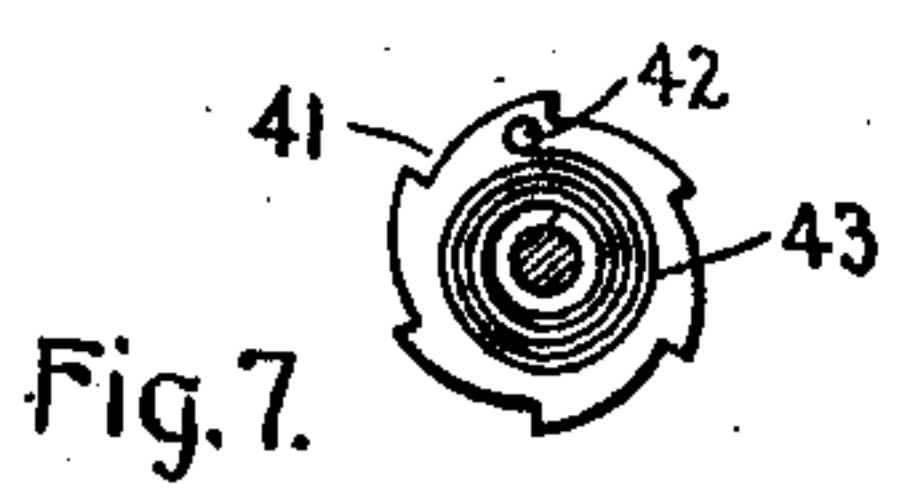
