N. P. FRASER.

BLOCK SIGNALING SYSTEM.

APPLICATION FILED JAN. 30, 1908.

912,301.

Patented Feb. 16, 1909.

2 SHEETS—SHEET 1.

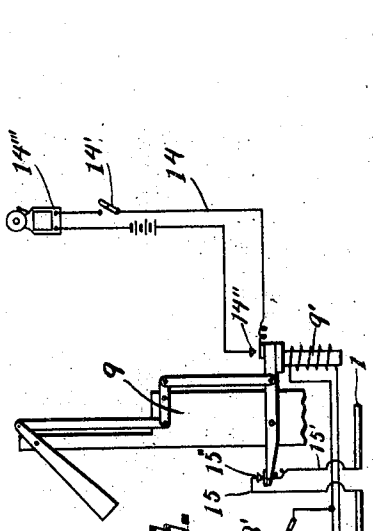

Fig. 3.

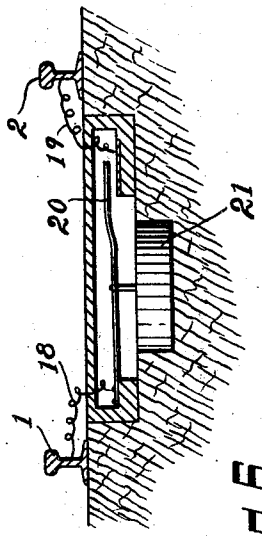

Fig. 5.

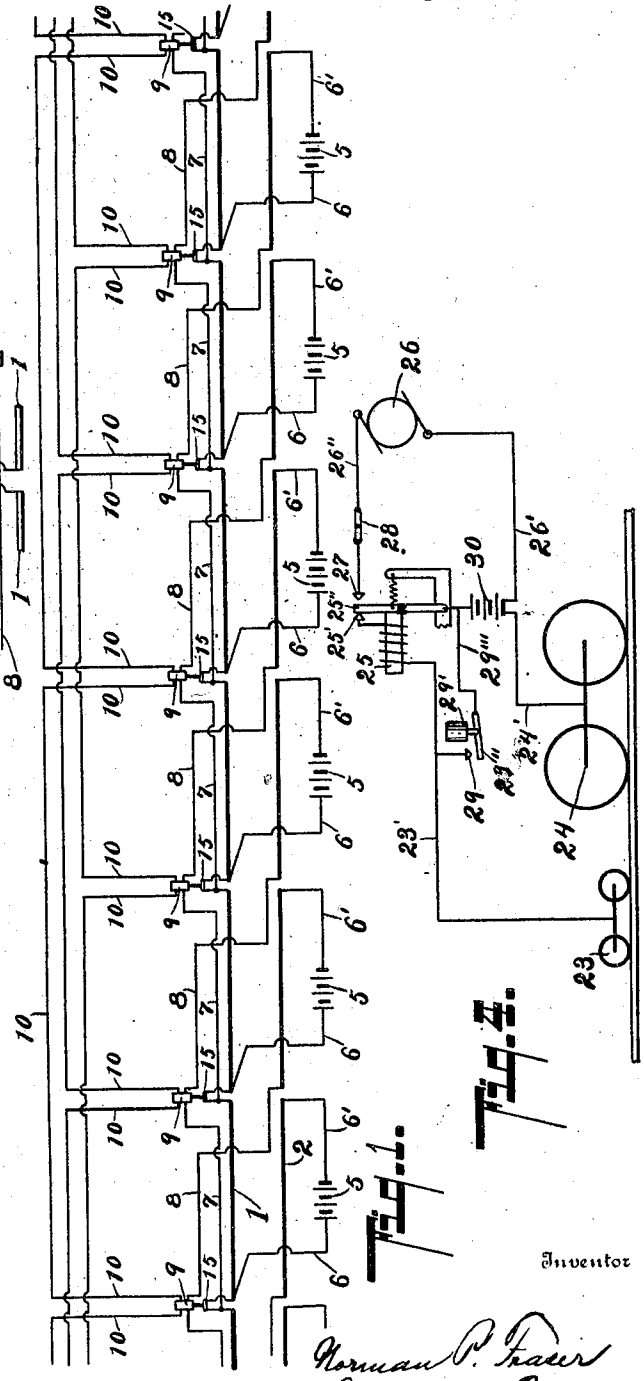

Fig. 4.

Fig. 1.

