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E. F. BARD & G. G. WAGNER.

AUTOMATIC TIME INDICATOR AND BLOCK SIGNAL.

No. 300,833. Patented June 24, 1884.

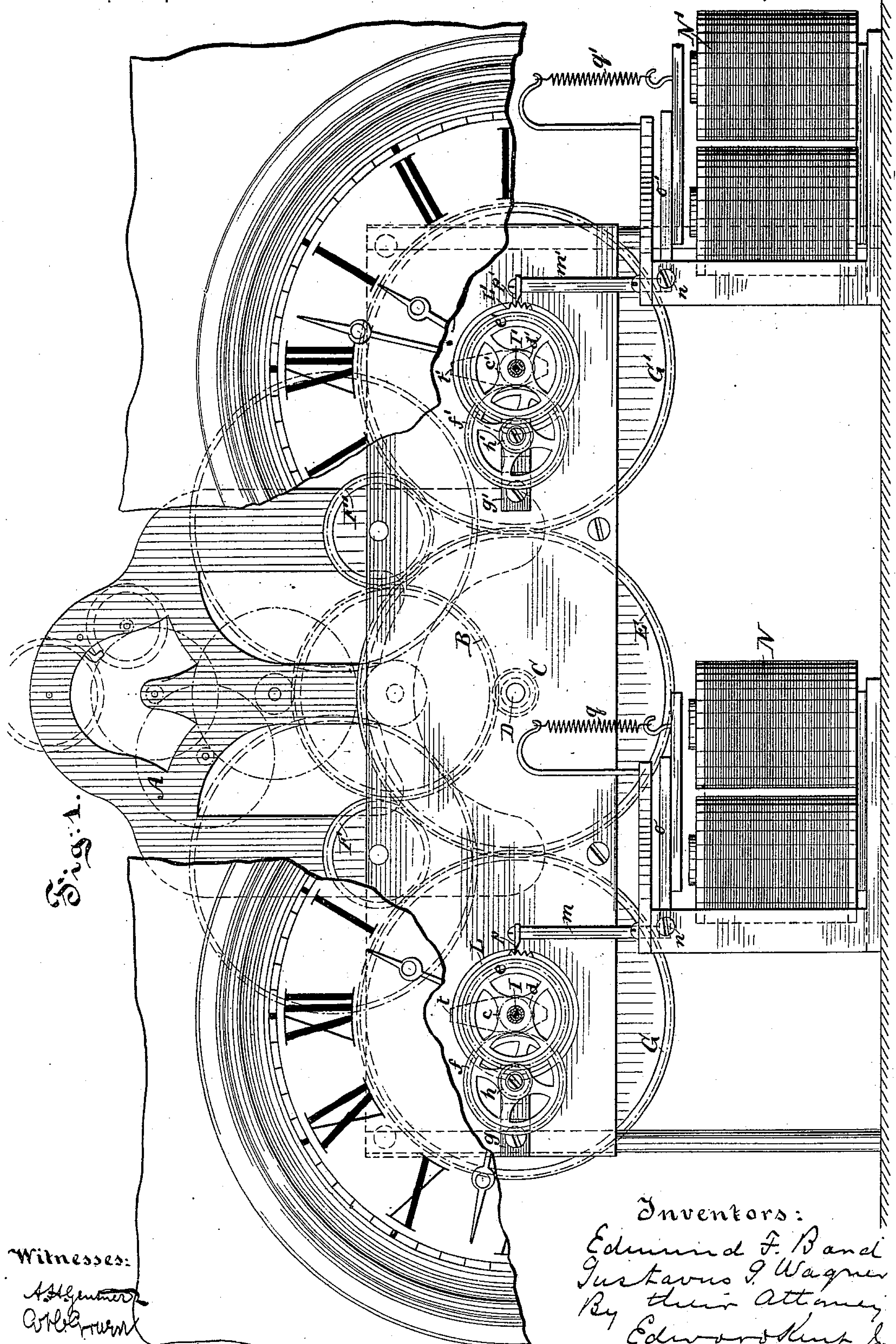

Fig. 1.

