No. 740,505. PATENTED OCT. 6, 1903.

A. G. WILSON.

AUTOMATIC BLOCK SIGNAL SYSTEM.

APPLICATION FILED FEB. 1, 1902.

NO MODEL. 2 SHEETS—SHEET 1.

Fig. 1.

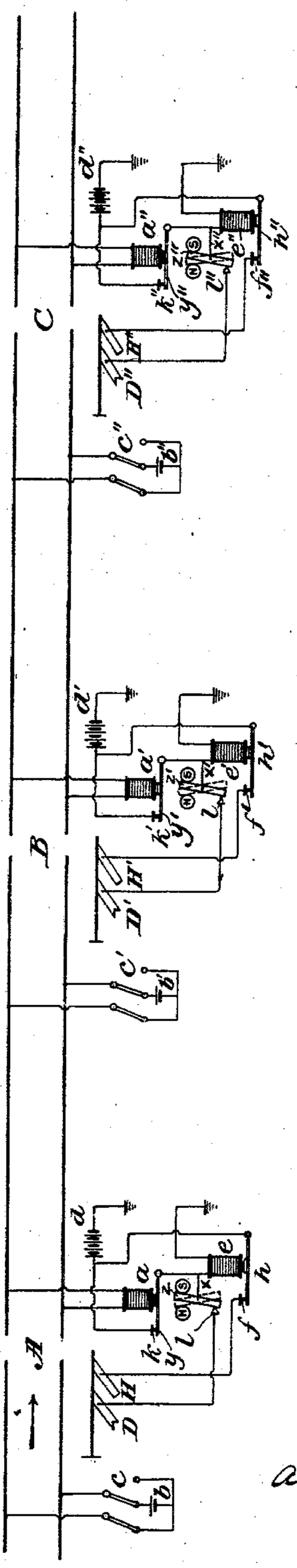


Fig. 3.

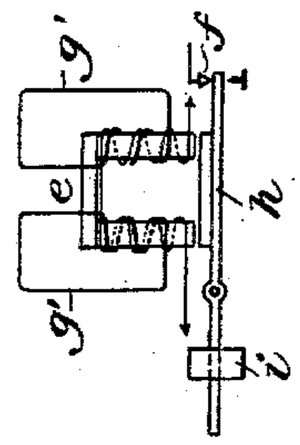


Fig. 4.

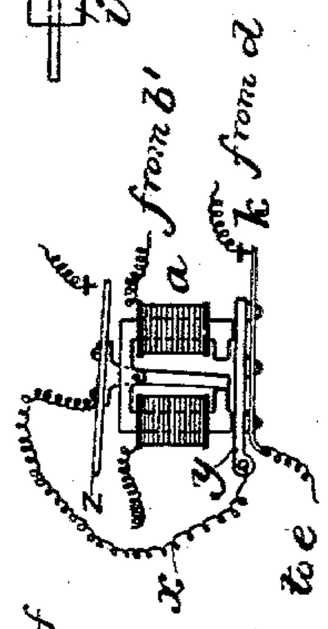
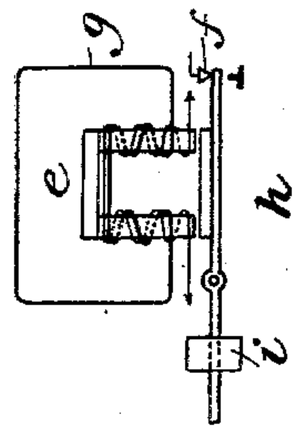


Fig. 2.



WITNESSES

L. A. Pommerening

Geo. B. Fleming

INVENTOR

Asbury G. Wilson

by James E. Bakewell

his Attorney

No. 740,505. PATENTED OCT. 6, 1903.

