2 Sheets—Sheet 1.

M. BOCK.

Clock-Case.

No. 208,563. **Patented Oct. 1, 1878.**

Fig. 1

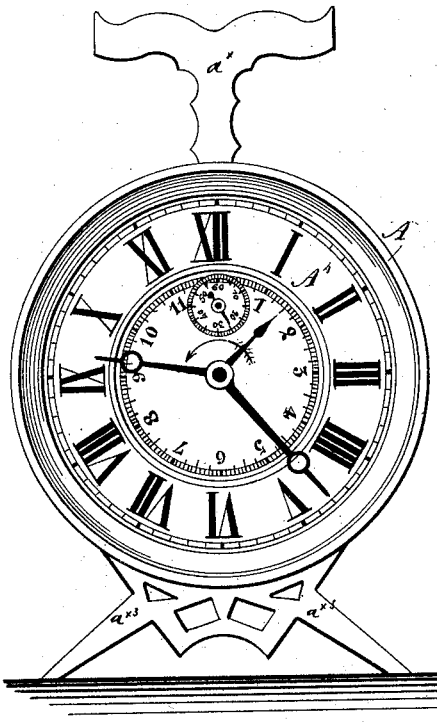


Fig. 2

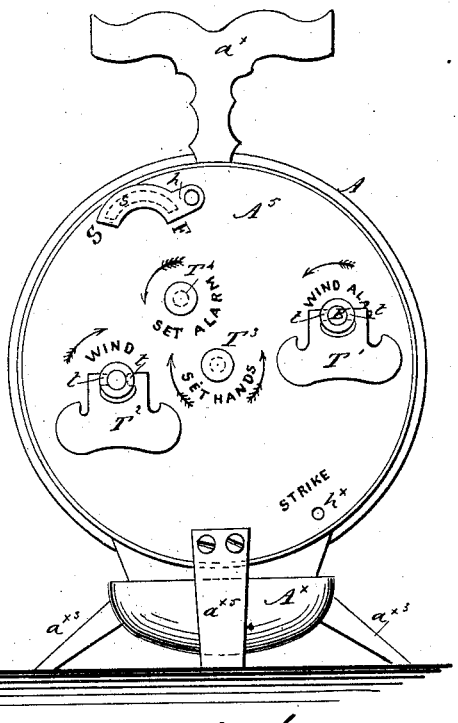


Fig. 3

Fig. 4

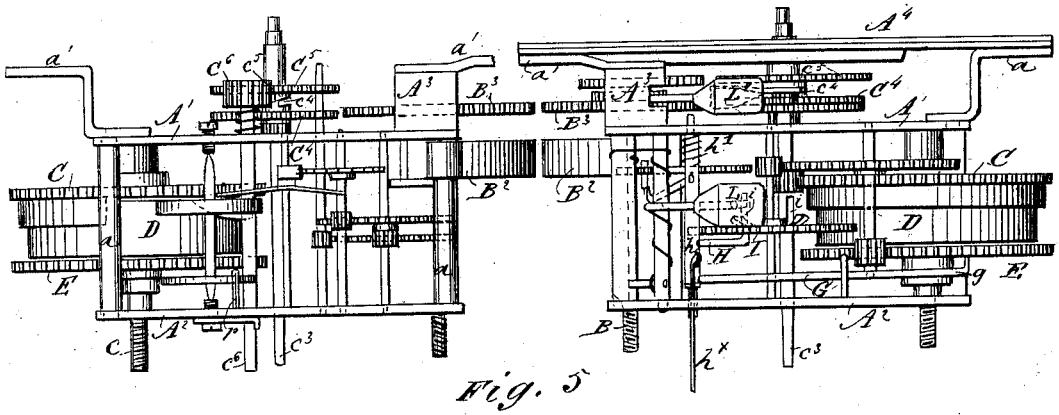
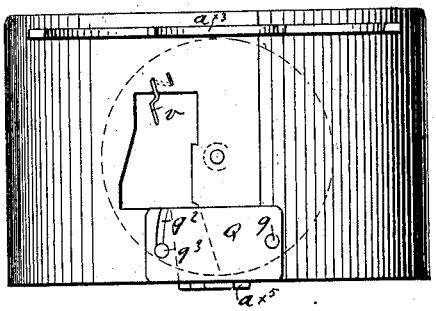


Fig. 5



WITNESSES:

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INVENTOR:

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2 Sheets—Sheet 2.

