

No. 679,374.

Patented July 30, 1901.

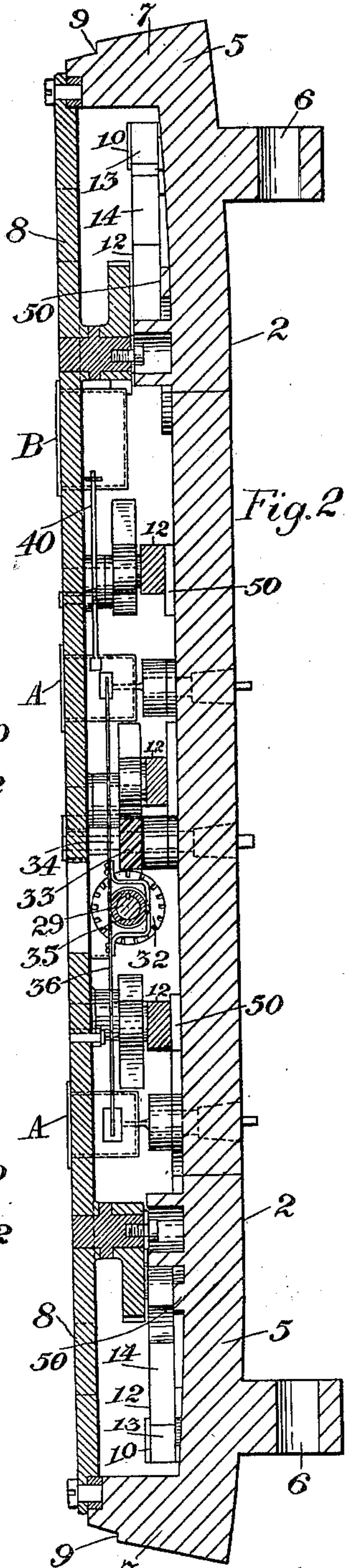
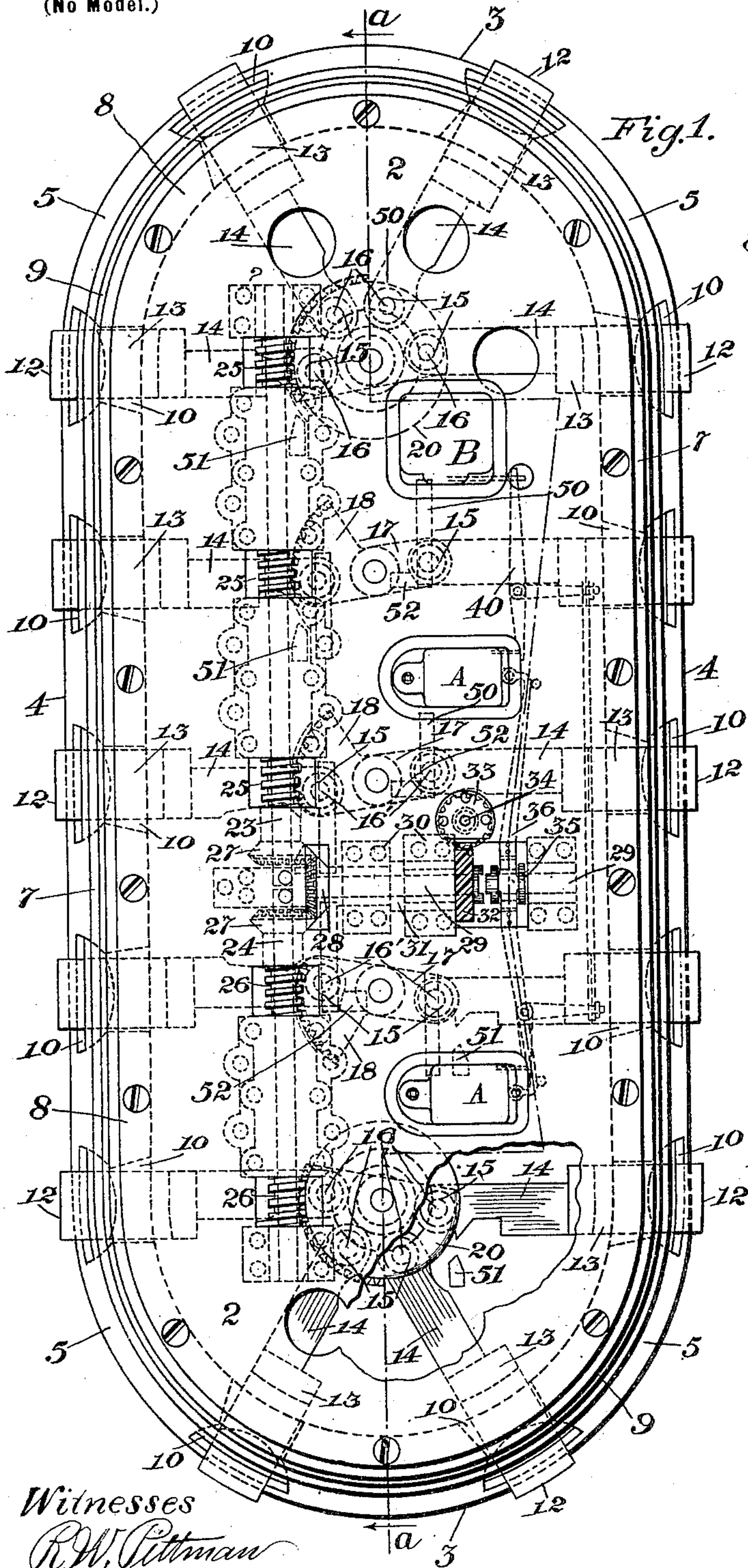
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BOLT MECHANISM FOR SAFE OR VAULT DOORS.