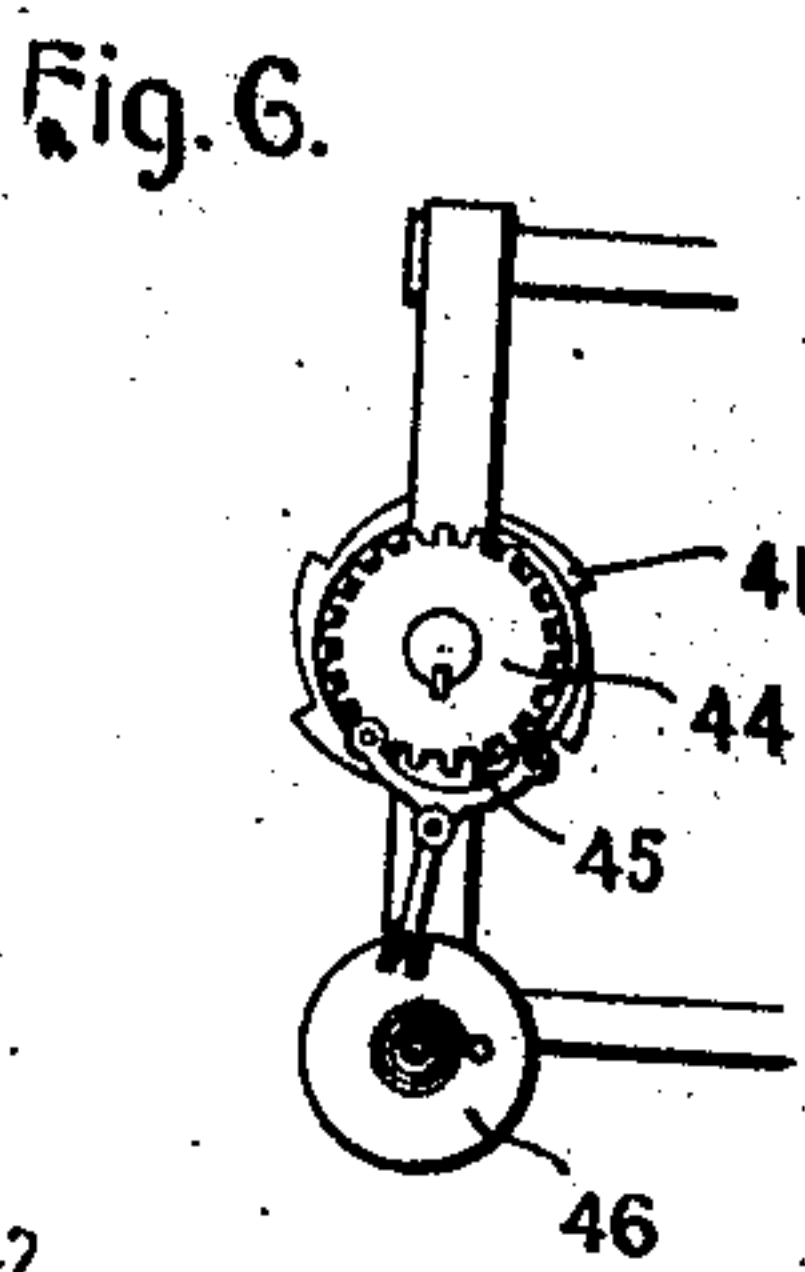
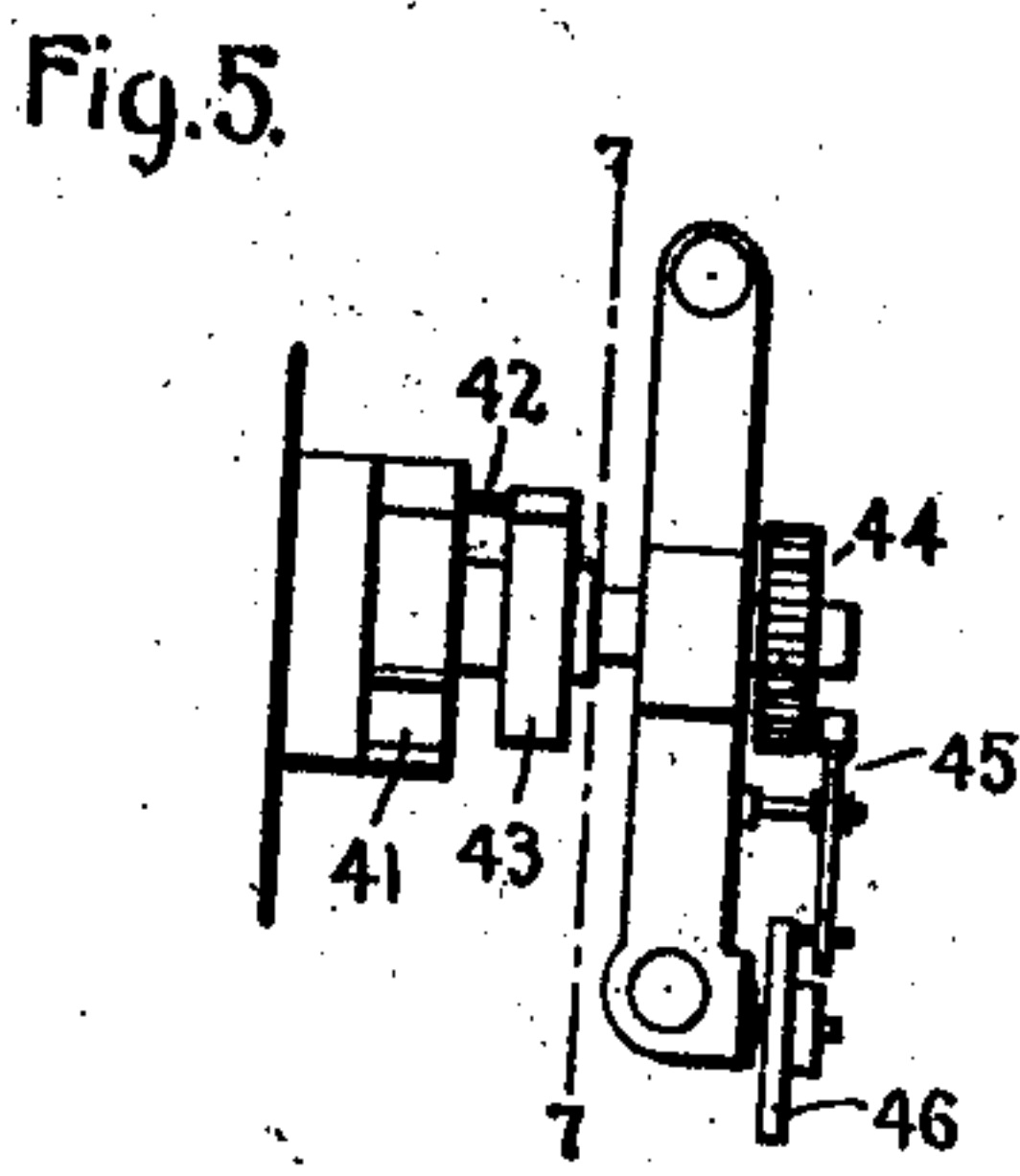
