No. 637,881. Patented Nov. 28, 1899.

G. A. MARSH.

GLASS GRINDING AND POLISHING MACHINE.

(Application filed Jan. 14, 1898.)

(No Model.) 3 Sheets—Sheet 1.

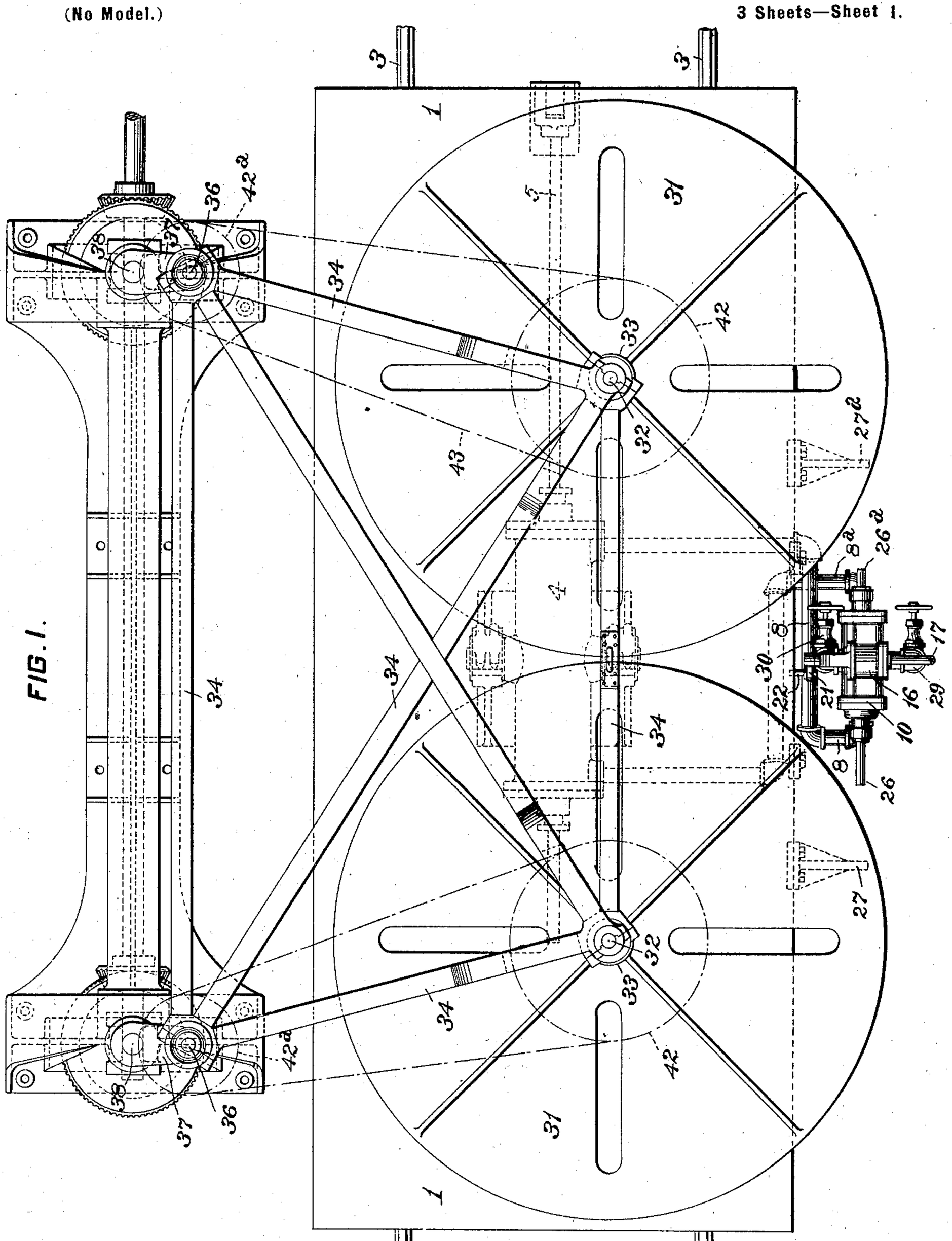

FIG. 1.

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FIG. 2.

