

No. 679,378.

Patented July 30, 1901.

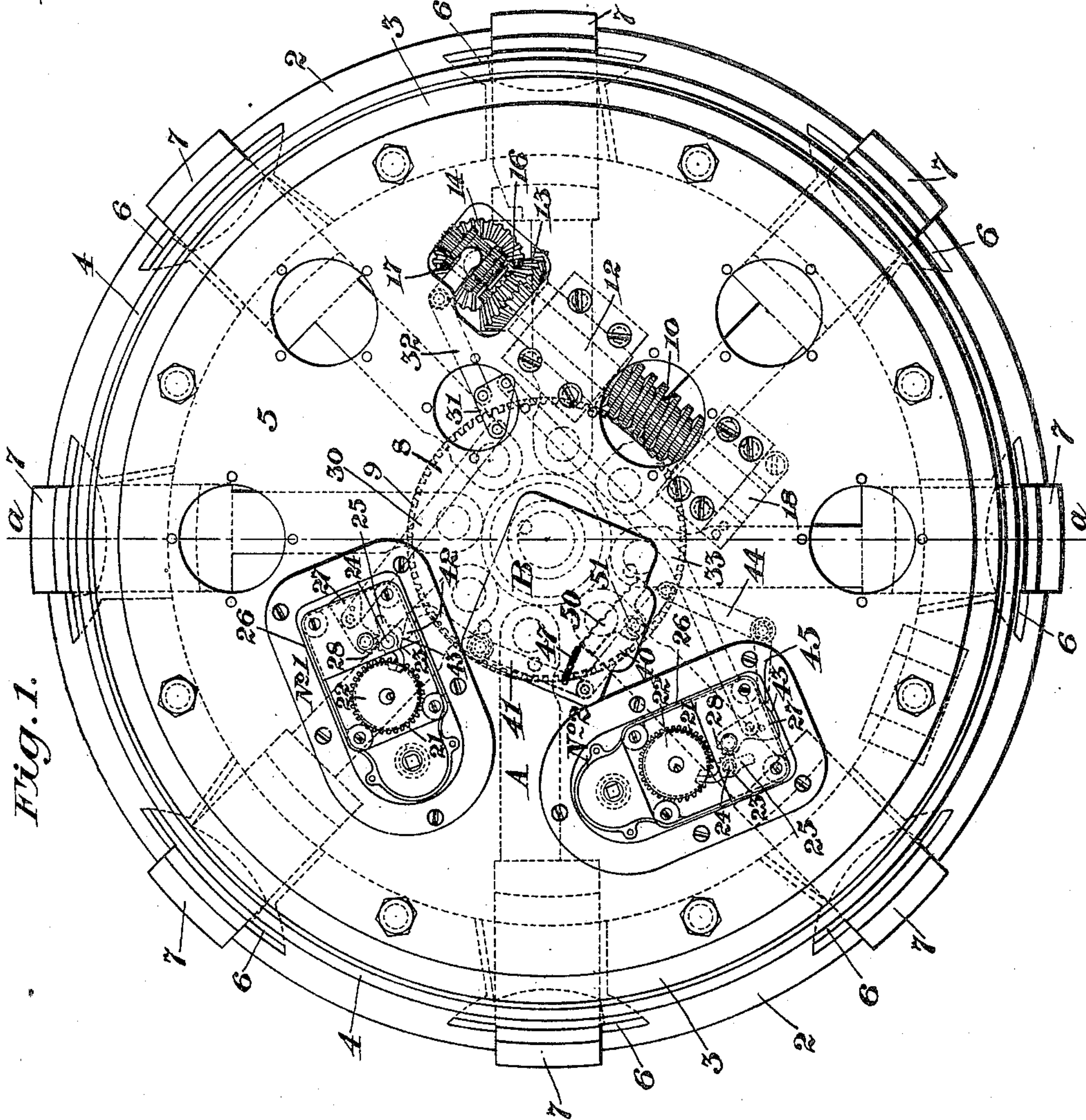
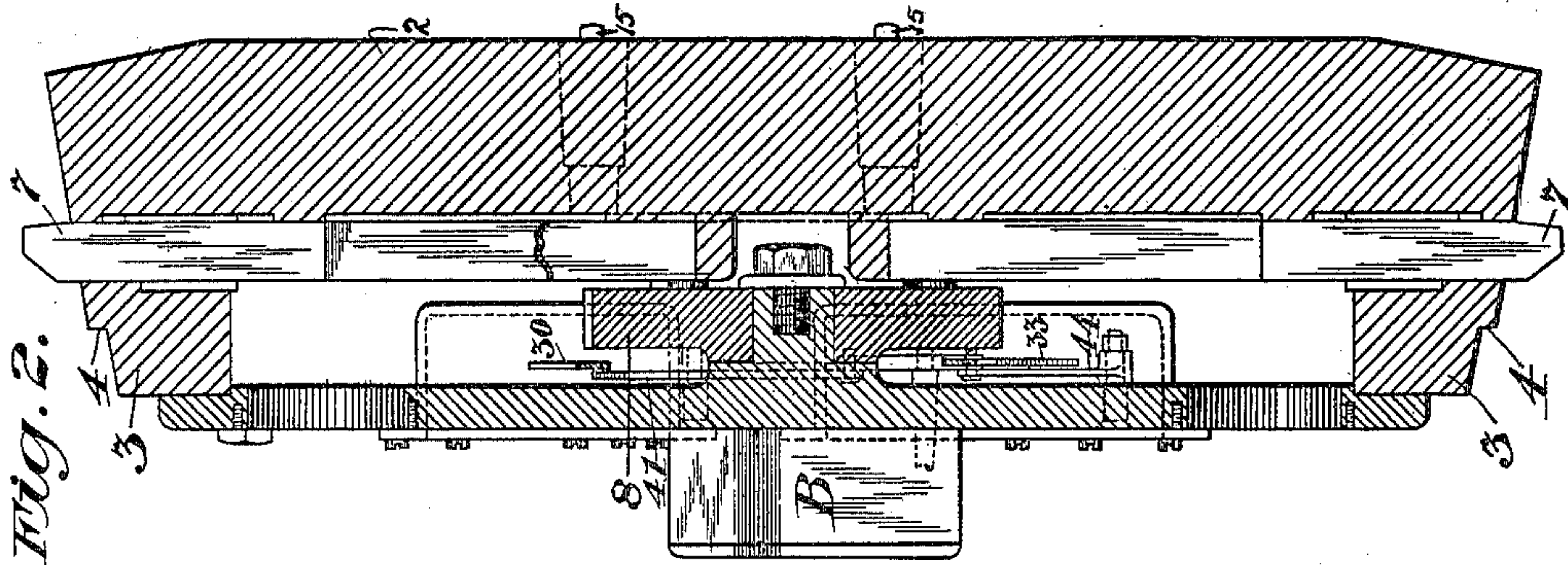
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LOCKING MECHANISM FOR SAFES OR VAULTS.

