J. T. SLOAN & A. G. ENGLISH.

THEFT DETECTOR FOR ELECTRIC METERS.

APPLICATION FILED AUG. 31, 1912.

1,066,856.

Patented July 8, 1913.

2 SHEETS—SHEET 1.

Fig. 1

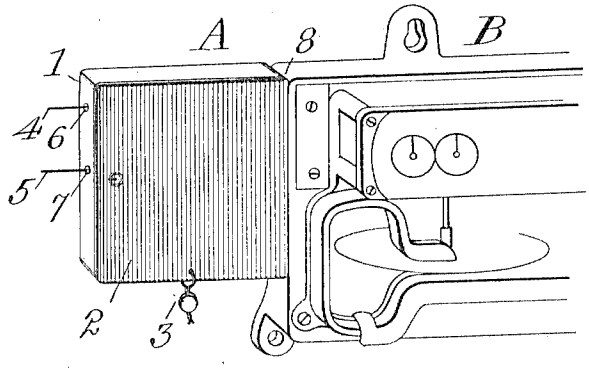


Fig. 2

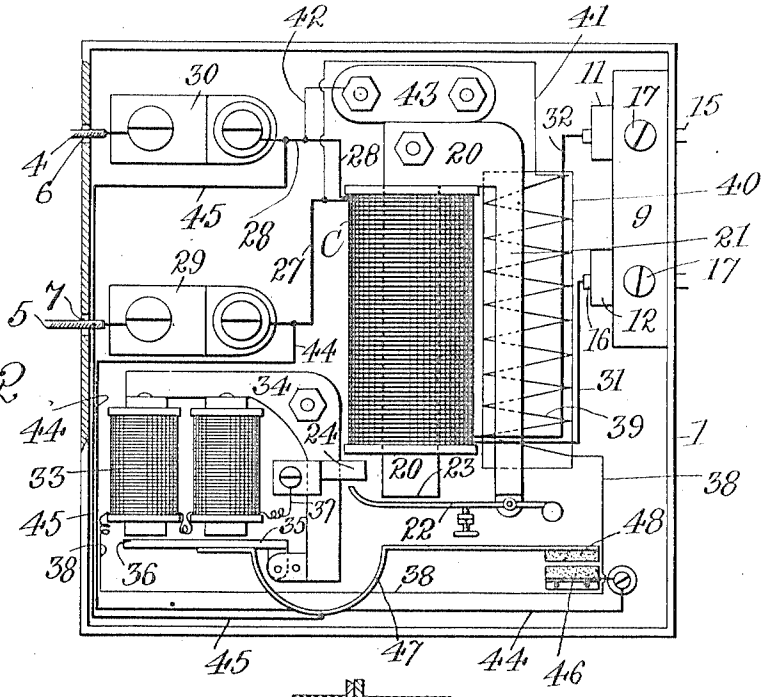
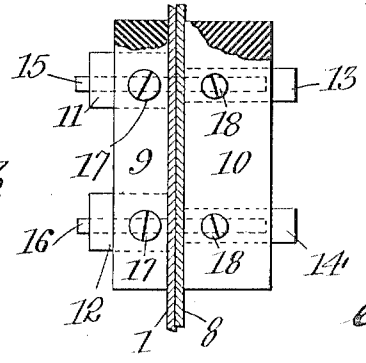


Fig. 3



WITNESSES

Joseph C. Stack.

