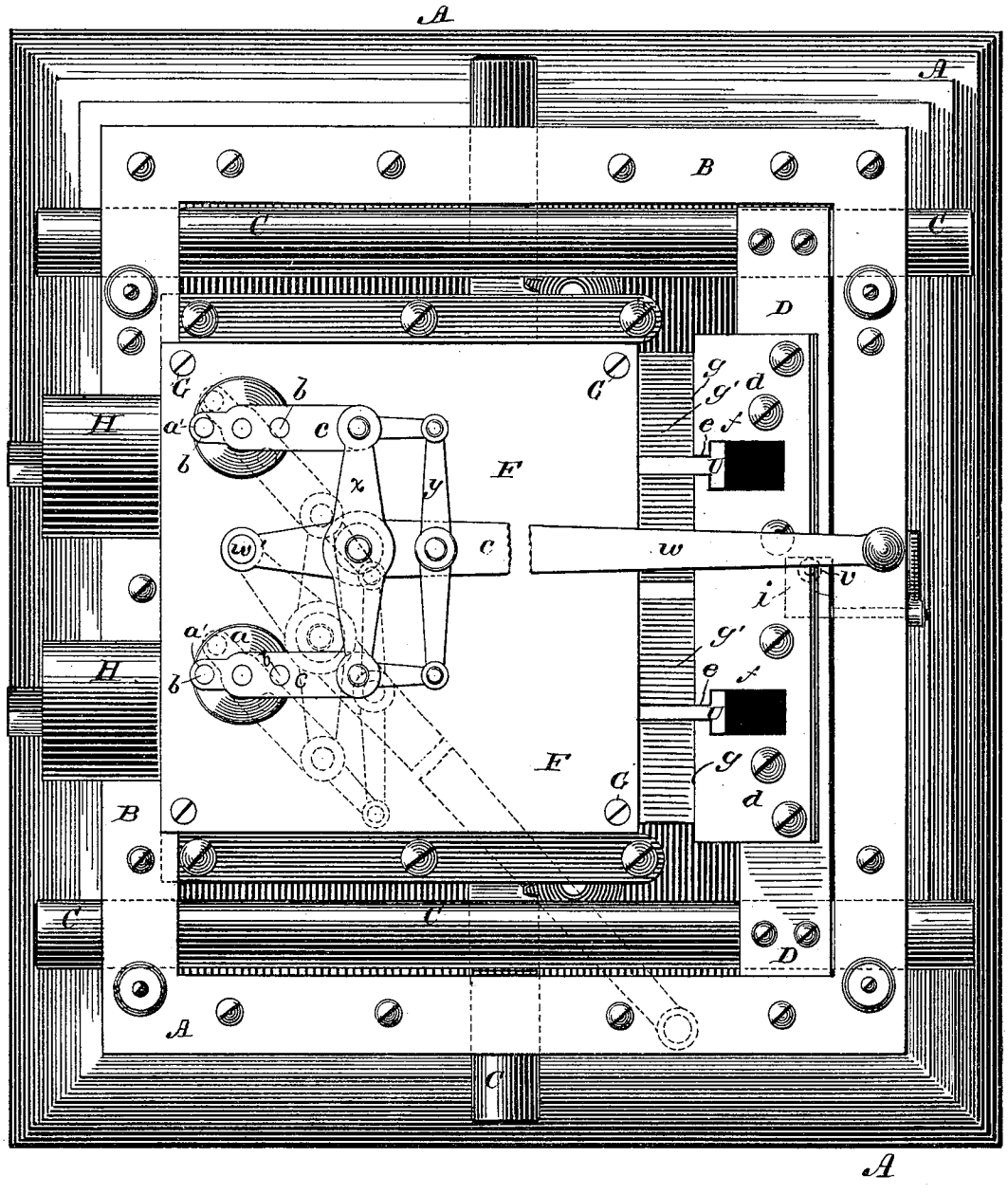
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E. STOCKWELL.

BOLT WORK MECHANISM.

No. 403,563. Patented May 21, 1889.

Fig. 1.



