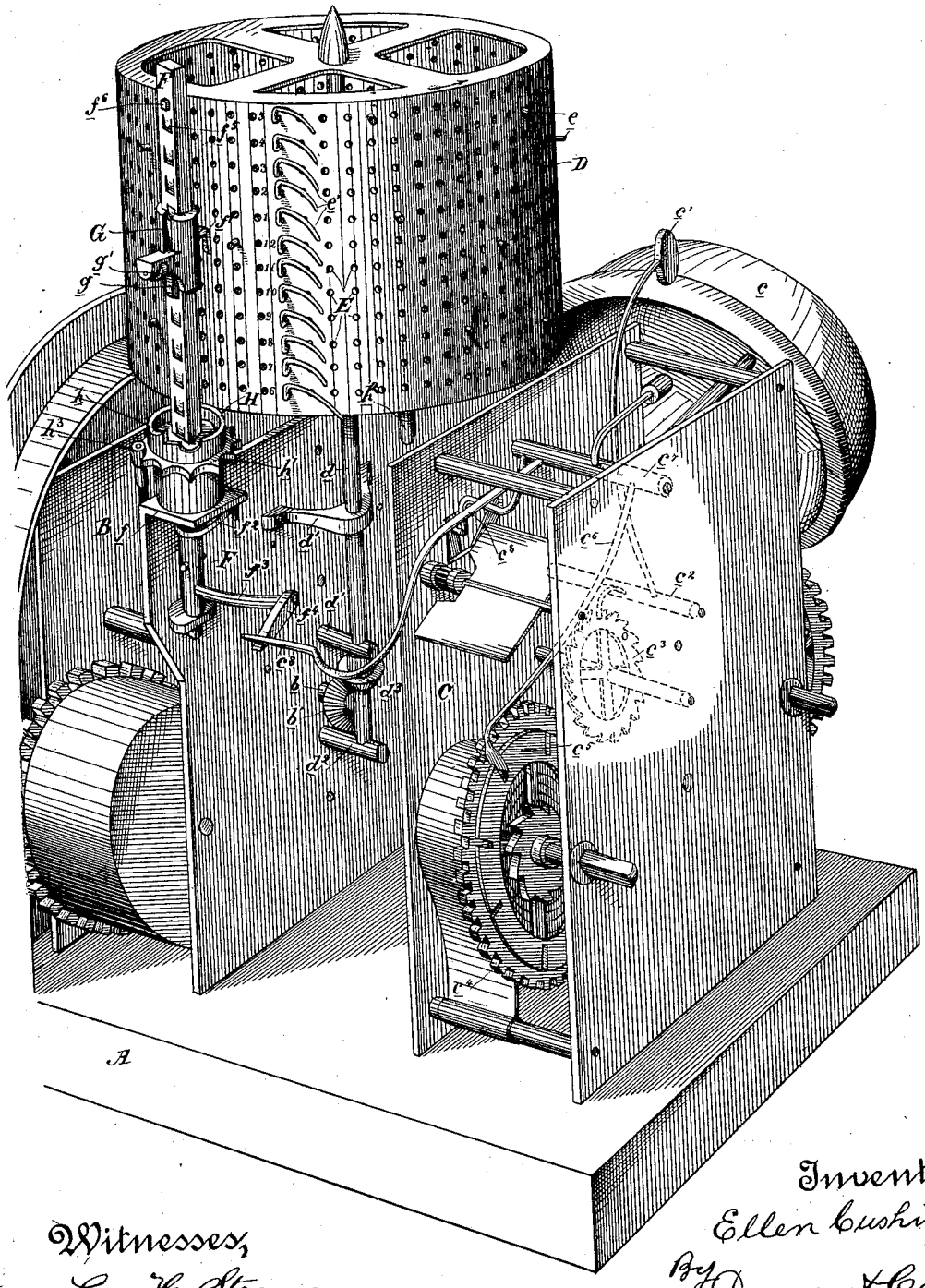
(No Model.)

