F. E. ARNDT.

LOCKING MECHANISM FOR VAULT DOORS.

APPLICATION FILED JUNE 14, 1919.

1,328,355.

Patented Jan. 20, 1920.

2 SHEETS—SHEET 1.

Fig. 1.

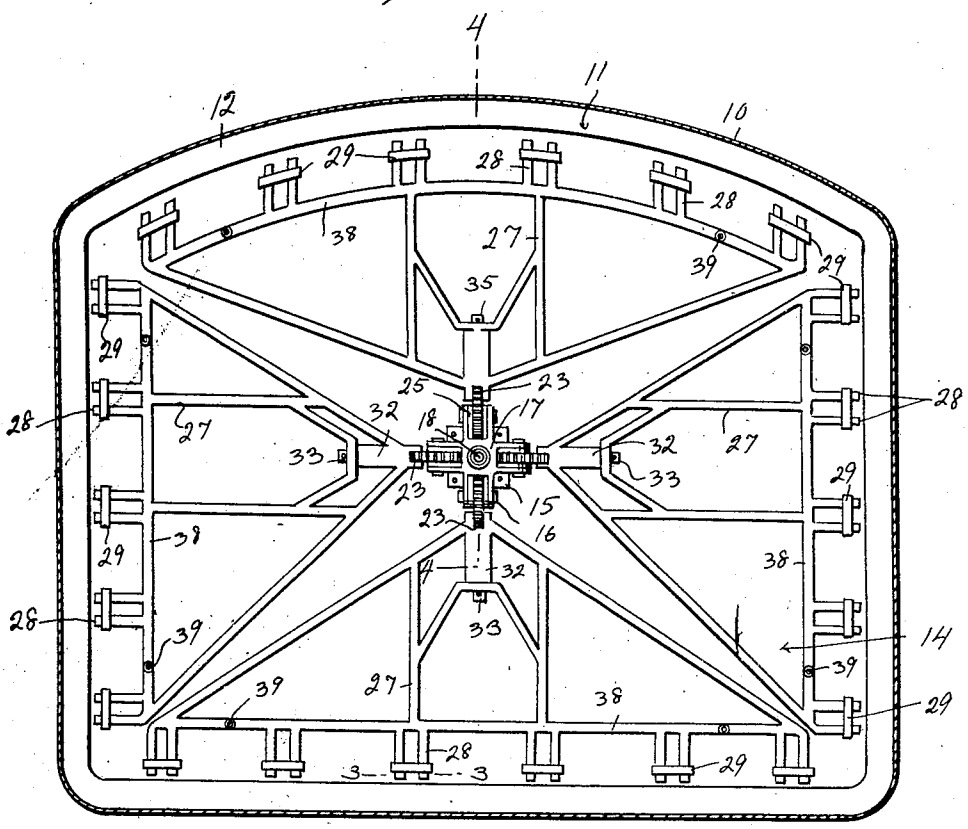


Fig. 3.

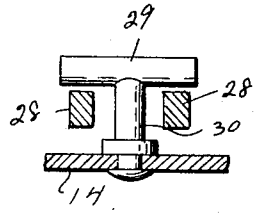
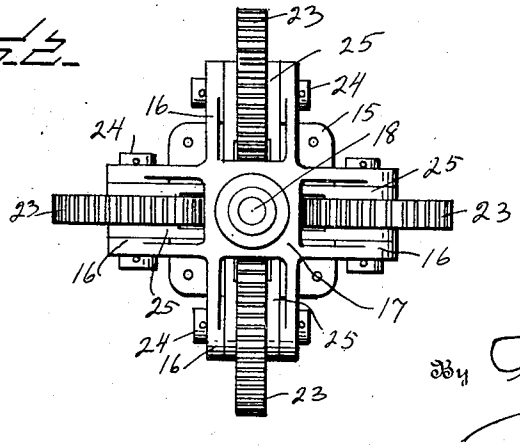


Fig. 2.



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2 SHEETS—SHEET 2.

Fig. 4.

