(No Model.) 2 Sheets—Sheet 1.

O. GASSETT.

RAILWAY SIGNAL APPARATUS.

No. 289,827. Patented Dec. 11, 1883.

Fig. 1.

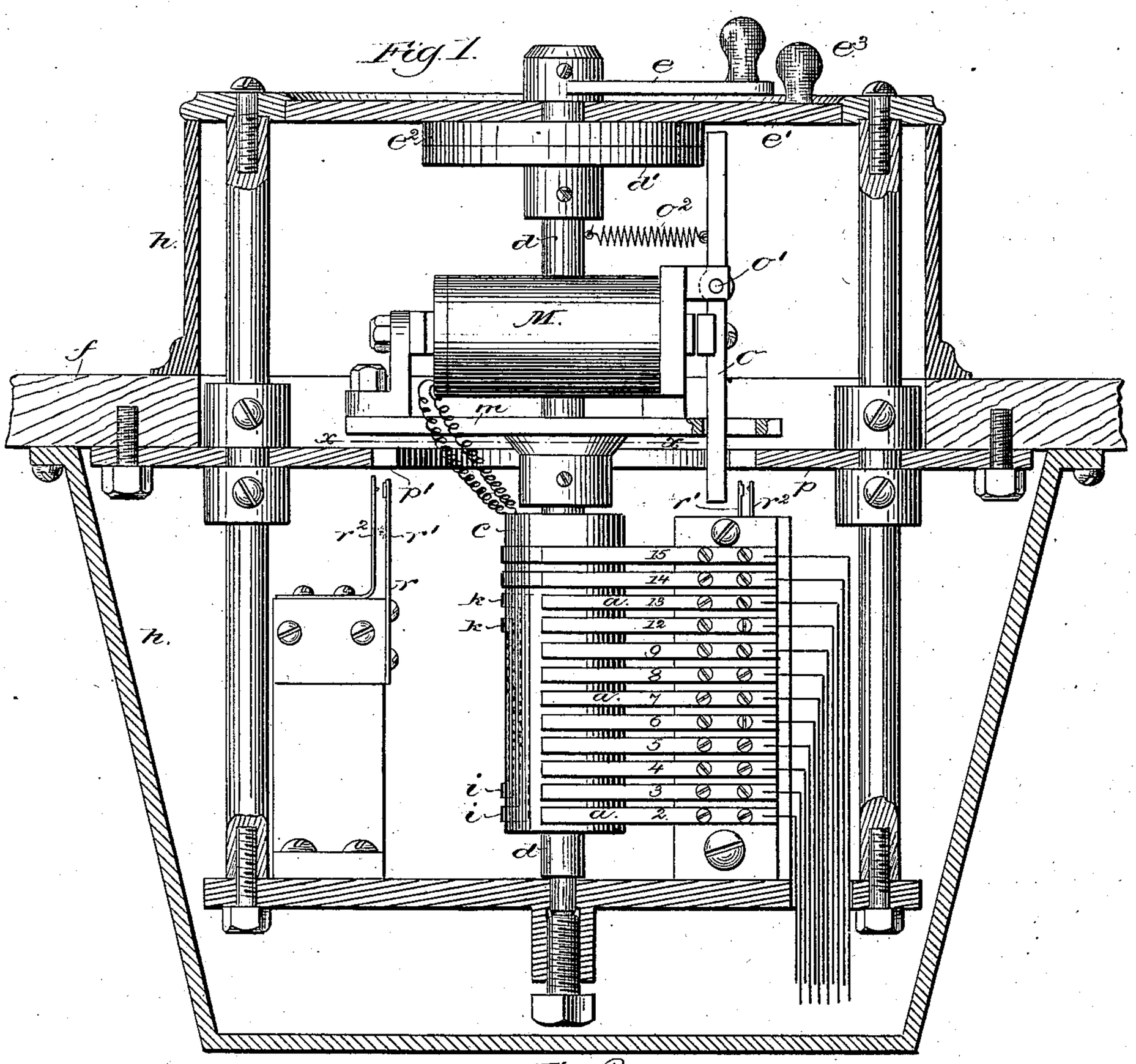
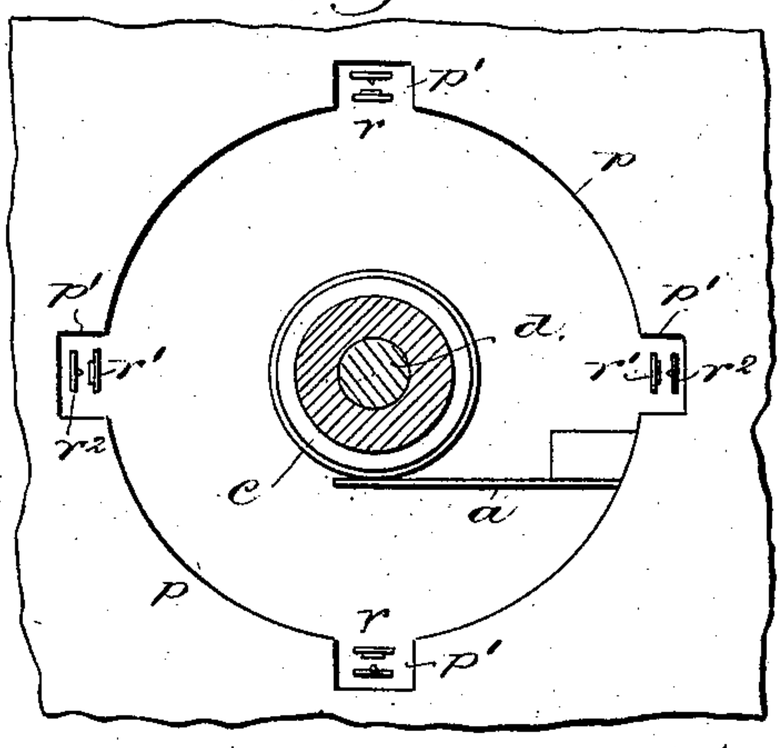


