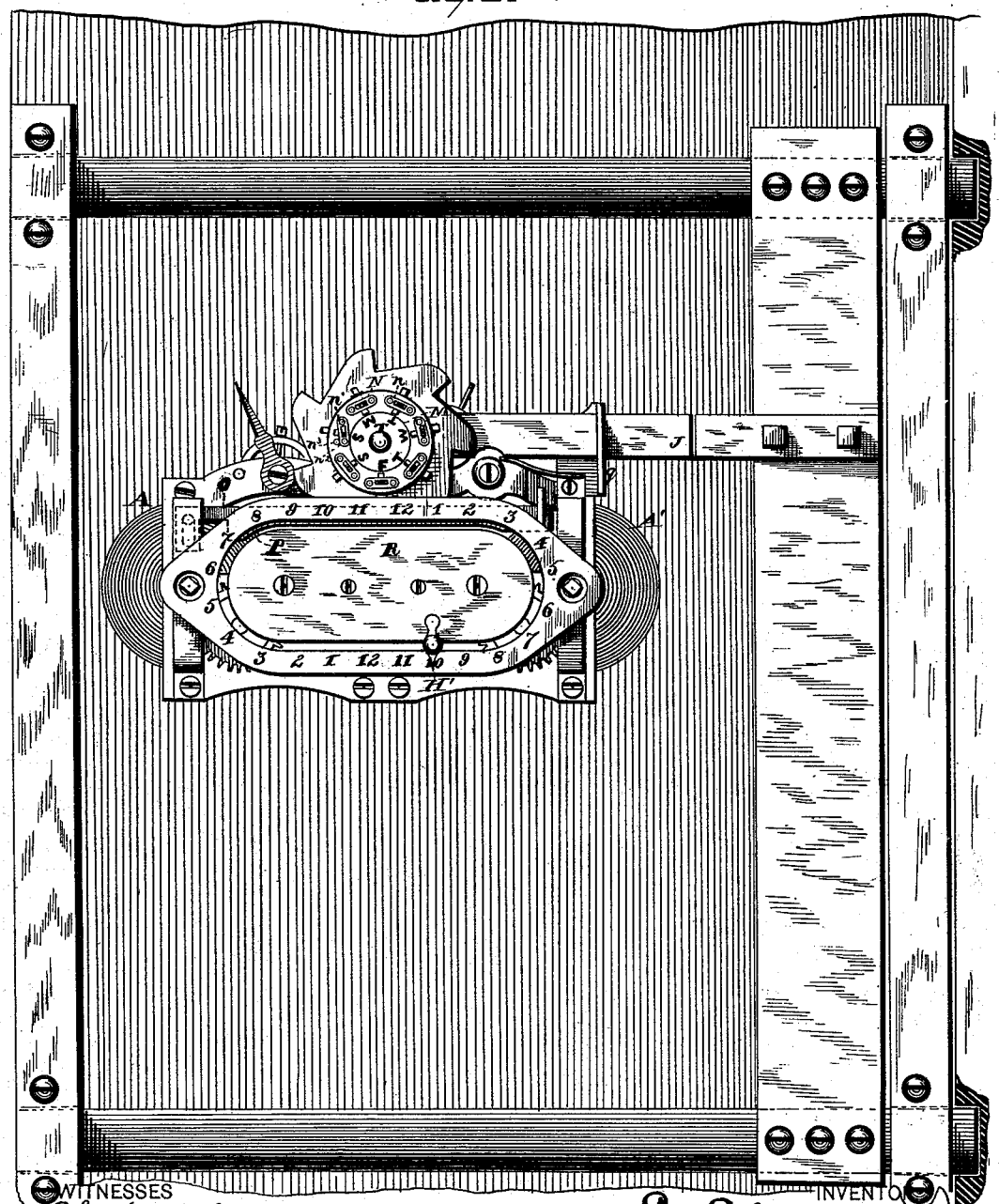
2 Sheets—Sheet 1.

E. STEWART.
Time-Lock.

No. 206,981. Patented Aug. 13, 1878.

Fig. 1.



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2 Sheets—Sheet 2.

E. STEWART.

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Fig. 2.

