(No Model.)

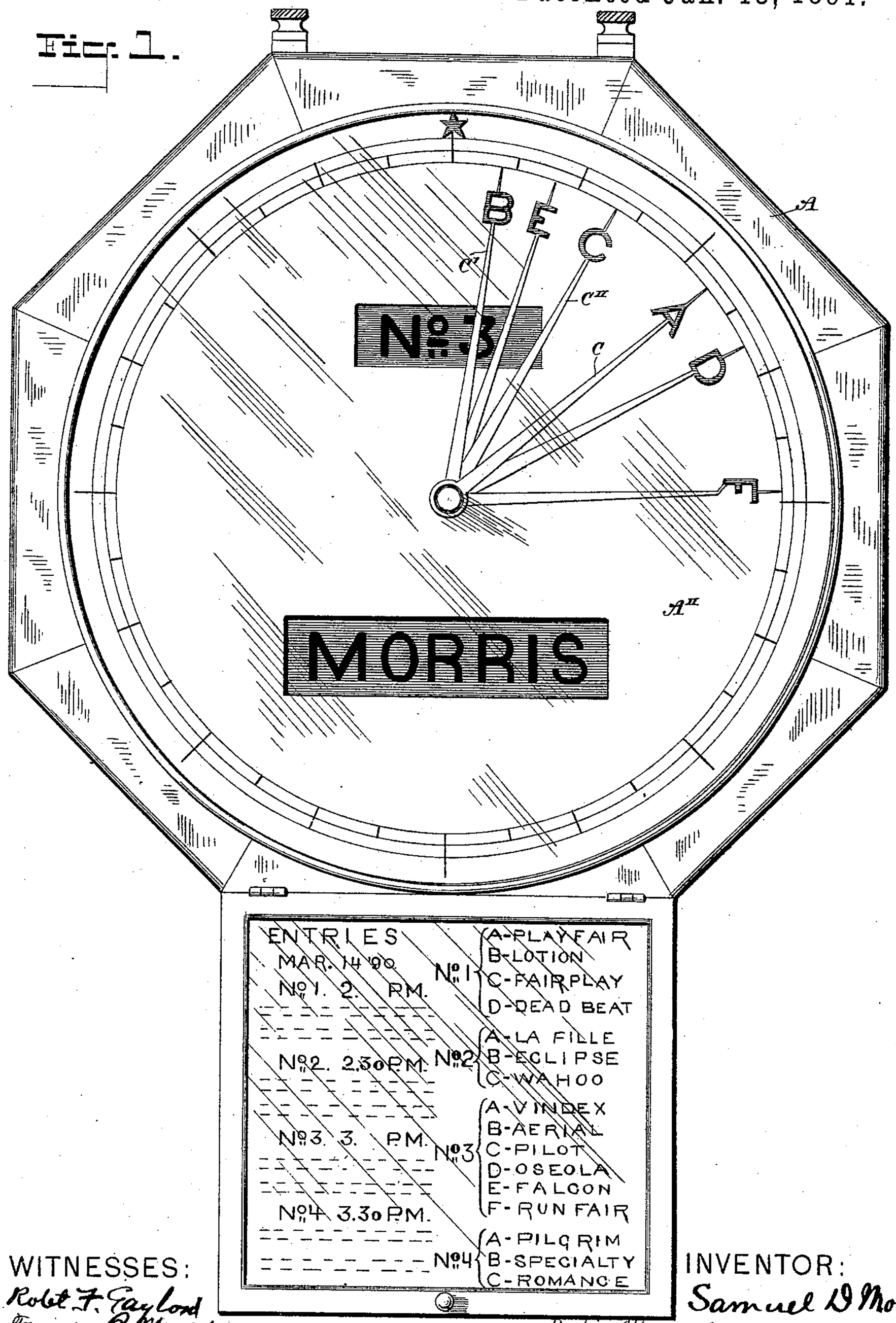
4 Sheets—Sheet 1.

S. D. MOTT.

RACING INDICATOR.

No. 444,454. Patented Jan. 13, 1891.

Fig. 1.



WITNESSES:
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Frank B. Murphy.

INVENTOR:
Samuel D Mott
By his Attorneys,
Duncan & Page

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

(No Model.)

4 Sheets—Sheet 2.

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Fig. 2.

