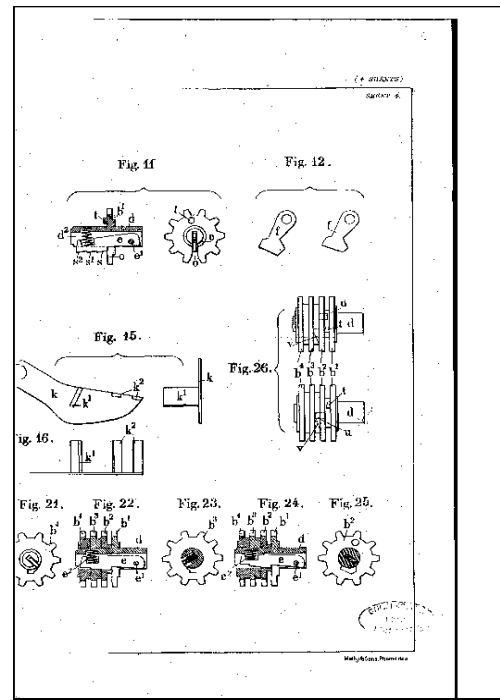
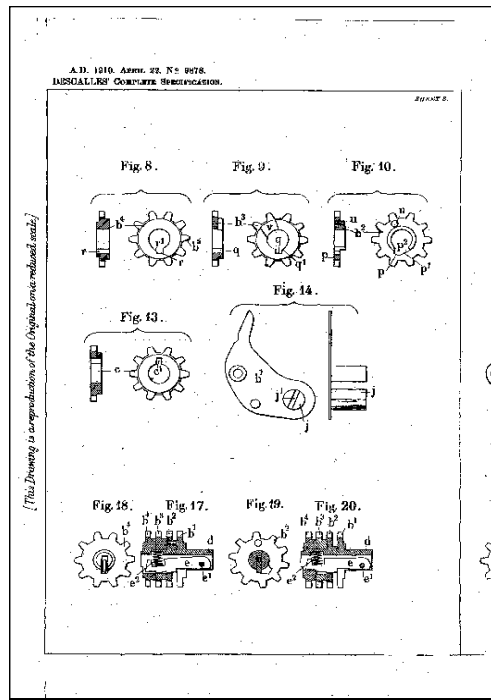
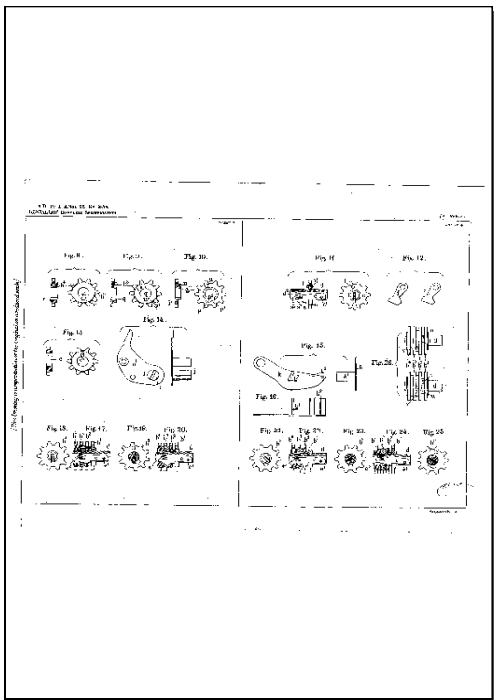


Drawing pages of GB191009878 A





Espacenet

Bibliographic data: GB191009878 (A) — 1910-10-06

Improvements in Permutation-locks.

Inventor(s): DESCALLES EUGENE MAURICE OCTAV [FR] ± (EUGENE MAURICE OCTAVE DESCALLES)

Applicant(s): DESCALLES EUGENE MAURICE OCTAV [FR] ± (EUGENE MAURICE OCTAVE DESCALLES)

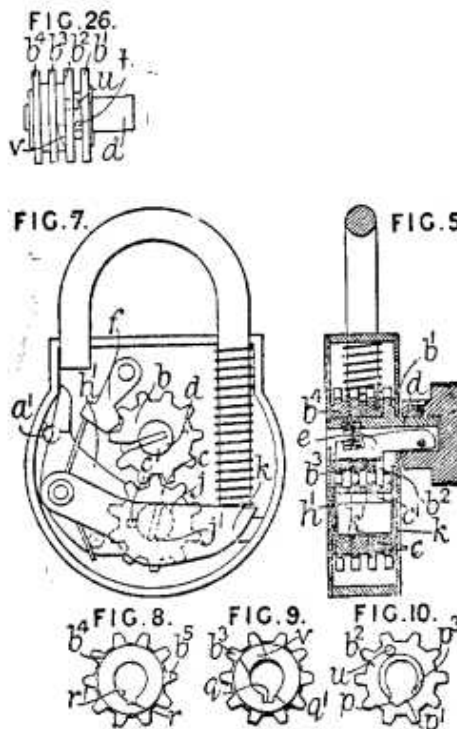
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Abstract of GB191009878 (A)

