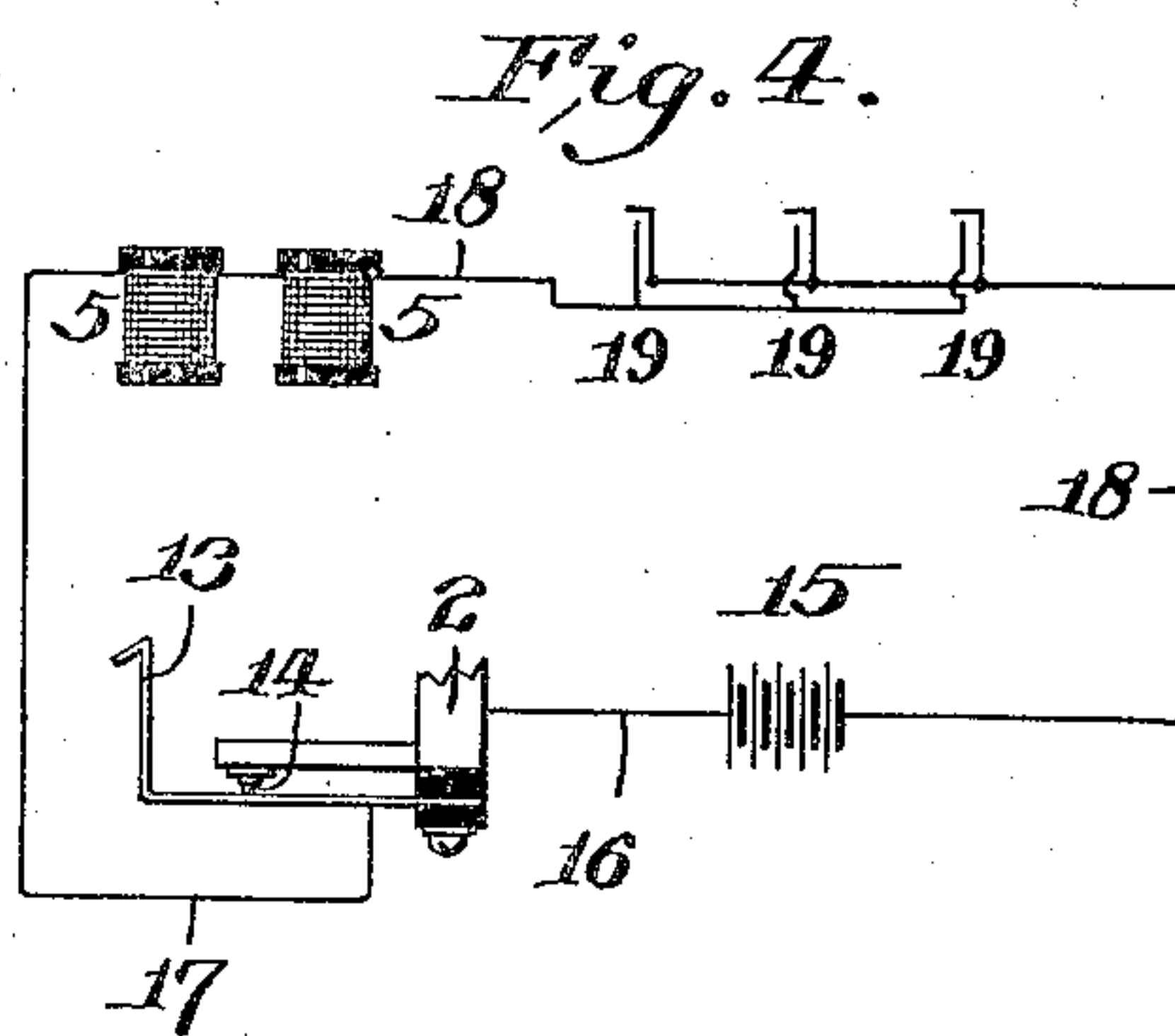
