

H. A. LUGRIN.
STOP WATCH.

No. 552,715.

Patented Jan. 7, 1896.

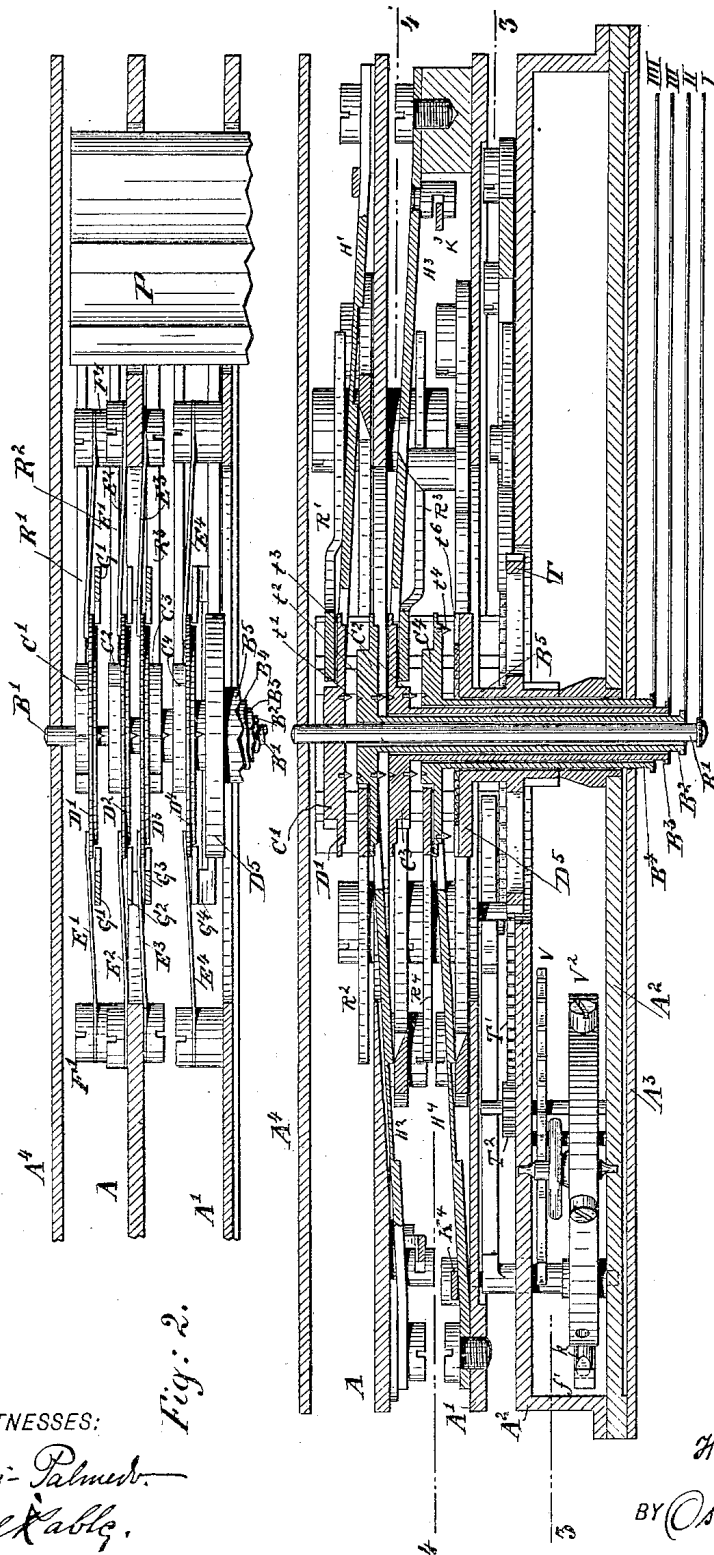


Fig. 1.

Fig. 2.

WITNESSES:

J. P. Palmes.
Carl Kable.

INVENTOR

H. A. Lugrin

BY Oscar T. Gurns

ATTORNEY.

