(Model.) 2 Sheets—Sheet 1.

J. J. WOOD.

SWITCH OR CUT-OUT FOR ELECTRIC CIRCUITS.

No. 383,933. Patented June 5, 1888.

Fig 1.

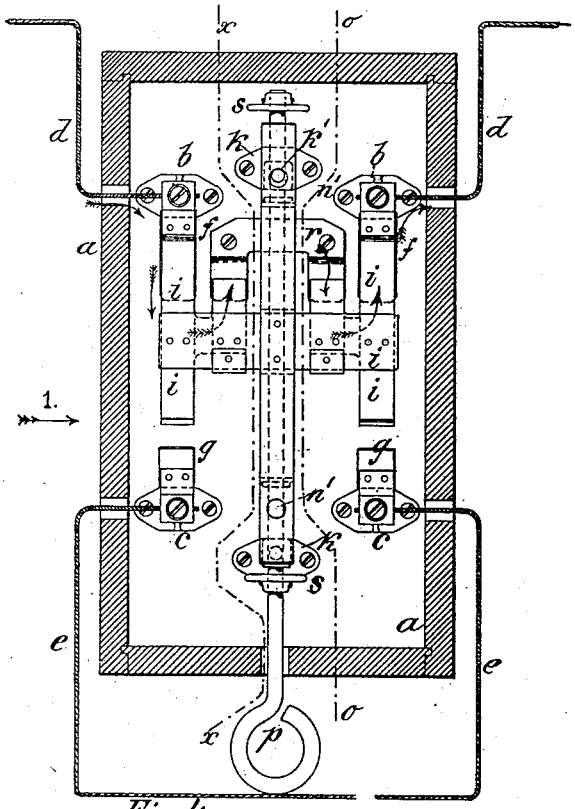


Fig 2.

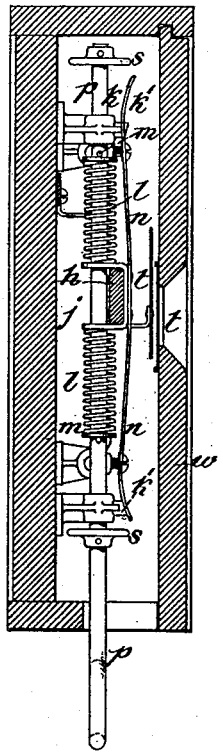


Fig 3.

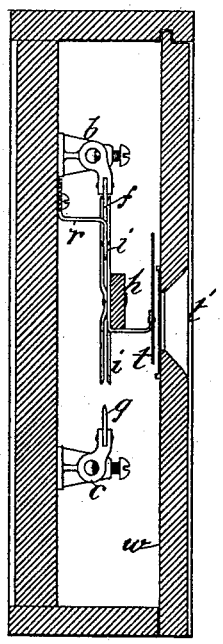


Fig 4.

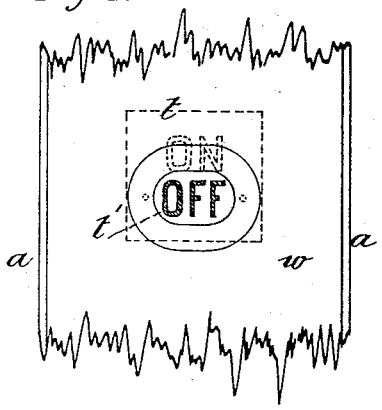
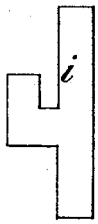


Fig 5.



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SWITCH OR CUT-OUT FOR ELECTRIC CIRCUITS.

No. 383,933. Patented June 5, 1888.

Fig. 6.

