

(No Model.)

3 Sheets—Sheet 1.

J. H. SCHMAHL & O. E. WESTPHAL.
SMOKE CONSUMER.

No. 575,990.

Patented Jan. 26, 1897.

Fig 1

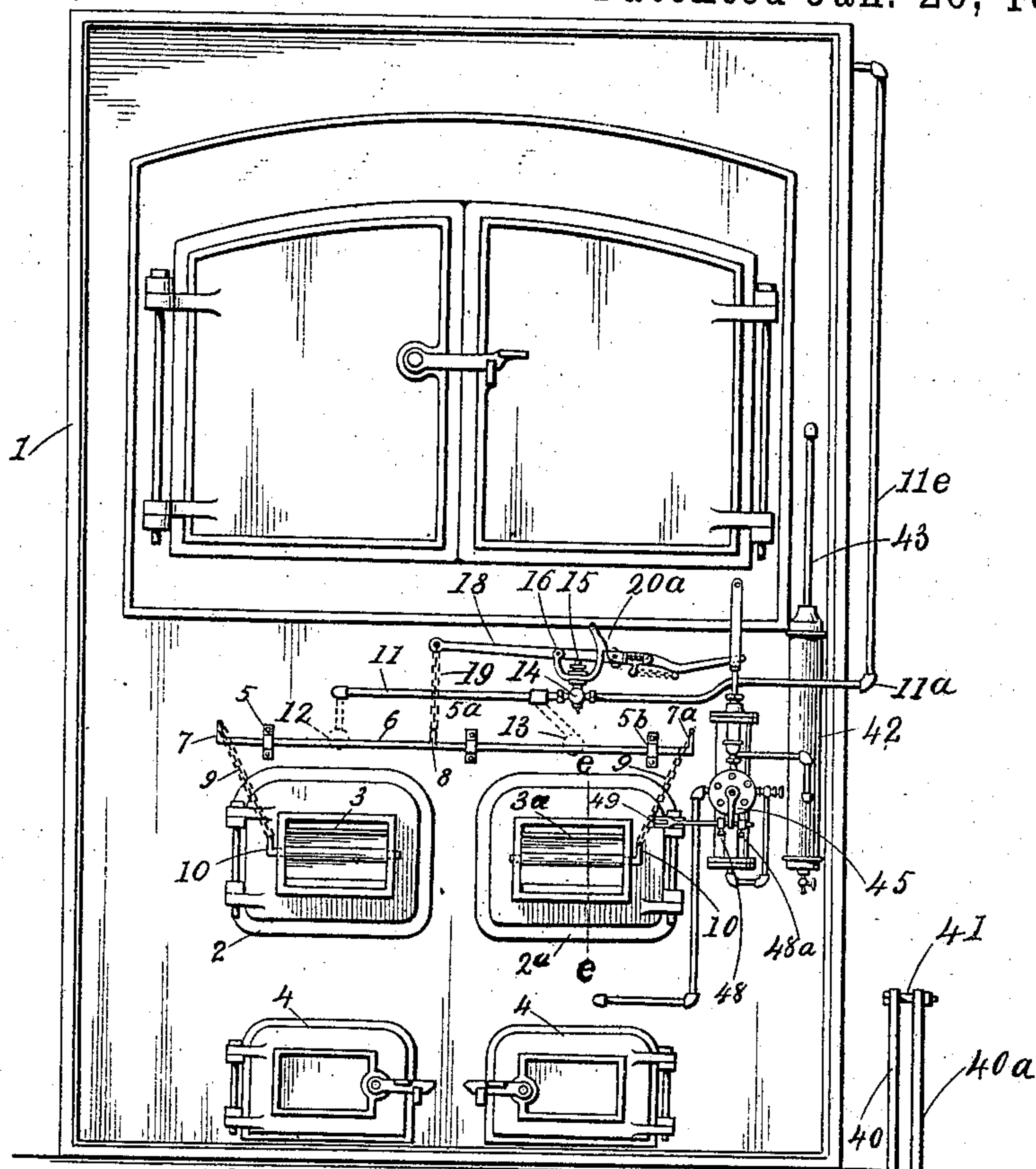


Fig. 2

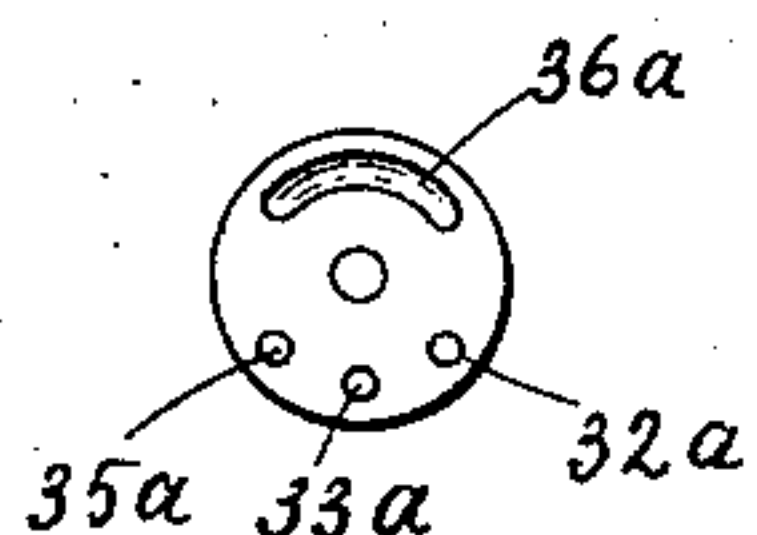


Fig. 3.

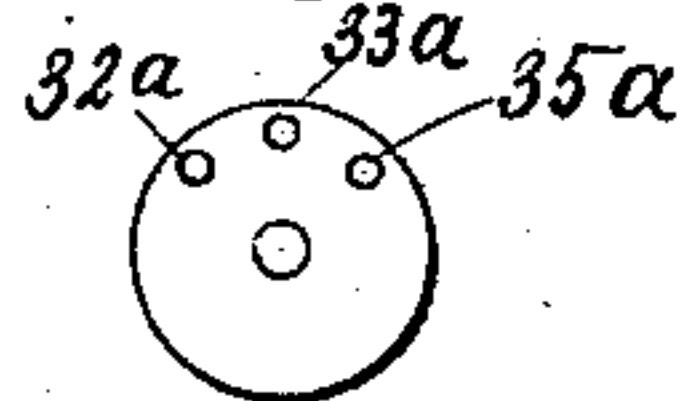


Fig. 4.

