2 Sheets—Sheet 1.

E. GRAH.

TIME-LOCK.

No. 184,368. Patented Nov. 14, 1876.

Fig. 1.

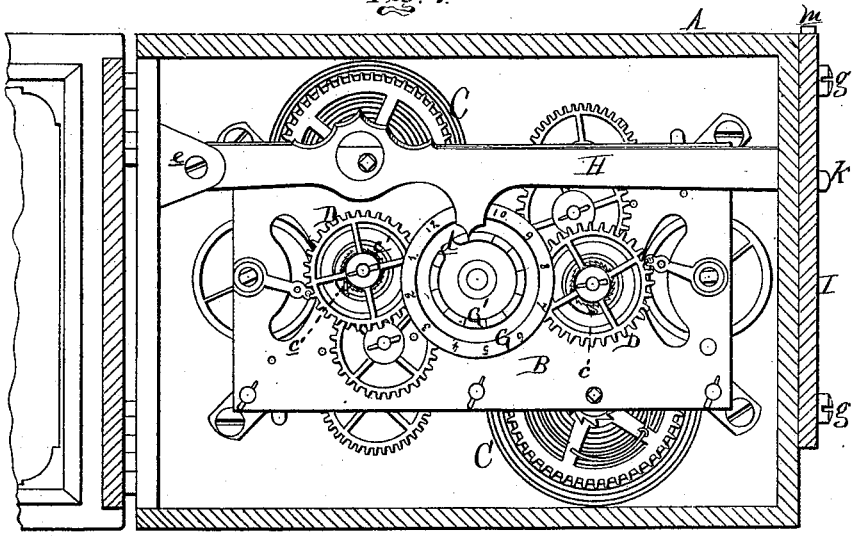
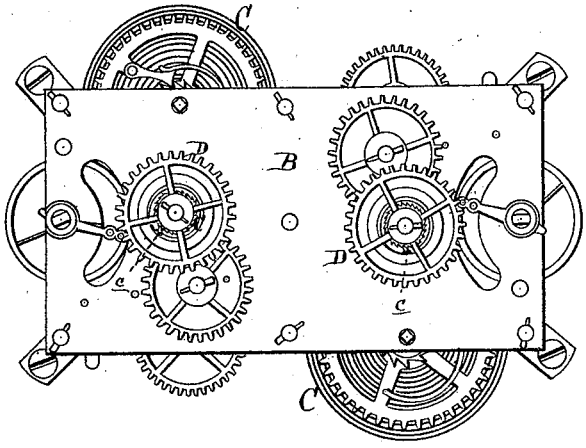


Fig. 2.



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Edward Barthel
H. F. Eberts.

Inventor:
E. Grah
By Atty
Wm. S. Sprague

2 Sheets—Sheet 2.

E. GRAH.

TIME-LOCK.

No. 184,368. Patented Nov. 14, 1876.

Fig. 3.

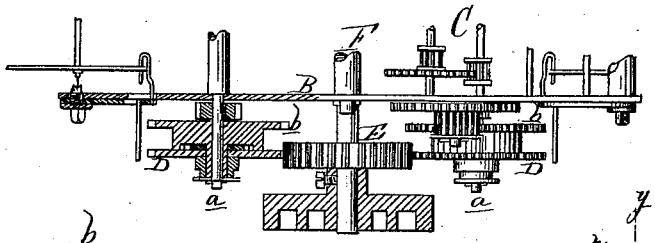


Fig. 8

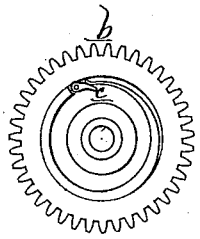
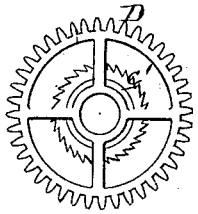


Fig. 9.



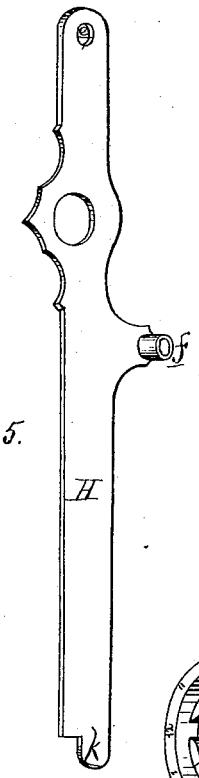


Fig. 5.

