S. MAZUR.

CLOCK.

APPLICATION FILED OCT. 24, 1919.

1,402,428.

Patented Jan. 3, 1922.

2 SHEETS—SHEET 1.

Fig. 1.

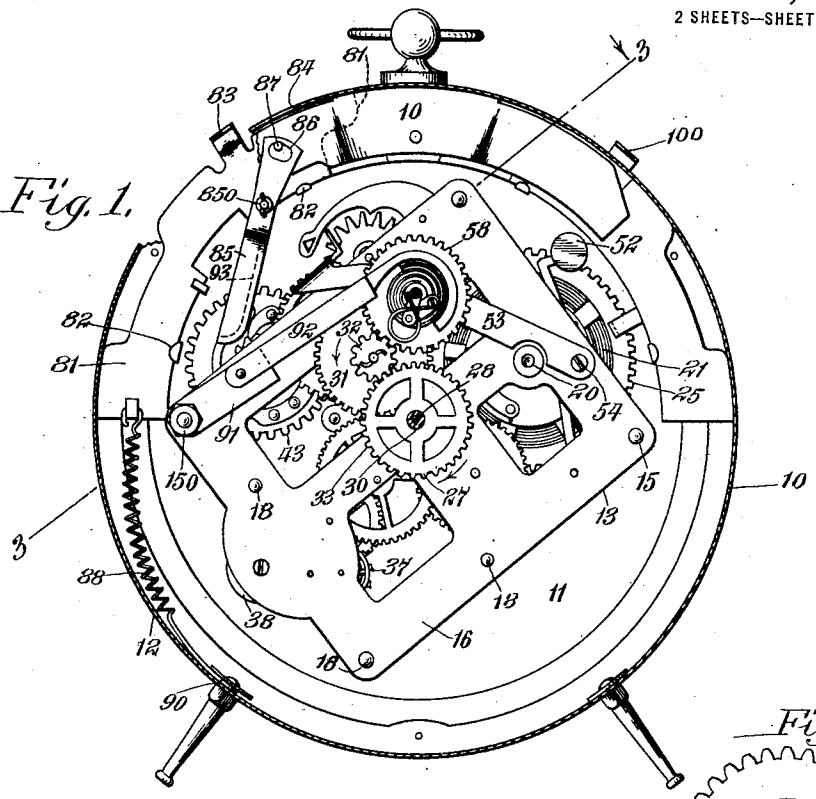


Fig. 7.

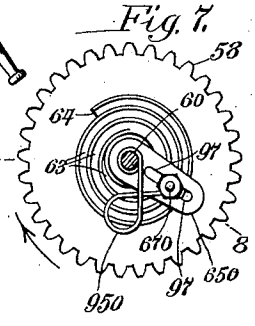


Fig. 2.

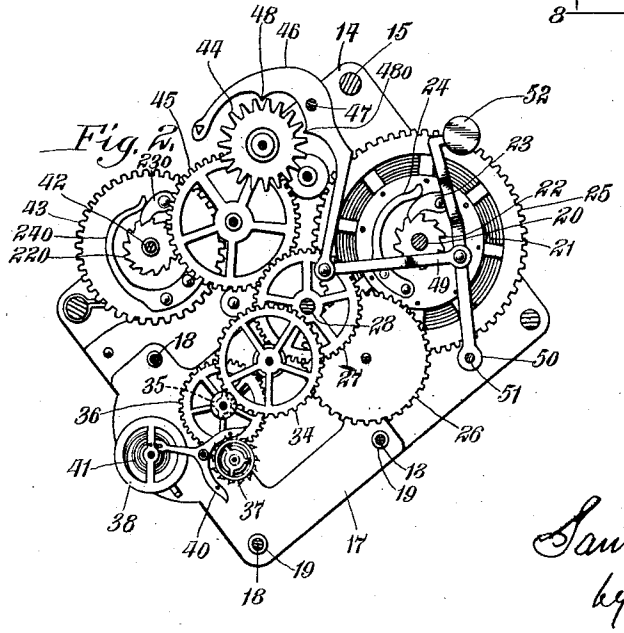
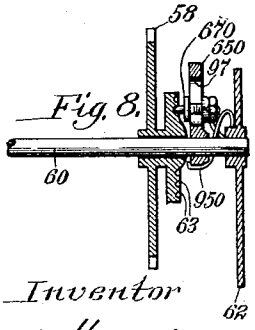


Fig. 8.



