

No. 765,617.

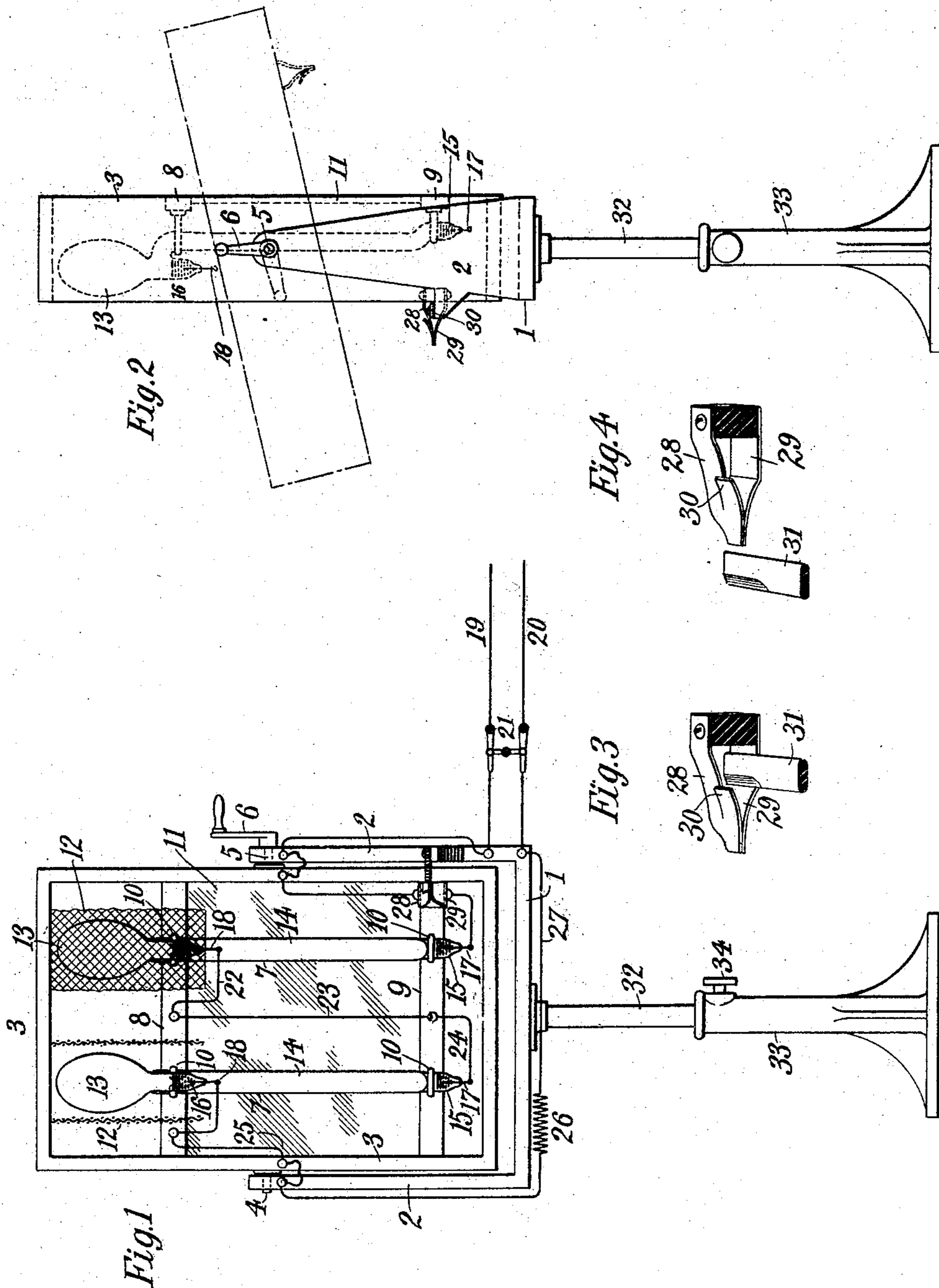
PATENTED JULY 19, 1904.

S. E. FLICHTNER.
STARTING MEANS FOR GAS OR VAPOR ELECTRIC DEVICES.

APPLICATION FILED SEPT. 19, 1903.

NO MODEL.

3 SHEETS—SHEET 1.



Witnesses:

Thos. D. Brown
Wm. H. Capel.

