

WITNESSES:

George T. Hackley.  
E R Newell

INVENTORS:

King W. Mansfield,  
William R. Thompson.

BY  
R. Reuter  
ATTORNEY.

No. 683,214.

Patented Sept. 24, 1901.

K. W. MANSFIELD & W. R. THOMPSON.

SIGNAL SYSTEM.

(Application filed July 21, 1900.)

(No Model.)

4 Sheets—Sheet 2.

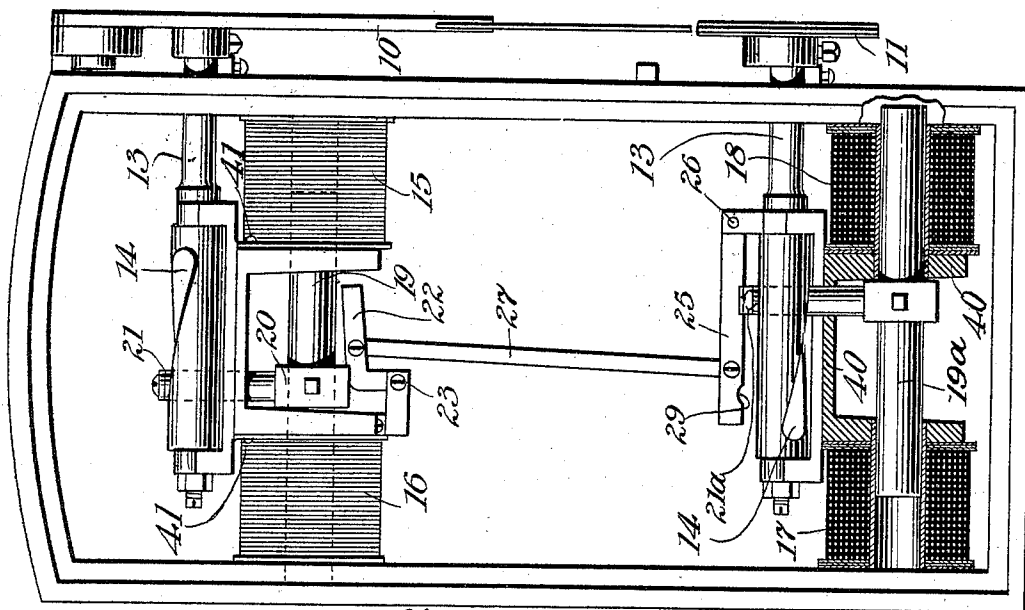


Fig. 2.

