

R. S. WOODS.
SIGNAL SYSTEM.

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973,154.

Patented Oct. 18, 1910.

Fig. 1.

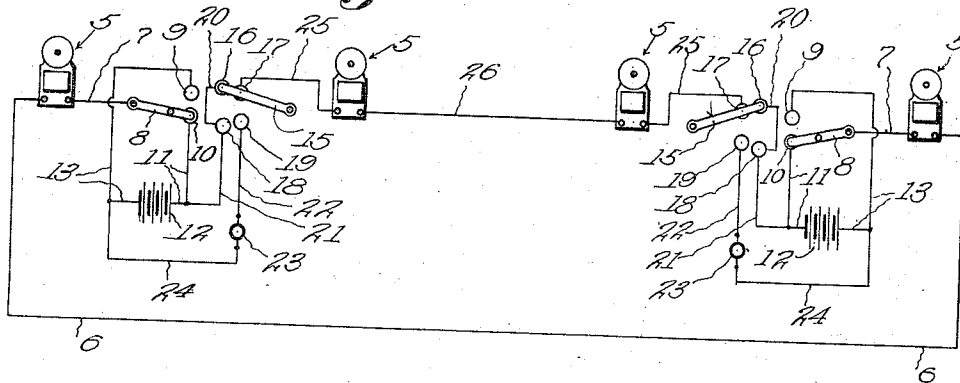
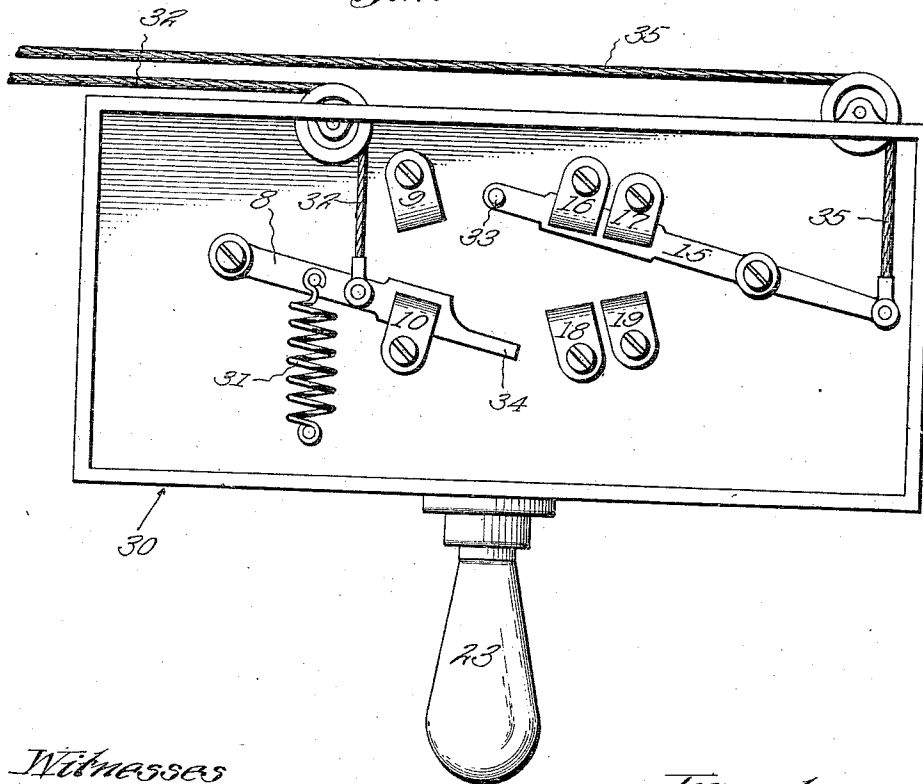


Fig. 2.



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UNITED STATES PATENT OFFICE.

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To all whom it may concern:

Be it known that I, ROBERT S. WOODS, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles and State of California, have invented new and useful Improvements in Signal Systems, of which the following is a specification.

This invention relates to a signal system especially adapted for use in controlling a train of two or more cars, and its object is the provision of a simple system of such character that there can be no confusion to either the motorman or conductors. This is the main object; others will appear in the following description of the system and its mode of operation.

In the "multiple system" now in use for the control of a train of cars, the connections are so arranged that any one of the car conductors may give the motorman a signal to stop. For starting it is necessary that the motorman receive a signal from each of the car conductors, it being thus necessary that he shall count the signals and start as soon as he has received as many signals as there are cars in his train. He may either mistake the number of signals, or momentarily forget the number of cars; either condition being the cause of confusion or possible accident. Moreover, there is always the possibility of two or more of the conductors transmitting simultaneous signals which appear to the motorman as but a single signal, causing confusion and delay.

