(No Model.)

4 Sheets—Sheet 1.

F. H. BULLARD.

SAFE BOLT WORK.

No. 486,817. Patented Nov. 22, 1892.

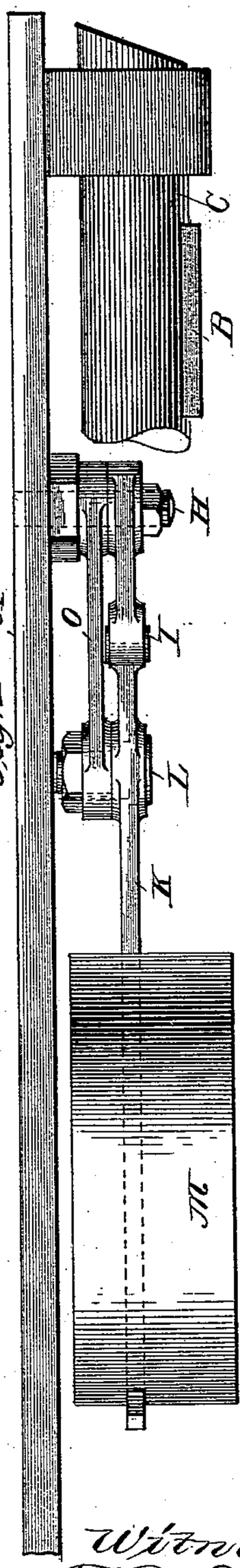

Fig. 1.