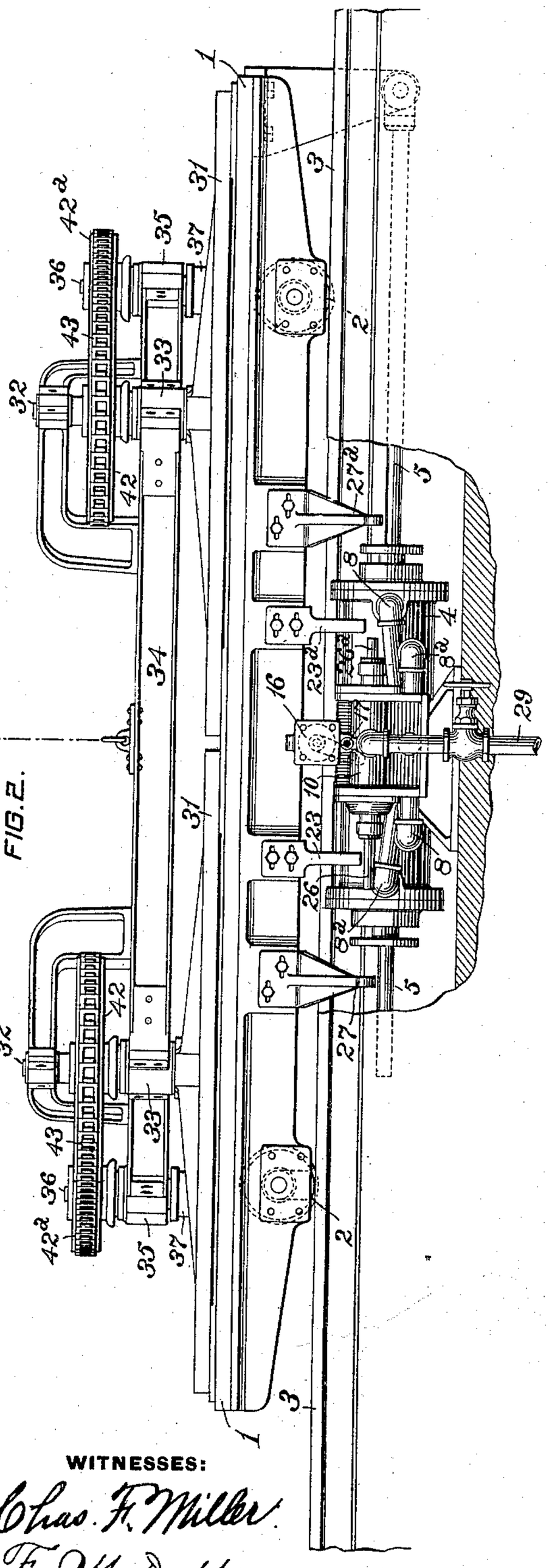

FIG. 6.

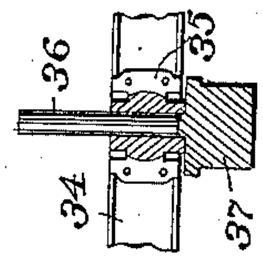

FIG. 3.

