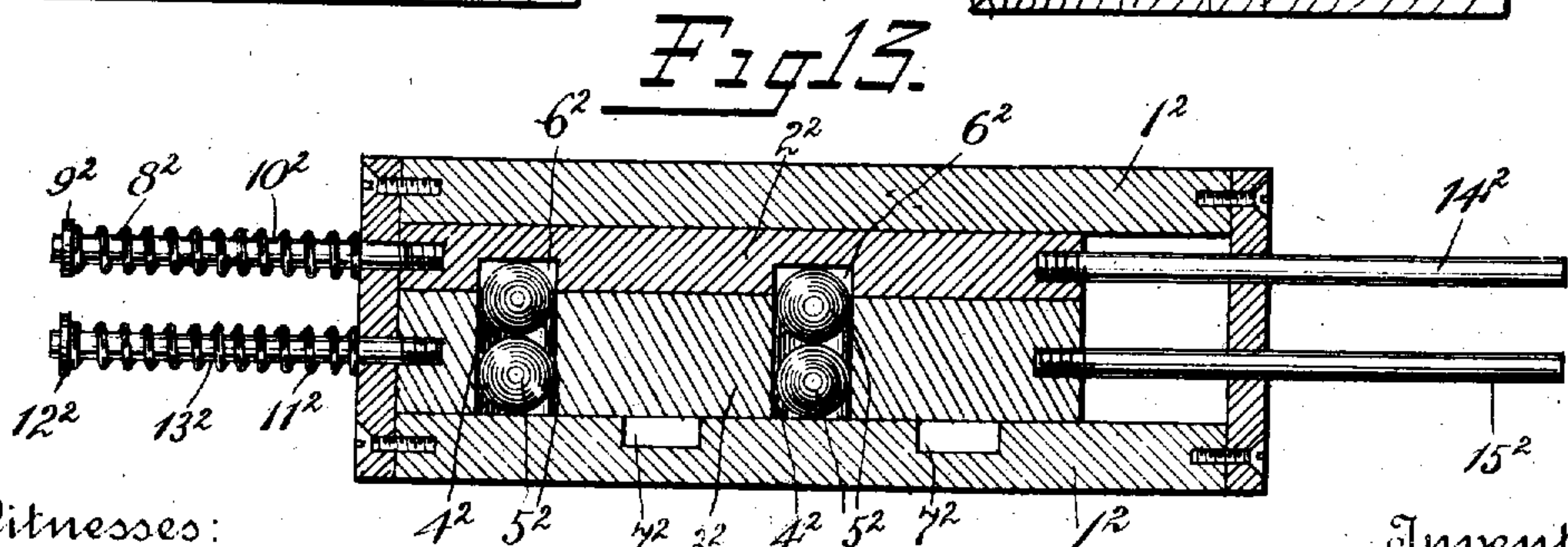
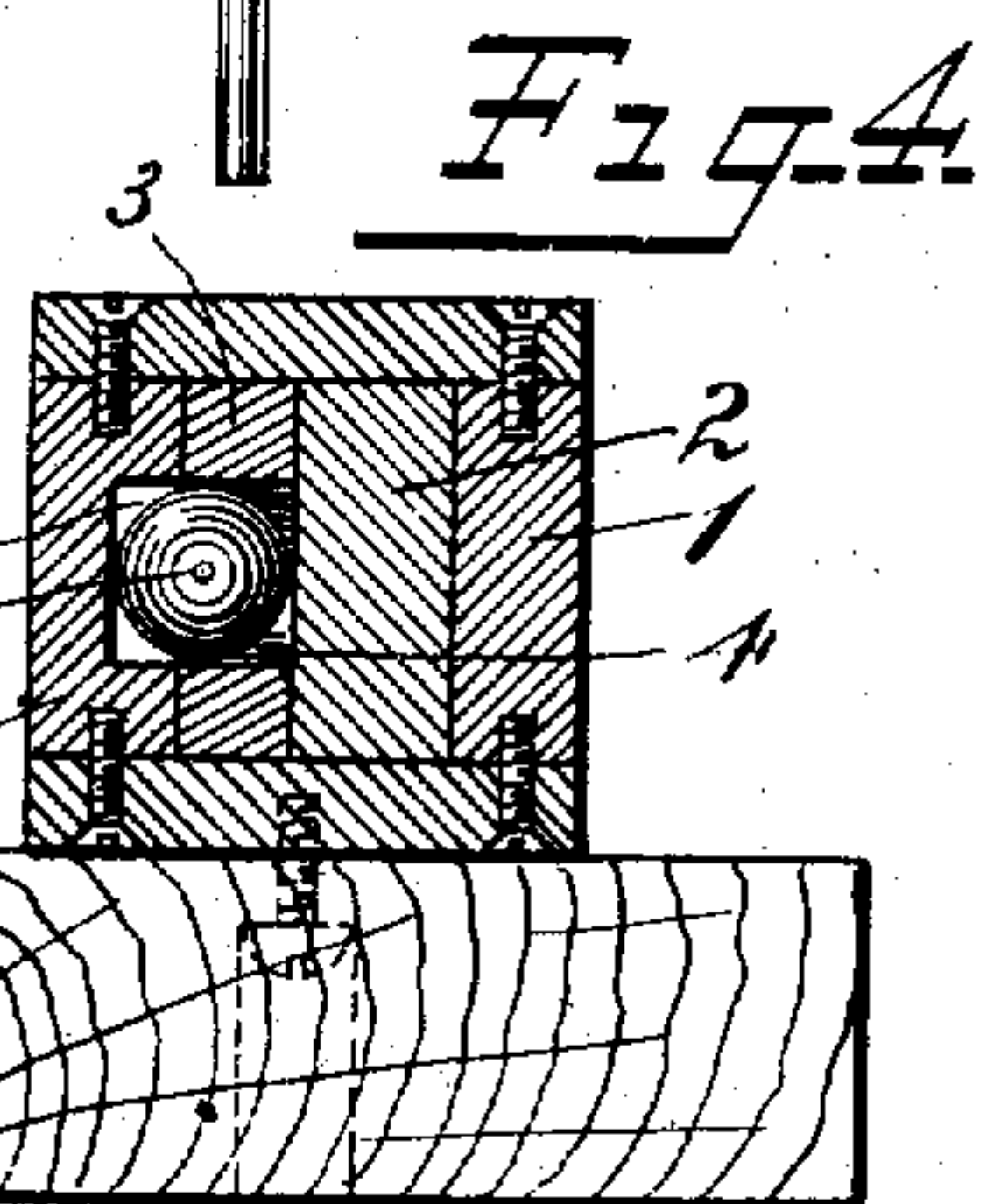
