H. J. & W. D. DAVIES.

ALARM CLOCK.

No. 188,865. Patented March 27, 1877.

Fig. 1.

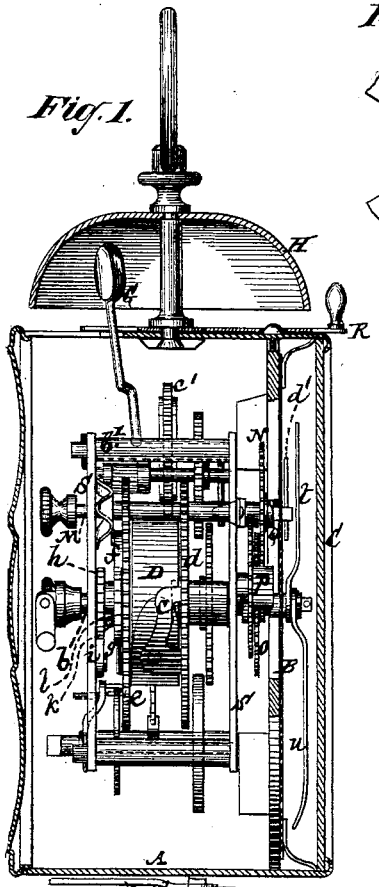


Fig. 6.

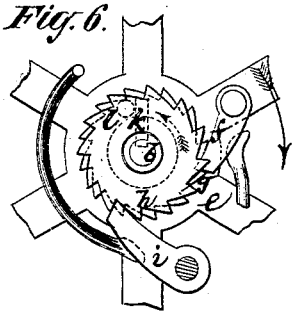


Fig. 5.

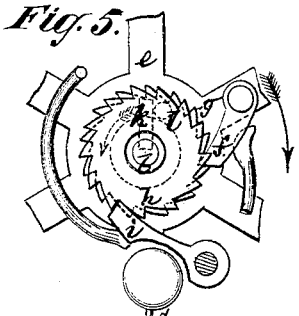


Fig. 2.

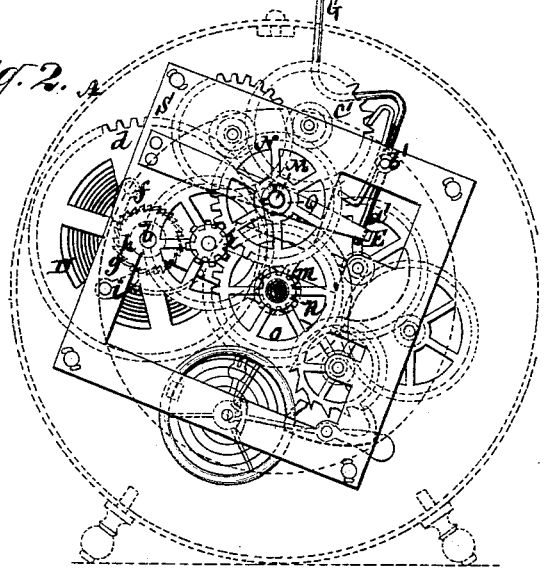


Fig. 3.

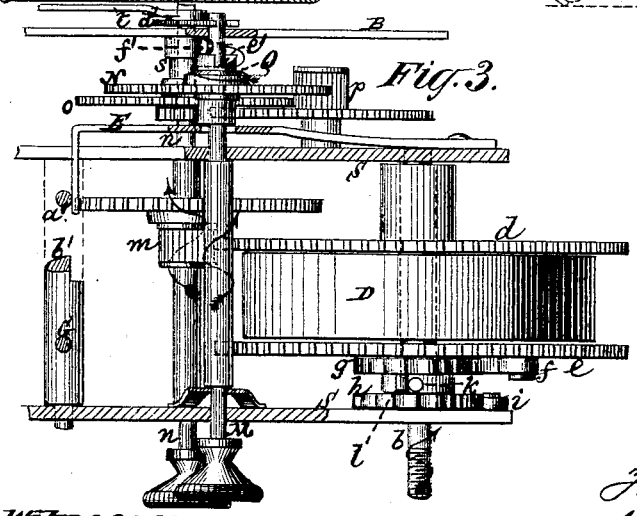
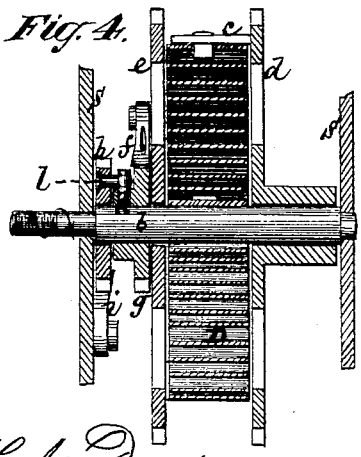


Fig. 4.



