

No. 885,061.

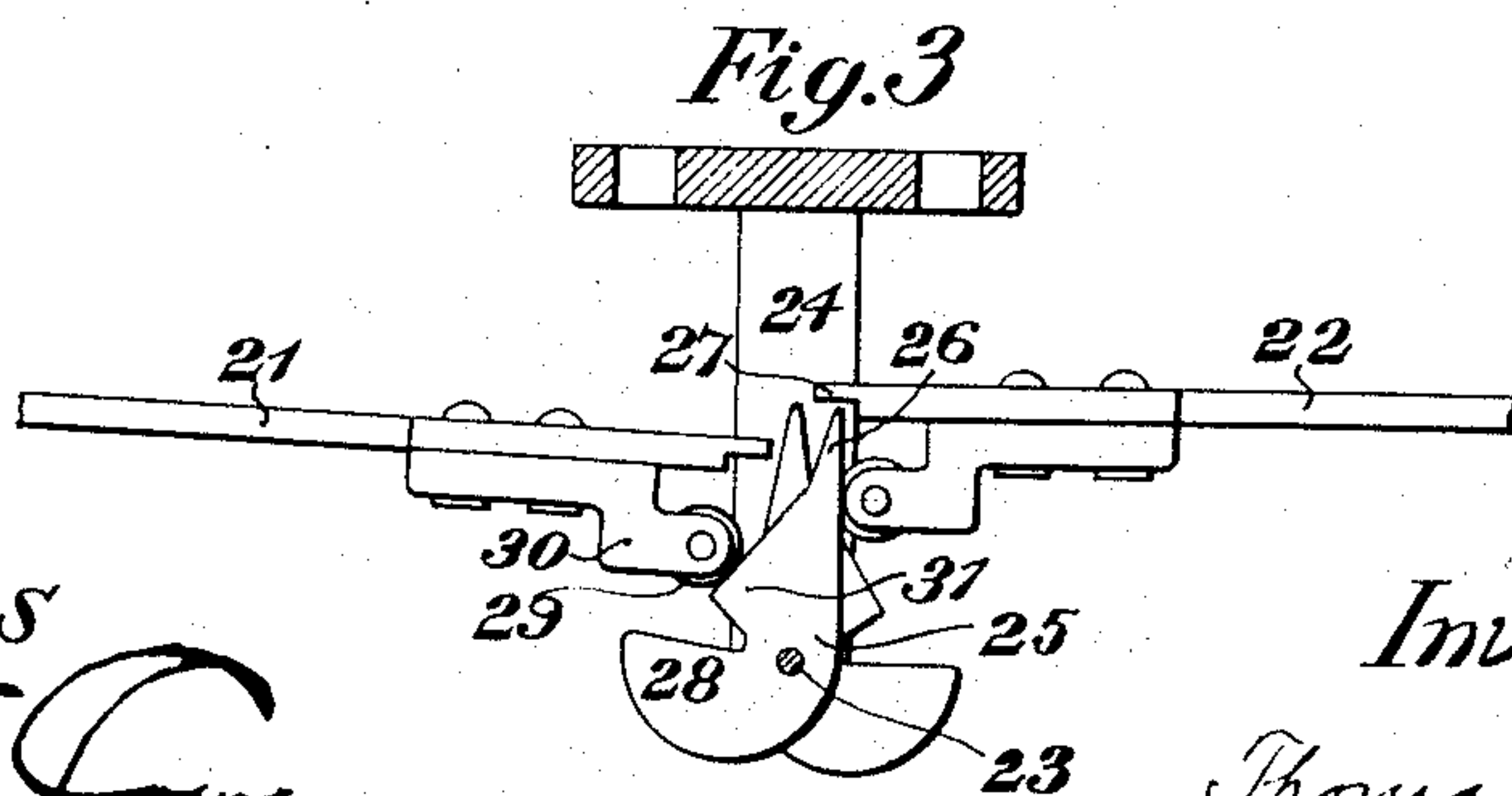