WITNESSES

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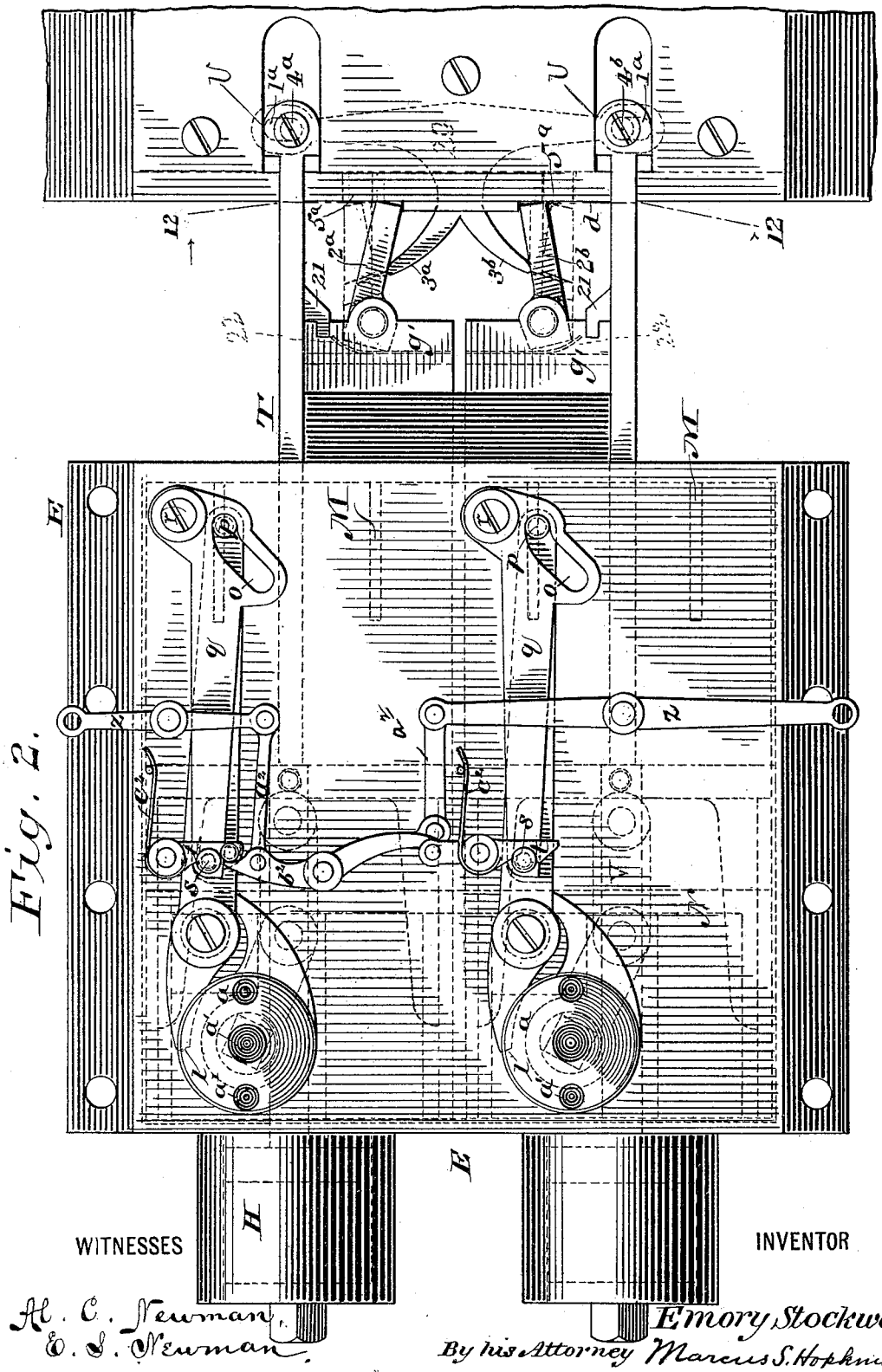


Fig. 2.

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E. STOCKWELL.

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Fig. 3.

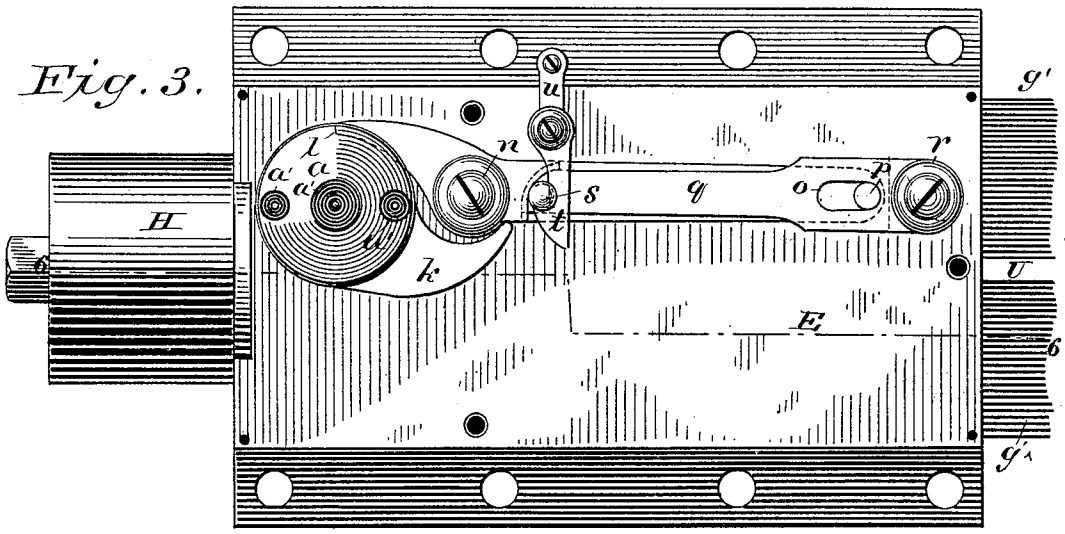


Fig. 4.

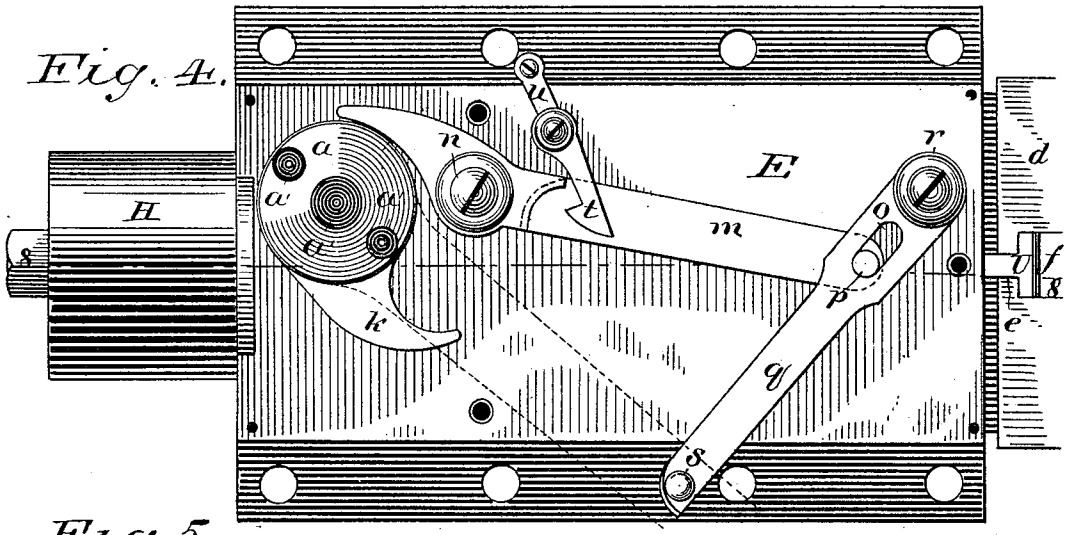
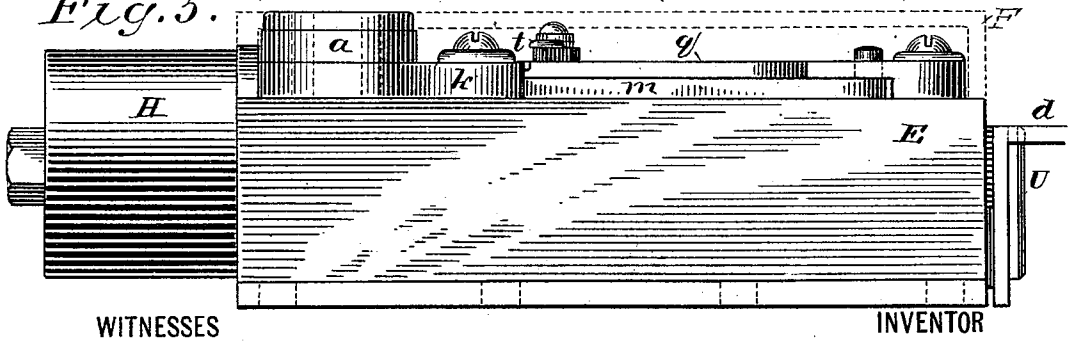


