2 Sheets—Sheet 1.

W. I. LUDLOW.

Latch.

No. 212,956. Patented Mar. 4, 1879.

Fig. 1.

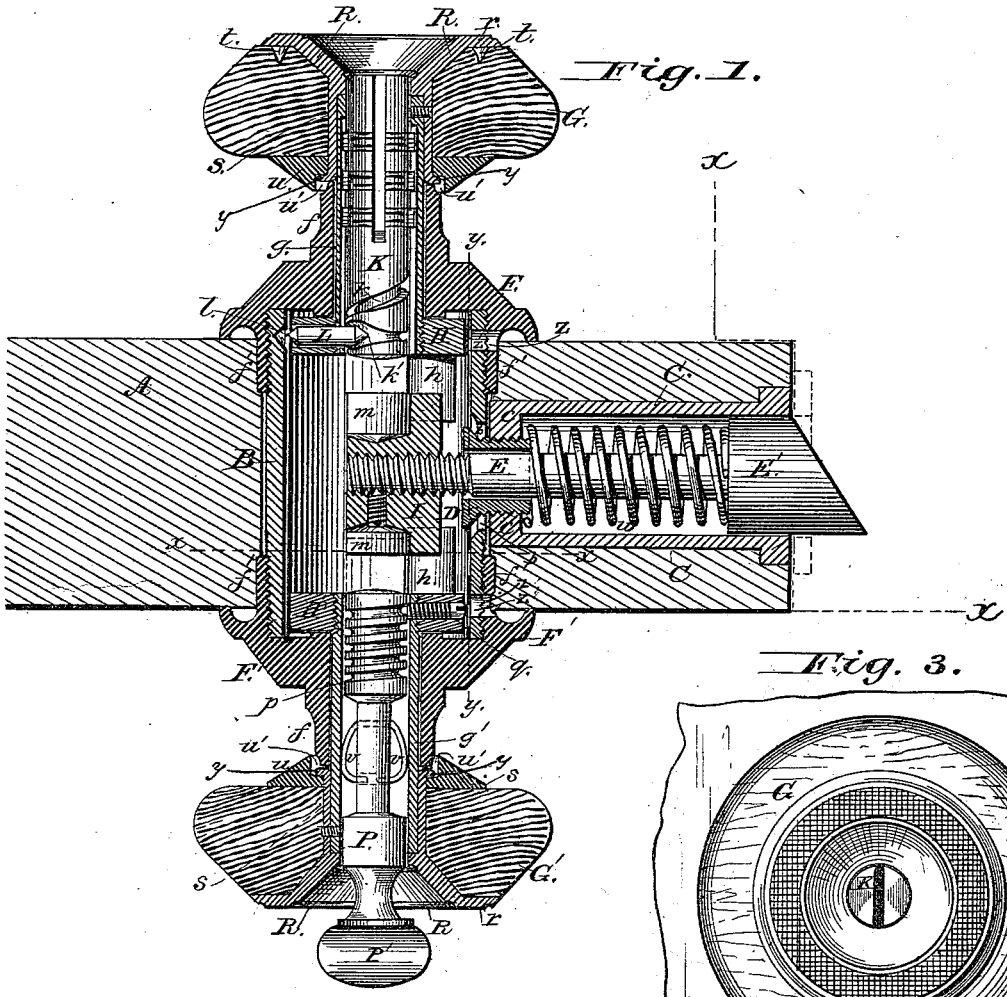
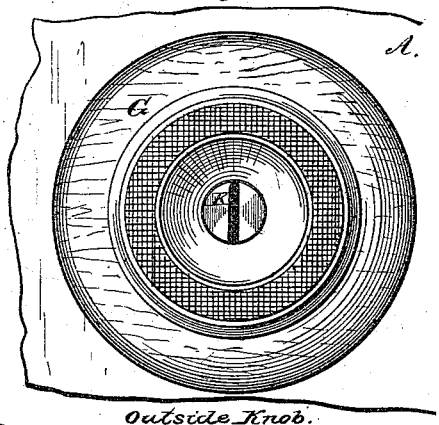
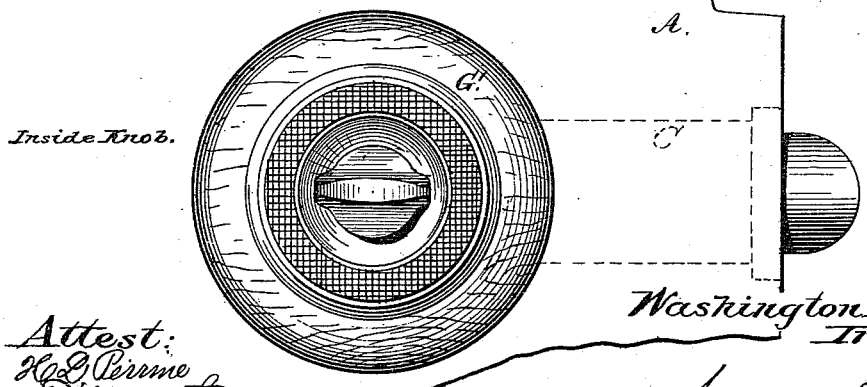