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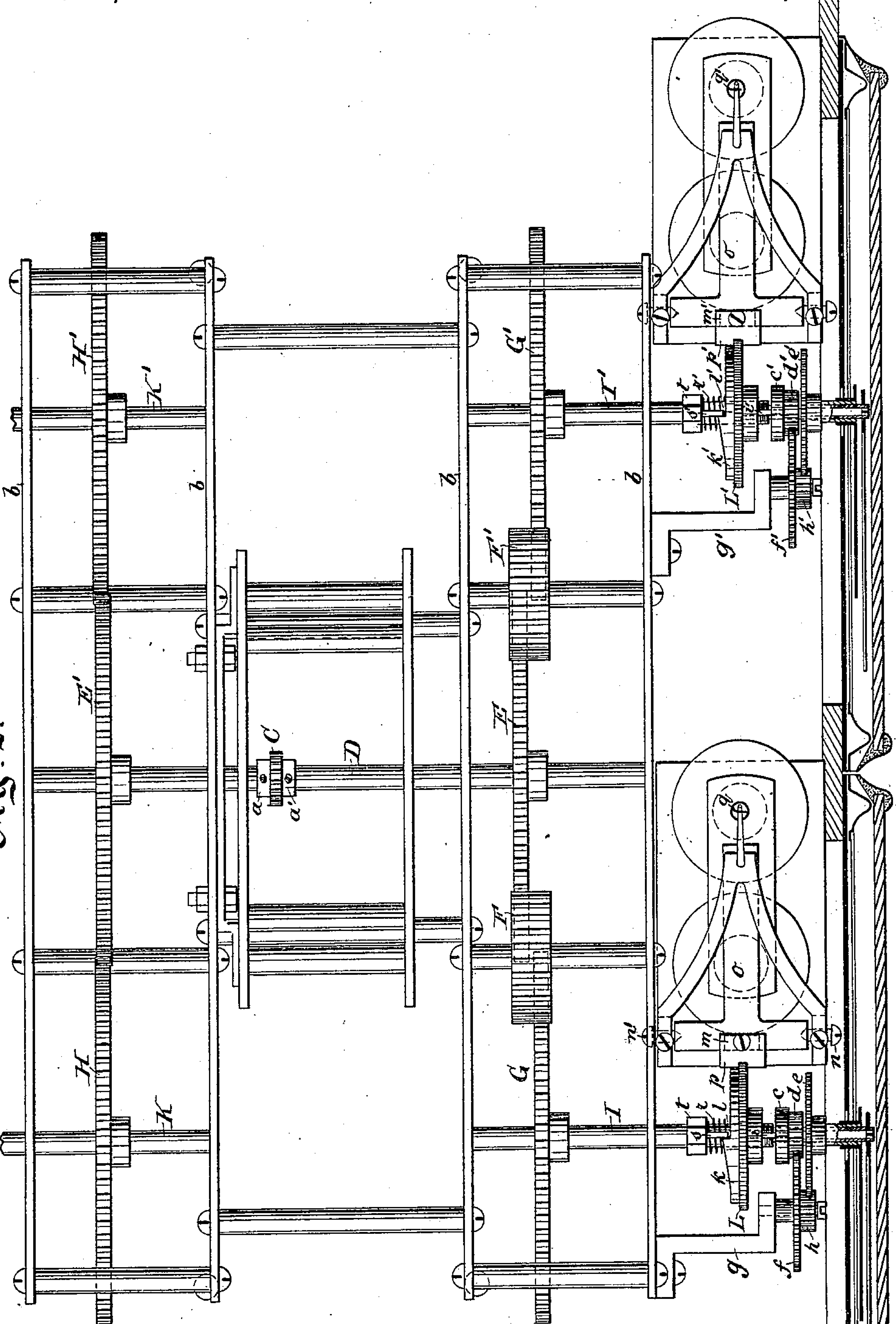
Fig: 2.