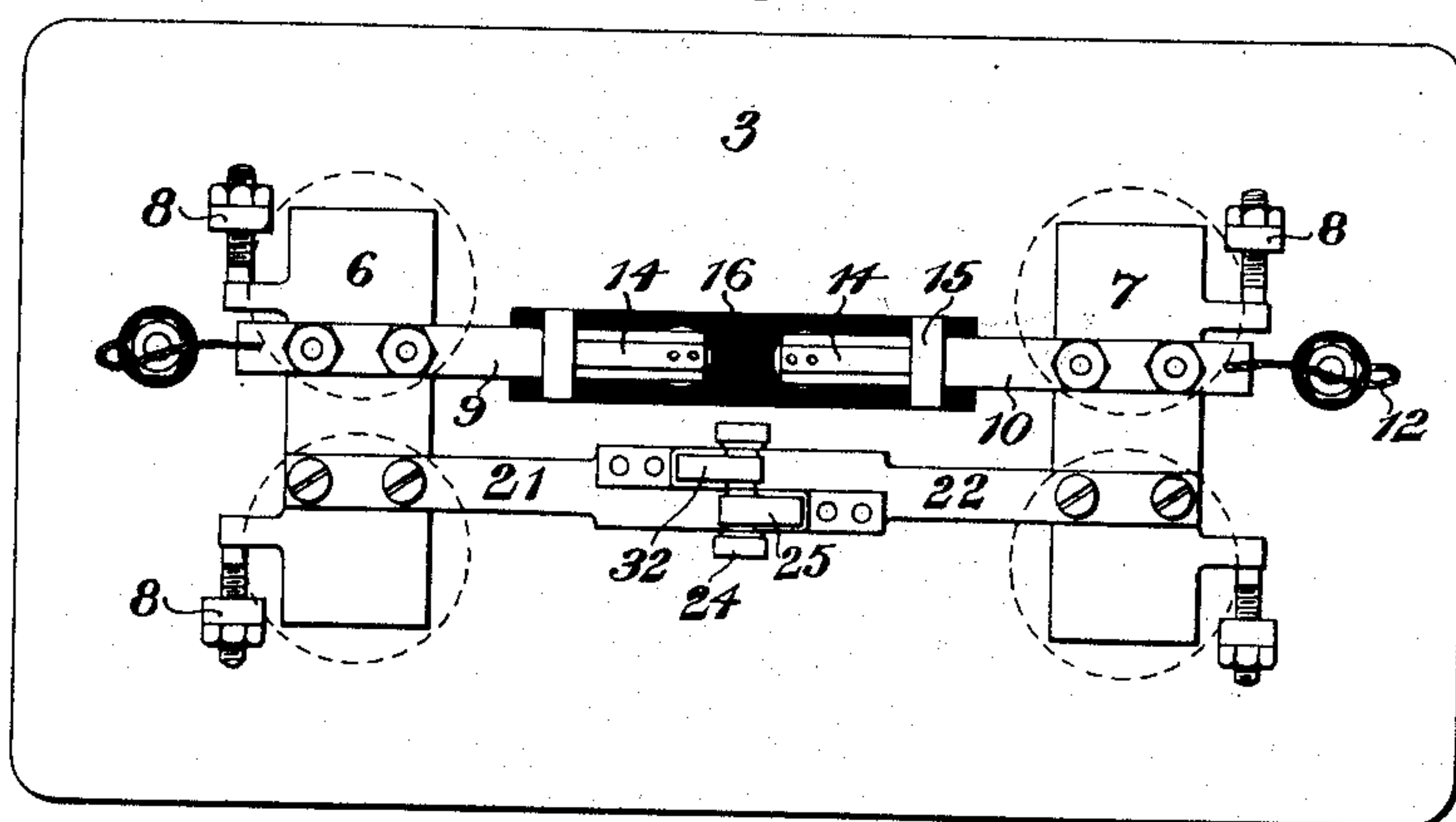
