H. C. VON PHILP.

LOCKING MECHANISM FOR SAFE OR VAULT DOORS.

APPLICATION FILED SEPT. 23, 1915.

1,173,068.

Patented Feb. 22, 1916.

5 SHEETS—SHEET 1.

FIG. 1.

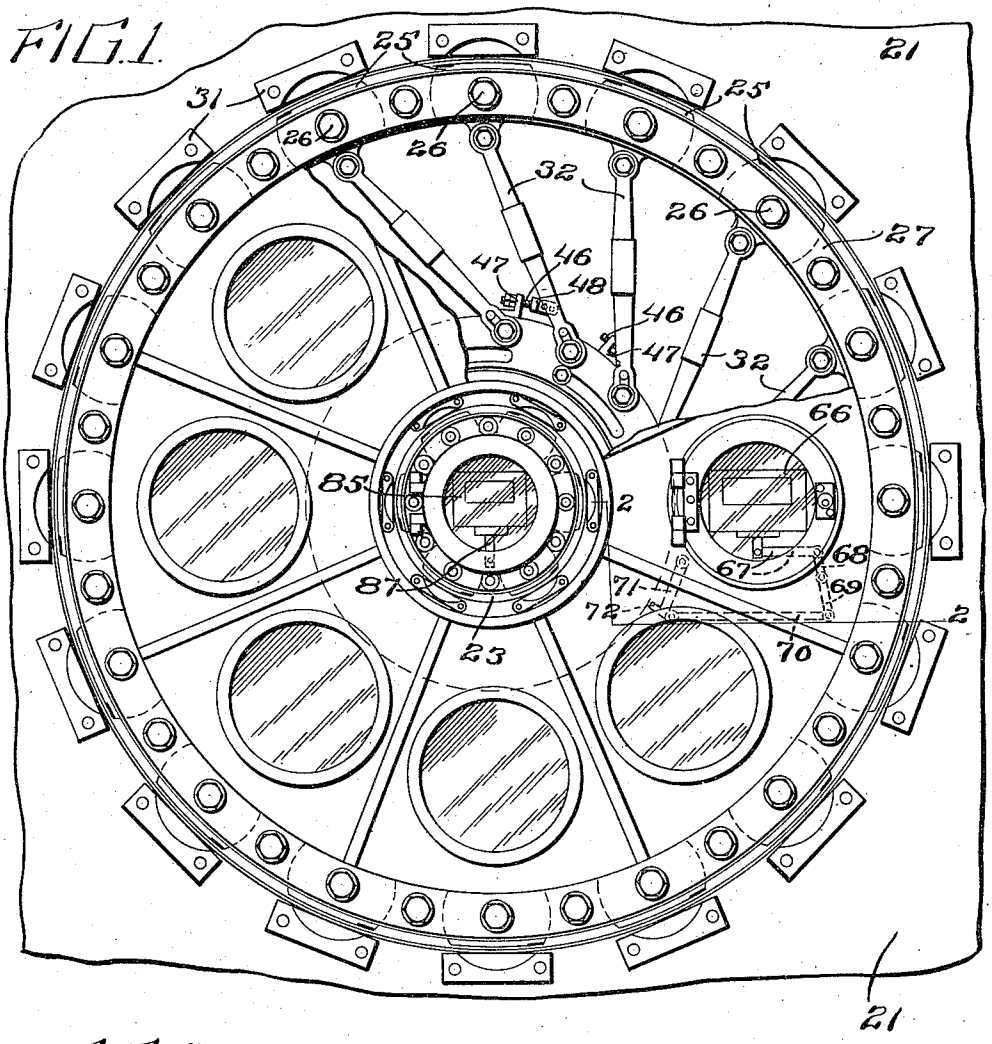
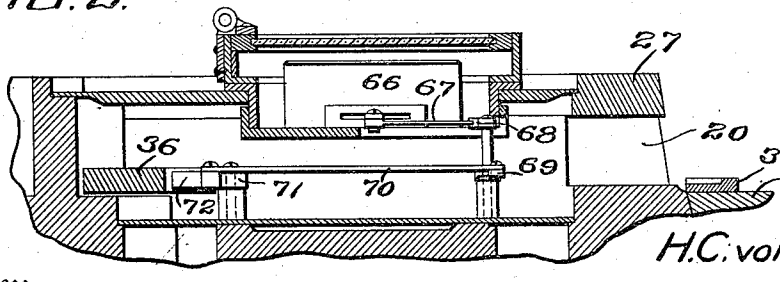


FIG. 2.