Fig. 2.



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(No Model.) 2 Sheets—Sheet 2.

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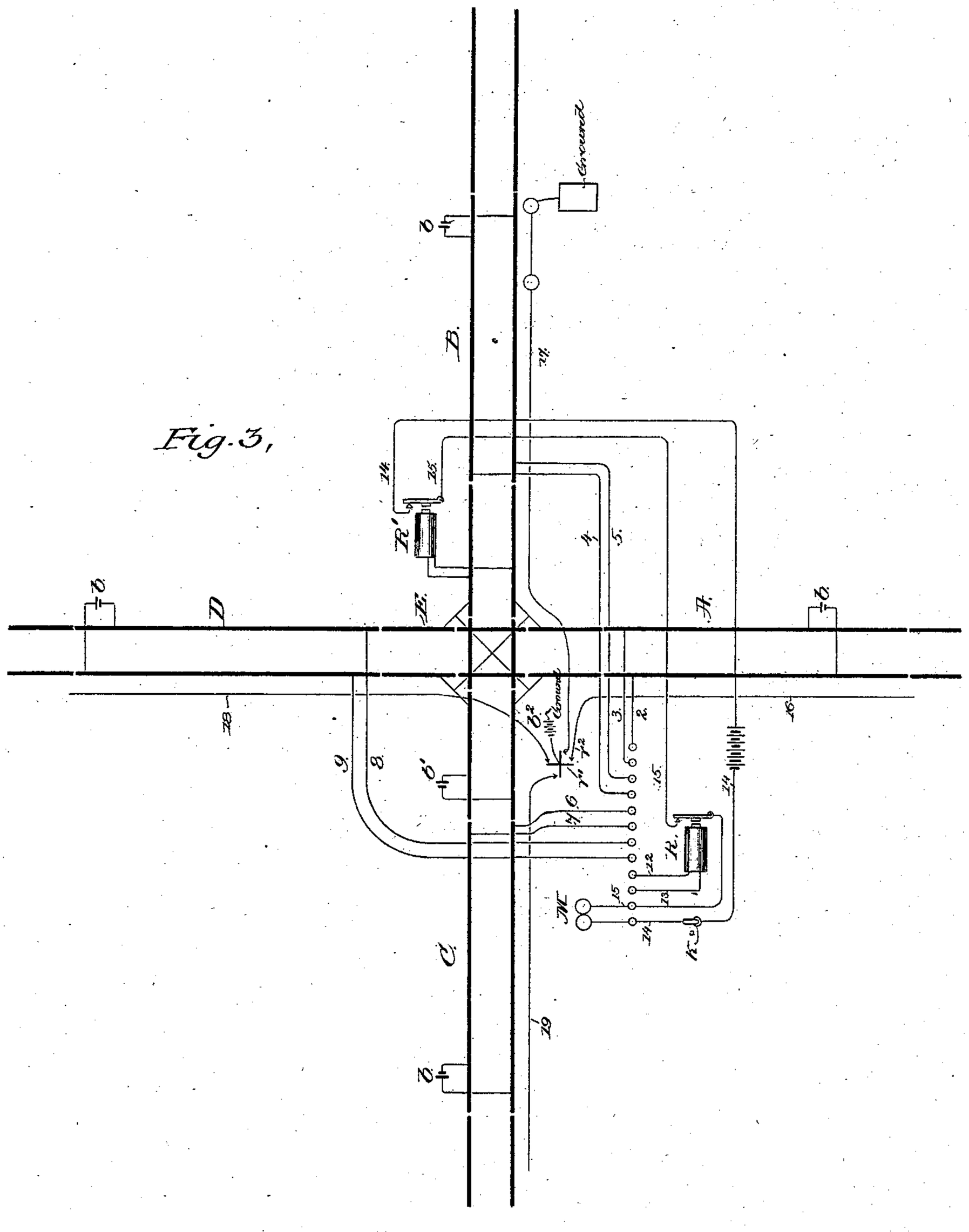
Fig. 3,



