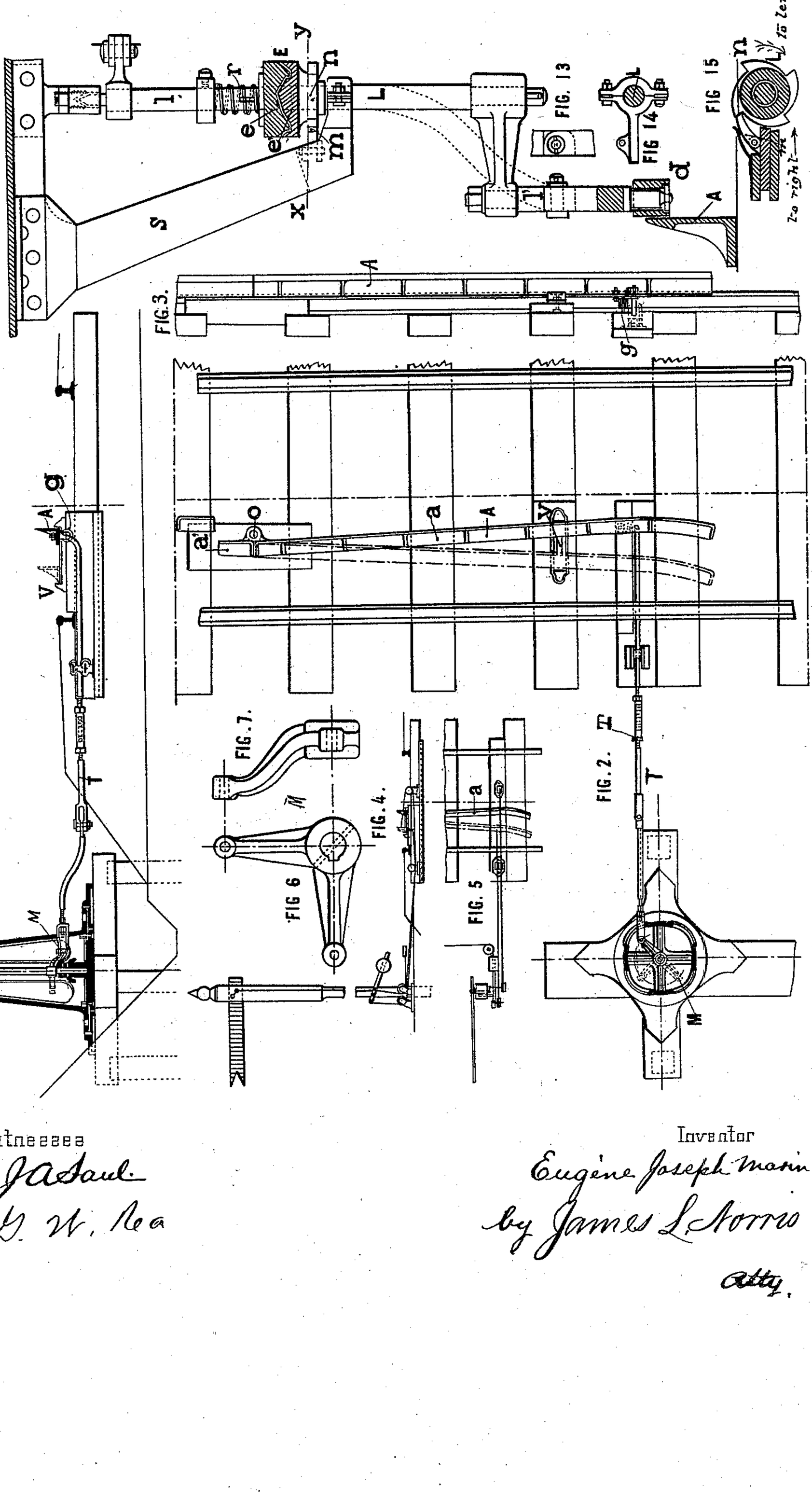
(No Model.) 3 Sheets—Sheet 1.

E. J. MARIN.

SAFETY APPLIANCE FOR RAILWAYS.

No. 544,923. Patented Aug. 20, 1895.



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(No Model.) 3 Sheets—Sheet 2.

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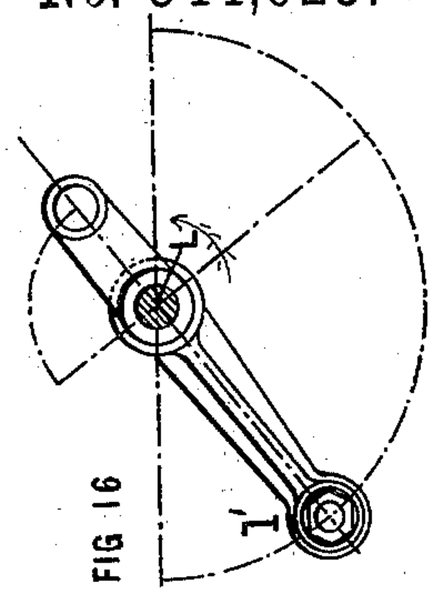