Fig. 5.



WITNESSES

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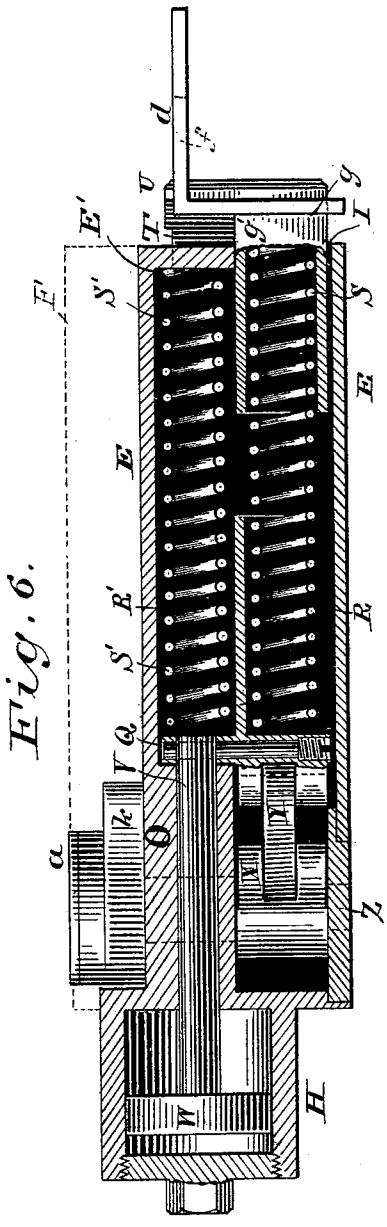


Fig. 6.

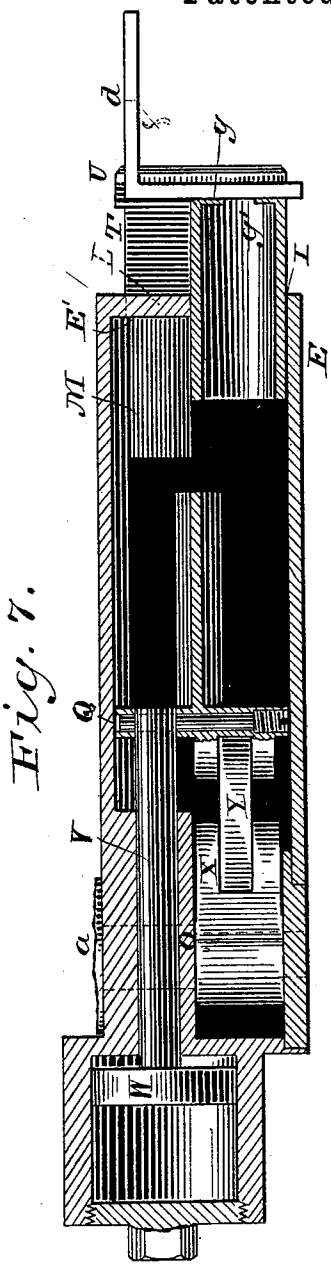


Fig. 7.

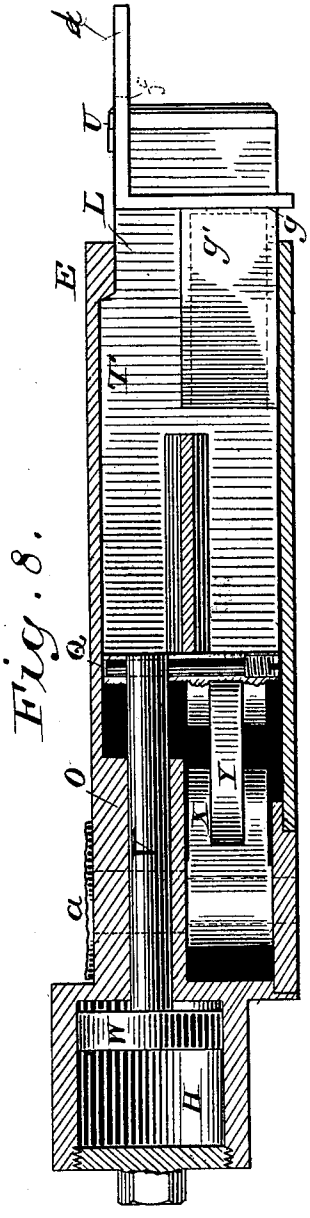


Fig. 8.

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Fig. 9.