E. CUSHING.

PROGRAMME ALARM CLOCK.

No. 357,373. Patented Feb. 8, 1887.



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UNITED STATES PATENT OFFICE.

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PROGRAMME ALARM-CLOCK.

SPECIFICATION forming part of Letters Patent No. 357,373, dated February 8, 1887.

Application filed September 9, 1886. Serial No. 213,341. (No model.)

To all whom it may concern:

Be it known that I, ELLEN CUSHING, of the city and county of San Francisco, State of California, have invented an Improvement in Alarm-Clocks; and I hereby declare the following to be a full, clear, and exact description of the same.

My invention relates to the class of alarm-clocks; and my invention consists, in connection with the clock-work mechanism which operates the hands and the alarm, of a rotating drum, wheel, ring, or band provided with removable or adjustable pins adapted to successively come in contact with a mechanism by which the alarm is operated.

More particularly, my invention consists in a drum having an hourly period of rotation and provided with holes or sockets arranged in rows in horizontal and vertical planes, removable pins fitted to these holes, a pivoted standard, by the partial rotation of which the alarm is operated, a sliding sleeve on said standard and carrying an arm with which the pins of the rotating drum successively come in contact, whereby the standard is partially rotated, cams on the drum for hourly raising the arm of the sleeve into position for the engagement of the pins of each row, a means for throwing the alarm out of action and bringing it into operation again, and various details of construction, all of which I shall hereinafter fully describe.

The object of my invention is to provide a clock which is capable of sounding a number of successive alarms during any given period, said alarms taking place at equal or at unequal or irregular intervals, as may be desired. It is especially adapted for use in school-rooms, where the hours are divided into stated periods for accomplishing certain work. These periods are ordinarily defined by a hand-bell operated by the teacher or by some monitor appointed for this purpose. The limits of the periods are therefore liable to be inaccurate; but with my clock this difficulty is entirely obviated, and the burden and responsibility are removed from the authority having the regulation of the time.

Referring to the accompanying drawing for a more complete explanation of my invention, the figure is a perspective view of my alarm-clock.

A is the base on which the clock rests.

B represents the ordinary mechanism of a clock by which the hands are moved over the time-dial. The various parts of this clock mechanism need no detailed description, and I shall therefore refer only to the arbor *b* of the minute-hand, as it is from this arbor that I derive motion for the operation of my drum, which I shall presently describe.

C represents the mechanism of the alarm, and as it is of the usual pattern I will describe it no further than to point out the gong *c*, the vibrating hammer c', the oscillating shaft c^2, to which the hammer is secured, the toothed wheel c^3, which operates the shaft, the spring-actuated main gear c^4, having the notched disk c^5, the gravity-pawl c^6, engaging the notched disk and controlling the gear c^4, and the oscillating shaft c^7, to which the gravity-pawl is secured.

I do not wish to confine myself to the arrangement and location of the several parts of the clock and alarm mechanism, as these may be differently applied and connected, or their equivalents may be used. My object is simply to employ any suitable clock and alarm mechanisms in connection with which to use the supplementary devices by which the object I have in view may be effected.

D is a drum, wheel, ring, or band, carried by a spindle or shaft, *d*, mounted in suitable brackets, d', and step d^2, and carrying on its lower end a beveled pinion, d^3, which meshes with a beveled pinion, b', on the arbor *b* of the minute-hand of the clock, whereby said drum makes a complete rotation in one hour. The drum is perforated or provided with holes or sockets E, in which are fitted pins *e*. The sockets are preferably internally threaded and the pins externally threaded, so that the latter may be readily moved from one hole or socket and placed in another.

Mounted or pivoted in a bracket, *f*, is a standard, F, to one side of which is connected an arm, f', with which the pins *e* in the drum D are adapted to come in contact, whereby the standard is partially rotated on its axis. A spring, f^2, throws it back to position when

relieved of the pin *e*. To the lower end of the standard is secured an arm, f^3, from which projects an inclined plane or cam, f^4.