A. A. Ege.

INVENTORS

John T. Sloan

and Arthur G. English

Chatfield Bradway Attorney

J. T. SLOAN & A. G. ENGLISH.

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Fig. 4

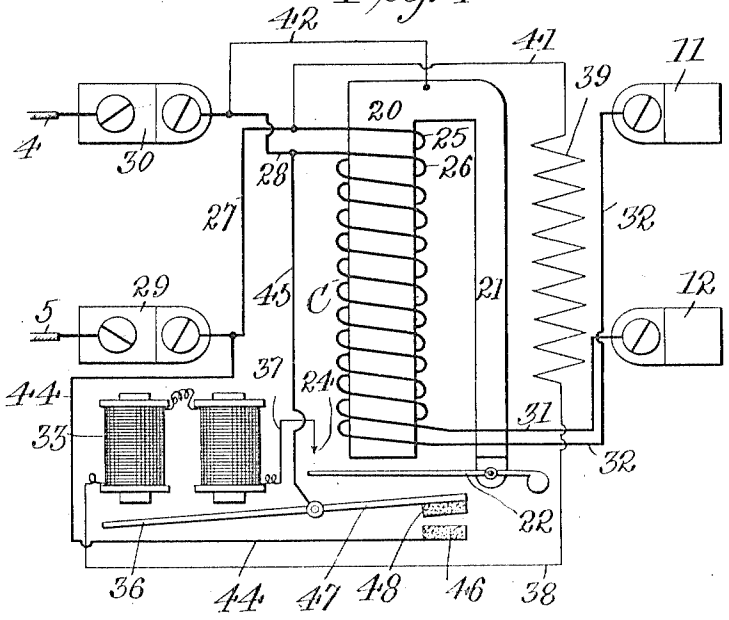
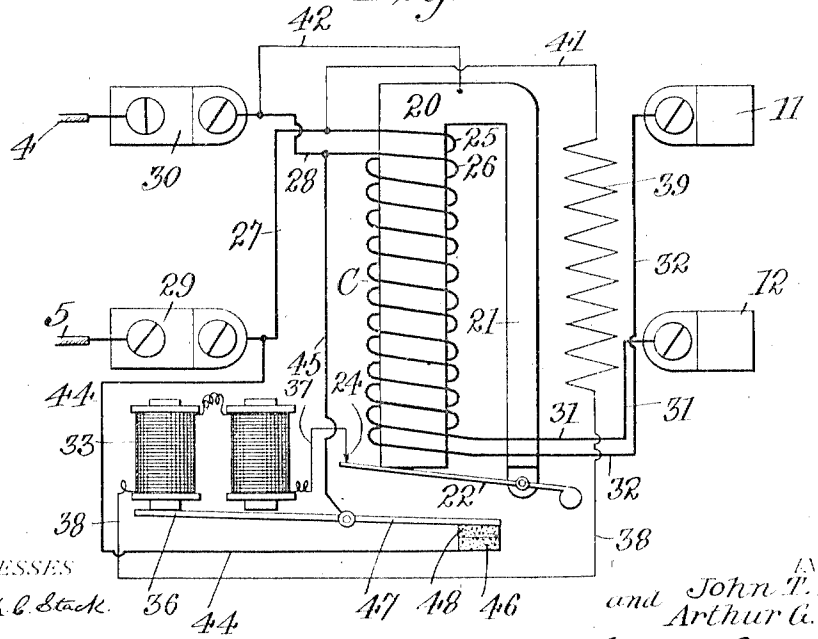


Fig. 5



WITNESSES

Joseph C. Stack.

C. C. Ege.

INVENTORS

and John T. Sloan

Arthur G. English.

Chatten Bradway Attorney

UNITED STATES PATENT OFFICE.

JOHN T. SLOAN AND ARTHUR G. ENGLISH, OF WICHITA, KANSAS.

THEFT-DETECTOR FOR ELECTRIC METERS.

1,066,856. Specification of Letters Patent. Patented July 8, 1913.

Application filed August 31, 1912. Serial No. 718,165.

To all whom it may concern:

Be it known that we, JOHN T. SLOAN and ARTHUR G. ENGLISH, citizens of the United States, residing at Wichita, in the county of Sedgwick and State of Kansas, have invented certain new and useful Improvements in Theft-Detectors for Electric Meters, of which the following is a specification.

This invention relates to a device for detecting the theft of electric current in light power or other current supply systems where the attempted theft is by the employment of a shunt around the current coils of the electric meter between the supply and service circuits of the system.

One of the objects of the invention is the provision of an attachment capable of use with meters of ordinary construction whereby a shunt is established across the line wires whenever current is attempted to be stolen by shunting the meter, which shunt across the line wires causes the fuses to be blown, resulting in power to the service being cut off. The device is so constructed that it automatically restores itself when the fuses are replaced so that it is unnecessary for an attendant to visit the meter attempted to be shunted for resetting the detecting device, which necessity is an objection to other types of detectors with which we are acquainted.