FIG. 16

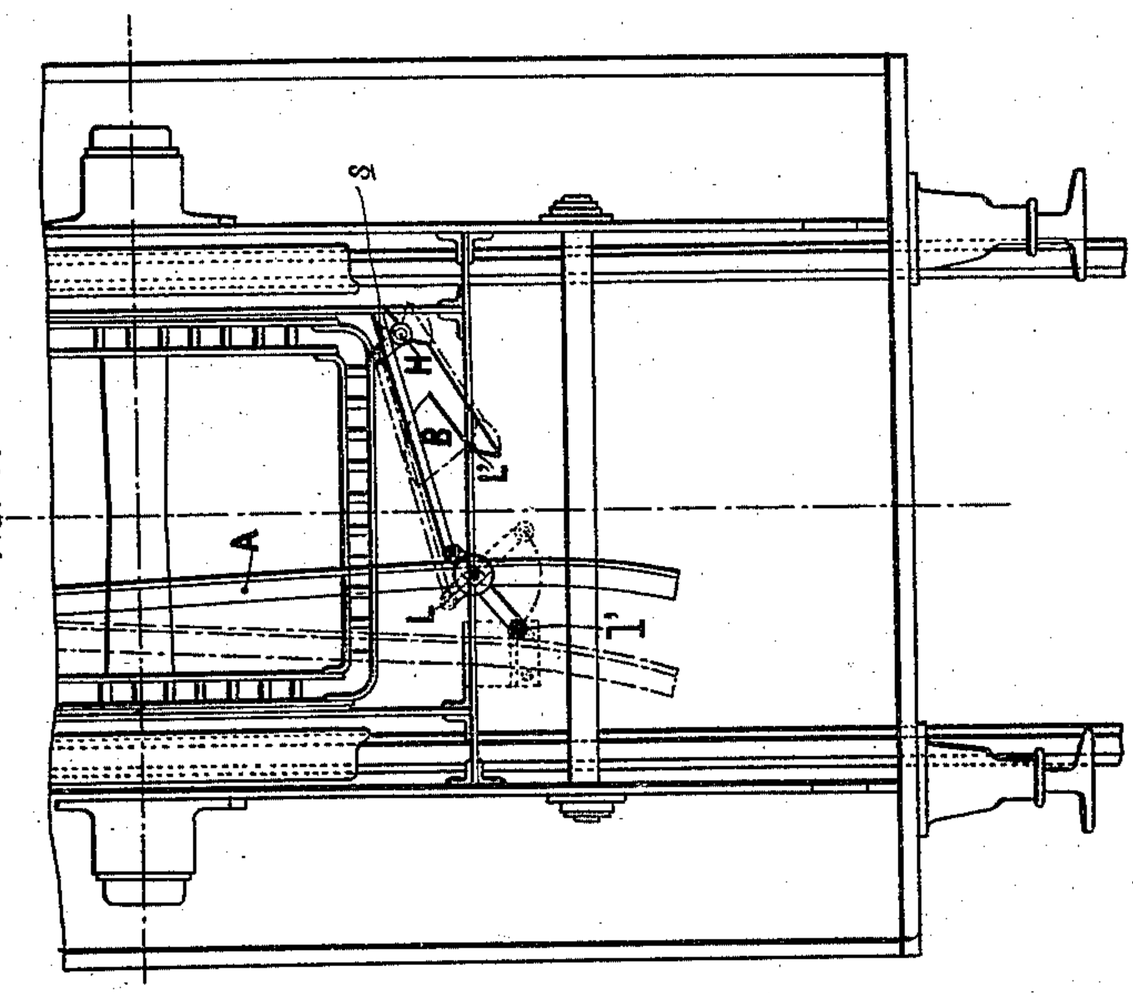

FIG. 10

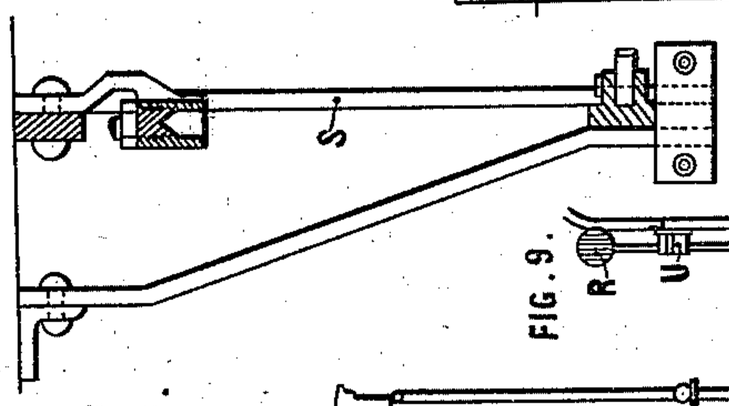

FIG. 11.

FIG. 9.

