3 Sheets--Sheet 1.

R. J. SHEEHY.

Electrical Apparatus for Timing Races.

No. 164,696. Patented June 22, 1875.

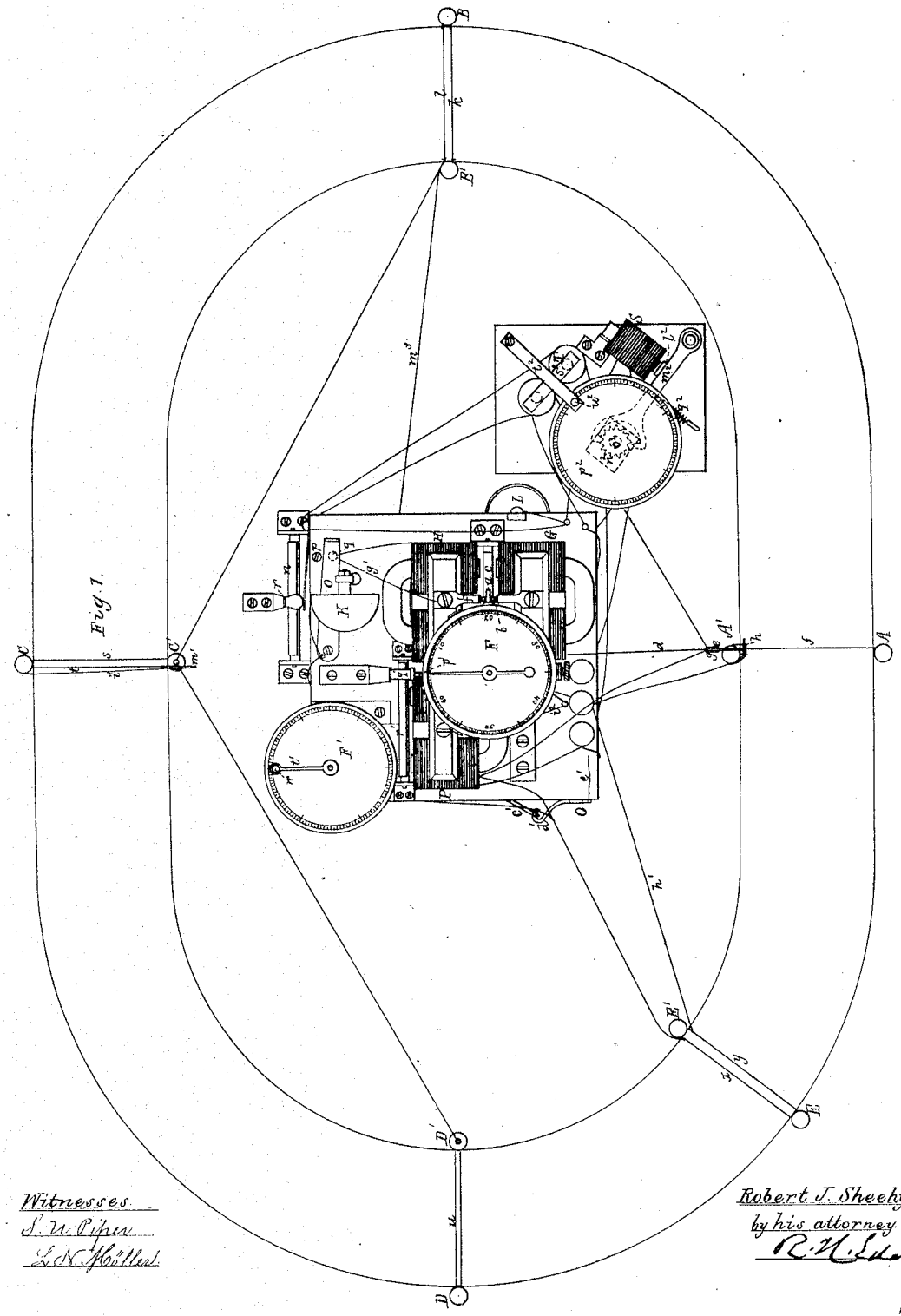

Fig. 1.

