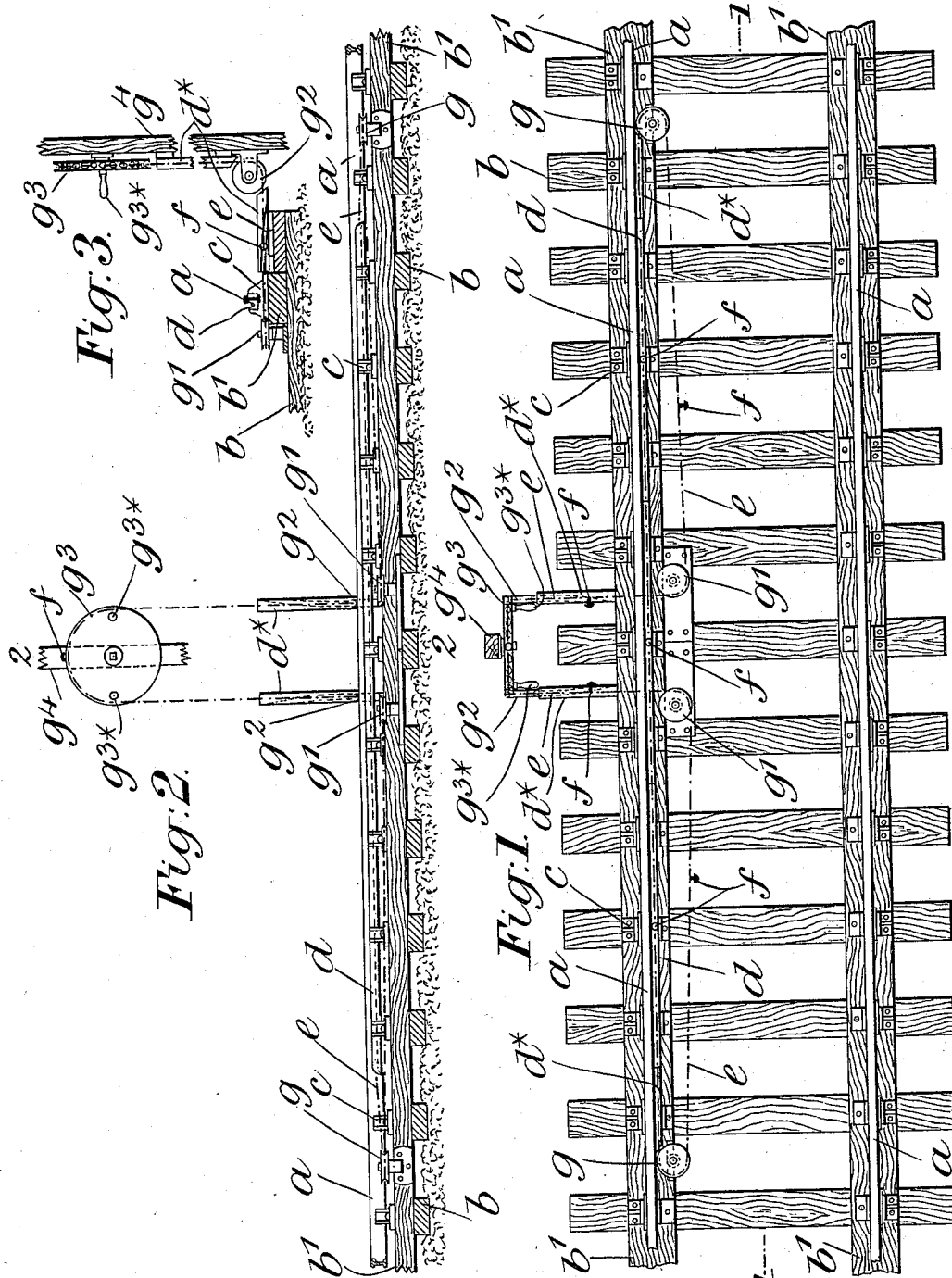


C. TIGHE.

FOG SIGNALING APPARATUS FOR RAILWAYS.

