(No Model.) 2 Sheets—Sheet 1.

J. T. WILLIAMS.

TRAIN DESPATCHER'S CHART BOARD.

No. 565,150. Patented Aug. 4, 1896.

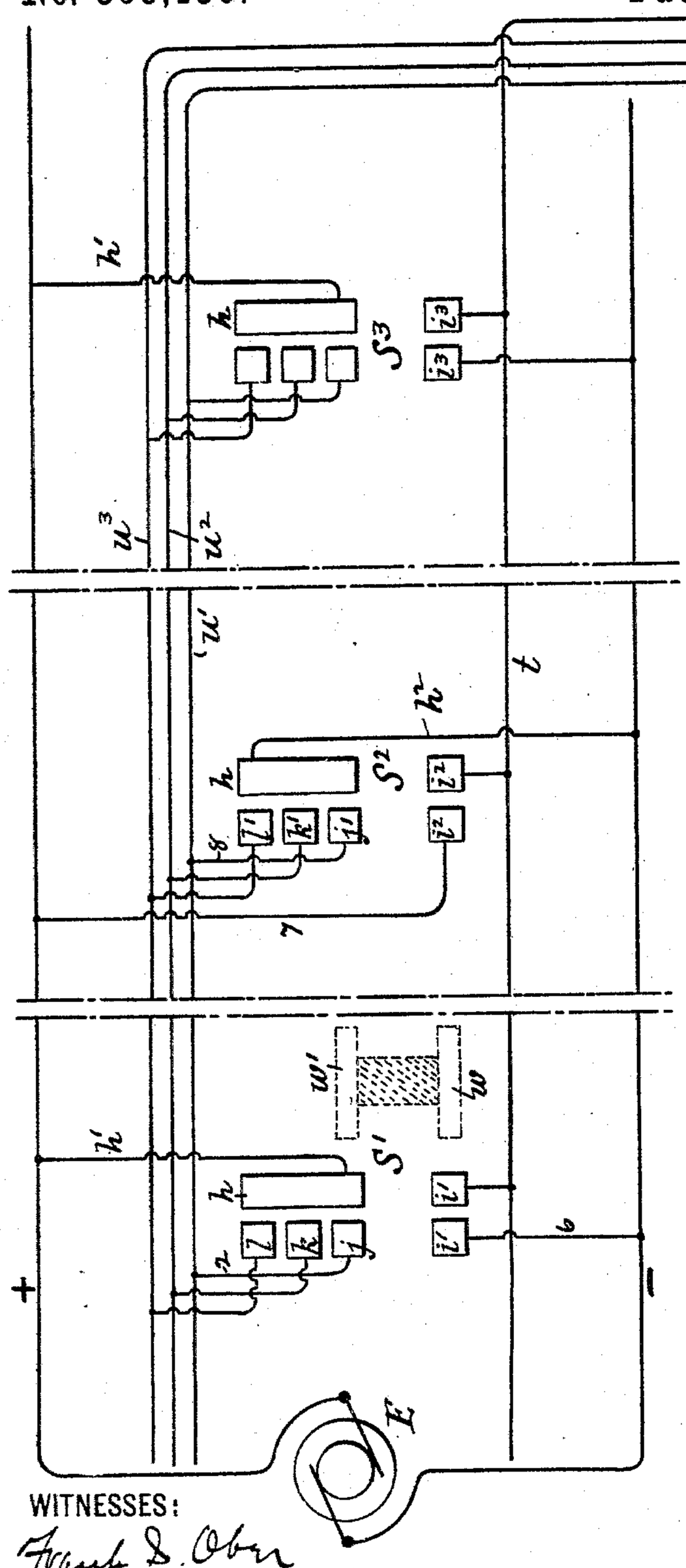
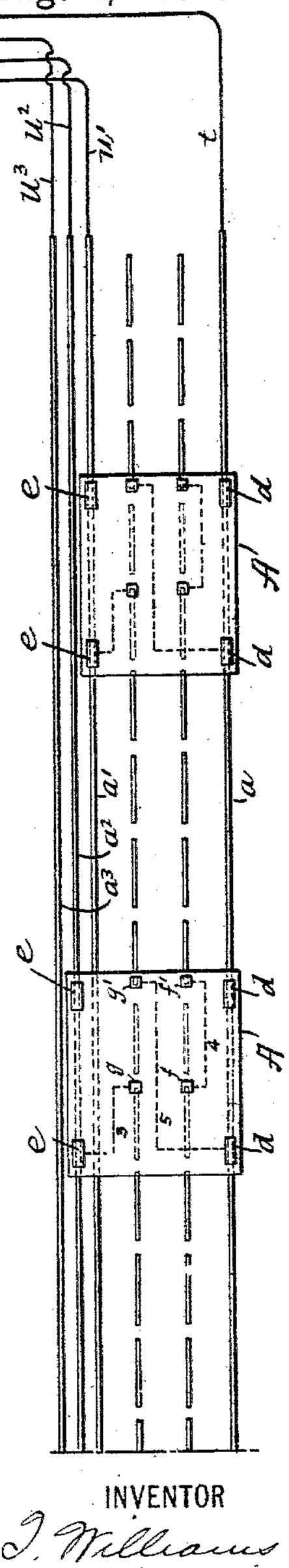