(Application filed Nov. 2, 1900.)

(No Model.)

4 Sheets—Sheet 1.



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4 Sheets—Sheet 2.

Fig. 4.

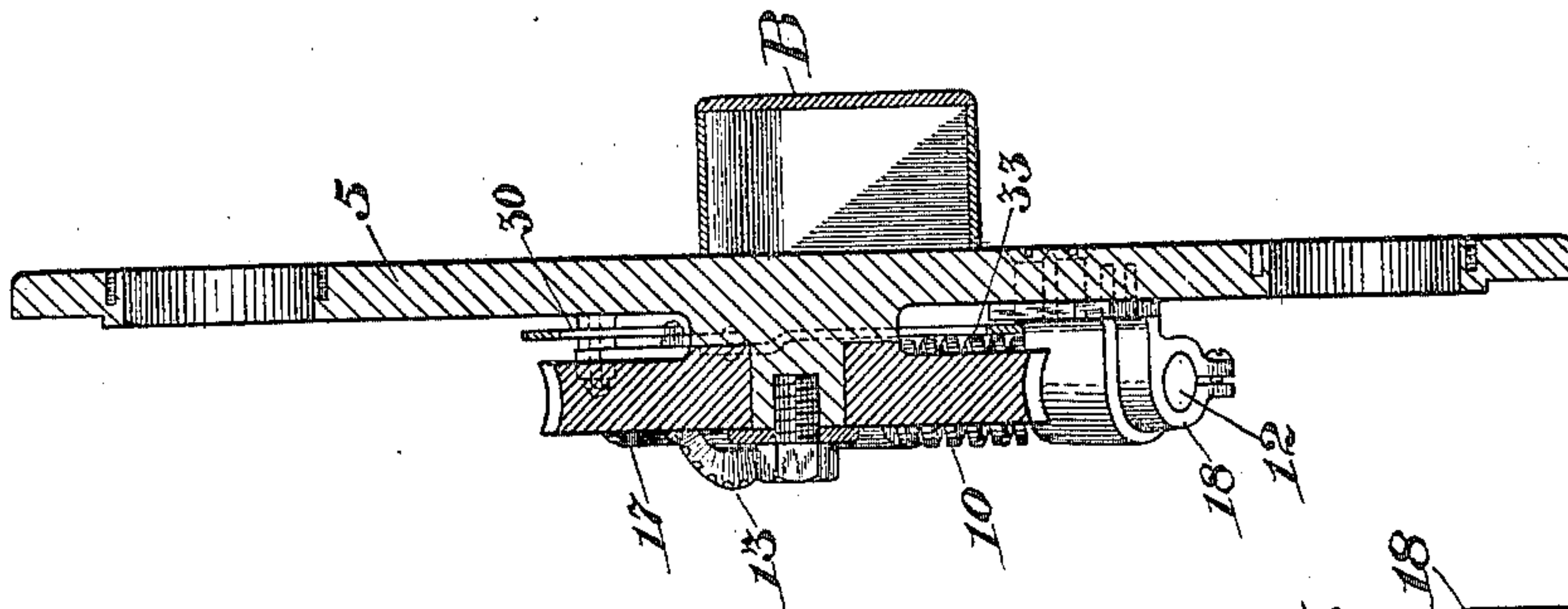


Fig. 7.