Inventor

Stamwood E. Flichtner
by Charles A. Pines - Atty

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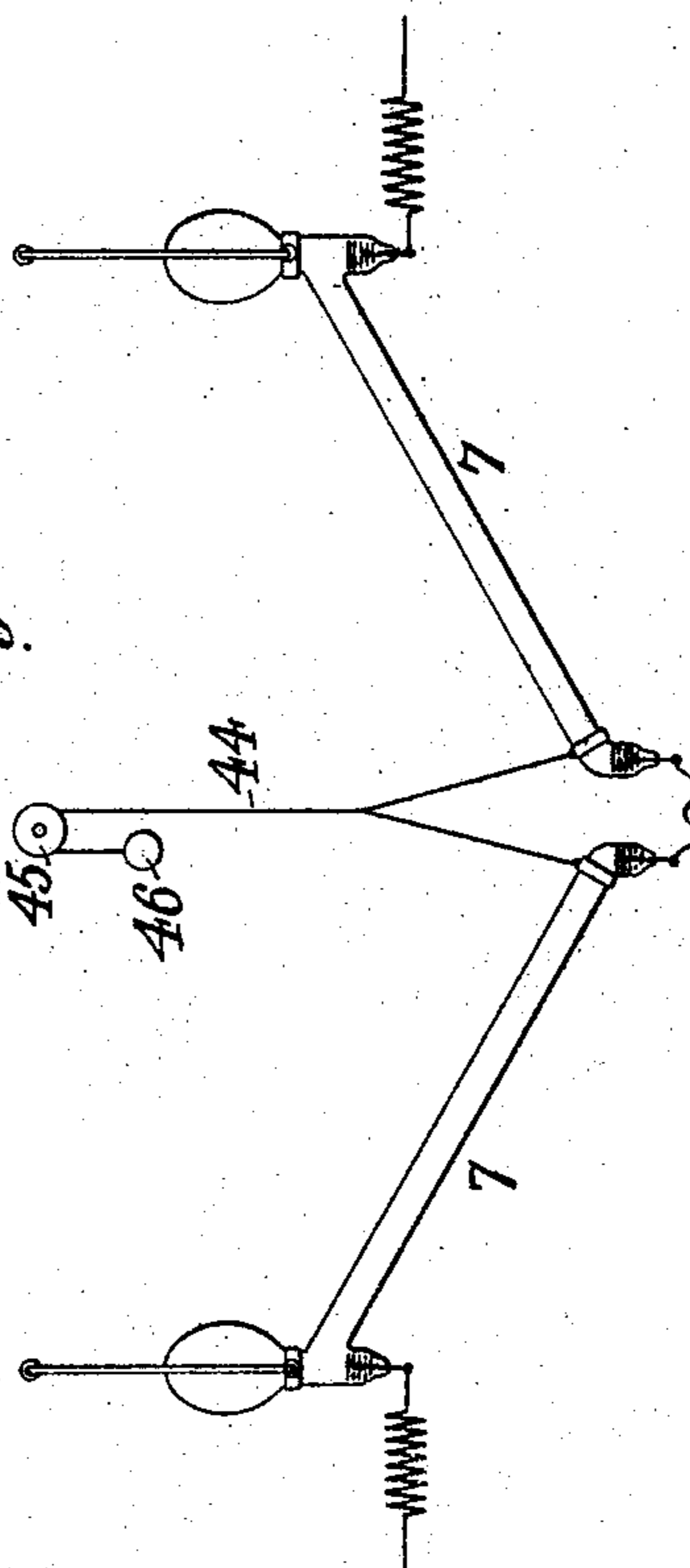
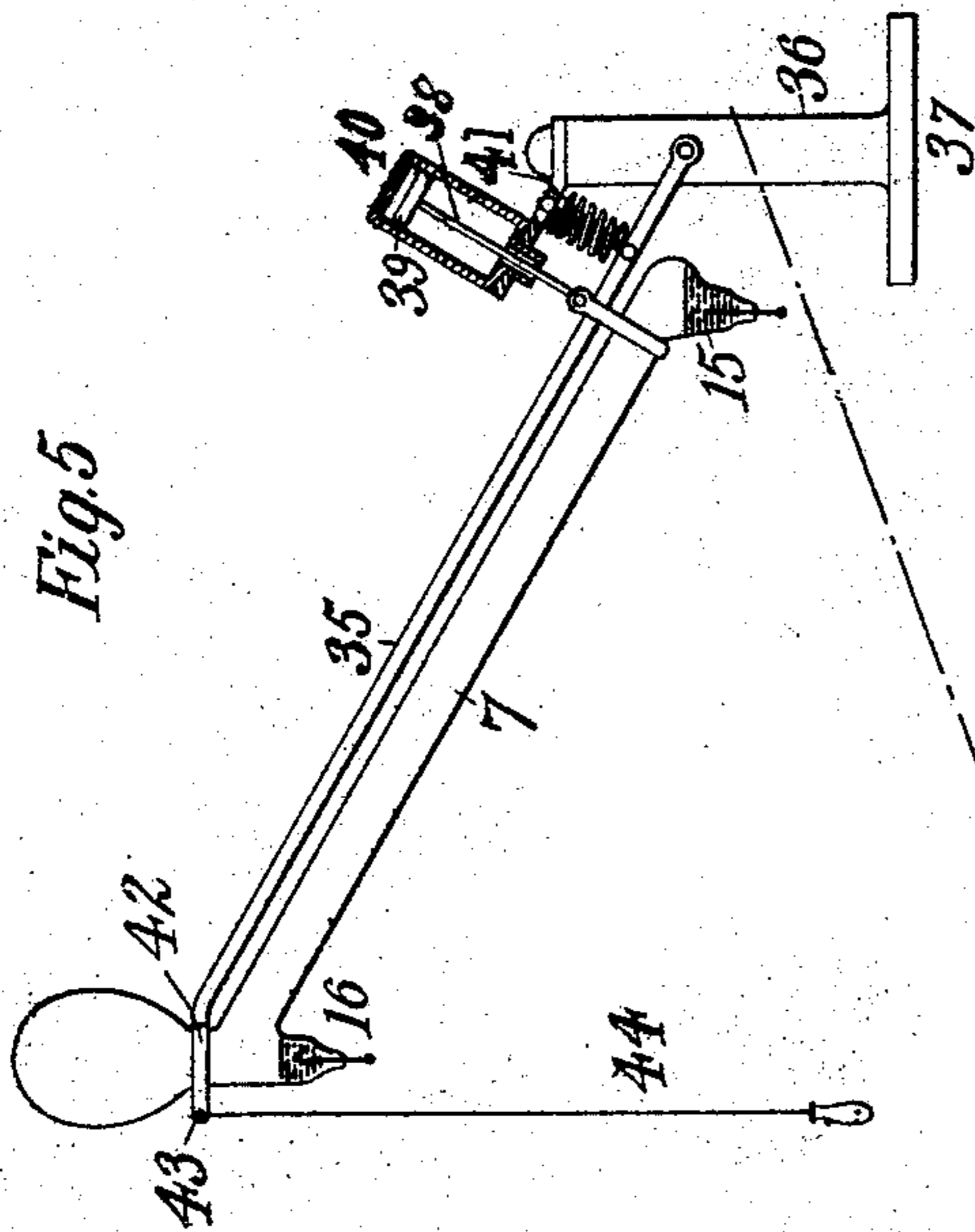
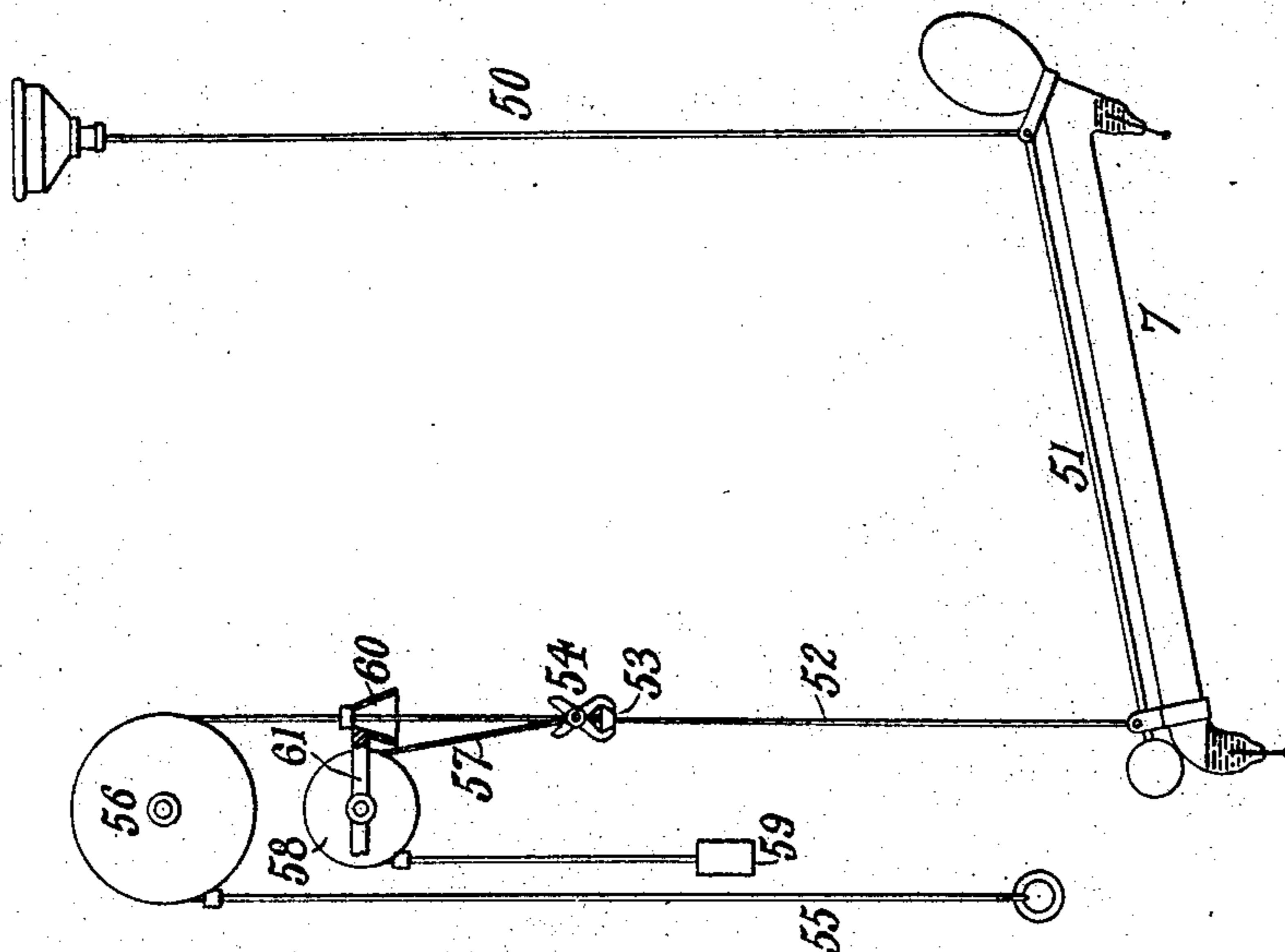
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Witnesses:
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3 SHEETS—SHEET 3.