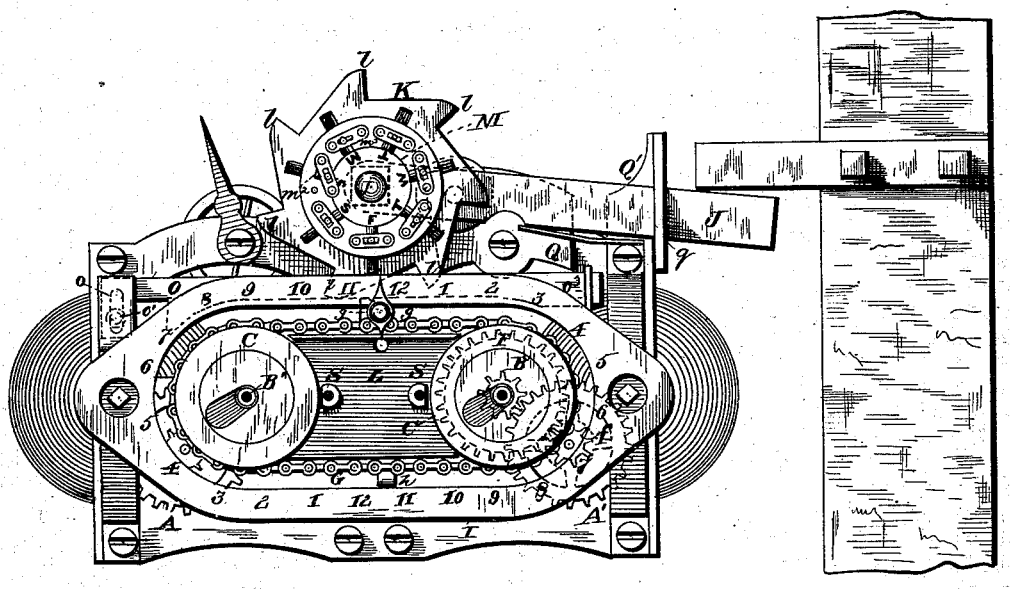


Fig. 3.

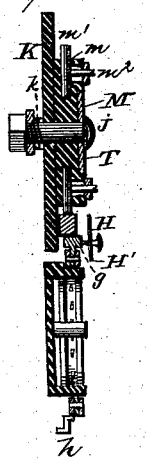


Fig. 4.

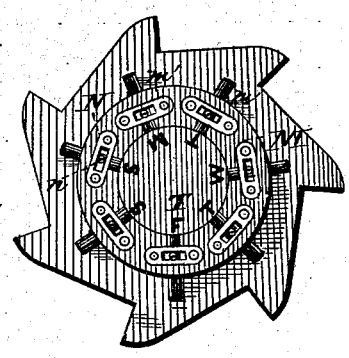


Fig. 5.

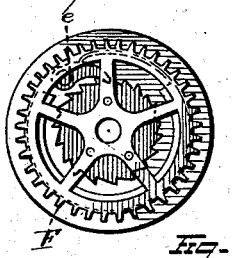


Fig. 6.

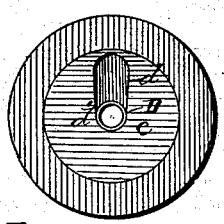
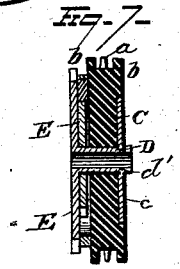


Fig. 7.



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UNITED STATES PATENT OFFICE.

EDWARD STEWART, OF FORT MADISON, IOWA, ASSIGNOR OF ONE-HALF HIS RIGHT TO SAMUEL ATLEE AND JACOB C. BLACKBURN.

IMPROVEMENT IN TIME-LOCKS.

Specification forming part of Letters Patent No. **206,981**, dated August 13, 1878; application filed May 20, 1878.

To all whom it may concern:

Be it known that I, EDWARD STEWART, of Fort Madison, county of Lee, and State of Iowa, have invented certain new and useful Improvements in Time-Locks; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use it, reference being had to the accompanying drawing, which forms a part of this specification.

My invention relates to an improvement in time-locks for safe and vault doors.

