2 Sheets-Sheet 1.

C. P. Wagner,

Permutation Lock.

No. 47,588. Patented May 2, 1865.

Fig. 1

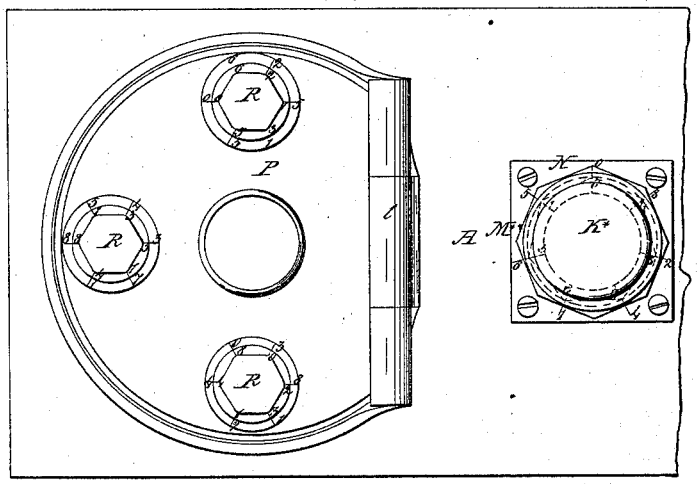
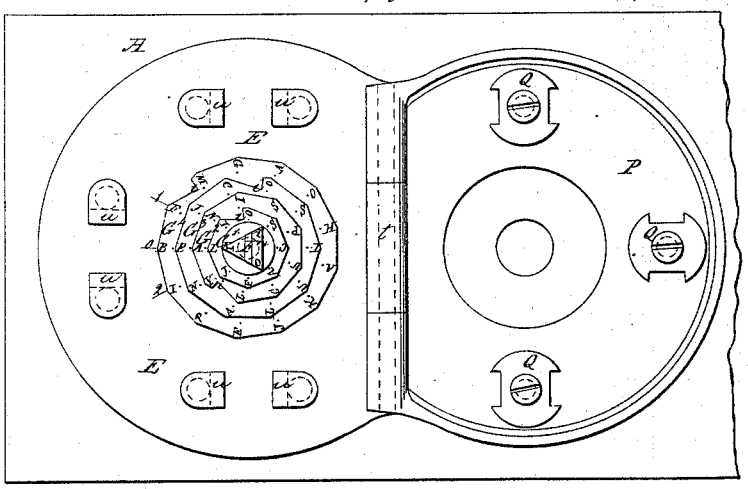


Fig. 2



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2 Sheets-Sheet 2.

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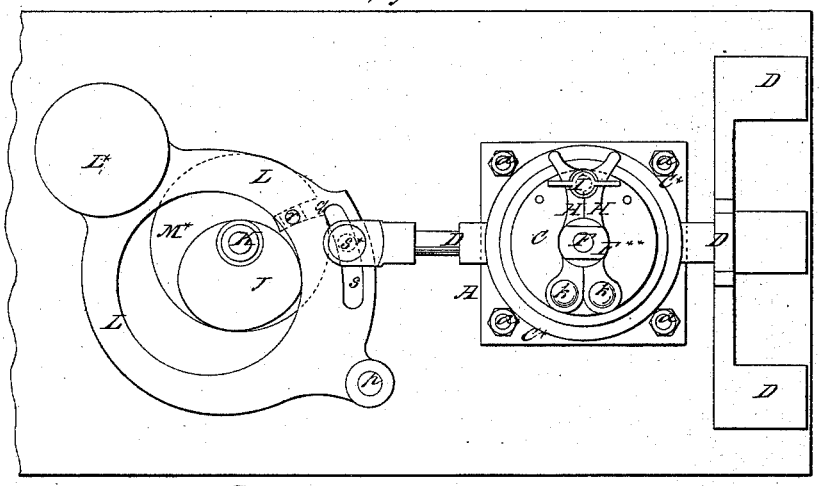
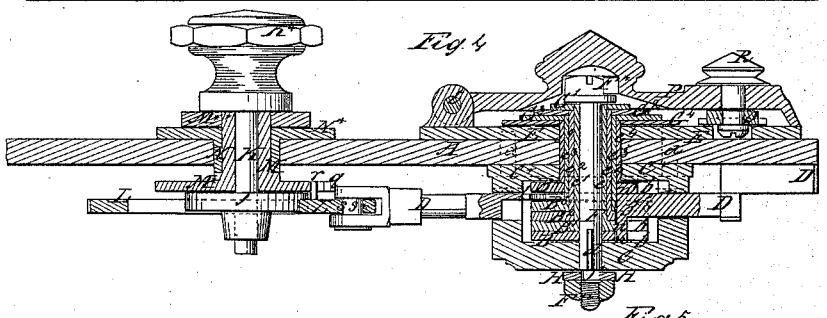
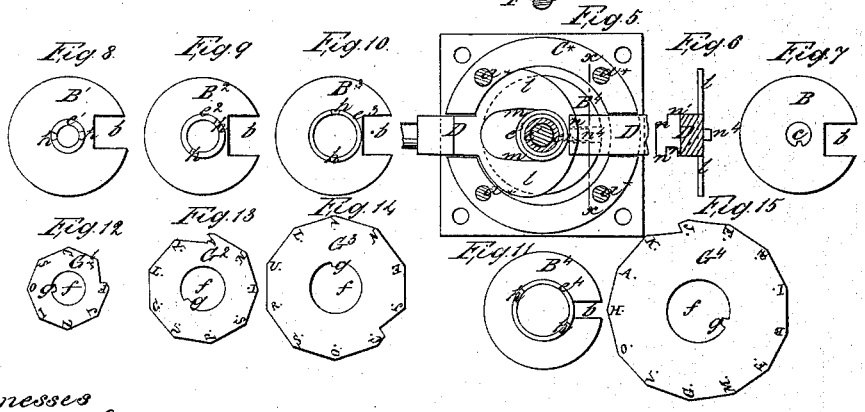
Permutation Lock.