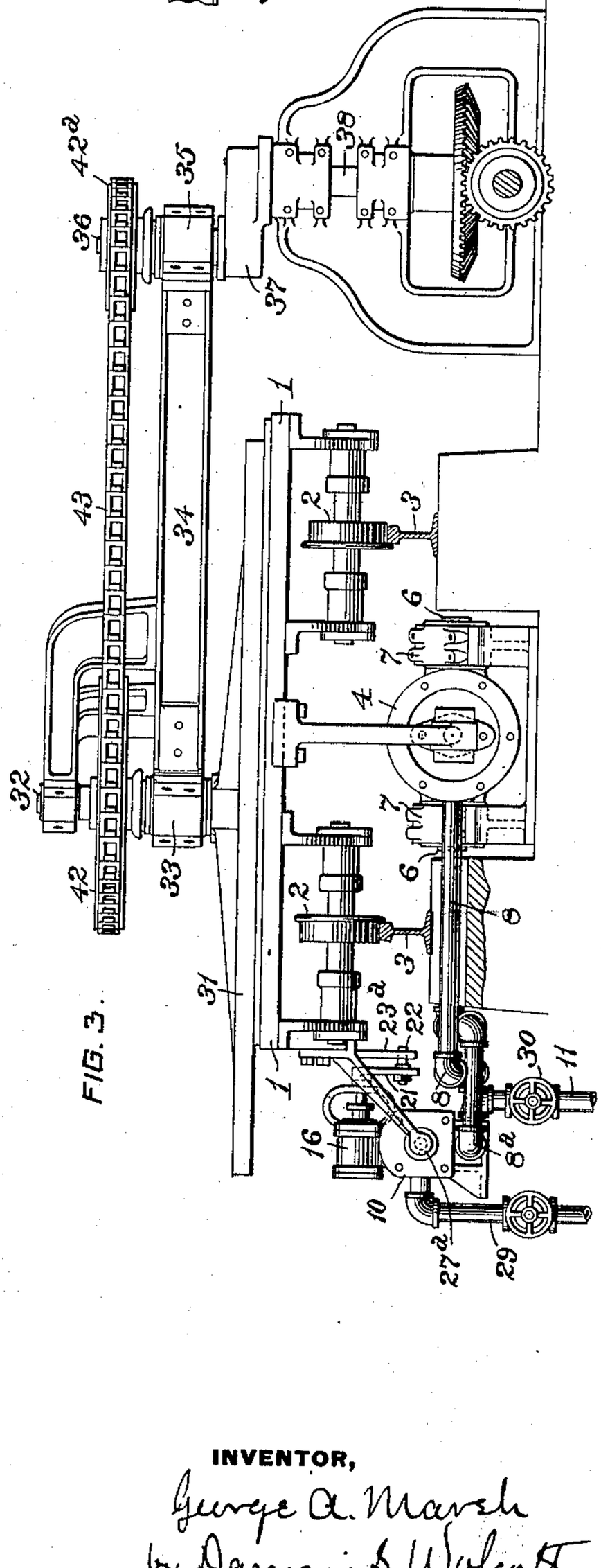

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FIG. 4.

