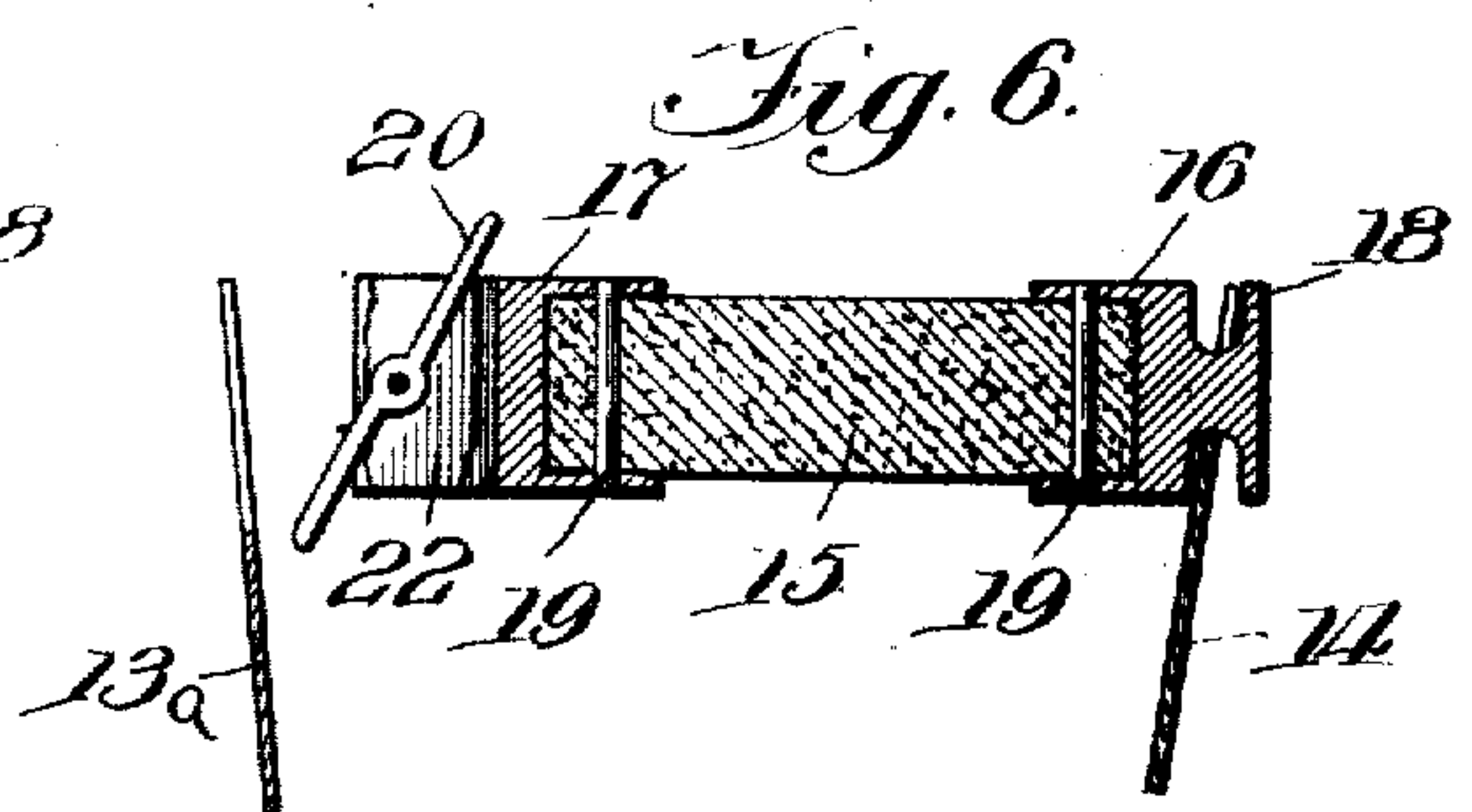