Secured to the oscillating shaft c^7, which carries the gravity-pawl c^6 of the alarm mechanism, is an arm, c^8, the bent end of which lies directly over the cam f^4 and is adapted to be raised by said cam. It will now be seen that as the drum D rotates and one of its pins *e* comes in contact with the short arm f' the standard F will be partially turned, so that the cam f^4, moving with it, will raise the arm c^8, thereby partially rotating the shaft c^7 and raising the gravity-pawl c^6, so that the main gear will be released and the alarm sounded in the ordinary manner. In order now to effect this result at given intervals, equal or unequal, during the hour, I have but to arrange the pins *e* at points around the drum D, which are separated by spaces bearing to the circumference of the drum a relation corresponding or approximate to the relation which the given intervals bear to the hour. For example, if I wished to sound the alarm at intervals of fifteen minutes I would place the pins ninety degrees apart, and for unequal intervals the pins would be separated by spaces corresponding.

For the purpose of providing for the alarm at any minute of the hour I make in any given horizontal plane of the drum D sixty equidistant holes or sockets, E, which represent the minutes, one hole passing a given fixed point each minute. Therefore, by using any required number of pins *e*, I can fit them to the holes at the proper distances, and thus effect the operation of the alarm at intervals equal or unequal. I have considered thus far a single hour only. What would answer for one hour would apply to the next, if the periods of sounding the alarm were the same in each. Thus if the hour, the quarter, the half, and the three-quarters were the periods fixed in each hour each would be but a repetition of the preceding one, and therefore the same pins *e* in a single horizontal plane would answer; but they could not serve the purpose if the periods were irregular—as, for example, if the alarm was required at twenty minutes past nine and at twenty-five minutes past ten—for if pins were placed in the same horizontal plane corresponding to the number of minutes, both twenty and twenty-five, the alarm would be operated at twenty minutes past nine, also at twenty-five minutes past, and at twenty and again at twenty-five minutes past ten. Therefore, to provide for irregular periods and different hours, I arrange the holes or sockets E, as shown, in rows in horizontal and vertical planes. There are sixty holes in each row in a horizontal plane, and there are as many holes in each row in vertical planes as there are hours during which I desire the alarm to operate.

If it were desirable to adapt it for the twenty-four hours, there would be twenty-four holes in each vertical row. I have here shown but twelve in each of said rows, as I intend that the alarm shall remain inactive during the night hours, unless specially set, which of course can be easily accomplished, as they are but a repitition of the day hours; but it is obvious that in thus providing separate rows of pins for each hour I must also provide for the proper and successive engagement of the pins of the succeeding hours. This I effect as follows: Though I have heretofore described the short arm f', with which the pins *e* come in contact, as being connected with the standard F, through whose partial rotation the alarm is operated, it is not directly connected with it, but is carried by a vertically adjustable or moving sleeve G, fitted and adapted to slide up and down upon the standard F, but so seated on said standard (as by a spline or feather, or by both being square or angular in cross-section) that they shall move together on their common axis. In the sleeve G is a spring-pawl, *g*, which engages notches f^5 in the standard F, said notches being on a level with the horizontal rows of pins *e* of the drum D. Thus by moving the sleeve G up to a notch opposite any given row of holes or pins in the drum said pins will engage the arm f' and operate the alarm, as before described. This adjustment of the sleeve is effected automatically by a vertical series of inclined planes or cams, e', secured to the drum. One of these cams, as it reaches the arms f', passes under it, and lifts it and the sleeve G up one notch higher, in which position the arm f', is adapted to be engaged by the pins of the hour succeeding the one whose pins had previously engaged it, and all the other pins will pass free of it. It will thus be seen that the location of the pins in any given row may be in accordance with the requirements of the case. When the sleeve G has reached the top of the standard F, the uppermost of the cams e' raises it high enough to pass over a trip-lug, f^6, on said standard, which forces the pawl *g* of the sleeve from its engagement, and by momentarily holding it out free allows the sleeve to descend of its own weight, which it does with a rush, and by the speed it attains passes all the notches of the standard and lands in its seat at the base. As the hours of action are now past, and it is desirable to let the alarm remain inactive, it is provided that the seat of the sleeve G shall be so low that its arm f' shall not be engaged by the pins of the first hour, nor shall the cam e' of said hour raise it to position; but as the time for readjustment approaches it is necessary that the sleeve shall be raised, to permit the engagement of its arm f' by the first cam e', so that it can be further raised to the first notch of the standard F, in position for the engagement of the pins of the first hour. This is effected as follows: Around the base of the standard F, and pivoted in a suitable journal, is an annular track, H, upon which the sleeve G rests when at its lower limit, a small anti-friction roller, g', being let into the sleeve for the track to travel under. At one point in

