No. 820,123. PATENTED MAY 8, 1906.

A. L. McMURTRY.

SPEED TIMING APPARATUS.

APPLICATION FILED JUNE 8, 1904.

2 SHEETS—SHEET 1.

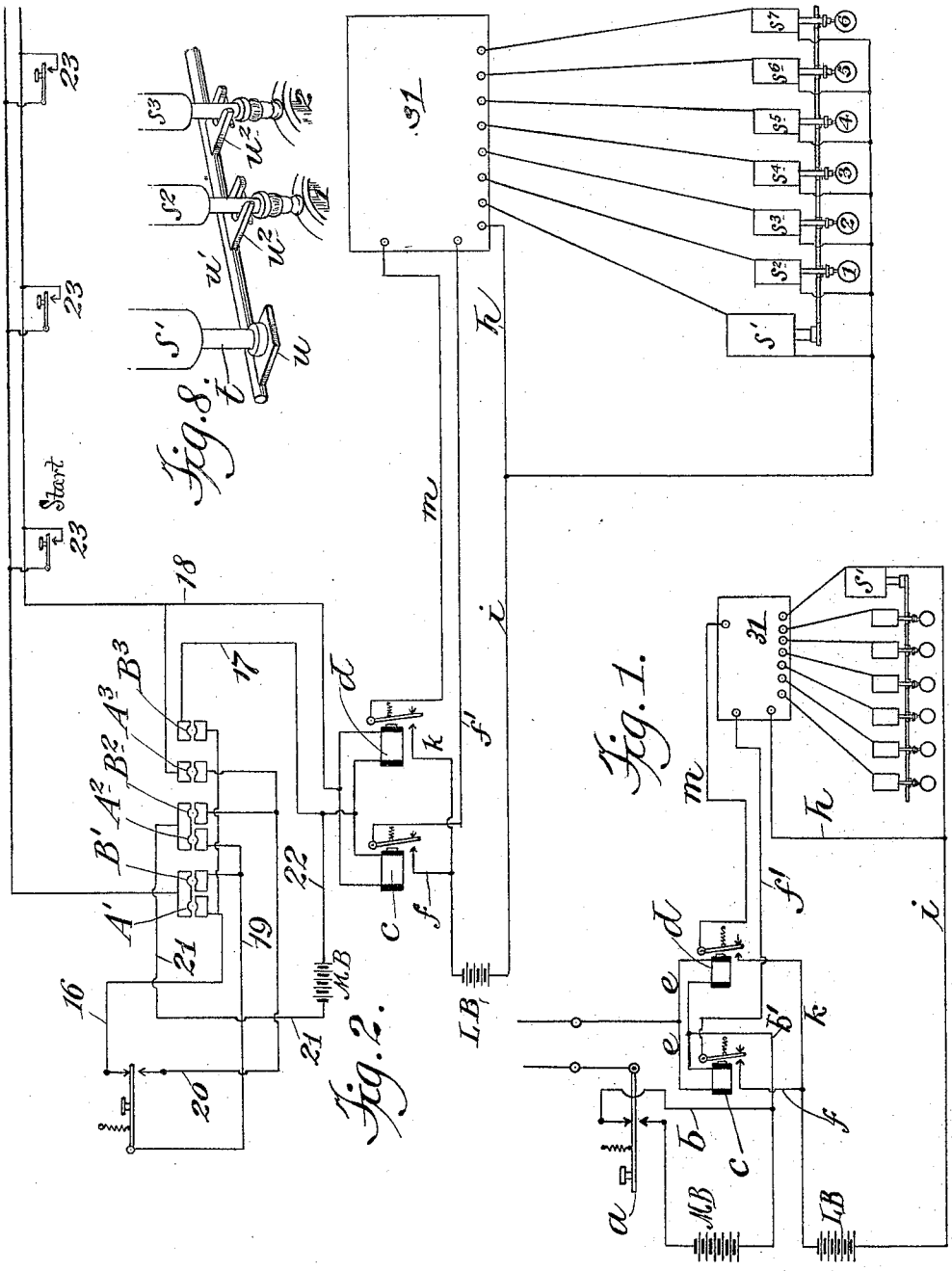

Fig. 1.

Fig. 2.

Fig. 3.

Witnesses
A. R. Appleman.
L. L. Browning.

Inventor
Alden L. McMurtry
By his Attorney
Edward C. Davidson

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2 SHEETS—SHEET 2.

