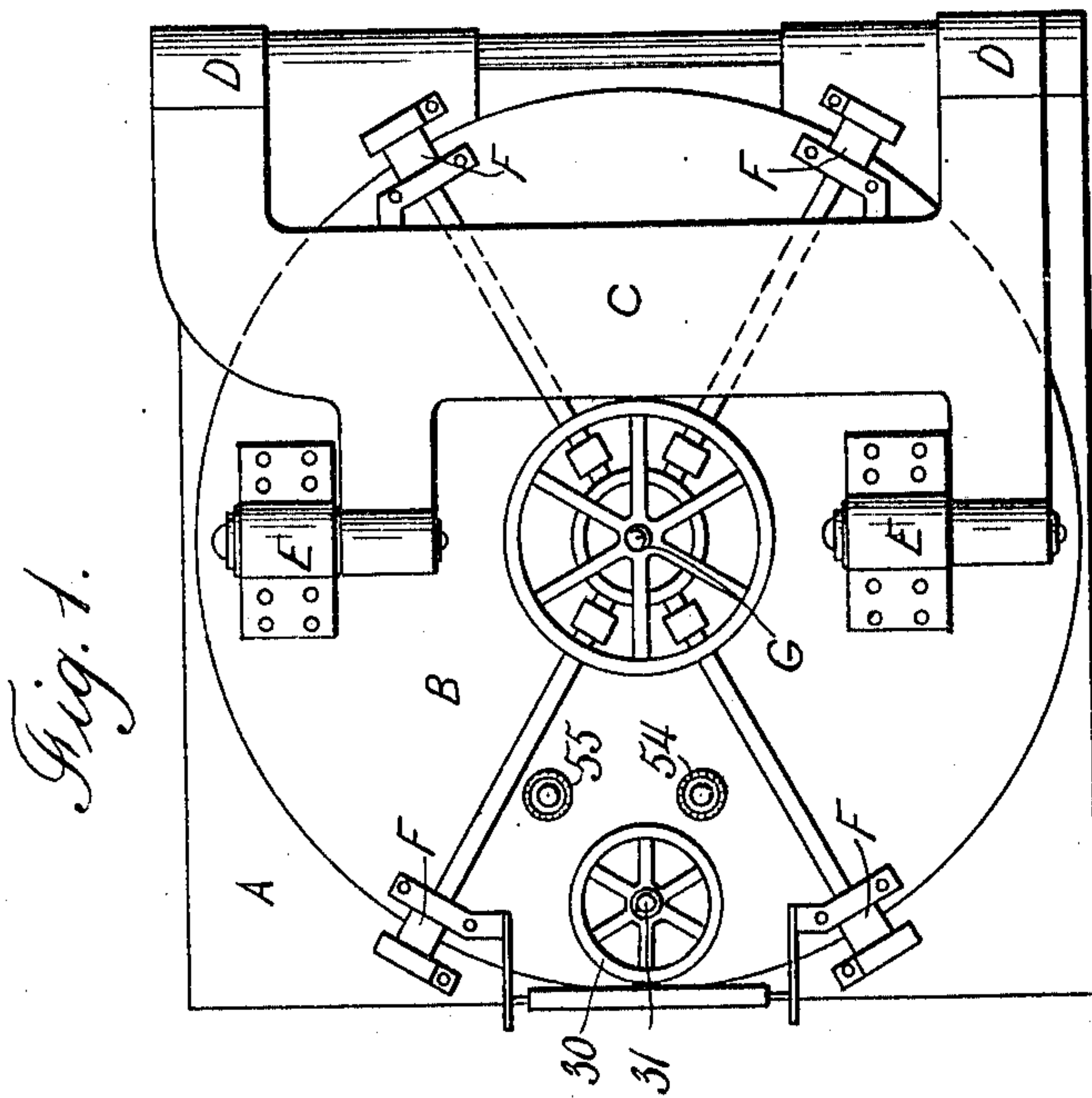


G. L. DAMON.  
 LOCKING MECHANISM FOR SAFES.  
 APPLICATION FILED AUG. 24, 1908.

952,981.

Patented Mar. 22, 1910.