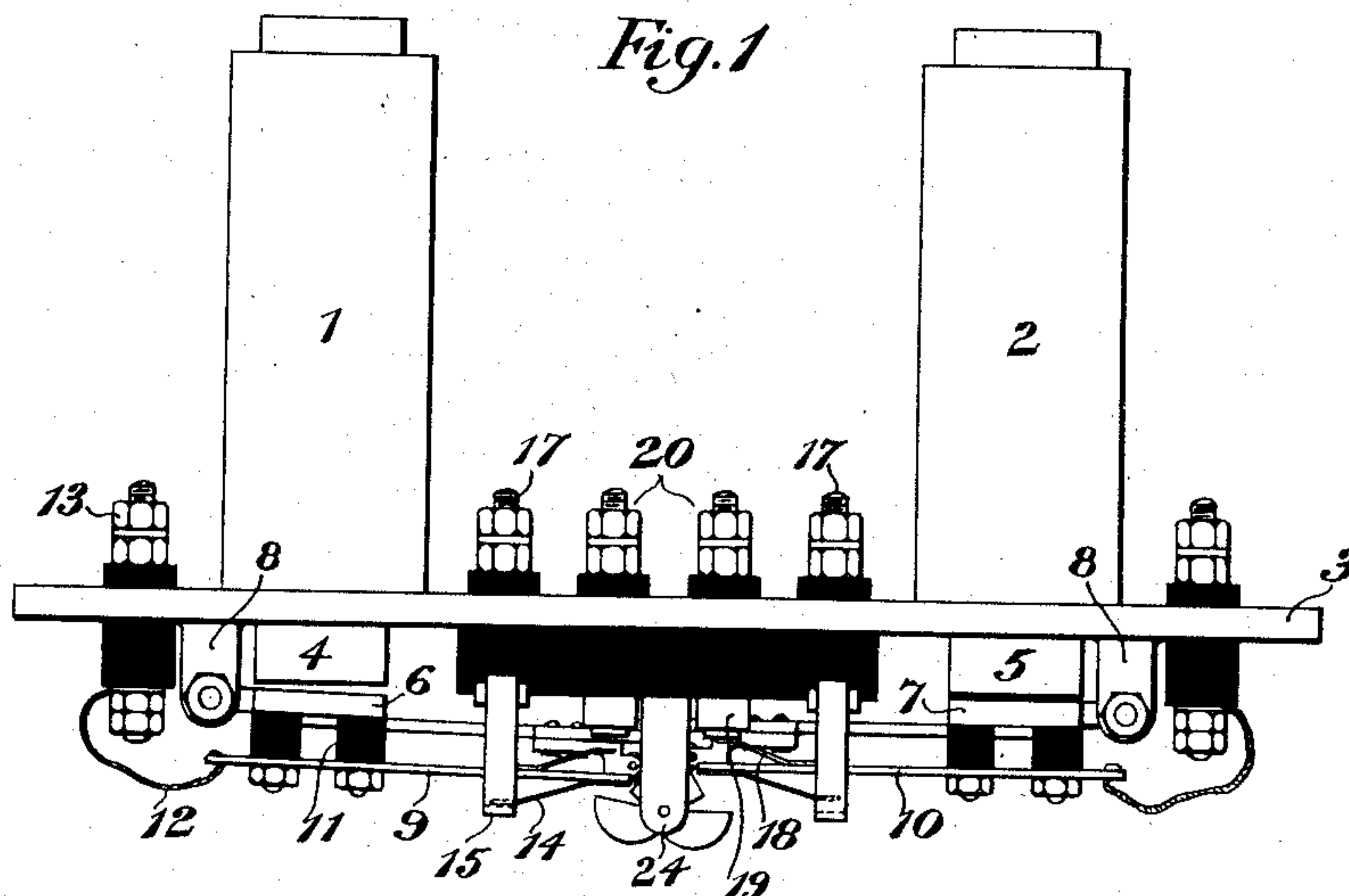
PATENTED APR. 21, 1908.