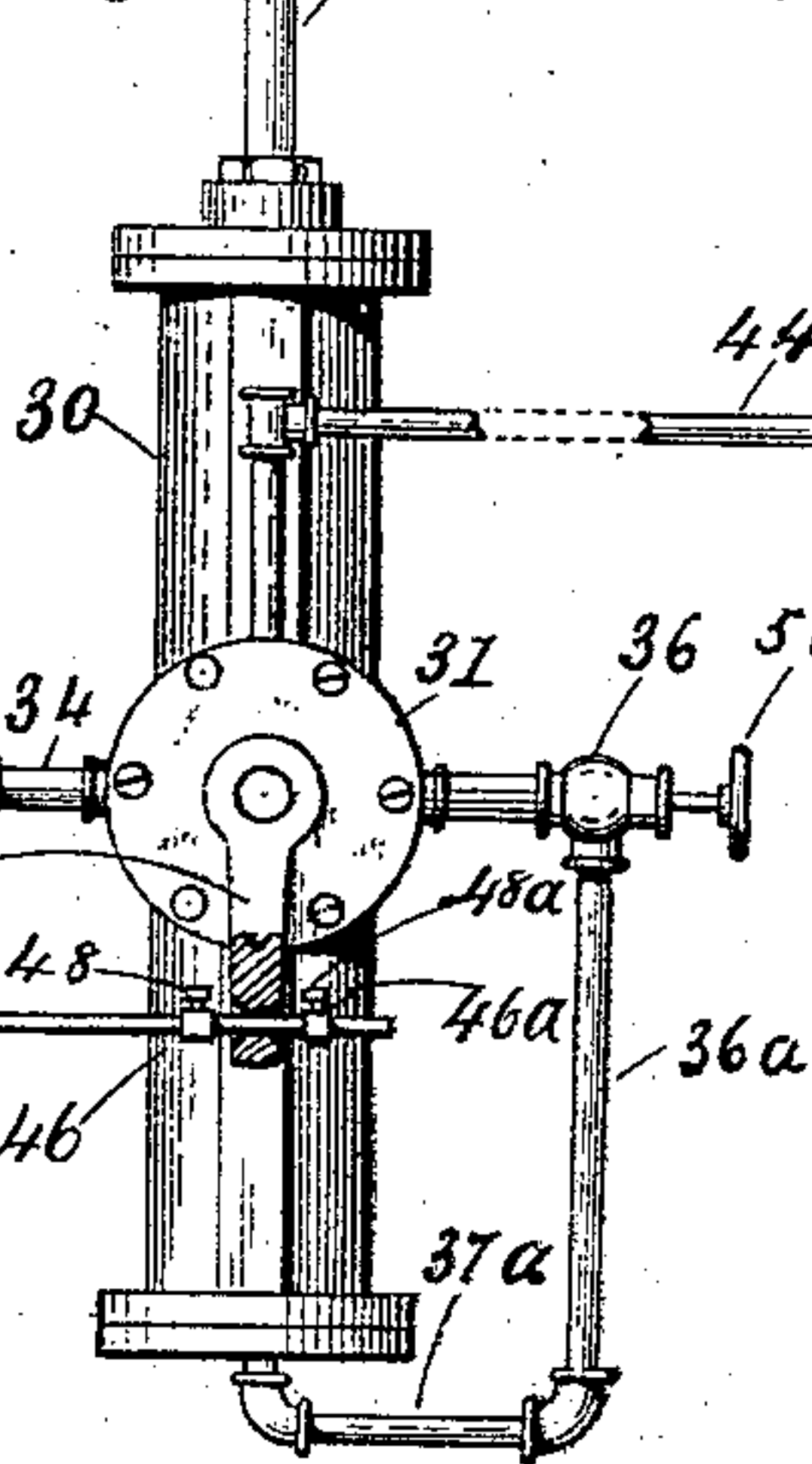
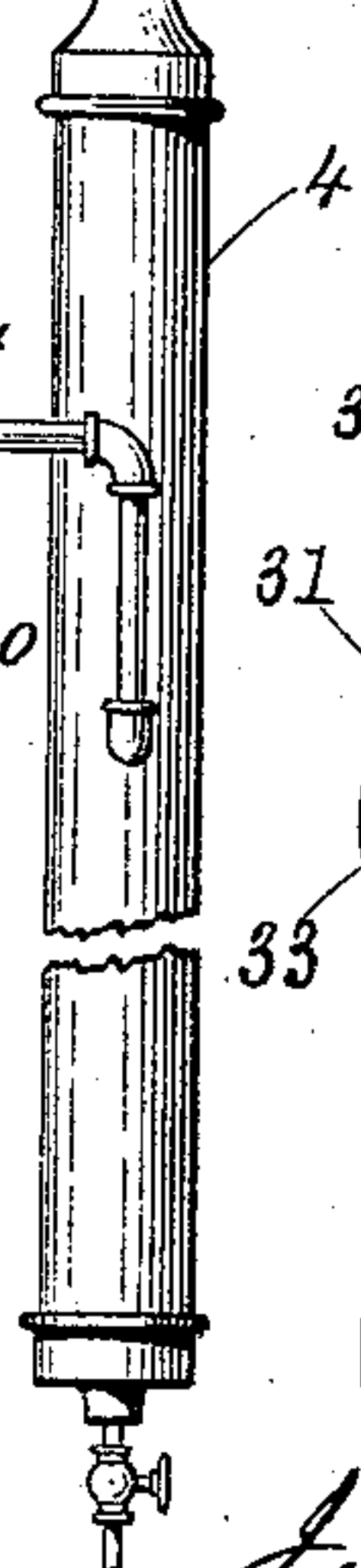


Fig. 5.