3 SHEETS—SHEET 1.



Witnesses  
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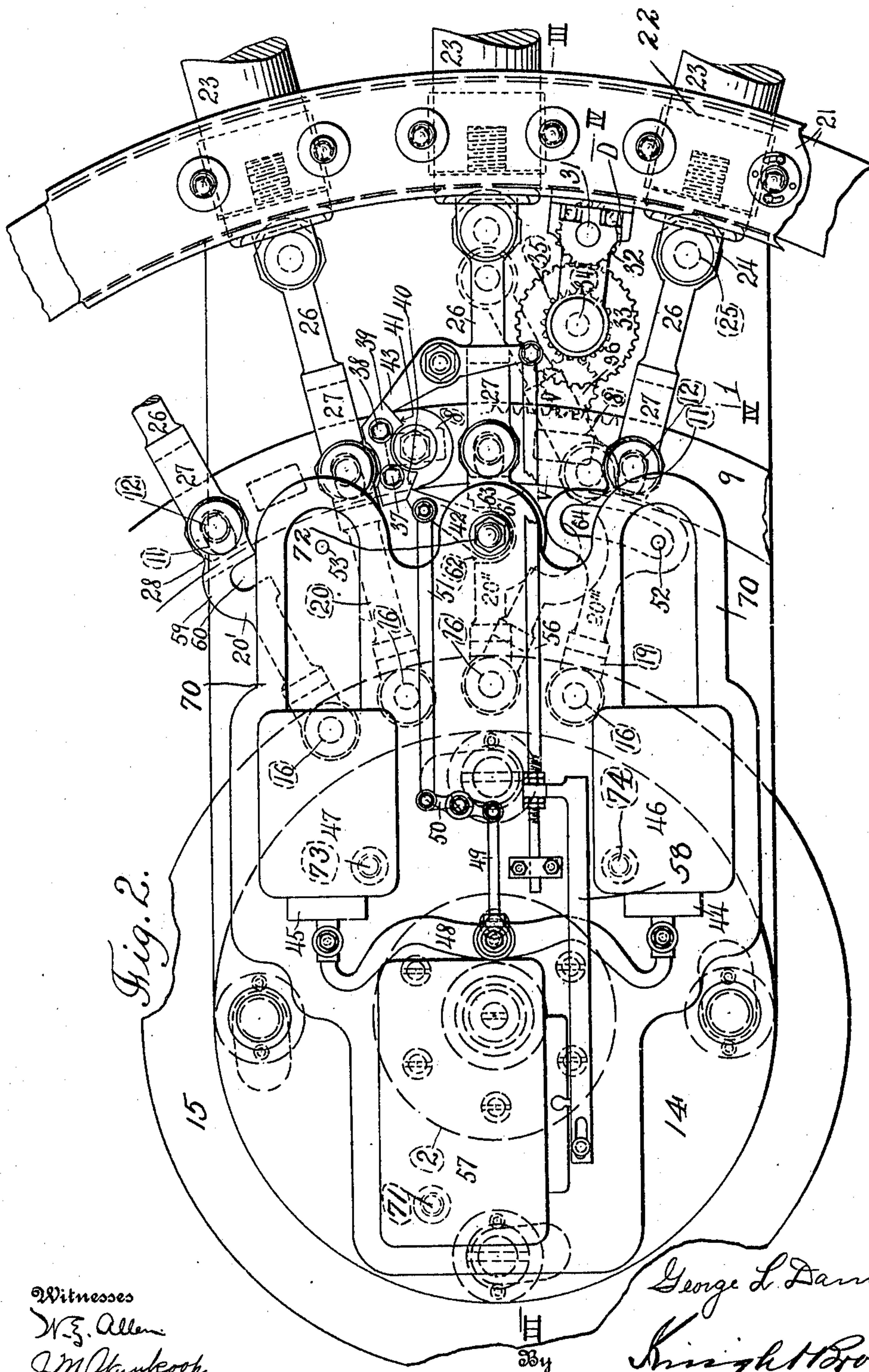
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3 SHEETS—SHEET 2.



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3 SHEETS—SHEET 3.

Fig. 3.