(No Model.)

4 Sheets—Sheet 2.

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Fig. 3.

WITNESSES:
D. Petri-Palmer
Carl Kable

INVENTOR
H. A. Lugin
BY *Oscar G. Gurney*
ATTORNEY.

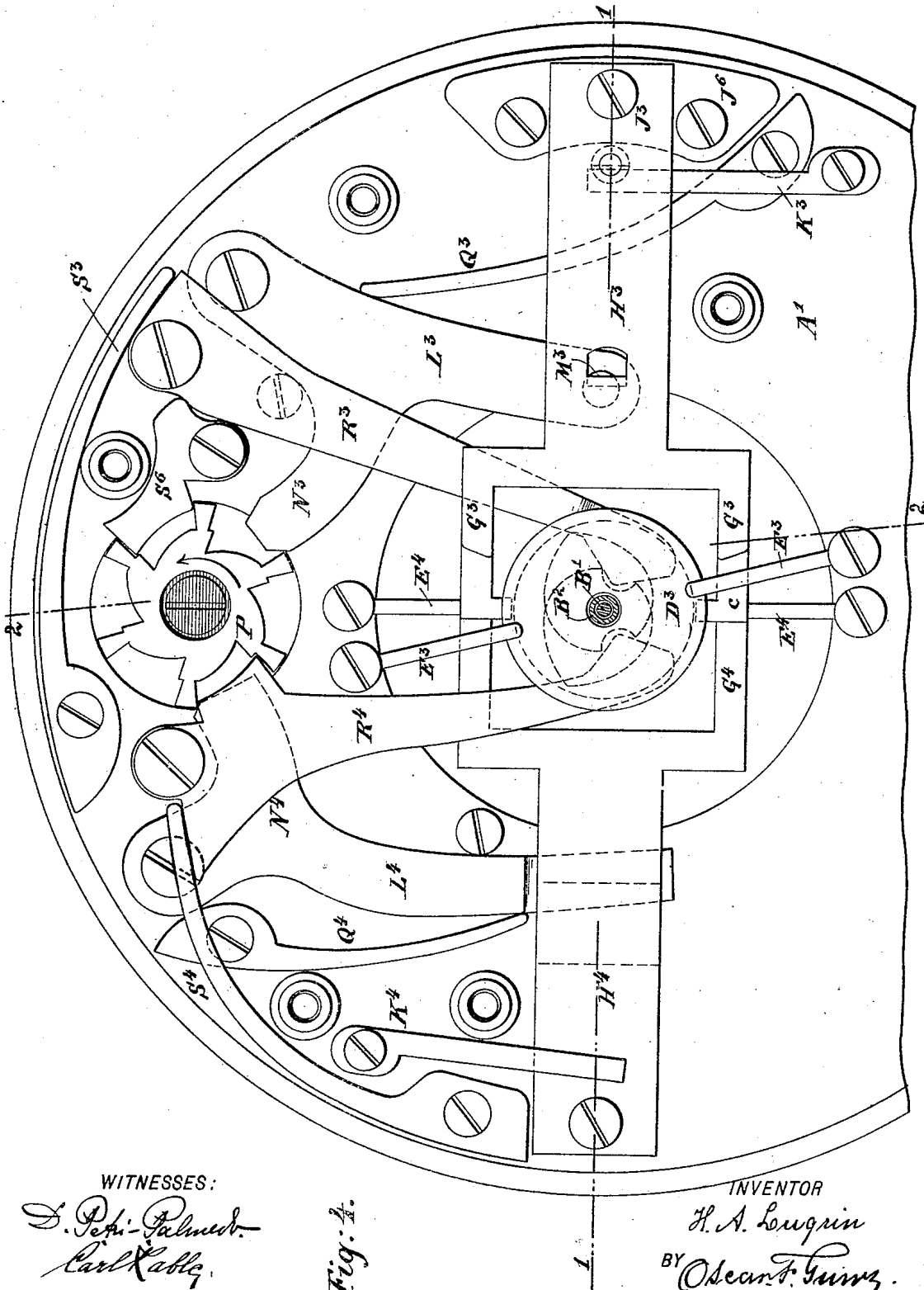
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WITNESSES:

D. P. Palmstedt
Carl Kable

Fig. 1.