No. 557,036.

Patented Mar. 24, 1896.



Witnesses.
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Fig. 5.

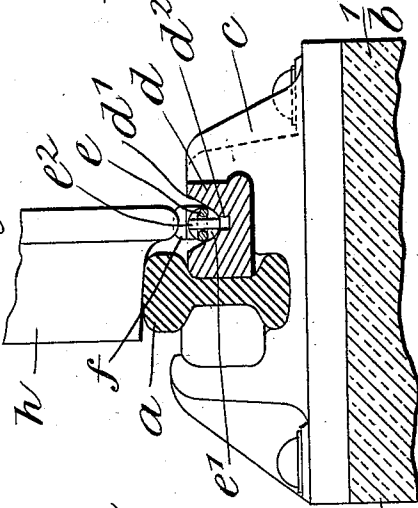
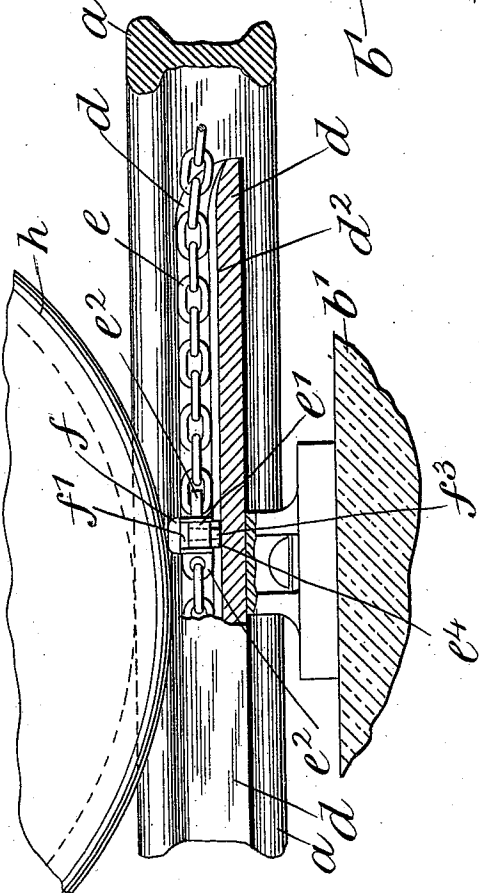


Fig. 4.



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Fig. 9. Fig. 10. Fig. 12.

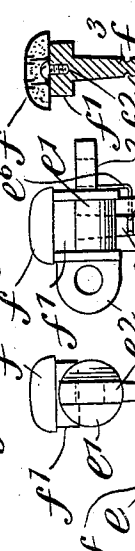


Fig. 8. Fig. 11. Fig. 13.

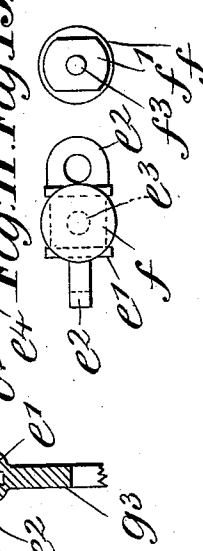


Fig. 6.

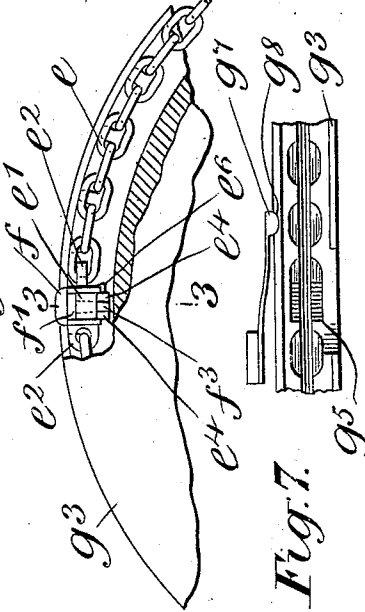


Fig. 7.



