

No. 731,108.

PATENTED JUNE 16, 1903.

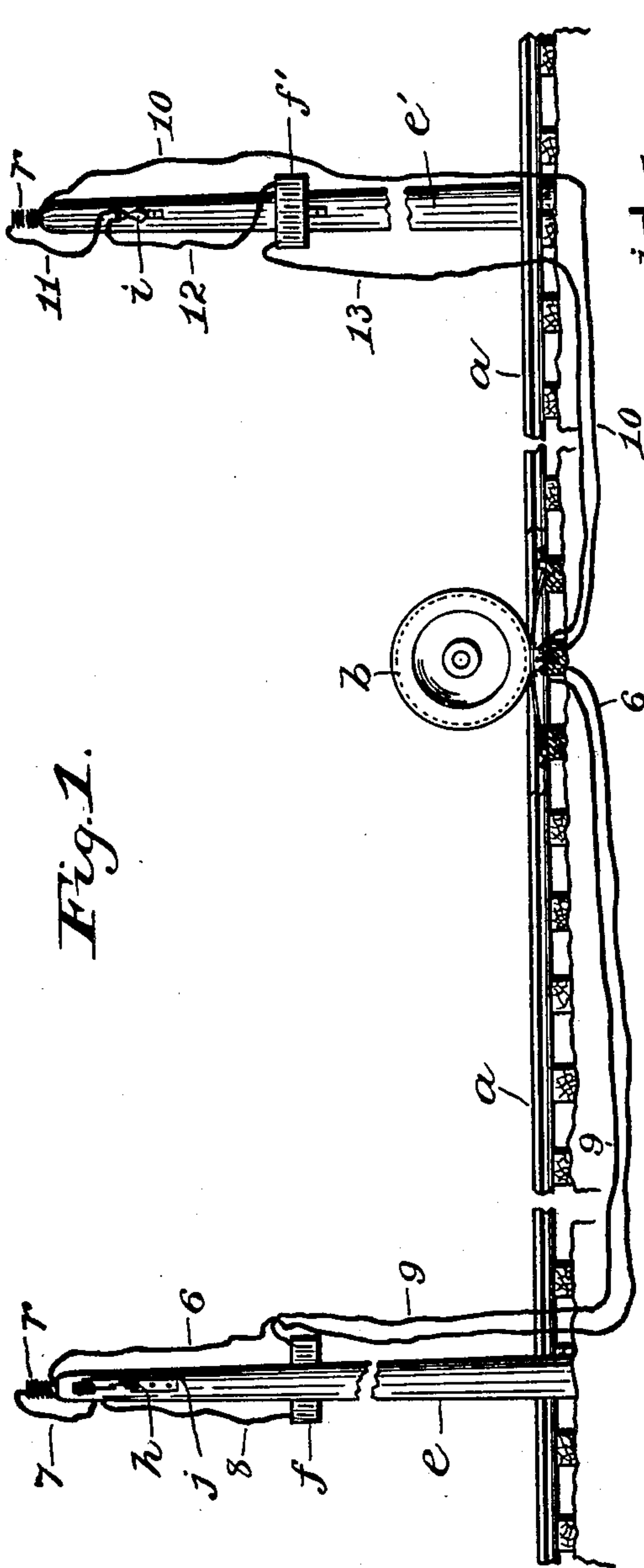
**J. GOLDSWORTHY.**

**AUTOMATIC SIGNALING APPARATUS FOR RAILWAYS.**

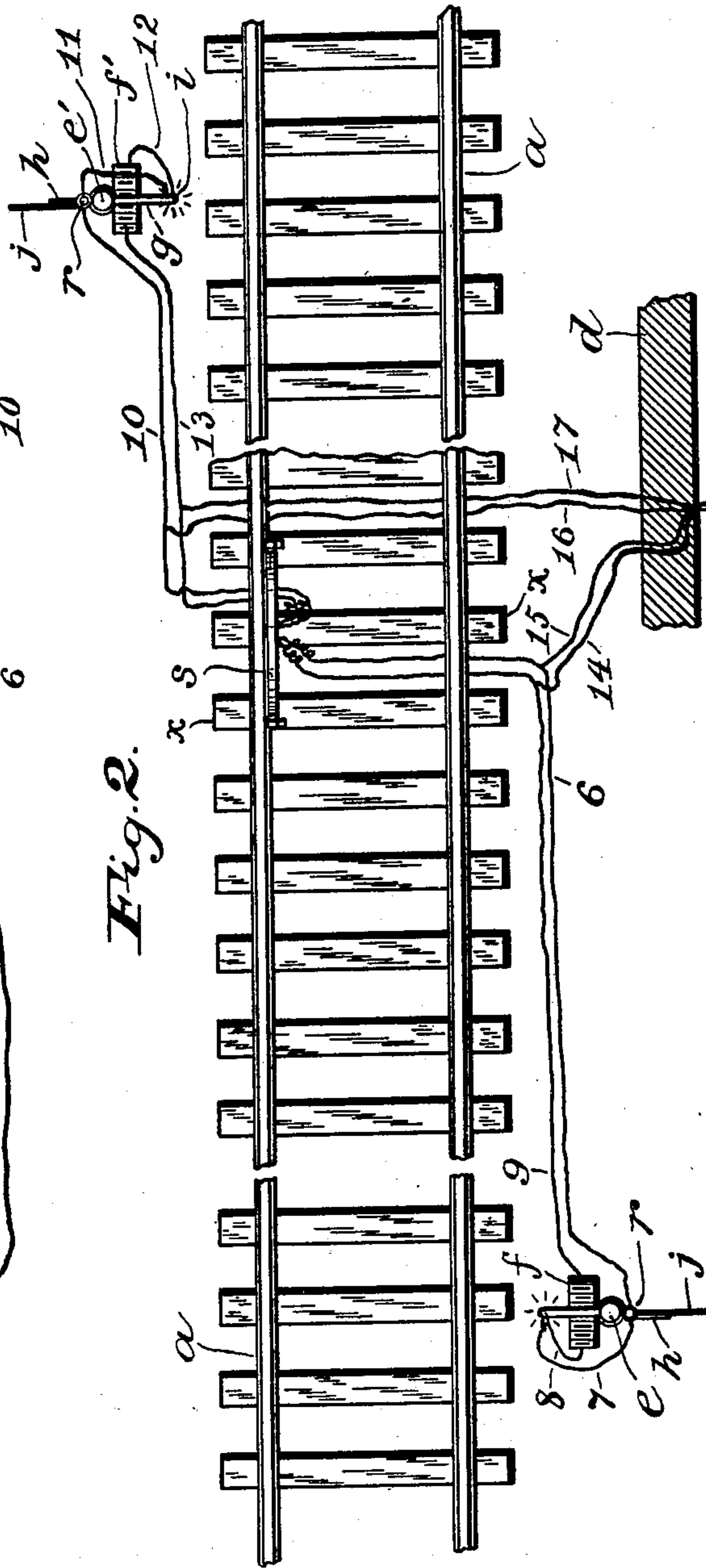
APPLICATION FILED JAN. 27, 1902.