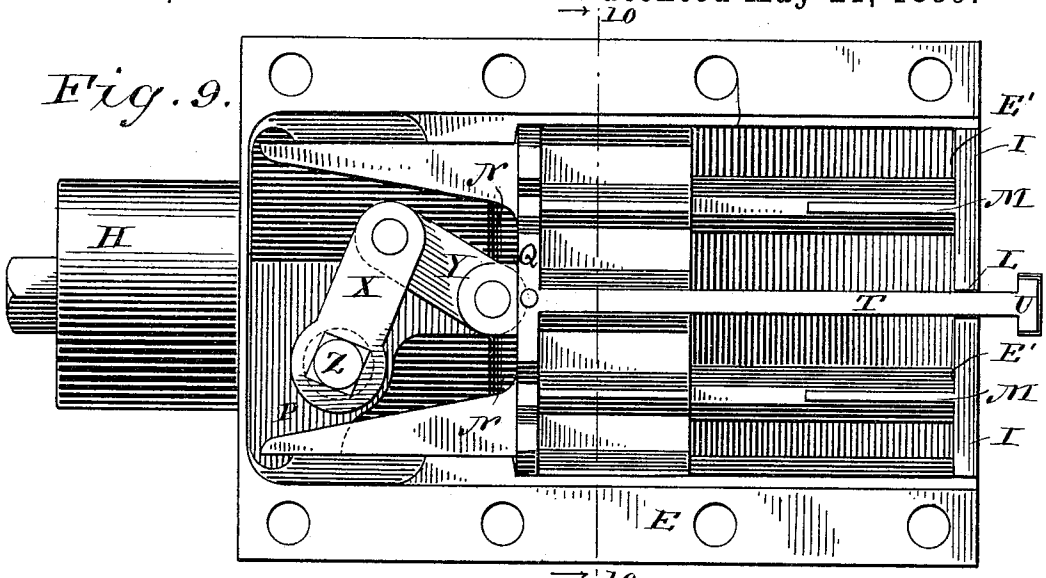


Fig. 10.

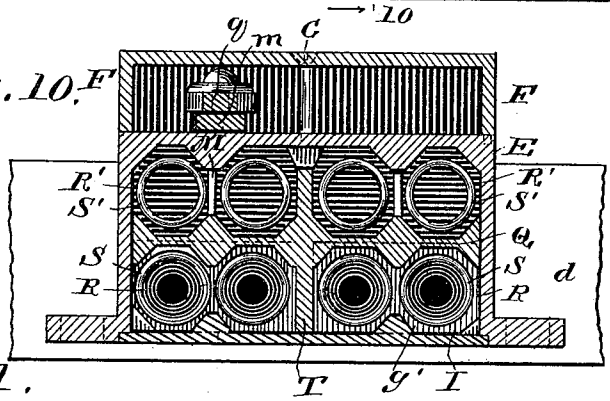
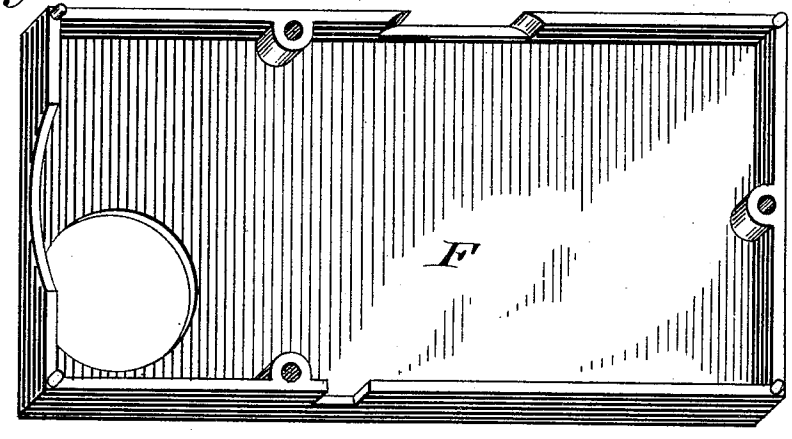


Fig. 11.



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Fig. 12.

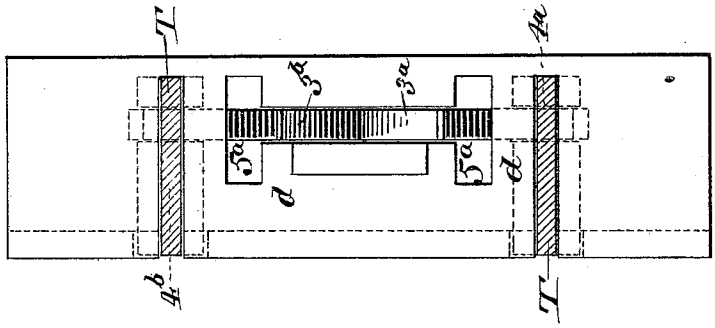
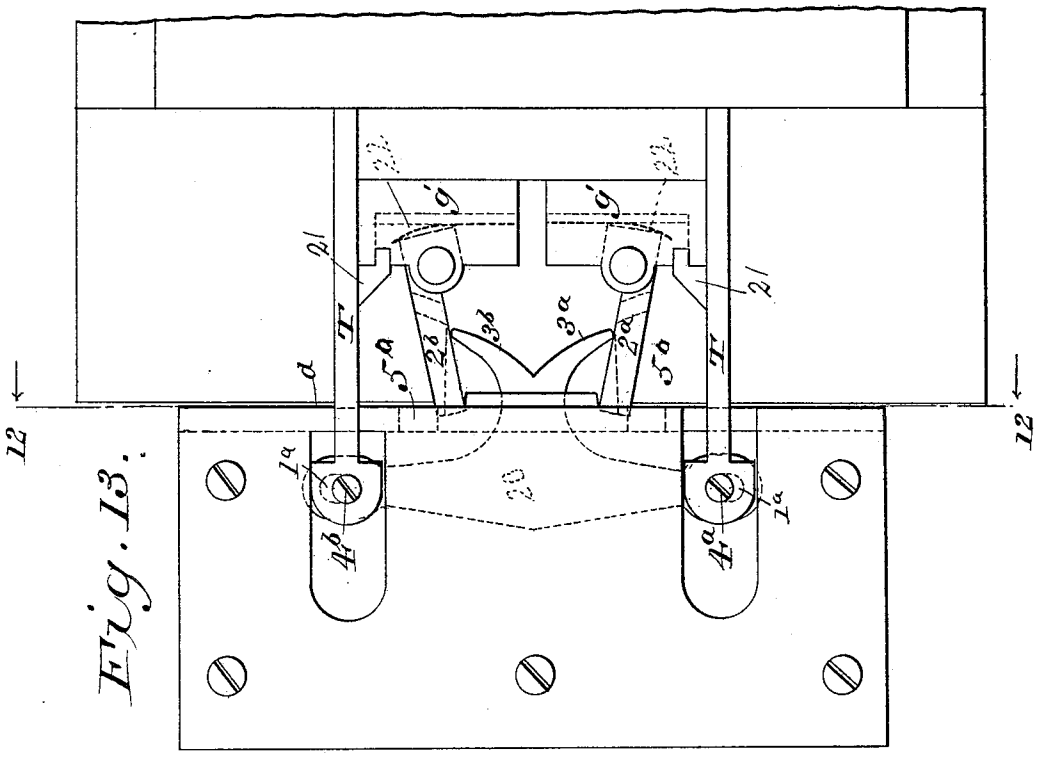


