H. J. HICK.

COMBINATION LOCK.

APPLICATION FILED JULY 2, 1915.

1,301,846.

Patented Apr. 29, 1919.

2 SHEETS—SHEET 1.

Fig. 1.

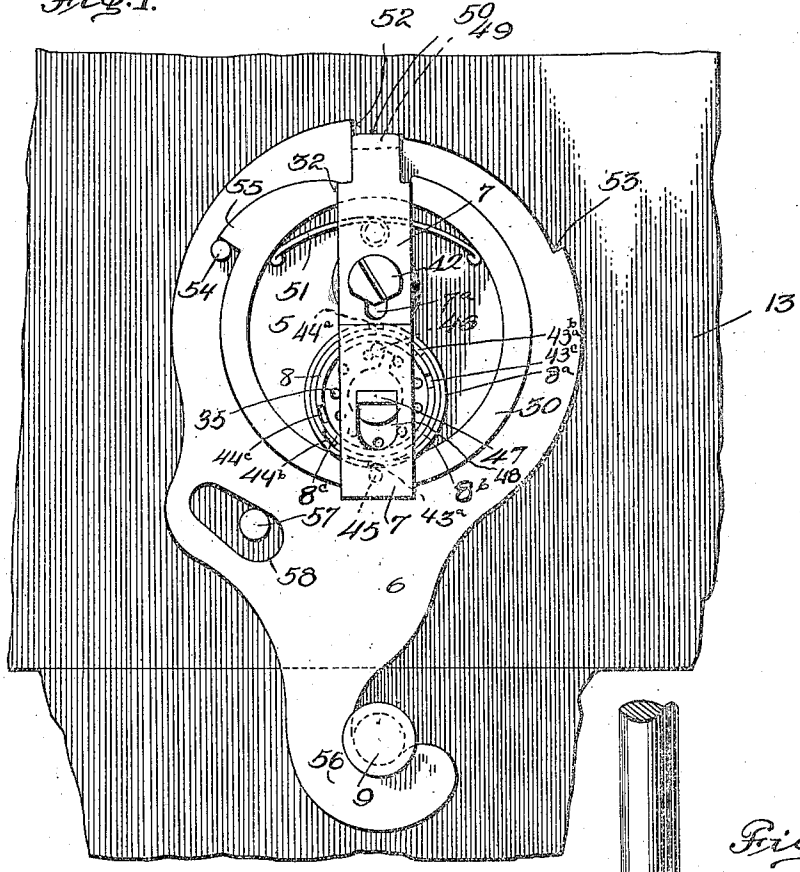


Fig. 2.

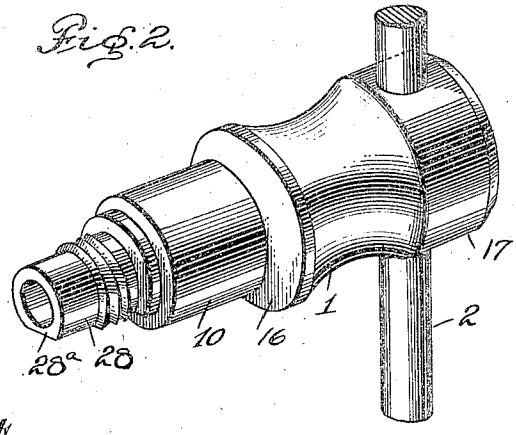
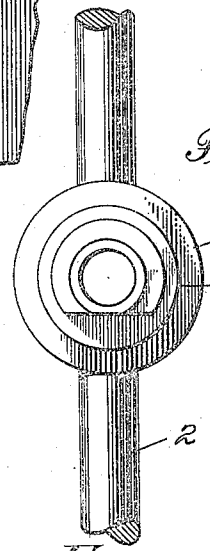


Fig. 3.



Witness:
Ernest C. Crocker

Inventor:
Harry J. Hick.
Hay Freese
Attorney.