INVENTOR

H. A. Lugin

BY *Oscar F. Lugin*

ATTORNEY.

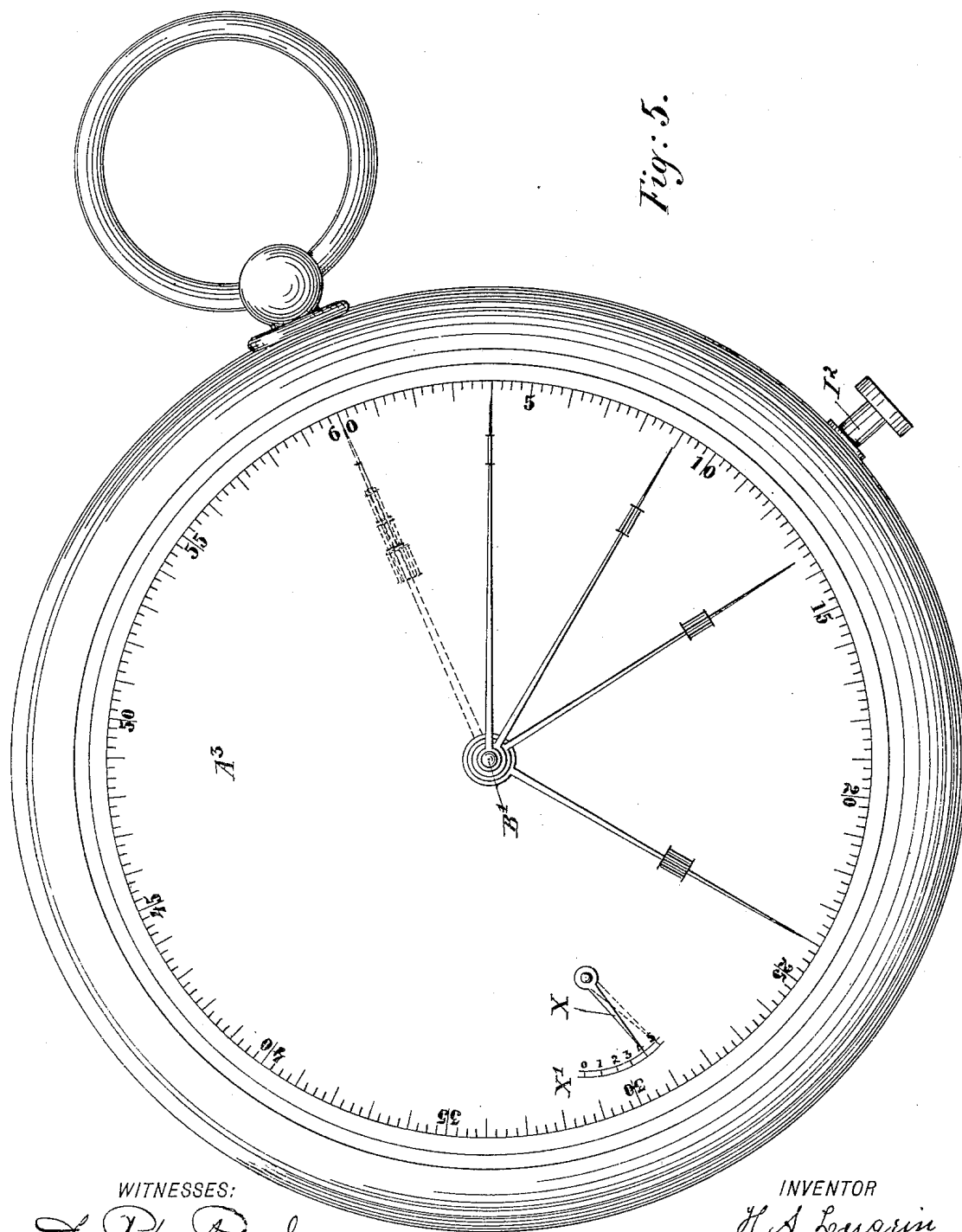
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WITNESSES:

S. Debi-Palmer
Carl Kable

INVENTOR

H. A. Lugin

BY *Oscar F. Lugin*

ATTORNEY.