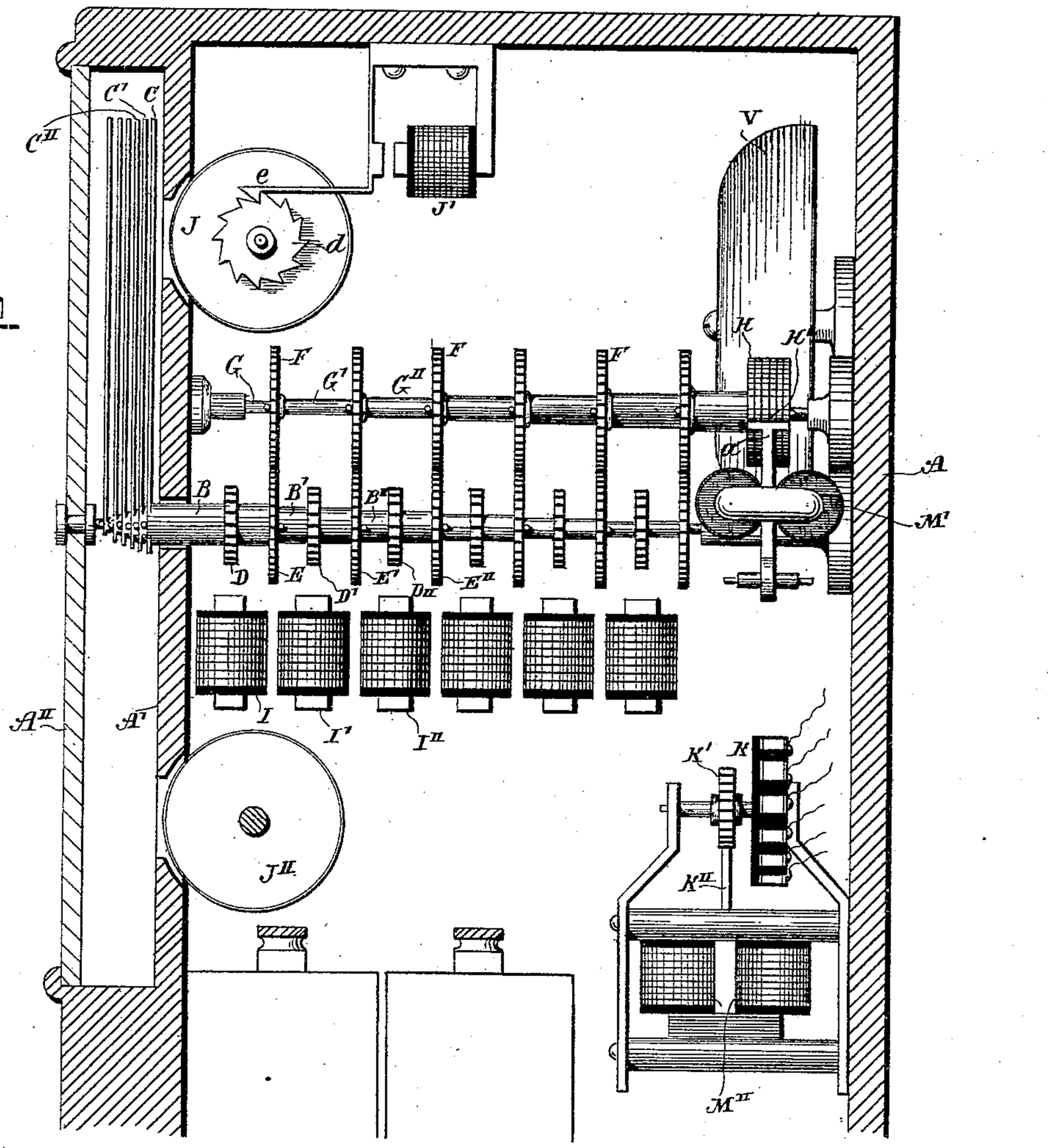
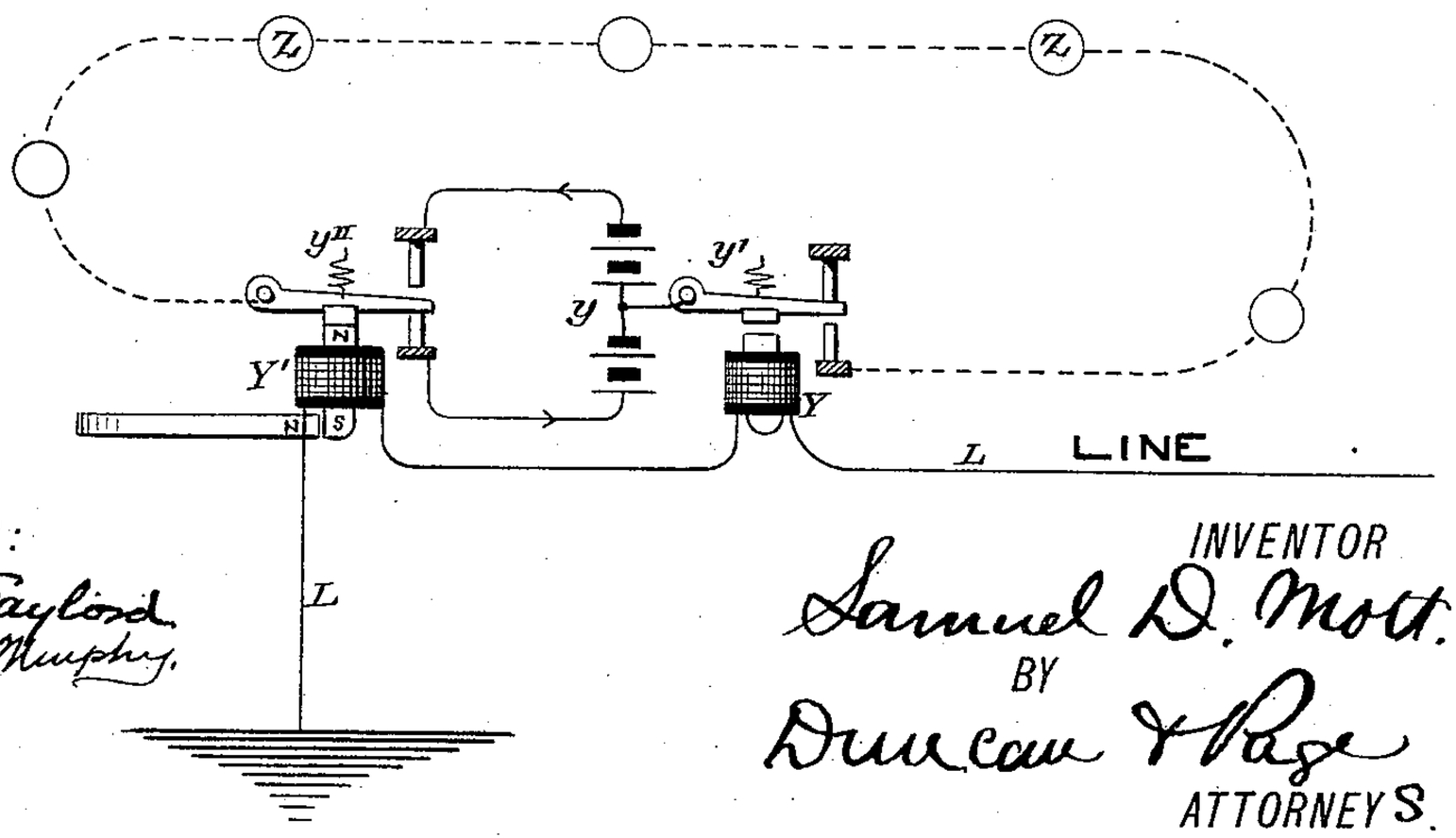


