

G. W. YOUMANS.
Permutation-Lock.

No. 201,375.

Patented March 19, 1878.

FIG. 1.

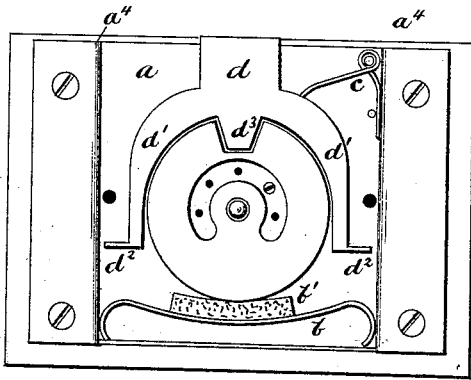


FIG. 2.

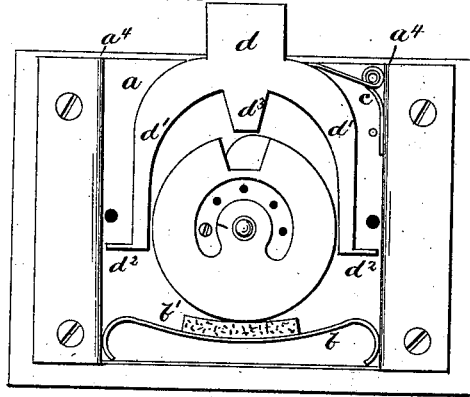


FIG. 3.

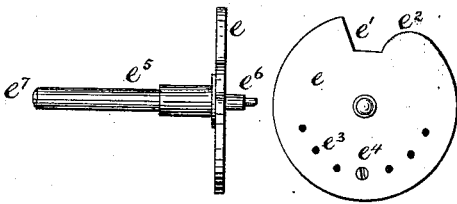


FIG. 4.

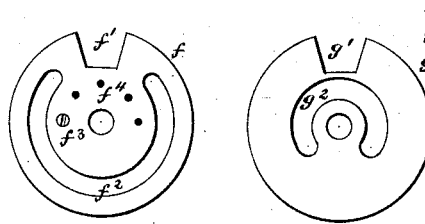


FIG. 5.

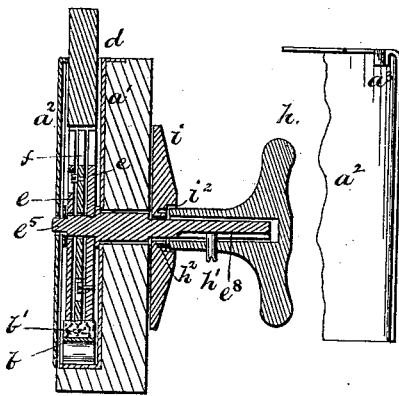
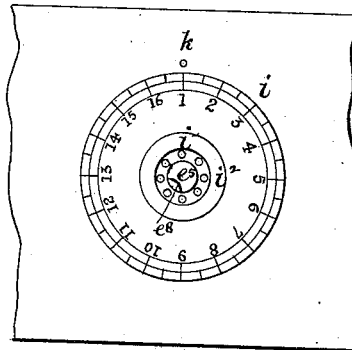


FIG. 7.

FIG. 6.



WITNESSES

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UNITED STATES PATENT OFFICE.

GEORGE W. YOUMANS, OF ZANESVILLE, OHIO, ASSIGNOR TO HIMSELF AND HERMAN F. ACHAUER, OF SAME PLACE.

IMPROVEMENT IN PERMUTATION-LOCKS.

Specification forming part of Letters Patent No. **201,375**, dated March 19, 1878; application filed November 22, 1877.

To all whom it may concern:

Be it known that I, GEORGE W. YOUMANS, of Zanesville, in the county of Muskingum and State of Ohio, have invented certain new and useful Improvements in Permutation-Locks; and I do hereby declare that the following is a full, clear, and exact description thereof, which will enable others skilled in the art to which it pertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

In the drawings, Figures 1 and 2 show rear side elevations of the lock with the back plate of the casing removed. Figs. 3 and 4 show the tumblers. Fig. 5 is a vertical section of the lock. Fig. 6 is the dial, and Fig. 7 is a portion of the rear plate of the casing.

