

(No Model.)

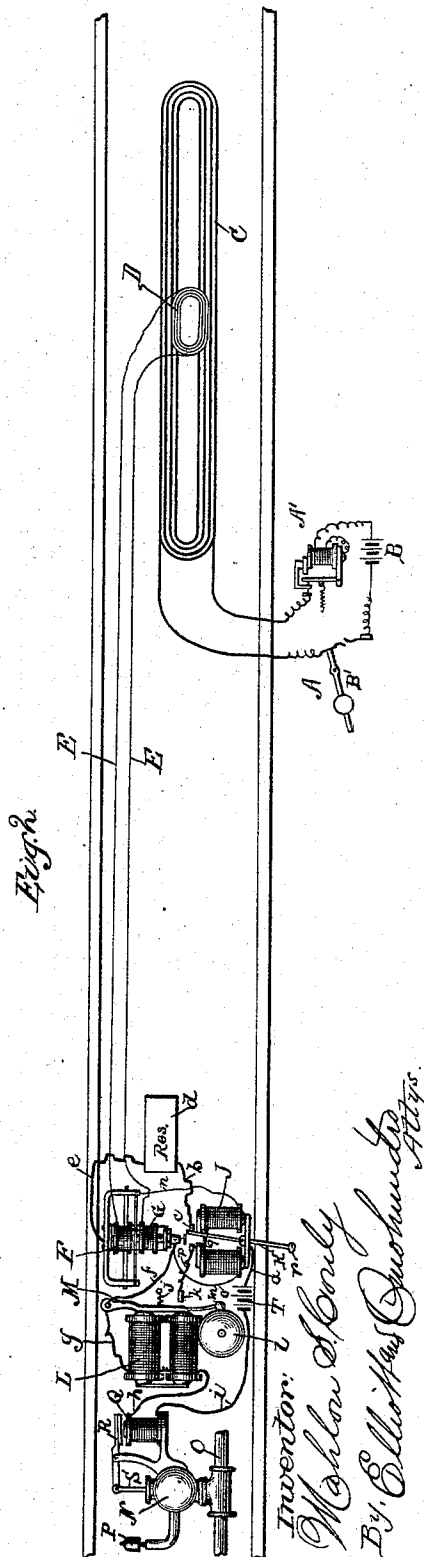
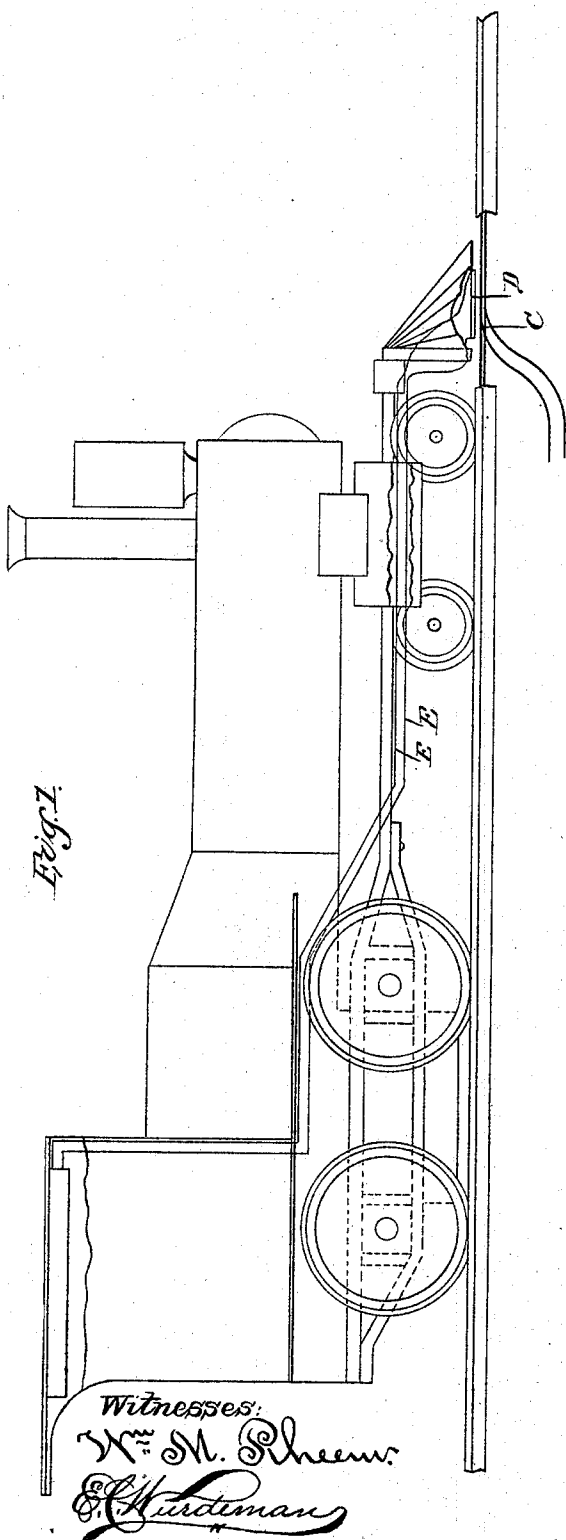
3 Sheets—Sheet 1.

