(No Model.) 2 Sheets—Sheet 1.

S. A. DE NORMANVILLE.

ALARM CLOCK.

No. 468,255. Patented Feb. 2, 1892.

Fig. 1.

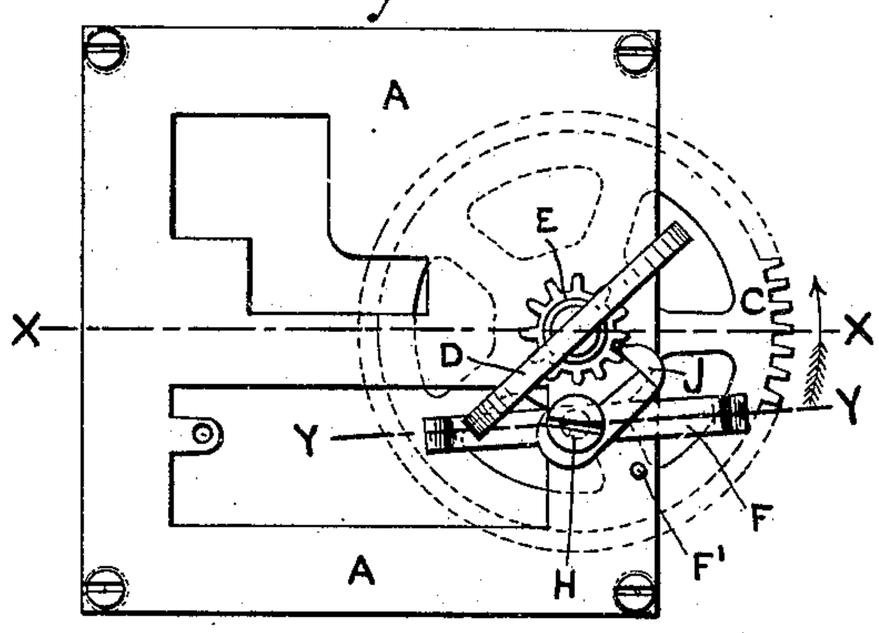


Fig. 2.

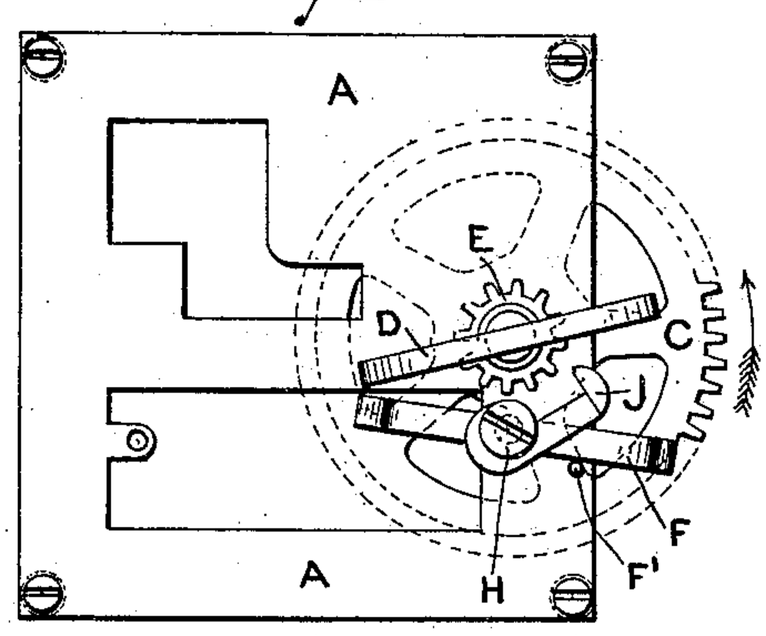


Fig. 3.