Witnesses.
S. W. Pipen
L. N. Hollister

Robert J. Sheehy.
by his attorney
R. H. Sheehy

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R. J. SHEEHY.

Electrical Apparatus for Timing Races.

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Fig. 2.

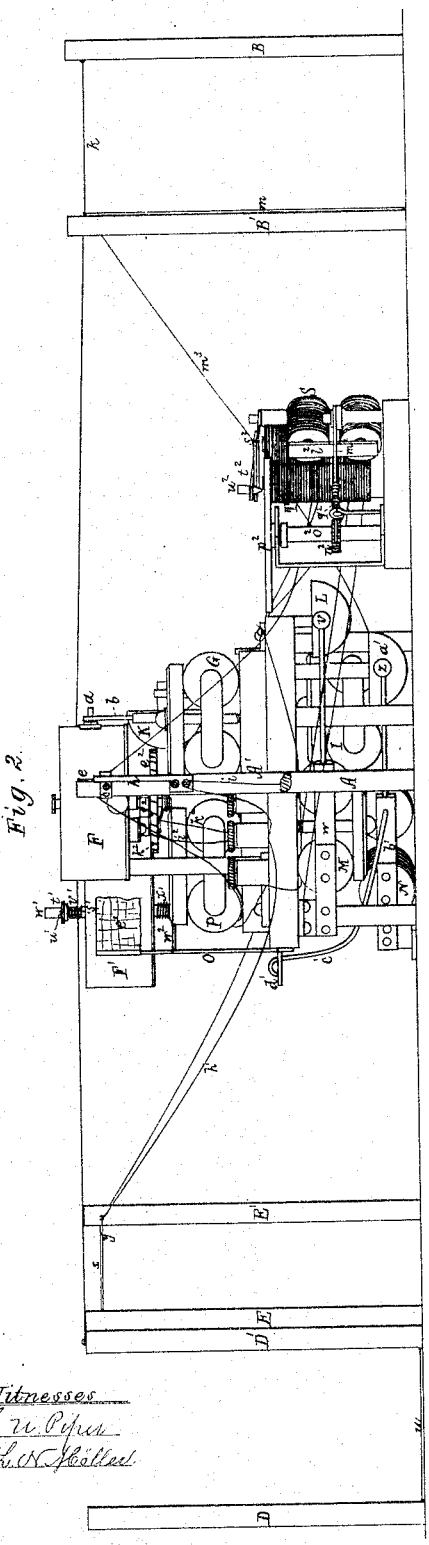
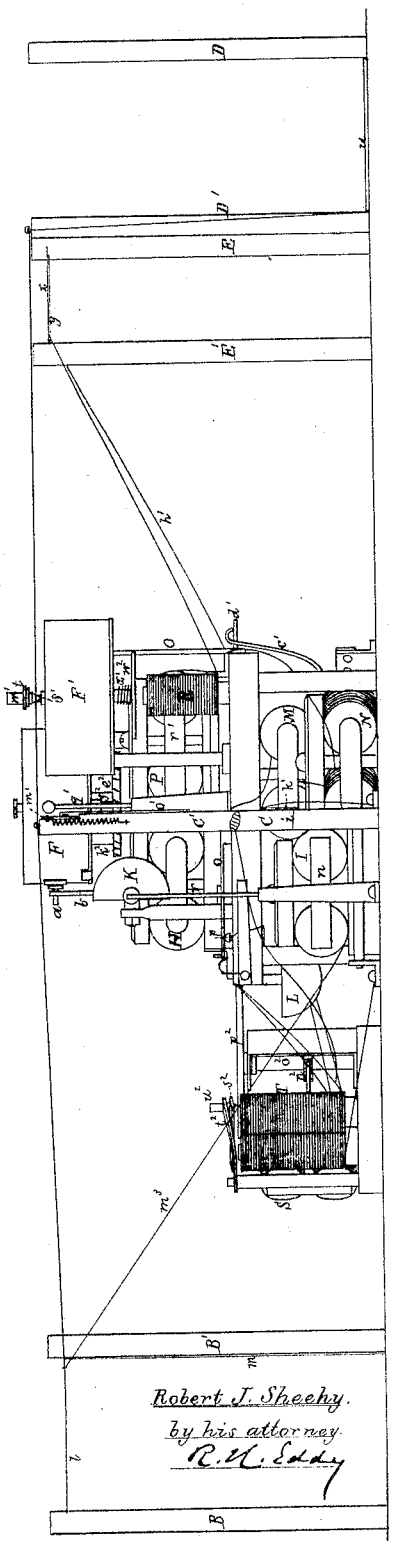


Fig. 3.