M. S. ONLY.

AUXILIARY SIGNALING SYSTEM FOR RAILWAYS.

No. 528,122.

Patented Oct. 23, 1894.



THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

(No Model.)

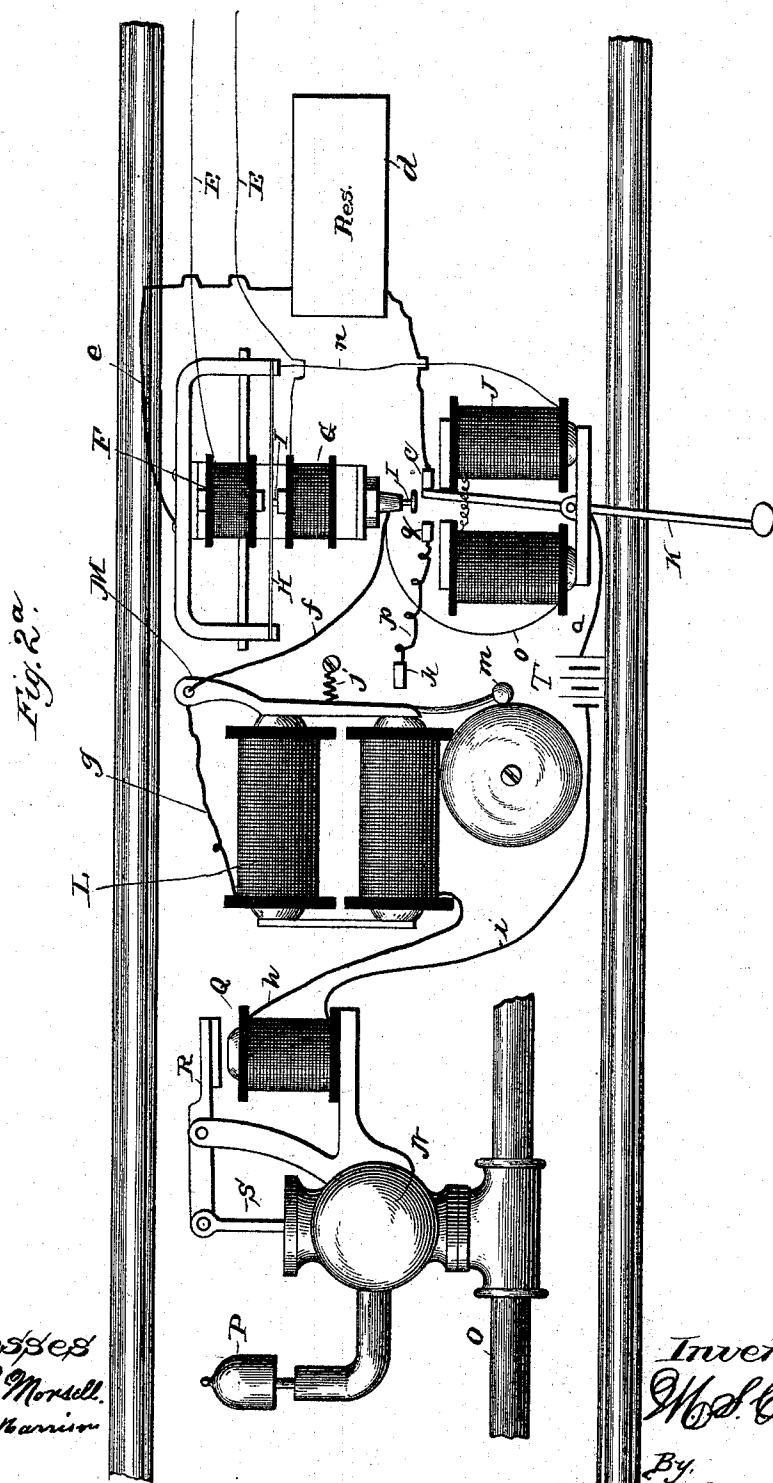
3 Sheets—Sheet 2.