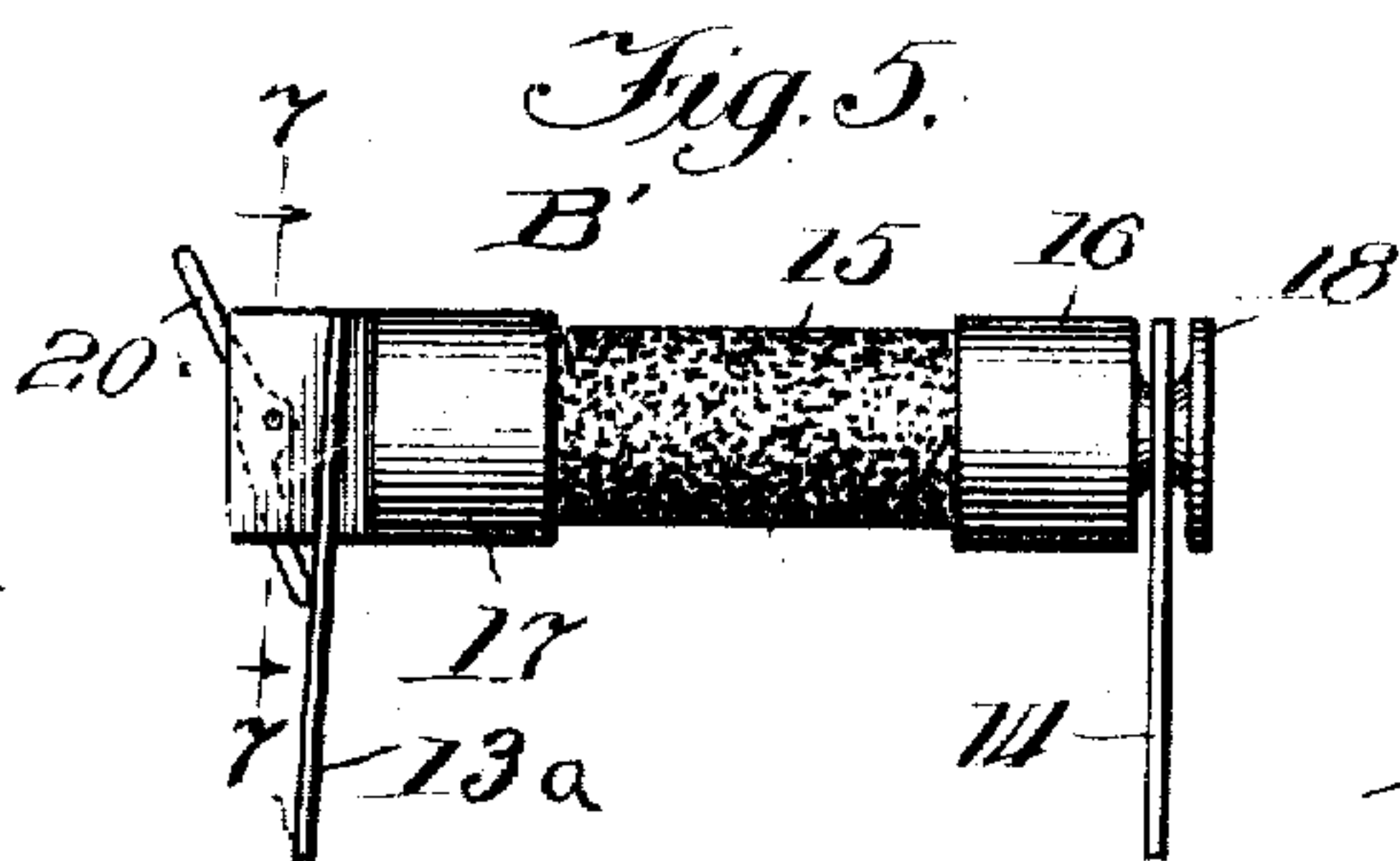
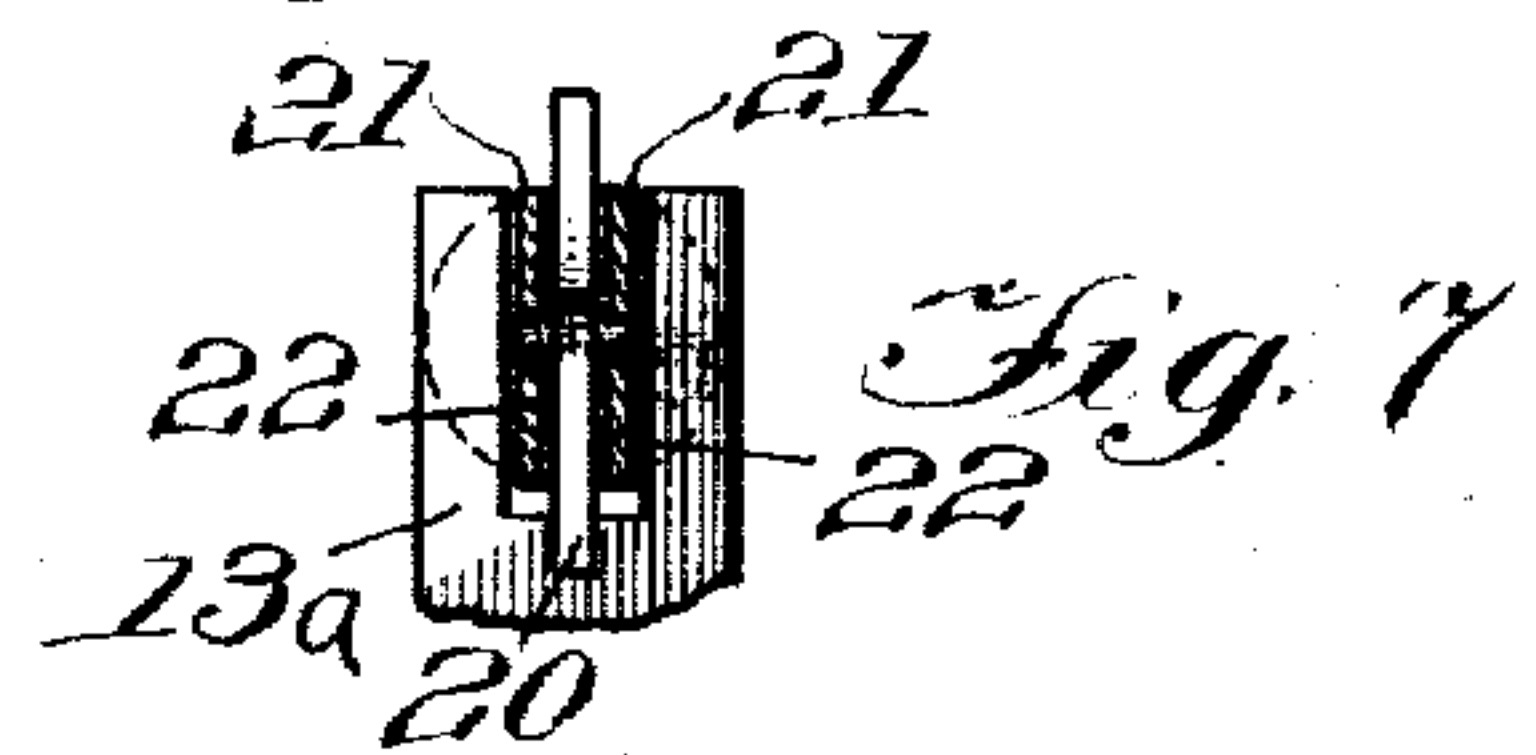