NO MODEL.

3 SHEETS—SHEET 1.



*Fig. 1.*



*Fig. 2.*

**WITNESSES:**

Wm H Payne  
Don W. Vorhies

***INVENTOR:***

John Goldsworthy.  
BY E. T. Silvers.  
ATTORNEY.

*ATTORNEY.*

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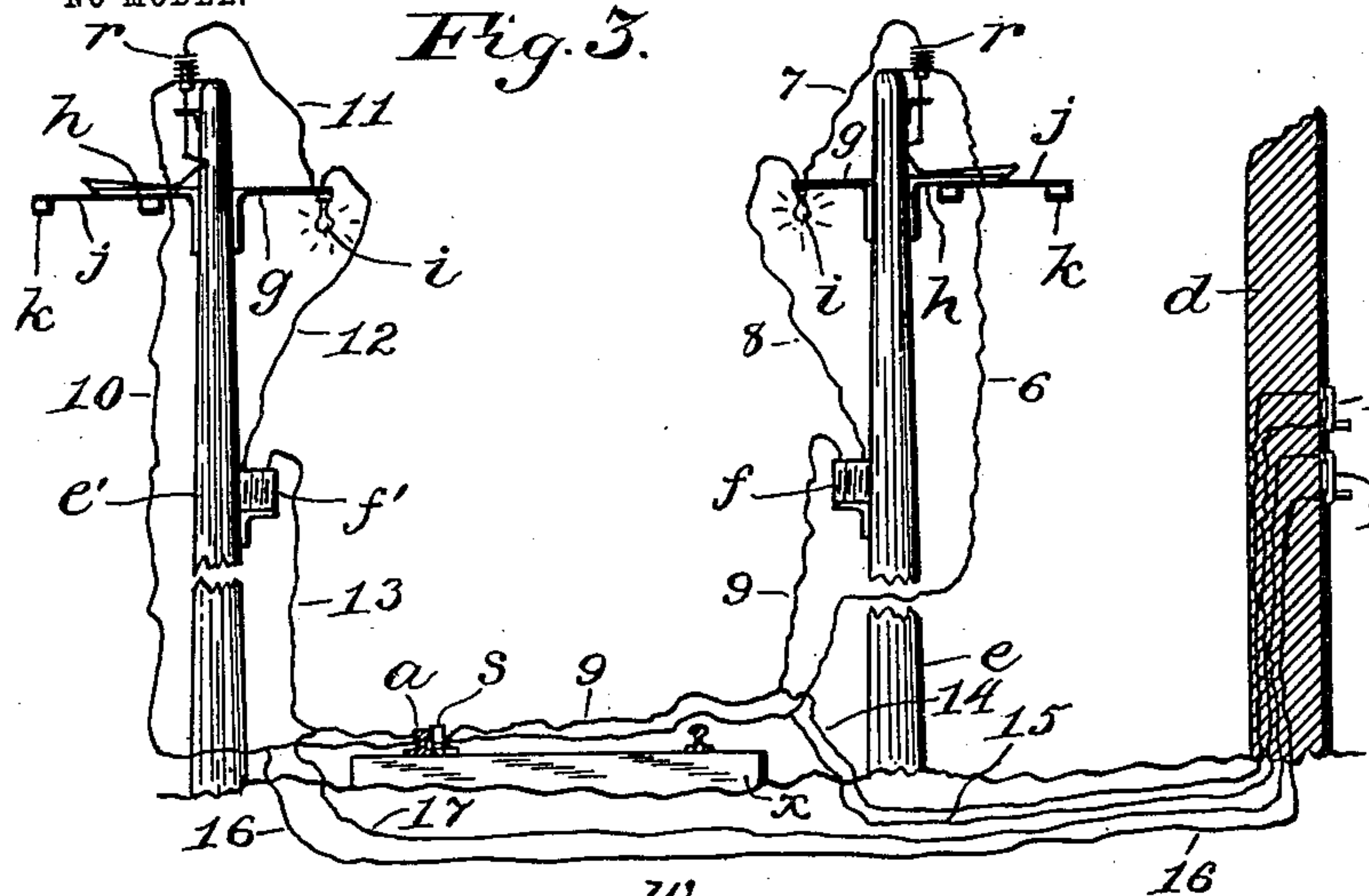
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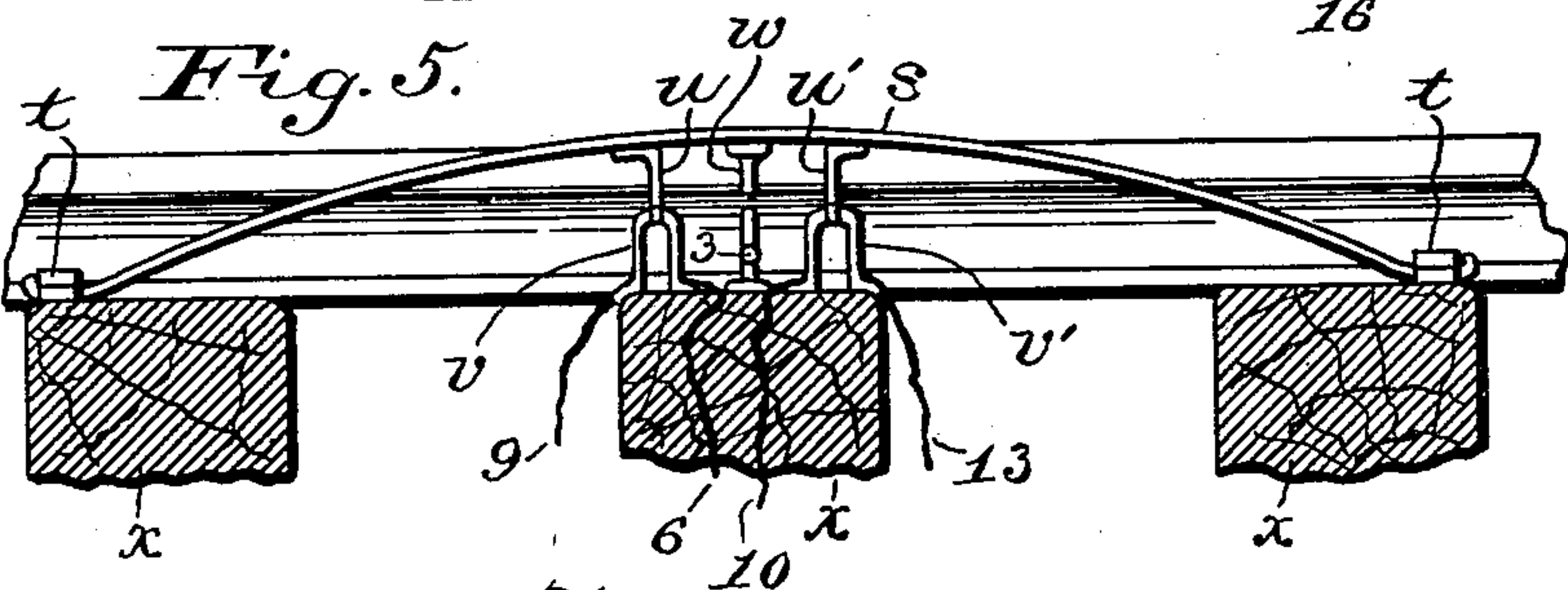
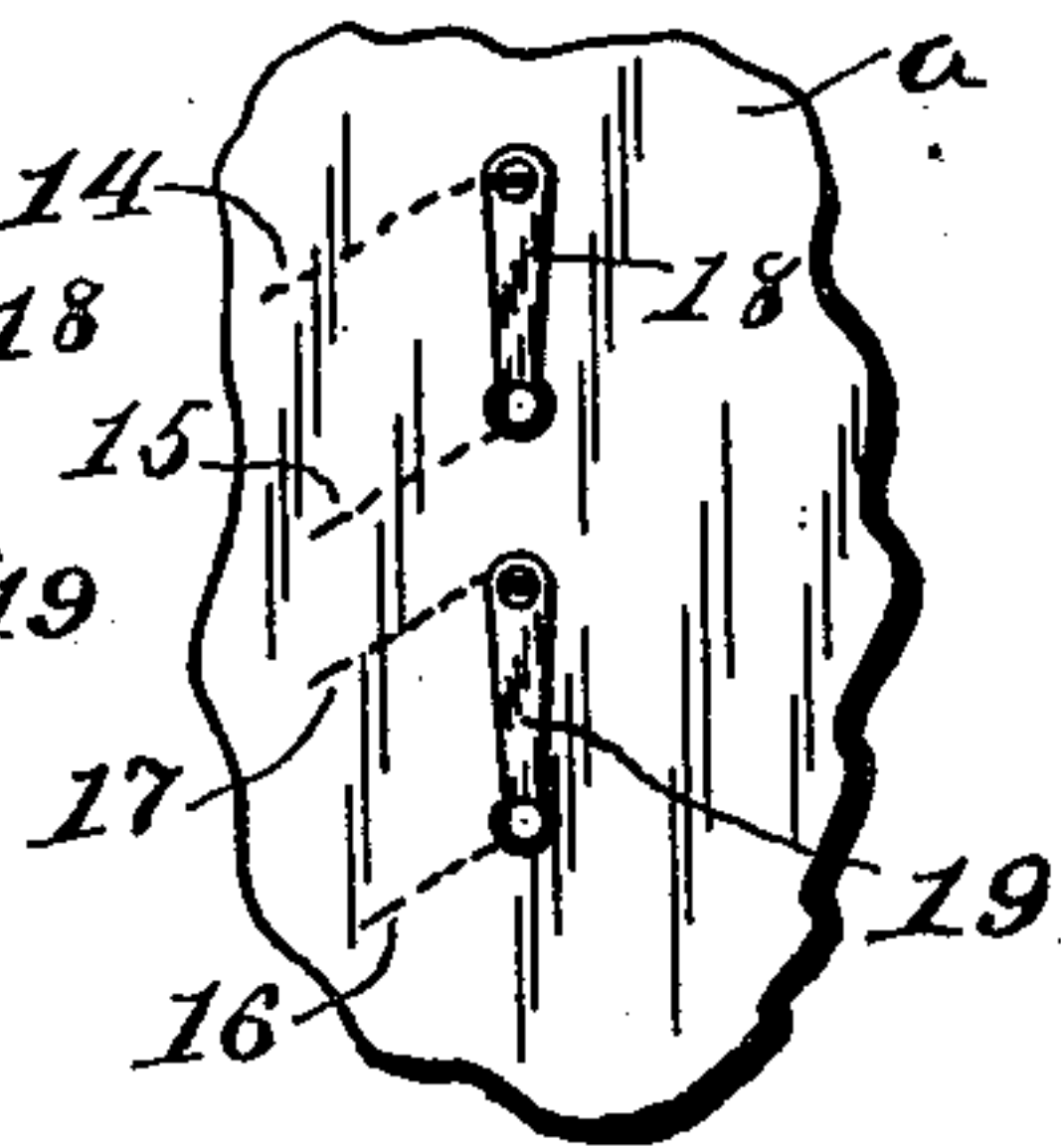
APPLICATION FILED JAN. 27, 1902.