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AUXILIARY SIGNALING SYSTEM FOR RAILWAYS.

No. 528,122.

Patented Oct. 23, 1894.



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(No Model.)

3 Sheets—Sheet 3.

M. S. CONLY.

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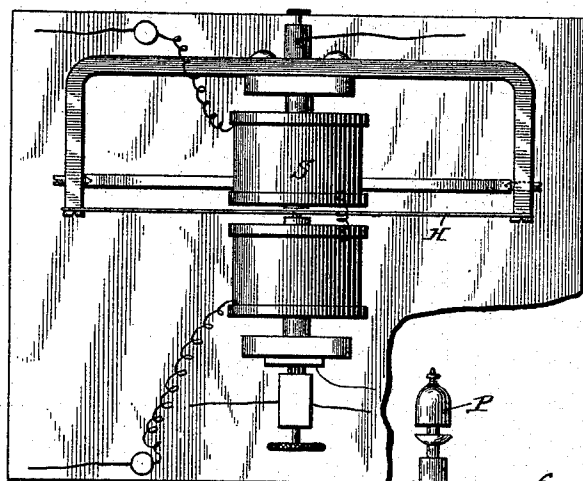


Fig. 3.

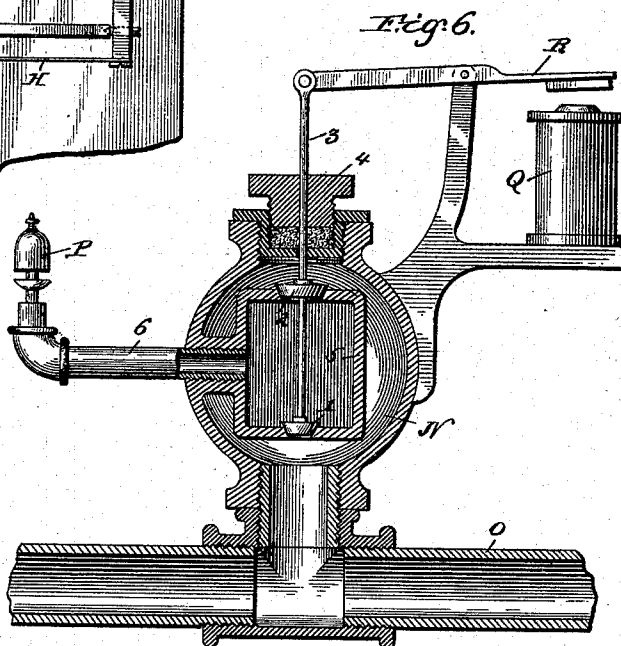


Fig. 6.

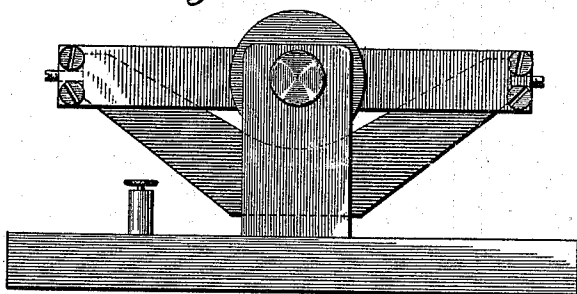


Fig. 4.

