

O. F. MIETH.

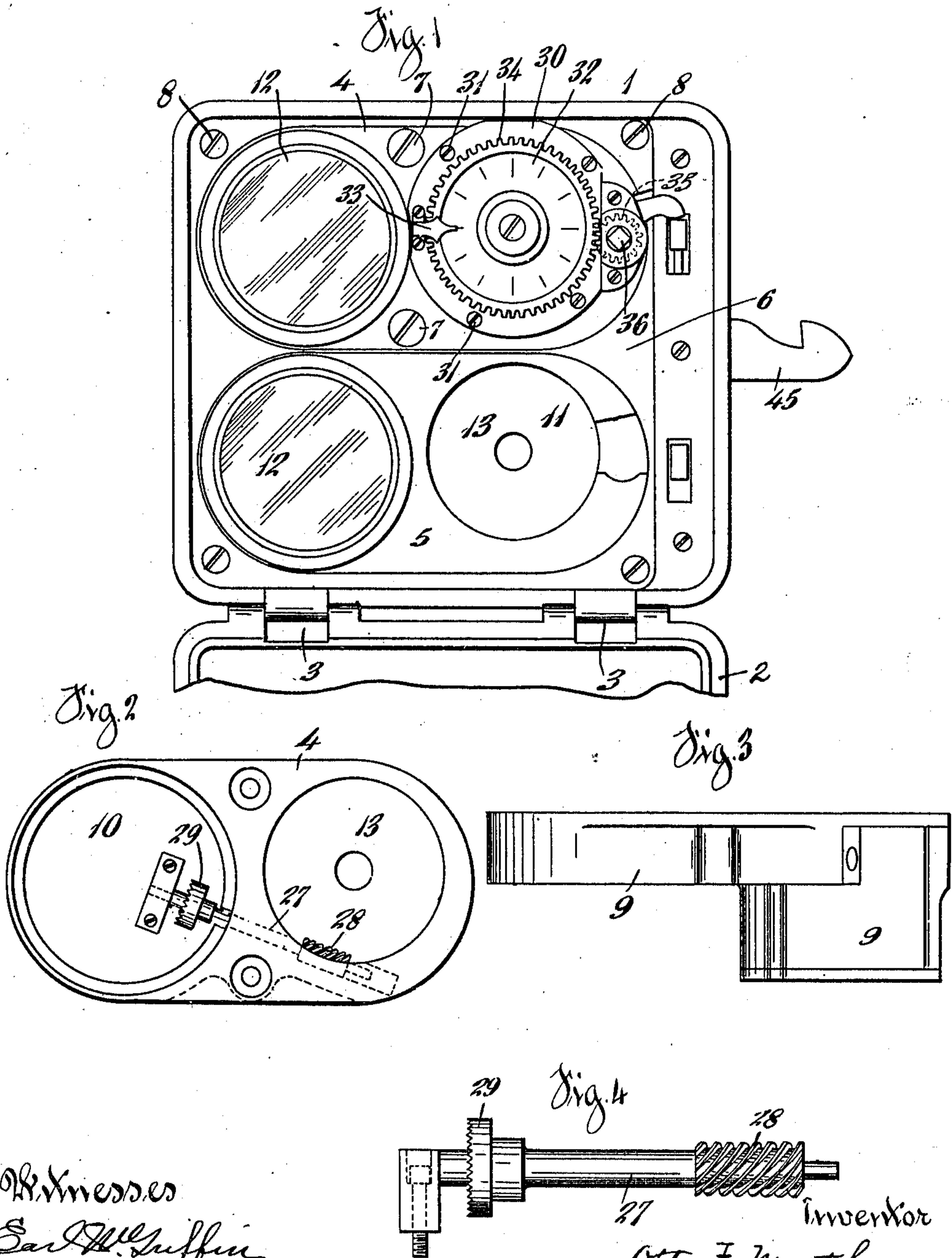
TIME LOCK.

APPLICATION FILED MAR. 10, 1910.

978,325.

Patented Dec. 13, 1910.