No. 47,588. Patented May 2, 1865.

Fig. 3







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UNITED STATES PATENT OFFICE.

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IMPROVEMENT IN LOCKS.

Specification forming part of Letters Patent No. **47,588**, dated May 2, 1865.

To all whom it may concern:

Be it known that I, CONRAD PH. WAGNER, of the city, county, and State of New York, have invented a new and useful Improvement in Locks; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a front view of the lock with the cover P of the permutation-plates closed. Fig. 2 is a similar view with the cover P open. Fig. 3 is a back view. Fig. 4 is a central horizontal longitudinal section. Fig. 5 is an inside view of a part of the case which contains the tumblers. Fig. 6 is a transverse section of the bolt in the line *x x*, Fig. 5. Figs. 7, 8, 9, 10, and 11 are front views of the several tumblers detached. Figs. 12, 13, 14, and 15 are front views of the permutation-plates detached.

Similar letters of reference indicate corresponding parts in the several figures.

This invention relates to the employment of a system of concentric rotating tumblers and a system of concentric permutation-plates attached to the said tumblers outside of the lock, and capable of being severally turned by the fingers or by other means to certain positions indicated by letters or numerals thereon, for the purpose of bringing the tumblers to the required positions to liberate the bolt of the lock.

It also consists in certain means of providing for the changing of the positions of the permutation-plates relatively to the rotating tumblers, for the purpose of enabling the position of the tumblers which permits the drawing back of the bolt to be indicated by a different combination of letters or numerals without requiring the box or case which contains the tumblers to be opened.

It also consists in inclosing the rotating tumblers separately from the other parts of the lock in a box through which the bolt passes, and which forms a convenient guide for the bolt, and in which are bearings for the tubes or sleeves to which the tumblers are attached, and for the central spindle around which the tumblers rotate, and which also affords facility for placing all the tumblers together in the lock.

It also consists in a certain device, whereby, though the tumblers may have been brought to the requisite position for allowing the bolt to slide back, such sliding back is prevented until the said device is also brought to a certain position.

It further consists in providing, for the purpose of covering and inclosing the permutation-plates, a cover, which is locked in a peculiar manner hereinafter described.

To enable others skilled in the art to make and apply my invention, I will proceed to describe its construction and operation.

A represents a portion of the door to which the lock is attached. C C* is a box or case, of cylindrical or other suitable form, containing the series of concentric rotating tumblers B B′ B^2 B^3 B^4. This case is secured to the interior of the door A by means of screws *a a*, and is made in two parts, C and C*, for the convenience of inserting the tumblers and the bolt D, the tumblers being inclosed within it and the bolt passing through it transversely to the common axis of the tumblers and parallel with the plane of the door. The two parts C C* are secured together by means of screws *a** *a** or other means. Outside of the door there is, opposite to the case C C*, a steel plate, E, which is secured by the screws *a a*, which attach the said case to the door.