(Application filed Oct. 31, 1900.)

(No Model.)

2 Sheets—Sheet 1.



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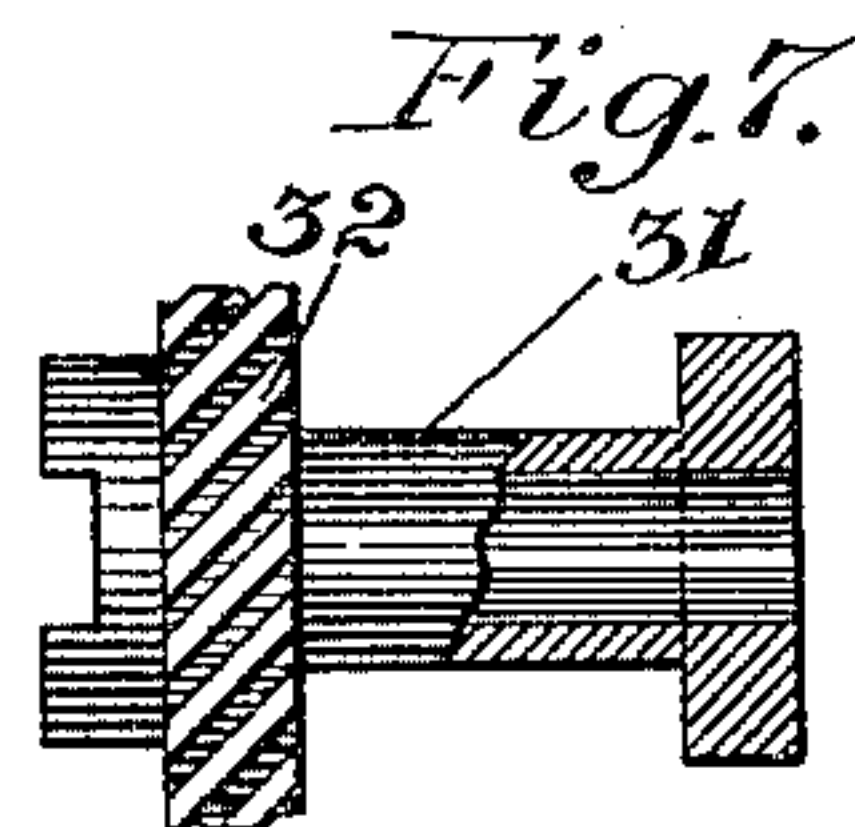
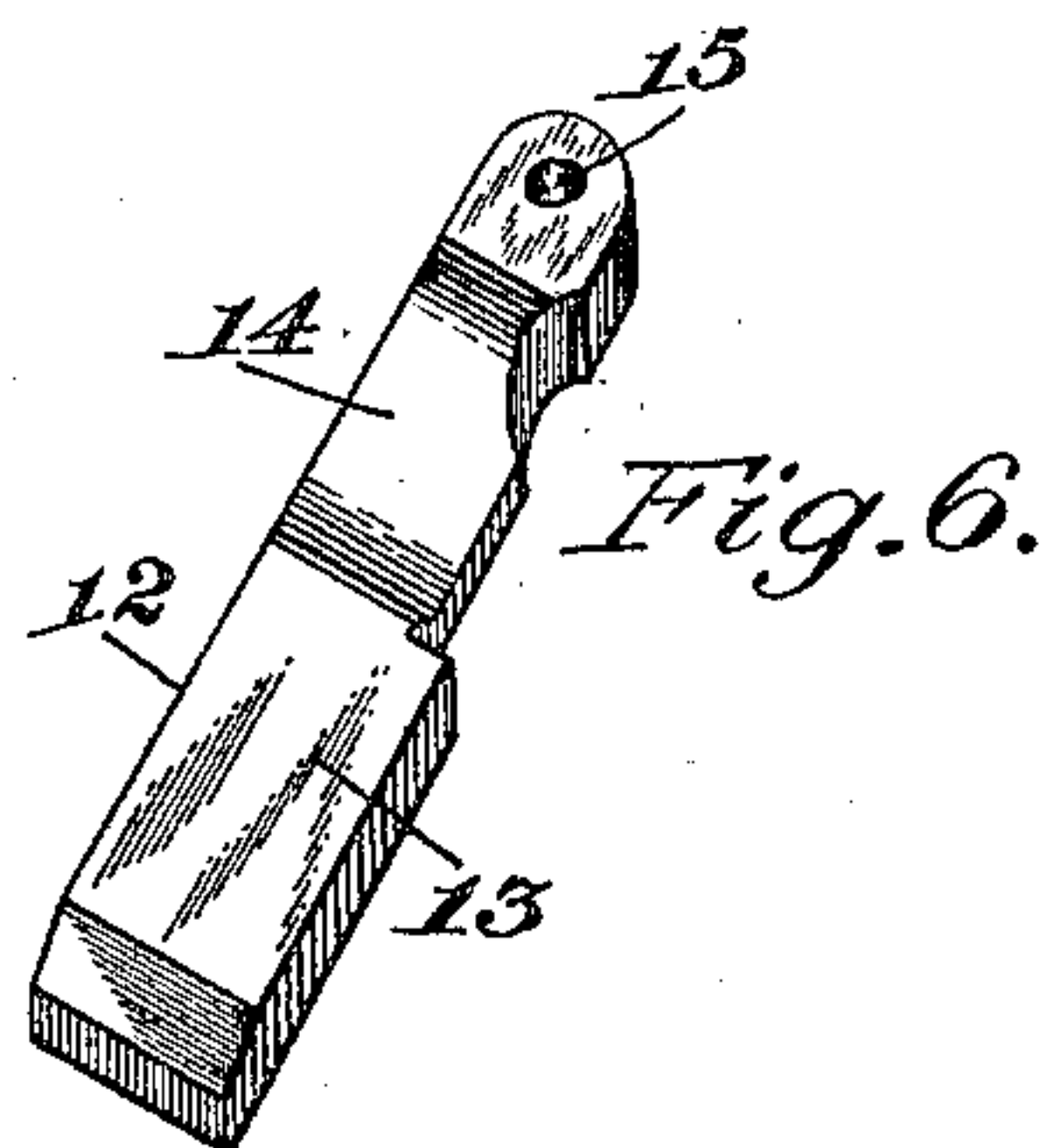
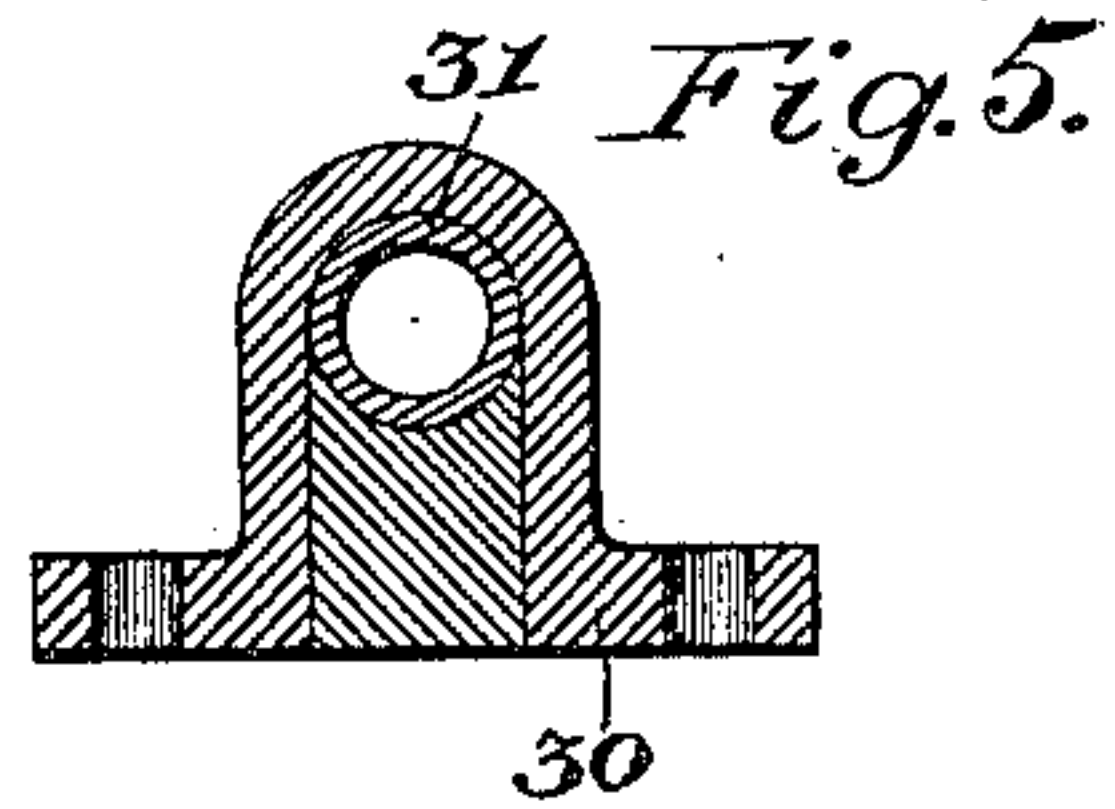
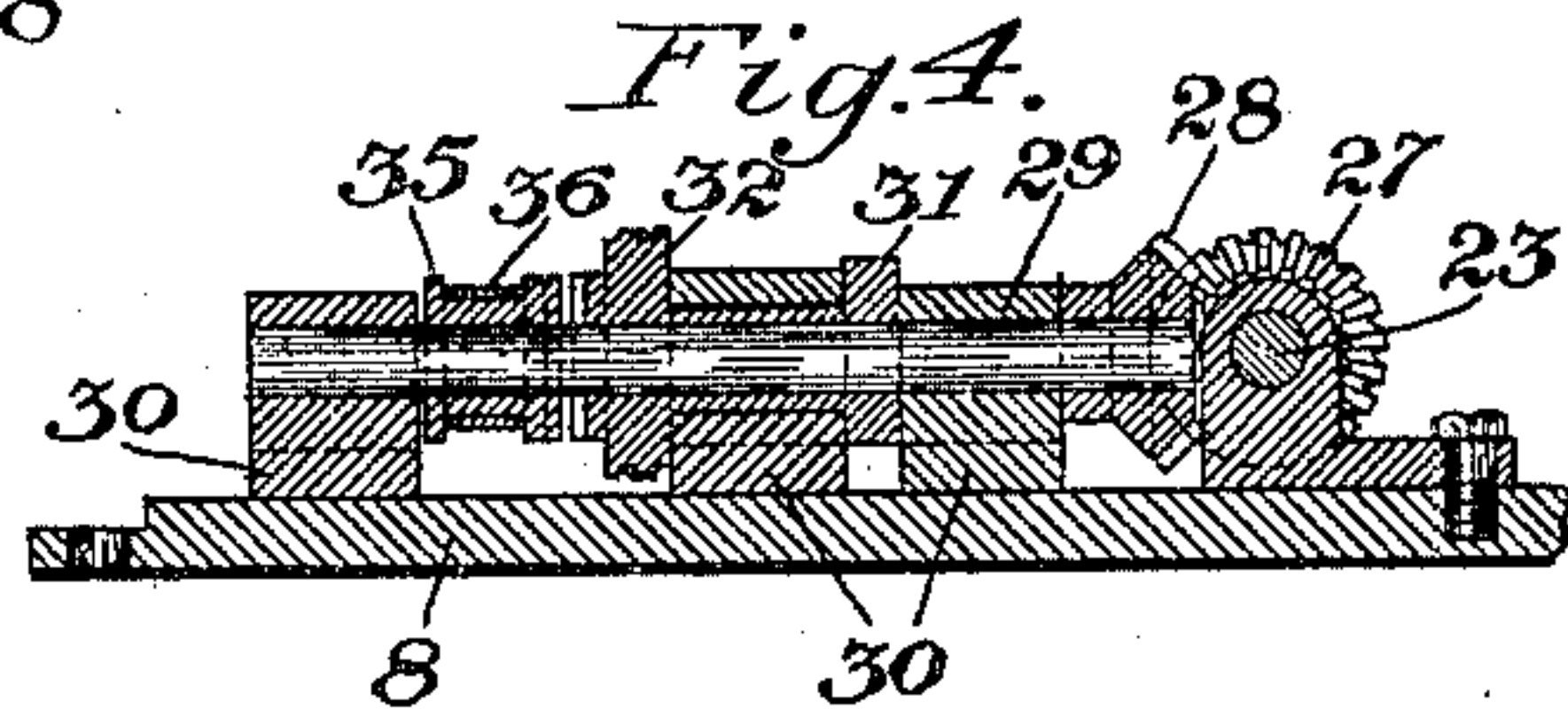
