(Model.) 4 Sheets—Sheet 1.

H. F. NEWBURY.

TIME LOCK.

No. 262,097. Patented Aug. 1, 1882.

Fig. 1.

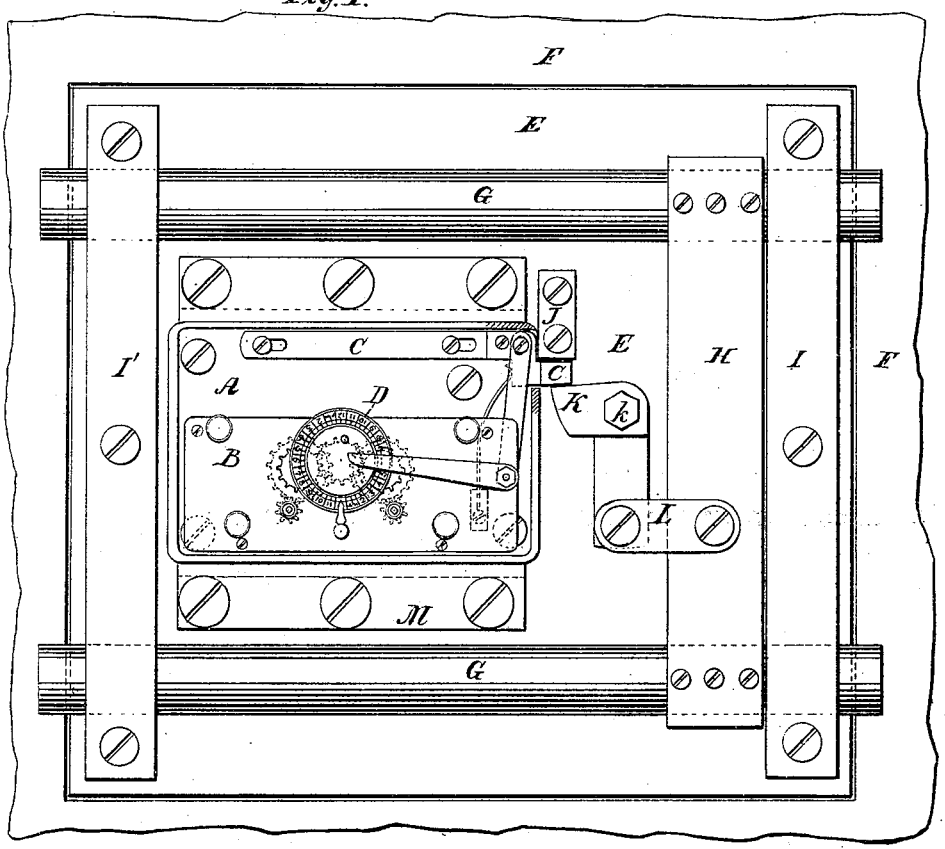


Fig. 2.

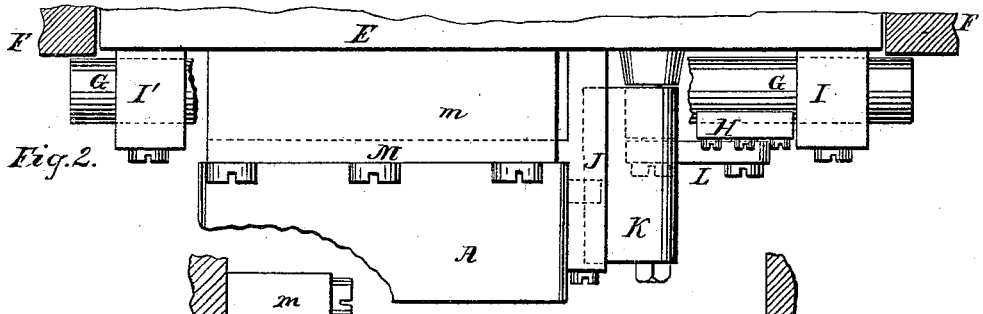


Fig. 3.

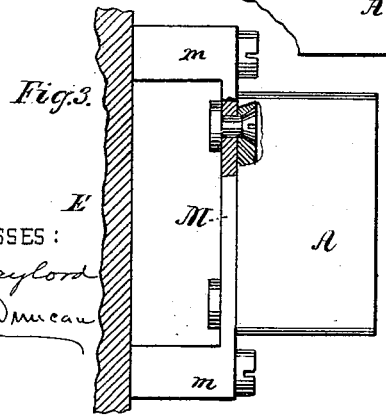
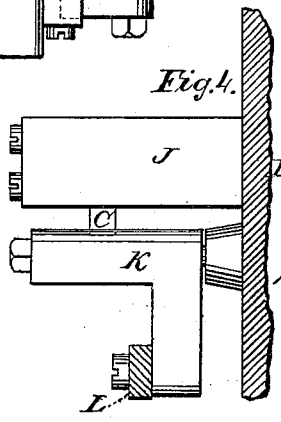


Fig. 4.