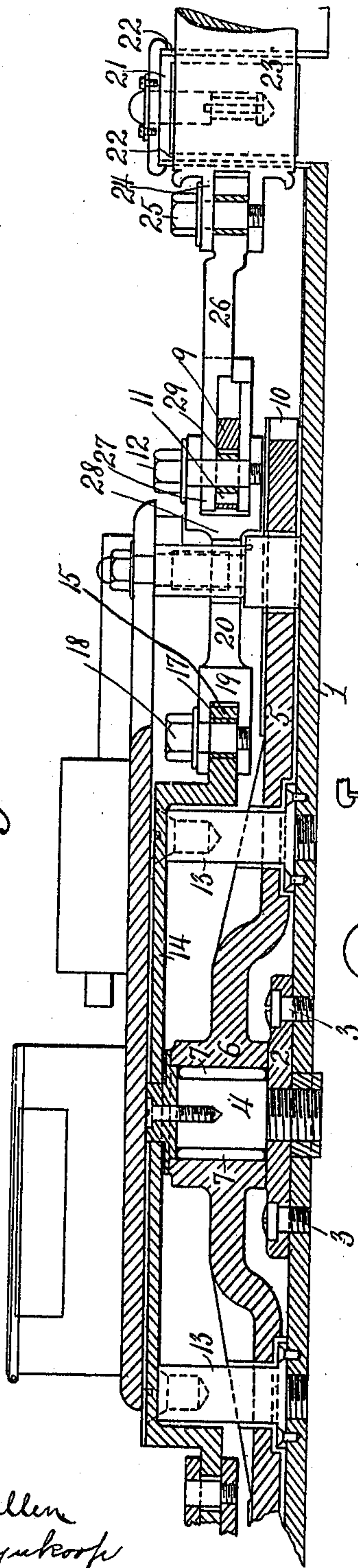


Fig. 5.