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2 SHEETS—SHEET 2.

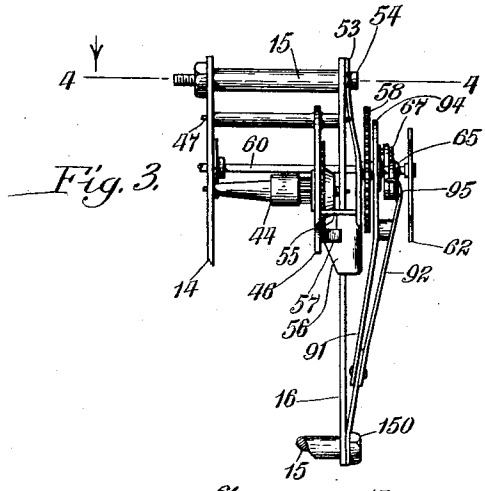


Fig. 3.

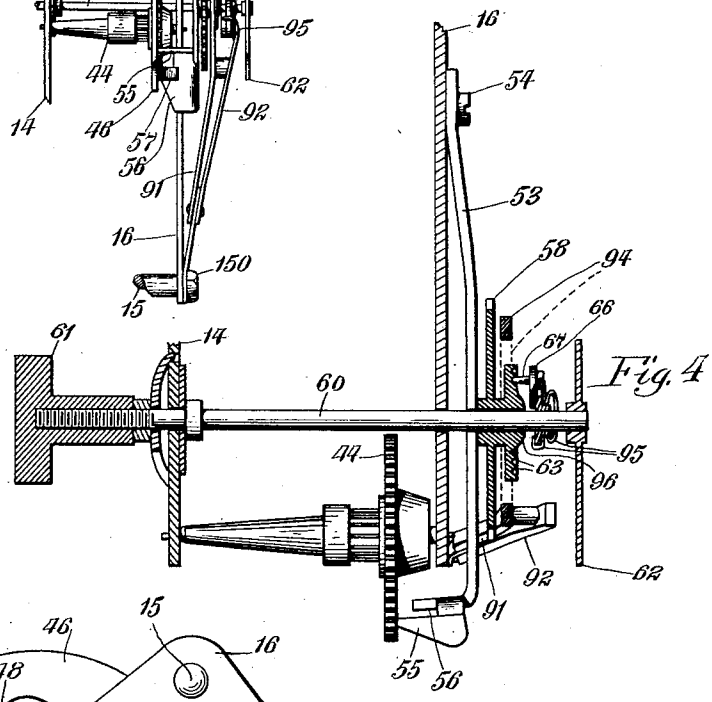


Fig. 4

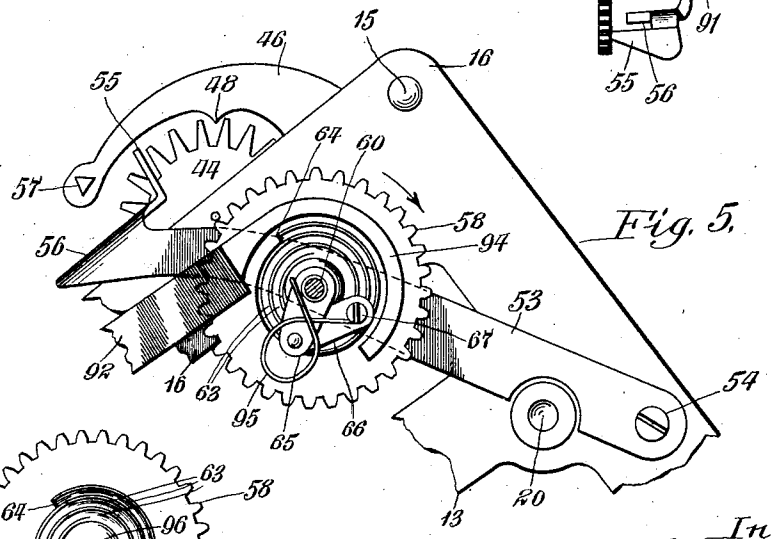


Fig. 5.