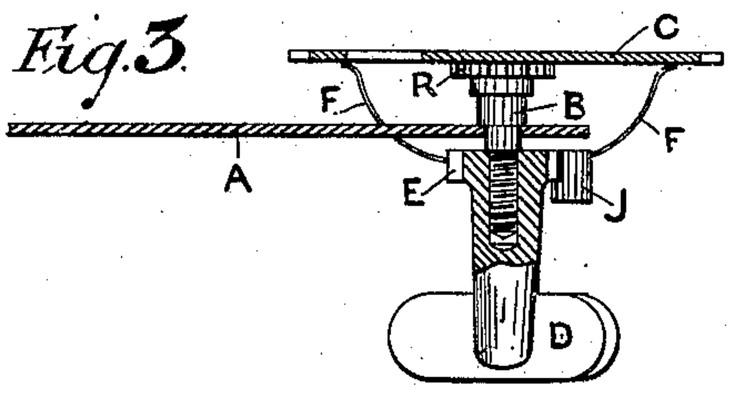


Fig. 4.

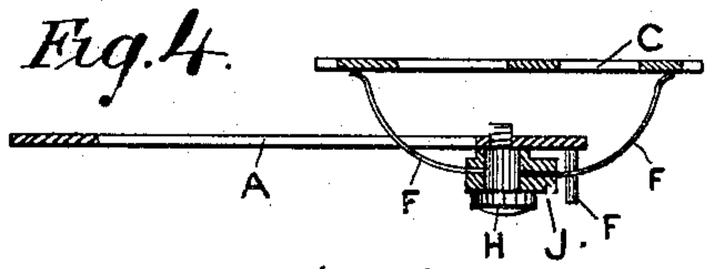


Fig. 7.

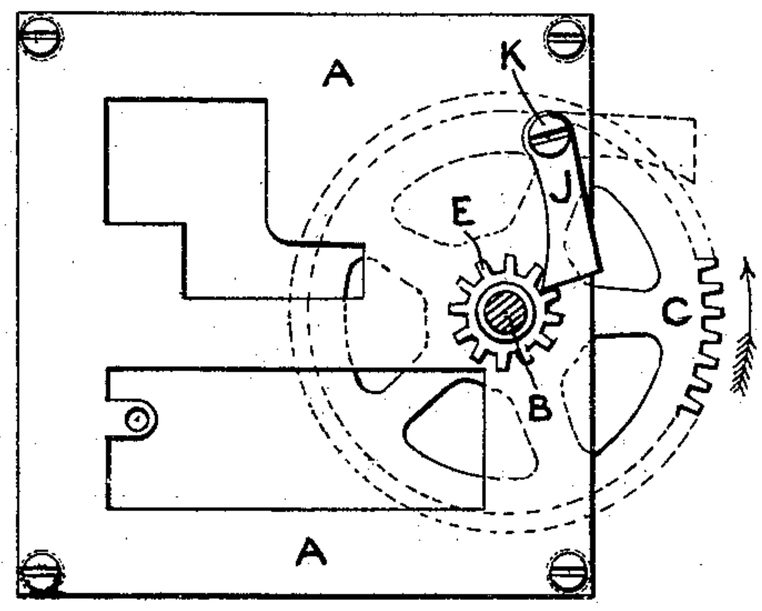


Fig. 5.