Fig. 1.



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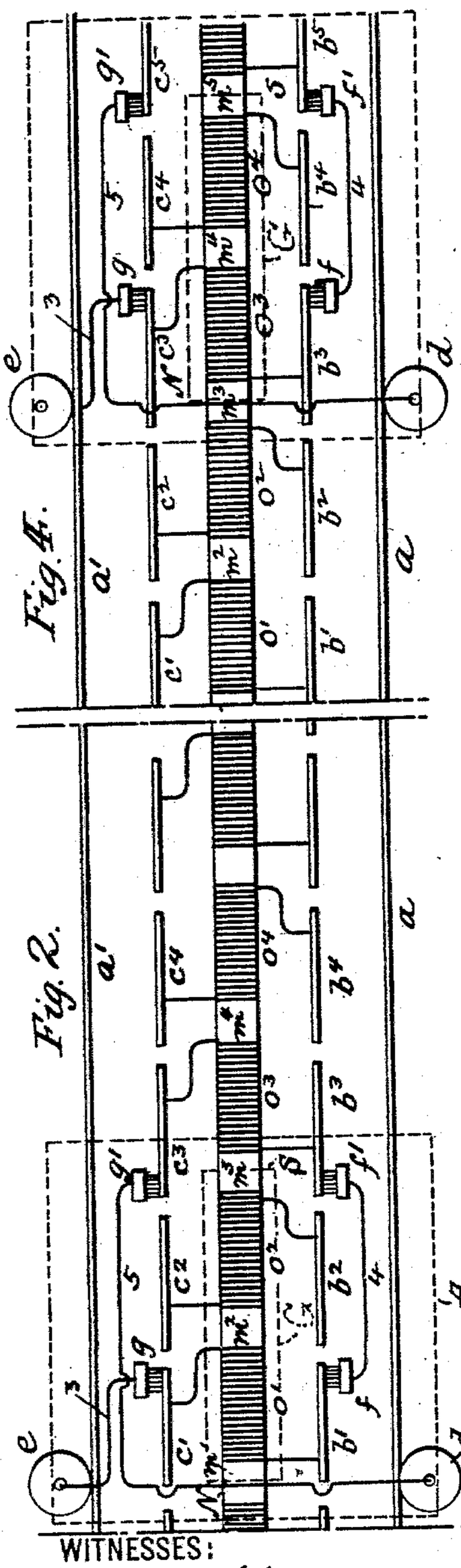