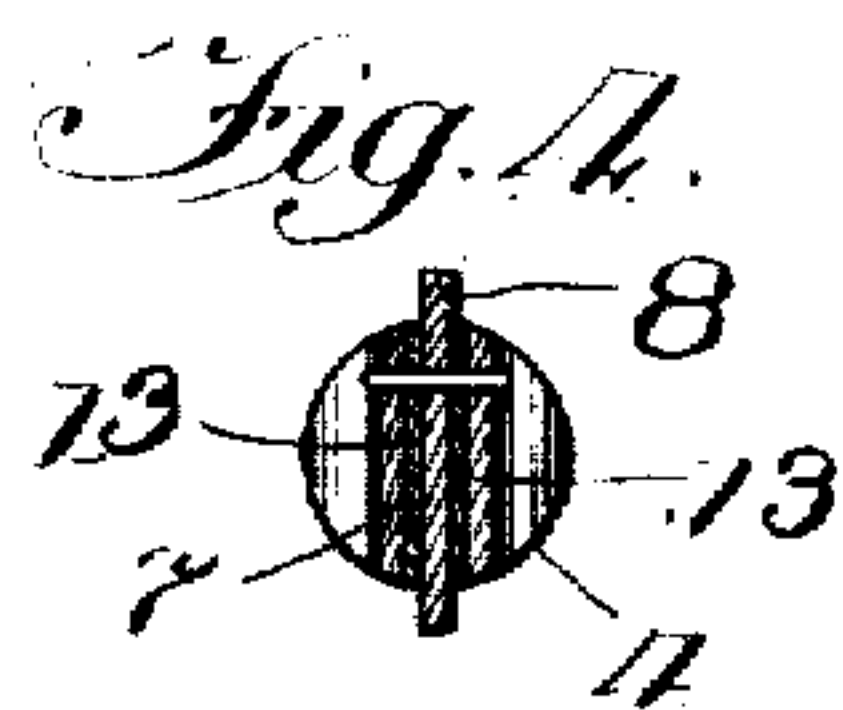