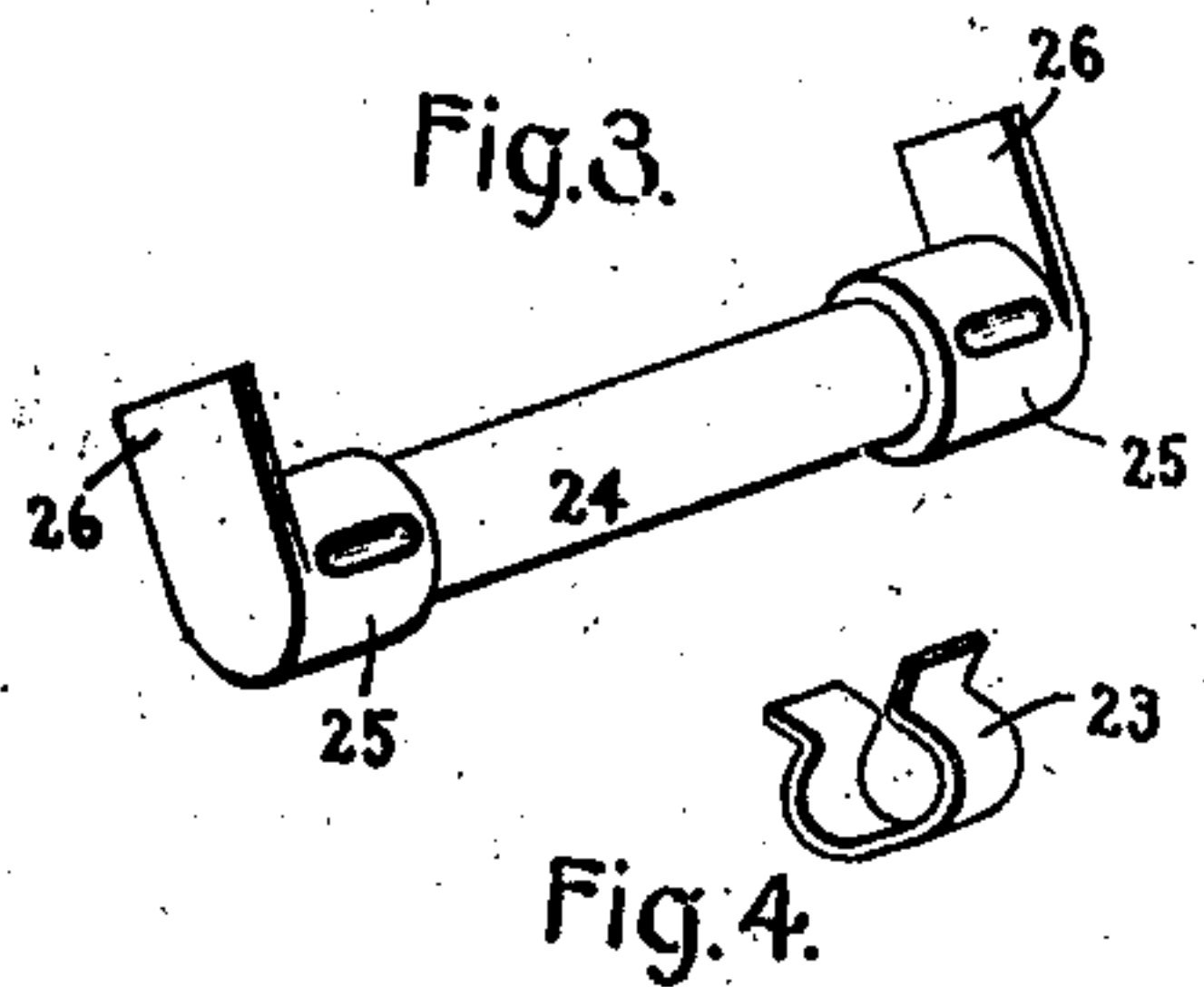