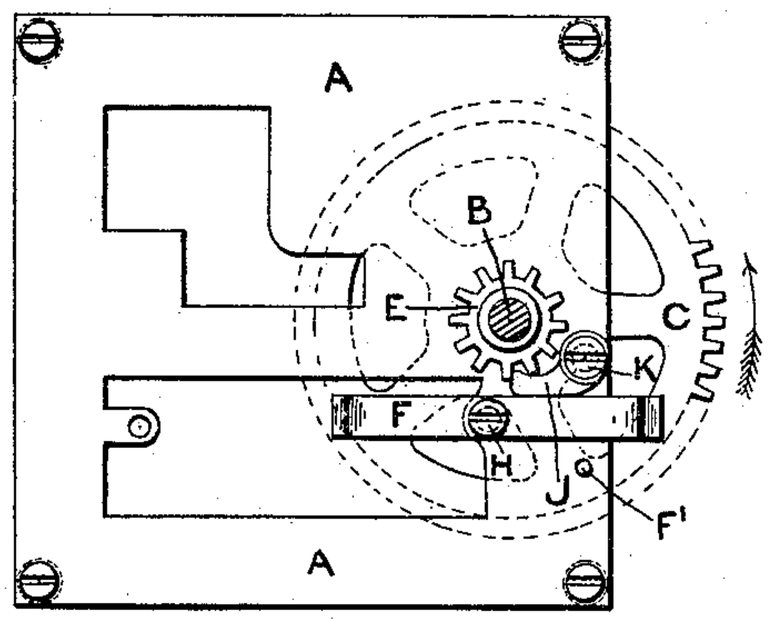
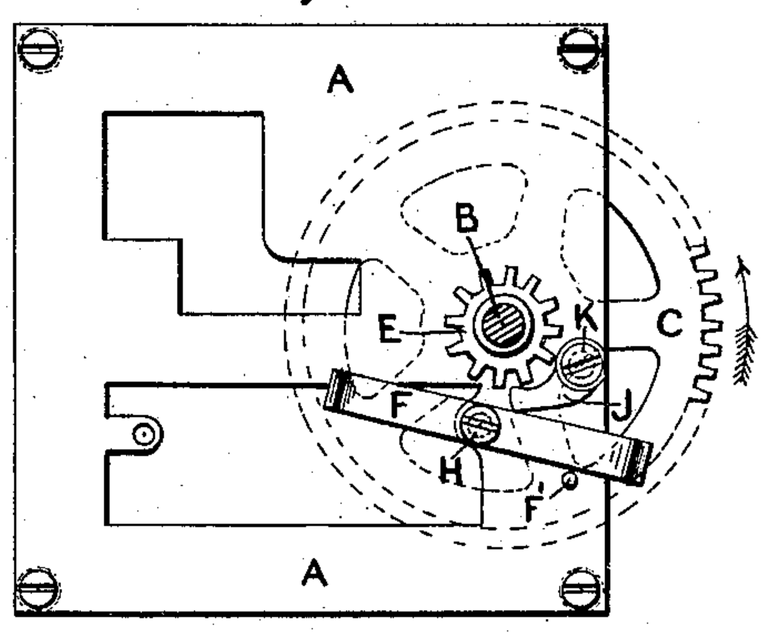


Fig. 6.



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(No Model.) 2 Sheets—Sheet 2

S. A. DE NORMANVILLE.

ALARM CLOCK.

No. 468,255. Patented Feb. 2, 1892.

Fig. 9

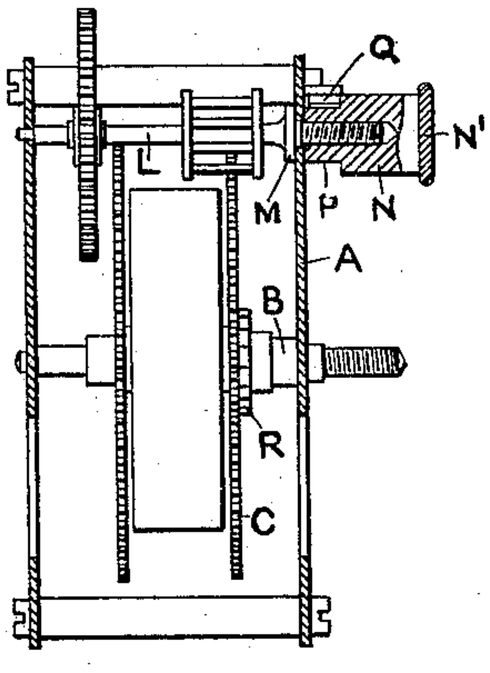


Fig. 8.