Witness

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FIG. 3.

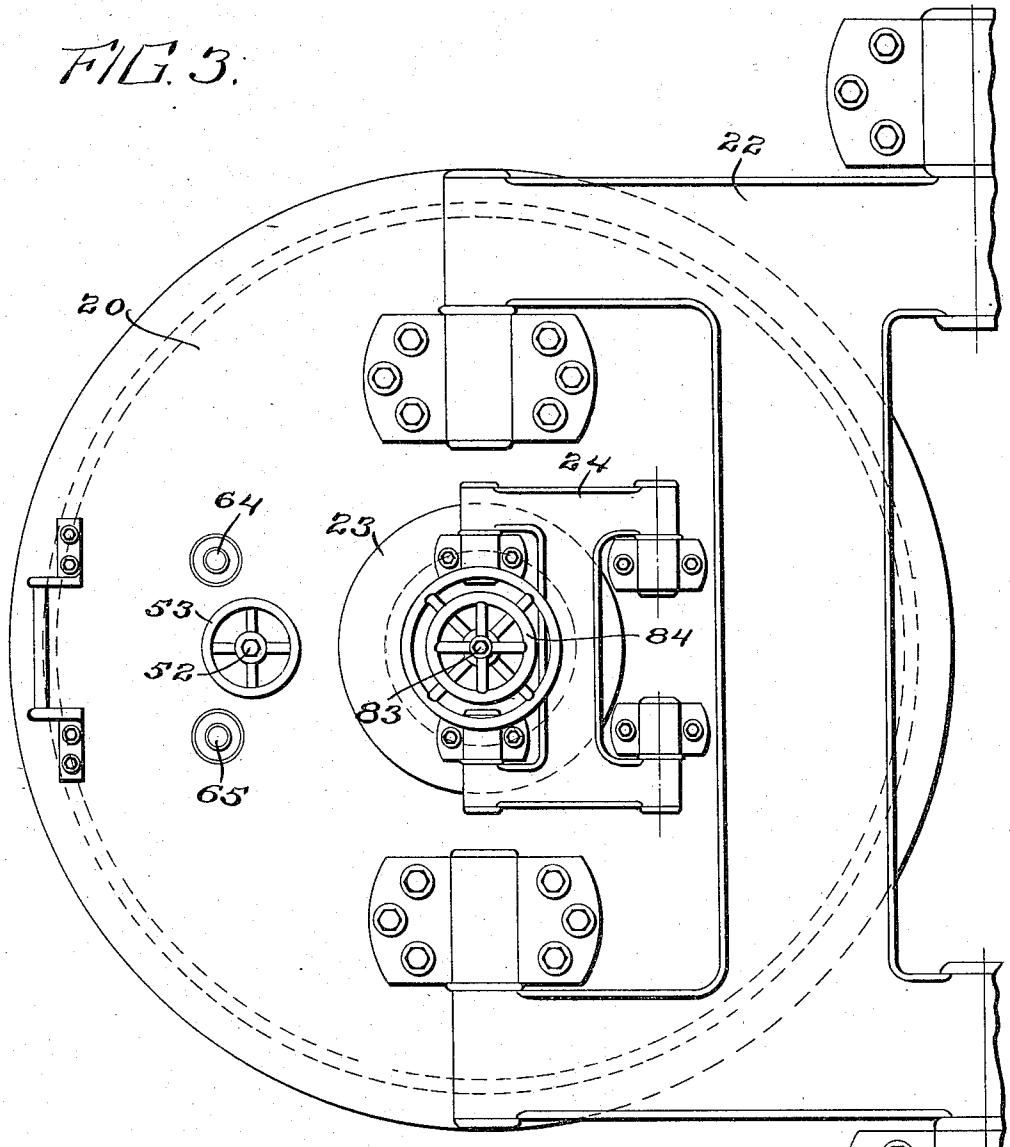
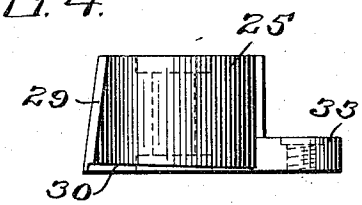


FIG. 4.