The object of the invention is to provide a time-lock of such construction that it may be set to release the lock-bolt of the time-lock at any predetermined hour of the day, and retain the same in an unlocked position for any desired time, and automatically move the lock-bolt into position for locking the safe at the expiration of the time at which the lock had been set to remain unlocked.

A further object of my invention is to provide a time-lock of such construction that it may be readily adjusted to automatically unlock at any predetermined hour of each successive day or of any particular day or days of the week; and to this end my invention consists, first, in a time-lock, in the combination, with a traveling pin or projection, motion being imparted thereto by suitable clock mechanism, of a lock-bolt and a lift-bar interposed between the bolt and projection, whereby the latter will act on the lift-bar and actuate the lock-bolt at any predetermined hour of the day, and retain the same in an unlocked position for any desired length of time, and automatically move the lock-bolt into a locked position at the expiration of the time at which the lock had been set to remain unlocked.

My invention further consists, in a time-lock, in the combination, with a traveling pin or projection, motion being imparted thereto by suitable clock mechanism, of a lock-bolt provided with adjustable abutments mounted on a movable plate, the several parts being constructed and arranged in such a manner that the lock may be adjusted to automatically unlock every successive day or any particular day or days of the week.

My invention further consists in the several details of construction and combinations of parts, as will hereinafter be described, and pointed out in the claims.

In the accompanying drawings, Figure 1 represents a safe or vault door provided with my improved time-lock. Fig. 2 is a plan view of the lock, with a portion removed to illustrate the mechanism more clearly for operating the bolt. Fig. 3 is a vertical section through the toothed wheel, endless chain, lifting-bar, and projection or pin on the chain. Fig. 4 is an enlarged view of the toothed wheel provided with a series of adjustable abutments. Fig. 5 is a rear view of one of the chain-wheels; Fig. 6, a front view of the same, and Fig. 7 a vertical section of the chain-wheel.

A A′ represent two chronometer time-pieces of any approved form of construction. On the center posts or studs B′ of each movement is placed a chain or sprocket wheel, C, which are provided with sprockets or spurs *a*, located between the flanges *b*. Chain-wheel or drum C is placed loosely upon a sleeve, D, and secured by means of a spring-disk, *c*, having an elongated slot, *d*, by means of which the disk is secured within the groove *d′* formed in one end of the sleeve. To the opposite end of the sleeve is rigidly secured a ratchet-wheel, E, and a pawl, *e*, pivoted to the wheel C, operates to lock the ratchet therewith when the latter is turned in one direction and allow the ratchet to revolve in the opposite direction without imparting motion to the wheel C. To the ratchet or to the sleeve is rigidly secured a toothed wheel, F, which engages with the pinion *f* of the clock-movement.

It will thus be observed that the clock-movement, through the pinion *f*, operates to turn the chain-wheels C in one direction through the medium of the toothed wheels F, ratchet-wheels E, and pawls *e*, while the chain-wheels C may be freely turned in the opposite direction without disturbing the regular operation of the clock-movement.

Around the chain-wheels C is placed an end-

less chain, G, the links of which engage with the spurs or sprockets *a*, and thus prevent any slipping of the chain on its wheels, and by means of said wheels the chain is carried around in one direction, while it may be freely moved in the other direction without stopping the clock-movements.

As two clock-movements are employed, there will be very little danger of a lock-out owing to the stoppage of the clock-movements, as, in case one of the clocks should run down or stop from any other cause, the other clock could continue running and carry the chain in the same manner as if both clocks were running.

To the endless chain G is secured a projection, *g*, formed with an oval or inclined engaging-face, *g'*. To projection *g* is attached a stud, H, provided with a pointer, H', the latter arranged to move over the graduated indicating-plate I, upon which is marked the twenty-four hours of the day. The time-movements are so constructed and regulated that pointer H' will make a complete circuit of the plate I once in every twenty-four hours. Endless chain is also provided with a flange, *h*, which projects laterally therefrom, for a purpose hereinafter described.

J represents a lock-bolt, pivoted at *i*. K is a toothed wheel, supported by a pin, *j*, which extends through the short end of the bolt J. Wheel K is prevented from accidental movement by means of a spring, *k*, interposed between the bolt and the wheel, said spring offering sufficient resistance to prevent any movement of the toothed wheel unless force is directly applied thereto.