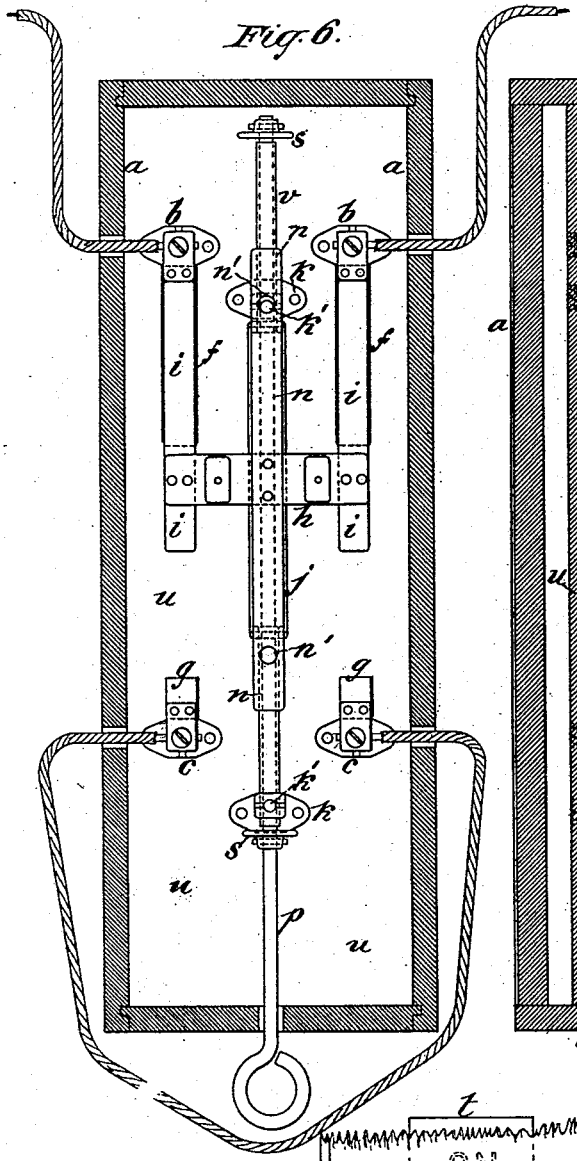


Fig. 7.

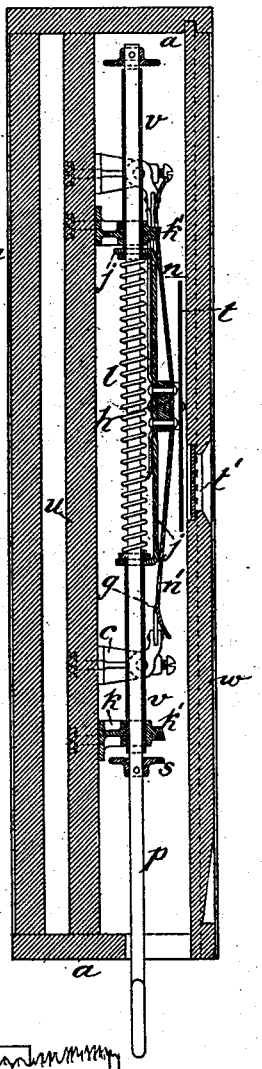
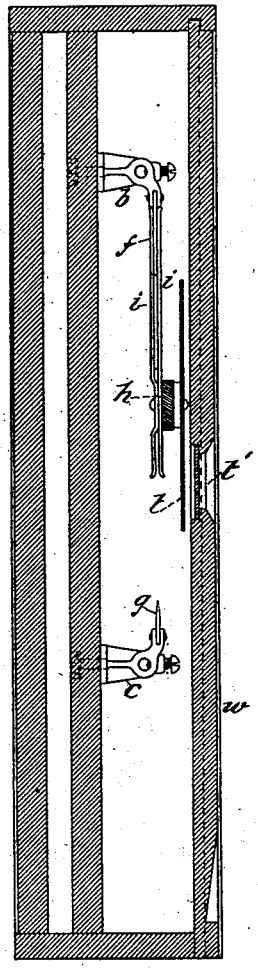


Fig. 8.



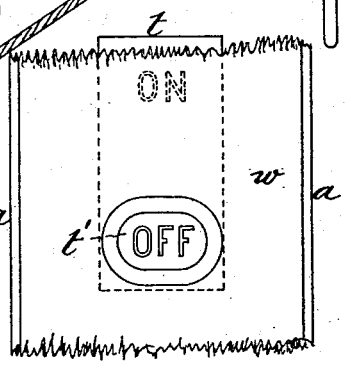


Fig. 9.

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SWITCH OR CUT-OUT FOR ELECTRIC CIRCUITS.

SPECIFICATION forming part of Letters Patent No. 383,933, dated June 5, 1888.

Application filed May 23, 1887. Serial No. 239,041. (Model.)

To all whom it may concern:

Be it known that I, JAMES J. WOOD, of Brooklyn, Kings county, New York, have invented certain new and useful Improvements in Switches or Cut-Outs for Electric Circuits, of which the following is a specification.