3 SHEETS—SHEET 1.



Witnesses
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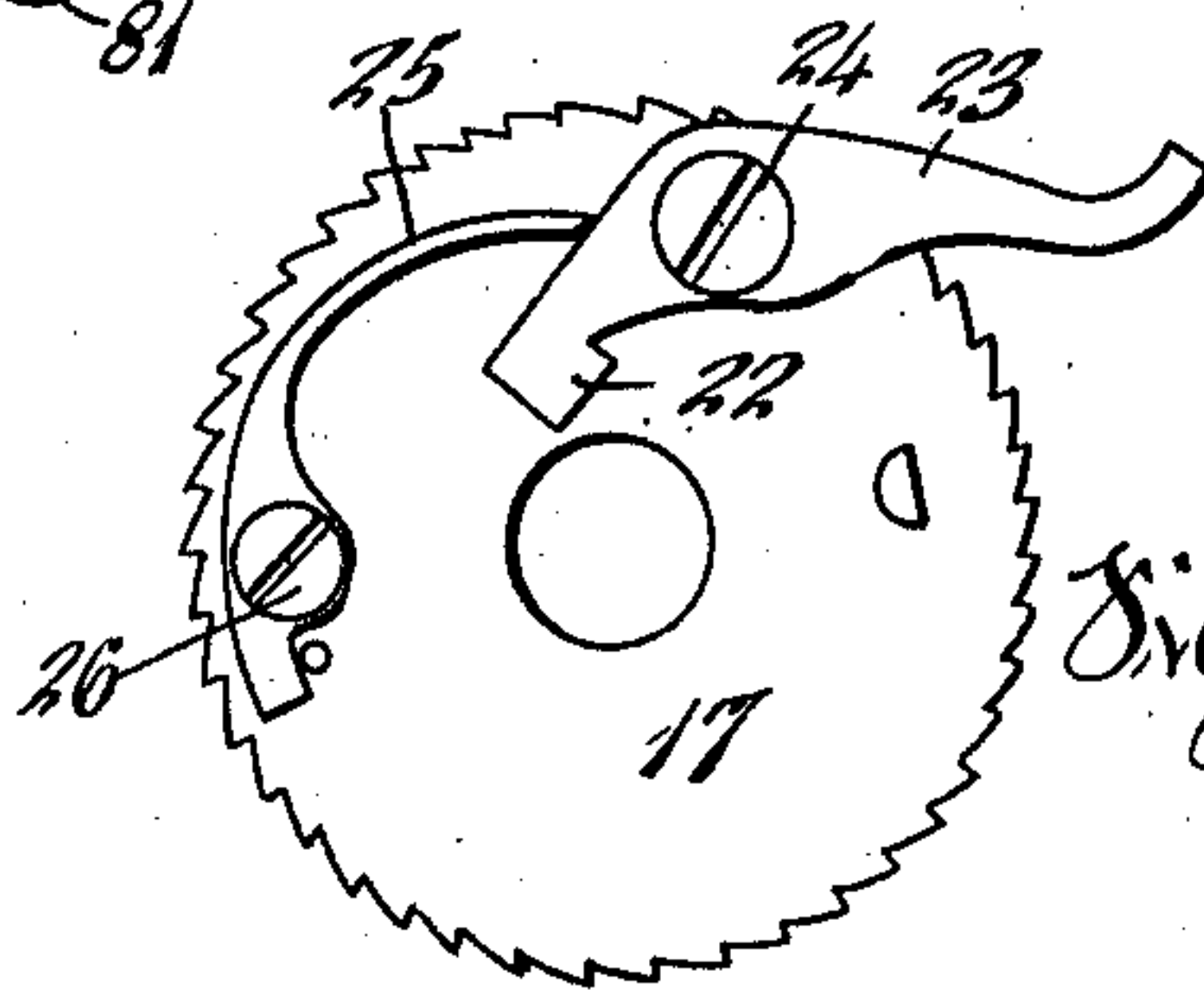