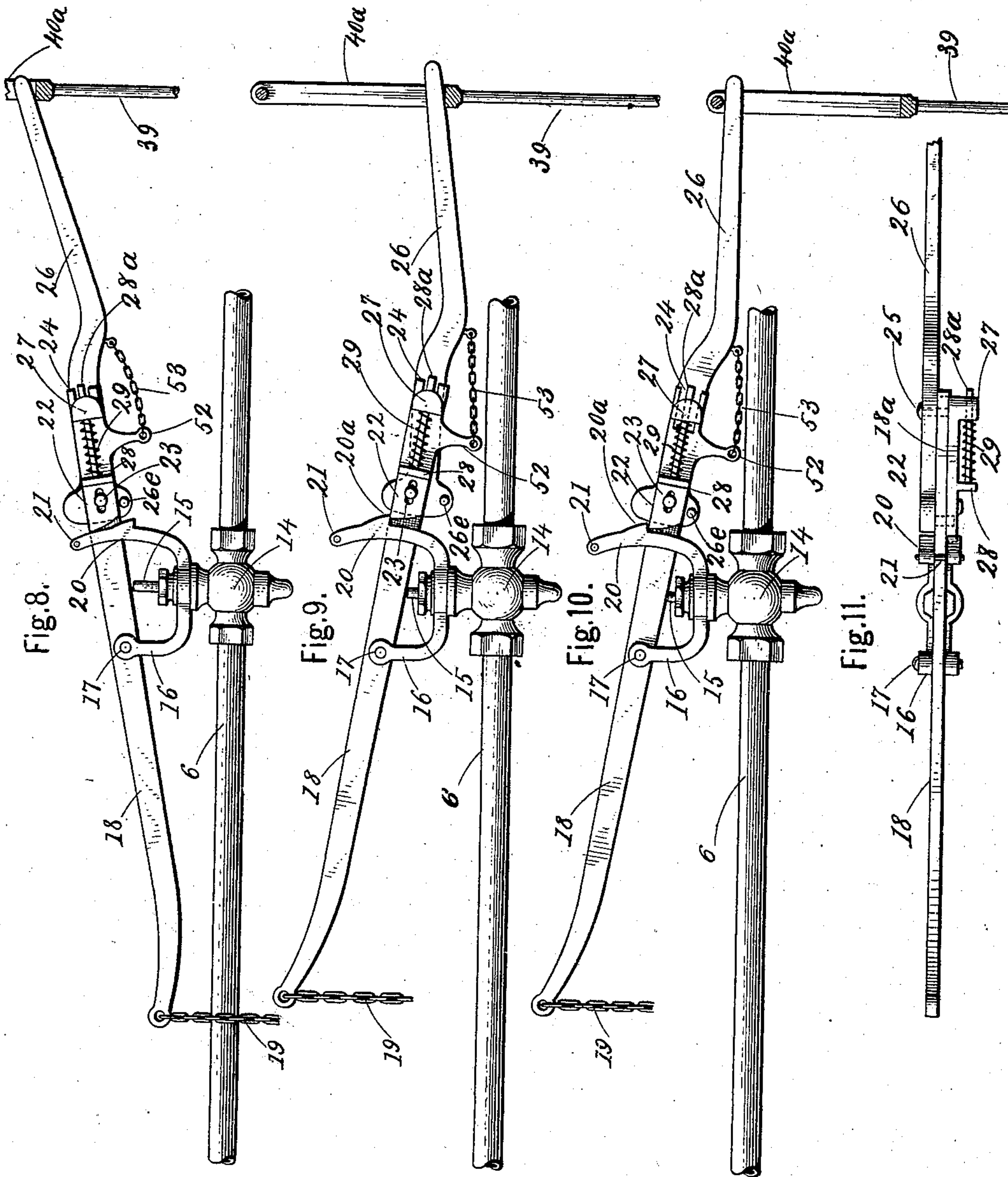
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3 Sheets—Sheet 3.

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Fig.12.