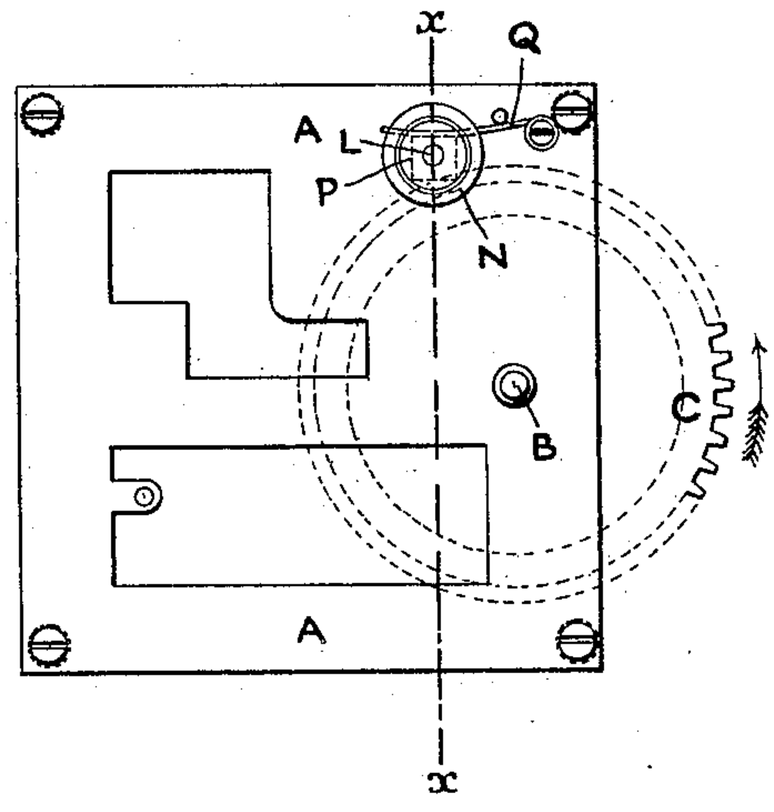


Fig. 11.

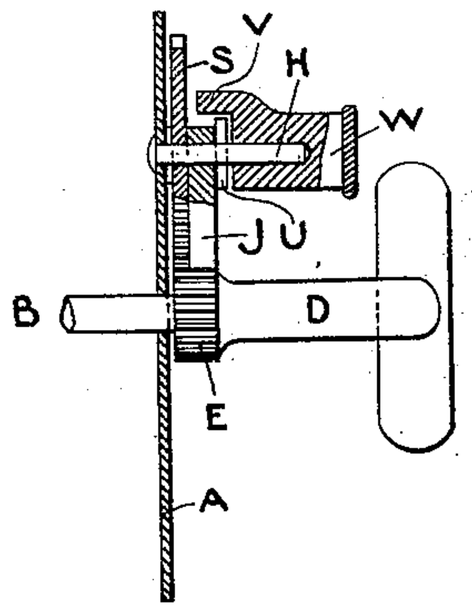
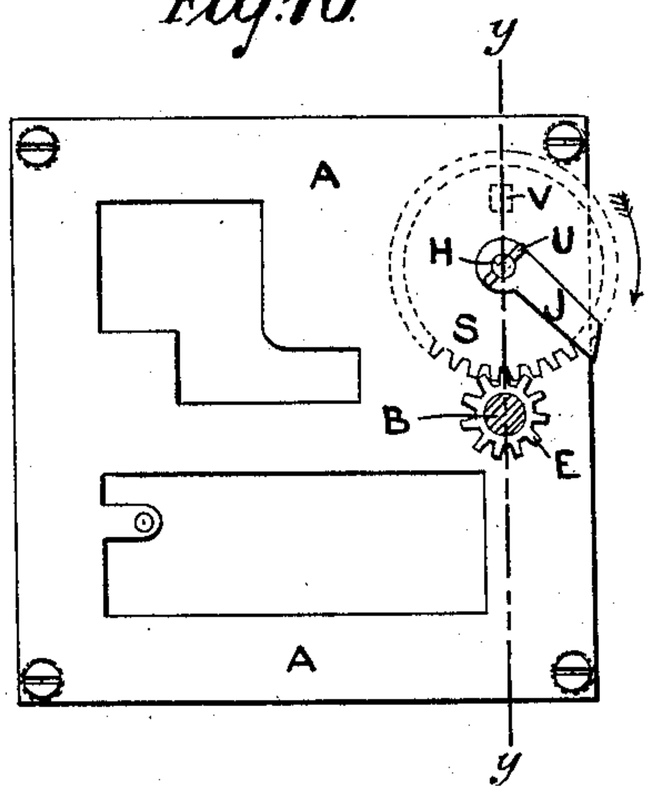


Fig. 10.