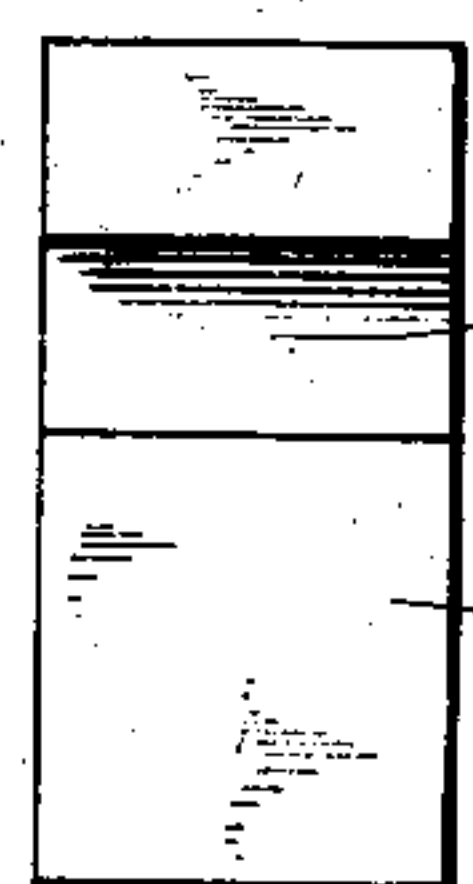
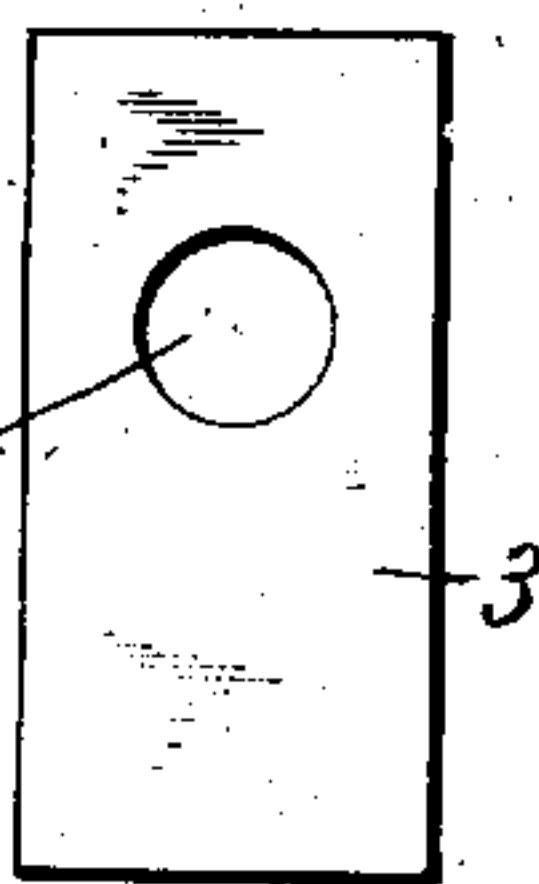
