J. PETRILLO.

CLOCK.

APPLICATION FILED APR. 14, 1914.

1,166,853.

Patented Jan. 4, 1916.

2 SHEETS—SHEET 1.

Fig. 1.

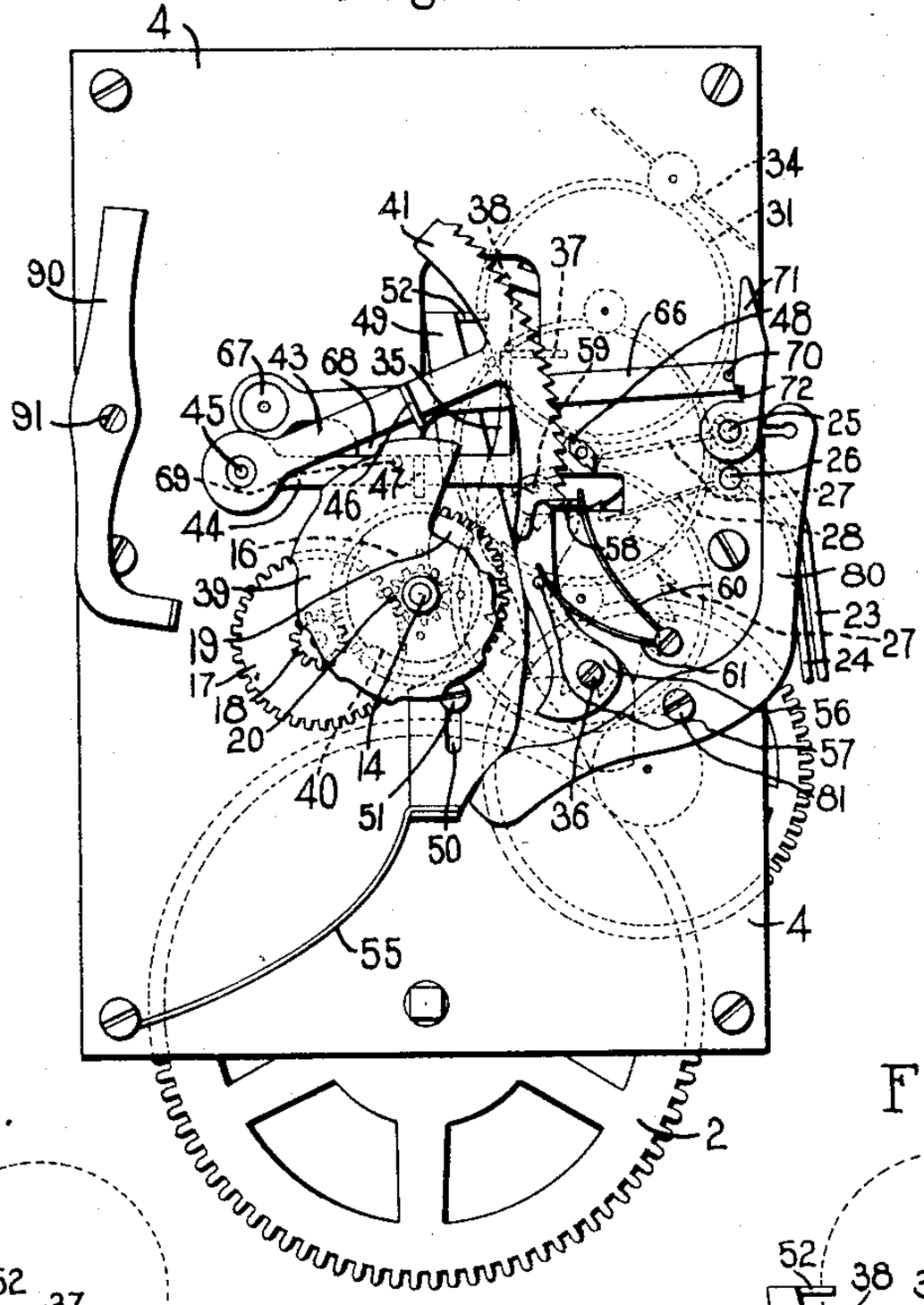


Fig. 2.

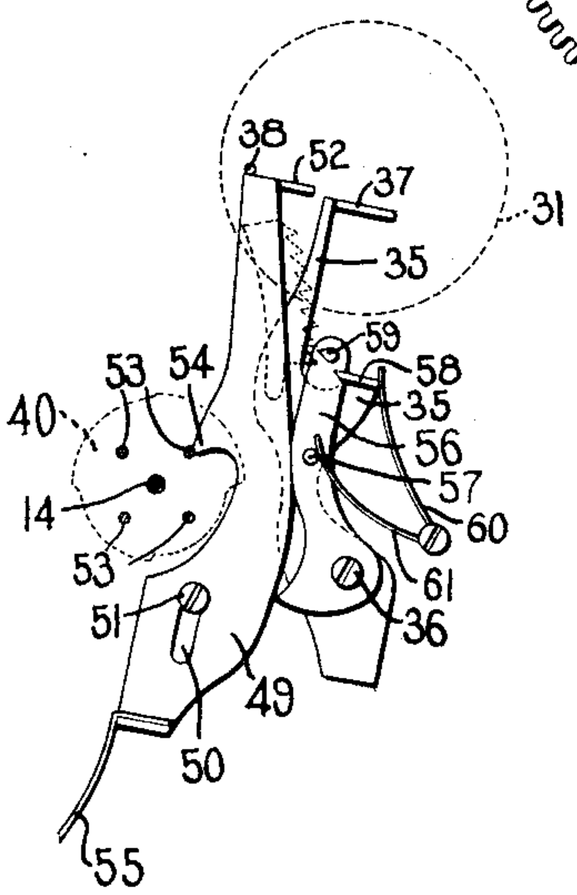


Fig. 9.

