No. 881,766. PATENTED MAR. 10, 1908.

O. BARNISH.

RAILWAY BLOCK SYSTEM.

APPLICATION FILED JULY 8, 1907.

2 SHEETS—SHEET 1.

Fig. 1.

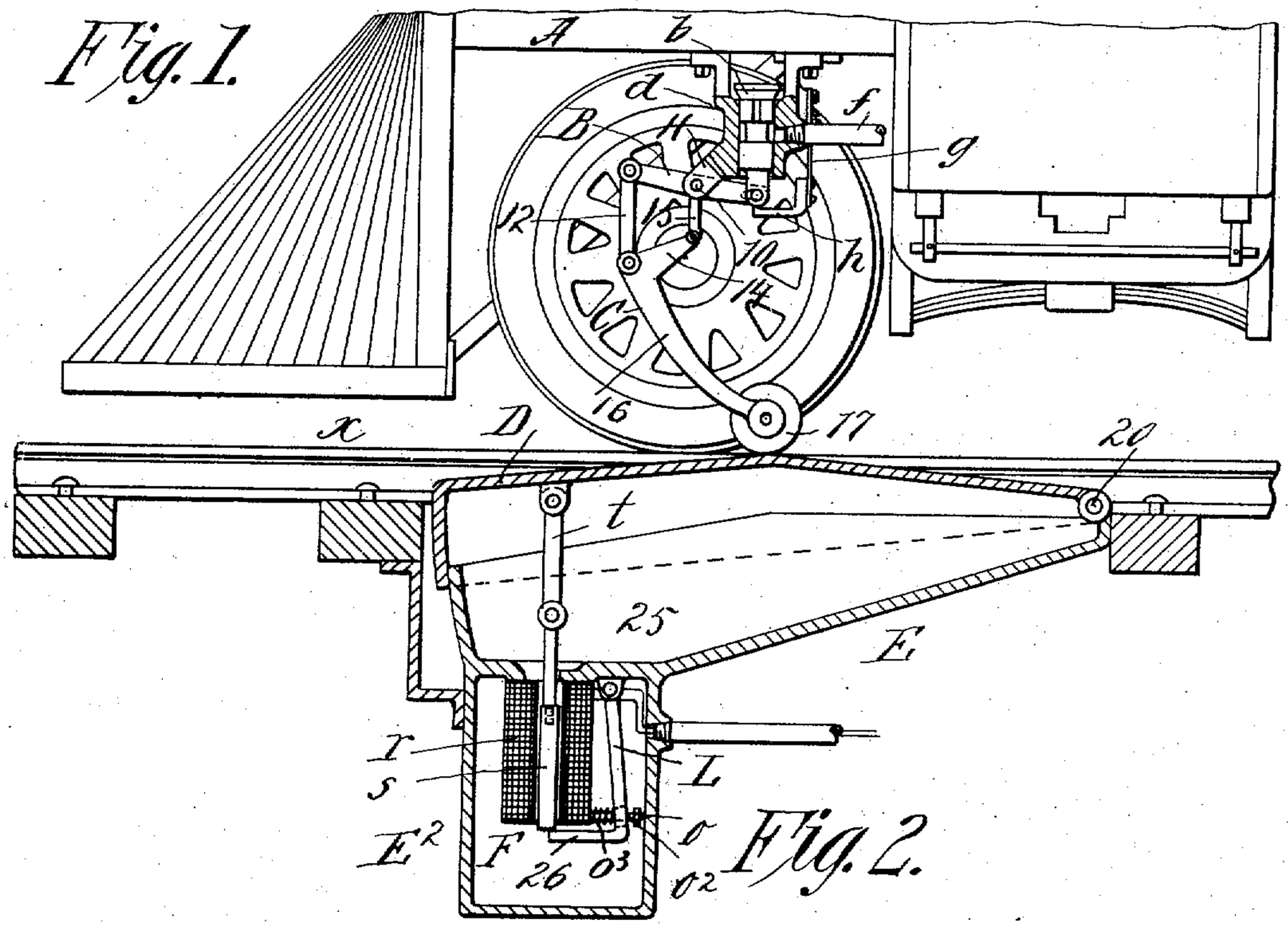
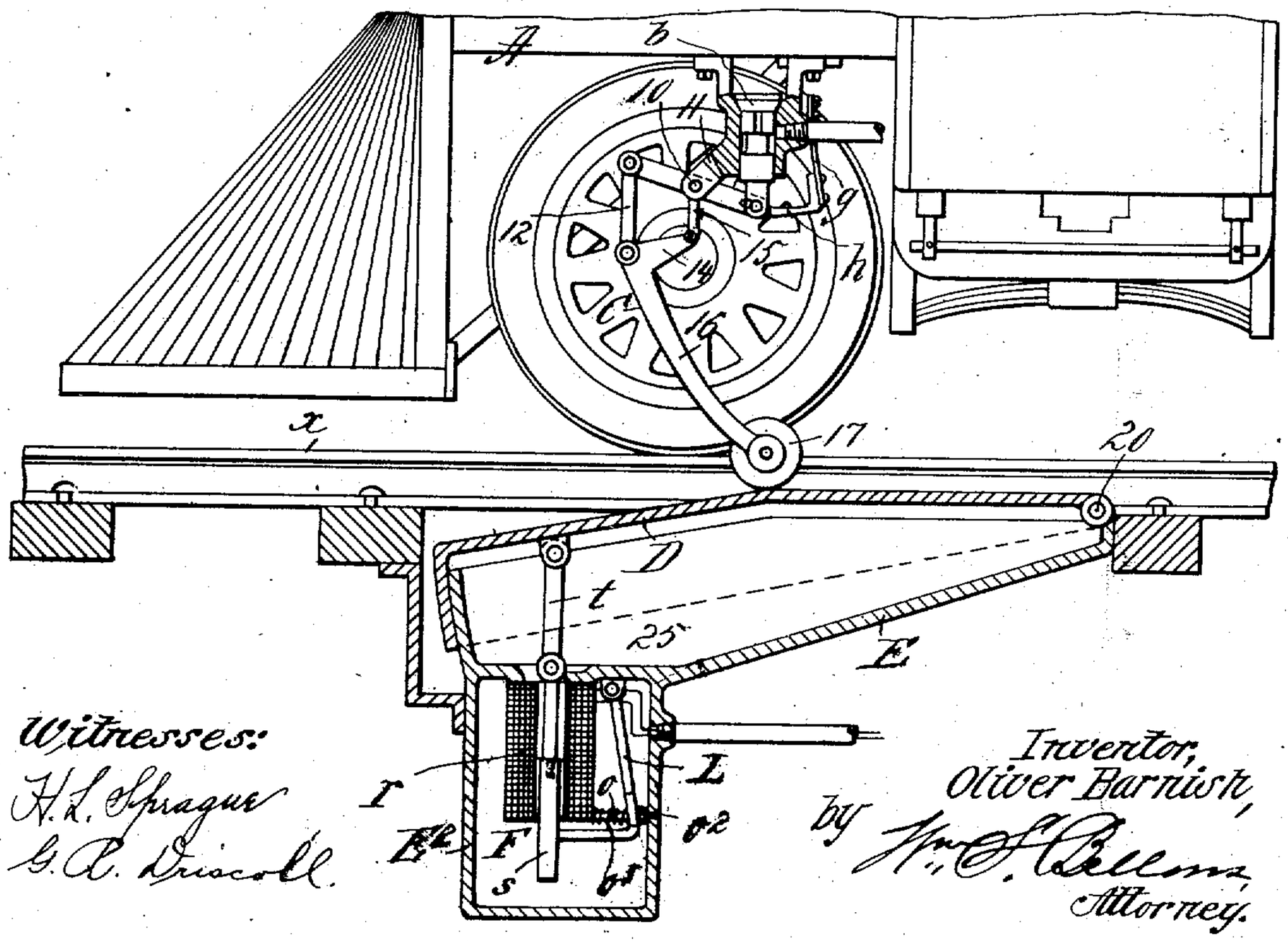