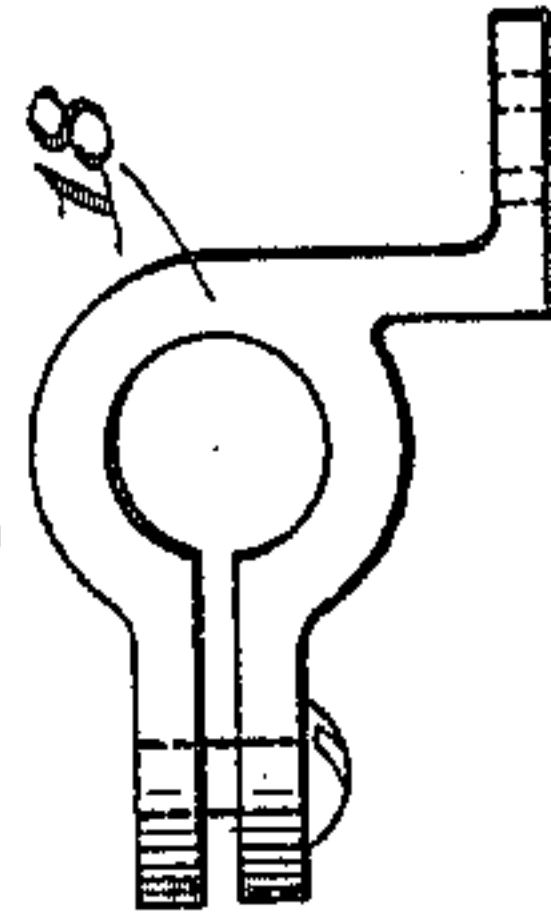
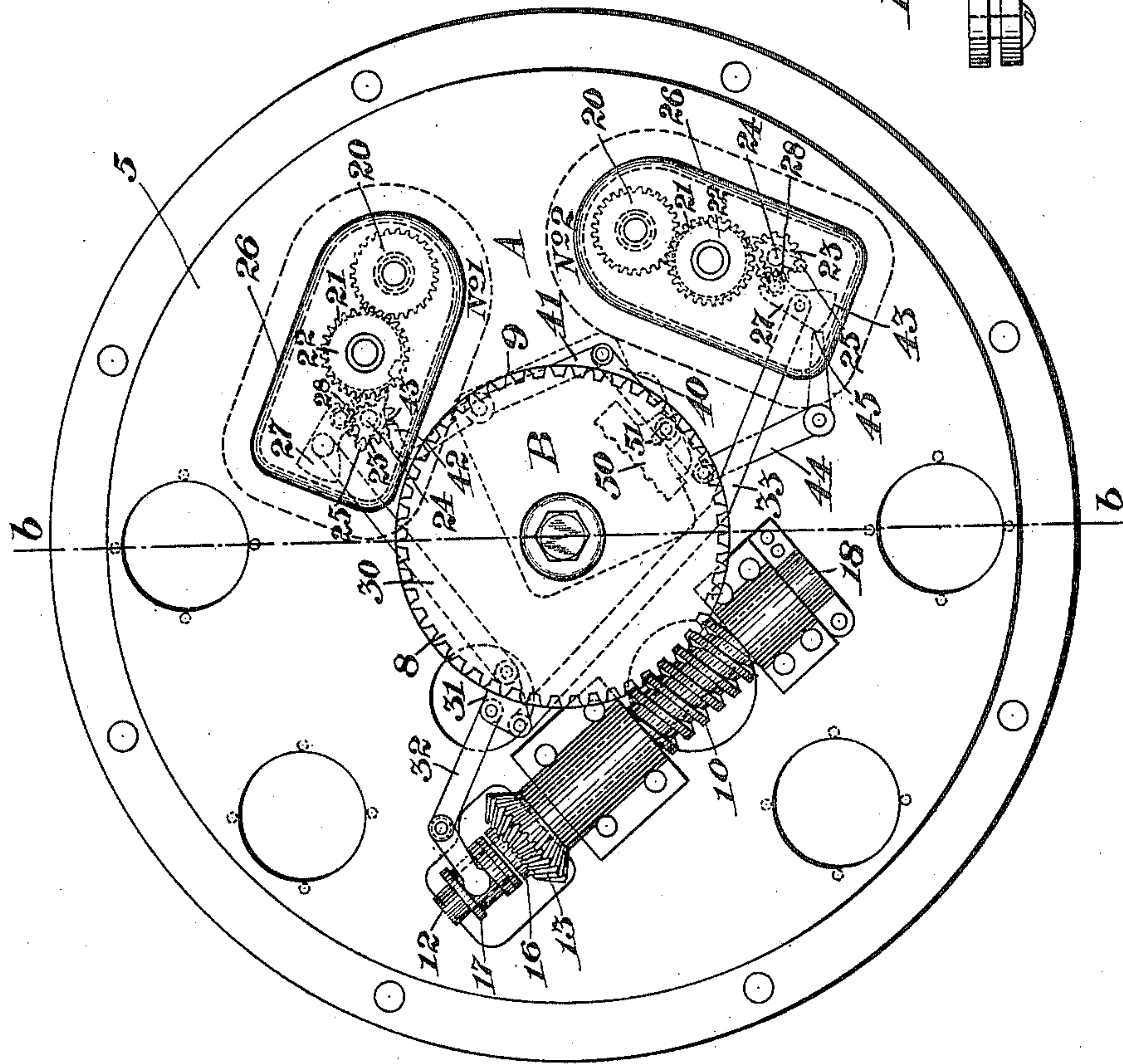


Fig. 3.



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4 Sheets—Sheet 3.