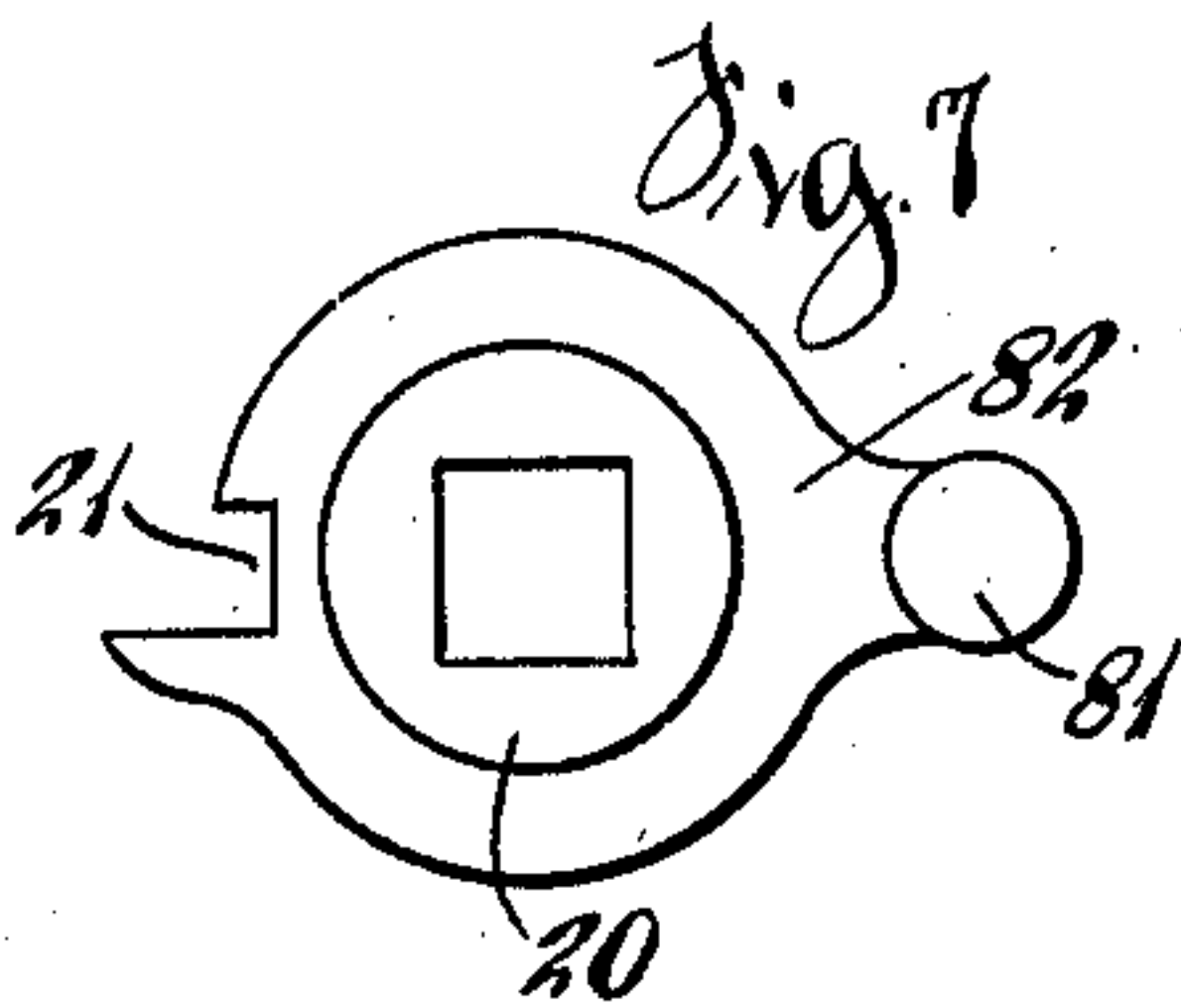
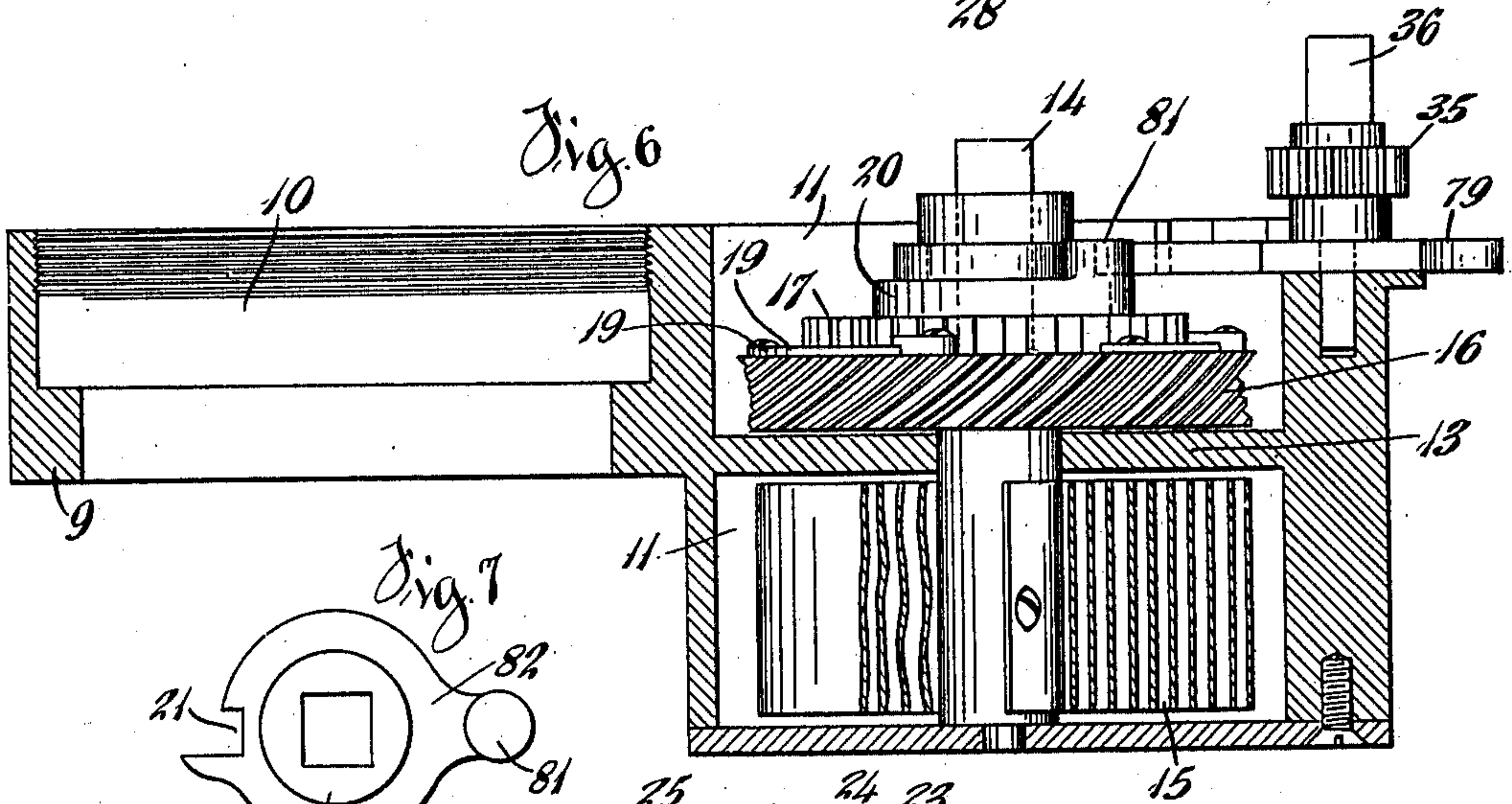
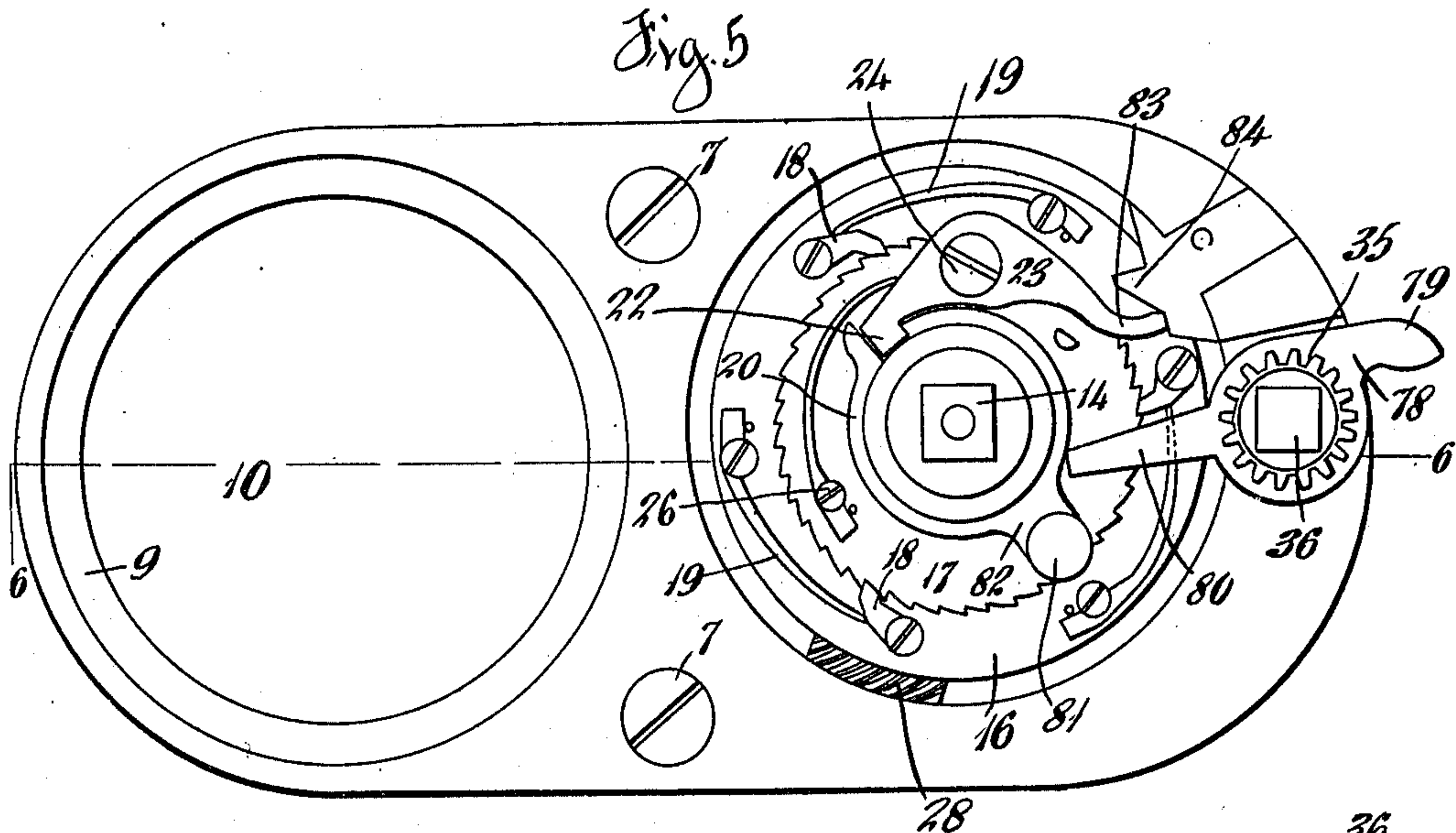
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