Fig. 6.

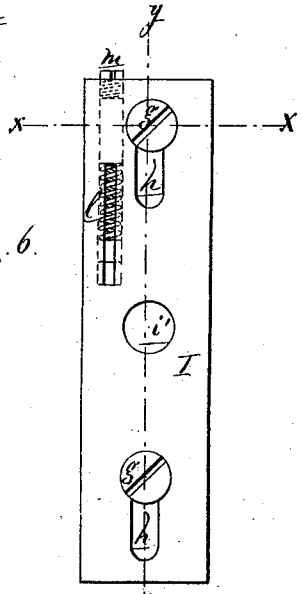
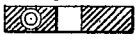


Fig. 7.



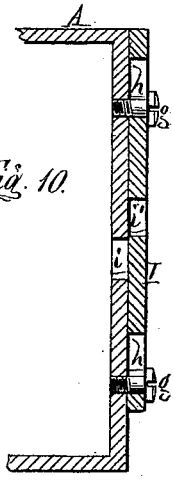


Fig. 10.

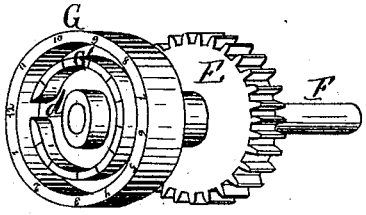


Fig. 4.

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UNITED STATES PATENT OFFICE.

EMIL GRAH, OF TOLEDO, OHIO.

IMPROVEMENT IN TIME-LOCKS.

Specification forming part of Letters Patent No. **184,368**, dated November 14, 1876; application filed May 26, 1876.

To all whom it may concern:

Be it known that I, EMIL GRAH, of Toledo, in the county of Lucas and State of Ohio, have invented an Improvement in Time-Locks for Safe and Vault Doors, of which the following is a specification:

The nature of my invention relates to an improvement in time-locks of that class wherein one or more clock movements are so arranged that they, or either of them, will permit the bolts of the door to be thrown at a certain interval of time after adjusting a dial connected with the clock-train.

The invention consists, first, in a peculiar sliding stop-plate, provided with an opening and spring, in combination with an opening in the case and the peculiar lever; and, further, in the combination of the lever and the dial-knob, having two concentric grooves cut in its face, and an opening connecting said groove, as more fully hereinafter explained.

Figure 1, Sheet 1, is an elevation of my lock with the case-door open. Fig. 2 is an elevation of the movement alone, the dial and dog being removed to show the parts behind them. Fig. 3, Sheet 2, is a sectional plan view of the front part of the clock-trains. Fig. 4 is a perspective view of the dial-knob, its spindle, and intermediate pinion. Fig. 5 is a similar view of the lever, looking at its rear side. Fig. 6 is an elevation of the sliding plate on one end of the lock-case. Fig. 7 is a horizontal section of the same at *x x*. Fig. 8 is an elevation of the center-wheel of one clock-train, and the click thereon. Fig. 9 is an elevation of the driving-pinion and its ratchet removed from the center-wheel arbor shown in the preceding figure, and Fig. 10 a section on the line *y y* in Fig. 6.

