No. 810,218. PATENTED JAN. 16, 1906.

J. NORTH.

GLASS WORKING MACHINE.

APPLICATION FILED APR. 27, 1904.

3 SHEETS—SHEET 1.

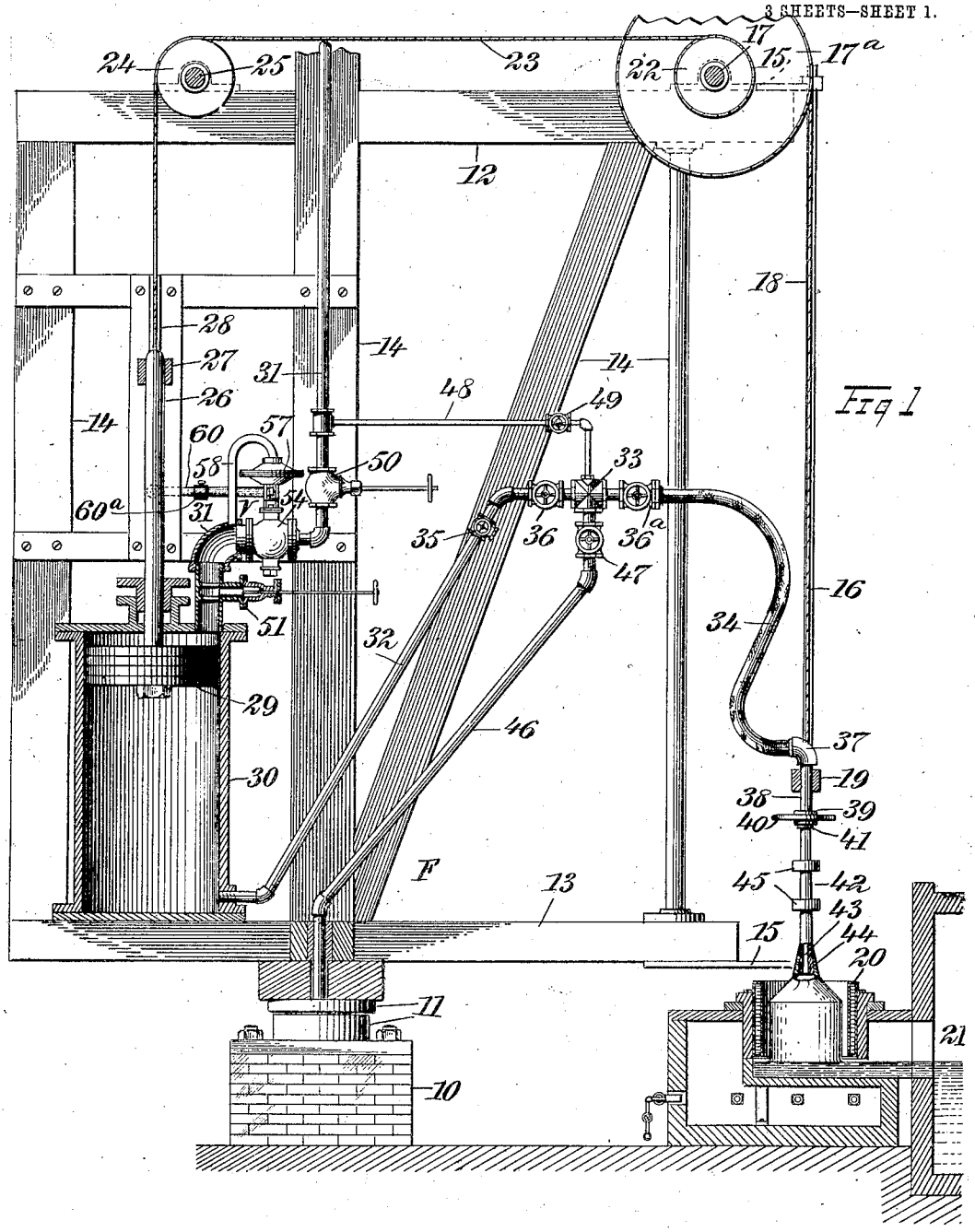


Fig. 1.