The tumblers consist of circular disks, of steel or other metal, each having a notch, *b*, in one side for the reception of a portion of the bolt D, or of a projection formed on the front or back thereof. The rearmost tumbler, B, has a central hole, which fits to a spindle, F, which passes entirely through the case C C*, the door, and the plate E, and the said tumbler is only prevented from turning on the said spindle by being provided with a feather, *c*, Fig. 7, to fit a groove, *d*, in the spindle. This spindle fits snugly into a hole in the back of the case C C*. The second tumbler, B′, is made in the same piece with or rigidly secured to a long concentric tube or sleeve, *e′*, which is fitted to turn upon the spindle F, and which is long enough to extend through the case C C* and the door and some distance through the plate E. The tumbler B^2 is made with a sleeve or tube, e^2, which fits to the exterior of *e′*; the fourth, B^3, with a sleeve or tube, e^3, fitting to the exterior of e^2,

and the front one, B^4, with a sleeve or tube, e^4, fitting to the exterior of e^3. The outer sleeves or tubes, commencing with e^2, are successively shorter than those inside of them in a sufficient degree to allow each of them to protrude farther through the plate E than the one outside of it, as shown in Fig. 4, in order to allow their respective permutation-plates G' G^2 G^3 G^4 to be put on. The exterior of the outermost tube or sleeve, e^4, fits a circular hole in the plate E. The permutation-plates consist of circular disks, of brass or other metal, and each one has a circular hole, *f*, in its center for the reception of the end of the tube or sleeve of its respective tumbler, and in the hole of each there is a tongue or feather, *g*, which enters into a notch, *h*, in the end of the tube or sleeve, and so enables the tumbler to be turned by turning its respective permutation-plate.

Each tube or sleeve has in its end two or more notches, *h*, (two shown in Figs. 8, 9, 10, 11,) for the reception of the feather *g* in its respective tube or sleeve, thus permitting each permutation-plate to be connected with its respective tumbler in two or more positions. The plate G^4, which is connected with the front tumbler, B^4, is next to the plate E and close against the said plate, and the next one, G^3, fits close to G^4; the next one, G^2, close to G^3, and the front one, G', close to G^2, and the several plates are kept upon their respective sleeves by the head F* on the front end of the central spindle, F, which is kept in place by a nut, F**, fitted to a screw-thread on its rear end.

The head of the spindle serves as a permutation-plate to the rearmost tumbler, B. The permutation-plates are each larger than the one in front of it, and the front one, G', larger than the head of the central spindle, that a portion of each may be exposed to view and present a surface on which to engrave or stamp the letters or numerals which serve as indices to the positions of their respective tumblers. In Fig. 2 of the drawings letters are represented on the said plates. Each of the said plates is also represented in that figure with a notch, *i*, in its edge, to facilitate the turning of it with the thumb or finger; but it would be better to have the edges milled for this purpose. In that portion of the central spindle, F, which protrudes through the back of the box C C* and in front of the screw-thread, there is turned a groove, *j*, (see Fig. 4,) for the entrance of the edges of the two jaws of a stop, H H, which are attached to the back of the box by means of pivots *k k*, Fig. 3. These jaws, when closed upon the spindle and secured in a closed condition by a set-screw, I, screwing into the back of the box, do not prevent the spindle from turning, merely operating in conjunction with the nut F**, to prevent the spindle from moving endwise; but by unscrewing the set-screw and opening the said jaws wide enough to clear the groove *j* or the nut, the said spindle is permitted to move forward far enough to allow the permutation-plates to be severally drawn off from the sleeves of their respective tumblers and turned, to allow them to be placed on again with their feathers *g* in different notches, *h*, in the sleeves. The said stop, if its jaws open wide enough to clear the nut, serves as a more convenient means of allowing the spindle to move forward than unscrewing the nut, and only just permits the spindle to move forward the requisite distance.

A portion of the bolt D, which is received within the case C C*, is made much thinner than the other portion, as shown at *l*, in Figs. 4, and 6, in order that it may work between two of the tumblers, B^3 and B^4, without keeping them very far apart, and in order to permit a portion of the greater thicknesses of the bolt beyond to enter the notches *b* of one or more of the tumblers, as shown at *b** in Fig. 4. The thinner portion, *l*, of the bolt is made wider than the other parts, and has provided in it a slot, *m*, through which the sleeve e^3 of the tumbler B^3 next behind it passes, and this widened portion of the bolt is just long enough to emit the necessary longitudinal movement of the bolt limiting the said movement by coming in contact with the sides of the case C C*. There is on the back of the bolt a projection, *n n'*, the portion *n* of which is formed or arranged to slip into the notch *b* of the tumbler B, and the portion *n'* formed or arranged to slip into the notch *b* of the tumbler B'. This for mation is shown in Fig. 4. There is also a projection, n^4, on its front face to enter the notch *b* of the front tumbler, B^4. The notches *b* of the tumblers may be of various widths. The bolt or its projections *n n'* and n^4 can only enter the said notches when the tumblers are in positions to present the several notches opposite to the said projections and to that portion of the body of the bolt which is to enter any of them, and in order to bring the tumblers to these positions the permutation-plates and spindle F have to be severally turned to such positions as are known to correspond with those positions of the tumblers, and indicated by the letters or numerals on the said plates. With the adjustment of the plates and spindle shown in the drawings the several plates have to be brought to such positions that a combination of letters produced by one letter on each plate and one on the head of the spindle brought opposite to a point marked *o* on the plate E will read, commencing at the left hand on the back plate, G^4, "BEALI," as shown in Fig. 2. When the several plates are brought to this position, the bolt may be shot in or out by a key, handle, or other device applied to it for this purpose, and when the bolt has been shot out to lock the door, the turning of the several plates from this position prevents the bolt from being shot back by any person unacquainted with the combination necessary to be formed by the letters or numerals to bring the tumblers to the proper position. This combination may