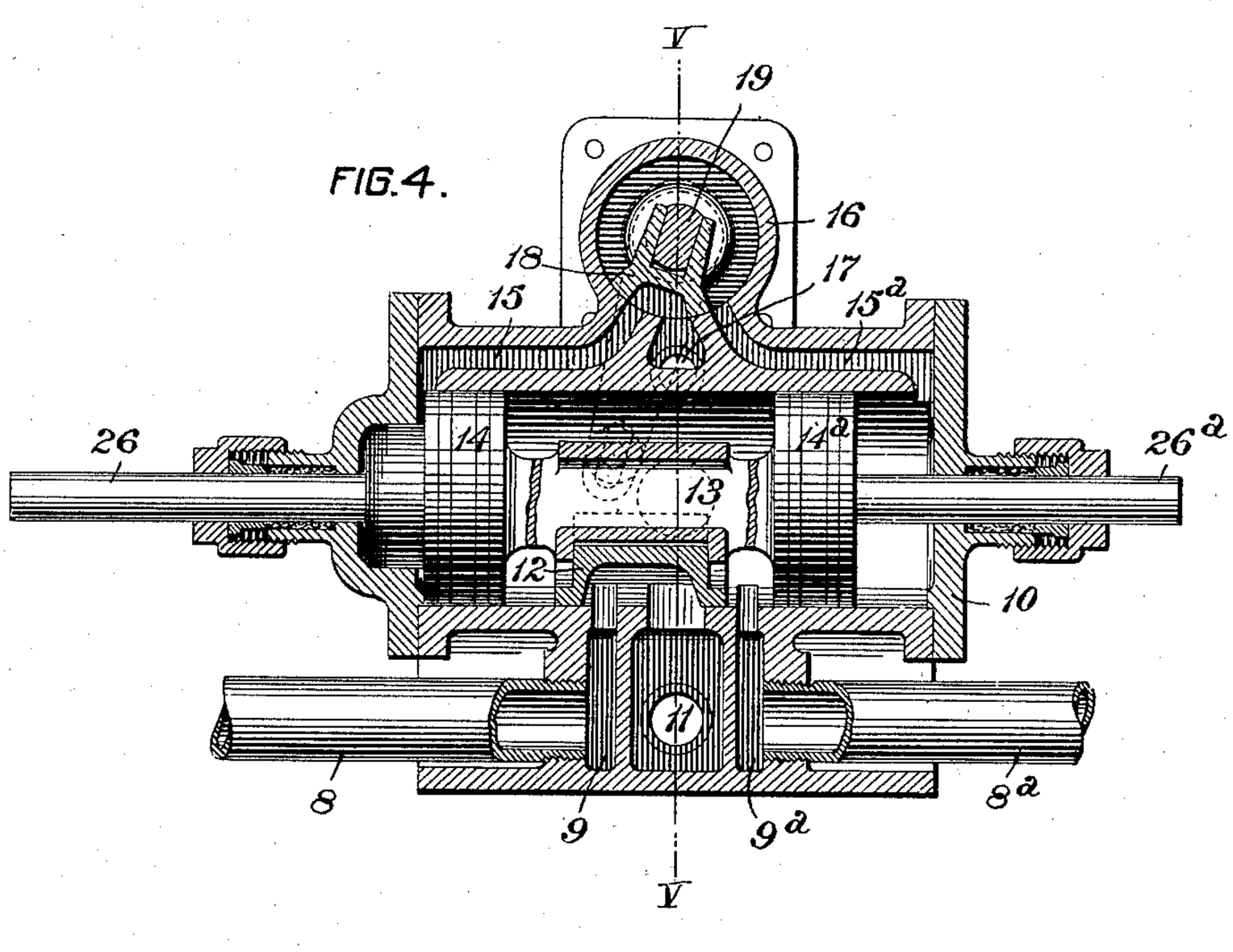
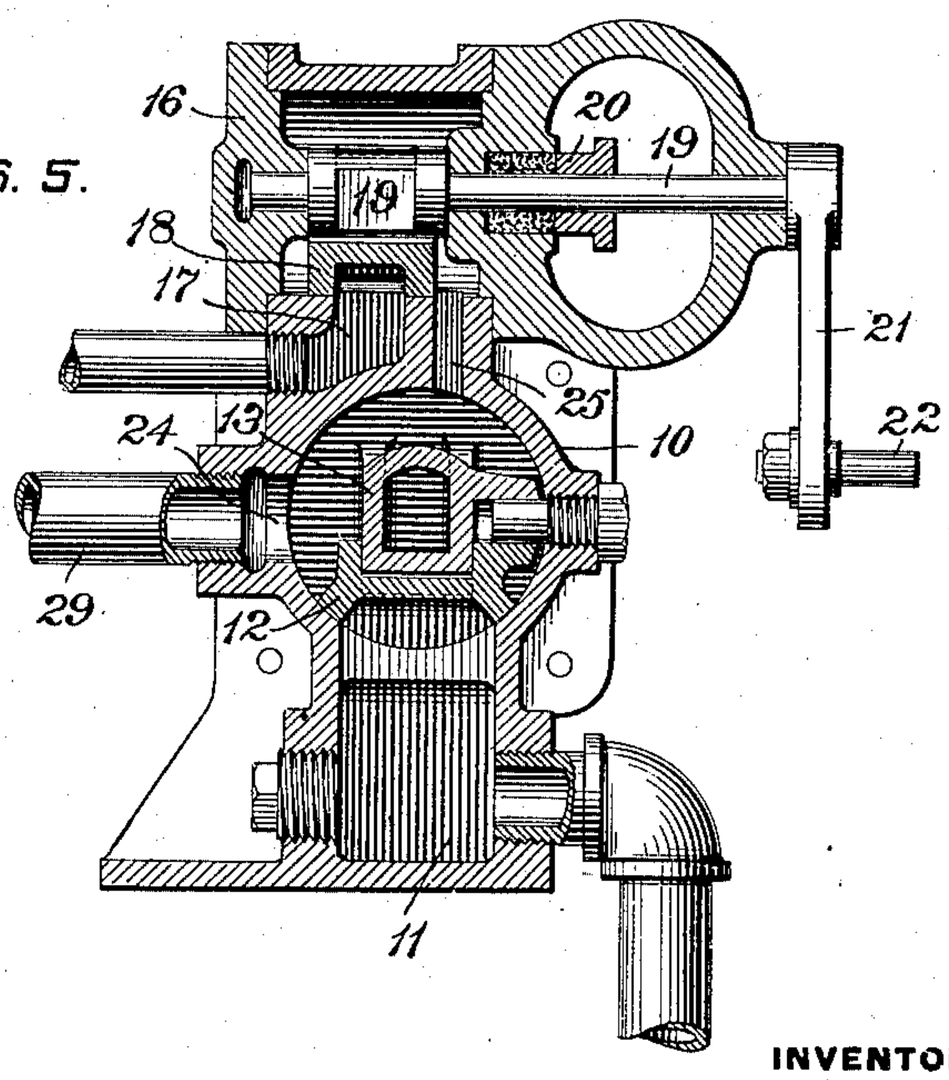


FIG. 5.



