

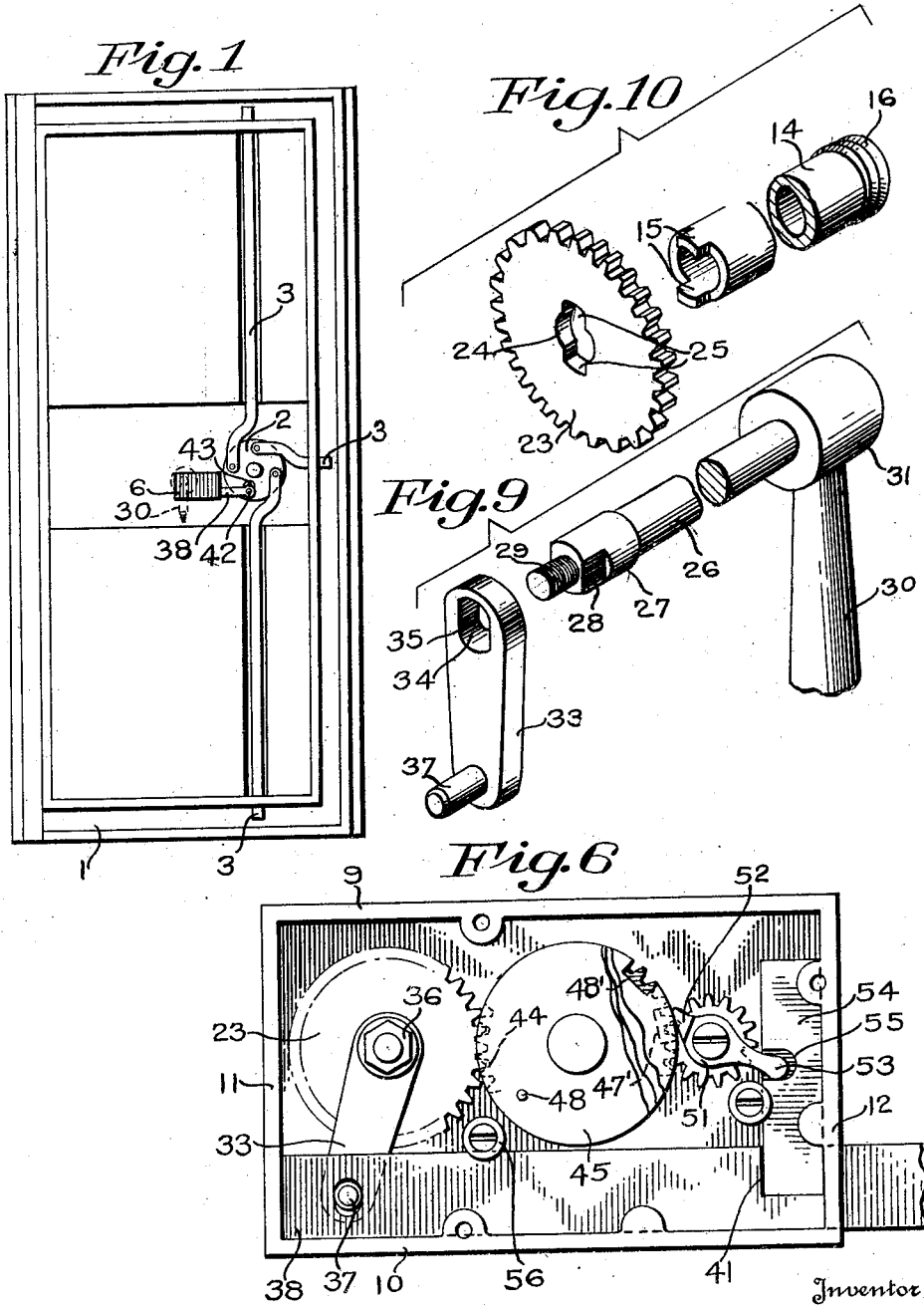
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LOCK MECHANISM FOR SAFES