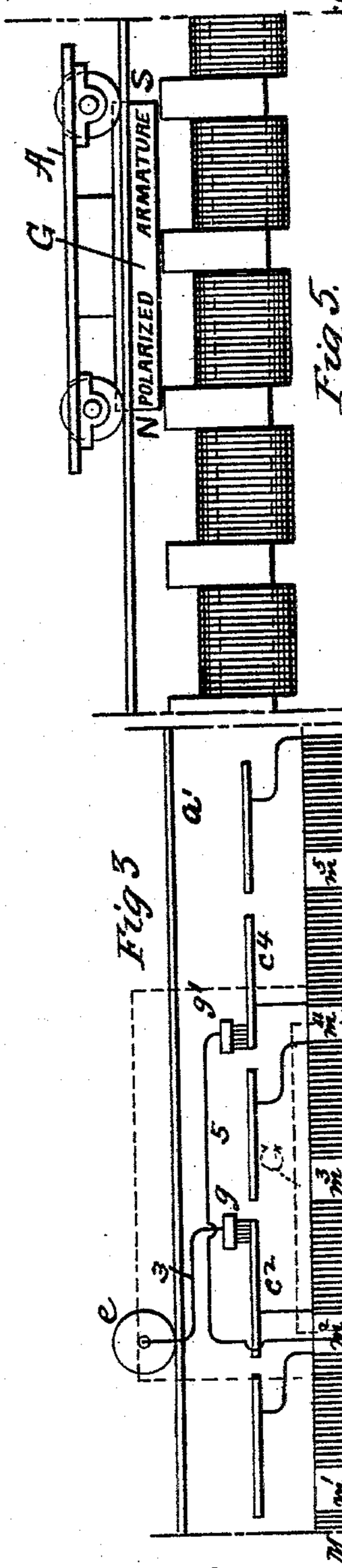

UNITED STATES PATENT OFFICE.

JOHN T. WILLIAMS, OF BROOKLYN, NEW YORK.

TRAIN-DESPATCHER'S CHART-BOARD.

SPECIFICATION forming part of Letters Patent No. 565,150, dated August 4, 1896.

Application filed April 30, 1896. Serial No. 589,621. (No model.)

To all whom it may concern:

Be it known that I, JOHN T. WILLIAMS, a citizen of the United States, residing at Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Train-Despatchers' Chart-Boards, of which the following is a full, clear, and exact description.

The object of this invention is to provide a reliable and positive means whereby a train-despatcher can have before him a mapped condition at all times of the relative positions of trains moving on the tracks under his supervision.

The invention comprehends a chart-board having arranged thereon a miniature duplicate of the tracks controlled by the despatcher and located in his station. The miniature trains move upon the tracks of the chart in accordance with the movement of trains on the regular track. In this way the train-despatcher is able to know when trains approach each other too closely and can give the necessary orders to correct any irregularities that may be noticed. The trains of the miniature tracks are caused to move in substantial unison with the trains on the regular track by means of electromagnetism, the trains on the regular track operating certain circuit-controllers at intervals which cause the miniature train to move forward or backward step by step accordingly as the circuit-controllers are operated.

The invention will be described in detail with reference to the accompanying drawings, in which—

Figure 1 is a diagram of the circuits and apparatus on the roadway and the chart. Figs. 2, 3, and 4 illustrate diagrammatically the progression of a tally-train on the chart; and Fig. 5 illustrates the construction of a tally train or car and the electromagnetic apparatus for moving the same.

As the invention is designed to indicate merely the distance intervening between trains on a given track, it is necessary only to describe and illustrate the invention as applied to a single track, it being understood that for two or more tracks the same mechanism is repeated and that ordinarily the train-despatcher's chart will have two miniature tracks corresponding to the regular outgoing and return tracks of the road.

I will first describe the chart and its apparatus.

