(No Model.) 2 Sheets—Sheet. 1.

J. H. REINHARDT.

RAILWAY SIGNAL.

No. 346,946. Patented Aug. 10, 1886.

Fig. 1.

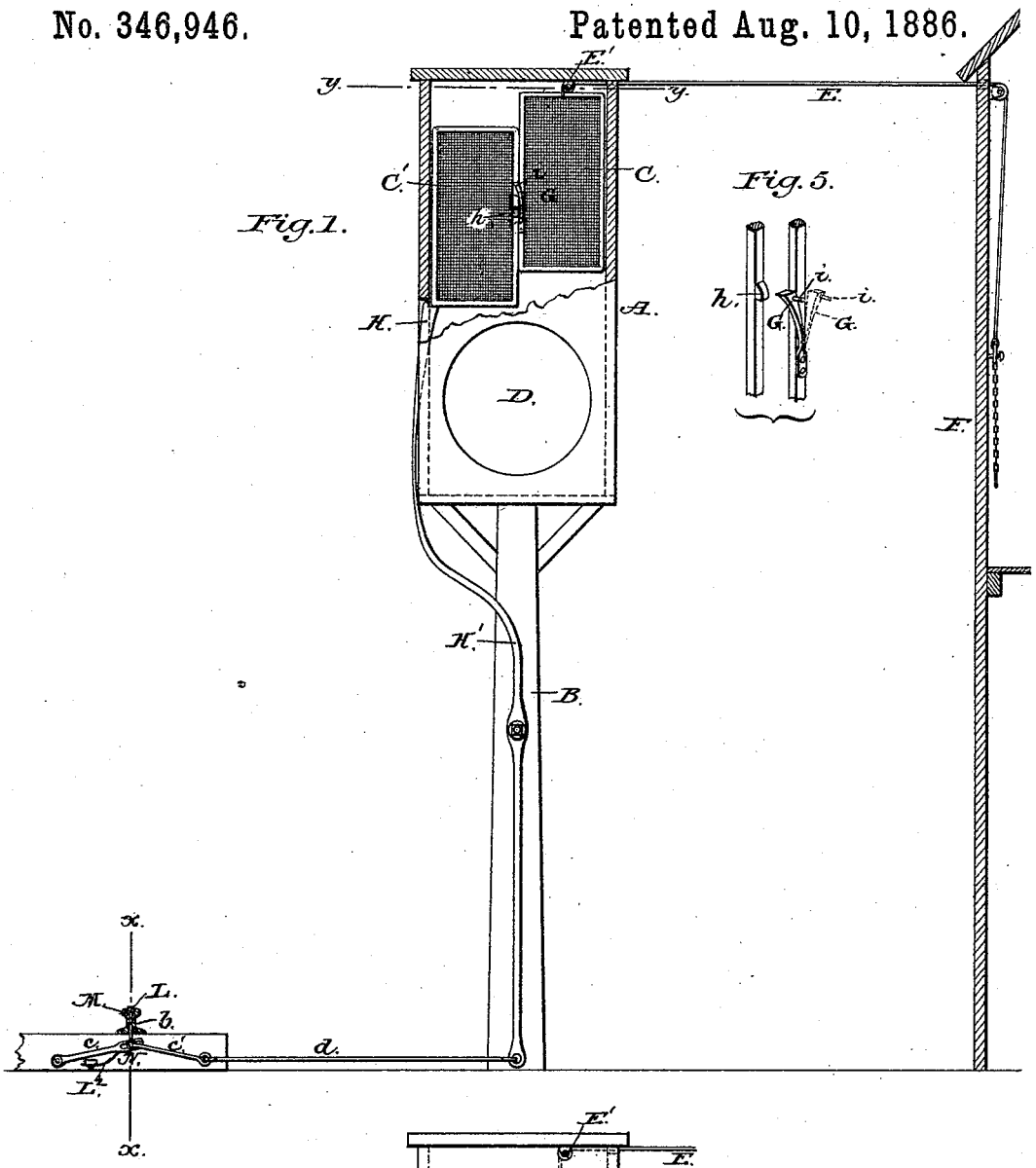


Fig. 5.

Fig. 2.

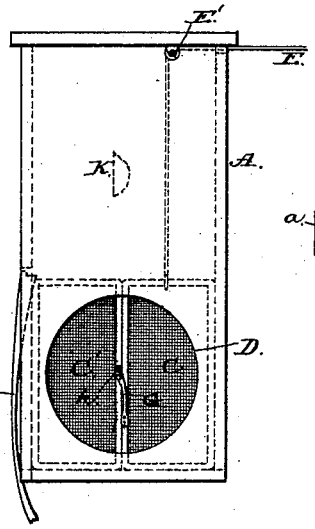


Fig. 3.

