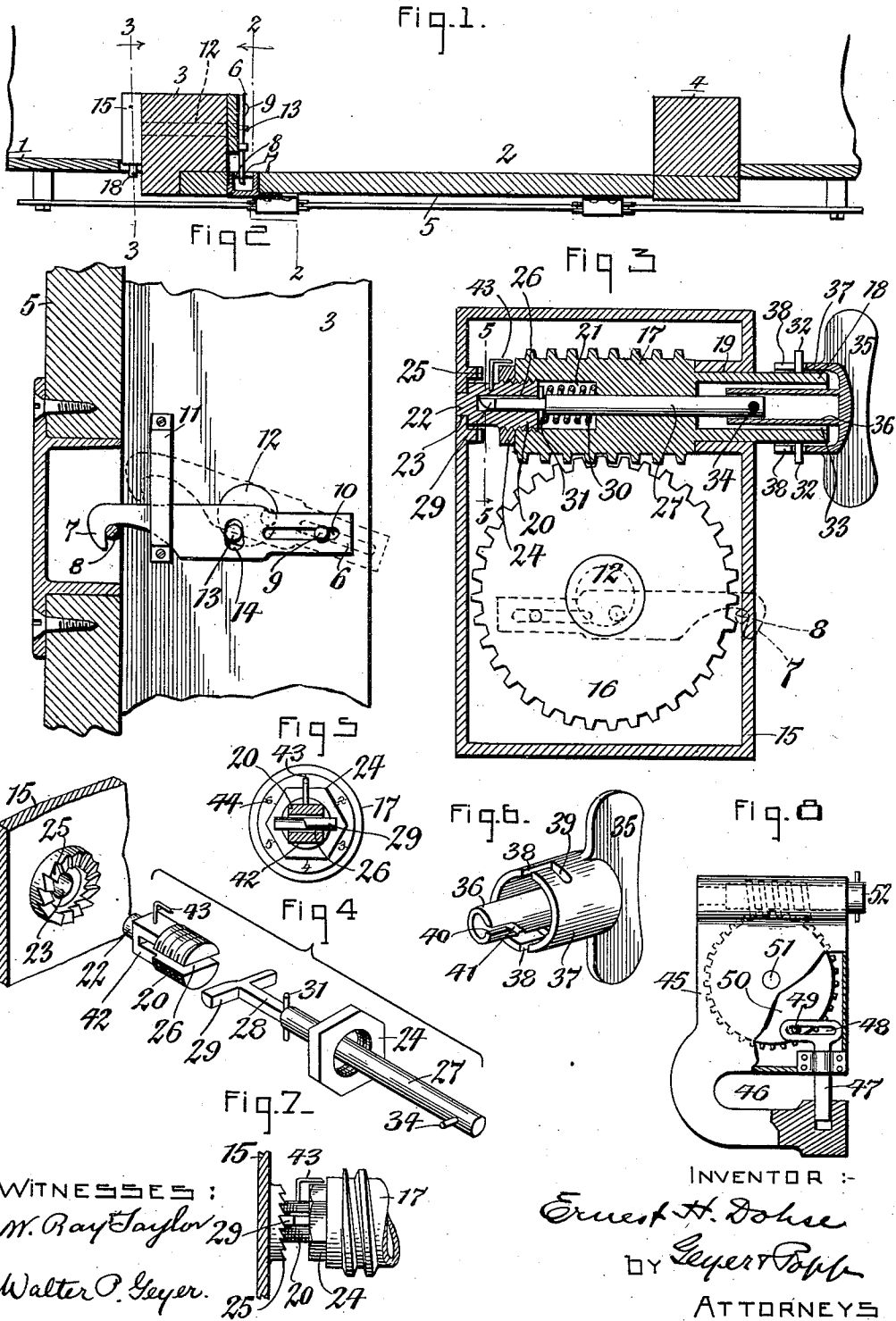


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LOCK.

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LOCK.