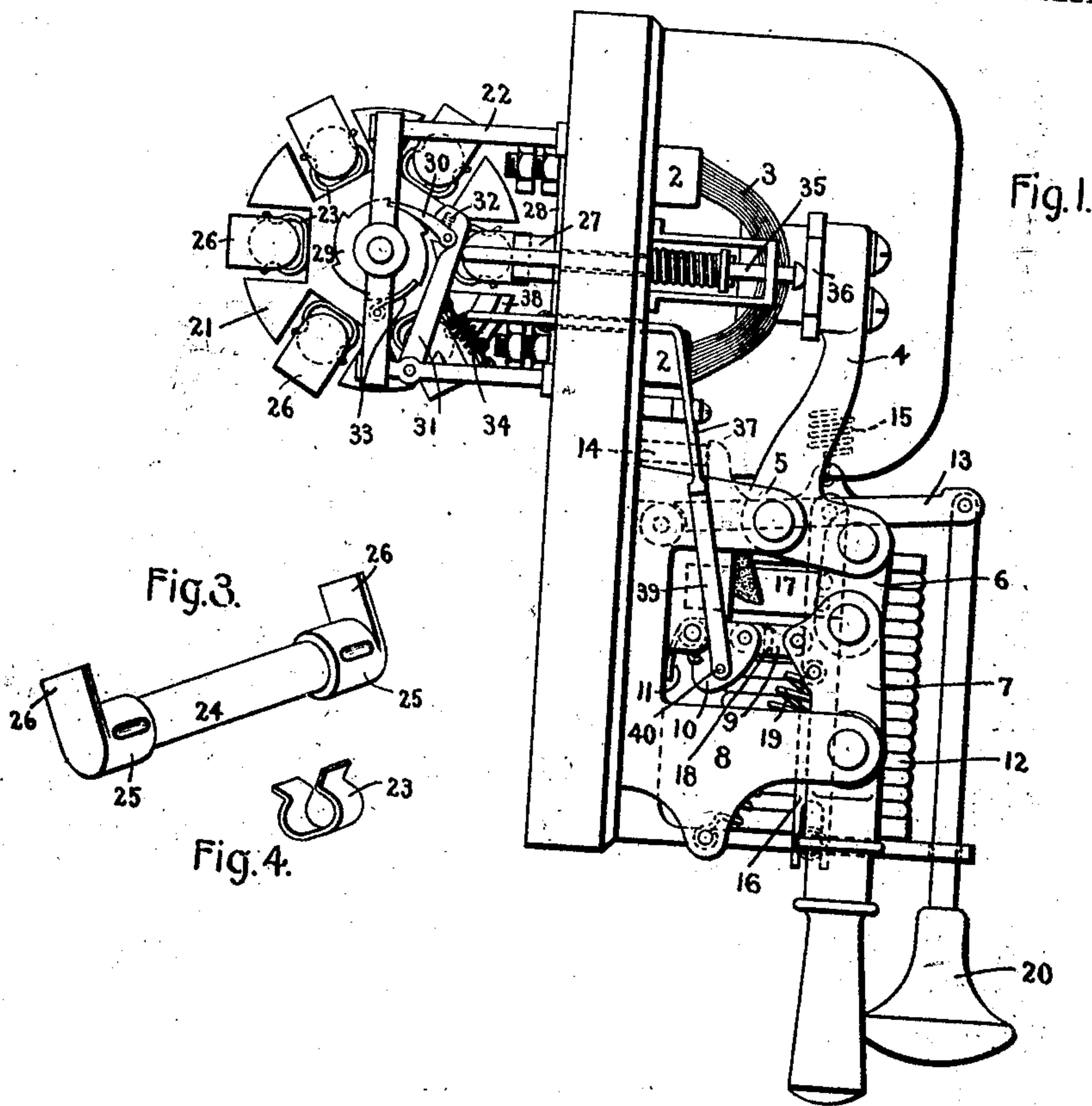


