

(No Model.)

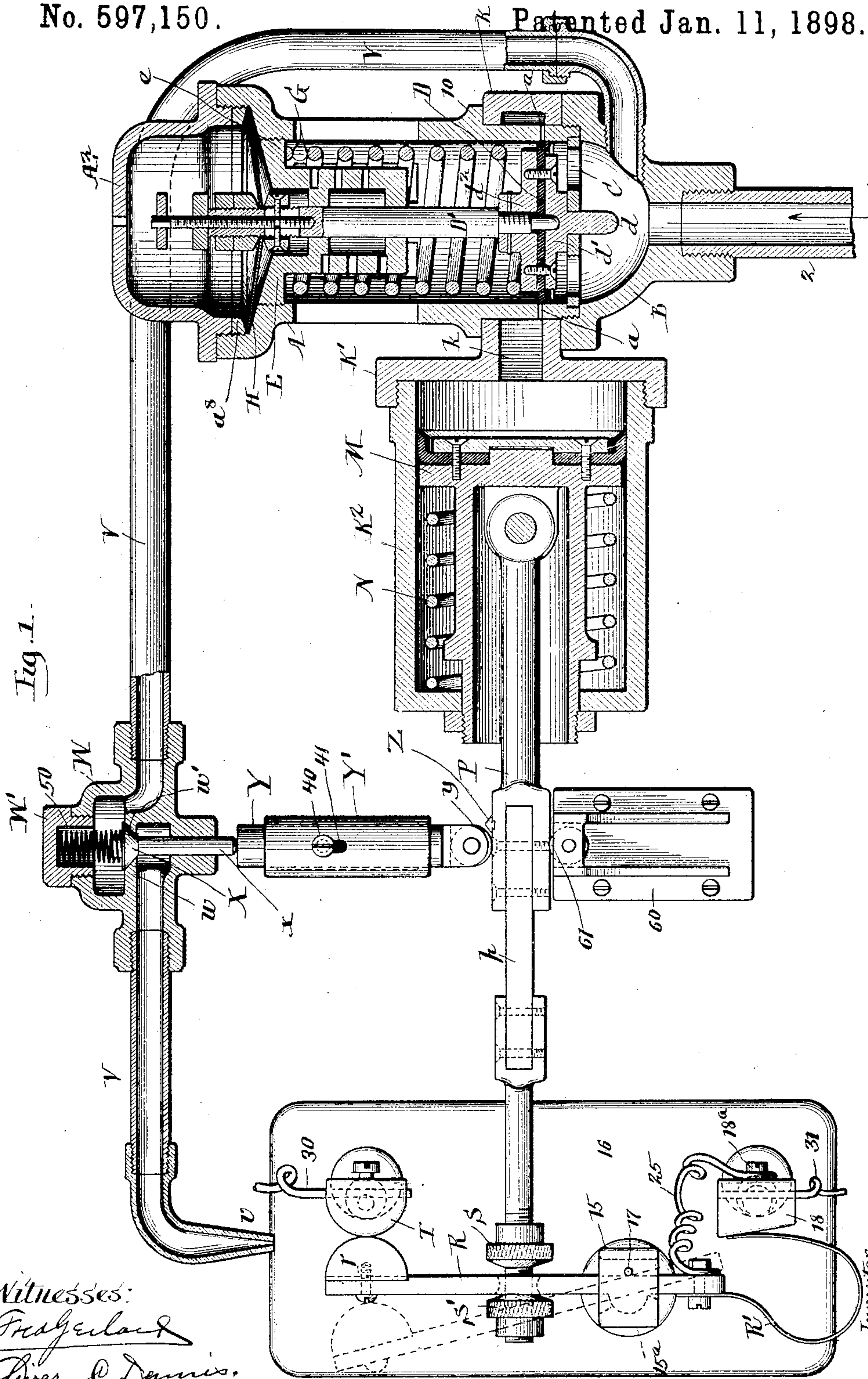
2 Sheets—Sheet 1.