Fig. 3.



Outside Knob.

Fig. 2.



Inside Knob.

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Fig. 8.

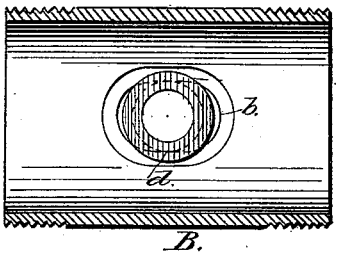


Fig. 4.

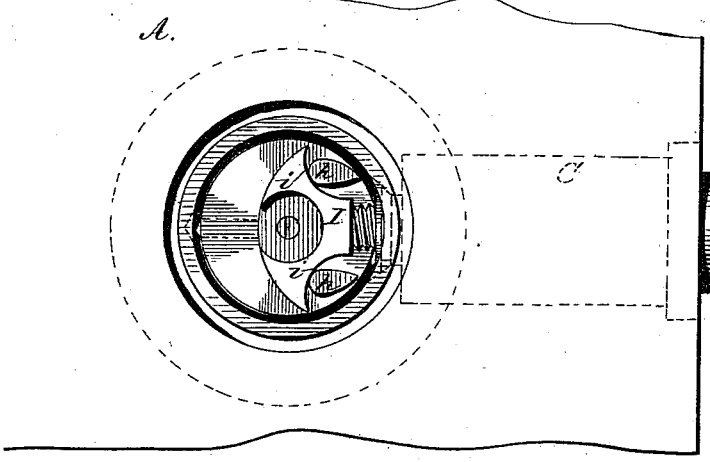
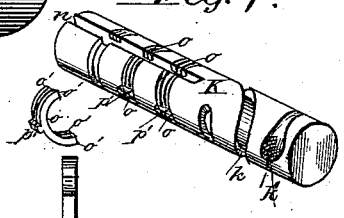


Fig. 9.



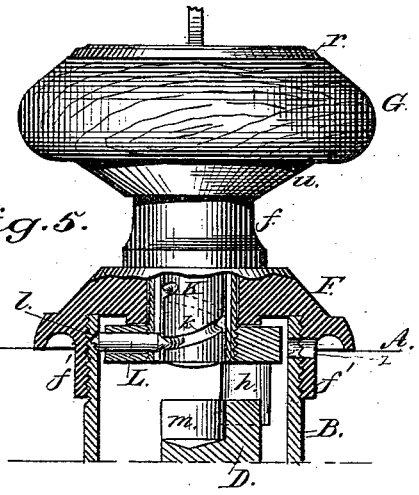


Fig. 5.

Fig. 6.

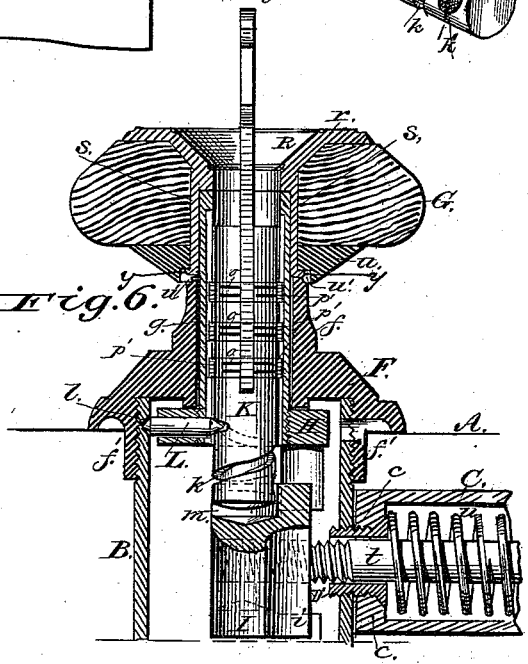


Fig. 7.