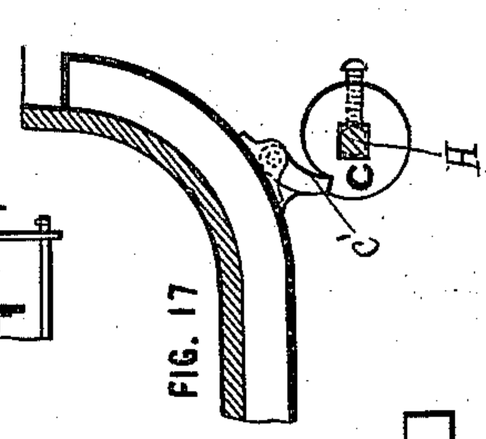

FIG. 17

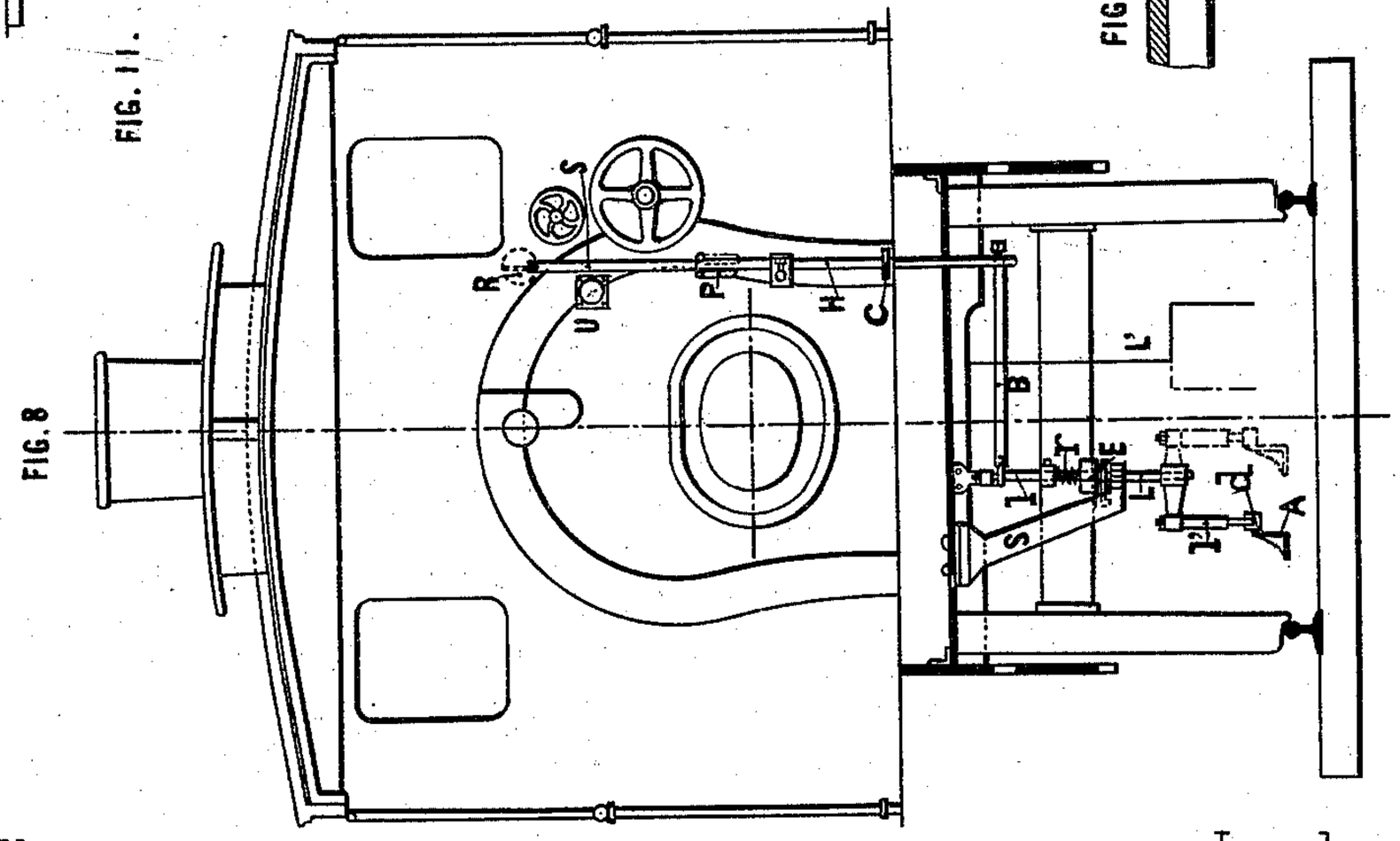

FIG. 8

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FIG 19

