

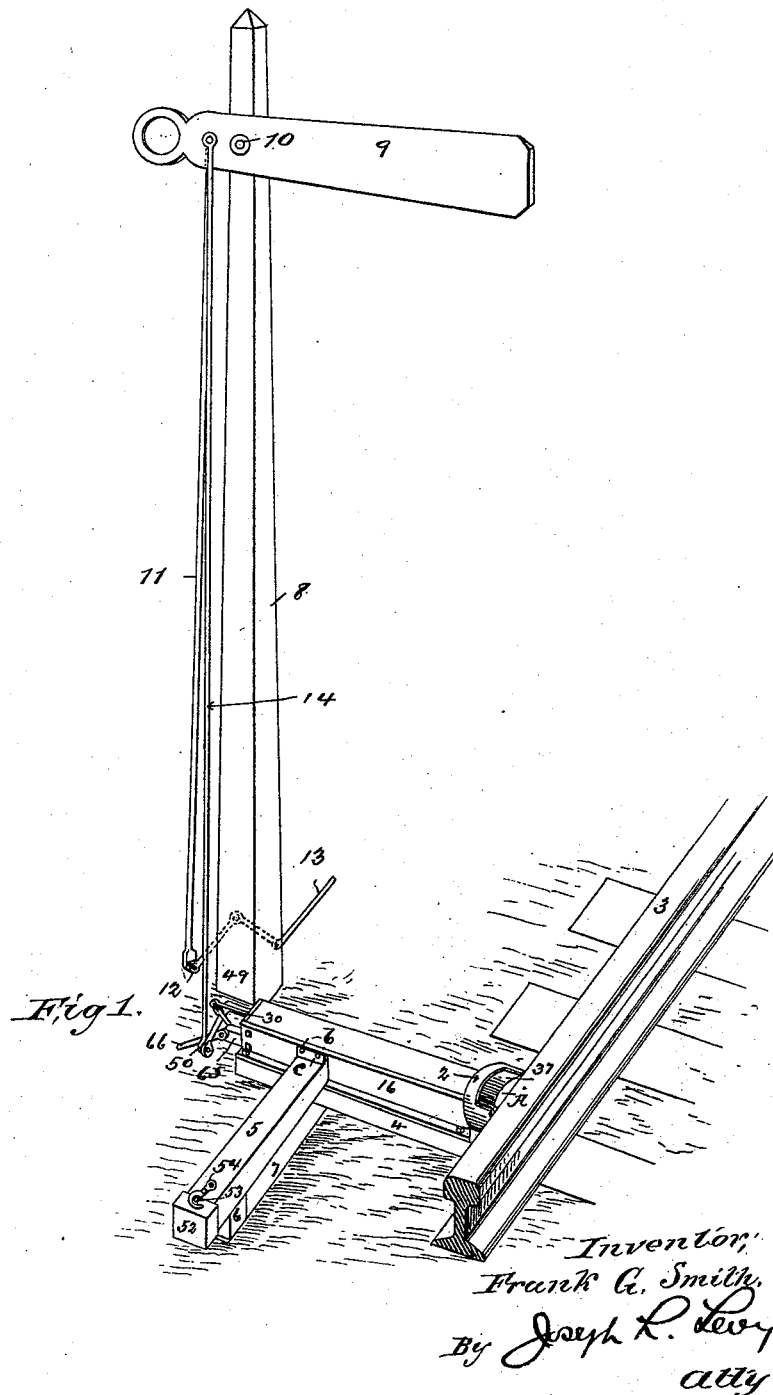
(No Model.)

4 Sheets—Sheet 1.

F. G. SMITH.  
RAILROAD SIGNAL.

No. 525,367.

Patented Sept. 4, 1894.



