No. 689,495. Patented Dec. 24, 1901.

E. H. JOHNSON.

STOP WATCH.

(Application filed Nov. 3, 1900.)

(No Model.) 3 Sheets—Sheet 1.

Fig. 1

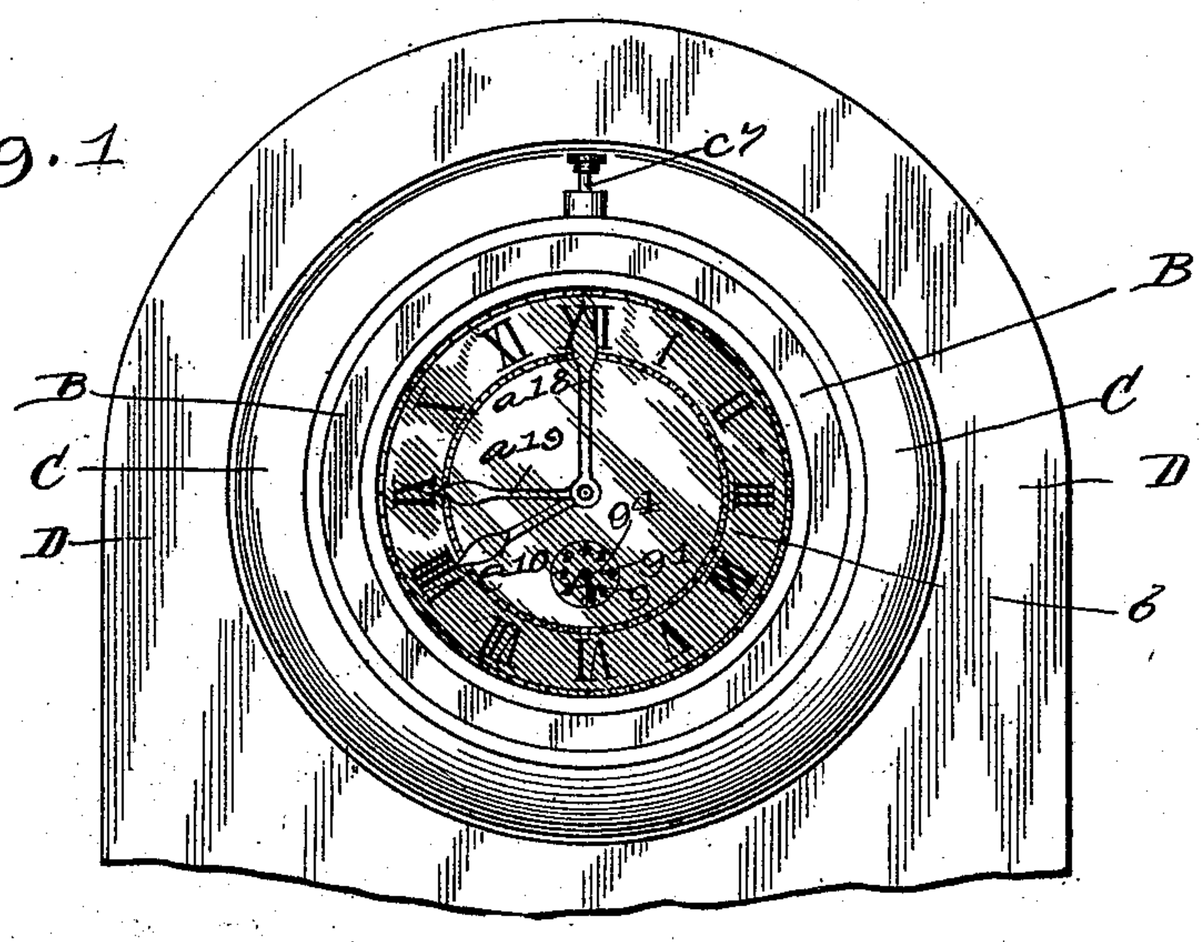


Fig. 2

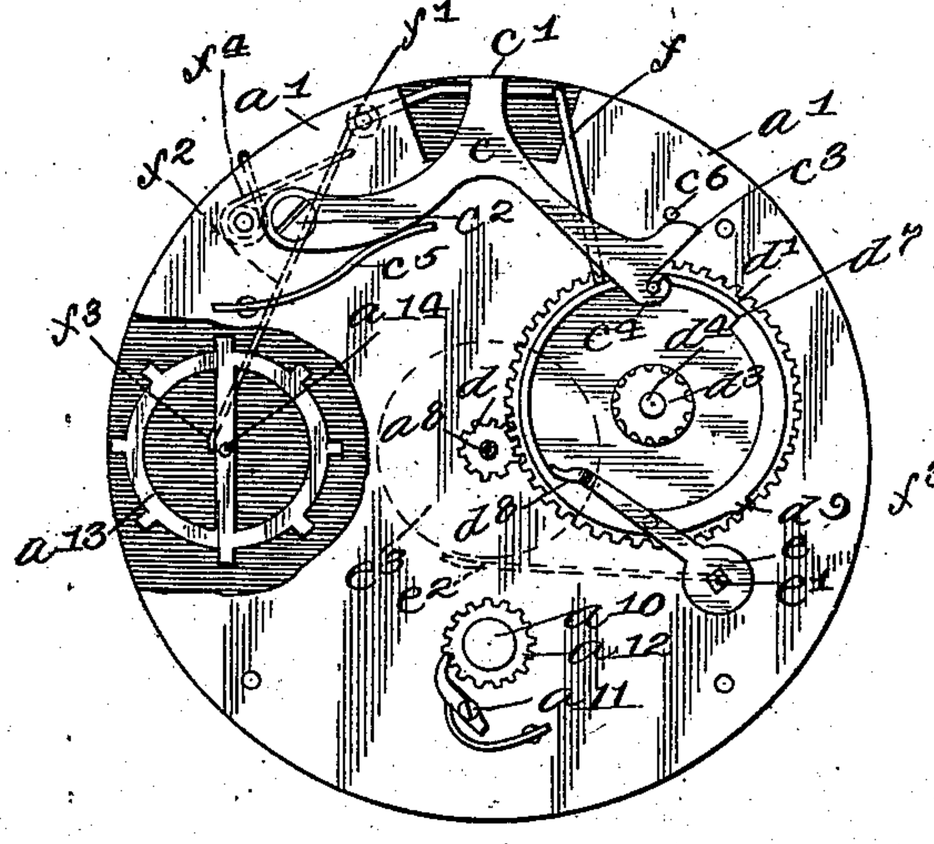