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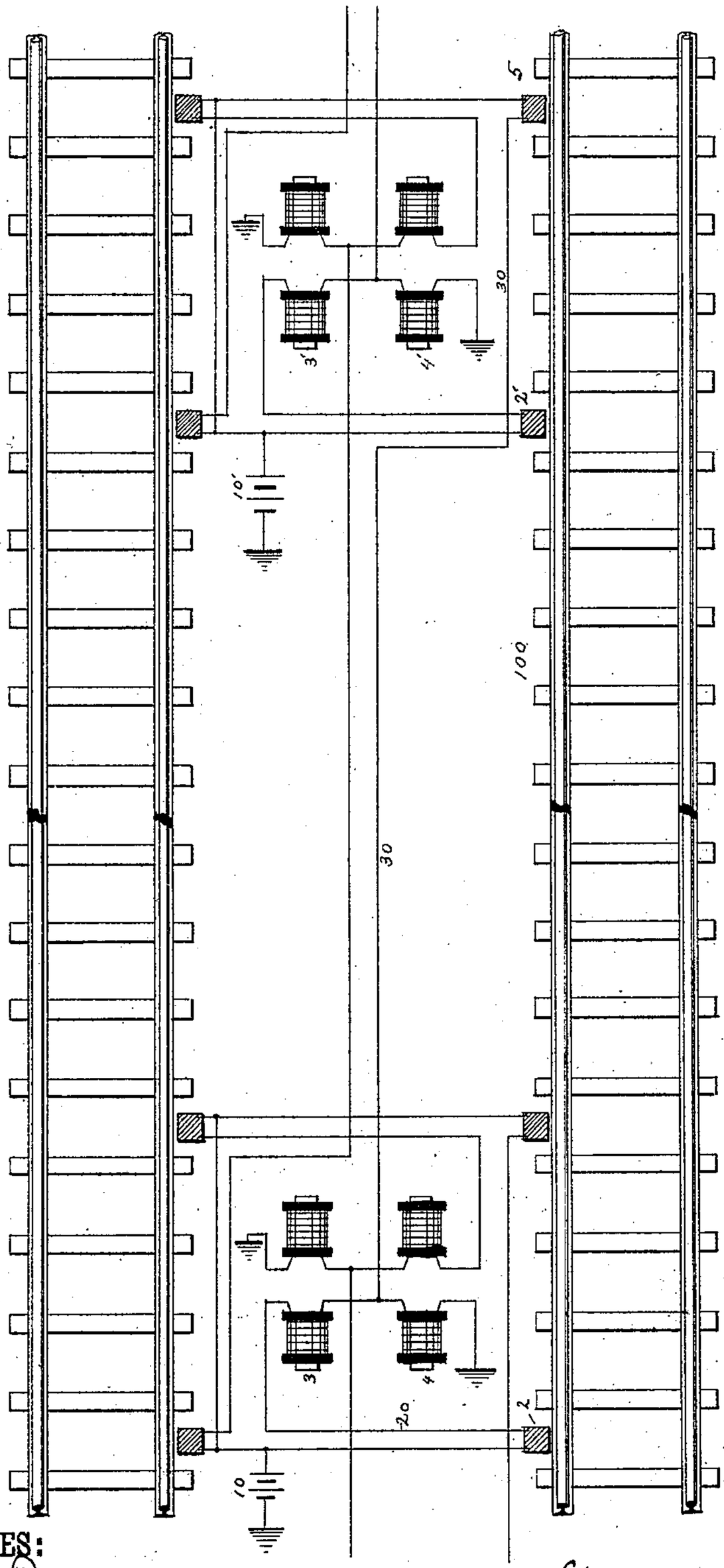

Fig 3

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E. F. BARD & G. G. WAGNER.