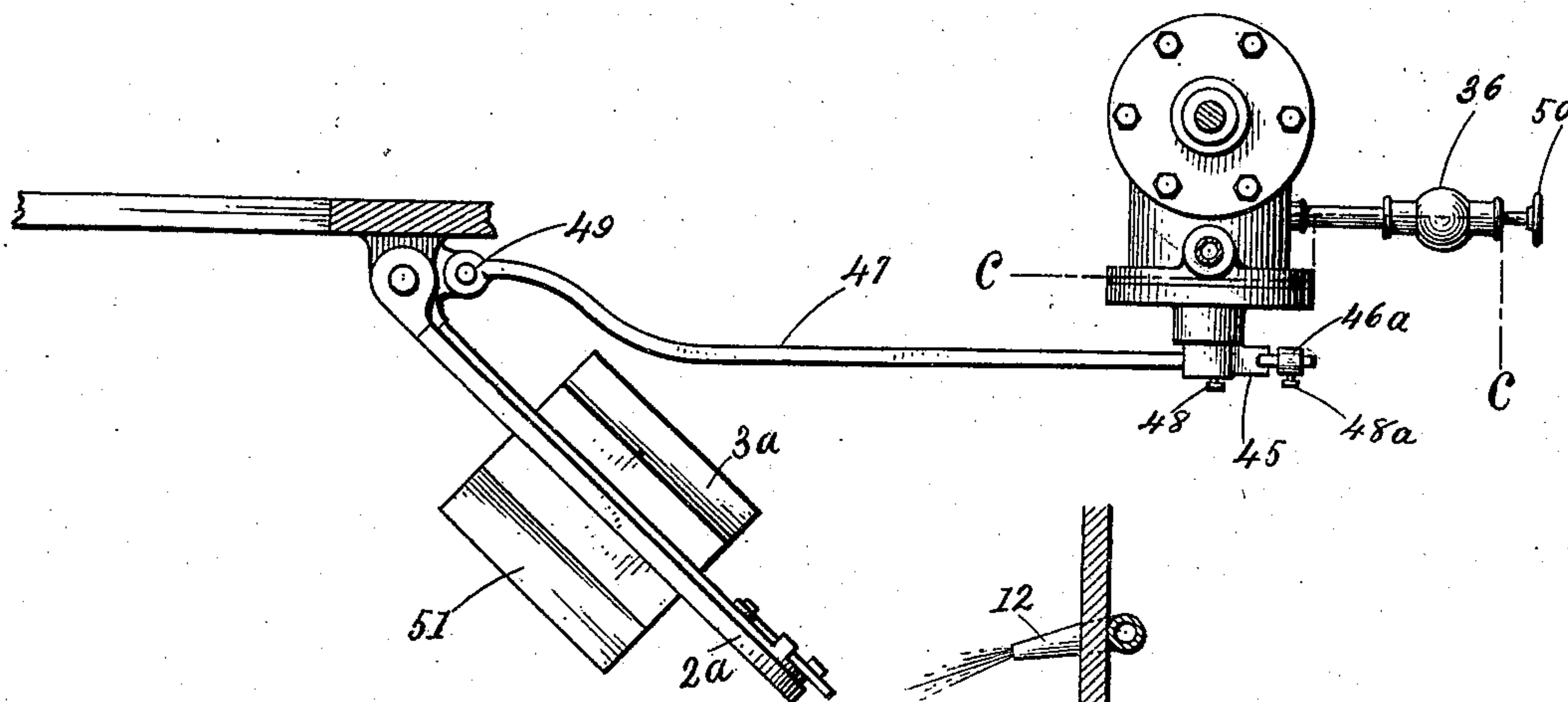


Fig.13.

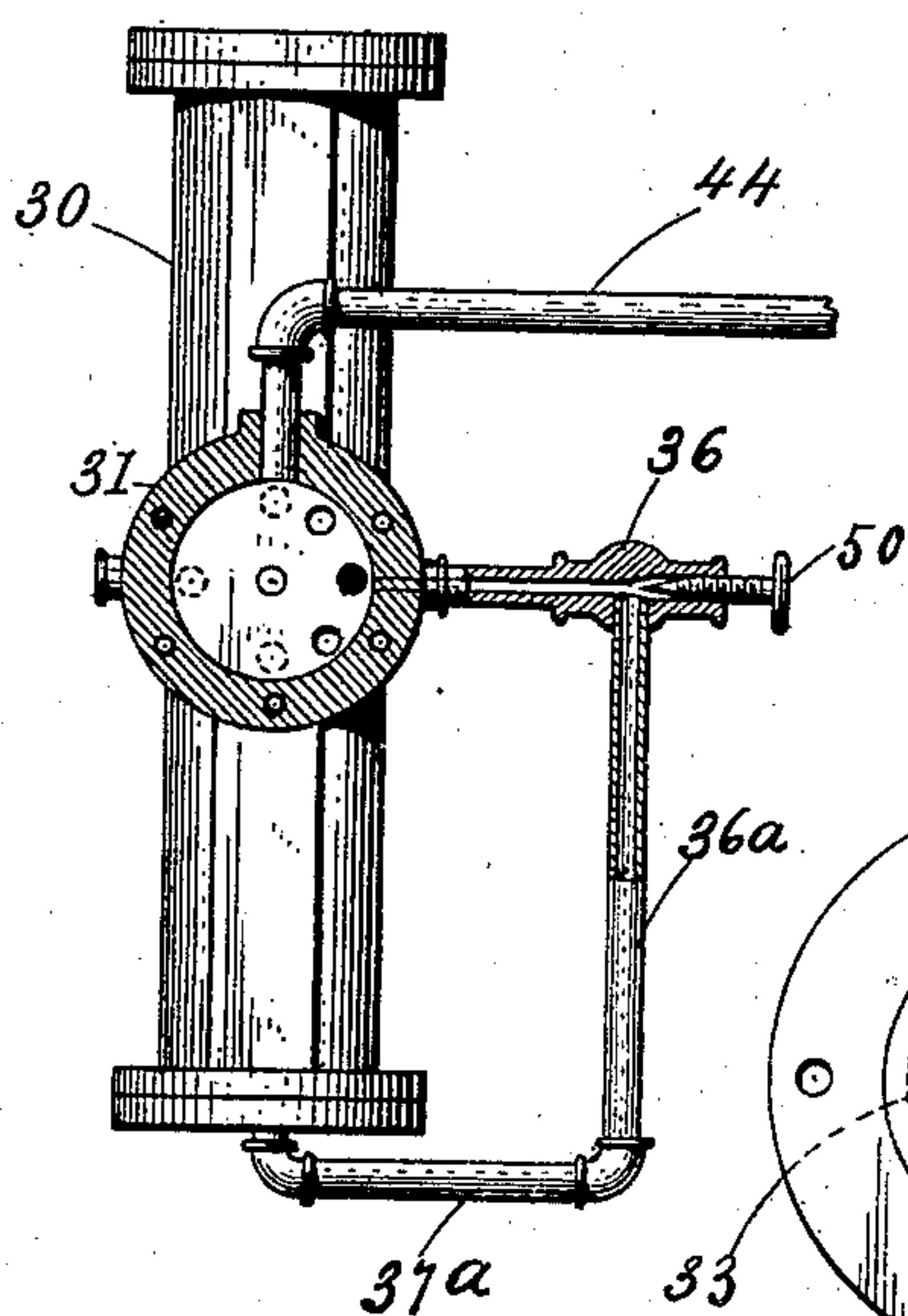


Fig.14.