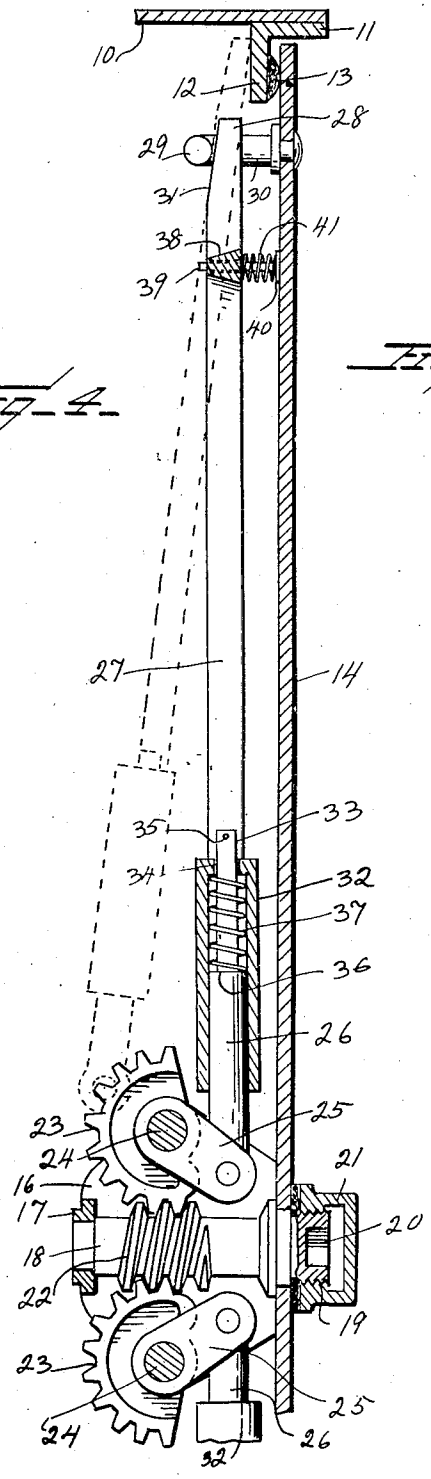
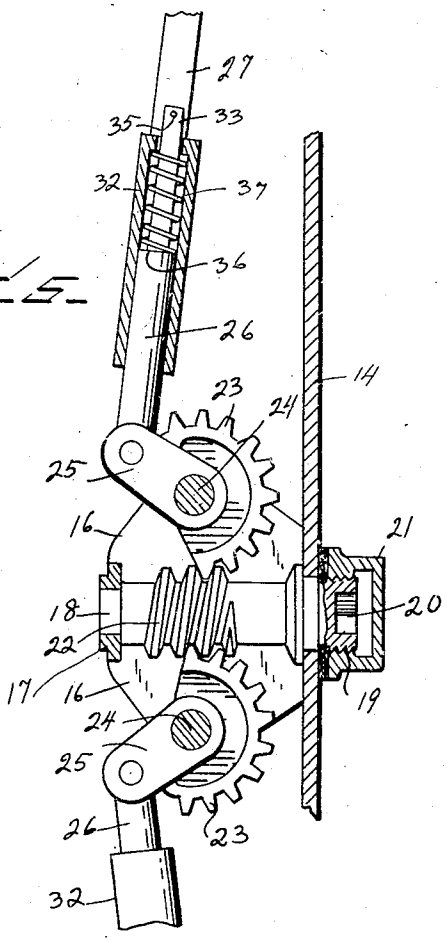


Fig. 5.



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UNITED STATES PATENT OFFICE.

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LOCKING MECHANISM FOR VAULT-DOORS.

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Application filed June 14, 1919. Serial No. 304,291.

To all whom it may concern:

Be it known that I, FRANKLIN E. ARNDT, a citizen of the United States, residing at Galion, in the county of Crawford and State of Ohio, have invented certain new and useful Improvements in Locking Mechanism for Vault-Doors, of which the following is a specification.