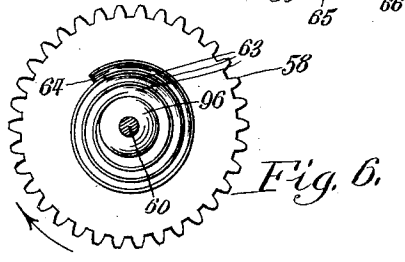


Fig. 6.

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UNITED STATES PATENT OFFICE.

SAMUEL MAZUR, OF BUFFALO, NEW YORK.

CLOCK.

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To all whom it may concern:

Be it known that I, SAMUEL MAZUR, a citizen of the United States, residing in Buffalo, in the county of Erie and State of New York, have invented new and useful Improvements in Clocks, of which the following is a specification.

This invention relates to a so called "eight day clock," and more particularly to a means whereby the alarm may be caused to ring on successive days at the same time, that is, every twenty four hours.

The object of the invention is to provide a compact and reliable eight day clock, which may be manufactured at low cost and which will involve no radical change in construction from the successful, high grade one day clocks now being manufactured, so that the working parts of the two types of clocks may be easily exchangeable, thereby requiring but a small stock of necessary extra parts on hand in each clock repair shop to meet the requirements of both kinds of clocks. A further object of the invention is to provide a simple and reliable means of automatically starting the alarm train of the clock at the proper time set for every twenty four hour interval and of manually stopping said alarm train without deranging the time setting of the alarm. Further objects and advantages will be more clearly disclosed in the following description and appended drawings.

In the accompanying drawings:

Figure 1 is a vertical transverse section through the entire clock showing the general arrangement thereof. Figure 2 is a detached vertical, transverse section through the clock mechanism or works. Figure 3 is a fragmentary diagonal longitudinal section of one part of the alarm system of the clock taken on line 3—3, Fig. 1. Figure 4 is a somewhat similar fragmentary diagonal longitudinal section on an enlarged scale taken on line 4—4, Fig. 3. Figure 5 is an enlarged, fragmentary front elevation of the alarm setting mechanism of the clock. Figure 6 is a detached enlarged front elevation of the alarm controlling wheel showing the spiral groove with which it is provided. Figure 7 is an enlarged fragmentary vertical transverse section showing a modified form of alarm detent arm. Figure 8 is a diagonal, longitudinal enlarged section of the same modification taken on line 8—8, Fig. 7.

Similar characters of reference refer to like parts throughout the several views.

10 represents the main cylindrical container or outer dust cover of the clock which may be constructed in various ways but is preferred as shown in the drawings, comprising a transverse flat rear head or wall 11 and an annular flange 12 extending longitudinally forwardly from the outer edge of said rear head 11. Secured preferably to said rear face is a main clock frame 13 which holds, as best shown in Fig. 2, all the principal mechanism of the clock, so that upon removing the same from the cylindrical container 10, all the moving parts which are liable to get out of order are entirely exposed for inspection and repair. This main frame 13 comprises a transversely disposed rear frame plate 14 arranged against the front face of the rear head 11 and detachably secured thereto. Extending longitudinally forwardly from the front face of said rear plate 14 are a number of frame studs or posts 15, to the forward ends of which a front frame plate 16 is secured which is arranged parallel to said rear plate 14. Arranged parallel to said front and rear frame plates and disposed intermediately thereof is an intermediate supporting plate 17 secured by the stud post 18 and retained in proper relation with respect thereto by sleeves 19 surrounding said posts 18 in the usual and customary manner.