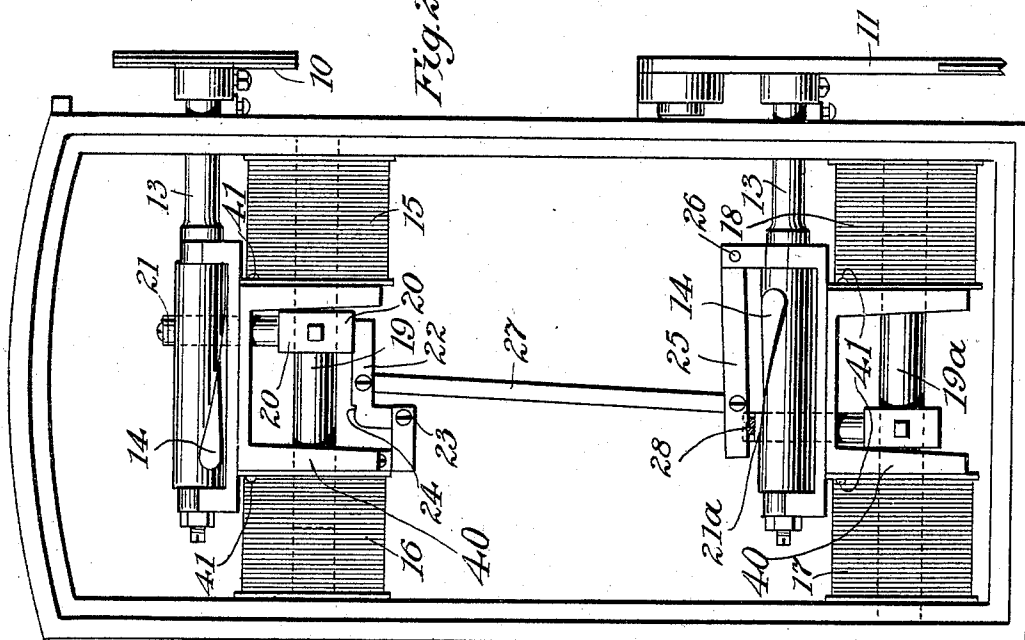


Fig. 3.

WITNESSES:

*George J. Hackley,*  
*E. R. Newell*

INVENTORS:

*King W. Mansfield,*  
*William R. Thompson.*

BY

*C. C. Wheeler*

ATTORNEY.

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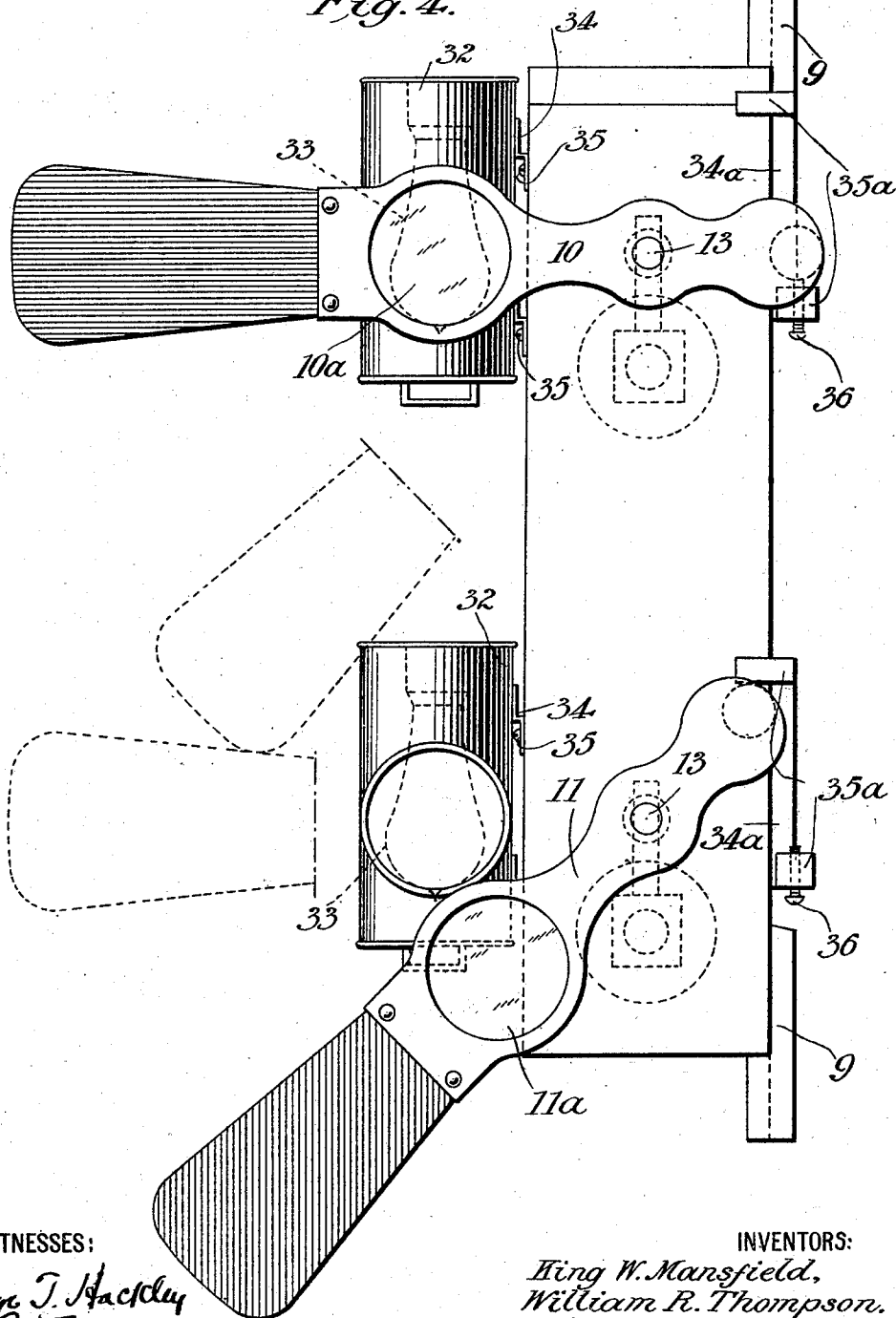
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Fig. 4.



