

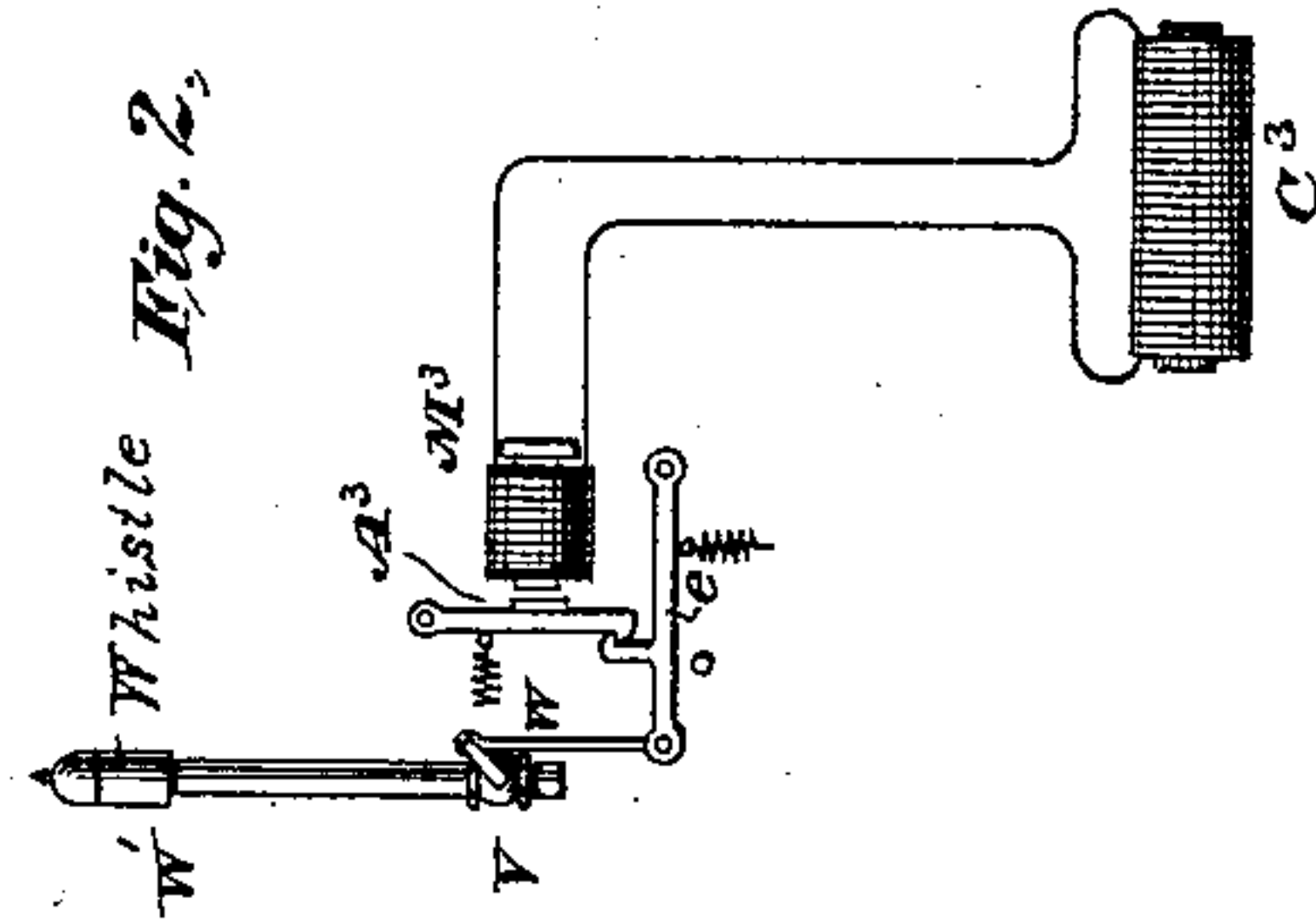
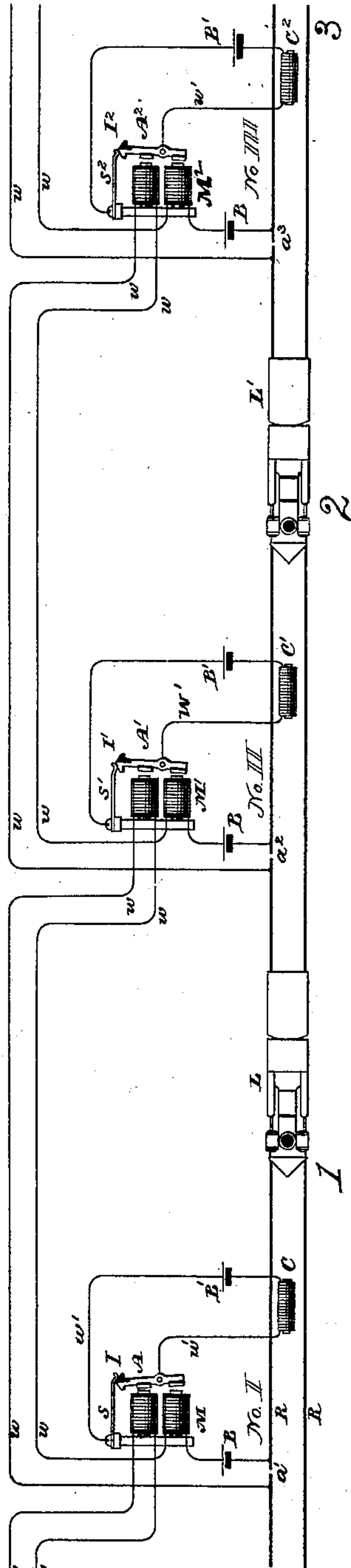
(No Model.)