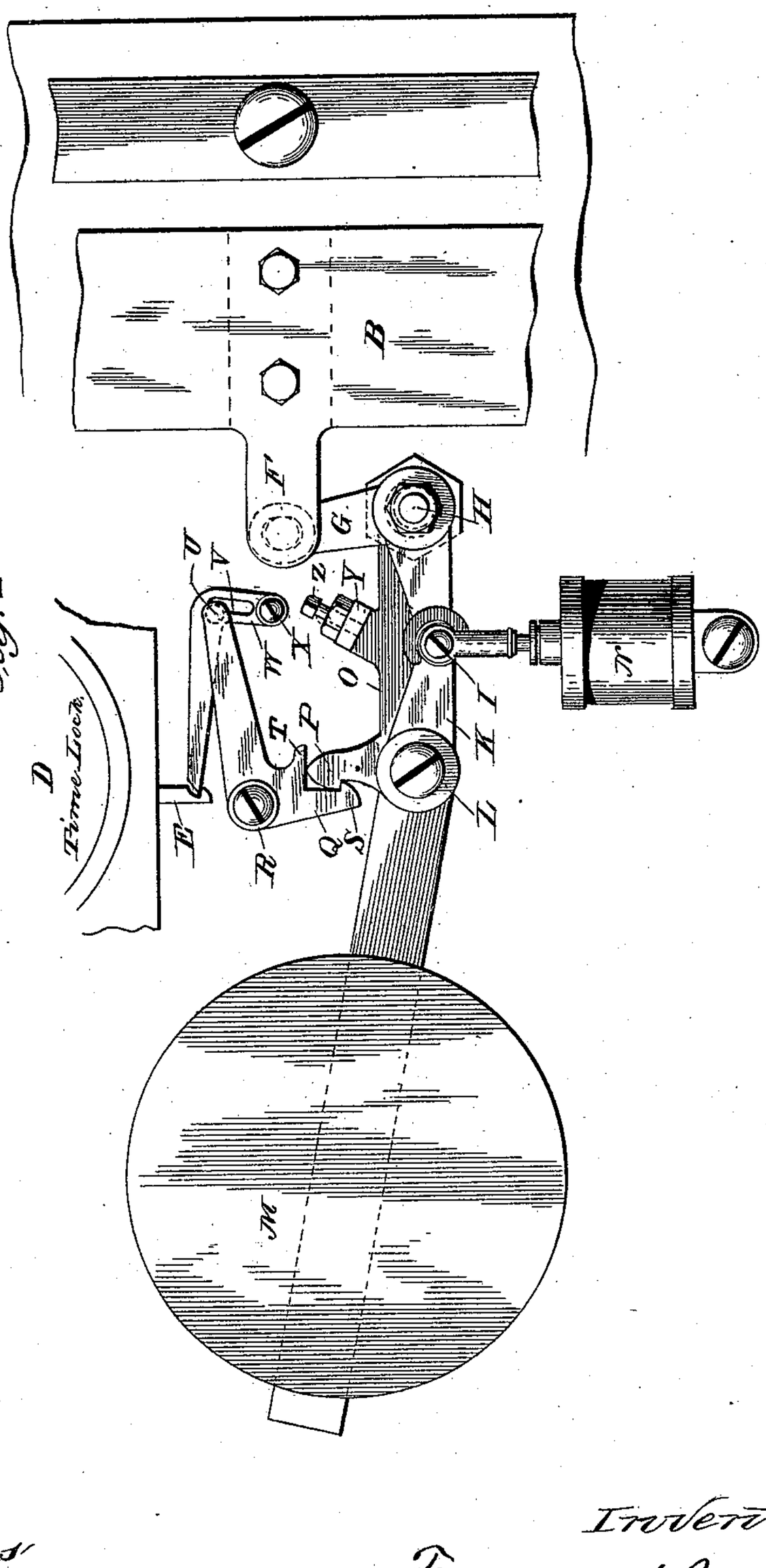

Fig. 2.

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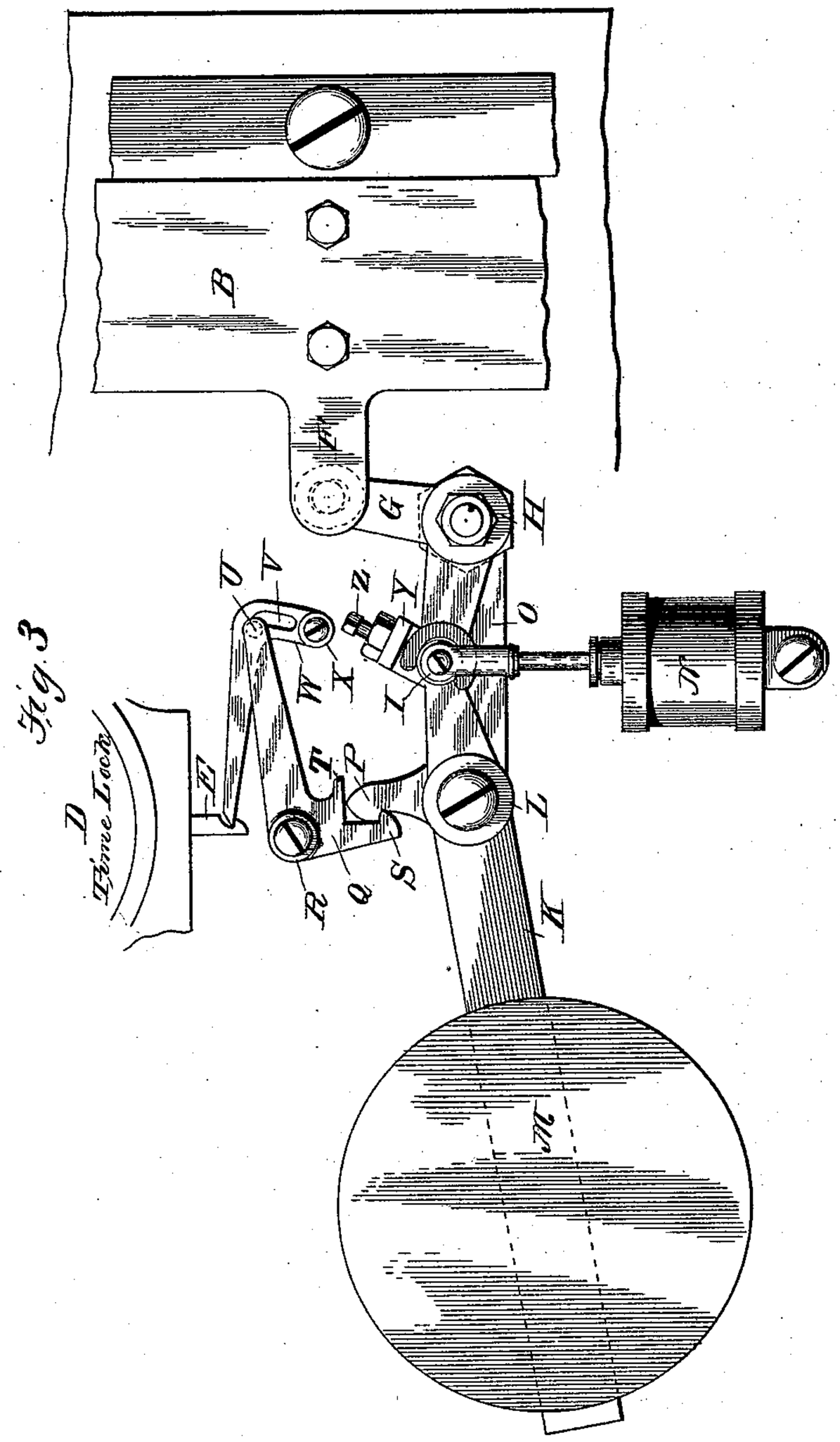