WITNESSES:

*George J. Hackley*  
*E. R. Hewell*

INVENTORS:

*King W. Mansfield,*  
*William R. Thompson.*

BY

*Reverend*  
ATTORNEY

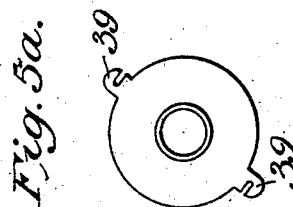
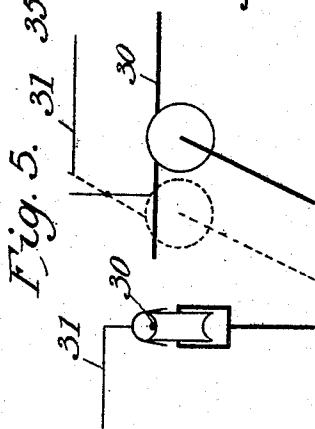
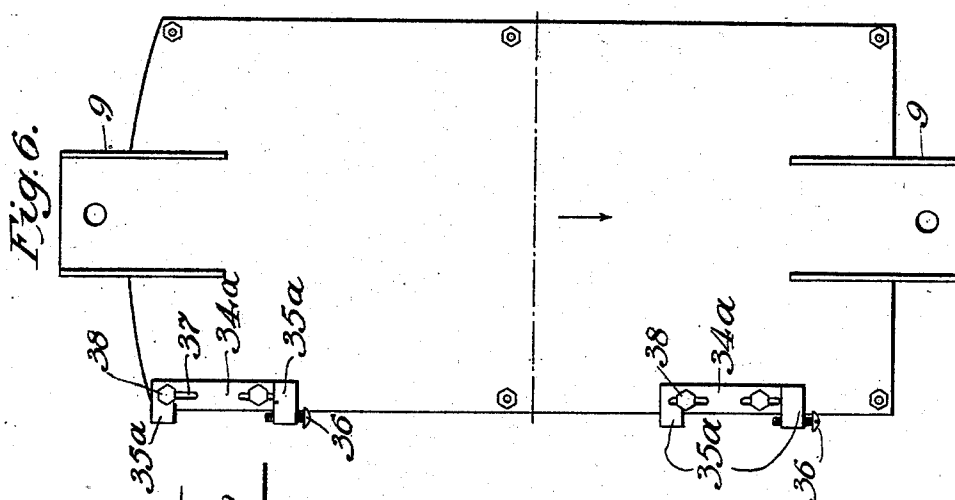
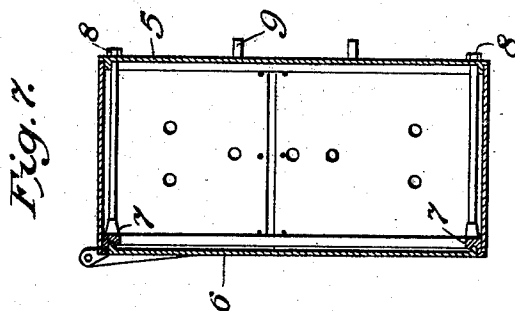
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WITNESSES:

George T. Hackley.  
E. R. Newell

INVENTORS:

King W. Mansfield,  
William R. Thompson.