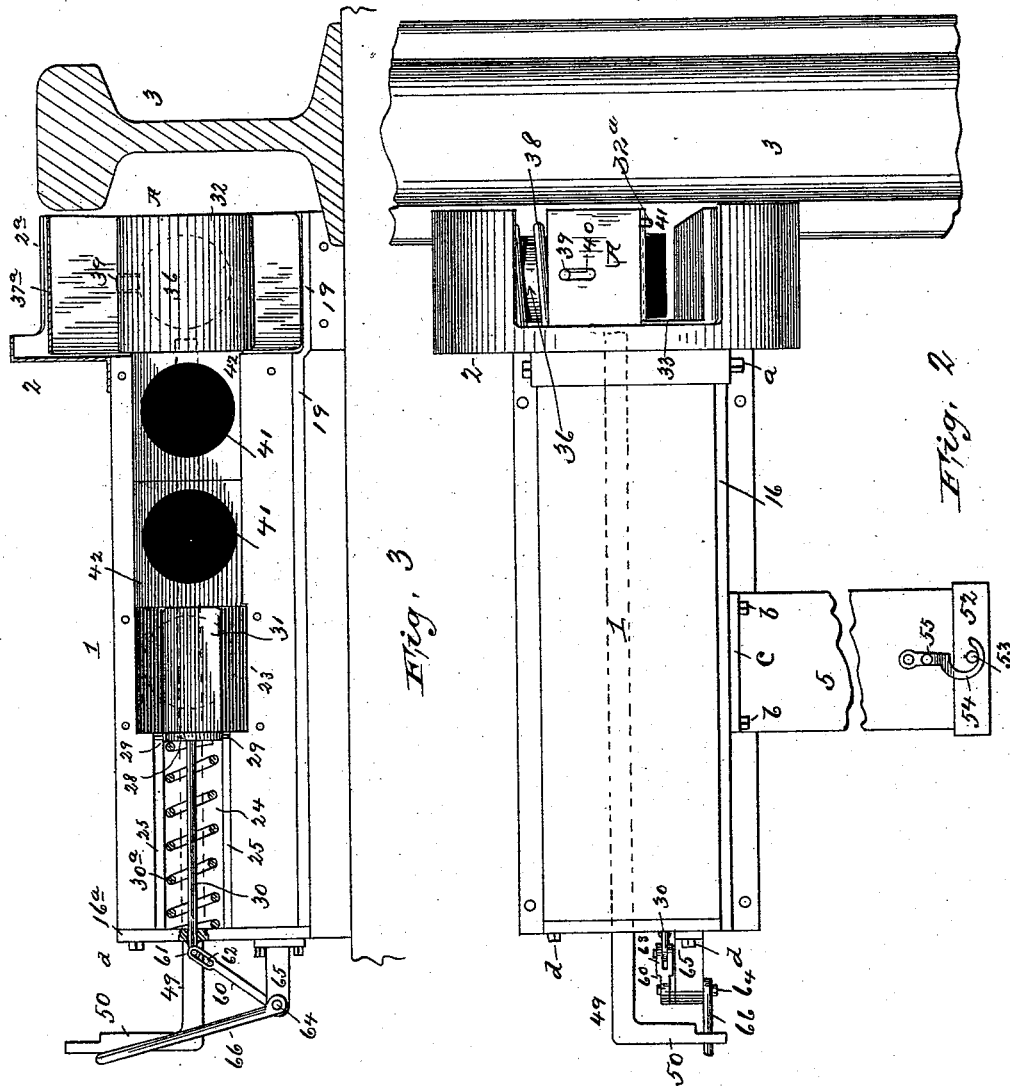
(No Model.)

4 Sheets—Sheet 2.

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No. 525,367.

Patented Sept. 4, 1894.



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R. S. Wier.

Inventor:  
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By Joseph L. Low  
att'y

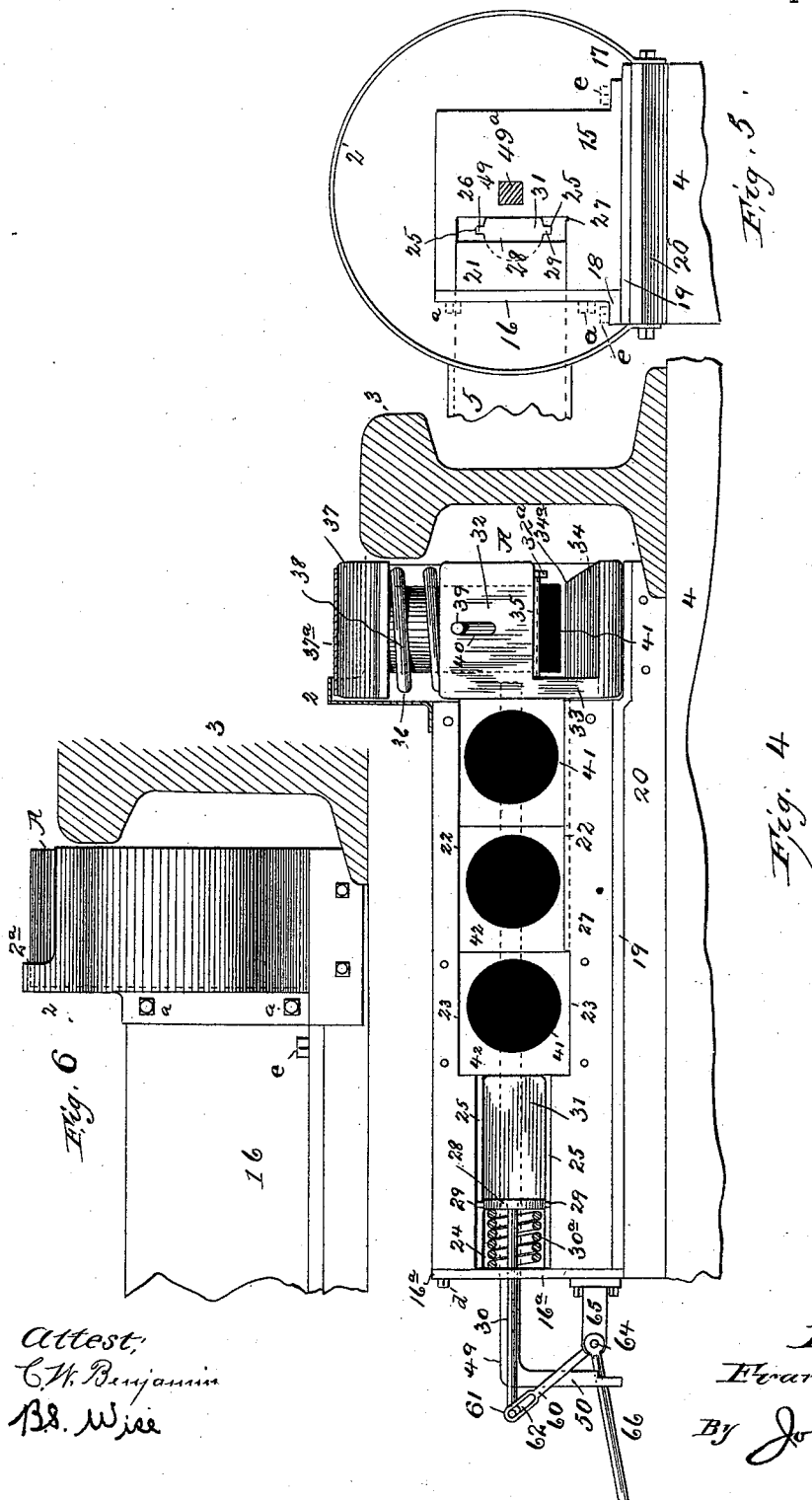
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4 Sheets—Sheet 3.