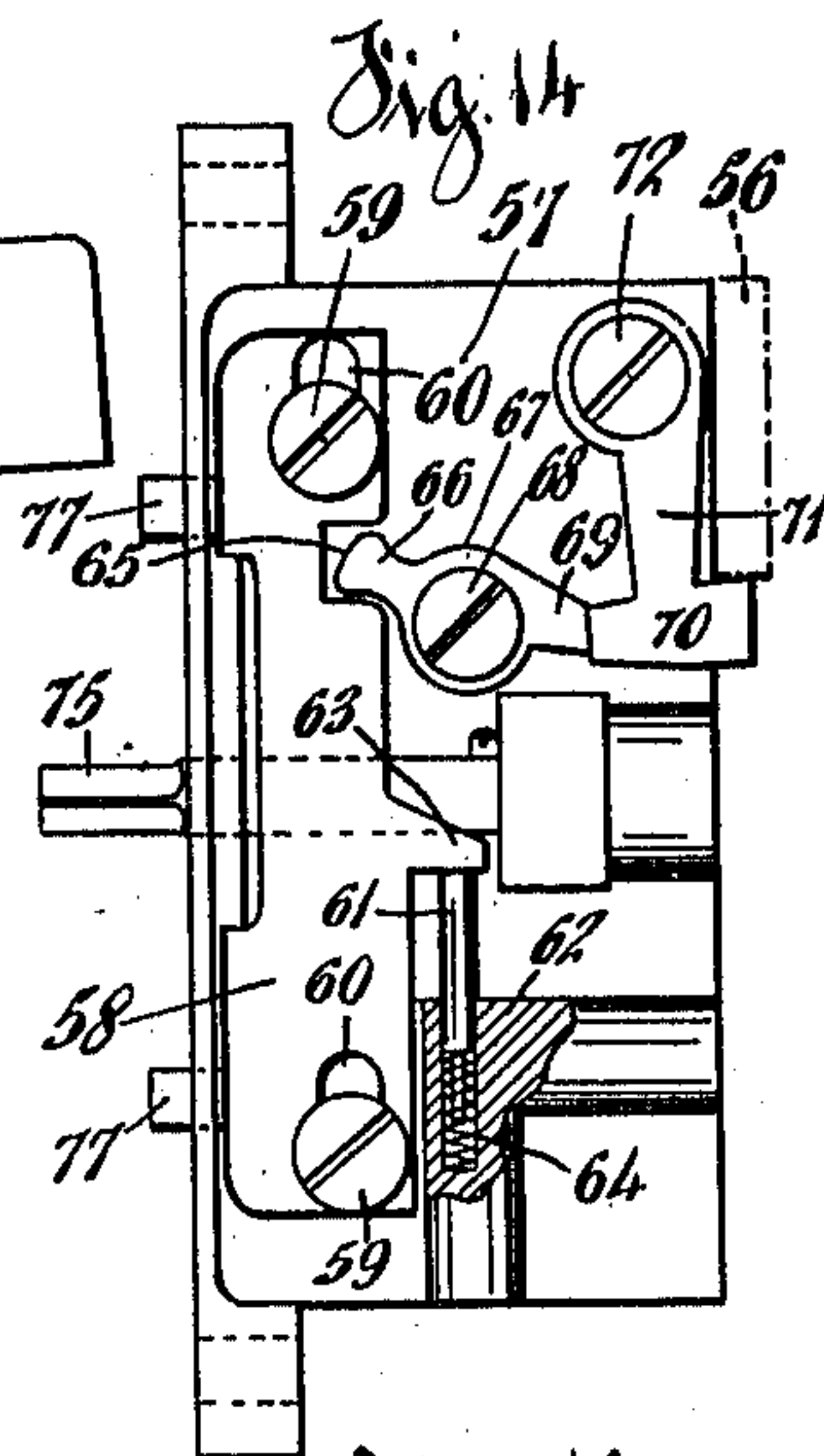
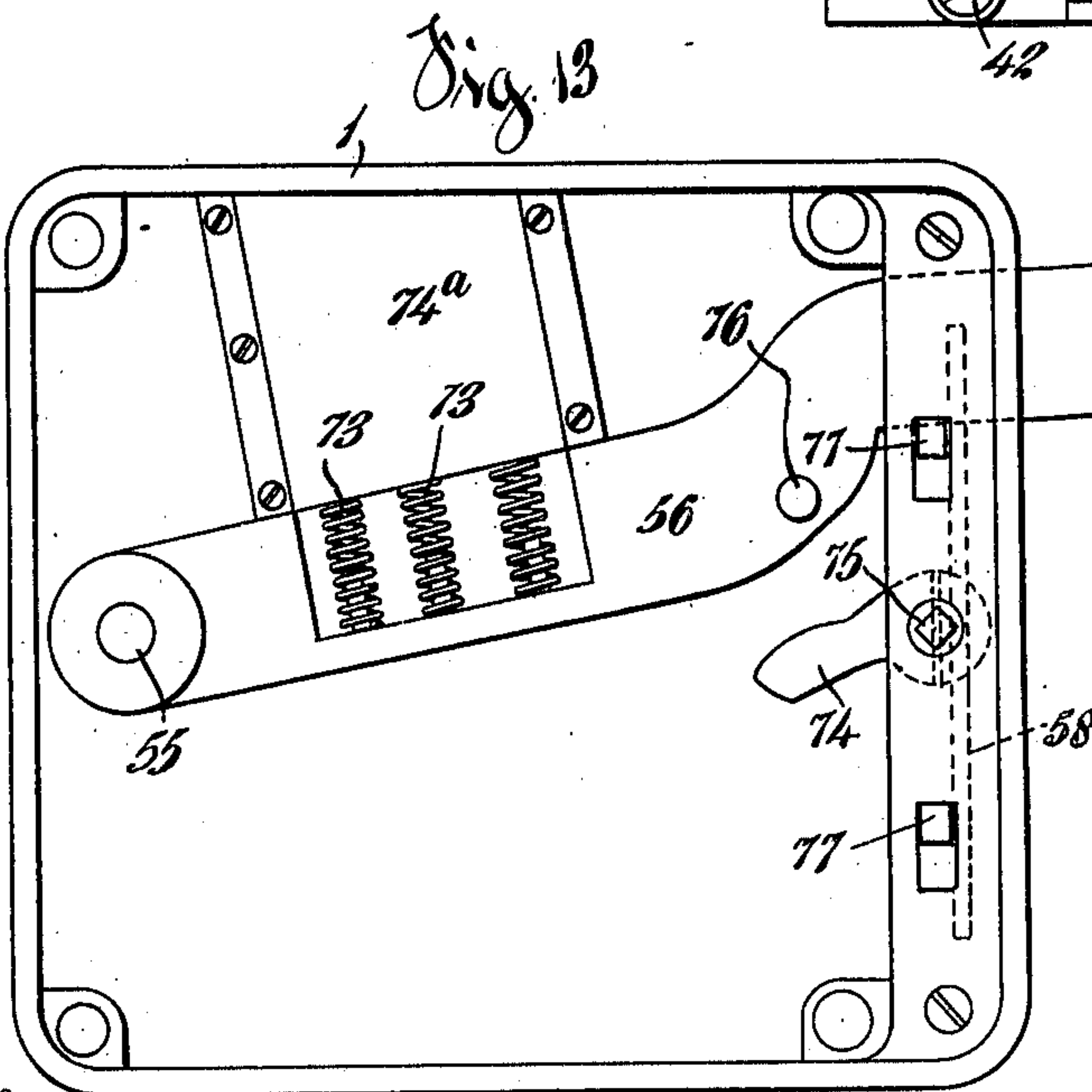
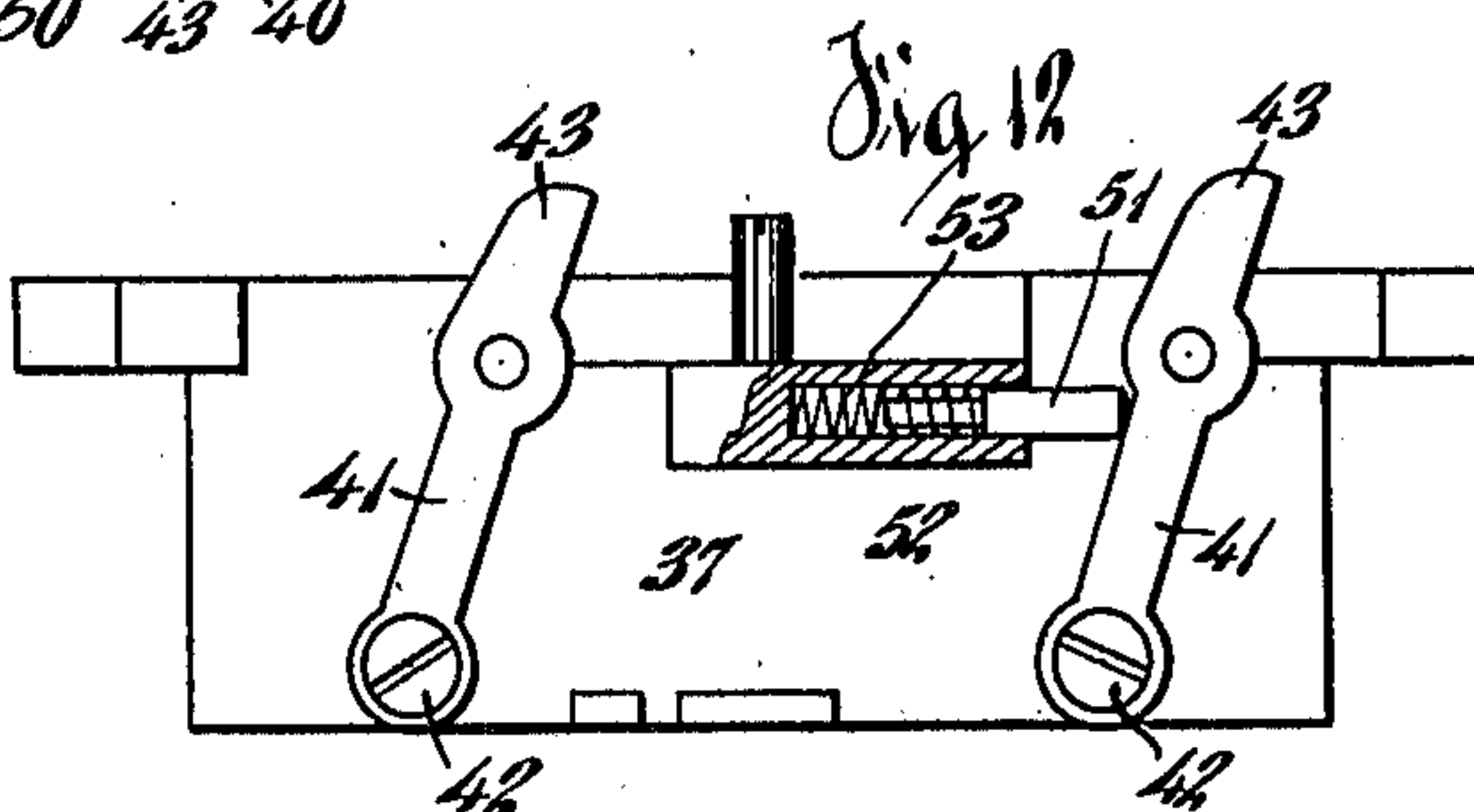