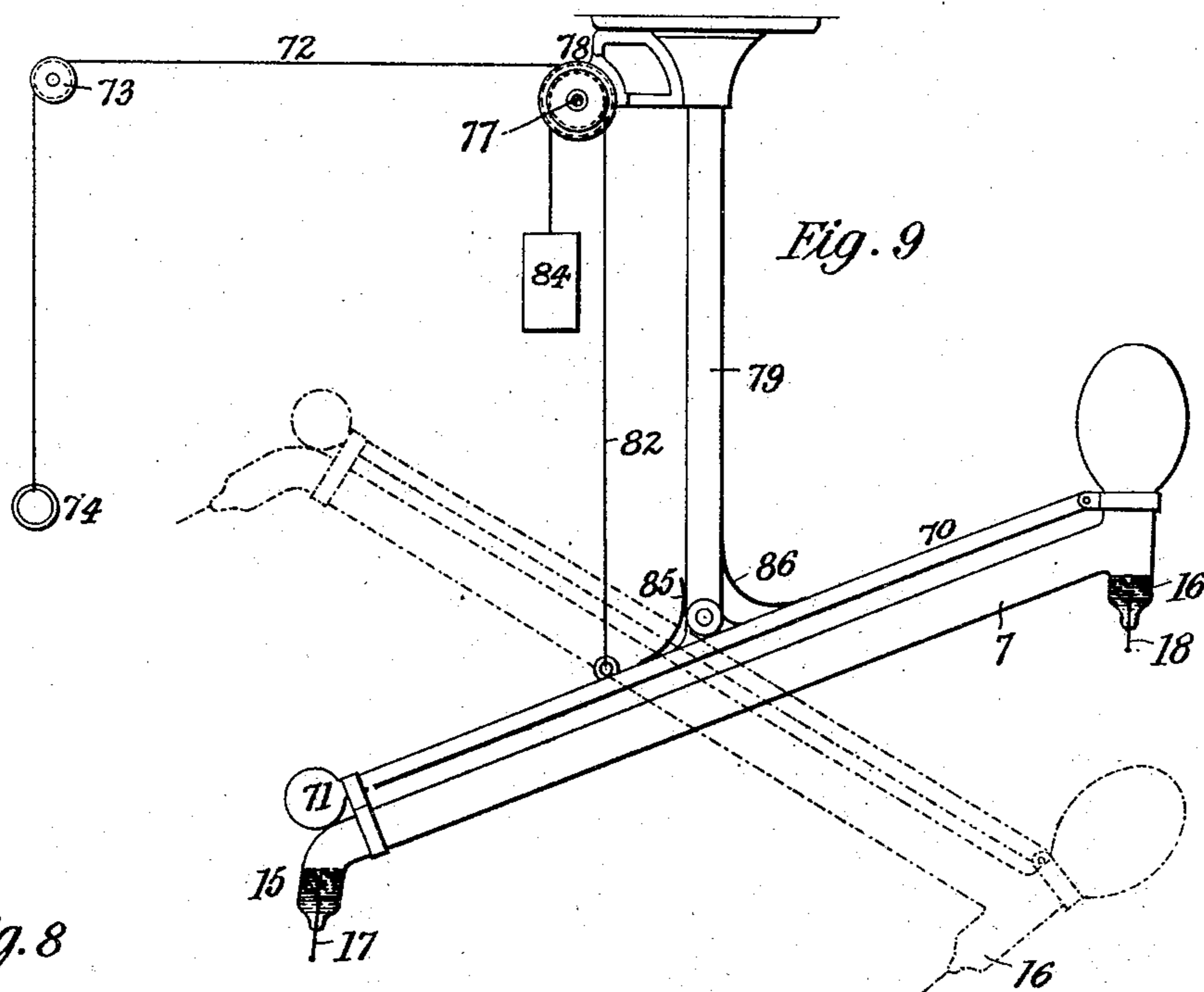


Fig. 8

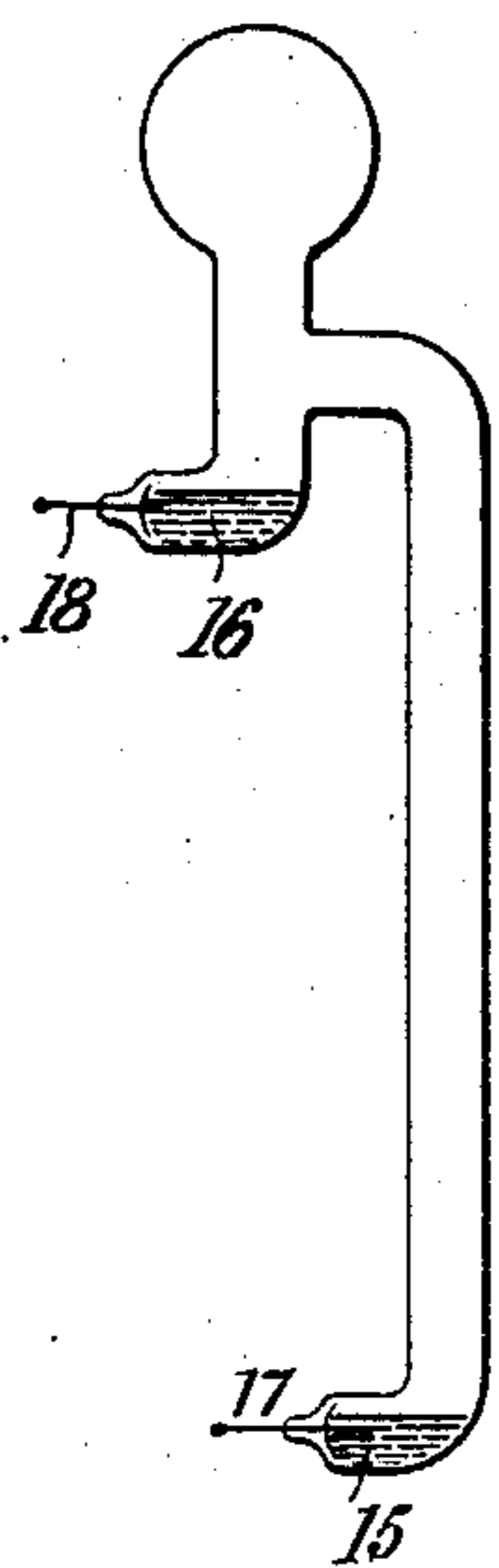