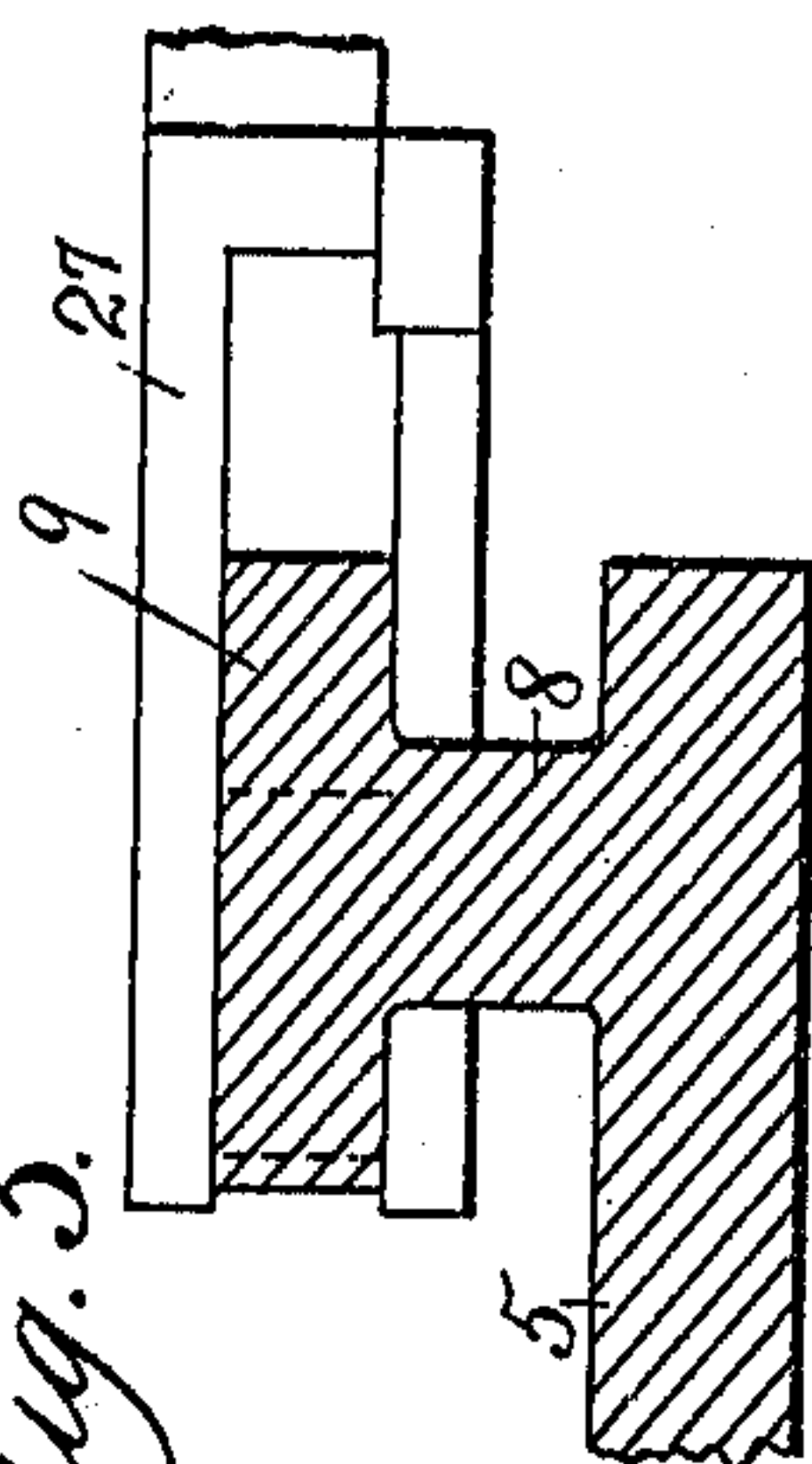
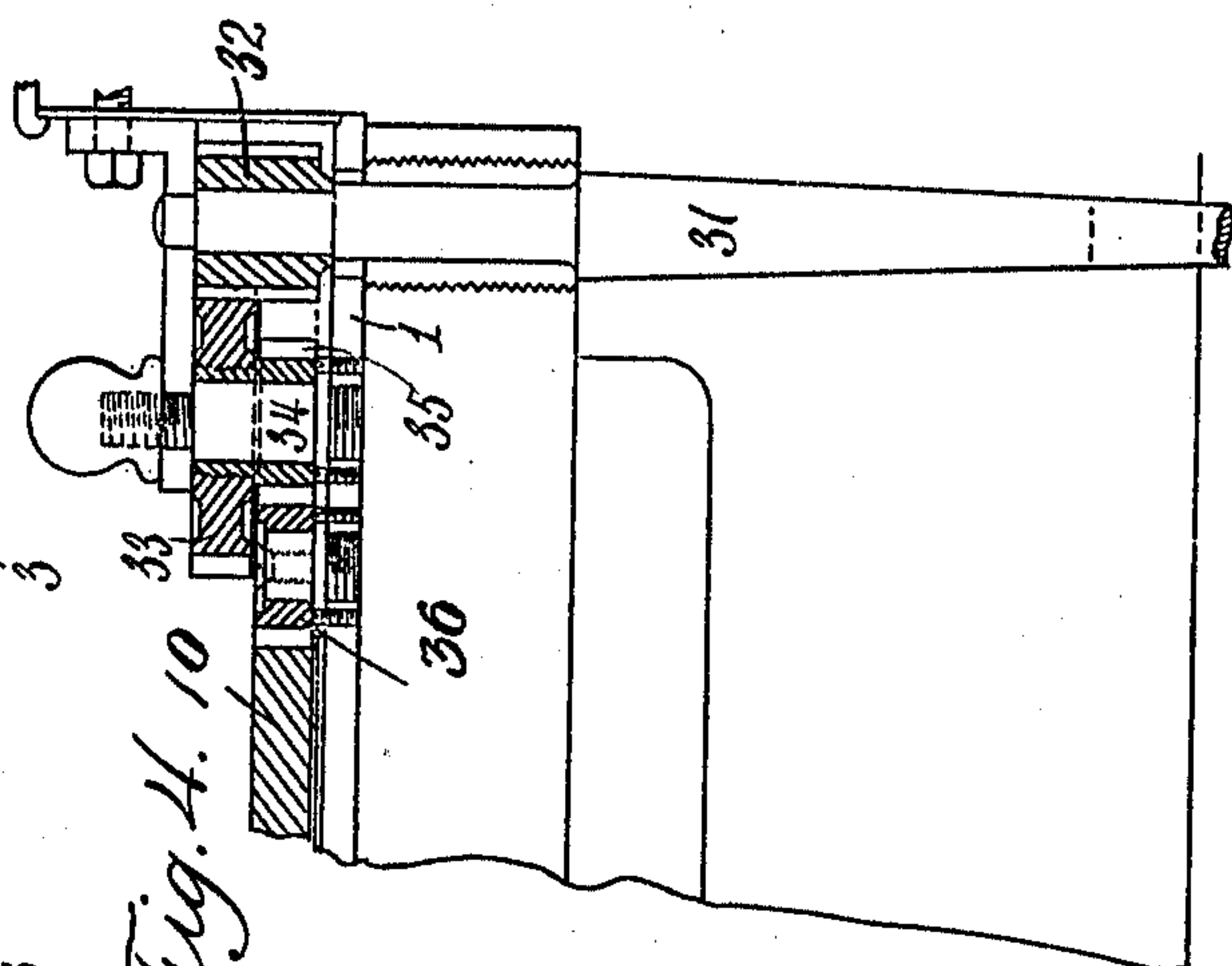