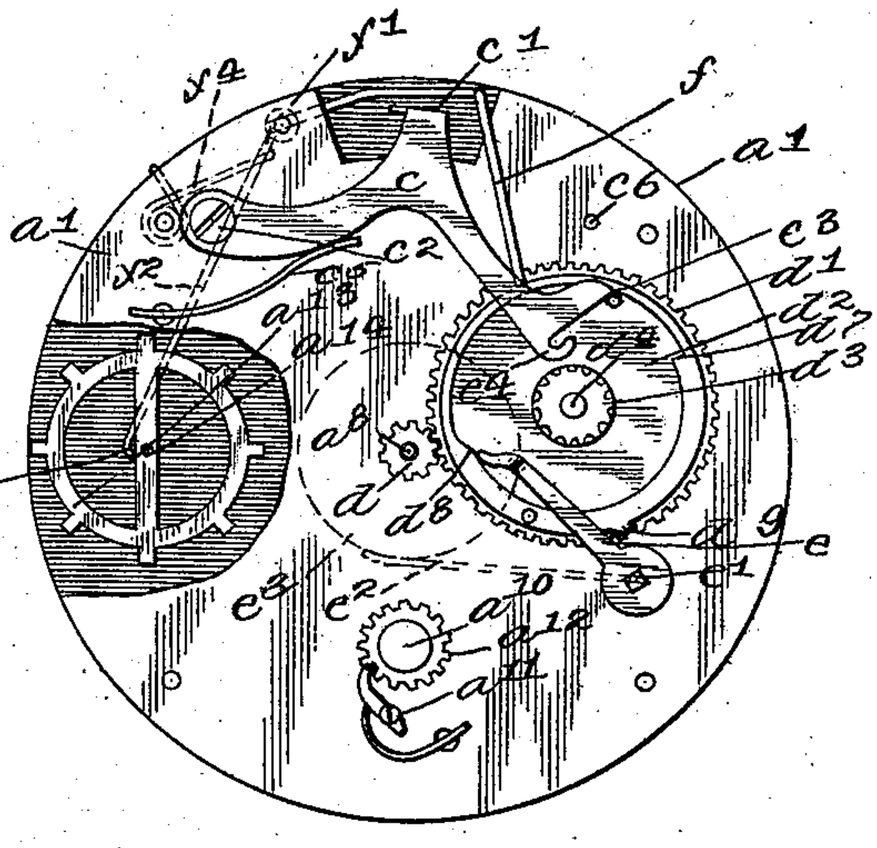


Fig. 3



Witnesses:
Ray White.
Harry R. White.

Inventor:
Edward H. Johnson.
By Brè Burr Attorney.

No. 689,495. Patented Dec. 24, 1901.

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(No Model.) 3 Sheets—Sheet 2.

Fig. 4.