Another object of the invention is the provision of a differential electro-magnet having its two windings, which are similar, connected respectively with the two sides of the circuit so that the magnetic flux is zero when the current on the ingoing and outgoing sides of the circuit are equal, and associated with the electro-magnet is a shunt circuit containing a resistance and an electro-magnet that is energized by the closing of the circuit when the differential electro-magnet is unbalanced, as by the meter being shunted upon an attempted theft of power. The energizing of the electro-magnet in the shunt circuit establishes a shunt directly across the line wires to thereby cause the fuses in the latter to be blown, thereby interrupting the flow of current and preventing the attempted theft. The various circuit-closing devices or contacts in the theft detector are so disposed that they gravitate to open-circuit position as soon as the line fuses blow, and consequently the detector will be in condition for operation as soon as the line fuses are renewed.

With such objects in view and others, as will appear as the description proceeds, the invention comprises the various novel features of construction and arrangement of parts which will be more fully described hereinafter and set forth with particularity in the claims appended hereto.

In the accompanying drawings, Figure 1 is a perspective view of the attachment applied to a meter, the casing of the latter being removed. Fig. 2 is an interior view of the detector. Fig. 3 is a detail view showing the connections between the terminals of the detector and meter. Fig. 4 is a diagrammatic view of the circuit connections of the detector when the latter is in normal operation. Fig. 5 is a similar view showing the detector brought into operation and shunting the line wires.

Similar reference characters are employed to designate corresponding parts throughout the views.

In Fig. 1 of the drawing, the theft detecting device is shown in connection with a well-known type of induction meter B, but it is to be understood that the detector attachment is not limited to any particular form of electric meter. It will be observed that the attachment A is set up closely against the frame of the meter B, so that it is impossible for the current coils of the meter to be shunted by connecting a shunting wire with the appropriate terminals of the meter between the latter and the theft detector attachment.

The device comprises a casing 1 of any suitable construction and having a door 2 which is equipped with a seal 3, so that access to the interior of the detector cannot be had without the broken seal serving as evidence. The line wires 4 and 5 lead into the openings 6 and 7 in the left side of the casing 1 and connect with the electrical devices within the casing.

The means of connecting the detector and meter together are shown in Fig. 3, wherein 1 and 8 represent parts of the detector casing and frame of the meter, respectively.

The terminal blocks 9 and 10 are suitably secured in the detector and meter, respectively, the block 9 having the terminals 11 and 12, and the block 10 having the terminals 13 and 14 which connect with the windings of the meter. Extending through the terminals 11 and 12 are copper connecting bars or rods 15 and 16, which are clamped in place by set screws 17 and extend, respectively, into the meter terminals 13 and 14, which terminals have screws 18 for clamping the bars 15 and 16 in the meter terminals. Obviously, the terminal blocks will be of suitable insulating material.

The theft detector comprises a differential electro-magnet C which has its core 20 suitably fastened in the casing 1, the said core having an external member or limb 21 which extends downwardly to and beyond the lower end of the magnet C, which latter is shown in vertical position. On the lower end of the member 21 is an armature 22 that is disposed adjacent the polar extremity 23 of the core 20, so that the armature will be attracted by the latter, and, by engaging a fixed contact 24, close a shunt circuit including an electro-magnet hereinafter to be described. The two windings 25 and 26 have their upper terminals connected, respectively, by wires 27 and 28 with the terminal pieces 29 and 30 to which the line wires 5 and 4 are connected, while the lower extremities of the windings 25 and 26 are connected with wires 31 and 32 with terminals 12 and 11, respectively, which are connected with the meter terminals, as hereinbefore described.

Assuming current enters the attachment at the terminal 29 and leaves by the terminal 30, it is obvious that the total current will flow through the winding 25, in passing to the meter and through the winding 26 in leaving the meter, and as the windings are uniform in resistance and number of turns, the fluxes due to both the windings will equally oppose each other so that no attraction is produced on the armature 22. When, however, a shunt is established around the attachment and meter, as when the consumer attempts to steal current, there will be a greater flow of current through one winding of the differential electro-magnet than through the other. This will unbalance the magnetic fluxes, due to the windings, and consequently the armature 22 will be attracted and close a circuit which in turn establishes a shunt across the line wires.