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5 SHEETS—SHEET 3.

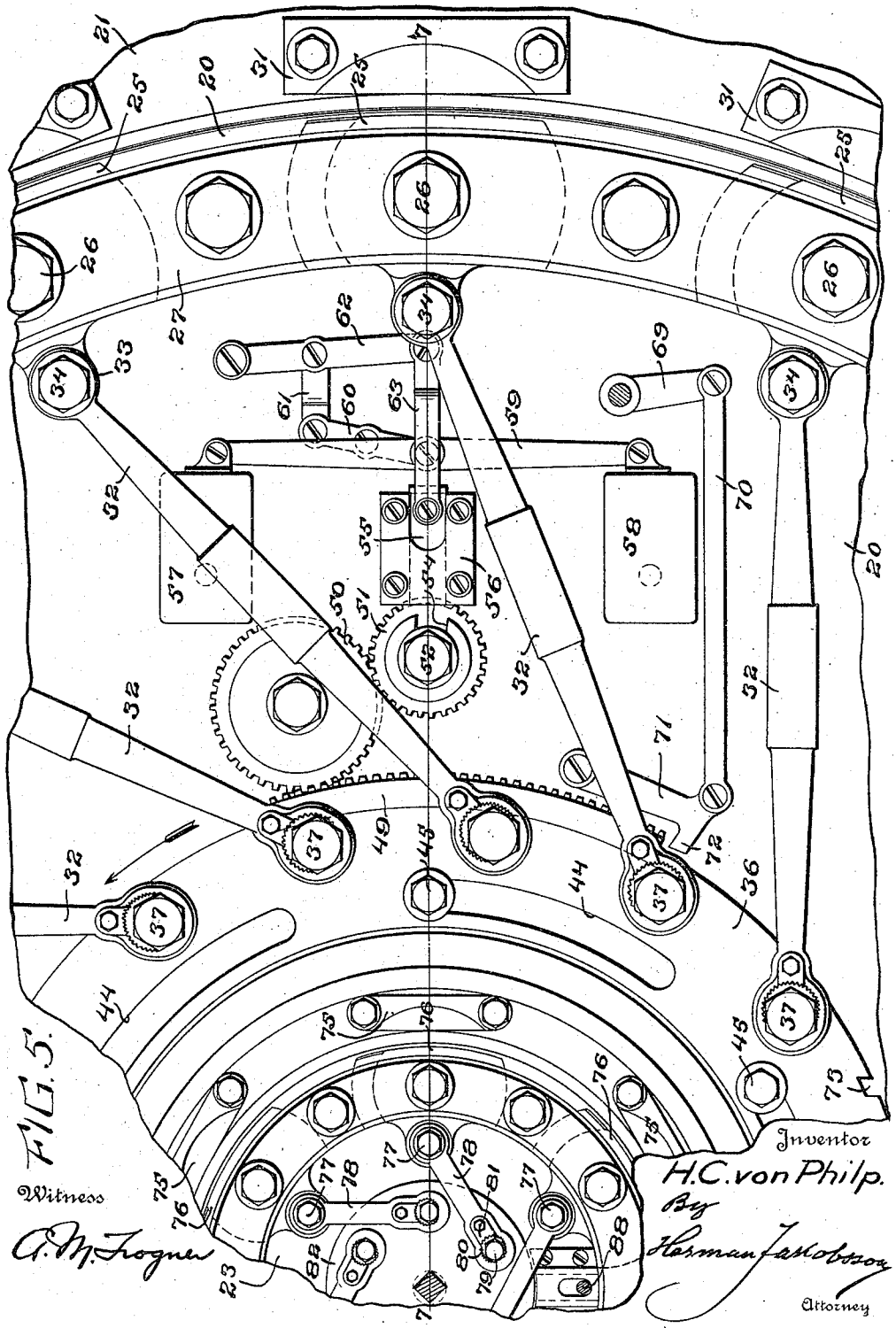


FIG. 5.

