

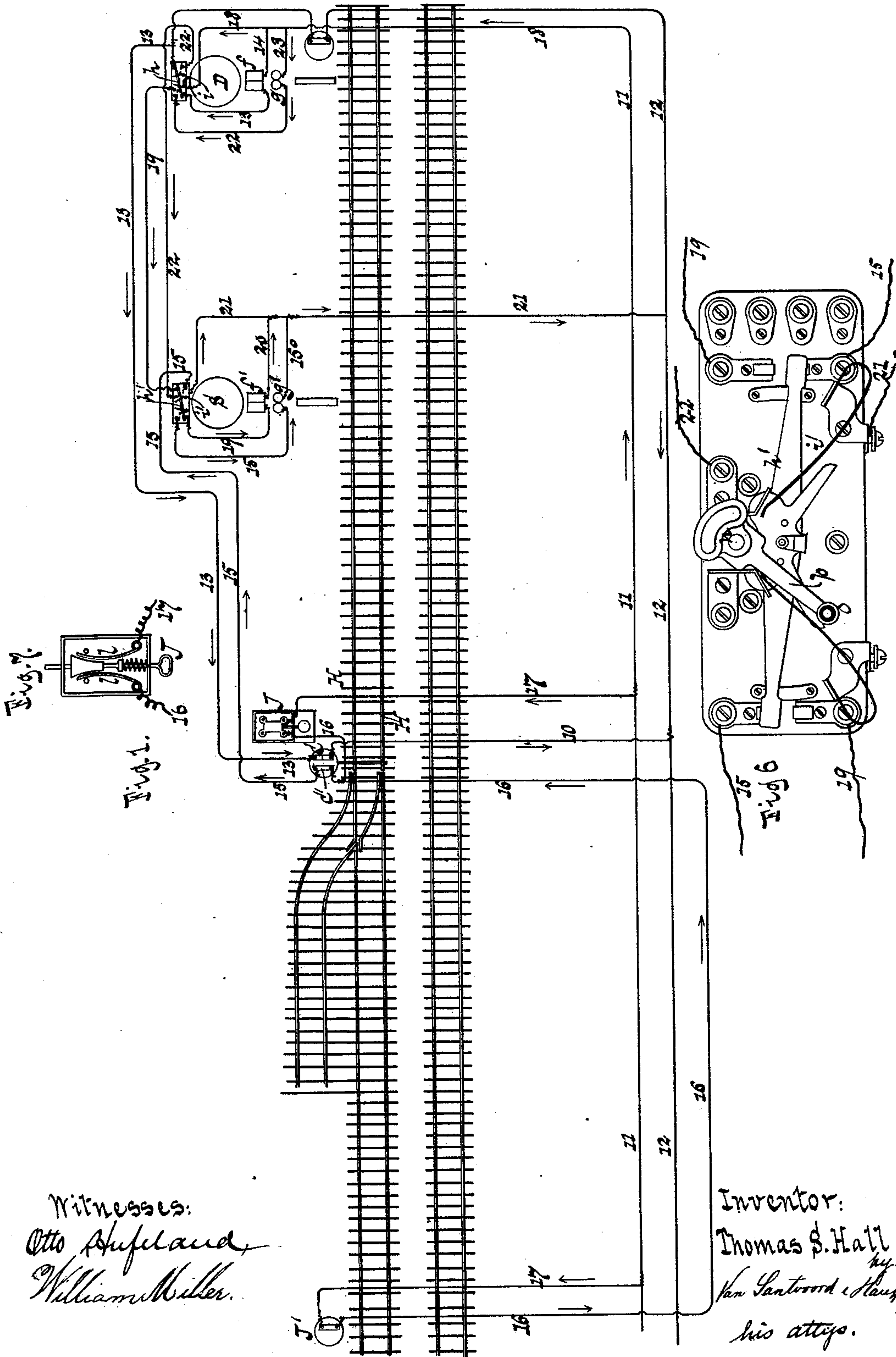
(No Model.)

2 Sheets—Sheet 1.

T. S. HALL

Electro Magnetic Switch Apparatus for Railroad Tracks.
No. 234,031.