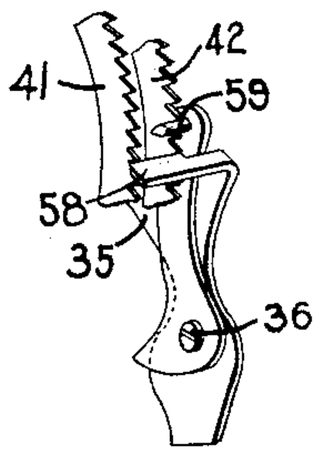
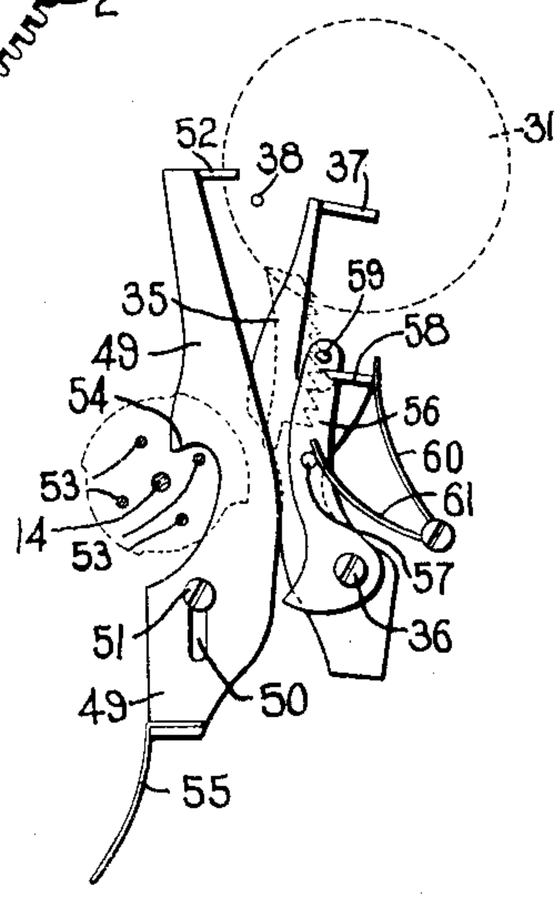


Fig. 3.



Witnesses.

J. Morrill Fuller

William E. Gagen

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Joseph Petrillo

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Att'y's

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2 SHEETS—SHEET 2.

Fig. 4.