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2 Sheets-Sheet 1



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2 Sheets-Sheet 2

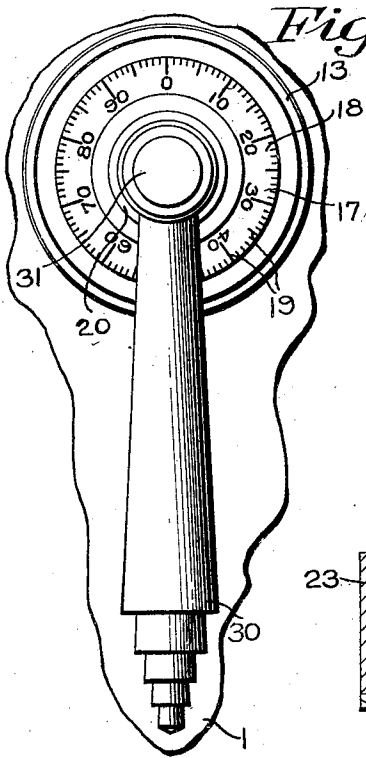


Fig. 2

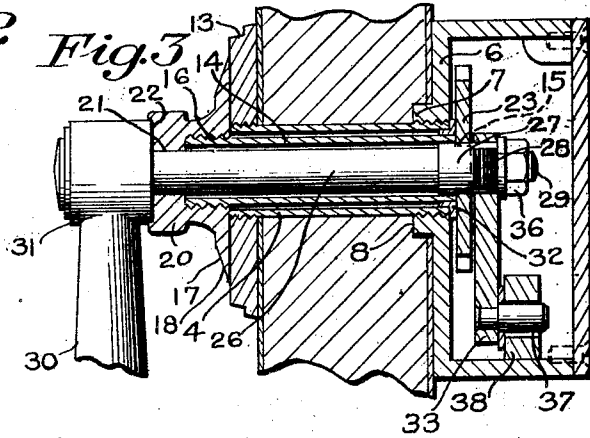


Fig. 3

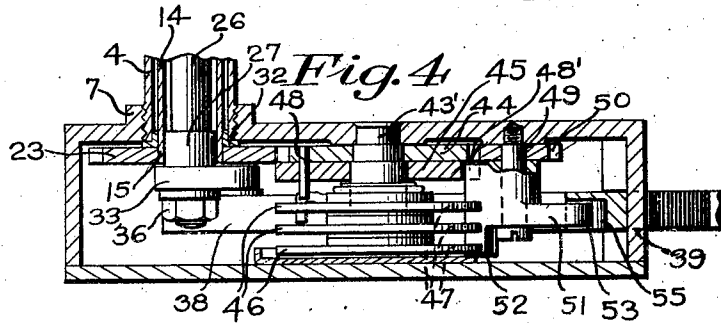


Fig. 4

Fig. 8

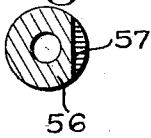


Fig. 7

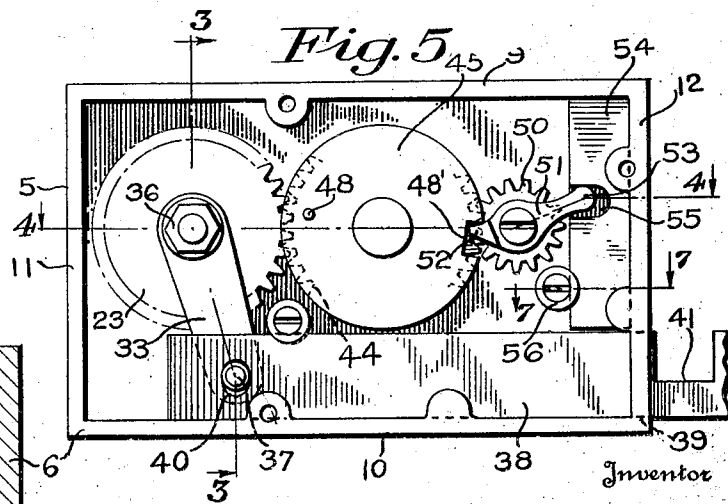
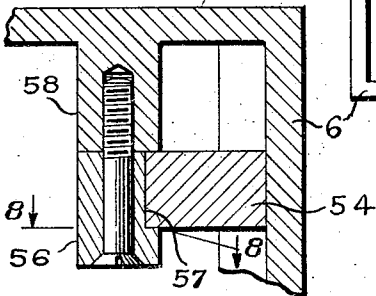