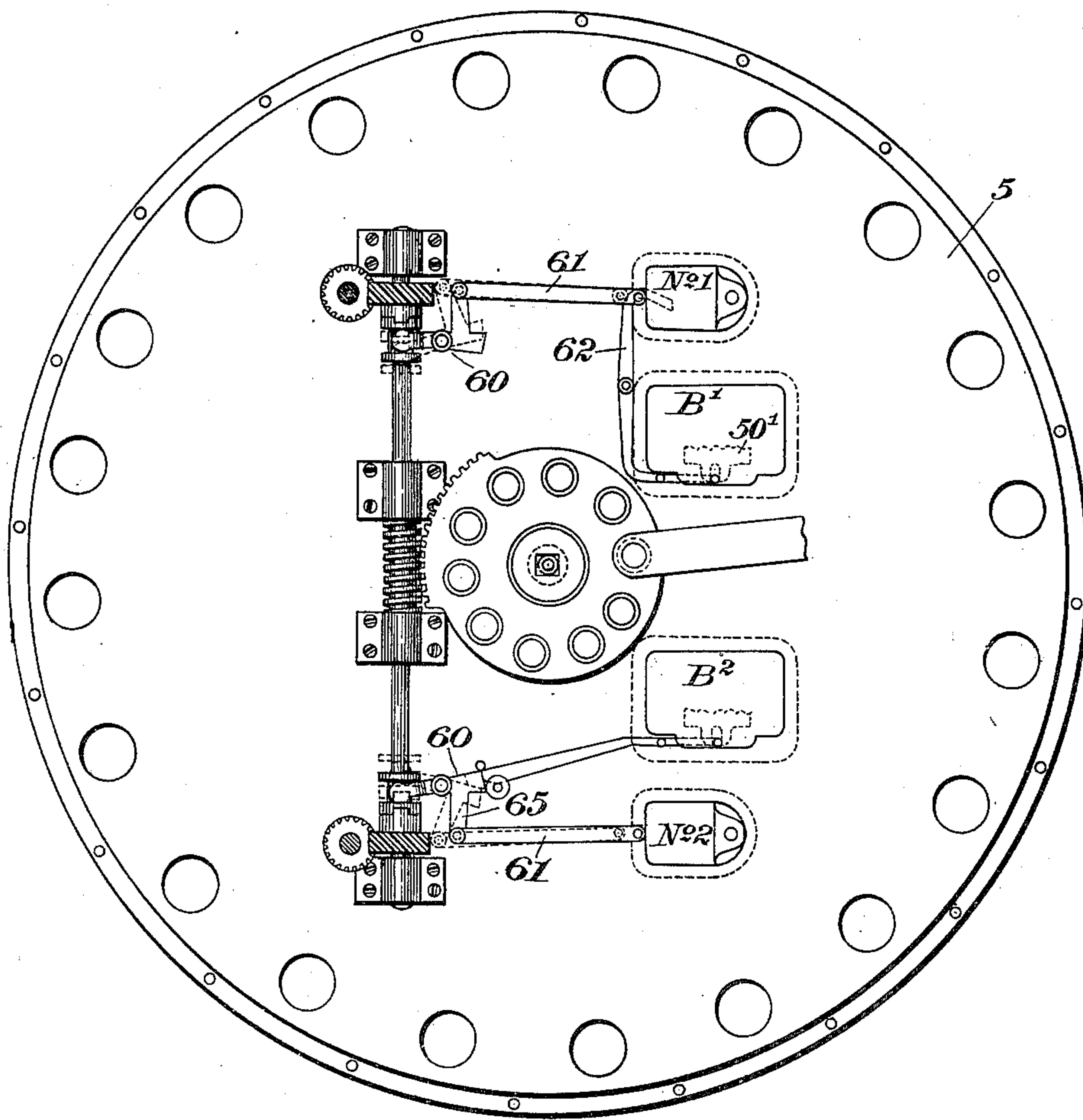


Fig. 5.

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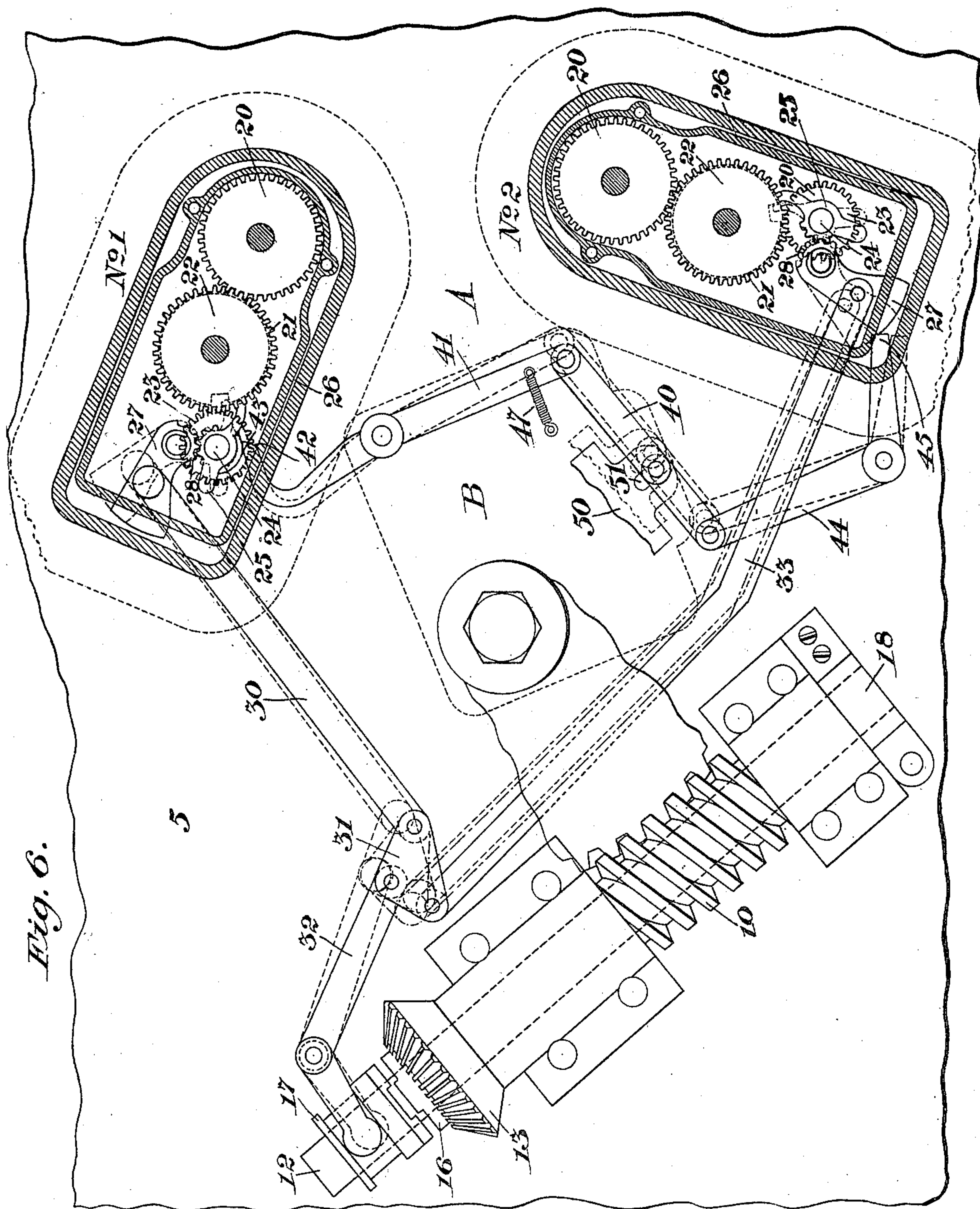
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4 Sheets—Sheet 4.