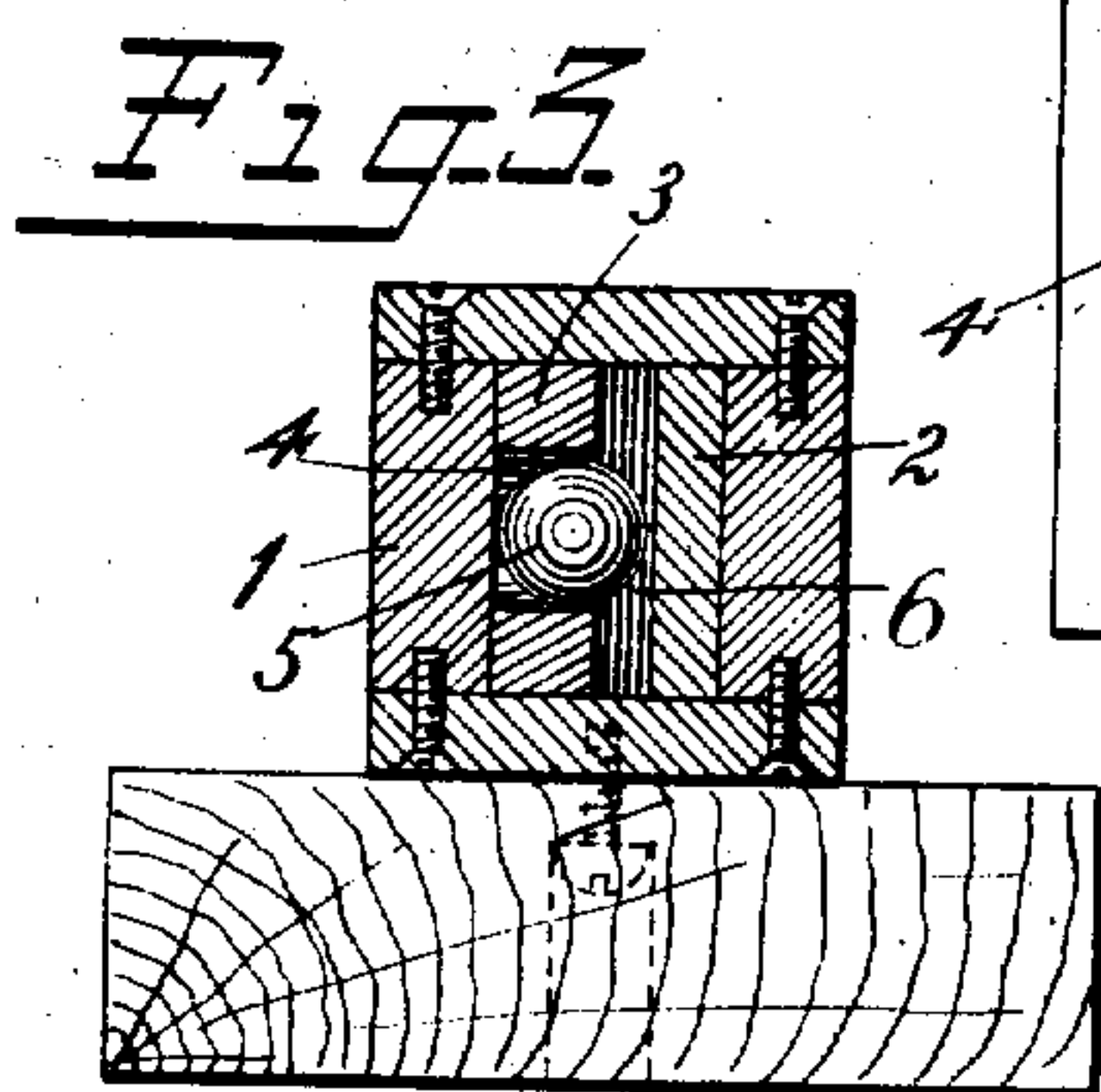