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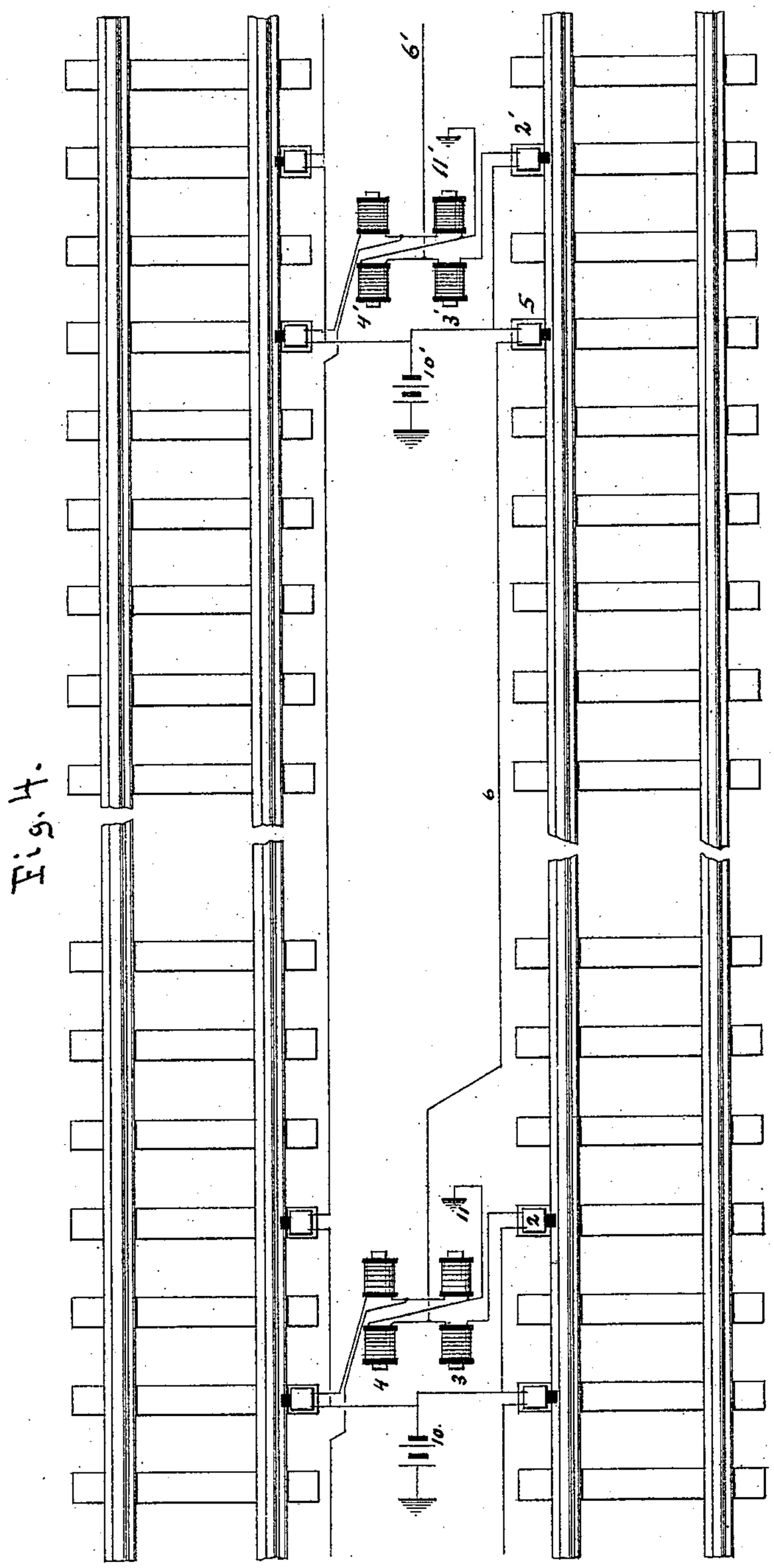

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UNITED STATES PATENT OFFICE.

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AUTOMATIC TIME-INDICATOR AND BLOCK-SIGNAL.

SPECIFICATION forming part of Letters Patent No. 300,833, dated June 24, 1884.

Application filed October 17, 1883. (No model.)

To all whom it may concern:

Be it known that we, EDMUND F. BARD, of Greenwich, in the county of Fairfield and State of Connecticut, and GUSTAVUS G. WAGNER, of Mount Vernon, in the county of Westchester and State of New York, have invented a certain new and useful Automatic Time-Indicator and Block-Signal, of which the following is a specification.

This invention relates to that class of signals which are used to indicate the approximate position of preceding trains; and it consists, essentially, of two clock-dials, one of which indicates the time when a train left the station or point at which the signal is located, while the other indicates the time when the train passed the next succeeding station or signal-point. In practice I use two sets of these dials, which are so arranged that one pair faces in one direction, and the other in the opposite direction, both pairs being controlled by the same clock-movement, but each pair having its own connections with the track, the hands of each pair being actuated by trains approaching from the direction toward which they face. The mechanism is so arranged that the hands on the dials are not advanced by the clock-movement, and are held stationary except when the holding mechanism is released by the passage of a train, at which time the hands on the dials facing the direction from which the train is moving are automatically set to indicate the exact time of the passage of the train. Immediately after the passage of the train the hands on both of the dials facing in the direction from which the train arrived point to the same hour and minute, and while in such position indicate "danger," or, in other words, that the train is still in the block of which the point at which the signal is located is the commencement. When the train arrives at and passes the next signal-station, it again releases the hand-holding mechanism of the right-hand dial, but does not disturb the hand-holding mechanism of the left-hand dial, so that the hands of the right-hand dial are moved forward to a position so as to indicate when the train passed off or out of the block, while the hands of the left-hand dial point to the hour when the train passed the signal. When in the position just described, the signal indicates "safety," as it points out the precise time when the train entered and left the block.