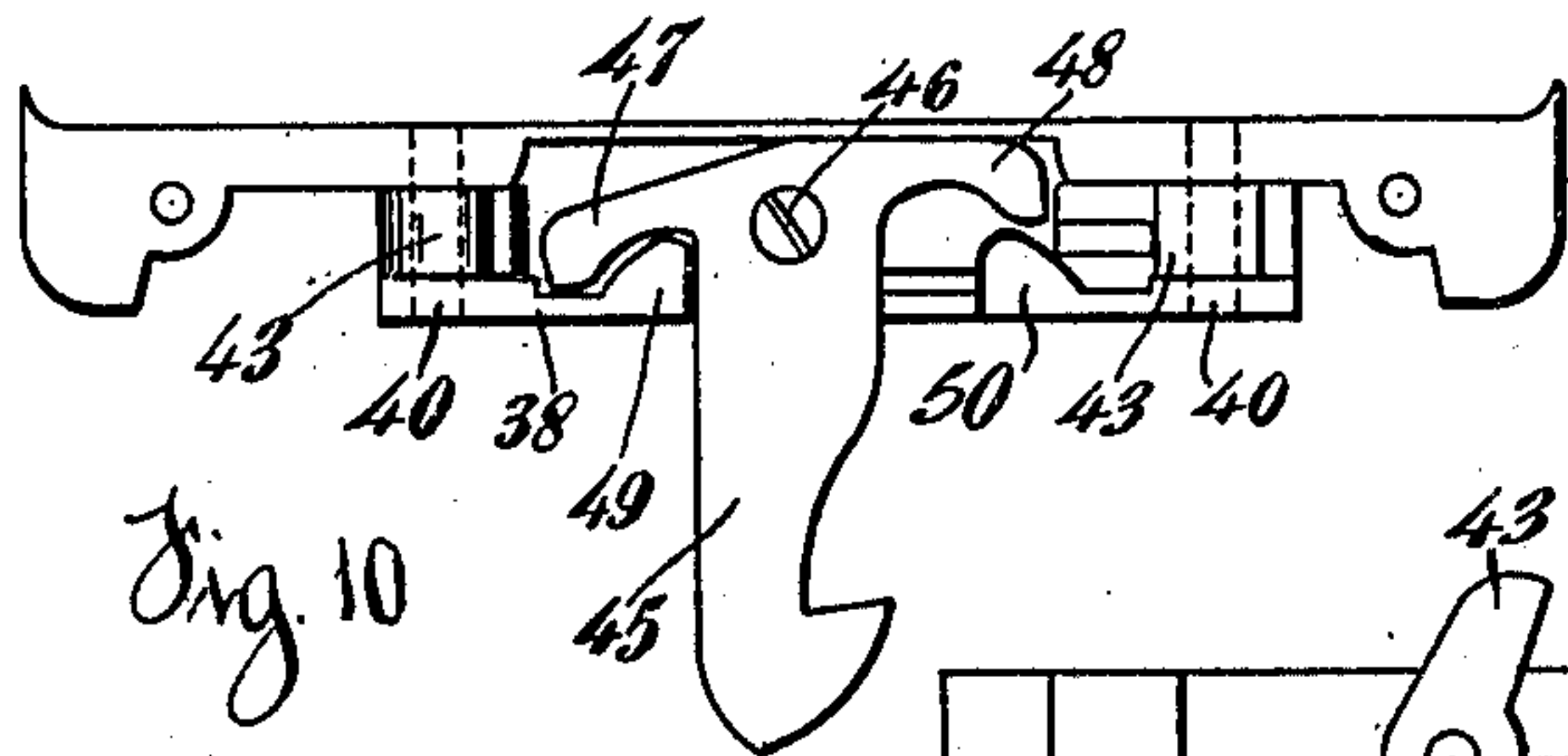
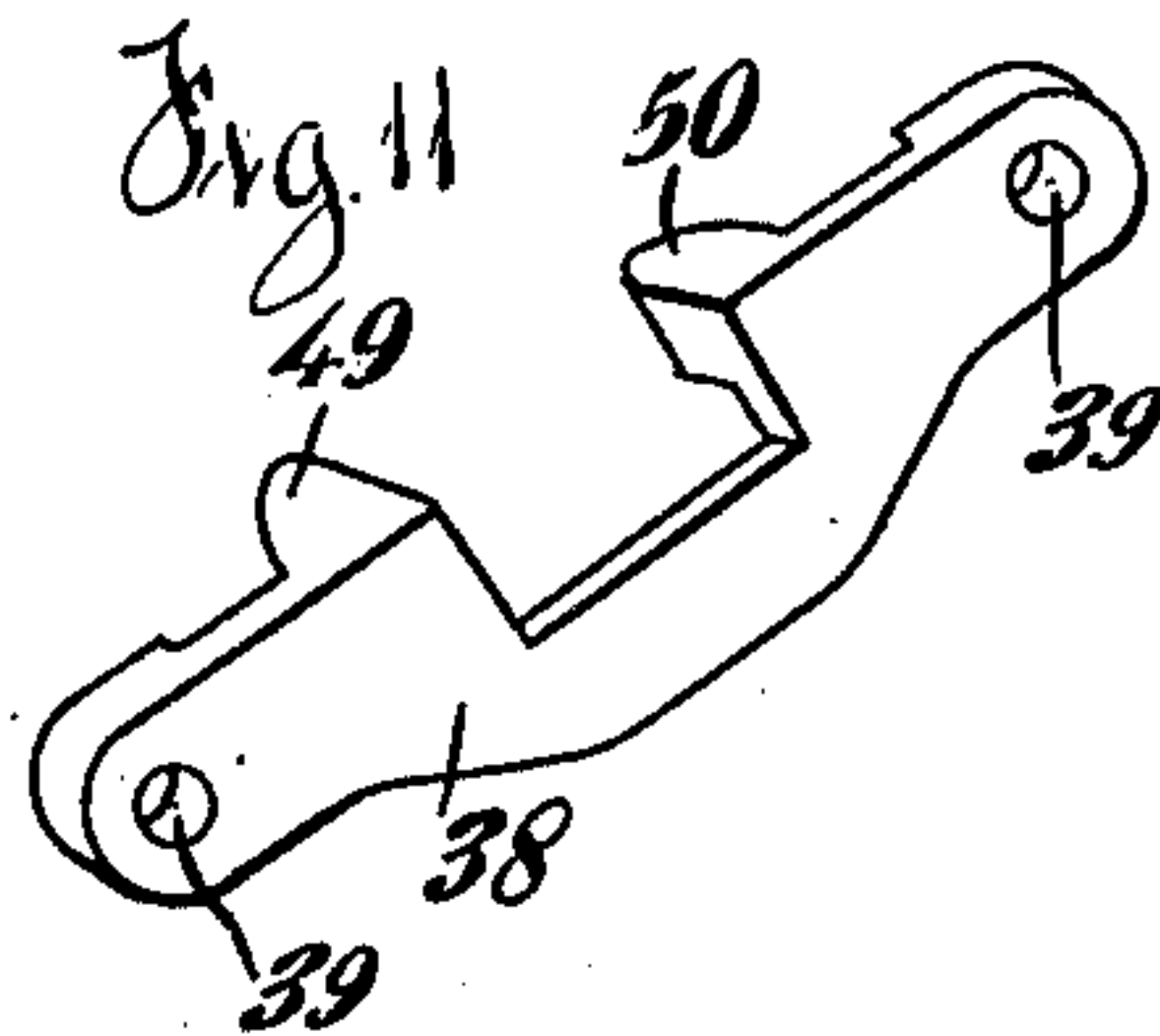
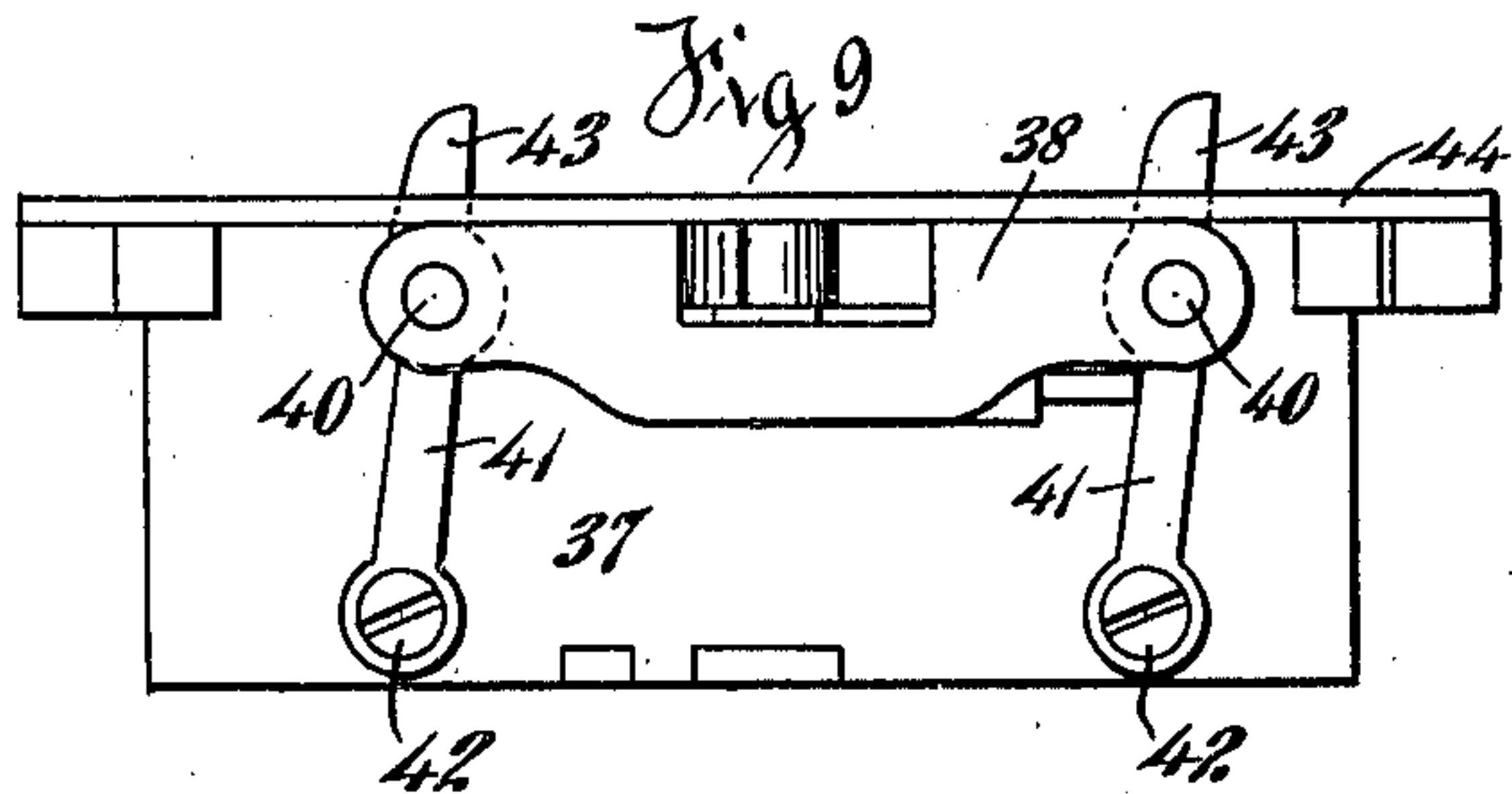
TIME LOCK.