J. B. KNUDSEN.

MEANS FOR OPERATING ELECTRIC SWITCHES AND EXTINGUISHING SPARKS THEREOF.

No. 597,150.

Patented Jan. 11, 1898.



(No Model.)

2 Sheets—Sheet 2.

J. B. KNUDSEN.
MEANS FOR OPERATING ELECTRIC SWITCHES AND EXTINGUISHING
SPARKS THEREOF.

No. 597,150.

Patented Jan. 11, 1898.

Fig. 2

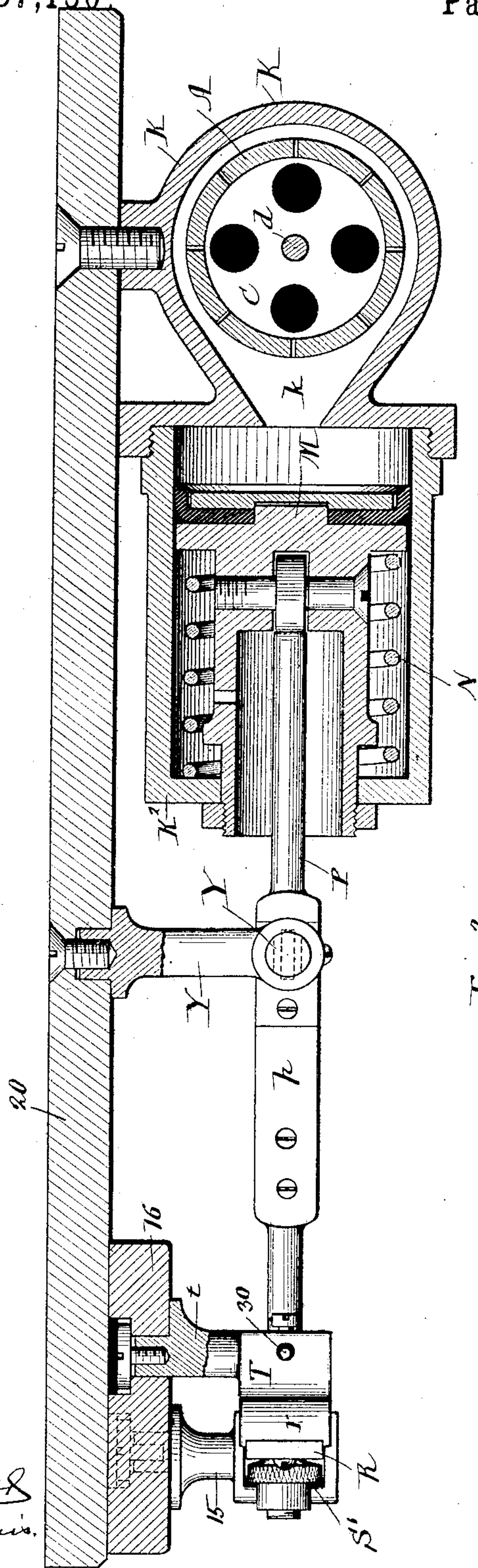


Fig. 3.

Fig. 4.