BY *Reinhardt*  
ATTORNEY.

# UNITED STATES PATENT OFFICE.

KING W. MANSFIELD AND WILLIAM R. THOMPSON, OF SOUTH NORWALK, CONNECTICUT.

## SIGNAL SYSTEM.

SPECIFICATION forming part of Letters Patent No. 683,214, dated September 24, 1901.

Application filed July 21, 1900. Serial No. 24,366. (No model.)

*To all whom it may concern:*

Be it known that we, KING W. MANSFIELD and WILLIAM R. THOMPSON, citizens of the United States, residing at South Norwalk, Connecticut, have invented certain new and useful Improvements in Signal Systems, of which the following is a full, clear, and exact description.

Our invention relates to a signal system; and our object is to improve the construction of the same.

Our invention is shown in the drawings and described in the following specification, and will be particularly pointed out in the claims.

In the preferred embodiment of our invention shown in the drawings, Figure 1 represents a diagram of the system; Fig. 2, a front elevation of the inside of one signal-box, the door being open and two of the solenoids being in section. Fig. 3 is a similar view showing the parts in another position. Fig. 4 is a side elevation of a signal-box, showing the semaphore-arms and the lamp-casings. Fig. 5 shows in detail two means for automatically closing the signal-circuits, and Fig. 5<sup>a</sup> shows an end view of one of the solenoids. Fig. 6 shows a rear elevation of the signal-box, and Fig. 7 is a central section of Fig. 6 looking toward the bottom of the box.

In the above preferred embodiment of our invention we have shown the system as applied to a railway having a track, preferably a stretch of single track, upon which moves a car 2, which track has branches, preferably turnouts, at either end. There is a corresponding main trolley-wire 30 and also wire-turnouts 3 and 4.

It is desirable in the so-called "block" system of signaling when a car leaves a turnout and enters upon a stretch of single track to set a signal at the turnout which has just been left by the car to indicate that a car is moving away from the turnout and at the same time to set a signal at the farther turnout to indicate that a car is approaching on the block. These signals are placed at different points along the track, preferably adjacent to—that is, in the vicinity of—the turnouts, as indicated in diagram in Fig. 1. The signal to indicate that a car is moving along the stretch of single track away from the ob-

server is usually, as in the present embodiment, green, and a red signal is to indicate that a car is approaching. We have in the present embodiment used these signals red and green, as they are in common use among railroad men; but we do not desire to be limited to such colors, as the difference in the signals might be denoted by a difference in the shape or position of the signals. These signals are preferably located together in pairs, one a green and the other a red signal. In the present embodiment we have provided a signal-box, Figs. 2 and 3, preferably metallic and constructed with the sides, top, and bottom formed from a single sheet of steel bent around and joined at the bottom, as shown at Fig. 7, and having a back 5 and hinged front door 6, of cast-iron.

7 shows threaded lugs, through which and the back 5 pass screw-bolts 8 for holding the parts together.

9 is a steadying device, preferably in the shape of two ribs, extending perpendicularly from the back of the box, so that the same will fit either a round, square, or other-shaped pole. Carried by each of these boxes is a pair of visual signals, preferably in the shape of semaphore-arms 10 and 11, the arm 10 being red and the arm 11 green. These arms are preferably made of pressed steel and may carry translucent portions, preferably disks 10<sup>a</sup> 11<sup>a</sup>, of glass, similarly colored—that is, of the same color as the arms which carry them.

13 13 are shafts which carry the arms upon their outer ends, and each shaft has a cam-face, in the present embodiment formed by a slot 14 therein.

15, 16, 17, and 18 are solenoids.