Fig. 3.



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(No Model.)

4 Sheets—Sheet 3.

S. D. MOTT.

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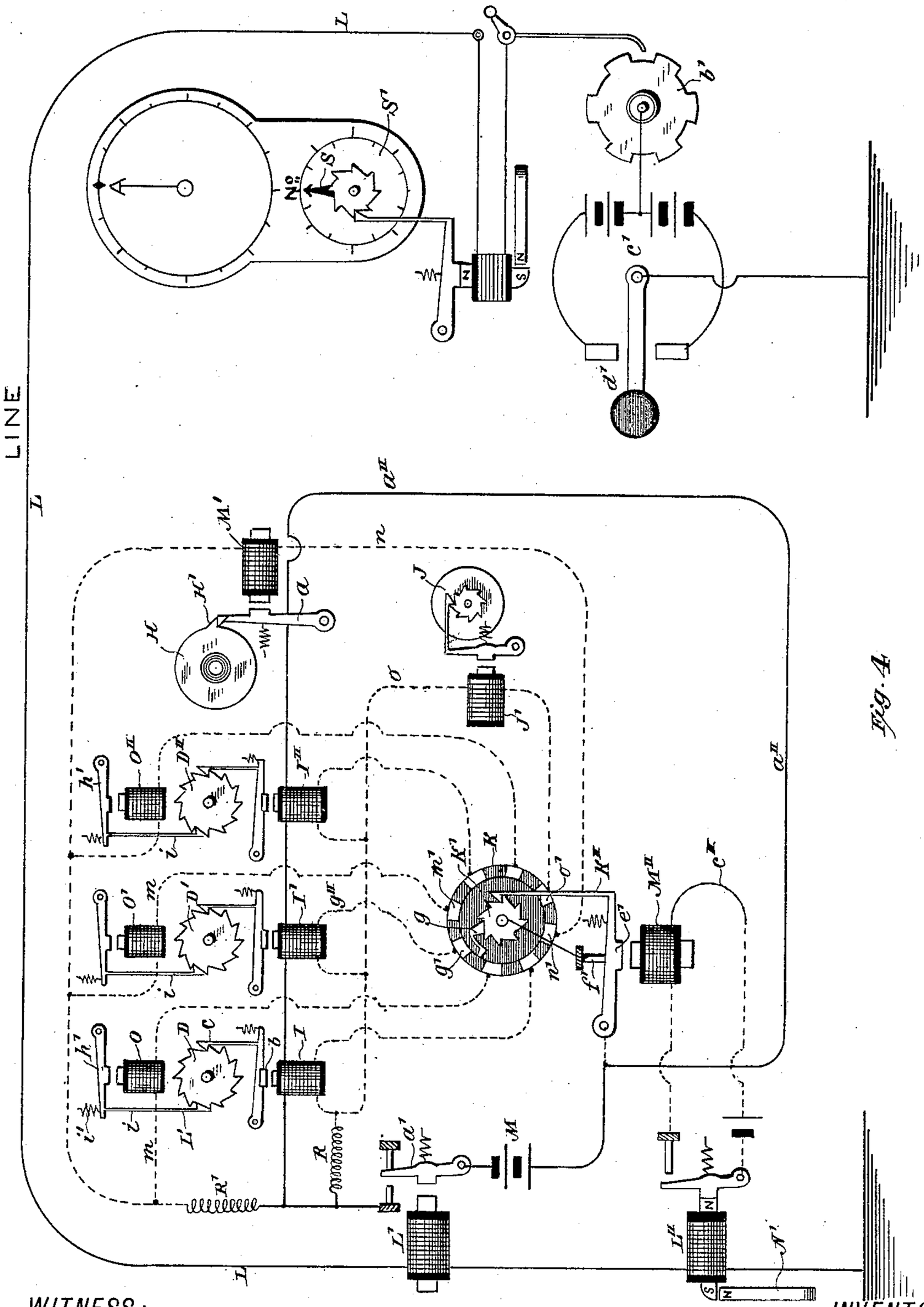

