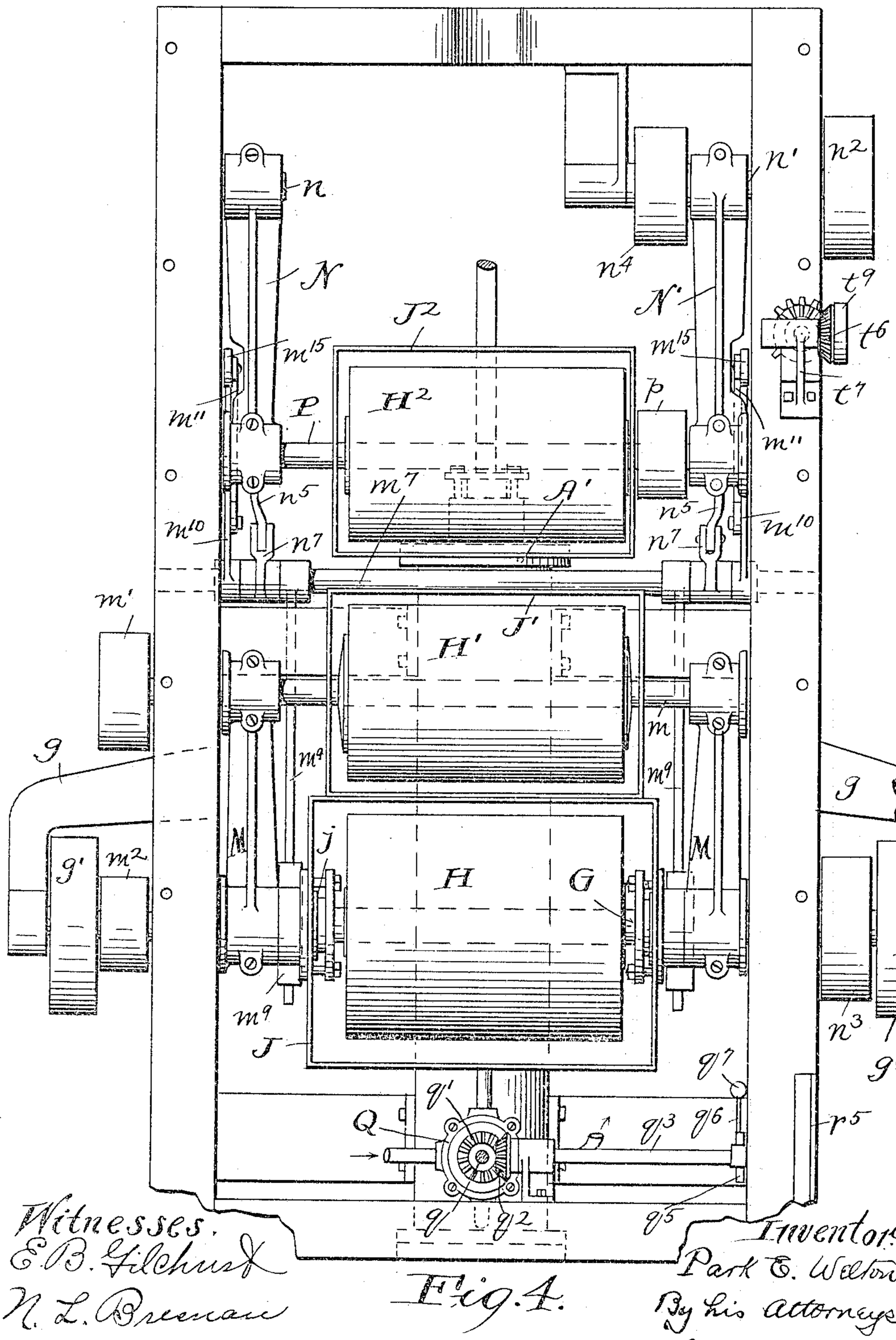

Fig. 4.

Witnesses:
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No. 766,084. PATENTED JULY 26, 1904.

P. E. WELTON.

GLASS BEVELING MACHINE.

APPLICATION FILED JUNE 29, 1903.

NO MODEL. 5 SHEETS—SHEET 5.

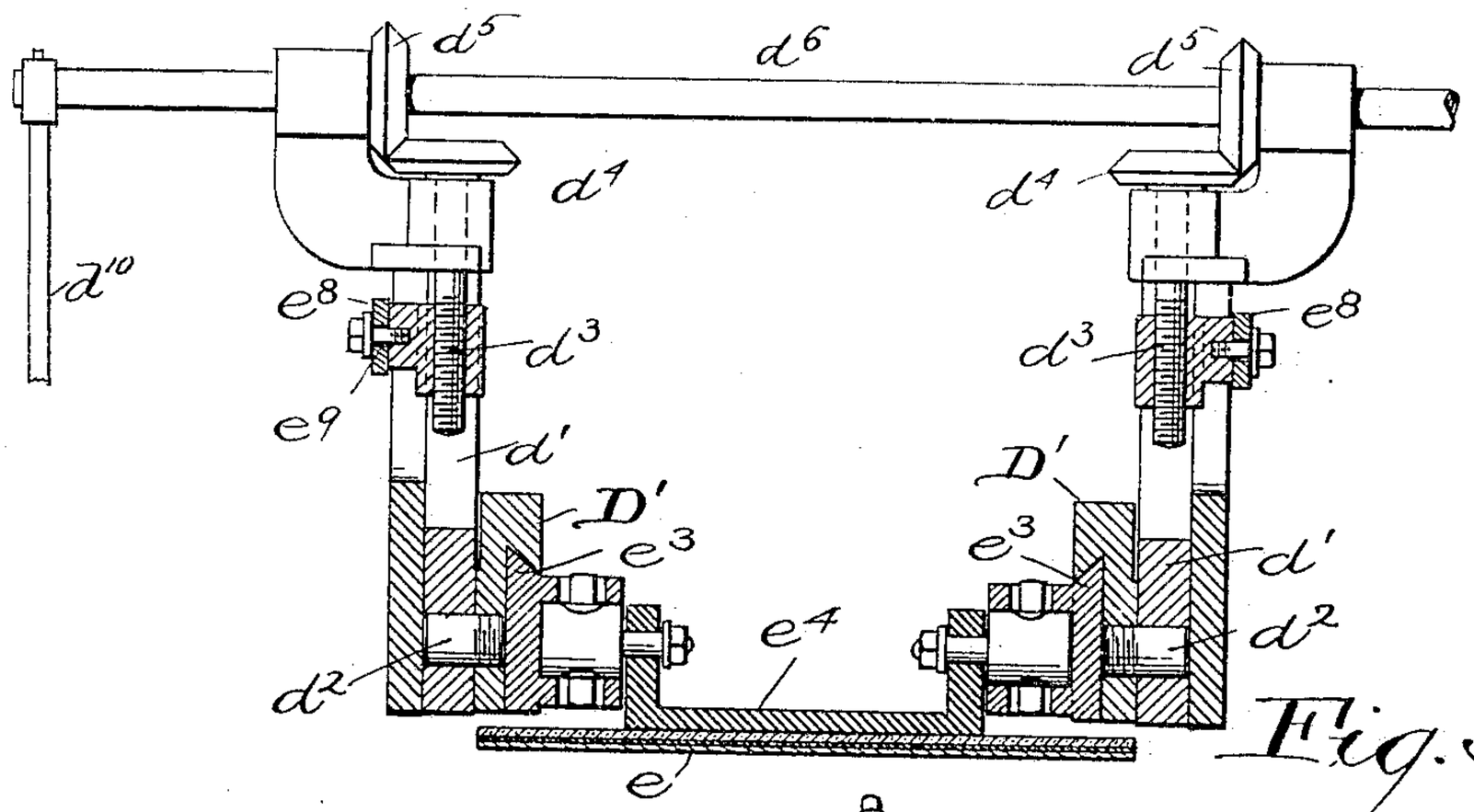

Fig. 5.