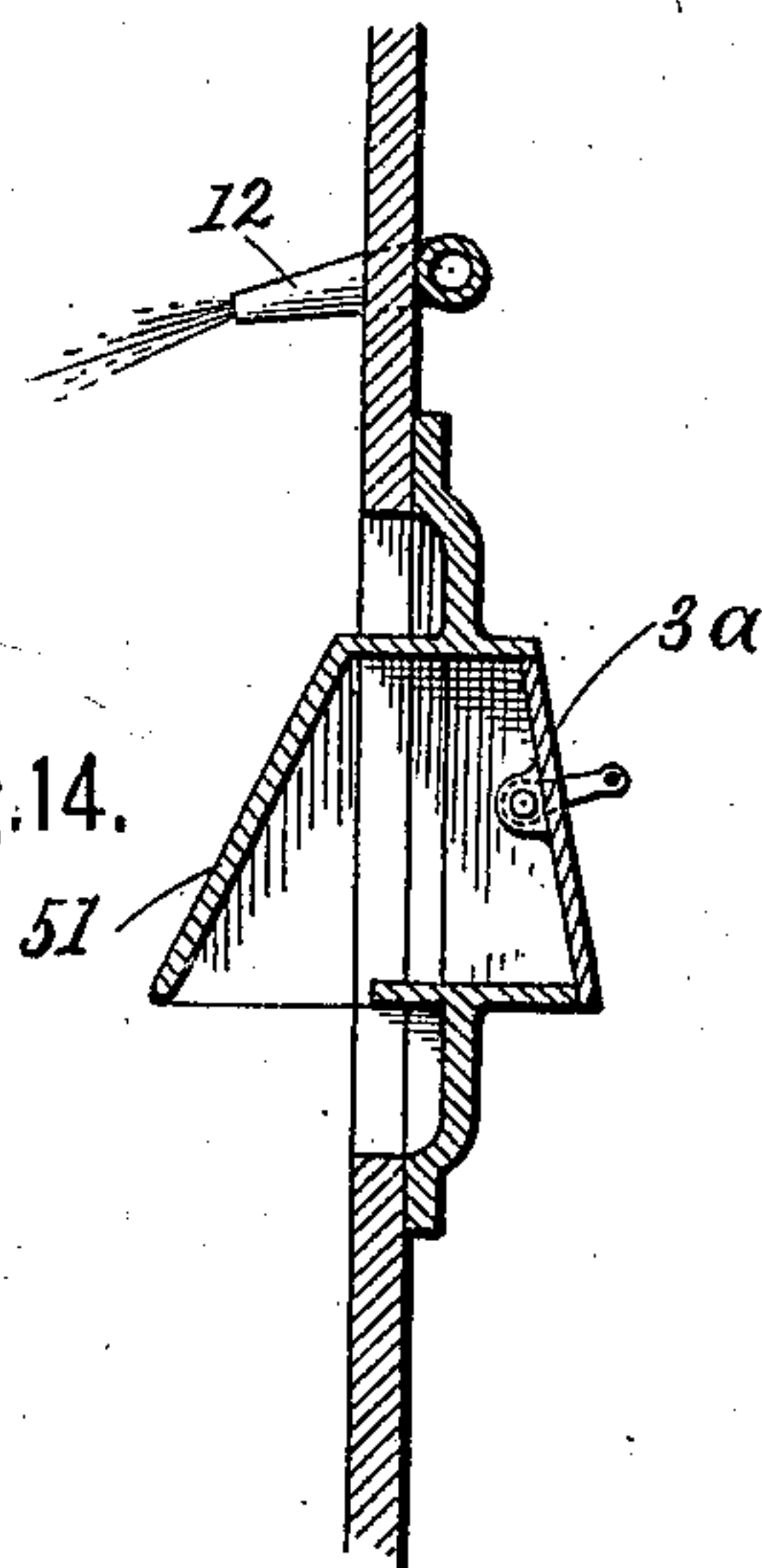


Fig.15.