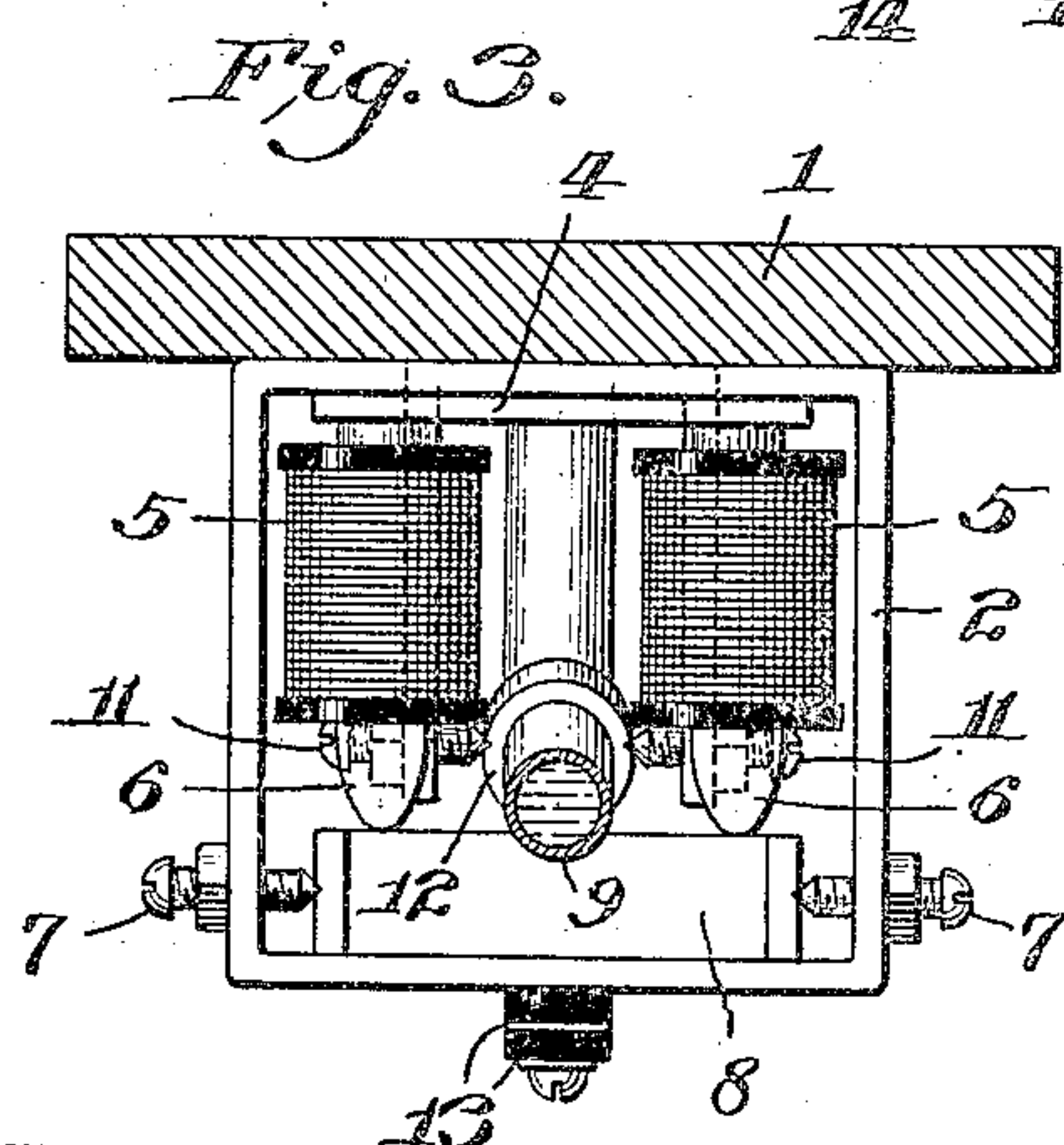
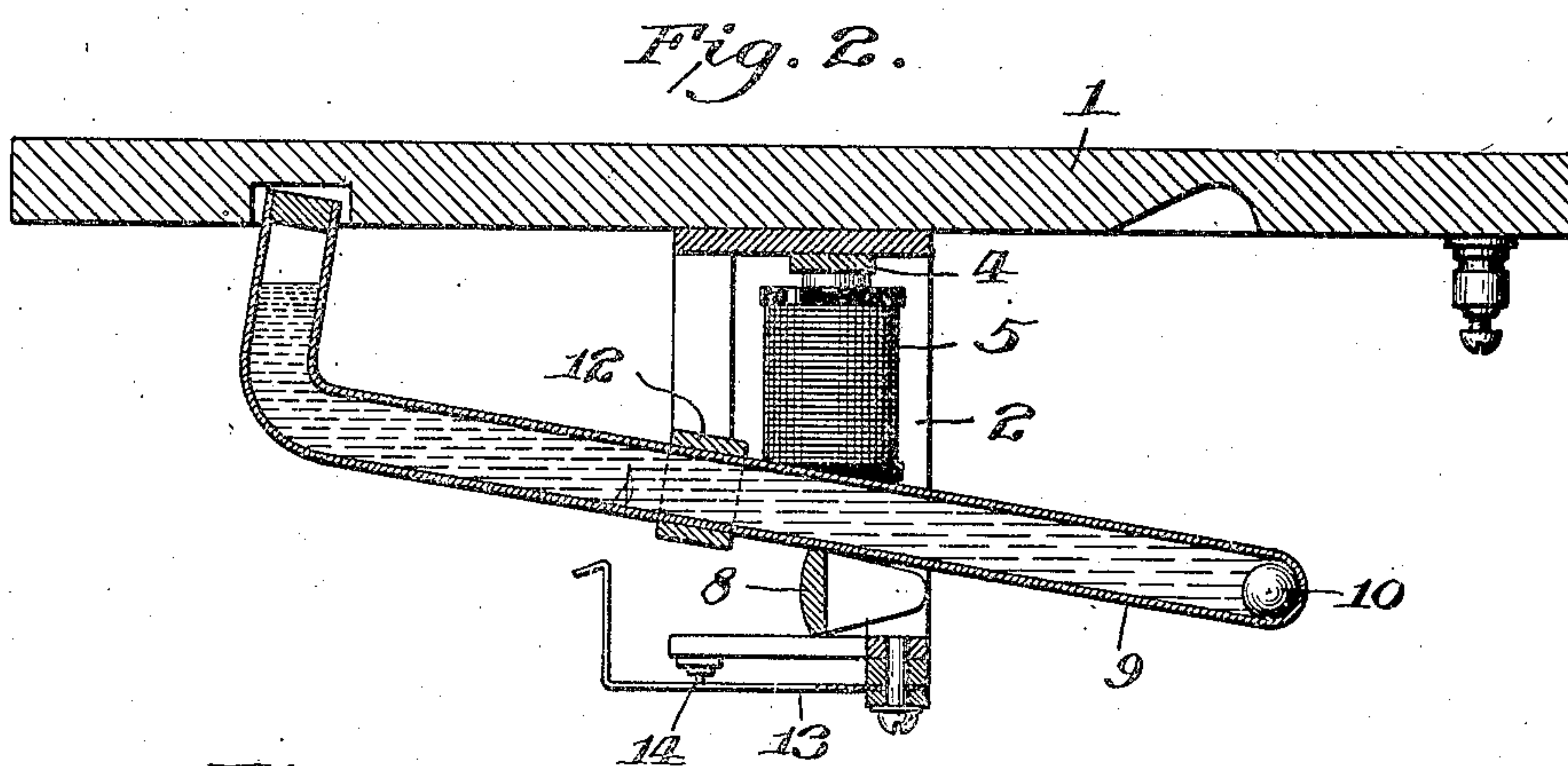