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To all whom it may concern:

Be it known that I, ERNEST H. DOHSE, a citizen of the United States, residing at Buffalo, in the county of Erie and State of New York, have invented new and useful Improvements in Locks, of which the following is a specification.

The object of this invention is to produce an improved lock which may be used for various purposes and which is so constructed that the same can only be operated by a key unlike those now in common use so as to prevent tampering with the lock by persons unprovided with the proper key.

In the accompanying drawings: Figure 1 is a fragmentary horizontal section of a car showing my improved lock employed for locking its door. Fig. 2 is a vertical transverse section, on an enlarged scale, taken in line 2—2, Fig. 1 and looking in the direction of the arrow associated with this line. Fig. 3 is a similar section taken in line 3—3, Fig. 1 and looking in the direction of the arrow associated with said line. Fig. 4 is a perspective view of several parts of the lock separated from one another. Fig. 5 is a vertical transverse section taken in line 5—5, Fig. 3. Fig. 6 is a detached perspective view of the key whereby the lock is operated. Fig. 7 is a fragmentary vertical section of the lock taken on one side of the worm and locking device. Fig. 8 is a side elevation of a pad lock constructed in accordance with my invention.

Similar characters of reference indicate corresponding parts throughout the several views.

Although my improved lock may be designed for various uses the construction shown in Figs. 1, 2 and 3 is more particularly adapted for use in locking the doors of freight or box cars which comprise a side wall 1 having a door opening or passageway 2, two upright posts 3, 4 arranged on opposite sides of the doorway and a horizontally sliding door 5 which is adapted to be either moved across the doorway for closing the same or to be moved to one side of the doorway for uncovering the same.

6 represents a horizontal locking bar mounted transversely on the outer transverse side of the door post 3 and provided at its outer end with a locking hook 7 which is adapted to engage with a locking pin 8 mounted on the adjacent inner part of the door. At its inner end this locking bar is

mounted so as to be capable of sliding transversely and also rocking vertically by means of a guide pin 9 secured to the door post 3 and passing through a longitudinal slot 10 in the inner end of the locking bar and adjacent to its outer end this locking bar is guided by means of a vertical loop or strap 11 which embraces this part of the locking bar and is secured to the adjacent part of the door post 3.

12 represents a rotatable crank shaft journaled horizontally in the post 3 and lengthwise of the door and provided at its inner end on one side of its axis with a crank pin or wrist pin 13 which engages with a vertical slot 14 in the central part of the locking bar. Upon turning the crank shaft in one direction the locking bar is first moved outwardly and then lifted at its outer end so as to disengage its hook from the pin on the door, thereby releasing the door and permitting the same to slide open. Upon turning the crank shaft in the opposite direction the locking bar is shifted so that its outer end is lowered and the hook is engaged with the locking pin and then the locking bar is moved horizontally inward so as to bring the hook tightly into engagement with the locking pin and hold the door firmly in its closed position.

The inner end of the crank shaft extends into the inclosing casing 15 of the lock proper which is secured to the inner upright transverse side of the post 3. Within the lower part of this casing is arranged a worm wheel 16 which is mounted on the inner end of the crank shaft 12 so as to turn therewith. In the upper part of the casing and transversely relatively to the car is arranged a rotatable operating member 17 having preferably the form of a worm the thread of which engages with the teeth on the upper part of the worm wheel. This worm may be journaled in the casing in any suitable manner but preferably by providing the front end of the same with the forwardly projecting circular shank 18 which turns in a bearing 19 in the front wall of the casing, and at its rear end the worm is rotatably supported by means of a bushing 20 having an external screw thread at its inner end which engages with an internally screw threaded socket 21 in the rear end of the worm while the outer end of the bushing is provided with a reduced circular portion or trunnion 22 which is journaled in a bear-

ing 23 in the rear wall of the casing. Rotation of this bushing and the worm relatively to each other is normally prevented by means of a lock or jamb nut 24 mounted
 5 on the threaded portion of the bushing and engaging with the rear end of the worm.