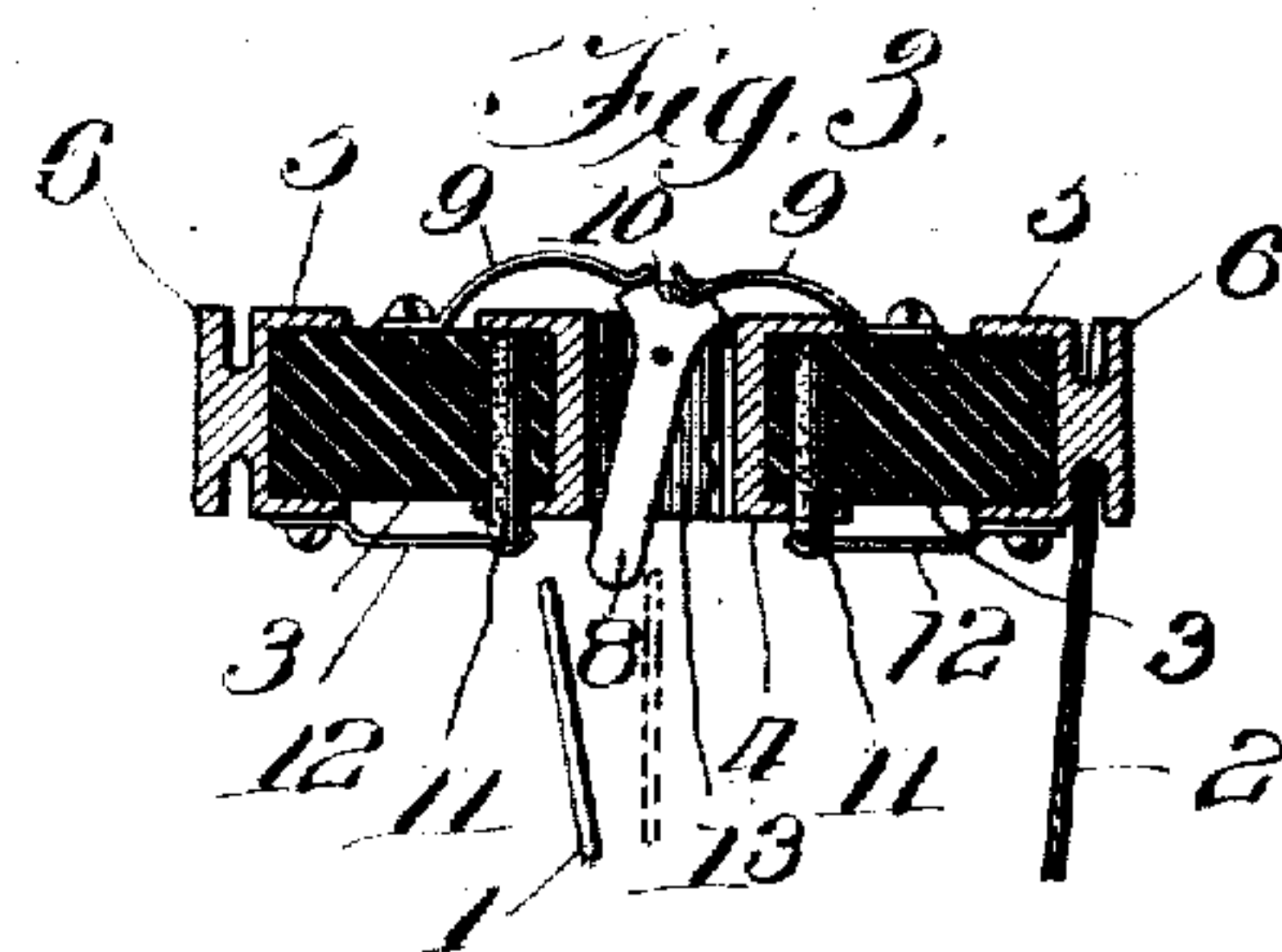
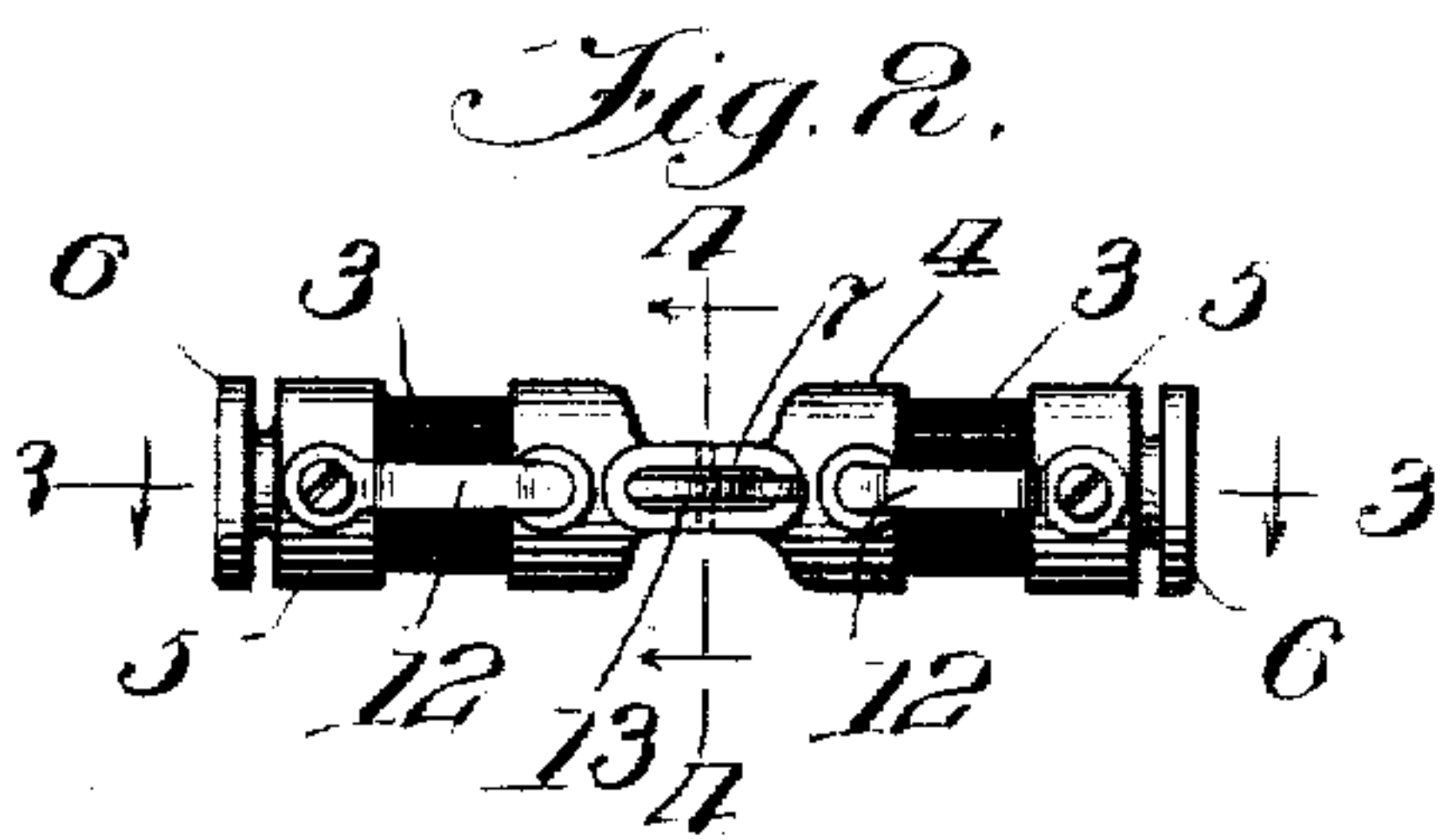