The circuit established when the differential electro-magnet is unbalanced includes an electro-magnet 33 fastened to a frame 34 secured in the casing 1, and on this frame is pivoted an arm or lever 35 which carries an armature 36. One terminal of the magnet 33 is connected by a wire 37 with the fixed contact 24 of the main switch formed by such contact and the armature 22, and the other terminal of the electro-magnet 33 is connected by a wire 38 with a resistance coil or element 39 which is in the form of a wire mounted on a suitable insulating base 40, said coil being, in turn, connected by a wire 41 with the wire 27. The member 21 of the core of the differential electro-magnet is connected by a wire 42 and bracket 43 with the wire 28. By this arrangement, when the main switch 22, 24, is closed by the unbalancing of the differential magnet C, current will flow from the line wire 5, through the wires 27 and 41, resistance 39, wire 38, electro-magnet 33, wire 37, contact 24, armature 22, core member 21, bracket 43, wires 42 and 28. The electro-magnet 33 thus becomes energized and attracts its armature 36, which, in turn, closes a shunt directly across the line wires 4 and 5. This direct shunt consists of wires 44 and 45 connected with the wires 27 and 28 that connect, respectively, with a fixed contact 46 and a lever contact 47, which lever contact is fastened at one end to the armature 36 and carries at its other end a contact 48 adapted to engage the contact 46. These contacts 46 and 48 may be made of carbon blocks or other suitable material so that they can carry the heavy flow of current when the direct or main shunt across the line wires is established. The lever 47 and armature 36 are so proportioned as to weight that when the electro-magnet 33 becomes deënergized, the parts will gravitate to a position where the contacts 46 and 48 are separated, and furthermore when the main electro-magnet C is deënergized, the armature 22 will gravitate to open-circuit position. The establishing of the main shunt, by the contacts 46 and 48 engaging each other, will shunt the meter and the service circuit connected therewith, and as a result, the fuses in the main line will be blown. The current is thus interrupted so that the parts of the detector will return to normal position and be ready for operation when another attempt is made to steal current. After the station attendant restores the fuses, the supply system is again ready for use, without the necessity of the meterman visiting the meter for restoring the attachment which has automatically restored itself.

From the foregoing description, taken in connection with the accompanying drawings, the advantages of the construction and of the method of operation will be readily apparent to those skilled in the art to which the invention appertains, and while we have described the principle of operation of the invention, together with the apparatus which we consider to be the best embodiment thereof, we desire to have it understood that the apparatus shown is merely illustrative, and that such changes may be

made when desired as are within the scope of the claims appended hereto.

Having thus described the invention, what we claim as new, is:—

1. The combination of main wires, and a meter connected therewith, with a theft detecting device for the meter, said device comprising means responsive to a greater flow of current on one side of the circuit of the meter than on the opposite side, and means for establishing a shunt across the main wires when the said device responds to said difference of current flow.

2. The combination of a meter and supply mains connected therewith, with a theft detecting device associated with the meter, said device comprising a differentially-wound electro-magnet having its coils connected respectively with said mains and terminals of the meter, means for establishing a shunt across the mains, and means controlling the shunt-establishing means by the energizing of the electro-magnet when the current flow through one winding of the latter is different from the current flow in the other winding.

3. The combination of a meter, and mains leading thereto, with a theft detector comprising differential electro-magnetic means adapted to become operative when the current on one side of the circuit exceeds the current on the other side, a second electro-magnet, means controlled by the first electro-magnet for closing the circuit of the second electro-magnet, and means controlled by the second electro-magnet for establishing a shunt across the mains.

4. The combination of a meter, supply mains leading thereto, and a theft detecting device comprising electro-magnetic means composed of two windings connected with the said mains and the terminals of the meter and adapted under normal conditions to produce equally-opposing fluxes, a main switch adapted to be closed by the electro-magnet when the said fluxes vary with respect to each other, means energized by the closing of the said switch, and means for establishing a short circuit across the supply mains by the energizing of the last-mentioned means.

5. The combination of a meter, and supply mains therefor, with a theft detecting device comprising electro-magnetic means having opposed windings connected respectively with the supply mains and terminals of the meter, a switch controlled by the said means and connected with one of the mains, a resistance connected with the other main, an electro-magnet in circuit with the switch and with the resistance, and a shunt adapted to be closed by the energizing of the electro-magnet to short-circuit the supply mains.

In testimony whereof we affix our signatures in presence of two witnesses.

JOHN T. SLOAN.
ARTHUR G. ENGLISH.

Witnesses:
C. B. TINGLEY,
W. O. EDMONDS.