(No Model.) 2 Sheets—Sheet 1.

E. HILL.

MACHINE FOR BEVELING PLATE GLASS.

No. 507,127. Patented Oct. 24, 1893.

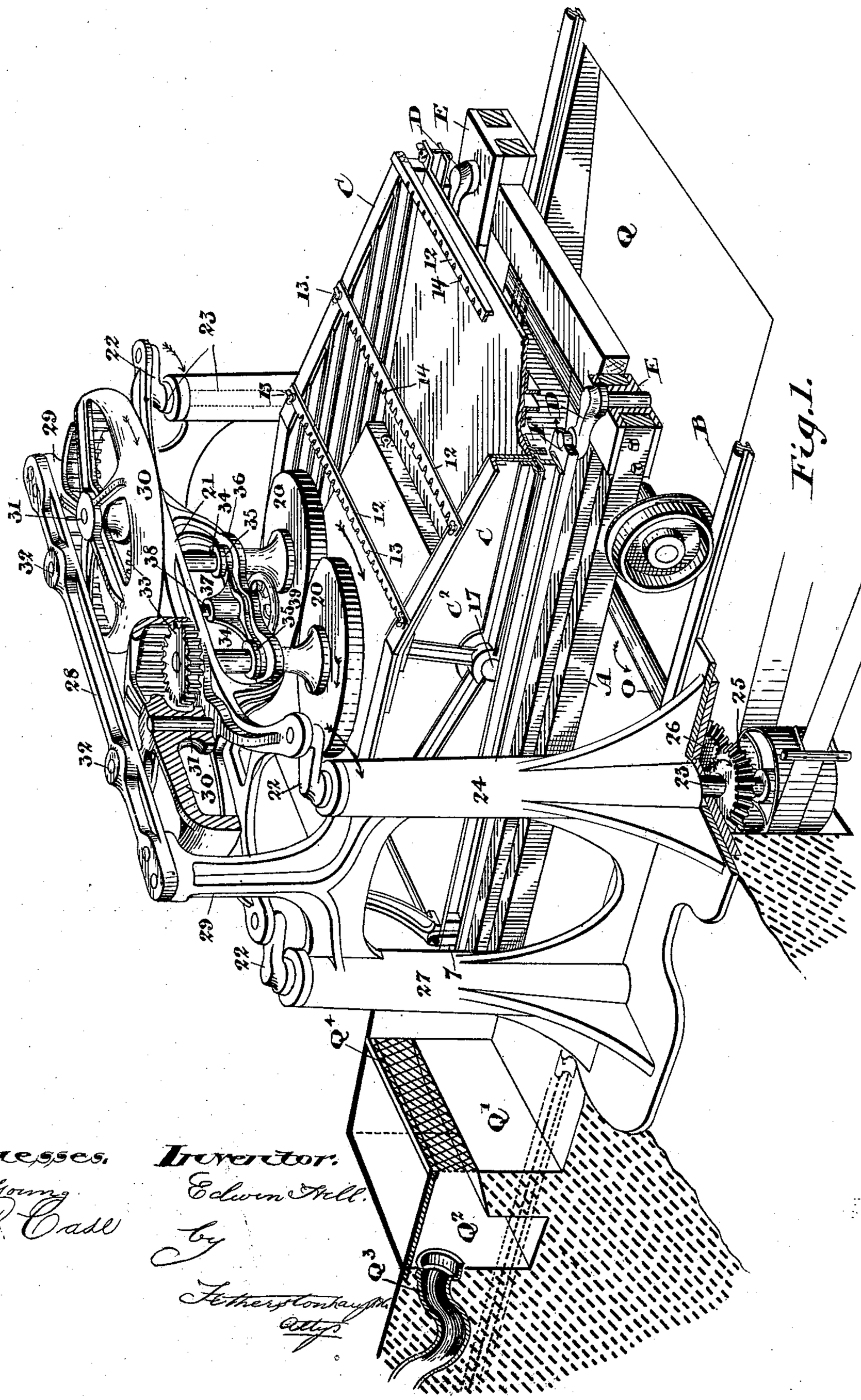

Fig. 1.