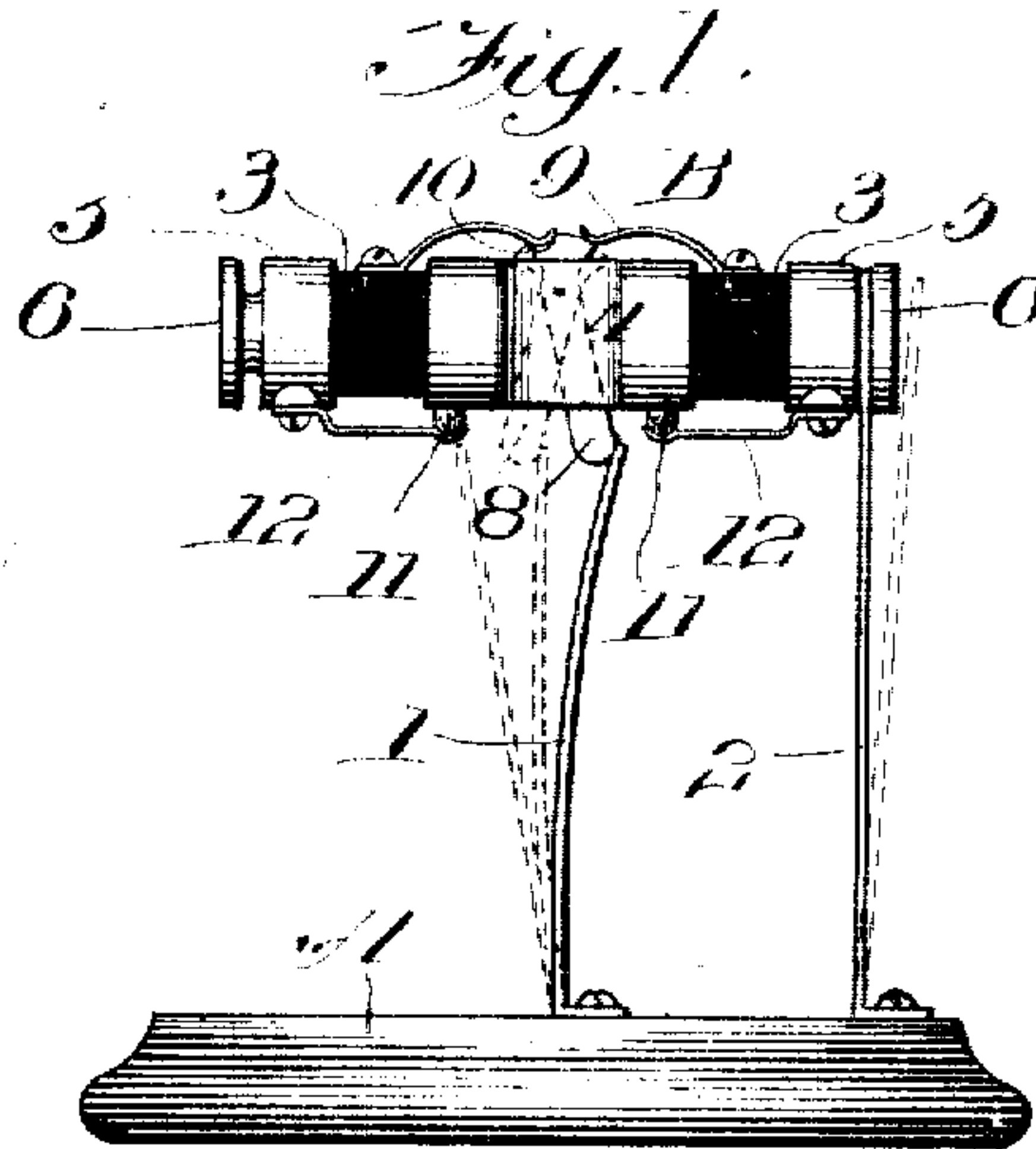