This invention comprehends certain new and useful improvements in burial vaults, and relates especially to that type of vault door locking mechanism wherein a series of locking members are projected from a position out of engagement with the wall of the vault into a position of engagement therewith.

One of the objects of the invention is a locking mechanism of this character that is so constructed and arranged that the clamping bars or bolts, after being projected into locking engagement with the flange on the vault body, are forced inward at their inner ends causing these locking bars or bolts to have a rocking movement or leverage action which shall draw the door of the vault into air-tight, hermetically sealed engagement with the flange on the body.

A further object of the invention is to provide means for projecting the clamping bars or bolts including cranks and plungers connected thereto, these plungers being associated with the clamping bars or bolts and having a telescopic engagement therewith, and there being coiled springs disposed to resist inward movement of the plungers with reference to the clamping bars so that the crank arms may pass their centers and the plungers may travel outward with reference to the clamp bars without retracting the clamp bars.

A further object is to provide means for holding the extremities of the clamp bars urged outward from the door so that they may pass over the angle iron at the end of the vault body without chance of the clamping bars engaging the edge of the angle iron and being prevented from full projection.

A further object is to provide a mechanism of this character wherein the parts may be cheaply manufactured and easily assembled, the parts being relatively few and of simple construction whereby the vault may be economically constructed, and may be sold at relatively low price.

Other objects will appear in the course of the following description.

For a full understanding of the invention, reference is made to the following description and accompanying drawings, in which:—

Figure 1 is a transverse section of a vault looking toward the door, the door being provided with my improved locking mechanism;

Fig. 2 is an inside face view of the gear case;

Fig. 3 is a section on the line 3—3 of Fig. 1;

Fig. 4 is a section on the line 4—4 of Fig. 1;

Fig. 5 is a like view to Fig. 4, but showing the locking members in locked position.

Referring to these drawings, the body portion of the burial vault is designated 10, and this body portion is constructed of any desired shape, size and design. This body is open at one end, and at this end has attached to the side wall of the body the angle iron 11 having the inwardly extending flange 12, with a yielding gasket 13. The door 14 is designed to abut against this gasket and to be forced inward so as to compress the gasket and secure an air-tight joint between the door and the vault. To this end, and to lock the door securely to the end of the vault, the door is provided at its center with an opening. Disposed upon the inner face of this door is a base plate 15 which is riveted, welded, or otherwise permanently attached to the door, this base plate being formed with a plurality of radially arranged pairs of upwardly extending webs or wings 16, connected at their upper ends by a web 17. The base 15 and the web 17 are formed to provide bearings for an inwardly projecting worm shaft 18, the outer extremity of which passes through the opening in the door and is exteriorly screw-threaded, as at 19. This outer end is also formed with a polygonal socket 20 whereby a wrench may be applied to the shaft to rotate it. A cap 21 is normally applied over the end of the shaft, the cap being interiorly screw-threaded to engage the screw-threads 19.

The shaft 18 carries the worm 22. Disposed between each pair of wings 16 or flanges is a sector gear 23, mounted upon a short transverse shaft 24. Mounted on this shaft on each side of the sector gear 23 are the crank arms 25. Thus, these crank arms and the sector gear and shaft rotate together. I do not wish to be limited to the

exact construction illustrated, as it is obvious that this might be changed in many ways. The sector gears mesh with the worm 22. Pivotally connected to the outer end of each pair of crank arms is a plunger 26.

Applied to the rear or inner face of the door 14 are any desired number of locking members 27. These locking members are illustrated as in the form of triangular-shaped frames, and four of these are illustrated in the present instance. These locking members or frames may be formed in any convenient way, and have a plurality of pairs of locking bolts 28. It is to be understood that while I have shown the bolts 28 as being arranged in pairs and as being attached to a locking member comprising an integral, triangular-shaped frame, yet I do not wish to be limited thereto, nor to the use of a gang of locking bolts, as the invention is equally applicable to one locking bolt or pair.