Fig. 13.



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Fig. 14.

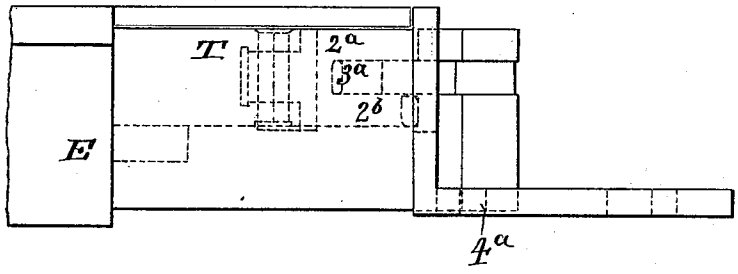
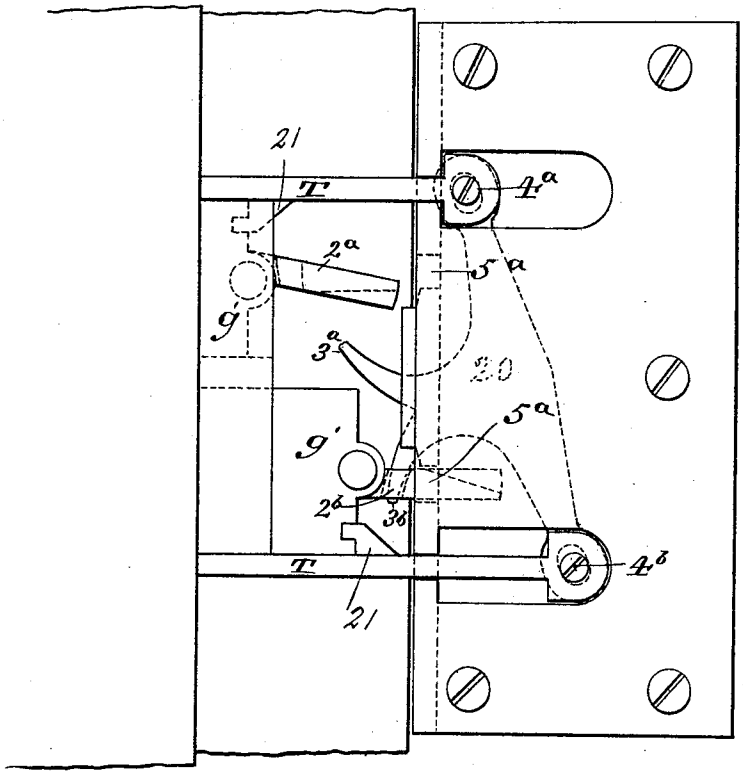


Fig. 15.



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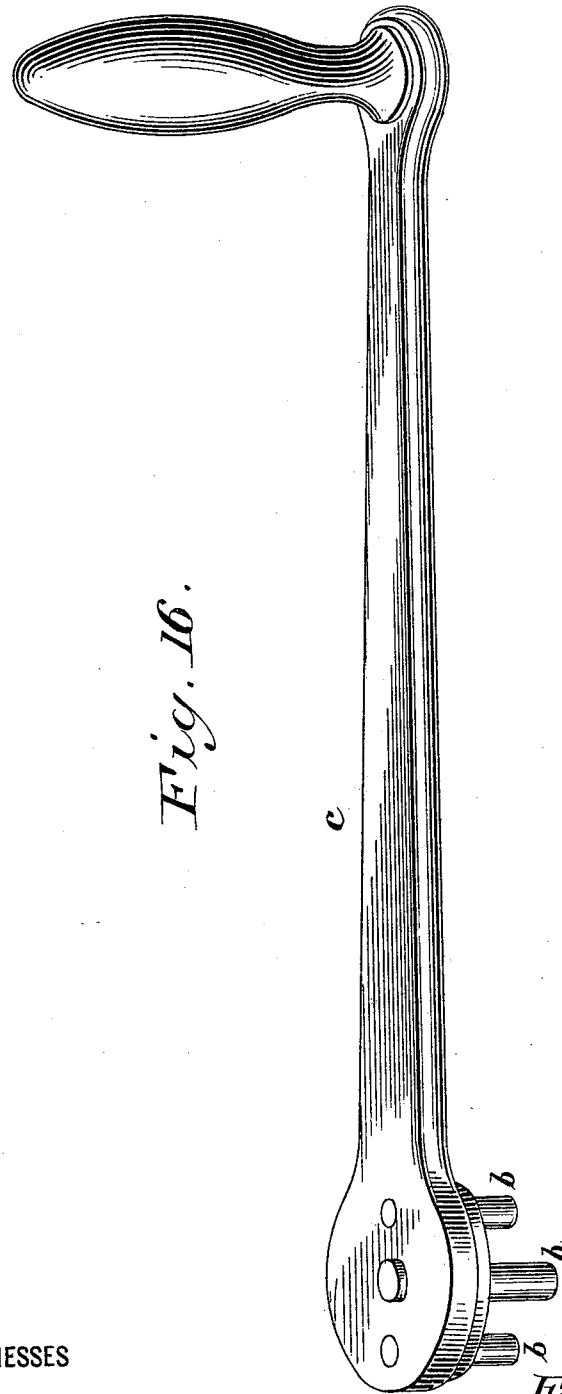


Fig. 16.