The track on the chart consists of one rail a and a plurality of rails a' a^2 a^3, &c., corresponding in number to the greatest number of trains ever running upon the road at one time. Between rails a and a' are arranged two lines of sectional electric conductors b' b^2 b^3, &c. Each miniature train, which is represented by A, is provided with wheels d, running upon the rail a, and wheels e, running upon one of the rails a' a^2 a^3, &c. There are also provided for each train two contact brushes or wheels f and f', running in contact with the sectional conductors b' b^2, &c., and brushes g and g', running in contact with sectional conductors c' c^2, &c. Along this miniature track, and preferably between the two sectional conductors, is permanently fixed a continuous magnetic core M, having pole-pieces m' m^2 m^3, &c., at intervals, and between the pole-pieces helices or coils of wire o' o^2 o^3, &c., corresponding with the opposite pairs of sections of the sectional conductors, and with their terminals respectively connected to the sections b and c to which they correspond. These coils are wound alternately in opposite directions or are connected in such a way that if a current flows from two adjacent sections c through two coils in parallel to two adjacent sections b the magnetism induced in the pole-piece m between the two coils will be of the same polarity, while that in the poles outside of the two coils will be of the opposed polarity.

The train A supports a polarized bar-armature G of such length as to just bridge three successive pole-pieces m. This armature is supported in any suitable manner upon the frame or truck of the train in position to run as closely as possible to the faces of the poles m without touching the same. This constitutes the entire apparatus on the chart-board, it being understood that there are always as many trains A operating on the chart as there are trains on the regular tracks.

Referring now to the equipment of the regular tracks, which is shown in the upper portion of Fig. 1 of the drawings, the + and —

signs indicate the two conductors of the main circuit supplying the operating current from source E. These extend along the roadway, being supported and insulated in any desired manner.

t is an insulated conductor extending throughout the roadway and electrically connected on the chart with the rail *a*.

u' u^2 u^3, &c., are a number of separate insulated conductors extending along the roadway and electrically connected, respectively, with the rails a' a^2 a^3 on the chart. Between or adjacent to the tracks and located at uniform distances apart are groups of exposed heads or electrical contacts S' S^2 S^3, &c. Each group of heads consists of a pair of heads i' and i', i^2 and i^2, i^3 and i^3, &c., one of the members of each pair being connected electrically with the conductor *t*, while the other members of the pairs are connected alternately with the main conductors, (indicated by + and —.) There is also in each group of heads a series of heads *j k l*, &c., connected, respectively, with the wires u' u^2 u^3, &c., and another elongated head *h*, standing opposite the heads *j k l* and common to them all, which is alternately connected with the + and — mains, as indicated by the conductors h' h^2. Where one of the contacts *i* is connected with the — main, the conductors h' are connected with the + main. Each of the regular trains will be equipped with two devices, such as shoes *w* and w', capable of connecting together the contacts i' and i', i^2 and i^2, successively, as it passes them and simultaneously the contacts *h* and one of the contacts *j k l*, corresponding to the particular train.

The operation of the system is as follows: Whenever a regular train leaves the despatcher's station he places upon the track of the chart a train A, whose wheels *e e* rest upon the rail a', a^2, or a^3, &c., that is connected through conductors u' u^2 u^3, &c., with the heads *j k l* in the groups S, which are put in circuit by that particular train as it goes over the road. For instance, suppose the train is provided with devices W and w', which, as it passes the several groups S, connects together on the one hand the two *i* contacts and on the other hand the contacts *h* and *k*. Then the train A, which the despatcher places upon the chart at the beginning of the track, will be one whose wheels *d* and *e* will rest, respectively, upon rails *a* and a^2.