No. 818,290.

PATENTED APR. 17, 1906.

R. H. READ.
HIGH TENSION CIRCUIT BREAKER.
APPLICATION FILED JUNE 25, 1903.

2 SHEETS—SHEET 1



Witnesses.
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Allen Oxford

Inventor.
Robert H. Read
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No. 818,290.

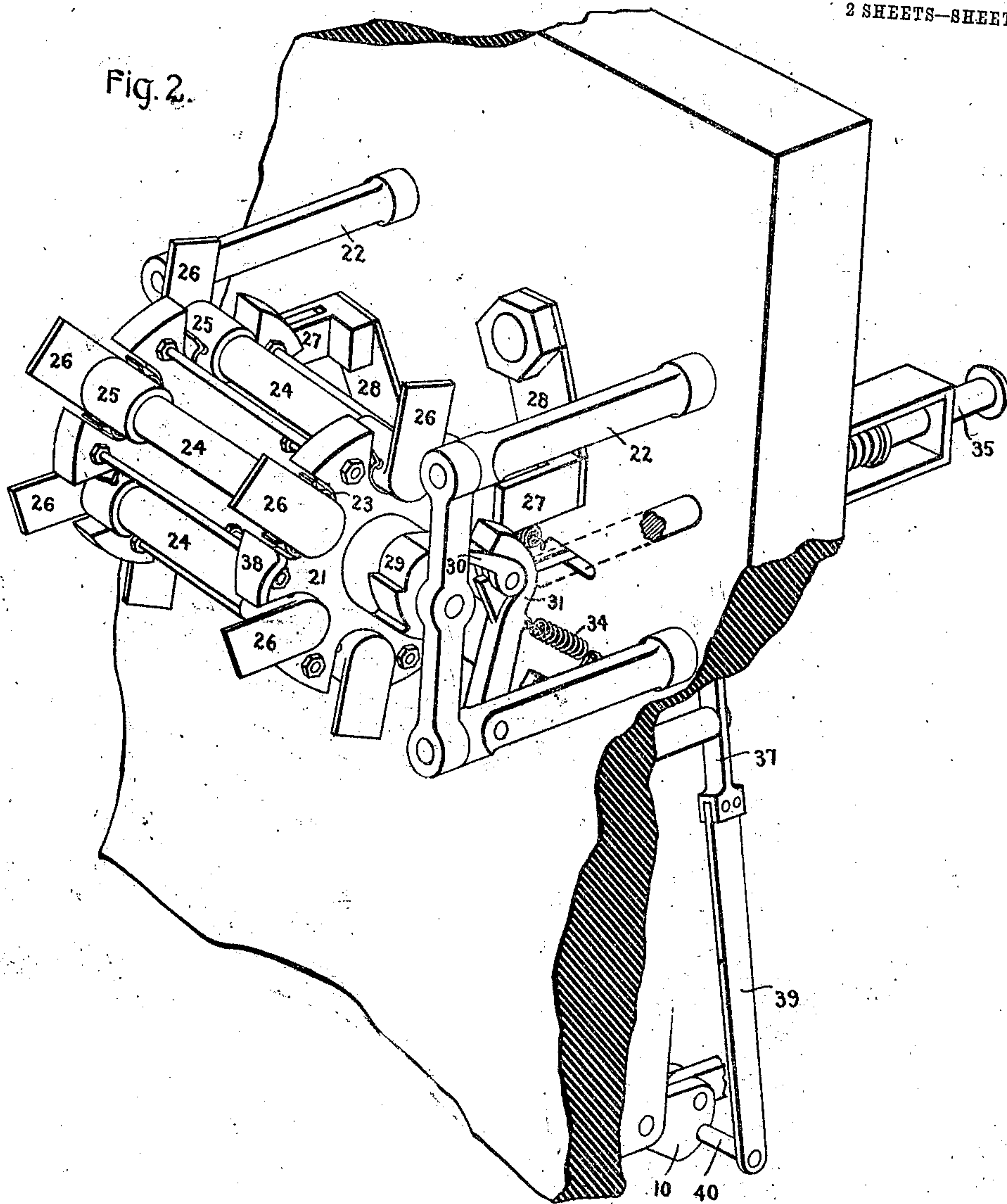
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2 SHEETS—SHEET 2.

Fig. 2.



WITNESSES.

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UNITED STATES PATENT OFFICE.

ROBERT H. READ, OF SCHENECTADY, NEW YORK, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

HIGH-TENSION CIRCUIT-BREAKER.

No. 818,290.

Specification of Letters Patent.

Patented April 17, 1906.

Application filed June 26, 1903. Serial No. 163,091.