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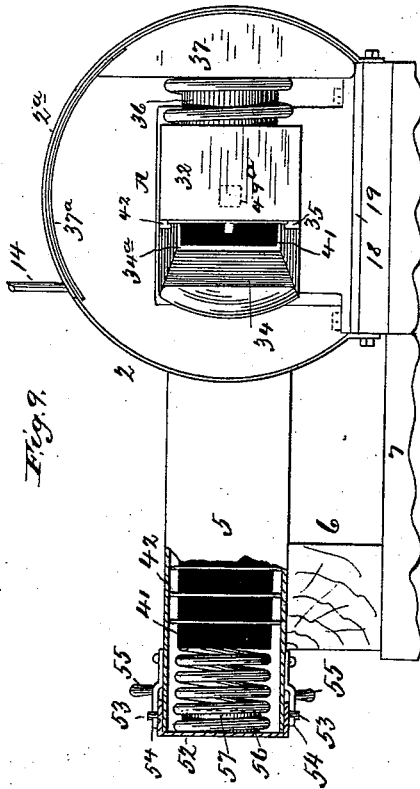


Fig. 9.

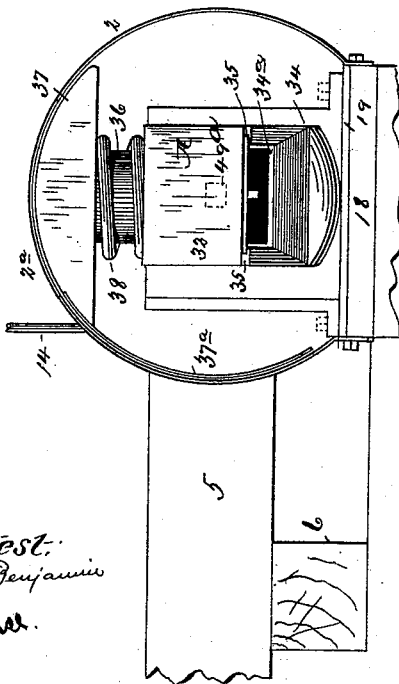


Fig. 7.

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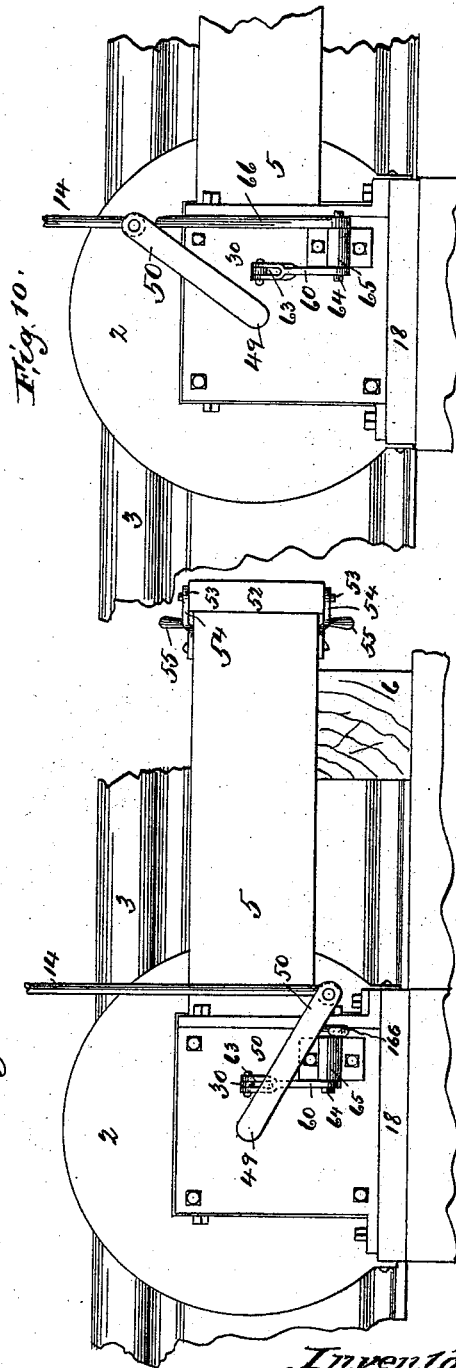