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UNITED STATES PATENT OFFICE.

GEORGE A. MARSH, OF PITTSBURG, PENNSYLVANIA, ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE PITTSBURGH PLATE GLASS COMPANY, OF SAME PLACE.

GLASS GRINDING AND POLISHING MACHINE.

SPECIFICATION forming part of Letters Patent No. 637,881, dated November 28, 1899.

Application filed January 14, 1898. Serial No. 666,650. (No model.)

To all whom it may concern:

Be it known that I, GEORGE A. MARSH, a citizen of the United States of America, residing at Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Glass Grinding and Polishing Machines; 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 appertains to make and use the same, reference being had to the accompanying drawings, and to figures of reference marked thereon, which form a part of this specification.

The invention described herein relates to certain improvements in that class or kind of glass grinding and polishing machines in which the grinding or polishing disks and the glass-holding table are reciprocated back and forth in paths of movement at an angle to each other. The mechanism heretofore employed for reciprocating the table has been of such a character—as, for example, a crank—that the motion of the table is slowed down as it approaches and recedes from the limits of its motion. As a result of such slowing down or retardation of the movements of the table the grinding and polishing disks, which have a constant and uniform speed of rotation, will be in operative contact with the end portions of the sheets of glass for a longer time than with the middle portions thereof, thereby subjecting such end portions to a greater reduction in thickness.

The object of the present invention is to provide means whereby a uniform rate of motion may be imparted to the table at all points of its traverse and also to provide for such a practically instantaneous reversal of its motion at the limits thereof that the action of the grinding and polishing disks will be equal at all points on the surface of the glass, thereby insuring a uniform thickness of glass.

The invention is hereinafter more fully described and claimed.

In the accompanying drawings, forming a part of this specification, Figure 1 is a top plan view of a grinding-machine having my improvements applied thereto. Fig. 2 is a side elevation, and Fig. 3 an end elevation, of the same. Fig. 4 is a longitudinal sectional elevation of the valve mechanism; and Fig. 5 is a transverse section of the same, the plane of section being indicated by the line V V, Fig. 4.

In the practice of my invention the bed or table 1 is provided with supporting-wheels 2, which are adapted to move along the rails 3. A convenient means for effecting the desired uniformity of movement of the table consists of a fluid-pressure cylinder 4, arranged in convenient relation to the table and having its piston-rod 5 connected thereto. It is preferred to construct the cylinder with trunnions 6, which are mounted in suitable bearings 7, arranged below the table or bed 1. This arrangement of the cylinder permits of the automatic adjustment of the latter in case their desirable alinement should become disturbed. The ends of the cylinder are connected by pipes 8 and 8ª with the ports 9 and 9ª of the valve-cylinder 10, which is provided with an exhaust-port 11 intermediate of the ports 9 9ª, as clearly shown in Fig. 4. The flow of fluid through the ports 9, 9ª, and 11 is controlled by the valve 12, which is operatively connected to the stem 13, connecting the pistons 14 14ª in the cylinder 10. The ends of the valve-cylinder 10 are connected by ports 15 15ª with the valve-chamber 16, which is provided with an exhaust-port 17 intermediate of the ports 15 15ª, as shown in Fig. 4. The flow of fluid-pressure through the ports 15, 15ª, and 17 is controlled by a valve 18, which is adapted to be shifted by the table through suitable interposed mechanism. A desirable means for effecting this purpose consists in a swinging valve which is secured on a stem 19, mounted in suitable bearings in the walls of the valve-chamber and projecting at one end through a stuffing-box 20. On this stem is secured an arm 21, provided with a pin 22, projecting into the path of movement of fingers 23 23ª, adjustably connected to the reciprocating bed or table 1. Fluid-pressure is admitted to the valve-cylinder 10 through a port 24 about midway of the length of the cylinder, so that it will not be closed at any time by the pistons 14 14ª. The valve-cylinder 10 and valve-chamber 16 are connected by a port or passage 25, so located that it will be closed by the valve 18 or