Fig. 3.

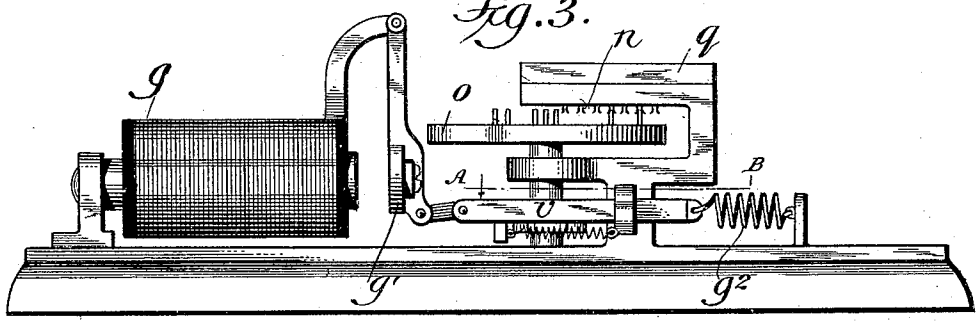


Fig. 4ª

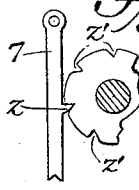


Fig. 4.

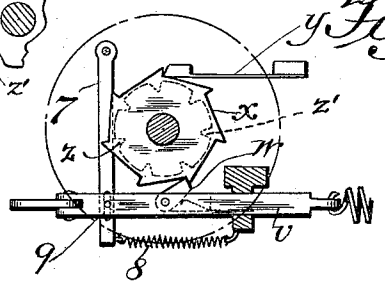
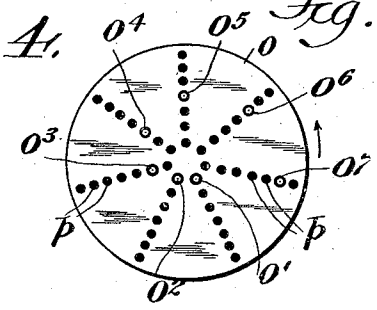


Fig. 5.



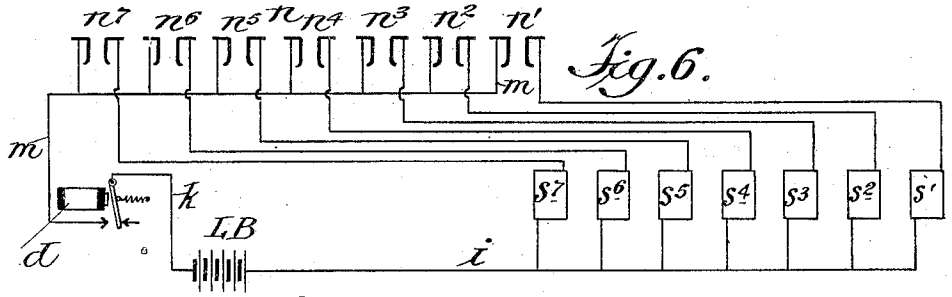
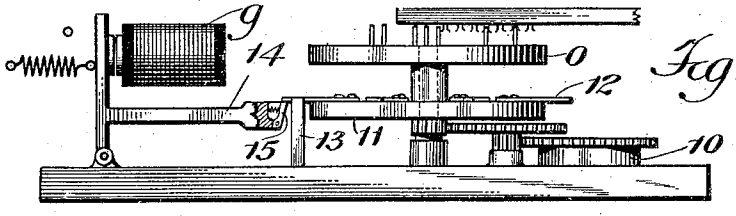


Fig. 6.

Fig. 7.



Witnesses
L. L. Browning

Inventor
Alden L. McMurtry
By his Attorney
Edward C. Davidson

UNITED STATES PATENT OFFICE.

ALDEN L. McMURTRY, OF NEW YORK, N. Y.

SPEED-TIMING APPARATUS.

No. 820,123. Specification of Letters Patent. Patented May 8, 1906.

Application filed June 8, 1904. Serial No. 211,685.

To all whom it may concern:

Be it known that I, ALDEN L. McMURTRY, a citizen of the United States of America, residing in the borough of Manhattan, city, county, and State of New York, have invented certain new and useful Improvements in Speed-Timing Apparatus, of which the following is a specification.