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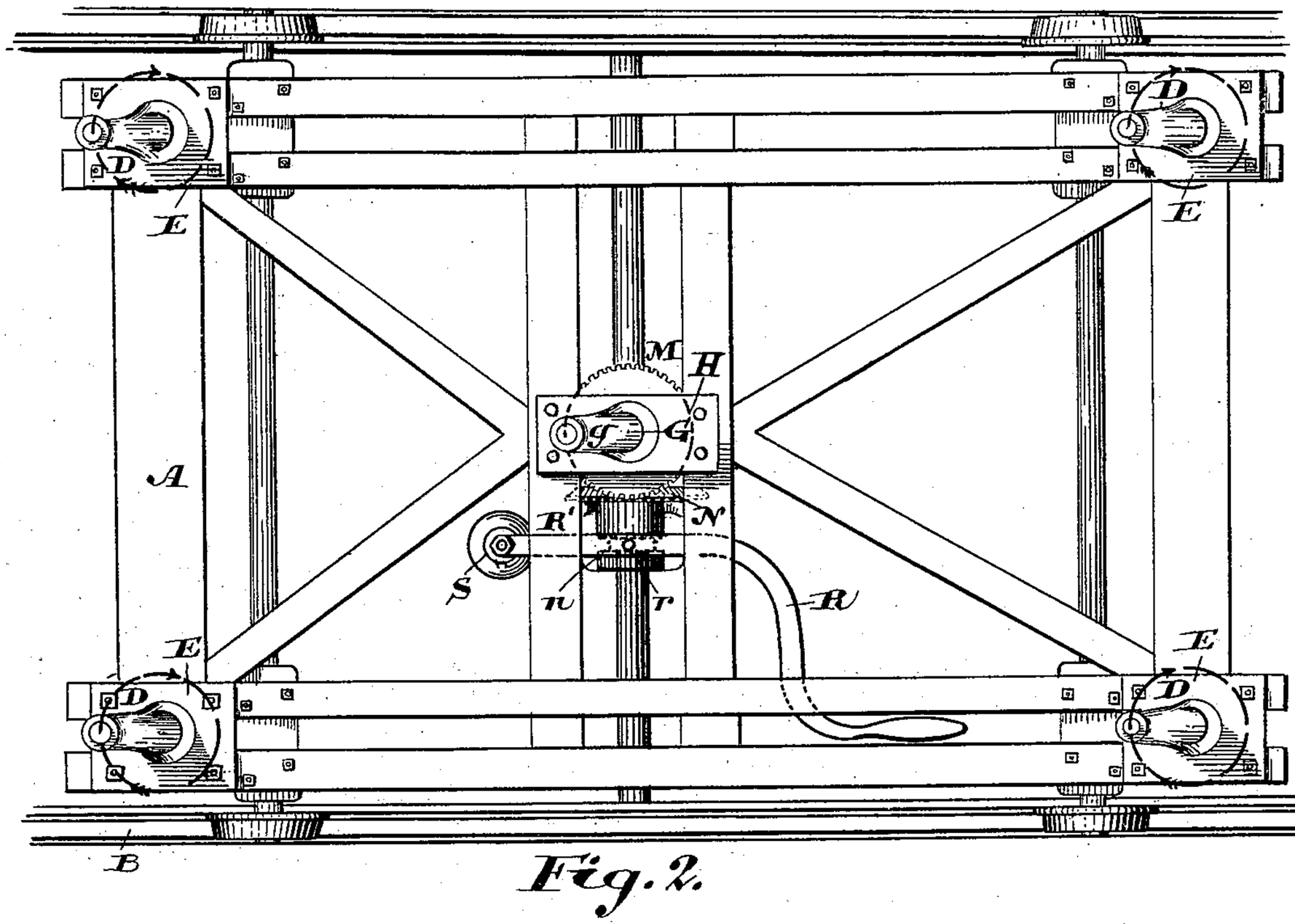

Fig. 2.