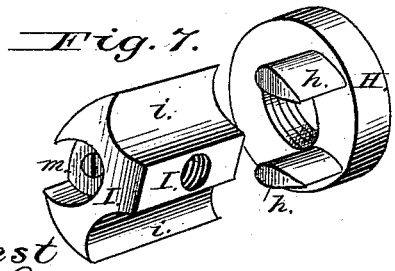
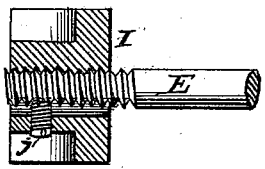


Fig. 10.



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UNITED STATES PATENT OFFICE.

WASHINGTON I. LUDLOW, OF ASHTABULA, OHIO.

IMPROVEMENT IN LATCHES.

Specification forming part of Letters Patent No. **212,956**, dated March 4, 1879; application filed December 23, 1878.

To all whom it may concern:

Be it known that I, WASHINGTON I. LUDLOW, of Ashtabula, in the county of Ashtabula and State of Ohio, have invented certain new and useful Improvements in Knob Latches and Locks, of which the following is a specification:

This invention relates to that class of knob-locks in which the knobs are operated independently of each other, and actuate the bolt by means of their spindles, and in which the locking mechanism is controlled by a suitable key or stop inserted through the knobs.

It consists, first, in the combination, with a tubular knob-spindle and a bolt having an inner head, of a longitudinally-adjustable cylinder arranged within said spindle, adapted to engage with the head of the bolt, and provided with means for preventing its movement except by a proper key; second, in the combination, with a tubular knob-spindle and a bolt having an inner head, of a screw-threaded cylinder arranged within said spindle, and engaging with an inner projection from the wall thereof, whereby said cylinder may, by rotation, be projected inward to engage with the bolt-head, or withdrawn therefrom, and so lock or unlock the bolt; third, in a knob-lock, the combination, with a bolt having an inner head and a tubular knob-spindle adapted to operate said bolt, of a spirally-grooved cylinder, having a depression at the end of its groove, and arranged within the hollow spindle, a reciprocating pin or shuttle-bolt projecting through the wall of the hollow spindle and into the groove of the cylinder, said pin or shuttle-bolt being pointed or beveled at its outer end, and a suitable stop for engaging the outer pointed or beveled end of said pin, as and for the purpose hereinafter described and explained; fourth, in a knob-lock, the combination, with a bolt having an inner head and a tubular knob-spindle, of a longitudinally-adjustable cylinder or stop-bolt arranged within said hollow spindle, and adapted for engagement with the bolt-head, and a movable stop adapted to prevent or permit rotation of the spindle, and for operation for that purpose by the movement of the said cylinder or stop-bolt, whereby the knob may be locked and unlocked independently of the bolt, or the bolt and knob may be locked or unlocked at the same time; fifth, in a novel construction and combination of the inner bolt-head and the knob-spindle head, having projecting lugs for operating upon said bolt-head; sixth, in a novel construction of devices for securing a knob to a tubular spindle; seventh, in a novel attachment of the bolt-case to the main barrel of a knob-lock; eighth, in a novel means of adjusting a knob-lock to doors of different widths.