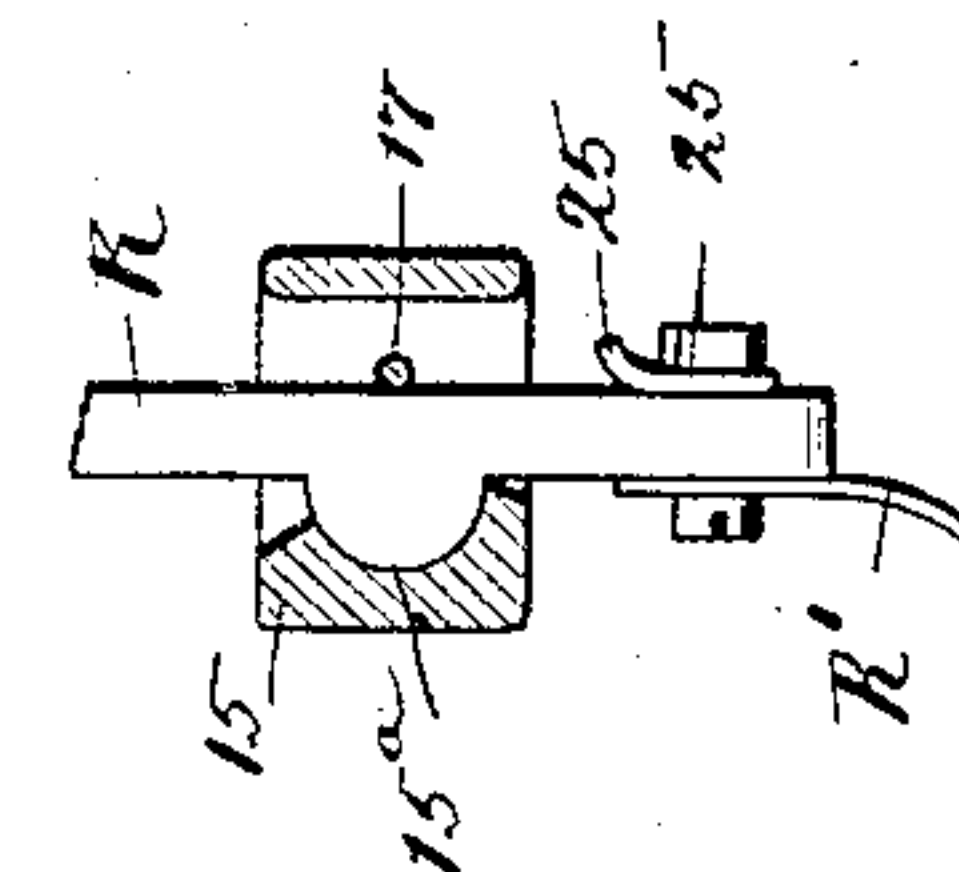
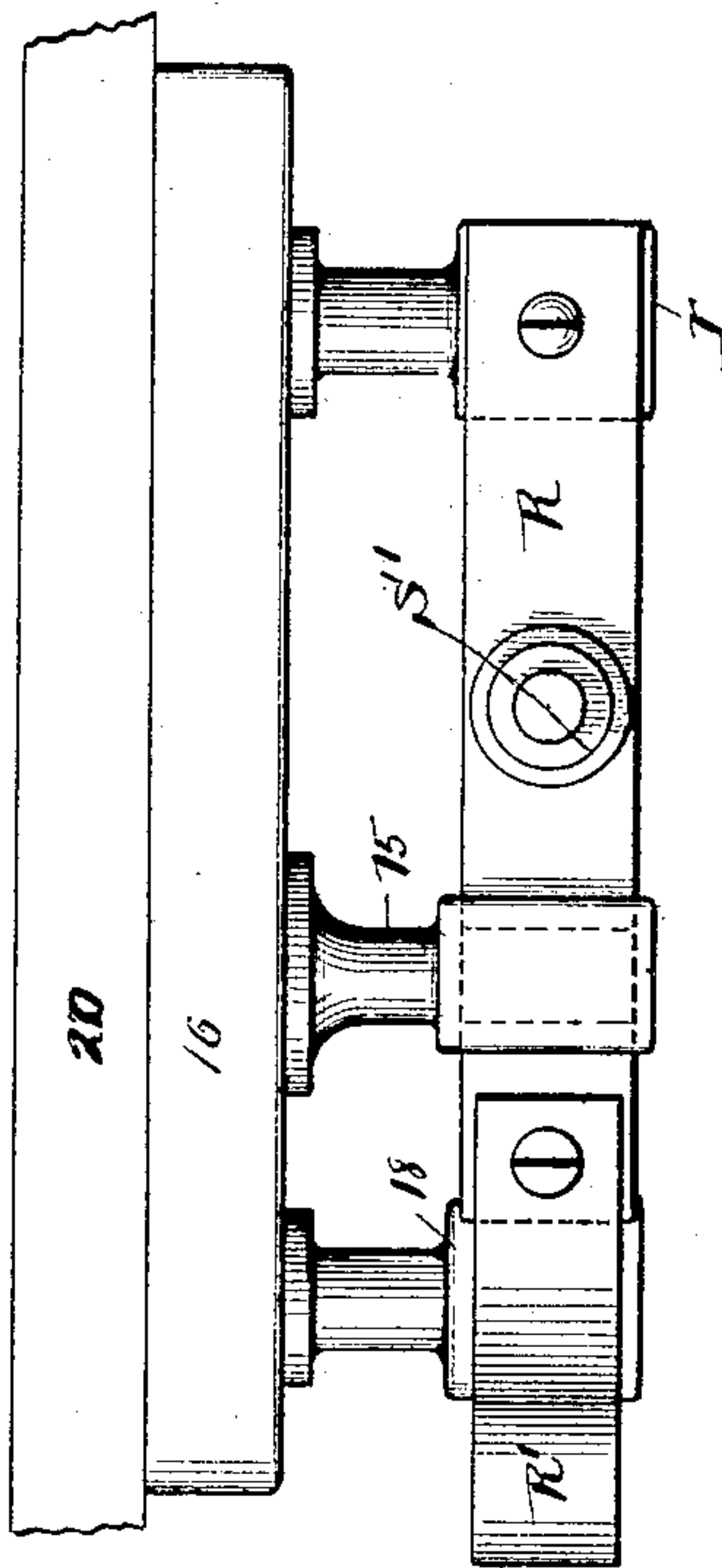