This apparatus is adapted to timing speed of vehicles, animals, &c., over a measured course, and is particularly intended for timing automobiles in speed contests.

The invention comprises an electric circuit combined with apparatus that may be placed at the start and finish as well as at intermediate points of a measured course. Each apparatus is so organized and constructed as to set into operation a series of stop-watches or like time-indicators and to stop them at will one by one. For instance, if a number of automobiles are to contest there may be one watch for each machine at both the start and finish, and should all the machines start at the same time all watches at both ends of the course should be simultaneously started. As the machines successively cross the finish-line the watches may be respectively stopped, the time of any one machine being shown by the watch stopped when that machine finished. If it is desired to take the total time of a machine over a measured course, as well as the time consumed in traversing any measured part or section of the course, the track may be divided into sections of uniform or dissimilar length. In that case there may be one watch for each section of the course as well as one watch for the whole course. All watches may be started simultaneously as the machine crosses the starting-line and stopped one by one as the machine finishes each section of the course, the watch indicating the time of running the entire course being arrested when the machine crosses the finish-line. In this way the time of the machine traversing the whole course or any section thereof may be determined. Thus the total time of the machine in traversing a ten-mile course may be shown by one watch and the time shown in traversing the different fractions of the course would be shown by the other watches.

In the accompanying drawings, Figure 1 is a diagram showing an organization in which a battery and series of watches may be placed at each end of the course; Fig. 2, a diagram showing an organization in which the line-battery and watches are placed at one end only and in which the watches may be successively stopped at different sections into which the track is divided are traversed. This figure shows an arrangement of plug-switches by which the apparatus may be converted into an arrangement in which the line-batteries and watches may be placed at both ends of the circuit. Fig. 3 is a side elevation of a circuit-distributer that operates to successively place the watch-stopping devices in a local circuit for stopping the watches; Fig. 4, a detail section on the line A B of Fig. 3. Fig. 4^a is a detail view showing some of the parts illustrated in Fig. 4; Fig. 5, a plan view of the disk which carries the distributer-switch plugs; Fig. 6, a diagrammatic view showing the branched local circuits in which the watch-stopping devices are included; Fig. 7, a side elevation showing a modified construction of the circuit-distributer, and Fig. 8 a detail view indicating a way in which the watches may be simultaneously started and each watch independently stopped.

Referring now to Fig. 1, which shows a metallic circuit system, the terminals of the sides of the metallic circuit 30, which extends between the start and finish connecting corresponding apparatus at both ends, are connected as follows: One terminal of the line passes to a key *a*, normally bearing against its top stop, from whence the circuit passes by wire *b b'* through the coils of two relays *c d*, and thence by wires *e e* to the other side of the line. The line-battery or source of energy M B is in a circuit connection extending from the bottom stop of the key to the wire *b b'*. When the key is depressed against its bottom stop, the circuit is then from line through the key to the battery, to wire *b'*, thence through the windings of the two relays, and thence to line, and the relays at both ends of the line will be energized. The relay *c* then completes at its contact-stops a circuit from the local battery L B, which may be traced as follows: from one pole of the battery by wire *f* through the contact-stops of the relay *c*, thence by wire *f'* through the winding of the electromagnet *g*, (shown in detail in Fig. 3 and contained in box 31,) forming part of the local-circuit distributer that controls the watches, as hereinafter described, and thence by wire *h i* to the other pole of the battery.

The second local-battery circuit is completed from one pole of the battery by wire *k*