Coacting with each pair of locking bolts 28 is a T-bolt 29, having a shank 30 disposed between the pair of locking bolts, and riveted or otherwise attached to the vault door, each pair of the bolts 28 operating beneath the cross bar of the T-bolt. The upper face of each of these locking bolts 28 is downwardly beveled, as at 31. Each locking member 27, whether in the form of a single bar, a double bar, or a gang of bars formed to provide locking bolts, is formed at its inner end with a tubular socket 32, within which the corresponding plunger 26 has telescopic engagement. The plunger 26 is formed with a reduced shank 33 which projects out though an aperture 34 in the extremity of the socket 32, and is temporarily held from disengagement in the socket by a removable transverse pin 35. Disposed between the shoulder 36 of the plunger and the outer extremity of the socket is a coiled compression spring 37. The locking member 27 is formed with a transverse bar 38 just rearward of the bolts 28 or extremities of the locking member, and at spaced points on this transverse bar there are downwardly extending pins 39, these pins being loosely mounted in the bar for vertical movement. This pin is formed with a head 40, and disposed between the bar 38 and this head is a coiled compression spring 41 which urges the pin downward with its head bearing against the inner face of the door.

From the foregoing description, in connection with the accompanying drawings, the operation of my improved vault door or closure will be apparent. After the casket has been inserted into the vault, the door 14 is applied to the open end thereof, with the locking members 27 in their inner or retracted positions and the pins 35 removed. Then a wrench having a square or polygonal stud at one end is applied to the socket 20 on the outer end of the shaft or stem 18, and the stem 18 is turned in such a direction that the sector gears 23 are rotated to force the plungers 26 outward. These plungers in their outward movement will compress the springs 37 of the several locking members, and when the springs have reached a certain stage of compression, they will force the locking members 27 outward from the position shown in full lines in Fig. 4 to the position shown in dotted lines where the bolts or outer ends of the members will bear against the flange 12 of the angle bar 11. By a continued turning of the worm pinions or sector gears 23, the clamp bars or bolts are thus forced out under the key bolts and the inner ends of the locking members will be raised so that these locking members will fulcrum against the key bolts, and the outer ends of the locking members bearing against the flange 12, will force the door and the plunger toward each other, thus giving the door extra compression or sealing it airtight.

When the crank arms 25 have passed their centers and the springs are fully compressed, the plungers will commence to move outward relative to the sockets 32, but the clamping members will remain in their projected positions by reason of the compression springs holding them in this projected position. Thus, when the crank arms have reached the position shown in dotted lines in Fig. 4, the vault door will be securely locked and will be held firmly forced against and compressing the gasket 13. Thereafter the vault door is securely locked and can not be unlocked, by a rotation of the sector gears 23, through the action of the worm 22, which will cause the plungers to reciprocate within the sockets. The small springs 41 are designed to hold the ends of the locking bolts 28 up close to the key bolts so that the bolts 28 will pass over the plunger 12 without striking the edge of the plunger. The heads 40 of the pins 39 will ride upon the inner face of the door when in locking member is shifted.

It will be seen that the mechanism which has been above described is very simple and effective, that all of the bolts are projected at the same time, that leverage is applied equally to all of the bolts or locking members so that every portion of the door is pressed with like force against the gasket 13, and that once the door is locked, it is impossible to unlock it, assuming that the pins 35 have been removed previous to the closing of the door. It will be seen that there is a compound movement of the locking members, first a sliding movement in an outward direction approximately parallel to the plane of the door 14, and then a rocking movement of the locking members in a plane at right angles to the plane of the door

which secures the compression of the gasket by the door.

It is to be noted that I have provided a manually operable actuating means for the bolts comprising the members 18, 23, 24, 25 and 26, and that the locking bolt 27 has telescopic engagement with the member 26 and that the spring 37 maintains operative engagement between member 26 and the locking bolt 27 upon an outward movement of the member 26 by reason of the fact that this spring yieldingly resists compression but is sufficiently strong to cause the locking bolt 27 to be forced forward to its dotted line position over the flange 12. Now when the crank arm 25 is rotated beyond the dead center, the plate commences to retract the arm 26 but the member 26 will not exert any retractive force upon the locking bolt 27. Thus, the operating mechanism becomes operatively disconnected from the locking member 27 when the locking member has been projected to its full extent and locked.

