(No Model.)

J. W. LATTIG.

ELECTRIC TORPEDO APPARATUS AND SYSTEM FOR RAILWAY SIGNALING.

No. 522,528. Patented July 3, 1894.

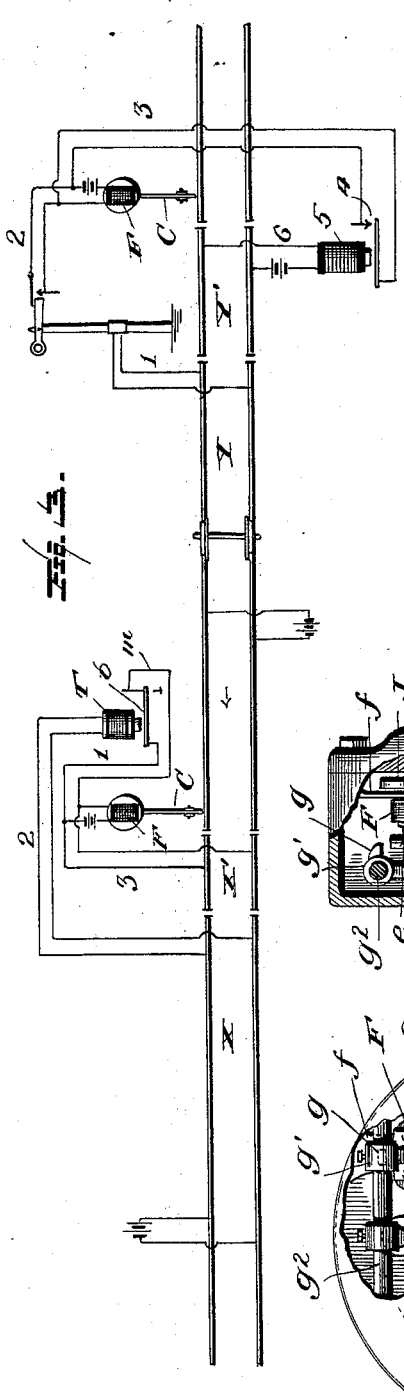

Fig. 3.

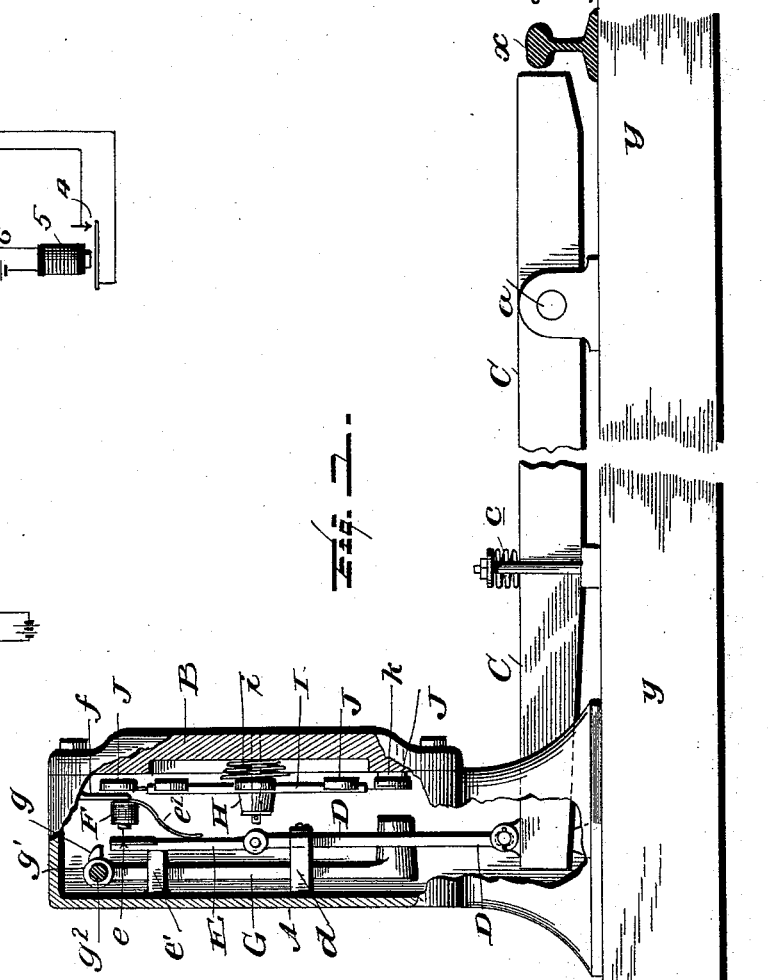

Fig. 1.