L is a plate, located between the chain-wheels C and attached to the front plates of the clock-movements. Plate L is provided with flanges, extending outwardly therefrom, and serving as supports for the endless chain.

Wheel K is provided with seven teeth, *l*, and when the lock-bolt J of the lock is raised, and prevents the retraction of the bolt-work of the safe or vault door, one of the teeth *l* will extend below the upper surface of the endless chain, and hence, when the flange *h* reaches the tooth *l*, it will strike and carry it forward through an arc equal to one-seventh of the wheel K, and thus bring the following tooth *l* in position to be moved by the flange *h* of the chain on its succeeding revolution.

From the foregoing it will be observed that the toothed wheel is moved forward a tooth for each complete circuit of the endless chain, the time for which is once in every twenty-four hours.

On the face of the toothed wheel K is secured a circular plate, M, provided with radial openings *m*, within which are placed the sliding rods or abutments m^1. Each abutment is provided with a pin, m^2, which projects through an elongated opening, m^3, in the plate M.

Spring-levers N, having elongated slots *n* formed therein, are pivoted at n^1, and their outer ends, by being toward or from the center of the plate, operate to impart a radial movement to the abutments. When the abutments are moved outward from the periphery of the circular plate M they are held in such position by means of a pin, n^2, attached to the end of the spring-lever, entering a depression, n^3, in the face of the circular plate.

A circular plate, T, is attached to the face of plate M, and lettered as shown, to denote the several days of a week, a letter being located in line with each one of the adjustable abutments.

O is a lift-bar, one end of which is provided with a vertical slot, *o*, through which extends a stud, o^1, while the opposite end is retained with a guide, o^3. This bar is prevented from longitudinal movement, but may have a free vertical movement. At one end of the bar there is secured or formed, as a part thereof, a curved shoe, P.

The outer end of the dog-bolt is upheld by a spring, Q, and the movement of same limited by means of guide-plate Q', having an elongated slot, *q*, formed therein.

The front plate, R, is secured in place by means of screws entering the studs R', on which the chain-wheels revolve, and also by screws secured to posts S, located between said chain-wheels.

The operation of my improved time-lock is as follows: We will suppose that it is desired to open and close the safe or vault door at the hours of 8 a. m. and 3 p. m., respectively, during every day of the week with the exception of Sunday, during which day the lock shall remain intact. The several adjustable abutments, with the single exception of the one denoted by the letter S, that indicates Sunday, are all forced outwardly from the center of the plate M and secured in such position. As the endless chain revolves from left to right the projection thereon strikes and raises the lift-bar at 8 o'clock, and the lift-bar strikes the abutment and raises the short end of the pivoted lock-bolt, depressing the opposite end, and allows the tongue-piece on the string-bar or other portion of the bolt-work of the safe or vault to be retracted and the door opened. When the projection on the endless chain shall have traveled seven hours, or reached the figure 3, it will allow the lift-bar and short end of the pivoted lock-bolt to drop, while the outer end is raised by means of a spring; and thus the lock-bolt is brought in line with the tongue-piece of the bolt-work, thereby securely fastening the door. As the chain continues its movement the flange thereon will strike one of the teeth *l* of the revolving toothed wheel and move the latter forward one tooth, thus causing the abutment indicating Tuesday to be placed in proper position to be struck by the lift-bar at 8 o'clock Tuesday morning. The lock operates in the manner above stated until Sunday. When the lift-

bar is raised, it fails to strike the abutment, as the latter is not adjusted to open the lock, and the clock keeps on running without affecting the position of the lock-bolt.

Instead of adjusting the mechanism so that the lock will automatically unlock six successive days of the week by simply adjusting every alternate abutment, the safe can be unlocked only on alternate days of the week.