M. BOCK.

Clock-Case.

No. 208,563. Patented Oct. 1, 1878.

Fig. 6

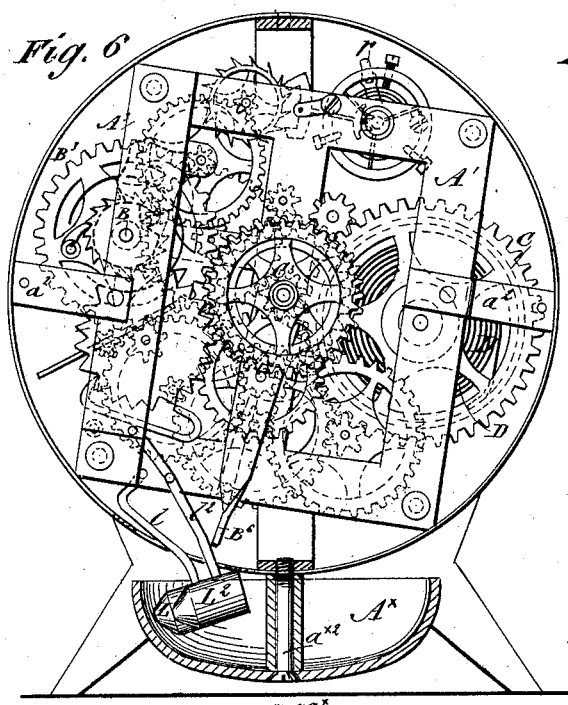


Fig. 8

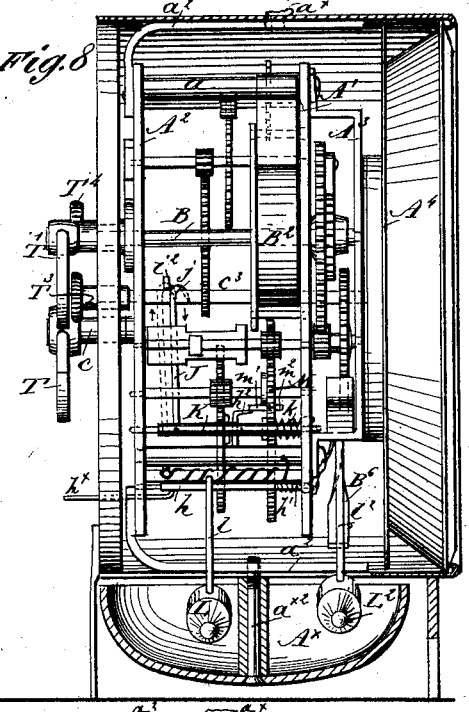


Fig. 7

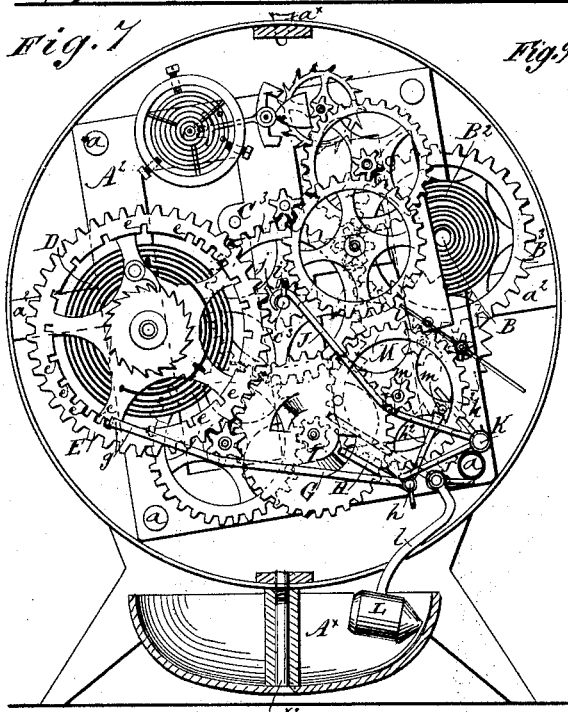
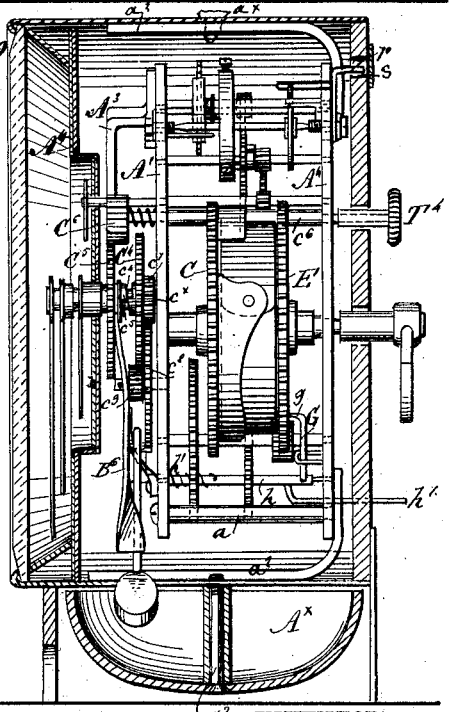


Fig. 9



WITNESSES:

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UNITED STATES PATENT OFFICE.

MARTIN BOCK, OF HUGHESVILLE, (DRUM'S P. O.,) PENNSYLVANIA.

IMPROVEMENT IN CLOCK-CASES.

Specification forming part of Letters Patent No. **208,563**, dated October 1, 1878; application filed August 1, 1878.

To all whom it may concern:

Be it known that I, MARTIN BOCK, of Hughesville, (Drum's P. O.,) in the county of Luzerne and State of Pennsylvania, have invented new and useful Improvements in Clocks, of which the following is a specification:

My invention relates particularly to a clock actuated by a spring instead of a weight, and provided with a balance-wheel escapement instead of a pendulum.

The invention consists in certain novel details of construction, arrangement, and combination of devices, hereinafter particularly described, whereby a time-movement, a striking-movement, and an alarm-movement are carried in and by a single frame, and inclosed in a case of neat appearance and of compact form and size; provision is made for operating and regulating the various parts from the exterior of the case; a cheap, substantial, and serviceable clock is produced, and several advantages are obtained.

The accompanying drawing represents a clock embodying my improvements.