In the drawing, A represents a metallic case to be secured to the inside of a safe or vault door. B is the front one of two plates of a double clock-train, C C, secured to the back wall of the case. *a a* are the center-arbors of the clock-trains, upon each of which is mounted the center-pinion *b*, which, through the usual train, is slowly driven by the clock-spring. *c*, Fig. 8, is a spring-pawl on the face side of each center-pinion *b*. D is a driving-gear sleeved on each center-arbor *a* in front of the pinion *b*, and is provided with a ratchet, *c'*, Fig. 9, on the back side, with which the pawl *c* engages, causing the gear D to be rotated with the train, but leaving it free to be turned back without damage to the train, (its own,) whether its train be in motion or not. E is an intermediate pinion mounted on an arbor, F, journaled in the plates between the two trains, and this pinion meshes with the driving-gears D D of both trains, and is rotated (with its arbor) by them in one direction. If turned back, or in the other direction, by hand, the gears D D will turn back on their arbors, slipping around under their clicks without disturbing the motions of the trains. If one train stops, the other will continue its motion and move the pinion E, and through it carry around the gear D of the other movement. G is a flat circular knob secured on the outer end of the arbor F, with two deep concentric grooves turned in its face, the metal between them forming a dial-flange, G', through which, at one point, is cut an opening, *d*, so that said dial-flange then becomes a sector of a circle, which, as well as the outer flange, is divided off. H is a lever pivoted at *e* between lugs on the inner end wall of the case, its outer end projecting through a vertical slot in the other end wall of the case, which is nearest to the bolts of the door. The lever lies just in front of the dial-knob, and has a stud, *f*, Fig. 5, projecting from the back side of the same, carrying an anti-friction sleeve, which stud projects into one or the other of the grooves in the face of the dial-knob.

If the slot *d* be brought coincident with the stud *f* the lever can be lifted up, the stud passing through the said slot when the dial-knob can be turned a little to the left, whereupon the stud will rest upon the sector-flange G', and thus support the lever in an elevated position until the arbor F has been revolved far enough by the clock-work to bring the slot *d* under the stud, which will then drop through it, bringing the free end of the lever into a lower position while the dial-knob continues to be rotated by the clock-trains. I is a sliding stop-plate, secured, by two screws, *g g*, Figs. 1, 6, and 10, to the end wall of the case, which screws pass through slots *h h* and allow the said plate a limited vertical move-

ment. *i* is a socket-opening in the end of the case, which receives the bolt-shank when the door-bolts are thrown inward. *i'* is an opening in the sliding plate, which is coincident with the opening *i* when the plate is down, and through which the bolt-shank passes into the socket-opening *i;* but when the plate I is up, the said opening *i* is covered by it, and the bolt cannot then be thrown. The outer end *k* of the lever passes through the lower part of a vertical slot in the sliding plate I, and on it rests a spiral spring, *l*, held in position by a screw, *m*, tapped down through the head of the plate. The said screw also serves to regulate the tension of the spring, so that it may lift up the plate when released, the lever being at the time in its elevated position. One or both of the dial-knob flanges may be laid off into hourly divisions, numbered from, say, 1 to 48, each mark representing the number of hours required to bring the opening *d* under the stud *f*, so as to let the lever drop. The pendent part of the lever, coming between two hourly marks, serves as an index.

To lock the door and set the lock so as to allow the bolts to be thrown after a given time, the lever being down, and the shank of the bolt being also in or through the openings *i i'*, first, wind up the movements by a key that will fit their winding-posts; next, turn the dial-knob to the left until its slot *d* is coincident with the stud *f;* then lift the lever and turn the dial to the left, when the lever will be supported by its stud resting on the sector-flange, turning the knob until the time to open is indicated under the stud. The plate will be held down by the bolt-shank, thus compressing the spring *l*. Then close the case-door, and shut the safe or vault door, and lock it by shooting its bolts into the sockets of the door-frame in the usual manner. When the door-bolts are thrown into their sockets the bolt shank is withdrawn from the openings *i i'*, whereupon the spring *l* will throw up the plate I, which will serve as a stop for the bolt-shank until the expiration of the time required to have the clock-movements drop said plate again in the manner hereinbefore described.

What I claim as my invention is—

1. In a time-lock, substantially as described, the sliding stop-plate I provided with the opening *i'* and spring *l*, in combination with the opening *i* in the case A, and a lever adapted to be sustained in an elevated position for a determinate or given period of time by one or more clock-trains within said case, substantially as and for the purpose set forth.

2. In a time-lock, substantially as described, the dial-knob G, having two concentric grooves cut in its face, and an opening, *d*, connecting the said grooves, in combination with the lever H, for the purpose of holding such lever in an elevated position for a determinate or given period of time, substantially as set forth and shown.

EMIL GRAH.

Witnesses:
C. I. SCOTT,
JAMES MOORE.