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3 SHEETS-SHEET 3.



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UNITED STATES PATENT OFFICE.

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TIME-LOCK.

978,325.

Specification of Letters Patent.

Patented Dec. 13, 1910.

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To all whom it may concern:

Be it known that I, OTTO F. MIETH, a citizen of the United States, and a resident of the city of Cincinnati, in the county of Hamilton and State of Ohio, have invented certain new and useful Improvements in Time-Locks, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

Time lock devices designed to mechanically release the locking bar or bolt of a safe at a predetermined time, in order to permit the bolt to be thrown and the safe to be opened have long been in use. In such constructions, the clock movement is ordinarily connected with some releasing bar or lever which is gradually pushed or pulled as the mechanism operates thereon until the releasing point is reached. The travel of the releasing lever when thus directly under the control of the clock movement must necessarily be slow, so that several hours elapse from the commencement of the action until the tripping takes place, and as the tripping mechanism approaches the point of release, the safe is necessarily insecurely locked and liable to be released by jarring or otherwise before the proper time. Moreover, the connection between the locking bolts, tripping bar, time lock case and safe is necessarily rigid, so that a considerable time before the hour set the jarring of the safe is liable to throw the locking devices. In addition to this, the clock movement for a number of hours is directly engaged in slowly shifting the releasing device and therefore during this time is under constant strain and very liable to stoppage in the event of any undue friction to be overcome in the actuation of the releasing mechanism. It is to overcome these difficulties and other disadvantages which will be hereinafter mentioned in connection with the description of my improvements, that my invention is directed.

The invention consists in one important feature in the substitution for the ordinary direct connection between the clock movement and the tripping lever and the pulling bar, of a tripping slide or device entirely disconnected and independent from the pulling lever until the moment of tripping, and in the substitution of a tripping device actuated momentarily at the exact time set,

whereby the safe is securely and completely locked until the moment of tripping, inasmuch as the pulling or releasing bar is not actuated at all until the device is tripped at the proper time. By thus removing the strain of the clock movement from the actuation of the pulling bar, I am enabled to incorporate many other improvements in the constructions to be hereinafter more particularly pointed out and claimed, among which may be mentioned the substitution of a worm and worm gear connection intermediate the main spring and the clock movement which enables me to provide a much more powerful driving spring than has heretofore been practicable without overtaxing the delicate clock or watch movement or straining any of its parts.

In the drawings,—Figure 1 is a plan view of the time locking mechanism with the door of the case open. Fig. 2 is a plan view of one of the movement blocks or time lock receptacles with the watch movement and operating mechanism removed. Fig. 3 is an elevation of the movement block shown in Fig. 2. Fig. 4 is an enlarged view of the worm gear transmission. Fig. 5 is an enlarged plan view of one of the movement blocks or time lock receptacles with the clock movement removed and the dial and cover also removed from the releasing mechanism. Fig. 6 is a central vertical section taken on the line 6, 6, of Fig. 5. Fig. 7 is a plan view of the clutch for the main arbor. Fig. 8 is a plan view of the ratchet and clutch lever of the main arbor. Fig. 9 is a side elevation of the releasing device for the locking hook. Fig. 10 is a plan view of the same. Fig. 11 is a perspective view of the sliding bar of the releasing device. Fig. 12 is a side elevation of the releasing device as illustrated in Fig. 9, with the sliding bar removed. Fig. 13 is a plan view of a modified form of unlocking mechanism. Fig. 14 is a side elevation of the same with casing in vertical position.

1 is the time lock casing, usually of metal, to form a suitable box for the reception of the time lock mechanism and releasing devices.

2 is the usual cover or lid for the casing hinged thereto at 3, 3.

Mounted in the casing are a series of movement blocks or time lock receptacles 4, 5, each of which contains means for tripping

the releasing bar of the mechanism, each controlled by a separate clock or watch movement. A number of these movements are usually provided, each complete in itself for acting on the bolt locking devices, so that in the event that one or more of the movements should be stopped, the others shall be able to complete the operation. Each of these movement blocks or receptacles is itself mounted in a suitable recess in a block or frame 6, the receptacles being held securely in a fixed position and in an unchanging relation to each other by means of screws 7, 7. The block or frame 6 with the movement blocks fixed therein is itself securely mounted in the casing by means of screws 8, 8, and these screws are usually provided with coiled springs so attached that the frame 6 will be held in a floating position to avoid as much as possible the damage due to jars of the main casing. This general construction of the main casing with the spring support block carrying the separate and independent movement blocks is the ordinary and usual construction, and forms no part of my present invention.

As both of the time locking mechanisms as contained in the movement blocks are identical in construction, the description of one will answer for both, and in the drawings I have only illustrated one of these movements. It will be understood that as many of these independent clock movements as desired may be furnished, each of which contains in itself the mechanism for shifting the releasing bar.

9 is the casing for the movement block of oblong shape, and provided with two cylindrical recesses 10 and 11. The recess 10 is of a proper size for the reception of the watch movement which may be of any suitable description, and the movement itself is inclosed by a glass cover 12. The recess 11 in the other half of the movement block is twice the depth of the watch movement recess, and is divided by a central partition plate 13 into an upper and a lower compartment. Mounted centrally in this compartment is the main arbor 14, upon which is mounted the main spring 15 of the movement. This main spring is secured at one end to the arbor and at the other to the casing, and by reason of the construction to be hereinafter described, I am able to provide a much more powerful main spring than would be practicable for the delicate watch movement mounted in the receptacle 10.

