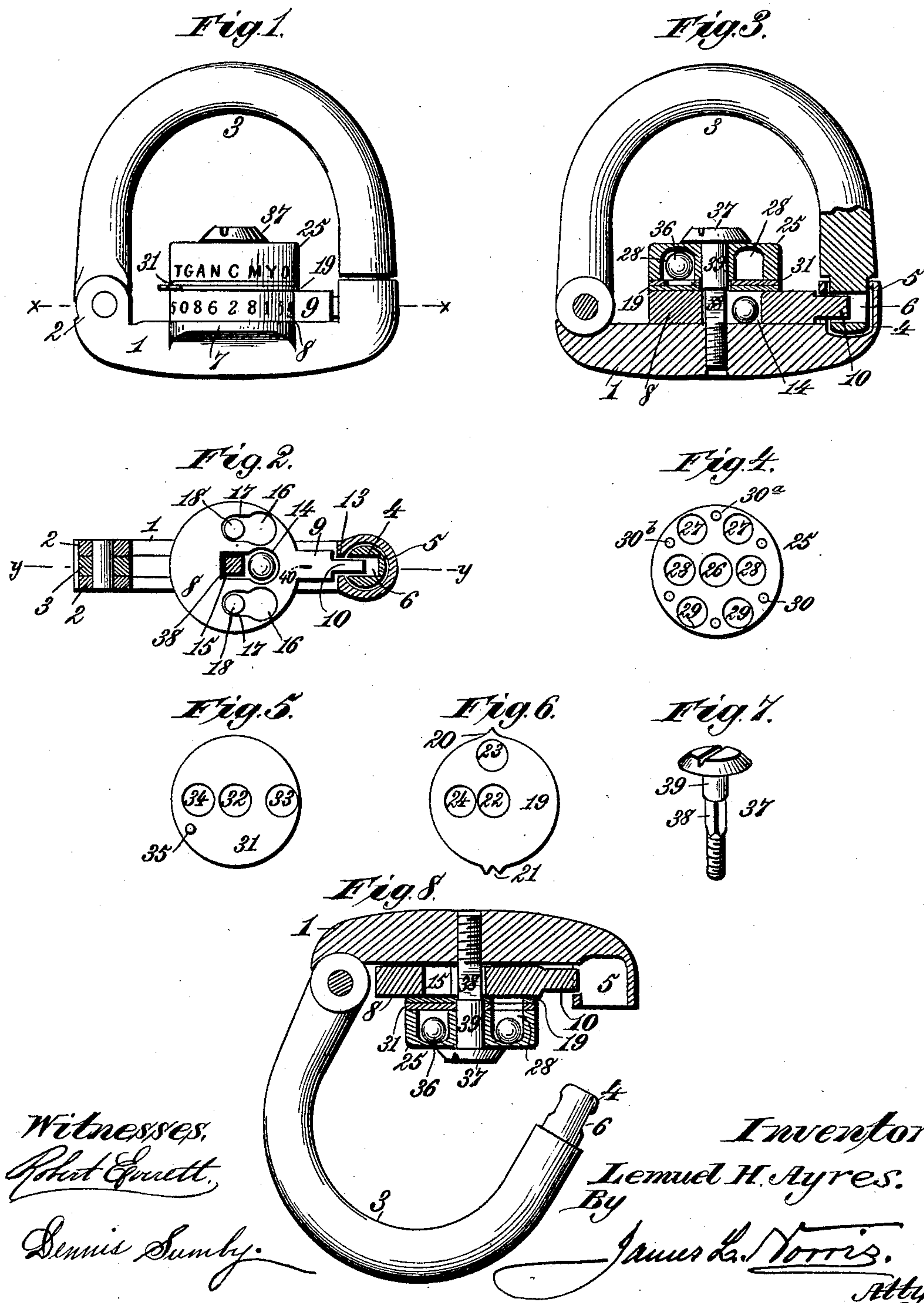


(Model.)

L. H. AYRES.  
PERMUTATION PADLOCK.

No. 451,356.

Patented Apr. 28, 1891.





# UNITED STATES PATENT OFFICE.

LEMUEL H. AYRES, OF GUTHRIE, KENTUCKY.

## PERMUTATION PADLOCK.

SPECIFICATION forming part of Letters Patent No. 451,356, dated April 28, 1891.

Application filed January 31, 1891. Serial No. 379,836. (Model.)

*To all whom it may concern:*

Be it known that I, LEMUEL H. AYRES, a citizen of the United States, residing at Guthrie, in the county of Todd and State of Kentucky, have invented new and useful Improvements in Permutation-Padlocks, of which the following is a specification.