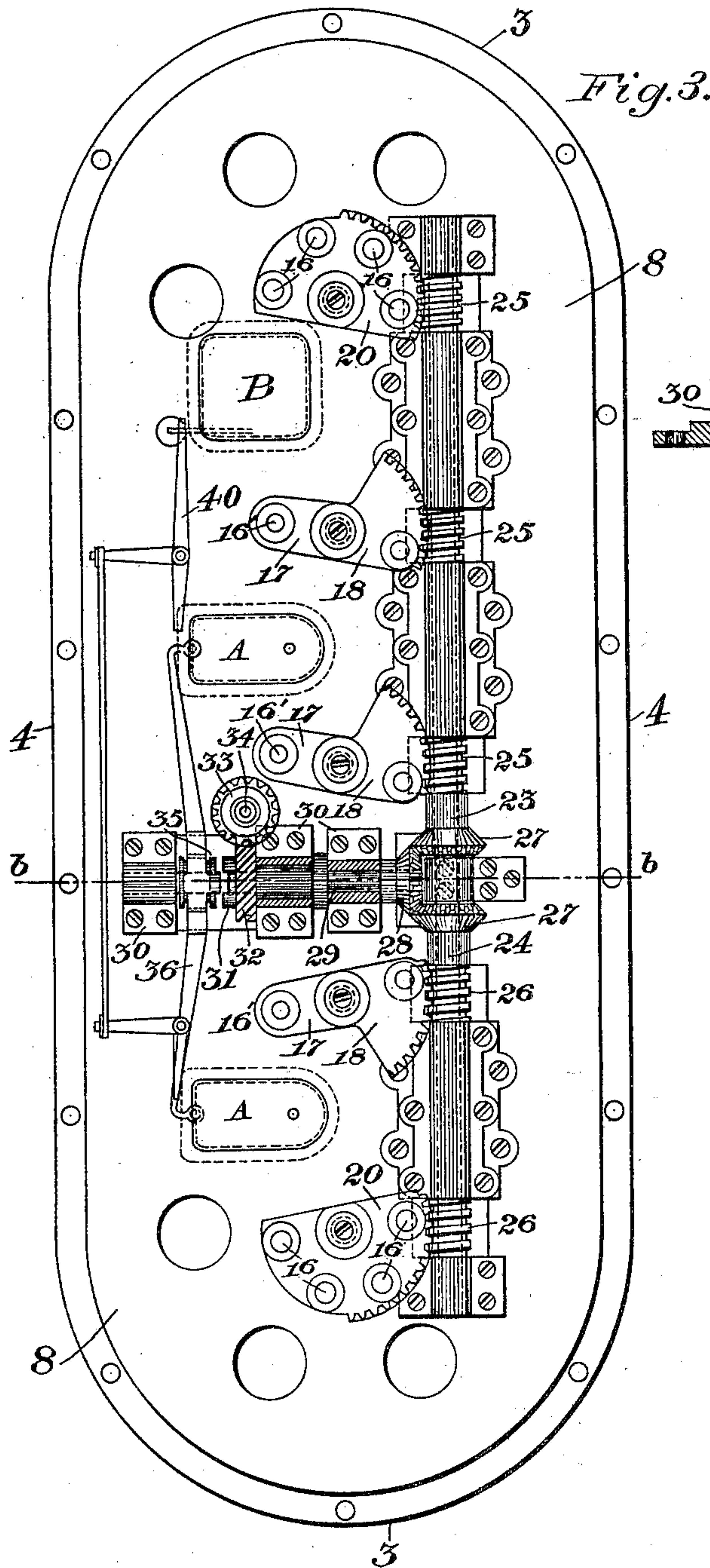
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BOLT MECHANISM FOR SAFE OR VAULT DOORS.