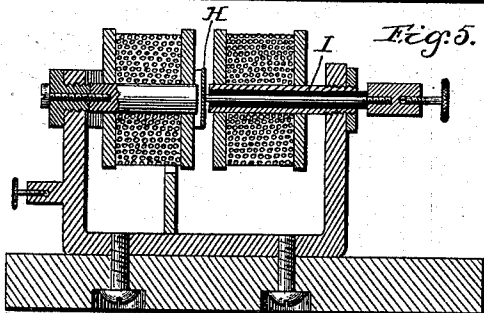


Fig. 5.

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UNITED STATES PATENT OFFICE.

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AUXILIARY SIGNALING SYSTEM FOR RAILWAYS.

SPECIFICATION forming part of Letters Patent No. 528,122, dated October 23, 1894

Application filed March 6, 1890. Serial No. 342,866. (No model.)

To all whom it may concern:

Be it known that I, MAHLON S. CONLY, a citizen of the United States, and a resident of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Auxiliary Signaling Systems for Railways, of which the following is a specification.

This invention relates to improvements in auxiliary signaling systems for railways in which automatic signaling apparatus is carried upon the engines, and designed for use in connection with block and other signaling systems, and has for its prime object to automatically sound an alarm, or set the air-brakes, or both, upon a train when the engine passes a point or into a block where danger exists.

Another object is to provide safeguards in addition to those now employed in block and other signaling systems which, when from negligence, inability, or any other cause, the engineer fails to observe a danger signal, or the sight target fails to work, so as to notify the engineer of danger, will automatically sound an alarm upon the engine or set the air-brakes on the train, or both, whereby is avoided the possibility of a train passing a point or entering a block where danger exists without notifying the engineer and giving him an opportunity to stop the train, or, where air-brakes are employed, additional security will be furnished by the automatic setting of the air-brakes.

These objects are attained by the devices illustrated in the accompanying drawings, in which—

Figure 1, represents a diagram of an engine, showing the relative location of the parts of my automatic apparatus; Fig. 2, a diagram in plan view, further illustrating the same and showing the apparatus carried upon the engine superimposed upon the track and stationary devices co-operating with such apparatus. Fig. 2^a, is a similar view of a portion of the device on an enlarged scale; Fig. 3, a detail plan view of an induction apparatus used upon the engine; Fig. 4, a front elevation thereof; Fig. 5, a central vertical section of the same; and Fig. 6, a detail section of an automatic valve for controlling the air-brakes.

Similar letters and numerals of reference indicate the same parts in the several figures of the drawings.

This invention may be used in connection with railway signaling systems of any character, but is more especially designed for use in connection with what is commonly known as "block signaling systems" in which, at regular intervals along the track, are placed signal towers operated by the passage of a train to throw a signal of some suitable character so as to indicate that the train is in the block at some point between the signal shown and the one next in advance. These systems are generally operated by electrical apparatus, the battery circuit of which is closed by a track instrument operated by the passage of the train, many forms of which are now in use, and it is therefore unnecessary to herein illustrate or describe in detail the construction and operation of either a signal tower or its track instrument.

For convenience of illustration, let A, represent a signal tower, and B, the battery thereat, the circuit of which is closed by the operation of the target or other signal B' in the tower, and includes an "interrupter" A' of any suitable character for producing an interrupted or alternating current. In this battery circuit is also included a long flat coil C, of coarse wire, lying between, and sufficiently below the tops of, the rails, to be protected from accidental injury, and incased in any suitable material which will protect it, and at the same time not absorb or conduct off the electricity therefrom.