Mounted loosely on the arbor 14 and resting upon a shoulder on the arbor keeping it free from the partition plate 13 to avoid friction is the worm gear 16 and this worm gear carries the ratchet 17 which is also loosely mounted on the arbor, the ratchet being connected with the worm gear by the spring pawls 18, 18, mounted on the worm

gear and held in engagement with the teeth of the ratchet by the springs 19, 19. The upper end of the arbor is squared, and mounted on this squared portion so as to rotate therewith is the clutch collar 20, which rests on the ratchet 17. 21 is a square notch in the periphery of this clutch collar 20, which notch is engaged by the hook 22 on the clutch lever 23, which is pivotally mounted by the screw 24 on the ratchet 17 and held in engagement normally with the clutch by the spring 25, secured at 26 on the ratchet.

Mounted in the casing 9, as illustrated in Fig. 2, is the connecting shaft 27, which carries on one end the worm 28 meshing with the worm gear 16, and which carries on the other end the crown wheel 29, or any other gear suitable for the purpose, which meshes with a pinion or escapement mechanism of the watch movement.

I have not illustrated any part of the watch movement which, as I have stated, is of the accurate and delicate construction of such watch movements, and which is intended to drive through the medium of the worm shaft and worm the releasing mechanism of the time lock. It will be understood, of course, that the main spring of the watch movement is removed, and that the main spring 15 forms the main spring for the watch mechanism.

Mounted over the clutch mechanism on the main arbor 14 is the cover plate 30 which is secured to the movement block by the screws 31, and mounted above the cover plate on the main arbor and secured to rotate therewith is the dial plate 32, graduated on its upper surface to indicate the hours, and 33 is the pointer secured to the cover plate. The dial plate is formed with gear teeth 34, and meshes with the pinion 35 mounted on the winding arbor 36. By turning the winding arbor 36 in the proper direction with a key, the main spring of the clock movement is wound up and the number of hours fixed for the main spring to unwind under control of the watch movement in the usual way.

Heretofore it has been customary to provide some such construction as heretofore described, and the movement of the mechanism under the action of the main spring has been brought to bear upon a releasing bar or some releasing device to gradually move the bar to trip the unlocking mechanism. Two such constructions of unlocking or releasing devices I have illustrated in Figs. 9 to 14. These devices are usually mounted in the casing in much the same way that the ordinary lock for a door is incased, and the devices are arranged so as to be actuated by the time lock movement, and usually will be at one end of the time lock casing. Mounted to slide on the side

plate 37 of this unlocking device is the slide bar 38. This slide bar is provided with holes 39, 39, at the ends which are engaged by the studs 40, 40, on the levers 41, 41, pivoted at 42, 42, near the bottom of the casing plate. The upper ends 43, 43, of these levers 41, 41, project through slots in the top plate 44 above the plate, so that by pushing on either of the ends 43, 43, the slide plate 38 is shifted from right to left. Pivoted at 46 on the casing to swing horizontally and extend out through a cut-out portion of the slide bar is a hook 45 which forms the releasing hook for the safe bolts. This hook is provided with side arms 47, 48, which are recessed in front, so as to engage the inwardly projecting lugs 49, 50, of the slide plate, and as the slide plate is shifted, the hook will be rocked on its pivot 46 to release the safe bolts. The slide bar 38 is normally held spring-pressed to the right by the pin 51 seated in a socket 52 in the case, and held in engagement with one of the levers 41 by the coiled spring 53 mounted in the socket and bearing on the pin.

It will be understood from the foregoing description that by pushing over either of the ends 43 of the levers 41, the slide bar will be shifted to rock the hook 45 and to release the safe bolt. I have shown two levers for shifting the slide bar, one of which is provided for each of the time lock movements, but it will of course be understood that when an additional number of time lock movements are provided for additional safety, additional lugs or levers are provided for shifting the slide bar, so that any one of the time movements can shift the bar to release the hook.

In some cases, instead of providing a hook to release the safe bolts, it is desired to employ an unlocking device which will itself throw the safe bolts. Such a construction I have illustrated in Figs. 13 and 14. Pivoted at 55 in the bottom of the case and extending out through a slot in the case is the lock lever 56. The lock holding and releasing devices for the lever 56 are mounted on the plate 57 of the lock casing, and 58 is the slide bar corresponding to the slide bar 38 of the hook releasing devices. This slide bar 58 is held in position and guided by the screws 59, 59, attached to the casing, which engage the slots 60, 60, of the slide bar. The slide bar is normally held under spring pressure by the pin 61 mounted in the socket 62 in the case and held in engagement with the lug 63 on the slide bar by the coiled spring 64. 65 is a notch in the edge of the slide bar which is engaged by the head 66 of the rock lever 67 pivoted at 68, to the casing. The end 69 of this rock lever engages the head 70 of the latch 71, pivoted at 72 to the casing, and the edge of the lock lever 56 is caught behind the head of the latch and normally

held against the pressure of the somewhat powerful coiled springs 73, 73, which are mounted in a recess in the lever and are compressed between the lever and the block 74^a secured to the bottom of the casing. The latch 71 is pivoted so that when the lever 56 is caught behind the head of the latch, as shown in Fig. 14, the radial axis of the latch will not be parallel to the plane of the movement of the lever 56, and except as held by the end 69 of the rock lever 67, the movement of the lever would swing the latch on its pivot to release the lever. As the slide bar is shifted against the spring pressure, the rock lever 67 will be rocked to shift the end 69 away from the head 70 of the latch, and the pull of the lever 56 under the tension of the springs 73 will actuate the latch and release the lever and allow it to throw the safe bolts. The slide bar 58 is returned to its normal position by the spring-pressed pin 61 bearing on the lug 63, and the lock lever is returned to its locking position by the arm 74 on the winding arbor 75 which bears against the stud 76 on the lever. The slide bar 58, as in the case of the slide bar 38, is provided with lugs 77, 77, in the pathway of the actuating devices of the time movement, so that either of the time movements can shift the slide bar to release the lock lever.

Having now described the two constructions of unlocking devices illustrated in the drawings, Figs. 9 to 14, both of which are provided with a slide bar to be actuated by the time lock movements, I will now return to the description of the time lock movement and describe the novel features of my construction, under which the slide bar is not actuated at all until the moment for releasing arrives.

Heretofore, so far as I am aware, it has been customary to provide constructions in which for some hours before the time designated the time lock movement is slowly shifting the slide bar to release the hook or lock lever as heretofore described, and as has been stated, for a considerable period of time before the release, the movement of the slide bar will have been brought so close to the tripping position, that with the ordinary constructions, jarring on the movement is apt to trip the device.

Loosely mounted on the winding arbor 36 of each of the movement blocks is a releasing lever 78, the outer end of which 79 stands in the pathway of the actuating devices on the slide bar of the unlocking mechanism. The inner arm 80 of this lever lies in the pathway of the stud 81 projecting upwardly from the arm 82 on the clutch collar 20, so that upon the release of the clutch collar as hereinafter described, the stud 81 will come in contact with the arm 80 of the lever 78 to shift the slide bar of the unlock-

ing mechanism. Until, however, the clutch collar is released, as hereinbefore described, the releasing lever 78 is entirely free and disconnected from the time lock mechanism.

5 In order to release the clutch collar 20, I provide as follows: The clutch lever 23 is provided with an extension 83, which lies in the pathway of the beveled lug 84 on the casing. Now as the main spring of the
10 movement under the control of the watch movement slowly unwinds, the clutch collar carries the clutch lever into engagement with the lug 84, and the clutch lever is finally, as it reaches the top of the lug, re-
15 leased from the notch in the clutch collar. As it is through the medium of the clutch lever that the ratchet and worm gear and watch movement are connected with the main arbor and main spring, the moment
20 the clutch lever is released, the watch movement is entirely disconnected from the main arbor and spring, and the full force of the main spring instantly rotates the clutch collar 20, bringing the stud 81 into contact
25 with the releasing lever 78, and the releasing devices are tripped and the safe bolts re-leased.