The present system is so arranged that any one of the car conductors is enabled to transmit a stop signal. For the starting signal it is necessary that all of the conductors be ready to start before the single signal can be transmitted; the last conductor in signifying his readiness to start transmits to the motorman the single starting signal. The disadvantages of the old system are thereby obviated.

In the accompanying drawings, Figure 1 is a diagrammatic view showing my improved system without its mechanical devices arranged for a train of two cars. Fig. 2 is a view showing the construction of the switch box and switches, one set of which is placed on each car.

Referring first most particularly to Fig. 1, 5 designates bells which are placed pref-

erably one at each end of each car. The number of bells and their placement does not affect the invention. A wire 6 running through the cars from end to end connects one side of each of two of the bells together, these bells being the ones farthest forward and rearward in the present showing for purposes of simplicity. The other side of each of these bells is connected by a wire 7 to a switch arm 8. Switch arm 8 is adapted to swing between two contacts 9 and 10, being normally in engagement with contact 10. A wire 11 connects contact 10 with one side of a battery 12, or other source of electrical energy, and a wire 13 connects contact 9 with the other side of the battery. A second switch arm 15 is adapted to normally engage with contacts 16 and 17, making an electrical connection between them. It is also adapted to swing into engagement with contacts 18 and 19. Contact 16 is connected by a wire 20 with contact 18. Contact 18 is connected by a wire 21 with wire 11 which leads to battery 12. Contact 19 is connected by wire 22 to a signal 23, preferably a light, which is in turn connected by wire 24 to wire 13 which leads to the other side of battery 12. Contact 17 is connected by wire 25 with one of bells 5 and a wire 26 connects bells 5 together.

The above described mechanism, of which there are two shown in Fig. 1, comprises a station set. It will be understood that as many station sets may be used as there are cars in a train, two sets being sufficient for the present showing and explanation.

The mechanical equipment of the device is shown in Fig. 2. The switches for each car are mounted in a box 30 which is secured preferably to the under side of the car roof. Switch arm 8 is normally held in contact with contact 10 by a spring 31, and a cord 32, which passes through the car, affords means for pulling the switch arm into engagement with contact 9. Switch arm 15 is provided with a pin or lug 33 with which an extension 34 on switch arm 8 is adapted to engage, switch arm 15 being forced into engagement with contacts 16 and 17 when switch arm 8 is pulled by cord 32 into engagement with contact 9. Switch arm 15 is held in this position by its frictional engagement with the contact. A cord 35 provides means for throwing switch arm 15 into en-

gagement with contacts 18 and 19, this cord also passing through the car for convenience of operation.

In the operation of this system the switches are normally in the position shown. If any one of the conductors desires to transmit a stop signal he pulls upon cord 32, thereby throwing switch arm 8 into engagement with contact 9. Supposing this operation to take place for the left hand switch arm 8 in Fig. 1, the circuit is as follows: from battery 12 through wire 13, contact 9, arm 8, wire 7, bell 5, wire 6, bell 5, wire 7, wire 11, wire 21 contact 18, wire 20, contact 16, arm 15, contact 17, wire 25, bell 5, wire 26, bell 5, wire 25, contact 17, arm 15, contact 16, wire 20, contact 18, wire 21, and wire 11 back to battery 12. The closing of this circuit rings bells 5 as long as the conductor pulls upon cord 32. As soon as he releases the cord switch arm 8 is pulled back into its normal position by spring 31. As soon as he has released cord 32 after giving the stop signal, the conductor pulls cord 35, thereby throwing switch arm 15 into engagement with contacts 18 and 19. By this operation he renders it impossible for any other conductor to give a starting signal as he has broken the circuit just described between contacts 16 and 17. Each of the conductors who wishes the train to stop pulls upon his cord 35, and thus it is rendered impossible to send the starting signal to the motorman until the last one of switch arms 15 has been replaced in its normal position connecting contacts 16 and 17. When the conductor is ready to start he pulls again upon cord 32, throwing switch arm 8 into engagement with contact 9 and arm 15 into engagement with contacts 16 and 17. The last conductor to pull upon his cord 32 gives the signal to start, it being impossible for the other conductors to previously give the signal on account of the fact that the bell circuit is open between his switch contacts 16 and 17. When cord 35 is pulled and switch arm 15 thereby thrown into engagement with contacts 18 and 19 a circuit from battery 12 is formed as follows: through wire 13, wire 24, lamp 23, wire 22, contact 19, switch arm 15, contact 18, wire 21 and wire 11 back to battery 12. The closing of this circuit causes light 23 to burn during the time in which the conductor wishes the train to stop. A person getting on or off the car knows that the train will not move while the light is burning.