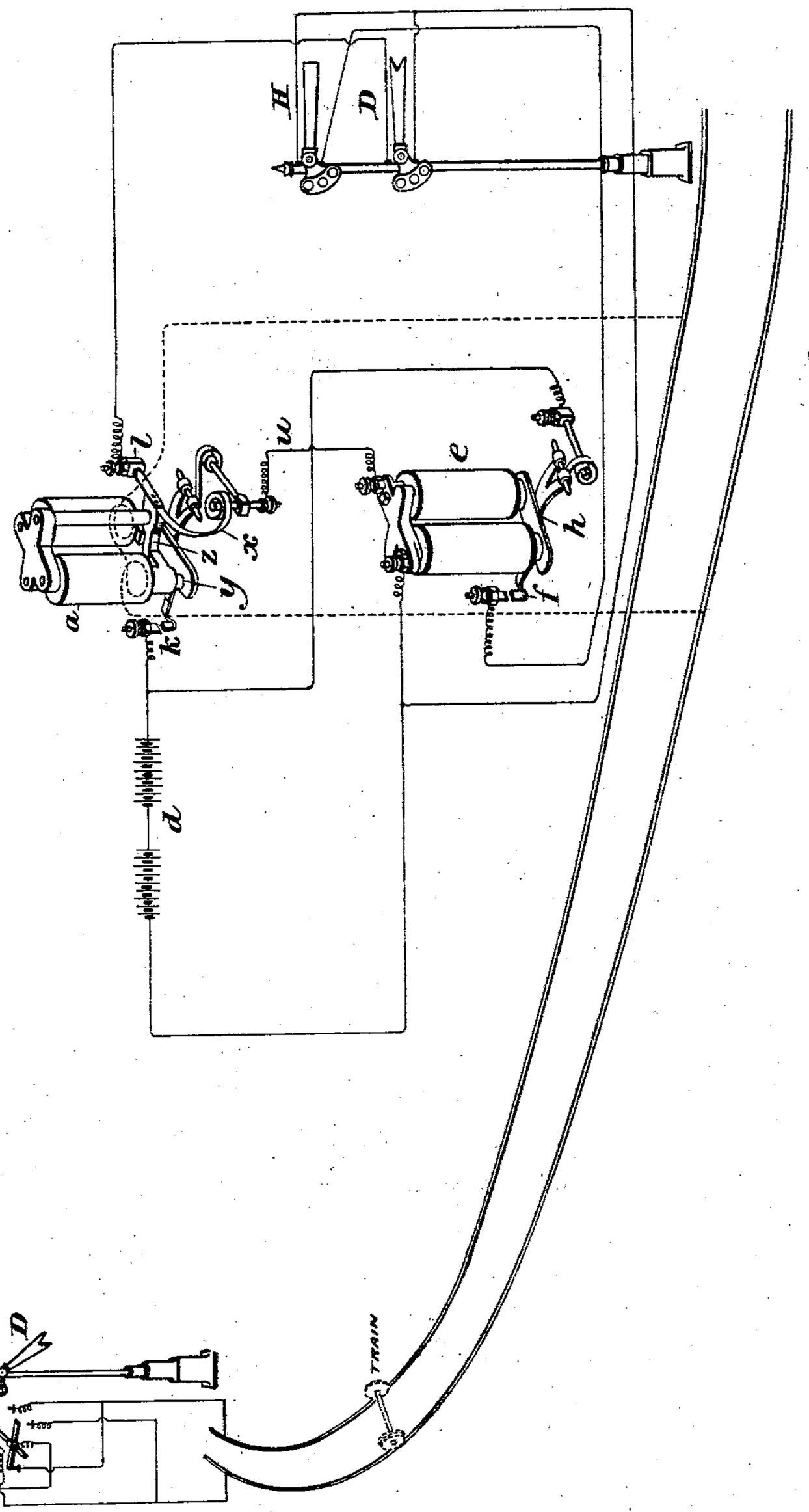
A. G. WILSON.

AUTOMATIC BLOCK SIGNAL SYSTEM.

APPLICATION FILED FEB. 1, 1902.

NO MODEL. 2 SHEETS—SHEET 2.

Fig. 5.



WITNESSES

O. W. Edelen.

C. K. Berryman.

INVENTOR

Asbury G. Wilson,

by W. B. Corwin,

Associate attorney.

No. 740,505. Patented October 6, 1903.

UNITED STATES PATENT OFFICE.

ASBURY G. WILSON, OF WILKINSBURG, PENNSYLVANIA, ASSIGNOR TO THE UNION SWITCH AND SIGNAL COMPANY, OF SWISSVALE, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

AUTOMATIC BLOCK-SIGNAL SYSTEM.

SPECIFICATION forming part of Letters Patent No. 740,505, dated October 6, 1903.

Application filed February 1, 1902. Serial No. 92,163. (No model.)