3 SHEETS—SHEET 2.

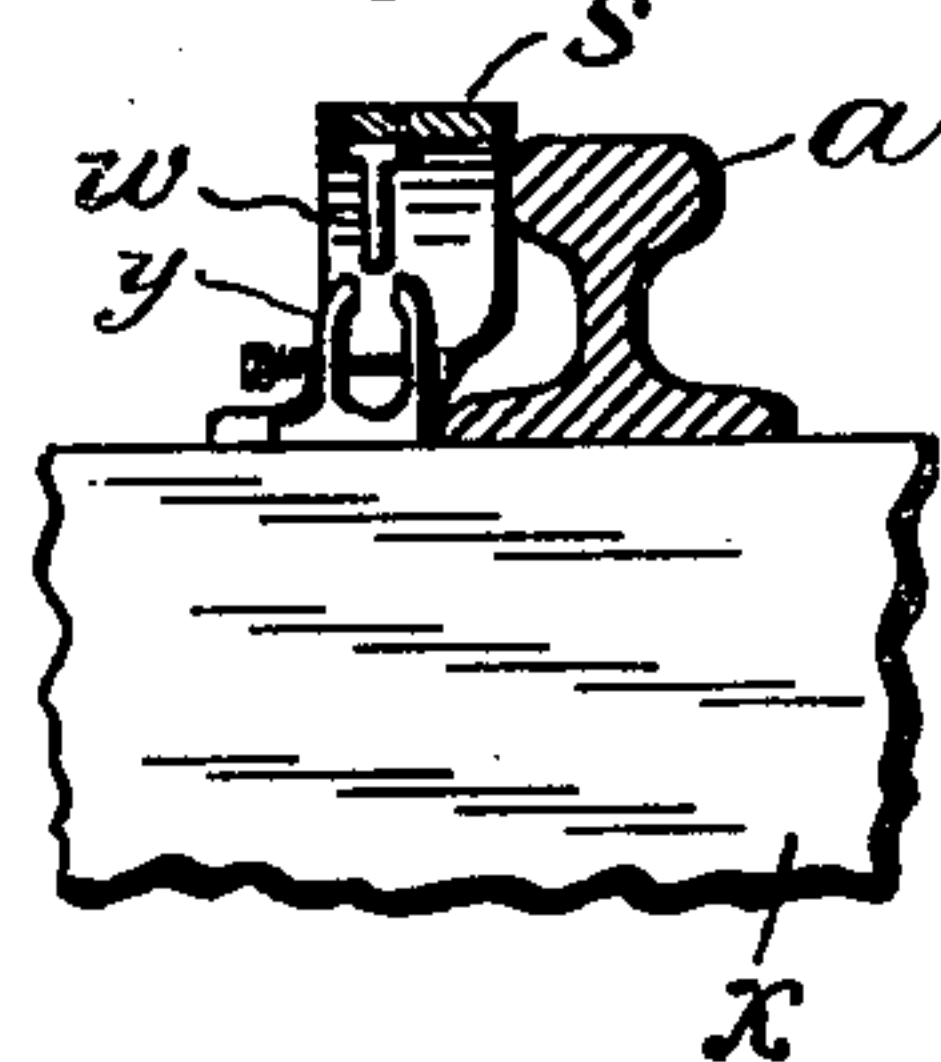
NO MODEL.