T. L. LEE.

INTERLOCKING RELAY.

APPLICATION FILED JUNE 6, 1907.

2 SHEETS—SHEET 1.



Witnesses
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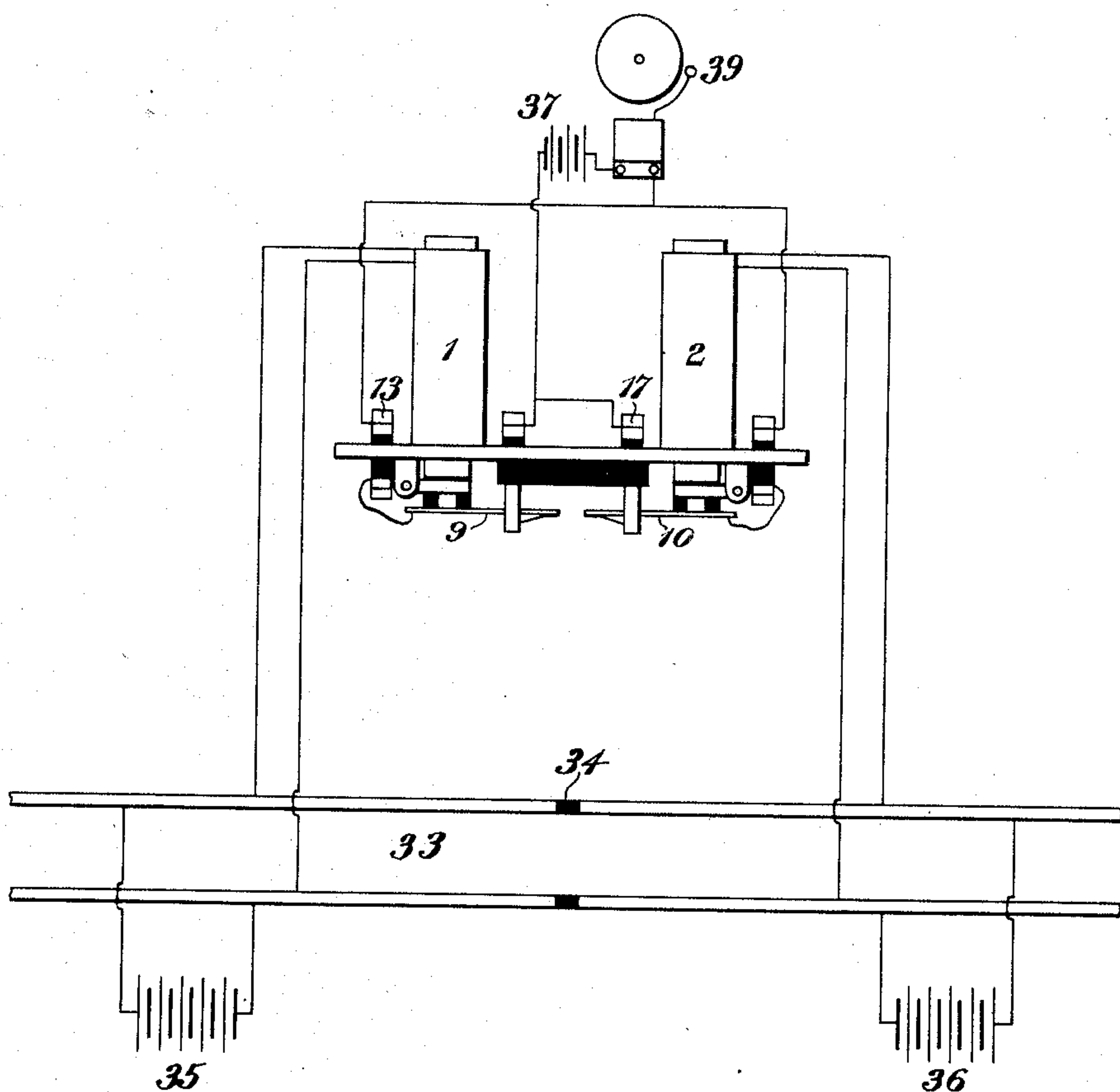
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2 SHEETS—SHEET 2.