H. J. HICK.

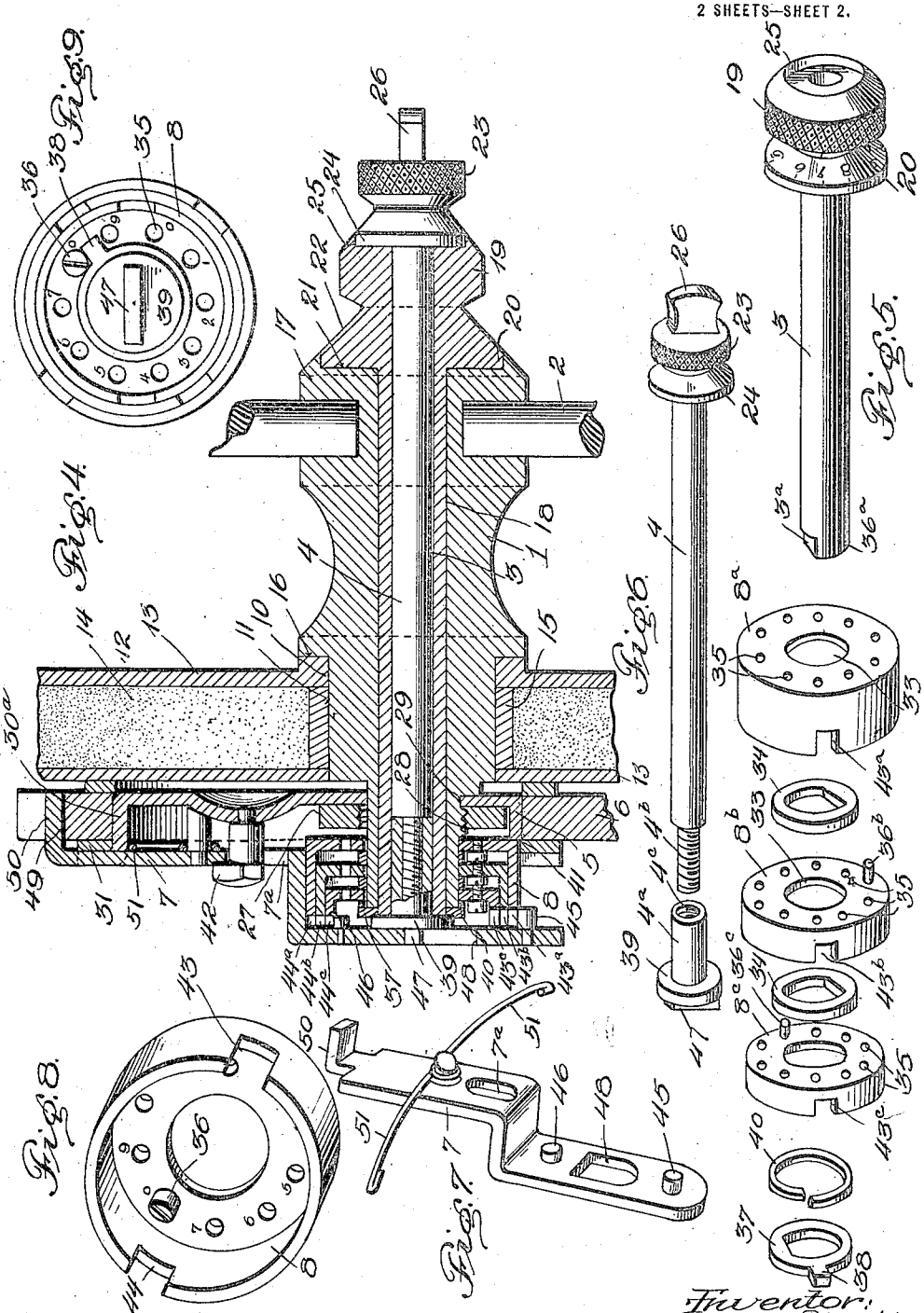
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Witness:
Ernest L. Crocker

Inventor:
Harry J. Hick.
Howgrease
Attorney.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

HARRY J. HICK, OF ALLIANCE, OHIO, ASSIGNOR TO THE McCASKEY REGISTER COMPANY, (INCORPORATED IN 1914,) OF ALLIANCE, OHIO, A CORPORATION OF OHIO.

COMBINATION-LOCK.

1,301,846. Specification of Letters Patent. Patented Apr. 29, 1919.

Application filed July 2, 1915. Serial No. 37,705.

To all whom it may concern:

Be it known that I, HARRY J. HICK, a citizen of the United States, residing at Alliance, in the county of Stark and State of Ohio, have invented certain new and useful Improvements in Combination-Locks, of which the following is a specification.