My invention applies to the hand-switches or cut-outs used in arc or incandescent lighting circuits to put the lines or loop in the building into or out of circuit with the external line or street circuit leading to the central station.

My invention aims to provide a cut-out of this class, which when manipulated will produce an instantaneous make or break between the contacts, so as to reduce flashing or sparking to the minimum and render the cut-out action absolute, and which will also hold the contacts firmly locked in either of the positions in which they may be set, and at the same time embody a simple and durable construction. To this end I construct the cut-out with a movable contact-making slide or cross-head, which plays between the terminals of the line and the loop and carries contact tongues or brushes which will junction with tongues or brushes on the terminals of the line or loop, according as the slide is shifted one way or the other. An operating bolt or rod is connected with the slide by interposed springs, so that when the rod is pushed in or pulled out one or other of the springs will be compressed against the slide, tending to shift it over; but a spring-latch acts to hold the slide in place until the rod is pushed far enough to compress the spring fully, when a projection on the rod trips the latch and allows the compressed spring to throw the slide over quickly, and thus instantly make contact on one side while breaking it on the other side. When the slide is thus shifted, a second spring-latch drops into engagement to hold the slide in said position until it is released and shifted in the same manner, when desired, by the opposite movement of the bolt-rod. My invention therefore lies mainly, in the construction above outlined, as hereinafter fully set forth and claimed.

In the drawings annexed, Figure 1 gives a front elevation of my improved cut-out switch for arc circuits, with the case shown in section. Fig. 2 is a vertical section on *x x*, and Fig. 3 a section on *o o*. Fig. 4 is a fragmentary front view of the covered case of the cut-out. Fig. 5 is a plan view of one of the contact-springs of the movable slide. Figs. 6, 7, 8, and 9 are views, similar to Figs. 1, 2, 3, and 4, illustrating a slight modification of my invention adapted for incandescent circuits.

Referring to Figs. 1, 2, and 3, *a* indicates a wooden case or box which sustains and incloses the various parts of the cut-out, and on the base of which are fixed the two pairs of binding-posts *b b c c*, in which the wires of the external line and the house-loop are received. The upper binding-posts, *b b*, receive the ends of the main-line wire *d*, while the lower posts, *c c*, receive the ends of the house-loop *e*, as well shown in Fig. 1. Now, from both pairs of binding-posts there project contact-tongues *f g*, the tongues *f* of the line-posts *b* being much longer than the contacts *g* of the loop-posts *c*, as shown in Figs. 1 and 3, and between the binding-posts is arranged a shifting slide or cross-head, *h*, which carries the contact springs or brushes to meet with said contacts on the posts. This slide consists of a non-conducting cross-bar, *h*, at each end of which is fixed the Y-shaped contact pieces or springs *i*, (shown detached in Fig. 5,) while the middle is fixed to a clasp, *j*, which is mounted on a sliding bolt or rod, *p*, which is arranged centrally and longitudinally and is supported near each end in the bearings *k k*, fixed to the base of the case. The lower end of the rod protrudes from the case, and is curved into a loop or eye for manipulation.

Between the bearings *k* and the clasp *j* the rod *p* is encircled by springs *l l*, which bear at their inner ends against the clasp *j* and at their outer ends against washers or collars, which rest against pins or stops *m* on the rod.

Referring to Figs. 1 and 2, *n* indicates a bow-shaped spring, which serves as a spring catch or latch to hold the slide, and which is attached at the middle to the middle of the cross-bar *h*, while its outwardly-turned ends will overlie either of the bearings *k* when the slide is at either end of its stroke, so that a hole or notch, *n'*, in the spring will engage with a projection, *k'*, on the bearing, as well shown in Figs. 1 and 2, and thus hold the slide at either end of the stroke. It may now be seen by referring to Figs. 1 and 3 that when the slide is shifted to-