Witnesses
J. N. Pierce
L. A. Hollard

Robert J. Sheehy.
by his attorney
R. H. Eddy

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R. J. SHEEHY.

Electrical Apparatus for Timing Races.

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Fig. 4.

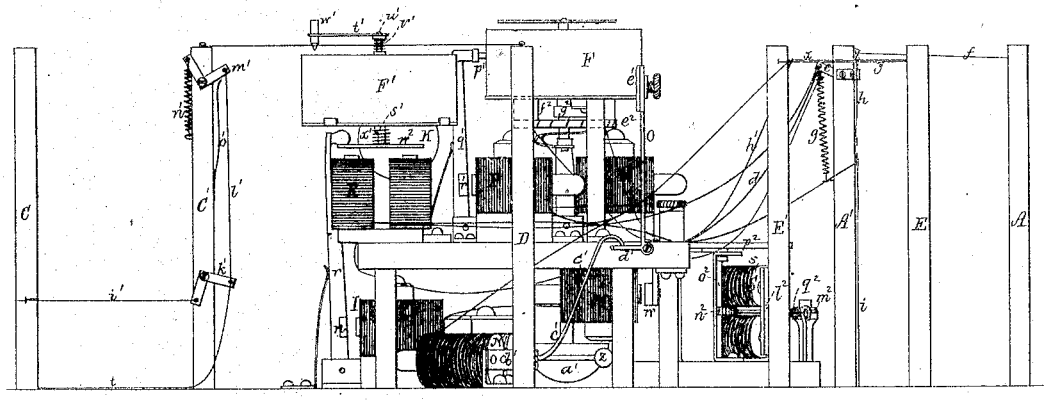


Fig. 5.

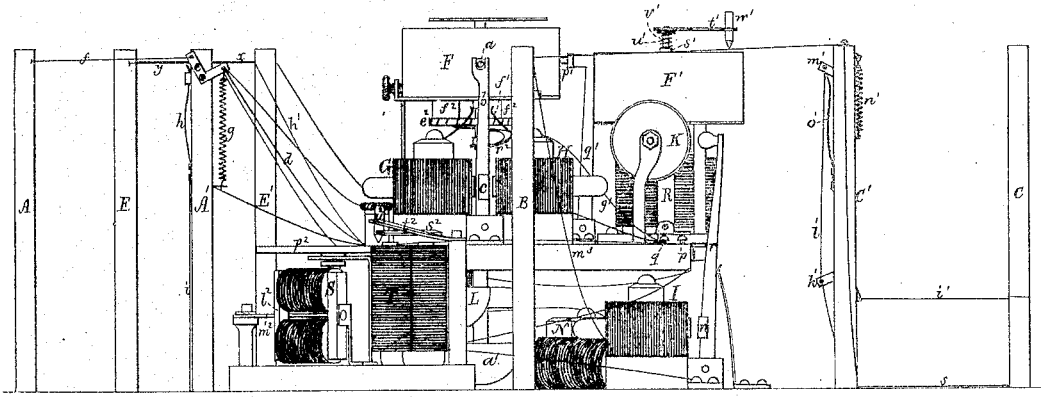


Fig. 6.

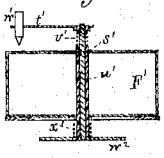


Fig. 7.

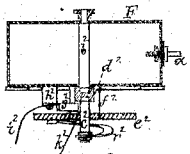


Fig. 8.

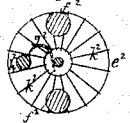


Fig. 9.

