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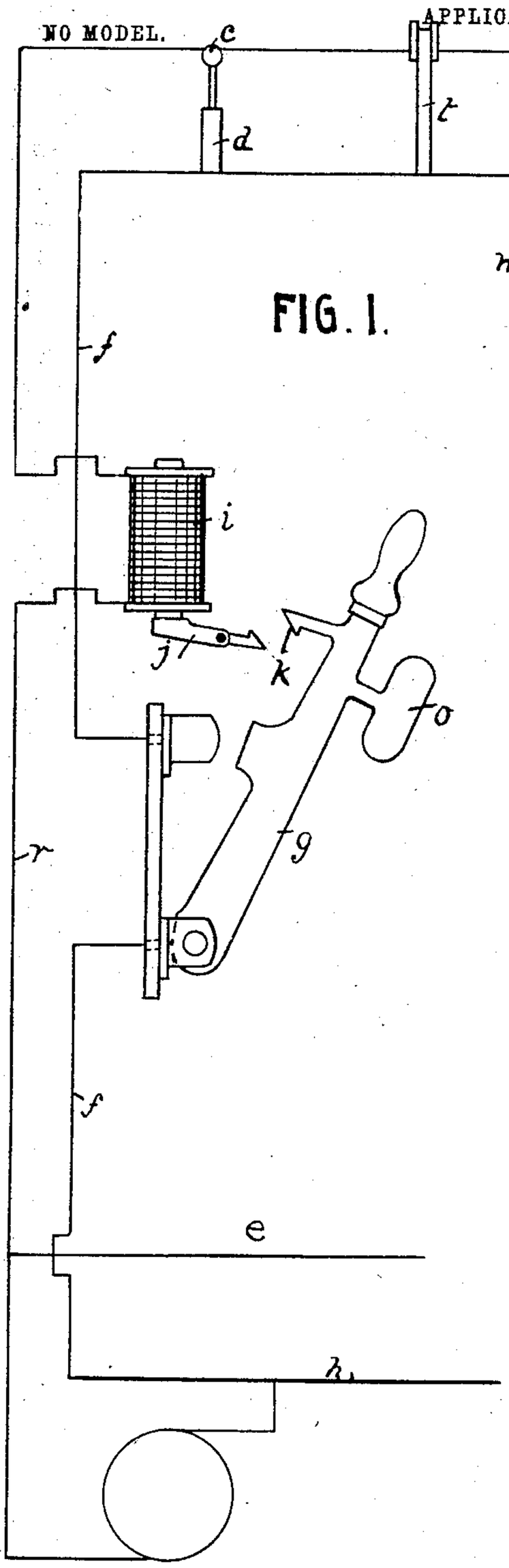
W. A. & L. O. HEYES.

SAFETY DEVICE FOR AUTOMATICALLY PREVENTING ACCIDENTS FROM TROLLEY WIRES.

APPLICATION FILED JAN. 3, 1902.

NO MODEL.

FIG. 1.