C. A. ROLFE.
ELECTRICAL PROTECTIVE DEVICE.
APPLICATION FILED DEC. 29, 1903.

920,778.

Patented May 4, 1909.



Witnesses:
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UNITED STATES PATENT OFFICE.

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ELECTRICAL PROTECTIVE DEVICE.

No. 920,778.

Specification of Letters Patent.

Patented May 4, 1909.

Application filed December 29, 1903. Serial No. 187,041.

To all whom it may concern:

Be it known that I, CHARLES A. ROLFE, a citizen of the United States, residing at Adrian, in the county of Lenawee and State of Michigan, have invented a certain new and useful Improvement in Electrical Protective Devices, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to devices for protecting low tension circuits such as telephone, fire-alarm and the like, from damage or injury by the unduly strong currents coming from electric light, trolley and power circuits.

The principal object of the invention is to provide a simple, practical and inexpensive form of device of this kind which will not require repair or replacement after operation.

In the accompanying drawing, Figure 1 is a side elevation of a protective device of the class mentioned, embodying my invention; Fig. 2 is a bottom view of the heat cartridge thereof; Fig. 3 is a longitudinal section taken on line 3—3 in Fig. 2, but with the device operated and showing also the supporting members for the heat cartridge; Fig. 4 is a cross section taken on line 4—4 in Fig. 2; Figs. 5 and 6 are respectively a side elevation and a longitudinal section of a portion of a modified form of device; Fig. 7 is a section taken on line 7—7 in Fig. 5.

Referring first to the device shown in Figs. 1 to 4 inclusive, A represents a suitable insulating base which can be made of any desired form and material such as porcelain, wood or the like. Upon this base are mounted two springs 1 and 2 which rise from the base and support at their ends a heat cartridge B. The springs 1 and 2 tend to spring outwardly or separate from one another but are held in restraint by the heat cartridge. The latter consists of two pieces 3, 3, of insulation preferably ebonite, a coupling 4 connecting said pieces of insulation and to such end made with cup-shaped ends, and terminals 5, 5 at the outer ends of the insulation pieces 3, 3; the terminals 5, 5 being also cup-shaped to embrace the ends of the pieces of insulation, and having heads 6, 6 adapted to be engaged by the forked ends of the springs 1 and 2. The coupling 4 is made with a central slot or cavity 7, and in this a lever 8 is pivoted. Springs 9, 9, are

mounted upon the pieces 3, 3 of insulation, and extend over so as to engage the top or head of the lever 8 which is for such purpose provided with a notch 10. Each piece of insulation 3, 3 is provided with a graphite stick or pencil 11 whose upper ends come in contact with the flanges of the coupling 4 as shown in Fig. 3, and whose lower ends are engaged by springs 12, 12 which are extended and secured to the terminals 5, 5. A small quantity of solder 13 is placed in the cavity in the coupling 4 so as to hold the lever 8 normally in the position in which it may be placed. This device operates as follows. Under normal conditions it will be arranged as shown in Fig. 1, with the spring 1 in engagement with the lower end of the lever 8 and the spring 2 which is forked, in engagement with the head 6 of one of the terminals 5. So long as the conditions of the circuit are normal, the device will remain in this condition, with the circuit closed through it by way of the head 5 engaging the spring 2, the spring 12 connected with said head, the graphite stick 11 connected with said spring, the coupling 4, the lever 8, and the spring 1. When an unduly strong current passes through the circuit, the graphite 11 is heated, thereby causing the melting of the solder 13 and releasing the lever 8, which when released is thrown outwardly by the spring 1, with the result that the spring 1 passes beyond the end of the lever and becomes disengaged therefrom, thereby opening the circuit as shown in Fig. 3. When this has been done, the lever 8 assumes the position shown in dotted lines in Fig. 1 and in full lines in Fig. 3, and is resoldered in that position by the cooling of the solder 13. When the circuit is to be restored to operative condition after the removal of the trouble, the heat cartridge B is lifted so that it becomes disengaged from the spring 2, and is reversed in position; that is, the ends are interchanged so that the terminal 5 formerly not in engagement with the spring 2, is placed in engagement therewith. The lever 8 thus is placed in the same position in which it was originally; that is, inclined toward the spring 2, and its lower end is engaged with the spring 1, thereby placing the device in substantially its original condition, ready for another operation.

The device shown in Figs. 5, 6 and 7 comprises two springs 13^a and 14 which are un-