W. F. Z. DESANT.  
RAILWAY SIGNAL.

No. 435,558.

Patented Sept. 2, 1890.

Fig. 1.



Witnesses  
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# UNITED STATES PATENT OFFICE.

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## RAILWAY-SIGNAL.

SPECIFICATION forming part of Letters Patent No. 435,558, dated September 2, 1890.

Application filed October 31, 1889. Serial No. 328,812. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIAM F. Z. DESANT, a citizen of the United States, and a resident of New York, county of New York, and State of New York, have made a new and useful Invention in Railway-Signals, of which the following is a specification.

My invention relates to improvements in railway-signals of that type known in the art as "block-signals," and in which the apparatus is regulated in its action or controlled by electricity.

In a prior patent granted by the United States jointly to Horace Hayden, Jr., and myself February 26, 1889, bearing No. 398,613, is disclosed a system of electrical block signaling for railways in which the successive signals in the block-sections are operated through the agency of electrically-controlled devices and the location of trains on the blocks made apparent to the engineers in the cabs of the engines as they approach the entrance of each block by sounding an alarm on board the engine if the preceding section is not clear. In that patent are disclosed two operating batteries at the end of each of the blocks with electro-magnets and circuit-connections for operating the signals in advance and rear and for sounding an alarm on the engine-cab in the event of an advance section being obstructed by a preceding train or engine. One of these batteries has for its function the operation of the signal on board the engine by circuit-connections through the wheels of the engine, a local magnet, and the wheels of the cab back to starting-point, the other battery operating the block apparatus in each direction.

My present invention is an improvement upon the above; and its object is to avoid the use of a local circuit through the wheels and alarm-magnet, thereby simplifying the apparatus and rendering it more certain in its operation. I accomplish this object by the arrangement and construction of parts hereinafter described, but particularly pointed out in the claims which follow this specification.

My invention will be better understood by referring to the accompanying drawings, in which—

Figure 1 is a plan and diagrammatic view

of a system of electrical block railway-signals, disclosing three blocks with the electrical circuits therefor. Fig. 2 is a detail view of that portion of the apparatus carried on board the engine or train for sounding the alarm thereon.

Referring to the drawings in detail, R R are the rails of a single-track railway, one line of which is divided at the points  $a'$ ,  $a^2$ , and  $a^3$  by insulation into block-sections 1, 2, and 3. In the prior patent above referred to the construction was such as to require supplemental short insulated sections, which feature I avoid by my improvement.

$w w$  and  $w w$  are the signaling-circuits running to the advance and rear ends of each block, and M, M', and M<sup>2</sup> the signal-magnets, A A' A<sup>2</sup> being the armatures thereof.

$w' w' w'$  are the local circuits for the batteries B' B' B'.

B B B are the signal-batteries for controlling the block-signal apparatus through the agency of magnets M M' M<sup>2</sup>, having armatures A A' A<sup>2</sup>.

I I' I<sup>2</sup> are insulating-blocks on the armatures A A' A<sup>2</sup>.

L L' are locomotive-engines, each of which carries its own signal apparatus, consisting, preferably, of a whistle W', having a valve or cock V, controlled by a lever  $e$  and hook-connections with the armature-lever A<sup>3</sup> of local magnet M<sup>3</sup>.

C, C', and C<sup>2</sup> are inductors of any preferred kind included in the local circuits  $w' w'$  of batteries B' B' B', said inductors being fixedly located in the road-bed and in such relation to the moving trains that as said trains pass over them they will inductively effect the secondary inductors C<sup>3</sup>, carried beneath the locomotive or car in which the signaling-magnet M<sup>3</sup> and its circuit is placed. These inductors, both primary and secondary, have preferably magnetic cores; but they may be omitted and the inductive positions of said parts be arranged to obtain the secondary currents in any manner known to those skilled in the art.