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5 SHEETS—SHEET 4.

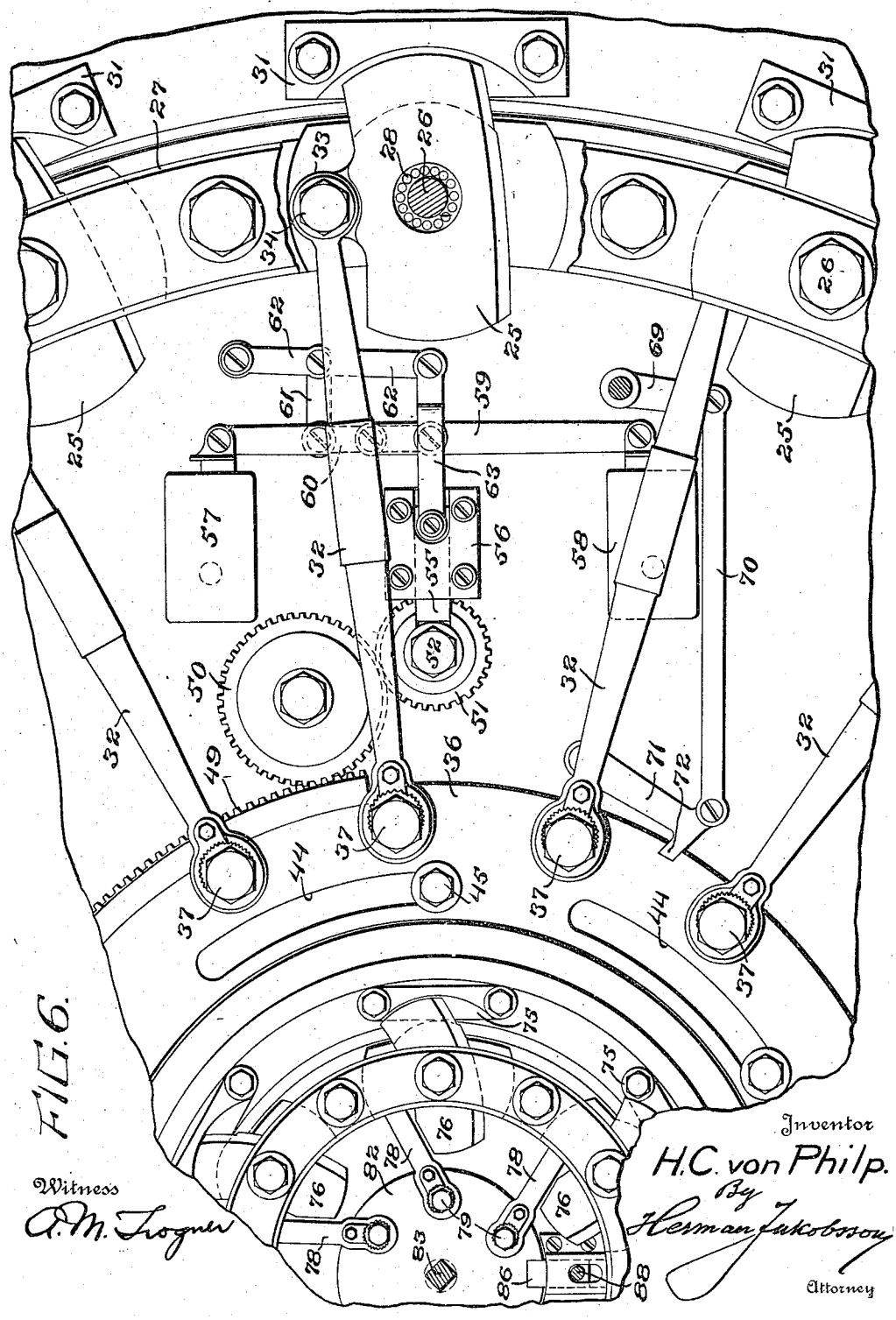


FIG. 6.