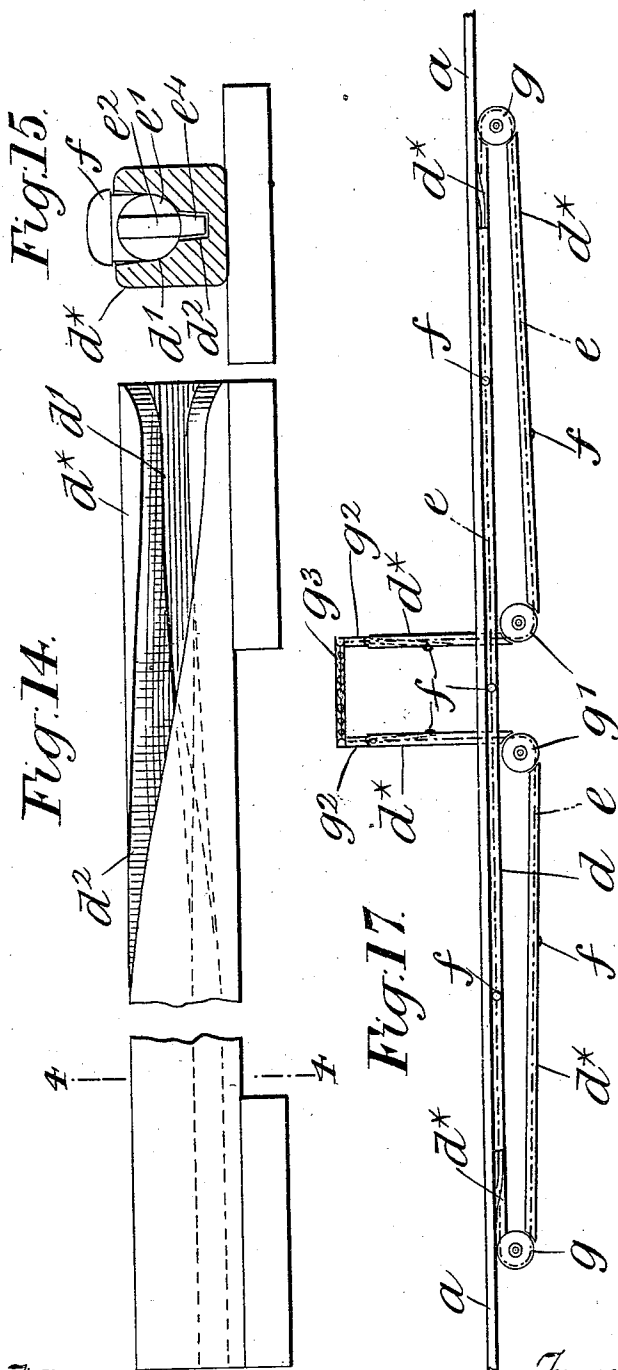
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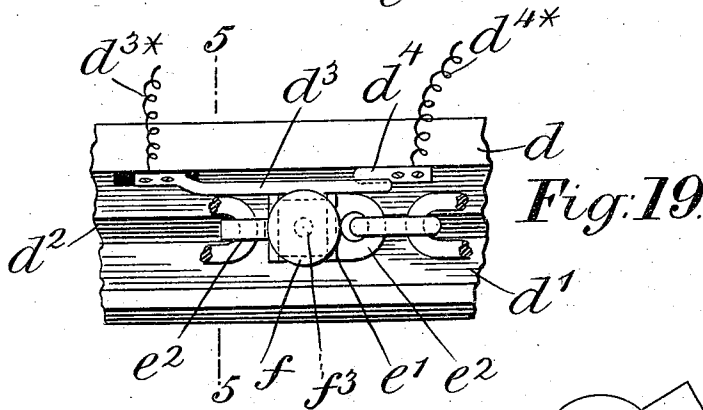
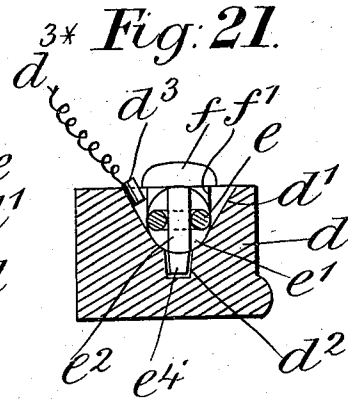
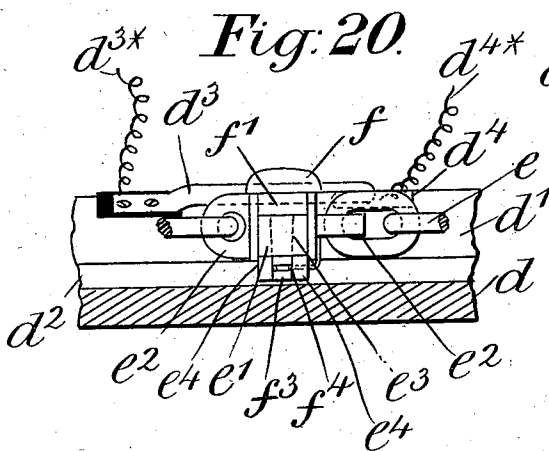
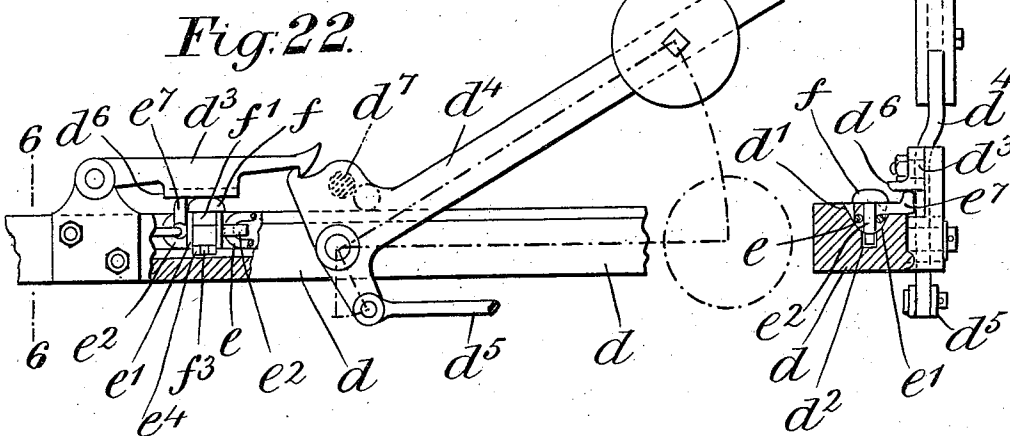