Witnesses

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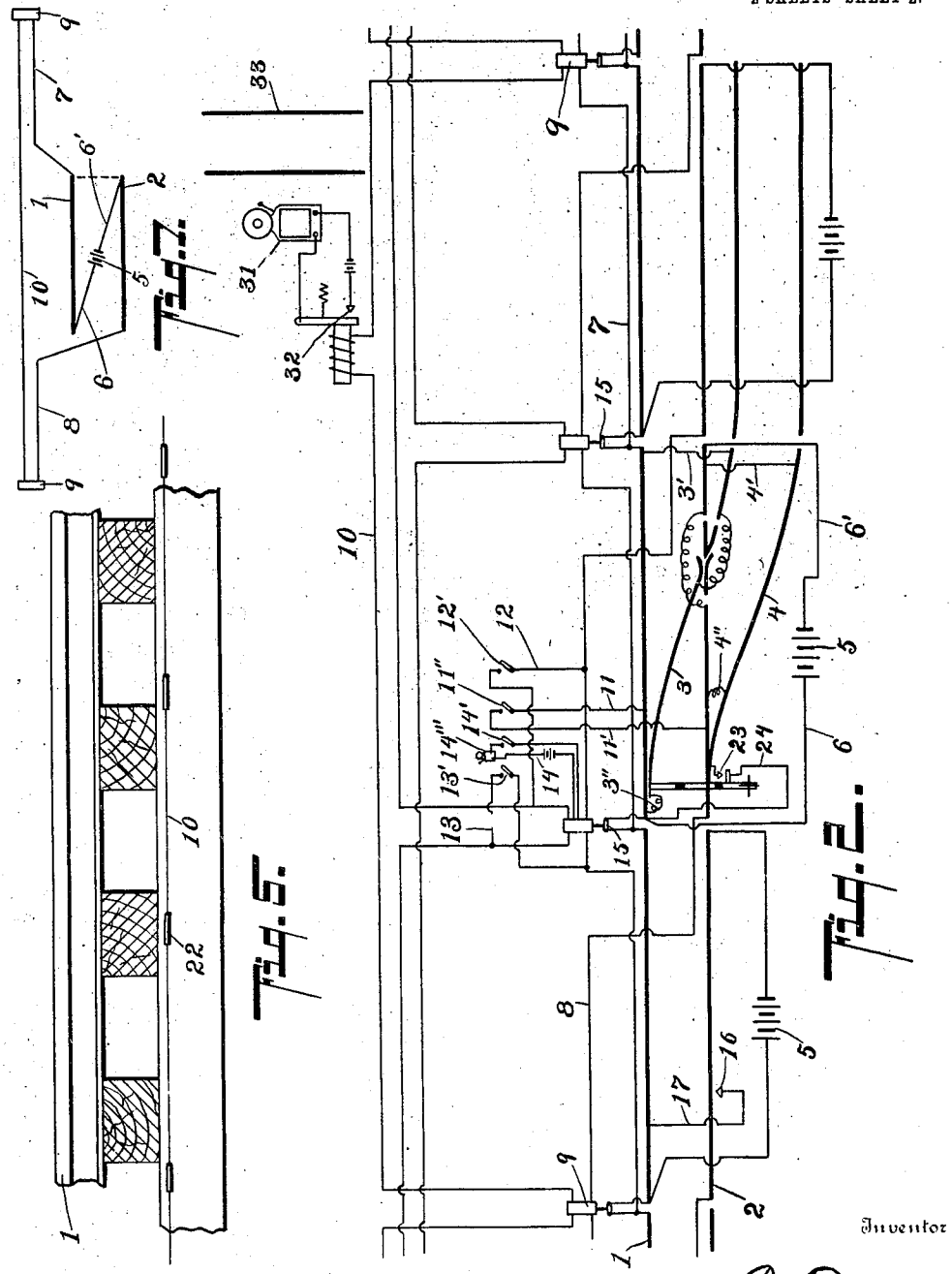

Fig. 2.

Fig. 5.

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UNITED STATES PATENT OFFICE.

NORMAN P. FRASER, OF CARSONVILLE, MICHIGAN, ASSIGNOR OF ONE-HALF TO WILLIAM GRIBBEN, OF CARSONVILLE, MICHIGAN.

BLOCK-SIGNALING SYSTEM.

No. 912,301. Specification of Letters Patent. Patented Feb. 16, 1909.

Application filed January 30, 1908. Serial No. 413,471.

To all whom it may concern:

Be it known that I, NORMAN P. FRASER, a citizen of the United States, residing at Carsonville, Michigan, have invented certain new and useful Improvements in Block-Signaling Systems, of which the following is a specification.