UNITED STATES PATENT OFFICE.

HENRY A. LUGRIN, OF BROOKLYN, ASSIGNOR OF ONE-HALF TO MAURICE D. FIELDING, OF NEW YORK, N. Y.

STOP-WATCH.

SPECIFICATION forming part of Letters Patent No. 552,715, dated January 7, 1896.

Application filed February 19, 1895. Serial No. 538,961. (No model.)

To all whom it may concern:

Be it known that I, HENRY A. LUGRIN, a citizen of the United States, and a resident of Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Timing-Instruments, of which the following is a specification.

This invention relates to improvements in instruments for timing horses, men, &c., during races, trotting and pacing trials, &c.

Heretofore it has been customary to provide ordinary timekeeping-watches with an additional or fly-back hand, which, at the will of the operator, could be started to indicate fractions of seconds and stopped at will and returned to its original position, and also to provide watches with two fly-back hands, also arranged to be started together and to be stopped independently of each other and to be returned to the initial position, and it has also been customary to construct timing-pieces that were not provided with any time-indicating hands but with a fly-back hand only.

The fly-back hands and the mechanisms heretofore applied on ordinary timekeeping-watches made the latter very costly and apt to get out of order, requiring frequent and expensive repairs, and, furthermore, the mechanism for operating the fly-back hands interfered seriously with the timekeeping qualities of the watch, thus materially reducing the reliability and value of the watch as a time-keeper, and the ordinary timekeeping mechanism also interfered with the proper action of the fly-back hands, frequently making the reliability of the latter very questionable.

The devices constructed without timekeeping mechanism were usually of a cheap grade and not very reliable and had only one or at the utmost two fly-back hands.

The object of my invention is to provide a new and improved timing-instrument for taking the speeding-time of a horse or man at the four quarters of a mile or taking the time of from one to four horses or men and indicating the time elapsed in minutes, seconds and fractions of seconds, and which instrument is so constructed that the four hands can be started at the same time and each stopped successively—for example, one at each quarter-mile

for one horse, or one when each horse or man arrives at the goal—without interfering with the others and locked in this position until the times have been recorded, when the several hands together can be thrown back to the initial position.

A further object of my invention is to provide a new and improved minute-indicator, which also serves to indicate whether the instrument is wound or set for operation or not.

A further object of my invention is to provide means for stopping the balance-wheel at the same time the last hand is stopped, in such a manner that as soon as the hands are again started the balance-wheel is also started.

A further object of my invention is to simplify the construction of the entire mechanism and to make it reliable, not apt to get out of order and to reduce the cost of the instrument.

The invention consists in a timing-instrument provided with a series of seconds-indicating hands, which are so mounted and driven that they can be started together and stopped successively, and said hands can then all be thrown back to the initial position, ready for a new race.

The invention further consists in a timing-instrument having a series of seconds-indicating hands and a separate minute-indicating hand, which latter is driven independently of the gearing for driving the seconds-indicating hands.

The invention further consists in a timing-instrument having a series of seconds-indicating hands and a push-pin for controlling and working the mechanism for starting and stopping, throwing back to the initial position said hands, and a motor-spring which can be placed in tension to give the requisite power by pulling said push-pin outward.

The invention also consists in the construction and combination of parts and details, as will be fully described and set forth hereinafter, and finally pointed out in the claims.

