

No. 662,435.

Patented Nov. 27, 1900.

H. D. HIBBARD.

LOCKING MECHANISM FOR SAFES OR VAULTS.

(No Model.)

(Application filed May 12, 1900.)

2 Sheets—Sheet 1.

Fig. 1.

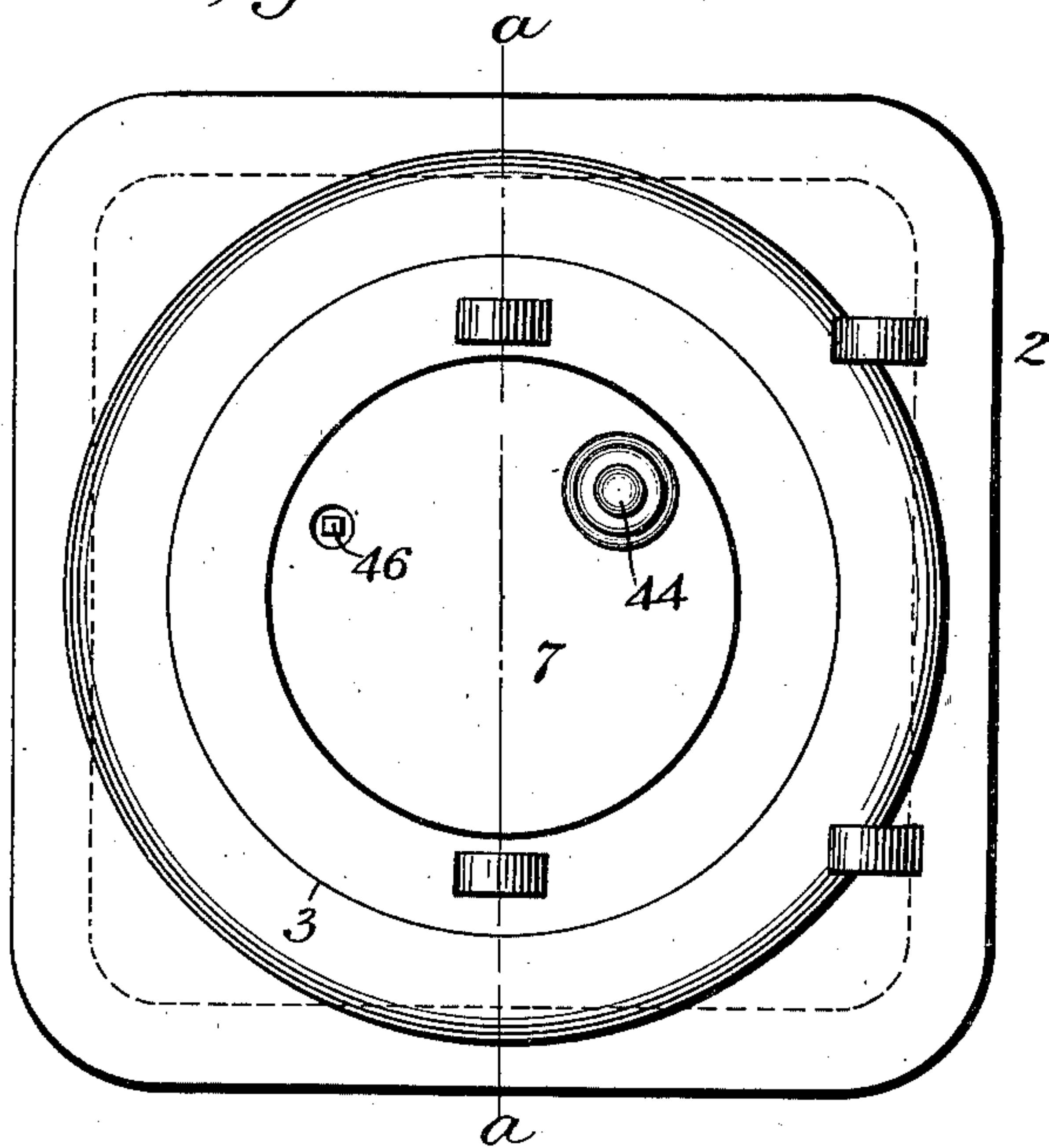


Fig. 2.

