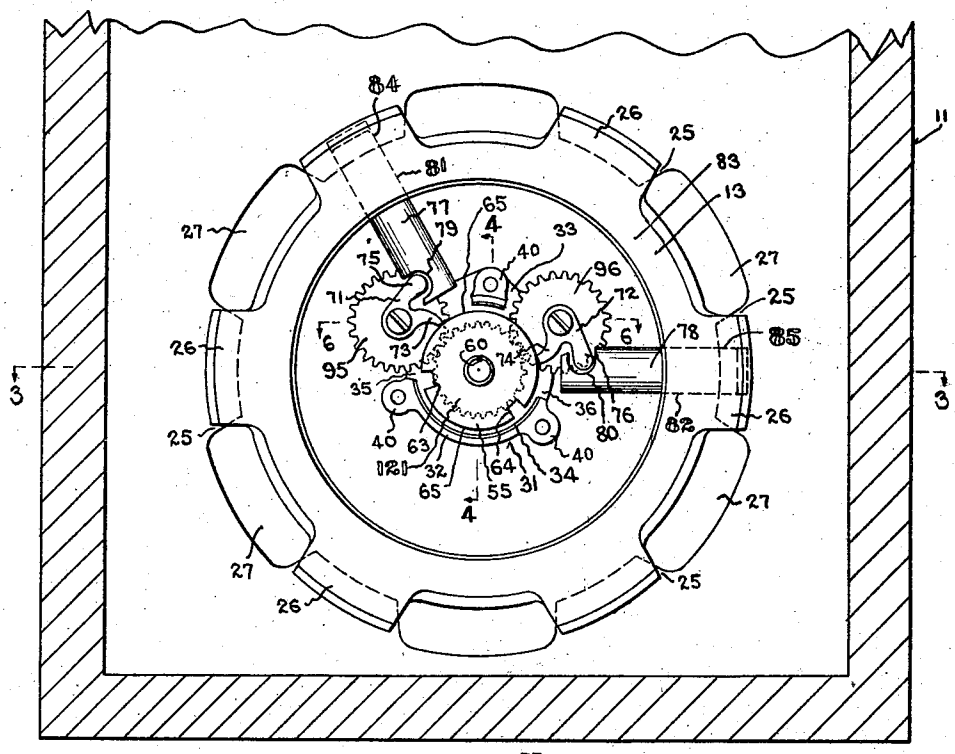
Feb. 8, 1927. 1,617,038

E. E. WATSON

COMBINATION LOCK MECHANISM

Filed July 12, 1926 2 Sheets-Sheet 1

Fig. 1.



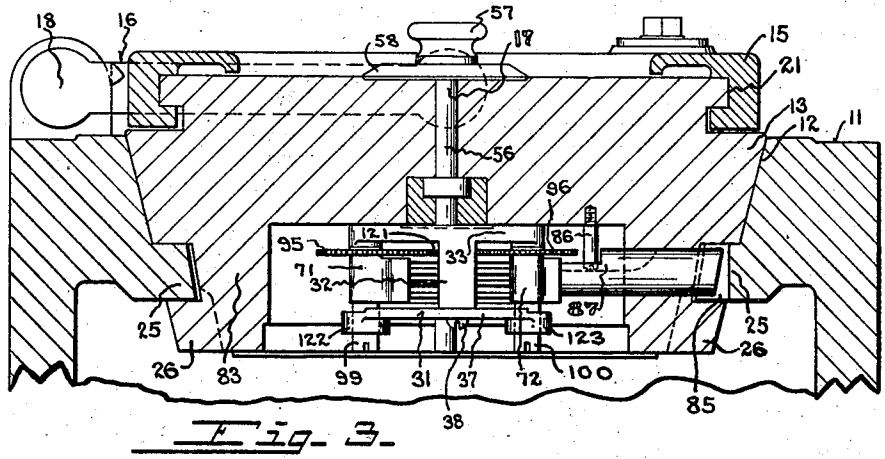


Fig. 3.

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Fig. 4.