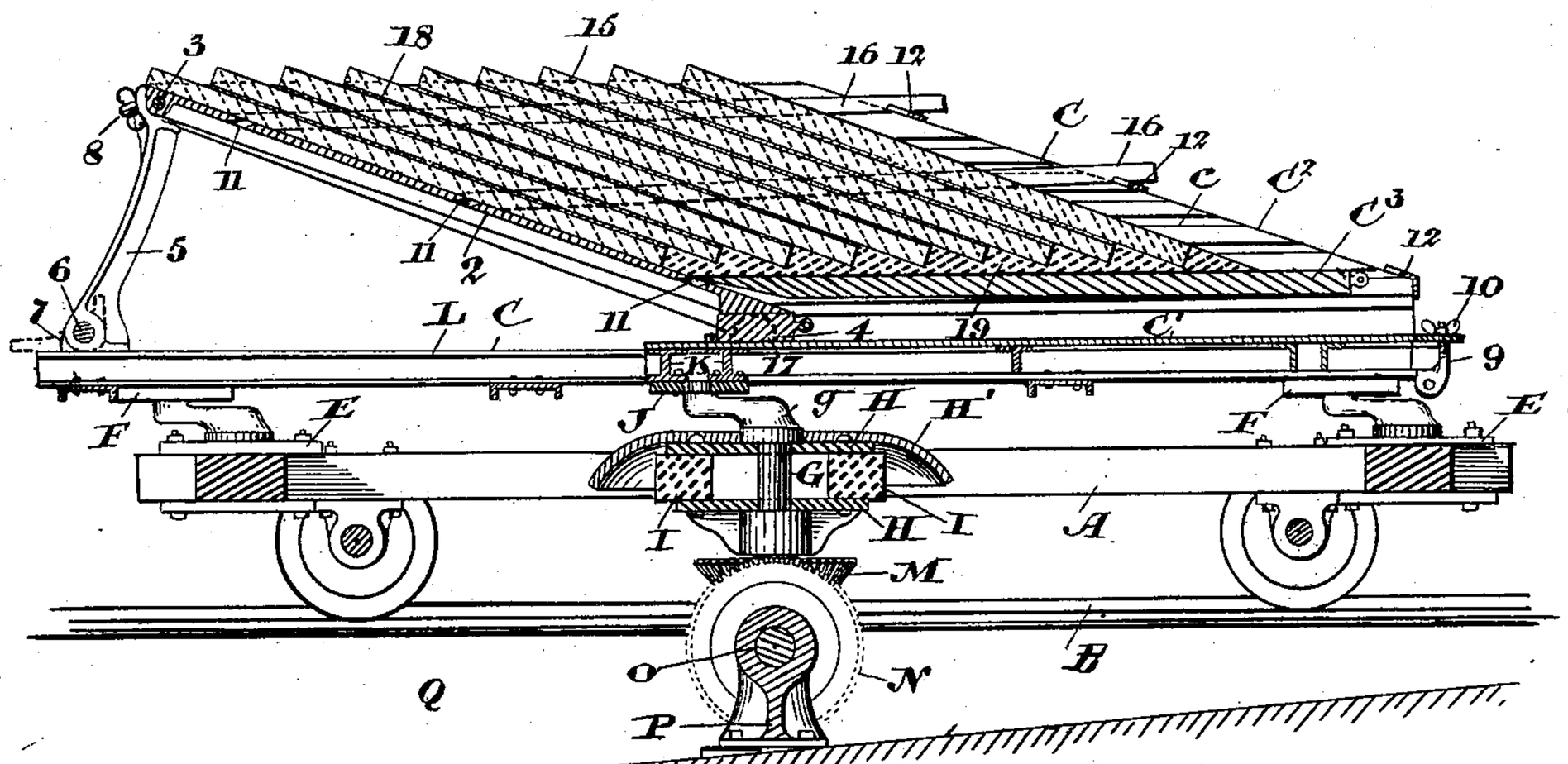

Fig. 3.

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UNITED STATES PATENT OFFICE.

EDWIN HILL, OF TORONTO, CANADA.

MACHINE FOR BEVELING PLATE-GLASS.