Fig. 10

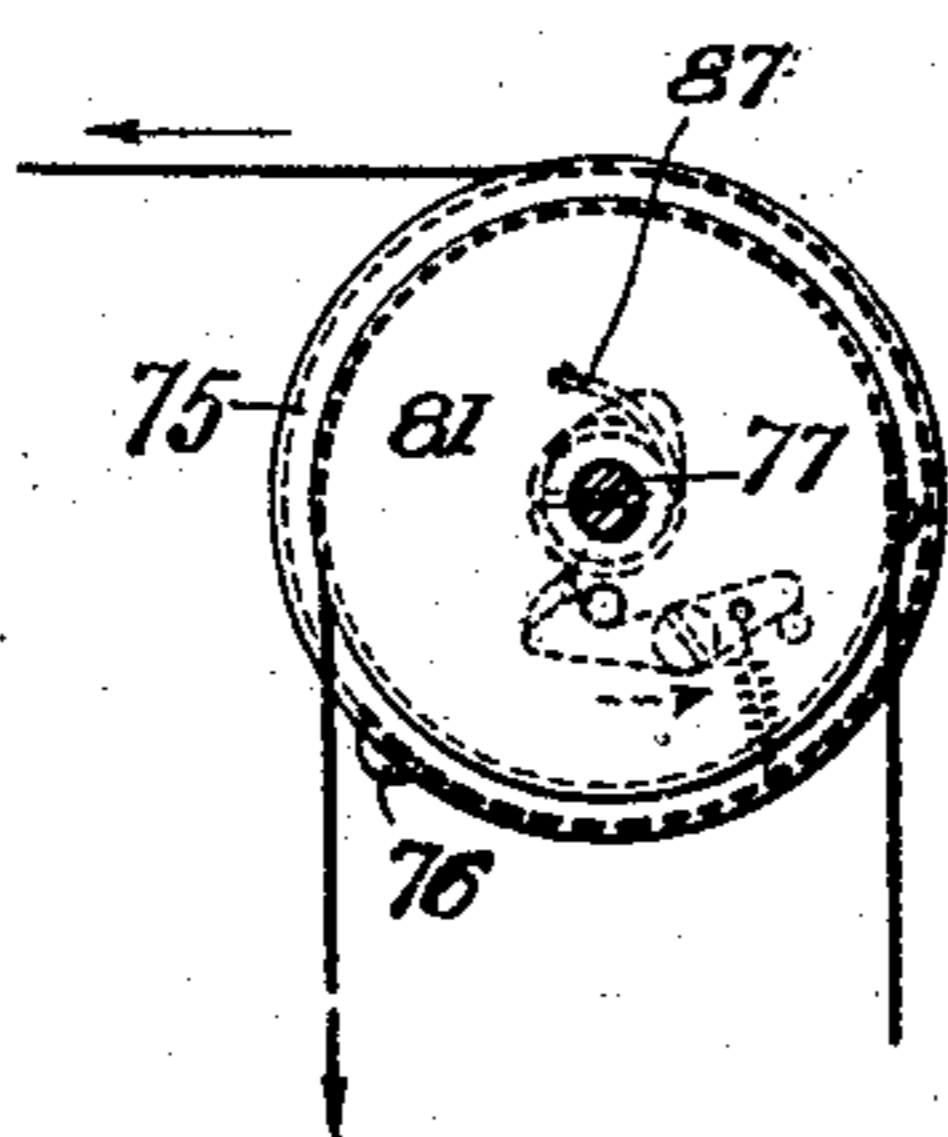


Fig. 11

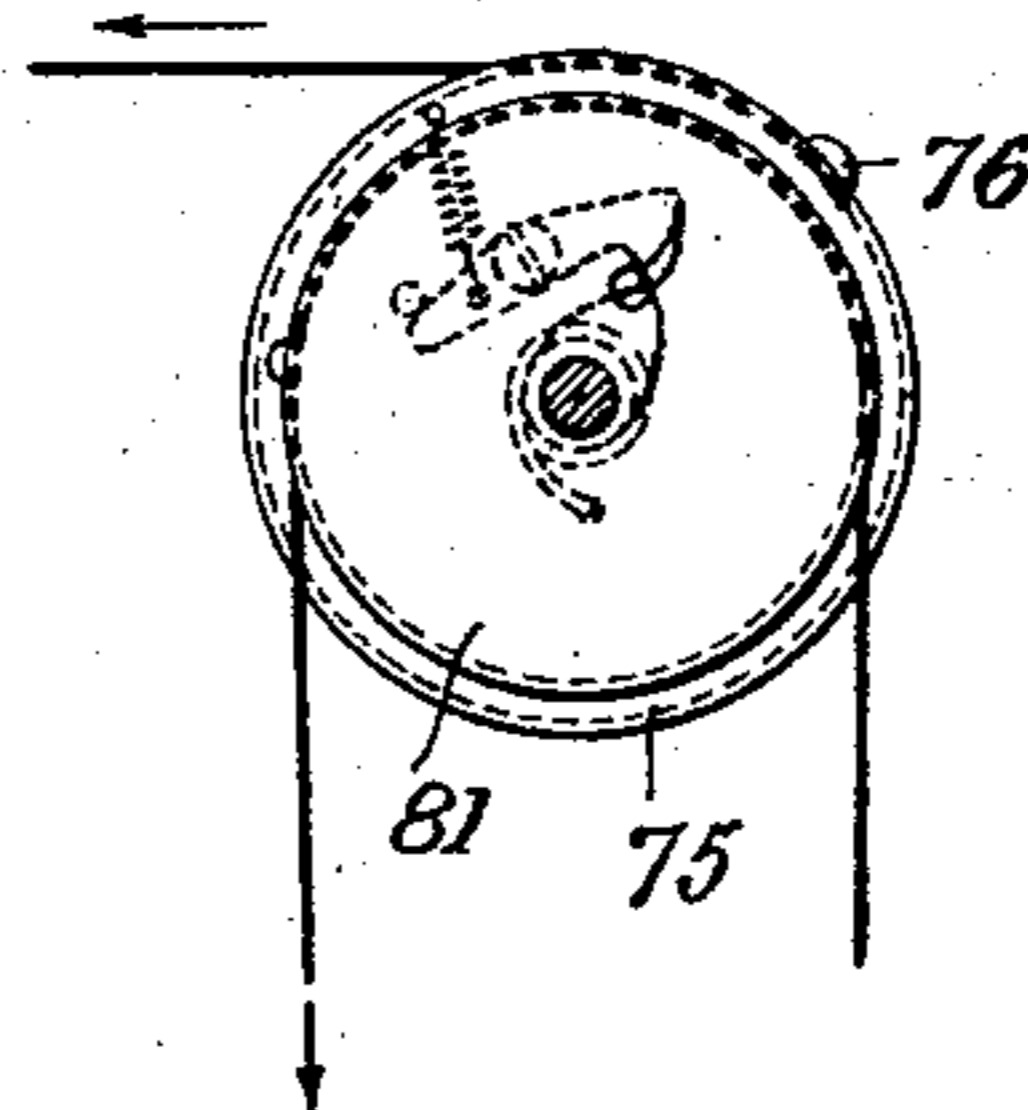