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UNITED STATES PATENT OFFICE.

EMORY STOCKWELL, OF STAMFORD, CONNECTICUT, ASSIGNOR TO THE YALE & TOWNE MANUFACTURING COMPANY, OF SAME PLACE.

BOLT-WORK MECHANISM.

SPECIFICATION forming part of Letters Patent No. 403,563, dated May 21, 1889.

Application filed July 2, 1888. Serial No. 278,775. (Model.)

To all whom it may concern:

Be it known that I, EMORY STOCKWELL, of Stamford, in the county of Fairfield and State of Connecticut, have invented certain new and useful Improvements in Mechanism for Throwing and Retracting the Bolt-Work of Safes and Vaults to Fasten and Unfasten their Doors, of which the following is a specification.

My improvements relate to that class of bolt-work which has no connection by means of a spindle or otherwise with the outside of a safe or vault door, but which is operated from the inside of the door when it is closed by means of springs. These springs are, as usual, so arranged that part of them may serve to throw the bolt-work into the fastening position when they are released by the act of closing the door, and that another part of them may serve to retract the bolt-work when they are released by the operation of time-lock mechanism.

My invention consists in certain improvements pointed out below in detail upon the class of interior automatic bolt-operating mechanism above mentioned, part of which class was invented by E. W. Fowler, and is shown in his United States Patents No. 317,986, granted May 19, 1885, and No. 331,390, granted December 1, 1885.

In order to fully illustrate the construction, operation, and relations of the parts of my improvements to one another and to what it is essential to use in practice, it is necessary to show a complete automatically-operative system of bolt-work upon a door, part of which is old and well known, and part of which is the invention of the said Fowler.

In the accompanying drawings, Figure 1 is an elevation of the inside of a safe-door having my improved double automatic bolt-operating mechanism applied to it. Fig. 2 is a view of my improved double mechanism detached and with the cap-plate of its case removed. Fig. 3 is a view of my single mechanism in the locked position with the cap-plate of its case removed. Fig. 4 is a view of the same in the unlocked position. Fig. 5 is a side elevation of the same, the cap-plate being shown in dotted lines and in place. Fig. 6 is a section taken on the line 6 6 of Fig. 3, the cap-plate being indicated in dotted lines and the parts all being in the unlocked position. Fig. 7 is a section on the same line, showing the springs removed and the parts in the positions they occupy when the unlocking-springs are compressed and when the bolts have been thrown forward by the locking-springs. Fig. 8 is a similar section showing the parts in the position they occupy when all of the springs are compressed and ready for action. Fig. 9 is a back or rear view of the bolt-throwing mechanism. Fig. 10 is a section taken on the line 10 10 of Fig. 9. Fig. 11 is a perspective view of the cap-plate removed. Fig. 12 is a section on the line 12 12 of Fig. 2. Fig. 13 is a view similar to that shown on the right-hand end of Fig. 2, but in a reverse position. Fig. 14 is a side elevation of the parts shown in Fig. 13. Fig. 15 is a view showing the operation of a single unlocking mechanism when its duplicate has not worked. Fig. 16 is a perspective view of a single wrench detached.

Referring to the letters upon the drawings, Fig. 1, A designates a safe or vault door, B a frame for supporting the bolt-work upon the inside of the door, C the sliding bolts, and D a carrying-bar rigidly connecting them, all these parts being of ordinary construction.

E, Fig. 2, indicates a case for containing the bolt-throwing mechanism. This case is provided with a removable cap, F, Fig. 1, secured in place by means of screws G. It is also provided at one end with a projection, H, forming a piston box or cylinder, and at the other end it is partly cut away, so as to leave an opening at I, Figs. 6, 7, and 9. The remaining part of its end wall, K, Figs. 7, 8, and 9, is slotted at L. This case is preferably provided within with spring-separating partitions M, Figs. 2 and 9, (but these are not essential,) and also with cross-partition N, Figs. 2 and 9, piston-rod guide O, Figs. 6, 7, and 8, and lug P, Fig. 9, all preferably cast integral with the case.

Q, Figs. 6, 7, 8, and 9, designates a sliding spring carrier or bearing containing recesses R and R′ for sustaining the inner ends of

two separate sets of coiled springs, S and S′, Fig. 6, the former being what I call the "locking springs" and the latter the "unlocking springs"—that is to say, the former being the springs which throw the bolt-work into the locked position and the latter those which (their outer ends bearing on the end wall of the case at E′) throw it into the unlocked position.

The spring-carrier is provided with a draw-bar, T, Figs. 2 and 9, which forms a horizontal partition between the springs and incidentally helps to stay them in place. This draw-bar is provided at its front end with a cross-head, U, Figs. 4, 5, 6, 7, 8, and 9. The rear end of the spring-carrier is connected with the piston-rod V, carrying the piston-head W within the cylinder H, Figs. 6, 7, and 8. The object of this piston and cylinder is to form an air cushion or buffer to prevent the shock which would otherwise be occasioned by the force of the unlocking-springs S′ in retracting the bolt-work. The piston-head is made so tight within the cylinder that the air will only enter and escape around its margin slowly; but any other usual means of providing for the ingress and egress of air would serve as well.