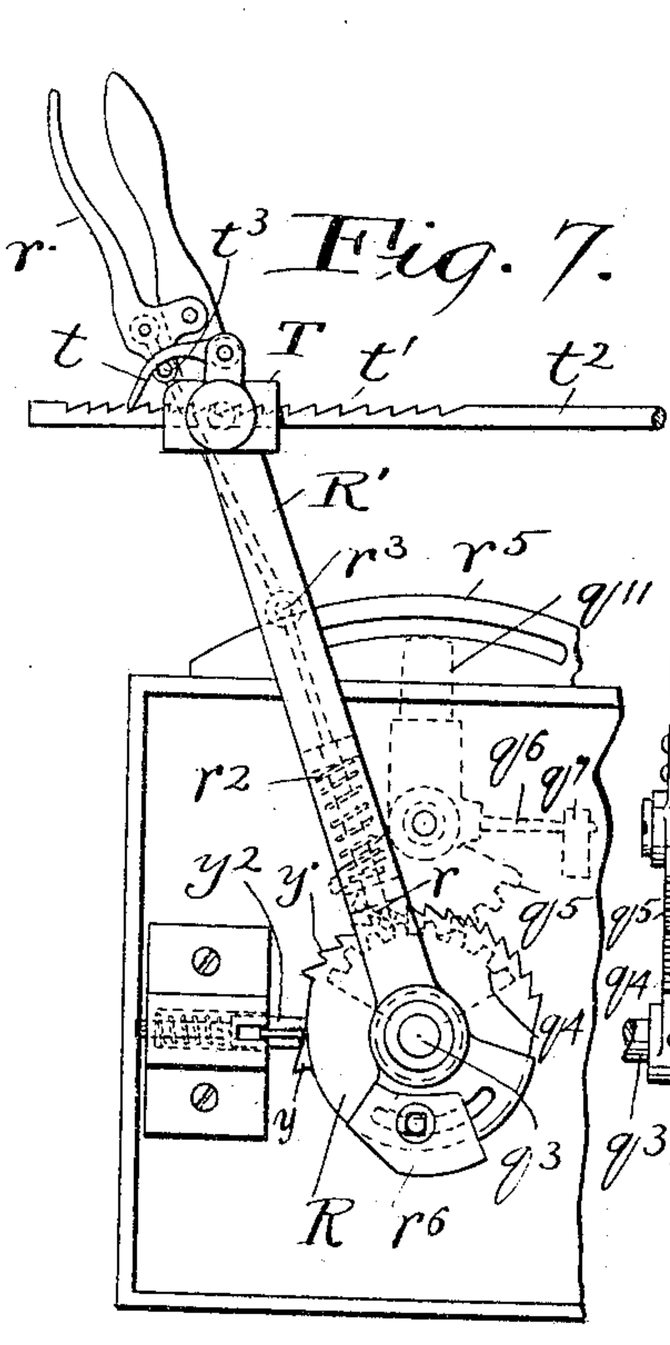

Fig. 7.

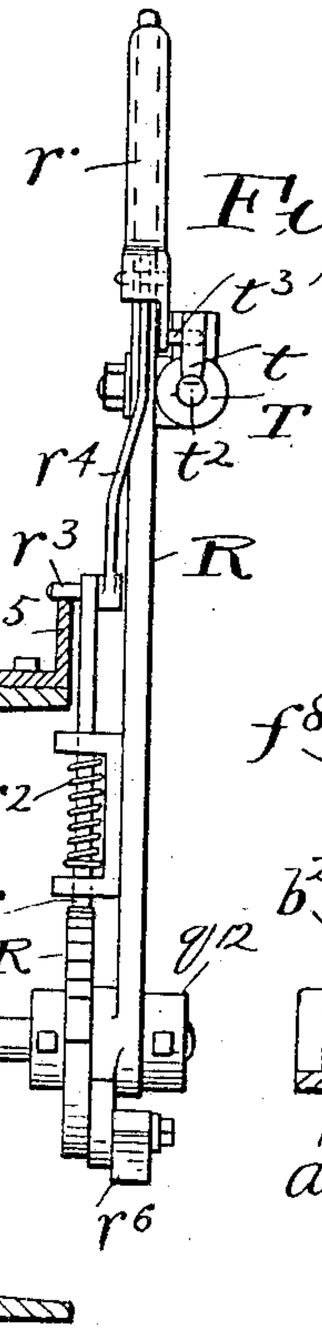

Fig. 8.

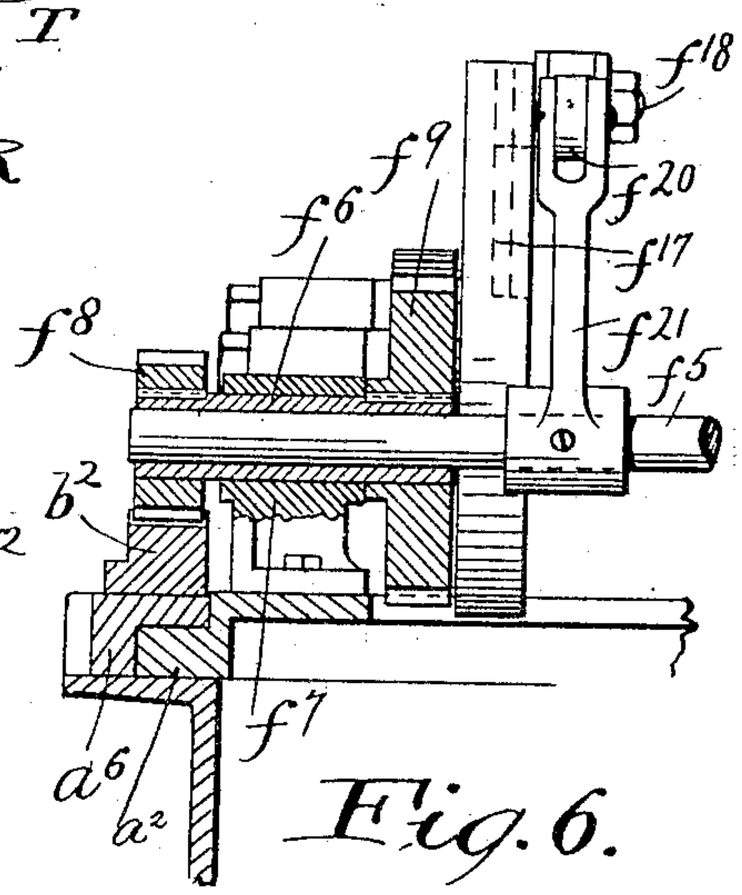

Fig. 6.