Fig. 23.



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UNITED STATES PATENT OFFICE.

CHARLES TIGHE, OF LONDON, ENGLAND.

FOG SIGNALING APPARATUS FOR RAILWAYS.

SPECIFICATION forming part of Letters Patent No. 557,036, dated March 24, 1896.

Application filed October 19, 1895. Serial No. 566,237. (No model.) Patented in England December 31, 1889, No. 20,969.

To all whom it may concern:

Be it known that I, CHARLES TIGHE, hosiery, a subject of the Queen of Great Britain, residing at 42 Lombard Street, in the city of London, England, have invented certain new and useful Improvements in Fog Signaling Apparatus for Railways, (in respect of which I have obtained Letters Patent in Great Britain, No. 20,969, dated December 31, 1889,) of which the following is a specification.

The invention relates to improvements in fog signaling apparatus for railways, and has for its object to enable the signal-man to place the detonators from within his cabin into position to be exploded or to withdraw the same when not required, thereby dispensing with the employment of the ordinary fog signal-men who now place the signals upon the line by hand, thus effecting a considerable economy in wages and a great saving in the lives of the men who perform such a dangerous duty; and the invention relates to various details of construction and arrangement of parts, as hereinafter pointed out; and in order that the said invention may be clearly understood and readily carried into effect I will proceed, aided by the accompanying drawings, fully to describe the same.