Fig. 2.



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2 SHEETS—SHEET 2.

Fig. 3.

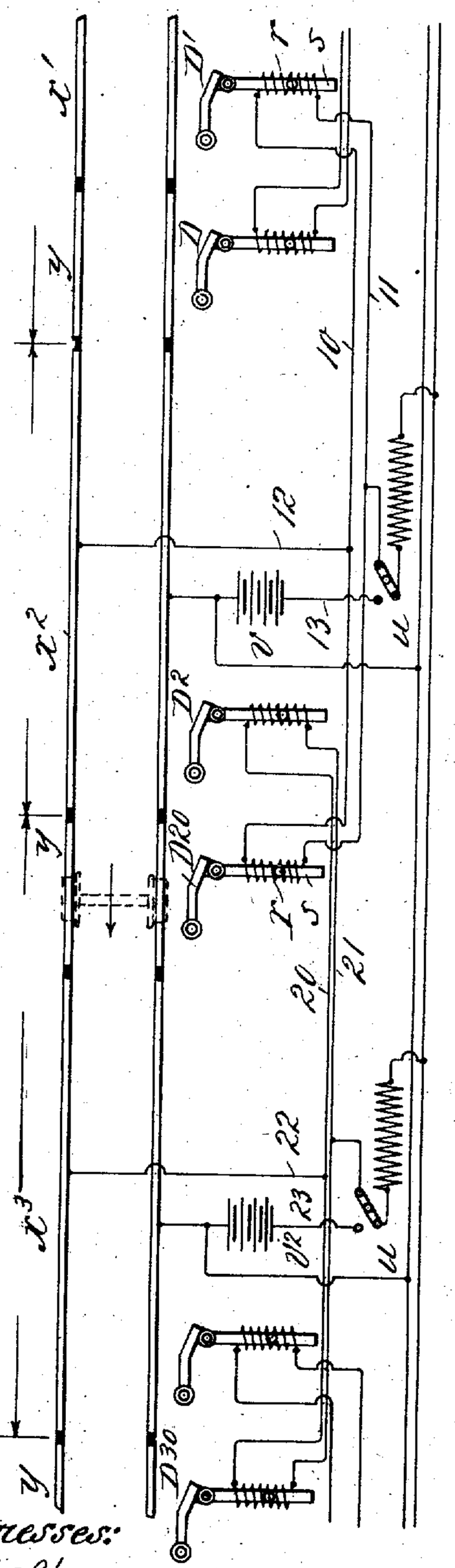
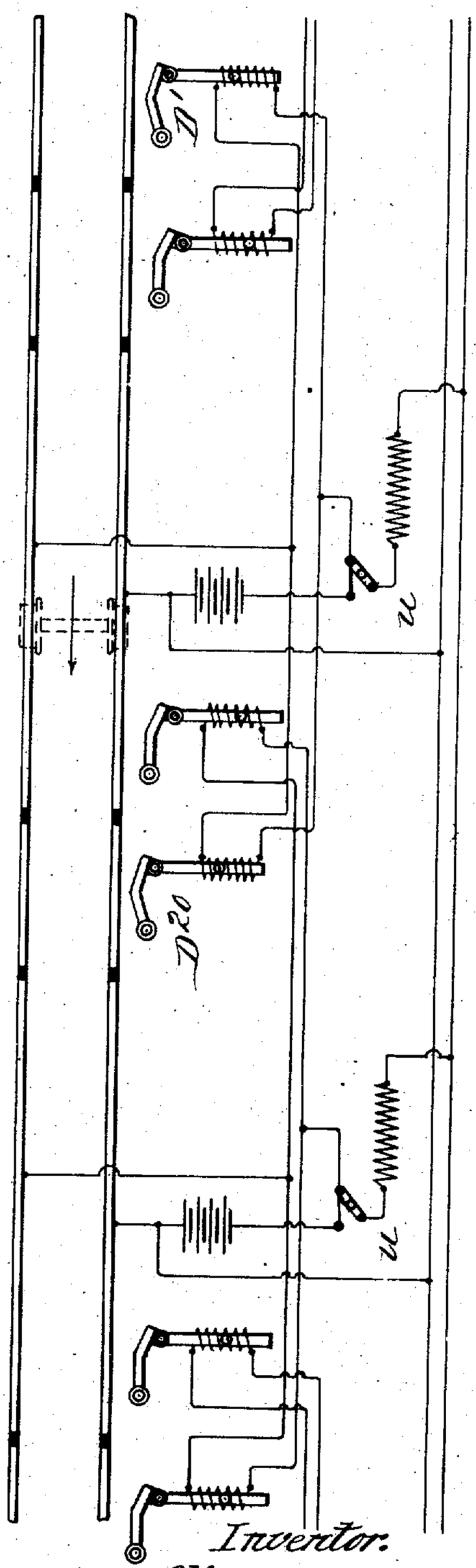


Fig. 4.



