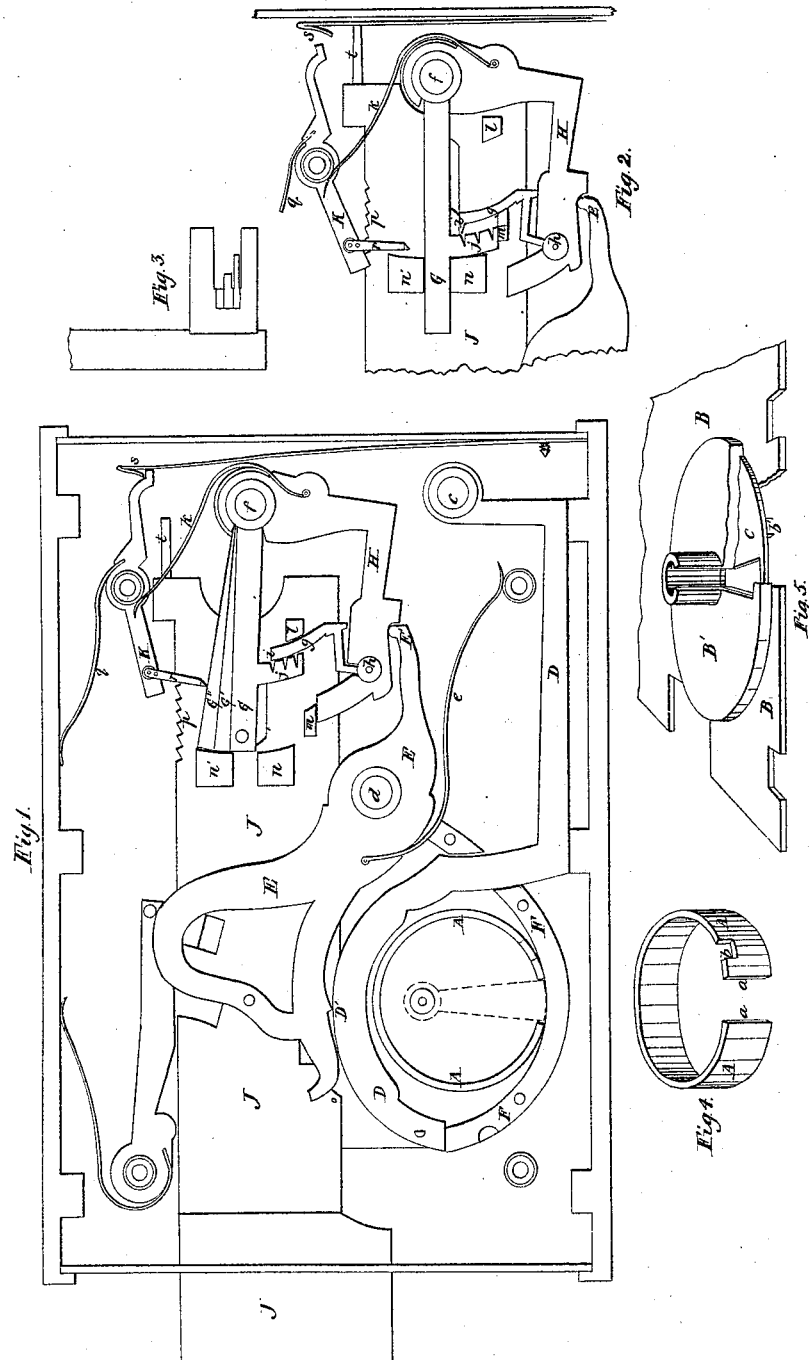


F. B. Pye,

Lock.

N^o 4,406.

Patented Mar. 7, 1846.



UNITED STATES PATENT OFFICE.

FRANCIS B. PYE, OF NEW YORK, N. Y.

PERMUTATION-LOCK.

Specification of Letters Patent No. 4,406, dated March 7, 1846.