Figure 1 is a face view of the clock inclosed in the case. Fig. 2 is a rear view of the same. Fig. 3 is a top view of the mechanism removed from the case. Fig. 4 is a bottom view of the same. Fig. 5 is a bottom view of the clock-case. Fig. 6 is a front view of the mechanism in place in the case, with the clock-face removed. Fig. 7 is a rear view of the same, with the back of the case removed. Fig. 8 is a side view of the mechanism, with the clock-case in vertical section, looking toward the right-hand side of Fig. 1 or Fig. 6. Fig. 9 is a similar view, looking toward the left-hand side of said figures, or toward the right-hand side of Figs. 2 and 7.

Similar letters of reference indicate corresponding parts.

The entire mechanism is attached to and carried by a frame composed of a front plate, A^1, and a back plate, A^2, connected by posts *a* at the corners. This frame is secured to the case A, and held firmly in place thereon at two points, and in a very simple manner, as follows: To the back plate, A^2, are secured two arms or strips of brass, a^2 a^2, one at the top and the other at the bottom. Each arm or strip is riveted at one end to the rear or outer side of the plate A^2, and is then bent forward toward the front of the frame, parallel with the various wheel shafts or arbors. A tap-hole is formed in each arm for the reception of a screw passing through the case A. In order to utilize said screws not only for fastening the frame, but for other purposes, the upper one is provided with an ornamental handle, $a^\times$, for carrying the clock, and the lower screw, $a^{\times 2}$, is employed for securing the bell $A^\times$ to the case A.