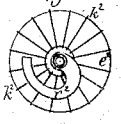
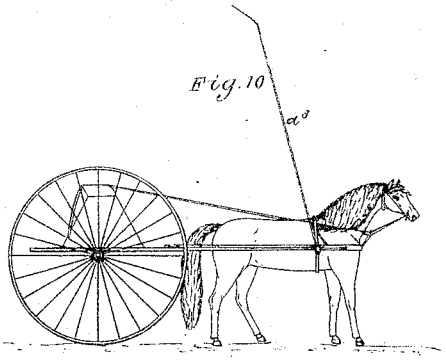


Fig. 10.



Witnesses
S. N. Piper
C. A. Seiler

Robert J. Sheehy
by his attorney
R. K. Eddy

THE GRAPHIC CO. PHOTO-LITH. 39 & 41 PARK PLACE, N.Y.

UNITED STATES PATENT OFFICE.

ROBERT J. SHEEHY, OF BOSTON, MASSACHUSETTS.

IMPROVEMENT IN ELECTRICAL APPARATUS FOR TIMING RACES.

Specification forming part of Letters Patent No. **164,696**, dated June 22, 1875; application filed April 20, 1875.

To all whom it may concern:

Be it known that I, ROBERT J. SHEEHY, of Boston, in the county of Suffolk and State of Massachusetts, have invented a new and useful Apparatus for Timing a Race; and do hereby declare the same to be fully described in the following specification and represented in the accompanying drawings, of which—

Figure 1 denotes a top view of an electrical apparatus as devised by me for the purpose. Figs. 2, 3, 4, and 5 are side elevations of said apparatus.

The first part of my invention is to determine the period of time the horse or boat may take in going around or over the entire course.

In the drawings, A A′ denote what I term the "starting-posts;" B B′, the "first-quarter" posts; C C′, the "half" or "second-quarter" posts; D D′, the "third-quarter" posts, and E E′ the "distance-posts," all such posts being supposed to be duly arranged in a race-course.

The electrical apparatus for timing is represented as arranged within the circle of the track; but in practice it would be outside thereof, or in what is termed the "judge's stand."

F is a common time-piece or stop-watch, such as used at races for marking minutes, seconds, and quarter-seconds. There is applied to the stop-slide *a* of said watch a furcated arm, *b*, extending up from the armature *c* of an electro-magnet, G. The circuit-wire of said magnet is connected at one end, as shown at *d*, to one arm of a short bent lever, *e*, such lever being pivoted to the upper part of the inner starting-post A′. A wire or actuator, *f*, connects the upper arm of the lever with the outer post A. To the lower arm of the lever *e* a spring, *g*, is attached, and also to the post A′. There is also applied to the said post A′ a metallic spring or arm, *h*, which, arranged as shown, is connected at its lower part with the ground-wire *i* of the circuit of the magnet.

I would observe that the lever, its spring, and the arm *h* are, to all intents and purposes, what electricians term a "key," such as is used to break and close an electro-magnetic circuit.

There is to project up from the horse or the vehicle drawn by him a suitable rod or device, a^3, (see Fig. 10,) which is a side view of the horse and vehicle, which, in passing under or across the wire *f*, shall move it so as to draw the lever *e*, or a projection therefrom, into contact with the arm *h*, and as a consequence close the circuit of the electro-magnet, and cause such magnet to draw to it its armature. In so moving the armature will move the furcated arm and start the stop-watch.

The next part of the apparatus is that for stopping the watch on completion of the race, or at the time when the horse or vehicle drawn by him may next bring the arm, a^3, carried thereby into contact with the cross-wire *f*, and move it so as to again move the lever *e*, or its projection, into contact with the arm *h*.