SPECIFICATION forming part of Letters Patent No. 507,127, dated October 24, 1893.

Application filed January 9, 1893. Serial No. 457,799. (No model.)

To all whom it may concern:

Be it known that I, EDWIN HILL, manufacturer, of the city of Toronto, in the county of York, in the Province of Ontario, Canada, have invented certain new and useful Improvements in Machines for Beveling Plate-Glass, of which the following is a specification.

My invention relates to improvements in machines for beveling plate glass and the object of the invention is to design a machine by which the edges of the plates may be perfectly ground, smoothed and polished without any danger of breaking the plates and it consists essentially of a carriage upon which is supported the frame for holding the plates, which frame with the plates held therein derives a limited circular horizontal movement, so that the grinding, smoothing or polishing wheels which are rotated in their bearings as described and also derive a limited circular, horizontal movement following the circular, horizontal movement of the frame act upon the upper corners of the upper edges of the plates held in the frame, the whole of the machine being otherwise constructed as hereinafter more particularly explained.

Figure 1, is a perspective view of my machine. Fig. 2, is a plan view of the carriage showing the means for driving the frame for holding the glass. Fig. 3, is a longitudinal section through the center of the carriage and frame for holding the glass.

In the drawings like letters and numerals of reference indicate corresponding parts in each figure.

A, is the carriage which runs upon the tracks B.

C, is the frame for holding the glass which is supported at each corner on the cranks, D, the lower ends of which are journaled in bearings in the end plates, E, of the carriage, and are free to revolve therein while the upper ends are journaled and free to revolve in the plates, F, on the bottom of the frame, C.

g, is a central crank forming part of the shaft, G, which is journaled in the central plates, H, attached to the cross beams, I, of the carriage. Above the plate, H, I locate a cap or cover, H′, which serves to protect the gearing, M, and, N, from the sand which is thrown off during the process of beveling. The free end of the crank, *g*, is journaled in the plate, J, secured to the cross irons K, forming part of the bed plate, L, upon which the frame, C, is supported. The lower end of the vertical shaft, G, has a bevel wheel, M, secured to it which meshes with the bevel wheel, N, on the counter shaft, O, as shown. The counter shaft, O, is supported on the standards, P, in the pit, Q. The hub of the bevel gear wheel N, has an annular groove, *n*, cut in it into which extend the pins *r*, from the top and bottom of the forked end, R′, of the lever, R, which is pivoted at the top of the standard, S, located in the pit Q, as indicated in Fig. 2. The gear wheel, M, is keyed to the shaft, so as to prevent it rotating except with the shaft, but is free to move laterally so that the lever, R, by its connections above described may by tilting it on its pivot move the gear wheel, N, from meshing with the gear wheel, M, and thereby allow of the carriage to be moved from underneath the grinding, smoothing or polishing wheels hereinafter described.

C′, is the bottom plate of the frame, C, and, C^2, are the sides and, C^3, is a false bottom which is designed to be inserted in any one set of longitudinal grooves, *c*, running the length of the side plates, C^2, this of course depending on the plates of glass that are placed in the frame.

2, is the end supporting plate which is pivoted on the cross rod, 3, the ends of which are supported in the side plates, C^2.

4, is a block which is placed underneath the lower end of the supporting plate, 2. This block, 4, may be of different sizes so as to raise or lower the lower end of the plate, 2, upon its hinge, 3, and thereby alter the angle at which the plates may be placed, so as to produce different bevels on the glass.

The frame, C, including the bottom plate, C′, which is fastened to the bottoms of the side plates, C^2, is held in position ready for beveling as shown in Fig. 3, by the upwardly extending arms, 5, which are hinged on the cross rods, 6, supported at each end in the end brackets, 7.

The upper ends of the side plates, C^2, are broad V-shaped so as to rest upon the broad

V-shaped ends of the arms, 5, to which the plates, C^2, are secured by the butterfly bolts, 8, which are screwed through the tops of the arms, 5, into the ends of the side plates, C^2, as shown in Fig. 3. The other end of the frame, C, is secured in position by the swing bolts, 9, which are pivoted on the end of the bed-plate, L, and extend up through the bottom plate, C′, of the frame, C, where they hold the plate, C′, and frame, C, securely in position at that end by means of the butterfly nuts, 10.