In the accompanying drawings, forming a part of this specification, and in which like letters of reference indicate like parts in all views, Figure 1 is a vertical transverse sectional view of my improved timing-instrument on the line 1 1 of Fig. 4, the case being omitted. Fig. 2 is a vertical transverse sec-

tional view of the same at right angles to the section shown in Fig. 1 and on the line 2 2 of Fig. 4, parts being omitted. Fig. 3 is a horizontal sectional view on the line 3 3 of Fig. 1. Fig. 4 is an enlarged detail horizontal sectional view on the line 4 4 of Fig. 1. Fig. 5 is a face view of the dial.

The entire mechanism is supported by the three plates A, A', and A², which are suitably connected with each other in the usual manner by posts and screws. The dial A³ is fastened on the plate A² in such a manner as to cover the recessed face of the same, and a circular line along the rim of the dial is divided into sixty equal parts representing seconds, and each such part is again divided into four parts representing quarter-seconds.

The subdivision of the dial forms no part of my invention and may be varied as may be desired.

The timing-instrument has four superimposed hands I, II, III, and IV, each fixed to a separate arbor. The hands are of the same length and bear the Roman numerals I II III IV, which are arranged different distances from the center so as not to cover each other, the Roman I being nearest the rim, the Roman numeral II next, and so on.

The hand I is fixed on the solid center arbor B', one end of which is mounted on the bridge A⁴, fixed on the outer surface of the plate A, and directly below said bridge a heart-cam C' and a disk D' are fixed on the said arbor B'. The ends of spring-fingers E', which are secured to posts F' on the plate A', rest on the top of the disk D' and serve to press the same in the direction toward the dial A³. The said fingers are adjusted to produce as little friction as possible on the disk D', and the tension of said spring-fingers is such as not to produce sufficient friction to interfere with the free rotating of the disk, at the same time, however, being sufficient to press the disk toward the dial as much as required for a purpose that will be set forth hereinafter. The rim of the disk D' rests upon the prongs G' of a forked spring-pressed lever pivoted in a manner that will be described later on. A spring presses or draws the forked end of the forked lever in the direction toward the dial, and said forked lever by means of another lever operated from a cam-barrel can be pressed in the direction from the dial and thereby moves the disk D' in the direction from the dial, as will be more fully set forth in relation to the mechanism for operating the hands III and IV. The pivoted heart-cam lever R', on which a cam-barrel P can act, serves for throwing the heart-cam C' and with it the arbor B' and hand I into the initial position.

The hand II is fixed on one end of a tubular arbor B² surrounding the arbor B' and carrying at its inner end the disk D² and heart-cam C², on which latter the heart-cam lever R² can act to throw it into the initial position. Spring-fingers E² press the disk D²

upon the prongs G² of a forked lever, also pivoted in a manner that will appear hereinafter. On said forked lever a separate lever acts, which is also operated from the cam-barrel.

The hand III is fixed on one end of a tubular arbor B³ surrounding the arbor B² and carrying at its inner end the disk D³ and the heart-cam C³, on which latter the heart-cam lever R³ can act under the tension of its spring S³, which presses a short lever S⁶ against the cam-barrel P. The disk D³ is pressed by two spring-fingers E³ upon the prongs G³ of a forked lever H³ pivoted by a screw J³ to a lug J⁶ on the plate A' in such a manner that the free end of said lever H³ can swing toward and from the dial. A spring K³ fixed on the plate A' has its free end engaged with the lever H³ in such a manner as to pull the said lever in the direction toward the dial. The free end of each prong G³ is provided with a recess c, through which the spring-fingers E³ pass. A lever L³ pivoted on the plate A' is provided with a beveled or rounded head M³, which can act on the under side of the forked lever H³ and press said lever in the direction from the dial, and said lever L³ has an arm N³, on which the cam-barrel P can act, a spring Q³ acting on the lever L³ and serving to press the arm N³ against the cam-barrel P.

