

No. 706,055.

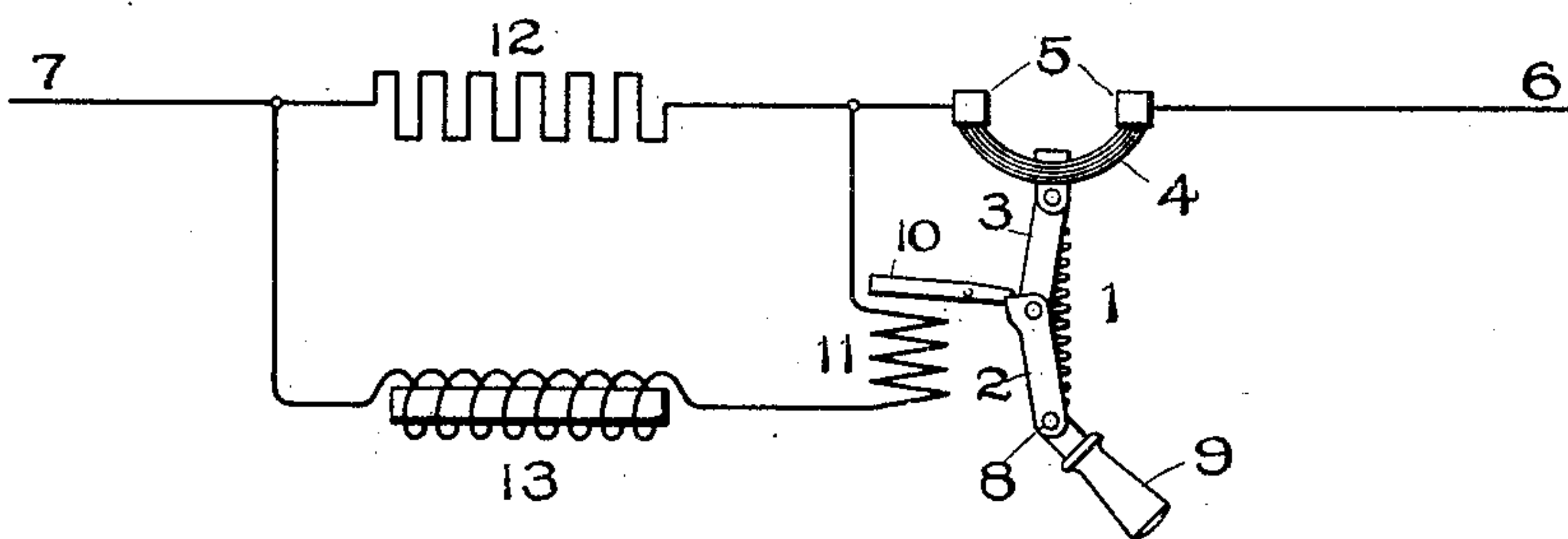
Patented Aug. 5, 1902.

H. M. HOBART.  
TIME LIMIT CIRCUIT BREAKER.

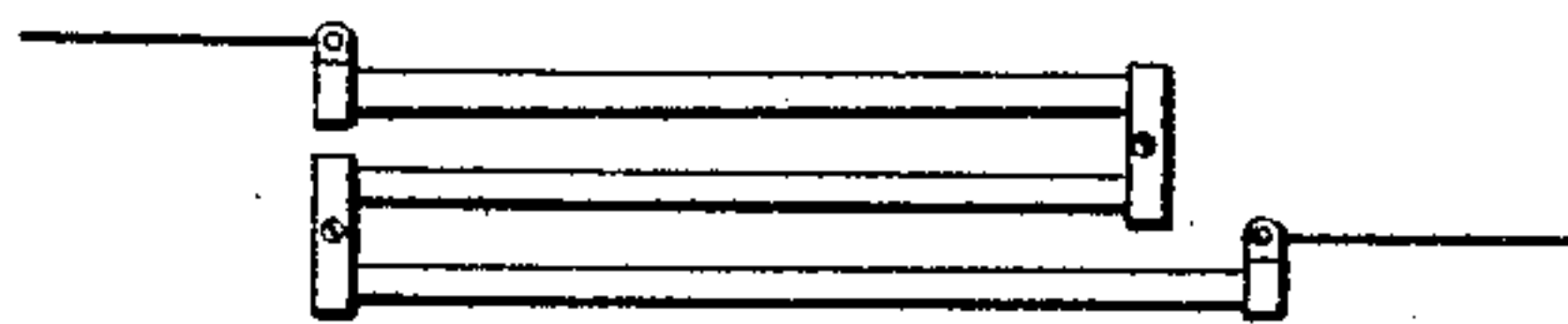
(Application filed Jan. 5, 1901.)

(No Model.)

*Fig. 1.*



*Fig. 2.*



Witnesses:

*Lewis D. Abell.*  
*Benjamin B. Hume*

Inventor:  
Henry M. Hobart,  
by *Albert B. Davis*  
Atty.

# UNITED STATES PATENT OFFICE.

HENRY M. HOBART, OF BERLIN, GERMANY, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

## TIME-LIMIT CIRCUIT-BREAKER.

SPECIFICATION forming part of Letters Patent No. 706,055, dated August 5, 1902.

Application filed January 5, 1901. Serial No. 42,260. (No model.)

*To all whom it may concern:*

Be it known that I, HENRY M. HOBART, a citizen of the United States, residing at Berlin, Germany, have invented certain new and  
5 useful Improvements in Time-Limit Circuit-Breakers, (Case No. 1,942,) of which the following is a specification.