Witnesses
E. B. Gilchrist
N. L. Freeman.

Inventor:
Park E. Welton,
By Thurston & Dale,
Attorneys.

No. 766,084. Patented July 26, 1904.

UNITED STATES PATENT OFFICE.

PARK E. WELTON, OF AKRON, OHIO, ASSIGNOR TO THE ACME GLASS MACHINE COMPANY, OF AKRON, OHIO, A CORPORATION OF DELAWARE.

GLASS-BEVELING MACHINE.

SPECIFICATION forming part of Letters Patent No. 766,084, dated July 26, 1904.

Application filed June 29, 1903. Serial No. 163,468. (No model.)

To all whom it may concern:

Be it known that I, PARK E. WELTON, a citizen of the United States, residing at Akron, in the county of Summit and State of Ohio, have invented a certain new and useful Improvement in Glass-Beveling Machines, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings.

This invention relates to improvements which I have made upon the glass-beveling machine for which I have now pending an application for United States Letters Patent, Serial No. 108,746, filed May 23, 1902.

These improvements relate particularly to certain mechanisms provided in connection with the polishing-drums for raising the same out of the tanks which contain the polishing material, mechanism in connection with the plate-holder for elevating the same and for presenting the glass to the different grinding and polishing drums at the proper angle, for operating the plate-holder transversely across the machine during its passage over the grinding-drum and the polishers, for elevating the plate-holder as it is returning over the polishers and the grinding-drum, and for certain valve-operating device whereby a slow motion is given to the table and the plate-holder as the glass is passing over the grinding-drum and over the several polishing-drums and whereby it will receive a fast motion when traveling between them.

Referring to the drawings, Figure 1 is a top plan view of the machine constructed according to the invention, showing all the parts in their relative positions. Fig. 2 is a side elevation of the same. Fig. 3 is a longitudinal vertical section. Fig. 4 is a top plan view of the machine-frame with the sliding table removed, showing the grinding-drum and polishers mounted in their respective positions, together with the mechanisms for rotating the same and also the mechanism for elevating the polishing-drums. Fig. 5 is a transverse section on the line x x, Fig. 3, showing the clamping-plate and the parts for operating same. Fig. 6 is a detailed view, partly in section, showing the mechanism for operating the plate-holder transversely across the machine. Fig. 7 is a detailed view of the valve-operating mechanism, and Fig. 8 is another view of the same device.

Referring to the parts by letters, A represents the frame of the machine, constructed in a suitable manner to contain all the parts necessary to the device. Secured to this frame at any suitable point, but preferably on its longitudinal center and near the lower part thereof, is a fluid-pressure operating-cylinder A′, which is of sufficient length to give a stroke for meeting all the conditions. Projecting from this cylinder is a piston-rod a, which is connected by a rigid arm a' with the longitudinal sliding table B, which is arranged to slide in suitable guideways a^2, secured to the upper part of the frame. This mechanism just described is for the purpose of shifting the table longitudinally, and there is a device in connection with the valve-controlling ports leading to the front and rear end of this cylinder for the purpose of governing the movements of the table. This device will be hereinafter described.

I will now proceed to describe the plate-holder, the means for turning the same horizontally at different angles to the axis of rotation of the drums, the means for raising and lowering it, and also the means whereby it is moved transversely across the machine at different stages in the beveling operation.

Secured to the table B are transverse guides b, engaging suitable grooves on the under side of a transversely-operating table C, having secured to the same, preferably on the under side, a rack c and on its upper side an upwardly-projecting pin c'. Upon this pin c' is pivoted a plate-holder frame D, having circumferential slots d^0 therein for the passage of adjusting-bolts d^{00} and also having guideways d for receiving the plate-holder slides d'. These slides d' are provided with trunnions d^2, which are screwed or otherwise secured in the plate-holder D′, and also with screw-threaded openings for receiving the elevating-screws d^3, which have on their upper

ends beveled gears d^4, meshing with beveled gears d^5, rigidly carried by an operating-shaft d^6. This shaft has a hand-wheel d^7 thereon for rotating the same and also has a depending arm d^{10}, which is adapted to be engaged by a stop d^9, carried by the longitudinally-movable table.

The plate-holder D′ is substantially of the configuration shown in Fig. 3, having a flat bottom plate e, upon which the plate of glass is adapted to lie in a flat position, and a cross-plate e', one face of which is disposed at an angle to the bottom plate e. The plate-holder is also provided with guides e^2, which are also at an angle to the bottom plate and have mounted between them sliding blocks e^3, one on each side of the plate-holder, to which is swung a wedge-shaped clamping-block e^4. This clamping-block e^4 is so arranged that one face thereof takes against the plate e', while the other face thereof takes against the upper surface of the glass plate which is upon the bottom plate e. At the head of each pair of guideways e^2 is a boss having an opening therethrough for the passage of a screw e^4, which engages a screw-threaded opening in the sliding block e^3. Rigid with each of these screws is a sprocket-wheel e^5 and a hand-wheel e^6 for the purpose of rotating the same. The two sprocket-wheels are geared together by a chain e^7 passing from one to the other; but sufficient slack is provided in the chain so that a slight movement may be given to one or the other of the screws without varying the other.

Secured to either side of the plate-holder D′ is a segment-bar e^8, which is pivoted to the plate-holder at one end and is adjustably secured at the other end to the slides d' by means of a cap-screw. This adjustment is brought about by a slot e^9 in the bar, which operates in connection with the cap-screw.

In operating the plate-holder the plate of glass is placed on the bottom plate e with the edge which is to be beveled extending beyond the front edge of said bottom plate. The clamping-block e^4 is then brought down upon the upper surface thereof, and the glass plate is firmly clamped to the bottom plate through the action of the plate e' upon the wedge-block. Should there be any unevenness in the thickness of the glass—that is, should one side of the glass be a small fraction of an inch thicker than the opposite side—the sliding block e^3 upon that side of the machine corresponding to the thin portion of the glass may be turned down a sufficient distance to firmly clamp that side of the plate and prevent chattering. The plate-holder, with the glass, may be moved up or down by means of the screw d^3 and the shaft connection d^6. After the glass has been presented to the grinding-drum and polishers and the carriage is again ready to return to its initial position the stop b^9 will engage the depending arm d^{10}, which operation will rotate the shaft d^6 and raise the plate-holder.