The hand IV is fixed on the end of a tubular arbor B⁴ surrounding the tubular arbor B³ and carrying at its inner end the disk D⁴ and the heart-cam C⁴. The heart-cam lever R⁴ acts under the tension of a spring S⁴, which presses an arm of the heart-cam lever against the cam-barrel P. Spring-fingers E⁴ press the disk D⁴ toward the dial and upon the prongs G⁴ of a forked lever H⁴, pivoted in the manner described above and acted upon by a lever L⁴, having an arm N⁴ that is pressed by the spring Q⁴ against the cam-barrel P. The spring K⁴ presses the lever H⁴ in the direction toward the dial. The disk D' is provided on its under side with two fine teeth or projections t', that can pass into corresponding recesses or notches in the upper surface of the heart-cam C². The disk D² is provided on its under side with like teeth t², that can pass into notches or recesses in the upper surface of the disk D³. The heart-cam C³ in like manner is provided with teeth t³, that can pass into recesses or notches in the upper surface of the heart-cam C⁴, and the disk D⁴ is provided on its under side with teeth t⁴, that can engage fine teeth t⁶ arranged in a circle on the upper surface of a disk D⁵ along the rim, which disk D⁵ is fixed on the inner end of a sleeve B⁵ surrounding the tubular arbor B⁴ and mounted to turn in an aperture of the plate A'.

The sleeve B⁵ carries the wheel T, having sixty-four teeth and engaged with the transmitting-wheel T' of the same number of teeth and engaging the pinion T² on the arbor of the escapement-wheel V, which is engaged with the escapement lever or anchor V', which in turn operates the balance-wheel V² in the

usual manner. The sleeve B⁵ also carries a pinion W, which engages a cog-wheel W', the arbor of which carries a loose ratchet-wheel W² that is engaged by a spring-pressed pawl W³ on the wheel W', and said loose ratchet-wheel is made integral with a pinion U engaged with a curved rack U' formed on the end of a lever U² pivoted at U³ and provided with a curved arm U⁴. A spring U⁵ fixed on one of the plates has its free end rested on the arm U⁴ and presses the lever in the direction of the arrow α . The arm U⁴ of the lever U² rests against one end of a pivoted lever Y, the opposite end of which bears against the arm Y' of a shaft Y², on which arm the free end of a spring Y³ bears.

A hand X, above the outer face of the dial, is fixed on the shaft Y² and can swing over an arc of a circle divided into five equal parts, as shown at X' in Figs. 3 and 5.

The cam-barrel P is provided with six cam-teeth P' and is made integral with a ratchet-wheel P² having thirty-six teeth, which ratchet-wheel P² can be turned by means of the spring hook-pawl P³ pivoted on one end of the pivoted lever P⁴, on which the spring P⁵ acts. On the free end of said lever P⁴ the tooth of a lever I' can act, and on the free end of said lever I' a push-pin I² can act when the same is pushed inward, whereby the spring-pawl P³ is caused to rotate the ratchet-wheel P² in the direction opposite to the arrow α' , as shown in Fig. 3. A pin I³ projecting from the push-pin I² serves to actuate a lever a , the other end of which rests on a projection U⁶ of the lever U². A lever a' pivoted at a^2 is pressed by a spring d against the cam-barrel P and is provided with a spring-arm e , which connects it with one arm of an angle-lever f pivoted at g , the other arm f' of which angle-lever is provided with teeth j inclined toward the balance-wheel V² and adapted to engage and lock a pin k , projecting from the rim of said balance-wheel. A stop-pin l serves to limit the throw of the arm f' of the angle-lever f .

m m are click-springs for the ratchet-wheel P².

The operation is as follows: Before the timing-instrument is to be used the hands must all be at the initial position—that is, at 60 of the dial. The several heart-cam levers rest in the notches of the several heart-cams and thereby hold the hands in the above positions. The pins t' t^2 , &c., of the several disks, D', D², D³, and D⁴ are out of the corresponding notches in the several heart-cams and disk D⁵ respectively. The hand X points to the subdivision 5 of the arc X' of the dial, indicating that the mainspring or motor-spring U⁵ is not wound or tightened, and therefore the first thing to be done is to tighten or wind said spring, so as to cause the same to give the power required for driving the mechanism. For this purpose the push-pin I² is pulled outward, whereby one end of the lever a is pulled outward and the other end resting on the projection U⁶ of the lever U² is pressed inward,

