(No Model.)

A. CRAIG.

CLOCK.

No. 533,581. Patented Feb. 5, 1895.

Fig: 1.

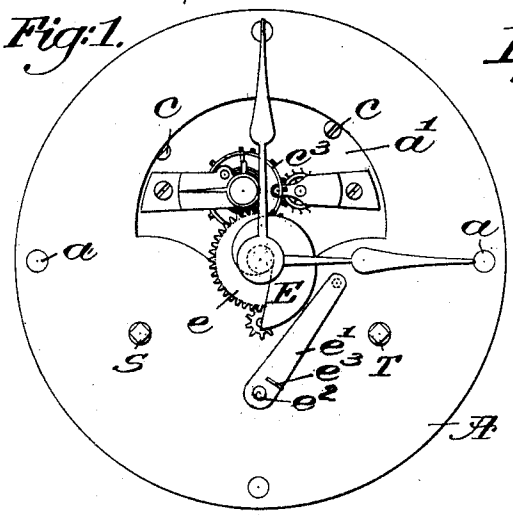


Fig: 2.

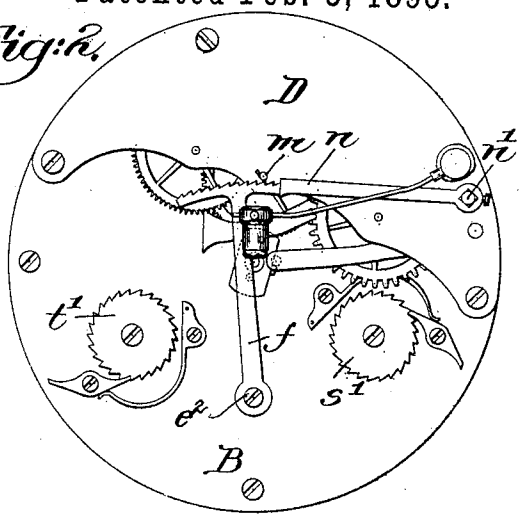


Fig: 4.

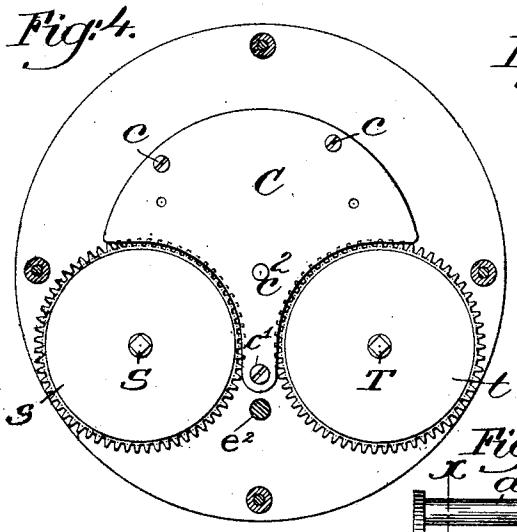


Fig: 5.

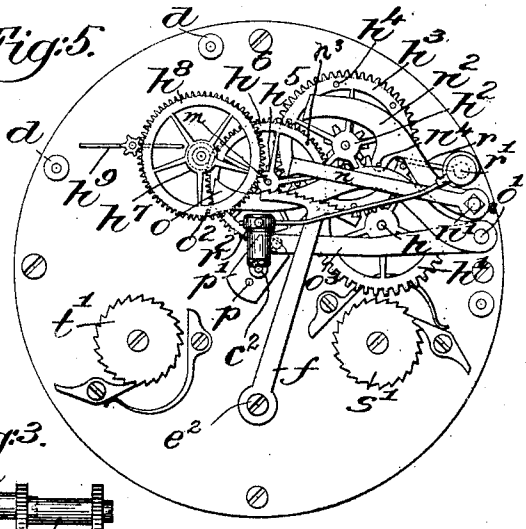
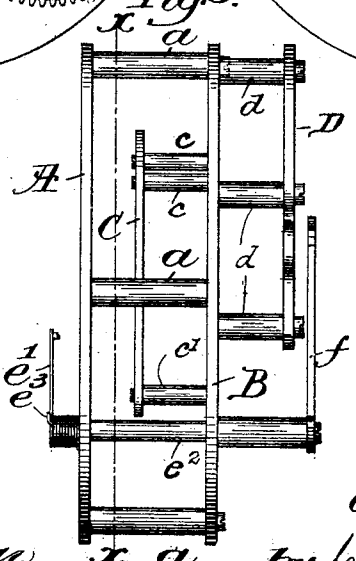