The object of this invention is to furnish a permutation-lock simple in structure, and which may have its combination changed without opening the lock, all of which will be hereinafter fully explained.

a is the casing, which is composed of angle-plates *a*¹ *a*². The angle-plate *a*¹ is adapted to be inserted within a suitably-formed recess in the side or edge of the door to which the lock may be applied, and within it are placed the tumblers and other internal operating parts. The plate *a*² is so formed that it fits over the plate *a*¹, and closes in the internal operating parts of the lock. It has formed on it the lugs *a*³, which are turned over at the sides, as shown, and which catch over the top edge at the corners or angles *a*⁴ of the plate *a*¹, to which it is firmly secured by screws. It may be removed by first taking out the screws and then disengaging the lugs *a*³ from their hold.

b is a spring placed within the casing, and provided with a pad, *b*¹, arranged so as to bear on the tumblers and hold the latter in place, as hereinafter explained.

c is another spring of suitable form, and secured within the casing, so that it will bear on the bolt and cause the latter to unlock, as hereinafter explained.

d is the bolt, formed with the circular arms *d*¹ *d*², adapted to fit snugly over the tumblers. They are provided with projections or guides *d*³ *d*⁴, which touch the sides of the plate *a*¹,

and aid in giving steadiness of movement to the bolt, and may serve as checks, which, coming in contact with suitable stops provided in the casing, will prevent the bolt from being thrown too far out. It is also provided with a central inner projection, *d*⁵, arranged and adapted to enter notches or recesses in the edges of the tumblers, as hereinafter explained.

f e g are the tumblers. I have employed only two tumblers, *f g*; but it will be understood that any desired number of such tumblers may be employed. The greater the number the greater will be the combination and the greater the time required to unlock the device.

e is the operating-tumbler, which is constructed with a recess, *e*¹, adapted to receive the central projection *d*⁵ of the bolt *d*. One side, *e*², of the recess *e*¹ is beveled, as shown, and acts as a cam, by which the bolt is thrown out and locked. It is provided with a series of holes, *e*³, arranged as shown, in which a movable stud, *e*⁴, is inserted.

*e*⁵ is the arbor of the tumblers. To it is fixed rigidly the operating-tumbler *e*, and the tumblers *f g* turn on the projecting end *e*⁶. The end *e*⁷ passes through the door to the outside, and has formed in it a longitudinal groove, *e*⁸, as shown.

The tumbler *f* is formed with a recess, *f*¹, corresponding in form to the recess *e*¹ in tumbler *e*, except that it does not have one side beveled. It has formed within it a circular slot, *f*², which has both ends closed, as shown, and which extends nearly around the tumbler, and is formed opposite the recess *f*¹, as shown. The stud *e*⁴ on tumbler *e* projects into the slot when the tumblers are placed together. It is also provided with a movable stud, *f*³, and a series of holes, *f*⁴, arranged in circular form on opposite sides of the center from the slot *f*².

The tumbler *g* is constructed with a recess, *g*¹, corresponding in form to the recess *f*¹ in the tumbler *f*. It is also provided with the circular slot *g*², arranged so as to alternate in position with the slot *f*² when the two tumblers *f* and *g* are placed together, with the recesses *f*¹ *g*¹ coinciding.

If further tumblers were to be employed, it would be necessary to provide the tumbler *g*

with a series of holes for a movable stud, corresponding in construction to the holes and stud in the tumbler f , and arranged on the opposite side of the center from the slot g^2 . The fourth tumbler would be a duplicate of the tumbler f , the fifth a duplicate of the tumbler g , and so on for any desired number.

In turning the arbor the studs $e^4 f^3$ move in the slots $f^2 g^2$, and cause the tumblers $f g$ to revolve.

The combination of the lock may be changed by fixing the studs $e^4 f^3$ in different position from those shown.

h is the knob, which slides upon the arbor e^5 , and is held firmly in position by a set-screw, h^1 , which turns down into the groove e^5 . It has formed or affixed to its inner end a small projecting pin, h^2 , which is designed to enter any one of a series of holes, i^1 , formed in the dial i , and lock the latter firmly in its position.

i is the dial, which is detached from and may be revolved around the arbor e^5 . It is provided with a suitable index, as shown, and has formed around its central opening a recess, i^2 , in which are a series of openings or holes, i^1 , into any one of which the pin h^2 may be inserted. k is a small pin, fixed in the door for a point to which to turn the dial.

By loosening the screw h^1 and sliding knob h outward till the pin h^2 becomes disengaged, the dial may be revolved in either direction, as desired.

In the construction of this dial I have employed figures for the index, and have selected the number 16, and arranged them with equal spaces between them around the outer edge, as shown. I have also made only eight (8) holes, i^1 , within the recess i^2 , so that if the dial be revolved so as to change the pin h^2 only one hole, the dial will be revolved two spaces.