X and Y, Figs. 6, 7, 8, and 9, indicate toggle-levers, the former pivoted to the lug P and the latter pivoted to the rear end of the spring-carrier Q. The toggle-shaft Z is secured to the lever X, so that the lever must turn with it, and extends through the lock-case and projects to the front of it through the cap F, and is provided there with a head, *a*, having three pin-holes, *a′*, Figs. 3 and 4, for the reception of the three pins *b* upon the setting wrench or lever *c*, Fig. 16.

d, Figs. 1, 2, 4, 5, 6, 7, and 8, indicates an angle-plate provided with a narrow slot, *e*, and a wider slot, *f*, Figs. 1 and 4, which are connected together. This plate by its narrow slot straddles the draw-bar T behind the cross-head U, so that the wide slot *f* forms an opening for the movement of the cross-head U forward. The part *g*, Figs. 1, 6, 7, and 8, of the angle-plate serves as a bearing for the sliding push-blocks *g′*, which receive the front ends of the locking-springs and pass through the opening I, Figs. 6, 7, and 8.

Upon the front part of the case, behind the cap F, is secured a system of levers and latch mechanism. Referring to this lever and latch mechanism, Figs. 3, 4, 5, and 6, *k* indicates a lever-arm projecting from the toggle-shaft Z, and *l* indicates a shoulder made by forming a depression or recess in one side of the toggle-shaft head.

m designates a lever pivoted at *n*, the short arm of which, when the springs are not compressed, rides over the periphery of the toggle-shaft head, as shown in Fig. 4, and when the springs are compressed enters the recess behind the shoulder *l*, as shown in Figs. 2 and 3. The long arm of this lever is connected by means of a slot, *o*, and pin *p* with another lever, *q*, pivoted at *r* and provided with a latch-stud, *s*, with which the pivot-latch *t* engages, as shown in Fig. 3. The arm *u* of the latch *t* is operated upon for unlatching, in practice, by time mechanism; but as that forms no part of my present invention it is not illustrated.

When the toggle-shaft Z is turned by means of the wrench *c*, Fig. 16, it operates the toggle-levers X Y and moves forward the spring-carrier and compresses all of the springs ready for locking and unlocking. (See Figs. 6, 7, 8, and 9.) At the same time the arm *k*, Figs. 2, 3, 4, and 5, will be forced against the long arm of the lever *m*, which in turn will swing the lever *q* upon its pivot into position to be caught by the pivoted latch *t*, hooking around stud *s*, which will hold the unlocking-springs in the retracted position where the power of the wrench has placed them. The parts are so adjusted that a very slight force applied by means of time mechanism or otherwise to the arm *u* of the pivoted latch *t* will disengage it and permit the retraction of the unlocking-springs; but the first action of the springs is of course to throw forward the bolt-work and fasten the door closed. This is done by the act of shutting the door, which in the usual way turns the trip-stop *i*, Fig. 1, out of the path of the lug *v* on the carrying-bar D and permits the locking-springs to thrust forward the sliding push-blocks *g′*, which in turn thrust forward the angle-plate *d* and the carrying-bar and bolt-work. This operation expends the force of the locking-springs without disturbing that conserved in the unlocking-springs, so that when time mechanism or other power releases the pivot-latch *t* the unlocking-springs expend their force to retract the spring-carrier, angle-plate, and bolt-work, the cross-head U drawing back the angle-plate.

The foregoing description applies to a single mechanism to be set, as described, for throwing bolt-work into the locked and unlocked positions; but my invention relates in part to a double mechanism for that purpose. Each part of my double mechanism, however, is exactly like that above described, the difference being only in such parts as serve to operatively connect and disconnect the two separate automatic spring-acting mechanisms. Therefore, I have adopted the plan of describing a single mechanism, desiring it to be understood that the double mechanism is only two single mechanisms, each such as described, combined together by the novel means I will now describe, double mechanism broadly being the invention of said Fowler.

Referring to Fig. 1, *w* designates a hand-lever pivotally fulcrumed at *w′* and having centrally pivoted to it two parallel cross-arms, *x* and *y*. These arms are at their ends pivoted to the handles of wrenches *c*, such as already described, which by their pins set into holes of the heads *a*. This double lever

mechanism will compress all the springs and set both parts of the double mechanism at once. Not only this; it is detachable, like the single wrench described, and cannot be applied and worked except when both sets of pin-holes are parallel. The result is that in case one mechanism has got out of order, or has not operated to retract the bolts a person attempting to apply the double wrench to compress the springs will be warned that something is wrong and put on inquiry about it. This affords protection against mistakes which might be mischievous were only a single wrench used first to set one part and then another of the double mechanism, because in that case a careless person might set only one mechanism and might not notice that the other was out of order or had not operated to unfasten; but the construction is such that should it become necessary a single wrench could be temporarily used to set either or both parts of the double mechanism.

Referring now to Fig. 2, which illustrates the tripping mechanism connecting both parts of the double mechanism so as to operate both simultaneously for unfastening the bolt-work, z indicates a pivoted lever, one end of which is adapted to be moved by time mechanism or any other power. To the other end of this lever is pivoted a link, a^2, also pivoted to a centrally-pivoted lever, b^2. One end of the lever b^2 is in position to release one of the latches t, and the other end of the lever is in position to release the other latch t. These latches are preferably provided with springs c^2, as shown, by which they are kept constantly in position for engagement with the latch-studs s. Duplicate parts a^2 and z are provided, so that two time mechanisms can be used. By this mechanism both parts of the double mechanism will ordinarily be operated for unlocking simultaneously, which gives greater security in throwing heavy bolt-work; but as each one is entirely independent of the other it will work whether the other works or not, so that in case one part of the double mechanism should get out of order or fail to work the other part will perform the unlocking function, because each part has its own complete sets of springs, its own air-cushion, and all the other elements essential to complete individual operation.

The locking-springs and the unlocking-springs are absolutely independent of each other in all their functions. While they are both compressed at once, they are released in opposite directions, so that it is not necessary that the locking-springs should shoot forward the whole distance required to completely throw the bolt-work. In fact it is not necessary that the locking-springs act at all upon the bolt-work in order to secure the working of the unlocking-springs, although, of course, they will not retract the bolt-work itself unless it has been more or less thrown forward by some agency.