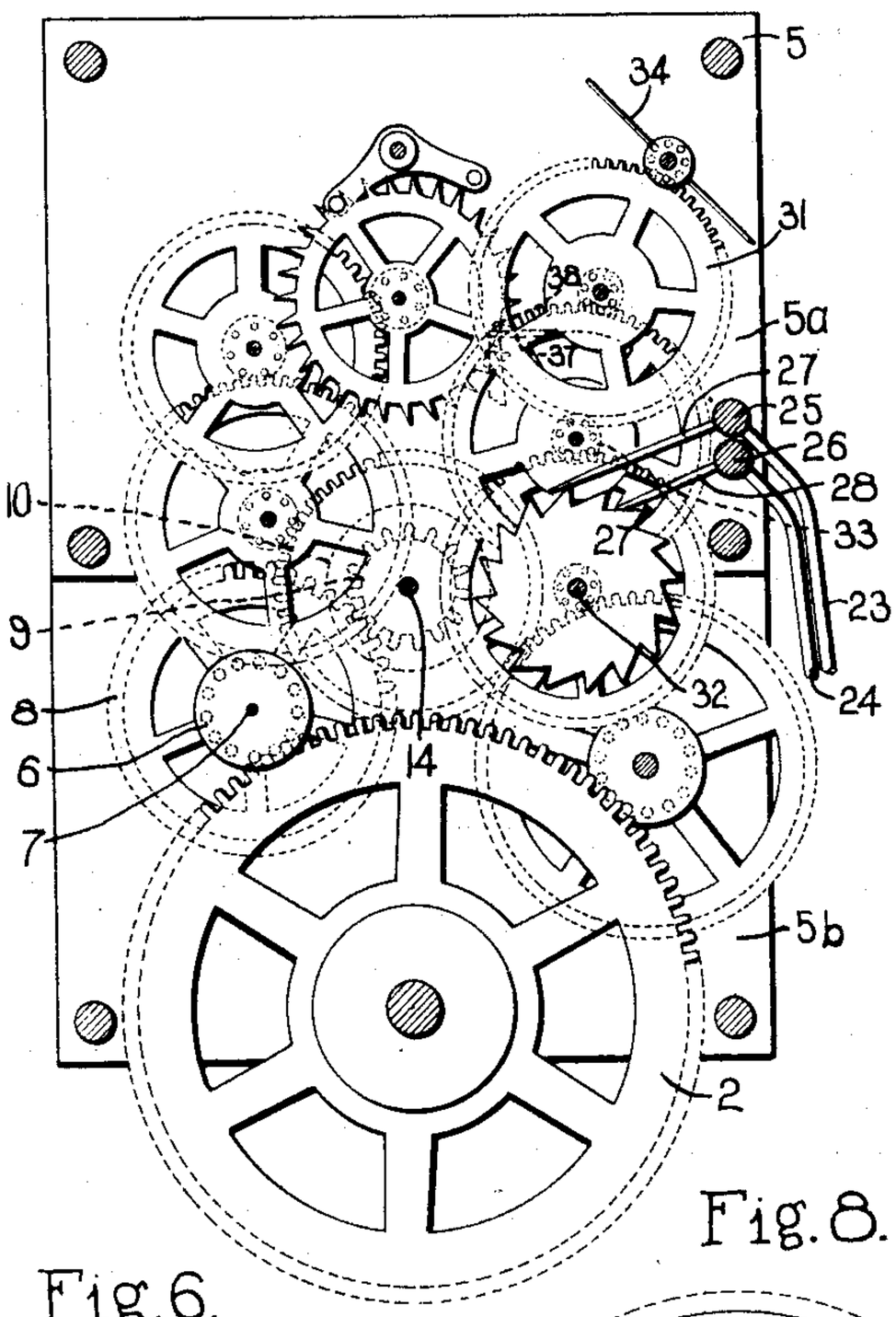


Fig. 5.

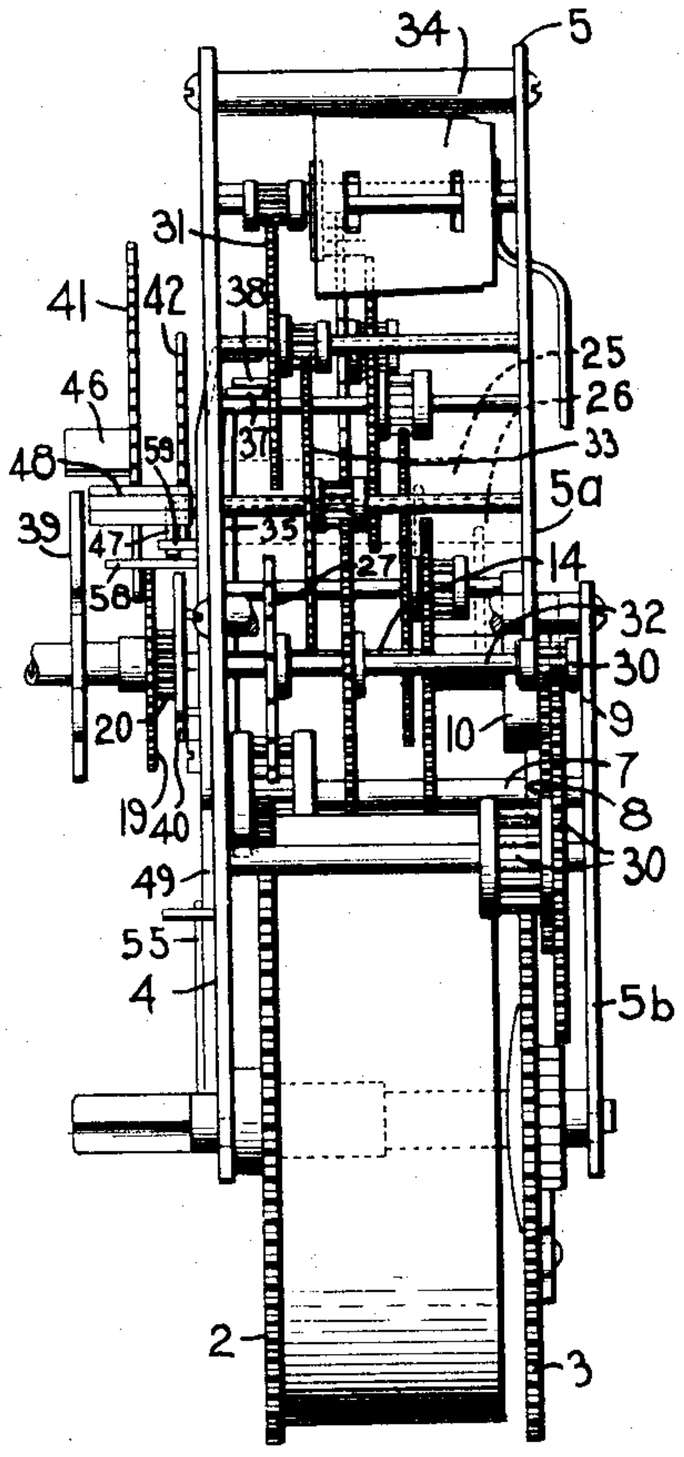


Fig. 8.