To the front plate, A^1, and to an additional plate, A^3, hereinafter referred to, two arms or strips of brass, a^1 a^1, are riveted, and to these two arms the clock face or dial A^4 is secured by screws. By this mode of attaching the face to the frame and securing the frame to the case I avoid the necessity for attaching the frame which carries the mechanism to an extra frame or ring before attaching it to the clock-case, as has heretofore been necessary.

The clock-case A is of circular form, preferably of metal, and may be plain or ornamental, as may be preferred; and it is provided with feet $a^{\times 3}$. The back A^5 is inserted in the case flush with its rear edge, where it is held in place by pins or screws, and it is provided with a foot, $a^{\times 5}$. These three feet support the clock, and provide ample space for the bell $A^\times$, located under the case.

The bell $A^\times$ receives the blows of the hammer L, which strikes the hours, and also of the hammer L^2, connected with the alarm-movement. Heretofore the alarm-movement in a clock has been carried in a special frame separate from that which carried the clock mechanism, and has been attached at another point in the clock-case, and connected by a rod or wire with a cam-wheel on the sleeve of the hour-hand wheel, which cam also carried a plate marked with figures corresponding with the twelve hours.

In my invention the alarm-movement is attached to and carried by the main frame.

The arbor B has its bearings in the back plate, A^2, the front plate, A^1, and an additional plate, A^3, having its ends bent laterally and then longitudinally, and secured to the front plate, A^1, at one side of the frame. The spring B^2 has one end connected to one of the posts *a*, and the other end to the arbor B, in rear of the front plate, A^1; and the main wheel B^3 and its ratchet and click are arranged on

said arbor in front of the front plate, A^1, and between it and the plate A^3. The alarm-hammer shank and the wheel and pinion driven by the main wheel B^3 also have their bearings between the front plate, A^1, and the plate A^3.

By this arrangement of the parts the entire mechanism is carried by the main frame, and a space in said frame is utilized which would otherwise be vacant.

Instead of the ordinary cam-wheel and disk for setting the alarm-movement, I employ a toothed wheel carrying a hand; and I mark an additional dial on the clock-face corresponding with the main dial. The alarm-hand wheel is set by a pinion carried by an arbor extending through to the back of the frame.

The parts are arranged and operated as follows: The center-wheel C^3 receives motion from the great-wheel C, and the center-wheel arbor c^3 carries the hour-hand wheel C^4, in the usual manner. The alarm-hand wheel C^5 is formed with a sleeve or hub, like the usual hour-hand wheel, and fits over the sleeve or hub of said wheel C^4, so as to turn independently thereof. On the inner end of the hub of the wheel C^5 is a cam, c^5, of a form somewhat resembling a ratchet or saw-tooth; and on the outer end of the hub of the wheel C^4, or the portion of said wheel from which its sleeve extends, is a notch or shoulder, c^4, corresponding in form with the tooth or cam c^5. (See particularly Figs. 3 and 9.) When the tooth c^5 and notch c^4 are exactly opposite to each other they engage, somewhat like a clutch, so that the wheel C^4 will move in one direction without turning the other; but if moved backward, or in the other direction, it carries the other with it, and the wheel C^5 will move indefinitely in one direction independently of the other, but can only make one revolution in the opposite direction. The wheel C^5 is turned in order to set the alarm-hand by means of a wheel, C^6, on an arbor, c^6, journaled in the front and back plates of the frame, and provided with a thumb-wheel, T^4, for turning it.

For holding the alarm-hammer to prevent it from striking except at the proper time, I employ a lever, B^6, having its fulcrum just below the center-wheel shaft, and provided with a spring, b^6, below its fulcrum, for pressing its lower end outward and its upper end inward. The upper end of this lever is forked, and fits around the hub of the wheel C^5, between the inner side of said wheel and a flange, c^x, formed on said hub between the side of the wheel and the tooth or cam c^5. By means of this spring-lever the wheel C^5 is enabled to move outward while the wheel C^4 is turning independently of it, and is forced inward when the tooth c^5 and notch or shoulder c^4 are opposite each other, so as to cause their engagement, as before described.