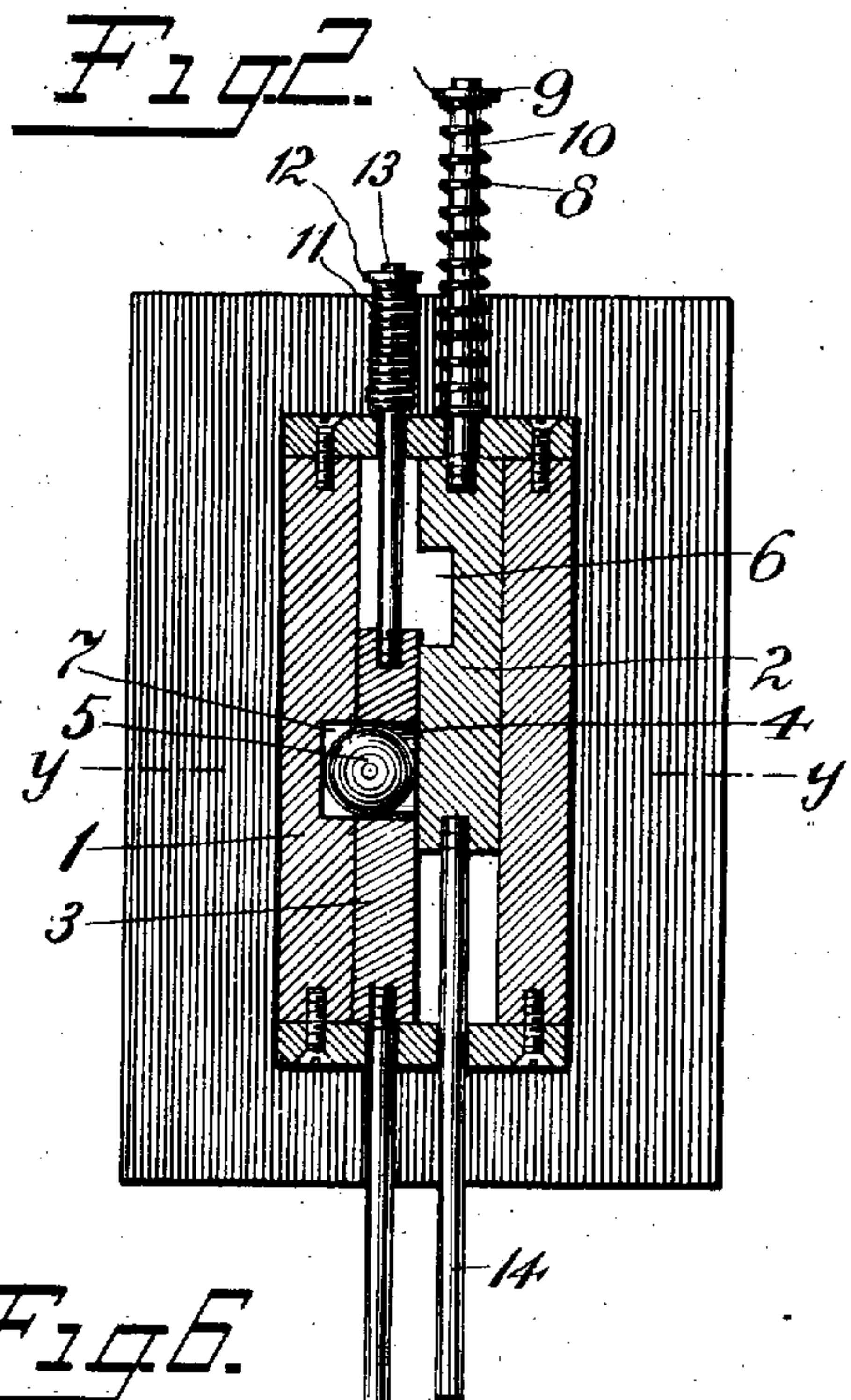
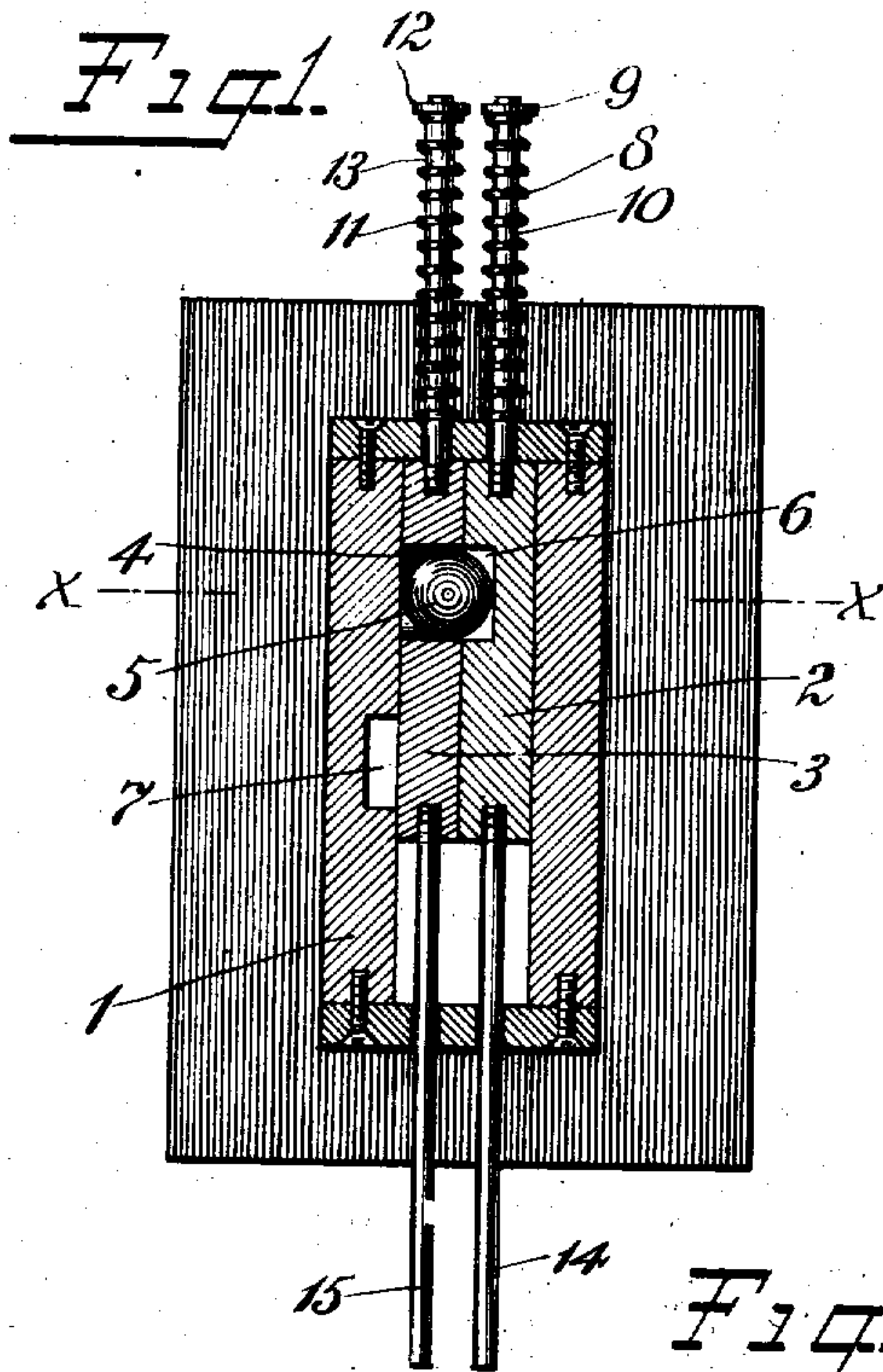