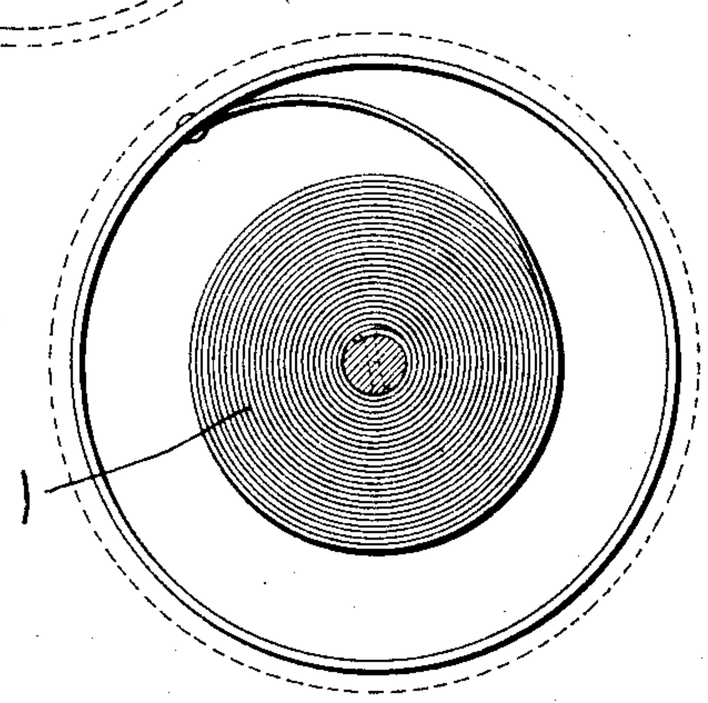


Fig. 6.

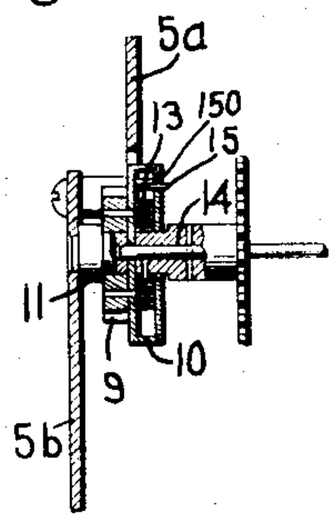
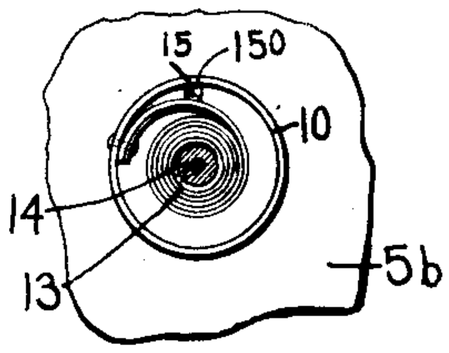


Fig. 7.



Witnesses.

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by Heard Smith & Tennant.

Att'y's

UNITED STATES PATENT OFFICE.

JOSEPH PETRILLO, OF MERIDEN, CONNECTICUT, ASSIGNOR TO THE IDEAL CLOCK MANUFACTURING COMPANY, OF WATERBURY, CONNECTICUT, A CORPORATION OF CONNECTICUT.

CLOCK.

1,166,853. Specification of Letters Patent. Patented Jan. 4, 1916.

Application filed April 14, 1914. Serial No. 831,841.

To all whom it may concern:

Be it known that I, JOSEPH PETRILLO, a citizen of the United States, residing at Meriden, county of New Haven, State of Connecticut, have invented an Improvement in Clocks, of which the following description, in connection with the accompanying drawing, is a specification, like characters on the drawing representing like parts.

This invention relates to clocks of that type which are designed to strike the quarter hour, and the objects of the invention are to provide a clock construction of this type which will permit the hands to be turned back without upsetting in any way the striking mechanism, which is provided with a repeating device so constructed that if it is operated just prior to the time when the striking mechanism normally operates, the clock will strike said time instead of repeating the time previously struck which is provided with a novel striking mechanism comprising two bells or chimes, both of which are operated to strike the quarter hours, and only one of which is operated to strike the full hour and both of which are actuated by the same wheel, and which is also provided with a novel driving mechanism for actuating the clock device, all as will be more fully hereinafter described and then pointed out in the appended claims.

Referring to the drawings wherein I have illustrated a selected embodiment of my invention, Figure 1 is a front view of a clock mechanism removed from its casing; Figs. 2 and 3 are fragmentary views of the releasing mechanism for the striking train. Fig. 4 is a vertical section taken immediately behind the front plate in Fig. 1; Fig. 5 is a side elevation of Fig. 1; Figs. 6 and 7 are detail views of the auxiliary spring for driving the time train; Fig. 8 is a view of the main spring; Fig. 9 is a fragmentary detail of the hour and quarter hour ratchets.