19 is an iron core movable into solenoids 15 and 16 alternately, and 19<sup>a</sup> is a similar core for solenoids 17 and 18. The core 19 carries a square head 20, which carries a projection 21, engaging with the cam-face on shaft 13, in the present instance located in the slot 14. As the solenoid 15 in Fig. 2 is energized the core and projection 21 will be thrown to the right, thus rotating shaft 13 and throwing the semaphore-arm 10 from the position shown in dotted lines in Fig. 4 to the position shown in full lines therein. The signal will be thrown back when the solenoid 16 is ener-

gized. The semaphore-arm 11 and its actuating mechanism is preferably similar to that just described. The normal position of the semaphore-arms is the inclined or safety position, and the arm is raised to the horizontal or danger position to show that a car is on the block.

To prevent both signals being set, in the present embodiment raised to the normal position at the same time, we have provided an automatic lock between the two signals. As shown in the present embodiment, an elbow-lever 22, Figs. 2 and 3, is provided at 23 and has a notch 24 therein, which when the arm 22 is in the position shown in Fig. 2 will engage a squared shoulder on the portion 20. Another lever 25 is pivoted at 26 and connected to the lever 22 by a rod 27. The pivot 26 is so situated that when the parts are in the position shown in Fig. 3 this lever 25 will slope slightly downward, as shown; but when the solenoid 18 is energized and the projection 21<sup>a</sup> moved to the right the lever 25 will be raised into the position shown in Fig. 2 by the rounded end 28 of projection 21<sup>a</sup> being pushed out of the notch 29 on lever 25. The adjustment of this notch and projection 28 is such that the lever 22 can, when the parts are in the position shown in Fig. 3, drop down sufficiently to allow the block 20 to clear the lever 22. On account of the shape of lever 22 the block 20 will readily push the same downward out of the locking position when the block 20 moves to the right. When both cores 19 and 19<sup>a</sup> are drawn to the left, neither signal will be locked; but as soon as one of the cores is drawn to the right, throwing one of the arms into the horizontal position, the levers 22 and 25 will be thrown into either the position shown in Fig. 2 or that shown in Fig. 3, thus locking the other signal from movement.

In the present embodiment we have provided means whereby the movement of the signals is automatically controlled by the movement of the car. As shown in Figs. 1 and 5, the trolley-wire 30 constitutes one terminal of the circuits, and when a car leaves the track corresponding to 3<sup>a</sup> of the turnout 3 the trolley-wheel causes an electrical connection between the trolley-wire and the other terminal of the circuit 31, thus energizing solenoid 18 of the box at that turnout and solenoid 15 in the box at turnout 4, thus raising the green semaphore at the turnout 3 and the red semaphore at the turnout 4 to the horizontal or danger position. This indicates at the turnout 3 that a car has just left the turnout and at the turnout 4 it indicates that a car is coming toward that point. When the car reaches turnout 4, in this embodiment when it runs onto the track corresponding to 4<sup>a</sup>, it makes another connection and energizes the opposite solenoid of those previously energized, thus throwing back both semaphores to the inclined position. By "reaches the turnout" in this case we do not mean that the car must necessarily have ac-

tually run onto the turnout, but we mean that it reaches the vicinity of the turnout. In this embodiment the signals are simultaneously set; but this is not absolutely necessary. It will be observed also that these signals could be set and thrown back by a hand-switch at each turnout, if desired, and we have shown an instance of this in dotted lines in Fig. 1. When the car is moving from the track corresponding to 4<sup>b</sup> of turnout 4, it in like manner sets a green signal at turnout 4 and a red signal at turnout 3, and when it reaches the track corresponding to 3<sup>b</sup> of turnout 3 it returns the signals to their safety position. The signals will remain in whatever position they are placed because of the arrangement of the parts and the balance of the arms. It will be observed that the circuits controlling the arms are normally open, and in this embodiment are only closed for a short time—sufficient to throw the arms from one position to the other.