the pistons 14 14ª. With the valves in the position shown fluid-pressure is flowing into the left-hand end of the cylinder 4, the pipes connecting the cylinder and valve mechanism being crossed, as shown in Fig. 1, and the right-hand end of the cylinder is in connection with the exhaust-port 11 of the valve-cylinder, so that the table 1 is being moved to the right. As the table approaches the desired limit of its movement the finger 23 will strike and shift the pin 22, thereby shifting the valve 18. This movement of the valve 18 will connect the port 15ª with the exhaust-port 17 and uncover the port 15, so that fluid-pressure will flow to the left-hand end of the valve-cylinder 10 and shift the pistons and the valve 12, so as to connect the left-hand end of the cylinder 4 with the exhaust-port 11 and uncover the port 9, so that fluid-pressure will flow by the pipe 8 to the right-hand end of the cylinder and move the table to the left.

In order to insure the shifting of the main valve 12, stems 26 and 26ª are connected thereto and project through stuffing-boxes in the ends of the valve-cylinder 10. These stems are in the path of movement of fingers 27 and 27ª, adjustably connected to the table 1, so that the valve may be shifted as the table reaches the limits of its movement. While it is preferred to shift the main valve 12 by fluid-pressure, which is controlled by the table in its movements, the valve 12 may be shifted directly by the fingers 27 and 27ª.

The speed of the table may be controlled by a valve 28 in the fluid-pressure supply-pipe 29 or by a valve 30 in the pipe connected to the exhaust-port 11.

The runners 31 are provided with central pins or journals 32, which are mounted in suitable bearings 33 at the outer corners of the frame 34. The inner corners of the frame are provided with bearings 35 for the reception of the pins 36 on the crank-arms 37, keyed on the upper ends of the vertical shafts 38, which are rotated by any suitable form of mechanism. The pins 36 and the bearings 35 are constructed to form a ball-and-socket joint, as shown in Fig. 6, so as to permit of the frame 34 being tipped to raise the runners away from the glass. The frame and runners are shifted back and forth by the crank-arms 37, and the runners are simultaneously rotated on their axes by sprocket-wheels 42 and 42ª, keyed on the pins 32 and 36, around which pass the chains 43. As the sprocket-wheels 42 are carried around they will shift the chains and impart a rotary movement to the runners.

It is characteristic of my improvements that both the table carrying the glass and the grinding or polishing devices are so actuated that all parts of the glass surfaces under treatment are operated on equally, thereby producing sheets of a uniform thickness throughout.

I claim herein as my invention—

1. In a glass grinding or polishing machine, the combination of a grinding or polishing mechanism, means for imparting a uniform movement to the grinding or polishing mechanism, a glass-supporting table or bed and mechanism for imparting a reciprocating movement uniform at all points to the supporting-table, substantially as set forth.

2. In a glass grinding or polishing machine, a glass-supporting bed or table, a fluid-pressure cylinder, having its piston connected to the bed or table, a valve mechanism for controlling the flow of fluid to and from the cylinder, means for shifting the valve mechanism as the table approaches or reaches the limits of its movements, in combination with grinding or polishing mechanism, substantially as set forth.

3. In a glass grinding or polishing machine, the combination of a glass-supporting bed or table, a fluid-pressure cylinder having its piston connected to the bed or table, a valve mechanism controlling the flow of fluid to and from the cylinder, and means controlled by the table for shifting the valve mechanism as the table approaches or reaches the limits of its movements, substantially as set forth.

4. In a glass grinding or polishing machine, a reciprocating table-support or bed, upon which the glass is placed, a cylinder connected with valve mechanism, means attached to the table for shifting a valve prior to the limit of the movement of the table to effect through the actuating medium the movement of a second valve which establishes communication between the fluid under pressure and the cylinder, a piston in the cylinder against which the fluid acts and a piston-rod connected directly to the table, or bed, substantially as set forth.

5. In a glass grinding or polishing machine, a table-support or bed, a piston-rod connected directly thereto, a cylinder positioned beneath the table or bed and a valve mechanism to one side of the same, means carried by the table to effect the movement of a valve before the table reaches the limit of its linear movement, for the purpose set forth.