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(No Model.) 4 Sheets—Sheet 3.

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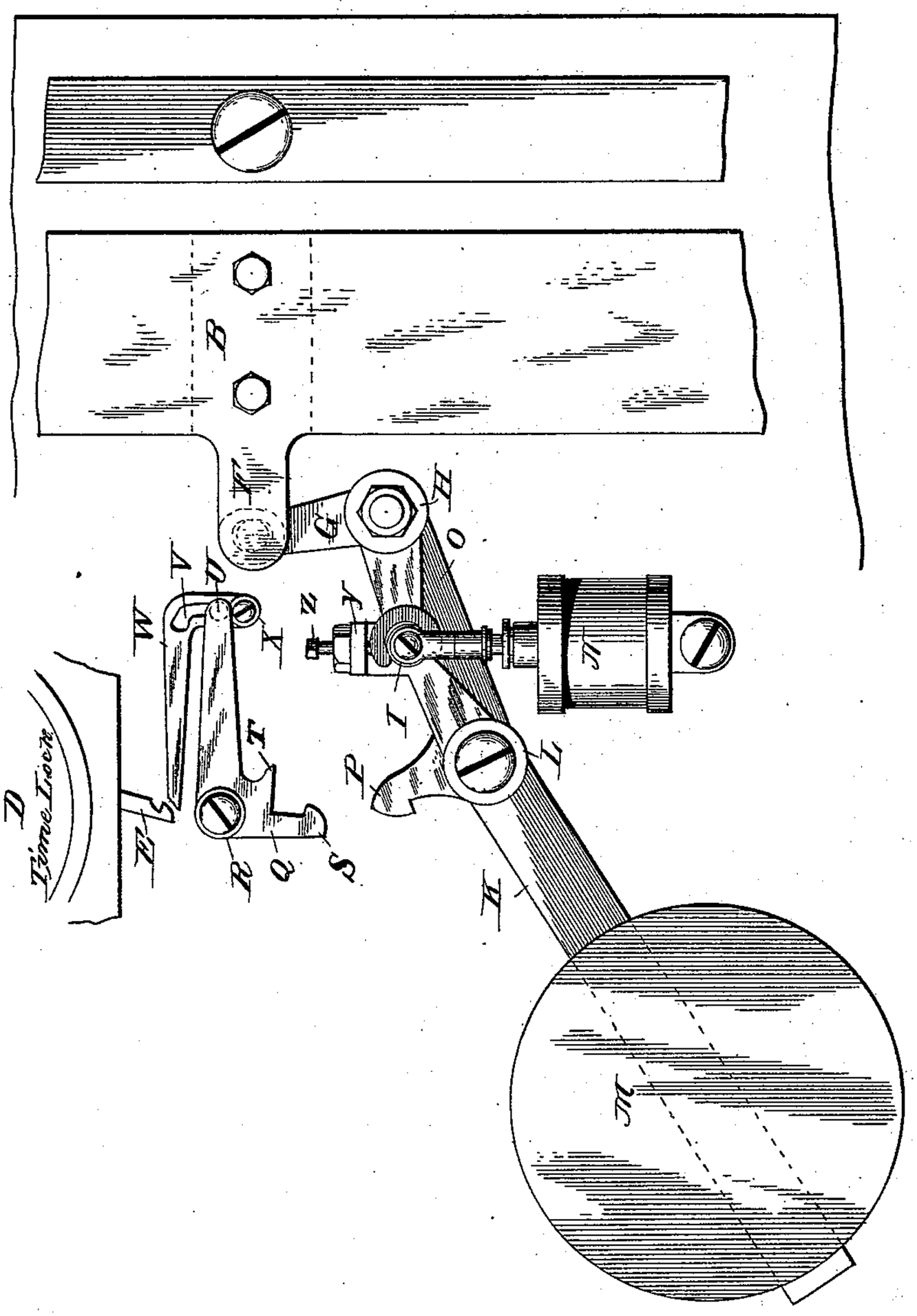
Fig. 4.