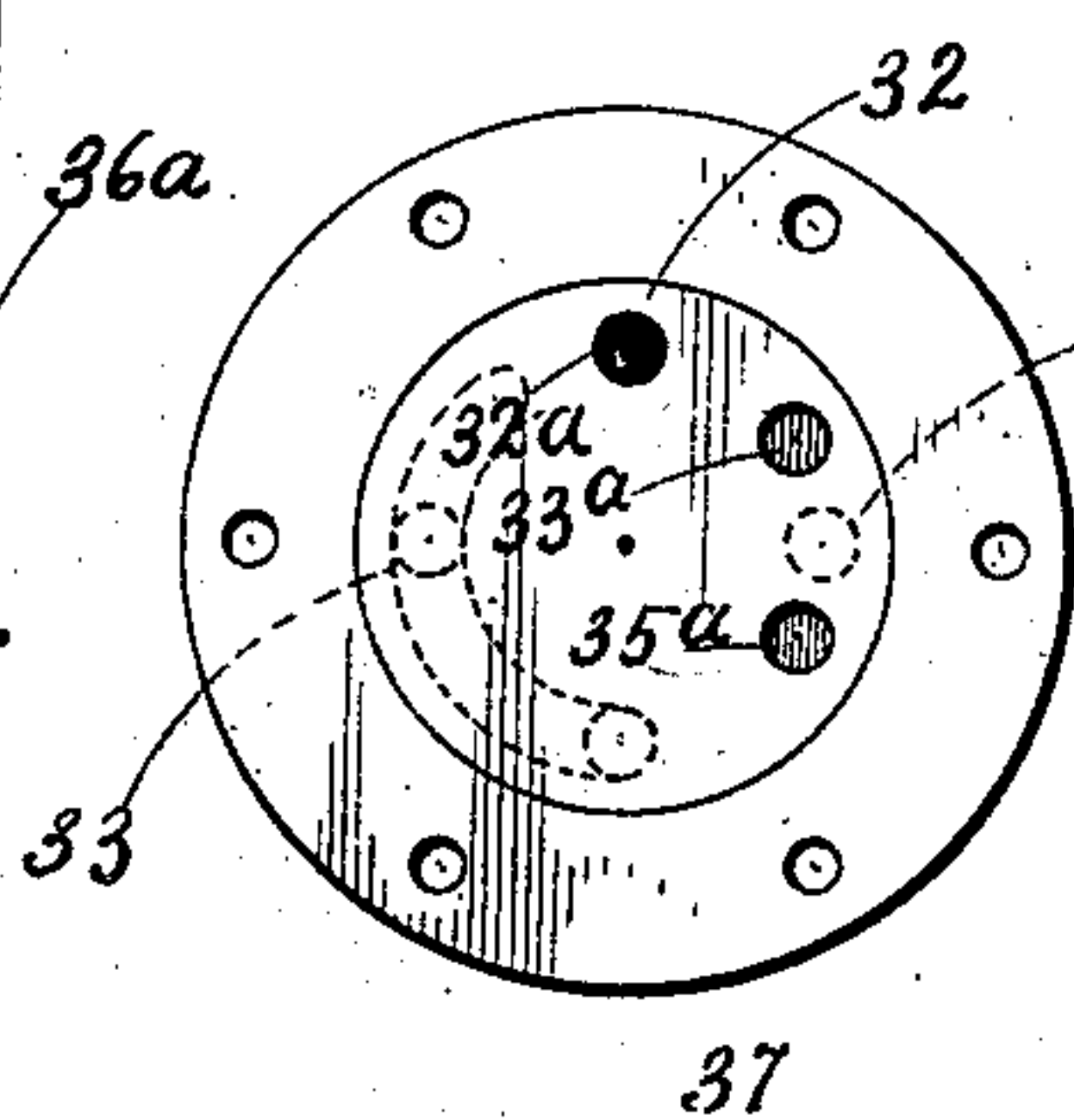
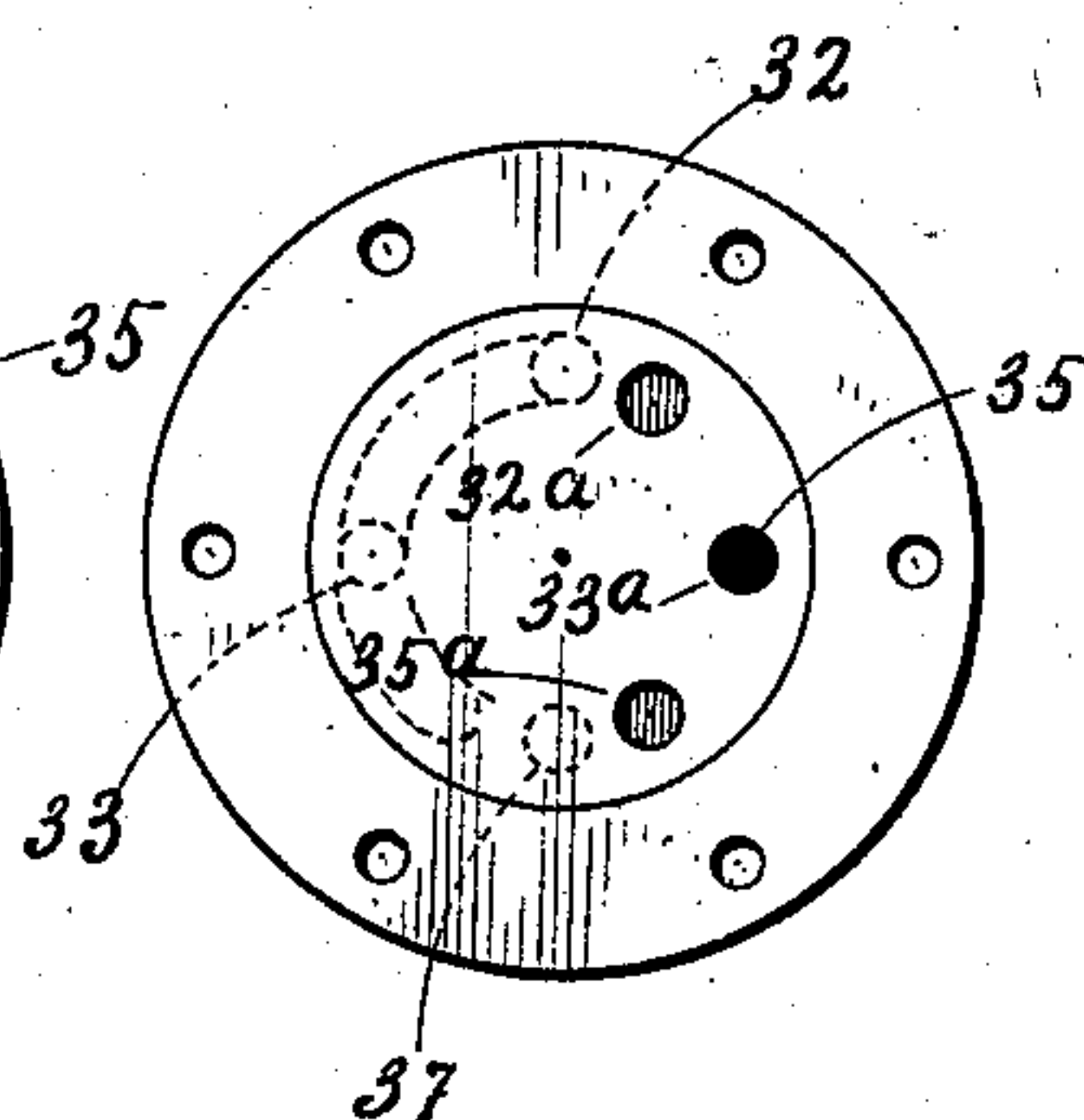


Fig.16.



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UNITED STATES PATENT OFFICE.

JOHN H. SCHMAHL AND OTTO E. WESTPHAL, OF BUFFALO, NEW YORK,
ASSIGNORS OF ONE-THIRD TO JOHN ROEHRER, OF SAME PLACE.

SMOKE-CONSUMER.

SPECIFICATION forming part of Letters Patent No. 575,990, dated January 26, 1897.

Application filed July 14, 1896. Serial No. 599,080. (No model.)

To all whom it may concern:

Be it known that we, JOHN H. SCHMAHL and OTTO E. WESTPHAL, citizens of the United States, residing at Buffalo, in the county of Erie and State of New York, have invented certain new and useful Improvements in Smoke-Consumers, of which the following is a specification.