From the foregoing it will be observed that the lock is so constructed and arranged that it will operate during every day or on any particular day or days of the week desired. The lock may be readily set to open or close at any desired time. If the parts are so constructed and arranged that ordinarily the lock shall open at 8 o'clock in the morning, or, in other words, so that the projection on the endless chain will raise the lift-bar when the projection arrives at the figure 8, the lock may be set to open in any desired number of hours by setting the pointer that connects with the said projection on the chain—as, for instance, it is desired that the safe shall remain locked but one hour, the pointer is set at the figure 7, next the figure 8, at which the lock is opened. If twenty-three hours time is desired before the safe shall be unlocked, the pointer is set at the figure 9 on the left-hand portion of the dial-plate, and the abutment is raised out of contact with the lift-bar. Again, the lock may be set to lock instantly after the door is closed or any desired time thereafter. When the outer end of the lock-bolt is depressed beneath the tongue-piece on the bolt-work by forcing the chain around until the projection which operates the lift-bar has gone beyond the end of said bar, then, when the bolt-work is thrown forward into the jamb of the door, the tongue-piece will allow the lock-bolt of the time-lock to rise and assume its locked position. The lock may be set to lock the safe or vault at any desired time after the door has been closed.

Instead of employing a cam-shaped projection on the chain for raising the lift-bar, an anti-friction roller might be used in lieu thereof and serve the same purpose.

Instead of adjusting the endless chain by means of a handle attached to the chain, a portion of the plate located over the chain-wheels may be removed, and a handle attached directly to one of said chain-wheels. Again, the lift-bar may be of any desired form, and may be made adjustable in length, so that the lock may be retained in an unlocked position for any time desired by changing the length of the lift-bar.

It is evident that my improvement may be embodied in locks of various forms of construction without avoiding the essence of my invention; and hence I do not limit myself to the exact construction shown and described; but,

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

1. In a time-lock for safe or vault doors, the combination, with suitable clock mechanism and a traveling pin actuated thereby, of a lock-bolt and a setting mechanism for each day of the week, permanently attached to and forming a part of the time-lock, and arranged and adapted to be adjusted to actuate the lock-bolt each successive day, or any particular day, or on alternate days of the week, substantially as set forth.

2. In a time-lock, the combination, with clock mechanism, of an endless chain provided with a device for imparting motion to the lock-bolt of the time-lock, substantially as set forth.

3. In a time-lock, the combination, with two clock-movements, of two chain or sprocket wheels and an endless chain, the parts being constructed and arranged in such a manner that the chain will be moved by one or both the clocks, and may be freely moved in a direction opposite to the movement of the clock-arbors without disturbing the clock mechanism, substantially as set forth.

4. The combination, with the center arbor of the time-movement of a time-lock, of a sleeve having a toothed wheel and ratchet-wheel rigidly secured thereto, of a chain or sprocket wheel provided with a pawl, and secured upon the sleeve by means of a yielding disk which engages a groove formed in the end of said sleeve, substantially as set forth.

5. The combination, with two clock-movements provided with chain or sprocket wheels and an endless chain, of a pointer attached to the chain, and an indicating plate or dial having the hours of the day marked thereon, substantially as set forth.

6. The combination, with a traveling pin or projection, movement being imparted thereto by suitable clock-work, of a lock-bolt provided with a revolving toothed wheel, a device for imparting an intermittent movement to said toothed wheel, one or more adjustable abutments for regulating the movement of the lock-bolt, and a lift-bar which is actuated by the traveling pin, substantially as set forth.

7. In a time-lock, the combination, with two clock-movements, a lock-bolt, and one or more adjustable abutments engaging therewith, a movable plate for changing the relative position of said abutments, of a traveling projection for moving the lock-bolt through the medium of said abutments, and a flange or equivalent device for moving the plate to which the abutments are secured, substantially as set forth.

8. The combination, with the lock-bolt of a time-lock provided with adjustable abutments, of a traveling chain provided with a projection, and a lift-bar adapted to be raised by said projection at any desired time, and cause said bar to strike one of the abutments connected with the bolt-lock and actuate the latter, substantially as set forth.

9. In a time-lock, the combination, with suitable clock mechanism, of a lock-bolt pro-

vided with a revolving toothed wheel having a series of radially-arranged adjustable abutments attached to a plate secured to said wheel, substantially as set forth.

10. In a time-lock, the combination, with suitable clock mechanism, of a lock-bolt provided with one or more adjustable abutments and slotted spring-levers for securing them in the desired position, substantially as set forth.

In testimony that I claim the foregoing I have hereunto set my hand this 6th day of May, 1878.

EDWARD STEWART.

Witnesses:
J. C. BLACKBURN,
R. J. SMITH.