Fig. 10.

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# UNITED STATES PATENT OFFICE.

FRANK G. SMITH, OF NEW YORK, N. Y.

## RAILROAD-SIGNAL.

SPECIFICATION forming part of Letters Patent No. 525,367, dated September 4, 1894.

Application filed November 10, 1893. Serial No. 490,551. (No model.)

*To all whom it may concern:*

Be it known that I, FRANK G. SMITH, a citizen of the United States, residing at New York, (Williams Bridge,) in the county of Westchester and State of New York, have made certain new and useful Improvements in Railroad-Signals, of which the following is a specification.

My invention relates to that class of signaling devices, wherein a torpedo, detonator, or the like is used to notify trainmen of a closed, blocked, unsafe or dangerous condition of the track or road.

My invention comprises a device which will or may operate in conjunction with the semaphore or other visual signal, permanently located on the road bed, for the purpose of audibly notifying the trainman of a signal being displayed at danger, or calling his attention to that fact.

My invention consists essentially of a magazine adapted to contain a plurality of torpedoes, an oscillatory carrier and detonator having a recess to receive a torpedo, and a movable exploder carried bodily by the detonator, and means for feeding the torpedoes to the detonator and oscillating it synchronously with the operation of the visual signal.

My invention further consists in the novel details of construction and combination of elements hereinafter set forth, and further pointed out in the claims.

An embodiment of my invention is shown in the accompanying drawings forming part of this specification, in which—

Figure 1, is a perspective elevation of my device located adjacent to the rail of a track and showing its conjunctive use with the visual signal or semaphore. Fig. 2, is an enlarged plan of the casing located adjacent a track rail, the operating parts being disconnected from the semaphore, the detonator having been rotated parallel with the rail to receive a torpedo, and out of the firing position. Fig. 3, is a side elevation of Fig. 2, the restraining plate and magazine having been removed to disclose the interior of the casing, the rail and hood being in section, the parts being in the same position as in Fig. 2. Fig. 4, is a side elevation and part section similar to Fig. 3, the detonator having been rotated to a vertical or firing position

at the side of the rail and the push block retracted. Fig. 5, is a front end elevation of Fig. 4 with the rail and detonator and carrier removed to disclose the front structure of the casing and hood. Fig. 6, is a side elevation of the front portion of the casing and hood, the rail being in section, the detonator and carrier being vertically disposed at right angles to the rail. Fig. 7, is a front elevation showing the detonator and carrier disposed vertically ready to detonate the torpedo, the magazine being broken away and the rail removed. Fig. 8, is a rear view of the device with the parts in the same position showing the magazine in full. Fig. 9, is a front elevation showing the detonator and carrier parallel with the rail and at safety, a portion of the magazine casing being broken away to disclose the operating mechanism; and Fig. 10, is a rear elevation of Fig. 9 with the parts in the same position, the magazine being broken away, for convenience in illustrating.

Similar numerals and letters of reference refer to like parts throughout the several views.

By reference to Fig. 1 it will be seen that my device comprises essentially, as in structure, a casing 1 in which the torpedoes are moved toward the rail on their way to the detonating device, in front of which casing is located a circular hood 2 in which the detonator is adapted to oscillate, the hood being closely adjacent to a rail 3 of the track, the casing 1 being set upon a block of wood or an extension of one of the ties as at 4. Extending outwardly from the casing 1 is a magazine 5 which lies parallel with the rail, said magazine being supported in its turn by a suitable block 6 mounted upon a suitable bed piece 7. These three parts comprising essentially the casing 1, hood 2 and magazine 5 can be cast in one piece of metal if desired or made in sections for readily adapting the same to be taken apart for repairs and the like, as the constructor desires, the form of casing, hood and magazine hereinafter described being a convenient structure for receiving my improved mechanism.

At 8 is shown the usual post for support of the visual signal or semaphore 9 which is pivotally supported upon said post by means of a suitable pin 10 or the like, the end of the

semaphore being connected by means of a rod 11 to a bell crank lever 12 pivoted upon the post 8, the opposite arm of said lever being in direct connection with the means, either remote or approximate, for operating the semaphore, the connection in this case being made by means of a rod or wire 13.