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UNITED STATES PATENT OFFICE.

OSCAR GASSETT, OF BOSTON, MASSACHUSETTS.

RAILWAY SIGNAL APPARATUS.

SPECIFICATION forming part of Letters Patent No. 289,827, dated December 11, 1883.

Application filed August 6, 1883. (No model.)

To all whom it may concern:

Be it known that I, OSCAR GASSETT, of Boston, county of Suffolk, and State of Massachusetts, have invented an Improvement in Railway Signal Apparatus, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

This invention relates to an interlocking railway-signal apparatus, by means of which a safety-signal may be displayed on one only of several different lines at one time, which signal, when thus displayed, is automatically locked by a train entering the section, so that the signal cannot be changed or another signal sent until after the train has passed off from the said section.

The invention is shown as applied to a crossing or intersection of two single-track roads, the rails of which are divided into five insulated sections, one including the rails of both tracks for a certain distance from their point of intersection, and the other four sections extending from the said common or intersecting section in each direction on each track.

By the interlocking mechanism a signal can be set to permit a train to enter any one of the four last-mentioned sections, but on only one of them at one time, and the train entering one of the said sections locks the signal and signal-setting mechanism, so that no other signal can be set until after the train has passed over the section upon which it entered and the common or intersecting section.

The signal-setting apparatus consists, essentially, of a commutator mounted on a rotating shaft and adapted, when in its different positions, to connect each one of the sections of the track at which the signals are to be set with a locking electro-magnet mounted on the said shaft and rotating therewith. The armature-lever of the said magnet is normally nearly parallel with the arbor or axis of rotation of the commutator, and co-operates with a notched locking-plate surrounding and concentric with the said arbor, to lock the same when it is turned to the proper position, and the magnet is in proper condition in this instance demagnetized. The said armature-lever operates by the same movement to lock the commutator and to effect the circuit of that one of the signals which it is desired to set. When no train is on any of the sections, the locking-magnet is normally charged, and the commutator-shaft consequently unlocked and free to be turned to any desired position to set any one of the signals; but after the train has entered the section it operates automatically by its wheels and axles, electrically connecting the opposite rails to demagnetize the said locking-magnet, so that it cannot be subsequently moved until after the train has passed off from the said section.

Figure 1 represents in vertical section a signal-controlling apparatus embodying this invention; Fig. 2, a detail of a portion thereof in horizontal section on line *x x*, Fig. 1; and Fig. 3, a diagram showing the electric circuits.

The apparatus is in this instance applied to a crossing or intersection of two single-track roads, each of which is divided into two insulated sections at either side of the point of intersection, as indicated on Fig. 3 by the letters A B C D, and a common section, E, including the rails of both tracks for a short distance from their intersecting point. The rails of each section are respectively connected with poles of a battery, *b*, and the rails of section A are also connected by wires 2 and 3 with a correspondingly-numbered pair of a series of contact-springs, *a*, (see Fig. 1,) all bearing on the surface of the commutator drum or cylinder *c*, mounted on a shaft, *d*, adapted to be rotated by a handle, *e*, the frame-work of the said parts being supported on a suitable table, *f*, and inclosed in a casing, *h*, preventing access to the working parts. In a similar manner the rails of the section B are connected by wires 4 and 5 with another pair of the said contact-springs *a*, the rails of section C by wires 6 and 7 with another pair, and those of section D by wires 8 and 9 with another pair of the said springs, there being a pair of contact-springs at the commutator for each section of track that is to be independently signaled. The commutator-drum *c* is provided with a pair of contact-points, *i*, at its periphery corresponding to each of the said pairs of springs 2 3, 4 5, &c., the said contact-points being so arranged that only one pair is in contact with the corresponding springs for any given position of the drum, they being shown in this instance as arranged one-fourth of a revolution apart upon the periphery of the