9878. Descalles, E. M. O. June 21, 1909, [Convention date]. Locks, permutation; padlocks. - Relates to permutation mechanism of the type comprising two interengaging sets of disks, one set c forming the locking-means and being operable by the other set b, actuated by a to-and-fro movement of the knob. The mechanism is shown applied to a Scandinavian padlock. The long limb of the shackle is loosely connected to the free end of a lever k, a projection k<1> on which works in a slot j<1> in the pivot pin of the disks c, and prevents the movement of the lever necessary for the release of the shackle until the disks are set to bring their notches c<1> into line with the slot in the pivot. The disks c are carried by a spring-controlled lever h', pivoted in the casing. When set to the releasing positions, the disks can be



moved out of engagement with the disks b, to enable the combination to be changed, by means of a conical pin inserted through a hole a' in the casing, and acting on the plate h'. The disks b are under the control of pawls f, which allow motion in either direction, with the exception that the last disk b<4> is provided with a narrow tooth b<s> which stops the disk when moving in a clockwise direction, this providing the zero point from which the combinations are counted. The disks b<2>, b<3>, b<4> are mounted loosely on the handle spindle d, and are provided with slots p, q, r respectively, for engagement with a lever e, pivoted within the spindle. In setting the disks, the handle is turned clockwise until the lever e engages and turns all the disks, and until the zero point is reached. From the zero point, the numbers of the combination are counted by the clicks of the pawls f. During the to-and-fro movement of the knob, the disks are successively disengaged from the lever e and left at their correct positions by means of inclines p<1>, r<1>, q<1> on the disks b<2>, b<3>, b<4> respectively, which inclines act in turn on the lever e at the moment of reversing the motion of the handle; the disk b<2> during the first movement of the handle is held stationary until the shoulder p<3> is reached, to enable the incline p<1> to release the lever e from the slot r of the disk b<4>. When turning the handle to move the disks into the zero position, a pin u, carried by, and capable of moving transversely through the disk b<2>, is adapted to be pressed by a lug t on the disk b<1> into a notch v in the disk b<3>. This movement couples the two disks b<2>, b<3>, with their slots p, q in alignment with the slot of the disk b<1>, and enables the lever e to drop into the slots of the disks.



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Description: GB191009878 (A) — 1910-10-06

Improvements in Permutation-locks.

Description of GB191009878 (A)

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COMPLETE SPECIFICATION.

Improvements in Permutation-locks.
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I, EUGÈNE MAURICE OcrAvk DESCALLES, of 7bill, Boulevard Rochochouart, Paris, in the Republic of France, Mechanical Engineer, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement: - ...[the present invention has for its object an improved permutation-lock of the kind wherein the permutation-discs or wheels are operated by an external knob or handle which, as it is rotated, produces a succession of clicking sounds
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which enable the lock to be operated without any visual indication, e.g., in the dark.

According to the present invention, in the spindle of the external knob or handle, there is pivotally mounted a lever; which is provided with steps corresponding in position with permutation-wheels and is adapted, e.g. in the zero position, to engage with driving notches in the permutation-wheels, that are each yieldingly held by spring pawls in the positions to which they are brought by said spindle. In order to release the said wheels from the spindle and leave them in the opening positions respectively, the said spindle is turned successively in one direction and then in the other so as to bring the stepped lever successively into engagement with suitably arranged inclines in said recesses, whereby the stepped lever is caused to slide out of said recesses, thus successively leaving the corresponding wheels stationary in the position in which the lock can be opened. Suitable intermittently-engaging projections are also provided for use in returning the permutation-wheels to zero by turning the manipulating button or handle continuously in one direction.

The permutation-mechanism above described is used in combination with another

series of wheels, known per se which gear with the permutation-wheels respectively and are provided with notches controlling the bolt of the lock through a fence or tenon, which is free to move when such notches-are in alignment. These wheels are capable of being moved out of engagement with the permutation-wheels, when the lock is open, to permit changing of the permutation.

The invention, as applied to a padlock is shown by way of example in the accompanying drawings in which:-

Figure 1 is a front view of the padlock.

Figure 2 is a rear view thereof.