To the armature *c* there is another electro-magnet, H, whose purpose is to draw the armature in a direction opposite to that in which it is moved by the magnet G, the same being to move the furcated arm, so as to stop the watch. It will be seen that in order for the circuit of the magnet H to be closed that of the magnet G must first be opened. From one to the other of the first-quarter posts B B′ two wires, *k l*, insulated from each other, are extended, one of said wires, *k*, being connected with the ground by a wire, *m*, leading down the inner post. From the other wire, *l*, a wire, m^3, leads to and about another electro-magnet, I, and makes part of its circuit. The armature of the magnet I is shown at *n* as attached to an upright lever, *r*, arranged aside of a switch, *o*, disposed as shown, and which is to work with two points or studs, *p q*. When the switch is on the stud *p* the magnet G is in circuit, and ready for being closed by the lever *e* being drawn into contact with the arm *h;* but when the switch is moved upon the stud *q* by the action of the magnet I, the magnet G will be out of circuit, and the magnet H will be in circuit.

From this it will be seen that when the horse or carriage, in passing the first-quarter posts, carries the metallic rod, extended from him or the carriage under and against both the wires *k l* simultaneously the circuit of the magnet I will be closed, and the switch will be moved from the stud *p* to the stud *q*, thereby causing the magnet H to be put into cir-

cuit, in order that when the said metallic rod of the horse or carriage may be next moved against the one, *f*, at the starting-posts, the circuit of the magnet H may be closed, so as to move the armature *c*, and, of course, the furcated arm *b*, so as to stop the watch.

The switch may be moved by hand from one of the points *p q* to the other; but I prefer to have such accomplished by an auxiliary magnet and circuit, to be put in action by the arm a^3, when carried in contact with the cross-wires of the first-quarter posts.

A bell, K, arranged, as shown, to be struck by the lever *r*, will give an alarm whenever such lever, by its armature, is moved up to said bell, and thus the alarm will indicate the passage of the first-quarter posts by the horse, and also by any following horse.

There may be applied to the second-quarter posts C C′, and also to the third-quarter posts D D′, wires like the wires *k l*, to be connected, in like manner, with the ground, and with the magnet I. Instead, however, of placing the wires at the tops of the posts, such may be arranged at or near the ground, as shown at *s t*, in order that the tire of the wheel of the vehicle, in crossing such wires, may close the circuit; or, in the place of such wires, a bar or spring, *u*, extended between the posts and near the ground, may be used, such bar being provided with a spring, to throw it upward. On the wheel passing across the spring or bar it will be forced down, so as to close the circuit, connecting it with the magnet I. Thus, while the vehicle may be passing the second-quarter posts, or the third-quarter posts, an alarm will be given, by which the person at the watch can see the time at which the passage of either was made. So when the horse or vehicle passes the starting-posts, whether at the commencement or end of the heat, an alarm is given by another bell, L, arranged as shown, operated by a hammer, *v*, projecting from a spring-armature, *w*, belonging to another electro-magnet, M, situated in the circuit of the magnets G and H.

The two distance-posts E E′ are also provided with cross-wires *x y*, extending from one to the other, as shown. These wires form, or are to form, parts of another circuit, provided with an electro-magnet, N, to whose armature b^1 is applied a hammer, *z*, to operate with another bell, a^1, all being arranged as shown. From the armature b^1 a curved arm or catch, c^1, extends upward, and takes upon the shorter arm d^1 of a flag-lever, O, arranged as shown, and provided with a flag, e^1.

On the first horse having completed the heat, the furcated lever or arm *b* will be thrown against a metallic spring, f^1, connected by a wire, g^1, with the stud *q*, the magnet N being placed in circuit with said stud through the switch. A ground-wire, h^1, for such circuit, extends from the wire *y* down the inner of the two posts E E′.

Thus it will be seen that, as the horse at the close of the heat passes the starting-posts, the circuit of the magnet N will be prepared for being closed by a following horse or vehicle, when passing the wires *x y* of the distance-posts. When this latter passing may take place, the bell of the magnet N will be rung and the catch c^1 be drawn off the flag-lever, so as to allow the latter, with the flag, to drop. Thus, on a vehicle passing the distance-posts, an audible as well as a visible sign will be given. Should the horse pass the distance-posts before the first horse may have passed the starting-posts, no alarm or dropping of the flag will take place.