WITNESSES:
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INVENTOR
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(Model.) 4 Sheets—Sheet 2.

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TIME LOCK.

No. 262,097. Patented Aug. 1, 1882.

Fig. 6.

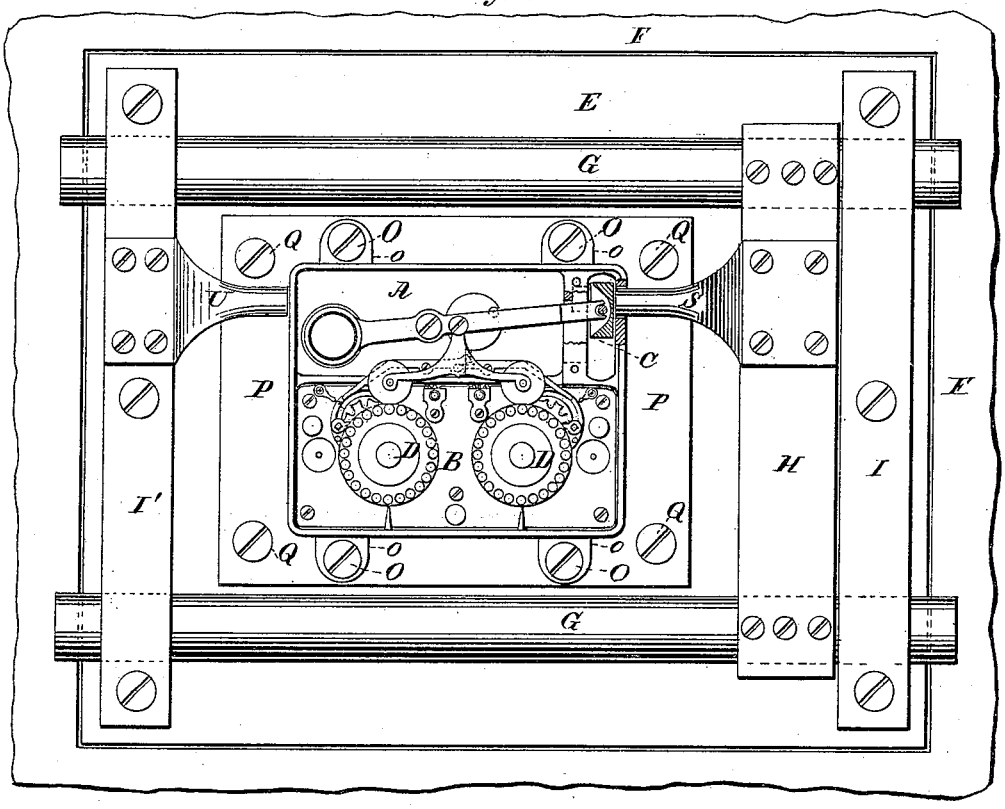


Fig. 4.

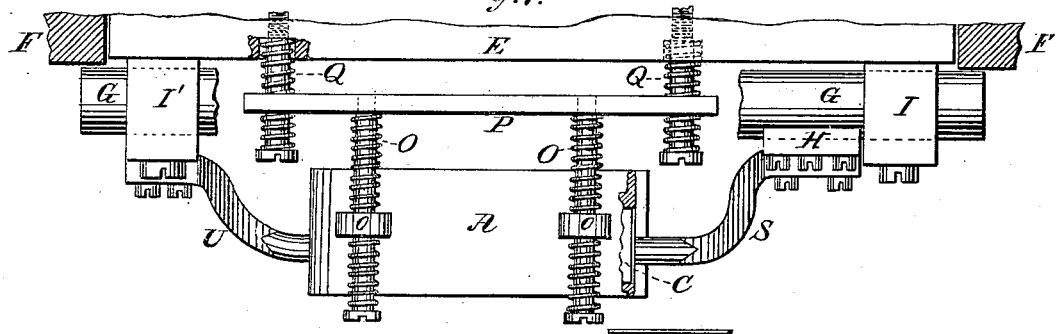


Fig. 5.

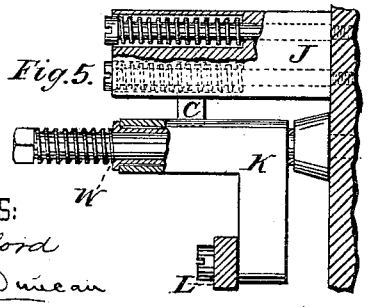
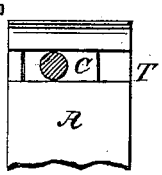


Fig. 8.