The invention relates to improvements in locks for fireproof filing cabinets and the like, of the type shown in my copending application, Serial No. 879,964, filed December 31, 1914, in which all the locking parts are placed within the case to protect the same from fire or other elements, said parts comprising a locking plate swiveled on the periphery of a disk eccentrically secured crosswise on the inner end of a rotary operating stem, a latch mounted on the eccentric disk and adapted to normally engage with a keeper notch in the periphery of the locking plate, and means for limiting the rotation of the locking plate in opposite directions, said latch being adapted to be operated by a rotary rod extending through an axial bore in the stem; and the object of the present invention is to provide a combination lock for the latch.

This object is attained by providing a plurality of cup-shaped tumblers nested one within another and having their rims in the path of stop pins provided on the latch to prevent movement thereof, said tumblers having notches in their rims adapted to be brought into alinement with each other and with the stop pins, by means of a rotary tube extending through the operating stem and having a detent thereon for operating the tumblers. By bringing the notches in the tumblers into alinement with the pins on the latch, the latch may be moved out of engagement with its keeper notch by means of a rotary rod extending through the rotary tube and having a tongue on its inner end operating in a cam orifice in the latch, thus permitting the cam plate to be turned to move the locking plate out of engagement with one of the sections of the cabinet.

A preferred embodiment of my invention is illustrated in the accompanying drawings forming part hereof, in which—

Figure 1 is a fragmentary elevation showing the lock applied to the two sections of a filing cabinet;

Fig. 2, a fragmentary perspective view of the operating stem;

Fig. 3, a fragmentary elevation of the same;

Fig. 4, a fragmentary sectional view showing the parts in position to permit the operation of the latch;

Fig. 5, a perspective view of the rotary tube, tumblers and detent in relative position for assembling;

Fig. 6, a detached perspective view showing the construction of the rotary rod;

Fig. 7, a detached perspective view of the latch;

Fig. 8, a detached perspective view of one of the tumblers; and

Fig. 9, an inner end elevation of the tumblers, detent and rotary rod assembled.

Similar numerals refer to similar parts throughout the drawings.

The operating elements of the lock may include the rotary operating stem 1, the handles 2, the rotary tube 3, the rotary rod 4 and the eccentric disk 5; and the locking elements may include the locking plate 6, latch 7, tumblers 8 and locking post 9.

The operating stem 1 of the lock is provided with the journal 10 on its inner end extending into and through the corresponding bearing 11 provided in the wall 12 of the case or cabinet; and when this wall is made of spaced surface plates 13 with intervening heat resisting walls 14, as shown, the journal bearing 11 is preferably made in the bushing 15 secured between the face plates 13 of the wall, which face plates are provided with apertures corresponding to the journal bearing in the bushing.

The annular shoulder 16 is preferably provided on the stem of the lock in abutment with the outer face of the wall, and on the head 17 of the stem are secured the diametrically opposite radial handles 2 which can be conveniently grasped by the hand of the operator for manipulating the lock and opening and closing the case.

The operating stem 1 is also provided with the axial bore 18 extending throughout its length, which is adapted to receive the ro-

tary tube 3 having a head 19 on its outer end, the annular shoulder 20 being provided on the stem adjacent the head, which shoulder is adapted to bear in the socket 21 formed in the end of the operating stem. The outer side of the shoulder 20 is preferably beveled to form the dial face 22 upon which are impressed a series of numerals, as from zero to nine, for use in positioning the tumblers, and the outer surface of the head 19 is preferably knurled so that it may be readily grasped for the rotation of the tube.

The rotary rod 4 is adapted to fit neatly within the bore of the rotary tube 3, a knurled head 23 and shoulder 24, similar to the head 19 and shoulder 20, being provided thereon, the shoulder 24 being adapted to bear in a socket 25 formed in the outer end of the head 19, the said head also having a thumb piece 26 thereon for facilitating the operation of the latch.

The operating disk 5 is eccentrically secured near the inner end of the operating stem by means of a nut 27 screw-threaded on the shank 28 provided on the inner end of the stem, said shank extending through an aperture 29 in the disk, and the shank and aperture being flattened on one side to stop a rotation of the disk with reference to the stem. Said disk 5 is provided with a peripheral flange 30 extending outward from one side of the peripheral rim 30^a of the disk, a washer 31 being preferably inserted between the flange and the face of the locking plate 6, and a guideway 32 is provided in said flange for receiving and guiding the latch 7 in its endwise movements.