In Fig. 3, it will be seen that the false bottom, C^3, is in the lowest set of grooves and that the inner end of the bottom, C^3, is tapered to a point, so that it will abut against the supporting plate, 2, no matter at what angle the plate is placed. The frame C, is made sufficiently wide so that it will take in the largest size of plate glass. Should it be wished to place in smaller sizes I can withdraw the false bottom, C^3, from the groove, *c*, and place it in any of the grooves above, which may be suitable to the size of the glass. In order to hold it from moving laterally I make three rows of holes, 11, in the end plate, 2. I also provide three cross bars 12, which are secured on the oblique ends of the side plates, C^2, by the thumb nuts, 13. The bars, 12, have each a series of notches, 14, cut in them at their upper sides corresponding in number to the holes, 11, made in the end or supporting plate, 2. If narrower than the width of the frame I place the plates of glass, 15, in position in the manner hereinafter more particularly explained and place bars, 16, at each side of the plates of glass one end of each bar being placed in a hole, 11, and the other in a notch in the bar, 12. By this means the plates of glass are held in position by the bars 16 on each side.

In order that the plates of glass may be readily placed in position I pivot the side plates C^2, of the frame, C, upon the trunnion, 17, shown in full lines in Fig. 1, and dotted lines in Fig. 3. The end plate 2, is pivoted on a bar extending from one side plate, C^2, to the other, and the side plates are held in position by the thumb screws 8, as before described. By unscrewing the thumb screws from the ends of the side plates, C^2, the arms, 5, which as before stated are pivoted on the rod, 6, may be swung back out of position as indicated by dotted lines in Fig. 3, so as to allow of the frame being swung down so that the end plate, 2, is horizontal. It will of course be understood that before doing this the thumb nuts, 10, must be removed from the ends of the swing bolts, 9, which pass through the ends of the bottom, C′. The plates of glass may be now placed in position, which position would correspond relatively to the position shown when canted ready for the operation of the bevel wheel as indicated in Fig. 3. The plates of glass, 15, have doe-skins, 18, inserted between them and plaster of paris, 19, placed at the lower angles so that they will be securely held in position. The doe-skins of course prevent any of the powder ground from the glass coming in between the plates. As however the method by which the plates are held in position is the subject matter of a previous application filed December 21, 1892, Serial No. 455,883, I do not describe it. It is sufficient to say that when the plates are placed in the relative positions shown in Fig. 3, the brackets 5, pivoted on the rod, 6, are swung back into the positions shown in Fig. 3, and the bolts, 8, screwed home and the nuts, 10, screwed on top of the swing bolts, 9, so as to securely hold the frame, C, in position ready for the operation of the beveling wheel which I shall now describe.

20, are the beveling wheels which are journaled in the frame, 21, which is pivotally supported on the ends of the crank arms, 22, secured on the end of the main driving shaft, 23, which extends up through the standard, 24, forming portion of the stationary frame of the machine.

25, is a bevel gear wheel secured on the lower end of the shaft, 23, which is driven from a pulley, 26. The bevel gear wheel, 25, meshes with the bevel gear wheel, 26, secured on one end of the shaft, O. There is also a corresponding bevel gear wheel situated in the opposite end of the shaft, O, which meshes with the corresponding gear wheel, 25, on the end of a counter shaft on the opposite side of the machine similar to the main driving shaft, 23. This counter shaft and its gear might be dispensed with but as a very strong drive is necessary in order to prevent vibration I prefer to use the two vertical shafts, 23. The other cranks, 22, corresponding to the cranks, 22, on the ends of these shafts are very securely journaled in the vertical standards, 27, also forming part of the stationary frame.

28, is a cross bar secured to the tops of the central standards 29.

30, are internal gear wheels journaled on studs, 31, securely held and extending upwardly from the top of the frame, 21.

32, are crank pins extending upwardly from one of the arms of the internal gear wheels, 30, into the cross bar 28.