through the contacts of relay d, and thence by wire m to the switch devices or contact-jaws n, (shown in detail in Fig. 6 and contained in box 31,) also forming part of the local-circuit distributer, which is constructed and operated as follows: A rotatable table o, Figs. 3 and 5, is formed with a series of sockets p, those in each series being arranged in a radial line, seven such series being shown. Arranged above and parallel with the face of the table is an arm q, in which are seated insulated spring contacts or switch jaws n, connected as shown in Fig. 6. The first pair n' are respectively connected one with the circuit connection m, leading through the contacts of relay d to one pole of the local battery L B, and the other through a solenoid s', connected by wire i to the other pole of the battery. The pair of contacts n^2 are respectively similarly connected with the battery and through a solenoid s^2. The remaining pairs are in like manner connected through the solenoids s^3 s^4 s^5 s^6 s^7. When the contacts of relays c d are closed, as described, simultaneously at each end of the circuit, the magnet g is energized and its armature g' attracted against the tension of spring g^2, and the switch-plug o^2, Fig. 5, being then between and in contact with the spring switch-jaws n', the circuit of the local battery L B is completed through the solenoid s', which being energized forces its core or armature t, Fig. 8, against a plate u, projecting radially from a rock-shaft u', rocking the shaft and causing the bifurcated projections u^2 thereof to bear upon cross-pins in the cores of the several solenoids s^2 s^3, &c., in contact with the heads or posts of the watches 1, 2, 3, 4, 5, and 6, thereby depressing the plungers against the tension of their supporting-springs and simultaneously starting all the watches. Upon cessation of current in the relays c d the solenoid s' and magnet g are deënergized, the rock-shaft is returned to initial or zero position by reaction of a suitable spring, and the armature of the magnet g is retracted. Between the armature-lever and its retractile spring g^2 is interposed an endwise-movable bar v, Fig. 3, which carries a pawl w, that engages the teeth of a ratchet-wheel x, fast on the axis of the rotatable table o, thereby advancing the table one step, it being locked in its advanced position by a back-stop or bank-pawl y, as well as by a pin z entering one of a series of recesses z' in the hub of the ratchet-wheel and shown in dotted lines in Fig. 4. This pin projects from a link 7, pivoted on the base of the instrument, normally drawn toward the hub by its spring 8 and joined by a pin-and-slot connection 9 with the endwise-movable rod v. By this movement of the table switch-plug o^2 is carried out of the contact-jaws n' and a switch-plug o^3 in the next radial series of plug-sockets is brought between the pair of spring contacts or jaws n^2, thereby completing the circuit of the solenoid s^2, except that that circuit is open at the contacts of the relay c. This of course may occur at both ends of the line. On arrival of the machine at the finish and on the completion of the line-circuit by the timekeeper, or by any appropriate automatically acting device acted upon by the machine, the relays c d will be energized and their contacts closed. The solenoid s^2 being energized its plunger bearing upon the post of watch number 1 acts to stop the watch. At the same time the magnet g is again energized. The operations described may be successively repeated (the pins o^4 o^5, o^6, and o^7 coming, respectively, successively between the contact-jaws n^3, n^4, n^5, and n^6,) until the watches of the entire series are stopped, the time shown by the several watches being respectively the time consumed by the several machines in traversing the course. Finally, all watches may be returned to zero, when plug o' is caused to engage switch-contacts n'. As shown in Fig. 5, the table o has but seven radial series of switch-plug sockets, and hence there is provision for but five stop-watches.

A modification of the distributer is shown in Fig. 7, in which the table o is rotated by a spring-drum 10, geared to the shaft of the table, which also carries below it a disk 11, from which project radially stop-arms 12, capable of yielding vertically, one for each series p of plug-sockets. A stop-post 13, against which the arms 12 successively contact, holds the table in its several positions, in each of which a radial series of plug-sockets is in line with the series of spring contacts or switch jaws. In this case the armature-lever of the magnet g has a projection 14, carrying at its end a spring-pressed pawl 15, so arranged that when the armature-lever is attracted the side of the pawl coming in contact with the outer edge of the radial stop-arm 12 (then in contact with the stop-post 13) yields, passing under the arm when the armature-lever reaches its attracted position. When the circuit of the magnet g is interrupted, its armature-lever is retracted by its spring, which is made of such strength as to cause the end of the pawl pressing against the under face of the radial arm 12 to lift the latter so that it will pass over the top of the stop-post, the table and disk being then moved automatically to the next position in which the next radial arm 12 abuts against the stop-post.

The pieces of apparatus illustrated in Figs. 3, 4, 5, 6, and 7 are contained in box 31, both in the arrangement indicated in Fig. 1 and in Fig. 2, which latter will now be described.