Normally the worm is prevented from being turned forwardly or clockwise except by a person provided with a suitable key for
 10 this purpose, and when the parts are in this condition the hook of the locking bar while in engagement with the locking pin of the door is prevented from being disengaged
 15 as much as the worm wheel and crank shaft are held against turning by the worm. The preferred means for thus holding the worm normally against forward turning movement is constructed as follows: 25 represents
 20 an annular row or rim of ratchet or abutment teeth formed on or secured to the inner side of the casing around the bushing, each of these teeth having an abrupt rear side and an inclined front side. Extending from the inner end of the bushing
 25 toward the outer end thereof and diametrically across the same is a longitudinal slot 26 the outer end of which is located between the reduced portion of the bushing and the jamb or lock nut mounted thereon.
 30 27 represents a longitudinally movable shifting rod which is arranged axially in the bushing and in the worm and is compelled to turn with the worm, preferably,
 35 by constructing its rear end of flat sided form, as shown at 28 and engaging the same with the opposite flat sides of the slot in the bushing. At its rear end the shifting rod is provided with a dog or pawl 29 which
 40 has its ends projecting laterally from opposite sides of the shifting rod beyond the periphery of the bushing and engaging with the abutment or ratchet teeth on the adjacent part of the casing. This dog is so constructed that each of its ends has an abrupt front side and an inclined rear side
 45 so as to permit this dog when in engagement with the ratchet teeth to be turned backwardly but prevent the same from moving forwardly. The dog is yieldingly held in engagement with the ratchet teeth, preferably, by means of a spring 30 surrounding that portion of the shifting rod which passes through the socket 21 and bears at
 55 one end against the bottom of this socket while its opposite end bears against a shoulder 31 formed on the shifting rod within the socket by means of a pin passing through the shifting rod, as shown in Fig. 3.
 60 It follows from this construction that so long as the dog is in engagement with the teeth of the ratchet rim the worm is locked against forward or clockwise rotation and this in turn prevents the disengagement of the locking hook 7 from the

locking pin 8 which is associated with the worm, thereby preventing the door of the car from being opened. When, however, the shifting rod is moved lengthwise so as to disengage the locking dog from the locking teeth it is then possible to turn the worm forwardly or in a clockwise direction and thereby turn the worm wheel and crank shaft in a direction which will lift the locking hook 7 out of engagement from the locking pin 8 so that the car door can be opened.

Various means may be provided which will permit only a person provided with such means to withdraw the locking dog from the locking teeth and turn the worm. The means, however, which are shown in the drawings for this purpose are suitable and constructed as follows: The shank 18 at the outer or front end of the worm projects forwardly beyond the front side of the casing and is exposed on the outer wall of the car so that it is accessible from the outer side thereof. On the exterior of this forwardly projecting front end of the worm the same is provided with one or more laterally projecting coupling pins 32, two of such pins being preferably employed and arranged on diametrically opposite sides of the worm, as shown in Fig. 3. The front end of this worm is constructed to form a tubular socket 33 which extends inwardly from the front end thereof. Within this socket is arranged the front outer end of the shifting rod which latter is provided adjacent to its front end within said socket with a laterally projecting coupling pin 34. Turning of the worm and releasing of the dog from the ratchet teeth is effected by means of a key in possession of an authorized person which key preferably comprises a handle 35 which is provided with inner and outer tubular sections 36, 37 which are arranged concentrically, the outer section being adapted to slip over the outer end of the worm and the inner section being adapted to slip over the outer end of the shifting rod. When two locking pins 32 are employed on the worm the outer tubular section of the key is provided with two bayonet or L-shaped slots each of which comprises a longitudinal portion 38 extending inwardly from the front edge of the outer section and a transverse portion 39 extending laterally. The inner tubular section of the key is provided with a slot 40 which extends inwardly from the front end thereof and has a cam-shaped or spiral portion 41, as shown in Fig. 6. In using this key for operating the lock so as to unlock the door the inner and outer tubular sections of the key are so alined with the outer ends of the shifting rod and the worm that the mouth of the slot in the inner key section is in line with the coupling pin of the shifting rod and the mouths of the slots in the outer key