A plurality of cup shaped tumblers 8^a, 8^b and 8^c, fitting one within the other and each having a central bearing aperture 33 therein, are rotatably mounted on the journal 28 formed on the inner end of the stem 1, the tumblers being spaced from each other by means of washers 34, said washers having a portion of their central aperture flattened to correspond with the flattened portion 28^a of the journal, thus holding them from rotation thereon in order to permit the tumblers to be rotated independently of each other.

Each of said tumblers is provided with a circular series of screw-threaded apertures 35 near the rim wall thereof, the apertures of the series being equidistantly spaced apart, and one aperture of each of the series is provided with a cap screw 36 therein, the heads and stems thereof forming stops, the stops on the tumblers 8^b and 8^c being of sufficient length to project from each side thereof to engage with the stop of the adjacent tumblers when the tumblers are rotated.

On the inner end of the rotary tube 3 is mounted a collar 37 having a detent 38 on its periphery, the central aperture of said collar being flattened on one side to correspond with a flattened portion 3^a on the tube in order to prevent the rotation of the collar thereon, said detent being adapted to engage with the stop on the tumbler 8^c when the tube 3 is operated. The collar 37 is held in position on the tube 3 by means of a disk 39 which is secured on the inner end of the rotary rod 4, a spring washer 40 being preferably provided between the collar 37 and tumblers 8 in order to hold the tumblers in position on the stem and take up any longitudinal play that might exist therebetween.

The tumblers 8 are arranged with their rims in the same plane on the journal 28 of the operating stem between the latch 7 and the eccentric disk 5, said latch being bent outwardly a short distance near its center in order to provide space for the tumblers between it and the periphery of the eccentric disk, a portion of the peripheral wall and flange of said disk being cut away, as at 41, to provide a bearing surface for the outer edge of the tumbler 8^a, said latch being secured to the eccentric disk 5 by means of a cap screw 42 extending through an elongated aperture 7^a in the latch and screw threaded into the disk.

The rims of each of the tumblers are provided with a pair of diametrically opposite notches 43 and 44, one of which is slightly deeper than the other, and the latch 7 is provided with a pair of stop pins 45 and 46, one slightly longer than the other, adapted to normally engage with the rims of the tumblers to lock the latch against endwise movement, the notches of said tumblers being adapted to be brought into alinement with each other and with their corresponding stop pins on the latch by means of the collar-detent 38 on the rotary tube 3 and the stops on the tumblers to permit the operation of the latch.

The inner end of the rotary rod 4 is provided with the diametric tongue 47 which is adapted to ride in the cam orifice 48 in the latch 7, whereby, when the notches in the tumblers and the pins on the latch have been brought into alinement with each other, the latch may be moved endwise in the guide way 32 of the disk.

The locking plate 6 rotatably mounted on the periphery of the eccentric disk 5 is provided with a keeper notch 49 in its periphery for the laterally extending tongue 50 of the latch, said tongue being normally held in engagement with said notch by means of a spring 51 having bearing engagement with the latch and disk. A pair of stops 52 and 53 are also provided on the periphery of the locking plate 6 whereby the movement of the eccentric disk and the latch, with reference to the locking plate, is lim-

ited; and in order to prevent a binding of the latch tongue against the sides of the keeper notch, a stop pin 54 is provided on the locking plate in the path of a lug 55 on the periphery of the eccentric disk, which lug is adapted to impinge and be stopped by the pin after the latch tongue clears one side of the keeper notch and before it impinges the other side thereof.

The locking plate 6 is also provided with a hook 56, preferably extending therefrom diametrically opposite the keeper notch 49, which hook is adapted to engage with the locking post 9. The stop post 57 secured on the wall 13 of the case and protruding through the slotted aperture 58 in the locking plate, is provided, for limiting the rotation of the locking plate in either direction.

For convenience in assembling, the rotary rod 4 is preferably made with a detachable end section 4^a, the main section having a stem 4^b thereon adapted to be screwed into an opening 4^c in the detachable section 4^a, for holding the sections securely together as an integral rod during the operation of the lock.