32 32 are casings supported on the outside of the signal-box and provided with electric lamps 33 33, which are located so that they will shine through the colored glasses 10<sup>a</sup> 11<sup>a</sup> of the semaphore-arms when the arms are in their horizontal or danger position. These casings are preferably of sheet metal and have slotted lugs 34 34, which engage projections in the form of screws 35 on the box to hold the same in position. The lamps are preferably supplied with current from a shunt-circuit from the trolley-wire, and to prevent the burning out of the solenoids when the lamps are burned out by lightning we have mounted these lamp-casings on the outside of the box, as shown, the casing of said box constituting a shield between the continuously and occasionally energized systems. The reason that this construction is particularly desirable is that the lamp-circuit is energized continuously and is therefore very liable to be struck by lightning, while the signal-circuit is energized only very occasionally and is therefore in little danger of being struck. By keeping the lamp-circuit outside the box all danger of having a lightning-discharge enter the box by that continuously-charged conductor is avoided and the danger of burning up the signal apparatus is reduced to a minimum.

To adjust the throw of the arms, we have in this embodiment provided stops 34<sup>a</sup> 34<sup>a</sup>, Fig. 6, each of which has an abutment 35<sup>a</sup> located on either side of the signal-arm, as shown clearly in Fig. 4. This stop is adjustable in the present embodiment by slots 37 in the stop, through which pass screw-bolts 38 on the signal-box. An adjusting-screw 36, against which the arm strikes, may be located in one abutment to provide for a finer adjustment.

To provide for the interchangeability of the solenoids, we have provided each solenoid with a ring (see Fig. 5<sup>a</sup>) having ears 39, similarly located and perforated for the reception

of screws 41, and upon opposite sides of the supporting-frame 40 we have provided screw-holes to be engaged by the screws passing through the ears. The solenoids are therefore interchangeable and may be readily and quickly replaced if one is injured.

In the present embodiment we have shown in Fig. 1 the solenoid-circuits as supplied with current from the trolley-wire; but it is obvious that they might be supplied from a battery or other source, as shown in dotted lines in said figure, if desired. The connections of the solenoids and lamps might be varied, as will be obvious to any one skilled in the art. It will be obvious that many other changes may be made in the construction herein described without departing from the spirit of our invention. We therefore do not desire to be limited to the particular construction herein disclosed.

What we claim is—

1. In a signal system in combination, a track, a pair of visual signals of different appearance at each of a plurality of points along said track, means located at each of said points and electrically connected with and controlling by positive action a signal of each pair whereby one signal of each pair may be substantially simultaneously set, or the other signal of each pair discontinued, from either point, and a mechanical interlock between all of said signals which are located at either point.

2. In a signal in combination, a pair of so-

lennoids, a core for the same, said core being movable into said solenoids alternately, a movable signal, a connection between said core and signal to move the latter and including a rotatable shaft having a cam-face and a portion in contact with said cam-face and moved by said core to rotate said shaft and throw said signal.

3. In a signal in combination, a pair of opposed solenoids, a core for the same, said core being movable into said solenoids alternately, a semaphore-signal, a connection between said core and signal to move the latter and including a rotatable shaft having a curved slot therein and a projection on said core located in said slot to rotate said shaft and throw said semaphore.

4. In combination, a pair of opposed solenoids, a core movable into the same alternately, a semaphore-arm connected with said core and adapted to be set thereby, a second pair of opposed solenoids, a movable core for the latter, a second semaphore-arm connected with said latter core and adapted to be set thereby, and a lock to prevent the setting of both semaphore-arms at the same time.

Signed at South Norwalk, Connecticut, this 18th day of July, 1900.

KING W. MANSFIELD.  
WILLIAM R. THOMPSON.

Witnesses:

RICHARD H. GOLDEN,  
W. E. MATHEWS.

It is hereby certified that in Letters Patent No. 683,214, granted September 24, 1901, upon the application of King W. Mansfield and William R. Thompson, of South Norwalk, Connecticut, for an improvement in "Signal Systems," an error appears in the printed specifications requiring correction, as follows: In line 9, page 2, the word "normal" should read *horizontal*; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed, countersigned, and sealed this 1st day of October, A. D., 1901.

[SEAL.]

F. L. CAMPBELL,  
*Assistant Secretary of the Interior.*

Countersigned:

E. B. MOORE,  
*Acting Commissioner of Patents.*