section are in line with the coupling pins of the worm and while in this position the key may be slipped with its inner and outer sections over the front ends of the shifting rod and worm. During this longitudinal movement the longitudinal portions of the bayonet slots in the outer key section receive the coupling pins 32 of the worm and the further movement of the key in this direction is arrested by engagement of the inner ends of these longitudinal portions of the bayonet slots with said pins. At the same time the slot in the inner key section receives the coupling pin of the shifting rod and this pin is within range of the cam-shaped portion of this slot. Upon now turning the key forwardly or in a clockwise direction the transverse portions of the bayonet slots in the outer key section receive the coupling pins of the worm but the key turns independently or the worm in this direction until the inner ends of the transverse portions of the bayonet slots engage with the coupling pins of the worm. While the key is being turned so as to engage the transverse slot portions in the outer key section with the pins of the worm the cam-shaped portion of the slot in the inner key section engages with the pin of the shifting rod and causes the latter to be moved lengthwise outwardly against the resilience of the spring 30 sufficiently to disengage the locking dog from the ratchet teeth. This disengagement of the dog from the ratchet teeth occurs by the time the inner ends of the transverse slot portions 39 engage with the coupling pins of the worm so that the continued rotation of the key in a forward or clockwise direction will cause the worm to turn, which movement is in turn transmitted to the worm wheel, crank shaft and locking bar so as to lift the hook of the latter out of engagement from the locking pin of the door.

For turning the worm in the reverse or backward direction so as to again engage the locking hook with the locking pin of the door, the key is applied to the worm and shifting rod in the same manner as before described but is turned backwardly. During this backward movement, however, the coupling pins of the worm engage with the inner ends of the longitudinal slot portions 38 in the key section so that the worm is turned backwardly without being interlocked with the key by a bayonet joint, and the cam portion of the slot in the inner key section releases the shifting rod and permits the locking dog thereof to engage by the spring 30 with the ratchet teeth of the casing. While the locking dog and ratchet teeth are in engagement at this time the worm is not held against backward rotation inasmuch as the locking dog merely trips backwardly over the ratchet teeth by engagement of the inclined rear sides of the

dog with the inclined front sides of the ratchet teeth. The backward rotation of the worm and the parts associated therewith may be limited by various means, for instance, by engagement of the outer end of the slot 10 in the locking bar with the guide pin 9.

It will now be apparent that this lock can only be operated by a key having slots in its inner and outer sections which stand in the same relation as the coupling pins of the shifting rod and worm. It is therefore possible by changing the location circumferentially of the pin on the shifting rod relatively to the pin or pins on the worm to produce a different combination which will require the use of a different key in which the slots in the inner and outer sections are similarly related, thereby enabling a variety of combinations to be produced but permit each lock to be only operated by its particular key.

In order to enable the combination of the lock to be changed, if this should be found necessary in the event of an unauthorized person obtaining possession of a key for that particular lock, this can be readily done by loosening the lock nut 24 and then turning the bushing in the worm together with the shifting rod so as to bring the coupling pin of the latter into a different position circumferentially relatively to the pins on the worm and then again tightening the lock nut so as to hold the shifting rod in this position. Another key may now be substituted having the slots in its inner and outer sections constructed to conform to the new relative location of the coupling pins of the shifting rod and worm. In order to permit of turning the bushing conveniently relatively to the worm for changing the combination of the lock this bushing is provided with flat sided faces 42 on its periphery in rear of the lock nut, whereby a wrench may be conveniently applied to the bushing for turning the same.

For convenience in setting the bushing and shifting rod circumferentially relatively to the worm for bringing the coupling pins of this rod and worm in a predetermined relation an indicating device is provided which preferably consists of a pointer 43 arranged on the rear part of the bushing and traversing a circular scale 44 which is arranged on the rear end of the worm and which may consist of a plurality of numbers, as shown in Fig. 5, or other suitable indicating marks.