To all whom it may concern:

Be it known that I, ASBURY G. WILSON, of Wilkinsburg, in the county of Allegheny and State of Pennsylvania, have invented new and useful Improvements in Block-Signal Systems, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, in which—

Figure 1 is a diagrammatic view of my improved system, showing it applied to consecutive blocks. Fig. 2 is a diagrammatic view illustrating the slow-release relay which I employ, and Fig. 3 is a similar view illustrating a modified form of the same. Fig. 4 is a similar view illustrating the neutral polar relay which I employ, and Fig. 5 is a diagrammatic perspective view illustrating my invention.

My invention relates to electrically-controlled block-signal systems the signals of which may be operated by electric, electropneumatic, or electromechanical means.

In my system the road is divided into sections, each of which is provided with electrically-controlled signal-operating devices, the signals being operated, preferably, on the "normal safety system", in which system the signals are held normally at "safety" by electrically-controlled devices, which are deënergized when a train enters the block, causing the signals to go to "danger" by gravity.

My devices comprise relays having neutral and polarized armatures, suitable pole-changers in the track-circuits, each connected to the home signal of the next section in advance, and slow-release relays having a release so slow as to prevent the momentary reversal of current in the neutral polar relay from changing the signal through the momentary release of the neutral armature thereof, and thus to provide mechanism which will hold the signal in a proper position.

A further object of the invention is to provide devices which will be simple and effective in service and not liable to become disarranged or defective.

In the drawings, A, B, and C represent track sections or blocks, each having home and distant signals H D, H′ D′, and H″ D″, respectively, and neutral polar relays $a\ a'\ a''$, having neutral and polarized armatures $y\ y'\ y''$ and $z\ z'\ z''$, respectively. These relays through said armatures control the signal-circuits through contacts $k\ k'\ k''$ and $l\ l'\ l''$, respectively. Each section or block is provided with a track-battery $b\ b'\ b''$ and a pole-changer $c\ c'\ c''$, operated mechanically by the movement of the home signal of the next section in advance. A signal-battery $d\ d'\ d''$ in each section connected to the usual signal-operating mechanism operates the signals. In order to prevent the home signals from being affected by the momentary breaking of the current, caused by release of the armature through change of polarity in the relays $a\ a'\ a''$, I introduce slow-release relays $e\ e'\ e''$, connected by suitable conductors to the home signals H H′ H″, the current being supplied from the signal-batteries $d\ d'\ d''$ to operate said signals. The contacts $k\ k'\ k''$ supply current to the relays $e\ e'\ e''$ through the neutral armature y and wire u and to the distant signals D D′ D″ through the neutral armature y, connector x, polarized armature z, and contact l.

The pole-changers $c\ c'\ c''$ reverse the direction of the current from the track-batteries $b\ b'\ b''$, and thereby change the polarity of the neutral polar relays $a\ a'\ a''$. These relays are relays having two armatures, one neutral, y, and the other, z, polarized, so that the former responds to currents in both directions and the latter to currents in but one direction. The slow-release relays which I employ are illustrated in Figs. 2 and 3, wherein in addition to the usual winding I provide a secondary closed coil g. In Fig. 2 this coil is indicated as including both legs of the magnet in a single closed circuit. In Fig. 3 each leg of the magnet is provided with a closed circuit $g'\ g'$. The closed secondary circuit gives a reaction when the magnet discharges and by mutual induction sets up an induced current in the secondary coil which retards the release of the armature h. The release of the armature h may be still further retarded by a counterweight l or a spring so placed on the armature that the armature

will be released very slowly, and as used in my system these relays prevent the signals being changed by the momentary interruption or breaking of the current at *k k' k''*, due to the movement of the pole-changers, the circuit to the signals H H' H'' being made by the contacts *f f' f''* at the time of this interruption.