The basis of this invention is seen to be the connection of a bell and a plurality of switches in series with each other, and a battery and switch so arranged that the series circuit may be either connected through the battery or around the same; or, otherwise expressed, a plurality of bells, switches and batteries connected in series with each other,

and a switch shunt adapted to connect the circuit around the battery, keeping the circuit closed but cutting the battery out. The number of sets of switches and bells has no bearing upon the invention.

Having described my invention, I claim:—

1. A signal system, comprising a plurality of station sets; each set comprising a pair of switches and a source of electrical energy, one of the switches comprising a switch arm and a pair of contact points arranged for alternate engagement with the said arm and the other comprising a switch arm and a pair of contact points each of which is engaged by said arm in one position thereof, an electrical connection between one of the contact points of the first mentioned switch and one side of the source of electrical energy, an electrical connection between one contact point of the second mentioned switch and the other side of the source of electrical energy, an electrical connection also between said contact point and the other contact point of the first mentioned switch; a signal, and a line conductor connecting the station sets and the signal in series, the conductor connecting to the switch arm of the first mentioned switch and to the other contact point of the second mentioned switch of each station set.

2. A signal system, comprising a plurality of station sets; each set comprising a pair of switches and a source of electrical energy, one of the switches comprising a switch arm and a pair of contact points arranged for alternate engagement with the said arm and the other comprising a switch arm and a pair of contact points each of which is engaged by said arm in one position thereof, an electrical connection between one of the contact points of the first mentioned switch and one side of the source of electrical energy, an electrical connection between one contact point of the second mentioned switch and the other side of the source of electrical energy, an electrical connection also between said contact point and the other contact point of the first mentioned switch, mechanical connective means between the two switch arms; a signal, and a line conductor connecting the station sets and the signal in series, the conductor connecting to the switch arm of the first mentioned switch and to the other contact point of the second mentioned switch of each station set.

3. A signal system, comprising a plurality of station sets; each set comprising a pair of switches and a source of electrical energy, one of the switches comprising a switch arm and a pair of contact points arranged for alternate engagement with the said arm and the other comprising a switch arm and two pairs of contact points the points of each pair arranged for simulta-

neous engagement by said arm and each pair of points for alternate engagement by said arm, an electrical connection between one of the contact points of the first mentioned switch and one side of the source of electrical energy, an electrical connection between one contact point of one pair of contacts of the second mentioned switch and the other side of the source of electrical energy, an electrical connection also between said contact point and the other contact point of the first mentioned switch, an electrical connection also between said contact point and one of the contact points of the other pair of the second named switch, a station signal, an electrical connection between the station signal and the first named side of the source of electrical energy, an electrical connection between the station signal and the other contact of the first mentioned pair of the second mentioned switch; a signal, and a line conductor connecting the station sets and the signal in series, the conductor connecting to the switch arm of the first mentioned contact switch and to the other contact point of the other pair of the second named switch.

4. A signal system, comprising a plurality of station sets; each set comprising a pair of switches and a source of electrical energy, one of the switches comprising a switch arm and a pair of contact points arranged for alternate engagement with the said arm and the other comprising a switch arm and two pairs of contact points the points of each pair arranged for simultaneous engagement by said arm and each pair of said points for alternate engagement by said arm, an electrical connection between one of the contact points of the first mentioned switch and one side of the source of electrical energy, an electrical connection between one contact point of one pair of contacts of the second mentioned switch and the other side of the source of electrical energy, an electrical connection also between said contact point and the other contact point of the first mentioned switch, an electrical connection also between said contact point and one of the contact points of the other pair of the second named switch, a station signal, an electrical connection between the station signal and the first named side of the source of electrical energy, an electrical connection between the station signal and the other contact of the first mentioned pair of the second mentioned switch, mechanical connective means between the two switch arms; a signal, and a line conductor connecting the station sets and the signal in series, the conductor connecting to the switch arm of the first mentioned contact switch and the other contact point of the other pair of the second named switch.