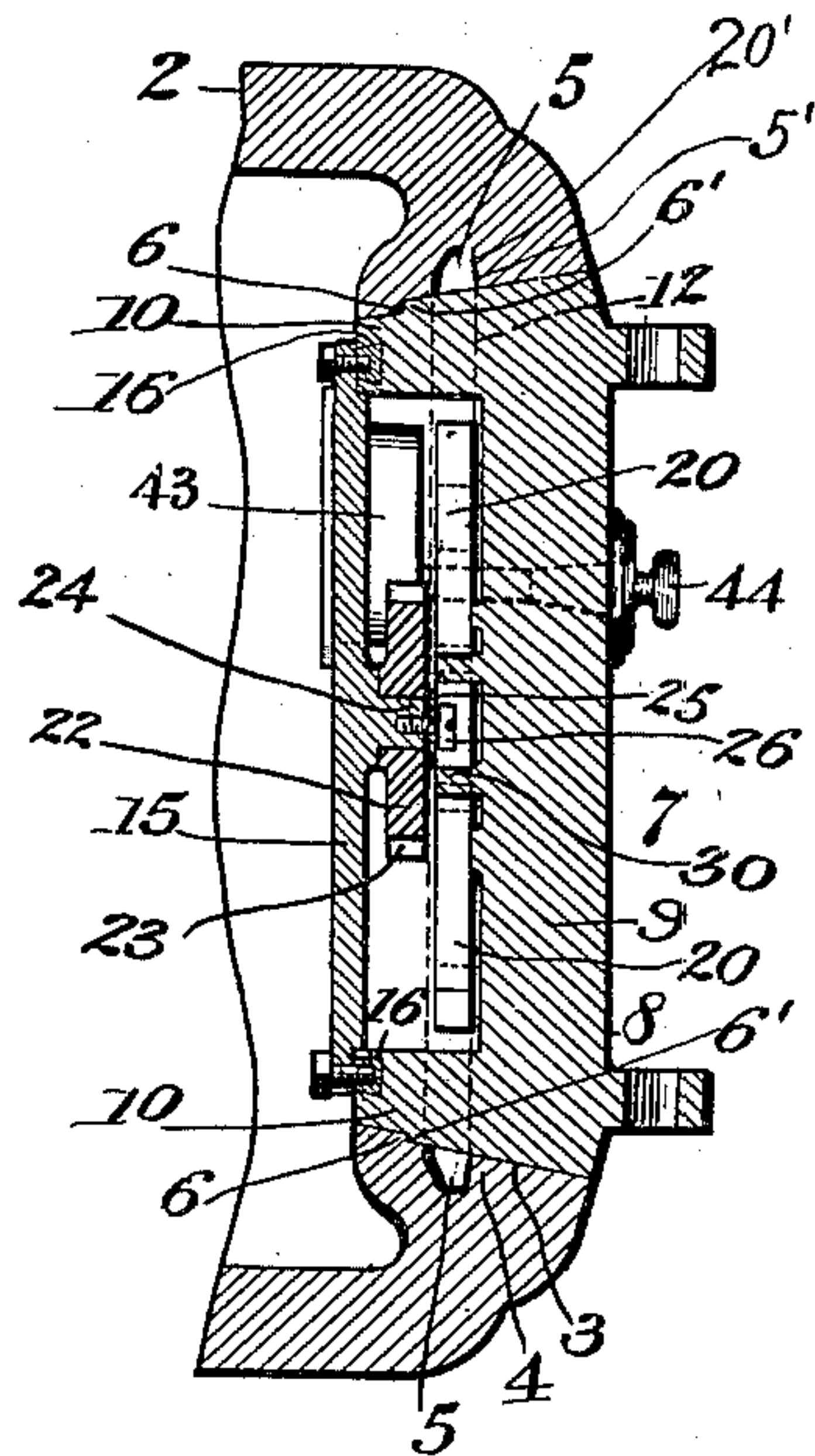