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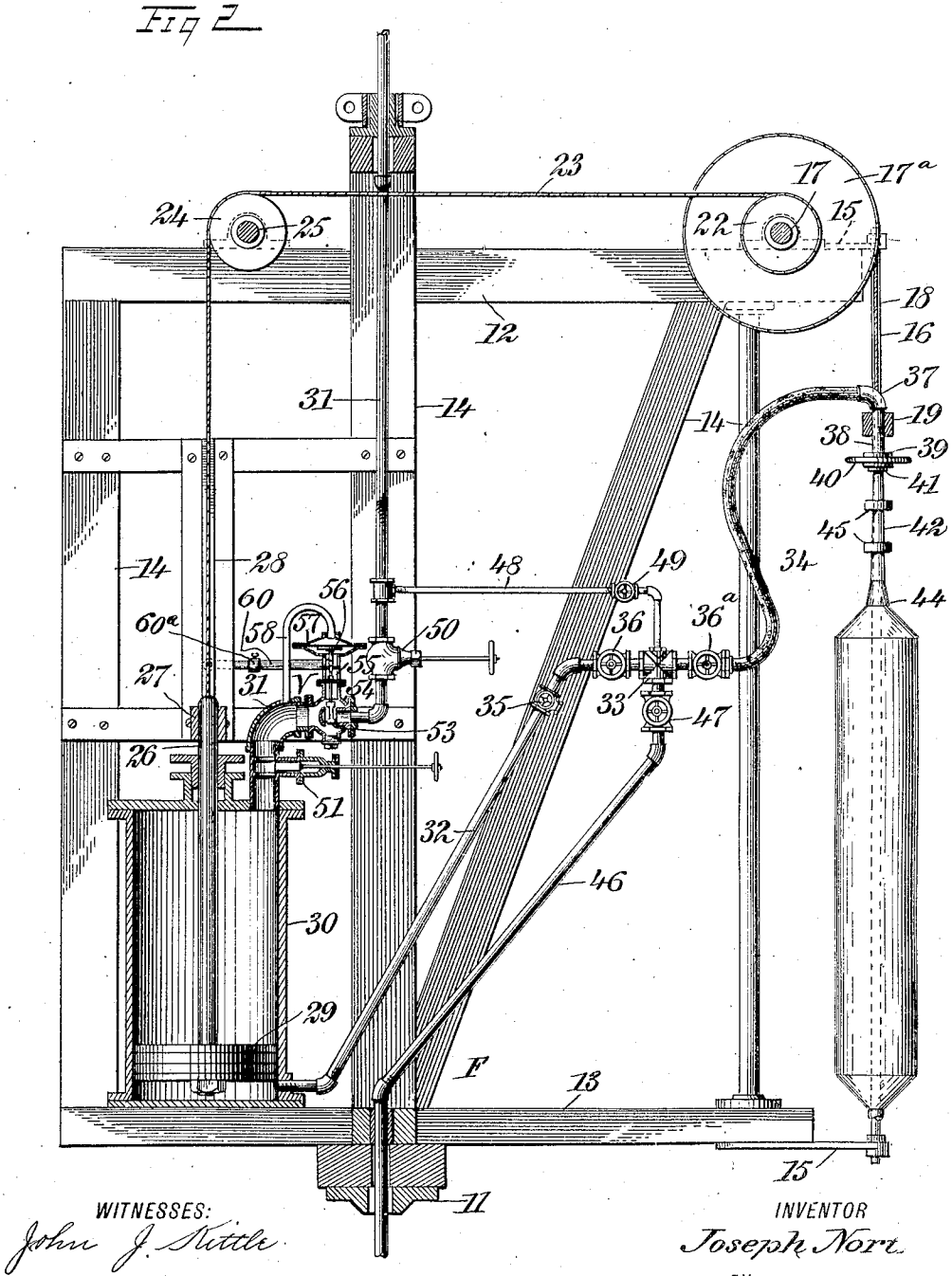
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3 SHEETS—SHEET 2.

Fig 2



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3 SHEETS—SHEET 3.