The operation is as follows: The engine L being on section 1, the armature of magnet M' at the entrance of that section is tilted with its upper end to the right, and the cir-



cuit of battery B' is closed through the spring s', circuit w', and track-inductor C', so that when engine L' passes over this track-inductor a current is induced in the secondary inductor C<sup>3</sup>, carried by the engine. This current energizes magnet M<sup>3</sup> and releases the lever e in a manner at once obvious, thereby announcing to the engineer that the engine L has not passed out of section 1. When the engine L passes out of section 1, circuit is made through each wheel of the engine and cars as it passes over the joint a' from battery B, through the lower half of magnet M, at station No. I to the upper half of magnet M' at station No. II and back by wire w to joint a', thus turning the armatures A A' to "danger" in the first instance for the section next beyond 1, and to "safety" in the second instance for engine L', now entering section 1, the passage of L' into section 1 displaying "danger" at station No. II to incoming engine and "safety" at station No. III. The signaling mechanisms at the ends of the blocks may be of any preferred type and controlled by the armatures A, A', A<sup>2</sup>, &c., in any preferred manner, block-signals controlled by electromagnets being well known in the art. An example of block-signals so controlled is illustrated in patent to F. L. Pope, No. 129,425, of July 16, 1872. The alarm of course continues to sound until the lever e is restored to its normal position by hand. Should the engine pass the inductors C' at the entrance of any section and receive an alarm, the engineer will of course ascertain when it is safe to proceed by moving his engine back and forth over the inductor or by taking notice of the position of the armature A, A', or A<sup>2</sup>, or its indicating mechanism of usual form. With this improved apparatus there is little danger that lightning will disturb the signals, the signaling-circuits being always open between the sections at a' a<sup>2</sup> a<sup>3</sup>, &c., and virtually earthed through the rails on each side of the controlling-magnets. Surety of action is had for the reason that the circuit is closed between the sections on the passage of each car, while there is no unnecessary conducting-circuit between the track and the engine or car carrying the moving inductor and its circuit-connections.

I am aware that it is broadly old to cause an inductor carried by a locomotive-engine to indicate inductively through a second inductor located in the road-bed and wires leading to a distant electrical signal that such engine is approaching the point where the signal is located, and I make no claims to this feature.

I am also aware that it is old in railway-car telegraphs to transmit signals between two or more moving trains which have no mechanical or electrical connections with the track or adjoining inductors through the agency of inductive apparatus, and that it is old to operate railway-signals of the "block" type, in which signals are transmitted to the loco-

motive-cab or a car inductively, said signals being controlled in the successive blocks by circuit-closers frictionally operated by the moving train, and I therefore make no claim to such constructions, my invention being directed to the application of the principle of controlling the movement of trains in a system of block signaling wholly by inductive signals from the advance and rear blocks, wherein the entire control of the block system is due to the inductive action of the apparatus, there being in my system no mechanical connection between the moving trains and any part of the signaling apparatus, and the position of the block-signals being controlled through the agency of battery-circuits and the direct action of the car-wheels themselves acting as circuit-closers; but

What I do claim, and desire to secure by Letters Patent of the United States, is—

1. In a railway-signal system of the block type, a line of rails divided into blocks separated or insulated electrically from each other at the ends of the blocks, in combination with signaling-circuits for each block, local circuits, including inductors controlled by the signaling-circuits, and a secondary inductor-circuit carried by a moving train and including alarm mechanism, substantially as described.

2. In a railway-signal system of the block type, a series of signaling-circuits having electrical connections with the ends of electrically-insulated lines or blocks of rails, in combination with local signal-circuits, including inductive devices located near the road-bed, and a secondary inductor-circuit carried by a moving train and including alarm mechanism, substantially as described.

3. In a railway-signal of the block type, a series of signaling-circuits, including signaling-magnets and having electrical connections with the ends of electrically-insulated blocks of rails, in combination with local circuits, including inductors at the end of each block, controlled by said signaling-circuits, and a secondary inductor-circuit carried by a locomotive and including alarm mechanism, substantially as described.

4. In a railway-signal of the block type, a series of signaling-magnets, one pair for each block, a pair of circuits for said magnets, one running to the front and the other to the rear of two adjoining blocks, a battery at each block for energizing said magnets, a local circuit, including a double armature adapted to be influenced by said magnets in turn, and an inductor located in close proximity to the track, in combination with a second inductor carried by a moving train in close proximity to the first-named inductor as said train passes it, said second inductor including in its circuit an electro-magnet which controls an alarm on board the train, substantially as described.

5. In a railway-signal of the block type, a pair of signaling-magnets at one end of each



block, a pair of circuits and batteries, one for  
each magnet, said circuits running to the front  
and rear of each block and including circuit-  
connections for closing said batteries through  
5 said magnets in succession, a tilting arma-  
ture-lever having an armature for each mag-  
net and included in the local circuit at the  
end of each block, with a stationary inductor  
located near the road-bed, and a second in-  
10 ductor carried by the train in close proximity  
to the first-named inductors, and including  
in its circuit an electro-magnet the armature  
of which controls a signal, substantially as  
described.

6. In a railway-signal of the block-type, 15  
the combination of signaling-magnets  $M M'$   
 $M^2$ , batteries  $B$ , circuits  $w w$ , local circuits  $w'$   
 $w'$ , batteries  $B'$ , armature-levers  $A A' A^2$ , in-  
ductors  $C C' C^2$ , with a secondary local in-  
ductor  $C^3$ , carried by a moving train, and in- 20  
cluding in its circuit an electro-magnet  $M^3$   
and signaling mechanism, substantially as  
described.

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Witnesses:

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