The lever B^6 is made of a strip of metal, and its lower end is twisted one-quarter of a turn, so as to place its width at right angles to the width of the main portion of its length. This twisted lower end bears against the shank l^2 of the alarm-hammer L^2 as long as the tooth or cam c^5 and notch or shoulder c^4 are not engaged with each other, and prevents the hammer from striking the bell; but as soon as said parts arrive opposite each other the wheel C^5 is forced inward by the action of the spring b^6 on the lever B^6, and the lower end of the lever is thrown outward, so as to relieve the shank l^2 and allow the hammer to strike the bell.

In striking-clocks as heretofore constructed two sets of mechanism were necessary—one for the going or time movement and one for the striking-movement—and each set required a separate spring independent of the other.

In my invention both the time-movement and the striking-movement are driven by one spring, which is arranged in a different manner from that heretofore employed.

One end of the mainspring D is attached to the great-wheel arbor c, and the other end is attached to the great-wheel C, which is loose on said arbor. The great-wheel C lies on one side of the spring D and the striking-wheel E on the other side. The striking-wheel is loose on the arbor, and is provided with a click, engaging with a ratchet which is fast on the arbor.

By this arrangement of the spring and the wheels, the one spring operates both wheels and drives them in opposite directions. The great-wheel C engages directly with the gearing on the center-wheel arbor, which, in turn, drives the rest of the going-train; and the striking-wheel E engages directly with the striking-train.

In clocks as heretofore constructed the striking is regulated by the engagement of a stop-lever with a locking-plate provided with notches corresponding with the hours. The locking-plate is arranged to revolve in a vertical plane, being usually carried by the striking-wheel or its arbor, and the notches are formed in the periphery of the plate. The stop-lever works vertically, and has its upper end bent and flattened, and arranged to drop into the notches at certain intervals, in order to arrest the motion of the striking-wheel when the striking of the hour is completed.

In my invention the ordinary locking-plate is dispensed with, and instead thereof I form the notches on the inner edge of the rim of the striking-wheel E, which thus practically forms a locking-plate. The notches e are arranged in two sets, each indicating twelve hours, as the wheel E revolves once in twenty-four hours.

The stop-lever G is arranged to work laterally instead of vertically, as heretofore. Its front end, g, is bent and flattened, and enters the sides of the notches e instead of the tops thereof. Its rear end is attached to a shaft, h, which is arranged to slide longitudinally, and carries a hooked arm, H, engaging with holes in a disk-wheel, I, provided with pins i, which engage with the tail of the hammer-

shank *l*, to give motion to the hammer and cause it to strike the bell. The shaft *h* is provided with a spring, h^1, which has a tendency to pull it toward the front of the frame.

The hammer L is hung in a position in the frame between the shaft *h* and one of the posts *a*. Just over this post a shaft, K, has its bearings, and is arranged to slide longitudinally therein, being provided with a spring, *k*, having a tendency to pull it toward the front of the frame. This shaft K carries an arm, J, the outer end of which is formed into a hook, *j*, which hook is also bent diagonally toward the center of the front of the frame. The shaft K also carries an arm, J^2, which extends between the hooked arm H and the front of the frame. The center-wheel arbor c^3 passes through the hook *j*, and has projecting from it a pin, i^2, for engagement with said hook. As the center-wheel arbor revolves in the proper direction to move the hands forward, the pin i^2 bears against one side of the laterally-inclined portion of the hook *j*, in the same manner as against a cam or inclined plane, and pushes it toward the back of the frame, causing the arm J^2 to pull backward on the hooked arm H and disengage it from the holes in the disk-wheel I, and also disengage the stop-lever G from the notches *e*, so as to produce the movement technically called "warning," which is done in the following manner: The disk-wheel I gears with a pinion, *m*, on the same shaft with a wheel, M, which drives the fan-fly. The wheel M is provided with two studs or stops, m^1 m^2, on opposite sides, which may be formed by passing a pin through a hole in the wheel, so as to project on both sides. The stop m^1 engages with an arm, k^2, on the shaft *h*, and the stop m^2 engages with an arm, k^2, on the shaft K. While the stop m^1 and arm k^2 remain engaged the wheel M cannot turn; but when the pin i^2 on the center-wheel arbor c^3 has nearly reached the end of the hook *j*, a few minutes before striking, the longitudinal movement of the shafts K and H toward the back of the frame disengages the arm k^2 and stop m^1, and allows the wheel M to make one revolution; but as the wheel M revolves with more than double the velocity of the disk-wheel I, said disk-wheel does not turn far enough to allow one of its pins *i* to engage with the hammer-shank *l*.