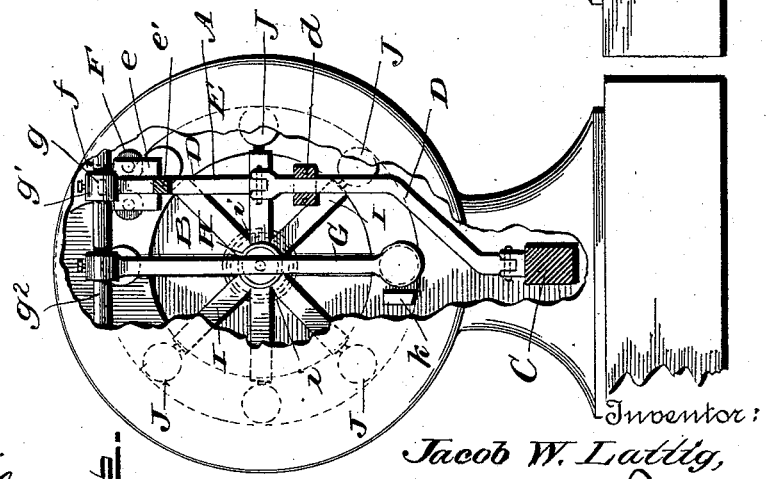

Fig. 2.

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JACOB WILLIAM LATTIG, OF EASTON, PENNSYLVANIA.

ELECTRIC TORPEDO APPARATUS AND SYSTEM FOR RAILWAY SIGNALING.

SPECIFICATION forming part of Letters Patent No. 522,528, dated July 3, 1894.

Application filed February 27, 1894. Serial No. 501,707. (No model.)

To all whom it may concern:

Be it known that I, JACOB WILLIAM LATTIG, of Easton, in the State of Pennsylvania, have invented certain new and useful Improvements in Electric Torpedo Apparatus and Systems for Railway Signaling, of which the following is a specification.

In an application for Letters Patent filed by me February 15, 1894, and bearing Serial No. 500,202, I have described a torpedo signal apparatus comprising a hammer or striker and actuating mechanism therefor having in it at some point a break, which when open, permits that part of the mechanism on the side of the break opposite from the hammer to move without influencing the hammer, and an electro-magnet and armature therefor whereby the break can be opened or closed as desired. In the same application I have also described this apparatus as combined in a system of electric circuits, comprising a normally closed track circuit and a track relay included therein, and a normally closed "torpedo" circuit, including the electro-magnet of the torpedo machine and completed through contacts controlled by the track relay—the arrangement being such that the "torpedo" circuit is closed and consequently the electro-magnet in that circuit is energized so long as the track circuit is completed through the track relay, the electro-magnet so long as energized serving to open the break in the hammer actuating mechanism. But whenever the track circuit is broken, or is completed through a path of lower resistance than the track relay, such for example as the wheels and axles of a passing train, then the torpedo circuit is broken, and the magnet therein is de-energized, with the result that the break in the hammer actuating mechanism is closed. Consequently, if under these conditions a following train should enter the track section to which the torpedo apparatus pertains, the latter would at once be called in action. This plan is all right as far as it goes. But it is open to the objection that inasmuch as a torpedo will be exploded, each time the track lever of the machine is struck by a wheel, many more torpedoes than necessary will be exploded by a train of cars; and indeed that in the case of a train of any length, inasmuch as the front of the train will enter a track section before the rear of it passes beyond the track lever of the torpedo machine appropriate to that section, then even that train, although free to enter the section, will explode some of the torpedoes of the machine of that section. My present improvement is directed to means for preventing any such occurrences, and for limiting under any conditions the number of torpedoes which can be exploded by a passing train.

Inasmuch as the torpedo exploding mechanism is operative or inoperative according to the condition of the electro-magnet by which the break in that mechanism is controlled, it is manifest if the magnet, after having been brought to condition to close the break, is allowed to thus remain only until any predetermined number of torpedoes, say one, two or even more, shall have been exploded, and is then brought, or returned, to opposite condition (to open the break) that further explosion will cease, even though the track lever of the torpedo machine continue to be struck by the passing wheels of the train.