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5 SHEETS—SHEET 5.

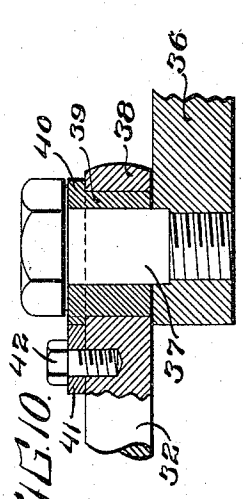


FIG. 10.

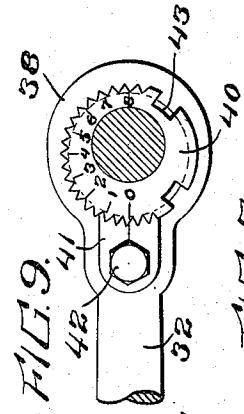


FIG. 9.

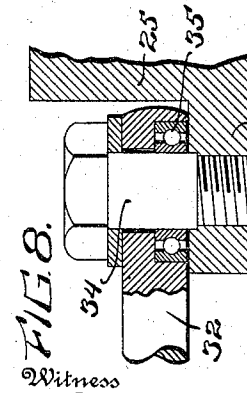


FIG. 8.

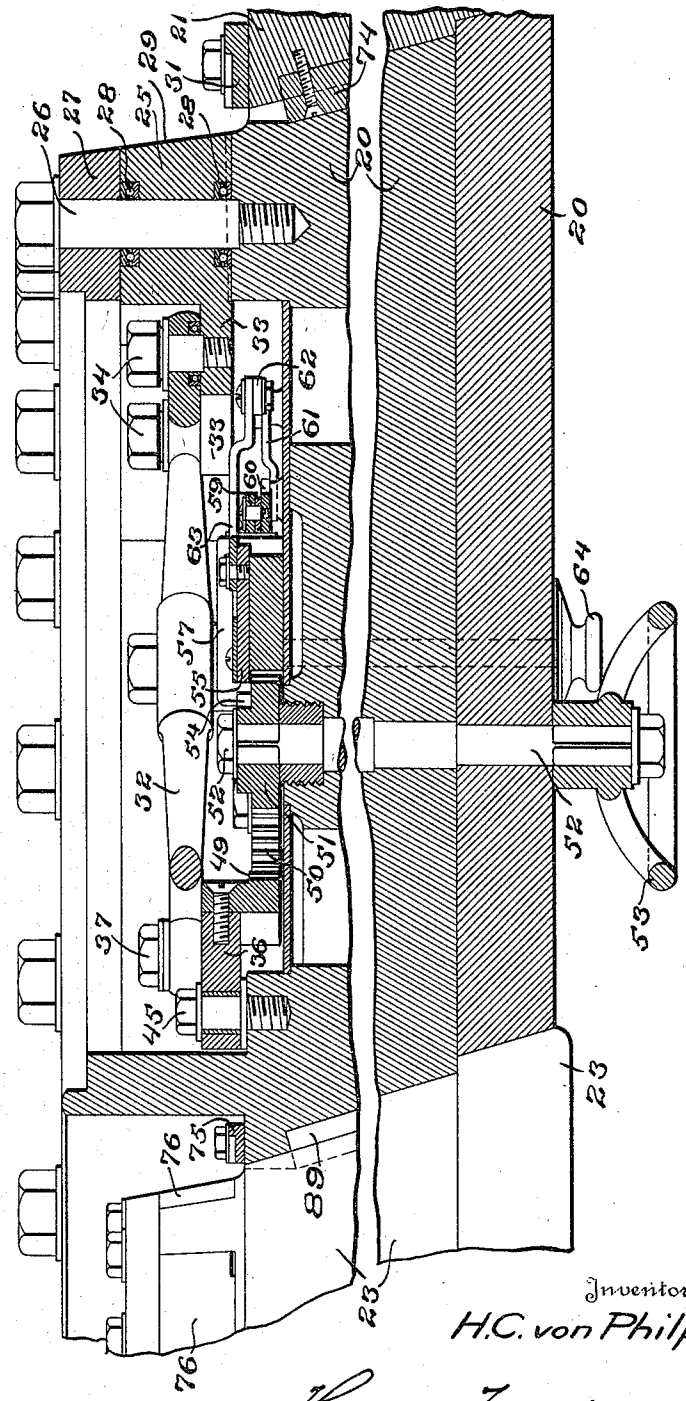


FIG. 7.