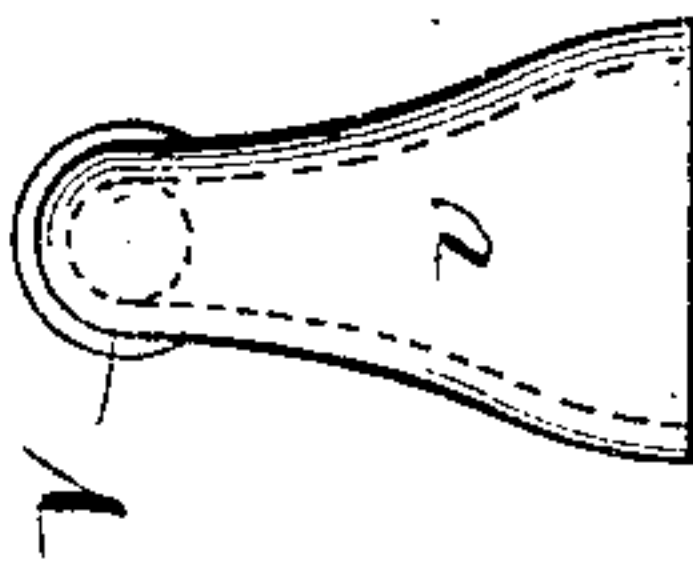