Suitably journaled in the front and rear plates 14 and 16 is a time winding shaft 20 around which is wound the usual spiral clock spring 21. Said winding shaft is provided with the usual form of ratchet wheel 22, detent dog 23 and dog spring 24 so as to permit of manually winding the shaft in the one direction but restraining the same against motion in the opposite direction. The outer end of said clock spring 21 is suitably secured to a primary driving gear 25 which rotates concentrically upon said time winding shaft 20. This primary driving gear 25 is arranged to drive a small spur gear which is formed integrally with one intermediate driving gear 26, so that the power is stepped up in speed from the primary driving gear 25 to the said intermediate driving gear 26. The latter drives a minute hand gear 27 by meshing with a small spur gear which is integral with said minute hand gear. The latter is secured to a minute

hand shaft 28 which extends a considerable distance forwardly and carries the usual minute hand, not shown, at its forward end. The hour hand is suitably secured to an hour-hand, hollow shaft or sleeve 30, being driven in the usual manner through consecutive gears 31, 32 and finally 33, which latter is secured to said hour hand sleeve 30, the gear 31 meshing with a small spur gear secured to the minute hand shaft 28 in the usual manner. The latter together with the hour hand sleeve 30 constitute the principal longitudinal axis of the clock, being located geometrically at the center of the annular flange 12 of the outside container of the clock. The minute hand gear 27 is connected, through a governing train comprising a set of gears 34, 35 and 36, to the usual form of escapement wheel 37 and balance wheel 38 whose oscillations are caused by an oscillating arm 40 and a hair spring 41. Inasmuch as the gears and shafts associated with the governing train need only be of light delicate construction, it is preferred that the length of the shafts of said governing train be very short. Consequently said shafts are journaled at their rear ends in the intermediate supporting plate 17 and at their forward ends in the front plate 16, the longitudinal distance between said plates being relatively smaller than the distance between the front and rear plates 14 and 16 of the machine.

Journaled at opposite ends in said front and rear plates is an alarm winding shaft 42 which is driven by a suitable spiral clock spring similarly to the time winding shaft 20 and similarly provided with a ratchet wheel 220, detent dog 230 and dog spring 240 so as to permit of winding the alarm shaft in one direction but restraining the same against motion in the opposite direction. This alarm winding shaft 42 drives a primary alarm gear 43, which in turn drives an alarm detent wheel 44 through the medium of an intermediate alarm gear 45. Said alarm detent wheel 44, whenever free to rotate, causes an oscillating movement of the alarm lever 46 which is pivoted to the frame of the clock at 47, and which is provided with two oscillatory teeth 48 and 480 which are adapted to intermittently engage with the long teeth of the alarm detent wheel 44 in the customary and well known manner. The inner end of said alarm lever 46 is pivoted to the inner end of an alarm link 49 which is in turn pivoted at its outer end to a hammer alarm lever 50. The latter is pivoted to the frame of the clock at 51 and carries a heavy striker head 52 at its outer end which is adapted to strike against a bell or other ringing object, not shown, in the usual and customary manner.

The operation of the alarm detent wheel 44 is controlled by a resilient alarm stop arm 53 as best shown in Figs. 4 and 5, the same being secured to the frame of the clock at 54. Said stop arm is normally forced rearwardly against the force of its resilient pressure and in such manner that the outer stop finger 55 of said arm is caused to project longitudinally rearwardly in between the long teeth of the alarm detent wheel 44, thereby stopping the rotation thereof. The alarm stop arm is customarily provided with an additional alarm stop abutment 56 which is adapted to move rearwardly into the position shown in the drawings, and into the path of the triangular head piece 57 which is secured to the outer end of the alarm lever 46. By this means the striker or hammer head 52 is prevented from noisily striking against the alarm bell when the clock is being moved about. The longitudinal movement of the alarm stop arm 53 is controlled by an alarm controlling gear 58 which is slidably journaled on an alarm setting shaft 60. The latter is suitably journaled in the front and rear plates 14 and 16 of the clock frame and is provided with a knurled head 61 at its rear end so that said shaft may be manually turned to any desired position so as to "set" the alarm, that is, to definitely fix the time at which it is desired that the alarm is to start ringing. Similarly to the usual construction of alarm clocks, the forward end of said alarm setting shaft 60 is provided preferably with a small alarm index hand 62 of the usual form, so that the manual "setting" of the alarm may be facilitated by noting the position of said index hand, which is arranged to swing around the usual small alarm dial, not shown, but which represents the hours in miniature of the principal dial of the clock.