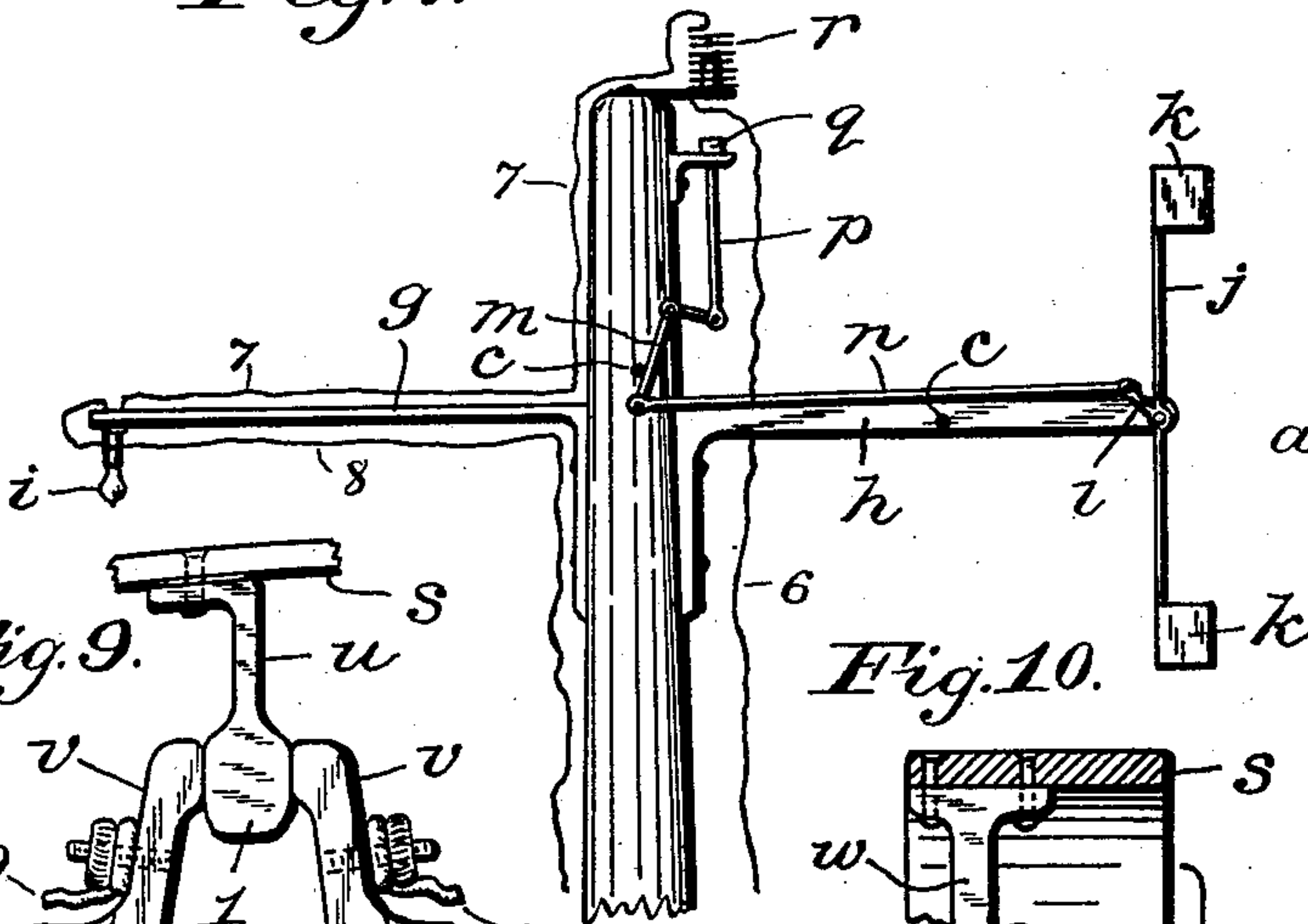
*Fig. 4.*



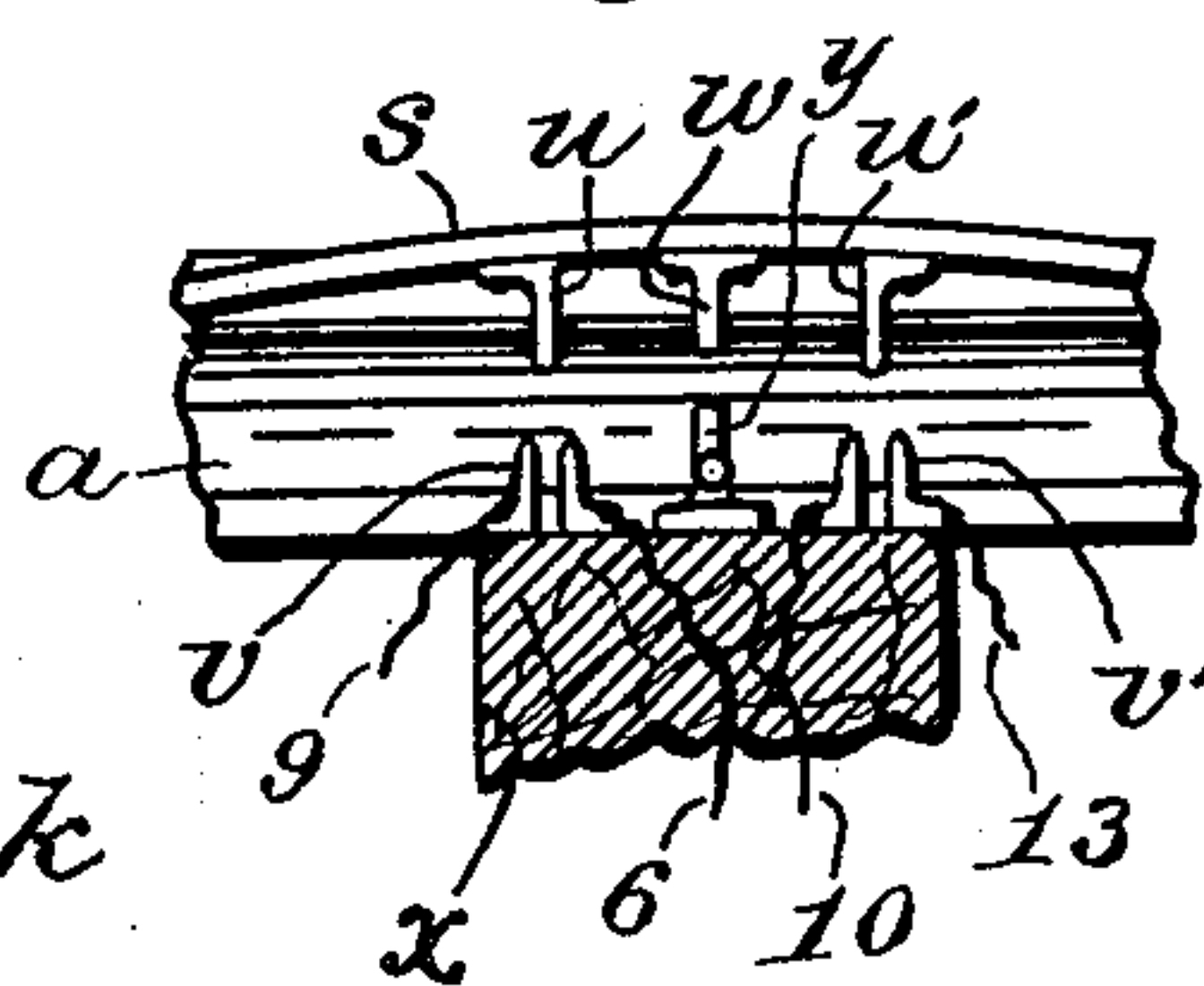
*Fig. 6.*



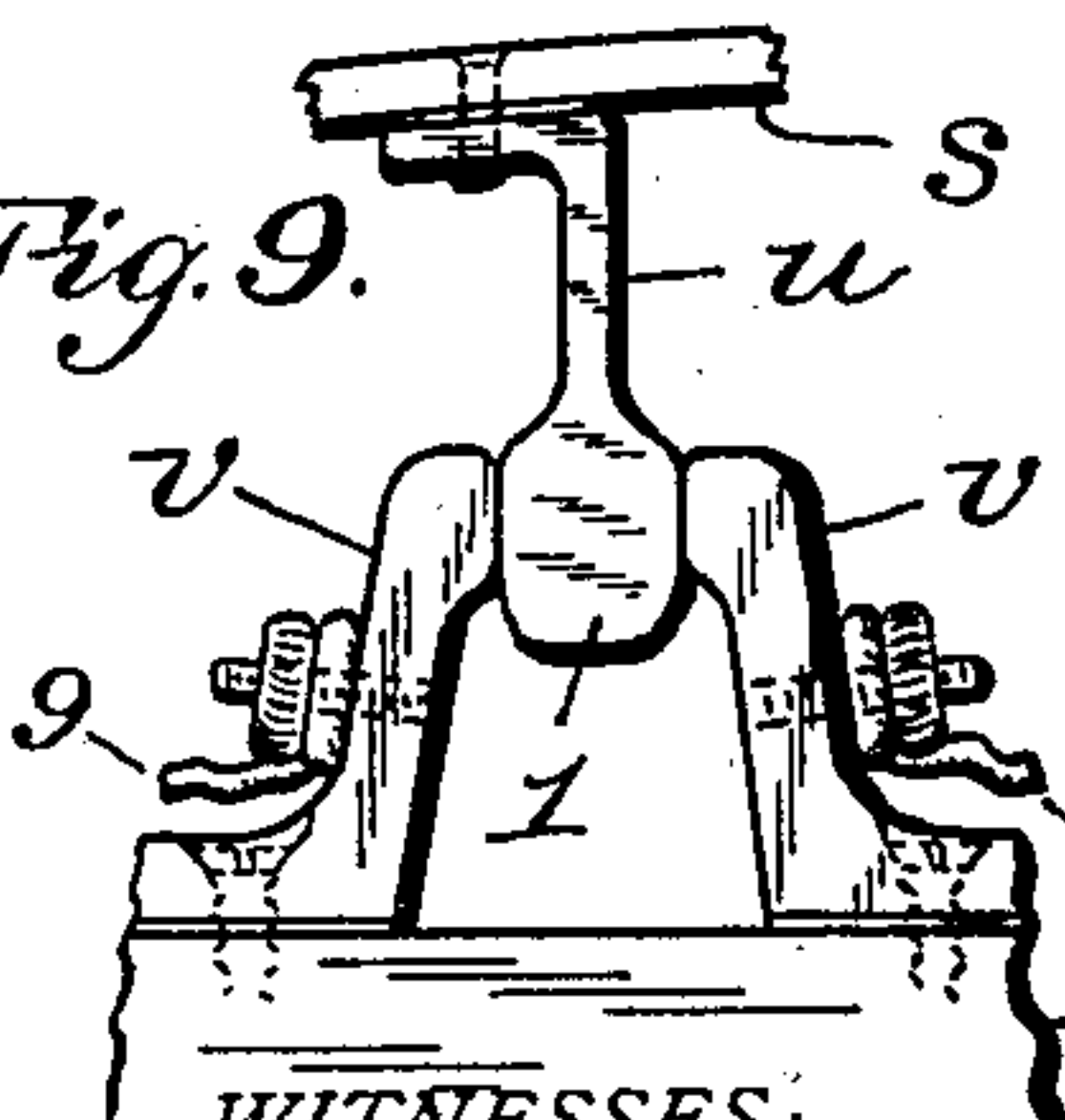