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(No Model.) 4 Sheets—Sheet 4.

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SAFE BOLT WORK.

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Fig. 5

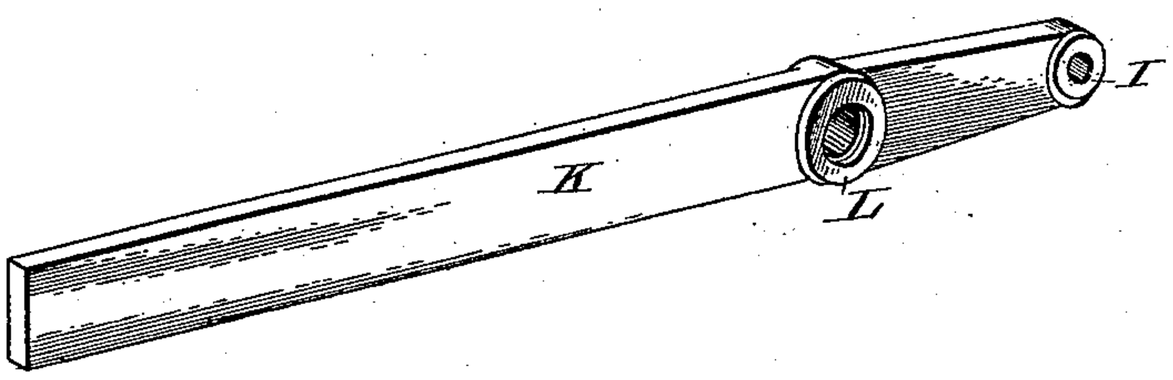


Fig. 6

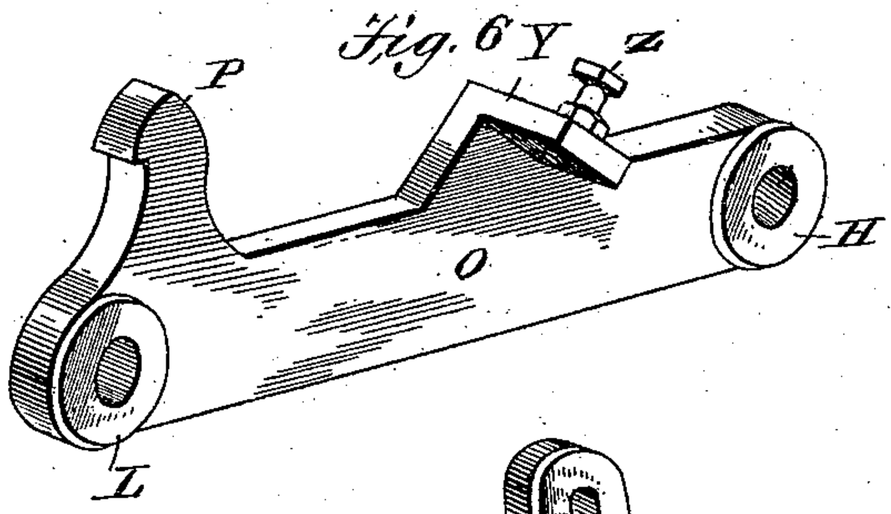
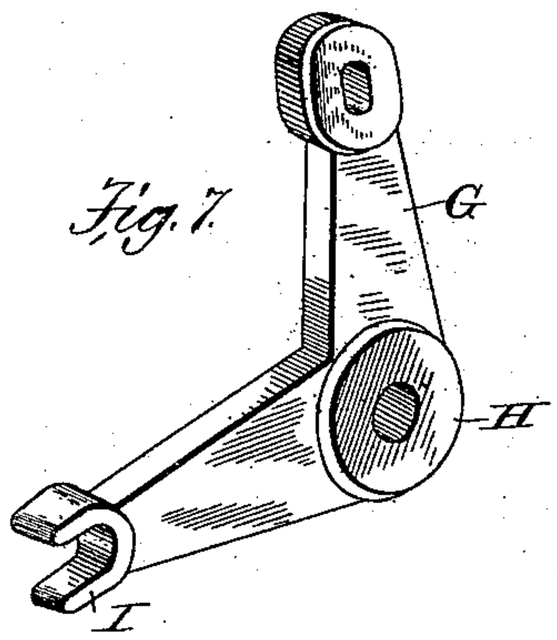


Fig. 7.