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UNITED STATES PATENT OFFICE.

HENRY J. DAVIES AND WALTER D. DAVIES, OF NEW YORK, N. Y.

IMPROVEMENT IN ALARM-CLOCKS.

Specification forming part of Letters Patent No. **188,865**, dated March 27, 1877; application filed February 14, 1877.

To all whom it may concern:

Be it known that we, HENRY J. DAVIES and WALTER D. DAVIES, both of the city, county, and State of New York, have invented certain new and useful Improvements in Alarm-Clocks, of which the following is a description, reference being had to the accompanying drawing, forming part of this specification.

This invention consists in a novel stop-motion for alarm-clocks, applied to the inner end of the mainspring of the clock, whereby, among other advantages, a uniform alarm-motion is obtained without interfering with the time-movement of the clock, and certainty of action is insured.

The invention also consists in various novel combinations of devices connected with the setting and liberating of the alarm, whereby the setting of the alarm-index in unison with the hour-hand of the clock is facilitated, and increased simplicity and efficiency generally is obtained.

In the accompanying drawing, Figure 1 represents a partly-sectional side view of an alarm-clock having our invention applied; and Fig. 2, a sectional view of the same, in part, taken in the rear of the dial, in a plane parallel with the latter, and showing the clock-case in dotted lines. Fig. 3 is a sectional plan, upon an enlarged scale, of the working mechanism in part; and Fig. 4, a section through the mainspring, in a longitudinal direction with its arbor, of the time and alarm winding devices and alarm stop-motion. Figs. 5 and 6 are views showing different positions of the alarm stop-motion.

A is the clock-case, which may be of any suitable material, shape, and construction, but which is here shown with a removable back, to provide for the winding and setting of the clock from the rear, including the setting of the alarm hand or index, and so that there will be no necessity to expose the dial B by opening the glazed front C, which may be kept permanently closed, thus protecting the dial from dust and the clock-hands from being tampered with. If desired, the lid at the back of the case may also be kept permanently closed, and the arbors of the winding and setting devices be projected through it.

D is the mainspring, and *b* its winding-arbor, to which the inner end of the spring is secured, while its outer end is attached, by a hook, *c*, or otherwise, to the main wheel *d*. This wheel *d*, which is the primary wheel or driver of the time-movement, is loose upon the arbor *b*, and upon the reverse side of the mainspring D is the primary wheel or driver *e* of the alarm-movement. Said wheel *e* is also loose upon the arbor *b*, but is connected with the latter by or through a pawl, *f*, which is pivoted to the wheel *e*, and a ratchet-wheel, *g*, fast on the arbor *b*, so that while the wheel *g* is free to slip past the pawl *f* when the arbor *b* is turned to wind the spring, it holds the inner end of the spring to secure the action of the latter on the time-movement of the clock. Another ratchet-wheel, *h*, is arranged loose upon the arbor *b*. This wheel is also so controlled by a pawl, *i*, pivoted to the clock-frame S, that it is free to slip past the pawl *i* while the arbor *b* is being turned to wind the spring, but which pawl *i* serves to hold the wheel *h* whenever a stud, *k*, on the fast ratchet-wheel *g* comes around as the alarm is liberated, and strikes a stud, *l*, on the ratchet-wheel *h*, thereby restricting the alarm movement and unwinding action of the inner end of the mainspring to the distance the stud *k* has to travel in coming round from its driving contact with the stud *l* when winding up the mainspring, as shown in Fig. 5, to its stopping contact with the stud *l* on the reverse side of the latter, as shown in Fig. 6, after the alarm has been actuated. Thus it will be seen that the alarm-movement, as controlled by the unwinding of the inner end of the mainspring, is not only positive and uniform, but is restricted to less than a single turn of the arbor *b* and corresponding limited movement of the mainspring. How much less than a whole turn of the arbor *b* takes place in the working of the alarm will depend upon the thickness of the stops or studs *k l*, or otherwise upon their construction limiting the travel of the stud *k* to less than a whole revolution. In some cases the stop or stud *l* may be divided into two, arranged at any suitable distance apart in a circular direction, with the stud *k* in between them, thus still further reducing the travel of the stud *k* in the working of the alarm. Such alarm stop-motion cannot fail to act whenever the wheel *e*, which is in driving connection by the pawl *f*, is liberated to operate the alarm, and the extent of the alarm movement is always the same, while, as it is the inner end of the mainspring that operates

the alarm, the latter, in even only a partial winding of the clock, will necessarily be always in working condition for use as required, inasmuch as it is the inner end of the spring which is first affected in winding up the clock; nor will the limited movement of the inner end of the spring to work the alarm sensibly, if at all, influence the time-movement as controlled by the outer portion of the spring.