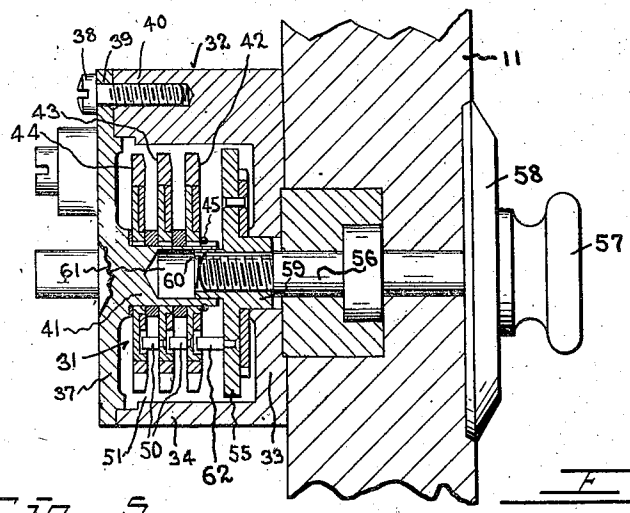


Fig. 5.

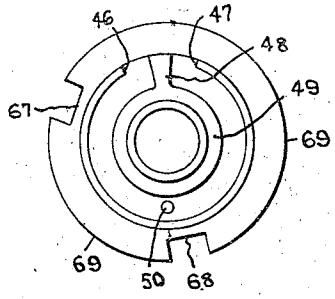


Fig. 2.

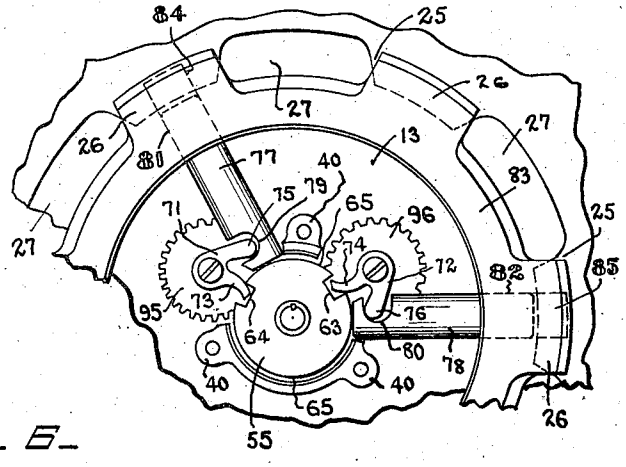
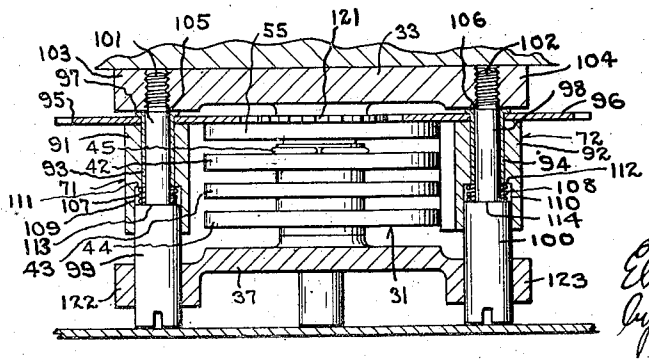


Fig. 6.



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Patented Feb. 8, 1927. 1,617,038

UNITED STATES PATENT OFFICE.

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COMBINATION LOCK MECHANISM.

Application filed July 12, 1926. Serial No. 121,836.

It is the object of my invention to provide a combination lock with a plurality of bolts so arranged as to be operated simultaneously into locked relation and into unlocked relation from a given point for lawful manipulation of the bolt works, and novel means whereby said plurality of bolts are held independently in locked relation when resisting felonious attempts to unlock the same, and, further, to provide novel means for compelling independent movements or manipulations of the respective bolts for causing the bolts to separately resist felonious attempts to unlock the structure to which my improved device is applied.

The invention will be further readily understood from the following description and claims, and from the drawings, in which latter:

Fig. 1 is a rear elevation of my improved device, with the rear plate and tumblers removed for better illustration of parts, and shown in connection with a round door of a safe, and with the bolts shown in locked relation.

Fig. 2 is a similar view of the same, partly broken away, with the bolts shown in unlocked relation.