In the drawings, Figure 1 is a plan, partly in section, representing part of a line of railway having the present invention applied thereto. Fig. 2 is a longitudinal section taken on the line 1 1 of Fig. 1. Fig. 3 is a vertical transverse section taken on the line 2 2 of Fig. 2. Fig. 4 is a longitudinal section of part of the railway, showing the wheel of a locomotive in the act of discharging the detonator. Fig. 5 is a sectional end view thereof. Fig. 6 is a sectional side view of a portion of the operating or pitch wheel located within the signal-man's cabin and showing the chain in position. Fig. 7 is a plan of part thereof, showing the chain removed. Fig. 8 is a vertical transverse section thereof, taken on the line 3 3 of Fig. 6. Fig. 9 is an end elevation of a special link of the chain forming a carrier for the detonators and showing a detonator in position. Fig. 10 is a side elevation thereof. Fig. 11 is a plan thereof. Fig. 12 is a vertical section of a detonator and its holder separately. Fig. 13 is an under side view thereof. Fig. 14 is a side elevation of a portion of one

of the spiral guides. Fig. 15 is a transverse section taken on the line 4 4 of Fig. 14. Fig. 16 is a transverse section showing part of one of the guide-pulleys. Fig. 17 is a plan representing part of a line of railway fitted with a slightly-modified form of apparatus. Fig. 18 is a detail view of a piece of the endless chain. Fig. 19 is a plan of a portion of the device representing means for electrically giving notice of the explosion of a detonator to the signal-man within his cabin. Fig. 20 is a vertical longitudinal section thereof. Fig. 21 is a transverse section thereof, taken on the line 5 5 of Fig. 19. Fig. 22 is a similar view to Fig. 20, but representing the substitution of a mechanical device for conveying the desired announcement to the signal-man; and Fig. 23 is a vertical transverse section taken on the line 6 6 of Fig. 22.

In the several figures, in which like parts are indicated by similar letters of reference, Figs. 4 to 16 and Figs. 18 to 23 are drawn to an increased scale with respect to Figs. 1, 2, 3, and 17.

Referring to Figs. 1 to 16, *a* represents the ordinary railway-rails, and *b'* represents longitudinal sleepers which are placed at the same level as the ordinary transverse sleepers and are employed for a short distance in order to support the apparatus hereinafter described, and *b* represents the ordinary transverse sleepers which support the longitudinal sleepers *b'* and are coextensive therewith, but are placed at a lower level than the ordinary sleepers in order to accommodate the longitudinal sleepers *b'* and to afford space for the apparatus, as will be readily understood.

The rails *a* are carried for a short distance by means of chairs *c* of special form, shaped to receive an anvil *d*, which is thereby held along the inner side of one of the rails *a*, and the anvil *d*, which may be in one piece or made up of several sections, should be of such a length as to accommodate three detonators placed at the usual distance apart.

The anvil *d* is provided with a V-shaped groove *d'* therein, which forms a guide for an endless chain *e*, which is traversed along the anvil *d*, as hereinafter described.

The endless chain *e* forms a vehicle for the detonators and carries them into position to be exploded by the flange of a passing wheel,

and it is at suitable intervals—that is to say, at the distance at which the detonators are required to be placed with relation to the line a —fitted with carriers, (shown more particularly at Figs. 9 to 11,) comprising a body e adapted to ride in the groove d' and provided with apertured lugs e^2 at each end thereof and disposed at right angles to each other, which are coupled with the ordinary links of the chain e .

The detonator-carrier e' is formed with a vertical hole e^3 therein, preferably tapered, and the detonators f are, by screws f^2 , fixed upon holders f' , formed with tapered pegs f^3 adapted to tightly fit the holes e^3 of the carriers e' , and the pegs f^3 are formed with annular grooves f^4 , which are engaged by spring-pins e^6 upon the carriers e' . By this construction the carriers e' may be readily charged with detonators. The detonators will, by the tapered pegs f^3 , holes e^3 , and spring-pins e^6 , be firmly held in position without liability of displacement, while at the same time the holders f' after the discharge of the detonators may be readily removed from the carriers.