From one end of the semaphore 9 depends a connecting rod 14 by which the detonator and carrier are oscillated and the torpedoes moved in the way in the main casing 1 and reversely operated synchronously with the movement of the semaphore, as will now be particularly set forth.

The casing 1 comprises a rectangular box-like casting 15 at one side provided with a detachable plate 16, both the casting and the plate having flanges 17, 18, the casing thus formed preferably resting upon a metal plate 19 and that upon a heavy plate 20, the last resting upon the beam or tie 4 (see Fig. 5). The detachable plate 16 has thereon a lug or projection 21 which, forward of the magazine 5, has a shape corresponding with the lines 22, Fig. 4, and rearwardly of the square 23 it has a segmental recess, as shown in dotted lines, Fig. 5, the opposing side of the casting 15 having been likewise provided with a recess, both recesses forming a channel 24, at the top and bottom of which is a groove 25, the block 21 forward of the magazine 5 lying within a recess formed on that side of the casting 15, and the block not being as deep as the recess leaves a channel or way 26, at the bottom of which is formed a groove 27 which extends rearwardly only as far as the square 23 which defines the entrance of the magazine 5 into the way 26, (see Figs. 4 and 5.)

The plate 16 is secured to the casting 15 by means of bolts *a*, the bolts *b* passing through a flange *c* on the magazine 5 which secures the magazine to the plate 16 as well as securing the plate 16 to the casting 15 at this point. To the rear end of the casing 1 the plate 16<sup>a</sup> is secured by means of the bolts *d*, and the casing 1 is secured to a bed or foundation by means of bolts *e* passing through the flanges 17, 18 of the casing 15 and plate 16 respectively. (See Fig. 5.)

In the channel 24 is adapted to be moved a circular follower 28 having guide pins 29 which travel in the grooves 25, and from the rear face of the circular follower extends a rod 30, and from the forward face of the follower extends a plate or push block 31, a spring 30<sup>a</sup> being coiled around rod 30, and passing at one end against the follower 28 and at its other end against a plate 16<sup>a</sup>.

In front of the way 26 the detonator or torpedo carrier A is pivotally carried, and adapted to oscillate to bring its receiving pocket in line with said way; said detonator being located within the hood 2, said hood being provided with a top opening 2<sup>a</sup>.

The detonator or torpedo carrier comprises essentially a casting having a stock 32 from which depends, by means of the web 33, an

anvil 34 having inclined sides (see Fig. 4) and between the top of the anvil and the bottom of the stock is formed a rectangular recess 34<sup>a</sup>, within which recess and between which anvil and stock the torpedo to be exploded is retained, and into this recess extend two grooved flanges 35, the grooves being on the inside of the flanges and which are adapted to be brought into alignment with the groove 27 in the way 26, when the stock is oscillated into a position parallel with the rail, as shown in Figs. 2, 3, and 9, so as to receive the torpedo within the grooved flanges which thus form a pocket which holds the torpedo suspended within the rectangular space 35<sup>a</sup> between the top of the anvil and the bottom of the stock. The stock directly over the pocket, thus formed by the flanges 35, is apertured centrally to receive the stem 36 (or, as it will be hereinafter called, the hammer) which is adapted to play up and down in said aperture, the stem being a continuation of the contact block 37 which is made segmental at the top to offer an easy riding surface for contact with the tread of the wheel with which it is to be engaged to force the stem or hammer downward in the stock to detonate or explode the torpedo, said contact block 37 being arranged to be brought in line with the opening 2<sup>a</sup> in hood 2, to permit a wheel to depress it, see Fig. 6. The contact block 37 also carries a curved shell 37<sup>a</sup>, that lies within the hood 2, and is arranged to close the opening 2<sup>a</sup> therein, when the detonator is horizontal or in the inactive position, (see Fig. 9.) By this means rain, &c., is excluded from the hood and the torpedo is thus protected.

The front portion of the stock 32 has depending therefrom a peg or stop 32<sup>a</sup> which is set directly in front and centrally of the grooved flanges 35, so as to prevent the unused torpedo in the detonator from being pushed out against the web of the rail, when the semaphore is set to safety after having been at danger, the torpedo not having been exploded, and no train having passed while it was at danger, during the manipulation of the signal as hereinafter described.

The spring 38, which encircles the stem 36, extends between the top of the stock 32 and the bottom of the contact block 37 and keeps said block in its normal position of elevation above the surface of the rail, and secured to said stem is a pin 39 adapted to work in a slot 40, formed in one or both sides of the stock 32 which limits the upward or outward movement of the stem and contact block. The torpedo consists in this case of a circular metallic casing 41 for the explosive, which is secured to a thin sheet of tin or other metal 42 which is readily destructible, although sufficiently rigid to carry the torpedo 41.