Fig. 3 is a plan view of my improved device with the safe shown in cross-section, taken in the plane of the line 3—3 of Fig. 1.

Fig. 4 is a vertical section of the same, taken in the plane of the line 4—4 of Fig. 1.

Fig. 5 is a front elevation of one of the tumblers.

Fig. 6 is a cross-section of a detail of the rotatable driving means, and their driving connections and relation to the tumblers and drive-wheel, taken in the plane of the line 6—6 of Fig. 1.

My improved device is adapted for attachment to any compartment which it is desired to lock, and is especially useful for safes or chests adapted to contain money or valuables, and in other relations in which it is desired to employ extra safeguards, or to make the felonious opening of the compartment especially tedious.

The compartment is exemplified as comprising a safe having a body 11 provided with a round door opening 12, and a round door 13 arranged to be received in and to close the opening.

The round door is exemplified as mounted in a suitable door ring 15, hinged by a usual hinge 16 to the body of the safe. The hinge has usual articulation on the axis 17 with the top and the bottom of the door ring, and usual articulation at its top and its bottom with the body of the safe on the axis 18. Suitable limiting lugs are provided for limiting the extent of swinging of the door ring on the hinge. The door has usual annular guide connection 21 with the door ring, and is arranged to be rotated in the door ring by any usual or suitable means operable in usual manner from the outside of the door.

The wall of the door opening is provided with usual lugs 25, and the door is provided with usual lugs 26, arranged to be received through the usual spaces 27 between the lugs 25, and to be moved behind the lugs 25 by rotation of the door, for placing the door in locked position and drawing the door into the door opening in usual manner.

A combination lock 31 is located on the door, and comprises a casing 32, having a front wall 33, an annular side wall 34, in which there are openings 35, 36, and a rear wall 37. The rear wall is removable, and is aranged to be attached to the casing by means of screws 38 passing through holes in lugs 39 on the rear wall and threaded into lugs 40 on the casing.

An axle 41 extends forwardly from the rear wall, and forms a journal for tumblers 42, 43, 44, held to said axle by means of a spring ring 45, received in an annular groove in the forward end of the axle. These tumblers may be of any usual or ordinary or other construction, and be provided with means for changing the combinations between the tumblers, and be operated in any suitable, ordinary or other manner. The respective tumblers comprise stops 46, 47. A fly 48 on a fly-ring 49 cooperates with the stops, the respective tumblers being also provided with pins 50, respectively engaging the flies of adjoining tumblers in usual manner for operating one tumbler from the other. The tumblers are assembled on the rear wall and are arranged to be moved as an assembly into and out of the cavity 51 in the casing.

A drive-wheel 55 is mounted on a spindle 56, to the outer end of which a knob 57 and a dial 58 are secured, the latter operable for registry of its graduations with a suitable mark on the door for manipulation of

the tumblers in operating the combination, and with another suitable setting mark on the door for resetting the tumblers, which resetting may be accomplished in any usual or suitable manner not herein more particularly described because any well-known, or other means adaptable for the purpose may be employed. The drive-wheel is provided with a threaded hub 59, into which the inner threaded end of the spindle is screwed, a key 60 being received in complemental slots in the spindle and in said drive-wheel for rotatively securing the spindle and drive-wheel together. The inner end of the hub of the drive-wheel is received in an axial bore 61 in the outer end of the axle 41. The drive-wheel is provided with a pin 62, arranged to coact with the fly of the fly-ring of the outer tumbler mounted on the axle.

The drive-wheel is provided with a plurality of notches, two being shown at 63, 64, which are arranged in separated relation, and have peripheral obstructing faces 65, therebetween. Each of the tumblers is provided with a plurality of notches, two being shown at 67, 68, which are spaced apart and have peripheral obstructing faces 69, therebetween. The respective notches 63, 64, and 67, 68, are brought into registry with each other when the combination has been manipulated for unlocking movement of the bolt works. The notches on the respective tumblers and drive-wheel are preferably arranged at acute angles with relation to each other.

Rockable members 71, 72, preferably corresponding in number to the number of notches respectively in the tumblers and drive-wheel, are arranged to cooperate with the tumblers and drive-wheel. These rockable members are provided with fences 73, 74, and actuator wings 75, 76.