I will now describe the operation of my invention: As the train approaches the section A B in the direction of the arrow both the home and distant signals H and D will be in the oblique or safety position, the home signal H indicating that the section A B is clear and the distant signal D indicating that the home signal H' of the next succeeding section is also in the oblique or safety position, thus showing that the section B C, as well as the section A B, is clear of traffic. As the train proceeds and enters the section A B the track-battery *b'*, which supplies current through the pole-changer *c'* to the relay *a*, is short-circuited through the wheels and axles of the train, and consequently very little, if any, current passes through the coils of the relay *a*, and the neutral armature *y* drops away and opens contact at *k*, thus cutting off all current from the battery *d* to the home and distant signals H and D, allowing them to rise to the horizontal or danger position by gravity in the usual way. As the train approaches the section B C the signals H' D' are seen at "safety" and remain in this position until the train passes on to the block, when they are brought to the danger position in the manner already described. When the rear of the train passes the point B, the current is again supplied by the track-battery *b'* through the pole-changer *c'* to the relay *a*, but in the opposite or reverse direction, for the reason that the pole-changer *c'* was moved and the current reversed by the signal H' going to "danger." The neutral armature *y* of the relay *a* is again drawn up and the contact *k* closed, thus enabling the signal-battery *d* to actuate the home signal H through the usual mechanism, the signal being thereby brought to the oblique or safety position. The pole-changer *c'* having, as stated, assumed a new position and the current passing in a reverse direction, the contact *l* is broken by the movement of the polarized armature *z* of the relay *a*, causing the distant signal D to remain in its danger position until this contact is again closed, as hereinafter described. When the train passes the point C, the signal H' returns to the safety position in the same manner as described in the case of the signal H, and as the polarity of the relay *a* is again reversed by the movement of the signal H' returning to safety position, owing to the fact that the pole-changer *c'* is operated by the signal H', the polarized armature of the relay *a* is again reversed in its movement and the contact *l* closed, and the signal D is brought to a clear or oblique position. As the signal H' passes from the danger to the safety position the neutral armature *y* of the relay *a* is momentarily dropped and picked up again, owing to the reversal of the current caused by the shifting of the pole-changer, and if the signal H were operated by mechanism requiring a continuous flow of current to hold it in the safety position it is possible that when the contact *k* is thus momentarily broken the signal H might assume the danger position; but I obviate this by employing the slow-release relays *e e' e''*, which momentarily supply the necessary current through the contacts *f f' f''*.

The advantages of my invention will be appreciated by those skilled in the art and familiar with the requirements for the successful operation of block-signal systems.

The devices I employ are simple and effective and are not liable to get out of order or to become unreliable by reason of complicated parts. By using a slow-release relay having primary coils and closed secondary coils no back contact is required on the relay controlling it, and therefore the liability of such contacts to become unreliable when in use is eliminated.

Changes in the form and arrangement of the several parts may be made by the skilled mechanic without departing from the spirit and scope of the invention.

I claim—

1. In a block-signal system, comprising a plurality of track-sections insulated from each other, a signal device for each section, mechanism for operating the same, a neutral polar relay in circuit with each insulated track-section, a source of electrical supply therefor, a circuit-closer controlled by said neutral polar relay, signal mechanism operated thereby, said circuit-closer comprising a secondary coil forming a closed circuit, so as to cause a slow release of the circuit-closer.

2. In a block-signal system comprising a plurality of track-sections insulated from each other, signal devices for each section and mechanism for operating the same, a neutral polar relay for each signal-station, a track-circuit for said relay, and a signal-mechanism-operating circuit controlled by two circuit-closers consisting of said neutral polar relay and a relay having a secondary coil forming a closed circuit so as to give a slow release to the circuit-closer controlled by said relay.

3. In a block-signal system comprising a plurality of track-sections insulated from each other, signal devices for each section and mechanism for operating the same, a track-circuit for each section, a neutral polar relay in said track-circuit, a pole-changer in said circuit connected to the signal mechanism of the next succeeding section, a signal-operating circuit controlled by said neutral polar relay and arranged to be broken when the electromagnets of said relay are deëner-

gized, and a second relay in said signal-operating circuit having a secondary winding forming a closed circuit, said closed circuit giving a slow release to the armature of said relay.

4. In a block-signal system comprising a plurality of track-sections insulated from each other, signal devices for each section and mechanism for operating the same, a track-circuit for each section, a neutral polar relay in said track-circuit, a pole-changer in said track-circuit connected to the signal mechanism of the next succeeding section, a signal-operating circuit controlled by said neutral polar relay and arranged to be broken when the electromagnets of said relay are de-energized, a second relay in said signal-operating circuit, and a counterweighted armature operated by said second relay, said second relay having a secondary winding forming a closed circuit said circuit giving a slow release to said counterweighted armature.

In testimony whereof I have hereunto set my hand.

ASBURY G. WILSON.

Witnesses:
A. M. STEEN,
W. F. STEWART.