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UNITED STATES PATENT OFFICE.

SAMUEL AUGUSTINE DE NORMANVILLE, OF LIVERPOOL, ENGLAND.

ALARM-CLOCK.

SPECIFICATION forming part of Letters Patent No. 468,255, dated February 2, 1892.

Application filed April 25, 1891. Serial No. 390,470. (No model.)

To all whom it may concern:

Be it known that I, SAMUEL AUGUSTINE DE NORMANVILLE, a subject of the Queen of Great Britain, residing at Liverpool, in the county of Lancaster, England, have invented certain new and useful Improvements in Alarm-Clocks, of which the following is a specification.

My invention relates to that class of alarm-clocks in which a single spring is used to actuate both the clock and the alarm trains, the main wheel of the clock-train being driven continuously in one direction by one end of the spring and the main wheel of the alarm-train being driven in the opposite direction (when the alarm-train is released) by the other end of the same spring. When the alarm-train is stationary, it forms the abutment for one end of the spring, the other end of which is driving the clock-movement. Winding is permitted by a ratchet-and-pawl arrangement. In such clocks as usually made means are furnished for checking the alarm-train after it has run a certain definite amount—say one or more turns of the main wheel of the train—but nothing is provided by which the user can adjust or alter this amount to meet various requirements. Such clocks are in this respect inferior to those having an entirely separate spring for the alarm-train, enabling the user to control the length of time during which the alarm will ring by winding up the spring more or less, as required.

The object of my invention is to produce a clock having only one spring, as aforesaid, but in which the user shall have control over the amount of alarm—that is to say, the length of time during which the alarm shall continue to sound.

In carrying out my invention I make no change in the arrangement by which the alarm is released at the required moment, and I may continue to make use of the arrangement common in single-spring alarm-clocks by which the alarm is made "silent" or prevented from sounding altogether. For checking the alarm after it has run the required time I provide upon one of the arbors of the alarm-train, preferably the main or winding arbor or the next succeeding one, a wheel, stud, or nut, which I call the "stop-piece," so mounted upon such arbor as to be free to revolve thereon, save as hereinafter mentioned. This stop-piece may be either within the main plates of the clock or outside upon a projecting end of the arbor, and the portion of the arbor carrying it may be either plain or screwed, in which case the stop-piece is screwed internally to correspond and move along the arbor in revolving upon it. Means are provided by which the stop-piece locks or engages with the arbor in one direction in a certain position relatively to the latter either by means of a pair of stops or projections being brought into contact, or, if the arbor and "stop-piece" are screwed, as aforesaid, by the stop-piece arriving against a shoulder or collar on the arbor or in some similar manner. A suitable external connection is provided by which the stop-piece may be rotated upon its arbor while the latter remains stationary, causing it to recede from that position. A device is provided capable of holding the stop-piece and preventing it from revolving in the direction of motion assumed by the arbor on which it is mounted when the alarm-train is in action, which direction is, for convenience, hereinafter called the "positive" direction and the opposite direction "negative." This said device is preferably in the nature of a catch or pawl acting either in compression or tension and engaging with teeth or equivalent devices on the stop-piece. If this catch or pawl be in gear with the stop-piece, preventing it from revolving in the positive direction, the motion of the alarm-train must be arrested as soon as the arbor arrives at that position relatively to the stop-piece in which it locks or engages with it, as aforesaid. This position of the parts I call the "locking position." Suitable means are provided for throwing the catch or pawl into and out of gear, as required. This may be done by a special external connection projecting through the case, or it may be effected by gravity, the pawl being loosely pivoted and actuated by tilting the clock; but I prefer that the pawl should be thrown out of gear by the act of winding the clock and returned into gear by the motion of some portion of the latter, with which it is frictionally connected for that purpose.