999,850.

Patented Aug. 8, 1911.
 2 SHEETS—SHEET 1.

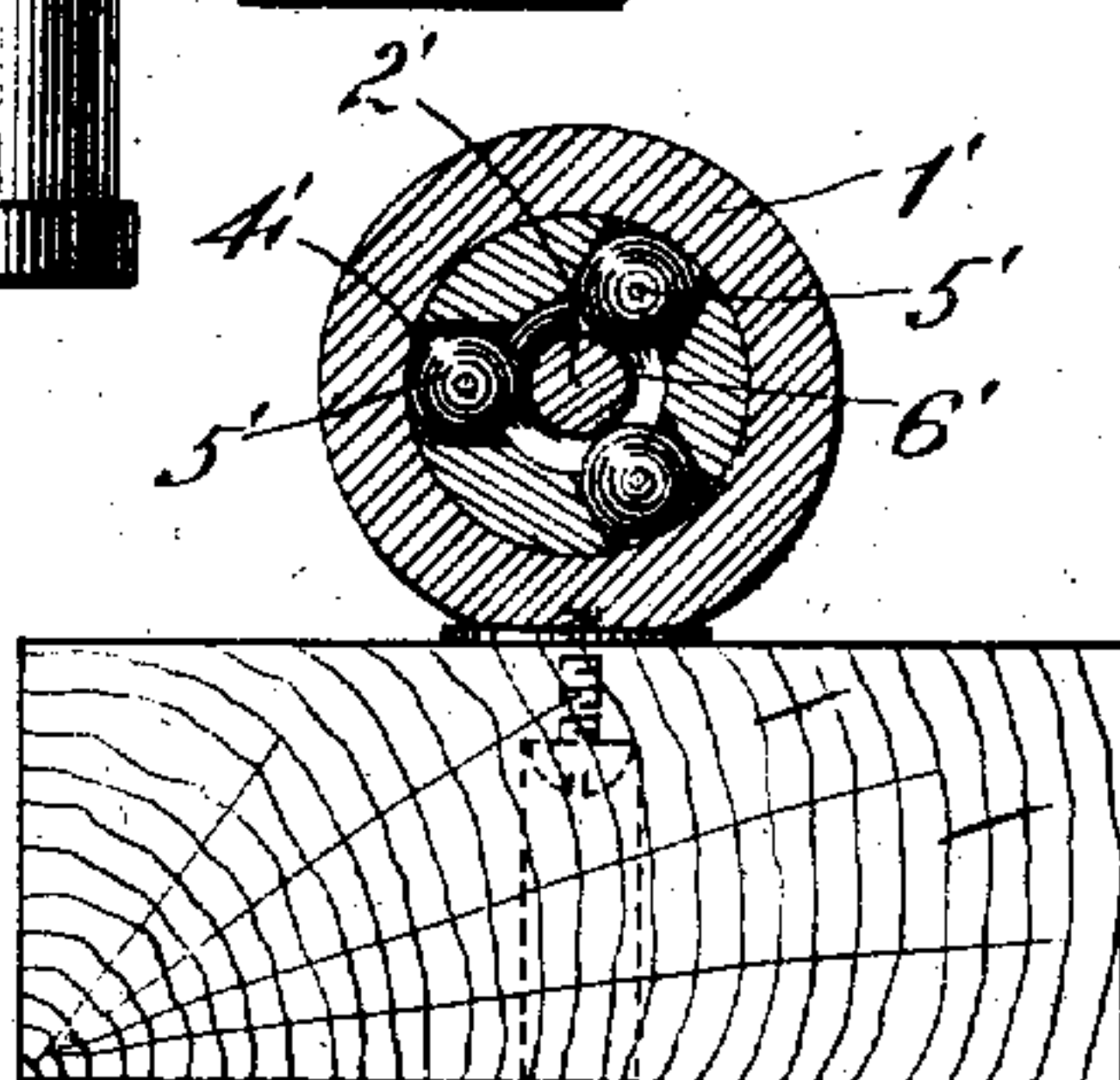


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 GRANVILLE E. PALMER
 By his Attorney
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APPLICATION FILED MAY 3, 1910.

2 SHEETS—SHEET 2.



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UNITED STATES PATENT OFFICE.

GRANVILLE E. PALMER, OF WINCHESTER, MASSACHUSETTS.

LOCKING DEVICE.

999,850.

Specification of Letters Patent.

Patented Aug. 8, 1911.

Application filed May 3, 1910. Serial No. 559,165.

To all whom it may concern:

Be it known that I, GRANVILLE E. PALMER, a citizen of the United States, residing at Winchester, county of Middlesex, State of Massachusetts, have invented certain new and useful Improvements in Locking Devices, of which the following is a full, clear, and exact description.

My invention relates to improvements in locking devices and has for its object to produce a positive clutch which shall be free from objectionable friction, and not liable to be affected by jarring.

It also has for its object to produce a clutch which shall be positive in action and easily released.

The following is a description of an embodiment of my invention, reference being had to the accompanying drawing, in which,

Figure 1 represents a vertical section of a simple form of my invention, the parts being in unclutched position; Fig. 2 represents the same in clutched position. Fig. 3 represents a horizontal section of Fig. 1 on the line $x-x$, Fig. 1; Fig. 4 represents a horizontal section of Fig. 2 on the line $y-y$, Fig. 2; Figs. 5 and 6 show details of two movable members; Fig. 7 shows a vertical section of the preferred form, the parts being in clutched position; Fig. 8 shows a horizontal section of the same in unclutched position; Fig. 9 shows a horizontal section of the clutch of Fig. 7 on the line $w-w$, Fig. 7; Fig. 10 shows a similar section on the line $z-z$ of Fig. 8; Figs. 11 and 12 show details; and, Fig. 13 shows a modification.

Referring more particularly to the drawings, 1 represents a stationary member or abutment.

2 represents a movable abutment.

