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PATENTED OCT. 2, 1906.

W. K. HOWE.  
RAILWAY SIGNALING APPARATUS.  
APPLICATION FILED NOV. 27, 1905.

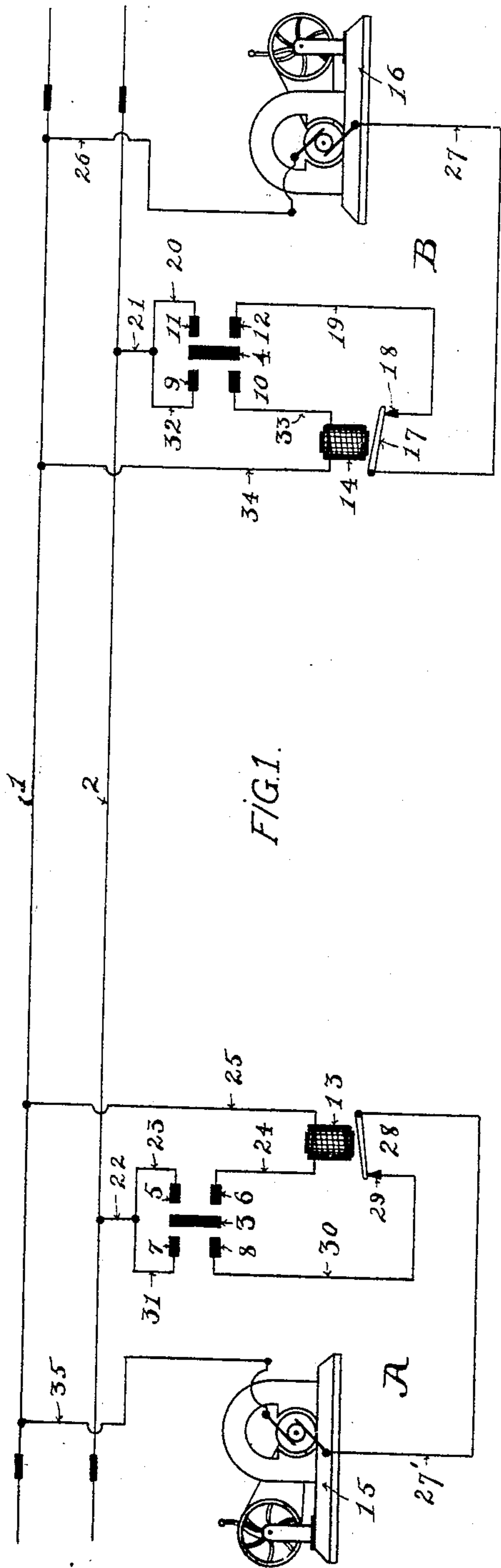


FIG. 1.