Witnesses:

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UNITED STATES PATENT OFFICE.

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LOCKING MECHANISM FOR SAFES OR VAULTS.

SPECIFICATION forming part of Letters Patent No. 679,378, dated July 30, 1901.

Application filed November 2, 1900. Serial No. 35,197. (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 Locking Mechanism for Safes or Vaults, of which the following is a specification.

This invention relates to locking mechanism for safe or vault doors, the object being to provide an improved organization of time and combination lock mechanism and also to provide an improved organization of time and combination lock mechanism particularly effective in connection with the improved locking or bolting mechanism shown and described in my contemporaneously-pending application, Serial No. 16,402, now Patent No. 662,455, dated November 27, 1900, and in my two contemporaneously-pending applications, respectively, for safe or vault doors, filed October 31, 1900, Serial No. 34,991, and safe or vault door mechanism, filed November 2, 1900, Serial No. 35,198.

In the drawings accompanying and forming a part of this specification, Figure 1 is a rear view of a safe or vault door with this improved locking mechanism applied thereto. Fig. 2 is a cross-sectional view taken in lines *a a*, Fig. 1. Fig. 3 is an interior view of the back plate detached and reversed. Fig. 4 is a sectional view thereof, taken in line *b b*, Fig. 3. Fig. 5 is a view of the back plate detached and reversed, carrying a somewhat different form of locking mechanism. Fig. 6 is a view illustrating the operation of this improved time and combination locking mechanism, and Fig. 7 is a detail view of the clamping device for preventing too free movement of the worm-shaft.

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

The bolting mechanism shown herein is substantially similar to that shown and described in my contemporaneously-pending application filed herewith and entitled "Safe or vault door bolting mechanism," and therefore only a general description thereof is deemed necessary herein.

The door in the present form shown com-

prises a body 2, having a rearwardly-extending flange 3, usually provided with an offset 4. To this flange is secured a back plate 5, on which is preferably located various parts of the bolting mechanism, and which back plate also carries in the present instance the time and combination lock mechanism, (designated in a general way by A and hereinafter described.)

The flange 3 is provided with a series of openings 6, located at intervals, each of which is shown of tapered or converging form, obtained by inclining one side wall of each opening. Working in each of these openings is a bolt 7, the shank of which is pivotally secured to a rocking member 8, having worm-teeth 9 located usually on a part of its periphery, but in the present instance shown entirely around such periphery. This rocking plate is mounted on a hub or projection rigid with the back plate and is in mesh with a worm 10 of a worm-shaft 12, mounted in suitable bearings on the back plate. This worm is provided with a bevel-gear 13, in mesh with a similarly-formed gear 14, carried by a spindle 15, projecting at the front side of the door, and by means of which spindle on the rotation thereof the worm-shaft will be actuated. To prevent the rotation of this worm-shaft except at the proper time, suitable controlling means is provided, shown herein in the form of clutch mechanism, and in the present instance the gear 13 of the worm-shaft is carried by a loosely-mounted clutch member 16, rotatable on such shaft and effective to engage with a clutch member 17, splined to such shaft, and which splined clutch member is controlled by the lock mechanism, hereinafter described. For preventing too free action of the worm-shaft a friction device is provided, shown as a bifurcated clamp 18, secured to the back plate and encircling one end of said worm-shaft, whereby play thereof is prevented.

In the form herein shown and described, and which may be its preferred form, if desired, the lock mechanism in the present instance comprises a time-lock (designated in a general way by B) and a pair of combination-locks, (one designated in a general way as No. 1 and the other as No. 2.) It is, how-

ever, to be understood that this improved lock mechanism may in some instances comprise a time-lock and one combination-lock. It is, however, preferable to provide a pair of combination-locks, since should one of them become inoperative for any reason the other can be utilized to operate the bolt mechanism, thereby to unlock the door without the necessity of forcing the same, usually requiring considerable time. Further, by providing a pair of combination-locks one may be permitted to respond to its combination and yet not be effective to unlock the safe, thus showing that the proper combination had been divulged, but that until the expiration of the time set for the time-lock to operate the safe or vault cannot be opened. In the form shown this improved time and combination lock mechanism is connected with the splined clutch member 17, whereby at the proper time such clutch member can be shifted into engagement with the loosely-mounted clutch member 16, thereby to form a positive connection between the bevel-gear of such loosely-mounted clutch member and the worm-shaft, so that on the operation of the spindle at the outer side of the door said worm-shaft can be rotated to shift the bolts, which move in a lateral and radial or longitudinal path and operate with a toggle action to draw the door to its seat with considerable force. Since in the present instance the combination-locks are the same, a description of one is deemed sufficient. This combination-lock may be of any desired form and usually comprises a spur-gear 20, mounted on the dial-spindle, and which gear meshes with a similar gear 21, the spindle or arbor of which carries a series of barrel-shaped tumblers 22, each having a notch. In mesh with this gear is a smaller gear 23, on the arbor 24 of which is mounted a fence 25, the hub thereof having teeth. This fence is so mounted that at certain periods the gear will turn independently thereof, while at other periods friction will cause such fence to turn with the gear. Mounted in the lock-case 26 is the usual bolt or actuator 27, provided with teeth 28, meshing with the teeth of the fence. When the dial-spindle is operated, the tumblers will be rotated in the usual manner until the notches of all the tumblers register with each other, whereupon the fence will be shifted into position to have its end enter such notches, whereby it will be rotated with such tumblers to shift the bolt or actuator 27. Each of the bolts 27 in the present instance is connected with the splined clutch member 17 by suitable mechanism, shown herein as a lever system, whereby the operation of either bolt 27 of either combination-lock will shift the splined clutch member into position to engage the loosely-mounted clutch member in the manner hereinbefore set forth. The bolt or actuator of combination-lock No. 1 is connected with the splined clutch member 17 by a lever 30, pivoted to such bolt and to a floating