The apertures 35 in each of the tumblers 8^a, 8^b and 8^c are numbered, as from zero to nine, to correspond with the numbers on the dial on the outer end of the tube 3, and the detent 38 is so arranged on the inner end of the tube that when the notches 43^c and 44^c of the tumbler 8^c are in alinement with the stop pins 45 and 46, and a certain number on the face of the dial is brought to a fixed point on the end of the operating stem, the detent will register with the correspondingly numbered aperture on the tumbler 8^c, so that by positioning the stop at a certain position in said tumbler the notches 43^c and 44^c may be brought into alinement with the stop pins 45 and 46 by bringing the number on the dial corresponding to the number of the aperture in which the pin is inserted in the tumbler to the fixed point on the end of the stem.

In like manner the stop 36^c which projects through the tumbler 8^c is arranged to engage with the stop 36^b in the tumbler 8^b when the tumbler 8^c is operated by the detent, so that when the number on the dial corresponding to the number of the stop 36^c is brought to the fixed point on the stem, the notches 43^b and 44^b will be in alinement with the stop pins 45 and 46; and the stop 36^b, which projects through the tumbler 8^b, is arranged to engage with the stop 36^a in the tumbler 8^a when the tumbler 8^b is operated by the tumbler 8^c, which in turn is operated by the detent 38, so that when the number on the dial corresponding to the number of the stop 36^a is brought to the fixed point on the stem, the notches 43^a and 44^a will be in alinement with the stop pins 45 and 46.

It will be understood that in the operation of the tumblers the tumbler 8^a is first brought into proper position by rotating the detent (at least three times), by turning the head 19 on the outer end of the rotary tube 3, the stops of the various disks engaging with each other, until the number on the dial corresponding to the number of the stop 36^a is in alinement with the fixed point on the stem, at which time the notches 43^a and 44^a will be in alinement with the stop pins 45 and 46. The detent is then rotated (two times) in the reverse direction until, by the engagement of the detent with the stop 36^c, and the stop 36^c with the stop 36^b, the number on the dial corresponding to the number of the stop 36^b is in alinement with the fixed point on the stem, the notches 43^b and 44^b will be brought into alinement with the stop pins 45 and 46. With the notches 43^a and 44^a, and 43^b and 44^b in alinement with the pins 45 and 46, by rotating the detent in the direction opposite to the direction of its last rotation, until the number on the dial corresponding to the number of the stop 36^c is in alinement with the fixed point on the stem, the notches 43^c and 44^c will be brought into alinement with the stop pins 45 and 46.

When the notches 43 and 44 of the tumblers 8^a, 8^b and 8^c are all in alinement with each other and the stop pins 45 and 46, by turning the rotary rod 4 a quarter revolution in either direction by means of the knurled head 23, the action of the diametric tongue 47 in the cam orifice 48 will raise the laterally extending tongue 50 of the latch 7 out of engagement with its keeper notch 49, thus permitting the stem 1 to be rotated to move the locking plate 6 out of engagement with the post 9.

I claim:

1. A lock including a rotatable stem, a locking plate eccentrically swiveled crosswise on said stem, a latch on the stem normally locking the plate from rotation thereon, and means extending axially through the stem operable to lock the latch.

2. A lock including a rotatable stem, a locking plate eccentrically swiveled crosswise on said stem, a latch on the stem normally having locking engagement with the plate, a stop on the latch, and means operable into the path of the stop to prevent a disengagement of the latch.

3. A lock including a rotatable stem, a locking plate eccentrically swiveled crosswise on said stem, a latch slidably mounted on the stem normally having locking engagement with the plate and having a stop thereon, and means positively engaging said stop to prevent disengagement of the latch.

4. A lock including a rotatable stem, a locking plate eccentrically swiveled crosswise on said stem, a latch slidably mounted on the stem normally having locking engage-

ment with the plate and having a stop thereon, means positively engaging said stop to prevent disengagement of the latch, means for disengaging the stopping means, and means for operating the latch.

5. A lock including a rotatable stem, a locking plate eccentrically swiveled crosswise on said stem, a latch slidably mounted on the stem normally having locking engagement with the plate and having a stop thereon, means positively engaging said stop to prevent disengagement of the latch, means extending axially through the stem for disengaging the stopping means, and means for operating the latch.