*Fig. 7.*



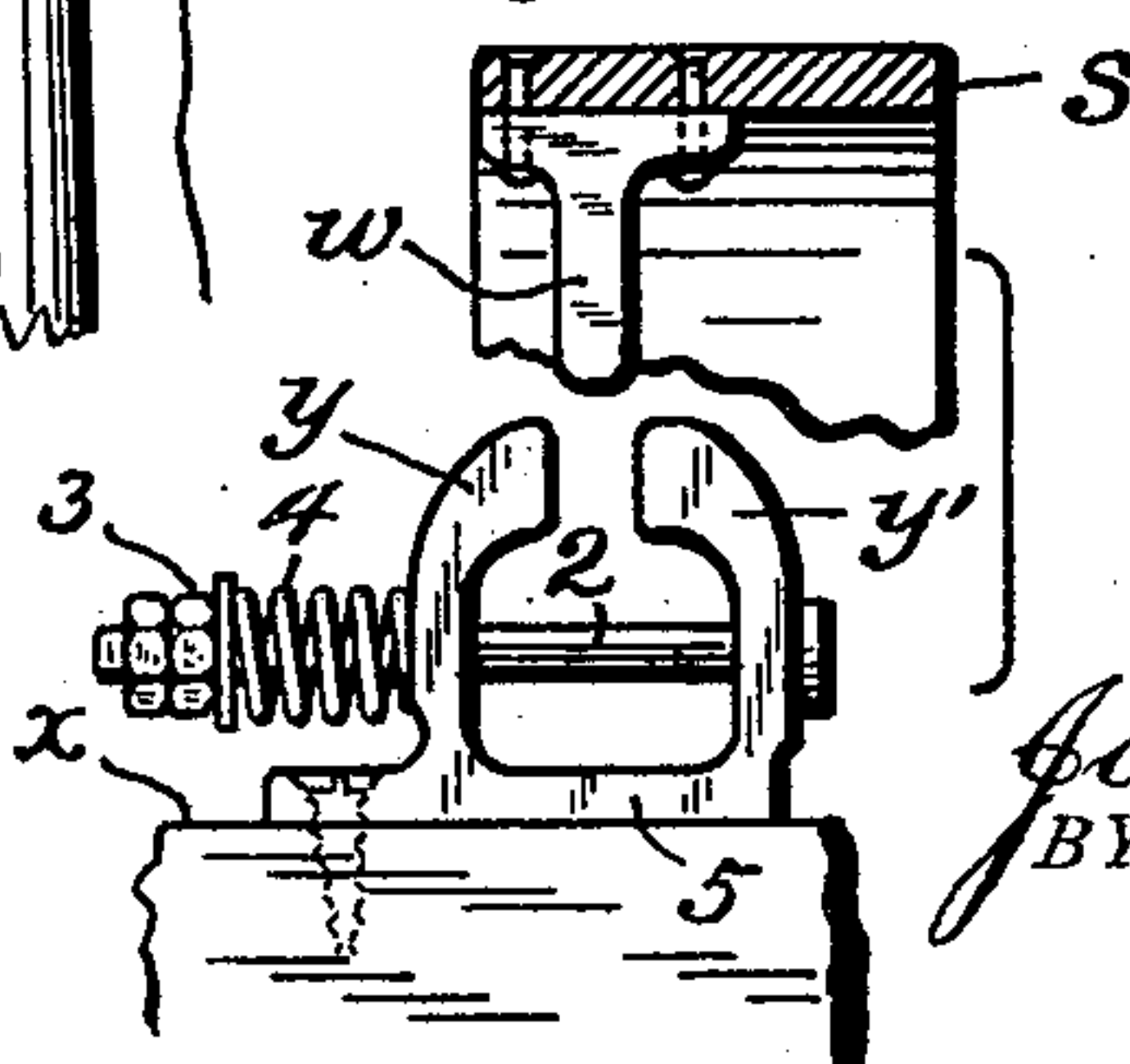
*Fig. 8.*



*Fig. 9.*



*Fig. 10.*



WITNESSES:

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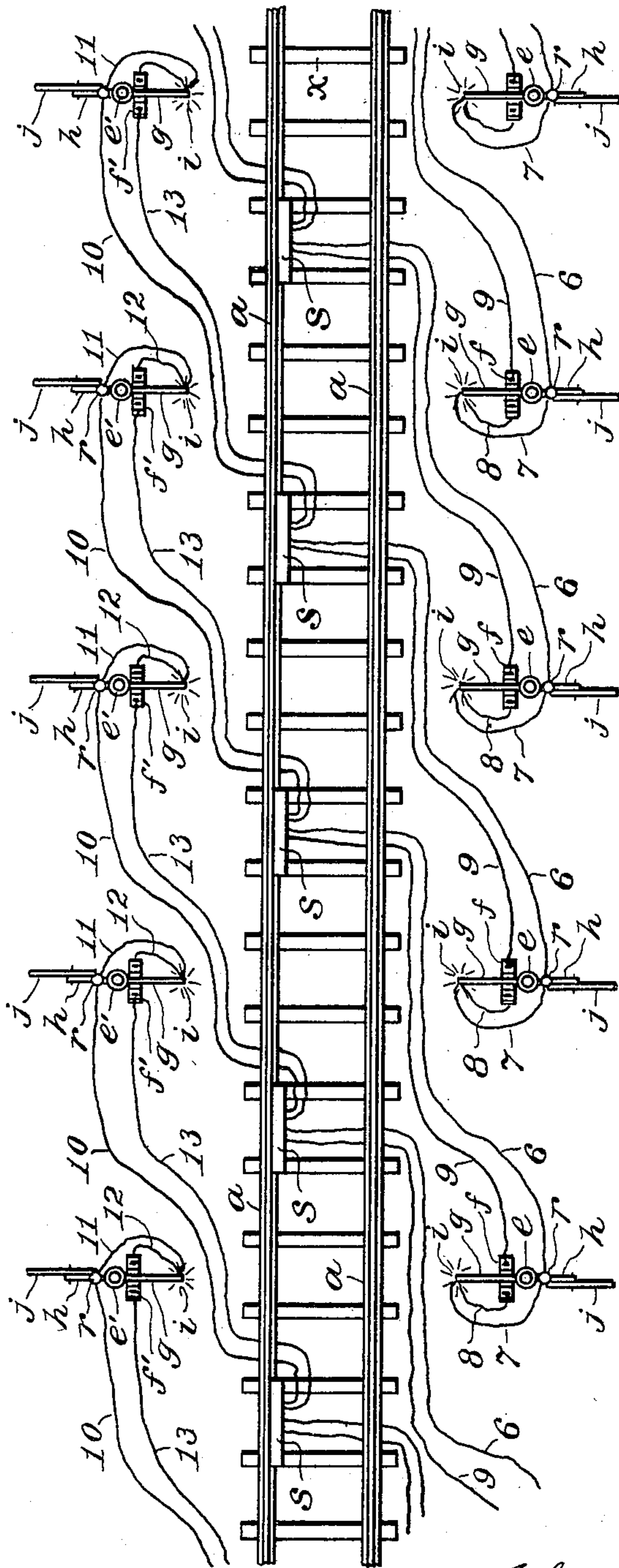
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3 SHEETS—SHEET 3.