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LOCKING MECHANISM FOR SAFE OR VAULT DOORS.

1,173,068. Specification of Letters Patent. Patented Feb. 22, 1916.

Application filed September 23, 1915. Serial No. 52,276.

To all whom it may concern:

Be it known that I, HJALMAR CASIMIR von PHILP, citizen of the United States, residing at Bethlehem, in the county of Northampton and State of Pennsylvania, have invented certain new and useful Improvements in Locking Mechanism for Safe or Vault Doors, of which the following is a specification.

My invention relates to improvements in the mechanism for locking doors of safes or vaults and although here shown and described in connection with circular doors, the mechanism may equally well be utilized on doors of other shapes.

Generally sliding bolts are used for locking safe doors in their jambs. The present invention resides now in providing revoluble wedges for the same purpose, which are all operated simultaneously from the same source, which is dependent on time or combination locks or both together.

One embodiment of my invention is illustrated in the accompanying drawings.

Figure 1 shows a rear elevation of the door; Fig. 2 is a section along line 2—2 of Fig. 1 in a larger scale; Fig. 3 is a front elevation of the door; Fig. 4 is a detail in larger scale; Fig. 5 is a portion of Fig. 1 in larger scale and the mechanism unlocked; Fig. 6 is a view similar to Fig. 5, with the mechanism locked; Fig. 7 is a section along line 7—7 of Fig. 5; Fig. 8 is a section in larger scale, of the locking wedge connection with its operating rod, and Figs. 9 and 10 respectively a plan view and a section of the head of the operating rod and its adjustment.

The main door 20, here shown circular, fits in its jamb 21 and has the general shape of a frustum of a cone. The door is hung in the usual manner on a double hinge 22. An emergency door 23 of the same shape fits in a central opening in the main door, and is of a size large enough to permit a person to enter the vault. The small door is hung in a similar manner on its double hinge 24.

The locking mechanism for the main door consists of a plurality of cam wedges 25 revolubly mounted on heavy steel studs 26 between the main door and a circular frame 27, the thrust being taken up by hardened steel balls and races 28. The outer surface 29 of each wedge conforms in shape to the taper of the door to facilitate entrance, compare Fig. 4, and a portion of its side, facing the door, is beveled as at 30. This is for the purpose of engagement between the cam wedge and a correspondingly beveled jamb plate 31, when the door is locked, one plate being secured on the inside of the joint, opposite each cam wedge in suitable position for such engagement.

Movement is imparted to the cam wedges 25 by links, which are connected to ears 33 on the wedges by means of top bolts 34 and ball bearings 35 (see Fig. 8). The other end of each link 32, is connected with the master ring or main drive-wheel 36 by means of a top bolt 37 running through its head 38, compare Figs. 9 and 10. As it is of the greatest importance that all the links coöperate properly in turning the cam-wedges, not only the length of the links, but also the location of the bolts, 26, 34, 37 must be exact. If not the mechanism will work stiffly. Although great care is taken to accomplish this, it is almost impossible to avoid that some dimensions are out a little. Now to rectify any such error and to insure the smooth and easy working of the mechanism, I provide adjusting means for the links. These adjusting means comprise an eccentric bushing 39 between the bolt 37 and the head 38, which bushing has a collar 40, toothed on a little more than half its circumference. A locking plate 41, held in position by its tap bolt 42 has corresponding teeth for engaging the collar and prevent the bushing 39 from turning after setting. The collar may be provided with a graduation for observing the amount of turning to be given the bushing, such turning being equivalent to lengthening or shortening of the links. Slots 43 for a wrench or setting tool are provided in the edge of the collar.