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(Model.) 4 Sheets—Sheet 3.

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TIME LOCK.

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Fig. 9.

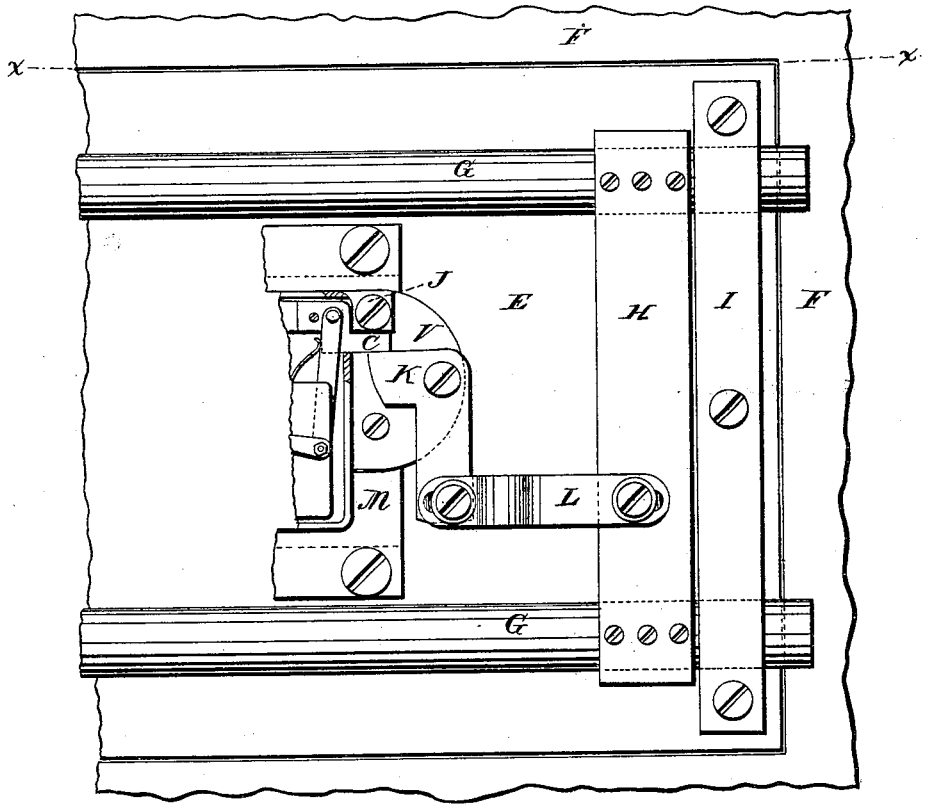


Fig. 10.

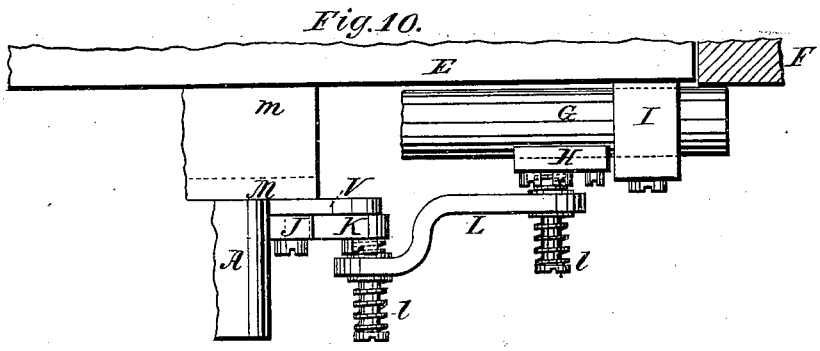
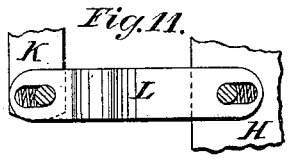


Fig. 11.



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(Model.) 4 Sheets—Sheet 4.

H. F. NEWBURY.

TIME LOCK.