My improvement has been planned on the lines just indicated, my aim being to automatically reopen the break in the hammer-actuating mechanism so soon as a certain number of torpedoes have been exploded by a train following one which is still on the track section to which the torpedo machine pertains, as well as to prevent the explosion of a torpedo by any train entering upon a section which is free, or which has been cleared of the train in advance. To this end I combine with the normally closed "torpedo" circuit including the torpedo magnet and completed through contacts controlled by the track relay, a normally open branch circuit also including the "torpedo" magnet, and formed in part by the rails of a short insulated section of the track, electrically distinct from the track section to which the torpedo machine pertains—this circuit being completed only when the rails of said insulated section are electrically connected or bridged as they will be by the wheels and axles of a train. This short insulated section is so located as to be met by the entering train, in such manner that by the time any of the wheels are on the main track section (with the effect of cutting out the track relay and

thus opening the main torpedo circuit) other of the wheels will be on the short insulated "torpedo" section, with the effect of completing the branch circuit and thus maintaining the torpedo magnet in its energized condition and consequently holding open the break in the hammer actuating mechanism. This is upon the supposition that the main track section is free or clear from any train in advance. But if there should be a train in advance, the torpedo magnet would be inert and consequently the break in the actuating mechanism would be closed at the time the following train reached the torpedo track lever. Therefore explosion would follow the striking of the lever by the wheels of the train, and the number of explosions would be determined by the number of times the lever was struck by the wheels, before the front wheels reached the short insulated torpedo track section. As soon as the torpedo track section is reached by the train, the branch circuit will of course be closed, and the machine will be at once thrown out of action as above explained. By adjusting the distance at which the track lever is placed in advance of the insulated torpedo track section, one, two, or more torpedoes as desired can be exploded before the machine is thrown out of action.

To enable others skilled in the art to make and use my invention I will now proceed to describe with more particularity the manner in which the same is or may be carried into effect by reference to the accompanying drawings, in which—

Figure 1 is a side elevation of the apparatus in connection with a track rail—a portion of the inclosing case being broken away to expose the parts within. Fig. 2 is a rear elevation of the same with the case partly broken away. Fig. 3 is a diagram representing two systems of circuits embodying my invention.

It is not necessary here to minutely enter into the details of the torpedo machine. That machine is fully described and claimed in my companion application, Serial No. 500,202, hereinbefore referred to.

In Fig. 1, x is the track rail adjoining which, that part of the hammer or striker actuating mechanism to be operated by a passing train is located; and y is the sleeper or tie on which the rail rests and the terpedo machine is secured. A is the case or shell of the machine, and B (Figs. 1 and 3) is the lid or cover for the front of the same. The track lever C, which is the part to be struck by the passing train, is pivoted in the fulcrum casting a with its shorter end or arm in proximity to and normally standing slightly above the level of the rail as is usual in this class of apparatus; and the long arm of the lever is held down with yielding pressure by a spring c.

To the rear end of the track lever C is pinned the upright rod D, which at its upper end is held in and passed through a vertical stationary guide d, secured to the case of the machine. At the point where the rod is pinned to the lever it has a slightly slotted hole for the pin, which will permit sufficient play between the parts to prevent the upper end of the rod jamming in its guide when moved up and down therein. To the upper end of the rod D is pinned the arm E, so as to be capable of vibration to and from an electro-magnet F attached to a stationary hanger or support f in the case. This arm E carries the armature e and is in effect the armature lever of the magnet. It is provided with a back stop e' and a spring e^2, which presses it against the back stop when not drawn forward by the superior attractive force of the magnet.

The upper end of the arm E is below a toe or projection g, attached to or forming part of a collar g', rigidly secured by a set screw or otherwise to a rock shaft g^2 journaled in the case A. Upon the same shaft (see Fig. 2) is also rigidly secured the shank of a hammer or striker G, which normally hangs by gravity in the position shown in Figs. 1 and 2.

The arrangement shown in the drawings is such that when the arm E is against its back stop (in which position it is represented in Fig. 1) its upper end will be directly under and in the path of the toe or projection g. Consequently, if the arm while in this position be lifted by the lever C, it will strike the toe and thus will cause a sudden partial revolution of the rock shaft g' with the effect of swinging the hammer sharply forward so as to strike with force anything in its path. But when, on the other hand the arm E is drawn forward by the attractive force of the magnet, its upper end will be carried out of the path of the toe or projection g, in which event its upper end in rising will clear and have no contact with the toe, and thus the hammer will remain at rest. The armature lever E is thus in effect a portion of the hammer actuating mechanism, and the break in that mechanism which is controlled by the electro-magnet F, is between that arm E and the toe or projection g.

The torpedoes J, which are presented successively to the action of the hammer are carried on the extremities of arms I radiating from a hub H mounted on a suitable axle or stud projecting from the inner face of the lid or cover B, and caused to revolve thereon (whenever free to do so) by suitable means, such as a spiral spring i attached at one end to the hub and at the other end to the cover. A stop k in the path of the unexploded torpedoes arrests each in turn in a position where it will be opposite to the hammer.