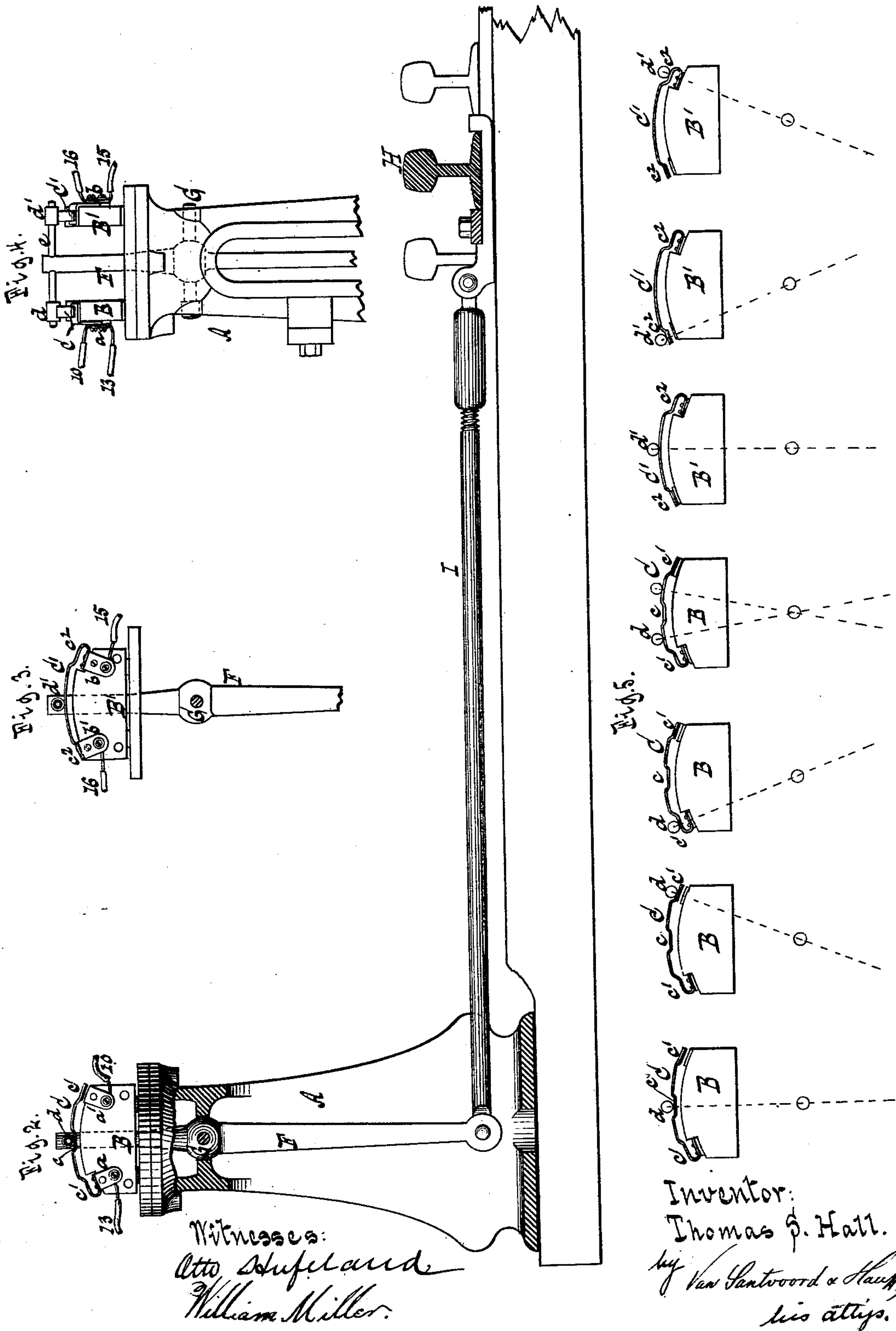
Patented Nov. 2, 1880.



(No Model.)

2 Sheets—Sheet 2.

T. S. HALL
Electro Magnetic Switch Apparatus for Railroad Tracks.
No. 234,031. Patented Nov. 2, 1880.



Witnesses:
Otto Schufeldt
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UNITED STATES PATENT OFFICE.

THOMAS S. HALL, OF MERIDEN, CONNECTICUT, ASSIGNOR TO THE HALL
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ELECTRO-MAGNETIC SWITCH APPARATUS FOR RAILROAD-TRACKS.

SPECIFICATION forming part of Letters Patent No. 234,031, dated November 2, 1880.

Application filed May 31, 1880. (No model.)

To all whom it may concern :

Be it known that I, THOMAS S. HALL, a citizen of the United States, residing at Meriden, in the county of New Haven and State of Connecticut, have invented new and useful Improvements in Electro-Magnetic Switch Apparatus for Railroad-Tracks, of which the following is a specification.

This invention relates to apparatus for operating one or more signals to show the position of a railroad-switch, and especially to that class of apparatus described in Letters Patent of the United States granted to me June 12, 1877, No. 191,958.

This invention is illustrated in the accompanying drawings, in which Figure 1 is a diagram illustrating the connections of the apparatus. Fig. 2 shows the apparatus, partly in side view and partly in section, and its connections with the switch-rail. Fig. 3 shows the automatic cut-out spring through which the reverse-circuit passes. Fig. 4 is a front view of the apparatus. Fig. 5 illustrates different positions of the circuit-closing and cut-out springs. Fig. 6 is a detail view of a cut-out lever and concomitants. Fig. 7 is a like view of a hand reversing-key.