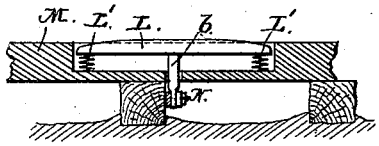
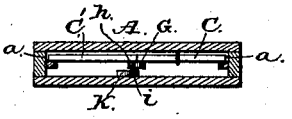


Fig. 4.



Attest:

John A. Ellis.

A. B. Moore.

Inventor:

Jenner H. Reinhardt

By David A. Burr

Atty.

(No Model.) 2 Sheets—Sheet 2.

J. H. REINHARDT.

RAILWAY SIGNAL.

No. 346,946. Patented Aug. 10, 1886.

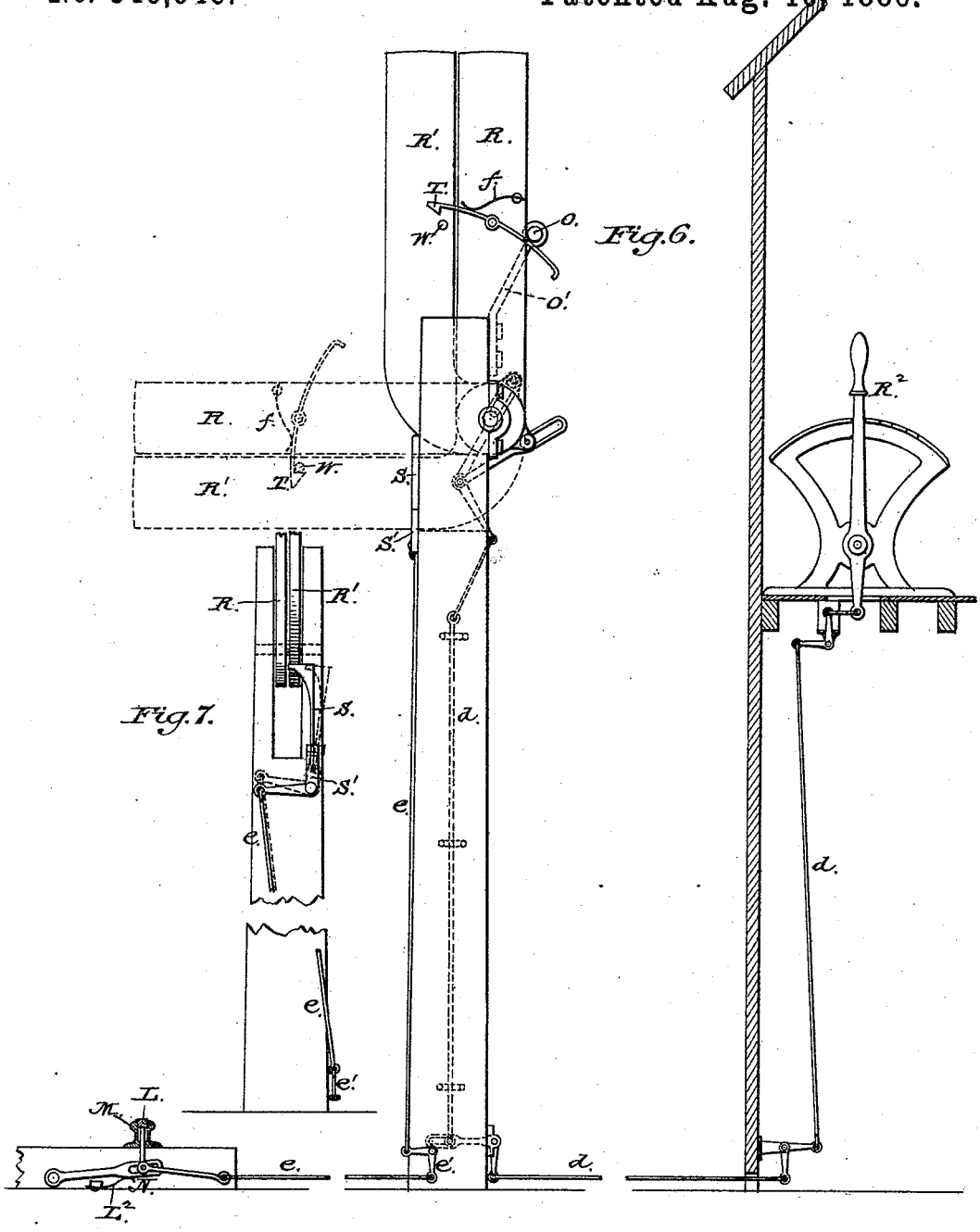


Fig. 6.