(Application filed Oct. 31, 1900.)

(No Model.)

2 Sheets—Sheet 2.



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# UNITED STATES PATENT OFFICE.

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## BOLT MECHANISM FOR SAFE OR VAULT DOORS.

SPECIFICATION forming part of Letters Patent No. 679,374, dated July 30, 1901.

Application filed October 31, 1900. Serial No. 34,991. (No model.)

*To all whom it may concern:*

Be it known that I, HENRY D. 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 Bolt Mechanism for Safe or Vault Doors, of which the following is a specification.

This invention relates to bolt mechanism for safe or vault doors, one object of the invention being to provide improved bolt mechanism for such doors.

A further object of the invention is to provide an improved organization of bolt mechanism particularly adapted for oval-shaped doors.

In the drawings accompanying and forming part of this specification, Figure 1 is a rear view of this improved bolt mechanism, the back plate of such door being partly broken away more clearly to illustrate the mechanism. Fig. 2 is a vertical sectional view thereof, taken in line *a a*, Fig. 1. Fig. 3 is a view of the back plate detached with this improved bolt mechanism supported thereon. Fig. 4 is a cross-sectional view taken in line *b b*, Fig. 3. Fig. 5 is a cross-sectional view of the support or bearing for the loosely-mounted clutch member. Fig. 6 is a perspective view of one of the bolts, and Fig. 7 is a partly sectional view of said loosely-mounted clutch member.