In order to prevent the chain e twisting with relation to the anvil d and thus to insure the detonators f always being presented to the wheel of the engine in correct position, the V-groove d' of the anvil d is at the lower part formed with a rectangular guide-groove d^2 , into which fit and travel projections e^4 formed upon the carriers e' , by which arrangement the detonators f are held in the required position during their passage across the anvil d , and the groove d' and guide-groove d^2 at the commencement of the anvil d are formed of a curved shape in order to receive the chain e and detonators f as they leave the last guide-pulley and to guide them properly into position.

In order that the detonators f may be led to the various guide-pulleys g g' g^2 and the operating-wheel g^3 in correct position to pass around the same, guides d^* , similar to the anvil d , but formed with spiral grooves d^2 therein, as shown more particularly at Figs. 14 and 15, are employed where necessary and adjacent to the pulleys or wheels to turn the chain e into the correct position, and the pulleys g g' g^2 and operating-wheel g^3 are each formed with a groove g^* corresponding with that d^2 of the anvil d and guides d^* .

It will be understood that other forms of detonators than those herein described might be employed in connection with the traveling chain e with good results.

The endless chain e passes along the inner side of the line a for a given distance, as herebefore described, and it thence passes around two horizontal guide-pulleys g . It then returns and passes around two horizontal guide-pulleys g' . It then passes under the line a , under two vertical guide-pulleys g^2 , up to and around a chain-wheel or pitch-wheel g^3 mounted upon a post g^4 located in the cabin of the signal-man and provided with handles

g^{3*} , by means of which it may be rotated at the times desired.

The wheel g^3 , which upon its periphery is formed like a chain-wheel or sprocket-wheel, is provided with a single recess g^5 of a size to receive the special links or carriers e' of the chain e , as shown more particularly at Figs. 6 and 7, and the circumference of the wheel g^3 is so proportioned to the distance apart of the special links or carriers e' of the chain e that at every revolution of the wheel g^3 a carrier e' falls into the recess g^5 , and thus one revolution of the wheel g^3 will place a single detonator f in position to be exploded by the flange of the wheel h of the engine or carriage. Two revolutions thereof will so place two detonators and three revolutions thereof will so place three detonators, while by a reverse movement of the wheel g^3 one or more of the detonators may be removed from the anvil d , as will be readily understood. It will also be understood that the diameter of the operating or pitch wheel g^3 might be varied, in which case the position or number of the recesses g^5 would require to be arranged accordingly.

In order to prevent the accidental movement of the operating-wheel g^3 , and consequently of the chain e and detonators, a spring-stud g^7 , entering a corresponding hole or recess g^8 in the wheel g^3 , is employed to hold the wheel g^3 in its normal position and to indicate to the signal-man each revolution thereof, as shown more particularly at Figs. 6 and 7, or any other suitable locking device might be employed for this purpose.

The anvil d is arranged to receive three detonators f in position to be exploded, as represented more particularly at Fig. 1, at an assumed distance of six feet apart, and the pitch or operating wheel g^3 is assumed to be correspondingly formed of a diameter of about two feet or a circumference of about six feet; but it will be evident that this arrangement of parts may be modified according to circumstances.

In the example given at Figs. 17 and 18 the chain e is coupled with the carriers e' by swivels e^5 as an additional precaution against detrimental twisting of the chain e and to enable the carriers e' to be guided with a greater degree of certainty around the guide-pulleys g g' g^2 and operating-wheel g^3 , and in this case the guides d^* are made continuous along the entire course of the chain e , and the groove d' therein is made spiral where necessary, and as shown more particularly at Figs. 14, 15, and 17, in order to bring the carriers e' into the correct position to pass around the guide-pulleys g g' g^2 and operating-wheel g^3 .