While I have illustrated a construction which I have found thoroughly effective in practice, and which is very simple and practical, yet it is obvious that minor changes might be made in the detailed construction of the several parts without departing from the spirit of the invention, and it is particularly noted that I do not wish to be limited to the exact form of the locking members 27 and that the frame 27 with the integral bolts 28 constitute in effect a single locking or clamp bolt.

I claim:—

1. A vault door, a locking member mounted upon the inner face thereof for outward movement approximately parallel to the face of the door, actuating means including a member moving longitudinally of the locking member, and means whereby said actuating member and the locking member shall have coincident outward movement upon an outward longitudinal movement of the actuating member but said actuating member shall have movement rearward independently of the locking member upon a retraction of the actuating member whereby to prevent a retraction of the locking member upon a retraction of the actuating member.

2. A vault door, a locking member mounted upon the inner face thereof for outward movement approximately parallel to the face of the door, actuating means including a member movable longitudinally of the locking member, and manually operable means for reciprocating said actuating member, and a compression spring disposed between said longitudinally movable actuating member and the locking member whereby the longitudinal outward movement of the actuating member will compress the spring and project the locking member and an inward movement of the actuating member will relieve the pressure on the spring without causing a retraction of the locking bolt.

3. A vault door, a locking member mounted upon the inner face thereof for outward movement approximately parallel to the face of the door and rocking movement at right angles thereto, and a single means operatively connected to the door and actuatable in one direction to shift the locking member outward and successively shift the inner end of the locking member away from the door to cause the outer end of the locking member to move toward the plane of the door, and means operatively disconnecting the locking member from the actuating means after the locking member has been projected to thereby prevent a retraction of the locking member by any further movement of the actuating means in either direction.

4. A vault door, a locking member mounted upon the inner face thereof for outward movement approximately parallel to the face of the door, and manually actuatable means for projecting the locking member comprising a longitudinally movable member having telescopic engagement with the locking member, a coiled compression spring disposed between said actuating member and the locking member whereby the outward movement of the actuating member will compress the spring and cause a projection of the locking member but a retractive movement of the actuating member will relieve the pressure on the spring without retracting the locking member.

5. A vault door having a member carrying a cross bar mounted adjacent its edge, a locking member disposed adjacent the inner face of the door and having its outer end extending beneath said cross bar, said locking member being mounted for movement approximately parallel to the face of the door and for rocking movement at right angles thereto with the cross bar as a fulcrum, and means for projecting and rocking said locking member comprising a rotatable member, manually operable means for rotating it, said rotatable member having a crank pin, a plunger pivoted to said crank pin and having telescopic engagement with the locking member, and a coiled compression spring disposed between the locking member and the plunger whereby upon a rotation of the rotatable member in one direction the plunger will be projected, the spring compressed and the locking member forced outward, and upon a further rotation of said rotatable member, the locking member will be rocked upon its fulcrum, the pressure on the spring will be relieved, and the plunger retracted without retracting the locking member.

6. A vault door, locking members mounted on the rear face thereof, and means for

projecting said locking members comprising a shaft extending through the vault door and carrying a worm, and a plurality of gear wheels engaged by said worm and operatively connected to the locking members, the operative connection between the locking members and the gear wheels being such that initial rotation of the gear wheels in one direction and to a predetermined extent will project the locking members but a further rotation in the same direction or reverse rotation will not affect the locking members.

7. A vault door, a locking member on the rear face thereof mounted for outward movement approximately in a plane parallel to the door, a gear wheel, means projecting through the door and engaging the gear wheel whereby the gear wheel may be rotated in one direction, a crank pin carried by the gear wheel, and an actuating member movable by and engaged with the crank pin, said locking member and said actuating member moving outward together upon an outward movement of the actuating member to thereby project the locking member into locking position, said actuating member being shiftable inward independently of the locking member.