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

One of the objects of the present invention, as hereinbefore stated, is to provide bolt mechanism particularly adapted for an oval-shaped door, and therefore door 2 in the present instance is of greater length than breadth and is shown provided with semicircular ends 3 and parallel sides 4 and is preferably oval in shape, this form being adapted to meet the demand for a door of this general shape which will not require as much floor-room in which to swing as a circular door. This door in the present instance comprises a body 5, having forwardly-extending lugs 6 for the reception of a hinge-pintle and a rearwardly-extending flange 7, the periphery of which in the form shown forms a continuation of the pe-

riphery of the body, whereby a continuous joint-surface is formed by such flange and body. To this flange the back plate 8, carrying the major part of the bolt mechanism, is secured. The flange 7 of the door is usually provided with an offset or step 9, cooperating with a similar step or offset located in the jamb of the body-doorway. The flange 7 is provided at intervals around the same with a series of bolt openings or apertures 10, each preferably of tapering or flaring formation obtained by forming one side of each opening inclined, whereby lateral movement of the bolts during their longitudinal or radial movement is permitted. Each of these bolts 12 is shown comprising a head 13 and a shank 14. The bolt-heads work in the bolt-openings, while the shanks thereof are provided with apertures 15 for the reception of projections or pins carried by means shiftable to throw the bolts. This shiftable means in the present instance comprises a series of rocking devices 17, some of which are shown as sector-shaped members 18, while others are shown as substantially semicircular members or plates 20, all having worm-teeth formed on their peripheries. These semicircular plates 20 are shown in the present instance as two in number and located one adjacent to each end of the door and mounted on a suitable hub or projection of the back plate and each carrying a plurality of pins or projections 16 (shown herein as four in number) for the reception of the inner ends of four bolts, two working at the opposite parallel sides of the door and two working at the curved ends of such door. Intermediate these two sets of bolts are located the sector-shaped members 18 (shown herein as three in number) and each mounted upon a suitable hub or projection carried by the back plate. To each of these sector-shaped members the inner ends of a pair of bolts are pivoted, such sector-shaped member carrying a pair of pins or projections 16' for this purpose. It will be understood, of course, that any desired number of these sector-shaped and semicircular members or plates may be provided, corresponding in number with the desired number of sets of bolts to be used. For shifting these rocking members a pair of worm-shafts 23



and 24 are mounted in suitable bearings on the back plate, one of said shafts in the present instance carrying three worms 25 in engagement with three of the rocking members, 5 while the other shaft carries a pair of worms 26 in engagement with the other two rocking members. Each of the worm-shafts is provided at its inner end with a bevel or miter gear 27 in mesh with a similarly-formed gear 10 28, carried by a shaft 29, mounted in suitable bearings 30 on the back plate. On this shaft 29 is located a loosely-mounted clutch member 31, having a gear 32, provided with spirally-formed teeth in mesh with a pinion 15 33, having similarly-shaped teeth located on the inner end of a spindle 34, which projects to the outer side of the door and by means of which said loosely-mounted clutch member 31 is rotated. Motion is imparted to the 20 worm-shaft by means of a clutch member 35, splined to the shaft 29 and shiftable into and out of engagement with said loosely-mounted clutch member 31 by combination-lock mechanism, which in the present instance is shown 25 comprising two combination-locks A, each connected with such splined clutch member 35 by a clutch-shifter 36. On the proper setting of the combination of either lock the shifter 36 will be actuated to shift the splined 30 clutch member into engagement with the loosely-mounted clutch member, whereupon on the rotation of the spindle 34 the worm-shafts will be rotated to actuate the rocking members, and thereby the bolts. Either one 35 of the combination-locks in the present organization will operate the clutch-shifter. When one is being used for this purpose, the point of connection of the shifter 36 with the other combination-lock constitutes a fulcrum 40 for such shifter. In the present instance the combination-locks are controlled by a suitable time-lock B, the mechanism of which is connected by a suitable lever system 40 with the fence of one and the bolt (not shown) of 45 the other combination-lock, whereby when the time mechanism runs down this lever system will be operated to permit the operation of both combination-locks, so that either one of said combination-locks can be utilized 50 to shift the clutch-shifter 36, and thereby the splined clutch member 35 into engagement with the loosely-mounted clutch member 31, whereupon on the operation of the spindle 34 the worm-shafts will be rotated to actuate 55 the bolts. By this organization of time and combination locks the mechanism of the combination-locks are dogged in such manner that even though the combinations may be disclosed the possibility of opening the safe 60 until the time at which the time-lock is set to run has expired is positively prevented. A further description, however, of this improved time and combination lock mechanism is not deemed necessary herein, since it 65 constitutes the subject-matter of a separate application pending contemporaneously herewith, Serial No. 35,197, filed November 2,

1900, and designated as locking mechanism for safes or bolts.