device or bell-crank 31, which in turn is connected with a clutch-shifter 32, pivoted to the back plate, one end of such clutch-shifter being in engagement with the splined clutch member. The bolt or actuator of combination-lock No. 2 is likewise connected by a lever 33, pivoted thereto and to such floating bell-crank. On the proper operation of combination-lock No. 1 it will be seen that the bolt or actuator 27 will be shifted into the position shown in dotted lines, Fig. 6, thereby moving the floating bell-crank into the position shown in dotted lines, thereby to actuate the clutch-shifter in the manner indicated in dotted lines to shift the splined clutch member into engagement with the loosely-mounted clutch member, the fulcrum for the proper operation of these levers being at the pivotal connection of the lever 33 with the bolt or actuator of combination-lock No. 2. On the proper operation of combination-lock No. 2 the bolt-actuator will be likewise shifted into the position shown in dotted lines, thereby to shift the lever 33 into the position indicated in dotted lines, whereupon the floating bell-crank will be again moved into the position indicated in dotted lines to actuate the clutch-shifter in the manner just described.

From the foregoing it will be seen that on the operation of either combination-lock by one familiar with the combination the splined clutch member will be operated, thereby to permit the rotation of the worm-shaft by the spindle. Unless some means, however, is provided to nullify temporarily the control of the combination-locks over the door-bolting mechanism it would be possible to secure by duress the combination from one familiar with it and utilize it to open the safe or vault. Therefore the combination-lock alone does not constitute absolute security against the opening of the safe. By the provision of time-lock mechanism, however, the operation of the combination-locks is not possible until the time at which such time-lock mechanism is set to run has expired. In the present instance the time-lock mechanism, which in one form comprises one time-lock, is connected with the combination-locks in an improved manner.

For the present purpose it is deemed necessary only to show the actuator of such time-lock, which is designated herein as 50 and is usually provided with a slot 51 for engagement with the device which is to be actuated thereby, which in the present instance comprises a lever 40, pivoted at one end to a stop member, such as a lever 41, pivotally secured to the back plate and having a stop-face 42, adapted to engage a corresponding face 43 of the fence of combination-lock No. 1, whereby the operation of this fence is prevented even though the combination be properly set. The other end of this lever 40 is likewise connected with a stop member comprising a lever 44, pivoted to the back plate and having a stop-face 45, adapted to engage the bolt or actuator 27 of combina-

tion-lock No. 2, whereby the operation of this bolt is not possible except as permitted by the time-lock. When these stop members are in the positions shown in full lines, Fig. 6, the operation of the fence of combination-lock No. 1 or the bolt of combination-lock No. 2 is prevented, so that even though the combinations were properly set the clutch-shifter would not be operated. When, however, the time-lock has run the limit for which it was set, it will shift the lever 40 into the dotted-line position shown in said figure, thereby to actuate both the two stop members 41 and 44 into the dotted-line positions shown and free the same from the fence of combination-lock No. 1 and the bolt of combination-lock No. 2, respectively, whereby on the proper operation of either combination-lock the clutch-shifter can be actuated in the manner hereinbefore set forth.

To properly counterbalance the mechanism of the time-lock, means is provided for this purpose, which in the present instance comprises a spring 47, connected with the back plate and with one of the stop members, as 41.

In the form of time and combination lock mechanism shown in Fig. 5 the time-lock mechanism comprises two time-locks B' B², one for controlling each combination-lock. Each combination-lock is connected with the worm-shaft by separate means, and for this purpose the worm-shaft is provided with clutch mechanism comprising a pair of clutches, each similar to that hereinbefore described, except that in place of bevel-gears having spiral teeth are shown. The clutch-shifting means comprises a pair of clutch-shifters, each of which is shown as a counterweighted member 60, connected by a lever 61 with the bolt or actuator (not shown) of one combination-lock, it being pivoted thereto. The combination-lock No. 1 is connected with the time-lock B' by a suitable lever 62, pivoted to the back plate and in engagement with the actuator 50' of said time-lock, and which lever is shiftable to dog the fence (not shown) of said combination-lock No. 1, whereby on the expiration of the time set for the time-lock to run this lever 62 will be shifted to free the fence of said combination-lock No. 1, and thereby permit the working of the clutch mechanism. The other time-lock B² is provided with a stop member 65, which is in engagement with the clutch-shifter of combination-lock No. 2, whereupon until the expiration of the time for which the time-lock is set to run the operation of this clutch-shifter is not possible; but when the time-lock runs down this stop member 65 will be carried into the position shown in dotted lines, whereby on the proper operation of combination-lock No. 2 the clutch-shifter will be operated to shift the splined clutch member into engagement with the loosely-mounted clutch member on the worm-shaft. The time-lock B' in the form shown in said Fig. 5 directly dogs the fence of combination-lock

No. 1, while the time-lock B² dogs indirectly the bolt of combination-lock No. 2.

I claim as my invention—

1. The combination, with a safe or vault door, of a plurality of bolts; a rocking plate to which the inner ends of said bolts are connected; means for rocking said plate thereby to shift the bolts laterally and radially; a combination-lock for controlling the operation of said means; and time-lock mechanism for controlling the operation of said combination-lock.