In the accompanying drawings, Figure 1 represents a horizontal central section through a door and the lock constructed according to my invention, the interior moving parts being shown in full lines. Fig. 2 is a front view of the inside knob. Fig. 3 is a front view of the outside knob. Fig. 4 is a section through the barrel of the lock on line *x x*, Fig. 1. Fig. 5 is a view, partially in section, showing outside knob locked alone. Fig. 6 is a view, partially in section, showing the outside knob and bolt both locked, and illustrating, also, a modification of the attachment of the bolt-case to the barrel of the lock. Fig. 7 is a view, in perspective, of the bolt and spindle-heads attached. Fig. 8 is a section through the barrel on line *y y*, Fig. 1, and illustrating the adjustable attachment of the bolt-case to the barrel. Fig. 9 is a view of a form of key cylinder or barrel and tumblers adapted for use in connection with the outside knob of my improved lock. Fig. 10 illustrates a modification of the connection of the bolt and its inner section or head.

The letter A indicates the door, and B the main barrel of the lock, which is adapted to be arranged in an opening cut through the door at a proper distance from its edge. C is the bolt-case, which is adapted to be inserted in an opening bored inwardly from the edge of the door, and intersecting the opening for the barrel. This barrel has formed in its wall a slot, *b*, which, when the barrel is in proper position, coincides with the bolt-case opening. The inner end of the bolt-case C has a head, *c*, through the center of which is a screw-threaded opening; and D is a hollow screw, which fits into said opening, and is provided with a head, *d*, the diameter of which is greater than the width of the slot in the barrel. When

this screw is inserted through said slot from within the barrel and into the opening in the bolt-case head it serves to secure the barrel and bolt-case together, and forms a guide or bearing for the bolt-stem E. This screw should have recesses cut across its walls at its smaller end to receive a screw-driver, which may be inserted through the bolt-case before the bolt is in position. The slot in the barrel, it will be perceived, permits the bolt-case to be centered in doors of different thickness, and obviates the necessity of great precision in forming the opening for said case.

The stem E of the bolt E′ is screw-threaded at its inner end, and this screw-threaded end engages with a corresponding hole in the inner bolt-head, I, so that by screwing the stem in one thread the extent of the bolt's projection from the edge of the door may be varied as desired, the spring *w*, which surrounds the stem, having a proper length and tension to expand or be compressed to correspond with the adjustment of the bolt.

The ends of the barrel B are screw-threaded, to engage the rosettes F, each of which has an outer tubular extension, *f*, to receive a knob-spindle, and an inner screw-threaded collar, *f′*, to embrace an end of the barrel B.

Each of the knobs G G′ has a hollow spindle, *g g′*, and these hollow spindles extend through the rosettes F, and are provided with heads H H′, secured thereto by screw-connection, and each of these heads has two lugs, *h*, projecting from its inner flat face, on opposite sides of the spindle. These lugs *h* project in front of the concave curved faces *i* of the inner bolt-head, I; and when one of the knobs is turned in either direction, one of these lugs will strike its adjacent one of the curved faces and move the bolt rearward.

When the lock is in position, the heads H prevent the knob-spindles from being withdrawn outward. The concave curved form of the forward faces of the inner bolt-head form four bearings or surfaces against which the lugs *h* impinge. Two of these bearings, it will be seen, are on each side of the center of the head, one above and one below. Now, when a spindle is turned, one of its lugs presses against and follows the contour of one of the concave bearings while forcing it rearward. This form of bearing for the lug is found to prevent the tilting to one side of the head which would result were the bearing rectilinear, and either abrupt or inclined.

The impinging faces of the lugs *h* are also curved, and in their contact with curved-head faces have a rolling instead of a sliding friction.

In the hollow spindle *g* of the outer knob, G, is arranged a key-cylinder, K. The inner portion of this cylinder has formed in it a spiral groove, *k*, which traverses about one-third the length of said cylinder, and terminates near the end thereof in a depression which extends nearly or quite to the center. In the head H of the hollow spindle *g*, in which this key-cylinder is located, is formed a radial passage, in which is arranged a short radially-movable pin, L, which, from its movement, I call a "shuttle-bolt." This shuttle-bolt has its ends pointed or beveled.