Fig 4

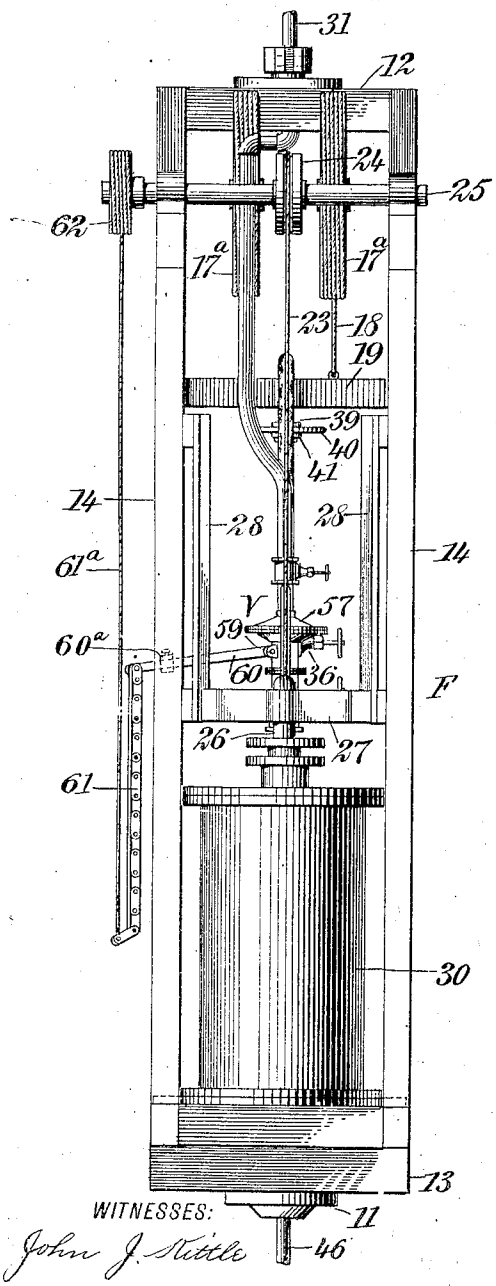
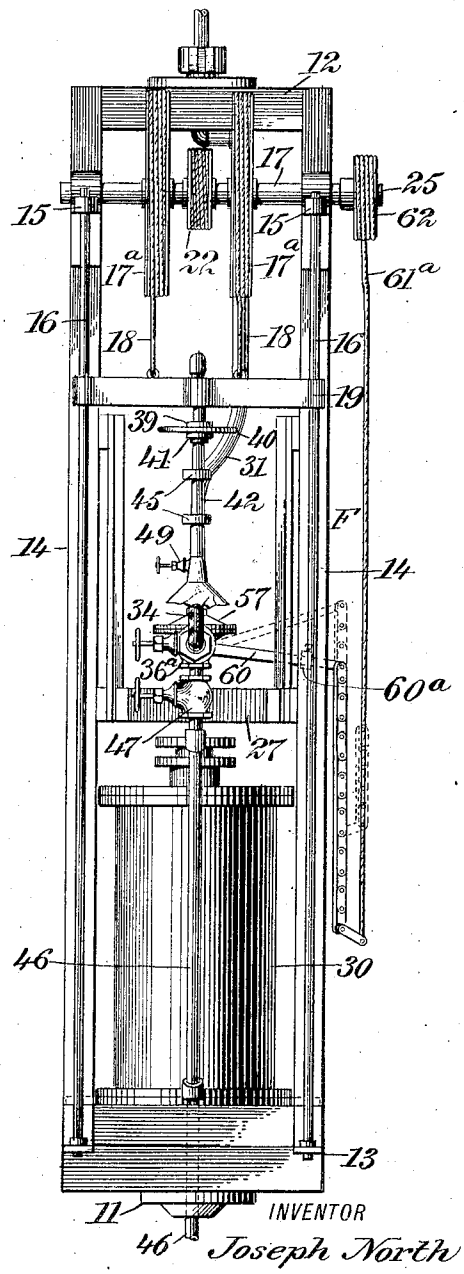


Fig 3



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JOSEPH NORTH, OF LANCASTER, OHIO.

GLASS-WORKING MACHINE.

No. 810,218. Specification of Letters Patent. Patented Jan. 16, 1906.

Application filed April 27, 1904. Serial No. 205,073.