The forward portion of the alarm controlling gear 58 is provided with a double-convolution spiral groove 63 as best shown in Fig. 6, said groove extending rearwardly and terminating abruptly at the outer end or terminus 64 of its outer convolution. Secured to the alarm setting shaft 60 is a laterally extending crank arm 65, at the outer end of which is pivoted the lower end of a guide link 66, which moves transversely and radially with respect to the alarm setting shaft. To the opposite end of said guide link 66 is secured a rearwardly and longitudinally extending detent finger 67 whose rear tip is adapted to bear rearwardly against, and slide in, the spiral groove 63, which action presses the whole alarm controlling gear 58 rearwardly. Thereby also the alarm stop arm 53 is pressed rearwardly into engagement with the alarm gear train and the oscillatory alarm lever 46, thereby restraining and preventing all movement of the alarm mechanism. But when the alarm controlling wheel 58 has rotated a sufficient distance in a clockwise direction, the

detent finger 67 finally arrives at the outer terminus 64 of the outer convolution of the spiral groove 63. A further movement of said alarm controlling wheel frees the detent finger 67 from the spiral groove 63 and allows the alarm stop arm 53, by reason of its resilience, to move longitudinally forwardly and out of engagement with the alarm train of the clock so that said alarm train is free to operate the hammer head 51 and ring the alarm bell.

The improved means of stopping the alarm mechanism which is easily adapted to the construction of an ordinary one day clock is as follows:

Circumferentially slidable in the outer frame or container of the clock is an alarm slide plate 81, which is prevented from outward movement by the close juxtaposition of the annular flange 12 of the outer clock frame and is prevented from inward movement by reason of a pair of small bent lugs or return bend flanges 82 which are formed integrally with the clock frame and are bent around the inner and front edge of said alarm slide plate 81. Said slide plate is adapted to be manually moved whenever it is desired to either stop the alarm mechanism of the clock, by means of an indicator arm 83, which projects radially outwardly through a suitable aperture or circumferential slot 84 formed in the outer clock frame or container 10. Pivoted at 850 to said alarm slide plate 81 is a shift lever 85 whose outer end is provided with an enlarged or loose pivot hole 86 which engages with a stationary pivot pin 87 secured to the frame of the clock. The inner arm of said shift lever 85 extends a considerable distance inwardly of its central pivot 850, so that, when the slide plate is caused to move upwardly by manually moving the indicator arm 83, the lower inner end of said shift lever is caused to swing upwardly. It is preferred that said lever be resiliently forced toward the position shown in the drawings, by means of an arcuate tension spring 88 whose upper end is fastened to the lower end of the slide plate 81 and whose lower end is stationarily secured at 90 to the clock frame. Secured to the frame of the clock by means of a nut 150 and extending upwardly and inwardly therefrom is a transversely disposed pressure arm 91, whose forward face is preferably inclined at 92 as best seen in Fig. 3. The rear upper corner of the shift lever is preferably though not necessarily beveled, as indicated by the dotted line 93 so that when said shift lever is turned, said beveled surface 93 comes in contact with the incline 92 of the pressure arm 91. Such action causes the outer curved end 94 of said pressure arm to move rearwardly so as to bear against the front flat face of the alarm controlling gear 58, and move the same rearwardly. This action also moves the double-convolution spiral groove 63 sufficiently rearwardly to clear the rear rounded end of the detent finger 67, which is then free to be forced radially inwardly under the influence of a coil spring 95, whose opposite ends respectively are connected to the said detent finger 67 and the crank arm 65 of the alarm setting shaft 60. Such a radially inward movement does not however disturb said alarm setting shaft or the circumferential position relative thereto of the detent finger, so that the "setting" of said alarm setting shaft is not disturbed and the alarm will again ring at the same time twenty four hours later without any resetting of said setting shaft 60. The ratio of the gearing is such that the alarm controlling gear rotates once every twelve hours, so that the detent finger 67 will arrive at the terminus 64 of the spiral groove every twenty four hours by reason of the fact that the spiral groove 63 has two complete convolutions. To stop the alarm from ringing, it is not necessary that the pressure arm 91 bear continuously backwardly against the front face of the alarm control gear 58, because just as soon as said control gear is momentarily moved backwardly, the detent finger is free to move radially inwardly over the front face of the spiral groove 63. Then when the pressure of said pressure arm 91 is released, said detent finger comes in contact with the forwardly rounded hub 96 of the alarm control gear 58, whose inclined slope causes said finger to slide sufficiently radially outwardly so as to engage with the inner convolution of the spiral groove 63 aforesaid. This release of the alarm stopping mechanism is effected automatically by the arcuate tension spring 88 which acts so as to pull downwardly both the slide plate 81 and the shift lever 85 and thereby free the latter from engagement with the pressure arm 91, the resiliency of which causes a sufficient forward movement to clear itself of the front face of the alarm controlling gear 58. A modified detent finger mounting is shown in Figs. 7 and 8 in which a modified crank arm 650 is secured to the alarm setting shaft 60 and is provided with a longitudinal radial slideway or groove 97. Arranged to slide radially in said groove is a modified detent finger 670, which is connected to the outer end of a coil spring 950, the inner end of which is suitably connected to the alarm setting shaft 60 so that the detent finger is moved resiliently and radially inwardly just as in the link construction of Fig. 5.