In the example given at Figs. 19 to 21 the anvil d has fixed therewith a spring-contact d^3 and a fixed contact d^4 placed in circuit by electrical conductors d^{3*} d^{4*} with any suitable electric battery and bell or alarm, so that upon a detonator f being exploded by a

passing train the spring-contact d^3 will be forced against the fixed contact d^4 , thus completing the circuit and sounding the alarm and, if desired, moving an indicator, and thus conveying to the signal-man an independent indication that the detonator has been exploded without the necessity for his relying upon his hearing the actual explosion upon the line.

10 In the example given at Figs. 22 and 23 an equivalent device is shown, but in this case the arrangement is mechanical instead of electrical. It consists of a pivotally-mounted detent d^3 engaging a weighted lever d^4 , which
15 by a rod d^5 is connected with an alarm or indicator in the signal-man's cabin, and the detent d^3 is provided with a lateral offset d^6 , which normally lies adjacent to the detonator f , so that upon the latter being exploded
20 when the parts are in the position indicated by the drawings the detent d^3 will be raised and the weighted arm or lever d^4 will fall into the position indicated by the dotted lines in Fig. 22, thereby through the rod or connection d^5 giving the required indication to the
25 signal-man in his cabin. The arm or lever d^4 is again set or raised into position to engage the detent d^3 by means of a pin e^7 upon the special link or carrier e' in the traverse of the chain e coming against and passing
30 under a pin d^7 on the lever d^4 .

In the traverse of the chain e the special links or carriers e' will pass over the operating or pitch wheel g^3 in the signal-man's
35 cabin, when he can readily remove the holders f' of the exploded detonators and recharge the carriers e' .

By the means hereinbefore described the signal-man is enabled to perform all the operations from within his cabin, and those operations and the apparatus are both of such a simple character that there is little or no risk of failure on the part of the operator or of the mechanism.

45 Having now particularly described and ascertained the nature of the said invention and in what manner the same is to be performed, I declare that what I claim is—

1. A fog signaling apparatus for railways
50 comprising an endless chain provided at intervals with carriers for detonators, a system of guide-pulleys for leading the chain to and from the signal-man's cabin and the railway, a grooved bar or anvil located along the inner
55 side of one of the rails for supporting and guiding the chain and detonators, and an operating-wheel placed under the control of the signal-man for traversing the endless

chain and placing the detonators in position to be exploded substantially as herein shown 60 and described.

2. A fog signaling apparatus for railways comprising an endless chain provided at intervals with carriers formed with vertical tapered holes to receive the pegs or holders of 65 the detonators, a grooved bar or anvil located along the inner side of one of the rails for supporting and guiding the chain, a supplemental groove in the anvil, projections upon the carriers to ride in the supplemental groove, 70 and means placed under the control of the signal-man for traversing the chain substantially as herein shown and described.

3. A fog signaling apparatus for railways comprising an endless chain provided at intervals with carriers for detonators, projections 75 upon the carriers and spirally-grooved guides for receiving the projections and guiding the carriers and detonators into correct position for passing around the guide-pulleys 80 and operating-wheel substantially as herein shown and described.

4. A fog signaling apparatus for railways comprising an endless chain provided at intervals with carriers for detonators connected 85 with the chain by swivels, projections upon the carriers, grooved pulleys and fixed guides for receiving the projections and guiding the carriers, the grooves of the fixed guides being spirally disposed at the approaches to the 90 guide-pulleys and operating-wheel in order to guide the carriers and detonators into correct position for passing around the guide-pulleys and operating-wheel substantially as herein shown and described. 95

5. A fog signaling apparatus comprising an endless chain provided at intervals with carriers formed with vertical holes to receive the pegs or holders of the detonators, grooves or recesses in such pegs and spring-pins upon 100 the carriers for engaging such grooves substantially as herein shown and described.

6. A fog signaling apparatus for railways comprising an endless chain at intervals carrying detonators and leading them into position 105 to be exploded by a passing train, and means adapted to be actuated by such explosion for conveying to the signal-man an indication that the train has passed over the detonator substantially as herein shown and 110 described.

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