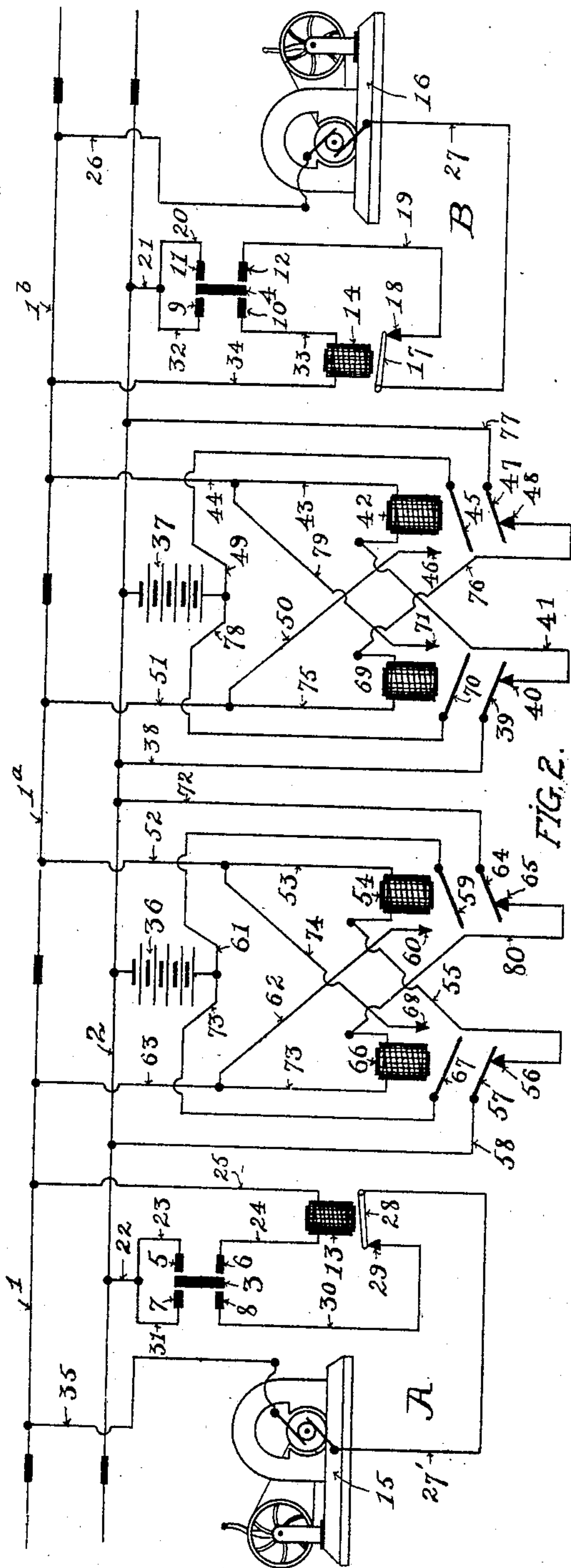


FIG. 2.

WITNESSES

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# UNITED STATES PATENT OFFICE.

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## RAILWAY SIGNALING APPARATUS.

No. 832,193.

Specification of Letters Patent.

Patented Oct. 2, 1906.

Application filed November 27, 1905. Serial No. 289,260.

*To all whom it may concern:*

Be it known that I, WINTHROP K. HOWE, a citizen of the United States, residing at Buffalo, in the county of Erie and State of New York, have invented new and useful Improvements in Railway Signaling Apparatus, of which the following is a specification.

My invention relates to railway signaling apparatus, and more particularly to apparatus employing electric energy in connection with the performance of theseveral functions.

The object of my invention is, first, to provide means for controlling the permissive movement or unlocking in manual-control block-signalsystems, and, second, to provide a relay system adapted not only to manual-control block systems, but to other electrically-controlled systems, by which the electric energy, which would under ordinary circumstances be inadequate to effect a result over a very long block or under serious conditions of leakage, may be employed to produce the desired results.

Referring to the drawings herewith, in which like characters of reference indicate corresponding parts, Figure 1 is a diagrammatic view of the first part of my invention, and Fig. 2 is a similar view of the said first part of my invention in combination with the said second part of my invention.

I will first describe that part of my invention shown separately in Fig. 1 by reference to that figure. A represents the apparatus generally at one end of a block, and B the apparatus at the other end of the block. Only the apparatus and wiring directly connected with my invention are shown, the ordinary signal apparatus and telegraphic or other means of communication between operators of adjacent blocks being well understood. 1 and 2 are the rails of an ordinary block-section, insulated from rails of adjacent blocks in the usual way. 3 and 4 represent the two electric switches through which permission is given and received, and 5 and 6, 7 and 8, 9 and 10, 11 and 12 are the contacts bridged by said switches 3 and 4. 13 and 14 are the signal-lever-releasing magnets at the blocks A and B, and 15 and 16 are hand-operated generators at blocks A and B, respectively.