Fig. 12

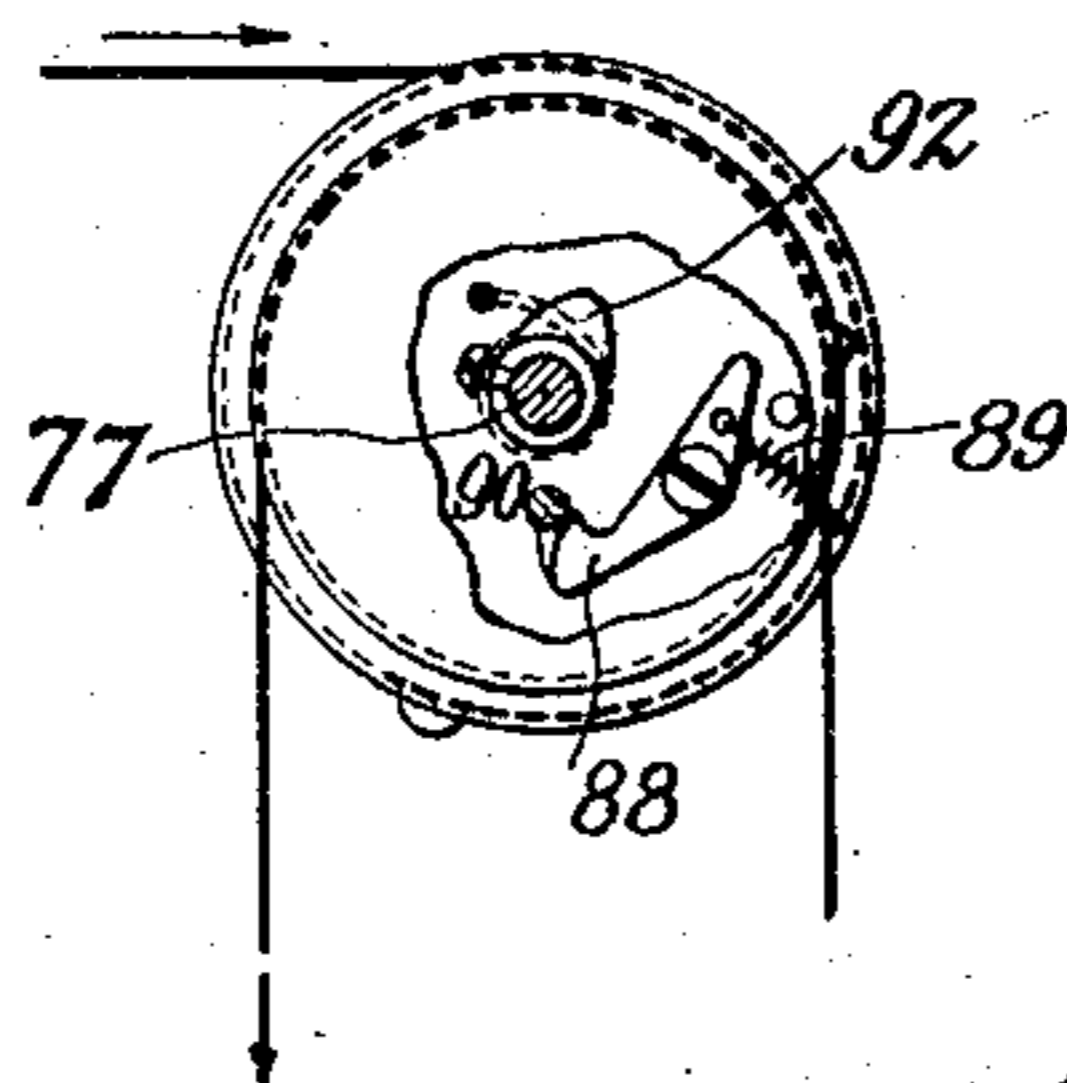
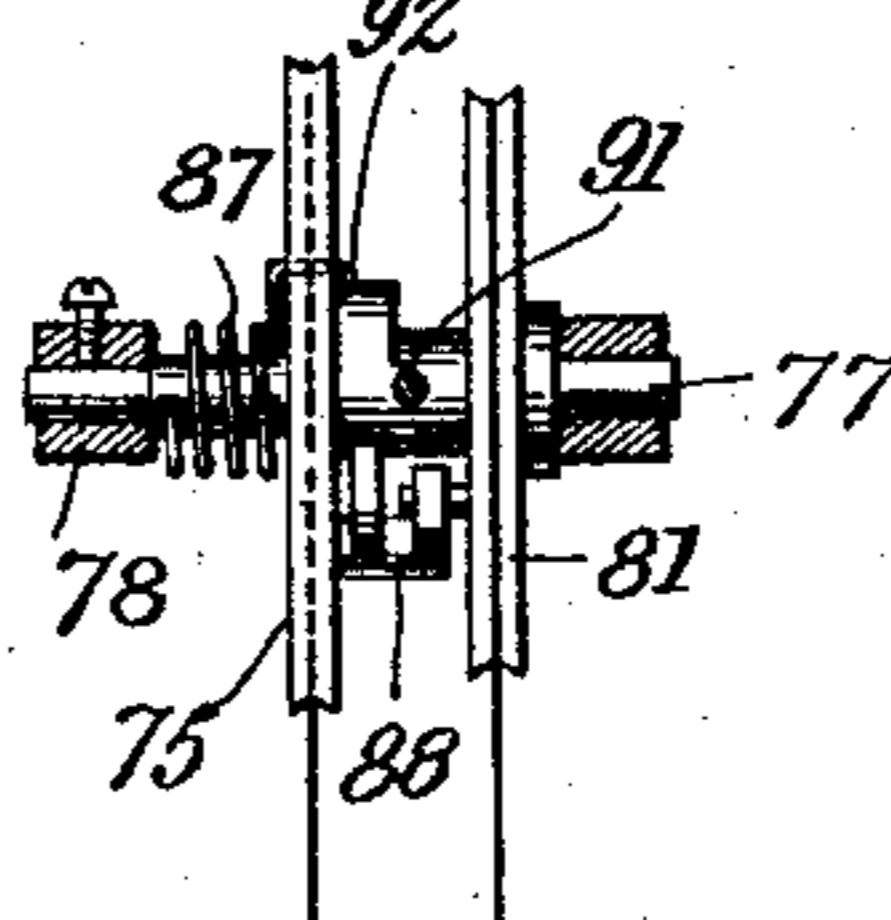