drum *c*, so that by successive quarter-turns thereof each pair of contact-points will in turn be brought in connection with the corresponding pair of springs. The said pairs of contact-points *i* are each connected with a corresponding pair of contact-points, *k*, (or, if desired, they might be rings,) encircling the drum, the said points *k* being in contact with a pair of commutator-springs, *a*, numbered 12 and 13, when one of the other pairs of springs, as 2 3 or 4 5, is in contact with the points *i*, so that by the successive partial rotations of the drum the different pairs of springs 2 3, 4 5, &c., will successively be connected with the springs 12 13, the wires from which include the coils of a relay-magnet, R, which is thus brought into the circuit of one or the other of the batteries *b*, according to the position of the commutator.

The local circuit 14 15, controlled by the armature of the said relay R, is connected with the coils of a locking-magnet, M, supported on a platform, *m*, fixed upon the shaft *d*, so that the said magnet is revolved bodily with the said shaft and commutator *c*, its connection with the local circuit 14 15 being maintained by a pair of springs, *a*, numbered 14 and 15, bearing on rings of the commutator *c*, connected with the electrodes of the said magnet. The local circuit 14 15 of the locking-magnet M is also controlled by a relay-magnet, R′, in circuit with the common section E to the two tracks, and it will be seen that while both relays R and R′ are magnetized, and the local circuit 14 15 otherwise closed, the locking-magnet M will be magnetized. The armature-lever *o* of the said magnet M is pivoted at *o′*, and revolves with the magnet when the shaft *d* is turned by the handle *e*, one end of the said lever traveling in a circular opening in the locking-plate *p*, surrounding and concentric with the said shaft *d*, and provided with a number of notches, *p′*, corresponding to the different positions of the commutator necessary to connect the pairs of springs 2 3, 4 5, &c., or the corresponding sections, A B, &c., in circuit with the relay R. When the magnet M is charged and its armature attracted, the end of the said lever *o* will travel freely within the opening of the plate *p*, and if the said lever is removed from one of the notches of the plate by a slight rotation of the magnet it will be free to revolve, even if then unattracted, until arrested by another notch, as the smooth interior of the opening of the plate *p* will not interfere with its movement. Corresponding to each of the notches *p′* of the plate is a circuit-controlling instrument, *r*, shown as each composed of two springs, r' r^2, normally standing separate from one another, and leaving the circuit open between them. All of the springs r' are connected with one pole of the battery b^2, Fig. 3, the other pole of which is grounded, and the springs r^2 are respectively connected with wires 16 17 18 19, passing to suitable signaling-instruments at the ends of the sections A B C D, and to the ground, so that when any of the pairs of springs r' r^2 are pressed into contact with one another the current of the battery b^2 will be caused to operate the signal at the head of the corresponding section of the track, setting the said signal to safety, or so as to permit a train to enter the section. The springs r' r^2 of any one of the circuit-closers *r* are thus forced into contact with one another to set the signal by means of the armature-lever *o* entering the corresponding notch in the plate *p*, and it will be seen that the signal cannot be thus set until the armature-lever has entered a notch, and thus locked the shaft *d* from further rotation, and, conversely, the said shaft cannot be unlocked until after the corresponding circuit is broken at r' r^2, so that it is impossible to set two of the signals to safety at the same time.

The shaft *d* has a disk, *d′*, fixed upon it near the opposite end of the armature-lever *o* to that which co-operates with the locking-plate and circuit-closer *r*, the said plate *d′* being also notched to receive and steady the end of the lever *o* and relieve its pivot *o′* from strain in case it should be attempted to turn the shaft when locked by the armature-lever. The shaft *d* is also provided with a plate, *e′*, having a disk, e^2, and handle e^3, the said disk being loose on the shaft *d*, which turns freely within it. The disk e^2 is of sufficient size to engage the armature-lever *o* and prevent it from turning on its pivot to co-operate with the locking-plate *p* and circuit-closer *r*, except when the handle e^3 is turned opposite the handle *e*, in which case a notch in the said disk e^2 is brought in position to receive the end of the armature-lever and permit it to operate. The rails of the common section E of the track are so connected that one rail of each branch leading from the intersecting point is connected with one pole of the battery *e′*, and the other rail of each of the said branches is connected with the other pole of the said battery, and the relay R′ is connected in circuit between the said rails, and is thus normally charged by the battery *b′*, keeping the circuit 14 15 closed at its armature. The said circuit is also provided with a hand key or switch, K, by which it may be operated by the operator when desired.