6. A lock including a rotatable stem, a locking plate eccentrically swiveled crosswise on said stem, a latch slidably mounted on the stem normally having locking engagement with the plate and having a stop thereon, means positively engaging said stop to prevent disengagement of the latch, means for disengaging the stopping means, and means extending axially through the disengaging means for operating the latch.

7. A lock including a rotatable stem, a locking plate eccentrically swiveled crosswise on said stem, a latch slidably mounted on the stem normally having locking engagement with the plate and having a stop thereon, means positively engaging said stop to prevent disengagement of the latch, means extending axially through the stem for disengaging the stopping means, and means extending axially through the disengaging means for operating the latch.

8. A lock including a rotatable stem, a locking plate eccentrically swiveled crosswise on said stem, a latch movably mounted on the stem having locking engagement with the plate and having a stop thereon, a plurality of tumblers mounted on said stem in the path of movement of said stop, said tumblers having notches therein, and means for rotating said tumblers to aline the notches with the path of said stop pin to permit disengagement of the latch.

9. A lock including a rotatable stem, a locking plate eccentrically swiveled crosswise on said stem, a latch on the stem in locking engagement with the plate having a stop pin therein, a plurality of tumblers mounted on said stem in the path of said stop pin, said tumblers having notches therein, means for rotating the tumblers to aline the notches with the path of the stop pin to permit movement of the latch, and means for moving the latch out of locking engagement with said plate.

10. A lock including a rotatable stem, an eccentric disk secured crosswise on said stem, a locking plate swiveled on said disk, a latch on the disk in locking engagement with the plate having a pair of stop pins thereon, permutation means normally engaging said stop pins to prevent the disengagement of the latch from the locking plate and adapted to be operated to permit movement of said latch, and means for operating the latch.

11. A lock including a rotatable stem, an eccentric disk secured crosswise on said stem, a locking plate swiveled on said disk, a latch on the disk in locking engagement with the plate having a pair of stop pins thereon, a plurality of cup shaped tumblers on said stem arranged to prevent movement of said latch, said tumblers having a pair of diametrically opposite notches in their rims, means for actuating said tumblers to move the notches into register with the stop pins on the latch, and means for operating the latch out of engagement with said locking plate.

12. A lock including a rotatable stem, a locking plate eccentrically swiveled crosswise on the stem, a latch movably mounted on the stem, a spring normally holding said latch in locking engagement with said plate, a pair of stop pins on the latch, a plurality of cup shaped tumblers on the stem arranged in the path of movement of said stop pins to prevent movement of the latch, said tumblers each having a pair of diametrically opposite notches in their rims, means for actuating said tumblers to move the notches into register with the stop pins, and means for disengaging the latch from the locking plate.

13. In a lock for a filing cabinet having two sections, a stem rotatably mounted on one section of the cabinet, a locking post on the other section of the cabinet, a locking plate eccentrically swiveled crosswise on said stem and adapted to be rotated into and out of engagement with said post, a latch movably mounted on said stem for locking said plate against rotation, said latch having a pair of stop pins thereon, a plurality of cup shaped tumblers mounted on said stem in the path of movement of the stop pins having a pair of diametrically opposite notches in their rims, means for positioning said tumblers to aline the notches thereof with said stop pins, and means for disengaging said latch from the locking plate to permit the rotation thereof.

14. A lock including a stem, a locking plate on said stem, a latch movably mounted on the stem for locking said locking plate against movement, a pair of stop pins on the latch, a plurality of cup shaped tumblers mounted on said stem in the path of movement of the stop pins for preventing movement of the latch, said tumblers having a pair of diametrically opposite notches in their rims and a circular series of apertures therein, a stop in one aperture of each of

said series adapted to engage with the stop of the adjacent tumbler, each of said apertures being numbered, a tube extending through said stem having a dial on its outer end corresponding to the apertures in the tumblers, a detent on the inner end of said tube adapted to engage with one of said stops, the notches being so arranged with reference to the apertures that when the number on the dial corresponding to the number of the stop screw in the tumbler has been rotated to a fixed point, the notches in the tumbler will be in register with the stop pins on the latch, and a rotary rod extending through said tube for operating said latch out of engagement with said plate.

HARRY J. HICK.

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