In the accompanying drawings, Figure 1 is an elevation of our improved automatic time-indicator. Fig. 2 is a plan view of the same. Fig. 3 is a diagram illustrating the various electrical connections for operating the indicator, and Fig. 4 is a diagram of a modified form of said electrical connections.

Similar letters refer to similar parts throughout the several views.

A is a clock-movement of any suitable structure, and so mounted that the main driving-wheel B engages with a pinion, C, which is loosely mounted on the shaft D, but which is prevented from turning by its frictional contact with the collars *a a*, said collars being secured to the shaft D by set-screws, so that a greater or less amount of friction may be obtained between the collars and the pinion *c*, as the circumstances of the case might require. The shaft D is so connected to the clock-movement that it revolves once an hour, and it extends beneath the clock and projects on either side, where it is mounted in proper bearings. Two gear-wheels, E and E′, are carried by this shaft D, one being secured to the shaft on either side of the clock. The gear-wheel E, which is in front of the clock, meshes with two intermediate gear-wheels, F and F′, and these intermediate gear-wheels in turn mesh with the gear-wheels G G′, which are the same size as the wheel E, and contain an equal number of teeth, the object of this method of gearing being to give the wheels G G′ a left to right motion, which is the motion given to the shaft D when looking at the front of the clock. The wheel E′, which is secured to the shaft D behind the clock, meshes directly with the gear-wheels H H′, and as the motion of the shaft D is from right to left when viewed from the rear of the clock, the motion of the gear-wheels H H′ will be from left to right. The gear-wheels G G′ and H H′ are mounted on shafts I I′ and K K′, which are secured in bearings formed in the frame-work *b b*, and these shafts

project outward and through the clock-dials, as is clearly shown in the drawings.

We will now describe the mechanism for holding the hands in position except at the time of the passage of a train, and for the sake of clearness our description will be confined to a single holding and tripping mechanism, it being understood that a similar mechanism is employed to control the movements of the hands on each one of the four dials.

Near the outer end of each of the shafts I I′ and K K′ there is loosely mounted a collar, as *c c′*, to which collars pinions as *d d′* are rigidly affixed, and from these pinions there project tubular arbors carrying the minute-hands.

Directly in front of the pinion *d* there is a gear-wheel, as *e*, which carries a tubular arbor for the support of the hour-hand. Mounted on a stud, *g*, projecting from the frame *b*, is a gear-wheel, *f*, and a pinion, *h*, the two being rigidly secured, the one to the other, and so arranged that the gear-wheel *f* meshes with the pinion *d*, and the pinion *h* with the gear-wheel *e*. Now, as the wheel *f* contains three times as many teeth as the pinion *d*, and the wheel *e* four times as many teeth as the pinion *h*, it necessarily follows that by turning the pinion *d*, which directly controls the movement of the minute-hand, the desired relative motion of the hour and minute hands will be secured.

Projecting from the rear of the collar *c*, and rigidly secured thereto, is a pin, *i*, the free end of which rides in a slot formed in the hub of a disk, as L. This hub is threaded to engage with a screw formed on the projecting end of the shaft I. A circumferential ring, as *k*, in which there is a notch, *l*, is formed on the inner side of the disk L. The depth of this notch is a little less than the pitch of the screw formed on the shaft I—that is to say, one turn of the screw would advance the disk a distance slightly greater than the depth of the notch. The periphery of the disk L is covered with small notches, which engage with a knife-edge, as *p*, carried by the upright arm *m* of a bell-crank lever, which is journaled in bearings at the points *n n′*, so that its horizontal arm *o*, which carries an armature, projects over the pole-pieces of the electro-magnet N. A spring, *q*, is arranged so as to hold the knife-edge *p* against the periphery of the disk L, and in engagement with the notches formed therein, so that as the shaft I is rotated through the medium of the clock-movement, the disk L is held from turning, but is advanced toward the clock-dial by the action of the screw formed on the shaft. The rotation of the shaft I winds up a spiral spring, *r*, one end of which is secured to the hub of the disk L, while the other end is fixed to the shaft I. A stop, *s*, arranged to engage with the notch *l*, projects from an arm *t*, which is secured to the shaft I, and this stop is so timed that when the notch *l* is in engagement with it the hands on the dial will point to the correct time. The shaft I is regularly rotated by the clock-movement, and makes one revolution each hour, and as the shaft I is rotated it carries with it the arm *t*, from which projects the stop *s*. Suppose the hands on the dial to be pointing to twelve o'clock, the notch *l* to be in engagement with the stop *s*, and the knife-edge *p* to be in engagement with the teeth formed on the periphery of the disk L, then as the shaft I is rotated the disk L would be advanced toward the dial and away from the stop *s*, and at the end of the hour required for the full rotation of the shaft I would occupy a position such that the notch or catch *l* would be cleared by the stop *s*. If after a full revolution of the shaft I the knife *p* be withdrawn from engagement with the disk L, the spiral spring would cause the disk to revolve, and the screw on the shaft would bring the disk toward the stop *s*, so that after making one revolution the catch *l* would be brought into engagement with the stop *s*, and, as in revolving the disk carries with it the collar *c* and the pinion *d*, the clock-hands would be advanced so as to point to one o'clock.