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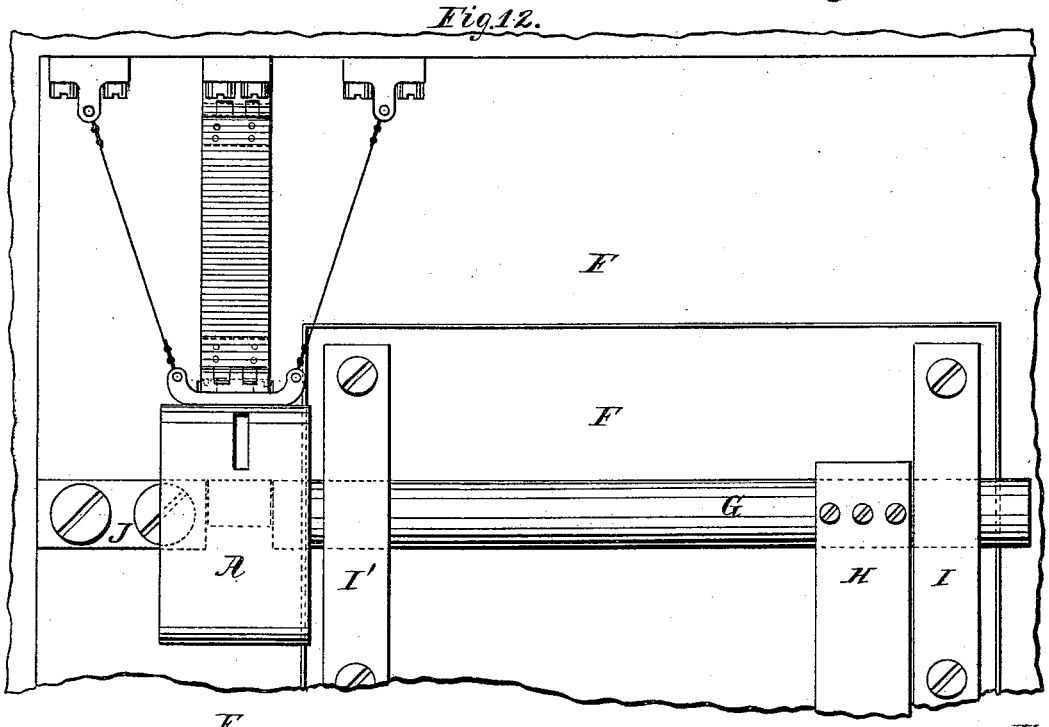
Fig. 12.



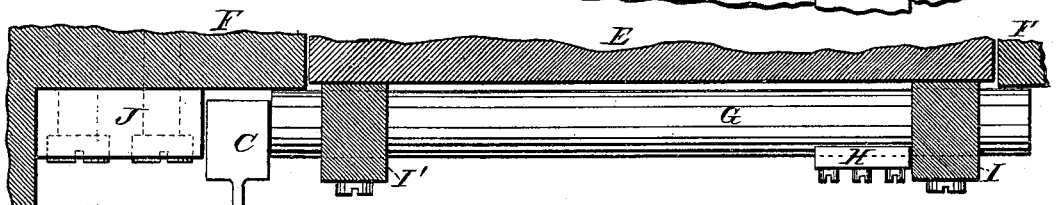


Fig. 13.

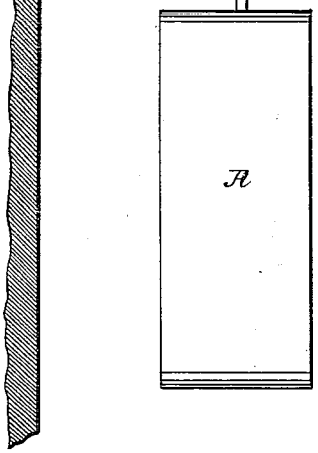
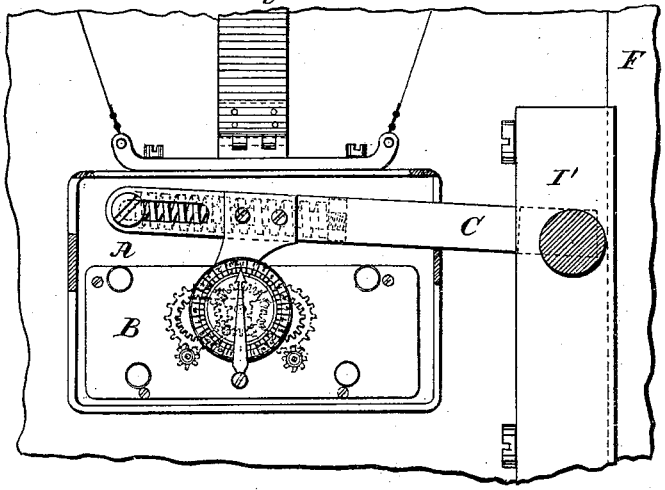


Fig. 14.



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UNITED STATES PATENT OFFICE.

HENRY F. NEWBURY, OF BROOKLYN, NEW YORK.

TIME-LOCK.

SPECIFICATION forming part of Letters Patent No. 262,097, dated August 1, 1882.

Application filed April 14, 1882. (Model.)