Fig. 4.

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(No Model.) 4 Sheets—Sheet 4.

S. D. MOTT.

RACING INDICATOR.

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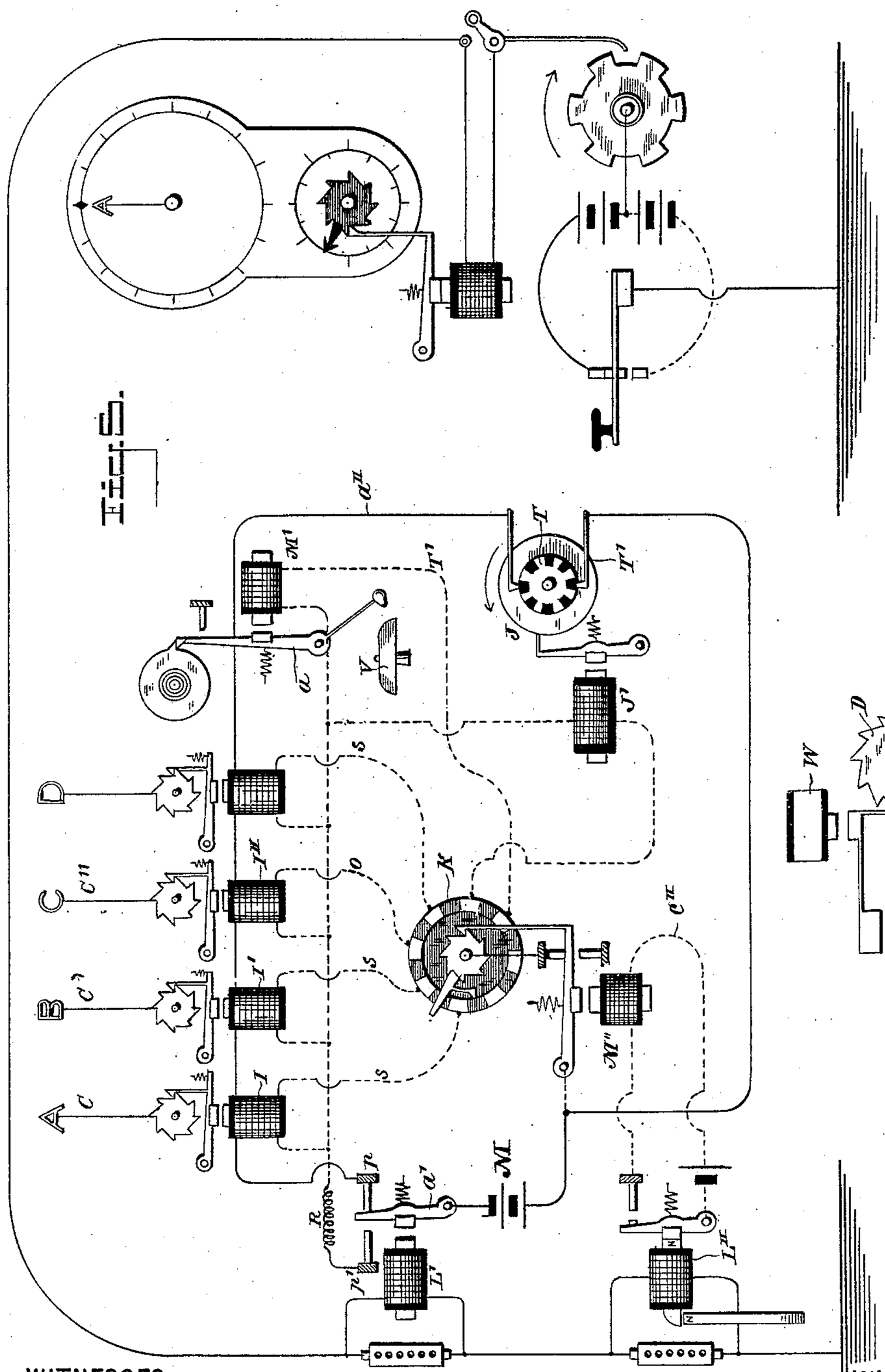