D, represents a flat coil of fine wire, preferably carried under the pilot or cow-catcher of the engine, as low down as practicable, the terminals, E, of which are led back to an induction instrument located in the cab of the engine, consisting of two permanently magnetized electro-magnets, F, G, with the spool of each one of which connects one of the terminals of the coil D, these spools being wound with very fine wire and having interposed between the opposing poles thereof, a ribbon or thin strip, H, of soft iron, normally resting against the end of an insulated pin, I, projecting through, and slightly beyond, the end of one of the poles. The polarity of these per-

manently magnetized electro-magnets is so arranged, that the ribbon, which constitutes the armature therefor, is normally attracted by the pole of the magnet through which the insulated pin projects, the pin preventing contact between the pole and armature, while the pole of the other magnet normally repels the armature; but upon the passage of a current of electricity through the spools of the electro-magnets, in alternately opposite directions, the polarity of the magnets will be rapidly changed, and the armature be thus alternately attracted by the poles, answering to every pulsation of the electric current. Hence, when the engine passes by the signal tower A, if the signaling apparatus of the tower has been previously operated so as to show a danger signal, and to throw the coil C, into the battery circuit of the tower, the coil D, carried by the engine into the magnetic field of the coil C, will have generated therein a secondary alternating current, which will cause a vibration of the ribbon armature of the induction instrument in unison with the interruptions of the current in the battery circuit of the tower. The vibrations of the ribbon armature of this induction instrument, are utilized for alternately opening and closing a primary battery circuit and a secondary circuit, through automatic devices carried upon the engine, of which circuits the ribbon armature and the insulated pin I, with which it is normally in contact, form a part. These devices consist of a polarized relay J, having a vibrating armature tongue K, an electro-magnet L, having a vibrating armature M, and a valve N, connected with the pipe O, leading to the air-brakes, and a whistle P, said valve being operated by an electro-magnet Q, the pivoted armature R, of which connects with the stem S, of the valve.

Upon the engine at any suitable point, is located a battery T, the primary circuit from which may be traced by wire *a*, connecting one side of the battery with the armature tongue K, of the polarized relay wire *b*, connecting a contact point *c*, with which the armature tongue is normally in contact, with a resistance *d*, wire *e*, connecting the resistance with the frame, supporting the ribbon armature H, of the induction instrument, through which armature and the insulated pin I, the circuit continues, to the wire *f*, connecting the said pin with the pivot of the armature M, which is in turn connected by a wire *g*, with the spools of the electro-magnet L, from whence the circuit continues over wire *h*, through the spools of the electro-magnet Q, and over wire *i*, back to the battery. This primary circuit, it will be understood is normally closed, and sufficient resistance is introduced therein to weaken the current to such an extent that the magnet Q, when the valve operated by it is employed, will not be operative, while the magnets L, will be operative only to such an extent as to hold the

armature M, thereof, against the poles of the magnet, and to overcome the tension of a controlling spring *j*, which tends to pull the armature over against a contact point *k*, whereby is prevented the accidental ringing of the bell *l*, due to the jarring of the engine, against which bell the clapper *m*, secured to the armature M, rests.

The secondary circuit for the polarized relay J, is formed by wire *n*, connecting one spool of said magnet with the frame supporting the ribbon armature H, of the induction apparatus and a wire *o*, connecting the other spool of the magnet with the insulated pin I, of the induction instrument, this relay being employed for short circuiting or shunting the primary circuit so as to throw the entire force of the battery through the vibrating bell magnet L, and the valve magnet Q, by cutting out the resistance. This is accomplished by connecting the contact point *k*, by a wire *p*, with another contact point *q*, opposing the contact point *c*, over against which the armature tongue of the relay will swing whenever the relay is energized, which occurs simultaneously with the breaking of the primary circuit, by the vibrations of the ribbon armature of the induction instrument, for it will be understood that the primary circuit being normally closed, is statically charged, and hence whenever the circuit is broken, a static discharge takes place therefrom, passing into the secondary circuit, thus energizing the relay magnet and causing the armature tongue thereof to swing over to the opposite pole and contact point from the normal, which movement is always in the same direction, because the secondary current necessarily passes through the magnet always in the same direction. Thus when the armature of the induction instrument is actuated by the passage of the engine over the charged coil of the tower, causing the breaking of the primary battery circuit upon the engine, by the deflection of the armature of the induction instrument, out of engagement with the insulated pin I, the magnet L, will be instantly demagnetized, and its armature M, under the influence of the spring *j*, will swing over against the contact point *k*, and simultaneously therewith the armature tongue K, will swing over against the contact point *q*, and thus close the primary circuit through the electro-magnets L and Q, and cutting out the resistance, when the armature M, under the alternate influence of the magnet L, and spring *j*, will be converted into an interrupter for the primary current, and thus by its vibrations, cause the ringing of the bell *l*, in the manner usual in this class of devices. Thus it will be seen that immediately the engine passes the tower A, at which the danger signal has been previously set, the bell or gong in the engine cab will begin to ring, and continue ringing until the engineer, whose attention is necessarily attracted thereby, seizes the button *r*, on an extension of the armature tongue K, and shifts the position of