To all whom it may concern:

Be it known that I, HENRY F. NEWBURY, of the city of Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Chronometric or Time Locks and the Mode of Mounting the Same, (Case E;) and I do hereby declare that the following is a full, clear, and exact description of my invention, and will enable others skilled in the art to which it appertains to make and use the same.

A chronometric or "time" lock, as the term is understood in the art of safe and vault protection, is a lock whose bolt or checking device (sometimes technically called "dog") is, for the purpose of unlocking at least, under the control of a time-movement capable of withdrawing it automatically, or of permitting it to be withdrawn, from the locking position upon the arrival of the hour for which the mechanism has previously been set. By placing such locks upon the interior of the structures to be protected, and without mechanical connection with the exterior thereof, it has been supposed that an efficient security is provided against what are known as "masked burglaries," and that thus locks of this class afford complete protection against the operations of the burglar, except when he resorts to violence calculated to force the walls of the safe or vault. I have discovered, however, that the security thus afforded is apparent only, and that any of the time-locks now upon the market, when mounted in the established way, can be defeated by the burglar without difficulty and without resort to force to break or penetrate the walls of the structure in which the lock is used. From this it results that practically a safe or vault guarded by a combination-lock has its security increased but little, if any, by the addition of any of the existing time-locks, and that the protection afforded by such time-lock alone is far less reliable than that afforded by an ordinary combination-lock alone. This defect in the existing chronometric locks as heretofore mounted arises from the frangible character of certain parts of the time-movement, which in all fine work are made so slight and delicate as to be broken readily by a sudden shock, such as might be communicated to them through the walls of the safe or vault by the explosion of a small charge of dynamite, nitro-glycerine, or other quick explosive outside the walls of the structure, but in proximity to that part of the walls against which the lock is secured. The parts of a time-movement which are the farthest removed from the main wheel are the most delicate, and therefore the most easily broken, this being the case especially with the staff of the third wheel and with the pallet and escape-wheel staffs. The journals of these staffs as ordinarily constructed are made exceedingly small for the purpose of reducing the surfaces of contact, and thus the friction, to a minimum, and the finer the workmanship of the lock the slighter and more frangible are these parts likely to be. Any material increase in the extent of the bearings, whereby the strength of the parts would be augmented, would correspondingly increase the friction and impair the time-keeping properties of the movement. Time-locks with jeweled movements, also, are especially exposed to injury in the manner indicated, since the jewels, by reason of their brittleness, might easily be broken by the force of an explosion of great intensity in close proximity to them. The destruction of any of the parts intermediate between the balance-wheel and the main wheel at once releases the main wheel from the control of the escapement, and the movement immediately begins to "run down," a movement which otherwise would continue to run for several days without rewinding now running down in as many seconds. As the dial or other device arranged to act upon the lock-bolt or dog to withdraw it or permit it to move from the locking position is actuated from the same spring that drives the main wheel, its speed will be correspondingly accelerated, so that the dog, instead of being withdrawn from engagement with the bolt-work of the door at the regular hour for which the lock has been set, will be withdrawn immediately upon the explosion or other shock, leaving the safe or vault, so far as the time-lock is concerned, entirely under the control of the burglar. If there are other locks on the door, (either combination or key locks,) the burglar will probably have effected the unlocking of them in advance of his attack upon the time-lock, either by picking them or forcing them, or by threats compelling the co-

operation of the custodian of the key or combination. In whatever way this may be done the subsequent unlocking of the bolt of the time-lock in the manner indicated (and repeated experiments show that this can readily be done with a charge of dynamite so small as to make but little noise, and not even indent or otherwise appreciably affect the walls of the safe) removes all obstruction to free access to the valuables placed under the protection of such lock.

The present invention seeks to overcome this difficulty connected with the use of existing time-locks as heretofore mounted; and it consists in a general way in attaching the lock, or at least the time-movement of the same, to the inside of the safe or vault in which it is placed, by means of a flexible or yielding support or supports, a sufficient space being left between the lock or such part thereof and the adjacent portions of the safe or vault to prevent concussion between them under the force of an explosion or other shock directed against the exterior of the structure for the purpose of damaging the lock, and thus destroying its control over the bolt-work, and in the use, in connection with such yielding supports and such space, of enlarged bearing-surfaces, or of flexible or yielding connections, between the parts thus flexibly mounted and the rigidly-mounted parts, as hereinafter fully explained.

The invention is fully illustrated in the accompanying drawings, in which the corresponding parts in the several figures are designated by the same letters.