5. A signal system, comprising a plurality

of station sets; each comprising a pair of switches and a source of electrical energy, one of the switches comprising a switch arm and a pair of contact points arranged for alternate engagement with the said arm and the other comprising a switch arm and a pair of contact points each of which is engaged by said arm in one position thereof, an electrical connection between one of the contact points of the first mentioned switch and one side of the source of electrical energy, an electrical connection between one contact point of the second mentioned switch and the other side of the source of electrical energy, an electrical connection also between said contact point and the other contact point of the first mentioned switch, mechanical connective means between the two switch arms whereby the second mentioned switch arm is thrown into engagement with its contacts when the first mentioned switch arm is thrown into engagement with its first mentioned contact point; a signal, and a line conductor connecting the station sets and the signal in series, the conductor connecting to the switch arm of the first mentioned switch and to the other contact point of the second mentioned switch of each station set.

6. A signal system, comprising a plurality of station sets; each set comprising a pair of switches and a source of electrical energy, one of the switches comprising a switch arm and a pair of contact points arranged for alternate engagement with the said arm and the other comprising a switch arm and a pair of contact points each of which is engaged by said arm in one position thereof, an electrical connection between one of the contact points of the first mentioned switch and one side of the source of electrical energy, an electrical connection between one contact point of the second mentioned switch and the other side of the source of electrical energy, an electrical connection also between said contact point and the other contact point of the first mentioned switch, mechanical connective means between the two switch arms whereby the second mentioned switch arm is thrown into engagement with its pair of contacts when the first mentioned switch arm is thrown into engagement with its first mentioned contact point, means to normally hold the first mentioned switch arm in engagement with its second mentioned contact; a signal, and a line conductor connecting the station sets and the signal in series, the conductor connecting to the switch arm of the first mentioned switch and to the other contact point of the second mentioned switch of each station set.

7. A signal system, comprising a plurality of station sets; each set comprising a pair of switches and a source of electrical energy,

one of the switches comprising a switch arm and a pair of contact points arranged for alternate engagement with the said arm and the other comprising a switch arm and two pairs of contact points the points of each pair arranged for simultaneous engagement by said arm and each pair of points for alternate engagement by said arm, an electrical connection between one of the contact points of the first mentioned switch and one side of the source of electrical energy, an electrical connection between one contact point of one pair of contacts of the second mentioned switch and the other side of the source of electrical energy, an electrical connection also between said contact point and the other contact point of the first mentioned switch, an electrical connection also between said contact point and one of the contact points of the other pair of the second named switch, a station signal, an electrical connection between the station signal and the first named side of the source of electrical energy, an electrical connection between the station signal and the other contact of the first mentioned pair of the second mentioned switch, mechanical connective means between the two switch arms whereby the second mentioned switch arm is thrown into engagement with its second mentioned pair of contacts when the first mentioned switch arm is thrown into engagement with its first mentioned contact point; a signal, and a line conductor connecting the station sets and the signal in series, the conductor connecting to the switch arm of the first mentioned contact switch and to the other contact point of the other pair of the second named switch.

8. A signal system, comprising a plurality of station sets; each set comprising a pair of switches and a source of electrical energy, one of the switches comprising a switch arm and a pair of contact points arranged for alternate engagement with the said arm and the other comprising a switch arm and two

pairs of contact points the points of each pair arranged for simultaneous engagement by said arm and each pair of points for alternate engagement by said arm, an electrical connection between one of the contact points of the first mentioned switch and one side of the source of electrical energy, an electrical connection between one contact point of one pair of contacts of the second mentioned switch and the other side of the source of electrical energy, an electrical connection also between said contact point and the other contact point of the first mentioned switch, an electrical connection also between said contact point and one of the contact points of the other pair of the second named switch, a station signal, an electrical connection between the station signal and the first named side of the source of electrical energy, an electrical connection between the station signal and the other contact of the first mentioned pair of the second mentioned switch; mechanical connective means between the two switch arms whereby the second mentioned switch arm is thrown into engagement with its second mentioned pair of contacts when the first mentioned switch arm is thrown into engagement with its first mentioned contact point, means to normally hold the first mentioned switch arm in engagement with its second mentioned contact; a signal, and a line conductor connecting to the station sets and the signal in series, the conductor connecting to the switch arm of the first mentioned contact switch and to the other contact point of the other pair of the second named switch.

In witness that I claim the foregoing I have hereunto subscribed my name this 10th day of July 1909.

ROBERT S. WOODS.

Witnesses:

JAMES T. BARKELEW,
ELWOOD H. BARKELEW.