The alarm is set to ring a greater or less amount, as follows: Supposing the parts to

be in the locking position and the alarm-train stationary, the catch or pawl is first thrown out of gear with the stop-piece, the latter is then rotated on its arbor a greater or less degree (according to the amount of alarm required) in the positive direction, thereby advancing it a certain angular distance in that direction away from the locking position. The catch or pawl is then returned, or left to return into gear, when it will prevent further rotation of the stop-piece.

When the alarm-train is released by the usual means it continues to run only till the arbor provided with the stop-piece has turned through an angular distance equal to that aforesaid when it overtakes and engages with the stop-piece, and the locking position being thus again reached the motion of the alarm-train is arrested. The amount of alarm is thus readily adjusted by merely setting the stop-piece a greater or less angular distance in advance of the locking position.

By a modification the amount of alarm is regulated by shifting not the stop-piece but the pawl to a position more or less removed, in an angular sense, from the locking position. The pawl being frictionally connected with some moving part of the alarm-train or with a special wheel gearing therewith is gradually returned to the locking position by the motion of the train when released, the time so occupied (during which the alarm continues to ring) being greater as the pawl is farther removed from the locking position. The position of the pawl in setting the alarm is controlled by an exterior connection.

Certain modes of carrying my invention into practice are illustrated in the accompanying two sheets of drawings, in which—

Figure 1 is a back elevation of portion of the movement of an ordinary alarm-clock of the class previously described, showing a mode of applying my invention to the main or winding arbor. Fig. 2 is a similar view showing the parts in a different position. Fig. 3 is a sectional plan through the line X X in Fig. 1. Fig. 4 is a sectional plan through the line Y Y in Fig. 1. Figs. 5 and 6 are similar views to Figs 1 and 2, showing a slight modification in the arrangement of the pawl. Fig. 7 is also a similar view to Fig 1, showing a further modification of the pawl. Fig. 8 is an elevation, as before, showing a mode of applying my invention to the second arbor of the alarm-train. Fig. 9 is a sectional side elevation through the line *x x* in Fig. 8. Fig. 10 is an elevation, as before, showing a modified mode of applying my invention to the main arbor. Fig. 11 is a sectional side elevation through the line *y y* in Fig. 10.

Similar letters of reference denote similar parts throughout the drawings.

Referring to Figs. 1, 2, 3, and 4, A is the back plate of the movement, B the main or winding arbor, and C the main wheel of the alarm-train, all as usually constructed. The outer end of the arbor B has a right-hand screw-thread cut upon it, as shown in Fig. 3, and the winding-handle D is screwed internally to fit the screw on the arbor. This arrangement of the winding-handle is commonly used in clocks of this class. Formed in one piece with the handle D or affixed thereto is a toothed wheel or pinion E, forming the stop-piece above mentioned.

F is a flat elastic strip of metal pivoted on the plate A at H. Its ends are bent downward and press with a slight amount of friction upon the wheel C, as shown in Figs. 3 and 4. The ends may, if desired, be tipped with india-rubber or other suitable substance to increase the frictional contact with the wheel.

J is a pawl affixed to the strip F and turning with it on the pivot H. The normal position of the parts is shown in Fig. 1.

R, Fig. 3, (appearing also in Fig. 9,) is the ordinary winding-ratchet, and forms no part of my invention.

The spring is wound by turning the handle D to the right or in the negative direction in the usual way. The effect of thus turning the handle is to throw the pawl J out of gear with the pinion E, the teeth of the latter in rotating pushing the pawl away, this being assisted by the inclined surface presented by the nose of the pawl. The pawl J and strip F are thereby moved into the position shown in Fig. 2, in which position they are retained by the pressure of the strip F on the wheel C.