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

SAMUEL D. MOTT, OF PASSAIC, NEW JERSEY.

RACING-INDICATOR.

SPECIFICATION forming part of Letters Patent No. 444,454, dated January 13, 1891.

Application filed August 7, 1890. Serial No. 361,326. (No model.)

To all whom it may concern:

Be it known that I, SAMUEL D. MOTT, a citizen of the United States, residing at Passaic, in the county of Passaic and State of New Jersey, have invented certain new and useful Improvements in Racing-Indicators, of which the following is a specification, reference being had to the drawings accompanying and forming a part of the same.

This invention is an apparatus or combination of devices to be connected with and operated by an electric circuit to indicate by the relative movements or changes in position of certain pointers, hands, or similar parts the relative positions of the contestants of a race. One of these instruments, for example, is placed in a public room or elsewhere in a city, and its pointers, each of which is arbitrarily distinguished, to correspond with one of the contesting men or horses in a race that is taking place at a track more or less remote. An operator stationed at the track, by means of an electric circuit, controls the movements of said pointers according to the positions which the corresponding contestants occupy at given points in the race, so that by watching the indicator the varying conditions of the race may be seen at a glance and the progress of the event followed in all its details. I prefer to use a dial suitably graduated or marked off to correspond to the track or course, and a series of pointers distinguished by figures or otherwise to correspond with the different contestants; but other means for these purposes may be employed, as will be understood. To meet the conditions and requirements of such a means for indicating the progress of a race, it is necessary, in the first place, that the pointers all have a capability of forward movement, and, secondly, that suitable means be provided for either retarding or accelerating, or both, the movement of any of the pointers relatively to the others. These my present invention provides, the means which I have devised being adapted for use with a single line or working circuit, whereby the system is very greatly simplified and cheapened, requiring no winding or attention after adjustment.

I have illustrated the construction and mode of operation of this my invention in the accompanying drawings.

Figure 1 is a front elevation of the instrument in its case. Fig. 2 is a side elevation of the operative parts of the apparatus, which are contained in said case. Fig. 3 is a diagram of circuit-connections. Fig. 4 is a diagrammatic detail of one of the indicators, the transmitting-instrument, and the circuit-connections. Fig. 5 is a similar view of a modification, and Fig. 6 is an enlarged detail of a modification of Fig. 5.

The general mechanical and electrical features of the indicator proper are illustrated in Fig. 2. The operative parts are inclosed in any suitable case A, provided with a dial-face A′, inclosed, preferably, by a glass plate A″. A number of tubular concentric shafts B B′ B″ of different lengths are mounted in the case and project out through an opening in the face-plate A′, where pointers C C′ C″ are secured to them. Each shaft and pointer is thus movable independently of the others. Each shaft B, B′, &c., carries within the case a ratchet-wheel, as D, D′, or D″, and an ordinary gear-wheel, as E, E′, or E″. The latter mesh with the similar wheels F of a corresponding series of concentric shafts C C′ C″, mounted above the first. The two series of shafts are mounted in reverse order, so that the outer shaft B engages with the inner shaft G, and so on. The shafts G G′, &c., terminate in a series of disks H, each provided with a tooth or stop H′, so located that when all the pointers are in line at the zero or starting point of their dial, the stops H′ will be in a horizontal line or engage with the end of an armature *a* of an electro-magnet M′, mounted in the case.

I I′ I″ are a series of electro-magnets which turn or operate the shafts B B′, &c. This is effected by pivoted armatures *b* and pawls *c*, as shown in Fig. 4, which latter engage with the ratchet-wheels D D′, &c.