Fig. 4



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UNITED STATES PATENT OFFICE.

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INTERLOCKING RELAY.

No. 885,061.

Specification of Letters Patent.

Patented April 21, 1908.

Application filed June 6, 1907. Serial No. 377,552.

To all whom it may concern:

Be it known that I, THOMAS L. LEE, a citizen of the United States, residing at Westfield, in the county of Union and State of New Jersey, have invented a certain new and useful Improvement in Interlocking Relays, of which the following is a specification, reference being had therein to the accompanying drawings, forming a part thereof.

My invention relates to relays for use in connection with electrical apparatus in which it is necessary to arrange for automatically preventing the contemporaneous opening or closing of two or more circuits, as, for example, in connection with an electric alarm bell for signaling the approach of trains on a single-track railroad, and the object of the invention is to produce an interlocking relay for this purpose which is simple in construction and reliable in operation.

To this end the invention comprises a relay in which two or more armatures controlling circuits are interconnected mechanically by detent mechanism operating, after one armature has been moved, to restrict the movement of another armature.

The invention comprises further an arrangement by which the detention of the second armature is continued, after the return of the first armature, until the impulse tending to move the second armature is discontinued.

Other features of the invention will be noted in connection with the description of the illustrated embodiment thereof.

I will now describe the embodiment of my invention illustrated in the accompanying drawings, and will thereafter point out my invention in claims.

In the drawings Figure 1 is a side elevation of an interlocking relay embodying the present invention. Fig. 2 is a bottom plan view of the relay. Fig. 3 is a detail view, in side elevation, of the detent mechanism; on an enlarged scale. Fig. 4 is a diagrammatic representation of an alarm-bell installation in which the relay is used.

The illustrated relay has two magnets 1 and 2 mounted on a base plate 3 and provided with pole pieces 4 and 5. Armatures 6 and 7 are pivoted on depending lugs 8 on the base plate and cooperate respectively with the pole pieces 4 and 5. The armatures carry flat metal contact fingers 9 and 10 fixed to the armatures but insulated from

them by insulating blocks 11. The contact fingers are connected, by flexible conductors 12, with binding posts 13 on the base plate.

Each contact finger carries a contact spring 14 cooperating with a stirrup-shaped fixed contact 15 mounted on an insulating block 16 and connected with a binding post 17. The contact springs 14 and the fixed contacts 15 constitute back contacts, being engaged and operating to close their circuits when the magnets are deenergized and the armatures fall by gravity.

In order that the armatures may operate also, when necessary, to interrupt circuits when they fall, each contact finger is provided with an upwardly-extending contact spring 18 arranged to engage a fixed contact 19 when the armature is in raised position. The front contacts 19 are mounted on the insulating block 16 and connected with binding posts 20.

The detent mechanism by which the armatures are rendered interlocking is shown particularly in Fig. 3. The armatures are provided with locking arms 21 and 22 arranged to cooperate with two detents pivotally mounted on a shaft 23 carried in a yoke 24 mounted on the base plate. The detent 25 has an upwardly-projecting arm 26 arranged to engage, when in operative position, the shouldered extremity 27 of the locking arm 22. A counterbalance 28 on the detent tends to swing the locking arm 26 to the left so as to keep it normally in inoperative position, clear of the end of the locking arm 22. A roller 29 is journaled in a bracket 30 on the locking arm 21, and engages an inclined cam surface 31 on the detent 25. When the armature 6 is released and falls the roller 29 operates to swing the detent 25 to the right, as shown in Fig. 3, and the arm 26 assumes a position beneath the end of the locking arm 22. If now the armature 7 be released by the magnet 2 it is prevented from falling, and the circuits controlled by the contact finger 10 are not affected. As long as the locking arm 22 rests on the detent arm the detent is prevented from returning to inoperative position, even after the armature 6 and the locking arm 21 have been raised again to normal position, and thus the detent is not restored to inoperative position by the counterbalance 28 until both armatures are restored to normal position.