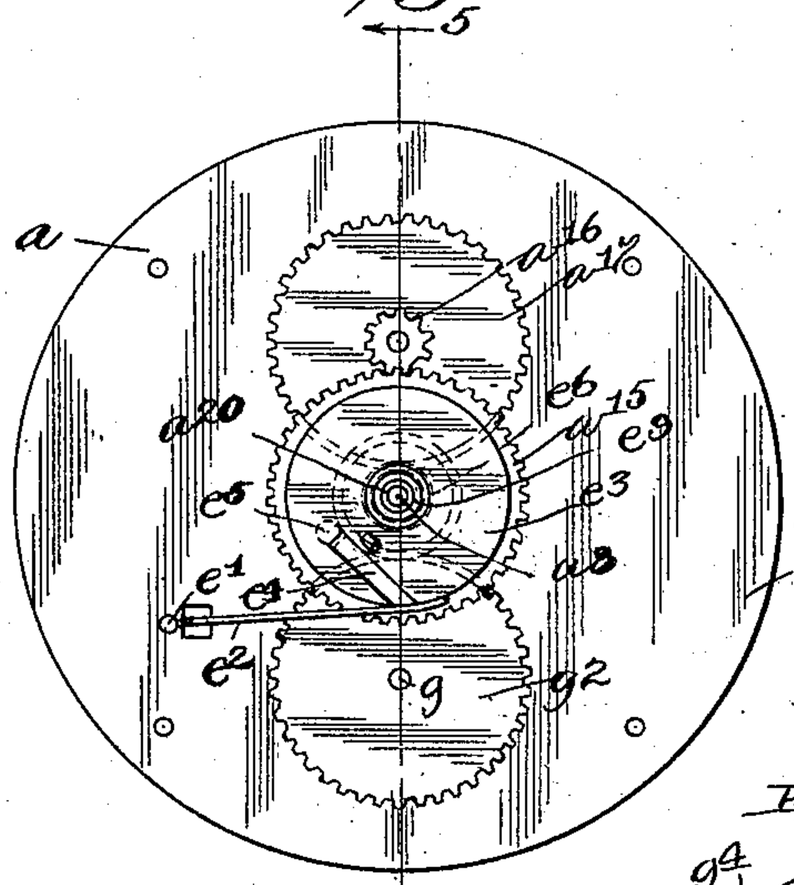


Fig. 5

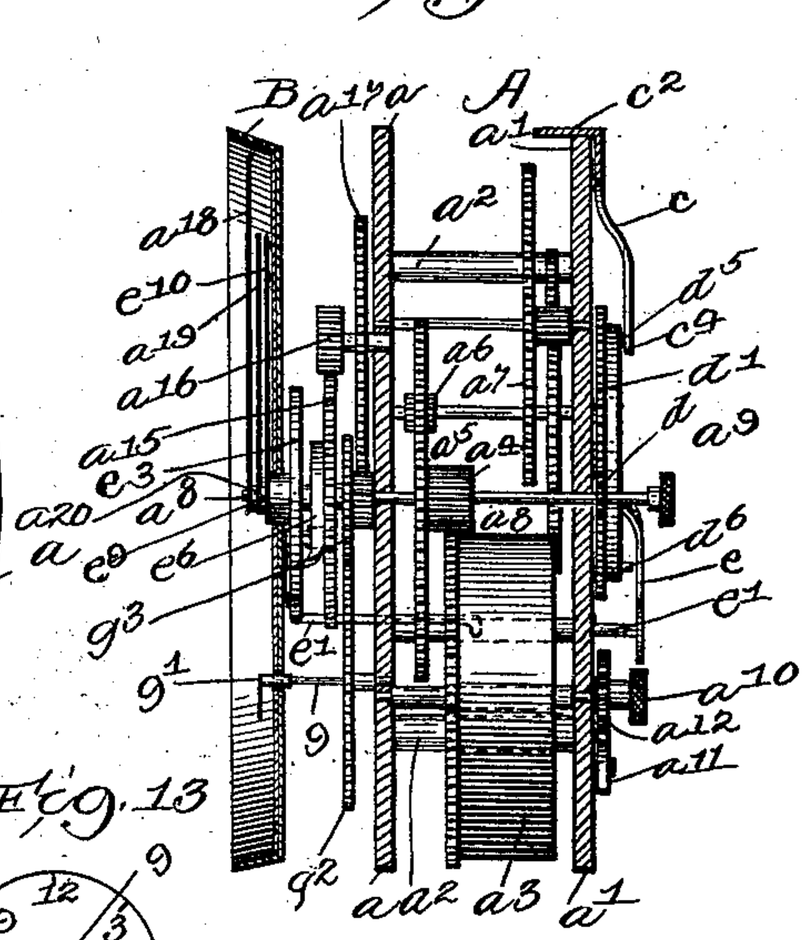


Fig. 13

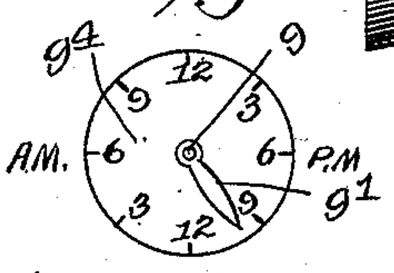


Fig. 6

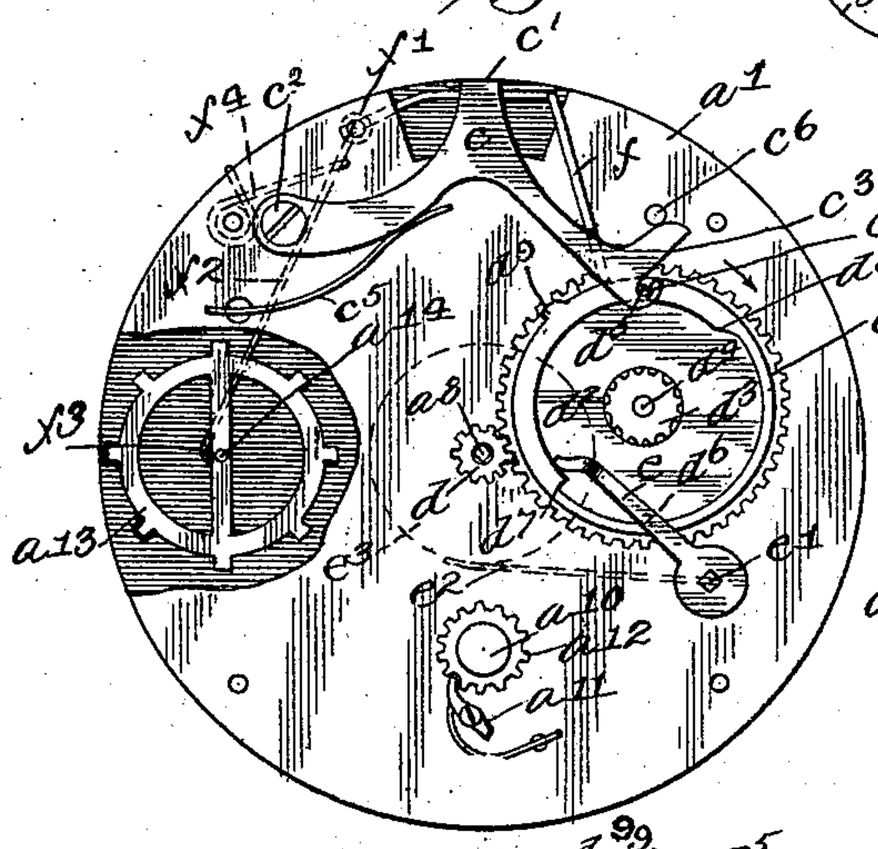


Fig. 7

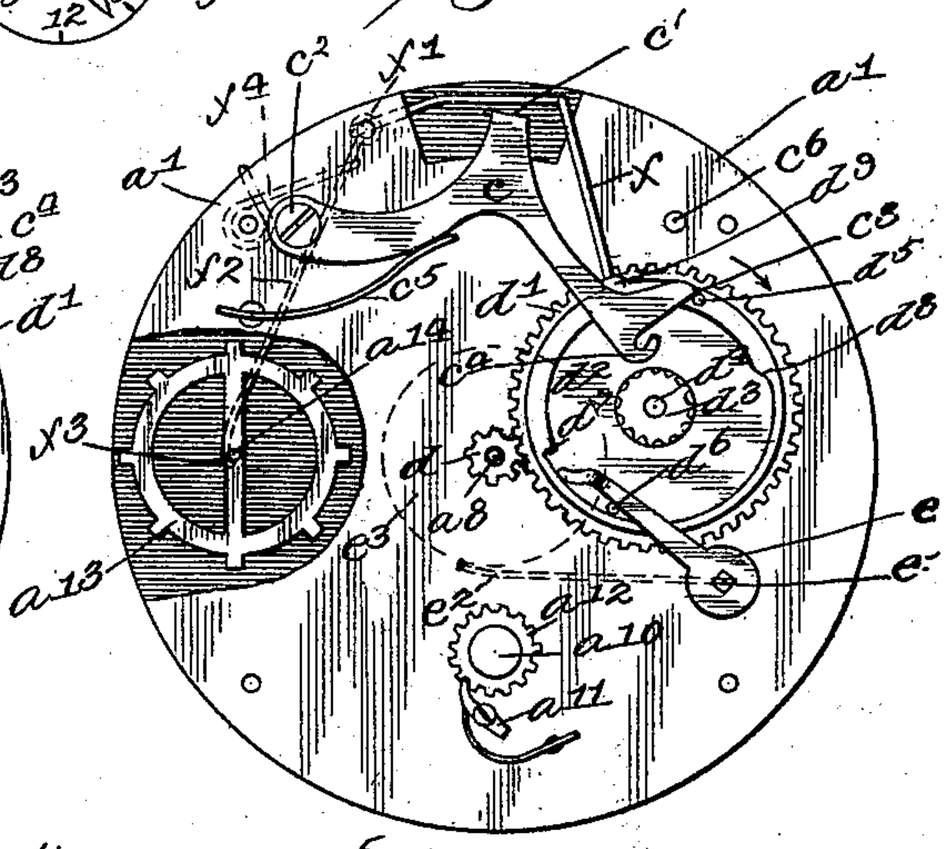


Fig. 8

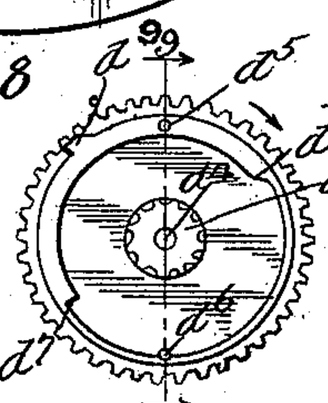