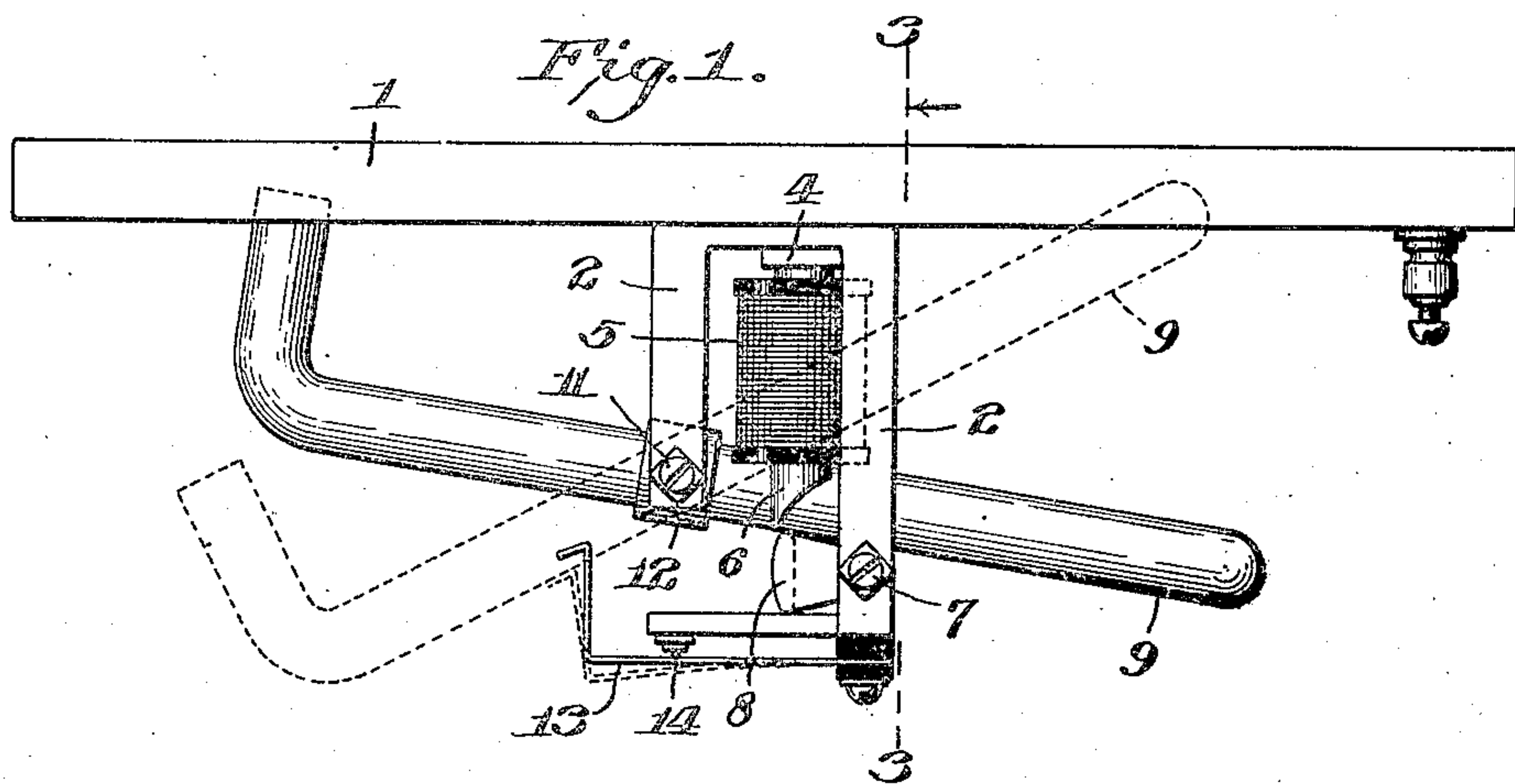