The organization shown in Fig. 2 provides switches by which the apparatus may be connected to operate in the same way as already described with reference to Fig. 1, which permits of a set of watches, line-bat-

tery, and local battery at each end of the line or start and finish of the course. When the switches are plugged to bring about this condition, the circuits are as follows: The plug-sockets of the switches are marked A′ A^2 A^3 and B′ B^2 B^3. When the switches B′ B^2 B^3 are plugged, the connections are the same as in Fig. 1 and may be traced as follows: The key being in normal elevated position, its upper stop is connected by wire 16 to lower member of the plug-socket B^3, thence to the upper member, thence by wire 17 through the coils of the relays and by wire 18 to line; from the other side of the line through switch-plug B′, thence by wire 19 to the key. An impulse of current received over the circuit will therefore operate the relays, and the operations already described will occur simultaneously at both ends of the line. Such a current may be thrown upon the line by depressing the key at the starting end. The circuit may be traced as follows: from the bottom contact of the key by wire 20 through plug-switch B^2, thence by wire 21 through the main battery M B and by wire 22 through the coils of the relays *c d*, thence by wire 18 to line; from the other side of the line through the plug-switch B′, and thence by wire 19 to the key. The current from the battery M B in such case simultaneously actuates the relays *c d* at both ends of the line. When the switches B′ B^2 B^3 are not plugged and the switches A′ A^2 A^3 are plugged, the main line is on open circuit and may be closed at the starting end or at desired intermediate points, as well as at the finish end, to energize the relays at the starting end only.

The circuit may be traced as follows: from the upper contact of the key by wire 16 through switch A′ to one side of the line. At the desired points normally open-circuit keys 23 may be bridged between the two sides of the line. The return-circuit passes to switch A^3 and also by wire 18 through the coils of the relays and by wire 22 to the main battery M B, thence by wire 21 through the switch A^2 and by wire 19 to the key. When, therefore, any one of the bridged normally open keys is closed, a battery-circuit through the relays is completed. The key marked "Start" may be a separate normally open key like the other bridged keys or may be the key shown in the diagram and from the points of which the circuit has been traced. If this last-named key be depressed, the normally open circuit through the battery and relays will be closed. The circuit may be traced as follows: from the bottom contact of the key by wire 20 through switch A^3, thence by wire 18 through the relays by wire 22 through the main battery, and by wire 21 through switch A^2, and thence by wire 19 to the key. On the depression of a key at the starting end at the moment a machine or machines start upon the speed contest the relays *c d* are energized and all of the watches are automatically started by action of the solenoid *s*′. At the quarter-mile or kilometer or any other measured section the time of the machine may be taken by closing the circuit. The relays will be actuated and the solenoid s^2 will be energized to stop the corresponding watch, (marked "1,") and so on throughout the course to and at the finish. Of course any number of watches may be employed, according to the desired subdivisions of the course. The connections of the local-battery circuits at the switch-contacts of the several solenoids are maintained while those contacts are stationary, and the movement of the distributer to bring the switch-contacts of the next solenoid into circuit occurs on de-energization of its magnet *g* either in the manners already described and indicated in Figs. 3 and 7, or otherwise.

The use for solenoids for starting the watches and respectively stopping them has been illustrated and described, and an ordinary electromagnet with a stationary core and vibrating armature-lever has been illustrated in connection with the distributer. The invention is not, however, limited to the use of a magnet in one case, solenoids in the other, nor in its broader aspect to any of the details of construction described and illustrated, since obviously they may be modified in a variety of ways known to those skilled in the art.

So far as I am aware this is the first instance in which a speed-timing organization has been provided in which a series of watches may be started and stopped at will, and as incidental to such general arrangement the plan of having a distributer and the contacts established thereby stationary at the time the relays and the respective solenoids are energized is considered to be a desirable and in some respects important feature of this invention.

I claim as my invention—

1. In a speed-timing apparatus, the combination of a main electric circuit and source of energy, a series of stop-watches grouped at a desired point, means for simultaneously starting all the watches, local means controlled by impulses of current in the main circuit for independently stopping the respective watches, and means located at any desired point or points in the main circuit for controlling it to thereby actuate said local means to successively stop the watches.

2. In a speed-timing apparatus, the combination of a main electric circuit and source of energy, two or more stop-watches, means for simultaneously starting them, two or more electromagnetic watch-stopping devices, their local circuits, and a local circuit-distributer controlled by current in the main circuit for successively connecting the re-

spective local circuits for operation of their watch-stopping devices.

3. In a speed-timing apparatus, the combination with an electric circuit and source of energy, two or more stop-watches, means for simultaneously starting them, two or more corresponding electromagnetic watch-stopping devices, their respective circuits, and local means controlled by impulses of current in said electric circuit and adapted when operated to successively effect energization of the respective electromagnetic devices to thereby successively stop the respective stop-watches.