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UNITED STATES PATENT OFFICE.

FREDERICK HERBERT BULLARD, OF CHICOPEE, MASSACHUSETTS, ASSIGNOR TO THE YALE & TOWNE MANUFACTURING COMPANY, OF STAMFORD, CONNECTICUT.

SAFE-BOLTWORK.

SPECIFICATION forming part of Letters Patent No. 486,817, dated November 22, 1892.

Application filed January 30, 1892. Serial No. 419,769. (No model.)

To all whom it may concern:

Be it known that I, FREDERICK HERBERT BULLARD, of Chicopee, county of Hampden, and State of Massachusetts, have invented certain new and useful Improvements in Bolt-Operating Devices, of which the following is a specification, reference being had to the accompanying drawings.

The object of my invention is to produce an improved bolt-operating device of the class in which the same operating power which casts the boltwork is also used for retracting it. In this class of bolt-operating devices the objection has heretofore existed that they have been so constructed that to bring the parts into a position for retracting the boltwork it was necessary for said parts, in casting the boltwork, to move through a certain distance, or, in other words, pass a dead-center before the spring or weight of the other power could operate to retract the bolts. It is obvious that this construction rendered the apparatus peculiarly liable to cause lockout, because if from imperfect adjustment or from sticking of the parts or any other obstruction the mechanism should fail to pass the dead-center point it would be impossible for the apparatus to retract the bolts. In my apparatus this objection is entirely obviated, because the center of motion or fulcrum for locking is quite distinct from the center of motion or fulcrum for unlocking. In order that the weight or spring may fully operate for unlocking, it is quite material through what distance the parts may move in the act of locking, so that in this particular my device has every advantage which is possessed by devices where the power which casts the bolts is separate and distinct from the power which retracts them. Another disadvantage in devices which have used the same power for casting and retracting the boltwork has been that they have usually employed the greatest power for casting the bolts instead of retracting them, which reverses the proper conditions. I obviate this objection by using two different fulcrums, as above pointed out, so that the casting power is less than the retracting power under the operation of the same motive power, whether a weight or spring or other power.

In the drawings I illustrate a weighted lever; but it is obvious that a spring might be employed in place of it. I also use a cylinder in which a piston works to relieve the shock. This piston may be either an air-piston or filled with fluid, as preferred, and is of course not essential to the operation of my device at all.

Figure 1 of the drawings is a top plan view of a door-plate with my bolt-operating mechanism attached. Fig. 2 is a front elevation of the same, the position of the time-lock being indicated and the parts being shown in the position for closing a safe or vault door, and by that act, as usual, removing an obstructing stump, so that the boltwork will be automatically cast into the fastening position. Fig. 3 is a similar view, the parts being shown in the position they occupy upon a door of a safe or vault when the door has been shut and the boltwork automatically cast into the fastening position. Fig. 4 is a similar view, the parts being shown in the position they occupy when the time-lock has performed its ordinary work of releasing a catch and gravity has caused the weighted lever to further descend and retract the boltwork, thus automatically unfastening the door. Fig. 5 is a perspective view of the weighted lever detached. Fig. 6 is a perspective view of a bar O detached. Fig. 7 is a perspective view of the bell-crank lever detached.

In the form of embodiment of my improvements illustrated, the operating power shown is a weight adjustable upon a lever; but that is only one example. Any other suitable power might be used.

Referring to the letters upon the drawings, A indicates a section of the door-plate to which my improved automatic bolt-operating apparatus is applied.

B indicates a section of an ordinary carrying-bar for boltwork.

C in Fig. 1 indicates a part of a bolt, and D indicates a time-lock. (Not illustrated in detail.)

E indicates the ordinary pivoted catch of a time-lock adapted to be engaged with a movable part of the bolt-operating apparatus and to be moved to one side by the operation of the time-lock at a predetermined time to disengage the movable part and release the bolt-operating mechanism, so that it can automatically perform its proper function.

F indicates a lug projecting from the carrying-bar, to which is pivoted one arm of a bell-crank lever G, pivoted again at H to the door-plate and pivoted again at I to one end of a lever K, which lever is pivoted at L and which carries an adjustable weight M.