Figure 3 is a view corresponding to Figure 1, the movable wall of the padlock casing being removed.

Figure 4 shows the position occupied by the parts of the padlock to permit the opening thereof.

Figure 5 is a vertical transverse section of the padlock on the line A, A, Figure 3. -
Figure 6 shows the position occupied by the parts of the padlock, when changing the permutation.

Figure 7 shows these same parts when the permutation has been broken.

Figures 8 to 11 show the permutation-wheels in elevation and in vertical section respectively.

Figure 12 shows the pawls acting on these wheels..

Figure 13 shows one of the locking wheels in elevation and in vertical section.

Figure 14 shows separately, in front and side elevation, a movable lock-plate, on which the locking wheels are mounted.

Figure 15 comprises a front view and a side view of the locking lever.

Figure 16 is a corresponding plan thereof.

Figures 17 to 25 are detail views showing the positions occupied successively by the operating lever in the formation of the permutation.

Figure 26 shows the arrangement for permitting the permutation-wheels to be brought back to zero.

As shown in the drawing, the improved padlock comprises a casing a, in the vertical axis of which are arranged two groups of toothed wheels b and c. The wheels b are mounted on a spindle d, one of the ends of which passes through the movable wall of the casing a and receives an actuating button d1. The
Image available on "Original document"

wheels b which, in the example shown, are four in number (b1, b2, b3, bE), serve to

form the permutations by means of a special lever 'e, which is arranged to move in a longitudinal slot d2 in the spindle d, as hereinafter described.

On each of the wheels b acts a pawl or abutment , which is pivoted on a pin f1 and which is constantly in engagement with the corresponding toothed wheel, under the action of a spring f1

The springs f8 are coiled on a pin g. fixed in the casing a, and their lower ends bear against an abutment-pin h., fixed on a movable lock-plate h1, which is capable of turning about the pin g. This lock-plate h' serves to support the second group of toothed wheels c which are capable of gearing with the teeth b and serve to form a locking mechanism.

The wheels e are movable about a pivot-pin fixed on the movable lock- plate],, 1 and provided with a vertical slot dividing this pin into two equal parts..

Each of these wheels c is provided internally with a notch c1 which can be made to form a prolongation of the slot j1, in order to permit the opening of the padlock and the changing of the permutation, as will be hereinafter mentioned..

On the pin g is also pivoted the end of a metal piece k forming a locking lever, on which are fixed a fence or tenon 0 and two claws - k 2.
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The fence or tenon k' fits into the slot .?" of the pivot pin j and is of the same dimensions as this slot. The two claws k2, which are arranged at the end of the lever k, engaged in an annular groove l formed in the lower part of the longer limb of the shackle l1 of the padlock.

The lower end l2 of this longer limb is of a smaller diameter than that of the rest of the said limb and engages with a guide m fixed on the side wall of the ,casing a. This end l2 of the shackle has a recess P, into which extends a transverse pin or tenon m1 arranged in the interior of the guide m, in order to prevent the shackle l1 from turning more than a quarter of a revolution, when the padlock is opened..

A spiral spring n, threaded on the longer limb of the shackle l1 and bearing, at one end against the upper wall of the casing a, and at the other end on the claws k 2 of the lever k, tends to maintain the shackle 11 continually in the closed position, that is to say, in the position in which the smaller limb of this shackle is engaged in the opening formed to receive it in the upper side of the casing a.

Before explaining the operation in detail, it is necessary to indicate how the permutations of the padlock are obtained.
Image available on "Original document"

It has been seen that the wheels bl, b3, and b4 are mounted on a spindle d, on which is fixed an 'actuating button d1 This spindle d has a longitudinal slot d2, in which is mounted a lever e.

The wheels bl, b\$, l3 and b4 all have the same number of teeth, the latter being ten in number, representing the figures from 1 to 0, in their sequence. One can thus form any

desired number of four figures.

. The toothed wheel b1 is fixed on the spindle d (Figures 5 and 11) and is provided with a slot o for permitting the lever e to swing outwardly.
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The toothed wheels b2, b3, and b4 are independent, that is to say, they are threaded on the spindle d and can turn about the latter.

The toothed wheel b2 is provided in its interior with a recess having the form shown in Figure 10, that is to say, it has a deep part p, the edge of which adjoins an incline p1. The other side of the recess p is formed with an incline p2 uniting it with the inner surface of the central opening of the wheel.

The wheel b3 is also provided with a recess q, arranged in the axis of the said wheel and united on one side by an incline q1 with the inner surface of the central opening of said wheel (Figure 9).