To all whom it may concern:

Be it known that I, ROBERT H. READ, a citizen of the United States, residing at Schenectady, in the county of Schenectady, State of New York, have invented certain new and useful Improvements in High-Tension Circuit-Breakers, of which the following is a specification.

This invention relates to switches, and especially to circuit-breakers for handling high-tension alternating electric currents; and its object is to provide a substitute for the oil-switches commonly used for that purpose. To that end I combine with a switch or circuit-breaker of any customary or desired construction a plurality of fuses, one of which is in shunt relation to the switch-terminals. When the switch is opened, there is no spark at the terminals, and the fuse then blows harmlessly. Means are provided for feeding a new fuse into circuit across the terminals after the switch has been closed. This is preferably accomplished automatically, and a stop may be thrown into action after the last fuse has blown, so that the switch cannot be closed until a new supply of fuses has been provided.

The fuses are preferably carried in a rotating magazine, which is actuated step by step by a ratchet-wheel and pawl simultaneously with the closing of the switch. Suitable provision is made to insure the closing of the switch before the fuse is connected across the terminals.

In the accompanying drawings, Figure 1 is a side elevation of an automatic circuit-breaker embodying my invention. Fig. 2 is a perspective view of the magazine-fuse. Fig. 3 is a perspective view of a fuse. Fig. 4 is a perspective view of a clip. Fig. 5 is a rear elevation, and Fig. 6 an end view, of a modification. Fig. 7 is a section on the line 7-7, Fig. 5.

I have shown my invention applied to an automatic circuit-breaker, such as is patented to E. M. Hewlett, September 9, 1902, No. 708,710, and in order that my invention may be more clearly understood I will briefly describe Mr. Hewlett's apparatus. Mounted on an insulating-base 1 are two stationary circuit-terminals 2, with which a bridging

contact 3, of copper laminae, coöperates. The bridge is carried by an elbow-lever 4, fulcrumed on a bracket 5 and actuated by a toggle comprising a link 6 and a handle 7, hinged on a bracket 8. When the handle is pushed in to straighten the toggle and close the switch, it is locked by an auxiliary toggle consisting of a link 9, pivoted to the handle, and a sector-plate 10, pivoted to a stationary support and urged upward by a spring 11, so that the locking-toggle operates automatically, and as its center pivot passes the straight line it locks itself. The overload-coil 12 has a hinged armature 13 maintained normally against a stop 14 by a spring 15. A bar 16 is pivoted to the armature and carries an arm 17, standing above a lug 18 on the link 9. When the coil attracts the armature, the arm knocks down the locking-toggle and permits the spring 19 to collapse the main toggle and open the switch. The same operation may be performed by hand at any time by means of the tripping-handle 20, attached to the armature.

It will be understood that the switch shown is merely illustrative, since my invention is capable of application to many kinds of switches.

At some point adjacent to the terminals 2, preferably on the back of the base or panel 1, I provide a magazine of fuses, one of which will be connected across said terminals whenever the switch is in a closed position. There are many ways in which this magazine can be constructed and arranged; but I prefer the one shown, where the fuses are carried on a drum 21, journaled in frames 22, projecting from the panel 1. On the drum are several pairs of clips 23, made of spring metal and receiving the ends of the fuses. I prefer to use what are known as "cartridge-fuses," which have a cylindrical body 24, of fiber, containing a quantity of sand or other finely-divided refractory material, in which the fuse proper is embedded. The body has metallic caps 25, to which the ends of the fuse are electrically connected. Each cap has a laterally-projecting flange 26, adapted to enter the jaws of two clips 27, arranged in the planes of revolution of the flanges and respectively electrically connected with the terminals 2,

as by strips of metal 28. The clips 23 preferably engage with notches in the caps 25 to prevent the fuses from twisting when being forced into the clips 27.

5 The drum is arranged to be automatically rotated through a given angle every time the switch is closed. This is preferably accomplished by a ratchet-wheel 29 on the shaft of the drum and a pawl 30, pivoted to a lever 31
10 and pressed against the teeth of the ratchet-wheel by a spring 32. A detent-pawl 33 prevents any backward movement of the wheel. The lever is retracted by a spring 34 and is pushed forward to turn the drum by
15 means of a spring-retracted plunger 35, which passes through the panel 1 and is struck by a lug 36 on the lever 4 when the switch is closed. The parts are so proportioned that the bridge 3 will close before the
20 flanges 26 enter the clips 27, the resilience of the bridge being sufficient to permit a further movement of the lug 36 and plunger 35 enough to complete the feeding of the fuse into the clips.

