F. H. VIETS.

SWITCH.

APPLICATION FILED NOV. 24, 1917.

1,357,750.

Patented Nov. 2, 1920.

2 SHEETS—SHEET 1.

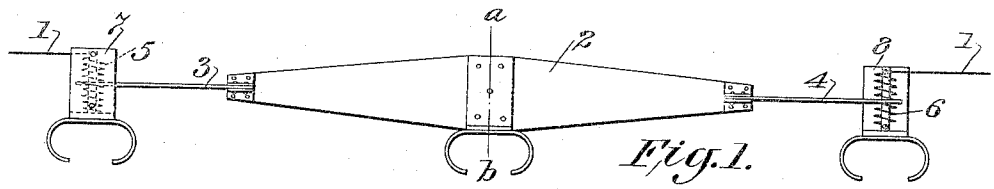


Fig. 1.

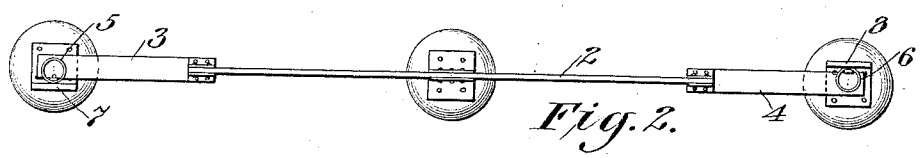


Fig. 2.

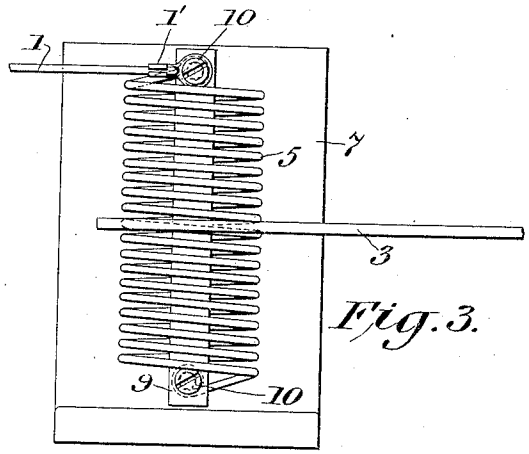


Fig. 3.

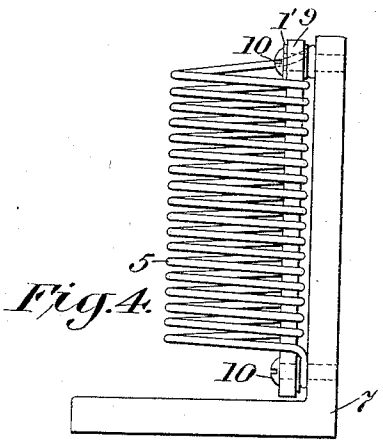
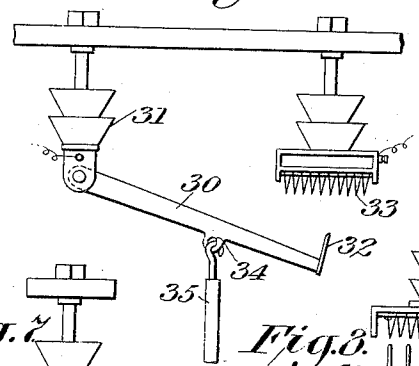
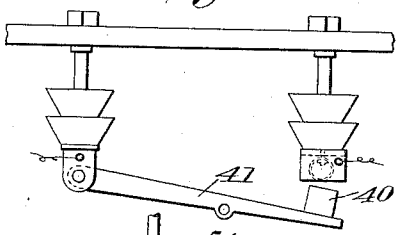


Fig. 4.

Fig. 5.

Fig. 6.





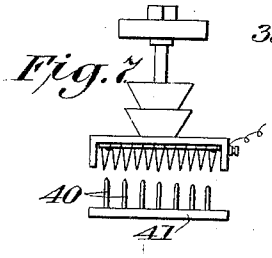


Fig. 7.

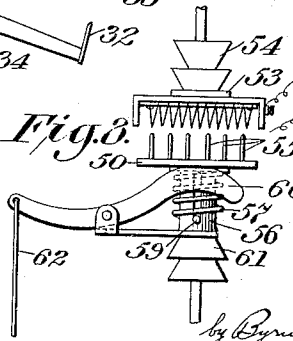


Fig. 8.

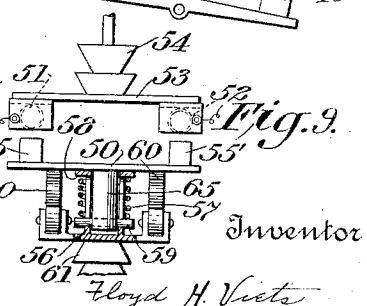


Fig. 9.