To enable a horse or animal without a vehicle to actuate the mechanism, I make use, instead of wires at the tops of the posts, of a thread or cord, i^1, extended about breast high of the horse or animal, from one post to a bent lever, k^1, pivoted to the other, and connected by a ground-wire, l^1, with another such lever, m^1. The lever m^1, pivoted, also, to the post, is provided with a spring, n^1, to draw it away from an arm, o^1, in the circuit. By pulling the lever m^1 down upon the said arm, the circuit will be closed.

Or, instead of such thread or the wire *f*, I can employ as an actuator a movable platform laid in the track at the starting-posts, and one at each set of the quarter-posts and one at the distance-posts, such platform to be thrown up by a spring or springs, and to be depressed by the horse or vehicle on coming upon it, such platform to be so connected with the key as, while being depressed, to move it to close the circuit to which it may belong.

The next portion of the apparatus is that by which the setting slider or knob of the stop-watch is pushed around, in order to cause the second-hand to be thrown back to zero, or the starting-point of the dial, the stop-watch or time-piece being supposed (as is customary) to have a mechanism to effect the said restoration of the second-hand when the setting knob or slide p^1 is forced inward. P is another electro-magnet, whose armature is shown at r^1 as fixed to a lever, q^1, whose head or upper end is arranged against the knob or slide p^1, as shown. This magnet is to be in circuit with the wires of the distance-posts when the switch is on the stud *p*. By moving the switch on said stud, the circuit of the magnet will be completed, and the knob p^1 will be forced in when the horse or vehicle may pass the distance-posts, which being done, the second-hand will fly back to the point of starting.

The next part of the apparatus is for recording the time or times of the race. If we suppose F′ to represent the time-piece, or an auxiliary one, and that the arbor s^1 of the second-hand t^1 is tubular, I extend down through such arbor, as shown in Fig. 6, a rod, u^1, a helical spring, *v′*, being interposed between the two, as shown, and I apply to the second-hand a pencil or marker, w^1. The lower end of the rod u^1 is fixed to a metallic disk or circular armature, w^2, of an electro-magnet, R. A helical spring,

x', fixed at its lower end to the armature, encompasses the arbor s^1, and is attached at its upper end to the arbor. The purpose of this spring is to allow the arbor to be revolved by the watch-works at such times as the armature may be in contact with the magnet, the spring on the armature being thrown off the magnet, serving to move the second-hand to the front, to which it would have been carried by the arbor had the armature been out of contact with the magnet. A paper dial or sheet of paper, being placed on the time-piece face, may be indented or marked by the pencil or marker carried by the second-hand, and thus a record be kept of the time of the heat.

Fig. 7 is a transverse section of the case of the time-piece F, and the arbor of the second-hand, with the circuit-breaker and parts below the case. Fig. 8 is a horizontal section of the spring over the circuit-breaker, and showing the latter. Fig. 9 is an under-side view of the circuit-breaker, and the lower or volute spring.

The arbor of the second-hand of the watch is continued down through the case, and formed in two pieces, b^2 c^2, connected by a piece of hard rubber or glass, d^2, or other suitable non-conductor of electricity. Beneath the watch-case, and concentric with the said arbor, is a flat annulus or disk, e^2, of hard rubber, having a hole through its center larger in diameter than the arbor. This disk is insulated from the case by blocks f^2, of hard rubber, which serve also to support the disk in place. A bow-spring, g^2, insulated from the watch-case by a block, h^2, of hard rubber, has a wire, i^2, extending from it to one pole of the battery. Around the disk, and through its eye, a wire, k^2, is wound, in manner as shown, such wire being extended to and around an electro-magnet, S, from whence it goes to the other pole of the battery. The armature l^2 of the magnet S is attached to a furcated escapement-lever, m^2, to work a toothed wheel, n^2, fixed upon a vertical shaft, o^2, carrying on its top a disk or table, p^2. A spring, q^2, serves to pull the escapement-lever away from the magnet and up to the wheel whenever the circuit is broken; but whenever the circuit is closed, the armature will fall, or move the lever in the opposite direction, the whole being to produce an intermittent rotary motion of the table.