ward the upper posts, *b b*, that the longer prongs of the Y-shaped springs *i* will contact with the tongues *f* on the posts *b*, while the shorter prongs will contact with the ends of a short bridge or conducting piece, *r*, which is fixed to the base between the binding-posts *b*, with its ends bent to meet with the short prongs of the springs *i*, as shown in Figs. 1 and 3. Hence when the parts are in the position shown in Fig. 1 the line or street circuit will be closed between the posts *b b* through the springs *i i* and the bridge-piece *r*, as shown by the arrows in Fig. 1, while the house-loop *e* will be disconnected from the line and broken at the separated contacts *g g i i*. When, however, it is desired to connect the house-loop with the line, the rod *p* is pulled downward, which will therefore compress the upper spring *l* against the clasp *j* on the cross-bar *h*, thus tending to shift the slide toward the lower posts, *c*. The slide, however, will remain stationary until the spring is almost fully compressed, when a collar, *s*, on the end of the rod will contact with the curved end of the spring-catch *n*, and thus lift it out of engagement with the projection *k'*, which will at once release the slide and allow the compressed spring to forcibly and instantaneously shift the slide toward the lower binding-posts, and thus bring the lower ends of the Y-shaped springs against the contacts *g* on the posts *c*, and thus put the loop in circuit with the line. As the Y-shaped springs make contact with the lower contacts, *g*, the short prongs of the springs *i* will break contact with the bridge-piece *r*, thus breaking the circuit between the posts *b b* only after the circuit is closed between the posts *c c*, so that the loop will be put on the line without at any time breaking the circuit of the line. The contact-tongues *f*, extending from the upper posts *b*, are much longer than the contact-tongues *g* on the lower posts, so that the springs *i* always keep in contact with the tongues *f*, whether the slide is shifted up or down, the contact being broken only between the bridge *r* and the springs *i*; but the length of the tongue is such that the contact will always be made between one set before it is broken at the other, so as to never interrupt the main line in operating the switch, as will be readily understood. It may therefore be understood that when the slide is shifted downward, as described, that the release of the spring-catch and the instantaneous shifting action of the compressed spring will cause the contact to be made and broken so quickly as to prevent any appreciable flashing or sparking, and thus render the action positive, safe, and certain. When the slide is thus shifted, the lower end of the spring-catch will engage with the projection *k'* on the lower bearing *k* and thus lock the slide in said position and prevent any accidental disengagement. On the other hand, when it is desired to cut the loop out of circuit the rod *p* is pressed upward, which will compress the lower spring *l* against the slide, and finally bring the lower collar *s* against the end of the spring-catch *n*, so as to disengage the same and thus release the slide, which will now be forcibly shifted in the opposite direction by the expansion of the compressed spring, which will thus cause the springs *i* to make contact with the bridge-piece *r* before they break contact with the tongues *g*, and thus close the line between the posts *b* before it breaks the circuit at the contacts or terminals *g* of the loop. The slide being thus shifted will be locked in place, as before, by the spring-catch engaging the upper projection, *k'*, as shown in Figs. 1 and 2.

I prefer to make the contact-springs *i i* in two layers, as seen in Fig. 3, between which the contact-tongues *f* or *g* will be received and embraced, as will be readily comprehended.

An indicating-plate, *t*, is attached to the middle of the insulating cross-bar *h* and contains the words "on" and "off," as seen in Fig. 4, which will appear before a reading opening or window, *t'*, in the lid *w* of the case when the slide is shifted in one direction or the other to indicate the condition of the cut-out, as will be understood from Figs. 3 and 4. This lid is preferably a removable slide, which may be slid off when desired to examine or adjust the contents of the case.

In Figs. 6, 7, and 8 the cut-out is of substantially the same construction already described, but is adapted for incandescent lines, using currents of high potential, such as the Edison "municipal" system. In this modification the operative parts of the cut-out are not mounted directly on the base of the wooden case *a*, but on a base-plate, *u*, of slate or other fire-proof and non-shrinking material, so as to resist all flashing from the contacts, and also prevent the possibility of relative displacement or derangement of parts by warping or shrinking, which would occur with a base subject to warp or shrink. In this modification the contact-bridge *r* between the line-posts is entirely dispensed with, and the contact-springs *i* are made simply as long straight springs, which always keep in contact with the tongues *f f* on the posts *b b*, as before, and make or break contact with the tongues *g* on the loop-posts *c c*, according as the slide is shifted up or down, as will be understood. The movement of the slide is, however, made much greater than in the former case, so as to produce a much wider break with the loop-contacts *g*, as shown in Figs. 6 and 8, so as to prevent the possibility of a flash or arc continuing across the break when the slide is shifted to cut the loop off the line, and at the same time leave the line open.