J is a cylinder on which is portrayed in columns the numbers of the races or other events, one of which is always exposed through an opening in the face-plate A′. This cylinder is rotated step by step by a ratchet *d* and a pawl *e*, operated by an electro-magnet J′. One or more additional cylinders, as J″, may be employed to indicate dates, places, or the like, and these are preferably to be turned by hand.

K is a circular flanged disk with alternate insulating and conducting sections, and K′ a ratchet-wheel moved step by step by a pawl K″, operated by an electro-magnet M″. The ratchet-wheel causes a conducting-arm *g* to sweep over the edge of the disk and in contact therewith, passing alternately over the insulating and conducting sections thereof.

With each ratchet-wheel, as D, there may be associated a single magnet, as I, Fig. 5, or two magnets, as I O, Fig. 4, and this latter arrangement I shall describe first by reference to Fig. 4. The main line L from the transmitter passes through two magnets L′ L″ at or in the indicator. One of these magnets, as L′, is neutral, while the other L″ is polarized, as by means of a permanent magnet N′, adjustable to and from one end of its core, and so as to respond by releasing its armature, for example, to a negative current only. The magnet L′ operates a vibrating circuit-closer *a′*, drawing it over onto a contact-stop each time that a current impulse of either direction is sent through the magnet. When thus attracted, the lever *a′* completes the circuit of a local battery M through the wire or circuit *a″*, which includes one set of the coils of all the magnets I I′ I″. Every time this circuit is thus closed the ratchets D D′ D″ are turned one step, and the pointers C C′ C″ are moved correspondingly over the dial-plate. To effect this closing of the main circuit I employ as a transmitter a contact-wheel *b′*, which is turned either by hand or by any suitable mechanism under the control of the operator, so as to send in a given time a sufficient number of impulses to cause the pointers to pass over the whole or any given portion of the dial-plate. For example, if a race occupying ordinarily one minute and forty-five seconds is to be indicated, the wheel *b′* is turned at a rate of speed which will carry the pointers completely around the dial in approximately the time named. A divided battery *c′* is used to transmit the currents, the direction of which is determined by the position of a switch *d′*. If, therefore, a succession of positive impulses be transmitted over the line, the pointers of each indicator will all move around the dial-plate without any change in their relative positions. In order, however, to retard a pointer which is distinguished in some way to indicate a horse or contestant that has fallen behind at, say, the first quarter, I have adopted the following mechanism: By the magnet L″, either directly or by means of a local circuit *c″* and a magnet M″, I operate, by negative impulses of current an armature *e′* and a pawl K″, the ratchet-wheel K′, and thus turn the arm *g* over the disk K until it rests on that one of the conducting-sections which is connected with the magnet of the pointer which is to be retarded. This connection is made as follows: The wire *a″* is connected to the armature *e′*, and an electrical connection is made from the back-stop *f″* of this armature to the ratchet-wheel K′. On the other side of the battery the local circuit *a″* is branched through each of the magnets I I′ I″, and said branches terminate in different conducting-sections of the disk K. The order of connections in all the indicators of a circuit is the same, so that if the operator have near him one instrument upon which he can observe the effect of the currents transmitted he will know the condition of all the others. So, for example, if pointer C′, operated by magnet I′, is to be retarded at a certain point in its movement, the arm *g* is moved by reversing the direction of the current-impulses over the line until it rests on the conducting-section *g′*. The direction of the current is then reversed and positive impulses transmitted. As long, however, as arm *g* rests on plate *g′* the current of the local battery N divides between the circuit *a″* and the branch *g″*, which contains the resistance R, and which is wound around the core of magnet I′ in a direction opposite to that of its main coil. In consequence of this the attractive effect of magnet I′ will be so far neutralized as not to move its pointer, and in this way the pointer C′ may be stopped while all the others advance. When this pointer has been checked and retarded as much as desired, a negative in lieu of a positive impulse is sent over the line, which throws the arm *g* onto the adjoining insulation. This interrupts the branch *g″*, so that the pointer C′ resumes its movement at the same rate as the others, but at a given distance behind them. In a similar manner any other one of the pointers may be retarded by stopping the action of their respective magnets until the remaining pointers have advanced through the desired distances.

If it be desired to accelerate any one of the pointers or to cause it to move forward one or more steps in advance of the others, or from its position relative thereto, the following means are provided. With the ratchet-wheels D D′ D″ are associated electro-magnets O O′ O″, which actuate armatures *h′*. These armatures carry pawls *i*, which engage with the teeth of the ratchets D, but which do not operate to turn said ratchet-wheels until the action of the springs *i′* comes into play after the cessation of magnetism in the magnets O O′. The coils of magnets O are included in branches *m m* of the circuit *a″*, and like branches *g″* contain a resistance R′ and are connected to different conducting sections of the disk K.