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UNITED STATES PATENT OFFICE.

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RAILWAY BLOCK SYSTEM.

No. 881,766. Specification of Letters Patent. Patented March 10, 1908.

Application filed July 8, 1907. Serial No. 382,568.

To all whom it may concern:

Be it known that I, OLIVER BARNISH, a citizen of the United States of America, and resident of Springfield, in the county of Hampden and State of Massachusetts, have invented certain new and useful Improvements in Railway Block Systems, of which the following is a full, clear, and exact description.

This invention relates to devices for inclusion in a railway block system designed to be operative to stop a moving train or to check the movements thereof, or otherwise warn the engineer, with certainty, whenever a train moves into a track section or block within which a train may be either running or stopped at any given time.

The apparatus of the character to which this invention pertains comprises a plurality of track sections or blocks insulated one from another and a vehicle to run thereover, of a movable abutment adjacent the track of one of said sections, a normally open circuit having a generator connected therein and also having connected therein the tracks of a given section, and also having connected therein a solenoid operative to shift the movable abutment adjacent the rail of a remote block, said circuit being adapted to be closed by the presence on the track section to which it pertains of opposite connected wheels of the locomotive or other vehicle running thereover together with a train controlling device on a vehicle and means operated by said abutment for actuating said train controlling device.

The particular object of the present invention is to provide means automatically coacting with the core of a solenoid,—and operative when the circuit is closed, the solenoid energized and the core thereof moved to shift the abutment to its train stopping position, to engage and lock the solenoid core whereby it is capable of resisting any impact or forces brought thereagainst by parts carried by the locomotive,—reliance on the potentiality of the electric current for keeping the solenoid elevated and the abutment shifted not being necessary; and as a consequence the comparatively small and light solenoids and low current may suffice for requirement of an efficient and reliable block system.

Another object of the invention is to provide an improved and more efficient means for operating the air brake controlling valve on a locomotive and for holding the valve, after it shall have been opened, with certainty, in its opened position.

The block system to which this invention pertains is in general similar to the one described, illustrated and claimed in an application for Letters Patent of the United States filed in my name March 16, 1907, Serial No. 364,221.

The invention consists in the improved devices or appliances and the combination and arrangement of parts hereinafter described in the accompanying drawings and set forth in the claims.

In the drawings,—Figure 1 is a side elevation of a portion of a locomotive showing, in section, the air brake operating valve for the engine and train drawn thereby, and showing in vertical section a movable abutment and electro magnetic means for controlling the position of the abutment, the parts being shown as in their positions for opening and holding open the said valve. Fig. 2 is a view similar to Fig. 1, but showing the parts as in their normal positions with the valve which controls the air brake mechanism closed. Figs. 3 and 4 are diagrams to show the inclusion of the movable abutments and electrically operating means therefor in a block system.

In the drawings,—A represents the forward lower portion of a locomotive and *b* represents the valve which controls the air brake operating mechanism or apparatus for the train, said valve being shown as adapted to open inwardly relatively to a seat therefor in a valve casing *d*, which by the pipe *f* is understood as connected with the usual air reservoir of the air brake system,—it being also understood that, as usual, the opening of the said valve causes an immediate vacuum effect for the setting of the brakes.

B represents a lever intermediately pivotally mounted at 10 on a bracket extension of the valve casing, one end of said lever being connected with the lower-exposed extremity of the stem of the valve.

A link 12 is pivotally hung to the other extremity of the lever B, to the depending end of which is pivotally connected an elbow lever C, the upper arm 14 of which remains

in contact against, or is pivoted to, the lower end of a depending extension or lug 15 carried by the bracket 11 while its depending member 16 extends alongside of and in proximity to the rail x at one side of the trackway and is provided with a roller 17, the path of which may be left clear or intercepted by the abutment D accordingly as to whether the latter is in its lower normal position, or elevated. The air pressure exerts a downward force at all times on the air brake controlling valve b to normally keep the same closed and the lever C in the position shown in Fig. 2.