This invention relates to improvements in automatic block signals for railways.

The objects of this invention are,—First, to provide an improved automatic means for controlling signals, such as semaphores, electrically by means of closed circuits. Second, to provide in such an apparatus means of detecting and indicating any defects in the rails or road-bed, or any imperfect arrangement of any parts, as an open switch or the like, or defects in the apparatus itself. Third, to provide in such a device means whereby the station master or train despatcher, as the case may be, can control certain blocks or sections of track. Fourth, to provide in such an apparatus means on the locomotive and in connection with a locomotive or train, as the case may be, which will signal the engineer and automatically control and stop the train if the track for any reason is blocked. Fifth, to provide in such an apparatus and in connection with such an apparatus, improved means of indicating the condition of the air-brake system on a train, or the condition of other mechanism or apparatus on such train.

Further objects and objects relating to structural details will definitely appear from the detailed description to follow.

I accomplish the objects of my invention by the devices and means described in the following specification.

The invention is clearly defined and pointed out in the claims.

A structure embodying the features of my invention is fully illustrated partially in diagram, in the accompanying drawing, forming a part of this specification, in which,

Figure 1 is a diagrammatic illustration of a number of blocks in a straight section of railway track, indicating the method of wiring for my improved block signaling system. Fig. 2 shows a similar view indicating the method of wiring a switch in a track to show whether the switch is open or closed, and showing the wiring in a despatcher's or station master's office, and automatic connections for electrically connecting the rails at one side in any two adjacent blocks which coact with the signal mechanism on a locomotive or train. Fig. 3 shows details of wiring and controlling a semaphore or signal, and enlarged details of apparatus used by train despatcher or station master, such as appears in Fig. 2. Fig. 4 is a diagrammatic view indicating the apparatus and the method of wiring on a locomotive or train to detect and indicate the condition of the block system to the engineer and control the locomotive automatically. Fig. 5 is an enlarged detail view showing the method of applying my improved system so that should any wooden structure become burned, as a wooden bridge, it will operate the block signal. Fig. 6 is a detail view of means placed in a track in connection with my improved signal system whereby a wash-out will be effectively indicated. Fig. 7 is a detail diagrammatic view showing the wiring of a simple single block of the track whereby the operating of the signals automatically is accomplished.

In the drawing, similar numerals of reference refer to similar parts throughout the several views.

Considering the numbered parts of the drawing, the rails of the railroad track 1 and 2 are divided into blocks which are insulated from each other, and the rails of each block are not electrically connected by the rails 2 except by my improved apparatus. A switch has its rails, 3 and 4, also appropriately and similarly connected, the switch being insulated from the side track to which it leads.

The wiring of each block is indicated in Fig. 7. A wire or conductor 6 extends from the left-hand end of the rail 1 to a battery or other source of electric current 5, and from thence a wire or conductor 6′ extends to the right-hand end of rail 2. The right-hand end of rail 1 is connected by the conductor 7 to electrical means, as magnet 9′, in a signal or semaphore 9, and a similar conductor 8 extends from the left-hand end of rail 2 to an electric means, in a second signal or semaphore 9 at that end, and a conductor 10 extends between the electric devices in the two said semaphores 9, 9. The current passing through the circuit 10 excites said electromagnets 9′ which actuate and control the said semaphores and hold the same at the safety point, or operate and control any other

signals in the same way. A single sequel or any number could, of course, be thus controlled.

When a locomotive, train or car of any description passes onto the particular block of track by its wheels and axles, it forms a conductor between the two rails, which short circuits the battery 5, and consequently releases the electro-magnets 9′ in the semaphores 9, thus operating the signals and blocking the track. Where a switch occurs in the track as appears in Fig. 2, the rails 3 and 4 of the switch are separated from each other by suitable insulation from the siding.

Referring to Fig. 2, it will be seen that the rail 4 is connected at both ends by wiring 4′ and 4″ to the rail 2 of the main track and that the rail 3 of the switch is connected by the wirings or bonds 3′ and 3″ to the rail 1 of the main track, so that they are brought into the same circuit as the rails of the main track in the same way, the switch rail 3 corresponding to main track rail 1 and switch rail 4 corresponding to main track rail 2, so that a train on the rails 3 and 4 will short circuit the batteries and operate the signals the same as a train on the main track.

A contact device 16 may be arranged just outside of either rail 1 or 2 at any point in the track where a spreading of the rails is liable to occur, and this contact device may be provided with a conductor 17 to the opposite rail, so that if there is an accidental spreading of the rail, the current will be short circuited between the rails 1 and 2 at that point, and the signals will be operated exactly the same as though a train had been moved onto the block.