The general operation of the clock is as follows:

The spiral clock spring on the time winding shaft 20 drives the minute hand shaft 28 through gears 25, 26 and 27. The movement of the latter is controlled in speed by an ordinary governing train of gearing

ending in a balance wheel 38. The hour hand sleeve 30 is driven from the minute hand shaft 28 by gears 31, 32 and 33, the former meshing with a small spur gear on the minute hand shaft in the usual and customary manner. The same intermediate hour hand gear 32 is of considerable length and drives an alarm controlling gear 58, which latter is longitudinally movable on an alarm setting shaft 60. The rear face of the hub of said alarm controlling gear bears against an alarm stop arm 53 which, when moved backwardly by said controlling gear, comes into contact with the alarm train and prevents the alarm from ringing. Said alarm controlling arm is normally held backwardly by reason of the engagement of a detent finger 67 which is secured to said alarm setting shaft. Said detent finger bears rearwardly against a double convolution spiral groove 63 which is formed in the forward face of said alarm controlling gear 58, which makes one complete revolution every twelve hours. When said detent finger moves off of the terminus 64 of the outer convolution of the spiral groove 63, it permits the alarm governing gear 58 to move forwardly which in turn also permits the alarm stop arm 53 to move forwardly out of engagement with the alarm train, so as to permit the same to vibrate the hammer head 52. When it is desired to shut off the alarm, the indicator arm is momentarily moved upwardly, causing the shift lever 85 to both swing and reciprocate upwardly and inwardly and strike against the inclined surface 92 of a pressure arm 91. The outer curved end 94 of said pressure arm thereby is forced backwardly against the alarm controlling gear 58, and moves the spiral groove 63 rearwardly likewise, sufficiently to permit the coil spring 95 to throw the detent finger radially inwardly. Then when the pressure of the shift lever 85 against the pressure arm 91 is released, the said detent finger drops into the inner convolution of the spiral groove 63, the circumferential position being dependent upon the setting of the alarm setting shaft 60, by which is governed the particular time the alarm is to "go off." When the alarm mechanism is to be permanently shut off a supplemental alarm control lever 100 is employed, such as is common in the art, and which acts to positively stop the alarm when in one extreme position and to free the alarm mechanism when in the other, although the alarm bell will not actually ring until the detent finger 67 reaches the terminus 64 of the spiral groove.

It will be apparent that the arrangement of the whole mechanism is very compact, each train of gearing being a substantially equal circumferential distance from the adjacent trains. The time winding shaft 20, the principal axis and the entire governing train lie substantially in a straight line flanked on one side by the intermediate gear 26 and on the other side by the alarm train;—the alarm winding shaft 42 and setting shaft 60 of which lie in a line practically parallel to the line previously mentioned. The entire mechanism may be very readily adapted to the standard one day clock construction, so that the added cost of dies, etc., is very low. Furthermore most of the parts are interchangeable with the parts which make up a standard, high grade one day clock, and the whole clock may be constructed at low cost. The time of production or the time required for the machine work and also the assembling of this improved clock is much less than is usual with eight day clocks. The cost of dies and other manufacturing requirements is very low, because this eight day clock consists substantially of nothing more than the frame of a large one day clock with the wheels, etc., of a small one day clock arranged therein.