Assume that the contestant corresponding to the pointer C′ was behind the others at the first quarter of a mile race, but at the half had gained a lead. To indicate this change it would be necessary to advance pointer C′ with respect to the others until it showed in front. To accomplish this one or more negative impulses of current are transmitted over the line to bring the arm *g* onto the metallic plate *m′*. Positive impulses are then sent over the line as before, and each impulse

causes the current of battery M to divide between the circuit a'' and that one of the branches m which is closed by the arm g, The effect of this will be to energize all the magnets I I′ I″ and also the magnet O′. The action of magnet I′ moves the ratchet-wheel D′ one step, and the movement of the armature h' causes its pawl to take up another tooth, which on the retraction of the armature moves the ratchet-wheel D′ through a second step. Thus for one impulse of current the pointer C′ will be moved through two spaces instead of one, and in this way it may be advanced as desired. Its advance is checked by shifting the arm g onto an insulating-space by means of a negative-current impulse.

It will now be understood how the relative positions of the pointers may be changed, as desired, while they are moved intermittently around the dial.

After each race the pointers should all be brought to the starting-point corresponding to the coming of the contestants under the wire. This is accomplished by means of the auxiliary series of shafts G G′ G″, &c. These shafts, being in engagement with the main shafts B B′ B″, are brought, after a sufficient number of impulses have been sent over the line, into the position shown in Fig. 2, in which all the projections H′ are in engagement with the armature a. Subsequent impulses sent over the line do not, therefore, affect or move the pointers, which are all at the starting-point. The electro-magnet M′ is in a branch circuit in all respects the same as the circuit g'' and the circuit m. Hence to release the pointers negative impulses are sent over the line until the arm g encounters the plate n', which closes the branch n. A positive impulse then sent over the line withdraws armature a and permits the projections H′ to slip past said armature, this being readily effected since the shafts G G′ are at the moment of the withdrawal of the armature a under a strain or tension due to the attraction of the magnets I.

The cylinder J may be operated by positive impulses sent over the line before the disks H are released and while the arm g is resting on the contact-plate o', which completes the branch circuit o containing magnet J′. The arm g is brought into the position referred to by the action of negative impulses of current.

The operator, in order to follow the effect of current impulses upon the several instruments connected with the circuit, should have at hand one instrument, as X, in all respects similar to the others, except that the ratchet-wheel K′ should operate a pointer S, that sweeps over a graduated scale S′, the divisions of which correspond to those of disk K.

In Fig. 5 I have shown an arrangement in which the magnets O O′ O″ are dispensed with and the acceleration of the pointers effected by means of single magnets I I′ I″. This system or plan involves no departure from that above described except in the particulars hereinafter noted. The local circuit a'', which includes one of the coils of each magnet I I′ I″, is normally closed by the contact of the armature a' with its back contact p. Whenever a current-impulse of either direction traverses the coils of the neutral magnet L′, the break and subsequent make of the local circuit a'' moves each pointer one step. The front contact p', upon which the armature a' bears when attracted by the magnet L′, forms the terminal of a circuit containing a resistance R equal to the resistance of the total number less one of magnets I I′ I″, and then divided into branches which includes the second set of the coils, respectively, of magnets I I′ I″, and which terminate in different conducting-sections of the disk A. The polarized magnet L″ in this case normally attracts its armature, holding open the circuit c''. As in the figure previously described, a positive impulse of current which energizes the magnet L′ merely strengthens magnet L″, while a negative current, which also energizes magnet L′, neutralizes magnet L″, allowing its armature to close circuit c''. To accelerate any one of the pointers or carry it in advance of the others it is merely necessary to carry by means of negative impulses the arm g onto the conducting-plate of the disk K to which the branch circuit including the magnet of such pointer is connected. When this is done, positive impulses are again sent over the line, whereby all the pointers will be simultaneously moved by the break and make between the armature a' and the contact-stop p, while the magnet in the closed branch will receive between such break and make an additional impulse of current from the battery M through the contact p' and the armature a'. The extra impulse, acting on the said magnet, moves its pointer one step in advance with relation to the others. A negative impulse throws the arm g onto an insulating-space when the pointer has been advanced sufficiently, as above described.

As the local circuit a'' is normally closed during the operation of the device, I provide on the shaft of cylinder J a disk of metal T, provided with alternate insulating and conducting peripheral sections upon which brushes T′ connected with the circuit a'' impinge. By means of the magnet J′ the cylinder J, immediately before a race, is turned to expose the number of such race, and in doing this the brushes T′ are brought onto conducting-sections of the disk T to close the circuit a''. After the race a single movement of the cylinder J brings the brushes T′ onto insulation. I have shown, also, in this figure, the starting mechanism operated by magnet M′, and a bell V is shown in position to be struck by a hammer carried by the armature

a when the latter is attracted by its magnet M'. This gives notice of the starting of a race.