The master ring or main drive-wheel 36 is mounted concentrically on the main door and has guide-slots 44 for its holding bolts 45 permitting a limited rotation of the drive wheel. This slot is slightly longer than the required rotation of the drive-ring, and stops, in the form of set screws 46 in bearings 47, are provided on the periphery of the drive-wheel and are set to impinge with one side or the other of an abutment plate 48 according to whether the mechanism is open or closed.

The gearing for rotating the main drive-

wheel 36, comprises a toothed segment 49, preferably made in a separate piece and secured on the drive-wheel, an idler 50 meshing with the segment as well as with the spur gear pinion 51, which is keyed to the spindle 52, mounted to revolve in the main door. The other end of the spindle which projects through the front face of the door, has an operating hand wheel 53 attached to it. The pinion 51 has a recess 54 cut in its front face for engagement with a latch dog 55 mounted to slide in its guide 56. By this means the pinion 51 and the operating wheel 53 are secured against turning until the latch dog has been withdrawn.

Two combination locks 57 and 58, the slide bolts of which are connected by a bar 59, control the sliding dog 55, through the link system 60, 61, 62, 63 and knobs 64, 65 actuate their respective locks, which link system is provided with adjustment that will allow the slide dog 55 to be operated by either one or both locks. Besides the two combination locks, a time lock 66 is also provided, so that, without the time lock having first released the locking mechanism, the latter cannot be opened even if the combination locks had withdrawn the latch dog 55; thus a double checking for the movement of the main drive wheel is attained. As the time and combination locks may be of any known construction and as they do not form part of this invention, no description of them is necessary. The time lock connects, by means of a link system 67, 68, 69, 70 with a swinging pawl 71, having a nose 72 for engaging with a notch 73 in the edge of the main drive-wheel 36, when the door is closed and locked.

To prevent any rotation of the door in its joint, a key 74, is secured in the joint and a key way cut in the surface of the door. Ordinarily, this key would have no particular function except perhaps during the assembling, but in case the hinge were broken by somebody attempting an illegal entrance into the vault, then the wedge would prevent the door from being rotated. There might be a remote possibility of this being done by applying a considerable force, and the cam-wedges 25 might as a consequence be turned, retracting their hold on the jamb plates 31. With this key 74 between the jamb and the door, the rotation of the latter will be impossible.

The operation of the device would be as follows:—As soon as the time lock 66 has retracted the pawl 71 from the recess 73, the knobs 64, 65 are manipulated to open the combination locks 57, 58, which then withdraw the latch dog 55 from the recess 54 in the pinion 51. The hand wheel 53 is thereupon turned actuating the gearing 51, 50, 49 and revolving the master ring or main drive-wheel 36 until stopped by the abutment 48. The turning of the drive-wheel is transmitted through the links 32 to their respective cam-wedges 25, which will now turn until flush with the conical surface of the main door, when the latter may be swung open.

In the center of the main door 20 is placed an auxiliary or emergency door 23 in the manner already described. The main door serving as jamb for the emergency door. A locking mechanism similar to that of the main door is provided for the smaller one and comprises jamb plates 75, cam wedges 76, bolts and links 77, 78, link-adjusting means 79, 80, 81, drive wheel 82 with spindle 83 and handle 84 for turning the same. This door being comparatively light, no intermediate gearing is considered necessary between the handle 84 and the drive wheel 82. A time lock 85 has been shown in this case, but there is nothing to prevent any other lock or checking device to be used. As in the case of the main door, this time lock controls a latch bolt 86 engaging in a slot on the drive-wheel 82 when the mechanism is locked. The time lock is suitably connected with the latch bolt 86 by means of a bar 87 and rod 88.

Similarly to the main door, the emergency door is also keyed in the jamb formed in the main door for it. This key 89 is shown in Fig. 7. It will now readily be understood that the emergency door may be opened at a certain time of the day, when the time lock has withdrawn the latch bolt 86. All that needs to be done is then to turn the drive-wheel 82, by means of the handle 84, when the links 78 will swing all of the wedges 76, releasing the door, which then may be swung open. The emergency door need not necessarily be placed in the center of the main door as shown. On non-circular doors as rectangular ones for instance, it might be advantageous to place it either at the upper or the lower end.