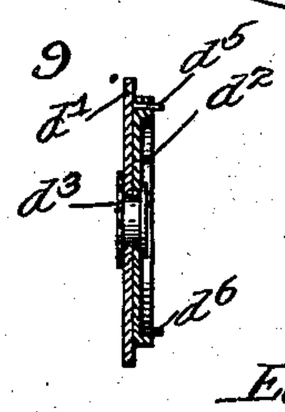


Fig. 9



Witnesses:
Ray White.
Harry D. Wilhite

Inventor:
Edward H. Johnson,
By Jones Dain Attorney

No. 689,495. Patented Dec. 24, 1901.

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(No Model.) 3 Sheets—Sheet 3.

Fig. 10

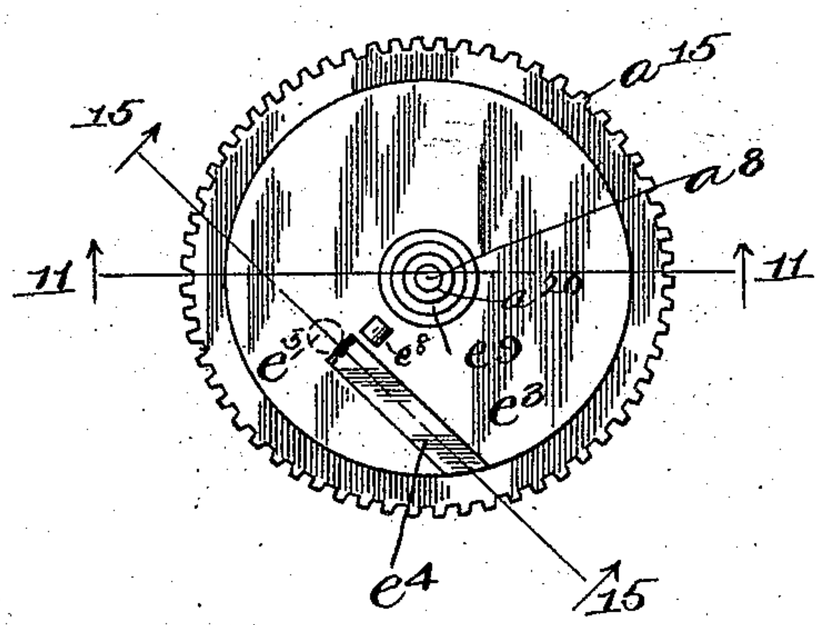


Fig. 12.