In order that the grinding-drum and the several polishing-drums shall be worn evenly when grinding narrow pieces of glass, it is necessary to provide some means whereby the plate-holder will have a zigzag motion throughout its course during the several operations. This is brought about in the following manner: Mounted upon the table B is a longitudinal shaft F, adapted to rotate in suitable bearings f'. This shaft is so located that a gear-wheel f^2, keyed to the end thereof, will project through a suitable opening through the top of the table C and engage with the rack c. At any suitable point in the shaft F is a beveled pinion f^3, which is adapted to mesh with a beveled gear f^4, keyed to a transversely-mounted shaft f^5, which extends through a sleeve f^6, rotatively mounted in a suitable bearing f^7. This sleeve f^6 carries on its outer end a pinion f^8 and on its inner end a gear-wheel f^9. The pinion f^8 meshes with a rack b^2, secured to the upper edge of the frame. Secured to the top of the table in the vicinity of the bearing f^7 are two upwardly-projecting brackets f^{10} and f^{11}, carrying studs f^{12} and f^{13}. Upon one of these studs is loosely mounted a gear-wheel f^{14}, which meshes with the gear-wheel f^9 upon the sleeve f^6. Upon the other stud, f^{13}, is a pinion f^{15}, loosely mounted upon said stud and carrying a crank-disk f^{16}. This crank-disk f^{16} has a T-shaped radial recess f^{17} therein for the purpose of receiving a crank-pin block f^{18}. This block f^{18} carries a crank-pin f^{19} and has connected therewith by means of a link f^{20} a rock-arm f^{21}, which is keyed to the shaft f^5.

It will be seen from the foregoing description that as the table B moves longitudinally along the frame the pinion f^8 will engage with the stationary rack b^2, and a rotary motion through the gears just described will be conveyed to the crank-disk f^{16}. The rotation of the crank-disk f^{16} conveys through the link f^{20} a rocking motion to the rock-arm f^{21}. This rocking motion is conveyed to the shaft f^5 and a partial rotation given to the beveled gear f^4. This rotation of the beveled gear will rotate the pinion f^3, and consequently the shaft F and also the gear-wheel f^2, which is keyed onto the end of the shaft F, and since this gear-wheel is in mesh with the rack c, secured in the transversely-guided table, a transverse movement will be conveyed to said table C.

The parts of the mechanism just described are so arranged and may be so adjusted that as the plates start over the grinding-drum one side of the glass will be substantially in a line with the end of said drum with the plate projecting beyond the same, and when the glass leaves the grinding drum its opposite side is

practically on a line with the opposite end of said drum. This is true also of the polishers, and it will be seen by this arrangement that the grinding-drum and the several polishers will be worn evenly no matter what size plates of glass are being beveled.

I will now proceed to describe the grinding-drum and the several polishers and also the device in connection with the latter for drawing them up into position to operate upon the plates. Near the head of the machine, or that end where the glass plates are started in their unground condition, I provide a transverse shaft G, which runs clear through the machine and is supported by suitable brackets g, secured to the outside of the frame. Two driving-pulleys g' are provided upon this shaft for rotating the same and for equalizing the strain throughout the machine. Upon this shaft and located substantially in a central position with respect to the frame is the grinding-drum H, which is keyed to the shaft and is adapted to be rotated thereby. This grinding-drum rotates in a trough J, which is provided with a supply of water in any suitable manner. Suitable boxes j are arranged around the shaft G and secured to the ends of the trough for the purpose of preventing the water from leaking out at these points. Swung upon this shaft G are two bell-crank brackets M, one on each side of the grinding-drum H. In the forward ends of these brackets is rotatably mounted a shaft m, carrying a polishing-drum H′, which is rigidly secured thereto in a line with the grinding-drum. The shaft m has at its outer end a driving-pulley m'. This pulley m' is belted with a pulley m^2, secured to the shaft G. Beneath the polishing-drum H′ is a trough J′, which carries a suitable polishing material therein. The ends of the trough J′ are slotted adjacent to the shaft m, so that the said shaft will be free to operate up and down therein.

On the downwardly-projecting arms m^3 of the bell-crank brackets M are pivoted two links m^4, which are provided with turnbuckles m^5 for adjusting the length thereof. These links m^4 are in turn pivoted to an arm m^6, keyed to a rock-shaft m^7. This rock-shaft m^7 is provided with an arm m^8, which is rigidly secured thereto and has extending therefrom a weighted arm m^9. The tendency of this weighted arm is to rock the shaft m^7 in a direction to raise the polishing-drum H′ through the link m^4 and arm m^3; but the polishing-drum H′ is, however, held down against this tendency by means of an operating-arm m^{10}, rigid with said rock-shaft m^7 and carrying at its free end a bell-crank lever m^{11}, which is pivoted thereto with one arm extending in the direction of said operating-arm m^{10}. A circumferential slot m^{12} in this bell-crank arm embraces a screw m^{13}. The other arm, m^{14}, extends upward and carries a friction-roller m^{15}, which is arranged to bear up against a flange b^3 on the under side of the table. This flange b^3 has an offset portion b^4, (shown in Fig. 3,) so that when the table comes to the offset portion the arm m^{10} will force the friction-roller m^{15} upward and the weighted lever m^9 will rock the shaft m^7, which in turn will raise the polishing-drum H′ up into position to operate upon the glass, as just described.

Means are provided in connection with the device for raising the first polishing-drum H′, for raising the second polishing-drum H^2, and this mechanism consists of two bell-crank brackets N and N′, N being pivoted upon a stud n and N′ being pivoted upon a shaft n', which is suitably mounted in the frame and projects beyond the outside thereof, where it is provided with a pulley n^2, adapted to be geared with the pulley n^3, mounted upon the shaft G. The shaft n' is also provided with a second belt-pulley n^4 on the inside of the frame. In the horizontal members of the bell-crank brackets N and N′ is rotatively mounted a shaft P, which carries the polishing-drum H^2 in a line with the other polishing-drums and also carries a belt-pulley p, which is keyed to the same and is arranged to be geared with the belt-pulley n^4. A trough J^2 is provided in connection with this polishing-roll H^2 and is similar in construction to J′. To the downwardly-extending arms of the bell-crank brackets N and N′ are links n^5, which are in turn provided with turnbuckles n^6 for adjusting the same and are pivoted to arms n^7, rigid with the rock-shaft m^7, so that when said rock-shaft is operated by the weighted lever and the polishing-drum H′ is thrown into operating position the polishing-drum H^2 will also be thrown up in like manner. The object of so arranging the polishing-drums is to provide means whereby said drums will be removed from the polishing material in the trough when they are acting upon the glass. This of course prevents an undue spattering of the polishing material.

It is necessary in operating the machine to provide some means whereby the glass plate will be conveyed over the grinding-drum at a slow speed and will be conveyed from there to the first polishing-drum at a fast speed in order to save time and will then return to the slow-speed motion over the polishing-drum, and so on from each successive polisher. I bring about this result by a mechanism for controlling the inlet of the fluid-pressure to the cylinder A, and the mechanism which I employ is the following:

Located at any suitable point near the cylinder A′, I provide a valve of a rotary type and so arranged that it will connect up the motive fluid in such a way that the table can be carried backward or forward at will and also so that the speed at which the table is conveyed may be limited, as desired. Such a valve is shown at Q and has a valve-stem q projecting through the casing and out at the top.