said tongue back to the normal position shown in the drawings, which will restore all of the parts to their normal position. The engineer will, therefore, have immediate notice upon entering a danger block, should he fail or neglect to see the danger signal, and will have time enough to whistle for "down brakes" to the train attendants, or set the air-brakes before the train gets fairly within the danger block. This bell signal would under most circumstances be sufficient, and would always be employed, or an equivalent signaling device, when the train is not supplied with air-brakes, in which case the valve N, and electro-magnet Q, would not be employed; but when the train is supplied with air-brakes, the bell or signal may be used in connection with the automatically operating air-brake valve and whistle about to be described, or it may be dispensed with. This automatic air-brake and signal, consists of a valve N, of any suitable construction, connected with the line pipe O, of the air-brake pipe leading from the engineer's valve to the brake cylinders, with which is connected a whistle P, which will be blown by the escape of the air upon the opening of the valve, which causes the simultaneous setting of the air-brakes, the valve proper being operated by the electro-magnet Q, through the medium of the armature lever R, thereof, whenever the primary battery circuit upon the engine is shunted through, so as to energize the magnet as before explained.

In Fig. 6, I have illustrated in detail one form of valve, commonly known as a puppet valve, in which a pair of valves 1, 2, nearly balancing each other, are secured to a valve stem 3, working through a stuffing box 4, in the valve chamber or globe N, these valves having their seat upon the inside and outside respectively, of a closed chamber 5, located internally of the globe, and with which, connects a pipe 6, having mounted upon the end thereof, the whistle P, through which the air from the internal chamber escapes.

In practice, the valves 1 and 2, are nearly balanced, the upper or outer valve 2, having a slight excess of area, so that the air pressure within the globe, combined with the gravity of the valves, gives the upper one a slight advantage, and serves to firmly seat the two valves normally against the escape of air from the globe through the internal chamber and whistle.

The advantage of the upper, or closing valve is slight, however, being only sufficient to prevent the accidental unseating of the valve by the jarring of the frame, and therefore requiring that the electro-magnet Q, shall have only sufficient force to overcome the gravity and friction of the parts, and the slight excess of pressure in order to unseat the valve. Thus, it will be seen that the operation of these valves and the whistle or like signal, is entirely automatic, just the same as the signal bell upon the engine be-

fore described, and that immediately upon the passage of the train into the danger block, the electro-magnet Q, will be energized so as to open the valve, thereby simultaneously permitting the escape of air from the line pipe O, the same as if the engineer's valve had been operated, thus causing the setting of the air-brakes, and also the sounding of the whistle alarm to notify the engineer of the fact.

As before described, the bell or gong signal upon the engine may alone be employed, or, when the train is equipped with air-brakes, the automatic valve and whistle alarm may alone be employed, or both these devices and the signal bell may be employed for additional security. Should the engineer be alert, however, and be notified of the danger by the usual signal in the tower, and still desire to enter the block, to feel his way along he may prevent the sounding of the bell alarm, and also the whistle alarm, and the setting of the air-brakes by holding the knob τ , upon the extension of the armature tongue of the relay magnet so as to prevent the operation of the said magnets, and consequently the other devices controlled thereby, while the engine is passing over the charged coils C, of the tower at which the danger signal is set.

Obviously various modified forms of signaling devices and apparatus for accomplishing the results herein set forth may be employed instead of those herein shown and described; but such substitution, even though the devices differ materially in construction, would not evade my invention so long as they produce the desired result.