Fig. 4. 10



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# UNITED STATES PATENT OFFICE.

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## LOCKING MECHANISM FOR SAFES.

952,981.

Specification of Letters Patent. Patented Mar. 22, 1910.

Application filed August 24, 1908. Serial No. 449,977.

*To all whom it may concern:*

Be it known that I, GEORGE L. DAMON, a citizen of the United States, residing at Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Locking Mechanisms for Safes, of which the following is a specification.

This invention relates to locking mechanisms used on the heavy doors of vaults, safes and similar receptacles, and has for an object, to provide means whereby the bolts may be moved into and out of locking position with great power and with a comparatively small amount of friction.

Another object is to make the bolt-throwing mechanism of a simpler and more powerful construction and to make the parts thereof more durable and efficient in action than in well-known devices of a similar nature.

A further and more particular object is to reduce the necessary angular displacement of the bolt-operating ring, which is accomplished by the use of toggle levers for connecting the bolts movably with the flanged stationary plate instead of using a series of single levers as heretofore made use of in similar devices of this nature.

With these and other objects in view, the invention consists of the parts and the combinations of parts hereinafter described, and more particularly pointed out in the appended claims.

In the drawings, Figure 1 is a front elevation of a safe door embodying my improvements; Fig. 2 is an elevation of a portion of the door on the inside; Fig. 3 is a transverse section on the line III—III, Fig. 2, with the time-lock and combination-lock connections removed; Fig. 4 is a transverse section on the line IV—IV, Fig. 2; and Fig. 5 is a section on the line V—V, Fig. 2.

Referring more particularly to the drawings, A represents a portion of the vestibule of the safe structure provided with a door B. The door B which comprises the usual beveled offset surfaces adapted to fit into corresponding recesses in the door frame, is mounted by swivel connections E upon the crane-hinge C which in turn, is swung from the vestibule structure by means of pintle bearings D. These parts are of well-known construction as is also the compression system F—G, so that a detailed description of the same is not necessary here.

Referring now to Figs. 2 and 3 of the drawings, the inner face of the door B is provided with a soft steel plate 1 secured thereto by bolts or other suitable means. Seated at the center of plate 1 and held rigidly thereon by machine screws 3, 3, is a pedestal 2 for mounting the stud 4, about which a large wheel 5 is adapted to be given a small angular oscillation through the agency of a gear train to be hereinafter referred to. Interposed between the journal surface of the stud 4 and the hub 6 of the wheel 5, are a plurality of roller bearings 7 by means of which the effort required to turn the wheel 5 is very largely reduced. Upon the periphery of the wheel 5, an arcuate rack 10 is provided whereby said wheel may be oscillated by the said gear train. Offset from the side face of the wheel and mounted coaxially therewith, is a bolt-operating ring 9 preferably formed integral with the wheel 5 and spacing pads 8, 8, as shown best in Figs. 2 and 5. It is evident that ring 9 may be made separate from the wheel 5 and attached thereto by suitable fastening means. Bolt-operating ring 9 is provided with radially-extending slots 11, spaced at regular intervals and adapted to receive bolts 12. Mounted coaxially with wheel 5 and rigidly secured to the soft steel plate 1, is a circular stationary member or plate 14 separated from plate 1 by means of the posts 13, 13. Plate 14 is fixed at such distance from the plate 1 as will prevent all interference between it and the wheel 5. An offset flanged portion 15 of the stationary member 14 is provided at equal intervals around its periphery, with circular holes 16 containing bushings 17. Turning freely within each of the bushings 17, is a bolt 18 adapted to serve as a pivotal connection between the grooved rod-end 19 of the rod 20 and the flanged portion 15 of the stationary plate 14. Within the circumference of the inmost stepped portion of the door and rigidly secured to the inner face of the door, is a bearing-ring 21 provided with annular bearings 22, 22. Slidably mounted within the annular bearings 22, 22, are the locking-bolts 23 provided with slotted inner ends 24. The ends 24 of said bolts are movably connected with the stationary plate 15, by means of the bolt-actuating toggle-levers 20, 26. In consequence of this arrangement, an angular oscillation of the actuating ring 9 re-