25 The operation is as follows: When the switch is opened, the shunt fuse prevents any arc at the terminals 2; but as the whole line-current then flows through the fuse it blows quickly and harmlessly and opens the circuit.
30 When the switch is closed again, a new fuse is brought into operative position. After all the fuses in the magazine have been used the switch is automatically locked to prevent it from being closed until a fresh supply of fuses
35 is provided. This is preferably effected by a lever 37, arranged to be moved by a cam 38 on the drum when the last fuse is inserted. The lever has a springy portion 39, carrying a pin 40, which the cam causes to bear against
40 the sector-plate 10, so that when the switch is opened the pin will spring in over the locking-toggle and prevent it from operating when one tries to close the switch.

Another mode of insuring the closing of
45 the switch before the fuse is inserted in the clips 27 is shown in Figs. 5, 6, and 7. Here the ratchet-wheel 41 is loose on the drum-shaft, but has a pin 42, to which is attached one end of a coiled spring 43, fastened to the
50 shaft. When the ratchet-wheel is actuated, it stores energy in the spring, which operates to turn the shaft and the drum, the speed of rotation being regulated by an escapement, such as the toothed wheel 44 and the anchor
55 45, damped by an oscillating spring balance-disk 46. The result is that the fuse is slowly brought into position a minute or two after the switch has closed.

60 In accordance with the patent statutes I have described the principle of operation of my invention, together with the apparatus which I now consider to represent the best embodiment thereof; but I desire to have it

understood that the apparatus shown is only illustrative and that the invention can be carried out by other means.

What I claim as new, and desire to secure by Letters Patent of the United States, is—

1. The combination with a switch, of a plurality of fuses, and means for automatically feeding them successively into shunt relation to said switch upon successive operations of the switch.

2. The combination with a switch, of a rotatable magazine-fuse in shunt thereto, and means for automatically rotating said magazine at each closure of the switch.

3. The combination with a switch, of a rotatable magazine-fuse in shunt thereto, means for rotating said magazine at each closure of the switch, and means for preventing the closure of said switch after the last fuse has blown.

4. The combination with a switch, of a plurality of fuses, means for feeding them successively into shunt relation to said switch, and means for insuring the closure of the switch before the circuit through the fuse is closed.

5. The combination with a switch, of a clip in circuit with each terminal thereof, a plurality of fuses each having a flange at each end, and means for automatically inserting said flanges into said clips.

6. The combination with a switch, of a plurality of fuses each having a flange at each end, a rotatable drum carrying said fuses, clips in circuit with the terminals of the switch and lying in the planes of revolution of said flanges, and means for automatically rotating the drum at each closure of the switch.

7. The combination with the switch, of a magazine-fuse in shunt to the terminals thereof, a locking-lever for preventing the closure of said switch, and a cam on the magazine for actuating said lever after the last fuse has been used.

8. The combination with a switch, of a rotatable magazine-fuse in shunt to the terminals thereof, a ratchet-and-pawl feed for said magazine, a coiled spring connecting the ratchet and the magazine, and an escapement for regulating the rotative effect of said spring.

9. The combination of a switch or circuit-breaker, a fuse automatically interposed in shunt to the main contacts after closure, and means for opening the contacts while the fuse completes the shunt.

10. The combination of a switch or circuit-breaker, a fuse-magazine containing a plurality of cartridge-fuses, and means for automatically positioning a cartridge-fuse and subsequently upon the opening of the breaker breaking the circuit through said fuse.

11. The combination with a switch, of a

plurality of fuses, means responsive to the switch-movements for feeding said fuses into operative position, and means for preventing the actuating switch-movements after the last fuse has been used.

5 12. The combination with a switch, of a plurality of fuses, and mechanical means controlled by the switch-movements for auto-

matically feeding said fuses into operative position.

In witness whereof I have hereunto set my hand this 24th day of June, 1903.

ROBERT H. READ.

Witnesses:

BENJAMIN B. HULL,
HELEN ORFORD.