Fig: 3.



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UNITED STATES PATENT OFFICE.

ABRAHAM CRAIG, OF BOSTON, MASSACHUSETTS.

CLOCK.

SPECIFICATION forming part of Letters Patent No. 533,581, dated February 5, 1895.

Application filed April 6, 1894. Serial No. 506,568. (No model.)

To all whom it may concern:

Be it known that I, ABRAHAM CRAIG, of Boston, county of Suffolk, State of Massachusetts, have invented an Improvement in Balance-Clocks, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

This invention has for its object to simplify and improve what are known as "balance clocks," *i. e.*, clocks having a balance escapement, as distinguished from a pendulum escapement.

One of the principal objects which I have had in view in devising my improved clock, is the application of a striking train, without complicating the time train or principal mechanism of the clock.

The simplest arrangement of the barrels for the time and striking trains is side by side, each being wound by its own independent winding arbor, projecting, preferably, through to the clock dial and accessible from the face of the clock. It is also desirable that the time train be arranged between the usual middle plate and a segmental intermediate plate between the middle and front plates; but in order to separate the time and striking barrels as above referred to, it is necessary to provide a novel means for supporting the said intermediate plate, and my invention comprehends a kite-shaped intermediate plate which is supported upon pillars projecting forward from the middle plate and above the line of the winding arbors or barrels referred to, the depending tail portion of the said intermediate plate extending down between the winding barrels and sustained at its lowest end, upon pillars, also projecting from the middle plate, but below the said winding arbors or barrels. The balance escapement is arranged at the front of this intermediate plate and preferably exposed to view through a segmental opening in the front plate. It is desirable that the striking train be arranged at the back of the clock between the middle plate and the usual back plate, but it is also necessary that the ratchets upon the winding arbors of the striking and time train and the clicks therefor, be also accessible, in order that the springs may be unwound readily when the clock is to be repaired or taken apart. I have, therefore, sought to so concentrate the striking train at the back of the clock, as to leave the winding and ratchet clicks referred to easily accessible, and this I have accomplished by making the back plate in the form of a segment, located preferably at the upper side of the clock; and between the segmental plate and the middle plate is concentrated the entire striking train, thereby leaving the lower half of the middle plate practically uncovered, and making the winding ratchets and clicks easily accessible.

A third object which I have had, is the simplification of the striking mechanism.

Prior to my invention in clocks of this type, it has been common to arrange the snail, which determines the number of blows to be struck at any one time, at the back of the clock, with the striking train, but in so locating the snail, it becomes necessary to employ an independent train to operate it, similar to the train which operates the hands at the face of the clock, inasmuch as the snail and hour hand must move together.

This my present invention comprehends the arrangement of the snail at the face of the clock upon the hour wheel, so that a single driving train suffices for both. The snail finger is mounted upon an arbor which extends through to the back of the clock, where, upon its opposite end is mounted the usual striking rack or sector.

In the drawings, Figure 1 represents in face view, the preferred construction of clock movement, embodying my invention; Fig. 2, a view looking at the back of the movement shown in Fig. 1. Fig. 3 is a left-hand side view of Fig. 2 without the gearing. Fig. 4 is a vertical section on the dotted line *x*—*x* Fig. 3, looking to the right toward the segmental intermediate plate; and Fig. 5 a view similar to Fig. 2, with the back plate removed to expose the striking train.