Fig. 7.

Attest:
John A. Ellis.
A. B. Moore.

Inventor:
James H. Reinhardt
By David A. Burr
Atty.

UNITED STATES PATENT OFFICE.

JAMES H. REINHARDT, OF MEMPHIS, TENNESSEE, ASSIGNOR OF ONE-HALF TO CHARLES X. CORDIER, OF NEW YORK, AND WILLIAM M. CALDWELL, OF BROOKLYN, NEW YORK.

RAILWAY-SIGNAL.

SPECIFICATION forming part of Letters Patent No. 346,946, dated August 10, 1886.

Application filed December 7, 1885. Serial No. 184,888. (No model.)

To all whom it may concern:

Be it known that I, JAMES H. REINHARDT, of Memphis, in the county of Shelby and State of Tennessee, have invented a new and useful Improvement in Railway-Signals Specially Adapted for a Block System; and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, making a part of this specification.

My invention relates to railway danger-signals designed more especially for use in connection with a "block" system.

Heretofore the efficiency of the various block systems upon railways has been made dependent wholly upon the watchful care of the signalman at the entrance of each block, so that where the man has failed to properly work the danger-signal accidents have occured. Automatic signals have likewise been devised to be operated by the passing trains as a substitute for a positive signal to be operated by an attendant; but the mere possibility of the failure of a purely mechanical device at the critical moment has prevented the adoption of such signals to the exclusion of human care and responsibility.

The object of my invention is to combine in the simplest manner the advantage of an automatic appliance for the display of a danger-signal moving invariably in obedience to mechanical forces, and which, when kept in proper repair, will be actuated unfailingly by the passage of a train over the rails to indicate the fact that the train has passed that point with the additional safe-guard of a second signal to be displayed by a signalman at the same point, by whom alone the two signals may be reversed to clear the line.

In the accompanying drawings, Figure 1 is a front elevation of a standard signal-box fitted with my improved signal, the box being partly broken away to illustrate the arrangement of sectional slides and the connection of the signal with the signal-tower and with an automatic operative device on the railway-track, also shown in the same view. Fig. 2 is an elevation of the front of the signal-box, illustrating the danger-signal displayed in complete form. Fig. 3 is a longitudinal section, upon an enlarged scale in line $x\,x$ of Fig. 1, of the rail and automatic actuating block by which one division of the signal is dropped. Fig. 4 is a transverse section through the signal-box in line $y\,y$ of Fig. 1. Fig. 5 is a detached view of the inner bars of the two slides of the divided signal, broken away and separated from each other to illustrate more clearly the spring-catch fitted upon the one to engage a lug upon the other. Fig. 6 is a front elevation of a semaphore, illustrating my invention as applied thereto, said semaphore being provided with two arms to serve jointly as a danger-signal. The position of the arms for "line clear" is shown by positive lines, and for "danger" by dotted lines. The operative connections of the arms with the signal-tower and with the automatic actuating device upon the railway-track are likewise shown in said view. Figure 7 is a detailed side view of a portion of the post carrying the signals, partly broken out to more fully illustrate the mechanism for moving the signal-arms.

A, Figs. 1 and 2, represents a signal-box of the usual form, which may be mounted upon a post, B, (or otherwise supported in the customary manner,) in full view of the engineer upon a locomotive approaching it on the adjacent track.

The red screen or target in the box is divided into two sections, C C′, fitted to work side by side in the same vertical plane, each to cover one-half of the sight-opening D in the box, and which are constructed each of a suitable frame, over which a red cloth is stretched, or in which a red glass is fitted, each frame being mounted to play freely up and down in suitable ways or grooves (see $a\,a$, Fig. 4) in the sides of the box. One of these red slides, C, is lifted, so as to display the white signal beneath to indicate "line clear" in the customary manner by means of a cord, E, led over a pulley, E′, in the top of the box, and which is carried thence over to the signal tower or station F, and within reach of the signalman in attendance. The signal-