To all whom it may concern:

Be it known that I, JOSEPH NORTH, a citizen of the United States, and a resident of Lancaster, in the county of Fairfield and State of Ohio, have invented a new and Improved Glass-Working Machine, of which the following is a full, clear, and exact description.

My invention relates to machines for producing glass articles, and more particularly to those for drawing tubes and cylinders. Its objects are to generally improve apparatus of this class.

It consists in the various features and combinations hereinafter described and claimed.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the figures.

Figure 1 is a side elevation of one embodiment of my invention, parts being in section, showing the drawing-tool in its lowered position. Fig. 2 is a similar view with the tool raised. Fig. 3 is an end elevation thereof, taken from the right in Fig. 2, the glass cylinder being broken away; and Fig. 4 is a similar view taken from the left in Fig. 2.

10 designates a suitable base upon which is mounted a pair of plates 11 11, the upper one being rotatable upon the lower and serving as a turn-table. Upon the upper plate is supported a frame F, here shown as consisting of upper and lower members 12 13, respectively, and intermediate vertical and inclined connecting members 14. At one end of the horizontal members are preferably mounted pairs of arms 15 15, between which extend substantially vertical rods 16 16. Near one end of the frame member 12 is journaled in suitable bearings a shaft 17, upon which is fixed a pair of rolls or pulleys 17^a 17^a, serving as supports, and, as here illustrated, provided with peripheral grooves. In the groove of each of these pulleys is secured one extremity of a cable 18, which is fastened at its opposite end to a cross head or bar 19, encircling at its ends the rods 16 16, which serve as guides for it. Below the frame and situated beneath the path of the cross-head is a trough or pot 20, connected with a furnace 21, adapted to contain and supply molten glass. Upon the shaft 17, here shown as between the rolls 17^a 17^a, is fixed a roll or pulley 22, to the periphery of which is secured a cable 23, passing over a roll or pulley 24, fastened upon a shaft 25, journaled in bearings near the other side of the frame and upon the member 12 thereof. The lower end of this cable 23 is attached to a piston-rod 26, which also has secured to it a cross-head 27, operating between guides 28 28, suitably mounted on the frame. The piston 29 of this rod operates in a preferably vertical cylinder 30, supported upon the lower member 13 of the frame. Into the upper portion of the cylinder opens a pipe 31, leading through the upper portion and axially of the frame from some source of power, preferably a compressor or reservoir of compressed air. From the opposite extremity of the cylinder leads a pipe 32, which extends into one of the side outlets of a cross-fitting 33, to the opposite outlet of which is connected a flexible pipe or hose 34. In the pipe 32 adjacent to the cross is shown a valve 35, which may serve to either permit direct passage through said pipe or divert the flow therefrom into the atmosphere, and near this valve is a shut-off valve 36. Upon the other side of the cross in connection with the flexible pipe is a shut-off valve 36^a. This flexible pipe 34 terminates in an elbow 37, from which depends a short section of a pipe 38, mounted in the cross-head. Upon the lower end of this pipe-section is mounted the rotatable member 39 of a union, which is preferably provided with a hand-wheel 40 for convenience in operating it. The other member 41 of the union is formed upon the upper extremity of a drawing pipe or tool 42, through which is a passage 43 and which terminates in a head or enlargement 44 for the purpose of taking up and holding the molten glass. Upon the drawing-tool are shown two collars 45 45 for convenience in handling it.

From the lower outlet of the cross extends a pipe 46, which preferably passes through the axis of the frame and through the center of the plates 11 11, this, with the similar situation of the delivery-pipe 31, permitting the rotation of the frame. In this pipe adjacent to the cross is a shut-off valve 47, and from the opposite or upper outlet leads a pipe 48, having a shut-off valve 49 and entering the delivery-pipe. In the pipe 31 is a regulating or controlling valve 51, here shown as located adjacent to the cylinder, and a shut-

off valve 50, both of which have elongated spindles extending toward the group of valves surrounding the cross, so that the hand-wheels of all of these valves may be readily operated by a single person without change in position. Between the valves 50 and 51 is a controlling-valve V, which is preferably of balanced piston type and having its movable portion 53 located within a casing 54. It is connected by its spindle 55 with a diaphragm 56, dividing a chamber 57. Pressure is admitted to the upper side of the draphragm through a pipe 58, leading from the pipe 31 on the piston side of the valve V. Pivoted at 59 in the casing is a lever 60, carrying an adjustable sliding weight 60^a and to which is secured a variable weight which, as here illustrated, consists of a chain 61. To the other end of this chain is jointed a cord or flexible connector 61^a, secured at its opposite end to the periphery of a roll 62, fixed upon the shaft 25.