For properly guiding the bolts during the 70 shifting thereof surfaces 50 are located in position adjacent to the inner ends of the bolts and upon which such inner ends slide, whereby improper play of the bolts is prevented. 75

To prevent the premature retraction of the bolts should the back plate be blown off under an explosive charge, suitable means are provided. This means in the form shown 80 comprises a series of stops, one or more for each set of bolts. In the present instance a plurality of stops for each set of bolts is provided. In the construction shown those bolts which are swung downward in retracting 85 have their inner ends or shanks inclined, so as to engage corresponding inclined surfaces of stops 51 and 52. It is to be understood, however, that other forms of stops may be used. Those bolts which, however, are 90 swung upward in retracting about when in their extended position against bosses or projections in a manner similar to that shown and described in my contemporaneously-pending applications, Serial No. 679,976, filed May 7, 1898, now Patent No. 662,428, dated November 27, 1900, and Serial No. 16,402, filed 95 May 12, 1900, now Patent No. 662,435, dated November 27, 1900.

From the foregoing it will be seen that a 100 toggle action of the bolts is secured whereby in practice the door will be drawn to its seat with considerable force. In other words, owing to the combined radial or longitudinal and lateral movements of the bolts the 105 faces of the bolt-heads which engage the surfaces of the safe or vault body are brought into engagement with such surfaces by a rotatable movement, so that such bolt-faces are shifted with a grinding action over such 110 body surfaces, and consequently a most powerful binding of the bolts upon the surfaces of the body is effected with a minimum amount of power applied to the actuating-spindle. Also by the use of worm-gearing the bolts are 115 operated with great force, which is not possible with rack-and-pinion gearing.

I claim as my invention—

1. An oval-shaped safe or vault door comprising a body and a rearwardly-extending 120 flange having bolt-openings, said flange having its periphery forming a continuation of the periphery of said body, whereby a continuous joint surface is formed by said flange and body; bolts working in said openings; and means for actuating said bolts. 125

2. A safe or vault door comprising an oval-shaped structure comprehending a body and a rearwardly-extending flange having tapering or flaring bolt-openings; bolts working 130 in said openings; and means for actuating said bolts.

3. A safe or vault door comprising an oval-shaped structure comprehending a body and a rearwardly-extending flange having bolt-



openings; a series of bolts working in said openings and located in sets; a rocking member having worm-teeth for each of said bolts; and a device having a worm for actuating said rocking members.

4. A safe or vault door having semicircular ends and parallel sides, and comprising a body having a flange provided with bolt-openings; a plurality of sets of bolts working in said openings; a rocking member having worm-teeth for each set of bolts; a pair of worm-shafts in engagement with said rocking members; and means for rotating said worm-shafts.

5. A safe or vault door having semicircular ends and parallel sides, and comprising a body having a flange provided with bolt-openings; a plurality of sets of bolts working in said openings; a rocking member having worm-teeth for each set of bolts; a worm-shaft in engagement with said rocking plates; means for rotating said shaft; and a lock for controlling the operation of the shaft-rotating means.

6. The combination, with a safe or vault door, of a plurality of bolts carried thereby and located in sets; a rocking member having worm-teeth for each set of said bolts; and a device having a worm for rocking said members thereby to shift the bolts laterally and radially.

7. The combination, with a safe or vault door, of a plurality of bolts carried thereby and located in sets; a rocking member having worm-teeth for each set of said bolts; a device having a worm for rocking said members thereby to shift the bolts laterally and radially; and stops having inclined surfaces cooperating with similar inclined surfaces of the bolts for preventing the premature retraction thereof.

8. The combination, with a safe or vault door, of a plurality of bolts carried thereby and located in sets; a rocking member having worm-teeth for each set of said bolts; a device having a worm for rocking said members thereby to shift the bolts laterally and radially; and a plurality of stops for each set of bolts for preventing the premature retraction thereof.

9. The combination, with a safe or vault door, of a plurality of bolts carried thereby and located in sets; a rocking member having worm-teeth for each set of said bolts; a device having a worm for rocking said members thereby to shift the bolts laterally and radially; and stops for preventing the premature retraction of said bolts.

10. The combination, with a safe or vault door, of bolt mechanism comprising a plurality of sets of bolts; a rocking member for each of said sets; a device for actuating said rocking members; and means comprising clutch mechanism and an actuator for rotating said device.

11. The combination, with a safe or vault door, of bolt mechanism comprising a plural-

ity of sets of bolts; a rocking member for each of said sets; a device for actuating said rocking members; means comprising clutch mechanism and an actuator for rotating said device; and means for controlling the operation of said clutch mechanism, and comprising a combination-lock and a clutch-shifter in operative connection therewith.

12. The combination, with a safe or vault door, of bolt mechanism comprising a plurality of sets of bolts; a rocking member for each of said sets; a device for actuating said rocking members; means comprising clutch mechanism and an actuator for rotating said device; and means for controlling the operation of said clutch mechanism, and comprising a pair of combination-locks and a clutch-shifter in operative connection with each of said locks.