derstood to be similar to the springs 1 and 2 of the above described device, except that both the springs 13^a and 14 are forked, and are also understood to be extended down to a suitable insulating base which is not shown. These springs 13^a and 14 support a heat cartridge B' which consists of a cylindrical graphite stick or pencil 15 provided at its ends with terminals 16 and 17, both of which are made cup-shaped so as to embrace the ends of the graphite, and one of which, 16, is provided with a head 18 to engage the spring 14. These terminals 16 and 17 are secured to the graphite stick 15 by pins 19, 19 passing through the graphite stick, and also by hard solder which makes fast the joints between the terminals and graphite stick. The terminal 17 is slotted at its outer end, as shown in Fig. 7, and a trigger 20 is pivoted between the forks 21, 21 formed by the slot in said terminal. A small quantity of solder 22 is confined between the forks 21, 21 so as to hold the trigger 20 firmly in any position to which it may be adjusted when said solder is cold. The operation of the device is as follows. When the circuit is in normal condition the device is arranged as shown in Fig. 5, the spring 13^a being held in position by the trigger 20 which is inclined with its lower end inwardly. So long as the current in the circuit is normal the device remains in this condition, the current passing between the springs 13^a and 14 by way of the trigger 20, terminals 16 and 17, and graphite stick 15. When, however, the current becomes unduly strong, the graphite stick 15 is heated, thereby causing the solder 22 to become softened or melted, with the result that the trigger 20 is released and the spring 13^a is allowed to spring or move outwardly. When this occurs the trigger 20 is shifted or swung about from the position shown in Fig. 5 to that shown in Fig. 6 and the spring 13^a is allowed to free itself from said trigger as shown in Fig. 6, thereby opening the circuit. The solder 22 in cooling hardens about the trigger 20 thereby holding the same in the position shown in Fig. 6. To restore the device to operative condition it is simply necessary to reverse the heat cartridge B' by turning it about its longitudinal axis 180 degrees, or in other words by turning it so that its upper and lower sides are changed in position. The trigger 20 then comes into position with its lower end inwardly or nearest the spring 14 and the spring 13^a is engaged therewith as before.

From the foregoing it will be seen that the device can be restored to condition for operation without repair or replacement of other parts, and this is accomplished merely by reversing the position of the heat cartridge in its supporting members. Provision for this reversal can be made by constructing the

heat cartridge in various ways, two of which are shown herein, the first one comprising practically a double cartridge with a single lever or trigger, and the second a single cartridge with a double lever or trigger. In any event the operated part,—that is the lever or trigger,—of the cartridge is not moved back or restored to any normal position in the cartridge but is resoldered in the position to which it is moved by operation, and then the cartridge itself is reversed in order to place the device in condition for a subsequent operation.

It will be understood that the two foregoing arrangements are merely exemplary of many forms of device which can be constructed upon this principle, and that I do not therefore wish to confine myself merely to the forms above shown. I consider that other forms operating on the same general principle lie within the scope of my invention and also that changes and modifications can be made in these forms without departing from the invention.

In the present application I shall claim specifically the device shown in Figs. 1 to 4 inclusive, while in another application, Serial No. 218,584, filed July 28, 1904, I shall claim specifically the double trigger device shown in Figs. 5, 6 and 7.

What I claim is:—

1. In apparatus of the class specified, an excess current operated device adapted to be changed in position and provided with means whereby one operation places the device in condition for another operation in a changed position.

2. In apparatus of the class specified, a reversible excess current operated device provided with means whereby one operation places said device in condition for another operation in a reversed position, substantially as described.

3. In apparatus of the class specified, a reversible heat cartridge provided with means whereby one operation places said cartridge in condition for operation in a reversed position, substantially as described.

4. In apparatus of the class specified, the combination of circuit controlling means and an excess current operated device provided with means for engaging said circuit-controlling means, said engaging means being adapted to engage the circuit controlling means in different positions of the excess operated device, and the excess operated device being adapted to be placed by one operation in condition for another operation in a different position, substantially as described.

5. In apparatus of the class specified, the combination with circuit controlling springs, of an excess current operated device provided with means for engaging said springs, and made removable therefrom and adapted

to be placed in engagement therewith in different positions, said device being provided with means whereby its operation by said springs in one position places it in condition
5 for operating in another position.

6. In apparatus of the class specified, the combination with a pair of circuit controlling springs, of a heat cartridge adapted to be engaged by said springs and being made reversible so as to engage the same in reversed
10 positions, said device being provided with means whereby its operation by said springs in one position places it in condition for another operation in a reversed position.

7. In apparatus of the class specified, the combination with a pair of circuit controlling springs, of a heat cartridge comprising means for engaging one of said springs with the cartridge in reversed positions, a movable part
20 adapted to engage the other spring with the cartridge in reversed positions, material affected by heat for holding said movable part against movement, and means for developing heat sufficient to affect said material and permit movement of said movable part upon the
25 passage of an unduly strong current, substantially as described.

8. In apparatus of the class specified, the combination with a pair of circuit controlling
30 springs, of a heat cartridge engaging said springs and holding the same in restraint, said cartridge comprising means for engaging one of said springs with the cartridge in reversed positions; a pivoted lever adapted to
35 engage the other spring with the cartridge in reversed positions, softenable material associated with said lever to hold the same normally against movement, and means for developing sufficient heat to soften said material, and thereby release said pivoted lever
40 upon the passage of an unduly strong current.

9. In apparatus of the class specified, the combination with a pair of circuit controlling
45 springs, of a heat cartridge engaging said springs and holding the same in restraint, said cartridge comprising means for engaging one of said springs with the cartridge in reversed positions; a pivoted lever adapted to
50 engage the other spring with the cartridge in reversed positions, a small quantity of solder holding the said lever normally against movement, and means for developing heat to melt or soften said solder and thereby release said
55 lever upon the passage of an unduly strong current.