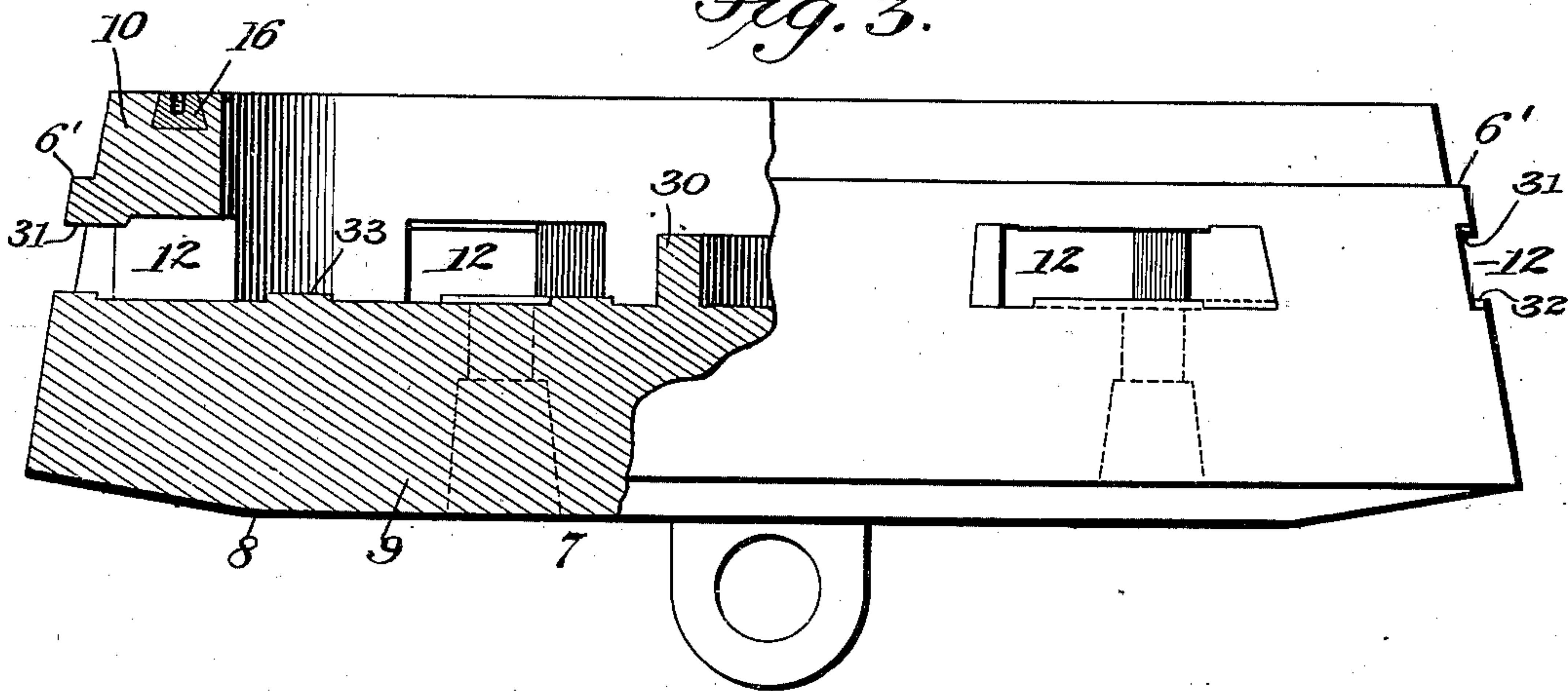