We will assume one of the regular trains to have just started and that its corresponding miniature train A has just been placed upon the chart at the beginning of the track. Let it be further understood that the train is equipped to close successively the contacts *i* and the contacts *j* in the road-bed and that the corresponding miniature train is running with its wheels *e* on track a'. The miniature car is held at the starting-point, as indicated in Figs. 2 and 5, by the attraction of the N and S poles of armature G for poles m' and m^3, there being no current in the coils *o*. Now when the regular train reaches the group of heads S' it bridges i' and i' and *j* and *h*. An impulse of current will then flow from the + main by wire h' to head *h*, head *j*, wire 2, wire u', rail a', wheel *e*, wire 3, contact-brush *g*, section c', coil o', section b', contact-brush *f*, wire 4, contact-brush f', section b^3, coil o^3, section c^3, contact-brush g', wire 5, wheel *d*, rail *a*, conductor *t*, contacts i' and i', wire 6 to — main. Owing to the method of winding and connections of the coils *o*, as above described, the current thus flowing through o' and o^3 will induce the same magnetic polarity in the pole-pieces m' and m^4, say, for instance, north, while in both the pole-pieces m^2 and m^3 it will be south. An attraction will consequently exist between pole-pieces m^4 and pole S of the armature on the miniature train, while at the same time a repulsion will exist between pole-pieces m' and the north end of the armature, and an attraction between pole-piece m^2 and pole N of the armature in consequence of which the car A will move forward. With the first movement brushes *g* and *f* cut out coil o' and cut in coil o^2, and as o^2 is wound opposite to o' the polarity of pole m^2 remains the same as before and gives an additional impulse to the armature and train to which it is connected. The train continues to move until the south end of its armature reaches pole-piece m^4, (see Fig. 3,) where it will be magnetically held as long as the contacts i' i' and h' *j* on the regular road are held closed by the train. When the regular train has passed group S', the train A will have come to a stop, and will be held in that position by the natural attraction of the armature for the adjacent pole-pieces until moved forward another step, which it does when the regular train closes contacts i^2 i^2 and h^2 j' in the group S^2. The circuits in this instance are as follows: From + main by wire 7, contacts i^2, conductor *t*, rail *a*, wheel *d*, wire 5, section c^4, coil o^4, contact-brush f', wire 4, contact *f*, section b^2, coil o^2, section c^2, contact-brush *g*, wire 3, wheel *e*, rail a', conductor u', wire 8, contact j', contact *h*, conductor h^2 to — main. Thus an impulse of current in the reverse direction from that previously sent is passed through the coils o^2 and o^4; but as o^2 is wound opposite to o' and as o^4 is wound opposite to o^3 the polarity of the pole-pieces m^2 and m^5 will be the same as the polarity which was before created in the poles *m* and m^4, to wit, both north. The intermediate poles m^3 and m^4 will then both be south. The armature on the train A will therefore again be attracted and moved forward until its south pole is opposite the pole-piece m^5. When the regular train reaches S^3, the impulse of current will again be reversed and the miniature train move forward another step, the circuits being easily traced from the description above given. Hence the miniature car makes a step-by-step movement in exact correspondence with the movement of the regular train over the several groups of con-

tact-heads extending from the starting-station to the destination of the train. Another train leaving the despatcher's station will be adapted to close the circuits through heads h and k and the corresponding miniature train will therefore be placed upon the track with its wheels e running on rail a^2, and so as each train leaves the despatcher's station miniature trains are added to the chart, each one being placed upon the particular rail a' a^2 a^3, &c., corresponding to the position of the circuit-closing device on the regular train.

When one train approaches the other too closely upon the main road, the train-despatcher observes it and issues orders accordingly.

The details of construction of the apparatus connected with the chart are unimportant features of my invention and may be modified at will without departing from the principle involved. The electromagnetic structure M o' o^2 o^3, &c., may be substituted by a series of separate electromagnets having pole-pieces similarly arranged, instead of series mechanically connected, as shown.

The contacts g and f may bridge the two sections c and b, on which they are left after each movement, because the corresponding coils o create similar polarity between them. The detail of the circuit-closers of the main track likewise may be modified.