I claim as my invention:

1. A clock comprising a driving train, a governing train, and an alarm train, each of said trains extending radially outwardly from the principal axis of the clock and arranged approximately an equal circumferential distance apart from each other.

2. A clock comprising a driving train, a governing train arranged in the frame of the clock oppositely to said driving train, and an alarm train arranged in the outer part of the clock frame intermediately of said driving and said governing train.

3. A clock comprising a time winding shaft, a principal clock axis constituting the hour and minute hand shafts, an intermediate driving gear arranged to transmit power from the said time winding shaft to said principal axis, a governing train connected to said principal axis and extending outwardly from said axis in a direction substantially opposite to the time winding shaft, and an alarm train also connected to said principal axis and extending outwardly therefrom in a direction substantially opposite to the intermediate driving gear aforesaid.

4. A clock comprising a winding train, an alarm controlling gear provided with a spiral groove having two complete convolutions and connected to said winding train so as to rotate therewith, a detent finger engaging with said spiral groove and adapted to be restrained against longitudinal movement relatively to the axis of said alarm controlling gear, an alarm train, and means for causing an operation of said alarm train upon the disengagement of said finger with the last convolution of said spiral groove.

5. A clock comprising an alarm train, a winding train, an alarm setting shaft, an alarm controlling gear provided with a double-convolution spiral groove slidably

arranged on said alarm controlling shaft, a detent finger arranged to control the axial movement of said alarm controlling gear and arranged on said alarm setting shaft so as to move only radially relatively thereto, a detent finger spring, means for starting the alarm train in motion whenever said detent finger disengages from said double-convolution spiral groove, and resilient means for forcing said alarm controlling gear axially.

6. A clock comprising a winding train, an alarm train including an alarm detent wheel, an alarm stop arm, an alarm controlling gear connected to said winding train and adapted to normally press said alarm stop arm into engagement with the teeth of said alarm detent wheel and provided with a double-convolution spiral groove, an alarm setting shaft, a detent finger radially mounted on said shaft and adapted to engage with said double-convolution spiral groove of said alarm controlling gear, whereby the axial position of said gear is governed, and means for moving said gear and said alarm stop arm when said detent finger disengages with the groove of said alarm controlling gear.

7. A clock of the character described comprising winding, alarm and governing trains, an alarm setting shaft, an alarm controlling gear slidably mounted on said shaft and provided with a double-convolution spiral groove, a detent arm mounted on said shaft and radially movable thereto, a detent arm spring, an alarm detent wheel, and an alarm stop arm adapted to normally engage with the teeth of said detent wheel and governed in its engagement therewith by the position of said alarm controlling gear.

8. A clock comprising a winding and alarm train, a pressure arm adapted to stop the movement of said alarm train, a shift lever pivoted to the frame of the clock, an alarm slide plate loosely pivoted to said shift lever and adapted to move the same into engagement with said pressure arm.

9. A clock of the character described comprising an alarm train, an inclined pressure arm adapted to stop the movement of said alarm train, a stop lever loosely pivoted at its outer end on the frame of the clock, and an alarm slide plate provided with a pivot pin adapted to engage with the central part of said pivot hole of said stop lever, the movement of said slide plate causing a combined rotary and reciprocatory movement of said stop lever so as to move the inner end thereof into engagement with the inclined portion of said pressure arm.

10. A clock comprising a principal axis, a time winding shaft, a governing train including a balance wheel, said governing train being arranged in a substantially straight line.

11. A clock comprising a principal axis consisting of an hour and minute hand shaft, a time winding spiral spring, an alarm train, and a governing train including a balance wheel geared to said principal axis said governing train being arranged in a substantially straight and compact line.

SAMUEL MAZUR.