30 The operation of my improved time lock construction will be evident from the foregoing description.

By reason of the fact that the watch movement has no work to do in shifting the slide bar of the unlocking mechanism, I am able to provide a very powerful main spring
35 for the movement and to connect the arbor of the main spring by means of the worm and worm gear mechanism with the delicate watch movement. As the worm and worm gear is one of the most powerful means of
40 transmitting power, it is also a very powerful means of retaining such power. In the ordinary constructions of time lock movements, inasmuch as the watch movement has to perform work of moving the releasing
45 power and its connecting parts, it is necessary to provide gear and pinion connections between the watch movement and the actuating mechanism, and therefore it is not possible to provide a main driving spring of
50 too much power without liability of exerting too much pressure on the delicate watch movement. With my construction, however, inasmuch as the only work required to be accomplished by the watch movement is to
55 release the clutch lever from the clutch collar, a worm and gear construction can be interposed between the driving main spring and the watch movement. It will also be evident that inasmuch as the moment the
60 clutch collar is released from the clutch lever of the ratchet wheel, the watch movement will be entirely disconnected, and the full entire force of the main spring will be employed in shifting the releasing lever to
65 actuate the unlocking mechanism. I am

thus able to take all the power of the driving spring from the movement and cause it to act on the slide bar, and I am able to concentrate all of my driving power at the tripping point, and I am not dependent for
70 tripping on the running of the watch movement at all. This makes it almost impossible that there should be any lock-out, no matter how tightly the parts may be con-
75 nected or how much unexpected friction may develop. It will also be noticed that the connection between the arms of the hook 45 and the lugs of the slide plate 38 in the bolt releasing mechanism is loose so that the slide
80 bar can be subjected to jars and may have considerable play without in any way disturbing the hook member. The same advantage is obtained in the other construction of bolt releasing mechanism, in that
85 the notch in the slide bar is wider than the head of the engaging lever, so that there is considerable looseness of fit.

What I claim as new, and of my invention and desire to secure by Letters Patent, is:—

1. In a time lock, in combination with the
90 bolt releasing mechanism, a watch movement with driving means separate therefrom, worm gear intermediate the watch move-
95 ment and driving means, and a clutch device coupling the worm gear to the driving means, with means for releasing the clutch at predetermined times to transfer the driv-
ing action to the bolt releasing mechanism.

2. In a time lock, in combination with a
100 bolt releasing mechanism, a watch movement with driving means separate therefrom, worm gearing intermediate the watch movement and the driving means, with di-
105 rect connection therefor with the watch movement, and a clutch device coupling the worm gear to the driving means, with means for releasing the clutch at predetermined times to transfer the driving action to the bolt releasing mechanism.

3. In a time lock, in combination with a
110 bolt releasing mechanism, a watch movement with driving means separate therefrom, worm gearing intermediate the watch movement and driving means, and a clutch device coupling the worm gear to the driv-
115 ing means, with means for releasing the clutch, under the action of the driving means, at predetermined times to transfer the driving action to the bolt releasing mechanism.

4. In a time lock, in combination with a
120 bolt releasing mechanism, a watch movement with driving means separate therefrom, worm gearing intermediate the watch movement and driving means, with direct
125 connection therefor with the watch movement, and a clutch device coupling the worm gear to the driving means, with means for releasing the clutch, under the action of the driving means, at predetermined times
130

to transfer the driving action to the bolt releasing mechanism.

5. In a time lock, in combination with bolt releasing mechanism, a watch movement with driving means separate therefrom, and gearing connecting the same with the watch movement, a clutch device interposed between the driving means and watch movement, with means for releasing the clutch at predetermined times with means to transfer the driving action from the watch movement to the bolt releasing mechanism.

6. In a time lock, in combination with bolt releasing mechanism, a watch movement with driving means separate therefrom, and gearing connecting the same with the watch movement, a clutch device interposed between the driving means and watch movement, with means for releasing the clutch, under the action of the driving means at predetermined times with means to transfer the driving action from the watch movement to the bolt releasing mechanism.

7. In a time lock, the combination with a bolt releasing bar and a lever for actuating said bar normally inactive, a watch movement, with driving means separate therefrom, gearing connecting the same with the watch movement, and a clutch device interposed between the driving means and the watch movement, one member of which is connected with the driving means, and means for releasing the clutch from the watch movement with means to propel said clutch member against said lever to actuate the bolt releasing bar.

8. In a time lock, the combination with a bolt releasing bar and a lever for actuating the said bar normally inactive, a watch movement, with driving means separate therefrom, gearing connecting the same with the watch movement, and a clutch device interposed between the driving means and the watch movement, one member of which is permanently connected with the driving means, and means for propelling the clutch under action of the driving means to propel said clutch member against said lever to actuate the bolt releasing bar.

9. In a time lock, in combination with a bolt releasing bar, and a lever for actuating said bar normally inactive, a watch movement with driving means separate therefrom, worm gear intermediate the watch movement and driving means, and a clutch device coupling the worm gear to the driving means, with means for releasing the clutch at predetermined times to transfer the driving action to the normally inactive lever.

10. In a time lock, in combination with a bolt releasing bar and a lever for actuating said bar normally inactive, a watch movement with driving means separate there-

from, worm gearing intermediate the watch movement and the driving means, with direct connection therefor with the watch movement, and a clutch device coupling the worm gear to the driving means, with means for releasing the clutch at predetermined times to transfer the driving action to the normally inactive lever.

11. In a time lock, in combination with a bolt releasing bar, and a lever for actuating said bar normally inactive, a watch movement with driving means separate therefrom, worm gearing intermediate the watch movement and driving means, and a clutch device coupling the worm gear to the driving means, with means for releasing the clutch, under the action of the driving means, at predetermined times to transfer the driving action to the normally inactive lever.

12. In a time lock, in combination with a bolt releasing bar and a lever for actuating said bar normally inactive, a watch movement with driving means separate therefrom, worm gearing intermediate the watch movement and driving means, with direct connection therefor with the watch movement, and a clutch device coupling the worm gear to the driving means, with means for releasing the clutch, under the action of the driving means, at predetermined times to transfer the driving action to the normally inactive lever.

13. In a time lock, in combination with a bolt releasing bar, and a lever for actuating said bar normally inactive, a watch movement with arbor and main spring separate therefrom, gearing connecting the main spring with the watch movement, a clutch device interposed in said train of gearing intermediate the main spring and watch movement, one member secured to said main spring arbor and the other member secured to the watch movement gear, means for releasing said clutch to propel the main spring clutch member against said lever to actuate the bolt releasing bar.

14. In a time lock, in combination with a bolt releasing bar and a lever for actuating said bar normally inactive, a watch movement with arbor and main spring separate therefrom, gearing connecting the main spring with the watch movement, a clutch device interposed in said train of gearing intermediate the main spring and watch movement, one member secured to said main spring arbor and the other member secured to the watch movement gear, means for releasing said clutch under the action of the main spring to propel the main spring clutch member against said lever to actuate the bolt releasing bar.

15. In a time lock, a bolt releasing bar and a lever for actuating said bar normally inactive, a watch movement with arbor and

main spring separate therefrom, a worm gearing intermediate the watch movement and the main spring, and a clutch device intermediate the main spring and the worm gear, one member secured to said main spring arbor and the other member to the worm gear, with means for releasing said clutch to propel the main spring clutch member against said lever to actuate the bolt releasing bar.

16. In a time lock, a bolt releasing mechanism comprising a slide bar and a bolt engaging member, a hook for engaging the

bolt member, a lever engaging the hook to hold the same in engagement with the bolt member, there being a loose fitting connection for the lever with the slide bar, and a watch movement with means to actuate the slide bar, whereby the slide bar may be subjected to jars without disturbing the bolt engaging member.

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Attest:

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