My invention relates to certain improvements in permutation-locks, and particularly in that class of locks adapted to secure the bows of padlocks.

It is the purpose of my invention to provide a simple and comparatively inexpensive construction and organization of parts, whereby the locking-bolt may be securely held when shot by devices which are brought into action by operating combining elements of the lock in accordance with a predetermined sequence of selected numbers or characters upon one or more of said elements or parts.

It is my purpose, also, to provide a padlock with a sliding head having a locking-bolt, and to combine therewith suitable permuting elements to fasten the locking-bolt, the pivot-bolt on which the latter turns, and on which, also, the sliding head moves, being so fastened by moving the sliding bolt to shoot the bolt as to prevent said pivot-bolt from turning for the purpose of detaching the same, while by withdrawing the locking-bolt the pivot-pin may be readily detached.

It is my purpose, further, to provide a lock capable of permutation, and which may be used upon a padlock or elsewhere, the construction being simple and comparatively cheap, and the parts being easily operated and not liable to get out of order.

It is my purpose, also, to provide a combination-lock suitable for use upon a padlock, in which the locking-bolt shall be retained in position when shot by holding devices which are acted upon by gravity, the permuting parts consisting of a dial of tumblers, one of which sets or permutes the lock, while the other completes the combination.

To these ends the invention consists in the several novel features of construction and new combinations of parts hereinafter fully set forth, and then definitely pointed out in the claims following this specification.

To enable those skilled in the art to make and use my invention, I will proceed to de-

scribe the same in detail, reference being had to the accompanying drawings, in which—

Figure 1 is a side elevation showing a padlock embodying my invention. Fig. 2 is a horizontal section of Fig. 1 in the plane X X, the dial and tumblers being removed to show the locking-bolt and the bolt-head. Fig. 3 is a vertical section on the line Y Y, Fig. 2, showing the parts in place and the bolt shot. Fig. 4 is an inverted plan view of the dial, with the tumblers removed to show the ball-chambers and the intermediate apertures which receive the point or nipple on the face of one of the permuting-tumblers. Fig. 5 is a detail view of one of the tumblers referred to in Fig. 4. Fig. 6 is a detail view of the other tumbler. Fig. 7 is a detail view of the central pivot-bolt, which is locked in such manner that when the bolt is shot said bolt cannot be turned to effect its removal. Fig. 8 is a view showing the lock reversed in position, and illustrating the manner in which the balls pass by gravity from the opening in the bolt-head back to the ball-chambers in the dial to permit the retraction of the bolt.

In the said drawings the reference-numeral 1 designates the metallic body of the padlock, upon one end of which are formed lugs 2, between which is hinged or pivoted the shackle or bow 3, consisting of a strong metal bar bent into a curved or nearly semicircular form and having at the extremity opposite its hinged end a tongue or point 4, formed to enter a socket 5, the metal within which the latter is formed projecting upward from the end of the body 1. In the tongue 4 is formed an opening 6, substantially in the central line of the body 1, to receive the fastening-bolt.

Upon the body of the padlock, between its ends, is formed a substantially circular platform 7, having its upper flat face flush, or nearly so, with the upper flattened face of said body. Upon this platform rests the bolt-head 8, consisting of a flat thick disk of metal of the same diameter as the platform, or nearly so. From the edge of this head or disk projects a rectangular bar of metal 9, carrying upon its end the bolt 10, which enters the wall of the socket 5 through an opening 13. In the central or diametrical line of the head 8 is formed an opening resembling in form a key-hole slot—that is to say, consisting of an



enlarged circular portion 14, into which opens a straight short slot 15, having a square end, which extends beyond the center of the disk toward the hinged end of the bow. The purpose of this opening and of the relative dimensions of its two parts will be explained hereinafter. Upon each side of the central opening, and substantially parallel therewith, is formed an opening having somewhat similar form, its end being rounded and the opening itself being, preferably, not quite as long as the central opening. Each of the lateral openings consists of an enlarged circular portion 16 and a straight or nearly straight narrower portion 17. These openings receive studs 18, rising from the platform 7, and serving to keep the bolt-head in place and guide the same. These studs also have a further and still more important function, which will be explained hereinafter.

The numeral 19 denotes the "rotary tumbler," which is so termed for the reason that by its rotary adjustment to a fixed point the locking and unlocking of the bolt are completed, this movement being combined with a predetermined adjustment of the dial, as shown hereinafter. The tumbler is composed of a thin metallic plate, of circular form, having a diameter equal to that of the bolt-head 8, but provided with a point 20 projecting slightly beyond the periphery of the bolt-head and serving as an index, while upon another part of the periphery, preferably opposite the point 20, are formed two of these projections 21, the intermediate notch, as well as the points, providing convenient means whereby the tumblers may be turned. In the center of the plate is formed an opening 22 to receive the pivot-pin upon which the tumbler turns.