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2 SHEETS—SHEET 2.

Fig. 10.

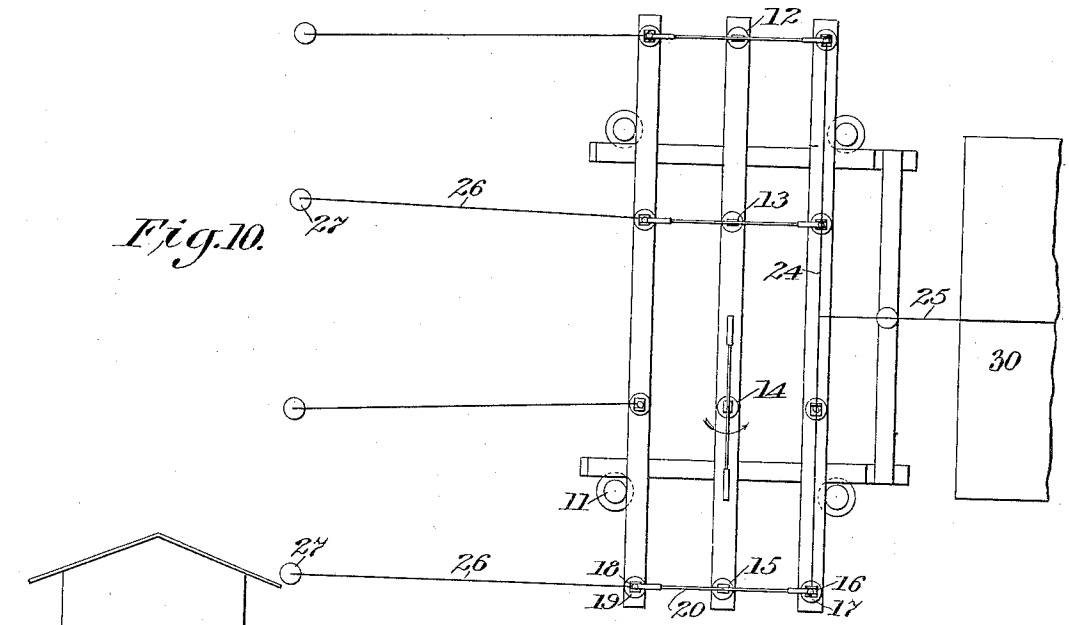
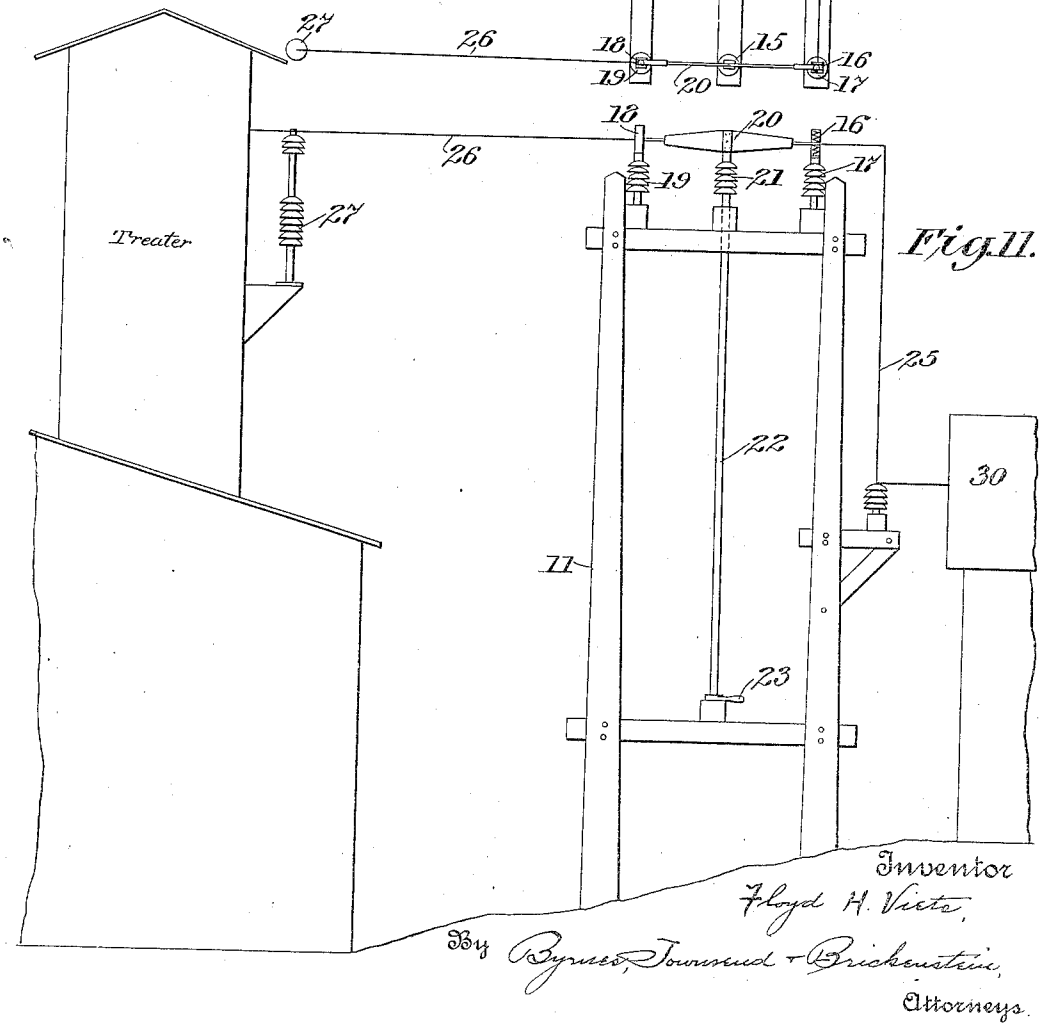