be altered at any time by unfastening and opening the jaws H H, drawing forward the spindle, and shifting the permutation-plates to bring their feathers *g* into different notches, *h*, in the sleeves of the tumblers.

The device represented for moving the bolt D consists of a cam and a yoke, L, Figs. 3 and 4. The cam is fast on a spindle, K, which is inserted through the door at a suitable distance from the case C C* and furnished with a knob, K*, outside of the door, to enable it to be turned by hand, and the yoke, which is connected with the bolt by a slot, *s*, and pin *s**, oscillates upon a pin, *p*, which attaches it to the door, and which is loaded at L*, in such a manner that it falls back of its own weight and draws back the bolt when the tumblers are brought to the requisite positions to permit its backward movement. The cam serves the purpose of shooting out the bolt, and the opening of the yoke in which the cam works is of such size that when the bolt is shot and the door locked the cam may rotate freely within it without disturbing the bolt.

The spindle K is fitted with a loose sleeve, M, which turns in a bearing, N, secured firmly in the door, and which forms the bearing for the spindle, and on this sleeve, inside of the door, there is a circular flange, M*, in which there is a slot, *q*, into which a pin, *r*, secured firmly in the yoke, must enter to permit the yoke to fall back and draw back the bolt. When the bolt has been shot out to lock the door, the sleeve M is turned by applying the finger and thumb to a flange M**, on its outer end outside of the door and behind the knob, K, to any position but that which permits the pin *r* to fall into the notch *q*, so that if the tumblers should be turned to the proper position to permit the sliding back of the bolt the latter cannot do so until the sleeve is turned to the proper position to bring the slot *q* opposite to the pin *r*, which position is indicated by a mark on the flange M**, being opposite to one of a number of marks on the outer face of the flange N* of the bearing N. Fig. 1 shows the flange M** in this position.

It will be understood that to open the door not only must every one of the tumblers be brought to a certain position, but the sleeve M and cam J also, and this is almost impossible to a person who is not acquainted with those positions. The yoke L may be operated by a spring instead of by a weight, L*. The flange M** may be attached to the sleeve M in the same manner as the plates G' G^2, &c., to the sleeves e' e^2, &c., and be made to serve as a permatution-plate in the same manner relatively to the flange M*, which is in reality a tumbler. Two or more such tumblers and permutation-plates may be used in combination with the yoke L or other device for drawing the bolt.

P, Figs. 1, 2, and 4, is the cover, of steel or hard iron, provided for the permutation-plates to serve as an additional safeguard to the lock. This cover is hinged at *t* to the plate E, and is furnished inside with any desired number of revolving buttons Q, which are capable to being turned by attached knobs R outside of the cover. These buttons are so formed, as shown in Fig. 2, that each, when turned to a certain position, will pass freely in and out between fixed catches *u u* secured in the plate E, and allow the cover to open and close; but that when turned from this position while the cover is closed parts of them will pass behind the catches *u u*, and will not permit the cover to open.

The proper position to which the knobs R require to be brought to bring the buttons to the requisite positions to permit the opening of the cover, is ascertained by bringing a certain number of marks on each knob to a certain one of a number of marks on the exterior of the cover, and it will be very difficult for any person not knowing the proper positions to bring all the knobs at once to those positions, which, for the example represented, are shown in Fig. 1.

The means of operating the bolt and the bolt itself may be modified to adapt my improved system of tumblers and permutation-plates to padlocks and trunk-locks.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The movable stop H H, in combination with the longitudinally-movable central spindle F, rotating tumblers B B' B^2 B^3 B^4, permutation-plates G' G^2 G^3 G^4, and tumbler-box C C*, substantially as and for the purpose herein specified.

2. The tumbler-box C C*, inclosing the tumblers separately from the other parts of the lock, forming a guide for the bolt D and a bearing for the tumblers and their central spindle, substantially as herein specified.

3. The sleeve M, with one or more slotted flanges or tumblers M* and the pin *r* in the yoke L, or its equivalent, applied in combination with the bolt of the lock and with the spindle K, substantially as and for the purpose herein specified.

4. The cover P, for inclosing the permutation-plates, secured by means of two or more revolving buttons, Q, and catches *u*, substantially as and for the purpose herein specified.

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