Fig. 5.



Witnesses:
Fred. Gulick
Chas. E. Dennis

Inventor:
Jacob B. Knudsen
By *Pierce & Fisher*
Attorneys.

UNITED STATES PATENT OFFICE.

JACOB B. KNUDSEN, OF CHICAGO, ILLINOIS, ASSIGNOR OF ONE-HALF TO
FRANK H. TAYLOR AND HARALD E. KNUDSEN, OF SAME PLACE.

MEANS FOR OPERATING ELECTRIC SWITCHES AND EXTINGUISHING SPARKS THEREOF.

SPECIFICATION forming part of Letters Patent No. 597,150, dated January 11, 1898.

Application filed June 16, 1897. Serial No. 641,003. (No model.)

To all whom it may concern:

Be it known that I, JACOB B. KNUDSEN, a resident of the city of Chicago, in the county of Cook and State of Illinois, have invented
5 certain new and useful Improvements in Means for Operating Electric Switches and for Extinguishing Sparks Thereof, of which I do declare the following to be a full, clear,
10 and exact description, reference being had to the accompanying drawings, forming a part of this specification.

The present invention, while susceptible of use in a variety of situations, is more especially directed, first, to the provision of improved means for controlling the switches of
15 electric motors whereby the pump mechanism of air-brakes is operated, and, second, to provide means for extinguishing the electric sparks incident to the operation of the switch. These objects of invention I have accomplished by the novel features of construction hereinafter described, illustrated in the
20 accompanying drawings, and particularly pointed out in the claims at the end of this specification.

Figure 1 is an inverted plan view of apparatus embodying my invention, parts being shown in horizontal section. Fig. 2 is a view
30 partly in side elevation and partly in vertical section. Fig. 3 is an end view of the switch mechanism and its supports. Fig. 4 is a detail view in horizontal section through the bracket that supports the switch-bar, this bar and certain adjacent parts being shown in
35 plan. Fig. 5 is a detail view of the air-pipe nozzle.

In Letters Patent of the United States No. 522,292, granted to me December 31, 1895, there are described and claimed certain improvements in valve-controlling mechanism,
40 and in the practice of my present invention I prefer to employ similar valve-controlling mechanism, the improvements of which are not, however, claimed in this application.

45 The valve-controlling mechanism, as shown in the accompanying drawings, comprises an inclosing casing A, to which air will be admitted by a pipe 2 from the air-reservoir. (Not shown.) The induction end B of the valve-
50 controlling mechanism is shown as screw-

threaded to the body A, that is provided with an annular flange 10, between which and the body A is held a ring K, that is formed integral with or attached to the base K' of a cylinder K². The ring K is formed with an
55 interior annular recess *k*, arranged opposite the ports *a*, leading from the interior of the valve-casing A. Within the valve-casing A is mounted a guide-plate or spider C, perforated to receive the stem *d* of a plate *d'*, projecting from the piston or valve D, this piston D being held between the plate *d'* and a
60 plate *d''*, that is screw-threaded to the end of the piston-rod D'. The piston-rod *d'* extends through a chambered casting E, that is provided with a screw-threaded flange *e* to engage a correspondingly screw-threaded portion of the upper part of the valve-casing A. A coil-spring G is arranged within the casing
65 A and bears upon the valve or piston D at one end, and at its opposite end against the annular flange *e* of the casting E. Above the casting E is placed a flexible diaphragm II, that is held in place between the upper part of the casing A and a threaded sleeve *a''*, below the cover A² of the casing, this cover being screw-threaded to enter and engage with
70 the correspondingly-threaded expanded upper end of the casing A. The flexible diaphragm II is held between adjusting-nuts at the end of the valve-stem D' in manner similar to that shown in my above-mentioned Letters Patent.

The above-described construction of valve mechanism, like that set forth in my said
85 Letters Patent, is such that when the pressure of air within the air reservoir or tank (usually located beneath the car) has reached the maximum point the valve or piston D will be shifted so as to uncover the ports *a*
90 and allow the escape of air therethrough, and the valve or piston D will remain off the ports until the pressure of air within the air tank or reservoir has diminished to such extent as to require the air-pump to be again set in operation in order to replenish the air-supply within the tank or reservoir.

Within the cylinder K² is arranged a trunk-piston M, against which bears a coil-spring N, the opposite end of this spring bearing
100