Our invention relates to certain improvements whereby the opening and closing of the doors put in action the mechanism for operating the device, and also to certain details of construction, all of which will be fully and clearly hereinafter described and claimed, reference being had to the accompanying drawings, in which—

Figure 1 represents a front elevation of the furnace, showing the device in position when the escapement-pawl is about to let go and release the mechanism that allows the dampers to be closed. Fig. 2 represents an inner face view of the valve, showing the position of the valve exhaust-port. Fig. 3 is an outside face view of the valve, showing the position of the three valve-ports. Fig. 4 represents an enlarged detached front elevation of the water-cylinder, showing the connecting-rod connecting with the door for operating the valve-arm and other details. Fig. 5 represents a detached side elevation of the water-reservoir and portions of its connecting-pipes. Fig. 6 represents a detached front elevation of the water-cylinder, the valve-case cover being removed to expose the ports below it. Fig. 7 is a vertical central section through the water-cylinder, showing the piston, piston-rod, and the forked or slotted portion at its upper end, showing also the ports for admitting water to the upper and lower sides of the piston. Fig. 8 is an enlarged detached side elevation of the damper-controlling device, showing it in its released position, during which the damper is closed, as will appear more clearly farther on. Fig. 9 is a side elevation of the same device, showing the position of the several parts when the damper is held open and about to be released to permit them to close. Fig. 10 is also a side elevation of the damper-controlling device, showing the position of the several parts when the damper is held open. Fig. 11 is a top

view of the damper-controlling mechanism, the lower portion of the valve being omitted. Fig. 12 is an enlarged detached top view of a portion of a furnace front, showing a top view of the door hinged to it, representing also the water-cylinder and connecting-rod for operating it, the furnace-door being shown open. Fig. 13 represents a vertical section on or about line *c c*, Fig. 12, cutting through the pin and main valve cases, and showing the position of the main valve for admitting water through the pin-valve to the bottom of the piston and forcing it slowly upward. Fig. 14 represents a vertical section through a portion of the boiler-front and through one of the doors and dampers on or about line *e e*, Fig. 1. Fig. 15 represents an enlarged front view of the valve-case below the cover, showing the valve in position for admitting water to the top of the piston and forcing it quickly down when the furnace-door is opened. Fig. 16 is also a front elevation of the valve-case, the cover being omitted, showing the valve in position to admit water to the pin-valve.

Referring to the drawings for the details of the apparatus, 1 represents the front of an ordinary steam-boiler; 2 and 2^a, the furnace-doors, and 3 and 3^a designate the dampers, and 4 represents the ash-pit doors, all of the usual construction.

Mounted at the front of the boiler, in supporting-bearings 5, 5^a, and 5^b, is a horizontal shaft 6. This shaft 6 is adapted to be moved easily in a longitudinal direction back and forth in its bearings, and also to be turned therein. At each end of the shaft 6 is rigidly secured a crank-arm 7 and 7^a, and between the two arms 7 and 7^a is secured another crank-arm 8. (See Fig. 1, where this is shown.) The arms 7 and 7^a are connected by a chain 9 with the arms 10, which control the action of the dampers 3 and 3^a.

A steam-pipe 11 (see Fig. 1) extends horizontally across the front of the furnace and connects with a steam-jet nozzle 12, extending into the furnace. (See Fig. 1, where the position of the nozzle is shown by dotted lines, and Fig. 14, where one of these nozzles is shown.) The opposite end of the horizontal pipe 11 is connected with an elbow 11^a and

then extends upward, as at 11^c, Fig. 1, and connects with the boiler at any suitable point communicating with the steam-chamber.

To the steam-pipe 11 is connected another steam-jet nozzle 13. This nozzle is also shown by dotted lines in Fig. 1. To one side of the nozzles is connected with the pipe 11 a valve 14, having its valve-stem 15 extend upward, the construction being such that the steam from the boiler passes first through the valve 14 (when open) and then through the nozzles. To one side of the valve 14 is rigidly secured a forked arm 16. In addition to Fig. 1 reference is had to Figs. 8, 9, 10, and 11, in which enlarged views of this portion of the mechanism are shown.

Between the forked portions of the arm 16 is pivoted by a pin 17 an arm 18, the free end of which is connected with a chain 19, which connects with the arm 8 (shown in Fig. 1) on the shaft 6, so that every time that end of the arm 18 is moved up the dampers 3 and 3^a are opened, and are closed every time it is lowered. The arm 18 is operated intermittently and the intermissions may be made of longer or shorter duration, as will appear farther on. At the opposite side of the valve 14 is another upright slotted or forked arm 20, between the forks of which the opposite end portion 18^a of the arm 18 extends, and is kept in place therein by means of a pin 21. On the end portion 18^a is a sliding catch 22, kept in position thereon by a bolt 23, which passes through a slot in the catch, so as to permit it to slide longitudinally back and forth on the portion 18^a. Its opposite end is secured so as to be movable lengthwise by its slotted end 24 and a bolt 25, which passes through an arm 26 and acts as a pivot upon which said arm 26 turns, and is then rigidly secured to a portion 27, (see Figs. 10 and 11,) which fits in the slotted end 24, so that the slotted end of the catch 22 slides thereon. The arm 26 is prevented from turning too far up by a pin 26^e. To keep the sliding catch 22 forward with a spring force, a small lug 28 extends outward therefrom. A pin 28^a is rigidly secured thereto, so that its opposite end passes through the portion 27. A spiral spring 29 is mounted on the pin 28^a, so that its ends are interposed between the portions 28 and 27. The sliding catch is thereby held forward by a spring force.

The object of the sliding catch or escapement 22 is to provide a suitable means for catching under the tooth 20^a when the arm 18 is raised upward, as in Figs. 9 and 10. The free end of the arm 26 passes through a slotted portion at the end of the water-cylinder piston-rod.

In describing the construction of the water-cylinder reference, in addition to Fig. 1, Figs. 2 to 7, inclusive, all on one sheet; also, Fig. 13 on the last sheet.

30 represents the water-cylinder; 31, the valve-case.