and thereby the curved rack U' on the inner end of said lever is swung in the inverse direction of the arrow α , whereby the pinion U and ratchet-wheel W² are turned in the inverse direction of the arrows α^3 without affecting the cog-wheel W'. At the same time the spring U⁵, which is the motor or main spring, is pressed by the arm U⁴ in the direction toward the rim of the plates and is brought in tension. The arm U⁴ being moved from the end of the lever Y permits the spring Y³ to swing the arm Y' of the shaft Y² in such a manner that the hand X is brought to 0 on the arc X' on the dial, thus indicating that the motor-spring is in tension and that the mechanism can be started. When the horses or men to be timed start, the push-pin I² is pushed inward, whereby the end of the lever I' is also moved inward and the hook-pawl P³ turns the ratchet-wheel P² the distance of one tooth and the cam-barrel P the distance of one-sixth of the distance between two of its teeth. By this movement of the cam-barrel the several heart-cam levers are thrown off the several heart-cams and at the same time the forked levers acting on the several disks D' D² D³ D⁴ are thrown toward the rims so as to permit the springs acting on said forked levers to press the same toward the dial, whereby the teeth t' t^2 , &c., on the several disks D' D² D³ D⁴ are brought into the notches in the adjacent heart-cams and disks and into the recesses between the teeth of the disk D⁵, respectively, under the action of the several spring-fingers E' E², &c. At the same time the end of the lever a' slides off the tooth of the cam-barrel P on which it rested and by the spring d is thrown toward the center of the cam-barrel, whereby the toothed arm f' of the lever f is thrown from the rim of the balance-wheel, and, releasing the pin k on the rim of the balance-wheel, permits said balance-wheel to oscillate under the action of its hair-spring V³. The driving mechanism is thus released, and, as the disks D' D² D³ D⁴ of the several hands are operatively connected with each other and with the disk D⁵, which is driven, by means of the gearing described, from the motor-spring, the four hands simultaneously begin to rotate over the dial in jumps of quarter-seconds. They continue to move in this manner until the horse arrives at the first quarter or the first horse or man arrives at the goal, when the push-pin I² is again pushed inward and the cam-barrel again turned one-sixth of the distance between two of its teeth, whereby the lever acting on the forked lever under the disk D' is moved toward the center of the mechanism and forces said disk upward against the spring-fingers E', so as to disengage its pins t' from the heart-cam C², directly below it, which heart-cam, however, continues to rotate. Thereby the hand I is stopped, as it is no longer connected with the driving mechanism. When the horse arrives at the second quarter or the second horse or man has arrived at the goal, the

push-pin I^2 is again pushed inward and the cam-barrel P is rotated one-sixth of the distance between two of its teeth, and the lever acting on the forked lever of the disk D^2 is moved toward the center, so as to force said forked lever in the direction from the dial and lift the pins I^2 of said disk D^2 free from the heart-cam C^3 directly below it, whereby the seconds-hand II is stopped. By another push on the push-pin I^2 the hand III is stopped in like manner when the horse arrives at the third quarter or the third horse or man has reached the goal, and finally when the horse arrives at the mile or the fourth man or horse has reached the goal the hand IV is stopped by again pushing the push-pin I^2 inward, as thereby the disk D^4 is lifted off the toothed disk D^5 . At the same time the cam-barrel acts on the lever a' , and thereby the arm f' of the angle-lever f is thrown toward the rim of the balance-wheel V' and engages the pin k , thereby locking the balance-wheel and absolutely stopping the driving mechanism as soon as the last hand IV is stopped. As the teeth on the arm f' are beveled, as shown, toward the balance-wheel, and the angle-lever f is connected with the lever a' by a spring-arm e , the balance-wheel can complete its stroke in the direction of its arrow x^4 , but is prevented from swinging back, so that the hair-spring V^3 will be in full tension when the mechanism is started again and will properly operate at once. After the records made by the single man or horse on quarter miles or by the several men or horses have been taken the push-pin I^2 is again pushed inward, and thereby the several heart-cam levers are thrown toward the several heart-cams, and throw all the hands to the initial position of 60 on the dial and the instrument is ready for use for a second race. As the driving mechanism runs down, the free end of the motor-spring U^3 moves inward and presses the arm U^4 of the lever U' inward, and, as the same acts on the lever Y and the latter acts against the spring Y^3 , moves the hand X over the arc X' from 0 toward 5, thereby indicating in minutes the time that has elapsed since the starting of the race. Said minutes-indicating hand X stops at the same time that the driving mechanism stops.