In a double apparatus for retracting bolts, in order that each part of it may be independent, it is of course necessary to provide that if one part of the apparatus should fail, the other, being tripped, would still retract the bolts. This may be accomplished in a simple manner by making the springs which throw the bolts of less strength than the springs which retract them, as shown in Fig. 6, so that the latter may overcome the former. It is obvious that this construction requires much greater strength in the retracting-springs, because each of these springs must be sufficiently strong of itself to not only throw the bolt-work, but to overcome the force of the locking-springs, and in this construction, therefore, the buffers are of prime necessity in order to avoid undue shock to the bolt-work; but in Fig. 2 I show another and preferable method, for the reason that in this construction when one part of the apparatus fails to act the part which fails will be thrown out of contact with the bolt-work, and will allow the active side of the machine to do the work without the necessity of overcoming the power of the locking-springs of that side which has failed to work.

The device referred to consists in a yoke, 20, which is pivotally connected to the two draw-bars T by elongated slots 1^a, as shown. This yoke has rearwardly-projecting curved arms 3^a and 3^b, which, when the bolts are in the locked position, as shown in Fig. 2, rest against the slotted push-dogs 2^a and 2^b, that are pivotally connected to the sliding push-blocks g' and held in their proper position by springs 22. These dogs bear at their front ends against the angle-plate d or carrying-bar to which the plate is secured, and serve to push out the parts and fasten the bolt-work when the locking-springs exert their force for that purpose upon the sliding push-blocks g'. These push-blocks, when forced out, come against the stops or brackets 21 on the draw-bars T, which prevent them from going too far forward under the impulse of the locking-springs. These brackets serve to keep the draw-bars and the push-blocks in operative relations to each other. They draw back the sliding push-blocks g' when the unlocking-springs draw back the draw-bars T and their cross-heads U. Without such mechanism whenever one side of the mechanism unlocked and the other did not the jar or recoil would be taken up by the yoke 20, which would be likely to be injured; but the brackets prevent any injury to the mechanism from the thrust of either the locking or unlocking springs.

It is evident that should one part of the mechanism fail to work some means must be provided for removing the push-dogs 2^a and 2^b out of the way of the angle-plate d, or else the bolt-work could not be retracted, except with a power much stronger than the locking-power. This means is provided in the pivoted yoke and slots and pivots of the push-dogs.

Suppose, for example, that the lower mechanism failed to work, and the upper one was tripped by the time-lock. The operation would then be as follows: The draw-bar T would move backward, and, as it would have to move a certain distance before its cross-head U would come in contact with the angle-plate *d* of the bolt-work, (see Fig. 15,) the yoke would move around the pivot 4^b, and the curved arm 3^b would move downward and push the push-dog 2^b into a horizontal position. This would bring it opposite a pocket, 5^a, in the angle-plate, so that the bolt-work could be retracted without overcoming the locking-springs. Then the draw-bar T would retract the carrying-bar of the bolt-work, the curved arm 3^b of the yoke passing through a slot in the push-dog 2^b, as shown. Should the other mechanism fail to work, a similar action would take place with the yoke and upper push-bar, as will be clear from the drawings.

What I claim as my invention is—

1. In an automatic double bolt-operating device, the combination of a series of locking and unlocking mechanisms and a series of fastening mechanisms adapted to release both locking mechanisms by the action of either one or more time mechanisms, substantially as set forth.

2. In combination with a case containing bolt-throwing mechanism, a cap for protecting the locking-levers and provided with an aperture, so that the setting-wrench may be applied without removing the cap, substantially as set forth.

3. A double automatic bolt-operating device composed of duplicate single automatic bolt-operating devices, combined with mechanism for simultaneously setting them and with mechanism for simultaneously releasing them, substantially as set forth.

4. The combination of a double mechanism for throwing bolt-work and a double wrench for simultaneously setting both parts of the double mechanism, substantially as set forth.

5. In combination with a double automatic mechanism for throwing bolts, a double wrench constructed with parallel pivoted arms, so that neither of said arms can operate its proper locking or toggle shaft unless both mechanisms are unlocked, substantially as set forth.

6. In a double bolt-operating mechanism, the double wrench, in combination with two locking-shafts and a fixed pivot which serves as a guide and support around which the wrench rotates in setting the mechanisms, substantially as set forth.

7. In a double wrench for setting a double bolt-operating mechanism, a hand-lever, *w*, connected to two single arms or wrenches by means of the cross-arm *x*, substantially as set forth.

8. In a double bolt-throwing device, two pivoted push-dogs which normally rest against some portion of the bolt-work and either of which, upon the failure of its side of the bolt-throwing mechanism to work, may be pushed out of connection with the bolt-work, so as to offer no obstruction to its retraction, substantially as set forth.

9. In a double automatic bolt-throwing device, two independent draw-bars, each provided with a bracket or support for holding the push-blocks in proper position, substantially as set forth.

10. In a double bolt-operating mechanism, the combination of two independent draw-bars, and a yoke pivotally connecting them and provided with projecting arms resting against slotted push-dogs, whereby if one of said mechanisms fails to act the arm of the yoke will push aside and pass through the push-dog, thus disconnecting and rendering harmless that mechanism which has failed to work, substantially as set forth.

11. In a double automatic bolt-operating mechanism, the combination of a double pivotal arm and two retaining-hooks which are both moved by said arm through the operation of a time lock or locks and both mechanisms released thereby, substantially as set forth.

12. In a double wrench for setting a double bolt-operating mechanism, a hand-lever, *w*, connected to two single arms by means of the parallel pivoted cross-arms *x* and *y*, which maintain the arms parallel to each other, substantially as set forth.

13. The combination, with the double mechanism for throwing bolt-work, of the pivoted lever *z*, the link a^3, the centrally-pivoted lever b^2, and the latches *t*, substantially as set forth.

In testimony whereof I have hereunto subscribed my name.

EMORY STOCKWELL.

Witnesses:

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GEO. E. WHITE.