sults in a displacement of the bolts 12 and a consequent throwing into or out of alinement, the toggle levers 20 and 26. Thus when said rods are brought into alinement, the bolts are thrown into locking position and vice versa.

Means for imparting motion to ring 9, is embodied in the mechanical train now to be referred to in connection with Figs. 1, 2 and 4. Mounted upon the outer face of the door B, is a hand-wheel 30 keyed to a spindle 31 extending through the thickness of the door. Upon the inner end of said spindle is keyed or otherwise securely fastened, a pinion 32 engaging the larger gear 33 of a compound gear turning freely upon a stub-shaft 34 mounted in the soft steel plate 1. The smaller gear 35 of said compound gear, in turn engages an idler 36 interposed between gear 35 and the arcuate rack 10 upon the bolt-actuating ring 9.

The mechanism for checking the movement of the actuating ring 9 being of well-known construction, and the time and combination locks for controlling the action of the same, being also of well-known construction, are but briefly referred to here. Rigidly secured to the actuating ring 9 by cap screws 37 and 38, is a check-block 39 provided with surfaces 40 and 41 against which the dogs or pawls 42 and 43 are adapted to impinge. Connecting the movable members 44 and 45 of the combination locks 46 and 47 which are mounted upon a skeleton member 70 suitably secured to the plate 14 by means of bolts 71, 73 and 74, and to the door proper by means of the bolt 72, is a yoke 48 pivoted to the center of which is one end of a connecting link 49. The other end of said link is pivotally connected with one arm of a rocking lever 50. The other arm of the rocking lever is connected to the pawl 42 by a connecting rod 51. For manipulating the combination locks, spindles 52 and 53 extending through the thickness of the door, are provided. The inner ends of said spindles are connected up with the combination locks by means of gear trains (not shown on the drawings) while the outer ends thereof (see Fig. 1) are provided with dials 54 and 55 adapting them to be manipulated in the usual manner. Connected with the dog 43, is a rod 56 adapted to transmit the motion of a time lock 57 to said dog by means of a longitudinally slidable bar 58. Movement of the ring 9 may thus be prevented by the time lock or combination locks or by all of them combined.

In carrying out the details of my invention as embodied in the accompanying drawings, a peculiar construction has been made use of in the formation of the links 20', 20'' and 20''' (see Fig. 2) which are individual members of the group of levers 20 pivotally attached to the stationary plate 14. In the

case of link 20', said peculiar construction consists in providing the link at its outer end, with a laterally curved neck portion 59, forming a U-shaped slot 60 whereby said link is adapted to partake of a limited movement on a bushing (not shown) upon the combination spindle 53. By means of this device, the oscillation of the actuating ring 9 is controlled in one direction. To control the movement of ring 9 in the opposite direction, link 20'' has been similarly provided with a neck 61 and slot 62 in such manner as to limit the movement of the link on the hub 63 of the pawl 42. In addition to these links, an effectual reinforcement to this control is effected by means of link 20''' embodying the closed slot 64 which limits the movement in both directions of the link 20''' over a bushing carried by the lower combination spindle 52.

While I have described my invention as adapted to the bolt work of a circular door, it is obvious that by substituting straight bars for rings, the same could be adapted for bolt work on rectangular doors. It is furthermore obvious that the flange 15 of the stationary plate 14 could be eliminated and the inner series of links pivoted directly to the door of the safe without departing from the spirit of my invention.