On Sheet I there is shown the well-known Holmes lock attached to the door of a safe by means of an interposed bed or cushion of rubber, Figure 1 being a front view of the inner face of the door, showing the ordinary bolt-work and the lock in elevation; Fig. 2 being a plan of the parts shown in Fig. 1, the upper door-bolt, for greater distinctness, being broken away; Fig. 3 being an end elevation of the lock and the rubber support, and a sectional view of the door; and Fig. 4 being a side elevation of the connections between the lock-bolt and the door-bolts, the part L being shown in section only. In Fig. 5 on Sheet II these same connections, instead of being secured to the door rigidly, as in Fig. 4, are shown as mounted on springs, for a purpose to be hereinafter explained.

On Sheet II there is shown a time-lock (the well-known Yale lock) attached to the door of a safe by an interposed support made highly flexible and elastic by means of spiral springs, Fig. 6 being a front view of the inner face of the door, showing the ordinary bolt-work and the lock in elevation; Fig. 7 being a plan of the parts shown in Fig. 6, the upper door-bolt and a corner of the lock being, for greater distinctness, broken away; and Fig. 8 being a partial end elevation of the lock-case.

Referring to the drawings more in detail, A represents the time-lock; B, the time-movement; C, the lock-bolt; D, the dial; E, the door of the safe; F, the door-frame; G G, the door-bolts; H, the carrying or tie bar, and I I′ the bolt-bars.

J, in Figs. 1, 2, and 4, is a stud projecting from the face of the door and serving as an abutment for the end of the lock-bolt C.

K is an angle or bell-crank lever pivoted to the safe-door at *k*, and L is the link that connects the lower end of this lever to the carrying-bar H. When the dog or end of the lock-bolt C is interposed between the abutment J and the head of the angle-lever K the bolt-work is locked. When the lock-bolt is retracted the door-bolts G G can be thrown back and the door opened.

The lock, as shown on Sheet I, is secured to the door as follows: It is first bolted to a sheet of rubber, M, and this sheet of rubber is then bolted directly to the door; and for this purpose it is provided on its back with two flanges or ribs, *m m*, which serve the double purpose of strengthening the rubber where the screw-bolts pass through it and of raising the body of the sheet, and thus lifting the lock away from the door. With a time-lock mounted in this manner, if sufficient space be left between the lock and the door or other adjacent portion of the safe, a very heavy and sudden shock may be brought against the exterior of the structure in the locality of the lock without producing any material injury to the time-movement.

By reason of the yielding or flexible connection between the lock and the door the vibration imparted to the solid mass of the door by such shock is not transmitted to the lock except in slight degree, and not enough to break or displace any of the parts of the lock, as would immediately happen were the lock so near the door that it would be brought into contact therewith by the force of the explosion or other shock. A similar result is secured when the lock is mounted as shown in Figs. 6 and 7 on Sheet II. In this case the lock is attached by means of screw-bolts O O to a plate, P, and this plate in turn is secured to the door by other screw-bolts, Q Q. The screws O O pass through ears *o o* on the lock-case, and spiral springs are introduced between these ears and the heads of the screws, and also between the ears and the plate P. In like manner the screws Q Q are provided with springs on both sides of the plate P.

S is a tongue-piece attached to the carrying-bar H, and arranged to take against the lock-bolt or dog C, a slot, T, being provided in the lock-case for this purpose.

U is a stud attached to the stationary bolt-bar I′, and arranged to take the thrust of the tongue-piece S, transmitted through the lock-case, in the event of any unusual strain put upon the bolt-work of the door through the medium of the spindle.

The travel which a lock mounted as above described will have relatively to the safe-door,

or, rather, which the door will have relatively to the lock, in case of a heavy shock communicating vibration to the door, renders it necessary to provide some kind of compensating mechanism to preserve the continuity of the connection between the lock-bolt and the bolt-work of the safe. One construction adapted to this end consists of an extension or elongation of the bearings between the lock-bolt and the tongue-piece or other device that constitutes the connection between such bolt and the door-bolts. This construction will prevent the lock-bolt being moved by the force of the shock out of alignment with the tongue-piece or other connecting device, which, if permitted, would at once release the door-bolts from the control of the dog. Such extension of the bearing-surfaces is shown in Figs. 2 and 4, in which the stud J and the head of the angle-lever K, between which the end of the lock-bolt C rests when in the locking position, are made much longer than the thickness of the bolt C. This allows these parts to play freely back and forth within the required limits without the lever K being carried away from contact with the bolt C, which would permit the door-bolts to be retracted. It is manifest that the same result could be attained by widening the dog or end of the lock-bolt itself, leaving the adjacent parts of their normal dimensions. Such construction is seen in Fig. 6, Sheet II, in which the block C, which constitutes the lock-bolt, is made wider than the diameter of the stud S, and the opening T in the lock case is elongated into a slot. This permits the movement of the door relatively to the lock within necessary limits, without carrying the end of piece S past the bolt C. By cutting the slot T across the entire end of the lock, portions of the lock-case, being substantially in alignment with the lock-bolt, will serve practically to extend the bearing between the flexibly-mounted lock and the rigid tongue-piece S.