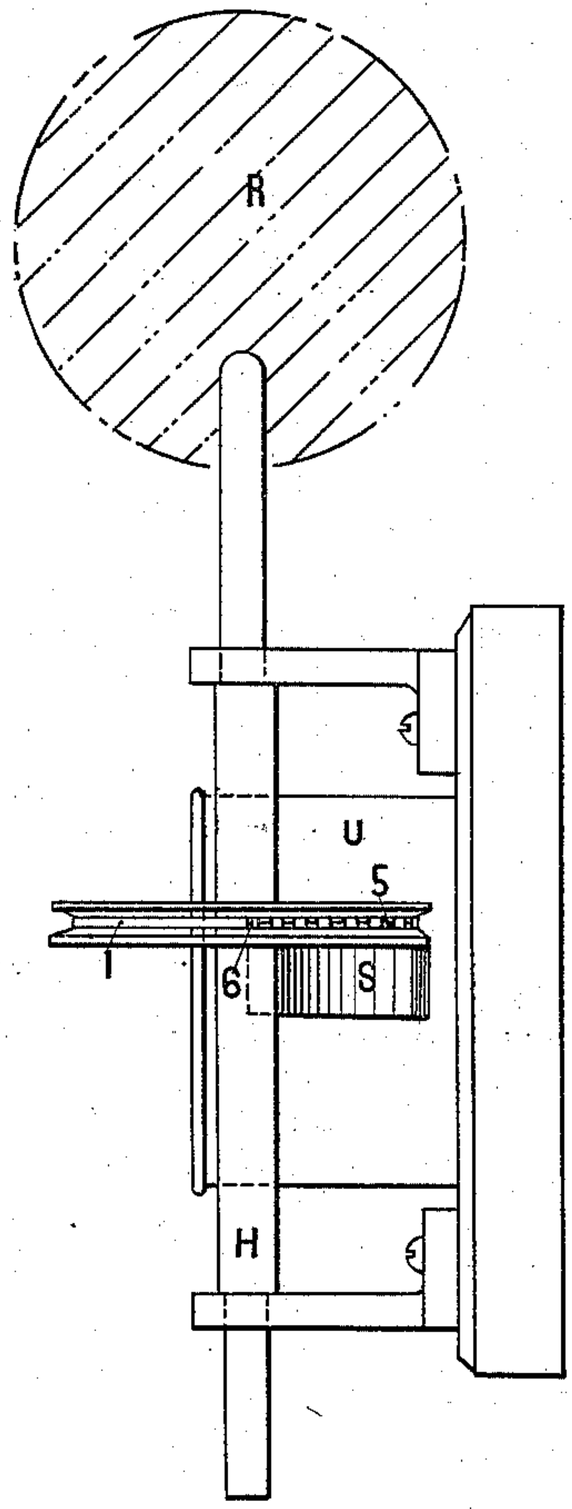


FIG 18

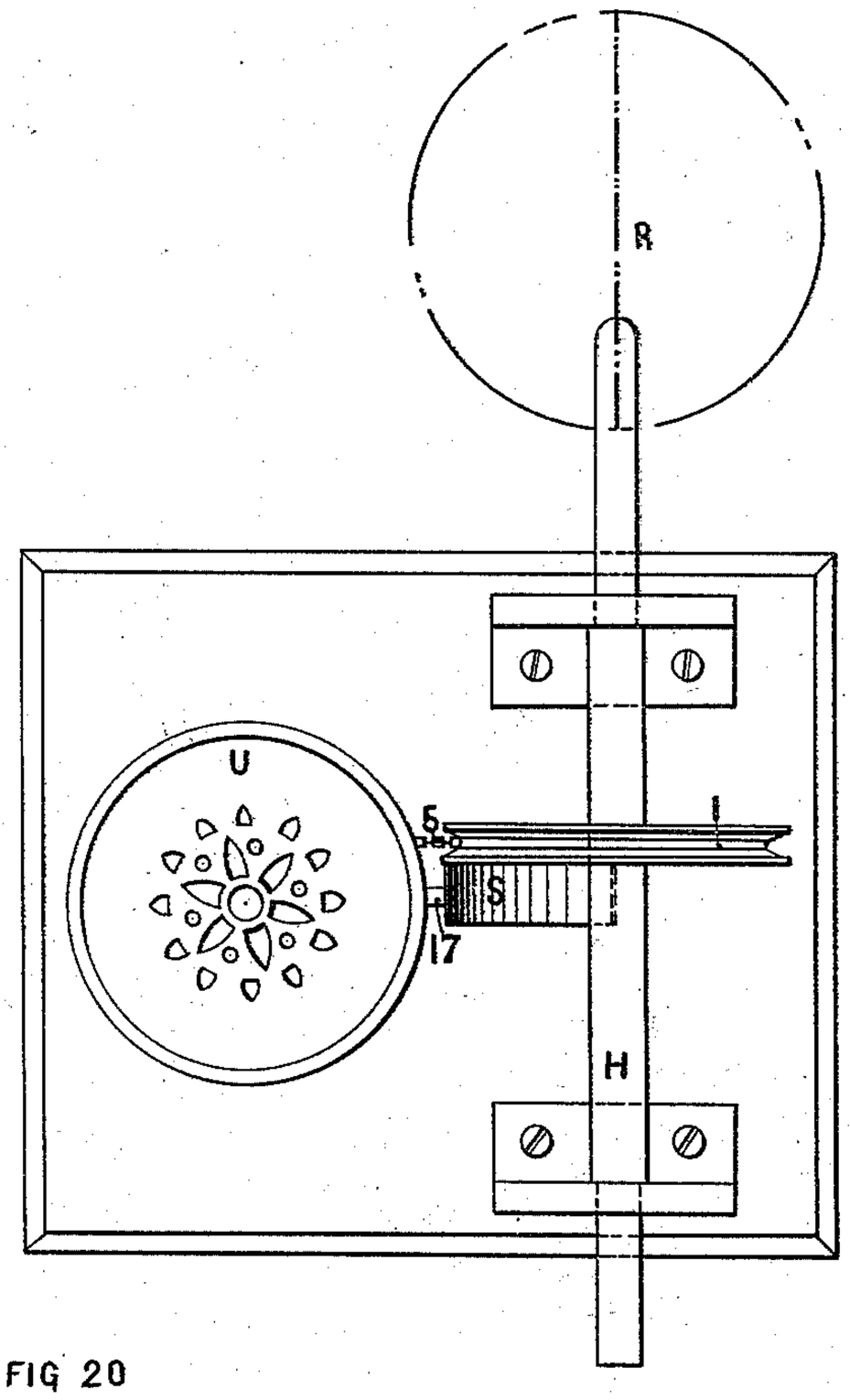
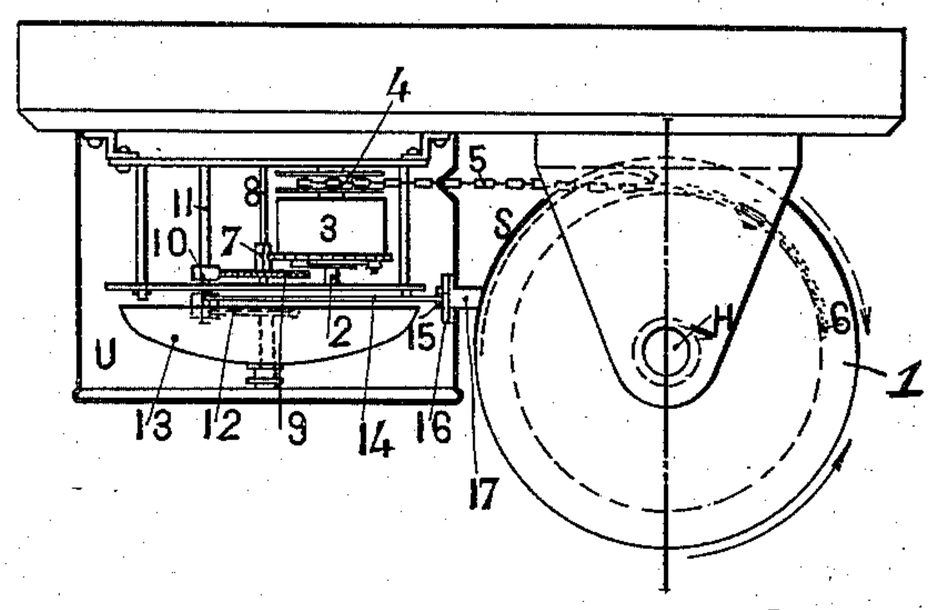