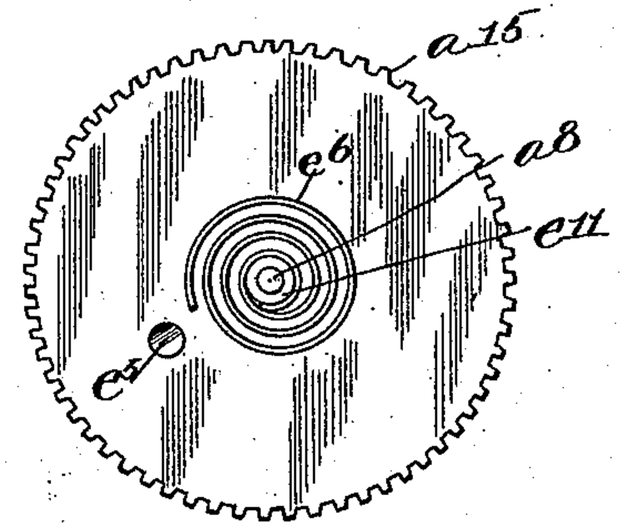


Fig. 11

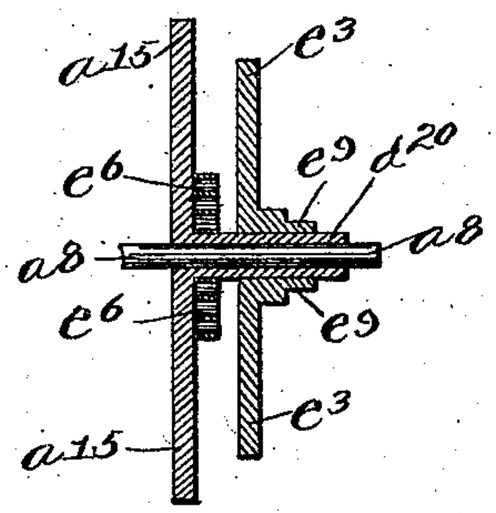


Fig. 15.

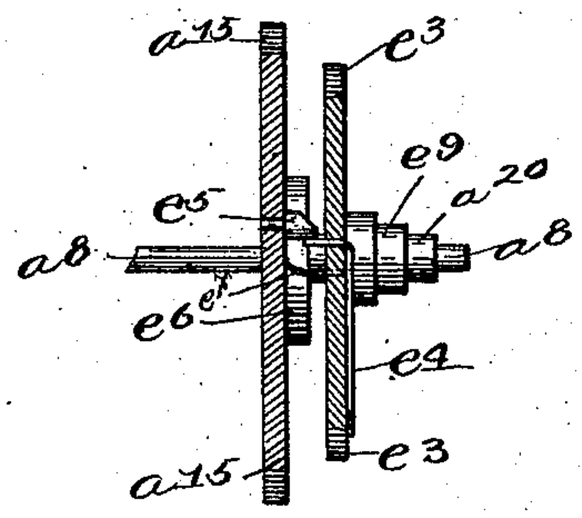
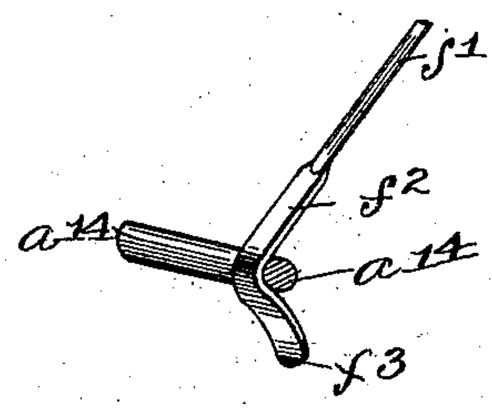


Fig. 14



Witnesses

Ray White.

Harry C. Lubite

Inventor.

Edward H. Johnson.

By Foré Dann

Attorney

UNITED STATES PATENT OFFICE.

EDWARD H. JOHNSON, OF OMAHA, NEBRASKA.

STOP-WATCH.

SPECIFICATION forming part of Letters Patent No. 689,495, dated December 24, 1901.

Application filed November 3, 1900. Serial No. 35,353. (No model.)

To all whom it may concern:

Be it known that I, EDWARD H. JOHNSON, a citizen of the United States, residing at Omaha, county of Douglas, and State of Nebraska, have invented certain new and useful Improvements in Time Mechanism; and I do hereby declare that the following is a full, clear, and exact description, such as will enable persons skilled in the art to which it appertains to make and use the same.

My invention relates to improvements in time mechanism.

The object of my invention is to provide a device by the use of which the happening of an event may be recorded or the space of time intervening between the happening of two events may be recorded and the time at which such events happened or the time intervening between the two events may be readily ascertained by indications made upon the face of the instrument.

My device partakes somewhat of the nature of a clock, and when not used as a registering device it may be employed for indicating the time as an ordinary clock.