man is thus enabled by releasing the cord to allow the slide C to drop and be displayed through the opening D, to indicate "danger," as shown in Fig. 2, and by drawing the cord to lift the signal to show the line "clear," as illustrated in Fig. 1. Other known mechanical appliances may be used to enable the signalman to raise and lower the slide C, and my invention is not confined to any specific form of operative device for this purpose. The second slide, C′, constituting the remaining half of the complete screen or target, and which is mounted in the same plane as the slide C, will in like manner drop automatically by its own weight when released, so as to cover the half of the sight-opening D, of which the first half is covered by dropping the slide C, as set forth. When the two slides C and C′ are brought together over the opening D, so as to display a complete danger-signal, the slide C′ is engaged automatically by a spring-catch, G, (see Fig. 5,) fitted upon the inner bar in the frame of the slide C, to spring out therefrom under a lug, *h*, projecting from the corresponding bar in the frame of the slide C′, as shown in Figs. 2 and 5; hence, when the first slide, C, is lifted by the signalman, to show the "line clear," the second slide, C′, is lifted with it. When fully lifted, the outer end of the bottom or lower edge of the slide C′ is caught and the slide upheld by means of a catch, H, playing in and out of the side of the box upon the end of an oscillating rod or lever, H′, extending to the ground, and which is pivoted about midway of its length to the post B, supporting the signal-box. The pivot of the lever H′ is so located with reference to the catch H on its upper end as that a very slight movement of the lower end of the lever will produce the requisite movement of the catch to throw it in and out of engagement with the bottom of the slide C′, as shown in Fig. 1.

The catch H consists of a flat spring, which admits of being forced back by the edge of the slide C′ as the slide moves up, but which will fly out to engage the bottom of the slide after the latter has passed over it. So soon as the two slides C and C′ have been both drawn up together by means of the cord E, so that the bottom of the slide C′ has passed above the catch H, a pin, *i*, (see Fig. 5,) projecting from the front of the spring-catch G, will come into contact with the inclined surface of a cam-block, K, (see dotted lines in Fig. 2,) fitted within the box A against the inner side of its front face. This cam-block K is so formed as that the continued upward movement of the slides, after the pin *i* on the catch G has engaged said block, will operate to force the pin and catch back from the slide C′, and thereby release the catch from its engagement with said slide, so that, while the slide C will remain elevated, the slide C′, released therefrom, will fall back upon the catch H, as shown in Fig. 1, where it will be in position to drop independently of the slide C when the lever H′ is moved. The movement of the oscillating lever H′ required to release the slide C′ and permit it to drop into view through the sight-opening D is obtained and produced automatically, whenever a train passes over the track of the railway, by means of a spring-block, L, (see Figs. 1 and 3,) inserted in the line of rails on the track so as to project very slightly above the level of the rail M, in which it is inserted. The two ends of the block L are beveled off so as to be flush with the top of the rail, leaving its central point at the height required to cause the proper depression of the block through the weight thereon of the wheels of a passing train required to actuate the catch-lever H′ of the signal-slide C′. This movement need be but very slight. The ends of the block L rest upon powerful springs L′ L′, which operate to throw it up into its operative position after each depression thereof. A central pin, *b*, projecting from the under side of this block is made to bear upon the knuckle of a toggle, N. The outer end of one arm, *c*, of this toggle-joint is pivoted to a fixed block, and the other, *c′*, to a rod, *d*, extending thence to the lower end of the lever H′. A third spring, L^2, placed under the knuckles serves to retract the rod *d* and lever H′ after it has been actuated by a depression of the block L and toggle.

In the operation of my improved apparatus it is made the duty of the signalman, as is customary, to drop the danger-signal C, so that it shall be displayed at the opening D so soon as a train has passed the station and entered the block which it marks. If the remaining division C′ of the signal be still raised to "line clear" at the time the division C is dropped, the catch G on the latter will yield and spring inward as it passes over the edge of the former, so that its fall will not be prevented by reason of the catch. So soon as the approaching train reaches the spring-block L on the track, the depression of the block, acting mediately through the toggle N and the lever H′, will retract the catch H from under the slide C′, allowing the latter to drop and complete in full the danger-signal at the opening D. This division C′ of the signal will be thus displayed automatically so soon as the train enters the block independently of the first division, C. When the signalman, having been notified that the train has passed the next signal-station and that the block is clear, proceeds in accordance with his duty to lift the division C of the signal, he will in lifting said division C likewise lift the remaining division C′, so that the entire red signal will be withdrawn from sight to show "line clear." If, therefore, the engineer of an approaching train finds only one half or section of the danger-signal displayed, and the signal consequently incomplete, it will not only become his duty to stop the train, but also to inform the conductor, who will inquire the cause, and if it appears that the signalman has failed of his duty, to report him, or, if the automatic appliances

have failed to work, to advise him thereof. In either case accident to the train is prevented, the independent action of the automatic mechanical appliances and the watchfulness of the signalman being both brought into play to insure safety.