Under ordinary circumstances and for daily use, the main door is of course unlocked and swung open after operating its lock, but there are many occasions when the smaller door would be utilized, its opening being large enough to permit a person to enter. Its principal use would always be when the lock of the main door is out of order, as access to the vault can then be had through the emergency door both for taking in or out valuables and for repairing the main lock. But even if the main-lock were in order, it might be preferable at times to use the emergency door, as for instance, during or after a fire, if the room were filled with smoke or poisonous gases, or if flooded above the bottom edge of the main door. By then using the small door, no water could enter the vault and very little smoke or gas would have time to get into it during the

short interval it would take for the person to open it and immediately again closing the door after passing through.

What I claim as new is:—

1. A locking mechanism for circular safe doors, comprising a plurality of cam-wedges revolubly mounted near the edge on the door; correspondingly shaped cams on the door jamb for engaging with said cam-wedges for locking the door, a member revolubly mounted on the door; and coaxial therewith a link for each cam-wedge connecting said member with each of said cam-wedges, means for rotating said member, joints on the cam-wedge and on said member for each link and means in one of said parts for adjusting the relative position of said joints.

2. A locking mechanism for circular safe doors, comprising a plurality of cam-wedges disposed in a circle near the edge of the door; a bearing ring bolted to the door and a journal for each cam-wedge secured to the door and the ring; correspondingly shaped cams on the door jamb for engaging with said cam-wedges for locking the door, a member revolubly mounted on the door and coaxial therewith; a link for each cam-wedge connecting said member with each of said cam-wedges, means for rotating said member, joints on the cam-wedge and on said member for each link, one of said joints having an eccentric adjusting means whereby the distance between said joints may be accurately adjusted.

3. A locking mechanism for circular safe doors, comprising a cam-wedge revolubly mounted on an antifriction bearing near the edge of the door; a cam on the door jamb engaging with said cam-wedge for locking the door, said cam-wedge being approximately rectangular in shape and provided with an ear on one of the long sides and symmetrically disposed with regard to a center line of said antifriction bearing so as to be perfectly balanced, a member revolubly mounted on the door and coaxially therewith; a link hinged to said member and the ear of said cam-wedge, means for rotating said member; the centers of said bearing and said hinge on the ear being in radial alinement with the center of said member, when the parts stand in open position.

4. A locking mechanism for circular safe doors, comprising a cam-wedge revolubly mounted on an antifriction bearing near the edge on the door; a cam on the door jamb engaging with said cam-wedge for locking the door, a member revolubly mounted on the door; link connection between said member and said cam-wedge and means for rotating said member, a latching device for said revoluble member and a safe-lock controlling the same, whereby said cam-wedges will be positively secured in the locking position; said device comprising a dog for engaging a corresponding notch provided in the edge of said revoluble member.

5. A locking mechanism for circular safe doors, comprising a cam-wedge revolubly mounted on an antifriction bearing near the edge on the door; a cam on the door jamb engaging with said cam-wedge for locking the door, a member revolubly mounted on the door; link connection between said member and said cam-wedge and means for rotating said member, a sliding bolt constructed to enter a notch in said rotating means and a safe-lock controlling said bolt, whereby said cam-wedges will be positively held in their locking position.

6. A locking mechanism for non-revoluble circular vault doors comprising a plurality of balanced cam-wedges revolubly mounted near the edges on the door and provided each with an ear, cams on the door jamb for engaging with said cam-wedges thereby locking the door, a connecting rod journaled on the ear of each cam-wedge, a common drive wheel coaxially mounted on the door, guides and stops between said drive wheel and said door permitting a limited rotation of the drive-wheel; a journal on said drive-wheel for each of said connecting rods, an eccentric bushing around each journal in each rod and setting means for said bushing for the purpose of adjusting the acting length of each of said connecting rods; and means for revolving said drive wheel.

In testimony whereof I affix my signature.

HJALMAR CASIMIR VON PHILP.

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