3 is an intermediate member movable relatively to both abutments 1 and 2. The intermediate member 3 is provided with a recess 4 in which is located a detent 5. This detent is preferably of a form having a surface of revolution, the most desirable form being a round ball which moves easily in the recess. The diameter of the surface of revolution or ball should be greater than the thickness of the member 3. The movable abutment 2 is provided with a recess 6 adapted to partially receive the detent 5. When a ball detent is used, the depth of this recess 6 should be such as to receive only a portion of one half of the ball, *i. e.*, the

depth is less than a radius of said ball. The abutment 1 is also provided with a recess 7, which, when a ball detent is used, should also be of such a depth as to receive only a part of one half of the ball, being less than a radius thereof.

8 is a spring bearing against the collar 9 on a post 10 and tending to raise the member 2.

11 is a spring bearing against the collar 12 on the post 13 and tending to raise the intermediate member 3.

14 and 15 are downward extensions or rods projecting from the parts 2 and 3.

The action of the device is as follows:

With the parts as shown in Fig. 1, the parts 2 and 3 are locked together by the ball 5 which is held forced partly into the recess 6 by the face of the stationary abutment 1.

As the intermediate member 3 is moved downward by pressure on rod 13, or pull on rod 15, the movable abutment 2 being locked to it, is moved downward also until the ball reaches the recess 7, whereupon the spring 8 can move the part 2 upward, which movement by reason of the engagement of the lower shoulder of the recess 6 with the detent 5 forces the detent 5 into the recess 7.

The movable abutment 2 continues to rise so that the recess 6 passes away from the detent 5 and the plane surface of the movable abutment 2 holds the ball 5 firmly in the position shown in Fig. 2 so as to lock the intermediate member to the stationary abutment 1.

The engagement is positive and can not be affected by jarring or the like. The clutch is then in closed position. To open the clutch, the movable abutment 2 is moved downward by pulling the rod 14 until the recess 6 comes opposite the detent 5.

The intermediate member 3 then moves upward under the action of its spring 11, the engagement of the ball 5 with the upper shoulder of the recess 7 in the stationary abutment 1 acting to force the ball out of the recess 7 and into the recess 6.