Having described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In an auxiliary signaling system for railways, the combination with the stationary signals along the track, an electric circuit at each of said signals, adapted and arranged to be closed upon the operation of the signal to show danger, and a primary coil included in said circuit; of a secondary coil and circuit carried by the engine, a battery or other electric circuit also upon the engine, and a generator and signaling device included in said battery circuit, said battery circuit being adapted and arranged to operate said signaling device upon the passage of the secondary coil through the magnetic field of the primary coil of the track signal, substantially as and for the purpose described.

2. In an auxiliary signaling system for railways, the combination with the stationary signals along the track, an electric circuit at each of said signals, adapted and arranged to be closed upon the operation of the signal to show danger, and a primary coil included in said circuit; of a coil carried by the engine, an induction instrument having an electro-magnet with the terminals of which the terminals of said secondary coil connect re-

spectively, an electric circuit also on the engine, signaling devices included in said second circuit, a secondary circuit on the engine and a relay included in said secondary circuit, substantially as described.

3. In an auxiliary signaling system for railways, the combination with the stationary signals along the track, an electric circuit at each of said signals, adapted and arranged to be closed upon the operation of the signal to show danger, and a primary coil included in said circuit, of a secondary coil carried upon the engine, an induction instrument, comprising a pair of permanently magnetized electro-magnets, and a vibrating armature therefor, with each of which magnets connects a terminal of said coil, a closed primary circuit of which said vibrating armature constitutes a part, a signaling device included in said primary circuit, a resistance also included in said circuit for rendering said device inoperative, a secondary circuit, of which said vibrating armature constitutes a part, operated by induction from the primary circuit, a relay magnet included in said circuit, the armature tongue of which, upon the energizing of said magnet, is adapted and arranged to shunt the primary circuit so as to cut out the resistance, and thereby operate the signaling device, substantially as described.

4. In an auxiliary signaling system for railways, the combination with the stationary signals along the track, an electric circuit at each of said signals, adapted and arranged to be closed upon the operation of the signal to show danger, and a primary coil included in said circuit; of a secondary coil and circuit carried upon the engine, a battery or other electric circuit also upon the engine, and the air brake valve, a magnet for operating said valve, and a signaling device included in said circuit; said circuit being adapted and arranged to operate said signaling device and valve, upon the passage of the secondary coil through the magnetic field of the primary coil of the track signal, substantially as, and for the purpose described.

5. In an auxiliary signaling system for railways, the combination with the stationary signals along the track, an electric circuit at each of said signals, adapted and arranged to be closed upon the operation of the signal to show danger, and a primary coil included in said circuit, of a secondary coil carried upon

the engine, an induction coil comprising a pair of permanently magnetized electro-magnets and a vibrating armature therefor, with each of which magnets connects a terminal of said coil, a closed primary circuit, of which said vibrating armature constitutes a part, a valve in the air-brake pipe, an electro-magnet for operating the same, included in the primary circuit, a resistance also included in said circuit for rendering said magnet inoperative, a secondary circuit, of which said vibrating armature constitutes a part, operated by induction from the primary circuit, a relay magnet included in said secondary circuit, the armature tongue of which, upon the energizing of said magnet, is adapted and arranged to shunt the primary circuit so as to cut out the resistance, thereby rendering the said electro magnet for the valve, operative, substantially as described.

6. In an auxiliary signaling system for railways, the combination with the stationary signals along the track, an electric circuit at each of said signals, adapted and arranged to be closed upon the operation of the signal to show danger, and a primary coil included in said circuit, of a secondary coil carried upon the engine, an induction coil comprising a pair of permanently magnetized electro-magnets and a vibrating armature therefor, with each of which magnets connects a terminal of said coil, a closed primary circuit, of which said vibrating armature constitutes a part, a valve in the air-brake pipe, an electro-magnet for operating the same, included in the primary circuit, a whistle or like device connected with, and operated by the discharge of the air through said valve, a resistance also included in said circuit for rendering said magnet inoperative, a secondary circuit, of which said vibrating armature constitutes a part, operated by induction from the primary circuits, a relay magnet included in said secondary circuit, the armature tongue of which, upon the energizing of said magnet, is adapted and arranged to shunt the primary circuit so as to cut out the resistance, thereby rendering operative the electro-magnet for the valve, substantially as described.

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