8. A vault door, a locking member on the rear face thereof mounted for outward movement approximately in a plane parallel to the door, a gear wheel, means projecting through the door whereby the gear wheel may be rotated in one direction, a crank pin carried by the gear wheel, a plunger connected to the crank pin, the locking member being formed with a socket in which said plunger moves, means resisting independent movement of the plunger and locking member when the plunger is projected by a rotation of the crank pin, said means permitting the plunger to be retracted relative to the locking member.

9. A vault door, a locking member on the rear face thereof mounted for outward movement approximately in a plane parallel to the door, a gear wheel, means projecting through the door whereby the gear wheel may be rototed in one direction, a crank pin carried by the gear wheel, a plunger connected to the crank pin, the locking member being formed with a socket in which said plunger moves, and a compression spring disposed between the plunger and the locking member causing a unitary, outward movement of the plunger and locking member but holding the locking member projected when the plunger is retracted.

10. A vault door, a locking member mounted upon the rear face thereof for movement in a plane approximately parallel to the face of the door and for rocking movement in a plane at right angles to the face of the door, a cross bar attached to the door beneath which the outer extremity of the locking member operates, a crank mounted upon the door, means extending from the door whereby said crank may be manually rotated, a plunger pivoted to the crank, the inner end of the locking member being provided with a socket wherein said plunger operates, and a coiled compression spring disposed between said plunger and the end of the socket whereby a rotation of the crank in one direction will cause a compression of the spring, and a unitary outward movement of the plunger and the locking member, and a further movement of the crank will cause the locking member to rock upon the cross bar as a fulcrum and the partial retraction of the plunger, the compression of the spring holding the locking member in its projected position.

11. A vault door having a plurality of locking members mounted upon the inner face thereof for movement approximately parallel to the face of the door and for rocking movement each in a plane at right angles to the door, cross bars disposed adjacent the edge of the door beneath which said locking members operate, a worm shaft mounted upon the door and projecting therethrough and carrying a worm, sector gears mounted upon the inner face of the door and engaged by said worm, there being a sector gear for each of said locking members, crank arms carried by the sector gears, plungers pivotally connected to the crank arms, the inner end of each of the locking members being formed with a socket wherein said plunger operates, and a coiled compression spring disposed within each socket and bearing against the end of the plunger.

12. A vault door, a plurality of locking members in the form of frames disposed in quartering relation upon the inner face of the door, each of said frames having a plurality of pairs of bolts at its outer edge, bolts attached to the inner face of the door and beneath which said pairs of locking bolts pass, the inner end of each frame being formed with a socket, a gear case mounted upon the inner face of the door at the center thereof, a centrally disposed shaft mounted in the gear case and extending through the door, the shaft being provided with a worm gear, a plurality of sector gears mounted in said gear case, one for each of said frames, and meshing with the worm, crank arms carried by the sector gears, plungers pivotally connected to the crank arms, each plunger having sliding movement in the socket of the corresponding locking member, each plunger having a reduced shank extending through a perforation in the end of said socket, and a coiled compression spring disposed in each socket surrounding said shank

bearing against the end of the socket and against the shoulder on the plunger at the junction of the shank.

13. In a vault, a body open at one end and having an inwardly extending flange at this end, a vault door disposed against the outer face of said flange, a plurality of locking members mounted upon the inner face of the door for longitudinal movement and for movement in a plane at right angles to the door, members having cross bars mounted upon the inner face of the door adjacent its margins and beneath which cross bars the locking members operate, means yieldingly urging the locking members against the cross bars, and manually operable means movable in one direction to shift said locking members outward to engage over the inner face of the flange on the vault door and successively shift the inner ends of the locking members away from the door to cause the extremities of the locking members to bear against said flange and urge the door toward the flange, said manually operable means being movable in an opposite direction independently of the locking members, whereby to prevent a retraction of the locking members upon a retraction of the actuating means.

In testimony whereof I affix my signature.

FRANKLIN E. ARNDT.