In Fig. 3 I have represented a track composed of two insulated sections each provided with my invention. In the arrangement shown in section X the apparatus is applied to that section without any accompanying visible signal. In this case the electro-magnet F of the torpedo machine is included in a

normally closed circuit 1 completed through contacts *m*, controlled by the armature lever *t* of the track relay T—the latter being included in a normally closed track circuit 2 completed through the rails of the section. So long as the track relay is closed, the circuit of the torpedo magnet F is closed also. As soon however, as a train enters section X the track circuit 2 will be completed through the path of shorter resistance afforded by the wheels and axles of the train, and the track relay consequently will be cut out and de-energized, thus breaking the circuit 2 at *m*.

Just in advance of track section X, is the short insulated track section X′, hereinbefore termed by me the torpedo track section—which may be of any suitable length—say from thirty to sixty feet; and still in advance of section X′ is the track lever of the torpedo machine pertaining to the main section X, the arrangement being such that the wheels of an approaching train shall meet the track lever before they reach the torpedo section X′, and shall pass over the latter section before they enter the main track section X.

The rails of the torpedo section X′ form part of a branch circuit 3 from the torpedo circuit 2; this branch is normally open, the break in it being between the opposite track rails of the section X′, and this break being bridged and closed by the wheels and axles of a passing train. Whenever and so long as the branch circuit 3 is closed the torpedo magnet will be energized.

Under these conditions the operation will be as follows: If section X be clear, then the circuit 2 will be closed. Consequently an entering train will pass over the torpedo track lever without possibility of exploding the torpedoes, until it actually enters section X. But at this time a portion of the train is on the insulated torpedo section X′ so that although circuit 2 is opened by the entrance of the train upon section X, with the consequent de-energizing of the track relay, still that portion of the train on the insulated section X′ completes and closes the branch circuit 3, thus maintaining the torpedo magnet active and consequently holding the torpedo machine out of action. On the other hand, if section X be not clear, then when a following train meets the torpedo track lever, both circuits 2 and 3 will be open, the torpedo machine will be in action, and consequently explosion will follow. Ordinarily the lever will be so placed that it will be struck once or twice, before the train reaches the insulated torpedo track section X′—thus providing for one or two explosions. The moment the train reaches section X′ the branch circuit 3 will be closed, and the torpedo machine will be thrown out of action. In the arrangement shown in Fig. 3, in connection with track section Y and its torpedo section Y′, the torpedo apparatus is likewise controlled from a track circuit 1 through the agency of a visible signal S, so arranged as to operate a circuit making and breaking switch in the circuit 2 of the torpedo magnet F.

The signal itself is held normally at safety by operating mechanism controlled by electrical appliances in a normally closed track circuit 1 in a well known way—as shown for example in my Letters Patent No. 499,125 of June 6, 1893. The torpedo magnet circuit 2 is normally closed also. In this example the branch circuit 3 does not include the rails of the torpedo section Y′, but is completed through normally open contacts 4, controlled by a relay 5 in a normally open torpedo track section circuit 6, which includes the rails of section Y′ and is closed by the wheels and axles of a passing train. The operation is substantially the same as that described for sections X, X′.

I state in conclusion that I do not restrict myself to the particulars herein described in illustration of my improvement, for manifestly the structural details of the mechanism as well as the arrangement of the circuits and circuit connections can be widely varied by the skilled mechanic and electrician without departure from my invention. What I now believe to be essential is that there should be for the torpedo magnet, in addition to its main circuit 2, a branch or auxiliary circuit such as 3, which mediately or immediately is so connected to or controlled by an insulated torpedo track section, that by and during the passage of a train over that section the branch or auxiliary circuit shall be put in such condition as to cause the torpedo magnet to maintain the torpedo exploding mechanism in, or restore it to, inactive condition, as the case may be, and I desire to be distinctly understood as claiming broadly this feature.

I claim—

The combination with the track circuit and track relay included therein, a torpedo apparatus having a break in its exploding mechanism, an electro-magnet for controlling said break and a circuit including said torpedo magnet and completed through contacts controlled by the track relay, of a branch or auxiliary circuit also including said torpedo magnet, a torpedo track section, and connections whereby, by and during the passage of a train over said torpedo track section, the branch or auxiliary circuit is put in condition to cause the torpedo magnet to maintain, or restore, as the case may be, the break in the torpedo exploding mechanism.

In testimony whereof I have hereunto set my hand, before two subscribing witnesses, this 24th day of February, 1894.

JACOB WILLIAM LATTIG.

Witnesses:

EDWARD J. MALLOY,

J. DAVIS BRODHEAD.