Similar letters indicate corresponding parts.

The letter A designates the foot of the apparatus, supporting two blocks, B B', of wood or other insulating material, to which are attached circuit-closing springs C C', the spring C being a fixture of a metal plate, *a*, and the free end thereof being opposite to a metal plate or anvil, *a'*, while the spring C' is a fixture of a metal plate, *b*, its free end being opposite to an anvil, *b'*. These circuit-closing springs C and C' are used in connection with signals D S, hereinafter described, and the spring C acts to raise the signals, while the spring C' forms a part of a circuit to reverse or let down the signals, the same being hereinafter termed a "cut-out" spring.

The raise-spring C has a cavity, *c*, at or near the middle of its length, and also a cavity, *c'*, at both of its ends, while the cut-out spring C' has a cavity, *c''*, at both ends, the intermediate portion thereof being left plain or continuous. On the raise-spring C rides an insulated roller-stud, *d*, and on the cut-out spring C' rides

a similar roller-stud, *d'*, both studs being mounted on a common spindle, *e*, (see Fig. 4,) which projects in opposite directions from a lever, F, at or near the upper end of such lever. This lever F has its fulcrum on an arbor, G, in the foot A, and it is connected to the switch rail or rails H at its lower end by a rod, I.

When the switch-rails H are shifted from the main to a side track, or vice versa, an oscillating motion is imparted to the switch-lever F, and by this means the roller-studs *d d'* are caused to ride to and fro on the springs C C'.

The arrangement of the roller-studs *d d'* is such relatively to the springs C C' that when the studs are brought onto a plain portion of the springs the circuits of which they form part are closed—that is to say, the springs are brought in contact with their anvils—while when the studs are opposite either cavity of the springs the latter recede by their inherent elasticity and the circuits are broken.

In applying the apparatus to use the fixed end, *a*, of the raise-spring C is connected by a wire, 13, with one end of the helix of an electromagnet, *f*, (see Fig. 1,) serving to raise the signal D, and the other end of said helix is connected by a wire, 14, with one pole of a battery—namely, through one of two line-wires, 11 12, while the anvil *a'* of the raise-spring C is connected by a wire, 10, with the other pole of the battery through the other line-wire.

When the switch-rails H are in line with the main track, as shown in Fig. 1, the switch-lever F occupies a substantially vertical position and the roller-stud *d* is opposite the central cavity, *c*, of the raise-spring C, as shown in Figs. 2 and 5; but when and during the time the switch-rails are shifted from the main track to the side track the roller-stud *d* is brought onto a plain portion of the raise-spring C, and it follows that a circuit is then closed through the magnet *f*, which has the effect of raising the signals D, such circuit being, however, again broken as soon as the switch-rail is brought in line with the side track, inasmuch as the roller-stud *d* is then brought opposite to either of the end cavities, *c'*, of the raise-spring.

The raise-magnet *f* of the signal D is so constructed that when the signal is raised it is au-

tomatically caught and held in that position until released by the action of a second or reverse magnet, *g*.

From the fixed end of the cut-out spring *C'* extends a wire, 15, which forms part of the circuit for reversing the signal *D*, as hereinafter more fully explained, while from the anvil of the cut-out spring extends a wire, 16, to a reversing-key, *J* or *J'*, and from this key extends a wire, 17, to one of the line-wires 11 12, the wire 17 completing the circuit.

The reversing-key *J* is a hand-key, and is set by the switchman, while the key *J'* is a track-instrument of ordinary construction, and is situated alongside the main track.

The reversing-key *J* may be constructed and arranged to act on springs *l l'*, to which are connected the terminals of wires 16 17, as clearly shown in Fig. 7.

When the switch-rails are in line with the main track and the lever *F* is in a vertical position, as before stated, the roller-stud *d'* rests on the intermediate or plain portion of the cut-out spring *C'*, and if the reversing-key *J* or *J'* is properly set the reversing-circuit of the signal *D* is closed through wire 16, spring *C'*, wire 13, lever *h'*, wire 15, electro-magnet *g'*, wires 15^o 21 12, battery 11 17, back to key *J* or *J'*, the cut-out lever *h'* being at that time in the position indicated in dotted lines in Fig. 1. When, however, the switch-rails are moved in line with the side track, the roller-stud *d'* is brought opposite to either end cavity, *c²*, of the cut-out spring *C'* and the continuity of the reversing-circuit is broken. In other words, the signal *D* cannot be reversed except when the switch-rails are in line with the main track.