Having thus described my invention, I claim—

1. In a train-despatcher's chart-board, the combination of a track, a series of electromagnets arranged coextensively therewith, a car or train running on the track and carrying an armature in inductive relation with said magnets, means whereby trains on a regular track send electric impulses to the helices of said magnets and means whereby said impulses cause a step-by-step movement of the chart-board train.

2. The combination of a regular railway and trains moving thereon, a station at which are located a miniature railway and trains corresponding to the regular railway and its trains, means whereby the trains on the regular railway send alternately positive and negative impulses of electricity to the miniature railway, and means whereby trains on the latter are caused to move step by step as the impulses are received, substantially as described.

3. A train-despatcher's chart consisting of a miniature track and train, a polarized armature carried by the train, and a series of electromagnets mounted near the track, in combination with contacts or circuit-closers placed at intervals along the regular track, electrical connections between said contacts and the series of electromagnets, and devices carried by the regular trains for operating in conjunction with said contacts or circuit-closers, substantially as described and for the purpose set forth.

4. A train-despatcher's chart-board consisting of a miniature track and train, a polarized armature carried by the train, and a series of electromagnets mounted near the track and coextensive therewith, and poles of the series of magnets facing up the poles of the armature on the train, and the poles of the armature adapted to bridge three of the poles of the series of magnets, switching devices controlled by the train for keeping in circuit the coils of at least two of said magnets all in combination with a series of contacts placed at intervals along a regular railway-track, a source of electricity connected therewith, electrical connections between said series of contacts and the chart-board such that alternate positive and negative impulses are sent to the chart-board as the contacts are successively operated.

5. In a train-despatcher's chart-board, the combination of a miniature train running thereon and carrying a polarized armature, a series of electromagnets mounted along the trackway at regular intervals, and with the pole-pieces arranged to influence the armature on the train, said armature being of such length as to bridge three successive poles at the same time, the coils of the magnets being wound or connected so that a current passing through any two adjacent coils either in parallel or series will create similar poles between them, switching devices controlled by the train for directing current through the coils, contact devices in connection with a source of electricity and located at intervals on a regular railway-track, to coöperate with a moving train, and connections from said contacts to said switching devices controlled by the miniature train, whereby positive and negative impulses of current are alternately sent to the chart-board as the regular train moves along its track, substantially as described.

6. In a system for indicating the position of trains on a railway, a series of electrical conductors equal in number to the greatest number of trains operating on the road at one time, and extending along the trackway, a miniature trackway having the same number of conductors extending along it and connected respectively with those on the main road, miniature trains running on the miniature road, and corresponding respectively to the trains on the regular road, each of the said miniature trains being connected with the conductor corresponding to the one with which its corresponding regular train connects, and a series of magnets arranged coextensively with the miniature track, the miniature trains carrying an armature in inductive relation with said magnets, and means whereby the regular trains send electric impulses to the magnets thereby causing the miniature trains to assume positions on the miniature track corresponding to the positions of the respective trains on the regular track, substantially as described.

7. In a system for indicating position of

trains on a railway, a series of electric conductors equal in number to the greatest number of trains operating on the road at one time, and extending along the trackway, a miniature trackway having the same number of conductors extending along it and connected respectively with those on the main road, miniature trains running on the miniature road, and corresponding respectively to the trains on the regular road, each of said miniature trains being connected with the conductor corresponding to the one with which its corresponding regular train connects, two sectional conductors along the miniature road, two pairs of contacts carried by the miniature trains and engaging respectively with the two sectional conductors, a series of electromagnets having coils connected in conductors bridging from one sectional conductor to the other and wound alternately in opposite directions or its equivalent and the miniature trains provided with a polarized armature, substantially as described.

In testimony whereof I subscribe my signature in presence of two witnesses.

JOHN T. WILLIAMS.

Witnesses:
WM. A. ROSENBAUM,
FRANK S. OBER.