Fig. 3.



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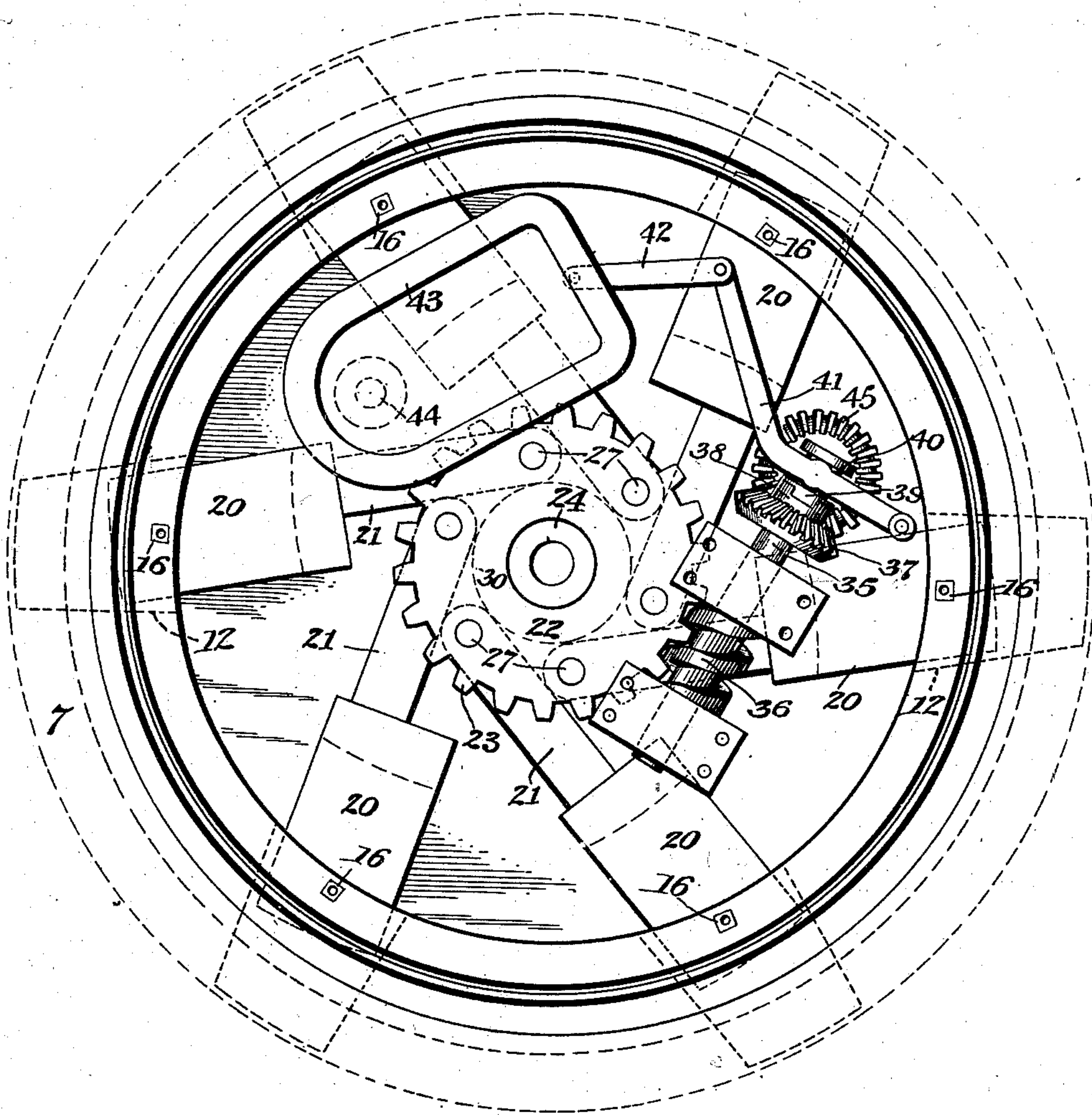
LOCKING MECHANISM FOR SAFES OR VAULTS.

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(No Model.)

2 Sheets—Sheet 2.

Fig. 4.



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LOCKING MECHANISM FOR SAFES OR VAULTS.

SPECIFICATION forming part of Letters Patent No. 662,435, dated November 27, 1900.

Original application filed May 7, 1898, Serial No. 679,976. Divided and this application filed May 12, 1900. Serial No. 16,402.
(No model.)

To all whom it may concern:

Be it known that I, HENRY DEMING HIBBARD, a citizen of the United States, residing in Plainfield, in the county of Union and State of New Jersey, have invented certain new and useful Improvements in Locking Mechanism for Safes or Vaults, of which the following is a specification.

This invention relates to locking mechanism for the doors of safes, vaults, or strong boxes; and one object of the invention is to provide improved bolt mechanism effective to draw the door to its seat with great force and to securely lock it in its closed position.

A further object of the invention is to provide door-locking means comprising bolts and improved actuating means therefor, one connected with the other in such manner that should such actuating means be subjected to violence it will be automatically detached from the bolts without affecting the locking position thereof.

A further object of the invention is to provide door-locking bolts and improved actuating means therefor so organized as to impart to said bolts a toggle motion.

In the drawings accompanying and forming part of this specification, Figure 1 is a front view of one form of safe, showing the door closed. Fig. 2 is a vertical sectional view thereof, taken in line *a a*, Fig. 1. Fig. 3 is an enlarged partly-sectional view of the door with the bolt mechanism removed, and Fig. 4 is an enlarged view of the door bolt mechanism.

Similar characters of reference indicate corresponding parts in the different figures of the drawings.

As a preface to a further description of the present improvement it is to be understood that this improved locking mechanism may be used in connection with various forms of safes, vaults, or strong boxes. In the present instance, however, it is shown in connection with a safe-body and door of a construction similar to that shown in my contemporaneously-pending application, Serial No. 679,976, filed May 7, 1898, of which the present application is a division. This safe-body 2, shown

as an angular integral structure, may be formed of any suitable metal; but in practice it is preferably formed of manganese steel and is provided with a doorway 3, in the present instance shown as circular, the jamb 4 of which may, if desired, be elongated in the manner similar to that shown in said contemporaneously-pending application and is provided with bolt-receiving means, shown herein as a recess or opening, such as an annular groove 5, in the rear of which a step or offset 6 is formed. Instead of a continuous groove it will be obvious that in practice each bolt may project into an independent opening. This groove has its outer or front face 5' beveled for the purpose of engaging with the beveled front faces 20' of the bolts, thereby to draw the door to its seat.

