A. MUSCARELLA.
COMBINATION LOCK KEY.
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1,161,151. Patented Nov. 23, 1915.

WITNESSES:

INVENTOR

Antonio Muscarella

BY

James Hamilton
ATTORNEY
To all whom it may concern:

Be it known that I, ANTONIO MUSCARELLA, a subject of the King of Italy, residing at the borough of Manhattan, city, county, and State of New York, have invented certain new and useful Improvements in Combination Lock-Keys, of which the following is a specification, reference being had to the accompanying drawings.

This invention relates to improvements in keys for locks and particularly to improvements in permutation or combination lock-keys; that is, a lock-key which can be engaged with the lock only after the combination of the key has been solved.

An object of this invention is to provide a lock-key of the class just referred to which will be simple in construction, comparatively cheap in manufacture, efficient in operation and use and susceptible of being readily adjusted for use with locks requiring keys of different lengths.

The invention hereinafter described constitutes an improvement on the lock-key shown and described in my pending application Serial No. 866,745, filed October 15, 1914.

In the drawings illustrating the principle of this invention and the best mode now known to me of applying that principle, Figure 1 is a central vertical section of my new combination lock-key; Fig. 2 is a view looking in the direction of the arrow B of Fig. 1; Fig. 3 is a section on the line A—A of Fig. 1; Fig. 4 is a detail showing the knob-spindle, the key proper detachably secured thereto and the sleeve mounted on the spindle; Fig. 5 is a view looking in the direction of the arrow C of Fig. 4, the key proper being removed; Figs. 6 and 7 are a side view and a plan, respectively, of the ring-support; Fig. 8 is an elevation of the ring-separator; and Fig. 9 is a detail showing in elevation an indicator-ring and a stop-ring mounted therein.

The base-member a is cup-shaped and is inserted in a recess b formed in the door c. This base-member a is formed with an annular flange d from which projects forward a circular series of pins e; and near these pins e there are inscribed a series of numbers (such as the digits) and a series of letters (such as A, B, and so on). In a recess b' formed in the side of the door c opposite the base-member a, there is mounted the lock proper f, which may be of any suitable type and which is provided with the bolt g. By means of screws h the lock proper f is fastened to the back or bottom i of the cup-shaped base-member a. This bottom i is formed with a rectangular recess or depression j and with a circular hole k near the center of the latter. In this depression there is fitted the rectangular base m' of a ring-support m having a hollow cylinder or barrel m'' that projects from the base m'. This barrel m'' is formed with a lengthwise-extending slot m''' and the base m'' is formed with a recess or notch m''' in line with this slot m'''. By means of screws a' the base m'' is fastened to the base-member a. From the cylindrical surface of the barrel m''' there project teeth o. The barrel m'' of the ring-support m is adapted to receive the slotted cylindrical portion or barrel p of a ring-separator q; and from one of the walls r' of the slot r'' in the barrel p there project teeth r which fit into the notches s formed in one of the walls of the slot m''' in the ring-support m. The ring-separator q is formed with an annular head or flange q' that bears against the outer end of the barrel m''' of the ring-support m.

Each indicator-ring s is internally notched, as shown at s', and each notch s' is adapted to receive and hold snugly a lug or tooth t' projecting from the stop-ring t, which is formed with a recess t''. These rings t are mounted upon the ring-support m and normally are held apart or separated by the lugs o formed on the latter and by the lugs or teeth r which project from the barrel p of the ring-separator q. To each of the indicator-rings s there is fastened a cylinder u which conceals and shields the outer cylindrical surface of the indicator-ring s; and each of these rings u is provided with a tongue or lip w' by means of which the indicator-rings s (and the stop-rings t) may be turned. The barrel p of the ring separator q forms a bearing for the sleeve member v which is formed with a series of teeth v' and through which passes the spindle w, the outer end of which is formed with a knob x and the inner end of which is formed with a slot y adapted to receive the butt end of the key proper z having a bit z'''. The slot y extends axially from end to end of the spindle w and is shaped so that it is adapted to receive either a key proper having a rectangular cross-section or one having a circular cross-section (Figs. 3 and
The shank of the key proper $z$ is held in place detachably in the slot $y$ by means of a set-screw $z'$. The user may readily indicate to what point the latter must be inserted in the slot $y$ in order that the bit $z''$ may engage properly the bolt $y$ of the lock proper $f$. Therefore, the key may be used with various thicknesses of doors $a$ by simply loosening the set-screw $z'$ and adjusting the key proper $z$ in or out of the slot $y$ and, after making the adjustment, simply tightening the set-screw $z'$ again. The sleeve $v$ lies between a collar $w'$ formed on the spindle $w$ and a washer $w''$ mounted on the latter; the washer $w''$ is held in place by a pin $w'$. The teeth or lugs $v'$ lie in a line parallel to the longitudinal axis of the sleeve $v$ and these teeth $v'$ are adapted to enter the slot $y'$ in the barrel $y$ of the ring-separator $g$. Normally the stop-rings $t$ prevent the spindle $w$ and its attached key proper $z$ from being forced inwardly into engagement with the lock proper $f$; but, when the combination of the lock-key has been solved and the stop-rings $t$ have been turned to their releasing position, the recesses or notches $t'$ are in alignment with one another and with the teeth $v'$ on the sleeve $v$; hence, in this position of the stop-rings $t$, the spindle $w$ and its attached key proper $z$ may be forced inwardly, whereby the key $z$ is engaged with the lock $f$.

The operation of the mechanism hereinbefore described will now be readily understood and may be set forth as follows: Assuming that the combination is $2'A8$, one of the ears $u'$ is brought into register with the number 2 on the face of the flange $z$ (Fig. 2), another of the ears $u'$ is brought into register with the letter $A$ and the third of these ears is brought into register with the number 8. By thus setting the ears $u'$, the rings or cylinders $u$, the indicator-rings $s$ and the stop-rings $t$ are turned and the slots $t'$ in the latter are brought into alignment so that the teeth $v'$ can without hindrance be pushed therethrough. Hence, the operator now seizes the knob $x$ and presses inwardly the sleeve $v$ and the spindle $w$ and thereby forces the key $z$ into the lock proper $f$, which is shown merely conventionally in the drawings and may be of any ordinary construction. By turning the knob $x$ the bit $z''$ of the key $z$ is made to actuate the mechanism (not shown) of the lock $f$ and thereby to withdraw the bolt $y$ thereof, as will be understood readily by all skilled in this art.

I claim:

In a combination lock-key, a key proper; a spindle formed with a bore shaped to receive the same and to permit the key proper to be adjusted in the bore; means for holding the key proper in its adjusted position; a lock proper; and permutation devices for preventing the engagement of the key proper with the lock proper; the adjustability of said key proper in its bore making the key proper susceptible of use with doors of different thicknesses.

Signed at the borough of Manhattan, city, county and State of New York, this 7th day of April, A. D., 1915, in the presence of the two undersigned witnesses.

ANTONIO MUSCARELLA.

Witnesses:

MICHAEL A. VERDI,
PHILIP J. TERMINE.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."