The detonator or torpedo-carrier A, is to be oscillated to bring the contact block 37 into position to be operated by a wheel when the semaphore 9 is at the danger signal, as in Fig. 7, and to be carried to the position shown in

Fig. 9 when the semaphore is a safety or indicating a clear track. For this purpose the detonator is carried by a shaft 49, that is journaled in suitable bearings in the casing 1, on its casing 15, to the rear of the way 26, the casing having a bore to receive it, as shown in dotted lines in Figs. 2, 3, and 4, the end of the shaft being squared as at 49<sup>a</sup>, Figs. 5, 8, &c., to receive and rotatably support the stock 32, and the detonator, the shaft 49 extending from the rear end of the casing 1 and having a crank arm 50 that is pivotally connected with the rod 14 depending from the semaphore 9. The parts are so related that when the semaphore 1 is moved to the "danger" position shown in Fig. 1 the shaft 49 will be turned to bring the contact block 37 in line with the tread of the rail 3, and when the semaphore is lowered to the "safe" position to indicate a clear track said block 37 will be turned downward to carry it away from the tread of the rail, as in Fig. 9. Thus the oscillations of the detonator are performed synchronously with the movements of the semaphore.

I shall now describe the operation of successively moving a torpedo and its carrier from the magazine into the way 26, the intermittent transverse progression of the torpedo and its carrier in said way forward toward the detonator and carrier, and the mechanism for performing these operations synchronously with the operation of the semaphore. The magazine 5, consists essentially of a hollow casing whose inner open end registers with the square 23 of the casing 1, so that the torpedoes can be projected from said magazine into the way 26 therein. The torpedoes 41 are placed in a row, against each other, side by side, as in Fig. 9, and when pushed forward within the way 26 of casing 1 the sheet or plate 42 will enter the groove 27 whereby the torpedo will be guided in its passage to the detonator A.

52 is a cap placed over the outer open end of the magazine 5, and said cap is to be detachably connected with said magazine. For this purpose I have shown said cap as provided with pins 53, on opposite sides (see Fig. 9) which pins are to be engaged by hooks 54 pivotally carried by the magazine 5. The hooks 54 are shown provided with knobs or handles 55 for convenience in operating said hooks.

For the purpose of propelling the torpedoes 41 through the magazine 5 and successively into the casing 1, I have shown a coiled spring 56 within said magazine, said spring pressing at one end against the cap 52 and at its other end against the contiguous torpedo 41, of the train of torpedoes in the magazine (see Fig. 9). On the inner side of the cap 52 is shown a stud 57 which projects into the spring 56, whereby the end of said spring is supported and guided. The spring 56 keeps the train of torpedoes within the magazine 5 pressed toward, and advances the torpedoes success-

ively into, the way 26 of casing 1, but of course other means can be employed for this purpose, if desired, and I do not limit myself to the precise arrangement of the spring shown. Each time that a torpedo has been exploded by a passing wheel the detonator or carrier A must be supplied, automatically, with another torpedo, and this renewal of the torpedo in the detonator is to take place synchronously with the movement of the semaphore 9. For this purpose I have shown the rod 30 of the follower 28 pivotally connected with a crank arm 60, as by a pin 61 entering a slot 62 in the arm 60. The crank arm 60 may be forked to receive the rod 30, as at 63 Figs. 8 and 10, if desired. The crank arm 60 is carried by a rock shaft 64 hung in bearings on a support 65 carried by the casing 1, and to the shaft 64 is also connected a crank arm 66, the crank arms 60 and 66 being set at angles as shown. Said crank arms 60 and 66 virtually form a bell crank lever, and such a device could be used if desired. The crank arm 66 is placed in such a position that the crank 50 will operate it, to retract the follower 28, when the semaphore is set at "danger" as in Fig. 1, and when the semaphore returns to "safety" the crank arm 66 will be released to permit the spring 30<sup>a</sup> to advance the follower 28 to push the torpedoes along the way 26 to the detonator.

The complete operation of my improved signal is as follows:—When the track is clear and the semaphore 9 hangs down the detonator will extend parallel with the rail 3, so that its recess 34<sup>a</sup> will be aligned with the way 26 in the casing 1, the shield 37<sup>a</sup> now closing the opening 2<sup>a</sup> in the hood 2 (see Fig. 9). The way 26 is now supplied with a train of torpedoes 41, that extend edge to edge (see Fig. 3), a torpedo having also been projected into the recess 34<sup>a</sup> of the detonator A. The first train of torpedoes may be placed in the way 26 by filling the magazine 5, and then operating the cranks 60 and 66 by hand to cause the follower 28 and push-block 31 to push the torpedoes along the way 26 from the magazine one by one, the spring 56 keeping the torpedoes pushed forward to the way 26. In its forward or normal position the push block 31 lies across the open end of magazine 5, and the torpedo in said magazine rests against it until the push block is drawn back, whereupon the spring 56 forces a torpedo into the way 26 in the path of the block 31. The parts being in their normal positions, as stated, the semaphore will next be set to "danger" by the operation of the rod 13 (see Fig. 1). This setting of the semaphore at "danger" depresses the rod 14, swings down the crank 50 from the position shown in Fig. 10 to that shown in Fig. 8, turns the shaft 49, and thus raises the detonator from the position shown in Fig. 9 to the position shown in Fig. 7. In this position the contact block 37 will be engaged by a passing wheel and the stem or hammer 36 being thus forced down will explode the tor-