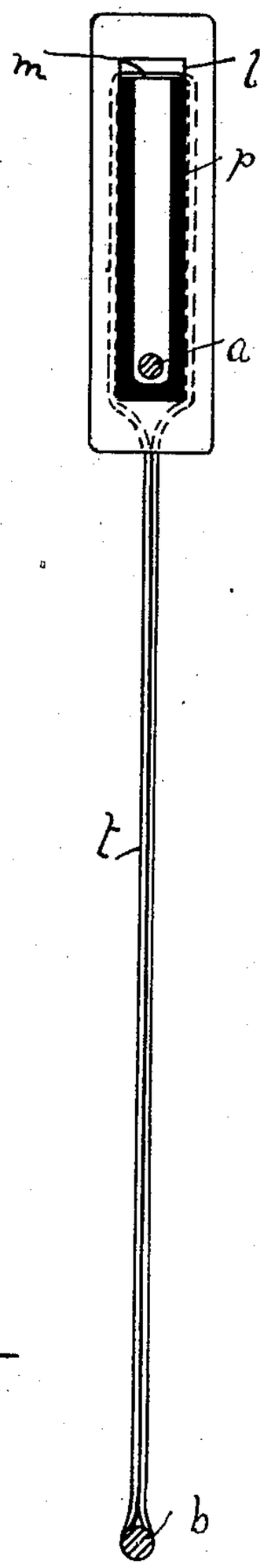
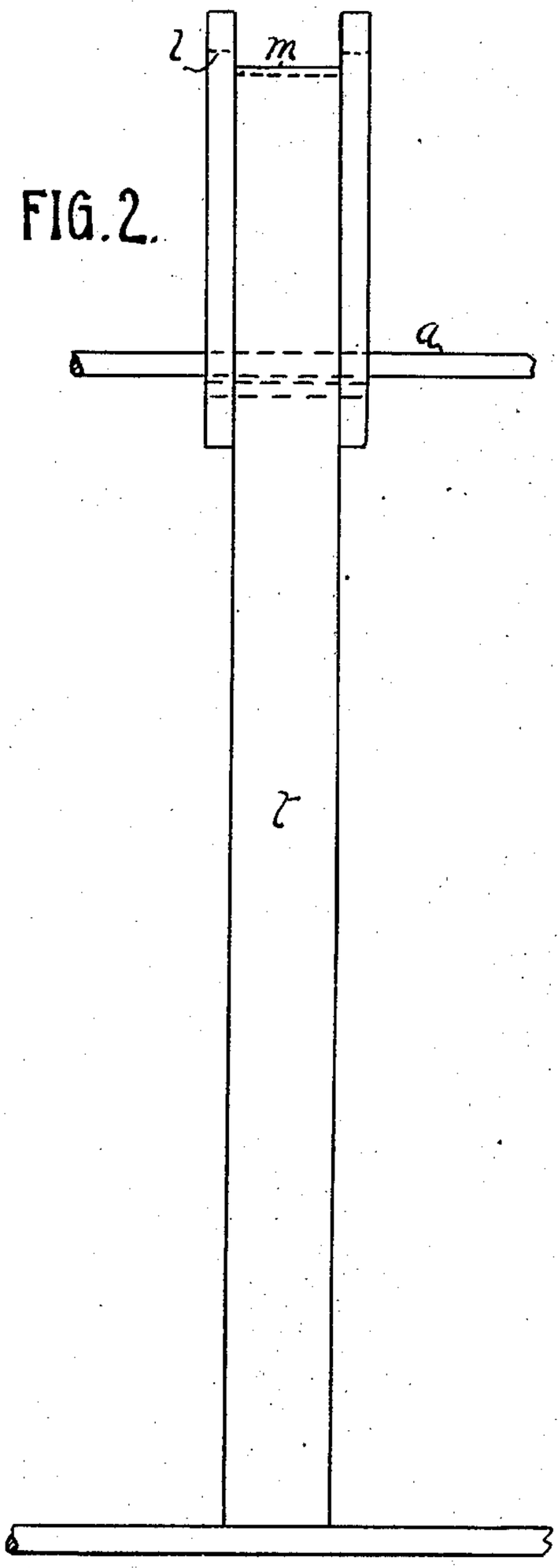


FIG. 2.



Witnesses

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UNITED STATES PATENT OFFICE.

WILLIAM ARTHUR HEYES AND LANCELOT OVID HEYES, OF WIGAN, ENGLAND.

SAFETY DEVICE FOR AUTOMATICALLY PREVENTING ACCIDENTS FROM TROLLEY-WIRES.

SPECIFICATION forming part of Letters Patent No. 726,061, dated April 21, 1903.

Application filed January 3, 1902. Serial No. 88,325. (No model.)

To all whom it may concern:

Be it known that we, WILLIAM ARTHUR HEYES and LANCELOT OVID HEYES, electrical engineers, subjects of the King of Great Britain, residing in Wigan, in the county of Lancaster, England, (whose full postal address is 20A Millgate, Wigan, aforesaid,) have invented certain new and useful Improvements in Safety Devices for Automatically Preventing Accidents from Trolley-Wires, (English application filed under No. 11,545, dated June 6, 1901,) of which the following is a specification.

This invention has for its object a safety device for automatically disconnecting the current-supply to trolley-wires when any danger occurs through the falling of telephone or other wires, or through the trolley-wire sagging or breaking, or through other like event taking place which renders it necessary for the current to be automatically cut off.

In the drawings, Figure 1 is a diagrammatic view of an overhead electric tramway system fitted with our safety device for preventing accidents through the falling of telephone or other wires; Fig. 2, a detail view of the device for preventing accidents when the trolley-wire sags or breaks.