Fig. 5

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## LOCK MECHANISM FOR SAFES

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This invention relates to improvements in locking mechanisms for safes.

It is usual in safes to provide two separate units for controlling the manipulation of the tumblers and for throwing the locking bars of the door. In opening a safe of this type, a tumbler dial is first manipulated to properly set the tumblers in proper unlocking position and then a handle, located at a point remote from the tumbler, is turned to withdraw the locking bars.

It is an object of the present invention to combine these separated controlling and operating members in a single mounting with the control shaft of the bar operating handle extending into the safe through the center of the tumbler dial. In this assembly, both the tumbler dial and bar throwing handle are mounted for independent movement, and the operation of one does not affect or move the other during the operation of either. By this arrangement, it is possible to mount the entire locking mechanism on a safe by providing a single hole in the door to substitute for the plurality of holes heretofore required. It is also possible to utilize a single tumbler housing for containing all of the tumbler and bolt throwing mechanism. The results of utilizing such features do not solely lie in the structural economy effected, but also improve the exterior appearance of the safe and centralize the controls so that it is possible to manipulate the same with one hand.

These and other features and objects of the invention are more specifically set forth in the following description and claims.

In the drawings:

Fig. 1 is a rear elevation of a safe door with the inside cover plate omitted, showing the locking mechanism of the present invention applied.

Fig. 2 is a front view of the assembled bar throwing handle and dial.

Fig. 3 is a section on the line 3—3 of Fig. 5.

Fig. 4 is a section on the line 4—4 of Fig. 5.

Fig. 5 is a rear view of the tumbler and casing assembly with the cover plate removed, and the mechanism in unlocked position.

Fig. 6 is a view similar to Fig. 5 with the mechanism in locked position.

Fig. 7 is a section on the line 7—7 of Fig. 5.

Fig. 8 is a section on the line 8—8 of Fig. 7.

Fig. 9 is a perspective view of the handle shaft and throw arm in disassembled relation.

Fig. 10 is a perspective view of the dial shaft and tumbler gear in disassembled relation.

In the specification, the numeral 1 indicates a safe door of conventional design provided at its rear side with a rotary member 2 connected to a number of lock bars 3 in the usual manner. Adjacent to the member 2 the door is provided with a hole to receive a bearing or guide sleeve 4 threaded externally at both ends. A rectangular housing 6 has a boss 7 threaded on the end of sleeve 4 at the rear side of the door. The wall 8 of housing 6 fits against the rear face of the door in a recessed portion therein.

The housing 6 is provided with a top wall 9, a bottom wall 10, and end walls 11 and 12 respectively. A dial or escutcheon plate 13 is threaded on the forward end of sleeve 4 and fits tight against the front wall of the door to retain the housing tightly against the rear wall of the door. A tumbler shaft or tube 14 is inserted within guide sleeve 4, is provided with opposed key portions 15 at the rear end, and with a threaded portion 16 at the other end, the key portions protruding into housing 6 and the threaded portion extending forwardly beyond the dial plate 13. A dial 17 is threaded onto threaded portion 16 of the tumbler tube 14. The dial 17 is of conventional design, having a flat base portion seating on the dial plate 13, and having an annular beveled edge 18 provided with dial markings 19. A handle portion 20 extends from the annular beveled portion of dial 17, has an opening 21 to provide a bearing surface, and a concentric counter bore 22 in the end thereof. A tumbler gear 23 is mounted on the rear end of the tumbler tube 14, having a hole 24 and recesses 25 forming a key slot to receive the projections 15 on tumbler tube 14 in recesses 25 with the end of the tube engaging the face of the gear at the marginal portions of open-