In the construction herein shown I employ a single main spring for operating both the clock mechanism and the striking mechanism. This main spring is shown at 1, and one end thereof is connected to a gear wheel 2 from which the clock train is driven through an equalizer spring, as will be presently described, and the other end of which is connected to a gear 3 from which the striking mechanism is operated. The spring, therefore, unwinds from both ends, the unwinding action from one end operating the clock mechanism, while the unwinding action from the other end operates the striking mechanism.

The clock frame in which the mechanism is sustained comprises the front and rear plates 4 and 5 which are connected together in usual way. The rear plate 5 is made in two sections, 5^a and 5^b, the lower section 5^b being capable of removal without disturbing the upper section. The purpose of this will presently be described.

Referring first to the clock train and the mechanism for driving it, it will be noted that the gear 2 meshes with a pinion 6 on an arbor 7 carried in the front plate 4 and rear plate section 5^b, and this arbor has a gear 8 thereon which meshes with a gear 9 fast on an auxiliary spring barrel 10. This spring barrel is loosely mounted on a stud 11 carried by the rear plate section 5^b.

13 is an auxiliary spring received within the barrel and connected thereto at its outer end, the inner end of the spring being connected to the center arbor 14 which is journaled at one end in the stud 11 and at the other end in the front plate 4 of the frame. This center arbor carries the minute hand as usual in clock mechanism, and suitable or usual reducing gearing 16, 17, 18 and 19 is employed for conveying motion from the center arbor 14 to the sleeve 20 that carries the hour hand, all as usual in clock mechanism. With this construction the main spring 1 is tending all the time to wind up the auxiliary spring through the gearing 2, 6, 8 and 9 and the power thus stored in the auxiliary spring is used to drive the clock mechanism.

I have provided herein a novel form of auxiliary spring by means of which a practically uniform tension may be maintained on said spring and which prevents said spring from being wound up beyond a certain degree. As herein shown the outer end of the auxiliary spring 13 for a limited distance is stiffer than the body of the spring. This is herein accomplished by making the outer end of the spring of double thickness, that is, a small length is secured to the extremity of the spring and loosely lies against the inner face of the spring for a limited distance. Intermediate of the ends

of this portion of double thickness said spring has a projection 15 extending therefrom which occupies a slot 150 in the spring barrel 10. In the operation of winding the auxiliary spring, it will, of course, be wound up from the center, the spring being coiled closely about the center arbor, as it is wound. During this winding process the outer end of the spring where the double thickness is will be comparatively straight and will lie closely against the wall of the barrel, but during the final winding movement of the spring, the portion of double thickness will begin to be coiled about the wound-up spring, and the projection 15 will move toward the inner end of the slot 150. This portion of double thickness is much stiffer and less flexible than the portion of single thickness, so that much greater power is required to wind this tightly around the coiled spring than is required for winding up the portion having a single thickness. As soon as the projection 15 has been brought into engagement with the inner end of the slot 150 the stiffness of the spring is further increased by reason of the fact that all further flexing of the spring must occur between the projection 15 and end of the portion of double thickness. As a result, the winding up movement of the auxiliary spring will cease when the winding movement has proceeded to such an extent that the portion of double thickness is being wound. As soon as this auxiliary spring has unwound itself sufficiently to free the portion of the spring of double thickness, then the main spring 1 will give to said auxiliary spring an added winding movement. This portion of double thickness at the end of the spring constitutes a means to limit the winding movement of the auxiliary spring and serves as a means for keeping said spring wound at all times to practically the same tension, thus causing the clock to run evenly.

It will be noted that the stud 11 on which the auxiliary spring barrel is mounted is carried by the movable section 5^b of the rear plate. It will also be noted that most of the gearing for the striking mechanism is carried in the upper section 5^a of the rear plate. The advantage of this construction is that the lower plate section 5^b can be removed if necessary to remove the auxiliary spring for repair without disturbing the smaller gearing of the striking mechanism as would be necessary if the entire rear plate had to be removed in order to gain access to the auxiliary spring. It will also be noted that the auxiliary spring is mounted on the stud 11 which forms a bearing for the center arbor 14. The advantage of this construction is that all the strain incident to winding the auxiliary spring comes on the stud and not on the center arbor.

The striking mechanism comprises two hammers 23 and 24 mounted on the two rock shafts 25 and 26, respectively. The construction is such that both hammers operate in striking the quarter hours, while the hammer 24 operates alone in striking the full hour. Moreover, the construction is such that the clock strikes not only the quarter, but also the hour at each quarter hour. For instance, at quarter past three the clock will strike once for the quarter hour and then three times for the hour. At half past three it will strike twice to indicate the half hour and then three times to indicate the hour, and at quarter of four it will strike three times to indicate three quarter hour, and three times to indicate the hour. As stated above, in striking the quarter hour both hammers are actuated, while in striking the hour the hammer 24 only operates. These hammers are both actuated from a common hammer-actuating wheel 27, the teeth of which engage arms 28, 29 extending from the rock-shafts 25, 26, respectively. This common hammer-actuating wheel is mounted on an arbor 32 which is geared to the driving gear wheel 3 by suitable train of gearing designated generally by 30. The hammer-actuating wheel 27 is normally locked against rotation by means of a stop wheel 31, as usual in clocks of this nature, this stop wheel 31 being geared to the shaft 32 of the hammer-actuating wheel by a suitable train of gearing 33 and also being geared to the fan or fly 34 by which the speed of the striking movement is regulated. This stop wheel is normally held from rotation by means of a stop member 35 pivoted to the front plate 4 at 36 and having a lip 37 at its upper end against which rests a pin 38 on the stop wheel 31. This stop member 35 is removed from the path of the pin at the proper time by a releasing mechanism, as usual in clocks of this nature.