It is evident that the several levers operated from the cam-barrel and serving to operate the forked levers acting on the disks D' , D^2 , D^3 , and D^4 must be so arranged and must have arms of such length that they slide off the cams of the cam-barrel successively and at the proper times.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. A timing instrument constructed with three or more concentric seconds hands, a separate arbor for each hand, a driving mechanism, means for operating one of the arbors from the driving mechanism, means for operating the remaining arbors, one from the other, a heart cam on each arbor, a heart cam

lever for each arbor, a lever for each arbor for throwing the same in or out of gear and a single cam barrel for actuating all the several heart cam levers and all the several levers for throwing the arbors in and out of gear, substantially as herein shown and described.

2. A timing instrument, constructed with a series of concentric seconds hands, a separate arbor for each hand, a disk on each arbor, spring fingers acting on each disk to press the same, and its arbor in the direction of its length toward a dial, a lever for each arbor for pressing the same in the direction from the dial, a heart cam on each arbor a heart cam lever for each heart cam and a common cam barrel for operating all such levers, substantially as herein shown and described.

3. A timing instrument, constructed with three or more concentric seconds hands, an arbor for each hand, a disk on each arbor, spring fingers bearing on each disk to press the same and its arbor in the direction toward a dial—a forked spring actuated lever for each disk, for moving the same in the direction from the dial, a separate lever for each forked lever, a heart cam on each arbor, a heart cam lever for each heart cam and a common cam barrel for operating the several levers, substantially as herein shown and described.

4. A timing instrument, constructed with a series of concentric seconds hands, an arbor for each hand, a disk on each arbor, which disks on the several arbors can be engaged with and disengaged from each other and means for shifting the disks successively for these purposes, substantially as herein shown and described.

5. A timing instrument, constructed with a series of seconds hands mounted concentrically, a driving gear for operating said hands, a balance-wheel in said driving gear, a pin projecting from said balance-wheel, a tooth lever for engaging said pin, devices for starting the hands together, devices for stopping them successively, and a cam-barrel for operating said devices and the toothed lever acting on the balance-wheel pin, substantially as set forth.

6. A timing instrument, constructed with a series of seconds hands mounted concentrically, a driving gear for rotating said hands, a balance-wheel in said driving gear, a pin projecting from said balance-wheel, a pivoted angle-lever provided with teeth for engaging said pin, a cam-barrel, a lever operated by the cam-barrel, a spring-arm connecting said lever with the toothed lever, devices for starting the several hands together, and devices for stopping the several hands successively, which devices are all operated from the same cam-barrel, substantially as set forth.

7. A timing instrument, constructed with a series of seconds hands, mounted concentrically, a driving gear for rotating said hands, a balance wheel in said driving gear, a pin projecting from said balance wheel, a pivoted angle lever provided with teeth for engaging

5 said pin, a cam barrel, a lever operated by the cam barrel, a spring arm connecting said lever with the toothed lever, devices for starting the several hands, devices for stopping the several hands successively, which devices are all operated from the cam barrel, substantially as herein shown and described.

In testimony that I claim the foregoing as

my invention I have signed my name, in presence of two witnesses, this 13th day of February, 1895.

HENRY A. LUGRIN.

Witnesses:

OSCAR F. GUNZ,

N. M. FLANNERY.