Upon this stem q is a beveled pinion, q', which meshes with another beveled pinion q^2, secured to a shaft q^3, extending to the outside of the frame. Just inside the frame the shaft q^3 is provided with a gear-segment q^4, which meshes with a gear-segment q^5, mounted on a stud secured to the frame. The gear-segment q^5 is provided with a rigid arm q^6, extending in a horizontal direction and having a weight q^7 thereon tending normally to rock said segment upon its stud, and thereby rock the segment q^4, which in turn would rotate the shaft and throw the valve Q into a reverse position. This segment q^5, however, is held against such movement by a stop q^8, (shown in Fig. 2,) rigidly carried by the end of the table, engaging an arm q^{11}, carried by said segment q^5. This stop consists of two members q^8 and q^9, which are adjustably united by a clamping-bolt q^{10}, passing through slots therein. It will be seen that when the table is in the position shown in Fig. 2 the weight q^7 is tending to hold the arm q^{11} against the stop q^8, and the table is then at a standstill, the segment q^5 having turned the valve in a position so that the valve is neutral.

For operating the shaft q^3 to open the valve, so as to start the machine, and also to further open it to give the fast speed and also for permitting the closing of the valve to obtain the slow motion when the plate is passing over the grinding-drum or the polishers I provide the mechanism shown in Figs. 7 and 8. This mechanism consists of a ratchet-segment R, keyed to said shaft q^3, and a hand-lever R′ loose upon said shaft and having a suitable pawl r, which is connected with a grip-piece r', pivoted to the upper end of the hand-lever R′. This pawl is normally held in contact with the ratchet-segment by means of a helical spring r^2 and has a pin r^3, upon which is pivoted a link r^4, connecting said pawl with said grip-piece r'. This pin r^3 extends out to a point where it normally remains adjacent to the upper edge of a segmental plate r^5, secured to the frame of the machine. The hand-lever R′ is loose upon the shaft q^3 and is retained in position by means of a collar q^{12}. Pivoted to the hand-lever R′ near it upper end is a socket T, carrying a pawl t, which is adapted to engage teeth t' on a reciprocating rod t^2. A pin t^3 projects from the grip-piece r' to a point where it can engage underneath the pawl t and lift the same from engagement with the teeth t'.

Reciprocating motion is conveyed to the rod t^2 by the table B through a rack b^6, secured thereto, preferably upon the side, and engaging with a gear-wheel t^4, loosely mounted upon a stud secured to the frame and carrying a beveled gear t^5, which in turn meshes with a beveled gear t^6, rigid with a shaft rotatively mounted in a bracket t^7. Upon the face of the beveled gear t^6 is a crank-disk t^9, which has secured therein a crank-pin t^8, to which is pivoted the rod t^2.

The ratchet-segment R is provided with an isolated tooth y beyond the regular course of ratchet-teeth y'. Between this isolated tooth and the regular teeth a spring-actuated pawl y^2 is adapted to rest, as is shown in Fig. 7. This arrangement takes place when the machine is at rest, or in the position shown in Fig. 2, with the table in its rearward position and with the stop q^8 in engagement with the arm q^{11}. The opening of the valve to permit the table to advance is accomplished by shifting the hand-lever R′ forward until the isolated tooth y rests upon the top of the pawl y^2. The table is then traveling at what is termed the "slow motion," and the bevel is being ground on the plate of glass. This continues until the crank-pin t^8 is upon the side of the center of the crank-disk t^9 opposite to that shown in Fig. 2, when there is no motion conveyed by the moving rod t^2 to the hand-lever on account of the ratchet-teeth t' slipping under the pawl t; but when the crank-pin t^8 starts back over the center toward the position it first held then the pawl t engages one of the teeth on the rod t^2 and the hand-lever R′ is drawn forward, taking with it the ratchet-segment, which in turn rocks the shaft q^3, and the valve is further opened thereby, thus giving a fast motion to the table. The pin r^3 is then just behind the dog y^3, and the further pull of the rod t^2 in the same direction carries the pin over the cam-face of the dog y^3, thereby raising the pawl r out of engagement with the ratchet-teeth of the ratchet-segment, and it drops on the forward side of the dog. The crank-pin t^8 is then starting upon the reverse operation and the hand-lever remains at rest. The raising of the pawl r, however, releases the ratchet-segment, which is keyed to the shaft q^3, and also releases this shaft to the action of the weighted segment q^5, which tends to rotate said ratchet-segment in the direction indicated by the arrow in Fig. 2. This operation brings the isolated tooth back into contact with the spring-actuated pawl y^2, and a slow motion is again given to the table. These parts are so timed that this particular slow motion just described commences with the first polishing-drum.

As the plate is traveling at slow motion over the first polishing-drum the crank-pin t^8 is traveling from its first position (shown in Fig. 2) to the position on the opposite side of the crank-disk t^9 and the hand-lever R′ is at rest with the pin r^3 just in front of the dog y^3. When the pin t^8 reaches the limit of its passage on the opposite side of the center, as just mentioned, the plate of glass has just completed its passage over the first polishing-drum and is ready for the fast motion. The crank-pin is at this period ready to start up

over the center and begins to draw the rod t^2 forward, the pawl t engages in one of the teeth t' upon this rod, and the hand-lever R′ is thereby drawn forward with the ratchet-segment R, which is being engaged by the pawl r on the hand-lever. This operation throws open the valve a greater distance and of course operates the table at its fast motion again. This fast motion continues until the rod t^2 draws the pin r^3 of the hand-lever R′ over the second dog y^4 to a position just in front of the same. The dog y^4 raises the pawl r out of engagement with its ratchet-teeth on the ratchet-segment R, and said segment will be free to rotate by the tendency of the weighted segment q^5. Before the ratchet-segment R is set free, however, the hand-lever R′ has traveled into a position where a cam r^6, mounted thereon, will engage with the spring-actuated pawl y^2 and push the same out of the path of the isolated tooth y. The segment will then, when the pawl r is withdrawn, rotate freely with the isolated tooth in a position beyond the same, which operation has turned the valve in a direction to reverse the motor, and the table will consequently be returned to its initial position.

As the table starts to return, the stops d^9, secured to the frame, will engage with the depending arm d^{10} on the shaft d^6 and the plate-holder will be elevated, so that the glass will not drag over the polishers and over the grinding-drum.

The continued reciprocating of the bar t^2 as the table is returning to its initial position would of course tend to continue to draw the hand-lever forward; but the operator can reach forward, grasp the handle of said lever, which would of course raise the pawls t and r, the pawl t being raised by the pin t^3, secured to the grip-piece r', and draw it back to starting position.