The two parts 1 and 3 are thus unclutched and the two parts 2 and 3 are locked together. The spring 11 is made strong enough to overcome the power necessary to be applied to the part 2 to overcome the spring 8, with the result that the parts 2 and 3, together with the detent, are moved upward as soon as the movable abutment 2 is moved downward sufficiently to bring the recess 6 opposite the detent 5.

The clutching of the two parts 1 and 3 together is accompanied with substantially no friction. The movement of the part 2 and the part 3 in unclutching is also accompanied with very little friction. The operation is not dependent on gravity and there is no spring acting directly on the detent.

In the preferred form, the stationary abutment is made in the form of a hollow block or cylinder 1' having an annular recess 7' whose upper edge provides the necessary surface for the detents to engage with. The movable abutment is made in the form of a round rod 2' having an annular recess 6'. The intermediate member is made in the form of a tube 3' having a plurality of holes 4' disposed in the same plane and dividing the periphery into equal parts. A corresponding number of ball detents 5' are used, one for each recess or hole 4'. From the top of the intermediate member 3, a rod 15' extends upward and from the bottom of the member 2' a rod 14' projects downward.

8' is a spring engaging a stop 9' and surrounding the rod 14' and tending to move it and the member 2' upward.

11' is a tension spring attached to the frame 12' and the lower end of the rod 15' which it surrounds, and tending to move it and the member 3' upward. The operation is the same as in the simple form of Figs. 1 to 6. This makes a compact form having a plurality of detents with corresponding recesses, making a clutch of correspondingly greater strength. It also makes a clutch in which the reactions of the detents 5' upon the releasing member or movable abutment 2' are balanced and in which the extent of surface subject to friction is reduced.

As shown in Fig. 13, detents 5² 5² and recesses 6² 6² and 7² 7² may be arranged one beyond the other as well as side by side as in Figs. 7 to 11. In this form, the detents each consist of two balls whose combined diameters are more than the thickness of the intermediate member 3². The parts, in other particulars, are similar to those of Figs. 1 to 6. It is preferable to make the adjacent parts having sliding contact of different metals so as to reduce friction. I therefore make the abutments of steel and the intermediate member of bronze or brass. The detents are hardened steel balls such as are used for ordinary ball bearings.

If the abutment member 3 is held stationary and the abutment 1 is moved upward, the abutment 2 would be held stationary by the detent 5 until the recess 7 reaches the detent 5, whereupon the abutment 2 will be released, the detent 5 moving out of the recess 6 and toward the recess 7 in the other abutment. The abutment 2 will thereupon move under the action of the spring 8, which will have been put under

tension by the movement of the abutment 1 and the parts connected thereto. The abutment 1 will thereupon be locked in its new position relatively to the intermediate member 3 and can be released by a movement of the abutment 2 sufficient to bring the recess 6 again opposite the detent 5.

My invention may be embodied in electric switches, circuit breakers, time locks, and various other relations where it is desirable to have no slip in the clutch at the moment of engagement or disengagement.

My invention permits of other embodiments and various modifications in the form and arrangement of the parts as will be evident to one skilled in the art.

What I claim is:

1. In a locking device, the combination of a primary abutment, a secondary abutment, an intermediate member, one of said parts being stationary and the others being independently movable relatively to said stationary part and to one another, means normally tending to make said movable parts move relatively to said stationary part, and a detent carried by said intermediate member, said abutments having recesses for receiving part of said detent, each abutment tending to cause the detent when in its recess and under strain to move toward the other abutment.

2. In a locking device, the combination of a primary abutment, a secondary abutment, an intermediate member, one of said parts being stationary and the others being independently movable relatively to said stationary part and to one another, means normally tending to make said movable parts move relatively to said stationary part, and a detent carried by said intermediate member, said abutments having recesses for receiving part of said detent, each abutment tending to cause the detent when in its recess and under strain to move toward the other abutment, the recesses in said abutments being of a depth to receive less than half of said detent.

3. In a locking device, the combination of a primary abutment, a secondary abutment, an intermediate member, one of said parts being stationary and the others being independently movable relatively to said stationary part and to one another, spring means tending when under tension to make said movable parts move relatively to said stationary part, and a detent carried by said intermediate member, said abutments having recesses for receiving part of said detent, each abutment tending to cause the detent when in its recess and under strain to move toward the other abutment, the recesses in said abutments being of a depth to receive less than half of said detent, the thickness of said intermediate member being greater than one-half of said detent.

4. In a locking device, the combination of a stationary abutment, a movable abutment, an intermediate member movable relatively to both abutments, spring means tending when under tension to make said movable abutment and said intermediate member move relatively to said fixed member, and a detent carried by said intermediate member, said abutments having recesses for receiving part of said detent, each abutment tending to cause the detent, when in its recess and under strain, to move toward the recess in the other abutment.