The bushing or sleeve 20 carrying the hour hand has an hour snail 39 thereon which determines the number that will be struck at each hour and the center arbor 14 has thereon a quarter hour snail 40 which determines the number that will be struck at the various quarter hours. These two snails 39 and 40 have coöperation with two ratchet members 41 and 42, the ratchet member 41 being the hour ratchet and the ratchet member 42 being the quarter hour ratchet. These ratchet members are mounted on arms 43 and 44 pivoted at 45 upon the frame, and the arm 43 has a finger 46 extending therefrom which coöperates with the hour snail 39, while the arm 44 has a finger 47 coöperating with the quarter hour snail 40. These two ratchets 41, 42 are actuated by a rotary toothed member 48 which is connected to the arbor of one of the gears of the train of gearing 33 so that whenever the stop wheel is released the member 48 will rotate there-

by swinging the ratchets 41 and 42 upwardly.

49 is a releasing member mounted for both swinging and vertical movement on the front plate 4 of the frame. This member 49 is shown as provided with a slot 50 through which a pin 51 extends, this pin and slot providing for both a swinging and vertical movement of the releasing member. The upper end of the releasing member 49 is provided with a lip 52 which coöperates with the lip 37 on the stop member 35 for controlling the time of release of the stop wheel 31. This releasing member 49 is provided with the nose portion 54 situated to be engaged by pins 53 carried by the quarter hour snail 40. There are four such pins, said pins being so arranged that they successively engage the nose 54 at quarter hour intervals. At every quarter hour period one of the pins will engage the nose 54 and by its engagement will move the releasing member 49 to the right, Fig. 1, this movement resulting in swinging the lip 37 out of engagement with the pin 38 on the stop wheel 31 and bringing the lip 52 into the path of movement of said pin. As soon as the lip 37 has been removed from the path of the pin 38, the stop wheel 31 will make a partial rotation until it is stopped by the engagement of the pin 38 with the lip 52, as seen in Fig. 2, this partial rotation occurring just prior to the quarter hour period. Just at the quarter hour period the pin 53 will pass off from the end of the nose 54, thus allowing the releasing member to return to its normal position under the influence of the spring 55, as seen in Fig. 3, and when in this position its lip 52 is withdrawn from the path of movement of the stop pin 38 thereby allowing the striking mechanism to operate. As stated above the swinging movement of the releasing member 49 operates to remove the locking lip 37 of the stop member 35 from the path of the pin 38. This is accomplished herein by providing a spring-pressed lever 56 pivoted to the front plate at 36 coaxially with the stop member 35 and adapted to be engaged by the releasing member 49 when the latter swings backwardly, said lever 56 engaging an arm 58 extending laterally from the stop member 35, so that when the releasing member 49 is moved to the right, Fig. 1, by the pin 53, the engagement of said member with the lever 56 moves said member back against the arm 58 and through said arm shifts the stop member 35 out of engagement with the stop pin 38. The lever 56 and the arm 58 constitute stops for the ratchet members 41 and 42, respectively, to limit the downward movement thereof, the lever 56 carrying a stop pin 59 adapted to engage under the quarter hour ratchet member 42 and the arm 58 adapted to engage underneath the last tooth of the ratchet member 41, as shown in Fig. 1 of the drawings. The arm 58 and the member 56 are acted upon by springs 60 and 61 which tend normally to hold them in their position shown in Fig. 1.

The operation of the device as thus far described is as follows: As the time approaches any quarter hour, one of the pins 53 engages the nose 54 on the releasing member 49 and forces said releasing member backwardly into the position shown in Fig. 2, and during this movement the releasing member by its engagement with the lever 56 moves the latter to the right thereby carrying the stop pin 59 out of engagement with the quarter hour ratchet member 42 thereby allowing said ratchet member to drop until the finger 47 engages the snail 40. During this movement of the stop member 56 to the right it engages the stop arm 58 and carries it out of engagement with the hour ratchet member thereby allowing said member to drop into a position determined by the hour snail 39. Since the arm 58 is carried by the stop member 35, the engagement of the stop member 56 with the arm 58 operates to turn the stop member 35 about its pivot thereby to move said stop member out of engagement with the stop pin 38. This permits the stop wheel 31 to make a partial rotation in a counter clockwise direction into the position shown in Fig. 2. As stated above, the movement of the releasing member 49 brings the lip 52 thereon into the path of movement of the pin 38, so that when the stop wheel is released by the stop member 35, as above described, it will rotate until the stop pin 39 brings up against the lip 52, as shown in Fig. 2. As the quarter hour time is reached, the pin 53 is carried off from the end of the nose 54 and immediately the releasing member 49 is swung backwardly to its normal position by means of the spring 55 as seen in Fig. 3, thus removing the lip 52 from the stop pin and permitting the stop wheel 31 with its train of gearing to operate under the influence of the main spring.