FIG 20



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UNITED STATES PATENT OFFICE.

EUGÈNE JOSEPH MARIN, OF VINCENNES, FRANCE.

SAFETY APPLIANCE FOR RAILWAYS.

SPECIFICATION forming part of Letters Patent No. 544,923, dated August 20, 1895.

Application filed March 28, 1893. Serial No. 468,038. (No model.)

To all whom it may concern:

Be it known that I, EUGÈNE JOSEPH MARIN, a citizen of France, and a resident of Vincennes, in the Department of the Seine, France, have invented a new and useful Improvement in Safety Appliances for Railways, of which the following is a specification.

This invention relates to an improved apparatus which greatly increases the safety of railway-trains by preventing the accidents which occur through signals being unobserved.

This apparatus, being constructed as hereinafter explained, operates in the following manner, viz: When a locomotive passes a signal set at "danger" it automatically causes a species of telltale or signal repeater to appear upon the engine or other part of the train, combined with the ringing of a loud bell, so that it is impossible for the engine-driver or officials in charge of the train to be unaware that the train has passed a signal set at "danger." The apparatus being so arranged as to be capable of working in the guards or brake-vans is enabled to warn the conductors or guards in time to enable them to take the necessary precautions to insure the safety of the trains.

The apparatus is further designed with a view to obtaining simplicity of construction and being little liable to get out of order, and also admitting of being readily applied to existing lines without requiring alterations in the construction of the latter. It is composed of two parts, one being placed upon the permanent way and connected with the mechanism of the ordinary signal, and the other part being carried by the locomotive and repeating the signal and calling attention to its position by ringing a bell. The first part is composed of an arm or movable rail oscillating about an axis and actuated from the ordinary signal mechanism by means of a connecting-rod. In certain cases this rail or arm may be worked by a rope or flexible connection. The second part is composed of a lever carried by the locomotive and so arranged that it comes in contact with the aforesaid rail or arm when the signal is at "danger." Locomotives arranged to travel in either direction are provided with a second lever similar to the first, but projecting on the opposite side. The rail or arm by guiding the lever along an inclined plane compels it to move through an angle of ninety degrees and transmits the motion to the signaling device carried by the locomotive, which in turn releases by means of a sector or quadrant a bell-ringing mechanism inclosed in a box. The operations of returning the signal to its original position and winding up the bell-ringing mechanism can be performed by the engine-driver by means of a handle, which simply requires to be rotated for this purpose.