A plurality of bolts 77, 78, corresponding in number to the number of the rockable members, are provided. The actuator wings of the respective rockable members have operative connections with the respective bolts, as by being received in recesses 79, 80, in said bolts.

The bolts are respectively axially movable in bearings 81, 82, in the annular flange 83 of the door, and are arranged to be received in keeper slots 84, 85, in corresponding lugs 25 in the wall of the door opening, the walls of the respective keeper slots receiving the respective bolts between them, for preventing rotation of the door and thereby locking the door. These bolts are arranged in different radial positions on the door, and are shown as positioned in acute angular relation to each other. Rotation of the bolts is prevented by means of pins 86, fixed in the door and received in slots 87, extending lengthwise of the respective bolts.

When the bolts are in locked relations, the fences of the respective rockable members coact with the outer peripheral resistance faces 65, 69, of the drive-wheel and tumblers, respectively, for maintaining said respective rockable members and bolts in locking relations independently of each other.

Felonious attempts at manipulation of one of the bolts, as by boring a hole through the wall of the safe and pounding one of the bolts endwise inwardly, or other attempts to tamper with one of the bolts, for feloniously placing the same in unlocking relation, does not affect the locked relation of the other bolt, which other bolt is maintained in locked relation by the independent connection between it and the tumbler mechanism, nor do felonious attempts to tamper with one of the rockable members affect the other rockable member of the other bolt.

If, therefore, a burglar should succeed in placing one of the bolts in unlocking relation, he would still have the other bolt to contend with, which latter is maintained in locked relation, making additional felonious manipulation upon the other bolt and rockable member necessary, before felonious access can be had into the safe. This increasing of the difficulty of access to the interior of the safe will consume so much additional time that successful burglarious opening of the safe is improbable.

The rockable members 71, 72, are provided with bearings 91, 92, journaled about hubs 93, 94, of gears 95, 96. The hubs of said gears are journaled about reduced stems 97, 98, of shanks 99, 100, the inner ends of which are threaded, as shown at 101, 102, and screwed into threaded holes in lugs 103, 104, of the casing 32, the stems being provided with annular shoulders 105, 106, screwed against said lugs. (See Fig. 6.) Spiral springs 107, 108, are located in cavities 109, 110, in said bearings 91, 92, of said rotatable members, the springs bearing against annular shoulders 111, 112, in said rockable members and against annular shoulders 113, 114, on said shanks, for normally pressing said rockable members toward the gears 95, 96, and causing yielding rotation of said rockable members with said gears. Rotations of said gears, independent of said rockable members, are, however, permitted during the manipulation of the tumblers.

A drive-gear 121 is fixed to the drive-wheel and meshes with the gears 95, 96, for driving the latter.

Bearings 122, 123, on the rear plate are received about the shanks 99, 100, for reinforcing the positions of said shanks and aiding in resistance to felonious disarrangement of the rockable members.

When the notches 67, 68, have been placed in registry respectively with each other by

manipulation of the tumblers through the medium of the dial plate and knob, the fences 73, 74, of the rockable members 71, 72, will, upon the next rotation of the knob, rotate with the gears, 95, 96, and enter said notches 67, 68, in the tumblers, the recesses 79, 80, being sufficiently wide to permit this, and also enter the spaced apart notches 63, 64, in the drive-wheel. Upon resistance to the rocking of the rockable members, on account of their connections with the bolts 77, 78, the corresponding walls of the spaced-apart notches 63, 64, in the drive wheel, (depending on whether the rotation of the drive-wheel is in locking direction or in unlocking direction), will engage the spaced-apart fences 73, 74, of the respective rockable members and move the bolts 77, 78, into locking position, or into unlocking position, dependent on the direction of rotation of the drive-wheel.

The simultaneous movement of the independent bolts into locking position or unlocking position is accomplished by means of the combination lock mechanism, but felonious manipulation from outside the combination lock mechanism is compelled to be independently upon each separate bolt.

My improved device prevents communication of any felonious opening stress from one bolt to the other.