It will be noted that when the releasing member returns to its normal position, as shown in Fig. 1, the lever 56 and stop arm 58 with the stop member 35 will tend to move forwardly, but their forward movement is limited by their engagement with the fallen ratchet members 41, 42, and the parts are so arranged that so long as the arm 58 is in engagement with the hour ratchet member 41 the stop member 35 will be held out of the path of movement of the stop pin 38, thus allowing said stop wheel 31 to move freely so long as the arm 58 engages the ratchet member. As soon as the stop wheel 31 is free it and the train of gearing connected thereto will rotate, thus rotating the toothed member 48 which en-

gages botn of the ratchet members 41 and 42, and gradually raises them into the position shown in Fig. 1. The position of the arm 58 and the stop projection 59 and the shape of the member 56 are such that when the parts have been brought into the position shown in Fig. 3, and the projection 59 has been moved into engagement with the quarter hour ratchet 42, the arm 58 will be held out of engagement with the ratchet 41. As a result when the striking mechanism first operates the initial rotary movement of the toothed member 48 will raise the two ratchet members one tooth at a time, and during this operation the projection 59 will click over the teeth of the ratchet member 42, so that said ratchet member will be gradually raised until the lower end of said ratchet member has been brought above the projection 48, at which time said projection will move forwardly underneath said ratchet member and thus retain it in its elevated position. During the time that the quarter hour ratchet is being raised the hour ratchet 41 is lifted by each tooth of the member 48 but drops again into engagement with the snail 39 when released by said tooth because the arm 58 is held out of engagement with said ratchet member. As soon as the quarter hour has struck, however, and the projection 59 has moved in under the ratchet member 42, then the arm 58 comes into engagement with the ratchet member 41, and said ratchet member will gradually be raised by the rotating toothed member 48 until the ratchet member reaches a position shown in Fig. 1.

The extent to which the hammer-actuating wheel 27 is rotated while the quarter hour ratchet 42 is being raised will depend upon the position of the quarter hour snail, and said snail, therefore, determines whether the quarter hour will strike once, twice or thrice. Similarly, the extent to which the hammer-actuating wheel 27 will rotate after the quarter hour ratchet 42 has been raised and while the hour ratchet 41 is being raised will depend upon the position to which the hour ratchet 41 has been allowed to fall by the snail 39, and this, of course, determines the number of times that the hour will be struck.

As stated above, my invention involves a construction wherein when the quarter hour strikes both of the hammers 23, 24 are operated, while after the quarter hour has struck the quarter hour hammer is thrown out of operation and the hour hammer continues to strike the hour. I will preferably make the two bells, which coöperate with the hammers, such as to give different sounds so that the difference between the striking indicating the quarter and that indicating the hour will be readily discernible. When the stop wheel 31 is released and is rotating the hammer-actuating wheel 27 is operated and by its engagement with the arms 28 and 29 vibrates the hammers. In order to throw the quarter hour hammer out of operation after the quarter hour has struck and while the hour is being struck I provide a quarter hour hammer lock herein shown as a lever 66 pivoted to the frame at 67 and having a portion 68 adapted to be engaged by a pin or arm 69 extending from the arm 44 of the quarter hour ratchet member 41. The free end of this lever 66 carries a pin 70 adapted to engage an arm 71 on the shaft 25 carrying the quarter hour hammer. This arm is provided with a notch 72 adapted to receive the pin 70 while the quarter hour is being struck, said notch being of sufficient depth so as to allow the full striking movement of the rock shaft 25. When, however, the lever 66 is raised so as to carry the pin 70 above the notch 72, then the movement of the rock shaft 25 will be limited to such an extent that its hammer will not strike its bell or sounder. When the quarter hour has been reached and the two ratchet members 41, 42 have been released and dropped by the movement of the releasing member 49 the lever 66 will drop with them, thus bringing the pin 70 into line with the notch 72. As the clock begins its striking movement both rock-shafts 25, 26 are actuated, thus causing both hammers to strike their bells, and this continues until the quarter hour ratchet member 42 has been raised into the position shown in Fig. 1. At this time the pin 69 on the arm 44 engages the portion 68 of the lever 66, and raises the lever so as to carry the pin 70 out from the notch 72, this being permitted by the fact that the shaft 25 and consequently the arm 71 are vibrating back and forth. As soon as the pin 70 has been carried above the notch 72, then the extent of the vibratory motion of the shaft 25 is limited to such an amount that its hammer will not strike the corresponding bell, and thereafter during the operation of the striking mechanism the shaft 25 and its hammer only are active. During the striking of the quarter hour, therefore, both hammers are operative, while during the striking of the hour one hammer only is operative.