In the use of my improved machine the frame is rotated until the end of the drawing-tool lies over the supply-trough. The tool is then drawn down until the head dips into the glass a sufficient distance to permit enough to adhere thereto to support the weight of the cylinder to be drawn, this bringing the connected piston near the top of its cylinder. The valves 36, 47, and 50 now being closed while 36^a and 49 are open, enough of the compressed air is admitted to start the glass from the inside of the head. The valve 49 is now closed, and the valve 51 is set to permit the entrance of sufficient air into the cylinder to force the piston down at the desired speed. The controlling-valve and its chain are then set to give enough pressure on the piston to start the operation. The valves 36 and 50 are now opened and the air admitted to the upper side of the piston. This causes it to travel downward, moving the cables over their supports and raising the drawing-tool. The air in the cylinder below the piston is simultaneously forced through the pipe 32 and the flexible pipe 34, its valve 36^a being also open. As the result, a hollow cylinder of glass will be formed upon the end of the tool the dimensions of which will be dependent upon the rate of travel of the tool and the quantity of air forced through its passage. As this proceeds the regulating-chain of the controlling-valve will be lowered, adding weight link by link to the lever and gradually opening the valve to augment the quantity and pressure of the air admitted, and thus increasing the rate of piston travel proportionately to the distance through which the tool is moved, and therefore to the weight of glass which it carries. When the desired length of cylinder has been attained, the valves 36 and 50 are closed and the valve 47 opened. The pipe 46 is connected with a vacuum-pump or a chamber in which at least a partial vacuum is maintained. The effect of this connection with the vacuum is to draw the cylinder together at the bottom, where it is still soft, rendering it easy to disconnect it from the molten glass. This having been done, the frame may be rotated to bring the cylinder to one side of the trough, when upon turning the union by means of its hand-wheel the drawing-tool is released and the cylinder may be detached therefrom.

It will be seen that in my improved machine the volume of air forced into the cylinder being drawn necessarily bears a fixed ratio to the speed at which the drawing takes place from the fact that the power-cylinder serves to both move the tool and to displace the air which enters the passage. This results in the production of a tube of fixed diameter and by virtue of the constancy of speed secured by the controller said tube will also be of uniform quality. The machine is moreover exceedingly simple and convenient to operate.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. In a glass-working machine, the combination with a drawing-tool provided with a passage, of a movable member connected with the drawing-tool and serving to force a fluid through the passage.

2. In a glass-working machine, the combination with a drawing-tool provided with a passage, of a movable member connected with the drawing-tool and serving to force a fluid through the passage, and means for applying power to the movable member.

3. In a glass-working machine, the combination with a drawing-tool provided with a passage, of a movable member connected with the drawing-tool and serving to force a fluid through the passage, means for applying power to the movable member, and means for controlling the application of power.

4. In a glass-working machine, the combination with a drawing-tool provided with a passage, of a movable member connected with the drawing-tool and serving to force a fluid through the passage, means for applying power to the movable member, and automatic means for controlling the application of power.

5. In a glass-working machine, the combination with a drawing-tool provided with a passage, of a movable member connected with the drawing-tool and serving to force a fluid through the passage, means for applying power to the movable member, and means movable with the member for controlling the application of power.

6. A glass-working machine comprising a movable drawing-tool provided with a passage, and means for applying fluid-pressure both through the passage and to effect the movement of the tool.

7. A glass-working machine comprising a movable drawing-tool provided with a passage, means for applying fluid-pressure both through the passage and to effect the movement of the tool, and means for producing at least a partial vacuum in said passage.

8. In a glass-working machine, the combination with a drawing-tool, of a power-cylinder and its piston, said piston being connected with the drawing-tool, and means for controlling the application of power to the cylinder operable through the movement of the drawing-tool.