13. The combination, with a safe or vault door, of bolt mechanism comprising a plurality of sets of bolts; a rocking member for each of said sets; a device for actuating said rocking members; means comprising clutch mechanism and an actuator for rotating said device; and means for controlling the operation of said clutch mechanism, and comprising a pair of combination-locks and a clutch-shifter in operative connection with each of said locks, the point of connection of the clutch-shifter with one of said locks constituting a fulcrum to permit the operation of such clutch-shifter on the actuation of the other lock.

14. The combination, with a safe or vault door, of bolt mechanism comprising a plurality of sets of bolts; a rocking member for each of said sets; a device for actuating said rocking members; means comprising clutch mechanism and an actuator for rotating said device; means for controlling the operation of said clutch mechanism, and comprising a pair of combination-locks and a clutch-shifter in operative connection with each of said locks; and a time-lock for controlling the operation of said combination-locks.

15. The combination, with a safe or vault door, of bolt mechanism comprising a plurality of sets of bolts; a rocking member for each of said sets; a device for actuating said rocking members; means comprising clutch mechanism and an actuator for rotating said device; means for controlling the operation of said clutch mechanism, and comprising a combination-lock and a clutch-shifter in operative connection therewith; and a time-lock for controlling the operation of said combination-lock.

16. The combination, with a safe or vault door comprising a body and a flange having bolt-openings; a plurality of sets of bolts working in said openings; rocking members including sector-shaped devices having worm-teeth pivotally secured to the inner ends of such bolts; a worm-shaft in mesh with said rocking members; and means for rotating said worm-shaft thereby to shift the bolts.



17. The combination, with a safe or vault door, of bolt mechanism comprising a plurality of sets of bolts; a rocking member having worm-teeth for each set of said bolts; a pair of worm-shafts in mesh with said rocking members; and means for rotating said worm-shafts thereby to actuate the bolts.

18. The combination, with a safe or vault door, of bolt mechanism comprising a plurality of sets of bolts; a rocking member having worm-teeth for each set of said bolts, the rocking member located adjacent to each end of the door carrying an increased number of bolts; a worm-shaft for operating said rocking members; and means for rotating said shaft.

19. The combination, with a safe or vault door comprising a body and a flange having flaring bolt-openings; a plurality of bolts working in said openings and located in sets; a rocking member pivotally secured to the inner ends of each set of bolts and having worm-teeth, the rocking member located adjacent to each end of said door carrying an increased number of bolts; a pair of worm-shafts in engagement with said rocking members and each carrying a bevel-gear; a spindle-operated shaft also carrying a gear in mesh with said worm-shaft gears; a loosely-mounted clutch member mounted on said spindle-operated shaft and carrying a gear in mesh with a gear located on a spindle projecting at the outer side of the door-body; a clutch member splined to such shaft; a pair of combination-locks; a clutch-shifter in operative connection with said combination-locks, the point of connection of such shifter with one of the locks constituting a fulcrum for such shifter when the other combination-lock is operated; and a time-lock for controlling the operation of such combination-locks.

20. The combination, with a safe or vault door, of bolt mechanism comprising a plurality of sets of longitudinally, or radially and laterally shiftable bolts located to be projected in different directions around the door; and means for shifting said bolts laterally and longitudinally, or radially thereby to swing or rotate the outer ends of the bolts with a grinding action over the bolt-engaging surfaces of a safe or vault body, thereby

to effect a most powerful binding of the bolts upon the surface of such body with a minimum amount of power.

21. The combination, with a safe or vault door, of bolt mechanism comprising a plurality of sets of radially and laterally shiftable bolts, and means for shifting said bolts radially, and simultaneously with such radial movements swinging such bolts laterally thereby to obtain a toggle action of said bolts.

22. A safe or vault door comprising an oval-shaped structure comprehending a body and a rearwardly-extending flange having bolt-openings; bolts working in said openings; and gear mechanism for actuating said bolts.

23. A safe or vault door comprising an oval-shaped structure comprehending a body and a rearwardly-extending flange having bolt-openings; a series of bolts located in sets working in said openings; and gear mechanism for actuating said bolts and comprising members having worm-teeth and worms, a set of such gearing for each set of said bolts.

24. The combination, with a safe or vault door, of a series of bolts carried thereby and located in sets; means for actuating said bolts; and stops for preventing the premature retraction of said bolts.

25. The combination, with a safe or vault door, of a series of bolts carried thereby and located in sets; means for actuating said bolts; and a stop for each set of said bolts to prevent the premature retraction thereof.

26. The combination, with a safe or vault door, of a series of swinging bolts carried thereby and located in sets; means for actuating said bolts; stops having inclined surfaces coöperating with similar surfaces on the bolts for preventing the premature retraction of said bolts.

27. The combination, with a safe or vault door, of a series of bolts carried thereby and located in sets; and gear mechanism for actuating said bolts and comprising members having worm-teeth and worms.

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Witnesses:

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