pedo between said hammer and the anvil 34. The parts of the torpedo will now pass from the recess 34<sup>a</sup>, out through the inclined walls thereof, and thus the recess will be left free to receive a new torpedo from the way 26 when the detonator or carrier is next swung back to the normal position. When the crank arm 50 swings down to turn the detonator, as above stated, said arm will bear upon the crank arm 66, and thus depress it, thereby drawing out the rod 30, retracting the follower 28 and push block 31 and compressing the spring 30<sup>a</sup> (see Fig. 4); this action now withdraws the block 31 from in front of the magazine 5 and allows the spring 56 to press a torpedo into the way 26. When the semaphore 9 is next set to safety the arm 50 will rise and release the crank 66, so that as soon as the detonator has returned to its normal position the spring 30<sup>a</sup> can press a new torpedo 41 from the way 26 into the recess 34<sup>a</sup> in the detonator. It will be understood that when I say oscillatory detonator or carrier, I mean a rotary or vibratory detonator as well. Many changes and modifications can be made in the structure illustrated herein without departing from the spirit of my invention.

I claim—

1. In a railroad signal, the combination of a prime worker or visual signal, with an oscillatory or rotative detonator, a hammer movable in said detonator and arranged to be brought into position to be engaged by a passing wheel, and means for synchronously feeding a torpedo into the detonator, substantially as described.

2. In a railroad signal, the combination of a visual signal, with an oscillatory or rotary torpedo detonator mounted on a horizontal axis, and having a movable hammer arranged to be engaged by a passing wheel, a magazine, and means for supplying torpedoes in a horizontal plane from said magazine to said detonator, substantially as described.

3. In a railroad signal, the combination of a semaphore, with an oscillatory or rotative detonator, connections between said parts for operating them together, a movable hammer carried by the detonator, an apertured recess therein, a magazine, and means operated by said semaphore for supplying said recess in the detonator with torpedoes from said magazine and oscillating said detonator, substantially as described.

4. In a railroad signal, the combination with a visual signal, of a reservoir or way, and an oscillatory detonator or carrier connected therewith, said detonator comprising an anvil and a hammer or stem having a torpedo receiving recess between them, and means connected with said visual signal for aligning the recess with said way, substantially as described.

5. In a railroad signal, an oscillatory or rotative detonator or carrier, having a torpedo receiving recess a casing having a way leading to said recess, a hammer movable to and

from said recess and carried bodily by the detonator combined with a magazine opening into said way, and with means for operating said detonator, and for positively passing torpedoes from said magazine to and through said way in said casing, substantially as described.

6. In a railroad signal, an oscillatory or vibratory detonator having a torpedo receiving recess, and a movable hammer a casing having a way leading to said recess, and positive means for propelling torpedoes through said way, combined with a semaphore, and means connecting said semaphore with said detonator for turning the latter with the former and for operating the torpedo propelling devices, substantially as described.

7. In a railroad signal, an oscillatory detonator or carrier, a hood inclosing the latter and having a side opening, a casing connected with said hood and a way in said casing for the passage of torpedoes to said detonator, combined with a semaphore and connections between the latter and said detonator for operating them synchronously, substantially as described.

8. In a railroad signal, a detonator, a hood having a side opening, a shield carried by said detonator to close said opening in said hood, a casing connected with said hood, and means for supplying torpedoes from said casing to said detonator, substantially as described.

9. In a railroad signal, an oscillatory detonator, disposed on a longitudinal axis, a recess and movable hammer in said detonator, a casing, a way in said casing to supply said detonator with torpedoes, and means for operating said detonator, combined with a magazine extending at right angles to said casing and communicating with the way therein, with means for positively passing torpedoes from said magazine to said casing, and means for positively propelling said torpedoes to said detonator, substantially as described.

10. In a railroad signal, a rotatable detonator, comprising in its construction, and bodily carried by it, the following instrumentalities: a stock, an anvil carried thereby and a stem or hammer carried by said stock to coact with the anvil in exploding a torpedo, and a contact block on said stem or hammer, combined with means for turning said detonator and means for supplying the latter with torpedoes, substantially as described.

11. In a railroad signal, a rotatable detonator, comprising in its construction, and bodily carried by it, the following instrumentalities: a stock, an anvil hung therefrom by a web, said anvil and stock having a recess between them, a spring actuated stem or hammer carried by said stock, and a contact block carried by said stem or hammer, combined with means for turning said detonator and means for supplying the latter with torpedoes, substantially as described.