The wheel b4 is also provided with a recess r, which is united on one side by means of an incline r1, with the inner surface of the central opening of the wheel (Figure 8). This incline r1 is arranged in the opposite direction to the inclines (Figure 9).

The pawls f, in engagement with the teeth of the wheels just described, are similar, except that in engagement with the wheel b4, the nose of which is smaller and can engage between two particular teeth of the said wheel by reason of the special form of one of these teeth, namely b5 (Figure 8). This wheel b4 can thus only be turned in one direction, whilst the wheels b1, b3 and b3 can be turned in either direction as desired.

The lever e is mounted, at one end, on a pivot-pin e1 extending transversely through the spindle d of the wheels, and the other end constantly tends to be depressed under the action of a suitably-arranged spiral spring e2 (Figures 5 and 11).

The lever e, which is formed of sheet metal, is notched on its outer edge to form steps s, s1 and s2, the height of which increases, starting from the free end of the lever, as shown in Figure 11.

When the permutation-mechanism is at zero, the slot o and the recesses p, q
Image available on "Original document"

and r of the wheels b2, b3 and b4 are all opposite to each other, in such a manner that the lever e, pressed outwards by the spring e2, occupies the whole depth of the said recesses (Figure 5).

This being mentioned, in order to set up any permutation, one proceeds in the following manner;

The mechanism being at zero, the actuating button d1 is turned from right to left and, consequently, also the spindle d on which this button is fixed. In this movement, the wheels b3 and b4, which are driven by the lever e in engagement with the recesses of the said wheels, also turn, whilst the wheel b1 remains immovable, being retained by its pawl f during the time that the lever e takes to pass along the incline p1 following on the recess p (Figures 10 and 19).

The wheel b2 is then driven with the others by the lever e.

. The movement of the lever e on the incline p1 has for its result to raise the

' said lever slightly, as shown 'in Figures 17 to 20, which remains in engagement
Image available on "Original document"

with the recesses of all the wheels 08, b3, and,b4.

In turning the button d1, each tooth of these wheels, raising the pawls f, produces a click which is heard clearly and which permits the number of teeth which are passed to be counted.

The movement is stopped when the first figure of the number chosen is reached. The actuating button d1 is then turned in the opposite direction, that is to say, from left to right.

The wheels hZ, 'b 3 and b4, always tending to be held fast by the pawls f, the
Image available on "Original document"

step s# of the lever e meeting the incline r1 of the recess r of the wheel V engages with this incline. The lever e is then raised slightly and the edge of the step S 2 comes to the level of the periphery of the internal aperture of the wheel b4 as shown in Figures 20 and 21.

The wheel b4, held by its pawl f, then remains immovable, whilst the wheels b3 and b2 are driven by the lever e.

When the second figure of the number chosen is reached, the rotary motion of the axis d is arrested, and the button d1 then turned in the opposite direc- tion, that is to say, from right to left. This movement has for its object to bring the step s1 of the lever e on to the incline q1 of the recessq of the wheel 13 which is retained by its pawl f. The lever e is then raised a' certain distance, and the step s1 placing itself at the level of the central aperture of the wheel b3, the latter is rendered immovable (Figures 22 and 23).

When the third figure',of the number chosen is reached, the actuating button is turned in the opposite direction, that is to 'say, again from left to right.

The movement above described is repeated, the step s of the lover e comes
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on to the incline p of the wheel b2 which is retained by its pawl f; this has for its result to raise the said lever, which is then completely freed, as shown in Figures 24 and 25....

It then only remains to turn the button d1 in order to .drive the toothed wheel P up to the moment when the fourth figure of the number chosen has been reached.

The return to zero of the wheels b1, b2, b3 and b4 is effected in the following manner:
-The actuating button-d1 is turned from left to right, but as, by reason of the raising of the lever e, the latter has no longer any action on the
Image available on "Original document"

wheels b₂, b₃, and , the wheel b", which is fixed to' the spindle d, bears an inclined projection t, that is adapted to come into contact with a projection u mounted to slide axially in an aperture in the wheel b 2 (Figures 10, 11 and 26).

When the button d' is turned from left -to right, the projection t, at a given moment, abuts against the movable projection u and thereb'y turns the wheel b₂ until the sliding projection u therein is opposite an inclined lateral recess v in the wheel b₃ and then, since the wheel ? in which the projection u is mounted, is retained by its pawl f, the projection u is pushed forward into the recess v on the wheel b₃ (Figure 26). When this projection has come'into contact with the bottom of the recess v, the wheel b₁ is-released from the wheel b₂, which then has its recess p opposite the recess- q in the wheel b 3. The wheel b₁ and lever e having moved forward through an angle corresponding to one.tooth of the wheels,, relatively to the wheel b₂, -the lever e, pushed. outwards by its spring e₂ falls into the aligned recesses p, q of the wheels b₂, b₃. The

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wheels b₁, b₂, b₃ then rotate together until the lever-e enters the recess r of the wheel b₄, and causes it also to rotate.