Referring to the drawings, A and B are the usual front and middle frame plates connected at proper points by the pillars *a*, *a*.

S and T are the winding arbors of the striking and time trains, said arbors being located in the same horizontal plane, as shown, and journaled in the front and back plates A and

B, said arbors having mounted upon them the usual spring barrels s and t, see Fig. 4, forming parts of and connected in usual manner with their respective time and striking trains, the former of which is not, with the exception of the balance, herein further shown, as the same does not form a part of my invention.

C is the intermediate plate between which and the middle plate B, are journaled the arbors of the time train, the said intermediate plate, as herein shown, being kite-shaped and supported upon suitable pillars c, c and c', the pillars c being arranged above the horizontal line of the winding arbors S and T, while the pillar c', is at the extreme end of the depending tail portion of the intermediate plate, which tail portion extends down between the barrels s and t, as best shown in Fig. 4, so that the said pillar c' is below the horizontal line of the said winding arbors.

In a clock movement embodying my invention and with the spring barrels side by side, it becomes necessary to carry this pillar c' below the horizontal line of the winding arbors, in order that it may clear the usual center wheel mounted upon the center arbor of the time movement, which arbor is shown at c^2, Fig. 4.

The balance c^3, of the time train, is shown in Fig. 1 in its preferred location at the front of the intermediate plate, and exposed to view from the face of the clock through a segmental opening a', in the front plate A.

Referring to Figs. 2, 3 and 5, D is the back plate, shown as segmental in form, and supported upon suitable pillars d, projecting rearwardly from the middle plate B, the striking train being arranged between this segmental back plate and the said middle plate, as best shown in Fig. 5.

It will be seen that by making the back plate D in the form of a segment, and locating the latter at the upper side of the clock, the entire striking train is removed from the vicinity of the ratchets s' and t' of the striking and time trains, leaving the latter with their clicks easily accessible from the back of the movement when repairing or cleaning is necessary. This point is of great practical importance, for it enables clock repairers to let down the main springs without danger of injuring or breaking any of the parts.

Referring now to Fig. 1, E is the snail, which, in accordance with my invention, is mounted directly upon or secured to and movable with the hour wheel e, and it is, therefore, driven by the same train as the said hour wheel. The snail finger e' is also arranged at the front of the movement, and is mounted upon the front end of an arbor e^2, which is journaled in the front and middle plates A, B, said arbor projecting through to the back of the latter, as shown in Fig. 3, where, upon its rear end, is mounted the striking ratchet or sector f. See Fig. 2. A coil spring e^3 encircles the front end of the arbor e^2, outside the front plate, and tends to press the said snail finger normally toward or against the periphery of the snail, said spring enabling me to arrange the parts connected with the said arbor in the best possible manner from a mechanical standpoint, making it unnecessary to so locate the parts that they will be actuated by gravity, as heretofore in clocks of this kind.

Referring now to Figs. 2 and 5, h is the intermediate arbor, upon which is arranged the intermediate pinion in mesh with and driven by the main striking wheel of the striking barrel s, said arbor also having fast upon it the intermediate wheel h' in mesh with and driving the second pinion h^2 upon the arbor, on which is made fast the second striking wheel h^3 provided with the usual lifting pins h^4, to be referred to. The striking wheel h^3 drives a third pinion h^5 upon the arbor of which is the third wheel h^6, in mesh with and driving the fourth pinion h^7, and fourth wheel h^8, the latter in turn driving the fan h^9, all as usual in striking trains. Upon the arbor of the third wheel h^6, is mounted the gatherer m, which co-operates with the teeth of the ratchet sector f to feed the latter along, tooth by tooth, as the blows are struck. The rack-pawl n is mounted upon the stop arbor n', which latter also has fast upon it the stop lever n^2, shown in Fig. 5, the latter co-operating with a pin n^3 on the third wheel of the striking train, to be referred to. The stop lever n^2 has a lifting pin n^4, which normally rests upon the warn lever o, mounted upon the arbor o', and adapted to co-operate with a warn pin o^2, on the fourth wheel h^8 of the striking train. The arbor o' also has fast upon it, the lifting lever o^3 actuated by one of the pins p of the lifting collet p' on the center arbor of the time movement.