33, are gear pinions secured at the upper ends of the vertical arbors, 34, on the ends of which the beveling wheels, 20, are secured.

35, are collars secured on the vertical arbors, 34, above the downwardly projecting portion, 36.

37, is a bridge piece through the ends of which pass the arbors, 34. The ends of the bridge piece 37, come beneath the collars, 35, secured to the arbors, 34. 38, is a screw spindle provided with a hand wheel, 39. The screw spindle passes through the central portion of the bridge piece, 37, which is raised on the screw spindle by turning the handle, so as to simultaneously raise the vertical arbors, 34, and consequently the grinding or polishing wheel from the work when completed.

When the glass is set in the frame as shown

in Fig. 2, the grinding wheels, 20, rest upon the top of the glass and the collars 35, on the vertical arbors, 34, are quite a little distance above the ends of the bridge piece, 37. As the grinding wheels wear down the corners of the glass the collars gradually come down. It is in order that the grinding wheels may be raised when the grinding has been completed that the bridge piece, 37, screw spindle 38, and hand wheel, 39, are provided.

The pit, Q, is inclined as shown in the drawings and is partially filled with water so as to catch the sand which is used in the grinding of the glass when beveling.

Q′, is a low wall built at the lower end of the pit, Q, and separating it from the supplemental pit, Q^2, from which leads the drain pipe, Q^3. The supplemental pit, Q^2, is covered as shown and is connected to the pit, Q, by a fine sieve, Q^4, situated at the top of the wall, Q′. The heavy sand which is thrown off from the grinding wheels is precipitated into the pit, Q, where it sinks to the bottom of the water in the pit and the lighter sand passes through the sieve, Q^4, into the supplemental pit, Q^2, where it sinks to the bottom. The sieve, Q^4, prevents the escape into the drain pipe of any papers or other foreign matter which would be likely to stop up the drain.

The fine sand which accumulates in the bottom of the supplemental pit, Q^2, may be removed from time to time.

Having now described the principal parts involved in my invention I shall briefly describe the mode of operation. The frame, C, which holds the plates of glass derives a circular horizontal movement from the crank, *g*, situated at the top of the vertical shaft, G, deriving motion from the gear wheel, M, on the lower end of the shaft, and the gear wheel, N, on the shaft, O, which is driven as before described. As the four corners of the frame, C, are supported on the cranks, D, and are correspondingly set to the crank, *g*, at the top of the shaft, G, it will be seen that the movement of the frame will be perfectly regular as all the cranks will be caused to rotate in the direction indicated by arrow. The frame, 21, on which are journaled the vertical arbors, 34, on the lower ends of which are secured the polishing wheels, 20, derives a horizontal circular movement in the direction indicated by arrow that is to say in the same direction as that in which the frame, C, is caused to move thereby causing the grinding wheels 20, to have a circular horizontal movement in their plane. In addition to the circular horizontal movement which the wheels, 20, derive from the frame, 21, they also are rotated through the gear pinions, 33, meshing with the internal gear wheels, 30, driven by crank pins 32, secured in the cross bar, 28. The distance from the center of the stud, 31, on which the internal gear wheels, 30, are journaled to the center of the crank pins, 32, by which these internal gear wheels, 30, are caused to rotate, is exactly the same as the distance from the center of the crank, 22, to its pivotal connection to the frame, 21. In other words the circle described by the crank pin corresponds exactly to the circle described by the crank, 22, so that when the crank, 22, makes a complete revolution the internal gear wheels also are caused to make a complete revolution by the circular movement of the frame, 21.