For enabling the striking mechanism to repeat at any time, I have provided a repeating lever 80 pivoted to the frame 4 at 81 and adapted at its lower end to engage the releasing member 49. When the repeating lever is operated it not only elevates the releasing member, but also engages the lower end of the stop member 56 and swings it to the right, thereby to release the stop wheel 31 and to allow the ratchet members to drop into engagement with the snails, thus setting the striking mechanism in operation.

One peculiar feature of my invention is

that if the repeating lever is operated just before the quarter hour strikes and after the releasing member has been thrown forwardly into the position shown in Fig. 2 by the pin 53, then instead of repeating the hour last struck, the striking mechanism will strike to indicate the next time interval. If at this time just prior to the striking the repeating lever 80 is actuated, it raises the releasing member 49 sufficiently to carry the nose 54 thereof above the pin 53 with which the nose is engaged, and as soon as this happens the spring 55 returns the releasing member to its normal position, thus carrying the lip 52 thereon out of engagement with the stop pin 38 and permitting the striking mechanism to be set in operation. With my invention, therefore, it is possible to cause the repeating mechanism to operate at any time even after one of the pins 53 has partially released the striking mechanism. It will be noted, however, that if the repeating is done at this time as last above described just prior to the actual quarter hour time, then the clock will not strike at the quarter hour, for this repeating operation has carried the nose 54 free from the pin 53 and has produced the same effect as would be produced by continued forward movement of the pin 53.

My invention is also of such a nature that the hands may be turned backwardly without affecting the striking mechanism. If the hands are turned backwardly the pins 53 engage the lower end of the nose 54 and raise the releasing member 49 sufficiently to allow the pins to pass backwardly out of engagement with the nose, and this raising or elevating of the releasing member 49 does not release the striking mechanism or affect it in any way.

If it is desired to throw the striking mechanism out of operation, this can be done by means of a throw-out lever 90 pivoted to the frame at 91 and adapted to engage the arms 43, 44 of the ratchet members thereby to hold said arms elevated and prevent them from dropping into engagement with the snails when the releasing member is actuated.

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

1. In a clock, the combination with two hammers, of a hammer-actuating wheel for actuating both hammers, means to render said wheel operative at each quarter hour interval, and means controlling the operation of the hammers by which both hammers are operative to strike the quarter hour and one hammer only is operative to strike the hour.

2. In a clock, the combination with a hammer-actuating wheel, of two hammers actuated thereby, means to operate said wheel at quarter hour intervals, and means to lock one hammer against operation after the quarter hour has been struck thereby leaving the other hammer to strike the hour.

3. In a clock, the combination with two hammers, of hammer-actuating mechanism, means to render said mechanism operative at quarter hour intervals to actuate both hammers to strike the quarter hour and to actuate one hammer to strike the hour, and means to lock the other hammer against movement during the striking of the hour.

4. In a clock, the combination with hammer-actuating means, of a stop wheel, a stop member normally restraining said wheel from operation, time-controlled means to move the stop member into inoperative position and to bring a second stop member into operative position whereby the stop wheel is partially released and subsequently to cause the return of the second stop member to its normal position whereby the stop wheel is entirely released and the hammer-actuating mechanism operated, and a manually-operable repeating member operative to release the stop wheel at any time regardless of the position of the stop members.

5. In a clock, the combination with spring-actuated hammer-actuating means, of a stop wheel connected to said means, a stop member normally restraining said wheel from operation, a releasing member, time-controlled means to actuate the releasing member and through the latter the stop member to carry the stop member into inoperative position and the releasing member into operative position to restrain the movement of the stop wheel and thereafter to release the releasing member thereby permitting the stop wheel to be operated, and a repeating member adapted to engage the releasing member and actuate the latter to release the stop wheel in either of the positions of said releasing member.

6. In a clock, the combination with spring-impelled hammer-actuating mechanism, of a stop wheel, a stop member engaging said stop wheel and restraining the latter from movement, a releasing member having a nose, a time-controlled member provided with pins to engage said nose and actuate the releasing member and through the latter the stop member to release the stop wheel, said releasing member being vertically movable whereby when the hands are turned backwardly the engagement of the pins with the nose will raise the releasing member to permit the pins to pass by the nose without actuating the stop member.

7. In a clock, the combination with two hammers, one to strike the hour and the other to strike the quarter hour, of a hammer-actuating wheel for operating both hammers, an hour ratchet member and a quarter hour ratchet member for controlling

the operation of said wheel, and means to hold the hour ratchet member inoperative while the quarter hour is striking.

8. In a clock, the combination with a quarter hour hammer and an hour hammer, of a single hammer-actuating wheel by which both hammers are actuated, an hour ratchet member and a quarter hour ratchet member for controlling said hammer-actuating wheel, both ratchet members being held normally inactive, means to release both ratchet members when the hour is to be struck, and means controlled by the quarter hour ratchet member to hold the hour ratchet member inoperative while the quarter hour is being struck and then to permit the hour ratchet member to become operative.

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

JOSEPH PETRILLO.

Witnesses:
LOUIS C. SMITH,
THOMAS J. DRUMMOND.