In order to prevent the stud J and the angle-lever K, as shown in Figs. 2 and 4, from being torn away from their fastenings by the force of a shock brought against the exterior of the safe, they may be attached in the manner shown in Fig. 5, whereby they are given a certain amount of play on the fastening bolts, being held in their normal position by spiral springs, and in order to relieve the angle-lever from friction arising from the use of the spring a sleeve, W, may be interposed between it and its fastening-bolt, the thrust of the spiral spring being against a flange on such sleeve, and the sleeve being a little longer than the head of the angle-lever.

Instead of mounting the entire lock upon a flexible or yielding support, as illustrated on Sheets I and II, the same result can be accomplished by mounting the clock-work alone upon such support, p.ovided the bearings between the parts thus mounted and the other parts of the lock, which are rigidly mounted, be of such extent as to permit the latter to move within the requisite limits without interrupting the connection between them and the former. In like manner the lock-bolt might be arranged to move in ways formed on or rigidly attached to the door or wall of the safe, and all the other parts of the lock be flexibly mounted, in which case the extended bearings would be formed between the lock-bolt and such other parts.

Instead of providing extended or elongated bearings between the parts which are flexibly mounted and those which are rigidly attached to the door or wall of the safe or vault, in the manner and for the purpose above set forth, the same result may be accomplished by providing a flexible or yielding connection between the parts. Such construction is illustrated on Sheet III, Fig 9 showing a section of a Holmes lock thus mounted on the inner face of the door of a safe; Fig. 10 being a plan view on the horizontal plane of the line *x x* of Fig. 9, the upper door-bolt being broken away; and Fig. 11 being a detailed view of the link L and its connections with the carrying-bar H and the angle-lever K. In this construction it will be seen that the abutment J, instead of being fast upon the safe-door, as in Fig. 1, is attached to an extension, V, of the back plate of the lock-case, so as to move with the lock. It will also be seen that this stud, as also the head of the angle-lever K, is not thicker than the end of the lock-bolt C. The link L is slotted at its two ends, as shown in Fig. 11, and, as shown in Fig. 10, is connected with the angle-lever K and the tie-bar H by the screw-headed bolts *l l*. The slots in the link give the connection all the necessary flexibility, and the spiral springs arranged upon the bolts *l l* in front of and behind the link, and the springs placed in recesses in the ends of the slots of the link, operate at all times to keep the link in proper position relatively to the other parts.

Instead of using a link with slots, the link might be connected to the tie-bar and to the angle-lever by means of ball-and-socket joints, or any other convenient form of universal joint.

Another mode of mounting a time-lock on flexible supports is illustrated on Sheet IV, Fig. 12 being a partial elevation of the inner face of one side of the safe, the lock being suspended by straps at some distance in front thereof; Fig. 13 being a plan of the lock and two sides of the safe, including the bolt-work, certain of the parts being in section; and Fig. 14 being a front view of the lock with its door removed. As here shown, the lock is suspended from the top of the safe by four flexible straps, preferably of steel, and at such distance from the adjacent walls as not to be exposed to concussion by the inward movement of either of the walls unless produced by a force sufficient to make an absolute breach therein. By reason of the suspension of the lock by the flexible straps any vibration given to the walls less than what would be necessary to break them down will communicate little or

no movement to the lock. As in this particular construction the dogging end of the lock-bolt is brought near to the side of the safe, it may be found advisable to slot the other end of this bolt, as shown in Fig. 14. A spring arranged behind the bolt and bearing against the pivot on which the bolt swings in locking and unlocking will serve to keep the dog in its advanced position for work. If, now, at any time a shock should be communicated to the wall of the safe in front of the lock, and be transmitted to the lock-bolt, it would only tend to force such bolt back upon its pivot (the spring yielding for this purpose) without materially disturbing the lock itself or the time-movement forming a part of it. An opening in the rear end of the lock-case will permit the heel of the lock-bolt, if necessary, to pass through the case. With this construction the relative positions of the lock-bolt and the front wall of the safe remain comparatively unchanged by a heavy shock; but the slot in the bolt constitutes an elongated or extended bearing between the bolt and the fixed pivot-pin on which it turns, by reason of which not only is the lock protected from the shock that otherwise might be communicated through the bolt, but the operative connection between the lock and the bolt-work of the safe-door is preserved. Without the yielding capacity of the lock-bolt (made possible by the elongated bearing between it and its pivoted pin) the blow of the wall of the safe against the bolt would cause the lock to bound away, so as to withdraw the dogging end of the bolt from behind the door-bolts. This construction of the lock-bolt, as, in fact, any other construction that will permit the bolt to give back relatively to the lock, and then automatically restore itself, will be found useful, not only when the lock is suspended as shown in Fig. 12, but when it is otherwise mounted with a large space intervening between it and the walls of the safe.