If desired this invention may be embodied in other forms of locks, for instance, as shown in Fig. 8, the same is embodied in a padlock. As shown in this figure, 45 represents the body of the casing containing the operating mechanism corresponding to that shown in Figs. 3, 4, 5 and 7 and provided with a gap 46 which is arranged at one end

of this casing and in which the parts to be locked are either confined or released by moving a locking bolt 47 forwardly across the mouth of this gap or withdrawing the same. At its rear end this locking bolt is provided with a transverse slot 48 which receives a crank pin or wrist pin 49 arranged on a worm wheel 50 which is carried by a shaft 51 corresponding to the shaft 12 in the construction shown in Figs. 1, 2 and 3. At the upper end of the casing is arranged a rotatable worm 52 which is operatively associated with the worm wheel 50 in the same manner as that described with reference to the construction shown in Fig. 3 and the same is also adapted to be either locked against turning or released by a key and cooperating internal mechanism like that shown in Figs. 3-7.

This lock is strikingly different from those now in common use and owing to the peculiar formation of the key and the parts associated therewith tampering with the same is rendered much more difficult, thereby materially increasing the safety of the same. This lock has comparatively few parts all of which can be produced at low cost, the same is not liable to get out of order and owing to the convenience with which the combination of the same can be changed the same is particularly desirable for use on freight cars which are constantly subjected to pilfering by tampering with the locks thereof.

I claim as my invention:

1. A lock comprising a rotatable member, an abutment provided with a circular row of fixed ratchet teeth, a longitudinally movable shifting rod turning with said member and provided with a dog engaging with said ratchet teeth, and a key adapted to be engaged with said member and said shifting rod and constructed to release said dog from said teeth and permit of turning said member.

2. A lock comprising a rotatable member, an abutment provided with a circular row of fixed ratchet teeth, a longitudinally movable shifting rod turning with said member and provided with a dog engaging with said ratchet teeth, a spring for yieldingly holding said dog in engagement with said teeth and a key adapted to be engaged with said member and said shifting rod and constructed to release said dog from said teeth and permit of turning said member.

3. A lock comprising a rotatable member,

a bushing connected with said worm, a stationary row of teeth arranged around said bushing, a longitudinally movable shifting rod turning with said bushing and member and having a dog engaging with said teeth, and means for shifting said rod so as to disengage said dog from said teeth and turning said member.

4. A lock comprising a rotatable member, a bushing capable of rotary adjustment relative to said member, means for indicating the relative position of said bushing and member, a stationary row of teeth arranged around said bushing, a longitudinally movable shifting rod turning with said bushing and member and having a dog engaging with said teeth, and means for shifting said rod so as to disengage said dog from said teeth and turning said member.

5. A lock comprising a casing having a front and a rear bearing, a rotatable worm journaled in said front bearing, a bushing having a screw connection with the rear end of said worm and provided with a longitudinal slot, and a trunnion which is journaled in said rear bearing, an annular row of fixed abutment teeth arranged on the inner side of said casing around said bushing, a shifting rod provided with a dog arranged in the slot of said bushing and engaging with said teeth, a spring operating to move said rod in the direction for holding said dog in engagement with said teeth, and means for moving said rod so as to disengage said dog from said teeth and turning said worm.

6. A lock comprising a rotary operating member, means for holding said member against rotation comprising a shifting rod movable lengthwise in said operating member, and means for shifting said rod and turning said member comprising a key having inner and outer tubular sections which are adapted to slip respectively over the front ends of said rod and member, said rod and member having laterally projecting pins, said outer tubular section having a bayonet slot adapted to receive the pin on the operating member and said inner tubular section having a cam-shaped slot adapted to receive the pin of said shifting rod.

Witness my hand this 22nd day of July, 1913.

ERNEST H. DOHSE.

Witnesses:

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ANNA HEIGIS.