In the inner surface of the barrel B, and opposite the head H, is formed a conical recess, *l*, of a size corresponding to that of the pointed ends of the shuttle-bolt. This shuttle-bolt extends into the spiral groove *k* of the key-cylinder, and is of such depth that when the end of said shuttle-bolt is in the main portion of said groove its opposite end will be forced into the recess *l* in the barrel B, and while in this position the knob G is locked from turning, as the recess *l* is stationary and the shuttle-bolt extends through the head H of spindle *g*. When, however, the key-cylinder is turned to bring the depression *k′* at the end of the groove *k* opposite the inner end of the shuttle-bolt, and the knob G is then turned, the pointed or beveled form of the outer end of the shuttle-bolt and the corresponding form of the recess *l* permit the said bolt to be forced inward and out of the recess, as there is nothing to oppose it until its inner end rests on the bottom of the depression. While the shuttle-bolt is in this position it offers no obstruction to the rotation of head H′, and of course the knob G is free to turn. When the end of the shuttle-bolt is in the depression *k′* a half-turn of the cylinder K is sufficient to project the outer end of said bolt into the recess *l*. Further turning of said cylinder in the same direction causes it to move also longitudinally inward, on account of the inner end of the shuttle-bolt coming into the spiral groove and causing a screw-like action of said cylinder. This groove is of such length as to permit the cylinder to travel inwardly until it enters a socket, *m*, in the end of the inner bolt-head, I, as shown in Fig. 6, and when the parts are in these positions it is obvious that the main bolt E′ is locked from being moved inward, and the knobs G G′ prevented from turning. The lock can be operated now by either knob.

The key-cylinder K has a diametric key-chamber, *n*; and in order to guard this cylinder from being operated except by a person having a proper key, I prefer to provide said cylinder with a series of expansible tumblers, *o*, which are arranged in circumferential grooves intersecting the key-chamber, their ends being approximately flush with the respective opposite walls of said chamber. They are of segmental shape, and split from near their middles to their ends, to form outward-bent elastic legs *o′*. Midway their outer surfaces they are provided with projections *p′*, and when they are placed in their grooves and the barrel inserted in the hollow spindle these projections fit in longitudinal grooves in the inner surface of said spindle, and the tumblers are thereby prevented from moving when the cylinder is turned. Should the cylinder be turned by a tool inserted in its outer end, one end of each tumbler will be thereby brought

into the key-chamber, and expanded therein, so that they cannot enter the opposite portions of the circumferential grooves, but will strike against the wall of the key-chamber on each side of said recesses, and thus prevent the further rotation of the cylinder.

In order to operate the cylinder for locking and unlocking the lock, a flat key must be used which fills the key-chamber, and is provided with notches or wards, which, when the key is in place, accurately coincide with the circumferential recesses, and form continuations of the same all around the cylinder.

This form of key cylinder or barrel and tumblers are included in an application for patent filed by me December 21, 1878, and will, therefore, not be claimed here.

In the cylinder *g'* of the inner knob, G', is arranged a cylinder, P, of about equal length with the spindle, and having a spiral groove, *p*, traversing about one-third of its inner portion, and provided at the opposite end with a head or thumb-piece, P'.

The tip of a set-screw, *q*, which secures the head H' from turning on spindle *g'*, projects into the spiral groove *p*, so that when the cylinder P is rotated it will also be caused to move longitudinally.

The cylinder P has its intermediate portion contracted; and in order to prevent the cylinder from turning too easily, a spring, *v*, formed of a bent piece of spring-wire, is inserted through openings in this contracted part of the cylinder, so that it will project therefrom and press against the inner surface of the spindle.

When the cylinder P is rotated to the right it will be caused to travel inward and enter one of the sockets *m* of the inner bolt-head, and thus the bolt may be locked from the inner side of the door independently of the outer knob or its contained key-cylinder.

It will be observed that my lock may be adjusted to doors of different thickness, for the inner rosette, F', may be adjusted by its screw-connection away from the middle of the barrel B, and the slot *b* in said barrel permits the adjustment of the bolt-case accordingly to correspond with the center of the door.

The spiral grooves in the locking-cylinders K and P should permit the travel of said cylinders to agree with the greatest width to which the lock may be adjusted.

On the outer end of each of the hollow knob-spindles I secure a concave or dished disk, R, having a flange, *r*, and a tubular projection, *s*, which coincides with a central opening in the disk. The flange *r* is provided with one or more inwardly-projecting spurs, *t*.

The main portion of the knob is formed by an annulus, G or G', of wood or any suitable material, having an opening to fit over the tubular projection *s* of the dished disk R, said tubular projection being of such length as to receive upon it and project beyond a washer, *u*, which fits against the inner surface of the knob, said washer being secured by a lip, *y*, on said projection.