Let it be assumed now that the operator at A desires to move his signal to the proceed position. He communicates such desire to the operator at B (in any well-known way, as by telegraph) and at the same time moves his switch 3 to bridge contacts 5 and 6. To give the release, the operator at B moves his switch 4 to bridge contacts 11 and 12 and then applies his muscles to his generator 16. This action generates a current which flows from the generator 16 through wire 27, arm 17, contact-point 18, wire 19, contact 12, switch 4, contact 11, wires 20 21, rail 2, wires 22 23, contact 5, brush 3, contact 6, wire 24, magnet 13, wire 25, switch-rail 1, and wire 26 back to generator 16. This will energize releasing-magnet 13 and permit the operator at A to move his signal. In like manner assume the operator at B has asked the operator at A for permission to move his signal to the proceed position. The operator at B moves his switch 4 to bridge 9 and 10, and the operator at A responds by moving his switch 3 to bridge 7 and 8. The operator at A then operates his generator 15, and current flows from said generator through wire 27', arm 28, contact 29, wire 30, contact 8, switch 3, wires 31 22, rail 2, wires 21 32, contact 9, switch 4, contact 10, wire 33, releasing-magnet 14, wire 34, rail 1, and wire 35 back to generator 15. This effects release for the operator as previously described. It will be evident that a release cannot be given with a train in the block, since the generators would be short-circuited through the wheels and axles of a train upon the track. In like manner it will be evident that neither operator can give the other release with his own signal in the proceed position, because the armature of his own releasing-magnet (the armature 28 for A or the armature 17 for B) would be raised and his circuit would be broken at that point. I do not wish to be understood as limiting myself to any particular form of generator, my intention being to include any device which will transform physical energy into a translatable form of energy. Since there is no source of energy other than the generators and since a releasing-magnet can be energized only by the generator of an adjacent block; a positive purposeful and physical effort must be made by



the operator at the block effecting the release, and the effort must be made at the time release is sought.

Referring now to the second part of my invention, it will be at once observed that I have shown the apparatus at block A and the apparatus at block B in identical form with that shown in Fig. 1. It will be noted that while the rail 2 is simply insulated at the ends of the block the same as rail 2 in Fig. 1 the rail corresponding to rail 1 in Fig. 1 is made up of three insulated sections 1, 1<sup>a</sup>, and 1<sup>b</sup>, thus forming a block made up of a plurality of insulated track-sections. This is a condition under which it would be impossible for either the generator 15 or the generator 16 to effect the release without some relay assistance. To that end my invention will be best understood by describing a movement without further preliminary statement. Let it be assumed that the operator at block A desires to move his signal to the proceed position and that by a well-known form of communication, as by telegraph, he informs the operator at block B of such desire and requests release of his lever. With such request the operator at A moves his switch 3 to bridge the contacts 5 and 6, and the operator at B moves his switch 4 to bridge the contacts 11 and 12. The operator at B then operates his generator 16 and generates a current which flows from generator 16 through wire 27, arm 17, contact 18, wire 19, contact 12, switch 4, contact 11, wires 20 21, rail 2 to wire 38, thence through wire 38 to arm 39, contact 40, wire 41, magnet 42, wires 43 44, to rail-section 1<sup>b</sup>, and thence by rail-section 1<sup>b</sup> to wire 26, and thence back to generator 16. This will energize the magnet 42 and cause it to lift the two arms 45 and 47, causing the arm 45 to make electrical connection with the contact 46 and causing the arm 47 to break electrical connection with the contact 48. This will establish a circuit of the battery 37, (one pole of which is in connection with the rail 2,) so that current will flow from battery 37, through wire 49, arm 45, contact 46, wires 50 51, to rail-section 1<sup>a</sup>, thence through rail-section 1<sup>a</sup> to wire 52, wire 53, magnet 54, wire 55, contact 56, arm 57, wire 58, rail 2, and thence by rail 2 back to battery 37. This will energize the magnet 54 and cause it to lift the arm 59 to make electrical connection with the contact 60 and the arm 64 to break electrical connection with the contact 65. This will establish a circuit of the battery 36, which is connected with the rail 2, the same as the battery 37, so that current will flow from battery 36 through wire 61, arm 59, contact 60, wires 62 63, a portion of rail-section 1, wire 25, release-magnet 13, wire 24, contact 6, brush 3, contact 5, wires 23 22, and rail 2, back to battery 36. This last movement will energize the magnet 13 and cause the unlock of the lever