against the outer end of the cylinder K^2 , through which the piston M projects. To the trunk-piston M is connected shifting-rod P, the outer end of which is attached to the electric switch R, whereby passage of current to the motor that operates the pump is controlled. The rod P is preferably formed of sections, one of which, p , is of hard rubber or like insulating material, and by preference the outer end of the rod P passes through the switch-bar R and is adjustably connected thereto by thumb-nuts S and S', arranged upon the threaded outer portion of the rod P at opposite sides of the bar R. The switch-bar R is shown as pivotally mounted within a bracket 15, connected by an insulating-block 16 to the base 20, whereby the various parts are sustained, this base 20 serving as a convenient support whereby the parts may be held in any desired position. The bracket 15 is formed with an opening through which the bar R passes, and at one side of this opening the bracket is provided with a circular seat 15^a to receive a corresponding circular offset formed on the side of the bar R, and the bar R is held in place within the bracket by a pin 17 or in any other convenient manner. The switch-bar R is formed of suitable conducting material, and the free end of this bar is provided with a contact-point r , while the opposite end is connected, preferably, to a plate-spring R', the opposite end of which spring bears upon the upper end of a bracket 18, that is attached to the insulating-block 16, the spring R' serving to force the contact-point r of the switch-bar R toward the contact-terminal T at the upper end of a bracket t , that projects from the block 16. The terminal T is electrically connected with a conductor-wire 30, and a similar wire 31 leads to a binding-post 18^a on the bracket 18, this binding-post being connected by a wire 25 with the rear end of the switch-bar R. Hence it will be seen that when the parts are in the normal position illustrated in Fig. 1 of the drawings, the contact-points r and T being together, current will pass through the switch-bar R and over the conductor-wires 30 and 31, and as these wires lead to the motor whereby the air-pump will be operated it will be understood that at such time the operation of the pump will occur. When, however, the pressure within the air tank or reservoir has reached its maximum point—say, for example, seventy pounds—the valve or piston D will be shifted by the pressure of air admitted to the pipe 2 until the ports a are uncovered. Thereupon air will pass through the ports a into the cylinder K^2 and will shift the trunk-piston M, causing this piston to move outward and force the rod P to shift the switch-bar R and break the contact between the terminals r and T, and so interrupt the passage of current to the motor that operates the air-pump. When the switch-bar R is thus shifted, so as to withdraw the contact-terminal r from the contact-terminal T, a spark or

arc will be formed, and in order to properly extinguish this arc and so prevent the burning of the terminals I provide the improved mechanism next to be described.

From the casing A, or from some other convenient point of connection with the air tank or reservoir, leads a pipe V, one end of which terminates in a nozzle or jet v , located adjacent the contact-terminals r and T. Within the air-pipe V is interposed a suitable valve W, to which the sections of the pipe V connect. Preferably the valve W comprises a casing having a diaphragm w , formed with a valve-seat w' , against which will bear a valve X, the stem x of which extends through the valve-casing W and bears against a rod Y, that is mounted in manner free to slide within a bracket Y', projecting from the base 20. The rod Y may be held within the bracket Y' by a screw 40, projecting through a slot 41, formed in the head of the bracket Y', and the end of the rod Y is conveniently provided with a friction-roll y , adapted to bear against the side of the bar P and to be engaged by a cam-shaped projection Z, extending from the side of the rod P. Within the casing of the valve W is arranged a coil-spring 50, preferably retained within the cap W' of the valve-casing, and this coil-spring 50 serves to force the valve X against its seat w' and to force the rod Y toward the switch-shifting rod P. The bracket 60, extending from the base-plate or support 20, is provided with a friction-roll 61, suitably journaled therein and adapted to bear against the shifting-rod P at a point opposite the friction-roller y .

From the foregoing description it will be seen that when the parts are in the position shown in Fig. 1 the valve X is closed, pressure of air being upon one side of this valve. As soon, however, as the plenum-pressure within the air-storage tank or reservoir is reached and the valve or piston D is shifted so as to uncover the ports a and cause the outward movement of the piston M, the cam or projection Z upon the rod P will contact with the friction-roll at the end of the rod Y, thereby causing the rod Y to move the valve X away from its seat and permit the passage of air through the nozzle v of the air-pipe V. This passage of air through the nozzle v will occur at the time that the contact-terminals r and T are separated, so that the spark or arc incident to such separation of the terminals will be promptly extinguished by the puff of air from the nozzle v and all danger of the burning out of the contact-terminals is thus avoided. It will be observed that the thumb-nut S does not contact with the switch-bar R, and consequently there is a slight initial movement or lost motion of the rod P before the movement of the switch-bar R occurs to separate the contact-terminals r and T. Consequently the valve X will be opened an instant before the actual separation of the contact-terminals, so that the jet of air through the nozzle v will extinguish the arc

or spark between the contacts instantly at the time that the separation of the terminals occurs.