When the table arrives at its most rearward position, the stop q^8 engages the arm q^{11}, carried by the weighted segment q^5, rocks the same upon its stud, and throws the valve to its neutral position.

Having described my invention, I claim—

1. In a glass-beveling machine, in combination with a plate-holder and a grinding-drum, means whereby the edge of the plate of glass, to be beveled, may be presented at an angle to the axis of rotation of the grinding-drum, substantially as described.

2. In a glass-beveling machine, in combination with a plate-holder, a grinding-drum, and a plurality of polishers, means whereby a plate of glass carried by the plate-holder will travel over the grinding-drum and said polishers at slow motion and will travel between them at fast motion, substantially as described.

3. In a glass-beveling machine, in combination with a plate-holder and a grinding-drum, means whereby a plate of glass carried by the plate-holder may be presented with its edge at an angle to the axis of rotation of said grinding-drum and means whereby said edge may engage the entire surface of the grinding-drum, substantially as described.

4. In a glass-beveling machine, in combination with a plate-holder, a grinding-drum and means whereby the plate-holder may be shifted at an angle to the axis of rotation of the grinding-drum, substantially as described.

5. In a glass-beveling machine, in combination with a plate-holder mounted upon a vertical pivot, a grinding-drum having its axis of rotation transverse to the path of said plate-holder, and means whereby said plate-holder may be shifted upon its vertical pivot so as to bring the edge of the plate of glass held therein, at an angle to the axis of rotation of said drum, substantially as described.

6. In a glass-beveling machine, in combination with a plate-holder, a grinding-drum and a plurality of polishers, means whereby the plate-holder may be shifted at an angle to the axis of rotation of the grinding-drum and polishers, means for shifting said plate-holder along the length of said grinding-drum and said polishers, thereby utilizing the entire surface thereof, means whereby said plate-holder is adapted to pass over the grinding-drum and polishers at slow motion and between them at fast motion, substantially as described.

7. In a glass-beveling machine, in combination with a grinding-drum mounted upon a transverse shaft, a longitudinally-movable table, and a plate-holder swiveled to said table whereby it may be shifted so as to present the glass plate held thereby at an angle to the axis of rotation of said grinding-drum, substantially as described.

8. In a glass-beveling machine, in combination with a frame and table slidable in said frame, a grinding-drum and a plate-holder swiveled to said table, means whereby said plate-holder may be adjusted at an angle to the axis of rotation of said grinding-drum, substantially as described.

9. In a glass-beveling machine, in combination with a plate-holder frame and a grinding-drum, means whereby said plate-holder frame may be shifted at an angle to the axis of rotation of said grinding-drum, and a plate-holder swung in said frame, substantially as described.

10. In a glass-beveling machine, in combination with a plate-holder, a wedge-shaped clamping-block, and means whereby said clamping-block may be forced forward and wedge the glass down upon the holder, substantially as described.

11. In a glass-beveling machine, in combination with a plate-holder having a bottom plate and another plate disposed at an angle thereto, a wedge-shaped clamping-block and means for forcing said clamping-block between said plates, substantially as described.

12. In a glass-beveling machine, in combi-

nation with a plate-holder, slides mounted in said plate-holder, a block pivotally hung between said slides, means for operating both of said slides in unison and means whereby one of said slides may be set up slightly without affecting the other, substantially as described.

13. In a glass-beveling machine, in combination with a plate-holder having a bottom plate, slides mounted in said plate-holder, a wedge-block pivotally hung between said slides, means for operating both of said slides in unison, and means whereby one of said slides may be set up slightly without affecting the other, substantially as described.

14. In a glass-beveling machine, in combination with a plate-holder having a bottom plate and another plate disposed at an angle thereto, slides mounted in said holder, a wedge-block pivotally hung between said slides, means for operating both of said slides in unison and means whereby one of said slides may be set up slightly without affecting the other, substantially as described.

15. In a glass-beveling machine, in combination with a plate-holder having a bottom plate and another plate disposed at an angle thereto, slides mounted in said holder, a wedge-block pivotally mounted between said slides, screws for operating said slides, sprocket-wheels and a chain, gearing both of said screws together, said chain having sufficient slack therein to permit the slight movement of one screw without the other, and hand-wheels provided upon said screws, substantially as described.

16. In a glass-beveling machine, in combination with a longitudinally-movable table, a plate-holder frame horizontally swiveled to said table, vertical guides provided on each side of said frame, slides operating in said guides, a plate-holder pivoted to said slides, means for adjusting same around its pivot and means for raising and lowering said slides, substantially as described.

17. In a glass-beveling machine, in combination with a longitudinally-movable table, a plate-holder frame horizontally swiveled to said table, vertical guides provided on each side of said frame, slides operating in said guides, a plate-holder pivoted to said slides, screws for raising and lowering said slides, gears provided upon said screws, an operating-shaft provided with gears meshing with said gears upon said screws, and means for rotating said shaft and raising said slides when the table reaches its limit of movement, substantially as described.

18. In a glass-beveling machine, in combination with a longitudinally-sliding table, a plate-holder frame carried thereby, guides provided on each side of said frame, slides operating said guides, a plate-holder hung between said slides, screws for raising and lowering said slides, gears provided upon said screws, an operating-shaft provided with gears meshing with said gears upon said screws, a depending arm rigid with said operating-shaft, and a stop carried by the stationary part of the machine and adapted to engage said depending arm, rock said operating-shaft, and raise said slides when the table reaches its limit of movement substantially as described.

19. In a glass-beveling machine, in combination with a longitudinally-sliding table, a transversely-sliding table, a plate-holder carried by said transversely-sliding table, grinding and polishing drums, means whereby said transverse table may be operated back and forth across the machine as the longitudinally-movable table proceeds, whereby the glass in the plate-holder will traverse the entire surface of the grinding and polishing drums, substantially as described.

20. In a glass-beveling machine, in combination with a longitudinally-sliding table, a transversely-sliding table, a plate-holder carried by said transversely-sliding table, and grinding and polishing drums, a gear rotatively mounted upon said longitudinally-sliding table, a rack carried by said transversely-guided table for engagement by said gear, and means for operating said gear in one direction or the other during the course of movement of said longitudinally-sliding table whereby said transversely-guided table may reciprocate back and forth across the machine and thereby present the entire surface of the grinding and polishing drums to the plate-holder, substantially as described.

21. In a glass-beveling machine, in combination with a longitudinally-sliding table, a transversely-sliding table, a plate-holder carried by said transversely-sliding table, and grinding and polishing drums, a gear rotatively mounted upon said longitudinally-sliding table, a rack carried by said transversely-guided table for engagement by said gear, a coöperating rack and pinion and suitable connections between this pinion and said gear whereby a vibration is given thereto, first in one direction and then the other, substantially as described.