The engagement of the arm k^2 with the stop m^1 is at a point somewhat forward of the point of engagement of the arm k^2 with the stop m^2, and the act of releasing the arm k^2 from its position in front of the stop m^1 has the effect of causing the arm k^2 to pass behind the stop m^2 as the wheel M begins to turn, so as to be in front of said stop when it reaches the same point again after making one revolution. This one revolution produces the movement called "warning," and this engagement of the arm k^2 and stop m^2 arrests the movement of entire striking-train, but holds the parts in readiness to move as soon as they are released.

When the hands of the clock reach the exact position for striking the hour, the pin i^2 on the arbor c^3 reaches the end or point of the cam or hook *j*, whereupon said end or point immediately slips over said pin i^2 and allows the shaft K to be drawn by the spring *k* to its former position, so as to disengage the arm k^2 from the stop m^2, and allow the striking-train to move and operate the hammer.

The arm k^2 is so arranged with relation to the disk-wheel I and hooked arm H that when the arm k^2 is engaged with the stop m^2 the hooked arm H is disengaged from the holes in the disk-wheel, and is ready to ride on the solid portion between said holes, so as to allow said disk-wheel to turn; and the holes in said disk-wheel I and the notches *e* in the wheel E, together with the hooked lever H and the bent end *g* of the stop-lever G, are so arranged with relation to each other that while the hammer is striking the hour the end *g* travels on the solid metal between two notches, *e*, and prevents the hooked lever H from springing into the holes in the disk-wheel I.

When the striking of the hour is completed, the next notch *e* has reached the end *g* of the stop-lever, which then springs into said notch, and the hooked lever H engages with the disk-wheel I, and thus arrests the movement of the wheel I, and consequently of the entire striking-train, and prevents the movement thereof until the center-wheel arbor has again turned far enough to cause the pin i^2 to engage the cam or hook *j* and repeat the movements before described.

In striking-clocks as heretofore constructed the hands of the clock cannot be turned backward without interfering with the striking mechanism. In my invention provision is made for turning the hands both backward and forward without touching the hands themselves. The center-wheel arbor c^3 extends entirely through the back A^5 of the case A, and is provided with a thumb-wheel, T^3, for turning it. As the center-wheel and its pinion are held on the arbor c^3 only by friction, said arbor may be turned by hand in either direction without affecting the going-train.

The engagement of the pin i^2 with the hook or cam *j* when the hands are moving forward is on the front side of the laterally-inclined portion of said hook, and the result is that the striking-train is set in motion, as before described; but when the arbor c^3 is turned in the opposite direction to move the hands backward, the pin i^2 passes behind the rear side of said hook and does not move it backward, and consequently does not interfere with the striking mechanism in any manner.

The turning of the hands by hand is accomplished by means of a pinion, c^7, fast on the arbor c^3, in front of the front plate, A^1, gearing with a wheel, c^8, on the shaft, with a pinion, c^9, which in turn gears with the hour-hand wheel C^4. By this means provision is made for turning the hands in either direction by

hand without touching them and without interfering with the proper working of either of the trains.

The arbor B of the alarm-movement extends through the back A^5, and is provided with a key, T^1, for turning it. It may also be provided with what is known as a "Geneva stop," to prevent the spring from being wound too tight. The great-wheel arbor *c* also extends through the back A^5, and is provided with a similar key, T^2. Each of these keys has its shank provided with an internal thread for engagement with an external thread on the arbor, and is thus kept always in place and ready for use.

In order to be out of the way when not in use, the bows are connected with the shanks by pivots, so that they may hang down. Each bow is made of a solid piece of flat metal, with two inwardly-turned pivots, *t*, which are sprung into place in holes in two opposite sides of the shank, near its outer end.