for the operator at station A. Assume now that the condition of request is reversed and the operator at B asks for release by the operator at A. B will have then moved his switch 4 to bridge contacts 9 and 10, and operator at A will move his switch 3 to bridge contacts 7 and 8. Thereupon A will operate his generator 15, which will cause current to flow from generator 15 through wires 27' and 28, contact 29, wire 30, contact 8, switch 3, contact 7, wires 31 22, rail 2 to wire 72, thence through wire 72, arm 64, contact 65, wire 80, magnet 66, wires 73 63, rail-section 1 and wire 35 back to generator 15. This will energize the magnet 66 and cause it to move the arm 67 to make electrical connection with the contact 68 and cause the arm 57 to break electrical connection with the contact 56. The closing of the arm 67 with the contact 68 will establish a circuit of the battery 36, so that current will flow from battery 36 through wire 73, arm 67, contact 68, wires 74 52, sectional rail 1<sup>a</sup>, wires 51 75, magnet 69, wires 76, contact 48, arm 47, wires 77, and rail 2, back to battery. The energization of the magnet 69 will through the electrical connection of the arm 70 with the contact 71 establish a circuit of the battery 37, so that current will flow therefrom through wire 78, arm 70, contact 71, wires 79 44, part of rail-section 1<sup>b</sup>, wire 34, release-magnet 14, wire 33, contact 10, arm 4, contact 9, wires 32 and 21, and rail 2, back to battery 37. This will energize the magnet 14 and produce the required release of the lever for operator at B.

While I have shown two relay devices interposed between the two ends of the block, it will be evident that I may employ any number from one upward, according to the conditions required. It will also be evident that this part of my invention is in no wise confined to manual-controlled block-signal systems, since all of the conditions precedent will be met wherever there is a source of energy at one end of the block and means for establishing a circuit of the rail-section and an electromagnetic device at the opposite end of the block; but of course it will also be understood that in most cases the condition which would obtain would be that of a source of electric energy at both ends of the block and other mechanism at the ends of the block to be actuated, respectively, by the source of energy at the opposite end of the block.

Having thus described my invention and its method of operation, what I claim is—

1. In combination with the insulated rails of a block-section, a releasing-magnet at one end of the block, a manually-operated generator at the other end of the block and means for closing said generator in circuit with said magnet.

2. In combination with the insulated rails of a block-section, releasing-magnets and



manually-operated generators at both ends of the block, circuits including said rails for connecting each generator with the releasing-magnet at the opposite end of the block, and electric switches for establishing said circuits.

5 3. In combination with the insulated rails of a block-section, releasing-magnets and manually-operated generators at both ends of the block, circuits for including said rails for connecting each generator with the releasing-magnet at the opposite end of the block, electric switches for establishing said circuits, and means for automatically breaking either of said circuits, upon the energization of the other circuit.

15 4. In combination with the insulated rails of a block-section, releasing-magnets, manually-operated generators at both ends of the block, circuits including said rails for connecting each generator with the releasing-magnet at the opposite end of the block, an electric switch at both ends of said block controlling both of said circuits and so arranged that both electric switches must be moved to es-

25 tablish the circuit of either generator and its respective releasing-magnet.

5. In a railway-block comprising a plurality of insulated track-sections, manually-operated generators and magnets at the ends of the block, means for effecting the energization of either of said magnets at the ends of the block mediately by the energization of the generator at the opposite end of the block comprising a source of electric energy at each pair of abutting ends of said track-sections for connecting, and electromagnetic means at each pair of abutting ends of said sections for connecting the source of energy at the abutting ends with the next following section, and so on until the magnet at the opposite end of the block, from whichever generator the impulse originated, is energized.

In testimony whereof I have hereunto set my hand in the presence of two witnesses.

WINTHROP K. HOWE.

Witnesses:

F. L. DODGSON,

MARK H. HOVEY.