The striking pins h^4 of the striking wheel h^3, actuate a short arm r, on the arbor r', carrying the hammer r^2.

The operation of the striking train is as follows, viz: The normal position of the ratchet sector f is as shown in Fig. 2, the same being held in its position at the left by the rack-pawl n dropped behind its end, the striking train being normally locked against movement by the stop lever n^2 which normally stands behind the stop pin n^3 on the third wheel h^6. The warn pin o^2 on the fourth wheel h^8, is, at such time, in a position just back of its position Fig. 5, as shown by dotted lines. Just before the hour, one of the pins p of the lifting collet p' raises the end of the lifting lever o^3, and turns its arbor o' to raise the warn lever o into the path of movement of the warn pin o^2 on the fourth wheel, such movement of the said warn lever, acting through the pin n^4, to raise the locking lever n^2 from behind the locking pin n^3, to release the striking train and permit it to run through nearly one complete rotation of the fourth wheel h^8, or until the warn pin o^2 on the said

wheel brings up against the end of the safety warn lever, raised as before described. The train remains in this condition until the hour is reached, when the pin p of the lifting collet which raised the lifting lever, moves from under the end of said lever and permits the latter to drop, thereby also dropping the warn lever o from behind the warn pin o^2, and releasing the striking train and permitting it to run and strike the required number of blows. When the locking lever n^2 is raised to release the striking train and permit it to move into control of the warn lever, the ratchet pawl n is, at the same time, by reason of its being on the same arbor, raised from behind the ratchet sector, to thereby permit the spring e^3 on the snail finger to move the latter from its position Fig. 1, against the snail, thereby moving the said ratchet sector a certain number of teeth under the end of the ratchet pawl, the number of teeth being determined by the length of movement of the snail arm before it reaches the periphery of the snail, the position of the snail and hour hand determining this. The striking train, therefore, starts with the ratchet pawl n in its elevated position Fig. 5, and runs until the ratchet gatherer m, by successive rotations,—of which there is one for each blow struck,—moves the ratchet sector along to the left Fig. 5, and permits the pawl n to drop into its position Fig. 2 behind the end of the ratchet, such dropping of the pawl also dropping the locking lever n^2 into the path of movement of the locking pin n^3 to stop the train.

This invention is not restricted to the particular shapes of the several plates shown, for the same obviously may be more or less varied without departing from the scope of the invention. Neither is my invention limited to the particular construction of parts entering into the winding train, and the connections between the same and the snail at the front of the movement.

I claim—

1. In a clock, the front and back plates adapted to receive a time train and its usual appurtenances between them, a center arbor, the segmental plate D arranged upon the back plate above and clear of the center arbor, and a striking train supported between said segmental plate and the back plate, substantially as and for the purpose described.

2. In a clock, the combination of front and back plates, a center arbor, a snail on said center arbor arranged at the face of the clock, an arbor e^2 extending from the face of the clock through to the back and bearing at the face a spring snail-finger and at the back the usual striking ratchet or sector, and a striking train arranged at the back, substantially as described.

3. In a clock, the combination of front and back plates, a center arbor supported therein, and receiving a snail, an intermediate kite-shaped plate adapted to receive and support a time train, a segmental back plate arranged above and clear of the center arbor, a striking train supported by such segmental plate, an arbor e^2 extending from the face of the clock through to the back and bearing at the face a spring snail-finger and at the back the usual striking ratchet or sector, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

ABRAHAM CRAIG.

Witnesses:
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