Fig. 11.



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UNITED STATES PATENT OFFICE.

FLOYD H. VIETS, OF NEW YORK, N. Y., ASSIGNOR TO RESEARCH CORPORATION, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

SWITCH.

1,357,750. Specification of Letters Patent. Patented Nov. 2, 1920.

Application filed November 24, 1917. Serial No. 203,814.

To all whom it may concern:

Be it known that I, FLOYD H. VIETS, a citizen of the United States, residing at New York city, in the county of Bronx and State of New York, have invented certain new and useful Improvements in Switches, of which the following is a specification.

The present invention relates to electrical switches and more particularly to switches for transmitting relatively small currents.

In the construction of high tension lines it is not always easy or convenient to properly aline the component parts of the usual type of switch and a defect in the alinement is likely to cause difficulties and inconveniences in the operation, because ordinarily switches of this kind are not accessible and there is considerable danger in handling them.

The object of this invention is to provide a form of switch, simple in structure and operation, which obviates the above mentioned difficulties.

For a fuller understanding of the invention reference is had to the appended drawings in which—

Figures 1 and 2 are an elevation and plan view respectively of one form of switch embodying the invention;

Figs. 3 and 4 are elevational views on an enlarged scale of the novel form of spring clip;

Fig. 5 is a schematic view of a modified form of switch;

Figs. 6 and 7 are schematic representations in elevation of another modification;

Figs. 8 and 9 are schematic views in elevation of still another modification and

Figs. 10 and 11 are a plan view and side elevation respectively of the form of switch shown in Figs. 1 and 2 as applied to a transmission system for electrical precipitators.

In Fig. 1 a switch arm 2, which may be suitably supported for rotation about a central line indicated by *a—b*, carries at its opposite ends knife blades 3 and 4. At diametrically opposite points in the path of travel of the knife blades 3 and 4 are mounted helical springs 5 and 6 of electrical conducting material having their axes substantially at right angle to the plane of travel of the knife blades. The thickness of the knife blades and the spacing of the convolutions of the springs are so correlated that the knife blade enters the space between adjacent convolutions to make a secure fit. Springs 5 and 6 are preferably mounted on brackets 7 and 8, shown in detail in Figs. 3 and 4. A bar 9 is shown extended through the coil and secured at its ends to the bracket by means of screws 10. The spring coil is thereby held securely in place. However, the particular form of mounting is in no wise of importance. A lug 1′ may be attached to one of the screws 10 to connect to the line wire 1.

Figs. 10 and 11 show the application of the device just described to a high tension transmission system. 11 is a switch tower carrying at its top a plurality of switch units 12, 13, 14 and 15. Each of these switch units comprises a spring coil clip 16 mounted on an insulator 17, a spring coil clip 18 mounted on an insulator 19, and a switch arm 20 mounted on an insulator 21. The switch arm 20 may be rotated by rod 22 connected to the insulator 21, a handle 23 being provided for that purpose.

The spring coil clips 16 are preferably interconnected by a common bus bar 24 to which a feed wire 25 conducts current from one pole of a supply in a station 30, as is usual. From the spring coil clips 18 of the several switch units conductors 26 lead to different precipitators or treaters, only one being indicated. An insulator 27 may be mounted on the treater frame to support the wire 26 in fixed position.

When it is desired to connect one of the treater units to the supply circuit, the switch arm 20 belonging to that unit is rotated in the direction of the arrow in Fig. 10. The knife blades 3 and 4 will strike the coils 16 and 18 and enter between two convolutions which may happen to be in the path of the knife edges, and to be held securely by them. It is not essential that the knife blades or the spring coils or the blades and coils be in exact alinement. The brackets on which the spring coils are mounted may be tilted or relatively inclined within certain limits without prejudicing the operation of the switch.