Conductors 18, 19 with a contact device 20 may be provided at intervals in the track where wash-outs are likely to occur for detecting such wash-outs, the contact device 20 being connected to a weight 21 located in the road-bed beneath, so that when the road-bed is disturbed by a wash-out the weight descending operates the contact device and short circuits the rails 1 and 2, thereby also operating the signal the same as though a train moved onto the block.

Where the rails of the track pass over a wooden structure, or a structure that is combustible, the conductor 10 should be arranged in proximity to the track and fuses 22 should be put into the same at intervals so that in case of any considerable heat being developed, the fuses will melt, thus breaking the circuit and in that way releasing the magnets as effectively, of course, as though the rails had been short circuited. In this way and by taking these precautions and providing these devices, the condition of the track is effectively tested and indicated with very slight additional expense.

With my improved apparatus, every time a train passes, the apparatus of the block signal for indicating the presence of trains is tested and operated, and must be in effective operative position, or the train will be blocked.

At the switch a contact device 23 and a conductor 24 effect the connection between the rails 1 and 2 whenever the switch is improperly placed and causes a short circuit and blocks the train until the position of the switch is corrected.

The semaphores 9 are identical and are operated by means of the electro-magnet 9′ when in the circuit 7, 10 towards the right of the section of track appearing in Fig. 7, and the other operated by the circuit 8, 10 appearing to the left of the section or block of track appearing in Fig. 7. In practice, the semaphore in advance of one block can, of course, be housed with the semaphore to the rear of another block, so that in Fig. 1 I have indicated these semaphores as a single apparatus, but there are in reality two semaphores in each, one of the semaphores of each being detailed in Fig. 3.

The signal need not be confined to merely operating the semaphores of a block signal system, but a relay can be put in at any point and operate a bell or alarm at crossing, for instance. Such a relay circuit and alarm is indicated at 31, with a contact device 32 adjacent to a crossing 33, as seen in Fig. 2, and this signal will be operated so long as the train is in the particular block.

At the railway station or despatcher's office, I provide conductors 11, 11′ connected to the rails 1 and 2, with a switch or contact device 11^2, so that the station agent or despatcher can short circuit the track and operate the signals to stop a train if he so desires.

At a railway station or despatcher's office means are provided in conjunction with my improved system whereby the train despatcher or the station agent is able to control trains, and signals will be operated in his office for his benefit. When he desires to raise the semaphore, he can short circuit the circuit leading to the magnet by means of the conductors 13 and switch or circuit closer 13′ appearing in Fig. 3, which will cut the magnet out and permit the semaphore or signal to swing to the danger point.

A relay circuit 14 is provided with a suitable buzzer, or other alarm 14‴ with a circuit device 14″ on the armature of the magnet 9′, so that when the magnet is released this relay circuit will be closed and the alarm given. A switch 14′ is provided for controlling this relay circuit at the will of the operator. The one circuit clearly can be arranged to give the alarm for any number of semaphores, and it is clear that this relay alarm circuit will be operated whenever the track is short circuited by any means, as an

approaching train or whenever there is any break in the circuit at any point.

Where it is desired that the signal shall become audible or visible in the cab of the locomotive, or that the train shall be stopped automatically, I provide conductors 15, 15′ connecting the adjacent ends of the rails 1 of two adjacent blocks with a contact device 15″. This contact 15″ is operated by the armature of the semaphore magnet 9′ when the same is released, the contact being thus broken when the signal is thrown to the danger point. This device is not needed in connection with the apparatus except when it is desired to communicate with a passing train or locomotive.