Fig. 13



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UNITED STATES PATENT OFFICE.

STANWOOD E. FLICHTNER, OF ENGLEWOOD, NEW JERSEY, ASSIGNOR
TO COOPER HEWITT ELECTRIC COMPANY, A CORPORATION OF NEW
YORK.

STARTING MEANS FOR GAS OR VAPOR ELECTRIC DEVICES.

SPECIFICATION forming part of Letters Patent No. 765,617, dated July 19, 1904.

Original application filed August 10, 1903, Serial No. 168,981. Divided and this application filed September 19, 1903. Serial No. 173,787. (No model.)

To all whom it may concern:

Be it known that I, STANWOOD E. FLICHTNER, a citizen of the United States, and a resident of Englewood, county of Bergen, State of New Jersey, have invented certain new and useful Improvements in Starting Means for Gas or Vapor Electric Devices, of which the following is a specification.

The invention forming the subject of this application relates to a means for starting gas or vapor electric apparatus in which electrodes of mercury or other liquid conducting material are located one above the other in the normal operation of the apparatus. It has been customary to start devices of this character into operation by impressing upon the terminals of the apparatus or through a starting-band or other equivalent a higher potential than that on which the apparatus is designed for operation, after which the source of high potential has been removed from the circuit and the device has been operated on a certain lower normal potential. I have devised means whereby the use of a source of higher potential may be dispensed with and the apparatus can be started with the normal operating-current applied to its terminals. The mode in which this is accomplished may be briefly described as consisting in tilting the apparatus so that a portion of the mercury or other liquid conductor residing in the receptacle containing the lower electrode will be spilled into the receptacle for the upper electrode and the excess will then be restored to the lower electrode-receptacle in a stream while the current is applied to the terminals. It is found that when this is done the stream of falling liquid will constitute a good conductor between the terminals and that when the liquid acting under the influence of gravity begins to form itself into spray near the bottom of the falling stream the current will pass from the mercury surrounding the lower terminal of the apparatus to the end of the solid portion of the stream and as the latter turns into spray will follow up the solid part of the stream until all the liquid which it is

designed to spill over has passed out of the upper receptacle, whereupon current will flow from the lower electrode to the upper, it being understood that sufficient mercury or other conducting liquid is retained in the upper receptacle to constitute an electrode for the apparatus.

Considering the particular embodiment which belongs to an apparatus designed for carrying out the above-described method, it may assume various forms; but, among other things, it will generally be provided with means whereby the apparatus can be tipped or tilted so as to cause some of the liquid from the normal lower electrode-receptacle to flow into the upper and can then be restored, so as to cause a continuous stream of conducting liquid from the normal upper electrode-receptacle to the lower. I generally support the apparatus in a frame and provide means whereby the frame can be tilted and also provide a stop for limiting the movement of the frame. I may also provide cushions or other equivalent for preventing shock during the tilting movement or at its termination.

It is often convenient to start two or more gas or vapor electric devices of the character described by the same operation, the devices being arranged in series with each other. I may, however, start the devices singly, as will be fully described hereinafter.

I have illustrated my invention in the accompanying drawings, in which—

Figure 1 is a side elevation of two gas or vapor electric devices mounted in a tilting frame. Fig. 2 is an end elevation thereof. Figs. 3 and 4 are detail views; and Figs. 5, 6, 7, 8, 9, 10, 11, 12, and 13 illustrate modified forms of the apparatus.

Referring to the drawings, 1 is a supporting-base having uprights or standards 2 2. Between the standards I mount a frame 3, generally of some good insulating material. The said frame 3 is suspended on pivots 4 5, the latter being connected with a crank-handle 6 and being rigidly secured to the frame 3. The gas or vapor devices appear at 7 7

as being mounted on cross-pieces 8 9 by means of suitable clips 10 10 10 10. The cross-pieces 8 and 9 extend across the frame 3 and are supported thereon. I may provide a mirror or reflector 11 to assist in throwing the light forward, and I may also provide protecting-netting 12 12 for the upper parts 13 13 of the gas or vapor devices. The said parts 13 13 are usually made in the form of enlargements of the glass-containers 14 14 and constitute condensing-chambers for the vapors inside the apparatus.

Each of the devices 7 7 is provided with a receptacle 15 at the bottom and with a receptacle 16 near the top, somewhat below the condensing-chamber 13. Lead-wires 17 and 18 connect, respectively, with the electrodes in the receptacles 15 and 16.

The receptacles 16 have a capacity greater than is necessary for holding sufficient mercury or other conducting liquid to constitute the upper electrodes.