In many cases it is desirable that circuit-breaking devices should not operate on heavy  
10 loads of only a few seconds or a fraction of a second duration.

My present invention consists of a circuit-breaker so arranged as to respond to an overload only after the overload has lasted a predetermined time. To accomplish this mode  
15 of operation, I arrange the tripping-coil of the circuit-breaker in a divided circuit the branches of which are of different time constants and are connected to the circuit upon  
20 which the circuit-breaker operates. In the branch containing the tripping-coil is placed a device of such construction as to retard the growth of current in this branch when the current in the main circuit varies. The  
25 other branch of the divided circuit is formed so as to offer no impediment either to the growth or decay of rapidly-varying currents. The result of this arrangement is that when  
30 the current in the main circuit suddenly increases the portion of the same passing through the tripping-coil increases but slowly, while that in the branch circuit about the tripping-coil rises instantly to its full value. Unless the main current is maintained for  
35 a predetermined interval, for which the parts are proportioned, the circuit-breaker will fail to act, the main current returning to a value or values below that for which the circuit-breaker is set. In case, however, the overload-current lasts a length of time sufficient  
40 to allow the current in the tripping-coil branch to rise to a steady value the circuit-breaker will then operate.

My invention may be better understood by  
45 reference to the following description, taken in connection with the accompanying drawings, in which—

Figure 1 represents the invention in diagram, and Fig. 2 shows a detail.

50 The scope of the invention is not to be limited by anything which I have said in de-

scribing the same, but is to be determined by reference to the claims appended hereto.

In the drawings I have represented at 1 a tripping circuit-breaker of a type well-known  
55 in the art. This circuit-breaker consists of two toggle-arms 2 and 3, the upper one, 3, carrying a bridging contact 4, coöperating with the fixed contacts 5 to open or close a circuit 6 7. The lower toggle-arm 2 is pivoted at 8 to a  
60 supporting-frame. (Not shown.) An operating-handle permits the resetting of the circuit-breaker, the operation consisting of a downward pull on the handle, which acts to throw in the knuckle of the toggle-joint and  
65 bring the bridging contact 4 into engagement with the coöperating fixed contacts 5. A pivoted latch 10 retains the parts in this position until the current in the tripping-coil 11, which acts upon this latch, is sufficient to trip  
70 the circuit-breaker and open the circuit 6 7.

Instead of placing the tripping-coil 11 directly in series with the main circuit, as is usual in practice, I include the same in one  
75 branch of a divided circuit, in series with which branch I place a reactance device—such, for example, as an inductance-coil. The other branch of the divided circuit consists of such a construction as will allow the current therein to rise and fall rapidly in re-  
80 sponse to variation in the differences of potential between its terminals. The circuit may therefore consist of a non-inductive resistance of comparatively low value. In the drawings this low-resistance branch is indi-  
85 cated at 12. The other branch in parallel therewith includes the tripping-coil 11 of the circuit-breaker and a device, such as an inductance-coil 13, in series therewith. This inductance-coil may consist of windings placed  
90 about an iron core; but, if desired, I may in order to obtain the same effect use instead a system of iron bars, as shown in Fig. 2, of considerable cross-section and of proper length. Any sudden rush of current through  
95 conductors of this character would take place in such a manner as to cause a concentration of current about the surface of the bar or bars, this concentration of current being known in the art as the "skin effect." As a  
100 result of this peculiar distribution of current the growth of the same to its full value is



very much retarded. The alternative path about the tripping-coil carries more than the usual proportion of the current until the normal condition of steadiness is again reached.

5 If the overload or rush of current lasts long enough to enable the current in the tripping-coil branch to rise to a steady value, the circuit-breaker will operate; otherwise not.

In the above description I have described  
10 my invention in connection with a tripping circuit-breaker of one particular type; but it is not to be understood that I thereby limit my invention to use in connection with a circuit-breaker of such construction, since it is  
15 applicable to circuit-breakers of many other kinds and descriptions. In other details my invention is capable of various modifications, and for that reason I do not wish my claims limited to the particular construction shown.

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

1. The combination with a circuit-breaker having a tripping-coil normally connected to the circuit upon which the circuit-breaker  
25 operates, of electroreactive means for causing the current in said tripping-coil to vary slower than the current in said circuit.

2. The combination of a divided circuit, one  
30 a circuit-breaker, and a device possessing inductance in series with said tripping-coil.

3. The combination of a divided circuit, one branch of which includes the tripping-coil of a circuit-breaker, and a device in series with said tripping-coil and acting to oppose varia- 35 tion of current but inactive during a steady condition of current.

4. A circuit-breaker comprising circuit-interrupting means, a tripping-coil, and a device possessing reactance for preventing the  
40 current in the tripping-coil from varying at the same rate as the current in the circuit upon which the circuit-breaker operates.

5. The combination of a divided circuit, one branch of which includes the tripping-coil of  
45 a circuit-breaker, and means responsive to variation of current for causing the branch including the tripping-coil to have a higher time constant than the other.

6. The combination of a divided circuit, one  
50 branch of which includes the tripping-coil of a circuit-breaker, and means dependent for its action upon variation of current for causing the branch including the tripping-coil to  
55 have a different time constant than the other.

In witness whereof I have hereunto set my hand this 18th day of December, 1900.

HENRY M. HOBART.

Witnesses:

HENRY HASPER,  
WOLDEMAR HAUPT.