2. The combination, with a safe or vault door, of bolt mechanism comprising a plurality of bolts; a worm-wheel rocking plate to which the inner ends of said bolts are connected; a worm-shaft in mesh with said rocking plate; means for rotating said shaft thereby to shift the bolts laterally and longitudinally, or radially; a combination-lock for controlling the operation of said means; and time-lock mechanism for controlling the operation of said combination-lock.

3. The combination, with a safe or vault door, of bolt mechanism comprising a plurality of bolts; means for shifting said bolts laterally and radially, and comprising a worm-wheel rocking plate to which the inner ends of the bolts are connected; a worm-shaft for operating said plate; means embodying clutch mechanism for rotating said shaft; a combination-lock for controlling the operation of said clutch mechanism; and time-lock mechanism for controlling the operation of said combination-lock.

4. The combination with a safe or vault door, of a plurality of bolts therefor; means for shifting said bolts laterally and radially and embodying a rocking device to which the inner ends of said bolts are connected; and a pair of combination-locks for controlling the operation of said bolt-shifting means.

5. The combination, with a safe or vault door, of bolt mechanism comprising a plurality of bolts; means for shifting said bolts laterally and longitudinally, or radially and comprising a worm-wheel connected with said bolts; a worm in engagement with said worm-wheel; means for rotating said worm; and a pair of combination-locks for controlling the operation of said worm-actuating means.

6. The combination, with a safe or vault door, of bolt mechanism comprising a plurality of bolts; means for shifting said bolts laterally and radially and comprising a worm-wheel; a worm in engagement with said worm-wheel; means for rotating said worm and embodying clutch mechanism including a clutch-shifter; and a pair of combination-locks for controlling the operation of such clutch-shifter.

7. The combination with a safe or vault door, of a plurality of bolts therefor; means for shifting said bolts laterally and radially and embodying a rocking device to which the inner ends of said bolts are connected; a pair of combination-locks for controlling the op-

eration of said bolt-shifting means; and time-lock mechanism for controlling the operation of said combination-locks.

8. The combination, with a safe or vault door, of bolt mechanism comprising a plurality of bolts; means for shifting said bolts laterally and radially and comprising a worm-wheel connected with said bolts; a worm in engagement with said worm-wheel; means for rotating said worm; a pair of combination-locks for controlling the operation of said worm-actuating means; and time-lock mechanism for controlling the operation of said combination-locks.

9. The combination with a safe or vault door, of a plurality of bolts therefor; means for shifting said bolts laterally and radially and embodying a rocking device to which the inner ends of said bolts are connected; a combination-lock for controlling the operation of said bolt-shifting means; and time-lock mechanism for controlling the bolt of said combination-lock.

10. The combination with a safe or vault door, of a plurality of bolts therefor; means for shifting said bolts laterally and radially and embodying a rocking device to which the inner ends of said bolts are connected; a combination-lock for controlling the operation of said bolt-shifting means; and time-lock mechanism for controlling the bolt of said combination-lock by dogging the fence thereof.

11. The combination, with a safe or vault door, of bolt mechanism therefor; means for actuating said bolt mechanism; means for controlling said actuating means and comprising clutch mechanism including a clutch-shifter; a combination-lock having its bolt operatively connected with said clutch-shifter; and time-lock mechanism for controlling the operation of said combination-lock.

12. The combination, with a safe or vault door, of bolt mechanism therefor; means for actuating said bolt mechanism; means for controlling said actuating means and comprising clutch mechanism including a clutch-shifter; a combination-lock having its bolt operatively connected with said clutch-shifter; and time-lock mechanism for controlling the operation of said combination-lock, said time-lock mechanism dogging the fence of said combination-lock.

13. The combination, with a safe or vault door, of bolt mechanism therefor; means for actuating said bolt mechanism; means for controlling said actuating means and embodying clutch mechanism including a clutch-shifter; a pair of combination-locks operatively connected with said clutch-shifter; and time-lock mechanism for controlling the operation of said combination-locks.

14. The combination, with a safe or vault door, of bolt mechanism therefor; means for actuating said bolt mechanism; means for controlling said actuating means and em-

bodying clutch mechanism including a clutch-shifter; a pair of combination-locks operatively connected with said clutch-shifter; and time-lock mechanism for controlling the operation of said combination-locks, said time-lock mechanism dogging one part of one combination-lock and another part of the other combination-lock.

15. The combination, with a safe or vault door, of bolt mechanism therefor; means for actuating said bolt mechanism; means for controlling said actuating means and embodying clutch mechanism including a clutch-shifter; a pair of combination-locks operatively connected with said clutch-shifter; and time-lock mechanism for controlling the operation of said combination-locks, said time-lock mechanism dogging the fence of one combination-lock and the bolt of the other combination-lock.

16. The combination, with a safe or vault door, of bolt mechanism therefor; means for actuating said bolt mechanism; means for controlling said actuating means and embodying clutch mechanism including a clutch-shifter; a pair of combination-locks the bolts of each of which are operatively connected with said clutch-shifter; and time-lock mechanism for controlling the operation of said bolts.

17. The combination, with a safe or vault door, of bolt mechanism comprising a plurality of bolts; a worm-wheel connected with said bolts; a worm-shaft meshing with said worm-wheel; means for rotating said worm-shaft; clutch mechanism including a clutch-shifter for controlling the operation of said means; a pair of combination-locks, the bolts of which are operatively connected to said clutch-shifter; and time-lock mechanism for controlling the operation of said combination-locks.

18. The combination, with a safe or vault door, of bolt mechanism comprising a plurality of bolts; a worm-wheel connected with said bolts; a worm-shaft meshing with said worm-wheel; means for rotating said worm-shaft; clutch mechanism including a clutch-shifter for controlling the operation of said rotating means; a pair of combination-locks, the bolts of which are operatively connected to said clutch-shifter; and time-lock mechanism dogging the fence of one combination-lock and the bolt of the other for controlling the operation of said clutch-shifter.