To prepare a combination for the lock, the cap or plate a^2 of the casing is removed and the tumblers $f g$ slipped off the projection e^6 of the arbor e^5 . The studs $e^4 f^3$ are placed in any one of the holes in their respective tumblers. The tumblers $f g$ are then replaced in position on the arbor, and the knob is turned first to the right to throw the projection d^3 out of the recesses $f^1 g^1$, and revolved until the combination is disarranged, after which it is turned to the left till all the tumblers are engaged and revolve simultaneously. The knob is then turned farther to the left till the recess g^1 in the outer tumbler g comes immediately under the projection d^3 on the bolt d . By reference to the dial the number opposite the pin k is noted, which number is the proper one for the first or outer tumbler. The knob is now revolved to the right a partial revolution till the recess f^1 in the second tumbler f comes opposite the projection d^3 , and the number on the dial opposite the pin k is noted for this tumbler. If there were other tumblers, the same process would be pursued till a number should be noted for each tumbler. The knob is finally revolved to the left, and when

the recess e^1 in the actuating-tumbler e comes to coincide with the recesses $f^1 g^1$, the spring c will throw the bolt back, bringing the projection d^3 into the recesses in the tumblers, as shown in Fig. 1, and thus unlock the door, drawer, or other thing on which the lock may be fixed.

In the drawings the combinations indicated are 15 for the outer tumbler g , and 11 for the middle tumbler f , and 1 for the actuating-tumbler e .

It is not essential to know the number for the actuating-tumbler, for, if the recesses in the other tumblers be all arranged in proper position opposite the projection d^3 , the bolt will drop into the recess e^1 as the latter comes to coincide with the other recesses. The numbers or combination of the tumblers $f g$ must be preserved, and, these being known, new combinations may be made without opening the casing, by revolving the dial to the right or left any given number of spaces.

The dial may be revolved by loosening the set-screw h^1 and sliding the knob outward on the arbor e^5 till the pin h^2 is disengaged from its hold in one of the holes i^1 . If, now, the dial be revolved one hole, i , to the right, the number 15 would be brought opposite to the pin k . This revolution of the numbers or combination of the tumblers will be diminished from 15 and 11 to 13 and 9. If the dial be turned one hole to the left, the numbers of the tumblers will be increased from 15 and 11 to 17 and 13; but as the scale or index ends at 16, the number for 17 would be 1 on the dial. Thus it will be seen that turning the dial to the right diminishes, and that turning the dial to the left increases, the numbers of the combination.

The arbor e^5 is provided with the guide-groove e^3 , not only to receive the end of the set-screw for the purpose of making the knob more secure, but also to cause the knob always to occupy the same position on the arbor. The pin h^2 is then always in the same relative position to the arbor and the recess e^1 in the fixed or actuating-tumbler e .

I have constructed the tumbler e , arbor e^5 , with its groove e^3 , and knob h , together with the pin h^2 in the hole i^1 , opposite the number 11 of the dial. The number 1 brought to the pin k , will indicate that the recess e^1 is in position to receive the projection d^3 on the bolt d . The relative arrangement of pin h^2 , dial i , to indicate the position of the recess e^1 , could be marked on the knob and dial, and would be no key to the combination of the lock, but would afford a sure starting point from which the original combination could be set when a subsequent combination made by revolving the dial should be lost. For example: If the first combination made by setting the studs be 15 and 11, as above stated, and then afterward changed to another combination by moving the dial i , as described, and the knob and dial should be tampered with and changed in their relative positions, the last combination would

be lost. In this case, the original combination 15 and 11 being known, the dial would be set with 1 to the pin *k*, and the pin *h*² in the hole opposite 11 on the dial, after which the lock could be operated.

The pad *b*' on the spring *b* holds the tumblers *f* and *g* in position during the process of unlocking the combination. The arms *d*¹ of the bolt *d* give to the latter steadiness and accuracy of movement.

When it is desired to lock the door, the knob is turned to the right, the cam *e*² throws the bolt out, as shown in Fig. 2. By giving the knob one or two additional revolutions, the tumblers *f g* will be engaged and revolved, and the combination disarranged.

Having described my invention, what I claim, and desire to secure by Letters Patent, is—

1. The tumbler *e*, having the notch *e*¹ in its periphery and fixed on the arbor *e*⁵, having

the guide-groove *e*³, dial *i*, sliding on the arbor *e*⁵, and having holes *i*¹ formed around its central opening, knob *h*, with guide and set-screw *h*¹, all constructed and arranged, relatively to each other, to operate substantially as and for the purposes set forth.

2. The bolt *d*, having the arms *d*¹ *d*¹ and central locking-projection *d*², springs *c* and *b*, and tumblers *e*, *f*, and *g*, having the notches or recesses *e*¹ *f*¹ *g*¹ in their peripheries, and the semi-circular slots *f*² *g*² and set-screws or stops *e*⁴ *f*⁴, all arranged in combination and operating as and for the purposes set forth.

In testimony that I claim the foregoing as my own I affix my signature in presence of two witnesses.

GEORGE W. YOUMANS.

Witnesses:

HERMAN F. ACHAUER,
GEO. J. MILLER.