22. In a glass-beveling machine, in combination with a longitudinally-sliding table, a transversely-sliding table, a plate-holder carried by said transversely-sliding table, and grinding and polishing drums, a gear rotatively mounted upon said longitudinally-sliding table, a rack carried by said transversely-guided table for engagement by said gear, a rack mounted upon a stationary part of the machine, a transverse shaft rotatively mounted upon the longitudinally-sliding table, gearing between this shaft and said gear operating the transversely-guided table, a sleeve surrounding said shaft, a pinion upon the end of said sleeve and engaging said stationary rack, a crank-disk rotatively mounted upon

said longitudinal table, gearing between said crank-disk and said sleeve, a rock-arm keyed to said shaft and a link having a crank-pin adjustably secured to said crank-disk and connected with said rock-arm, substantially as described.

23. In a glass-beveling machine, in combination with the frame, a grinding-drum, a plurality of polishing-drums, brackets supporting said polishing-drums, a rock-shaft, connections between said rock-shaft and said brackets whereby the operation of said shaft in one direction will raise said polishing-drums, means carried by said rock-shaft for rocking the same, and means for holding the same against operation whereby said polishing-drums will be held in depressed position, substantially as described.

24. In a glass-beveling machine, in combination with a frame, a longitudinally-sliding table, a grinding-drum, a plurality of polishing-drums, brackets supporting said polishing-drums, a rock-shaft, connections between said rock-shaft and said brackets whereby the operation of said shaft in one direction will raise said polishing-drums, an arm carried by said rock-shaft having a portion projecting to the under side of said longitudinally-sliding table, a flange on the under side of said table engaging said arm and holding said rock-shaft against operation and then setting it free and thereby raising said polishing-drums, substantially as described.

25. In a glass-beveling machine, in combination with a frame, a longitudinally-sliding table, a grinding-drum, a plurality of polishing-drums, brackets supporting said polishing-drums, a rock-shaft, connections between said rock-shaft and said brackets whereby the operation of said shaft in one direction will raise said polishing-drums, a weighted arm rigid with said rock-shaft and having a tendency to throw said polishing-drum into an upward position, another arm rigid with said rock-shaft and having a portion extending up to the under side of said longitudinally-sliding table and a flange upon the under side of said table holding said rock-shaft against the tendency of its weighted arm and then releasing it to the action of said arm, substantially as described.

26. In a glass-beveling machine, in combination with a frame, a longitudinally-sliding table, a grinding-drum, a plurality of polishing-drums, brackets supporting said polishing-drums, a rock-shaft, connections between said rock-shaft and said brackets whereby the operation of said shaft in one direction will raise said polishing-drums, a weighted arm rigid with said rock-shaft and having a tendency to throw said polishing-drum into an upward position, an operating-arm rigid with said rock-shaft, a bell-crank lever pivoted thereto, having one arm extending upward to the under side of the table and provided with a friction-roller, and having another arm extending along said operating-arm and provided with suitable adjusting mechanism, and a flange on the under side of the longitudinally-sliding table for engaging said friction-roller, thereby holding said rock-shaft against the tendency of its weighted arm and then setting it free to the action of said arm, substantially as described.

27. In a glass-beveling machine, in combination with a frame and grinding-drum, a plurality of polishing-drums, brackets supporting said polishing-drums, a rock-shaft, connections between said rock-shaft and said brackets whereby the operation of said shaft in one direction will raise said polishing-drums, means tending normally to rock said shaft in said direction, an operating-arm rigid with said rock-shaft, a bell-crank lever pivoted thereto, having one arm extending upward to the under side of the table and having another arm extending along said operating-arm and provided with suitable adjusting mechanism between it and said operating-arm, and means for engaging said upwardly-extending arm of said bell-crank lever whereby said rock-shaft is held against its tendency to rotate and raise the polishing-drums, and means for setting it free to such tendency, substantially as described.

28. In a glass-beveling machine, in combination with a frame and grinding-drum, a plurality of polishing-drums, brackets for supporting said polishing-drums, a rock-shaft, connections between said rock-shaft and said brackets whereby the operation of said shaft in one direction will raise said polishing-drums, means tending normally to rock said shaft in said direction, an operating-arm rigid with said rock-shaft, a bell-crank lever pivoted thereto, having one arm extending upward to the under side of the table and having another arm extending along said operating-arm and provided with a circumferential slot, a clamping-bolt passing through said slot and into said operating-arm, and means for engaging said upwardly-extending arm of said bell-crank lever whereby said rock-shaft is held against its tendency to rotate and raise the polishing-drums, and means for setting it free to such tendency, substantially as described.

29. In a glass-beveling machine, in combination with a frame, a longitudinally-sliding table, a grinding-drum and polishing-drums, brackets mounted upon the shaft of said grinding-drum carrying in their forward ends a rotatable polishing-drum, said brackets having downwardly-projecting members, a rock-shaft mounted in the frame, connections between said rock-shaft and said downwardly-projecting members, whereby said rock-shaft may raise and lower said polishing-drums, a weighted arm rigid with said rock-shaft tending to throw said polishing-drum upward, an

operating-arm secured to said rock-shaft having a member projecting up to the under side of the longitudinally-movable table and a flange on the under side of said table adapted to hold said rock-shaft against the tendency of said weighted arm and then set it free to the operation of said weighted arm, substantially as described.

30. In a glass-beveling machine, in combination with a grinding-drum, a plurality of receding polishers, a trough provided under said polishing-drums for containing the polishing material, substantially as described.

31. In a glass-beveling machine, in combination with a longitudinally-sliding table having a plate-holder thereon, a fluid-pressure motor adapted to operate said table, a grinding-drum and a polishing-drum, a valve for controlling the fluid-supply to said motor and means in connection with said table whereby it will operate to control said valve and thereby permit the plate-holder to travel over the grinding-drum and the polishing-drum at slow speed and to travel between them at fast speed, substantially as described.

32. In a glass-beveling machine, in combination with a longitudinally-sliding table having a plate-holder thereon, a fluid-pressure motor adapted to operate said table, a grinding-drum and a plurality of polishing-drums, a valve for controlling the fluid-supply to said motor, means tending normally to throw said valve into a position to reverse the motor, means for holding it in the neutral position, means for holding said valve open in a position to convey a slow motion to the table, and means operated by the table for further opening the valve for the fast motion, means for setting free said valve so as to bring it back to slow speed for the next operation in the beveling process, means whereby said valve may be again further opened for fast motion and means for permitting said valve to finally reverse the motor, substantially as described.

33. In a glass-beveling machine, in combination with a longitudinally-sliding table, having a plate-holder thereon, a grinding-drum and polishing-drums, a fluid-pressure motor for operating said table, a valve for controlling said motor, mechanism tending normally to throw said valve into a reverse position, a stop carried by said table holding said valve in a neutral position, a hand-lever provided with a suitable pawl, a ratchet-segment coöperating therewith for operating said valve, means for holding said segment in a position to operate the valve and give a slow motion when said table is passing over the first drum, means carried by the table for operating said hand-lever so as to further open the valve and give a fast motion between the drums, means for setting free said segment so as to permit it to return to slow-motion position before the plate reaches another drum and means for finally setting free said segment and permitting it to operate into the reverse position to return said table, substantially as described.