The door 7, shown as circular, may be supported in any suitable manner—as, for instance, by a crane-hinge shown and described in a divisional application of said original application above referred to, Serial No. 16,250, filed May 11, 1900. This door comprises, in the preferred form thereof, a main portion 8, consisting of a body 9, and an annular flange 10. This flange is provided with a series of bolt apertures or openings 12, communicating when the door is in its closed position with the annular bolt-receiving groove 5 in the jamb, and which bolt apertures or openings are shown tapered toward the periphery of the door for the purpose hereinafter specified. The door-flange is also provided with an offset or step 6', adapted to register with the step or offset 6 in the jamb, and consequently located in the rear of said bolt-apertures. From the above it will be seen that the bolt-openings are located intermediate the offset or step 6' and the body 9 of the door, whereby the possibility of forcing nitroglycerin into the joint around the door sufficiently far back to reach the step is prevented, while at the same time should any nitroglycerin be forced into the joint it will pass through the bolt-openings into the interior of the safe or be received in the bolt-receiving groove in the jamb, where the firing thereof would be impracticable if not impos-

sible, such groove and bolt-opening thus forming a protection for the step or offset of the door and jamb.

The door is provided with a back plate 15, 5 secured to the inner face of the flange 10 thereof by suitable bolts or other fastening means, which project into soft-metal dovetail inserts 16, located in said flange. These inserts may be placed in position in the mold, 10 so that the metal during the casting of the door may be poured around it. By this organization it will be readily seen that the door may be formed of hard, tough, unmachinable metal, while the back plate may be 15 formed of any suitable material, it being secured to the door by the means just described in an efficient and rigid manner, even though the metal of the door be so hard that it is not capable of being worked by cutting 20 or boring tools.

The locking-bolts 20 in the present instance are provided with reduced inner ends 21 for connection with a suitable actuator, shown herein as a rocking device, such as a 25 plate 22, the periphery 23 of which is formed as a worm-wheel, either provided with teeth around its entire periphery or around a portion thereof. This actuator is journaled on a projection or stud 24 of the back plate 15, 30 being maintained in position by a suitable washer 25 and screw 26, and is connected with the inner end of each of the bolts by a suitable pin 27, which in practice is headless, whereby should nitroglycerin be worked 35 into the interior of the door and fired, and the back plate thereby forced inwardly toward the interior of the safe, it would carry with it the worm-wheel, which would readily detach itself from the bolts without interfering 40 with the positions thereof.

Formed on the body 9 of the door, centrally thereof, is a projection or boss 30, against which the inner ends of the bolts abut when in their locking positions. This prevents 45 their withdrawal except in the proper manner, since by the organization just described in order to project or withdraw the bolts it is not only necessary that they be shifted radially, but that they also be swung laterally, 50 this swinging of the bolts laterally being permitted by the tapered formation of the bolt-apertures in the door-flange. By the provision of this centrally-located boss or member 30 the inner ends of the bolts when in their 55 locking positions are properly backed, thereby guarding against any possibility of moving the bolts inward by any force surreptitiously applied, the swinging movement of the inner end of each bolt, due to the circular 60 path traversed by its connecting-pin 27, giving, in effect, a toggle-joint motion to the bolts, and consequently increased power for effectively forcing out and withdrawing the bolts by facilitating their movement on the 65 adjacent surfaces of the jamb. The flared or tapered form of the bolt-apertures permit

this swinging movement of the bolts with a small size of such aperture.

The fact that the locking-bolts must be swung or shifted laterally to effect the un- 70 locking thereof in view of the breadth of their outer ends and the great friction offered by the strong pressure of such points to resist such movement increases the difficulties of effecting such motion and opening the safe 75 by violence.

The interior of the annular groove 5 in the jamb needs only to be finished on one face—namely, the outer face. The locking-bolts, which may be of any ordinary high steel, are 80 each fitted to the aperture in the door-flange in which it is to work, and after the door is hung the bearing-surfaces of the bolts where they touch the sides of the groove in the jamb are carefully fitted, so as to get a good con- 85 tact over the whole bearing-surfaces. Each of these bolts has its front face 20' beveled or inclined, whereby when such beveled faces engage with the beveled outer face 5' of the jamb groove or recess the door will be drawn 90 tightly to its seat.