12. In a railroad signal, a detonator con-



sisting of a stock or body, an anvil and hammer, said anvil and hammer having a recess between them provided with a groove, combined with a casing having a way for the passage of torpedoes, and a groove at one side of said way, said detonator being arranged to be turned to bring the recess and its groove into alignment with the way and its groove respectively, and with means for passing torpedoes through said way into said recess, substantially as described.

13. A detonator having a torpedo receiving recess and means for turning said detonator, combined with a casing having a way for alignment with the recess in the detonator, a spring actuated follower or plunger for pushing torpedoes along said way, means for operating said follower or plunger, and a magazine arranged to supply torpedoes to said way in said casing, substantially as described.

14. A detonator having a torpedo receiving recess, combined with a casing having a way and a groove 25, an opening 23 in said casing leading to said way and groove, a magazine for torpedoes leading to said opening 23, means for propelling torpedoes from said magazine to said way, and means for propelling torpedoes from said way to the recess in the detonator, substantially as described.

15. The combination of an oscillatory or rotary detonator having a recess, a hammer carried by the detonator, with a casing having a recess, a plate having a lug or projection to form with the recess in the casing a way for a torpedo, a torpedo, a magazine opening into said way, and means for propelling torpedoes through said way to the recess in the detonator and aligning said recess with said way, substantially as described.

16. A detonator having a torpedo receiving recess, combined with a casing having a recess, one portion of which is segmental, a plate having a segmental recess to register with the segmental recess in the casing, said plate also having a lug or projection to enter the recess in the casing to form a way for a torpedo, a magazine leading to said way and means for propelling torpedoes through said way, substantially as described.

17. A detonator having a recess provided with a side groove, combined with a casing having a way provided with a corresponding groove, a magazine, torpedoes having a side extending plate to enter said grooves whereby they are guided, means for moving said torpedoes from said magazine to said way, and means for propelling said torpedoes through said way to said recess in the detonator, substantially as described.

18. A detonator having a torpedo receiving recess provided with a side groove, combined with a torpedo having a side projecting plate or flange, and means for placing said detonator in the recess in said torpedo, substantially as described.

19. The combination of a casing having a torpedo receiving way, with a shaft carried

by said casing, a detonator carried by said shaft, a semaphore connected with said shaft to turn the latter thereby, a follower in said casing and connections for operating said follower synchronously with the movement of said semaphore, substantially as described.

20. The combination of a casing having a torpedo receiving way, with a detonator, a shaft carried by said casing and supporting said detonator, a crank arm on said shaft, a semaphore connected with said crank arm, and means for propelling torpedoes through said way to said detonator, substantially as described.

21. The combination of a casing having a torpedo receiving way with a shaft journaled in said casing and carrying said detonator, a crank arm on said shaft, a semaphore connected therewith, a follower in said casing, a crank arm connected with said follower and connections between said crank arm and the crank arm on the shaft as and for the purpose specified.

22. The combination of a casing having a torpedo receiving way, with a detonator, a shaft carrying the same, a crank arm thereon, a semaphore connected with said crank arm, a follower in said casing, a rod extending from said follower, a spring to actuate said follower and devices connected with said rod for operation by said crank arm, substantially as described.

23. The combination of a casing having a way and a recess in line therewith, with a follower in said recess, a push-block connected with said follower, and devices for operating said follower, a detonator rotative on a horizontal axis, a semaphore connected therewith and devices for operating the follower synchronously with the operation of said detonator, substantially as described.

24. The combination of a casing having a recess and a way, with a follower in said recess, a rod extending therefrom, a spring to move the follower, a crank arm pivotally connected with said rod, a crank arm connected with said crank 60, a shaft having a crank arm 49 arranged to operate the crank 66, a semaphore connected with the crank 50 and a detonator carried by said shaft, substantially as described.

25. The combination of a casing having a way and a detonator having a recess in line therewith, said detonator being rotative on a horizontal axis with a magazine leading to said way and a spring in said magazine for moving torpedoes therefrom to said way, substantially as described.

26. The combination of a casing having a way and a detonator that is rotative on a horizontal axis, with a magazine leading to said way, a cap on the end of said magazine, devices for holding said cap on said magazine and a spring within said magazine for moving torpedoes to said way, substantially as described.

27. A casing having a way for torpedoes

combined with an oscillatory detonator pivotally carried by said casing, a recess in the detonator, a hammer carried by said detonator, means for moving a torpedo from the way  
5 in said recess, a semaphore, and connections between said detonator and semaphore for operating the former by the latter, substantially as described.

28. A casing having a way for torpedoes  
10 combined with an oscillatory detonator having a movable hammer, said detonator having a greater length than width and so ar-

ranged that when turned in one direction it will be in position to be engaged by a passing wheel, and when turned in the opposite direction will be out of contact with said wheel, substantially as described. 15

Signed at the city, county, and State of New York this 6th day of November, 1893.

FRANK G. SMITH.

Witnesses:

JOSEPH L. LEVY,  
B. S. WISE.