N indicates a cylinder, which with its piston and the fluid it contains constitutes a cushion. The stem of the piston is pivoted at I, where the end of lever K and the bell-crank lever are also pivotally connected for operation, so that whenever the free end of the lever descends by the operation of its weight the fluid cushion operates to make its descent gradual and noiseless, so that no shock is produced.

O indicates a bar pivoted at one end at H and at the other end at L and provided with an upwardly-projecting hook P, adapted to engage with a lever Q, pivoted at R and provided with a hook S and a projection T, against which the hook P strikes when raised to adjust the lever Q. The lever Q is again pivoted at U in a slot V of a lever W, pivoted at X. This lever W is adapted to engage with the catch E of the time-lock in the usual way.

Y indicates a projection from the bar O, extending over the pivoted end of the lever K and provided with a screw Z. This screw is adjustable up and down and forms a stop to limit the upward motion of the pivoted end of the lever K and other pivotally-connected parts. From this construction it will be perceived that the lever K is provided with what may be called a "shifting fulcrum," so that the lever itself by changing the position of its fulcrum is converted from a lever of the first kind into a lever of the second kind.

When the parts are in position, as shown in Fig. 2, the weight being at its highest point of elevation and the hooks P and S being engaged, the fulcrum of the lever K is at L, and the weight tends to raise the piston of the fluid cushion and to turn the bell-crank lever on its pivot H and gradually cast the boltwork and fasten the door, when it will be in position as shown in Fig. 3. In this position it will be observed the screw-top Z has limited the upward movement of the pivoted end of the lever K, and also the upward movement of one end of the bell-crank lever, and has practically converted the bar O and the lever K into one continuous lever having its fulcrum at H. In this condition the weight of the lever would tend to press down the piston and to operate the bell-crank lever so as to retract the boltwork; but it is prevented by the engagement of hooks P and S, through which the weight of the lever is suspended. When, however, the time-lock disengages the catch E, the fulcrum of the lever being then at pivot H, the weight will descend, forcing the piston downward and operating the bell-crank lever to retract the boltwork, which will leave the parts all in the position as indicated in Fig. 4.

I thus produce a simple and efficient bolt-operating device in which the same power is used for casting and retracting the boltwork, which has all the certainty and independence of action that is obtained by the use of independent casting and retracting powers and in which the failure of the parts to move a certain distance in locking will not in any way interfere with the retraction of the boltwork at the proper time.

What I claim is—

1. In an automatic bolt-operating device, the combination of a power and boltwork with a lever K operated by the power, mechanism for operatively connecting the lever with the boltwork, and a stop adapted to limit the movement of the lever for casting the boltwork, substantially as described.

2. In an automatic bolt-operating device, the combination of a power and boltwork with a lever and a bar O, connected therewith and with the boltwork, and a stop by means of which the lever and bar are operatively connected as one lever, whereby a partial action of the power casts the boltwork and a further action of the power retracts the boltwork, substantially as described.

3. In an automatic bolt-operating device, the combination of a power and boltwork with a bell-crank lever adapted to be moved by the power in the direction for casting the boltwork, and a second lever with which the bell-crank lever engages, and a time-lock adapted to release the power, whereby the bell-crank lever will move in the direction for retracting the boltwork, substantially as described.

4. In an automatic bolt-operating device, the combination, with boltwork, of a weighted lever, a bell-crank lever, and a stop over the pivoted connection of the two levers, whereby the fulcrum of the weighted lever is shifted when that lever has been partially operated, substantially as described.

5. In a bolt-operating apparatus, the combination of a bell-crank lever pivotally connected by one arm with the boltwork and pivotally connected by the other arm with a weighted lever, and a bar connecting the lever-fulcrum pivot at L with the bell-crank

lever-pivot at H, and a stop, as at Z, whereby the fulcrum-pivot of the lever is shifted from L to H, substantially as described.

6. In an automatic bolt-operating apparatus, the combination, with the boltwork and a time-lock, of a bell-crank lever G, a weighted lever K, a bar O, having a hook P, a lever Q, provided with a hook S and a projection T, a slotted lever W, and a projection Y from the bar O, provided with screw Z, all arranged and operating substantially as described.

In testimony whereof I have hereunto subscribed my name.

FREDERICK HERBERT BULLARD.

Witnesses:

DANIEL M. KEY,

FRANK HARRINGTON.