Near the periphery of the plate 19 is formed a circular opening 23, so arranged that its diameter shall coincide with a radius of the tumblers or plate 19, which will pass, if prolonged, through the center of the projection 20. A second and similar opening 24 is also formed in the tumbler-plate 19, its diameter forming a right angle, or nearly so, with the radial line passing through the center of the opening 23. This second opening 24 is placed as far from the periphery of the tumblers as the opening 23 is removed from the central opening 22.

The numeral 25 indicates the dial of the lock, consisting of a thick metal disk provided with a central opening 26, having the same or substantially the same diameter as the opening 22 in the tumbler 19. The dial itself is of about the same diameter but of a little greater thickness than the bolt-head 8. In the dial are formed a double series of chambers 27 28 29, the central chamber 28 in each of said series being removed from the periphery of the dial a distance substantially equal to the space separating the two extreme chambers 27 and 29 from the central opening 26. Near the periphery of the dial and at equal

intervals are formed small apertures 30, for a purpose presently to be shown.

The numeral 21 denotes the permuting-tumbler, consisting of a thin metallic disk having a central opening 32, and provided with two circular openings 33 and 34, arranged upon opposite sides of the central opening in such manner that one and the same diameter drawn from edge to edge of the tumbler shall coincide with the diameter of each of the openings 33 and 34. The former is placed close to the edge of the permuting-tumbler and the latter close to the central opening 32. At one side of the circular opening 34 is set a stud or nipple 35 of such size that it may readily enter any one of the small apertures 30. It will be seen that when placed in certain of said apertures—as, for example, the openings 30<sup>a</sup>—the circular opening 33 will substantially coincide with the chamber 29, lying near the periphery. On the other hand, if the nipple or stud 35 be inserted in the opening 30<sup>b</sup>, the circular aperture 34 will coincide with the chamber 28, which is the middle chamber of the series, lying close to the central opening. By adjusting the tumbler in the manner described—viz., by removing the stud 34 from one aperture 30 to another—the lock-combination may be changed or permuted as often as desired.

The parts heretofore described are arranged, when assembled, in the following manner: Upon the bolt-head, as it rests upon the platform 7, is placed the rotary tumbler 19, and upon the latter rests the permuting-tumbler 31, with its stud 35 placed in one of the openings 30 of the dial 25, which rests upon the tumbler 31, the chambers in said dial being each supplied with a metallic ball 36 of such size as to readily enter and leave its chamber by the force of gravity only. Through the central openings in the tumbler is passed a pivot-bolt 37, having a threaded extremity which enters a central threaded aperture in the platform 7. Above the threaded end is a square portion 38, of such size that when turned until two of its sides are in substantial parallelism with the sides of the slot 15 in the bolt-head, the latter may be pushed forward until the bolt enters the socket in the bow, whereupon the pivot-bolt cannot be turned in either direction. Therefore to insert the threaded end of said pivot-bolt in its opening the bolt-head is drawn back until the bolt stands in the enlarged circular portion 14 of the opening in the bolt-head, where it can be turned easily. Above the square portion 38 is a cylindrical part 39, upon which the dial turns.

The pivot-bolt 37 being set up to the proper point, the operation is as follows: Upon the periphery of the dial are formed at suitable intervals a series of letters, figures, or other symbols, the space between the successive characters being immaterial, provided that one of said characters shall lie in the radial



line passing from the center of the dial through the center of each ball-chamber. In attaching the permuting-tumbler 31 the operator notes the letter or other character at this point or coinciding with this line and retains this character or figure in mind as being one element of the combination upon which the lock is operated. When the locking-bolt is thrown forward to fasten the shackle or bow, the enlarged circular openings 16, forming part of the lateral openings which receive the studs 18, are left vacant, the studs now having passed into the narrower parts of these openings. If a radial line is drawn from the center of the bolt-head through the center of either enlarged portion 16 it will coincide with one of a series of characters inscribed upon the outer face or periphery of the bolt-head. If the dial is turned until the character coinciding with the ball-chamber uncovered by the opening in the permuting-tumbler is brought into vertical line with the character on the bolt-head which coincides with the center of either circular or enlarged opening 16, and if the rotary tumbler is then turned until the point or index thereon is brought into the same line the ball will pass through the openings in both tumblers and drop from the chamber in the disk into one of the said openings. This ball, lying in front of the stud 18, prevents the bolt from being retracted. When the padlock is to be unlocked, it is turned until the dial is undermost, and the parts being brought into the position already described, the ball drops back into its chamber and the locking-bolt is released.