The shaft *h* is provided with an arm, $h^\times$, which extends through a hole in the back A^5. By pulling outward on this arm the striking-train is set in motion and the clock made to strike independently of the going-train.

The regulating-lever *r*, for regulating the balance-spring, works in a slot, *s*, in the back A^5, provided with a sliding or swinging plate, *p*, for covering it. By this means the clock may be regulated from the exterior of the back of the case.

In the lower side of the circular case A is an opening for the working of the hammer-shanks. A portion of this opening is covered by a door or plate, Q, swinging on a pivot, *q*, and provided with a notch, q^2, for engagement with a stud, q^3, on the case. By this means the plate may be moved outward to allow the hammer-shanks to pass, and may be moved inward and fastened so as to leave only room for them to operate.

Attached to the edge of the opening in the bottom of the case is a spring, *v*, for throwing the hammer L^2 out of contact with the bell $A^\times$ after each stroke, in order to prevent interference with the vibration of the bell when struck.

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

1. In combination with the case A and the upper arm a^2 of the frame, the screw $a^\times$, having its upper part formed into a handle, whereby said screw is made to serve the double purpose of securing the frame to the case and providing for carrying the clock, substantially as herein described.

2. In combination with the case A and the lower arm a^2, the screw $a^{\times 2}$, serving the double purpose of securing the frame to the case and securing the bell $A^\times$ in position, substantially as herein described.

3. A wheel, C^5, provided with a sleeve or hub carrying a hand or pointer, and adapted to fit over and turn freely on the sleeve of the hour-hand wheel, in combination with an additional dial marked on the clock-face, whereby the indicating of the time for sounding the alarm is facilitated, substantially as herein described.

4. The combination, with the alarm-hand wheel C^5, of the wheel C^6, arbor c^6, and thumb-wheel T^4, arranged as shown, whereby provision is made for moving the alarm-hand from the exterior and rear of the case, substantially as herein described.

5. The combination of the alarm-hand wheel C^5, provided with the tooth or cam c^5, and the hour-hand wheel C^4, provided with the notch or depression c^4, whereby provision is made for the engagement and disengagement of the alarm-movement and the time-movement, substantially as and for the purpose herein described.

6. The spring-lever B^6, having its upper end formed for engagement with the hub of the wheel C^5 and its flange $c^\times$, and its lower end for engagement with the hammer-shank l^2, in combination with the alarm-hand wheel C^5 and alarm-hammer L^2, whereby said hammer is held motionless until the desired time for striking, and is then released and allowed to strike the bell to sound the alarm, substantially as herein described.

7. A locking-plate made in one piece with the great-wheel of the striking-train by forming the notches on the inner edge of the rim of said wheel, substantially as herein described.

8. In combination with a locking-plate formed on the rim of the striking-wheel, a stop-lever adapted to engage with the sides of said notches, substantially as herein described.

9. The combination of the center-wheel arbor c^3 and its pin i^2, the arm J and its hook or cam *j*, the shaft K and its arm J^2, the shaft *h* and its hooked arm H, the stop-lever G and its bent and flattened front end *g*, the disk-wheel I, and the striking-wheel E, provided with the notches *e*, arranged with relation to and operating in connection with each other, as shown, for operating the striking-train, substantially as herein described.

10. The combination of the center-wheel arbor c^3 and its pin i^2, the arm J and its hook or cam *j*, the shaft K, carrying the arms J^2 and k^2, the shaft *h*, carrying the hooked arm H, stop-lever G, and arm h^2, the striking-wheel E, provided with notches *e*, the disk-wheel I, and the wheel M, provided with the stops m^1 m^2, arranged with relation to and operating in connection with each other, as shown, for starting and then arresting the striking-train and holding it in readiness for striking at the proper time, substantially as herein described.

MARTIN BOCK.

Witnesses:
GEORGE HUGHES,
H. W. SCHEIRY.

Correction in Letters Patent No. 208,563.

It is hereby certified that the subject-matter of these Letters Patent specified as follows, viz: in the Letters Patent proper, and in the headings of sheets 1 and 2 of the drawings and of the specification thereto annexed, was erroneously stated by the Patent Office to be Clock Cases. It should be Clocks.

December 7, 1878.