its circumference the track H has an upwardly-inclined cam, *h*, the face of which is abrupt. The height of this cam is sufficient to raise the sleeve G so that its arm *f'* is in position to be engaged by the lowermost cam, *e'*.

The track H has a rack-flange, *h'*, with twelve teeth. Under the drum D, at a point a little in advance of the cams *e'*, is a pin, h^2, which engages the rack-flange *h'* and turns the track H one tooth each hour, thus causing it to make a complete rotation in twelve hours. A spring-mounted roller-pawl, h^3, plays in the rack-flange *h'* and governs it. This mechanism is so arranged that as the period of inaction draws to a close the track is in position to begin to raise the sleeve G on its cam *h*, and when said period has expired it has raised it to proper position, as heretofore described.

I do not confine myself wholly to the relative position of the parts I have described, as the drum D may be located differently, and thus cause a corresponding change in all the parts. A suitable casing, which I have not here shown, is provided for concealing the mechanism, as in the case of other clocks.

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

1. In an alarm-clock, the rotating drum D, having holes or sockets, and the removable pins *e*, seated in said holes or sockets, in combination with an alarm mechanism, a pivoted standard or shaft, by the partial rotation of which the alarm is operated, and an arm connected with said standard, with which the pins of the drum successively come in contact to effect the partial rotation of said standard, substantially as herein described.

2. In an alarm-clock, the rotating drum D, having holes or sockets, and the removable pins seated in said holes or sockets, in combination with the alarm mechanism C, having arm c^8, by which it is operated, as described, the pivoted standard F, having the arm f^3, with cam f^4, by which the arm c^8 is operated, and an arm connected with the standard and engaged successively by the pins of the rotating drum, substantially as and for the purpose herein described.

3. In an alarm-clock, the rotating drum D, provided with holes or sockets E, arranged in rows in horizontal and vertical planes, as described, and the removable pins *e*, seated in said holes, in combination with an alarm mechanism, and a vertically-moving arm, c^8, through which the alarm is operated by the contact therewith of the pins of the rotating drum, substantially as herein described.

4. In an alarm-clock, the drum D, having an hourly period of rotation and provided with holes or sockets E, arranged in rows in horizontal and vertical planes, and the pins *e*, seated in said holes, in combination with an alarm mechanism, a vertically-movable arm, c^8, by the partial rotation of which the alarm is operated, the vertical movement of said arm being hourly and through distances equal to the spaces between the horizontal rows of holes E, whereby the pins of said rows are adapted successively to engage the arm, substantially as herein described.

5. In an alarm-clock, the drum D, having an hourly period of rotation and provided with holes or sockets E, arranged in rows in horizontal and vertical planes, and the pins *e*, seated in said holes, in combination with an alarm mechanism, a vertically-movable arm, c^8, by the partial rotation of which the alarm is operated, and the vertical series of cams *e'*, carried by the drum, for hourly raising the arm in position to be engaged successively by the pins in each horizontal row of holes in the drum, substantially as herein described.