The operation is as follows: Suppose a train is approaching the section B. By a suitable signaling-instrument already in use, a signal will be sent to the operator in charge of the instrument at the crossing, showing that the said train is approaching this particular section. The operator will then turn the handle *e* to the point corresponding with the said section, bringing the commutator *c* into position to connect the wires 4 5 with the wires 12 13, thus closing the circuit of the battery *b* of section B through the relay R, which makes it close the local circuit 14 15 at its armature-lever. The handle e^3 is then turned to the position opposite the handle *e*, and the local circuit 14 15 upon the magnet M opened by means of the key K. The armature-lever *o* is thus

released by the magnet and acted upon by its attracting-spring o^2, so as to throw it into the notch p', and cause it to operate the circuit-closer r, setting the signal at the head of section B, and thus permitting the train to enter.

As soon as the train enters the section B its wheels and axles make a direct connection between the opposite rails, completing the circuit of the battery b, and diverting its current from the relay R, so that the local circuit 14 15 is automatically opened at the armature-lever of the relay, and the magnet M thus retained in its demagnetized condition as long as the train is in the said section, thus locking the shaft d in this position, so that the said shaft cannot be turned and no other signal can be set. Before the train passes off from the section B it enters the section F and operates in a similar manner to demagnetize the relay R′ and open the local circuit 14 15 at its armature-lever. As soon, however, as the train passes wholly from the section E the relay R′ will again be magnetized, and by closing the key K the local circuit of the magnet M will be completed, thus causing it to attract its armature and unlock the shaft d. The handle e^3 will then be preferably turned a short distance, so as to mechanically prevent the armature from operating, and thus retain the shaft unlocked, although the local circuit 14 15 may be opened at K, so that it would be possible to quickly turn the shaft to the proper position to set the signals of any section without danger of its being caught in one of the notches of the plate p. If desired, the local circuit may be kept normally open at the key K, which has to be closed merely to unlock the shaft after the train last signaled has passed the crossing and left the common section.

It is obvious that the construction of the parts may be varied without departing from the essential features in the invention.

I claim—

1. The commutator and its shaft and a series of different electric circuits connected with the said commutator, combined with the electro-magnet and its armature supported on the said shaft and placed by the rotary movement thereof in connection with any desired one of the said circuits, substantially as described.

2. The combination of a series of track-sections with a single movable electro-magnet, adapted to be controlled by each of the said sections independently, and locking mechanism whereby the said magnet is locked when under control of one of the said sections, and prevented from being placed under control of another section, substantially as described.

3. The series of track-sections, and signals corresponding thereto included in independent electric circuits, combined with an electro-magnet controlling each of the said circuits, but one only at a time, whereby any desired one of the said signals may be set independently of the others, the said magnet being itself always controlled by the section the signal of which it is at that time governing, substantially as described.

4. A series of insulated track-sections, combined with an electro-magnet and commutator, whereby the said magnet may be placed under control of any desired one of the said sections, and locking mechanism for the said commutator controlled by a train entering the said section, whereby the said commutator is prevented from moving while a train is on the section, substantially as described.

5. In an interlocking signal apparatus, a series of track-sections, combined with a movable commutator and electrical circuits leading therefrom to each of the said sections, and an electro-magnet controlling the movement of the said commutator, and adapted to be itself placed thereby under control of the said track-sections, substantially as described.

6. A series of track-sections and independent signals therefor, combined with a commutator and electrical circuits leading therefrom to each of the said sections, and an electro-magnet adapted to be placed by the said commutator under control of any one of the said sections, and mechanism whereby the armature of the said magnet is caused to set the signal and lock the commutator at a single operation, substantially as described.

7. The movable commutator-shaft and electro-magnet fixed thereon, and adapted to be placed thereby under control of any desired one of a series of circuits, combined with a locking-plate co-operating with the said magnet, whereby it and the connected commutator are prevented from movement as long as the controlling-circuit is in a certain condition, substantially as described.

8. A series of track-sections and signals therefor, combined with an electro-magnet and commutator, whereby it is placed under control of any desired one of the said sections, the armature of the said magnet being adapted to lock the commutator and then operate the signal, and a device whereby the said armature is mechanically prevented from operating, substantially as and for the purpose described.

9. In an interlocking signal apparatus for a railway-crossing, an intersecting or common section, including the rails of all the intersecting tracks and a series of track-sections adjacent thereto, combined with an electro-magnet and commutator, whereby the said magnet may be placed under control of trains passing over any of the said sections and the common section, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

OSCAR GASSETT.

Witnesses:
JOS. P. LIVERMORE,
BERNICE J. NOYES.