Fig. 11.



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# UNITED STATES PATENT OFFICE.

JOHN GOLDSWORTHY, OF INDIANAPOLIS, INDIANA.

## AUTOMATIC SIGNALING APPARATUS FOR RAILWAYS.

SPECIFICATION forming part of Letters Patent No. 731,108, dated June 16, 1903.

Application filed January 27, 1902. Serial No. 91,327. (No model.)

*To all whom it may concern:*

Be it known that I, JOHN GOLDSWORTHY, a citizen of the United States, residing at Indianapolis, in the county of Marion and State of Indiana, have invented new and useful Improvements in Automatic Signaling Apparatus for Railways, of which the following is a specification.

My invention relates to signaling apparatus for railways, whether operated by means of steam, electricity, or other power, for automatically displaying signals for the guidance of those who may be in control of the trains.

The principal object of the invention is to provide safe, simple, and economical signaling means whereby trains may be controlled in their operation so as to avoid collisions between two or more trains running either in the same or opposite directions upon the same track or between a moving train and one at rest, which means may be also adapted to warn persons at highway-crossings of the approach of trains.

A further object is to provide signaling devices and a system for operation in connection with the devices which will be so easily understood and so clear as to remove all possibility of collision when operating in conformity therewith, allowance being made for the possibility of failure of even the most perfect mechanisms as well as faulty judgment of operatives.

The above objects are attained in the invention illustrated in the drawings accompanying and forming parts of this specification, in which similar reference characters designate corresponding parts throughout.

Referring to the drawings, Figure 1 represents a side elevation of a section of railway-track of indefinite length with which my invention is connected; Fig. 2, a plan view of the track and my signaling apparatus connected therewith; Fig. 3, a transverse view showing the rails in section and the signal devices in elevation, the above-mentioned figures being partly diagrammatic, so as to illustrate electric circuits. Fig. 4 is a fragmentary view showing hand-connectors which may be employed at stations; Fig. 5, a fragmentary view showing the inner side of a railway-rail upon cross-ties and operative ele-

ments, illustrating substantially the manner in which the electric circuit may be completed and broken in the operation of the signals by means of the wheels of the locomotives and cars; Fig. 6, a fragmentary view transversely of the rail, including features shown in Fig. 5; Fig. 7, a fragmentary detail view of parts of the signal devices, showing both day and night signals mounted on a post; Fig. 8, a fragmentary view showing modifications of the connecting devices illustrated in Fig. 5; Fig. 9, a fragmentary detail view of the circuit-connector; Fig. 10, a fragmentary detail view of devices for prolonging the period of operation of the signals after having been actuated by the moving train; and Fig. 11 is a top plan of a section of track of indefinite length, showing diagrammatically the arrangement of the signaling devices in connection therewith arranged as connected blocks or series.

In the drawings, *a* designates the railway-rails forming the track; *b*, a flanged wheel or a number of wheels of a motor or a car; *d*, the wall of a station-building; *e e'*, posts upon which the signals are displayed at either side of the track, and *ff'* batteries for supplying electric currents, these being shown merely to illustrate the electric circuits, the currents in practice being preferably supplied by means of dynamos in the usual manner at power stations.

In practically carrying out my invention I provide a multiplicity of safety sections or "blocks," each comprised within the limits of a pair of signal-posts, and devices, as between the posts *e* and *e'*, set at suitable distances apart along the track, it being designed that the block-signals be closer together at crooked parts than at straight parts of the road. About midway between two connected signal-posts I provide means whereby the wheels of passing trains may operate or control the signals on the posts, so that approaching trains in both directions may be warned against further movement.

Each signal-post has stationary arms *g* and *h*, one supporting one or more electric lamps *i* and the other supporting a signal-flagstaff *j*, to which one or more flags *k* are attached. In practice, however, one stationary arm may suffice for both day and night signals. The



staff *j* is pivoted to the arm *h*, and it has a crank-arm *l* attached rigidly thereto. A bell-crank *m* is pivoted to the post *e* or to some equivalent member, and a connecting-rod *n* is pivotally attached to an arm of the crank *m* and also to the arm *l*. A rod *p* is connected to the bell-crank *m* and to a movable armature *q*. In proximity to the armature is an electromagnet *r*, suitably supported immovably. These electric devices may be variously constructed, so that the magnet may attract the armature, and thereby move the signal-flags into positions in which it will be understood that they are displayed, the staff *j* being in the present case horizontal with the flags drooping when the latter are supposed to be effective as signals. Suitable stops *c* may be employed for limiting the movements of the staff *j*.

A member *s* is designed as a medium, to be operated by contact of the wheels, as hereinbefore mentioned, for opening and closing the electric circuit. The member *s* may be termed a "shifter," and preferably consists of an arched spring-steel bar mounted close to the inner side of a rail *a* and having its ends movably seated in housings *t*, attached to cross-ties *x*, so that the central portion of the bar may normally stand elastically in a plane sufficiently high near that of the top of the rail that it may be depressed by the flange of a moving wheel.

A connector *u* is attached to the shifter *s* and extends downwardly therefrom, the two members being insulated. The connector has a head *1*, adapted to engage and connect two like opposing blades *v v*, Fig. 9, that are suitably supported and insulated and connected to the circuit-wires. The single connector may suffice if but one circuit is provided for both signal-posts; but when the wiring is so arranged that the apparatus at each post has a separate circuit then I employ two connectors, the other connector *u'* and its blades *v'* being like those above described and operating in the same manner, the connector normally closing the circuit, which would cause the signals to be constantly displayed except when the connector is forced down by the wheels and the circuit thus broken. In thus opening the circuit the head *1* is depressed below the contact-points of the blades *v*. When it may be desired to have a closed electric circuit only when the car-wheels press down the shifter *s*, the connectors and the blades are shorter and normally disconnected, as shown in Fig. 8, the circuits being open and, as will be understood, may be closed by depressing the shifter. In the above-described construction it will be seen that as the wheels of a train pass over the shifter the latter would be operated intermittently, and therefore cause the display of the signals intermittently. This may be desirable in some cases, while it may not be so in other cases. I therefore provide means whereby when the shifter is

depressed it will remain so during a predetermined length of time. To accomplish this, a friction-bar *w* is secured to the shifter *s* and extends downwardly therefrom. A pair of spring friction-blades *y y'*, secured to a base *5*, are suitably supported below the bar *w*, so as to be engaged thereby only when the shifter is depressed. The blades are connected by a bolt *2*, provided with a screw-nut *3* and a spring *4* for adjusting the tension of the blades. This provides a simple means for the purpose; but obviously other suitable devices may be substituted therefor.