Having thus described my invention, the following is what I claim and desire to secure by Letters Patent:—

1. In a lock mechanism for safes, the combination with a sliding bolt; of a stationary member; a toggle lever connecting the bolt with the stationary member; and a ring movable angularly, said ring being slidably connected with the knee of said toggle lever in such a manner as to permit relative radial sliding movement between said lever and the ring.

2. In a lock mechanism for locking safes, the combination with a sliding bolt; of a circular stationary plate; an actuating ring movable about the axis of said stationary plate, said ring being provided with a radial transverse slot; a plurality of levers connecting the sliding bolt with the stationary plate; and means sliding in said slot and connecting said actuating ring with said levers whereby said levers are adapted to transmit pressure from said stationary plate to the bolt when said ring is moved.

3. In bolt mechanism for safes, the combination with the radially movable bolts; of a stationary plate; a plurality of levers connected in pairs by swiveled connections and connecting said bolts to the stationary plate; a movable actuating ring connected to the swiveled connections in such manner as to permit radial movement of said connections on said ring; and means for imparting an angular oscillation to the actuating ring.



4. In a bolt mechanism for safes, the combination of sliding bolts and a stationary ring member with a plurality of toggle levers each of said toggle levers being connected at one end with a sliding bolt and at the other end to said ring; a connection-member swiveled to the knee of each of said toggle levers; and means for oscillating said swiveled connection.

5. In a bolt mechanism for safes, the combination with a plurality of bolts arranged in a circle and sliding radially; of a plurality of toggle-levers attached at one end to said sliding bolts and at the other end to a circular series of fixed points concentrically arranged with respect to said bolts; a movable ring concentric with said fixed points; and means connecting the knee of each toggle-lever with said ring in such manner as to allow a limited relative movement between the lever and the ring.

6. In a bolt mechanism for safes, the combination with a fixed member; of a plurality of movable bolts extending radially from said member; a toggle connecting each of said bolts to the fixed member; a movable ring connected with the knee of said toggle and constructed to permit radial play between it and the knee; and means oscillating the movable ring about its axis.

7. In a bolt mechanism for safes, the combination with a movable bolt and a stationary ring member; of a toggle lever having one end pivotally connected with the bolt and its other end pivoted to said stationary ring member; a connection member swiveled to the knee of said toggle lever; a movable actuating ring loosely secured to said swiveled connection and provided with an arcuate rack on the periphery thereof; and geared means for oscillating said actuating ring about its axis.

8. In combination with the door of a safe, a plurality of bolts movable thereon; a plurality of toggle levers each pivoted at one end to the end of one of said bolts and at the other end upon a part rigid with the door; a common connection member swiveled directly to the knees of all of said toggle levers, and means for oscillating said common

connection member and actuating the several bolts.

9. In combination with the door of a safe; a bolt mechanism comprising a bolt movable longitudinally upon the door; a toggle lever pivotally connected at one end to said bolt and at the other end to a portion rigid with the door and provided with means for limiting its angular movement about its pivot; a movable actuating ring loosely secured to the knee of said toggle lever; and means operated from outside the door for operating said actuating ring.

10. In combination with the door of a safe; a bolt mechanism comprising a member rigid with the door; a plurality of bolts movable thereon; a plurality of toggle levers connecting each bolt with said rigid member; and means for throwing each of said toggle levers into and out of alinement to actuate the bolts on the door.

11. In a bolt mechanism for locking safes, the combination with a fixed ring and a plurality of movable bolts; of toggle levers, for connecting said bolts with the fixed ring, one of said toggles comprising a rod limited in its movement in one direction, another of said toggles comprising a rod limited in its movement in the opposite direction, and a third toggle comprising a rod limited in its movement in both directions; and a movable actuating ring connected with all of said toggle levers and adapted to make them move in unison.

12. In a bolt mechanism for safes, the combination with a fixed plate; of a plurality of bolts connected therewith by toggle levers; means carried by the levers for limiting their angular movement; an actuating ring connected with the knees of the toggle levers; means for imparting an angular oscillation to said actuating ring; and means controlled by time and combination locks for preventing said angular oscillation.

The foregoing specification signed at Pittsburgh, Pa., this 1st day of April, 1908.

GEORGE L. DAMON.

In presence of two witnesses—

R. B. COONEY,

A. O. KNIGHT.