It is evident that semaphores with double arms may be readily substituted for the slides C C′ as signals, one arm of the semaphore being operated, substantially in manner as described, by the signalman and the other by the automatic movement of an operating-block, L, or its equivalent, actuated by a passing train. Such a modification is illustrated in Figs. 6 and 7 of the drawings.

R R′ represent two arms in a semaphoric signal, both pivoted side by side upon a common pivot-pin. The inner pivotal end of one of these arms, R′, is bent so that the arm shall be carried at one side of its twin arm, R, and the faces of both be thereby made constantly visible whether they are in a vertical in or a horizontal position. The eccentricity of the pivot of this arm R′ will, moreover, cause the arm to drop automatically from a vertical to a horizontal position when left unsupported. Its twin arm, R, is connected by suitable operating-rods, *d d*, and bell-cranks with a lever, R^2, in the signal-tower, so as to be thrown from a vertical to a horizontal position, and vice versa, positively by the movement of said lever R^2. The arm R′ is supported, when in a vertical position, by the end of a spring, S, carried upon one arm of a pivoted bent lever, S′, which, when the arm is elevated, springs under the one end of the arm to support it; but which, by a movement of the lever, (see dotted lines, Fig. 7,) is readily withdrawn from the arm, whereupon the latter will, by its own weight, automatically drop into a horizontal position. (See dotted lines, Fig. 6.) The movement of the lever S′ to withdraw the spring S is produced by means of the movement of a spring-block, L, and toggle N arranged in connection with the rail M of the railway in manner as hereinbefore described, (see Figs. 1 and 6,) the free arm of the toggle being connected by rods and cranks *e e′* with said lever S′; hence, when the arm R′ is elevated, the passage of a train over the rail M will, by withdrawing the supporting-spring S, allow the arm to drop automatically to a horizontal position to indicate "danger." When the arm R′ is thrown up, the spring S, held in position by the lever S′, will yield sufficiently to allow the arm to pass it, and will then fly back under the arm. The arm R′ is elevated simultaneously with the arm R, as the latter is lifted by the signalman through the agency of his lever R^2 in the tower, by means of a spring-actuated pawl or catch, T, pivoted upon the face of the arm R, to project over the face of its twin arm R′, and when left free will engage a pin, *n*, on the face of the latter, this engagement being enforced by a spring, *f*, bearing against the catch. The face of the pawl or catch is so beveled or inclined as that when it comes into contact with the pin W by moving toward it—as when the arm R swings toward the arm R′, after the latter has dropped to a horizontal position—the catch will yield to pass the pin and then automatically fly under the pin to engage it, so that a return movement of the arm will carry with it the arm R′. A stop-pin, O, provided upon the end of a fixed rod, O′, to arrest the movement of the arm R when it has reached a vertical position, serves also to engage the outer bent arm of the pivoted catch T as the arm R reaches its elevated position, and, by forcing the arm downward, will compel a release of the catch from the pin W, so that the arm R′ is thereupon left free, except so far as it is supported by the spring S, as described.

In the operation of this apparatus, a train passing on the rail M will cause the one arm, R′, to drop to "danger," leaving the second arm, R, to be dropped parallel therewith by the signalman, to complete the danger-signal. As before, if but one arm be dropped, it becomes the duty of the conductor of an approaching train to inquire and report why the signal is incomplete, while the possibility of passing a train upon a block which has not been cleared is diminished by combining the automatic with the positive signal.

It is evident that various forms of divided or double danger-signals and modifications of mechanism for operating the same may be used without departing from my invention, wherein the two signals, or divisions of a signal, are dropped to indicate "danger" independently of each other, the one automatically, and the other by a signalman, while the two may only be changed to "line clear" by the action of the signalman alone.

I claim as my invention—

The improvement in the mode of signaling railway-trains, which consists in causing, first, the display of one section of a divided or double signal automatically by the passage of a train; second, the display of the remaining section to complete the signal positively by the signalman; and, third, the return of both sections to their first position by the positive action of the signalman alone, substantially in the manner, and for the purpose herein set forth.

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

JAMES H. REINHARDT.

Witnesses:
WM. H. DRAKE,
S. R. LAWRENCE.