It is of course obvious that changes may be made in the parts and their construction and arrangement, within the scope of the appended claims, without departing from my invention.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent, is:

1. A combination lock mechanism comprising a tumbler mechanism, a plurality of rockable members each comprising a fence and an actuator wing, and a bolt for each of said rockable members, said actuator wings coacting with said respective bolts for moving said bolts into locked relation and into unlocked relation, said bolts extending independently outwardly with relation to said tumbler mechanism, said tumbler mechanism provided with notches for recieving said respective fences for unlocked relations of said bolts and with obstructing faces coacting independently with said fences for maintaining said respective fences independently in locked positions for independent locked relations of said bolts.

2. A combination lock mechanism comprising a tumbler mechanism, a plurality of rockable members at different positions about said tumbler mechanism, independent bolts having independent operative connections with said respective rockable members, means having operative connections with said rockable members for rocking said rockable members from within said combination lock mechanism for simultaneously moving said bolts into locked relation and into unlocked relation, and obstructing means other than said last-named operative connections resisting unlocking stresses from without said combination lock mechanism upon said respective bolts.

3. In a combination lock mechanism, the combination of tumbler mechanism comprising a driving wheel and tumblers, said driving wheel and said tumblers each provided with a plurality of separated peripheral notches separated by peripheral resistance faces, and a plurality of rockable members and a plurality of bolts coacting therewith respectively in different radial positions about said tumblers, said rockable members respectively provided with fences coacting with the walls of said respective notches for moving said fences into said notches and said bolts into unlocked positions and said fences coacting with said peripheral resistance faces for independent resistances to unlocking stresses upon said bolts and said rockable members.

4. In a combination lock mechanism, the combination of tumbler mechanism including tumblers and a drive wheel coaxially arranged and provided respectively with spaced apart peripheral notches in acute angular relation and with peripheral resistance faces between said notches, a plurality of rockable members arranged in acute angular relation about said tumblers and respectively provided with fences and with actuator wings, bolts respectively having operative connections with said actuator wings, and independent yieldable actuating means between said drive wheel and said rockable members to urge said fences independently into said notches for positive operative relations between said driving wheel and said respective bolts, and said fences arranged to coact with said peripheral resistance faces in acute angular relation to each other for independent resistances to unlocking stresses upon said respective bolts.

5. In a combination lock mechanism, the combination of tumbler mechanism comprising a drive-wheel and tumblers, said drive-wheel and said tumblers each provided with a plurality of notches, a plurality of rockable members each provided with a fence and an actuator wing, said rockable members arranged in different positions about said tumblers and said drive-wheel, and means to cause yielding rotation between said drive-wheel and said rockable members, said fences arranged to be received simultaneously in said notches for positive simultaneous rotations of said rockable members by said drive-wheel, and said tumblers provided with resistance faces between said notches for independently resisting rotations of said rockable members and conse-

quently separating dislodging urge between said bolts.

6. A combination lock mechanism comprising a tumbler mechanism, a plurality of rockable members each comprising a fence and an actuator wing, a bolt for each of said rockable members, said actuator wings coacting with said respective bolts, said bolts extending independently outwardly with relation to said tumbler mechanism, said tumbler mechanism provided with separated notches for independently receiving said respective fences and with obstructing faces between said notches for maintaining said rockable members in rocked relations for independent locked relations of said bolts, and means acting from within said combination lock mechanism for combinedly rocking said rockable members for locked relation and for unlocked relation of said bolts, and constructed and arranged for maintaining independence of unlocking movements of said bolts by means acting from without said combination lock mechanism.

7. A combination lock mechanism comprising a tumbler mechanism, a plurality of rockable members each comprising a fence and an actuator wing, and a bolt for each of said rockable members, said actuator wings coacting with said respective bolts for moving said bolts into locked relation and into unlocked relation, said rockable members arranged at different positions about said tumbler mechanism, said bolts extending in different radial positions outwardly with relation to said tumbler mechanism, said tumbler mechanism comprising tumblers respectively provided with a plurality of notches in different radial relations, the fences of said respective rockable members arranged to be received in said respective notches for unlocked relations of said bolts, and said tumblers respectively provided with obstructing faces between said notches for independently maintaining said fences in positions for independent locked relations of said respective bolts.

In testimony whereof, I have hereunto signed my name.

ELMER E. WATSON.