It is manifest that the precise details of construction above described may be varied within wide limits without departing from the spirit of my invention, and I do not wish the invention to be understood, therefore, as restricted to such details. Thus, for example, instead of using a piston M and cylinder K² for controlling the movements of the switch it is manifest that a diaphragm-valve and air-chamber might be employed, these being well recognized equivalents in mechanism of this character.

So also it is manifest that my invention, so far as it relates to the mechanism for extinguishing the arc, may be employed whether the valve that controls the passage of air to the jet adjacent the contact-points of the circuit be operated by the same piston that controls the switch or by other mechanism automatically actuated in correspondence with the switch-operating mechanism.

So far as I am aware my invention presents the first instance of the combination, with switch-operating mechanism that is controlled by an air-cylinder and piston, of a discharge-jet adjacent the contact-terminals of the circuit and a valve for controlling the passage of air through said discharge-jet, said valve being automatically shifted in correspondence with the shift of the switch in order to extinguish the arc between the contact-terminals.

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

1. In apparatus of the character described, the combination with contact-terminals and with a switch for controlling the passage of current through said terminals, of means for operating said switch comprising an air-cylinder and a piston suitably connected with said switch, and a regulating-valve connected with said air-cylinder, whereby when said regulating-valve is shifted by the pressure of air from the air tank or reservoir, air will be admitted to said cylinder to cause the shifting of said switch.

2. In apparatus of the character described, the combination with contact-terminals and with a switch for controlling the passage of current through said terminals, of means for operating the switch comprising an air-cylinder and a piston suitably connected with said switch, a regulating-valve for controlling the passage of air to said air-cylinder and a lost-motion connection between said piston and said switch.

3. In apparatus of the character described, the combination with contact-terminals and with a switch for controlling the passage of current between said terminals, of an air-cylinder, a spring-actuated piston within said air-cylinder, a regulating-valve provided with a discharge-port communicating with one end of said air-cylinder and a piston within said regulating-valve for controlling said discharge-port.

4. In apparatus of the character described the combination with contact-terminals and with a switch for controlling the passage of current between said terminals, of means for operating the switch comprising an air-cylinder and a piston, a regulating-valve for controlling the passage of air to said air-cylinder, an air-pipe having a discharge-jet adjacent said terminals, a valve for controlling the passage of air through said air-pipe and a suitable part extending from said air-pipe valve and adapted to be shifted by said piston when the latter is moved to operate the switch.

5. In apparatus of the character described, the combination with contact-terminals and with a switch for controlling the passage of current through said terminals, of a regulating-valve, an air-cylinder connected with said valve, a piston within said air-cylinder, a rod connecting said piston with the switch, an air-pipe having a discharge-jet adjacent said terminals, a valve for controlling passage of air through said air-pipe, said valve being provided with a stem extending outside the valve-casing and a rod extending between said valve-stem and the rod that connects the switch with its operating-piston.

6. In apparatus of the character described, the combination with contact-terminals and with a switch for controlling the passage of current between said terminals, of means for operating said switch comprising an air-cylinder and a piston, a regulating-valve for controlling the passage of air to said air-cylinder and means for extinguishing the arc between the contact-terminals comprising an air-pipe having a discharge-jet adjacent said terminals, a valve for controlling the passage of air through said jet and suitable means whereby said last-named valve is automatically shifted in correspondence with the shift of the switch in order to cause a discharge of air through said jet as the passage of current between the terminals is interrupted.

JACOB B. KNUDSEN.

Witnesses:

FRED GERLACH,
ALBERTA ADAMICK.