Openings *z* are left in the tubular collars *f'* of the rosettes for the insertion of the set-screws which secure the heads to the spindles, and an opening, *z'*, in the barrel B permits the insertion of the shuttle-bolt L into its opening in the head H of spindle *g*.

The washer *u*, when in place, forms practically a part of the knob, and has a recess or countersink, *w'*, surrounding its central opening; and when the parts of the lock are in working position, the outer end of the tubular portion *f* of the rosette sets into this countersink, so that the joint between the knob and rosette is concealed and protected from dust; further, this construction permits of a greater length of bearing for the knob-spindle without rendering it necessary to throw the knob farther from the door.

In Fig. 9 I have shown a modification of the means of attaching the adjustable bolt to its inner head, one side only of the opening in the head being provided with serrations or threads corresponding to the threads of the bolt-stem, the other side of the opening being smooth, and the opening being of sufficient size to permit the bolt-stem to be moved longitudinally therein without turning.

A set-screw, *j*, passing through the head I, forces the threads of the end of the stem into engagement with the serrations or threads of the opening, which then prevent the longitudinal movement of the bolt in the head.

What I claim is—

1. The combination, with a tubular knob-spindle and a bolt having an inner head, of a longitudinally-adjustable cylinder arranged within said spindle, adapted to engage with the head of the bolt, and provided with means for preventing its own movement except by a proper key, substantially as described.

2. The combination, with a tubular knob-spindle and a bolt having an inner head, of a screw-threaded or spirally-grooved cylinder arranged within said spindle, and engaging with an inner projection from the wall thereof, substantially as and for the purpose set forth.

3. The combination, in a knob-lock, of a bolt having an inner head, a tubular knob-spindle adapted to operate said bolt, a spirally-grooved cylinder having an inward depression at the end of its groove, and arranged within said hollow spindle, a reciprocating pin or shuttle-bolt projecting through the wall of the hollow spindle and into the groove of the cylinder, said pin or shuttle-bolt being pointed or beveled at its outer end, and a suitable stop for engaging the said outer end of said pin, substantially as and for the purpose set forth.

4. In a knob-lock, the combination, with a bolt having an inner head and a tubular knob-spindle, of a longitudinally-adjustable cylinder or stop-bolt arranged within said spindle, and adapted for engagement with the bolt-head, and a movable stop adapted to prevent

or permit rotation of the spindle, and for operation for that purpose by the movement of the said cylinder or stop-bolt, substantially as and for the purpose set forth.

5. The combination of the inner bolt-head having the concave curved faces, and the spindle-head having lugs projecting in front of said faces and traversing the same when the spindle is turned, substantially as and for the purpose set forth.

6. In a knob-spindle, the combination of a disk having a central opening and a tubular projection coinciding therewith, the hollow spindle secured in said tubular projection, the annular knob arranged upon said projection, the washer fitting against the inner surface of said knob, and the lip formed on the tubular projection for holding the knob and washer in place, substantially as described.

7. The combination of a bolt-case of a knob-lock, the main barrel provided with an opening in its wall, and a hollow screw passing through said opening and engaging in a screw-threaded opening through the bolt-case head and forming a guide for the bolt-stem, substantially as described.

8. The combination of the barrel B, having screw-threaded ends and a longitudinal slot in its wall, the rosettes screw threaded to engage, more or less, as desired, with the ends of said barrel, and the bolt-case having the headed hollow screw passing through the slot in the barrel, whereby the lock may be adjusted to and the bolt centered in doors of different widths, substantially as described.

9. The combination of the knob having the countersink around its central opening with the rosette having its outer end adapted to sit in said countersink, substantially as and for the purpose set forth.

10. A lock-case provided with a central elongated opening, adapted for receiving the projecting end of a latch-bolt case, whereby the said latch-bolt case is permitted lateral movement in its adjustment to said lock-case, substantially as described.

In testimony that I claim the foregoing I have hereunto set my hand in the presence of the subscribing witnesses.

WASHINGTON I. LUDLOW.

Witnesses:
JAMES L. NORRIS,
JAS. A. RUTHERFORD.