No. 837,092.

PATENTED NOV. 27, 1906.

W. MERRILL.  
CIRCUIT BREAKER.  
APPLICATION FILED OCT. 19, 1905.



WITNESSES:

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# UNITED STATES PATENT OFFICE.

WILLIAM MERRILL, OF WILMINGTON, DELAWARE.

## CIRCUIT-BREAKER.

No. 837,092.

Specification of Letters Patent.

Patented Nov. 27, 1906.

Application filed October 19, 1905. Serial No. 283,378.

*To all whom it may concern:*

Be it known that I, WILLIAM MERRILL, a citizen of the United States, residing at Wilmington, in the county of New Castle and State of Delaware, have invented certain new and useful Improvements in Circuit-Breakers, of which the following is a specification.

This invention relates to that class of circuit-breakers wherein means are provided for automatically breaking an electric circuit should said circuit remain closed longer than a predetermined period of time.

The main object of the invention is to provide a simple and efficient circuit-breaker which will permit the electric circuit to remain closed for a longer period of time than has been heretofore attained.

The invention consists in various novel features of construction and combination of parts, which will be hereinafter fully described and claimed.

In the drawings, Figure 1 is a side elevation of a circuit-breaker embodying my invention. Fig. 2 is a longitudinal vertical section thereof. Fig. 3 is a transverse section, as on the line 3 3 of Fig. 1. Fig. 4 is a diagrammatic view of the electrical connections.

1 designates a suitable base-board, to the under side of which is secured a frame 2. Arranged within the frame 2 and depending from the top thereof is an electromagnet comprising the bridge-piece 4, the coils 5 5, and their cores 6 6. Directly below the lower ends of the cores 6 6 and pivotally mounted in the frame 2 by pointed screws 7 7 is an armature-bar 8. This bar 8 rests normally upon the frame 2 in the position shown in the drawings. When the electromagnet is energized, the bar 8 is attracted by the cores 6 6 and raised, and when the electromagnet is deenergized the bar returns to normal position by gravity.