ing 24. A bar operating shaft 26 is mounted in and extends through the tumbler tube 14 into housing 6, where it is provided with an enlarged portion 27 recessed to form flat faces 28 at the free end, a reduced threaded portion 29 extending from the free end. Shaft 26 extends through opening 21 in the dial and has an operating handle 30 mounted thereon, the head portion 31 of the handle seating in the counterbore 22 of the dial handle 20. The enlarged portion 27 has bearing contact in opening 24 of gear 23, which in turn, has a bearing adjacent thereto on tube 14 engaging in bearing ring 32 seated in the end of bearing sleeve 4.

A bar throw arm 33 is provided with a hole 34 at one extremity having two flattened walls 35. The arm is fitted over the enlarged portion of the bar operating shaft with the walls 35 fitting against the flat faces 28 on the shaft, to prevent rotation of the arm thereon. The arm is secured against removal from the enlarged portion of the shaft by a nut 36 which is screwed on the threaded portion 29 thereof. A pin 37 is secured to and extends laterally from the other end of arm 33.

A throw bolt 38 extends through a rectangular opening 39 in the lower portion of wall 12, and slides on the bottom wall 10 of housing 6. One end terminates in the housing and engages the wall 10, as shown in Fig. 6, in the locked position of the parts, the end of the bolt 38 having a slot 40 receiving pin 37 on throw arm 33. Bolt 38 has a recess 41 in the portion adjacent wall 12 positioned within housing 6 and having the outer edge terminating in substantial alignment with the inner face of wall 12 in the position shown in Fig. 6 for a purpose hereafter described. The outer end of bolt 38 is connected to rotary member 2 by stud 42 extending through a radial slot 43 in said member.

A tumbler shaft 43' is riveted to back wall 12 of housing 6 and extends perpendicularly thereto within the housing. On this shaft any suitable type of tumbler mechanism known in the art may be mounted. For example, the tumbler operating gear 44 is rotatably mounted on the shaft and meshes with the tumbler gear 23. A dog operating tumbler disc 45 is mounted on the shaft adjacent and secured to the gear 44.

A series of shield tumblers 46 are mounted for independent rotation on shaft 43' each having a recess 47 in the edge thereof and cooperating combination setting pins 48 adapted to align the recesses 47 in the tumblers 46 with a corresponding recess 48' in the periphery of tumbler disc 45, when the combination is set for unlocking the safe in a manner well known in the art. A stud 49 is mounted on the back wall of the housing adjacent the tumbler assembly, and a dog operating gear 50 is rotatable thereon with an operating dog 51 in frictional engagement

therewith for rotation on said stud with said gear 50. The dog 51 is provided with a ratchet tooth 52 which extends entirely across all of the tumblers in the usual manner, and is adapted to engage within the recesses 47 and 48 when they are set in the position indicated at 47', shown in Fig. 6 in dotted lines. An arm 53 extends from the opposite side of the dog and is rounded at its extremity. A lock bolt 54 is mounted on the inside of the wall 12 of the housing and is adapted for sliding movement thereon and may be mounted against lateral movement in any suitable manner. The inner surface of the lock bolt is slotted at 55 to loosely receive the end of arm 53. The lower end of lock bolt 54 is adapted to fit within recess 41 of the bolt 38 when positioned as shown in Fig. 6, and is guided against lateral movement relative to the back wall by a guide washer 56 which is flattened at 57 to engage the surface of the bolt opposite wall 12 and is mounted on a suitable boss 58 on the housing as shown in Fig. 7. A similar guide washer is mounted in the housing for guiding the movement of bolt 38.