32 (see Figs. 6 and 7) represents the cylin-

der-port which communicates with the top of the piston; 33, the port communicating with the exhaust-pipe 34. (Shown in Fig. 4.)

35 represents the port which communicates with the pin-valve 36 and with the cylinder below the piston through the pipes 36^a and 37^a. (See Figs. 4 and 13.)

37 is the relief-port which communicates with the cylinder below the piston.

The piston 38 (see Fig. 7) is constructed in the usual way with packing-rings. (See Fig. 7.)

39 represents the piston-rod. It is provided with forked portions 40 and 40^a at the top, the upper ends of the forks being connected by a bolt 41. The free end of the arm 26 passes through or between the fork portions 40 and 40^a.

The water-tank consists of a vertical tubular vessel 42. (See Figs. 1 and 5.) It is connected to the boiler-front, and a pipe 43 connects with the water of the boiler.

44 represents a pipe connecting the water-tank with the water-cylinder-valve case.

To the main valve-arm 45 is secured by collars 46 and 46^a a connecting-rod 47, the end of which passes through the lower end of the valve-arm, substantially as shown in Fig. 4. The collars 46 and 46^a are made adjustable along said rod by means of set-screws, as shown in said Fig. 4; also, Fig. 1, at 48 and 48^a. The opposite end of the connecting-rod 47 is pivoted to the furnace-door at 49. (See Figs. 1 and 12.) The main valve itself is provided with three ports 32^a, 33^a, and 35^a and an exhaust depression or recess 36^a. (See Figs. 2 and 3, where both sides of the main valve are shown.) The opening through the pin-valve to the water-cylinder is closed or opened by the hand-wheel 50. The operator can therefore adjust the device to cause the piston to move up as slowly or as fast as desired. The device can in this way be set to operate at such intervals of time as may be required. At the back of each damper is an inward and downward inclined plate 51, (see Figs. 12 and 14,) which directs the air downward against the fuel as it flows in through the open dampers. It also becomes heated as it passes down over said plate 51.

It will be noticed that the spring-catch 22 is provided with a downward-extending arm 52, to which a chain 53 is attached, the other end of the chain 53 being secured to the arm 26, so that as the arm 26 is raised the chain is drawn tight and this catch 22 is moved backward so as to disengage it from the tooth 20^a.

The operation of our improved smoke-consuming device is as follows: When the doors are closed and the dampers shut, the water-cylinder piston-rod 39 is at its highest point, the arm 18 at its lowest point, and the pivoted arm 26 is also raised up, the spring-catch 22 being disengaged from the tooth 20^a, the parts being in substantially the position shown in Fig. 8, and the main valve-port being in the position shown in Figs. 13 and 16.

If the door 2^a be now opened, it operates the main valve-arm 45, through the connecting-rod 47, and moves the main-valve port 32^a over the port 32 to the position shown in Fig. 15, and the exhaust-port is brought in communication with the port 37. The opening of the furnace-door also opens the valve 14 and allows a jet of steam to be admitted to the furnace. This operation permits the water, which is forced by the boiler-pressure, to move the piston and piston-rod 39 quickly downward and thereby bring the arm 18 upward, the arm 26 downward, and locking the catch 22 with the tooth 20^a, the parts being brought to the position shown in Fig. 10. It also opens the dampers, so that the air flows in and they remain open after the furnace-doors are closed. The opening of the furnace-door also causes the valve 14 to open and allow a jet of steam to pass into the fire through each jet-nozzle. This is done by the portion 18^a of the arm 18, which presses down the valve-stem 15 and thereby opens the valve. The furnace-doors are kept open long enough to put in the required fuel. The closing of the door brings the main valve to the position shown in Fig. 16, so that the water passes in through the port 35, from thence to the pin-valve, and then through the pipes 36^a and 37^a, to the lower side of the piston, which it slowly forces upward until the bottom of the forked portions 40 40^a touch the end of the arm 26 and move it upward until the chain 53 disengages the catch 22, thereby allowing the arm 18 to drop instantly downward and the dampers to close by gravity, as they are pivoted nearer the top than the bottom, so that the lowest portions are the heaviest. This operation also shuts off the steam from the jet-nozzles. The device now remains inactive until the furnace-door or doors are again opened, when the operation is repeated.

We claim as our invention—

1. The combination, with a furnace, the doors of which are provided with dampers, of a steam-pipe projecting into the furnace, a valve in the pipe, an arm for controlling the valve and the dampers, a piston between the door and the arm, the rod of which operates the arm, a valve for the piston provided with a perforated arm, a rod pivotally secured to

the door and having its free end projected through the perforation in the valve-arm, and collars adjustably secured upon the rod for engaging with the valve-arm, substantially as set forth.

2. The combination, with a furnace, the doors of which are provided with dampers, of a steam-pipe projecting into the furnace, a valve in the pipe, a support on the valve-case, provided with a shoulder, an arm pivotally secured to the support, an end portion pivotally secured to the arm, a sliding catch connected with the end portion, and means for moving the catch when the end portion is turned upon its pivotal point, and a motor connected with the door and with the end portion, substantially as set forth.

3. The combination with a furnace, of a steam-pipe connected with the boiler and carrying steam-jet nozzles, a valve connected with said pipe, an arm pivoted to a support on said valve for operating the valve, means connecting said arm with dampers located in the furnace-doors for opening or closing them, a locking-tooth at the opposite side of said valve, a spring-catch connected with the opposite end of said arm for engaging said tooth, and an arm pivoted to the pivoted arm and connected by a chain for operating said catch, for the purposes described.

4. The combination with a furnace, of a steam-pipe communicating with the boiler and provided with steam-jet nozzles, a valve connected with said pipe having a support on one side carrying a pivoted arm, having at one side means connecting with the dampers for opening and closing them, a locking-tooth and support at the opposite side of said valve, a spring-catch mounted so as to be movable longitudinally on the pivoted arm and adapted to engage with the locking-tooth, an arm jointed to the pivoted arm and connected thereto by a chain for disengaging the spring-catch, and means connected with the furnace-doors for operating said arm, substantially as described.

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