6. In an alarm-clock, the drum D, having an hourly period of rotation and provided with holes or sockets E, arranged in rows in horizontal and vertical planes, and pins *e*, seated in said holes, in combination with an alarm mechanism, the pivoted spring-actuated standard F, by the partial rotation of which the alarm is operated, the sleeve G, fitted and adapted to slide on said standard, as described, the arm *f'*, carried by the sleeve, and the vertical series of cams *e'* on the drum for engaging and raising the arm *f'* of said sleeve, so that it may be successively engaged by the pins in the holes of each horizontal row, substantially as herein described.

7. In an alarm-clock, the drum D, having an hourly period of rotation and provided with holes or sockets E, arranged in rows in horizontal and vertical planes, and pins *e*, seated in said holes, in combination with an alarm mechanism, C, the pivoted spring-actuated standard F, by the partial rotation of which the alarm is operated, said standard having notches f^5, the sleeve G, fitted and adapted to slide on the standard and having a spring-pawl, *g*, for engaging the notches, the arm *f'*, carried by the sleeve, and the vertical series of cams *e'* on the drum, whereby the arm is raised to be engaged by the pins in each horizontal row of the drum, substantially as herein described.

8. In an alarm-clock, the drum D, having an hourly period of rotation and provided with holes or sockets E, arranged in rows in horizontal and vertical planes, and pins *e*, seated in said holes, in combination with an alarm mechanism, C, the pivoted spring-actuated standard F, by the partial rotation of which the alarm is operated, said standard having notches f^5, the sleeve G, fitted and adapted to slide on the standard and having a spring-pawl, *g*, for engaging the notches f^5, the arm *f'*, carried by the sleeve, the vertical series of cams *e'* on the drum for raising the arm and sleeve, and the trip-lug f^6 on the top of the standard, whereby the sleeve is disengaged at its upper limit and allowed to drop, substantially as herein described.

9. In an alarm-clock, the drum D, having an hourly period of rotation and provided with holes or sockets E, arranged in rows in hori-

zontal and vertical planes, and the pins *e*, removably or adjustably seated in said holes, in combination with the alarm mechanism C, having an arm, c^8, by which it is operated, the pivoted spring-actuated notched standard F, having an arm, f^3, and a cam, f^4, for engaging the arm c^8 of the alarm mechanism, the sleeve G, mounted and adapted to slide on the standard and having a pawl, *g*, for engaging said standard, the arm f', carried by the sleeve and with which the pins of the drum engage, and the vertical series of cams e' on the drum for raising the sleeve, whereby its arm is brought into position, substantially as herein described.

10. In an alarm-clock, the rotating drum D, having the pins *e*, as described, in combination with the pivoted standard F, by which the alarm is operated, the sliding sleeve G on said standard, and the arm f' on the sleeve, with which the pins of the drum engage, the vertical series of cams e' on the drum for raising the sleeve into position, and the means for raising the sleeve to the engagement of said series of cams, consisting of the track H, on which the sleeve rests, having a cam, *h*, the toothed or rack flange h' of said track, and the pin h^2 on the drum, whereby said track is rotated, substantially as herein described.

11. In an alarm-clock, the hand-operating mechanism B, having the minute-hand arbor *b*, provided with a pinion, b', the spindle or shaft *d*, having a pinion, d^3, engaging pinion b', the drum D on said shaft or spindle, having the holes or sockets E, arranged in rows in horizontal and vertical planes, and the removable pins *e* in said holes, in combination with the alarm mechanism C, having arm c^8, the pivoted spring-actuated notched standard F, having arm f^3 and cam f^4 for operating the arm c^8 of the alarm mechanism, the sleeve G, mounted and adapted to slide on the standard and having a pawl, *g*, for holding it in place, the arm f' on said sleeve, with which the pins *e* of the drum engage, the vertical series of cams e' on the drum for lifting said arm and sleeve, the rotating cam-track H, on which the sleeve rests below, and the pin h^2 on the drum for operating the track, whereby the sleeve is raised for the engagement of the cams e' of the drum, all arranged and adapted to operate substantially as herein described.

In witness whereof I have hereunto set my hand.

ELLEN CUSHING.

Witnesses:
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