6. In a glass grinding or polishing machine, the combination with a reciprocating table-support or bed, of a cylinder, a piston arranged in said cylinder, the rod thereof being connected with the table and a valve mechanism which is controlled by the movement of the table.

7. In a glass grinding or polishing machine, the combination with a reciprocating table-support or bed, of a cylinder pivotally supported so as to be capable of rocking at right angles to the plane of movement of the table-support or bed, a piston arranged in said cylinder, the piston-rod being connected with the table, substantially as set forth.

8. The combination with a horizontally-reciprocating table or bed, of a cylinder positioned beneath the same, a piston arranged

in the cylinder and provided with a piston-rod which engages with a hanger which depends from the table, substantially as shown.

9. In a glass grinding or polishing machine, the combination with a reciprocating table, of a cylinder its piston and piston-rod connected to the table, a valve mechanism comprising a rock-valve operated by the movement of the table and a fluid-pressure valve governed in its movement by the rock-valve.

10. In combination with a glass grinding or polishing table, of a cylinder the piston and piston-rod thereof being connected to the table, said table having tappets, of a valve mechanism embodying a rock-valve operated by the tappets, an automatic valve governed by the rock-valve, a single induction-pipe, and exhaust-pipes, substantially as set forth.

11. In a glass grinding or polishing machine the combination with a reciprocating table, of a cylinder, a piston arranged in the cylinder and connected with the table, a valve mechanism whereby the actuating fluid is supplied to the cylinder and is operated by the movement of the table, the valve mechanism including a fluid-pressure-operated valve and a rock-valve actuated by the movement of the table, for the purpose set forth.

12. In a glass grinding and polishing machine, a table-support or bed to which a reciprocating movement is imparted by a piston-rod attached to a piston which operates in a cylinder positioned beneath the table, a valve mechanism for governing the supply of fluid-pressure to the cylinder, embodying a valve which is operated by the movement of the table, an automatic operating-valve, a single supply-pipe and exhaust-pipes, the exhaust-pipe through which the fluid passes from the cylinder having a cut-off or valve, whereby the exhaust therefrom can be retarded without retarding or affecting the pressure which operates the automatic valve.

13. In a glass grinding or polishing machine, the combination of a cylinder having a piston and rods which pass through the heads thereof, the piston being connected to a hanger which depends from the table, a valve mechanism positioned to one side of the table, tappets carried by the table, the valve mechanism including a valve the stem of which has a depending arm adapted to be moved by the engagement of the tappets nearest the center of the table, and an automatic fluid-pressure-operated valve with stems which project beyond the valve-casing, said stems being in line with the tappets farthest from the center of the table, so that said valve will be operated in case of failure to operate automatically and pipes connecting the valve-casing with the cylinder, for the purpose set forth.

14. In a glass grinding or polishing machine, the combination of a cylinder pivotally supported beneath the grinding or polishing table, the piston-rod thereof being connected to the table, induction and eduction pipes having couplings, said pipes extending from the cylinder to a valve-chamber, an exhaust-pipe connected with the valve-chamber and a second exhaust for exhausting the fluid-pressure which operates an automatic slide-valve, a single induction-pipe and valve-operating means carried by the table, substantially as and for the purpose set forth.

15. In a glass grinding or polishing machine, an actuating piston-rod connected directly thereto, the piston thereon operating in a cylinder, the table having tappets, of a valve mechanism including a valve which is shifted by the engagement of the tappets therewith before the table reaches the limit of its movement so as to open ports and cause the immediate movement of an automatic valve which admits the fluid-pressure to the piston to cause an immediate change of movement, for the purpose set forth.

16. In a glass grinding or polishing machine, the combination of a cylinder, the piston-rod of which is connected to a movable table, a valve mechanism the valves of which are actuated by the movement of the table and by the fluid which operates the piston in the cylinder, the automatic operating-valve having projecting stems and the positively-operated valve, an arm, tappets for operating the rock-valve positioned so that they will operate the valve to which the arm is attached before the table reaches the limit of its movement, the tappets beyond engaging with the stems of the automatic valve only when said valve fails to act automatically, substantially as set forth.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

GEORGE A. MARSH.

Witnesses:
H. E. SEIBERT,
DU WAYNE LOOMIS.