The apertures or bolt-openings 12 in the door-flange are cast with allowance added to the bearing-surfaces for finishing, which is done when manganese steel is used by grind- 95 ing and which grinding is reduced by providing a relatively narrow raised surface 31 on the inner face of each bolt-aperture and two corresponding raised surfaces 32 and 33, one, as 32, on the opposite or outer face of the aper- 100 ture, and the other on the door-body in line with such aperture. Sufficient bearing is afforded by these raised surfaces to give and maintain the required close fit of the bolts under all the strains to which the parts can 105 be subjected by any ordinary violence, while the amount of material to be removed by the grinding is materially less than would be required if the bearing were over the whole adjacent surface. 110

From the foregoing it will be seen that if the back plate 15 of the door be forced inwardly toward the center of the safe by an explosion within the door or by other violence it will carry with it the screw and washer, 115 and consequently the oscillating actuator or plate and the several pins which readily disengage themselves from the bolts, while leaving the bolts in their locking positions, with the rear ends thereof abutting against the 120 boss in some respects more effectually than before, so that the surreptitious opening of the safe is prevented.

By forming the door channel-shaped in cross-section a long bearing-joint between the door and safe-body is provided. This admits 125 of the strains on the locking-bolts being taken from them directly by the metal without being transmitted through the bolts or other parts. 130

To rock the actuator 22, a worm-shaft 35, having a worm 36 in mesh with the teeth of

such actuator, is supported in suitable bearings. Loosely mounted on this worm-shaft is a bevel-gear 37, the hub of which is constructed to form one member 38 of a clutch.

5 Splined to this worm-shaft for rotation therewith is the other member 39 of this clutch, it being provided with an annular groove or collar 40 for the reception of a lever or connector 41, the opposite end of which is piv-
10 oted to a lever or connector 42 in engagement with a suitable combination-lock, (not shown,) which lock may be inclosed in a suitable casing 43. The spindle 44 of this lock projects through the door to be manipulated in the
15 usual manner. On the turning of this spindle 44 the clutch member 39 will be shifted longitudinally of the shaft to engage or disengage its companion clutch member, where-
20 by when such clutch members are in engagement the worm-shaft may be rotated by suitable means provided for this purpose, which in the present instance comprises a bevel-
25 gear 45, carried on the inner end of a spindle 46, projecting through the door, the outer end of which is formed for the reception of a
30 suitable crank. By this organization it will be seen that when the clutch members are out of engagement the turning of the spindle 46 by its crank will merely rotate the loosely-
35 mounted bevel-gear without imparting movement to the worm; but when such clutch members are in mesh the turning of the spindle 46 will rotate the worm-shaft, and thereby the
40 rocking actuator, to shift the bolts.

In conclusion it is to be understood that
35 modifications may be made in the various parts without departing from the scope of the invention. For instance, there may be any
40 number of locking-bolts, while other means than clutch mechanism may be used to control the operation of the rocking plate, or other connections may be used between the
45 combination-lock and the clutch members, or the soft-metal inserts be secured in position in other ways than that described.

I claim as my invention—

1. A safe-door having diverging bolts each
45 with a slightly-inclined bearing-face adapted to engage a suitable recess in a safe-body; a
50 rocking plate adapted when subjected to violence to move inwardly independently of the door and pivotally attached to the inner ends
55 of said bolts to laterally move them and thereby force them outward with a toggle action; a device rigid or integral with said door and
60 against which the inner ends of said bolts abut when in their locking position thereby to prevent the improper withdrawal of the bolts on the detachment of said rocking plate
by violence; and a worm and connections for
operating said rocking plate, substantially as
described.

2. The combination, with a safe or vault
65 body, and with a door therefor, of locking-bolts for said door; a device for shifting said bolts and having detachable connection with each of said bolts whereby when said device

is subjected to violence it will automatically
be detached therefrom without affecting the
position of said bolts; a device integral or
70 rigid with said door and against which the inner ends of said bolts abut when in their locking positions thereby to prevent the improper
withdrawal of said bolts on the detachment
of said device by violence; and means for op-
75 erating said device.

3. The combination, with a safe or vault
body, and with a door therefor comprising a
body and a rearwardly-extending flange lo-
80 cated in position to form a continuation of the edge of said body, of a back plate secured to said flange; a series of swinging, radially-shift-
able bolts for said door; means embodying an
actuator supported by said back plate for
85 shifting said bolts, said actuator having piv-otal, but detachable connection with each of
said bolts whereby when subjected to violence
it will be automatically separated therefrom
without affecting the position of the bolts.