A vertical spring g is affixed by its outer end portion on the side of the valve casing, and its lower free end carries an angular stop h the normal position of which is shown in Fig. 2,—the same being operative so soon as the valve is opened and raised to the position shown in Fig. 1, to be spring snapped under the lower end of the valve stem and operate as a lock for holding the valve opened for an indefinite time,—that is until it may be manually forced away from engagement with the valve stem to permit the valve under the air pressure thereagainst to be closed.

The abutment D is in its length of an obtuse angular form and is pivoted at 20 at one end of an upwardly open elongated casing E which is sunk below the level of the road bed just outside of the track line. The said casing has a downward extending continuation E^2, in which is an axially vertical solenoid F,—r representing the solenoid coil, and s its core. The solenoid which is below the abutment plate D is connected to the latter by the link t so that when an electric circuit in which the solenoid is included is energized, causing the rising of the solenoid core, the abutment D will be elevated to the position shown in Fig. 1, its humped middle portion having a position to lie across the path of the longitudinally moving lever roller 17.

L represents the solenoid lock, the same having the form of a rigid L shaped lever pivotally hung, as represented at 25, at its upper end in a supporting ear lug therefor formed as part of the solenoid casing, while its lower horizontally disposed member 26 has its location below the solenoid coil. A short rod o stands from the side of the solenoid coil, near the bottom of the latter through a vertical slot in the L shaped locking lever, and has a stop nut o^3 at its outer end, while a spiral spring o^2 encircles the rod and is in compression between the lever T and the side of the coil. When a circuit in which the solenoid is connected is opened and the solenoid is dead, the spring o^2 will cause the locking device L to be swung to the rightward, as represented in Fig. 2, the solenoid core will drop and the abutment D will be lowered. When the solenoid is energized so that its core is drawn upwardly to elevate the abutment D, the locking device L, which has the function of an armature, is electrically attracted towards the axis of the core of the solenoid and engages in the lower end thereof and serves to mechanically lock the core in its raised position whereby the core and abutment D held supported thereby, will be capable of resisting forces in a relatively downward direction thereagainst which may be much stronger than the solenoid core might be able to sustain from the exercise, merely, of electrical agencies. So soon as the circuit becomes opened and the solenoid deënergized the force for maintaining the lock L for the solenoid core in the engagement with the latter becomes destroyed, leaving the solenoid locked subject to the action of its retracting spring which is effective to displace it from engagement with the core which by its gravity will descend and permit or insure the lowering of the abutment D.

The devices comprising the abutment and solenoid, for coaction with the air brake valve operating devices on a locomotive may be utilized in a railroad block system, for instance in a manner represented in the diagram views, Figs. 3 and 4, wherein x^1, x^2, and x^3, represent suitably long track sections or "blocks" which may be a mile, more or less in length; and these blocks are separated by comparatively short track sections y as long as the maximum length of any train which may be run thereover. One of the abutments D and its electro magnetic actuating device is located alongside of the track of one of the "dead sections" y; and another of these abutments is located adjacent the rail at or near the forward end of the next block in advance. The coil r of the solenoid, coacting with the abutment specially designated D', which is adjacent the track at the advanced end of block x', is oppositely connected by the circuit wires 10 and 11, which by wires 12 and 13 have connection with the bonded rails in the block x^2, said wires also having connection with the opposite ends of the coil r of the solenoid coacting with the abutment, specially designated by D^{20} in the dead track section y, which is in advance of track section or block x^2, and one of the track connecting circuit conductors (13) has a battery or other generator v connected therein. Another set of circuit conductors 20, 21, connects the solenoid coil coacting with the abutment D^2 near the forward end of block x^2 and the coil of the solenoid coacting with the abutment D^{30} adjacent the dead rail section in advance of the block x^3; and these circuit conductors 20, 21, by wires 22 and 23 have connections with the bonded track rails in the latter named block, and said circuit conductors have a battery v^2 connected therein.