Referring now to Fig. 4, the apparatus and wiring for the locomotive or train will be readily understood, the same being described here as in conjunction with a locomotive. The front truck 23 should be insulated from the locomotive, or train, and a conductor 32′ should connect thereto and extend to the electro-magnet 25 which controls the relay, the end of the circuit having a contact device 25′ which contacts with the armature 25″, which armature is included in the circuit leading to the battery or other generator 30. The driving wheels 24, or some track back of the first, are connected into the circuit by the conductor 24′. A motor 26 is provided, which is connected to the battery 30 by the conductor 26′ and a conductor 26″ is provided with a contact point 27 that contacts with the armature 25″ when the same is released by the breaking of the electric current through the magnet coil. A switch 28 is provided in the conductor 26‴ for opening that circuit when desired. It will be seen that when this locomotive passes from one block to another of the track, if the semaphore is at safety, the ends of the rails 1, 1 of the adjacent block will be coupled by the conductor 15, 15′, when the circuit will be completed between the trucks 23 and the drivers 24, but if the semaphore has been operated and thrown to the danger point, as soon as the front truck 23 passes from one block to the next, the circuit in the locomotive will be broken, owing to the gap between the rails of a block, and the electro-magnet 25 will release its armature 25″ which will be thrown against the contact 27 by the armature spring and the circuit will be closed through the motor 26, which will immediately begin to operate and can be connected to throttle the engine and apply the brakes, and can also be connected to an alarm or in any way desired. It will thus be seen that if for any reason the engineer fails to see the semaphore or recognize the signal, as soon as he passes onto the block covered by the signal the circuit through the track will be broken, which will operate the relay in the engine. On the engine a contact device 29 can be connected to the circuit 23. An air cylinder 29′ can be connected with the air brake mechanism and a switch 29″ can be controlled by said cylinder, whereby the circuit will be closed when the air pressure falls, for any reason. The conductor 29‴ would then short circuit through the conductor 23′ and permit the relay to operate and stop the engine, or give an alarm, so that the same mechanism can serve as a safety device in conjunction with the brake mechanism, or, indeed, this device may be made use of as a safety appliance in connection with any of the operative parts of the locomotive.

In the operation of my improved block signal system, it will be noted, referring to Fig. 7, that as soon as a locomotive or anything else connects the rails 1 and 2, the current is short circuited and the semaphores 9, 9 are operated and will hold any train approaching from either direction blocked until the train moves onto the next block of track. Also if there is any break in the circuit, the semaphores will be operated and the same thing occur until repair is made. By placing the battery or generator 5 in a conductor, which is connected to the right end of one rail, as No. 2, and the left-hand or opposite end of rail No. 1 of the block, it will be seen that in the event of a broken rail, the track will be blocked because the circuit will be broken. The same thing is true if any train moves onto the switch appearing in Fig. 2, which is in the block, and if any of the devices in the track are disturbed by a peculiar accident or displacement which they are intended to detect, that section of the track will be blocked until repair is made.

The station agent or despatcher has control of the system in certain ways. By closing the switch 13, he short circuits the semaphore magnet 9′ and operates the semaphore. By closing the switch 11′, he short circuits between the rails 1 and 2 of the track and controls a block in that way. By short circuiting, by the switch 14′, he throws an alarm into operation, when the semaphore is operated, and this gives the benefit of the sounding of a buzzer or the ringing of a bell to avoid constant watching to see when a train is in the block, or the semaphore is operated for any reason. When the semaphore is operated for any reason, the connection is broken between the ends of the rails in the adjacent blocks, so that when the locomotive with apparatus designed for use in conjunction with this signal system moves over the track, the closed circuit in the locomotive is broken by the gap in the rail and an alarm is sounded in the cab of the locomotive, or the train is stopped automatically.

Having thus described my invention, what

I claim as new and desire to secure by Letters Patent, is:

1. In an automatic block signal apparatus, the combination with an insulated block of track, the rails of which are electrically separated from each other, of a conductor connecting the diagonally opposite ends of said rails; a source of electric current in the said conductor; an electric signal having a closed circuit therethrough, connecting to the opposite ends of the rails from which the said conductor connects, whereby a train moving onto the rails will short circuit the current and release the signals of the semaphore.

2. In an automatic block signal apparatus, the combination with an insulated block of track, the rails of which are electrically separated from each other, of a conductor connecting the rails; a source of electric current in the said conductor; an electric signal having a closed circuit therethrough, connecting to the rails; conductors leading from the adjacent ends of the rails in adjacent blocks; contact devices connected to the said signal for closing the circuit through said conductors when the signal is at safety, to close the gap between the said blocks; a train having its end truck insulated; a relay with an electric coil 25 for a closed circuit 23′, 25′, 24′, embracing wheels and an axle back of the front truck 24; a local battery or source of supply; a relay circuit closed by the release of the said magnet; and a motor in the said relay circuit for actuating an alarm or stopping the train, coacting so that when the train moves from one block of track to the next, the circuit will be broken, if the signal is at danger, and the local electrical supply be thrown into operation, coacting as specified.

In witness whereof, I have hereunto set my hand and seal in the presence of two witnesses.

NORMAN P. FRASER. [L. S.]

Witnesses:

LUELLA G. GREENFIELD,

PHINA WOODRUFF.