F′ is a check-pin to prevent F being accidentally pushed too far over, so as to allow its ends to slip off the wheel C. The handle D is now unscrewed on the arbor B, say, about half a turn. When the time arrives for the alarm to sound and the train is released, the wheel C, and with it the arbor B, begins to revolve in the direction shown by the arrows—*i. e.*, the positive direction. The strip F is carried round by the wheel C, carrying with it the pawl J until the latter re-engages with the pinion E, thereby preventing rotation of the handle D. The wheel C with its arbor continues to revolve until the said arbor is screwed back into the handle, when the further motion of the alarm-train is at once arrested. It will thus be seen that after winding the clock in the ordinary manner it is only necessary to partially unscrew the handle D, the amount of such unscrewing determining the length of time during which the alarm can sound. If after winding the clock the handle is not unscrewed, the alarm will still sound for a few moments while the pawl J is re-engaging with the first available tooth on the pinion E. This constitutes the minimum amount of alarm. By unscrewing the handle one, two, three, or more turns any desired amount of alarm is obtainable. The nose or catch of the pawl J is preferably made of considerable depth, as shown in Fig. 3, so that it still engages with pinion E, though the handle D is unscrewed several turns, as aforesaid.

I prefer to make the teeth of pinion E of

somewhat rounded form, so that they do not engage with pawl J, preventing the handle D from being unscrewed if the pawl J is thrown back into slight contact with them by the backlash of the wheel C after winding.

In the modification shown in Figs. 5 and 6 the pawl J is pivoted on a separate pin K. When the clock is wound, the pawl is pushed out of gear with the pinion, and in so moving pushes the strip F into the position shown in Fig. 6. When the alarm is released, the strip F, bearing against the back of the pawl, returns it into gear with the pinion, such position of the parts being shown in Fig. 5.

It is obvious that the pawl J might be returned into gear by being frictionally pivoted on or connected with some other portion of the clock or alarm train revolving in the required direction, or it might be moved into or out of gear by a special extension or connection projecting through an opening in the clock-case, so as to be operated from outside by the user. This mode, being sufficiently obvious, is not shown in the drawings. In the arrangement shown in Fig. 7 the action is substantially the same, but the parts are simplified and cheapened, the spring-strip F being dispensed with. The pawl J is pivoted loosely on a pin K, as in Figs. 5 and 6, and the handle D carries a pinion E, as before. The pivot on which the pawl hangs is so placed that the action of gravity causes the said pawl to engage with the teeth of pinion E when the clock is in its ordinary position. When the clock is wound, it is tilted sufficiently out of the vertical position to enable the pawl to hang free of the teeth. The handle can then be unscrewed to the desired amount, and on returning the clock to the normal position the pawl will re-engage or be ready to re-engage with the pinion as soon as the alarm-train is set in motion. In all these cases the stop-piece pawl E engages or locks with the arbor B, either by screwing up against a shoulder or collar on the arbor or by the end of the arbor abutting against the end of the internally-screwed tube of the handle D.

It is obvious that the locking of the arbor with the stop-piece might be effected by a pair of projecting stops being brought into contact, in which case the screw could be dispensed with; but in this case without some special arrangement the stops would re-engage in the opposite direction after the stop-piece had made about one full turn on the arbor, so that it could not be set more than one full turn in advance of the locking position. The special advantage of the screw is that the stop-piece by moving around and along it has a range of adjustability of as many revolutions as may be necessary.

In the figures at present described my invention is shown as applied to the main or winding arbor; but in Figs. 8 and 9 I show a mode of applying it to the second arbor of the alarm-train. In this case the second arbor L is provided with a collar M and an externally-screwed end projecting through the plate A. A nut N, having a milled head N′, screws on the said arbor, and has three, four, or more flat facets P, formed on its inner end. A flat spring Q is affixed to the plate A, and acts somewhat as a pawl bearing on the said facets. After the clock has been wound in the usual manner the nut N is partially unscrewed in the positive direction, which in this case is to the right, and is held by the spring Q in such position.