Suitably-arranged circuit-wires connect the blades *v v* with the electric lamp *i* and the electromagnet *r* and also with the battery *f* or other electric generator or accumulator, as the wires *6*, *7*, *8*, and *9*, and similar wires *10*, *11*, *12*, and *13* connect the blades *v'* with the lamp and magnet on the other post *e'* and also with a generator. As it may be desired to manually operate the signals at depots, water-stations, or elsewhere when a train is at rest, I provide circuit-breakers *18* and *19*, one connected by branch wires *14* and *15* to the wires *6* and *9*, and the other connected by branch wires *16* and *17* to the wires *10* and *13*.

Any suitable number of blocks or systems of signals may be employed to conform to road conditions, the blocks overlapping, as illustrated in Fig. 11, suitable modifications being made at terminals of roads where signals would not be required beyond the track.

In practical use it is designed that the roadway shall be lighted, figuratively rather than literally, when clear for trains to proceed by the display of signals, a flag or flags, and one or more lights, and it is to be understood that in the absence of the signal the train in the block must stop and not proceed except as rules may permit under control and with caution, first ascertaining whether the signal had been withdrawn purposely by another train or accidentally through defects or accident to the devices. Referring to Fig. 2, let it be supposed that a west-bound train approaches from the right. The engineer or motorman will see the light in the lamp *i* if at night or the flags *k* in proper position if in the day-time at the post *e'*, indicating a clear track and the right of the train to proceed. The signals at the post *e* also appear, permitting an east-bound train that may be approaching from the opposite direction to also proceed on the same track within certain limits. It is obvious, of course, that the signal-posts may be set or spaced with respect to one another according to well-known plans not necessary to illustrate herein. It may be stated, however, that in the present invention the posts *e* and *e'* and the shifter *s*, as in Fig. 2, comprise one system. Other like systems will overlap, as it were, this system, so that between the shifter *s* and the post *e'* would be located a shifter of another system with a signal-post between the shifter *s* and the post



5 *e* and its other signal-post at the right of the  
 post *e'*, as in Fig. 11, and so on, so that the  
 shifters would be located equidistant, and  
 between each two shifters would be two sig-  
 10 nal-posts, at either side of the track. Now  
 the systems being arranged as stated the  
 trains will have passed the posts *e* and *e'*;  
 but when the west-bound train reaches the  
 shifter between the post *e'* and the shifter *s*  
 15 the signal for the opposing train that would  
 be between the shifter *s* and the post *e* will  
 be withdrawn. Should the east-bound train  
 first arrive at the shifter between the post *e*  
 and the shifter *s*, then it would cause the sig-  
 20 nal for the west-bound train between the  
 shifter *s* and the post *e'* to disappear. It will  
 thus be seen that either train must withdraw  
 the signal for the opposing train before a  
 collision could occur, and in some cases both  
 25 trains could withdraw the signals for the op-  
 posing trains. In the operation when the  
 first wheel of a train engages the shifter *s*  
 the latter will descend and open the circuit,  
 causing the electric light *i* to be extinguished  
 30 and demagnetizing the electromagnet *r*, which  
 permits the armature *q* to descend by gravity,  
 the staff assuming a vertical position. The de-  
 vices shown in Fig. 8 would operate oppositely  
 or with reversed effects. When the bar *w* is  
 35 forced between the blades *y y'*, the latter will  
 frictionally hold down the shifter, and thus  
 continue the period of time in which the cir-  
 cuit is open, (or closed, as the case may be,)

40 so that after a train may have passed over a  
 shifter the signals behind the train will be a  
 protection thereto for a suitable length of  
 time against a following train, the elastic ten-  
 sion of the shifter *s* causing the bar *w* to be  
 45 gradually withdrawn from the friction-blades  
*y y'*, the result being obvious. The advan-  
 tage of the circuit-breakers 18 and 19 will be  
 obvious if a train stopping between the posts  
*e* and *e'* is to be protected against others.

Having thus described my invention, what  
 45 I claim as new is—

1. In railway signaling apparatus, the com-  
 bination with the track, of a pair of posts at  
 opposite sides of the track, arms attached to  
 opposite sides of the posts, flagstaffs pivoted  
 50 to the arms at either one of the sides of the  
 posts, flags attached to the ends of the staffs,  
 electric lamps mounted on the arms at the op-  
 posite sides of the posts, a generator, electro-  
 magnets mounted on the posts, movable ar-

55 matures poised near the electromagnets, op-  
 erating-rods connecting with the armatures  
 and also with the flagstaffs, circuit-con-  
 nectors, a shifter coöperating with the circuit-  
 connectors, and circuit-wires extending from  
 the generator through the electromagnets and  
 60 the electric lamps to the circuit-connectors  
 and also to the generator, substantially as set  
 forth.

2. In signaling apparatus, the combination  
 of a pair of posts, arms attached to the posts,  
 65 flagstaffs centrally pivoted upon the arms,  
 flags attached to the ends of the staffs, elec-  
 tric lamps mounted on the arms, a generator,  
 electromagnets mounted upon the posts, mov-  
 able armatures mounted below the electro-  
 magnets, bell-cranks mounted below the ar-  
 70 matures, operating-rods connected to the ar-  
 matures and pivoted to the bell-cranks, oper-  
 ating-rods connecting the bell-cranks and the  
 flagstaffs, circuit-connectors, a shifter coöp-  
 erating with the circuit-connectors, and cir-  
 75 cuit-wires extending from the generator  
 through the electromagnets and the electric  
 lamps to the circuit-connectors, substantially  
 as set forth. 80

3. In railway signaling apparatus, the com-  
 bination with the track, of a plurality of pairs  
 of posts adjacent to the track, the posts of  
 each pair being at opposite sides of the track  
 and forming a block, and the blocks overlap-  
 85 ping adjacent blocks, arms attached to the  
 posts, movable signal devices, means pivot-  
 ally supporting the signal devices on the posts,  
 electric lamps mounted on the arms, a gener-  
 ator, electromagnets mounted on the posts, 90  
 movable armatures mounted near the electro-  
 magnets and coöperating therewith, movable  
 connections coupling the signal devices to the  
 armatures, circuit-connectors situated at the  
 track, shifters situated at the track, one for 95  
 each block and coöperating with the circuit-  
 connectors for the block, and independent  
 series of circuit-wires for each block in con-  
 nection with the generator and extending  
 through the electromagnets and the electric 100  
 lamps and also through the circuit-connectors  
 of the block, substantially as set forth.

In testimony whereof I affix my signature  
 in presence of two witnesses.

JOHN GOLDSWORTHY.

Witnesses:

WM. H. PAYNE,  
E. T. SILVIUS.