To all whom it may concern:

Be it known that I, FRANCIS B. PYE, of the city of New York, in the State of New York, have invented certain new and useful improvements in the manner of constructing permutation-locks to be used on vaults of banks, on safes, and wherever great security is required; and I do hereby declare that the following is a full and exact description thereof.

In my improved lock the key is surrounded by a hoop which is nearly equal in depth to that of the bit of the key; this hoop however does not constitute a perfect cylinder, an opening being left in it which is to be occupied by the end of the bit when the key is inserted. Above this hoop there is a revolving circular plate that is received within a groove in the face plate or cover of the lock; through this plate the key hole is made and it is turned around by the bit of the key along with the hoop above named. The pin that receives the barrel of the key is not in the center of the hoop and as it is turned around the acting part of the bit projects beyond the hoop and operates upon a set of levers which I denominate the key levers and raises these levers to different heights, governed of course by the arrangement of the parts of which the bit of the key is composed, and upon which the permutation is dependent. As these levers are raised they act upon another set of levers which I denominate the intermediate levers, and these operate upon a third series, which, as they are immediately connected with the bolt I denominate the bolt levers. It will be seen by those who are acquainted with the manner of constructing the several permutation locks that have, within a few years been the subject of Letters Patent, that I dispense entirely with the slides and tumblers used in most of those locks and substitute therefor levers working upon suitable fulcra, or pivots, and it is from this circumstance that I have been induced to denominate my lock the permutation lever lock.

In the accompanying drawing Figure 1 represents my lock with the cap plate removed, the respective parts employed by me being shown in the position which they occupy when the bolt is shot out. Fig. 2 shows the situation of the bolt levers and

of other parts connected with the rear end of the bolt when it is retracted. Fig. 3 is a side view of the bit of the key showing three permutation pieces only to operate upon the respective series of three levers which are all that I thought it necessary to represent as being sufficient to exemplify completely the construction and operation of all the parts.

A, A, Fig. 1 is the hoop which surrounds the key, the bit of which, when it is first entered in the key-hole occupies the situation represented by the red lines. Fig. 4 shows the hoop A in perspective, *a a* being the open space in it for admitting the bit of the key; and *b* a notch to receive a pin *b'* on the circular plate in the cap plate through which the key passes, said notch and pin serving to cause the hoop and circular plate to revolve together. Fig. 5 shows in perspective that part of the cap plate B, B, which contains the key-hole, a portion of the cap piece B' which covers the revolving plate C being cut away for the purpose of showing said plate. When the key is entered the upper side of the bit will be flush with the top of the plate C and as the whole of the bit is surrounded by the hoop A and is covered by the plate C it will not be possible therefore whether the key be in or out to examine any part of the interior by the aid of light, or to introduce any kind of instrument by which to operate on the levers. In each of these figures, where the same parts are represented they are designated by the same letters of reference.

D D is the outermost of the key levers of which as well as of the others there may be any desired number superimposed on each other; these have their fulcrum pin at *c*. E E is the outermost of the intermediate levers which levers have their fulcrum at *d*. The key levers are in contact with and act upon the intermediate levers at the point D'; springs *e* act on the intermediate levers and keep them and the key levers down when not raised by the key. The key levers pass through a notch in the strong partition piece F F which extends from plate to plate of the lock and sustains the hoop A. The bolt levers are shown at G G' G'' these not covering each other as do the other levers when the bolt is shot out. The bolt levers G are connected with the

intermediate levers E by means of the auxiliary levers H which are acted on by the toe E' of the intermediate levers. The auxiliary and the bolt levers have each their fulcrum on the same pin f each of them being reduced in thickness one half so as to lap on each other. The auxiliary levers each carry a toothed talon g; these talons being connected with the levers by making an annular countersink about halfway through the latter leaving a pin in the center on which the talons turn, the talons being also reduced one half in their thickness at the joint part h; each of the talons carries a claw or point i which are to engage in notches or teeth made in the bolt levers as shown at j on the descending arm of the bolt levers; these talons operate in a way to be presently described. A spring k on the joints of each of the auxiliary levers compels them and the bolt levers to follow the rise and fall of the intermediate levers E keeping both in place for action.