5. In a locking device, the combination of a stationary abutment, a movable abutment, an intermediate member movable relatively to both of said abutments, said intermediate member having a hole and said abutments having recesses, a detent having a surface of revolution and located within said hole, spring means tending when under tension to cause said movable abutment and intermediate member to move relatively to said stationary abutment, the recesses in said abutments being of a depth to receive less than half of said detent.

6. In a locking device, the combination of a stationary abutment, a movable abutment and an intermediate member movable relatively to both of said abutments, said intermediate member having a hole the diameter of which is greater than the thickness of said intermediate member, a detent located within said hole and having a surface of revolution of a diameter greater than the thickness of said member, said abutments having recesses capable of receiving less than half of said detent, and means normally tending to move said member and movable abutment relatively to said stationary abutment.

7. In a locking device, the combination of a stationary abutment, a movable abutment and an intermediate member movable relatively to both of said abutments, said intermediate member having a hole, a ball detent located within said hole and having a dimension greater than the thickness of said member, said abutments having recesses each capable of receiving less than half of the contacting ball, and means normally tending to move said member and movable abutment relatively to said stationary abutment.

8. In a locking device, the combination of a stationary abutment having a bore, a tubular intermediate member fitting said bore, a movable abutment fitting the bore of said intermediate member, said intermediate member having a series of holes angularly disposed, ball detents in said holes of greater dimensions than the thickness of the metal of said member, said abutments having recesses of a depth less than the radius of the balls of said detents, and means tending to cause said movable member and abutment to move relatively to said stationary abutment.

9. In a locking device, the combination of a stationary abutment having a bore, a tubular intermediate member fitting said bore, a movable abutment fitting the bore of said intermediate member, said intermediate member having a series of holes angularly disposed, ball detents in said holes of a diameter greater than the thickness of the metal of said member, said abutments having annular recesses of a depth less than the radius of the balls of said detents, and means tending to cause said movable member and abutment to move relatively to said stationary abutment.

10. In a locking device, the combination of a stationary abutment having a bore, a tubular intermediate member fitting said bore, a movable abutment fitting the bore of said intermediate member, said intermediate member having a series of holes angularly disposed, ball detents in said holes of a dimension greater than the thickness of the metal of said member, said abutments having recesses of a depth less than the radius of the balls of said detents, and means tending to cause said movable member and abutment to move relatively to said stationary abutment, and extensions from said movable abutment and member for manually actuating the same.

11. In a locking device, the combination of a primary abutment, a secondary abutment, an intermediate member, said intermediate member surrounding one of said abutments and said other abutment surrounding said intermediate member, one of said parts being stationary and the others being independently movable relatively to said stationary part and to one another, means for moving said movable parts relatively to said stationary part and to one another, said intermediate member having a plurality of passages therein angularly disposed, ball detents in each of said passages having a greater dimension than the thickness of said intermediate member, said abutment having recesses for receiving parts of said detents, each abutment tending to cause each of said detents, when partially within a recess therein and under strain to move toward the other abutment, the recesses in said abutments being of a depth less than the radii of the balls of said detents.

12. In a locking device, the combination of a primary abutment, a secondary abutment, an intermediate member, one of said parts being stationary and the others being independently movable relatively to said stationary part and to one another, means normally tending to make said movable parts move relatively to said stationary part, and a detent carried by said intermediate member, said abutments having shoulders for engaging parts of said detent, each abutment tending to cause said detent when in

engagement with its shoulder and under strain to move out of such engagement and toward the other abutment.

13. In a locking device, the combination
 5 of a primary abutment, a secondary abutment, an intermediate member, one of said parts being stationary and the others being independently movable relatively to said stationary part and to one another, yielding
 10 means tending to move one of the movable parts relatively to the other movable part and to retract said other movable part when manually moved, and a detent carried by said intermediate member, said abutments having
 15 shoulders for engaging parts of said detent, each abutment tending to cause said detent when in engagement with its shoulder and under strain to move out of such engagement and toward the other abutment.
 20 14. In a locking device, the combination

of a primary abutment, a secondary abutment, an intermediate member, one of said parts being stationary and the others being independently movable relatively to said stationary part and to one another, a spring
 25 tending to return one of said movable parts when manually moved relatively to said stationary member, a spring tending to move the other movable part relatively to said last mentioned movable part, a detent within the
 30 intermediate member, and recesses in said abutments having shoulders for engaging said detent; each abutment tending to cause said detent when in engagement with its shoulder and under strain to move toward
 35 the other abutment.

GRANVILLE E. PALMER.

Witnesses:

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 IDA M. HUNZIKER.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

Correction in Letters Patent No. 999,850.

It is hereby certified that in Letters Patent No. 999,850, granted August 8, 1911, upon the application of Granville E. Palmer, of Winchester, Massachusetts, for an improvement in "Locking Devices," an error appears in the printed specification requiring correction as follows: Page 2, line 56, for the word "abutment" read *intermediate*; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 19th day of September, A. D., 1911.

[SEAL.]

E. B. MOORE,
Commissioner of Patents.

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