4. The combination, with a safe or vault
90 body, and with a door therefor comprising a body and a rearwardly-extending flange lo-
cated to form a continuation of the edge of
said body, of a back plate secured to said
flange; a series of bolts for the door; a rock-
95 ing device supported by said back plate and provided with worm-teeth and detachably
connected with said bolts whereby when it is
subjected to violence it will be automatically
separated from the bolts without affecting the
100 position thereof; a worm in connection with said rocking device for shifting the same; and
means for operating said worm.

5. An integral safe-door channel-shaped in
105 cross-section having a centrally-located boss integral therewith in combination with bolts
working through apertures in the flange of
said door and abutting against said boss when
in their locked position; and means for actu-
110 ating said bolts.

6. A safe-door comprising a body and a
flange, said flange having an offset and a plu-
rality of bolt-apertures located intermediate
said offset and the body of the door, in com-
115 bination with bolts working in said apertures; and means for actuating said bolts.

7. A safe-door comprising a body and a
flange, said flange having an offset and a series
of tapered openings located intermediate said
offset and the body of the door, in combina-
120 tion with bolts working in said apertures; and means for actuating said bolts.

8. A safe-door comprising a body and a
flange, said flange having a step, and a plu-
rality of bolt-openings intermediate said step
125 and said body; a centrally-located boss rigid or integral with said door; and locking mechanism embodying a plurality of bolts working
in said openings and adapted when in their
locked position to have their inner ends abut
130 against said boss.

9. The combination of a safe or vault body,
having a doorway, the jamb of which is pro-
vided with bolt-receiving means and in the

rear of said bolt-receiving means with an offset or step; a door comprising a body and a flange, said flange having an offset or step registering with the offset or step of said jamb, and also having a series of bolt-openings intermediate said step and door-body, a series of bolts working in said openings; and means for actuating said bolts.

10. The combination of a safe or vault body having a doorway, the jamb of which is provided with bolt-receiving means, and in the rear of said bolt-receiving means with a step; a door comprising a body and a flange, said flange having a step registering with the step of said jamb, and also having a plurality of bolt-openings intermediate said step and door-body; a centrally-located member rigid or integral with said door-body; a plurality of bolts working in said openings; and means for actuating said bolts, and comprising an actuator having detachable connection with said bolts whereby when it is subjected to violence it will be automatically separated therefrom.

11. The combination of a safe or vault body having a doorway, the jamb of which is provided with bolt-receiving means, and in the rear of said bolt-receiving means with a step; a door comprising a body and a flange, said flange having a step registering with the step of said jamb, and also having a plurality of bolt-openings intermediate said step and door-body; a centrally-located member integral with said door-body; a plurality of bolts working in said openings; a rocking actuator having connection with each of said bolts; and means for actuating said actuator.

12. The combination of a safe or vault body having a doorway, the jamb of which is provided with a bolt-receiving opening, and in the rear of said bolt-receiving opening with an offset or step; a door comprising a body and a flange, said flange having an offset or step registering with the offset or step of said jamb, and also having a series of bolt-openings intermediate said step and door-body; a centrally-located member on said door-body; a series of bolts working in said openings; a rocking plate having teeth on its periphery and pivotally connected with each of said bolts; a worm in operative connection with said rocking plate; and means for actuating said worm.

13. A burglar-proof safe or vault comprising a body and a door, said door having a series of locking-bolts located to be projected in different directions from the door into the jamb of said body; a worm-wheel rocking member pivoted directly to each of said bolts; a worm in mesh with said rocking member; and means for actuating said worm thereby to actuate the bolts.

14. A burglar-proof safe comprising a body and a door, said door comprising a body and a flange, and said flange having a series of bolt-openings; a series of bolts carried on said door and working in said openings; a worm-wheel rocking member pivotally connected

to the inner ends of each of said bolts; a worm in mesh with the teeth of said rocking member; and means for actuating said worm and thereby the rocking member to actuate the bolts.

15. A burglar-proof door comprising a body and a flange, said flange forming a continuation of the edge of said body and having bolt-openings; a back plate secured to said flange; a series of bolts working in said flange-openings; a worm-wheel carried by said back plate and having connection with said bolts; and means for actuating said worm-wheel.

16. A burglar-proof door having a main portion of hard, tough, unmachinable material, such, for instance, as manganese steel, and a series of inserted pieces of softer material, as for instance, iron or low steel, securely embedded therein, in combination with a back plate carrying locking mechanism and secured in position by fastening devices engaging said inserted pieces, substantially as described.

17. In a burglar-proof safe, a series of locking-bolts in the door located to be moved out and in, and engaging in a suitable recess in the jamb, in combination with mechanism for causing said bolts to travel not only outward but also laterally, and with a part against which the inner ends of the several bolts abut when in their outward position, substantially as described.