9. In a glass-working machine, the combination with a drawing-tool, of a power-cylinder and its piston, said piston being connected with the drawing-tool, a valve controlling the application of power to the cylinder, and automatic means for operating the valve.

10. In a glass-working machine, the combination with a drawing-tool, of a power-cylinder and its piston, said piston being connected with the drawing-tool, a valve controlling the application of power to the cylinder, a variable weight connected with the valve, and means for shifting the weight through the movement of the drawing-tool.

11. The combination with a drawing-tool, of a piston connected therewith, a cylinder in which the piston operates, a pipe for delivering fluid-pressure to the cylinder, a valve in the pipe, a variable weight connected with the valve-spindle, and connections between the weight and drawing-tool.

12. The combination with a drawing-tool, of a piston connected therewith, a cylinder in which the piston operates, a pipe for delivering fluid-pressure to the cylinder, a valve in the pipe, and a diaphragm connected with the valve and under the influence of the pressure.

13. The combination with a drawing-tool, of a piston connected therewith, a cylinder in which the piston operates, a pipe for delivering fluid-pressure to the cylinder, a valve in the pipe, a diaphragm connected with the valve and under the influence of the pressure, a lever connected with the valve and diaphragm, and a movable weight associated with the lever.

14. The combination with a drawing-tool provided with a passage, of a piston connected therewith, a cylinder in which the piston operates, a pipe for delivering fluid-pressure to the cylinder at one side of the piston, and a pipe connected with the cylinder at the opposite side of the piston and with the tool-passage.

15. The combination with a drawing-tool provided with a passage, of a piston connected therewith, a cylinder in which the piston operates, a pipe for delivering fluid-pressure to the cylinder at one side of the piston, a pipe connected with the cylinder at the opposite side of the piston and with the tool-passage, and a valve in each of the pipes.

16. The combination with a drawing-tool provided with a passage, of a piston connected therewith, a cylinder in which the piston operates, a pipe for delivering fluid-pressure to the cylinder at one side of the piston, a pipe connected with the cylinder at the opposite side of the piston and with the tool-passage, and an automatic controlling-valve in the delivery-pipe.

17. The combination with a drawing-tool provided with a passage, of a piston connected therewith, a cylinder in which the piston operates, a pipe for delivering fluid-pressure to the cylinder at one side of the piston, a pipe connected with the cylinder at the opposite side of the piston and with the tool-passage, and a pipe joining the delivery-pipe and drawing-tool pipe.

18. The combination with a drawing-tool provided with a passage, of a piston connected therewith, a cylinder in which the piston operates, a pipe for delivering fluid-pressure to the cylinder at one side of the piston, a pipe connected with the cylinder at the opposite side of the piston and with the tool-passages, and means for producing at least a partial vacuum in the drawing-tool pipe.

19. The combination with a support, of a cable passing over the support, a drawing-tool provided with a passage connected with the cable at one side of the support, a cylinder, a piston operating in the cylinder and connected with the cable at the other side of the support, and a communication between the cylinder and the tool-passage.

20. The combination with a support, of a cable passing over the support, a drawing-tool connected with the cable at one side of the support, a cylinder, a piston operating in the cylinder and connected with the cable at the other side of the support, a pipe for delivering fluid-pressure to the cylinder, a valve in the pipe, and a chain connected with the valve-spindle and movable with the cable.

21. In a glass-working machine, the combination with a rotatable frame, of means for supplying pressure extending axially of the frame, and a drawing-tool carried by the frame and operable through said pressure.

22. In a glass-working machine, the combination with a rotatable frame, of a drawing-tool and a power-cylinder carried by the frame, and connections between the cylinder and the drawing-tool.

23. In a glass-working machine, the combination with a rotatable frame, of a draw-

ing-tool and a power-cylinder carried by the frame, connections between the cylinder and the drawing-tool, and a supply-pipe for the cylinder extending axially of the frame.

24. In a glass-working machine, the combination with a pipe for supplying a fluid under pressure, a union member rotatable upon one end of the pipe and provided with a hand-wheel, and a drawing-tool having the companion member of the union connected with the supply-pipe.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JOSEPH NORTH.

Witnesses:
CHARLES F. ZEISLER,
CHAS. F. FRICKER.