19. The combination with a safe or vault door, of a plurality of bolts therefor; means for actuating said bolts; a pair of combination-locks for controlling the working of said bolts; and time-lock mechanism comprising a pair of time-locks one having a part cooperating with a part of one combination-lock and the other having an independent part cooperating with an independent part of the other combination-lock for controlling the operation of said combination-locks.

20. The combination, with a safe or vault door, of bolt mechanism therefor; a worm-wheel for actuating said bolt mechanism; a worm-shaft meshing with said worm-wheel; means for rotating said worm-shaft; a pair of combination-locks for controlling the operation of said means; and time-lock mechanism comprising a pair of time-locks for controlling the operation of said combination-locks.

21. The combination, with a safe or vault door, of bolting mechanism therefor; means for operating said bolting mechanism; clutch mechanism comprising a pair of clutches for controlling the operation of said bolting mechanism; clutch-shifting means; and a pair of combination-locks in connection with said clutch-shifting means.

22. The combination, with a safe or vault door, of bolting mechanism therefor; means for operating said bolting mechanism; clutch mechanism comprising a pair of clutches for controlling the operation of said bolting mechanism; clutch-shifting means; a pair of combination-locks in connection with said clutch-shifting means; and time-lock mechanism for controlling the operation of said combination-locks.

23. The combination, with a safe or vault door, of bolting mechanism therefor; means for operating said bolting mechanism; clutch mechanism for controlling the operation of said bolting mechanism; clutch-shifting means; a pair of combination-locks in connection with said clutch-shifting means; and time-lock mechanism comprising a pair of time-locks for controlling the operation of said combination-locks.

24. The combination, with a safe or vault door, of bolting mechanism therefor; means for operating said bolting mechanism; clutch mechanism for controlling the operation of said bolting mechanism; clutch-shifting means; a pair of combination-locks in connection with said clutch-shifting means; and time-lock mechanism comprising a pair of time-locks for controlling the operation of said combination-locks, one of said time-locks dogging the fence of one combination-lock and the other dogging the bolt of the other combination-lock through the instrumentality of the clutch-shifting means.

25. The combination, with a safe or vault door, of bolt mechanism comprising a plurality of radially and laterally shiftable bolts; a worm-wheel connected with said bolts; a worm-shaft in mesh with said worm-wheel; clutch mechanism carried by said shaft; clutch-shifting means; a pair of combination-locks the bolts of which are operatively connected with the clutch-shifting means; and time-lock mechanism comprising a pair of time-locks for controlling the operation of said combination-locks.

26. The combination, with a safe or vault door, of bolt mechanism therefor; means for shifting said bolt mechanism and embodying

clutch mechanism including a clutch-shifter; a pair of combination-locks the bolts of which are connected with said clutch-shifter; time-lock mechanism embodying an actuator; a pivotally-mounted member connected with said actuator and dogging the fence of one combination-lock, and a pivotally-mounted member connected with said actuator and dogging the bolt of the other combination-lock.

27. The combination, with a safe or vault door, of bolt mechanism therefor; means for actuating said bolt mechanism and embodying clutch mechanism including a clutch-shifter; a pair of combination-locks each connected with said clutch-shifter; and time-lock mechanism embodying counterbalanced means connected with said combination-locks for controlling the operation thereof.

28. The combination, with a safe or vault door, of a plurality of bolts therefor; a worm-wheel connected with said bolts; a worm in mesh with said worm-wheel; means for rotating said worm; and a friction device for controlling the movement of said worm.

29. A lock mechanism comprising a pair of combination-locks; time-lock mechanism; and a pair of members connected with and controlled by said time-lock mechanism for controlling the operation of said combination-locks, one member cooperating with one part of one combination-lock and the other member cooperating with another part of the other combination-lock.

30. A lock mechanism comprising a pair of combination-locks having bolts; time-lock mechanism; and a pair of stop members connected therewith for controlling the operation of said combination-locks.

31. A lock mechanism comprising a pair of combination-locks; time-lock mechanism; and a pair of stop members connected therewith for controlling the operation of said combination-locks, one stop member cooperating with one part of one combination-lock, and the other stop member with another part of the other combination-lock.

32. A lock mechanism comprising a pair of combination-locks having bolts and fences; time-lock mechanism; and a pair of stop members connected therewith, one dogging the fence of one combination-lock, and the other the bolt of the other combination-lock.

33. The combination, with a door, of locking mechanism therefor; means for actuating said locking mechanism; lock mechanism comprising a combination-lock having a bolt; a lever pivoted to said bolt and operatively connected with said actuating means, time-lock mechanism, and a stop member connected therewith and controlling the operation of said combination-lock and thereby the movement of said lever.

34. A lock mechanism comprising in combination with means to be controlled a pair of combination-locks; time-lock mechanism; and means connected therewith and effective

to dog the fence of one combination-lock and the bolt of the other combination-lock.

35. The combination, with a door, of means for locking the door; means for actuating
5 said locking means; clutch mechanism for controlling the operation of said actuating means; clutch-shifting means; and a pair of combination - locks operatively connected with said clutch-shifting means.

10 36. The combination with a safe or vault door, of a plurality of bolts therefor; means for actuating said bolts; a pair of combination-locks for controlling the working of said bolts; and time-lock mechanism having in-
15 dependent devices one controlling the operation of a part of one combination-lock and

the other controlling the operation of a part of the other combination-lock.

37. The combination, with a door, of means for locking the door; means for actuating
20 said locking means; clutch mechanism for controlling the operation of said actuating means; a combination-lock connected with said clutch mechanism for controlling the operation thereof; and time-lock mechanism
25 for controlling the operation of said combination-lock.

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