The two signals *D S* are respectively a danger and safety signal, and each signal is fixed on a pivot, *n*, Fig. 6, on which is also fixed a cut-out lever, *h* or *h'*, co-operating with a circuit-closing spring, *i* or *i'*, to raise or reverse the signals. The cut-out lever *h* or *h'* acts on the circuit-closing spring *i* or *i'* by means of an insulated stud, *o*, (see Fig. 6,) attached to an arm, *p*, which is fixed to the pivot *n* of the lever, and in this example two springs are shown; but for the purpose of my present invention only one spring is required. Said two signals *D S* differ from each other in the respect that the signal *D* drops out of sight, while the signal *S* drops into sight, and vice versa. With the signal *S* are combined a raise-magnet, *f'*, and reverse-magnet *g'*, corresponding to the magnets of the signal *D*.

The following is an explanation of the working of the two signals *D S*, reference being had to Fig. 1, where both signals are shown in their lower positions. In that position of the signals the cut-out lever *h* forms part of the circuit through the raising-magnet *f'* of the signal *D*; but when this circuit is closed by the action of the raise-spring *C* and the signal *D* swings or rises into sight the cut-out lever *h* partakes of its motion, and is there-

by brought out of such circuit. In this movement the cut-out lever *h* acts on the spring *i* to close the circuit through the raise-magnet *f'* of the signal *S* by wires 18 19 20 21 and the cut-out lever *h'*, whereupon the signal *S* rises out of sight and the cut-out lever *h'* is brought out of such circuit. The two cut-out levers *h h'* now stand in the position indicated by dotted lines in Fig. 1, and as fully represented in Fig. 6. If the cut-out spring *C'* is then closed, as by moving the switch-rails back to the main track, and the reversing-key *J* or *J'* is operated, a circuit is closed through the reverse-magnet *g'* of the signal *S* by wires 17, 16, 15, 15^o, and 21, and the cut-out lever *h'*, which permits the signal *S* to drop back into sight. When this takes place the cut-out lever *h'* returns to the position shown in Fig. 1, and during the movement thereof it acts on the spring *i'* to close a circuit through the reverse-magnet *g* of the signal *D* by wires 18 23 22 21 and the cut-out lever *h*, which permits the signal *D* to drop back out of sight. The two signals *D* and *S* are thus operated simultaneously; but it is obvious that the use of two signals is not essential to the successful operation of the switch apparatus.

It should be remarked that the object of providing the springs *C C'* with two end cavities, *c' c²*, is to adapt the same to a switch used with two side tracks, only one end cavity being required for a single side track.

What I claim as new, and desire to secure by Letters Patent, is—

1. In an electro-magnetic railroad-switch apparatus, the combination, with the switch-rails and with a lever connected thereto, of a circuit-closing spring arranged to be acted on by the lever, a cavity at or near the middle of the circuit-closing spring and a cavity at or near its end, a wire extending from the anvil of the circuit-closing spring to one end of the helix of an electro-magnet, serving to raise or display a signal, a wire extending from the other end of such helix to one pole of a battery, and a wire extending from the fixed end of the circuit-closing spring to the other pole of the battery, substantially as shown and described, for the purpose set forth.

2. In an electro-magnetic railroad-switch apparatus, the combination, with the switch-rails, with a lever connected thereto, and with a signal arranged to be raised or displayed whenever the switch-rails are moved or displaced, of a cut-out spring arranged to be acted on by the lever, a cavity at the end of the cut-out spring, a wire extending from the fixed end of the cut-out spring and forming part of a circuit for reversing the signal, a wire extending from the anvil of the cut-out spring to a reversing-key, and a wire extending from such reversing-key to complete the reversing-circuit of the signal, substantially as shown and described, for the purpose set forth.

3. In an electro-magnetic railroad-switch

apparatus, the combination, with the switch-rails and with a lever connected thereto, of two springs, C C', both arranged to be acted on by the lever, as herein specified, a cut-out lever connected to each signal, and two electromagnets connected to each signal, the whole adapted to operate substantially as described.

4. The combination, with a railroad-switch and the signals D S, of the hand circuit-closing key J and track circuit-closing key J', for the purpose of reversing the signals or placing them in a condition of "all clear" when the switch has been adjusted to main track, the whole adapted to operate substantially as described.

5. The combination, with a railroad-switch

and the signals D S, of the cut-out spring C, having a recess, (one or more,) for the purpose of cutting off the reversing-circuit from the signals and preventing their being set to a condition of "all clear" or "safety" so long as the switch-rails are connected with side track, the whole adapted to operate substantially as described.

In testimony whereof I have hereunto set my hand and seal in the presence of two subscribing witnesses.

THOMAS S. HALL. [L. S.]

Witnesses:

W. HAUFF,

E. F. KASTENHUBER.