As illustrated in Fig. 14, the lock-bolt is withdrawn from the locking or dogging position by the positive action of the time mechanism, being in this respect like the mechanism shown in Fig. 1.

I am well aware that it is old in the art to interpose thin rubber washers between locks and the doors of safes and vaults on which they are mounted. This is a common practice in the case of both time and non-time locks, and is done for the purpose of preventing the bolts that hold the lock in place from being unscrewed by pounding against the outside of the door.

I am also aware that it has been proposed to mount the time-movement of chronometric locks, and in some instances the locks themselves, upon supports having a limited degree of flexibility, for the purpose of protecting the clocks against stoppage in consequence of shocks communicated from or through the door; but in no case, so far as I am aware, has the space between such lock and the door or adjacent wall, or between the time-movement and the case of the lock, been such as to afford any protection whatever against the destruction of the time mechanism by the shock arising from the use of explosives against the exterior of the walls in the vicinity of the lock.

In one of the well-known constructions, for instance, it has been customary to cushion the time-movement by the use of spiral springs arranged upon the bolts that fasten the movement in the lock-case; but the space between the movement and the back of the case has been so small as practically to afford no security against a shock arising from the use of explosives in the manner above indicated. In fact, the space has been such as to render the destruction of the clock-work more certain, if possible, than if the entire lock were fastened rigidly to the door. In the latter case the lock would participate in the first inward movement of the door, and therefore would not receive a blow from it; but as the lock is constructed in practice the time-movement would remain comparatively stationary until the door, carrying the lock-case with it, had acquired great velocity, and then, the cushioning-springs having been fully compressed, the lock-case would strike with great violence against the clock-mechanism and inevitably break its more delicate parts. So, also, if, as has been proposed in another instance, the lock be held in place between two upper and two lower brackets projecting from the face of the door, with rubber blocks interposed between the brackets and the lock-case, and with but a narrow space between the back of the lock-case and the door, such mode of mounting would be totally inadequate as a protection against the injury arising from an explosion of dynamite or other similar material against the outside of the safe. The shock produced thereby would not only cause the safe door or wall to hammer the lock, so as to break its clock mechanism, but would project the lock bodily inward and tear it away from its fastenings.

In my invention, on the other hand, the space between the lock and the door or wall of the safe or vault (or between the time-movement and the lock-case, if the movement only is put upon flexible supports) is to be such that when an explosion takes place near the exterior of the structure and in the vicinity of the lock the door or wall will not be bulged in sufficiently to deliver a blow against the lock or the time-movement thereof. This assumes that the force of the explosion is not such as to effect an absolute breach in the walls of the safe, or so far to displace the parts as to set or bind the door-bolts so that they cannot be retracted. In the first of these cases it is manifest that no possible construction of lock could afford protection, and in the latter it is manifest that it would be comparatively immaterial whether the clock be injured or not, since the safe would have to be cut open. Burglars, however, for obvious reasons, would not be

likely to use such heavy charges as either to breach the safe or to set the bolts. Their likely course would be to use a charge less than this, but sufficient to cripple the clock, if not specially protected, and thus cause it to surrender its control over the door-bolts, at the same time leaving these in condition to be retracted by the simple manipulation of the spindle from the outside of the safe.

By mounting the lock or its clock-work with such space between it and the door or wall, or the rigidly-mounted parts supported on the door or wall, that, under the force of such an explosion as burglars would be likely to use against such lock, if unprotected, no blow will be communicated to the clock-work, it is believed that a complete practical remedy is offered for a most serious danger.

What is claimed as new is—

1. In combination with the time mechanism of a chronometric lock, a yielding or flexible support therefor, and means for preserving the continuity of the connection between the parts thus flexibly mounted and the adjacent parts, substantially as described, whereby the time mechanism of the lock is held at such distance from the door or wall of the structure in which it is used as to protect it from injury under the force of an explosion directed against the exterior of the structure, and of a character to break the parts of clock-work of the lock if mounted in any of the methods heretofore practiced, the control of the lock over the door-bolts being thereby preserved.

2. In combination with a chronometric lock, a yielding support or supports suspending such lock from the top of the safe or vault in which it is used and at a distance from any of the vertical walls thereof, whereby it is protected from injury by the force of an explosion or other shock directed against the exterior of the safe or vault.

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