Instead of using two coils on the magnets I I' I'', I may use two magnets, as I W. (Shown in Fig. 6.) The magnets W in this case would be connected in the branch circuits *s* and arranged to turn the ratchets D D', &c., in the same direction as the magnets I I' I''.

In some instances it may be desirable to operate a number of these indicators in a certain quarter or section of a city from a remote point. In such cases I employ relays, such as shown in Fig. 3. In this case the main line L operates by means of two magnets Y Y' an apparatus similar to the original transmitter and consisting of a divided battery *y* and two contact armature-levers *y' y''*.

Z Z are the indicators connected in series with the circuit operated by the battery *y*.

I am aware that electrically operated or controlled indicators have been devised for showing certain varying relations of a number of moving bodies, such as the positions of trains on railroad-tracks or of horses in a race, and I do not claim such devices, broadly.

What I claim is—

1. The combination, with a main or line circuit, of a series of independent movable indicating devices or pointers, an electro-magnet for each pointer, all connected to a single local circuit controlled by the main circuit, and mechanisma ctuated thereby for imparting to said pointers intermittent movements of equal extent, independent electric circuits or branches for controlling the action or effect of said electro-magnets, and mechanism for closing any one of the independent circuits operated by the main circuit, as set forth.

2. The combination, in an electrical indicator, with a main line or circuit, of a series of devices, such as pointers, an electro-magnet for each pointer for imparting thereto intermittent movements of equal extent, each of said magnets being provided or wound with two coils, one connected with a circuit common to all and controlled by the main circuit and the other with an independent circuit or branch, and mechanism for closing any one of the said independent circuits operated by the main circuit, as set forth.

3. The combination, in an electrical indicator, with a main line or circuit, of a series of pointers, electro-magnetic step-by-step motors, one for each pointer, and all connected with a single local circuit controlled by the main, electro-magnetic controlling devices for retarding or accelerating the movement of any of the pointers and included in normally inacting independent circuits, and a switch mechanism operated by the main circuit for closing any one of said independent circuits, as set forth.

4. The combination, in an electrical indicator, with a main line or circuit, of a series of pointers, an electro-magnet for each pointer, all included in the same local circuit and adapted to impart movements of given extent to the pointers, a second electro-magnet for each pointer, each included in an independent circuit or branch and adapted to accelerate the normal movement of the pointers, and mechanism, substantially as described, operated or controlled by the main circuit for making and breaking the local circuit and any of the independent or branch circuits described.

5. The combination, in an electrical indicator, with a main line or circuit, of a series of pointers, an electro-magnetic motive device for each pointer, having two coils, one included in a local circuit common to all the motors, the other in an independent circuit or branch, a second electro-magnetic motive device for each pointer, each included in an independent circuit or branch and adapted to accelerate the normal movement of the pointers, and mechanism, substantially as described, operated or controlled by the main circuit for making and breaking the said local circuit and any of independent or branch circuits described.

6. In an electrical indicator, the combination, with a series of concentric shafts carrying pointers, of a series of step-by-step electric motors for turning said shafts, means for accelerating or retarding any of the shafts, a second series of shafts corresponding to and engaging with the first, respectively, stops carried by the second shafts corresponding to the pointers on the first, and an electro-magnetic detent for engaging with all of said stops to bring the pointers to a given starting-point and releasing the same, as herein set forth.

7. In an electrical indicator, the combination, with a main or line circuit and a neutral and a polarized electro-magnet included therein, of a series of pointers, a step-by-step electro-magnetic motor for each, a local circuit common to all of said motors and controlled by the neutral magnet of the main line, a series of independent circuits or branches for controlling or modifying the relative movement of the pointers, and a circuit-closer operated by the polarized magnet of the main line to complete any of the said independent circuits, as set forth.

8. In an electrical indicator, the combination, with a main or line circuit and a neutral and a polarized electro-magnet included therein, of a series of pointers, a step-by-step electro-magnetic motor for each, a local circuit common to all of said motors, a circuit-breaker therein controlled by the neutral magnet of the main line, a series of independent derived circuits or branches from said local circuit, mechanism contained therein for retarding or accelerating the movement of the pointers, and a switch operated by the

polarized magnet of the main line to complete any of the said independent circuits, as set forth.

9. The combination, in an electrical indicator, with pointers or similar devices and electro-magnetic motive devices for moving the same, each having two opposing circuits or coils, of a local circuit including one of the coils of each motor, independent derived or branch circuits from the local, each including one of the opposing coils, a main or line circuit, and two electro-magnets, one a neutral magnet for making and breaking the said local circuit, the other a polarized magnet for completing any one of the derived or branch circuits, as set forth.

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Witnesses:
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