It will be understood that when the permuting-dial is so arranged as to disclose a ball-chamber through one of the openings lying near the central opening of the dial the latter must be turned until the outer letter or character coinciding with said chamber shall register with a mark 40 upon the center of the bar carrying the locking-bolt, and in like manner the index or point on the rotary tumbler must be brought into alignment with a character on the bolt-head, by which the opening 24 in the rotary tumbler shall be brought directly over the enlarged circular portion 14 of the central opening in the bolt-head. When the permuting-tumbler is arranged to deliver the ball from the dial through the opening 34, the delivery-opening in the rotary tumbler will not coincide with the point or projection 20, but lies about ninety degrees from it. By knowing this the operator can easily tell how to adjust the rotary tumbler in order to cause the opening 24 to coincide with the opening 14 in the central line of the disk, and this can be accomplished simply by turning the tumbler until said opening is brought into position and then noting upon the exterior of the bolt-head what figure or character the point or index 20 coincides with.

What I claim is—

1. In a permuting-lock, the combination, with a shackle, of a bolt-head movable upon a support to insert and withdraw the locking-bolt, said bolt-head having an enlarged opening and a communicating narrower opening inclosed between two parallel walls, a pivot-bolt entering said opening and tapped into the support, said bolt having a rectangular portion, which may be revolved in the enlarged opening in the bolt-head when the locking-bolt is withdrawn and is prevented from turning when the bolt is shot and the rectangular portion of the pivot-bolt brought between the parallel walls of the narrower opening, and means for locking the bolt-head in its locked position, substantially as described.

2. In a permuting-lock, the combination, with a suitable support and a shackle, of a bolt-head having a locking-bolt projecting from it, said head being guided by studs rising from the support into openings in the bolt-head having such length that when the locking-bolt is shot the forward ends of said openings are unoccupied, a dial superimposed upon the bolt-head and having chambers containing loose balls, a permuting-tumbler connected with the dial, and a rotary tumbler, both interposed between the dial and bolt-head, the former being adjustably connected with the dial and each having openings to register with each other, with one of the ball-chambers in the dial, and with one of the openings in the bolt-head as the rotary tumbler is turned and the dial adjusted, substantially as described.

3. In a permuting-lock, the combination, with a body portion having a support and a shackle, of a bolt-head movable on the latter and provided with openings to receive studs rising from the support, a dial having chambers containing loose balls, a permuting-tumbler having one or more openings detachably connected to and turning with the dial to cause either opening to coincide with one of the chambers, a rotary tumbler having one or more similar openings, and a pivot-bolt passing centrally through the dial and tumblers and through an elongated opening in the bolt-head, said opening having an enlarged and a narrower portion to permit the movement of the head and to allow the attachment and detachment of the pivot-bolt when the bolt is drawn and to prevent said detachment when the bolt is shot, substantially as described.

4. In a permuting-lock, the combination, with a shackle and a bolt-head movable upon studs standing in elongated openings therein, of a dial pivoted over the bolt-head and concentric therewith when the bolt is shot, said dial containing chambers having balls stored loosely therein, and tumblers arranged intermediate of the dial and bolt-head, one of said tumblers turning independently of the dial and both having openings for the escape of



the balls into one of the openings in the bolt-head when the bolt is shot, substantially as described.

5 In a permuting-lock, the combination, with a shackle and a bolt-head sliding on a support to shoot and withdraw the locking-bolt and having openings on each side of its center to receive rigid studs, of a dial arranged to turn concentrically with the bolt-head when  
10 the bolt is shot, said dial having chambers containing loose balls, a tumbler consisting of a thin metallic plate having a stud detachably connected to the dial and turning with it and having openings, either one or more of  
15 which may be made to coincide with one or the other of the ball-chambers, and an independent tumbler having differently-arranged openings, one of which may be caused to register with that in the other tumbler and with  
20 one of the openings in the bolt-head, substantially as described.

6. In a permuting-lock, the combination, with a shackle and a movable bolt-head carrying the locking-bolt and provided with openings receiving the pivot-bolt, of studs guiding  
25 the bolt-head, a dial centrally mounted on the pivot-bolt and having chambers set at different distances from its center and detachably connected to said dial, a rotary tumbler turning upon the same axis with the dial and having  
30 openings registering successively with one or the other of the chambers in the dial, and balls loosely placed in said chambers, substantially as described.

In testimony whereof I have hereunto set  
35 my hand and affixed my seal in the presence of two subscribing witnesses.

LEMUEL H. AYRES. [L. S.]

Witnesses:

J. H. BOWLING, Jr.,  
C. M. DUFFY.