When the alarm-train is set in motion, the arbor L rotates and screws into the nut N, the said nut being prevented from rotating by the friction of the spring Q acting on any one of the facets P. This screwing action continues until the plate A is gripped between the end of the nut and the collar M. This forms the locking position, and further rotation is arrested and the alarm stops. The adjustment of the amount of alarm is thus accomplished in precisely the same manner as in the previous cases by setting the nut N, which is here the stop-piece, forward from the locking position a greater or less amount, as required.

Figs. 10 and 11 show a modified mode of applying the invention to the main or winding arbor. A pinion E is fixed on the handle D, as in Figs. 1 to 4. The spring F (shown in Figs. 1 to 4) is replaced by the spur-wheel S, gearing with the pinion E and rotating on the fixed stud H, its object being to give motion to the pawl J, rotating on the same stud and frictionally connected with the spur-wheel by the pressure of the pin U. The check-pin F′, Figs. 1 to 4, is not employed; but in place of it a cap W, with a milled head, fits stiffly upon the end of the stud H, and is provided with a projecting lug or stop V.

The action is as follows: When the clock is wound by the handle D, the pinion E causes the spur-wheel S to rotate and carry the pawl J out of contact with it. The pawl revolves on the stud H until it comes in contact with the stop V, when its further motion is arrested, though the spur-wheel continues to revolve until the winding is completed. When the alarm-train is set in motion, the wheel S rotates in the reverse direction, and by its frictional contact brings the pawl J back into gear with the pinion (this occupying a longer or shorter time, according to position of stop V) and the alarm-train is arrested. The amount of alarm thus depends upon the position of the stop V, and this is adjusted by rotating the cap W.

I wish it to be understood that in carrying my invention into practice I do not confine myself to the precise modes described and shown in the accompanying drawings, as the same may be considerably varied without departing from the essential principles of the invention.

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

1. In an alarm-clock, the combination of an alarm mechanism and a stop moved into action by the clock to arrest the action of the alarm and adjustable to vary the duration of the continuous alarm.

2. In an alarm-clock, the combination of an alarm mechanism, an adjustable stop to arrest the action of the alarm, and intermediate connections through which the alarm mechanism brings the stop into action sooner or later, according to its adjustment, whereby the duration of the alarm may be determined in advance.

3. In an alarm-clock, the combination of an alarm-actuating wheel, a stop for said alarm movable different distances from its operative position, and connections through which said driving-wheel acts to bring the stop into action after a longer or shorter interval, according to its adjusted position.

4. In an alarm-clock, an alarm mechanism adapted to sound continuously from the beginning to the end of its action, in combination with an adjustable automatic stop whereby the duration of the action may be lessened, thus adapting the clock to sound variant alarms.

5. In an alarm-clock, the combination of an alarm-train, a stop for the alarm, a screw upon which the stop devices may be adjusted in different positions for starting, and means actuated by the clock for causing the screw to move the stop into action.

6. In an alarm-clock, a screw actuated by the alarm-train, in combination with a stop, the action of which is caused by the screw, and adjustable connections to vary the duration of the action.

7. In an alarm-clock, a screw driven by the alarm-train, a threaded handle or nut adjustable to different positions on the screw, and means to hold the handle against rotation, whereby the nut is caused to stop the alarm on reaching the end of the screw and the duration of the alarm made dependent on the initial position of the nut.

8. In an alarm-clock, the alarm-train, the screw-threaded arbor carried thereby, the threaded handle or nut thereon, a pawl to prevent the rotation of the handle, and friction devices actuated by the train to set the pawl into engagement.

In testimony whereof I hereunto set my hand in the presence of two attesting witnesses.

SAMUEL AUGUSTINE DE NORMANVILLE.

Witnesses:
FREDERICK JOHN CHESSBROUGH,
REGINALD WALTER ARMISTEAD,
Both of 15 *Water Street, Liverpool, England.*