Instead of having two springs *l* on the bolt-rod *p*, on each side of the clasp *j*, as seen in Figs. 1 and 2, I use one spring *l* at the middle of the rod, which abuts at each end against loose tubes or sleeves *v v* on each end of the rod. The clasp *j*, fixed to the middle of the insulating cross-bar *h* is made much wider, so as to embrace the spring between its ends and engage at each end the flanges on the ends of

the said tubes *v*. The spring-catch *n* and the engaging projections *k'* and the releasing-collars *s* are the same as before described. It will be therefore seen that in this case, when the bolt-rod is pulled out, referring to Figs. 6 and 7, the upper collar *s* will press against the tube *v* and compress the spring *l* against the opposite tube, thereby tending to shift the slide, which will take place instantaneously when the spring is fully compressed and when the collar strikes against and releases the end of the spring-catch *n*, in the same manner as before described. The operation to reverse or shift the slide in the opposite direction will be obvious, and therefore needs no description.

It can be readily understood that the arrangement of spring and clasp with the sleeves *v v* shown in Fig. 7 may be used in either the arc or incandescent switch instead of the arrangement of springs, &c., shown in Fig. 2. It may now be seen that my improved cut-out not only produces a sudden and instantaneous make and break of the contacts by the action of a suddenly-released spring, and thus insures safe and quick switching with the least possible flash or spark, but, besides this, the contact-maker is automatically locked securely in place when shifted to either position, which is a feature novel to my cut-out—that is, in my cut-out the contact-maker has a latch which locks it in either of its positions, while the manipulating device of the contact-maker compresses a spring against the contact-maker during the first part of its movement, while the terminal part of its movement acts to release said latch and allow the spring to shift the contact-maker, which is again locked by the second engagement of the latch, which construction is original with my device.

Another great advantage of my device is that at the moment of the reversal of the contact-maker the spring is then at its fullest tension and acts with its greatest power to move the slide instantaneously and forcibly, whereas the force of the spring declines at the end of its stroke and loses its tension when the slide is locked and at rest; hence this prevents battering of the stops or abutments of the slide and also prevents the spring becoming set, which is not the case where the contact-maker is moved by a spring swinging over a crank-center, in which case the power of the spring to shift the contact-maker is least at the moment of reversal and greatest at the end of the stroke.

I do not limit myself to any special form of spring between the manipulating device and the contact-maker, whether spiral, coiled, or flat, or whether it acts by expansion, contraction, torsion, or otherwise; but

What I claim is—

1. In an electrical switch or cut-out, the combination, with the movable contact-maker, of a latch to lock the same in either position, a movable manipulating device, a spring interposed between the said device and the contact-maker, and an engaging-trip between the manipulating device and the latch, whereby the first movement of the manipulating device compresses or strains the spring against the contact-maker, while the terminal motion releases the latch, substantially as and for the purpose set forth.

2. In an electric switch or cut-out, the combination, with the movable contact-maker, of a movable bolt or rod for shifting said contact-maker, a spring interposed between the shifting-rod and contact-maker, and a latch or catch arranged to hold the contact-maker in either of its positions, with a trip or trips connected with and operated by the rod and arranged to release said catch or latch when the rod is at the end of its stroke and the spring strained, whereby the contact-maker is suddenly released and shifted instantaneously and again held by the latch, substantially as herein set forth.

3. In an electrical switch or cut out, the combination of the movable contact-maker carrying the movable contacts, a clasp, *j*, attached to said contact-maker, and a rod, *p*, passing through said clasp, with the flanged sleeves *v v*, fitting on said rod and abutting against said clasp, a spring, *l*, encircling said rod and abutting at each end against said sleeves, fixed stops or collars *s* on said rod, and a spring catch or latch, *n*, with engaging-points *k'*, arranged and operating substantially as shown and described.

4. In an electrical switch or cut-out, the combination of the terminals *b b* and *c c*, with contact-tongues *f g*, and the fixed conducting-bridge *r*, with the movable non-conducting cross-bar *h*, and Y-shaped contact-springs *i*, fixed thereon, arranged and operating substantially as shown and described.

5. In an electrical switch or cut-out, the combination, with the fixed contacts, of the movable contact-maker, such as *h*, carrying the movable contacts, such as *i*, a manipulable rod, *p*, a spring, *l*, interposed between the rod and the contact-maker, bearings *k k*, in which the rod slides, a spring-latch, *n*, attached to said contact-maker, having recesses *n* and engaging projections *k'*, with trip-stops *s* on said rod, substantially as shown and described.

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