.On continuing to turn the button in the same direction, the pawl f, acting on the wheel b₄, is raised successively by the passage' of each tooth, until .the moment when the tooth 11 > presents itself. By reason' of the form of this tooth, the nose of the pawl f passes in further and renders immovable the wheel b₄ and consequently also the whole mechanism when turned in this direction. It is now possible to explain the general operation of the padlock.

The different parts of the latter being in the position shown in Figure 3,

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that is, to say, in the ~position. where. the notches c_i of the wh₄pela -;e,,4re =.placed oxie :above, the, other, and, in the prologation , of the slot : jx in aliei pipt-pill j, into. an-, aperture a! formed in tli-e: bdek, o4 - the- -casing -, -a,, a conical, pin te whic₅, gradually pushing before it the edge of the lock-,plate fil, causes the latter to turn about the pivot-pin g, as shown in Figure 6 of the drawing. ,',..':

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.- -Tlfii'S;74ovement.of the lock-plate is permitted by reason of the engagement of the fence or tenon k_l of the lever k in the notches c_l (Figure 6), this latter lever remaining immovable. The teeth of the wheels c are then disengaged from the teeth of.the .wheels b, in such a manner that any desired number of four figures can be set up by moving the said wheels b, in the manner described above.

When the desired number is formed, the pin w is removed, which has for its result to bring the wheels c towards the wheels b, the movable lock-plate h₁ moving upwards under the action of the springs f₂ of the pawls f, The parts 'of the mechanism are then in the position shown in Figures 3 and 4, which, is. the only .position admitting the opening of the padlock.

. In fact, if a pull. be applied at this moment to the shackle 1 1 of the padlock,

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the locking, lever .k, by reason of. the engagement of its claws k2 in the groove of the shackle, will be raised simultaneously with the latter. The notches c1
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of the wheels c are in the prolongation of the slot j1 of the pivot-pin and the fence or tetl on Jc1 on the lever le passes into these notches, which permits the :end of the said lever to be raised; this lever is then carried alongwith the shackle, at the same time compressing the spring n.

This displacement of the lever k permits the passage of the shorter limb. of the shackle l1 out of its recess and consequently the opening of the padlock.

To close the- padlock, it is only necessary to bring this shorter limb back .into, position .above the opening designed to receive it. The spring n, then acting on the lever k, pushes back the latter which, carrying with it the longer limb of the padlock by means of its claws k2, replaces the different parts in the position shown in Figure 3.

When these parts are in this position, if the button d1 be turned in one or the other direction, the permutation is broken, as shown in Figure 7. The movement of the wheels b has for its result to turn the wheels c, with which they gear; so that these wheels c are moved in such a manner that their notches c1 no longer coincide with the slot jl in the pivot-pin j.

It is then impossible to open the padlock, the lever being held fast, since it can only lie moved if the notches c1 are placed in the prolongation of the slot jl. Any attempt to introduce a pin into the aperture a1 in the casing a would then have no result.

The permutation being broken, in order to be able to open the padlock again, all the wheels b are brought back to zero by turning the button dl from left to right, the number is then re-formed so as to permit opening in the manner above described.

When this number is formed, the notches cl of the wheels c are in the pro- longation of the slot j1 in the pivot-pin j, in such a manner that the shackle l1 can be raised, as above described.

It will thus be seen, from what precedes, that it is necessary to bring back the permutation-mechanism and the locking mechanism into a predetermined position, in order to permit the opening of the padlock. This arrangement renders the latter unpickable. Moreover, the parts of the mechanism are all very strong and only take up a small amount of space, so that the size of the padlock does not need to be increased beyond the normal.

In the accompanying drawing, there is shown a permutation-mechanism comprising four toothed wheels, but it is obvious that the number of these
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wheels may be increased or diminished according to requirements by modifying some of. the details of construction,

For example, in the case where the permutation-mechanism only' comprises three

wheels, the arrangement for returning the parts to zero would be dispensed with, the incline in the wheel 1} being arranged in the opposite direction, which permits the driving of the wheels when the button is turned from . left to right.

It is obvious that the mechanisms permitting the permutations to be obtained, as well as the locking device of the padlock, can be applied to all kinds of locks.

The above arrangements are only given by way of example, the forms, dimensions and detail arrangements can be varied according to each particular case, without departing from the nature of the invention.