The time-movement of the clock, actuated by the wheel *d*, is or may be the same as in other clocks, and does not need any very minute description here, *m* being the minute-pinion; *n*, the minute-hand spindle, carrying the minute-hand *u;* and *o*, the last wheel of the hour-hand train, which derives its motion from a pinion, *p*, and which is fast on the sleeve *s* of the hour-hand *t*.

The alarm is liberated by the flying outward, when released for the purpose, of a simple spring lever or hook, E, so as to free it from locking engagement with an arm, *a'*, on the pallet-spindle *b'* of the escapement-wheel *c'* of the alarm, which wheel is connected, by a train of gear, with the wheel *e* on the winding-arbor. G is the hammer of the alarm, fast on the pallet-spindle *b';* and H, the gong.

The means for setting the alarm to ring at any particular time, and for controlling the spring lever or hook E, which liberates the alarm, will now be described. M is the setting-spindle, which, while free to be turned by hand from the rear of the clock-case to set the alarm index or hand *d'* to the hour or time at which it is required to ring the alarm, is otherwise a still one. Said index or hand is thus adjustable over an independent dial or imitation-dial on the face of the main dial. This secondary dial is divided into hours, and, if necessary, fractions of hours, like the main dial. Loose on the alarm-setting spindle M is a wheel, N, which is in unison with the hour-wheel *o*, and is in continuous operation with the time-movement of the clock. Thus said wheel N may be of the same diameter as the hour-wheel *o*, and be driven by the same pinion *p*. Q is the trip or tripping device by which the alarm is liberated. This trip, which consists of a revolving notched cam moving in unison with the hour-hand or its rotating sleeve, is arranged loose upon the setting-spindle M, and is here shown as formed by constructing the hub on the front side of the wheel N with a suitably-shaped notch, *e'*, and fitting said wheel so that it is free to slide lengthwise on the spindle M. This forming of the trip on the wheel, which gives it the necessary motion, conduces to the simplicity and efficiency of the alarm. The spring-lever E bears on the back of the wheel N, to slide it outward, and so release said lever from its hold of the alarm, whenever the notch *e'* of the revolving trip Q comes round, to admit of its embracing or receiving within it a stud, *f'*, on the setting-spindle M. After the alarm has been sounded, the continued rotation of the wheel N and trip Q carries the notch *e'* clear of the stud *f'*, and causes the plain portion of the face of the trip Q to bear against said stud, and to slide the wheel N back again, and act upon the spring-lever E, to make it engage with the arm or leg *a'* and lock the alarm.

This combination of alarm setting and tripping devices is not only a very simple one, but it provides for the setting of the alarm index or hand *d'* by turning the spindle M without disturbing or operating the alarm-gear; and it furthermore provides for the most perfect accuracy and facility as regards the setting of the alarm. Thus the loose wheel N, with attached trip Q, is set so that the notch *e'* of the trip bears a certain relation with the hour-hand *t* of the clock, and as the trip revolves in unison with the hour-hand—that is, makes a revolution in the same time as the hour-hand—this relation is necessarily unalterable, so that by setting the trip Q, for instance, with its notch *e'* to receive within it the stud *f'* of the spindle M, when the hour-hand stands at XII (twelve) the alarm-index will also stand at XII (twelve) on its dial; and in any adjustment of the setting-spindle M to change the hour or time of sounding the alarm, both the alarm-index and the hour index or hand will point to the same time on their respective dials when the alarm is sounded.

Any suitable disengaging device may be applied to the clock for disconnecting the alarm, so that it will fail to be sounded when the trip comes round—as, for instance, a lever, R, which may be adjusted to arrest the hammer G.

We claim—

1. The combination, with the winding-arbor *b* and mainspring D, of the ratchet-wheels *g* and *h*, having a fast and loose relation, relatively, with said arbor, and provided with one or more engaging studs or stops, *k* and *l*, the loose main alarm-driving wheel *e*, and the pawls *f i*, substantially as and for the purpose herein set forth.

2. The alarm-setting spindle M, made capable of independent adjustment, in combination with the alarm-releasing device or trip Q, arranged to rotate loosely upon or around said spindle, essentially as described.

3. The combination of the gears *o*, N, and *p* with the hour-hand or its sleeve, and the alarm-trip Q, substantially as specified.

4. The combination of the alarm engaging and disengaging spring hook or lever E, the loose wheel N, with its attached notched trip Q, arranged to rotate in unison with the hour-hand of the clock, and the independently-adjustable alarm-setting spindle M, having a stud or projection, *f'*, essentially as and for the purpose herein described.

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