18. In a burglar-proof safe, a series of locking-bolts in the door located to be moved out and in, and each having a broad bearing at its outer end engaging in a suitable recess in the jamb, in combination with mechanism for causing said bolts to travel not only outward but also laterally, and with a part against which said inner ends abut when in their outward position and with a rocking plate, and means for rocking said plate thereby to operate all of said bolts simultaneously, substantially as described.

19. In a burglar-proof safe, a series of locking-bolts in the door located to be moved out and in, and each having a broad bearing at its outer end engaging in a suitable recess in the jamb, in combination with mechanism for causing said bolts to travel not only outward but also laterally, and with a part against which the inner end of the several bolts abut when in their outward position, and with a rocking plate, and means for rocking it; headless pins connecting said rocking plate with said bolts, whereby said bolts may be operated so long as the mechanism is properly worked, but be disengaged from such bolts and leave them in a locked position if the back plate is detached by violence, substantially as described.

20. In a safe, the combination, with a body having a doorway, of an integral door therefor having a rearwardly-extending flange provided with bolt-openings; bolt mechanism comprising a plurality of radially and laterally shiftable bolts working in said openings;

and means for shifting said bolts radially, and simultaneously with such radial movement, swinging said bolts laterally thereby to obtain a toggle action of said bolts.

5 21. In a safe, the combination, with a body having a doorway, of an integral door therefor having a rearwardly-extending flange provided with flaring bolt-openings; bolt mechanism comprising a plurality of radially and laterally shiftable bolts working in said openings; and gear mechanism for shifting said bolts radially, and simultaneously with such radial movement, swinging said bolts laterally thereby to obtain a toggle action of said bolts.

15 22. In a safe, the combination of a body having a doorway; a door therefor; a series of bolts; a worm-wheel having connection with each of said bolts; a worm in engagement with said worm-wheel; and clutch mechanism for actuating said worm.

20 23. In a safe, the combination of a body having a doorway; a door therefor; a series of bolts; a worm-wheel having connection with each of said bolts; a worm in engagement with said worm-wheel; and clutch mechanism for actuating said worm, said clutch mechanism having connection with and being controlled by lock mechanism.

25 24. In a safe, the combination of a body having a doorway; a door therefor; a series of bolts for locking said door in said doorway; a worm-wheel having connection with each of said bolts; a worm-shaft for operating said worm-wheel; a gear loosely mounted on said worm-shaft and forming one member of a clutch; a sliding clutch member mounted on said worm-shaft; means embodying an intermeshing gear for rotating said worm-shaft; and means for sliding said last-mentioned clutch member into and out of engagement with said first-mentioned clutch member, whereby when it is in engagement therewith the worm-shaft can be rotated thereby to shift the bolts.

45 25. In a safe, the combination of a body having a doorway; a door therefor; bolt mechanism for locking said door in the doorway; a rocking actuator connected with said bolts;

and means for rocking said actuator and embodying clutch mechanism and gear mechanism, one mechanism connected with and controlled by a lock mechanism, and the other adapted to operate said actuator on the unlocking of said lock mechanism.

26. In a safe, the combination of a body 55 having a doorway provided with a bolt-receiving recess in its jamb; a door comprising a body and a flange, said flange having bolt-apertures communicating with the bolt-receiving recess of the jamb, and said door-body having 60 a centrally-located projection; a back plate secured to said flange; a worm-wheel supported by said plate; a series of bolts working in said bolt-openings and connected with said worm-wheel; a worm-shaft having a 65 worm in mesh with said worm-wheel; a gear loosely mounted on said shaft and forming one member of a clutch; a longitudinally-shiftable clutch member also mounted on said shaft and having connection with lock mechanism; a 70 gear in mesh with said worm-shaft gear and having a spindle projecting through the door, whereby when said clutch members are in operative connection said gears may be operated to rotate said worm-wheel and thereby 75 shift the bolts radially and laterally.

27. In a safe, the combination, of a safe-body having a doorway, the jamb of which is provided with a bolt-receiving opening having a beveled face; a door; a plurality of 80 bolts, each having a beveled face cooperating with the beveled face of said bolt-opening; means for actuating said bolts, the organization being such that the engagement of the beveled faces of the bolts with the beveled 85 face of said bolt-opening will draw the door tightly to its seat; and a stationary device rigid with said door and against which the inner ends of said bolts abut when in their locking position thereby to prevent the disengagement of the beveled faces of said bolts 90 from the beveled face of said jamb-opening.

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