There is fixed to the lower part c^2 of the arbor of the watch a volute spring, r^2, which bears against the under side of the disk e^2, and is carried around such by the arbor as it revolves, the spring being moved alternately on and off one of the radial coils of the wire of the disk. On the spring passing in contact with a coil the circuit will be closed, so as to cause the magnet to attract the armature.

Another electro-magnet, T, having its armature s^2 attached to a lifter-spring, t^2, carrying a pencil or marker, u^2, is arranged near the rotary table, as shown, the pencil or marker being directly over such table. This magnet may be placed on one of the main or one of the local circuits of the apparatus, the object being to record each passage of the horse or vehicle by the starting-posts, or either of the quarter-posts, by the pencil at such times being brought down upon a dial-sheet of paper placed on the table, to be revolved thereby in synchronism with the second-hand of the watch.

I claim as my invention as follows—that is to say:

1. In combination with a time-piece or stop-watch, mechanism, substantially as described, for moving, through the agency of electricity, the starting and stopping stud or device of said time-piece or watch, for the purpose of starting the watch at the commencement of a race-heat, and stopping it at the termination thereof, such mechanism consisting of the furcated arm b, the two electro-magnets G H, their circuit-wires, switch o, key, and actuator f, all to operate essentially as specified.

2. The combination of the auxiliary electro-magnet I, its circuit-wires, armature n, and the lever r thereof, essentially as described, with the furcated arm b, the two electro-magnets G H, their circuits, the switch o, the key, and actuator f, all being to operate, in connection with the stop-watch and race-course, substantially as specified.

3. The combination of the alarm or bell K with the auxiliary magnet I, its circuit-wire, armature, and the lever thereof, combined with the main magnets G H, their circuits, the furcated arm b, the switch o, the key, and the actuator f, all substantially as described.

4. The combination of the alarm or bell L, its hammer v, spring-armature w, and electro-magnet M, with the above-described mechanism, for starting the watch at the commencement of a race-heat, and stopping it at the termination thereof.

5. In combination with the mechanism for starting the watch at the commencement of the heat, and stopping it at the termination thereof, the spring f^1, wire g^1, and the electro-magnet alarm or apparatus applied to the distance-posts E E′, such consisting of the electro-magnet N, with its circuit or circuit-wires x y, armature b^1, hammer z, and bell a^1, all being to operate essentially as specified.

6. The flag-lever O and curved arm or catch c^1, in combination with the spring f^1 and line g^1, and the electro-magnetic alarm applied to the distance-posts, and with the mechanism for starting the watch at the commencement of a race-heat, and stopping it at the termination thereof, all as explained.

7. In combination with the mechanism for starting the watch at the commencement of a race-heat, and stopping it at the termination thereof, the mechanism for actuating the setting slide or knob p^1 of the stop-watch, in order to cause the second-hand to be thrown back to zero or the starting-point of the dial, such last-mentioned mechanism being the electro-magnet P, armature r^1, and lever q^1, such

magnet P being in circuit with the wires of the distance-posts, as described.

8. In combination with the stop-watch, and mechanism for starting it at the commencement of a race-heat, and stopping it at the termination thereof, as set forth, the apparatus for recording the time or times of the heat or race, such consisting in the electro-magnet R, the disk-armature w^2, rod w^1, spring v^1, and the pencil or marker w^1, and spring x', applied to said stop-watch, or to an auxiliary stop-watch, F′, as described.

9. In combination with the stop-watch, and the electro-magnetic mechanism for starting it at the commencement of a race-heat, and stopping at the termination thereof, recording mechanism, consisting of the arbor b^2 c^2 d^2, as described, the hard-rubber annulus or disk e^2, spring g^2, wires i^2 k^2, electro-magnet s, armature l^2, escapement-lever m^2, toothed wheel n^2, shaft o^2, table p^2, springs q^2 r^2, electro-magnet T, armature s^2, spring t^2, and marker w^2, such electro-magnets having circuit-wires, and all being to operate substantially as specified.

ROBERT J. SHEEHY.

Witnesses:
R. H. EDDY,
J. R. SNOW.