The detent 32 is similar in form and opera-

tion to the detent 25, but serves to lock the locking arm 21 when actuated by the locking arm 22, so that the armatures are mutually interlocking.

5 Fig. 4 shows the electrical connections for an alarm bell on a single-track railroad. The rails 33 are divided and insulated at a point 34 opposite the station, and are connected at either side of this point with the terminals of
10 batteries 35 and 36. The rails are also connected with the terminals of the magnets 1 and 2, so that normally a constant current flows through each magnet and the arma-
15 tures are held in raised position. The front contacts of the relay are not used in this application of the device, but the binding posts 13 and 17 are connected in circuit with a bat-
20 tery 37 and an alarm bell 39, so that upon the closing of either back contact of the relay the bell will ring.

Supposing that a train approaches from the left, as soon as it enters the left-hand in-
25 sulated section of the track the wheels of the train short-circuit the battery 35 in the usual manner and the current substantially ceases to flow through the magnet 1. The arma-
30 ture 6 then drops and the contact finger 9 closes the bell circuit and the bell rings. The detent mechanism then occupies the position of Fig. 3. As soon as the forward wheels of
35 the train reach the right-hand portion of the track the battery 36 is short-circuited and the armature 7 is released. This armature is prevented from falling, except for the short
40 distance necessary to bring the locking arm 22 into contact with the detent arm 26, and the right-hand branch of the bell circuit is not closed. As soon as the train leaves the
45 left-hand portion of the track the armature 4 is raised, opening the bell circuit through the contact finger 9, and as the armature 7 is still locked by the detent 25 the bell ceases to
50 ring. When the train passes off from the right-hand section of the track the armature 7 is raised to normal position and the detent 25, being thus released from contact with the locking arm 22, returns to normal position.

When a train approaches from the right a similar series of operations occurs, with the
50 parts of the relay operating in reversed relation.

The above-described operation of the system is such as to cause the bell to ring, upon the approach of a train in either direction,

until the train passes the station, and then 55 to cease ringing, whereas with an ordinary relay the bell would continue to ring until the train passed from the second insulated section of the track.

The application of the relay above de- 60 scribed is only one of many which will occur to those skilled in the art, and it is apparent, furthermore, that various modifications may be made in the embodiment of my invention shown and herein described within the nature 65 and scope of the invention.

I claim:

1. An interlocking relay having, in combi-
nation, two magnets, two armatures con-
70 trolled thereby and operating to control electric circuits, and two movably-mounted detents each of which is arranged to be thrown into operative position by movement of one armature and to operate, when in such
75 position, to restrict the movement of the other armature.

2. An interlocking relay having, in com-
bination, two magnets, two armatures con-
80 trolled thereby and operating to control electric circuits, a pivotally-mounted detent pro-
vided with an upwardly-extending arm and an inclined cam surface thereon, a roll carried
85 by one armature and engaging the cam surface so as to swing the detent arm laterally into operative position when said armature
is moved in one direction, and means carried
90 by the other armature and arranged to engage the upper end of the detent arm in such operative position to restrict the downward movement of said means.

3. An interlocking relay having, in com-
bination, two magnets, two armatures con-
95 trolled thereby, contact fingers mounted on but insulated from the armatures, fixed con-
tacts cooperating with the fingers, a locking
arm mounted on each armature, and two
detents each of which is arranged to be en-
gaged and actuated by one locking arm and
to engage and lock the other locking arm to
100 prevent contemporaneous operation of the armatures and their contact fingers.

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

THOMAS L. LEE.

Witnesses:

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