In Fig. 3 we have illustrated by diagram the various electrical connections which are employed for operating our time-indicator and block-signal. For the sake of clearness our description of the connections will be confined to a single track, it being understood that the connections with both tracks are alike. A train approaching a signal-station on the track marked 100 closes the circuit at 2, where there is located any appropriate style of circuit-closing device, and the current passes from the battery 10, which is grounded, to and through the contact-point 2, thence over line marked 20 to the electro-magnets 3 and 4, and from the electro-magnet 4 to ground. These electro-magnets control the movements of the hands of the pair of dials facing the direction from which the train under consideration arrived, and such hands are consequently moved forward, so as to indicate the time of the passage of the train. When the advancing train arrives at the contact-point marked 2′, the circuit in which the magnets 3′ and 4′ are located is closed, and the current passing from the battery 10′ through the contact-point 2′ and magnets 3′ and 4′ and on to ground, sets the hands controlled by said magnets so that they indicate the time of the passage of the train. Upon arriving at the contact-point marked 5, the circuit, including the magnet 4, is closed, and the current passes from the battery 10′ to and through contact-point 5, back over the line marked 30, to and through the magnet 4, and thence to ground, thus setting the hands controlled by the magnet 4 so that they will indicate the time when the train passed the point 5—*i. e.*, the time when the train left the block, which commenced at the point where the magnets 3 and 4 are located.

In Fig. 4 there is shown another arrangement of the circuits, whereby the left-hand

dial is employed to indicate the time when the train left the block. In this case the train closes the circuit at 2 and the current passes from the battery 10, which is grounded through the contact-point 2, thence to the magnets 3 and 4, and on to ground at 11, and the hands controlled by the magnets 3 and 4 are set to indicate the time of the passage of the train. At the end of the block is the contact-point 5, and when the train reaches that point the circuit is closed and the current passes from the battery located near the contact-point, thence through the contact-point 5, and down the line marked 6 to and through the magnet 4, and thence to ground, thus setting the hands on the left-hand dial, so that they point to the time when the train left the block. These connections are duplicated for the other track.

It will be understood that at night the several dials are to be illuminated by any of the well-known illuminating devices.

An application to cover a portion of the mechanical devices shown and described herein is about to be filed in the name of Gustavus G. Wagner, who is the sole inventor thereof.

Having thus fully described our invention, what we claim, and desire to secure by Letters Patent, is—

1. The method herein described of indicating the time when a train enters and leaves a block, which consists in automatically moving the hands on two clock-dials by the passage of a train, so that one of said dials shall indicate the time when the train entered the block, and the other shall indicate the time when the train left the block, substantially as described.

2. The herein-described method of signaling, which consists of causing a passing train to automatically set the hands on two clock-dials, so that both shall indicate the time of passing the point where the signal is located, and in further causing such train to automatically set the hands on one of the dials so that they shall indicate the time when the train passed the next succeeding signal-station, substantially as described.

3. The combination, with the hands of two clock-dials located at the commencement of a block, of mechanisms and electrical connections whereby the continued travel of a train will automatically set the said hands so that one set shall indicate the time of entry and the other the time of the departure of the train from said block, substantially as described.

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