4. In a speed-timing apparatus, the combination of a single main electric circuit, means adapted to be located at a desired point with reference to the course to be traversed, comprising electromagnetic means for simultaneously starting two or more stop-watches or time-indicators, electrically-controlled means for at will independently stopping the respective watches and means located at the finish end of the course for independently controlling the electromagnetic watch-stopping apparatus to at will separately stop the respective watches.

5. In a speed-timing apparatus, the combination of a single main electric circuit, means adapted to be located at a desired point with reference to the course to be traversed, comprising electromagnetic means for simultaneously starting two or more stop-watches or time-indicators, electrically-controlled means for at will independently stopping the respective watches and means located at the finish end and at intermediate points of the course for at will independently controlling the electromagnetic watch-stopping apparatus to at will separately stop the respective watches.

6. A speed-timing apparatus comprising the combination of the line-circuit, its source of energy, a local circuit and its source of energy, two electromagnets or relays included in the line-circuit, an electromagnetic watch-starting device, and a series of electromagnetic watch-stopping devices included in a circuit of the local battery controlled by one of the relays, an electromagnetic circuit-distributing device in another circuit of the local battery controlled by the other relay and means controlled by the last-named electromagnetic device for successively transferring the local circuit from the electromagnetic watch-starting to the electromagnetic watch-stopping devices.

7. A speed-timing apparatus, comprising the combination of the line-circuit, its source of energy, a local circuit and its source of energy, two electromagnets or relays included in the line-circuit, an electromagnetic watch-starting device and a series of electromagnetic watch-stopping devices included in a circuit of the local battery controlled by one of the relays, an electromagnetic device in a local circuit controlled by the other relay, and a circuit-distributer controlled by the last-named electromagnetic device and comprising switch-contacts by which the first-named local circuit is on each movement of the circuit-distributer transferred from one electromagnetic watch-stopping device to another.

8. In a speed-timing apparatus, the combination of a series of stop-watches stopping devices, their circuits, a circuit-distributer adapted to control said circuits and comprising two members movable one relatively to the other, one member carrying the switch-contacts of the several circuits of the several watch-stopping devices and the other member adapted to carry means for completing said circuits at their switch-contacts.

9. In a speed-timing apparatus, a series of watch-stopping devices, local circuits in which they are respectively included, a circuit-distributer controlling the local circuits comprising switch-contacts by which the respective circuits are closed when the distributer is at rest, an electromagnetic device controlling the movement of the distributer, and means whereby the distributer is advanced from one position to the next when its controlling electromagnetic device is deëner-gized.

10. In a speed-timing apparatus, the combination of a normally open line-circuit normally including in metallic connection the windings of two relays and a main-line battery, means for closing the circuit at any desired point or points in its length to thereby energize the relays, a local battery whose circuits are controlled by the relays, a series of electromagnetic stop-watch-stopping devices in branch or derived circuits in one circuit of the local battery, a circuit-distributer for transferring the circuit of the battery from one watch-stopping device to another, and an electromagnetic device governing the movement of the distributer and controlled by the other relay.

11. A speed-timing apparatus, comprising the combination of a series of stop-watches, a local battery, an electromagnetic device and its circuit adapted to simultaneously start the stop-watches, a series of corresponding electromagnetic watch-stopping devices and their circuits, a circuit-distributer controlling the circuits of the watch-starting and watch-stopping devices, an electromagnetic device governing step-by-step movement of the circuit-distributer, and circuit-distributing contacts whereby by the movement of the distributer, the circuit of the local battery is transferred from the starting electromagnetic device step by step to the respective watch-stopping electromagnetic devices.

12. A speed-timing apparatus comprising the combination of a line and local circuit

with appropriate sources of energy, and a circuit-distributer comprising a step-by-step rotatable table having therein radially-disposed series of switch-plug sockets, a series of switch-contacts arranged opposite the face of the rotatable table, a series of electromagnetic watch-stopping devices whose circuits are respectively connected with such switch-contacts, an electromagnetic device governing the step-by-step movement of the circuit-distributer and controlled by line impulses, means for advancing the distributer when its controlling electromagnetic device is deënergized, and a second electromagnetic controlling device energized by line impulses and controlling the local circuit including in derived circuit the respective electromagnetic watch-stopping devices.

In testimony whereof I have hereunto subscribed my name.

ALDEN L. McMURTRY.

Witnesses:

KATHARINE MACMAHON,

LILLIE F. BROWNING.