34. In a glass-beveling machine, in combination with a table having a plate-holder mounted thereon, grinding and polishing drums, a fluid-pressure motor operating said table, a valve for controlling said motor, an operating-stem for said valve, a gear-segment rigid with said stem, another gear-segment meshing therewith and provided with a weighted arm tending to throw said valve into reverse position, another arm provided upon the second-mentioned gear-segment and adapted to be engaged by a stop carried by the table when it is at rest, thereby holding said valve in a neutral position, means for holding said valve open in a position to convey slow motion to said table when said plate-holder is passing over a drum, means for automatically opening said valve so as to convey a fast motion to the table when passing between the drums and for finally setting said valve free to the tendency of said weighted segment and throwing the valve into reverse position to return the table, substantially as described.

35. In a glass-beveling machine, in combination with a table having a plate-holder mounted thereon, grinding and polishing drums, a fluid-pressure motor operating said table, a valve for controlling said motor, an operating-stem for said valve, a gear-segment rigid with said stem, another gear-segment meshing therewith and provided with a weighted arm tending to throw said valve into a reverse position, another arm provided upon the second-mentioned gear-segment, and a stop carried by said table for engaging said other arm provided upon the second-mentioned gear-segment, whereby said valve is held in a neutral position, substantially as described.

36. In a glass-beveling machine, in combination with a longitudinally-sliding table having a plate-holder, grinding and polishing drums, a fluid-pressure motor adapted to shift said table, a valve for controlling said motor, an operating-stem for said valve, a ratchet-segment secured to said stem, mechanism in connection with said stem tending to throw the valve into the reverse position, said mechanism being engaged by a stop carried by the table so that said valve is held in a neutral position, a hand-lever having a pawl adapted to engage said ratchet-segment and rock said stem, an isolated tooth upon said segment, a spring-actuated pawl engaging said tooth and holding said valve in slow-motion position, means operated by the table for shifting said hand-lever, thereby further opening the valve to obtain fast motion between the drums, means for setting free said segment and permitting it to return to slow-motion position as the table approaches another drum, and means for finally setting free said segment and permitting the valve to move

into reverse position, substantially as described.

37. In a glass-beveling machine, in combination with a longitudinally-sliding table having a plate-holder, grinding and polishing drums, a fluid-pressure motor adapted to shift said table, a valve for controlling said motor, an operating-stem for said valve, a ratchet-segment secured to said stem, mechanism in connection with said stem tending to throw the valve into a reverse position, means carried by the table engaging said mechanism and holding said valve in a neutral position, a hand-lever having a pawl coöperating with said ratchet-segment to rock said stem, an isolated tooth upon said segment, a spring-actuated pawl engaging said tooth and holding said valve in slow-motion position, means operated by the table for shifting said hand-lever, and thereby to further open the valve to obtain fast motion between the drums, means for setting free said segment and permitting it to return to slow-motion position as the table approaches another drum, and means for finally setting free said segment, permitting the valve to move into reverse position, substantially as described.

38. In a glass-beveling machine, in combination with a longitudinally-sliding table having a plate-holder, grinding and polishing drums, a fluid-pressure motor adapted to shift said table, a valve for controlling said motor, an operating-stem for said valve, a ratchet-segment secured to said stem, mechanism in connection with said stem tending to throw the valve into the reverse position, said mechanism being engaged by a stop carried by the table so that said valve is in a neutral position, a hand-lever having a pawl coöperating with said ratchet-segment to rock said stem, an isolated tooth upon said segment, a spring-actuated pawl engaging said tooth and holding said valve in slow-motion position, a reciprocating rod, a pawl-and-ratchet connection between said rod and said hand-lever, whereby the forward movement of said rod will operate said hand-lever upon its pivot and shift said segment to open said valve into fast-motion position, after the plate-holder has passed from one drum and also adapted upon its next forward movement to again shift the hand-lever into a position where said ratchet-segment will be set free to return to its slow-motion position as it approaches the next drum, and a cam carried by said hand-lever for engaging said spring-actuated pawl for holding same out of engagement with said ratchet-segment until the valve is returned to reverse position, substantially as described.

39. In a glass-beveling machine, in combination with a longitudinally-sliding table having a plate-holder, grinding and polishing drums, a fluid-pressure motor adapted to shift said table, a valve for controlling said motor, an operating-stem, for said valve, a ratchet-segment secured to said stem, mechanism in connection with said stem tending to throw the valve into the reverse position, said mechanism being engaged by a device carried by the table so that said valve is held in a neutral position, a hand-lever having a pawl adapted to engage said ratchet-segment and rock said stem, an isolated tooth upon said segment, a spring-actuated pawl engaging said tooth and holding said valve in slow-motion position, means operated by the table for shifting said hand-lever so as to open said valve to produce a fast motion, a dog mounted upon the stationary part of the machine and adapted to engage with a projection on the pawl of said hand-lever and disengage the same from said ratchet-segment, thereby permitting said isolated tooth to again engage said spring-actuated pawl, another dog arranged to disengage the pawl of said hand-lever from said ratchet-segment when the mechanism carried by the table again shifts said hand-lever, and a cam carried by said hand-lever engaging said spring-actuated pawl before said last-mentioned dog sets free the ratchet-segment, thereby permitting the isolated tooth to pass the spring-actuated pawl and allow the valve to pass into its reverse position, substantially as described.

40. In a glass-beveling machine, in combination with a longitudinally-sliding table, grinding and polishing drums, a fluid-pressure motor for shifting said table, a valve for controlling said motor, means tending to normally throw said valve into a reverse position, means for holding said valve in neutral position when the table is at rest, a ratchet-segment keyed to the valve-operating stem, a hand-lever provided with a pawl for shifting said ratchet-segment, an isolated tooth upon said segment, a spring-actuated pawl for engaging said tooth and holding said valve open at slow motion, a crank-disk adapted to be operated by a rack and pinion in connection with the table, connections between said crank-disk and said hand-lever whereby the same will be thrown into different positions to get the fast and slow motions, substantially as described.

41. In a glass-beveling machine, in combination with a longitudinally-sliding table, grinding and polishing drums, a fluid-pressure motor for shifting said table, a valve for controlling said motor, means tending to normally throw said valve into a reverse position, means for holding said valve in neutral position when the table is at rest, a ratchet-segment keyed to the valve-operating stem, a hand-lever provided with a pawl for shifting said ratchet-segment, an isolated tooth upon said segment, a spring-actuated pawl for engaging said tooth and holding said valve open at slow motion, a rack carried by the table, a pinion adapted to be rotated by said rack, a crank-disk operated by said pinion, a rod piv-

oted to said crank-disk and arranged to be reciprocated thereby, a rack and pawl constructed between said rod and said hand-lever whereby the rotation of said crank-disk will shift said hand-lever forward to the fast and slow motion, and suitable dogs for setting free said valve, substantially as described.

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

PARK E. WELTON.

Witnesses:
H. A. BEERS,
E. J. CAUFFIELD.