In order that my invention may be clearly understood, I will now proceed to describe the same in detail, referring to the accompanying drawings, which illustrate a complete apparatus according to my invention in the form which I prefer to employ in practice.

Figure 1 of the accompanying drawings represents, in elevation and partly in transverse section, the part of the apparatus which is placed on the permanent way. Fig. 2 represents this part of the apparatus in plan. Fig. 3 is a side elevation of the same. Fig. 4, drawn to a smaller scale, illustrates a modified form of this arrangement. Fig. 5 is a corresponding plan. Fig. 6 is a front view of the crank provided on the disk or signal. Fig. 7 is a side view of the crank. Fig. 8 illustrates in front elevation the second part of the apparatus or that part which is carried by the locomotive. Fig. 9 represents the same part in side elevation, and Fig. 10 represents it in plan. Fig. 11 is a detail of the support or bracket for the lever. Fig. 12, drawn to a larger scale, illustrates a detail of the lever and accessory parts. Fig. 13 represents in side elevation a knuckle-joint provided in the cranked arm or pin of the lever. Fig. 14 represents the support of the lever in plan. Fig. 15 illustrates in horizontal section on the line X Y, Fig. 12, a pawl-and-ratchet arrangement hereinafter described. Fig. 16 represents the lever in plan. Fig. 17, drawn to a larger scale, represents a cam or ratchet and catch arrangement hereinafter described. Fig. 18 is a face view of the repeater and box. Fig. 19 is a side view of the same. Fig. 20 is a rear view, the lid closing the box being cut away to show the interior parts.

The first part of the apparatus—namely,

that arranged upon the permanent way and the principal part of which is formed by the arm or movable rail A—requires to be very rigid and firmly connected with the movement or mechanism of the signal and should not offer any perceptible resistance to the oscillating motion in order that the counterweight may be enabled to actuate it at the same time as the disk or signal. The arm or movable rail also requires to be so arranged as to obviate the occurrence of a sudden shock or concussion when it comes in contact with the lever on the locomotive, even when the latter is running at high rates of speed, which may sometimes be as high as one hundred feet per second. The former of these conditions is complied with by forming the switch-rail A in two parts *a* and *a'*, the movable part *a* being of greater length and preferably made of cast-steel of peculiar hollow form with webs. This arm or switch-rail is supported upon a roller *g*, Fig. 1, and vibrates upon a vertical axis *o*, Fig. 2. A guide *v*, attached to an intermediate sleeper, prevents the arm from being deflected in a vertical direction. The second condition is complied with by making the deflecting arm or rail of considerable length, the shorter part *a'* being fixed and having a small angle with or inclination to the line of rails, which amounts to about one-half of an inch in the foot. The length of this rail enables it to remain in contact with the device on the locomotive for about one-quarter of a second, (assuming the latter to be traveling at the rate of one hundred feet per second,) and this time being allowed for rotating the repeater this movement is enabled to take place without a jerk and will even take place slowly when the train is traveling at low speeds. When moving at the rate of, say, about twenty miles an hour, for example, the repeater will take about four seconds to make its revolution.

The movable rail is so arranged that when the track is clear and the signal set at "safety" it allows the lever on the locomotive to pass without moving it, sufficient allowance being made for the side movements of the engine and irregularities in the track. Moreover, the curved portion of the movable rail A near its extremity enables the pin *l'* on the lever L to be acted on, even when the signal-disk on the permanent way has been rotated through sixty degrees only in place of ninety degrees. The situation of the movable rail on one side of the axis of the track and its elevation and projection above the level of the rails are regulated in such a manner that the said rail is not liable to come in contact with any of the other lower projecting parts of the locomotive or cars.

The second part of the apparatus—viz., that carried by the train—may be modified to suit the construction of the locomotive or car on which it is placed; but the lever L, hereinbefore referred to in connection with the movable rail, must always be placed in the same situation relatively to the axis of the vehicle. This lever being carried by a bracket S of any suitable shape is composed of an upper part *l* and a lower cranked part *l'*, which is brought down to a point above the level of the rails at which it is not liable to come in contact with any of the parts usually projecting from the track beneath the vehicles. The pin *l'* is retained in contact with the movable rail A by a helical or coiled spring *r*, which applies pressure through a washer upon a clutch-box E, Fig. 12. This clutch is composed of two parts, the upper part *e* being vertically movable on the upper portion *l* of the lever L and rotating with it by sliding on a vertical groove and the lower part *e'* being loose upon the said lever L, but being engaged or retained, when the latter moves to the right hand, by a pawl *m* acting on a ratchet-wheel *n*, Fig. 15, that is fast on said lower clutch part *e'*. On the other hand, when the lever rotates from right to left in order to return to the position indicating "way clear," the ring *e'* is carried round with the ring *e* and returns to its original position.