My device is especially adapted to be used in connection with cash-registers and affords a ready means for ascertaining the time at which a clerk having charge of a store closes the store for the night and also the time at which he opens the store in the morning.

This device when used in connection with a cash-register completes the record of the official actions of the clerk of a store or other establishment during the absence of the employer and leaves permanent indications which may afterward be consulted by the employer as a guide and a source of accurate information.

In the drawings, Figure 1 shows my device as it appears when in operation. Figs. 2, 3, 6, and 7 are views of rear elevations of the mechanism with the respective parts shown in various positions. Fig. 4 is a front view of the mechanism, showing a train of gear. Fig. 5 is a transverse section through the mechanism, taken on lines 5 5 of Fig. 4. Fig. 8 is a perspective view of one of the cam-wheels. Fig. 9 is a transverse section of the same through line 9 9 of Fig. 8. Fig. 10 is a perspective view of the hour-wheel of the clock with the brake-wheel mounted on the same shaft. Fig. 11 is a side elevation of the same. Fig. 12 is a front elevation of the hour-wheel with the brake-wheel removed, showing a hair-spring fastened by means of a friction-collet to the shaft thereof and a pin in the face of said wheel. Fig. 13 is an auxiliary dial. Fig. 14 is an enlarged detail view of one of the levers of the mechanism. Fig. 15 is a section taken on line 15 15 of Fig. 10.

In all of the views the same letters of reference indicate similar parts.

A indicates the movement or the clock mechanism.

B indicates the dial.

C is a frame which incloses the mechanism and dial.

D is a part of a cash-register frame or a frame of a similar nature, in which the mechanism and case are inserted and secured by means of a lock or otherwise.

a and a' are the plates or housings which contain the bearings for the various shafts of the mechanism.

a^2 represents the separating-posts, which retain the plates in their respective positions.

a^3, a^4, a^5, a^6, and a^7 represent a train of gear which is common to twenty-four-hour clocks.

a^8 is the minute-shaft of the clock.

a^9 is the button by which the shaft a^8 may be rotated when it is desirable to set the clock.

a^{10} is the shaft to which the driving-spring which propels the mechanism of the clock is attached.

a^{11} and a^{12} represent the pawl and ratchet by which the said spring is held when wound up.

a^{13} is the balance-wheel of the clock. a^{14} is the shaft upon which the said balance-wheel is supported.

The wheel a^{15} surrounds the central shaft a^8 and is provided with a central laterally-projecting thimble d^{20}, to which the hour-wheel of the clock is attached.

a^{16} and a^{17} are the usual reducing-wheels, which reduce the motion from the main minute-shaft a^8 to the hour-wheel a^{15}, by which the wheel a^{15} is rotated in the relation to the shaft a^8 in proportion of one to twelve.

The figures on the face of the dial denoting the hours and minutes are all common to the ordinary twelve-hour clock. Additional divisions b on the dial at the base of the numerals, of which there are seventy-two in the

complete circle or six between each hour, will be hereinafter explained.

A triangular lever c is pivoted at c^2. The top of the lever is bent over, forming a surface c' at right angles to the vertical plane of the lever. The lower free end of the lever is provided with an angular edge c^3 and c^4 at the base of the angle. A spring c^5 is adapted to hold the lever c normally in the position shown in Figs. 2 and 6 against the stop-pin c^6. A vertical shaft c^7, loose in the case, is provided with a push-button on its upper end and is guided in the case C. The lower end of the said shaft is adapted to rest upon the surface c' of the lever c, so that when pressure is applied to the shaft c^7 the lever c will be depressed into the position shown in Figs. 3 and 7. A small pinion d is fixed to the shaft a^8 and is adapted to revolve the geared wheel d' in relation of six to one. An internal cam-wheel d^2 is held concentrically with the gear-wheel d' in frictional contact therewith by means of an eyelet-rivet d^3, and both wheels are mounted upon the fixed stud d^4. The friction resistance existing between the gear-wheel and the cam-wheel is sufficient to revolve both together when there is no resistance applied to the cam-wheel. The cam-wheel is provided with two oppositely-disposed laterally-projecting studs d^5 and d^6. The points d^7 and d^8 of the cam-wheel indicate the conjunction of the two internal diameters of the said cam-wheel. d^9 is an enlargement fixed to the outside periphery of the cam-wheel, the said enlargement being tapered on its approaching edge and truncated upon its receding edge. A lever e, which is fixed to the shaft e', is bent at its free end, so that it projects into the inner surface of the cam-wheel d^2 and rests upon the interior periphery of the said cam, as shown in the various figures.

The shaft e' projects through the mechanism of the clock, and upon the far end thereof a horizontal lever e^2 is fixed. This lever is adapted to bear against the roughened peripheral surface of the wheel e^3, which is shown in full lines in Fig. 4. The levers e and e^2 are fixed to the shaft e' in such relation that when the lever e is bearing upon the thin portion of the cam, as shown in Figs. 2 and 7, the lever e^2 is free of the wheel e^3, and when the lever e is bearing upon the thick portion of the cam, as shown in Fig. 6, then the lever e^2 is in frictional contact with the periphery of the wheel e^3 and prevents it from turning. The friction-wheel e^3 carries an auxiliary hand e^{10} over the clock-face upon the projecting thimble e^9, upon which the said wheel has rotative bearings and which surrounds the projecting thimble a^{20} of the hour-wheel a^{15}. e^4 is a flat spring which is fixed to the face of the wheel e^3, the free end of which projects through a slot inside of the wheel and is adapted to come into contact with a pin e^5, which is carried by the coacting wheel a^{15}. The projecting end of the spring is tapered, so that it passes freely over the pin e^5 when the disk e^3 is rotated in one direction and makes contact with the said pin when the wheel is rotated in the opposite direction.