Fig. 5 shows a switch mechanism in which

the switch arm 30 is pivoted at one end on an insulator 31 and carries at its other end a knife blade 32 to engage the spring coil clip 33. The arm 30 may be operated through an insulator rod 35 by means of an ordinary hook and eye arrangement 34. The spring coil 33 is only schematically indicated. In practice the convolutions are so spaced relatively to the knife blade that it requires some force to drive the blade into the coil. In other words the knife blade is made thicker than the intervening space between adjacent convolutions so that the convolutions are forced apart by the blade. Since the edge of the blade is fairly thin, it can readily force its way into the coil.

Figs. 6 and 7 show a switch similar to that shown in Fig. 5. Instead of a single knife blade, however, there is a plurality of blades 40 mounted at the end of arm 41. This arrangement affords means for transmitting a larger current and makes it possible to split up the current during the opening of the switch.

Figs. 8 and 9 show a multi-blade switch similar to that shown in Figs. 6 and 7. However, the switch arm 50 is mounted for reciprocating movement toward and away from the clips. The clips 51 and 52 are mounted in spaced relation on a support 53 of insulating material which in turn may be supported by an insulator 54. The arm 50 carries at its ends groups of blades 55 and 55′ respectively to simultaneously engage the spring coil clips 51 and 52. The particular form of operating mechanism for opening and closing the switch is not essential. The switch arm 50 is shown connected to a pin 65 which is slidably mounted in a sleeve 56. A spring 57 surrounding the sleeve 56 and interposed between flange 58 on the sleeve and projections 59 on the pin 55 normally operates to withdraw the arm 50 from the clips 51 and 52. To close the switch against the tension of the spring 57 a double cam lever 60 may be suitably mounted on the insulator 61 supporting the switch arm structure and this cam lever may be actuated by a rod 62 of insulating material. The mechanism for operating the switch may, of course, be adjusted for any sparking distance. This arrangement has the advantage not only to split up the current, but also to break the current in two places and thereby reduce the sparking distance. When the rod 62 is released the spring 57 is free to act and breaks the circuit by a short and snappy action.

In operation the device constructed according to the invention has the following advantages: So long as the helical coil is positioned reasonably in the path of the movable knife blade, the blade will find a point to enter between any two of the convolutions, force them apart and lodge securely between them. Since the spring reaction forces the convolutions back on the blade, good electrical contact is insured.

When the switch is opened *i. e.* when the blade is withdrawn from the spring coil, the coil acts as an arc destroyer. As soon as the blade gets out of contact with the coil, the coil will violently oscillate before coming to a state of rest. These oscillations depend on the material of the coil, the number and size of the convolutions and the thickness of the blade which determines the amount of displacement of the convolutions. These oscillations are instrumental in extinguishing the arc, especially in connection with the multi-blade switch arm, where the current is divided at the moment the switch is opened and distributed through the various blades and the oscillations are more pronounced due to the greater displacement of the coil as a whole.

In the foregoing I have shown some embodiments of my invention. It is obvious that it may find expression in various other forms and what is shown is for the purpose of illustration only. A knife blade is shown and described merely because it is the most usual form of movable contact maker. It is referred to only as one conventional form out of a large number of available forms for the purpose specified. The movable contact member could, for instance, be a coil spring itself to engage the spring coil clip. The term "knife blade" used in the claims is therefore intended to cover all forms of devices adapted to forcibly enter between the laterally yielding clip elements in general or the convolutions of the spring coil in particular.

I claim:—

1. An electric switch comprising a movable knife blade and a helical coil of electrically conducting material having its convolutions spaced to yieldingly receive the knife blade.

2. An electric switch comprising a movable switch arm and a clip, the said switch arm carrying a plurality of laterally spaced knife blades and the said clip consisting of a helical coil of electrically conducting material having its convolutions spaced to yieldingly receive the said knife blades.

3. An electric switch comprising a pivoted switch arm carrying a knife blade at its end and a clip consisting of a helical coil of electrically conducting material having its convolutions spaced to yieldingly receive the knife blade.

4. An electric switch comprising a switch arm pivoted at its center and carrying a knife blade at each end and clips positioned to engage the knife blades, said clips consisting each of a helical coil of electrically con-

ducting material having its convolutions spaced to yieldingly receive one of the knife blades.

5. An electric switch comprising a switch arm pivoted at its center and carrying a plurality of laterally spaced knife blades at each end and clips positioned to engage the knife blades, said clips consisting each of a helical coil of electrically conducting material having its convolutions spaced to yieldingly receive the knife blades.

In testimony whereof I affix my signature.

FLOYD H. VIETS.