It will be observed that the opposing faces of the rings or clutch parts *e e'* are so constructed as to act as a cam in one direction of rotation of the lever L and as a clutch in the other direction. When the roller *d* on the pin *l'* is in contact with the movable rail A, whereby the pin *l'* and lever L are partly rotated to actuate the signal-repeater, the lower clutch part *e'* will be held stationary by reason of the engagement of the ratchet-wheel *n* and pawl *m*, and the upper clutch part *e*, rotating with the lever L, will be raised by the action of the opposing cam-surfaces of said parts *e e'*, thereby compressing the spring *r*, while the reaction of said spring on the clutch will press the roller against the rail. In returning the repeater and actuating-lever L to normal position, as by means of a handle P, hereinafter referred to, the ratchet-wheel *n* and pawl *m* will no longer hold the lower clutch part *e'* stationary, and it will consequently be turned backward to its normal position by the clutching action of the upper clutch part *e* carried by the rotating lever L.

The pin *l'* is provided at its lower extremity with a sleeve or antifriction-roller *d* for the purpose of reducing the friction on coming in contact with the rail A. This pin is also provided with a stiff knuckle-joint rounded on one side, so as to be absolutely rigid only when the train is proceeding in the direction for which the apparatus on the track is arranged, and which enables the pin to turn upon the said joint or yield when the train is moving in the opposite direction. This is merely an accessory arrangement, provided in case the train is required to run back after passing a signal at "danger."

A connecting-rod B transmits motion, by the aid of two cranks or lever-arms, from the lever L to a shaft H, Fig. 8, connected with

the signal-repeater R. The rotary movement imparted to the lever L by the engine-driver in order to return the repeater to "way clear" is limited to ninety degrees by means of a snail-cam or ratchet C, Fig. 17, placed on the shaft H. The handle P, Figs. 8 and 9, by which the apparatus is worked, is jointed and folds down against the shaft.

When the pin l' of the lever L meets the rail A, the position being supposed to correspond to the "stop" signal, (as represented by mixed lines in Figs. 2, 5, and 10,) the shaft L l, Fig. 12, receives a sudden rotary movement in the direction of the arrow, Fig. 16. The clutch e' cannot turn in the same direction, being hindered by the pawl m meshing with ratchet n, Fig. 15, which is part of the clutch. On the other part, the inclined faces of clutch e, Fig. 12, to which ascending movement is allowed by a spline and vertical groove, rise upon the inclined faces of the clutch e', and in rising clutch e compresses spring r until the shaft L l having made a quarter-turn each of the cam-faces of the clutch e fall back into the clutch-box E into the cavities of clutch e', which follow those previously occupied.

The roll d, Fig. 12, is for reducing the friction of the pin l' against the rail A, and by its length and inclination the rail compels said pin to turn one-quarter of a revolution. This movement is transmitted by connecting-rod B, Figs. 8 and 10, to shaft H of the repeater, which turns an equal one-quarter revolution in a direction away from the pawl c' of the snail-cam C, Fig. 17, carried on said shaft. This quarter-revolution of the shaft H causes the signal R of the repeater to appear to the eyes of the engineer. As soon as the repeater or signal R comes in view and is observed the engineer should close the throttle to cut off the admission of steam to the cylinders, and should also apply the brakes in the usual way. When the signal returns to "clear" the train goes on and the engineer ought to return the apparatus to the position indicating "track clear"—that is to say, the position it had before the roll d of pin l' came in engagement with rail A. For this purpose the engineer raises the handle P, Figs. 8 and 9, which turns the shaft H backward until the tooth of cam c carries to a new engagement with pawl c'. The movement of shaft H is transmitted by the connecting-rod B to shaft l L, which makes a quarter-turn in a direction contrary to its former movement, and comes back to the position shown in Fig. 16.

The clutch e', fast on shaft l L, is controlled in its rotary movement by the friction of the cam-faces of the two parts of clutch e e', one against the other, and at the termination of movement the four-toothed ratchet n stops in the position shown in Fig. 15, after having turned in the direction of the arrow, the pawl m having passed one tooth.

It will be noted that when once returned to the position of "track clear" the mechanism is not free to turn in either direction, for, on the one hand, by the engagement of the two parts of the clutch e e', the pawl m abuts against one of the teeth of ratchet n and hinders shaft l L from turning against the arrow, Fig. 15, clearly showing that it is the pressure of spring r which, in seeking to maintain the engagement, forces the roll d to rest against rail A. On the other hand, the pawl c' butting against the tooth of the cam C prevents shaft H from turning in one direction. That said shafts may again turn about one-fourth a revolution it is necessary that roll d ride over another oblique rail, like A, placed in a corresponding position. Under these conditions the inclined faces of clutch e ride up on those of clutch e', which is hindered from turning by the pawl m and ratchet n. The operation will then again be as already set forth.