A spiral hair-spring e^6 has a turned-up end e^7, which passes through a hole e^8 in the wheel e^3, by means of which it is attached thereto. This spring is also frictionally connected to the wheel a^{15} by having its inner convolutions sprung over the sleeve or thimble a^{20} of the wheel a^{15}. It will therefore be seen that the wheel a^{15} may be rotated while the wheel e^3 remains stationary, as the spring e^6, which connects them together, will permit the revolution of the sleeve a^{20} with only sufficient frictional resistance to drive the wheel e^3 and the index-hand when they are free to be revolved.

A bent lever comprising the arm f, shaft f', and the arm f^2 is adapted to rest with its lower free end upon the cam-wheel d^2. The said lever is pivoted at f', and the other free end, which extends obliquely in direction to the first-mentioned end, is adapted to be forced into contact with the shaft a^{14} of the balance-wheel a^{13}. The lower end of this lever is shown enlarged in Fig. 14, in which it is also shown flattened out at f^2 for the purpose of rendering it less positive in its action. The bent end f^3 is adapted to rotate the shaft a^{14}, to which the balance-spring is connected, when it is brought into forcible contact therewith. By this means the balance-spring of the balance-wheel is partially wound up and held in a state of stress. A spring f^4 normally moves the lever f to the position shown in Fig. 3.

A shaft g is adapted, by means of gears g^2 and g^3, to make one revolution in twenty-four hours. g' is an indicating-hand which is attached to the said shaft. The dial is divided into twelve hours A. M., which are to the left of the vertical diameter, and twelve hours P. M., which are those indications which are shown on the right of the same.

The use and operation of my device are as follows: The mechanism heretofore described and shown by the drawings is designed to be contained within the case B, (shown in Fig. 1,) and this case is adapted to be locked or otherwise retained in the receptacle D by a means under the sole control of the parties for whom the records are to be made. When the instrument is placed within the receptacle and locked, it is impossible to change the position of the hands or to otherwise interfere with the operation of the device, except by means of the push-button, which is outside and which is attached to the vertical shaft c^7.

My device is especially adapted to be attached to a cash-register, although it may be used quite independently of a cash-register, as it may be used for other purposes than that with which I will now describe its use.

Suppose for the purpose of illustration that the proprietor of an establishment having one of my devices desires to ascertain pre-

cisely the time his store or other establishment is closed by his employee who he may leave in charge of the said establishment. The position of the parts as shown in Fig. 2 is a normal one, and in this position the mechanism will operate and the clock will keep time as an ordinary clock. The auxiliary hand e^{10}, which I prefer to designate by coloring it red, will remain normally under the hour-hand a^{19} and will follow this hand in this position continuously until stopped by pressure upon the push-button c^7. If now it is eight o'clock and the store is ready to be closed, the employee just before closing presses the button c^7. This act will push the lever c into the position shown in Fig. 3. Normally the pins d^5 and d^6 of the cam d occupy the positions shown in Fig. 2—that is, d^6 is within the grasp of the hook c^4 of the lever c, and d^5 is situated at the opposite diameter, and when the lever c is depressed in the manner described the angular edge c^3 causes the cam d^2 to be slightly rotated around its axis on wheel d' by reason of the edge of the said lever impinging against the pin d^5 until the parts occupy the position shown in Fig. 3. At this time the lever e is raised by the thick part of the cam d^2, which rotates, being driven by frictional contact with wheel d' under the free end of said lever, and thereby the shaft e' is partially rotated and the horizontal lever e^2 (shown in full lines in Fig. 4) is raised into frictional contact with the periphery of friction-wheel e^3. By this means the hand e^{10}, which is fixed to the frictional wheel e^3 by means of the projecting thimble e^9, is held at rest at the place it and the regular hour-hand occupied at the time the button c^7 was depressed. The red hand will remain stationary as long as the lever e is raised and the lever e^2 is maintained in contact with the wheel e^3 or while the thick part of the cam d^2 is passing under the free end of the lever e. In the meantime the gear-wheel d' and the cam d^2, which has driving frictional contacts therewith, will be together rotated by means of the pinion d until the pin d^6, which projects laterally from the cam d^2, is caught by the hook c^4 of the lever c, as shown in Fig. 6. This will occur within three hours from the time the button c^7 has been depressed, when the gear-wheel d' will continue to be revolved; but the cam d^2 will be held stationary by means of the hook c^4 and the pin d^6. Therefore the hand e^{10}, which indicates the time at which the store was closed, will remain constant at eight o'clock, and the hands a^{18} and a^{19} will continue to move around the face of the dial in the usual manner. Now when the clerk comes in the morning for the purpose of opening the store the first thing that he shall do is to press the push-button c^7. At this time the mechanism is still in the position shown in Fig. 6. When the push-button c^7 is depressed at this time, the lever c is forced into the position shown in Fig. 7. The pin d^6 and the cam d^2 are set ahead on the frictional axis of wheel d', and the enlargement d^9, which is located on the outside periphery of the cam d^2, will raise the arm f, rotate the shaft f', and raise the arm f^2 and cause the oblique end of the said lever to engage with the shaft a^{14} of the balance-wheel a^{13}. When the lower end of this lever is thus brought into contact with the shaft a^{14}, the bent flexible portion f^3 will cause the shaft a^{14} to be revolved by its frictional contact for a portion of a revolution, and by this means the usual balance-spring, which is an appurtenant of the balance-wheel a^{13}, will be partially wound up and held in stress by means of the lever-arm f^2. The effect of this will be to stop the clock, and all of the hands will remain stationary. Now when the proprietor arrives in the morning he can instantly ascertain the time at which the store was closed in the evening and also the time at which it was opened in the morning. The red hand, which has remained stationary and which points to eight o'clock in the example, is the means by which he is informed that the store was closed at that time in the evening, and the time at which all of the remaining hands were stopped in the morning is the time at which the store was opened in the morning. The time intervening between these two indications is the time the store remained closed. He then unlocks the case containing the clock, removes the clock, and proceeds to set it to the proper time by turning the knob a^9, which is attached to the minute-shaft a^8. As soon as he begins to turn this shaft the pinion d, which meshes into the gear-wheel d', will rotate the latter until the enlargement d^9 of the cam d^2 is carried forward from under the lever f. The latter then returns to its normal position upon the outside periphery of the cam d^2 and by means of the spring f^4 of the arm f' the shaft a^{14}, carrying the balance-wheel, is slightly rotated and the clock started. The normal position of the arm f is free from the shaft a^{14}. During its reciprocating movement from one position to the other it will have frictional contact with and partially rotate the shaft a^{14}, thereby winding up the hair-spring when the clock is stopped, which will when liberated by the lever f positively start the clock. This feature of the device is very essential, because the mere placing of a friction upon the balance-wheel and removing it will not always start the mechanism when the friction is removed, and therefore it is highly essential that some motion should be given to the balance-wheel when the said friction is removed for the purpose of positively starting the mechanism in operation. When friction has been applied to the friction-disk e^3, as described, for the purpose of stopping the auxiliary red hour-hand e^{10}, the positively-driven gear-wheel a^{15}, which normally drives the said friction-disk through the hair-spring e^6, will continue to be revolved. The hair-spring e^6 is sprung around the thimble e^{11} with a slight frictional contact