The first operation consists in tilting the vapor apparatus by means of the crank-handle 6, so that the frame will occupy the position indicated in dotted lines in Fig. 2. By this operation a part of the mercury in the receptacle 15 is poured into the receptacle 16, thereby filling the latter receptacle with an excess of mercury. The next operation consists in turning the frame 3 back to its normal position, as indicated in full lines in Figs. 1 and 2, during which operation the mercury is poured in a stream from the upper to the lower electrode, thereby constituting a complete metallic conducting-circuit within the apparatus.

The external or supply circuit is illustrated at 19 20 and is provided with a controlling-switch 21 for opening and closing the same. The wire 19 is connected, as shown, through the walls of the frame 3 near one of its pivots with the leading-in wire 17 of one of the vapor devices, the opposite electrode of the same device being connected by a wire 22, conducting-pieces 23, and a wire 24 with the leading-in wire 17 of the next vapor device in the series. From the opposite electrode of this second vapor device a wire 25 leads through the walls of the frame 3 to a rheostat or inductive device 26, and thence by a wire 27 to the conductor 20. The circuits being run as described, when the tilting motions mentioned above are accomplished the streams of falling mercury or other conducting liquid in the gas or vapor devices 7 7 will practically close a continuous conducting-circuit from one of the main wires 19 20 to the other.

In practice it is found that the streams—say of mercury—are formed into spray near the bottom and that the current passes from the electrodes in the lower receptacles 15 15 through the spray to the ends of the solid portions of the streams, creeping gradually upward as the spray spreads in the other direc-

tion, until a continuous flow of current takes place, no longer through the liquid stream, but through the vapor inside the apparatus. If the devices are arranged to give light, it will be found that the vapor-path between the electrodes of the several gas or vapor devices is strongly illuminated.

I may pass one of the conductors leading to or from the terminals of the apparatus through a pair of springs 28 29, secured to the movable frame 3 and provided with a bent portion 30, adapted to engage with an insulating stop 31 on one of the standard supports or uprights 2 2. The object of this arrangement is to provide against a turning back of the tilting frame for a second operation while the current is still flowing through the apparatus, which might result in emptying one or both of the electrode-receptacles and causing a burning away of the platinum leading-in wires at that point. By means of the spring-locking device described above when the tilting frame is returned to its upright position and the apparatus is in operation the bent piece 30 will spring over the stop 31, so that the frame cannot again be tilted without forcing the springs to separate by reason of the fact that the stop 31 must pass between them in order to allow the tilting. This operation serves to separate the springs, and thereby stop the flow of current through the apparatus. The frame can then be tilted for a second operation without danger to the leading-in devices.

I find it convenient sometimes to mount the base 1 and the parts which it supports upon a stem 32, which is adjustable in a hollow base 33, a thumb-screw 34 being used to regulate the adjustment.

Fig. 5 shows a gas or vapor electrical device 7 mounted underneath a rod or bar 35, which is pivoted to a standard 36 on a base 37. The rod or bar 35 is connected with a piston-rod 38, connected with a plunger 39 in a cylinder 40, the last-named piece constituting a dash-pot connected with the rod or bar 35 for preventing too rapid a movement thereof on its pivot. A spring 41 may be provided for assisting in the regulation of the movement of the rod or bar 35. At its upper end the said rod is connected to a band 42, surrounding the neck of the gas or vapor device and provided with an extension 43, to which a cord 44 is attached. The action will be clearly understood when it is said that the cord 44 is designed to serve as a means for pulling down the gas or vapor electric apparatus and filling the electrode-receptacle 16, after which the starting of the apparatus takes place automatically through its being restored by means of the spring 41 to the position illustrated.

Fig. 6 shows devices whereby two lamps 7 7, connected in series, can be tilted by means of a cord 44, running over a pulley 45. This

cord is provided with a counterweight 46, which, however, is not heavy enough to retain the devices after their inner ends have been drawn up by the cord, but allows them
5 to sink slowly, and thereby be properly started into operation.

Fig. 7 illustrates automatic means for starting apparatus of this sort. Here one end of the gas or vapor electrical device 7 is supported by a cord 50 and the other by a cord 52, the weighted arm 51 being provided above the gas or vapor device. To the cord 52 I attach conical pieces, one of which is shown at 53, which are adapted to be grasped by
15 clutches or tongs 54, carried by a cord 55, running over a pulley 56. The cord 52 runs over another pulley 58 and carries at its lower end a counterweight 59.

To operate this apparatus, it is necessary to
20 pull down on the cord 55, lifting the cord 52 and one end of the gas or vapor device 7. The lifting ceases, however, and the gas or vapor apparatus is allowed to fall by gravity when the upper ends of the clutches or tongs
25 54 are drawn into conical guides 60 on the support 61 for the pulley 58. The clutches or tongs are thereby opened and release the conical piece 53, with which they have been in engagement, and thereby permit the gas
30 or vapor apparatus to fall, as described. Stops 100 and 101, secured, respectively, to the cords 55 and 52, prevent the apparatus from being carried too far.

The uncovering of the lower leading-in wire
35 may be prevented by other means than those already described. For example, as shown in Fig. 8, the lower electrode-receptacle 15 may be extended in such a way as to insure that some of the mercury or other liquid will
40 always remain in the receptacle even when the frame 3 is tilted to its extreme position.

In Fig. 9 I illustrate other means for causing the automatic restoration of the gas or vapor apparatus. Here the tube 7 is supported upon a rod or bar 70, which is provided at its lower end with a counterweight
45 71, adapted to restore the apparatus after it has been tilted. The tilting operation takes place through the cord 72, extending over a pulley 73 and provided with an operating ring or handle 74. The cord 72 also passes
50 over a pulley 75 and is attached to a lug 76 on the said pulley. The pulley 75 is mounted on a shaft 77, which is itself journaled in a bracket
55 78, from which depends a supporting-arm 79. The arm or rod 70 is pivoted at 80 to the said supporting-arm. On the same shaft 77 is mounted a second pulley 81, over which extends a cord 82, which is connected to the rod
60 or arm 70 at the eyepiece 83. To the opposite end of the cord 82 is connected a weight 84, adapted to serve as a counterweight with respect to the weight 71, as already described, and to prevent a sudden dropping of the gas or vapor
65 apparatus when it is released, as will be

described farther on. I also provide springs 85 and 86, which I attach to the rod or arm 70 and bear against opposite sides of the supporting-arm 79 to assist in preventing any sudden dropping of the apparatus. The pulley 75 is flexibly secured to the shaft 77 by means of a spring 87, one end of which is connected with the shaft and the other with the pulley. On the inner side of this pulley I mount a pivoted catch 88 and provide a
75 spring 89, which tends to urge the catch into cooperation with the pin 90 on the inner side of the pulley 81. To the shaft, between the pulleys, I secure, by means of the pin 91, a cam 92, which is adapted to rotate with the
80 shaft. The pulley 81 is loosely mounted on the shaft and its movements of rotation are controlled by the devices now being described and by the force of the counterweight 84 and the parts cooperating therewith.
85

In order to tilt the apparatus into the position illustrated in dotted lines in Fig. 9, it is necessary to pull down on the operating-ring 74, thereby rotating the pulley 75 and carrying the pulley 81 along with it by reason of
90 the engagement of the catch 88 with the pin 90 on the latter pulley.