Referring to Fig. 1, *b* is the trolley-wire, and directly over this we fix a guard-wire *a* at a distance of about eighteen inches from the trolley-wire. The guard-wire is earthed to the rail by wire *r*, and it may be of iron, steel, or copper wire and is attached to insulators *c*, fixed on the pole-arm *d* or span-wire.

e represents the tramway-rails; *f*, section-feeders; *g*, a circuit-breaker or switch weighted at *o* and placed in circuit between the feeder-cable *h* and the trolley-wire *b*.

i is an electromagnet and resistance in circuit between that end of the guard-wire *a* which is nearest the section-feeder and the earth or tram-rails. It is independent of the circuit-breaker *g*.

j is an armature or trigger of the electromagnet, with a claw or tooth at end thereof, which under normal conditions engages the tooth at *k* on the circuit-breaker *g*. Immediately, however, a current flows through the electromagnet and resistance the trigger is attracted, and its movement releases the tooth *k*, thus permitting *g* to fall away by reason of its counterweight *o*, thus breaking the circuit and disconnecting the current-supply to the trolley-wire.

There is of course a circuit-breaker *g* and electromagnet and resistance *i* in each feeder-section.

In the event of a telephone or other wire falling across the guard-wire *a* and coming in contact with the trolley-wire *b* the current from the guard-wire is conducted to earth through the resistance *i*, thereby releasing the circuit-breaker and disconnecting the trolley-wire *b* from the feeder *f*. When the breakdown is repaired, the working may be at once reëstablished by the claw *k* of the circuit-breaker *g* being again placed in engagement with the trigger *j*, thus reëstablishing the current-supply. Owing to the resistance *i*, the guard-wire need not be of high conductivity or large cross-sectional area. In the event of the trolley-wire breaking or unduly sagging we arrange a means whereby the current is switched off immediately the trolley-wire breaks. To attain this end, we fix at intervals on the trolley-wire *b* a piece of copper strip *t*, Figs. 1 and 2, which are soldered to the trolley-wire *b* in a vertical position. The top end of this strip is formed with a rectangular slot or loop *l*, through which passes the guard-wire *a*. The sides and bottom of this slot are insulated at *p*; but the top *m* is left bare, so that the guard-wire *a* can only make electrical contact with the copper strip *m* at the top. When, therefore, the trolley-wire breaks or becomes very slack, the top end of the slot or loop in the copper strip *m* drops and comes into contact with the guard-wire *a*. Current from the trolley-wire *b* is thereby sent through the guard-wire *a* and through the resistance to the earth or tram-rails, thereby operating the trigger *j* and releasing the circuit-breaker. The trolley-wire is thus disconnected from the feeder-cable automatically. In places where it is not necessary to fix guard-wires we arrange in the event of the trolley-wire breaking a metallic arm, projecting from the pole-arm or span-wire. The copper strip, with its slot or loop in the top end, is soldered

to the trolley-wire in such a position that the arm projects through the slot or loop, the arm itself being connected to the earth or tram-rails. In the event of the trolley-wire breaking or becoming very slack the top end of the slot in the copper strip comes into contact with the metallic arm, which instantly earths or short-circuits the trolley-wire, thereby causing the circuit-breaker to disconnect the trolley-wire from the feeder or dynamo circuit.

We declare that what we claim is—

1. A safety device for trolley-wire systems comprising a guard-wire normally "dead;" an electromagnet connected in series between the said guard-wire and the tramway-rails, a cut-out switch in the main circuit, a catch adapted to engage with a notch on said switch and mounted in such manner as to be drawn out of engagement by the electromagnet in the guard-wire circuit when the latter is energized, and means tending to pull back the said switch when released by the catch.

2. A safety device for trolley-wire systems comprising a guard-wire normally "dead;" an electromagnet connected in series between the said guard-wire and the tramway-rails, a cut-out switch in the main circuit, an armature adapted to coöperate with said electromagnet and provided with mechanical means for engaging said switch in its closed position, and means tending to pull back said switch when released.

3. In a safety device for trolley-wire systems, the combination with a guard-wire, and means connected therewith for breaking the main circuit when the current passes through the guard-wire, of a device for automatically connecting the main conducting-wire to the guard-wire if said connecting-wire should sag or be broken, comprising a conducting-strip mounted on the conducting-wire and having a loop at its further end through which the guard-wire passes, and insulation at the bottom and sides of the said loop, whereby the guard-wire is prevented from touching the conducting-loop until the main conducting-wire falls so far as to cause the top of the loop to rest on the guard-wire.

In witness whereof we have hereunto signed our names, this 19th day of December, 1901, in the presence of two subscribing witnesses.

WILLIAM ARTHUR HEYES.
LANCELOT OVID HEYES.

Witnesses:
G. C. DYMOND,
F. P. EVANS.