Extending between the coils 5 5 is a movable device, which in the present embodiment of my invention is a tube 9, containing a liquid, and a movable member or ball 10. This tube 9 is pivotally mounted on the frame 2 by means of horizontally-arranged pointed screws 11 11, entering the sides of a collar 12, which surrounds the tube 9 intermediate of its ends.

One end of the tube 9 extends from the collar 12 directly over the armature-bar 8, and it rests normally upon said bar and is supported thereby in a slightly-inclined position, as

shown in the drawings. In this normal position of the tube 9 the ball 10 rests in the lower end thereof, and when the electromagnet is energized the bar 8 is attracted thereby in a manner to raise the lower end of the tube and lower the opposite end thereof, thereby reversing the inclination of the tube. When the inclination of the tube is thus reversed, the ball 10 moves slowly toward the opposite end thereof, and when the ball reaches the point where it overcomes the weight of that end of the tube from which it is moving the opposite end of the tube is still further lowered to the extreme position shown by dotted lines in Fig. 1.

The diameter of the ball 10 is slightly less than the interior diameter of the tube 9, and the movement of the ball through the tube is greatly retarded by the action of the liquid passing the ball. Thus it will be seen that after the tube has been raised by the bar 8 it will take some time before the ball moves to the point where it will tilt the tube to the extreme position shown by dotted lines in Fig. 1.

Secured to the bottom of the frame 2 and insulated therefrom is one end of a horizontally-extending flat spring 13, the free end of which extends upwardly to a position below the raised portion of the tube 9. This spring bears normally against a contact-pin 14, projecting from the bottom of the frame 2, and when the tube 9 is tilted to the extreme position shown by dotted lines in Fig. 1 said tube engages the spring 13 and moves it out of contact with the pin 14. When the tube 9 is merely tilted by the bar 8 and before it is still further tilted by the ball 10, the tube does not engage the spring 14.

The coils 5 5, the frame 2, and the spring 13 are included in an electric circuit, as shown in Fig. 4. Referring to this figure, 15 designates a battery, and 16 a wire leading therefrom to the frame 2, which is electrically connected to the spring 13 through the pin 14. Leading from the spring 13 to the coils 5 5 is a wire 17 and leading from the coils 5 5 to the battery 15 is a wire 18, thus completing the circuit.

The invention is especially adapted for use in connection with gas-lighting systems wherein the gas-burners are provided with contact making and breaking devices for the purpose of producing sparks to light the burners, and in Fig. 4 I have shown the wire 18 interrupted by several of such devices, (designated 19.)



The operation briefly described is as follows: When the parts occupy the position shown in the drawings, the electric circuit is unbroken between the frame 2 and the spring 13 and is broken at the devices 19. When the circuit is completed by one of the devices 19 in lighting a burner the coils 5 5 are energized and the armature-bar 8 and therewith the lower end of the tube 9 are raised. If the circuit be immediately broken, as is usually the case, the bar 8 and tube 9 return to normal position by gravity. If for any reason, due to devices 19 being defective or otherwise, the circuit should remain closed longer than a predetermined period of time, the ball 10 will move slowly down the tube until it tilts the tube to the extreme position shown by dotted lines in Fig. 1, thereby causing the tube to engage the spring 13 and move it out of contact with the pin 14, and thus automatically break the circuit, the purpose of thus automatically breaking the circuit in this instance being to prevent the battery from becoming exhausted.

I desire it to be understood that the invention is not limited to use in connection with lighting systems, and, further, I do not limit myself to the particular construction herein shown and described, as the same may be

greatly modified without departing from the invention.

I claim—

1. In a circuit-breaker, the combination with an electric circuit, of a support, a liquid-containing movable device thereon, a member engaged with the liquid and movable by gravity upon said device to hold it in two positions, means whereby the position of said device is changed when the circuit is closed, and means whereby the movement of said member upon the device in its changed position causes the breaking of the circuit.

2. In a circuit-breaker, the combination with an electric circuit, of a support, a movable liquid-containing tube thereon, a ball within the tube and movable by gravity to hold the tube in two positions, means whereby the position of the tube is changed when the circuit is closed, and means whereby the movement of the ball within the tube in its changed position causes the breaking of the circuit.

In testimony whereof I affix my signature in presence of two witnesses.

WILLIAM MERRILL

Witnesses:

CHARLES GREEN,  
FRANCIS S. BRADLEY