10. In apparatus of the class specified, a heat cartridge comprising means for engaging
60 a pair of circuit controlling springs with the cartridge in different positions, and means whereby operation in one position of the cartridge, places the same in condition for another operation in a different position.

11. In apparatus of the class specified, a

heat cartridge comprising means for engaging
65 ing a circuit controlling spring with the cartridge in different positions, a movable part for engaging another spring, said part being arranged and adapted to be moved by said
70 other spring in operation, to place it in condition to restrain said spring with the cartridge in a different position, material normally hard but adapted to be softened by heat, for holding said part normally against
75 movement, and means for developing heat to soften said material on the passage of an unduly strong current, substantially as described.

12. In apparatus of the class specified; a heat cartridge comprising means for engaging
80 ing a circuit controlling spring with the cartridge in reversed positions, a pivoted lever adapted to engage another circuit controlling spring, said lever being arranged in its
85 different positions to hold said spring in restraint with the cartridge in reversed positions, a small quantity of solder for holding said lever normally against movement, and means for developing heat to soften said
90 solder on the passage of an unduly strong current, substantially as described.

13. In apparatus of the class specified, the combination with a pair of circuit controlling
95 springs, of a heat cartridge engaging said springs and holding the same in restraint, said cartridge comprising a pair of metallic terminals or heads each adapted for engaging one of said springs, a device for engaging the
100 other spring, located between said heads, and means whereby said device is held normally against movement but is permitted to move on the passage of an unduly strong current, substantially as described.

14. In apparatus of the class specified, the combination with a pair of line springs, of a
105 heat cartridge engaging said springs and holding the same in restraint, said cartridge comprising a pair of devices for engaging one of said springs; a device for engaging the other spring, located between said pair of
110 devices, a small quantity of material normally hard but softenable upon a moderate excess of heat, and a heat concentrating device for softening said material on the passage of an unduly strong current, said intermediate device being adapted to be moved
115 by said line spring into position to be reengaged thereby when the device is turned end for end, substantially as described.

15. In apparatus of the class specified, the
120 combination with a pair of circuit controlling springs, of a heat cartridge engaging said springs and holding the same in restraint, said cartridge comprising a pair of separated terminals each adapted to engage one of said
125 springs, a pivoted lever located between said terminals and adapted to be engaged by the other line spring, a small quantity of solder

normally holding said lever against movement, and means for concentrating heat to soften said solder on the passage of an unduly strong current, substantially as described.

5 16. In apparatus of the class specified, the combination of a pair of circuit controlling springs 1 and 2, of a heat cartridge comprising terminals 6, 6, each adapted to engage a line spring 2, a pivoted lever 8 lo-
10 cated between the terminals 6, 6, a small quantity of solder normally holding the lever 8 against movement, and means for concentrating heat on the passage of an unduly strong current to soften said solder, sub-
15 stantially as described.

17. In apparatus of the class specified, an excess current operated device, comprising a pair of separated terminals, a movable device located between said terminals and
20 adapted for engaging a line spring, and means whereby said device is held normally against movement during the passage of a normal current, but is released and permitted to move on the passage of an excess cur-
25 rent, substantially as described.

18. In apparatus of the class specified, a heat cartridge comprising a pair of separated terminals, a pivoted device located between said terminals, means for holding
30 said device normally against movement, and means whereby said holding means is affected to release the device on the passage of an unduly strong current, substantially as described.

35 19. In apparatus of the class specified, a heat cartridge, comprising a pair of separated terminals 6, 6, a pivoted lever 8 located between said terminals, a small quantity of softenable material normally holding
40 said lever against movement, and means for concentrating heat on the passage of an unduly strong current to melt or soften said material, substantially as described.

20. In apparatus of the class specified, a

solder joint reversible heat cartridge having 45 provisions for automatically resoldering itself.

21. A protector for electrical circuits, having a heat cartridge having means whereby it can be reversed in position in the protec- 50 tor, and also having provisions for automatically resoldering itself after operation.

22. A protector for electrical circuits, having a heat cartridge provided with a movable member, and also with a solder joint 55 normally holding said member against movement, the cartridge and protector having provisions for the engagement of the cartridge in reversed positions with its movable member in different positions, and also 60 having provisions whereby said member is placed by operation in position for operation with the cartridge in a reversed position, the solder joint of said movable member being intact after operation, whereby said member 65 is automatically resoldered after operation in condition for another operation in a different position in the cartridge.

23. A heat cartridge for electrical circuit protectors provided with engaging devices at 70 its opposite ends and between its ends, the cartridge having provisions for automatically resoldering said intermediate engaging device after operation. 75

24. In apparatus of the class specified, a solder-joint reversible heat cartridge having provisions for automatically resoldering itself in operative condition.

25. In apparatus of the class specified, a 80 reversible solder-joint heat cartridge having provisions for automatically resoldering itself after operation.

In witness whereof, I hereunto subscribe my name this November 16th, A. D., 1903. 85
CHARLES A. ROLFE.

Witnesses:

A. MILLER BELFIELD,
I. C. LEE.