The auxiliary levers that carry the talons will in all the positions of the bolt J J be kept in contact with the toe E' of the intermediate levers, and as these intermediate levers descend on the throwing out of the bolt, the talons g will be lifted to such height as will enable the claws i to engage with the teeth on the arms j of the bolt lever; and they will be forced into them by the stud l which being made fast to the bolt is brought into contact with the backs of said talons. When the bolt J is retracted, the stud m which is also made fast to the bolt will disengage the claws of the talons from the teeth j and leave the bolt levers free from their action. On the bolt J there are also made fast two studs n n' which are at such distance apart as just to allow the bolt levers G to pass between them. When the bolt is forced forward the outer ends of these levers will be raised and will be nearly in contact with the uppermost stud n' as shown in Fig. 1. The claws i serve to bring these levers into the proper position for passing between the studs n n' and until this is done the bolt cannot be thrown back by any improper pressure made upon the key talon o; but as the ends E' of the intermediate levers descend by the raising of said levers by the key bits in the process of unlocking, each claw will draw its appropriate lever G down to the proper position for entering between the studs and when the bolt is shot back, the talons g and the bolt levers G will be in the position shown in Fig. 2. To prevent the pushing back of the bolt when it is partially protruded and the bolt levers are between the studs n n', I use a latch K Figs. 1 and 2 which when the bolt levers are not elevated bears upon the upper edge of the bolt J, and is received within the notches p at its rear end as shown in Fig. 2, the spring q causing

it to bear down on said notches. To the latch k a lifting piece r is made fast, and when the bolt levers G are raised, one of them will be brought into contact with the lifter r and disengage it from the notch p thereby allowing the bolt to be moved back; the latch will be held in its raised position by the spring catch s until a pin t projecting out from the rear end of the bolt, frees it from said spring catch when the latch will again be brought into contact with the edge of the bolt.

By the employment of the intermediate levers E which are not acted upon directly by the key, and which cannot be reached by the insertion of any instrument into the lock it will be impossible to draw or force either of these levers down for the purpose of ascertaining when one of the bolt levers is in a position that would enable it to pass between the studs n n' and even were the hoop A removed the key levers themselves would cut off all access to the intermediate levers through the key hole. The intention of this peculiar construction has therefore it is believed been fully attained, namely, to prevent the ascertaining by forcing the bolt back the position of those devices which require a particular arrangement to admit of its being actually retracted.

Having thus fully described the manner in which I combine and arrange the respective parts of my permutation lever lock, I do hereby declare that I do not claim as of my invention either of the parts of this lock taken individually but only as combined and cooperating with other parts in the manner set forth; but

What I do claim as new and as of my invention is—

1. The manner of arranging and combining the hoop A with the revolving plate C the partition piece F and with the key levers D; the pin that receives the barrel being placed eccentrically with the hoop, and the hoop and the plate C revolving with each other as described.

2. I also claim the manner set forth of arranging and combining with each other the key levers D D, the intermediate levers E E, the auxiliary levers H and the bolt levers G which are raised and lowered by said auxiliary levers, the whole of them having fulcrum pins on which they rise and fall and not operating as slides in a direct line; by which arrangement they are rendered more certain in their action.

3. I claim the manner in which I have arranged and combined the auxiliary levers with the clawed talons g the bolt levers G and with the respective studs l m and n so as to operate for the purpose and in the particular manner herein set forth; I do not claim the use of talons with claws to engage in notches or teeth or slides; but I limit my

claim to the special arrangement herein made known.

4. I claim the manner of employing a latch K in combination with the bolt J, le-
5 vers G, lifting piece *r*, and the spring *s* for the purpose of preventing the pushing back of the bolt when it is but partially shot out;

the respective parts concerned in this operation being arranged and acting substantially as described.

FRANCIS B. PYE.

Witnesses:

THOS. P. JONES,

EDWIN L. BRUNDAGE.