The bell apparatus or mechanism inclosed in the box U is released during the rotation of the repeating-signal by the action of a small sector s, which presses a contact-button and frees the hammer of the bell. This bell apparatus is wound up at the same time as the signal is put back to "way clear" by means of a chain attached to the sector s, and which is wound upon a small drum placed upon the spindle of the spring. The box U is fixed upon a suitable support arranged in the most convenient part of the vehicle. Upon the shaft H of the repeater R is keyed a grooved pulley 1, Figs. 18, 19, and 20, on the face of which is mounted a sector s, having the form denoted in Fig. 20. In the box or perforated casing U is an axis 2, on which is mounted a clock-barrel 3, inclosing a spiral spring, which tends to turn it in the direction of movement of the grooved pulley 1. On the latter is a sprocket-chain 5, attached at its end 6 to the pulley 1 and at its other end to a small pulley 4 on the clock-barrel axis. The crown-gear of the barrel 3 meshes with a pinion 7 on the shaft 8, on which is a gear having saw-teeth for an escapement 10, mounted on a shaft 11, carrying at its end a hammer 12, inside a bell or gong 13. On the shaft 11 is a lever 14, the end of which bears on a screw-head 15 on the leaf-spring 16, the lower end of which is riveted to the casing U and the free end of which is furnished with a finger 17, passing through the casing and pressed by the tension of the spring 16 against the sector s. This forms a mechanism for operating the sounder or gong.

In the position shown in Figs. 18, 19, and 20 the repeater is at "track clear." Under these conditions the spiral spring in the barrel 3 is under tension by the revolution of pulley 1 in the direction of the arrow in broken lines, Fig. 20, as the preceding action has turned the repeater R from the position "track closed" to the position "track clear;" but the hammer 12 is not operated by the barrel to strike the gong, because the shaft 11 is hindered by the lever 14. When the

roll *d*, Figs. 8 and 12, comes against rail A in the position "track closed," the shaft H and pulley 1 turn a quarter-revolution in the direction of the arrow, Fig. 20, as heretofore explained. The segment *s* also turns, slipping on the finger 17. When the inclined end of the segment has passed the finger, the leaf-spring 16 ceases to press the screw 15 against the lever 14. The shaft 11 and hammer 12 are then set free and the signal operates until the spring in the barrel 3 is spent.

When the engineer sets the repeater back to "track clear," the pulley 1 turns in the direction of the arrow denoted by broken lines in Fig. 20, and the inclined end of the segment *s* strikes the spring 16 and re-engages the screw 15 with the lever 14, which prevents the hammer from striking. At the same time the pulley 1 operates the sprocket-chain 5 and turns the small pulley 4, which resets the signal.

As soon as the operation ends and the apparatus is returned to the position shown in Figs. 18, 19, and 20 as "track clear," it is ready to act anew, as already explained.

This apparatus may be provided, not only on the locomotive but also upon the brake van or vans, in order to signal to the guards or conductors in charge of means for stopping the train in case of danger. The first or stationary part of the apparatus may also, if required, be arranged at any part of the track away from or independent of the signal or semaphore. The semaphore is connected with the movable rail A by means of rods T, Figs. 1 and 2, and crank M, Figs. 1, 2, 6, and 7, or other suitable devices.

At L′, Figs. 8 and 10, is indicated the position of a second lever mechanism similar to lever L, with which the locomotive may be provided, if it is desired to operate a telltale or repeater signal when traveling in either direction.

Having now described my invention in detail, I declare that I do not limit myself strictly to the forms, dimensions, proportions, and materials hereinbefore described or represented by way of example in the accompanying drawings. For example, the position of the axis of vibration of the movable arm or rail may be changed, and the lever may be altered by substituting in the place of the cranked part a device having the same effect—that is to say, a device capable of mechanically transmitting to the shaft placed upon the locomotive a rotary motion through an angle of ninety degrees, which movement may be utilized, not only for actuating the alarm or signal proper, but also for actuating a device acting upon the brakes.

I claim as my invention—

1. The combination with a tell-tale or signal repeater mounted on a locomotive, of a cranked lever L mounted on the locomotive and provided with a jointed pin *l′* adapted to be engaged by an adjustable rail or arm on the track, a shaft H through which the signal repeater is actuated, and a connecting rod B for transmitting motion from the lever L to the shaft H, substantially as described.

2. The combination in a signal repeating mechanism, of the vertical rotary shaft H mounted on a locomotive or car and provided with handle P and snail cam or stop C, the cranked lever L provided with a pin *l′* projecting in position to be engaged by an adjustable rail or arm on the track, and the connecting rod B for transmitting motion from the lever L to the shaft H, substantially as described.

3. The combination in a signal repeating mechanism, of the vertical rotary shaft H mounted on a locomotive or car, the cranked lever L provided at its lower end with a pin *l′* adapted to be engaged by an adjustable rail or arm on the track, a connecting rod B between the lever L and shaft H, the upper vertically-movable clutch ring *e* mounted on and rotating with the lever L, the spring *r* bearing on the upper part of said clutch ring, and the clutch-ring *e′* loose on the lever L and provided with pawl and ratchet *m*, *n*, the said clutch rings being provided with opposing cam surfaces, substantially as described.

4. The combination, in a signal repeating mechanism for locomotives or cars, of a vertical rotary shaft H through which the signal repeater is actuated, a cranked lever L mounted beneath the locomotive and connected with said shaft, and a jointed pin *l′* carried by the cranked lever and provided with a roller *d* adapted to be engaged by an adjustable rail or arm on the track, substantially as described.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

EUGÈNE JOSEPH MARIN.

Witnesses:
W. LONG,
G. DELANY.