It will be seen on comparing Fig. 1 and Fig. 2, that the cranks, 22, in Fig. 1, are oppositely set to the cranks, *g*, and, D, in Fig. 2. This position is of course always maintained as these cranks revolve. The wheels, 20, it will be seen are caused to rotate in the direction indicated by arrow on their own axes and to have a circular movement in the direction indicated by arrow in the same plane. The frame also as before described derives a circular motion in the same direction as indicated by arrow and as the cranks, 22, and, *g*, and, D, are set in opposition it will be seen that the wheels, 20, have a movement on top of the corners of the edges of the plates of glass following the circular movement of the plates contained in the frame. Consequently the grinding of the corners is performed, as the wheels, 20, are brought upon the top corners of the edges of the plates by their own gravity, and derive the movement above specified in relation to the movement of the plates of glass to be beveled without any danger of their chipping or breaking as might be the case if the wheels were caused to move in their plane in the opposite direction to that in which the frame C, is caused to move.

The teeth of the internal gear wheels, 30, are of sufficient depth to allow of free vertical movement of the arbors, 34, and consequently the wheels, 20.

What I claim as my invention is—

1. In a machine for beveling plate glass the combination with the frame, C, an obliquely arranged plate thereon for supporting the plates in an inclined position, said frame supported on the carriage, A, and deriving a circular horizontal movement as specified, of the polishing wheels driven and designed to act upon the corners of the upper edges of the plates in the frame, C, as and for the purpose specified.

2. In a machine for beveling plate glass the combination with the frame, C, the obliquely arranged supporting plate for the glass the cranks, D, and deriving a circular horizontal movement from the crank, *g*, located on the end of the shaft, G, which is driven as specified, of the grinding wheels, 20, driven and designed to act upon the upper corners of the edges of the plates in the frame as and for the purpose specified.

3. The combination with the frame, C, the obliquely arranged plate for supporting the glass in an inclined position the supporting cranks, D, on the carriage, driven by the crank, *g*, on the vertical shaft, G rotated from

the main shaft, 23, by the bevel gears M, N, and, 26, and, 25, of the grinding wheels, 20, means for rotating them on their axes, and giving them a circular horizontal movement against a plurality of plates of glass in the frame, C, as and for the purpose specified.

4. The combination with the frame, C, supported and deriving a circular horizontal movement as specified, of the grinding wheels 20, rotated, deriving a circular horizontal movement and limited in their downward movement as specified, and having their arbors 34, provided with collars, 35, by means of which the wheels may be raised from their work by the bridge piece, 37, adjusted vertically on the screw spindle, 38, by the hand wheel, 39, as and for the purpose specified.

5. The combination with the frame, C, supported by the cranks, D, upon the carriage, and deriving a circular horizontal movement from the shaft, G, journaled in the plates, H, by the crank, *g*, and gear wheels, M, and, N, of the forked lever, R, pivoted on the standard, S, and having the pins, *r*, in the fork projecting into the annular groove, *n*, in the hub of the gear wheel, N, as and for the purpose specified.

6. In combination, the frame C having end plate 2 provided with holes 11, and cross bar 12, provided with notches 14 and the side bars 16, substantially as described.

7. The combination with the frame, C, provided with a permanent bottom, C′, and an obliquely placed end plate, 2, of the false bottom, C^3, tapered from the bottom to the end next the end plate, 2, and fitting in grooves, *c*, in the sides, C^2, as and for the purpose specified.

8. The combination with the frame, C, provided with a permanent bottom, C′, and an obliquely placed end plate hinged at 3, in the sides, C^2, of the adjusting block placed beneath the lower end of the end plate, 2, as and for the purpose specified.

9. The combination with the frame, C, provided with a permanent bottom, C′, and an obliquely placed end plate, 2, of the sides, C^2, pivoted on the trunnions, 17, as and for the purpose specified.

10. The combination with the frame, C, provided with a permanent bottom, C′, and an obliquely placed end plate, 2, and the sides, C^2, pivoted on the trunnions, 17, of the pivoted arms, 5, supporting and securely holding in position the upper ends of the sides, C^2, by the bolts, 8, as and for the purpose specified.

11. The combination with the frame, C, provided with a permanent bottom, C′, and an obliquely placed end plate, 2, and the sides, C^2, pivoted on the trunnions, 17, of the pivoted arms, 5, supporting and securely holding in position the upper ends of the sides, C^2, by the bolts, 8, and the swing bolts, 9, extending through the bottom plate, C, and provided with thumb nuts, 10, as and for the purpose specified.

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