In operation, when it is desired to unlock the safe, from the locked position of the mechanism as shown in Fig. 6, the dial 17 is manipulated in the usual well known manner until the recesses 47 and 48' on the tumblers 45 and 46 are in line with the point of the ratchet tooth 52, as shown at 47'. Subsequent rotation of tumbler 45 in a clockwise direction, as viewed in Fig. 6, will rotate dog operating gear 50 and through the frictional engagement with dog 51, the ratchet tooth 52 of dog 51 will be moved into the recesses 47 and 48 in the tumblers 46 and 48 respectively, so that upon further movement of the tumblers 46 and 48, the dog 51 will move downwardly and arm 53 will move upwardly and lift the lock bolt 54 to a position abutting the inside of the top wall 9 as shown in Fig. 5. This frees the throw bolt 38 for movement by the operating handle 27 from the position of Fig. 6 to the right into the position of Fig. 5, causing the rotation of member 2 to withdraw the locking bars 3 and unlock the safe door. By moving the dial 20 out of unlocking position so as to interrupt the combination setting in the usual manner, the mechanism will be prepared so that movement of the handle 30 into locking position will move the locking bolt 38 to the position shown in Fig. 6, when the lock bolt 54 will drop into recess 41 again setting the lock.

The showing of the tumbler mechanism is only generally illustrated in diagrammatic form as this mechanism is well known in the art and any of the usual types of combination controls for locks may be used. The feature of the present invention lies in the concentric mounting of the dial 20 and han-

dle 30 with the mechanism controlled thereby combined in a new manner for the control and operation of the locking bars 3.

It is particularly pointed out that the location of the concentric shafts in relation to the location of the tumblers and operating dog offers a burglar-proof feature against the driving in of the shafts to upset the locking mechanism. It will be apparent from the description that such burglarizing operation will be difficult in view of the sturdiness of construction inherent to the concentric shafts, and that furthermore if the shafts were driven in, the locking controls including the tumblers and the locking dog being remote thereto would not be affected.

What is claimed is:

1. In a lock for a safe door, a combination mechanism mounted on said door and provided with gear means, a throw bolt formed with a transverse notch and slidably mounted on the door adjacent said mechanism, a pair of independently rotatable concentric shafts mounted through the door, one of said shafts having gear means meshing with the gear means of said combination mechanism and the remaining shaft having a crank arm engaging said throw bolt, a locking bolt mounted for lateral movement relative said throw bolt and engageable in the transverse notch thereof, and means connecting said locking bolt to the combination mechanism for operation thereby.

2. In a lock for a safe door, a housing mounted on the inner side of the door, a combination mechanism mounted within said housing, a pair of independently rotatable concentric shafts mounted through the door and extending into said housing adjacent said combination mechanism, intermeshing gear means on the combination mechanism and on one of said shafts, a crank arm secured to the remaining shaft, a throw bolt slidably mounted on one wall of the housing and operatively connected to the crank arm, said throw bolt formed with a transverse notch, a locking bolt slidably mounted in said housing for movement transverse to said throw bolt and adapted to enter in the notch thereof in locking relation, and means connecting said locking bolt to the combination mechanism for operation thereby.

3. In a lock for a safe door, having an aperture therethrough, a sleeve extending through the aperture thereof, a dial plate secured to the sleeve on the exterior of the door, a housing secured to the sleeve on the interior of the door, a pair of independently rotatable concentric shafts extending through the sleeve and into said housing, locking bars movable into and out of locking position, a combination mechanism mounted within said housing remote from said shafts, means connecting one of said

shafts to the combination mechanism for operating the same, means connecting the remaining shaft to the locking bars for operating the same, a movable locking bolt adapted to engage the locking bars in locking relation and means connecting the locking bolt to the combination mechanism for operation thereby.

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