which will constantly slip, so that the wheel a^{15} will continue to revolve without carrying the disk e^3 with it. When the friction has been removed from the disk e^3, which will occur after the lever c has been depressed the second time, but not until the clock has been again started, by turning the shaft a^8, by means of the button a^9, and thereby causing the lever f to drop down off of the enlargement d^9, as shown in Figs. 2 and 3, then the light coiled hair-spring e^6 will cause the disk e^3 to be rotated upon its axis until the bent projecting end of the spring e^4 comes in contact with the pin e^5 of the gear-wheel a^{15}. At this time the red hand will be carried around and rest immediately under the regular black hour-hand of the clock, because the pin e^5 bears this definite relation with the hour-hand a^{19}. The clock may then be set, and the registering-hand e^{10} will not be in view during the day when the device is operating as a clock. The clock may be used to keep accurate and correct time and properly indicate the same as with ordinary clocks during the day.

The object of dividing the space between the adjacent hours into six divisions is to be able to indicate more accurately the location of the hands, especially of the auxiliary indicating-hand, with reference to the exact time at which the first indication was made, so that it may be more accurately ascertained. The auxiliary hand g' and the dial around which it is designed to be rotated are used for the purpose of ascertaining whether the clock was stopped in the A. M. or P. M. of that day and to render it more difficult for the attendant to register falsely by any illicit means that he may employ.

My invention may be used for other purposes than that described—in fact, for any purpose where a period of time or a period existing between two definite hours are desired to be ascertained. There are a number of uses to which the device may be appropriated.

There are many changes that may be made in the mechanism from that shown in the drawings without departing from the gist and spirit of my invention.

Having described my invention, what I claim as new, and desire to secure by Letters Patent of the United States, is—

1. A registering time mechanism comprising a train of gearing carrying the usual hour and minute hands, a supplementary hour-hand adapted to be revolved around a common axis therewith, a wheel on said axis by which said supplementary hand is carried, a stop for holding said wheel at a predetermined position with relation to said train, a spring for returning said wheel to said position, a friction contact for driving said wheel through said spring, and a stop for arresting the motion of said wheel, and thereby holding said supplementary hand in a fixed position, substantially as set forth.

2. A registering time mechanism comprising a train of gearing carrying the usual hour and minute hands, a supplementary hour-hand adapted to be revolved around a common axis therewith, a wheel on said axis by which said supplementary hand is carried, a stop for holding said wheel at a predetermined position with relation to said train, a spring for returning said wheel to said position, a friction contact for driving said wheel through said spring, a stop for arresting the motion of said wheel, and a means operated by said train of gearing for applying said stop, substantially as set forth.

3. In a time mechanism the combination of the cam d^2 carried by the gear-wheel d', a lever e adapted to be vibrated by said cam, a shaft e' joining said lever with the arm e^2, a friction-wheel e^3 against which said arm is adapted to impinge, and an indicating-hand e^{10} carried by said friction-wheel, substantially as set forth.

4. In a time mechanism the combination of a lever c, an angular surface c^3 on the free end thereof, a hook c^4 upon the end of said lever, a cam d^2 adapted to be rotated by the clock mechanism, pins d^5 and d^6 projecting from said cam and adapted to engage with said hook, an enlargement d^9 for raising the lever f, and the lever f adapted to arrest the motion of the clock mechanism, substantially as set forth.

In testimony whereof I have signed this specification, in the presence of two subscribing witnesses, this 26th day of October, A. D. 1900.

EDWARD H. JOHNSON.

Witnesses:
W. J. CLAIR,
O. W. DYE.