Assuming the train runs past block x^1 into block x^2, conditions will be established,

as represented by the diagram Fig. 4, that is to say, axially united wheels of the train will close the circuit in which solenoids D′ and D²⁰ are included and cause the elevation of the abutments which are combined with the solenoids; and now, of course, if a train approaches the block x^2 from the rear, before reaching the forward end of block x', it will encounter, through the medium of the lever arm h thereon, the abutment, specially designated by D′, with the result that its air brake valve will be mechanically opened and the train will be stopped before having proceeded very far on the dead track section in advance of block x';—and thus no train can collide at the rear end of one already in the block x^2. And, again, on the assumption that the apparatus may be used on a single track road, the train in block x^2 securing the elevation of the abutment D²⁰ on the dead track section in advance thereof, will assure the train in said block x^2 from being collided with, head on, by a train moving towards it from the left. And it is, of course, manifest that repetitions of the devices including the abutments and circuit connections pertaining to pairs thereof will protect each and all of the blocks in the system in the manner which has been especially described in respect of the block x^2. The circuit conductors in which a block and a solenoid are connected may each have a cut out switch u, the same to be normally closed, but adapted to be opened for the purposes of economy or expediency.

Whenever by the operation of the electro mechanical devices described the air brake controlling valve b is upwardly opened against the air pressure, the spring carried lock h, snapped under the lower end of the valve stem, will operate to keep the valve locked open for an indefinite time, that is, until the catch or lock is manually disengaged, allowing the valve to automatically close under the pressure.

I claim:—

1. In a railway block system, the combination with a plurality of track sections insulated one from another, and a vehicle to run thereover, a movable abutment adjacent a track of one of said sections, a normally open electric circuit, having a generator connected therein, comprising the tracks of a given section, and also having connected therein a solenoid, said circuit being adapted to be closed by the presence, on the track section to which it pertains, of opposite connected wheels of the vehicle, means for engaging and locking the shifted core of the solenoid, and a brake operating device on the vehicle adapted to be actuated by said abutment.

2. In a railway block system, the combination with a plurality of track sections insulated one from another, and a vehicle to run thereover, a movable abutment adjacent a track of one of said sections, a normally open electric circuit, having a generator connected therein, comprising the tracks of a given section, and also having connected therein a solenoid the core of which is operative to shift said movable abutment, said circuit being adapted to be closed by the presence, on the track section to which it pertains, of opposite connected wheels of the vehicle, an armature adapted to be magnetically attracted by the energized solenoid and to engage, and lock, the shifted core of the latter, and a brake operating device on the vehicle adapted to be actuated by said abutment.

3. In a railway block system, the combination with a plurality of track sections insulated one from another, and a vehicle to run thereover, a movable abutment adjacent a track of one of said sections, a normally open electric circuit, having a generator connected therein, comprising the tracks of a given section, and also having connected therein a solenoid the core of which is operative on said movable abutment, said circuit being adapted to be closed by the presence, on the track section to which it pertains, of opposite connected wheels of the vehicle, an L-shaped armature pivotally mounted at the side of the solenoid, adapted to have a member thereof magnetically attracted by the latter when energized, and by a member thereof to engage and lock in shifted position the solenoid coil, and a spring for retiring the armature from engagement with the solenoid coil, and a brake operating device on the vehicle adapted to be actuated by said abutment.

4. The combination with a solenoid and circuit conductors in which it is connected, of an armature pivotally mounted alongside the solenoid and adapted to be magnetically attracted to assume a position across the axis of the solenoid and to engage the shifted core of the latter, and means for retiring said armature from its core engaging position.

5. The combination with a solenoid and circuit conductors in which the solenoid is connected, of an L-shaped armature pivotally mounted at the side of the solenoid and adapted on the energizing of the latter to have an angular member thereof magnetically attracted to locking engagement with the shifted solenoid core, a rod relatively to which the L-shaped armature swings and a spiral spring encircling the rod and reacting against said armature.

6. The combination with a trackway, and a railway vehicle having an air brake controlling valve mounted thereon, and a lever intermediately pivoted on a fixture adjacent said valve, having one arm thereof engaged

with the stem of the valve, an elbow lever fulcrumed at the end of one of its arms to an extension of the valve casing, link connected at its elbow to an arm of the first named lever and having a depending arm, of a movable abutment located adjacent a rail of the trackway adapted to assume a position to be engaged by and to swing said elbow lever, and means for moving said abutment to the lever engaging position.

Signed by me at Springfield, Mass., in presence of two subscribing witnesses.

OLIVER BARNISH

Witnesses:
G. R. DRISCOLL,
WM. S. BELLOWS.