It should be understood that the cord 82 is attached to a lug on the pulley 81, so that when the said pulley is rotated the cord is
95 positively pulled along and the gas or vapor apparatus is lifted or tilted, as indicated in dotted lines in Fig. 9. This operation continues until the cam 92 is brought into engagement with the end of the catch-lever 88,
100 thereby lifting the latter off the pin 90 and releasing the pulley 81. Thereupon the latter falls into the power of the opposing forces constituted mainly by the weight 71 and the counterweight 84. The gas or vapor apparatus accordingly begins to sink into its normal position, as illustrated by full lines in Fig. 9, and during this process a stream of mercury passes from the receptacle 16 to the receptacle 15 with the results already
110 described—that is to say, the apparatus is started into operation, the circuit being first established through a solid stream of mercury, and subsequently being established through the vapor as the mercury breaks up at the
115 lower end of the stream or elsewhere in its course.

It will be understood that during the pulling up of the apparatus into the dotted position shown in Fig. 9 some of the mercury
120 from the receptacle 15 will have passed over into the receptacle 16, thereby creating an excess of conducting liquid in the latter receptacle.

It will be understood that the vapor devices described in this specification may be started by any of the means or methods herein described and may afterward be removed from the tilting frame or other appliances whereby the starting is accomplished and
130

supported in any suitable way or in any preferred location. It will also be understood that instead of starting a number of these devices in series single devices may be started

5 by similar means or methods.

It is found that when the restoration of the vapor device takes place slowly, as illustrated in some of the later figures of the drawings, the breaking up of the mercury is likely to
10 begin at the top of the stream or even at some intermediate portion thereof. Accordingly it is not desired to limit the action of the apparatus to a breaking up of the stream at its lower end, but it will be understood that the
15 interruption of the stream at any point is adequate to serve as a means for starting the apparatus into operation. It is to be noted in this connection that one of the essential features of the present invention consists in caus-
20 ing a closing and opening of the circuit through the apparatus by a single mechanical operation. In this respect the action differs from that of the somewhat similar devices in which one operation is made use of to close a circuit
25 through the device, while a reverse operation ruptures the circuit through the conducting liquid and establishes the circuit through the gas or vapor.

In another application, filed August 10, 1903,
30 Serial No. 168,981, of which the present application is a division, claims are made upon the method herein described.

I claim as my invention—

1. In a gas or vapor electric apparatus, a
35 pair of conducting liquid electrodes, arranged one above the other, and means for tilting the apparatus so as to cause a continuous stream of conducting liquid between the two electrodes.

40 2. In a gas or vapor electric apparatus, a pair of electrodes, one arranged above the other, means for tilting the apparatus so as to establish a continuous flow of liquid from one electrode to the other, and means for apply-
45 ing a normal operating-current to the terminals of the apparatus.

3. In an electrical system, a gas or vapor electrical device, a tilting frame in which the said device is mounted, electrodes in the said
50 device, and means whereby the said frame can be tilted in one direction for supplying an excess of electrode material to one of the electrodes, and in the other direction for creating a conducting stream of electrode material be-
55 tween the two electrodes.

4. In an electrical system, a gas or vapor electrical apparatus containing two electrodes, one arranged above the other, a tilting frame in which the said apparatus is mounted, means
60 for moving the frame in one direction to supply an excess of electrode material in the upper electrode, and automatic means whereby the apparatus can be restored to normal position and at the same time to establish a con-
65 tinuous stream of conducting material be-

tween the electrodes, the stream being subject to gravity, whereby an interruption thereof takes place and the starting of the apparatus is accomplished.

5. The combination with a gas or vapor elec- 70
tric apparatus, of the character described, of a tilting frame supporting the same, means for tilting the said frame to start the apparatus into operation, and means whereby a
75 second tilting of the frame will cause a rupturing of the circuit of the apparatus.

6. The combination with a gas or vapor elec-
tric apparatus of the character described, of a tilting frame supporting the same, means
80 for tilting the said frame out of normal position, means for restoring the frame to normal position, and means for locking the frame after restoration.

7. The combination with a gas or vapor elec- 85
tric apparatus of the character described, of a tilting frame supporting the same, means for successively tilting and restoring the frame to start the apparatus into operation, means
90 for locking the frame after restoration, and means whereby a second tilting of the frame will momentarily break the circuit of the apparatus.

8. In an electric system, one or more sus-
pended gas or vapor electric devices, electrodes
95 within the said devices, means for tipping or tilting the said device or devices so as to supply an excess of electrode material to one of the electrodes in the said device or devices, means for restoring the said device or de-
100 vices after starting it or them into operation, and means for retarding the restoring means.

9. In an electric system, one or more sus-
pended gas or vapor electric devices, electrodes
105 within the said devices, means for tipping or tilting the said device or devices so as to supply an excess of electrode material to one of the electrodes in the said device or devices, means for automatically restoring the said de-
110 vice or devices after starting it or them into operation, and means for retarding the restoring means.

10. The combination with a gas or vapor
electric apparatus containing a pair of elec-
trodes, located one above the other in the nor-
mal operation of the apparatus, means for tem-
115 porarily reversing the said normal location of the said electrodes so as to supply an excess of the said electrode material to the electrode which is normally uppermost, and automatic
120 means for restoring the normal position and simultaneously creating a natural disruptible flow of electrode material from the uppermost to the lowermost electrode.

11. The combination with a gas or vapor
electric apparatus containing a pair of elec-
trodes located one above the other in the nor-
mal operation of the apparatus, means for tem-
125 porarily reversing the said normal location of the said electrodes so as to supply an excess of the said electrode material to the electrode
130

which is normally uppermost, and means for restoring the normal position and simultaneously creating a natural disruptible flow of electrode material from the uppermost to the lowermost electrode.

12. The combination with a gas or vapor electric apparatus containing a pair of electrodes, located one above the other in the normal operation of the apparatus, means for temporarily reversing the said normal location of the said electrodes so as to supply an excess of the said electrode material to the electrode which is normally uppermost, and automatic means for restoring the normal position and

simultaneously creating a natural disruptible flow of electrode material from the uppermost to the lowermost electrode, such means consisting of a gravitationally operated and retarded cord, a grip for the said cord and a release for the said grip.

Signed at New York, in the county of New York and State of New York, this 16th day of September, A. D. 1903.

STANWOOD E. FLICHTNER.

Witnesses:

WM. H. CAPEL,
THOS. H. BROWN.