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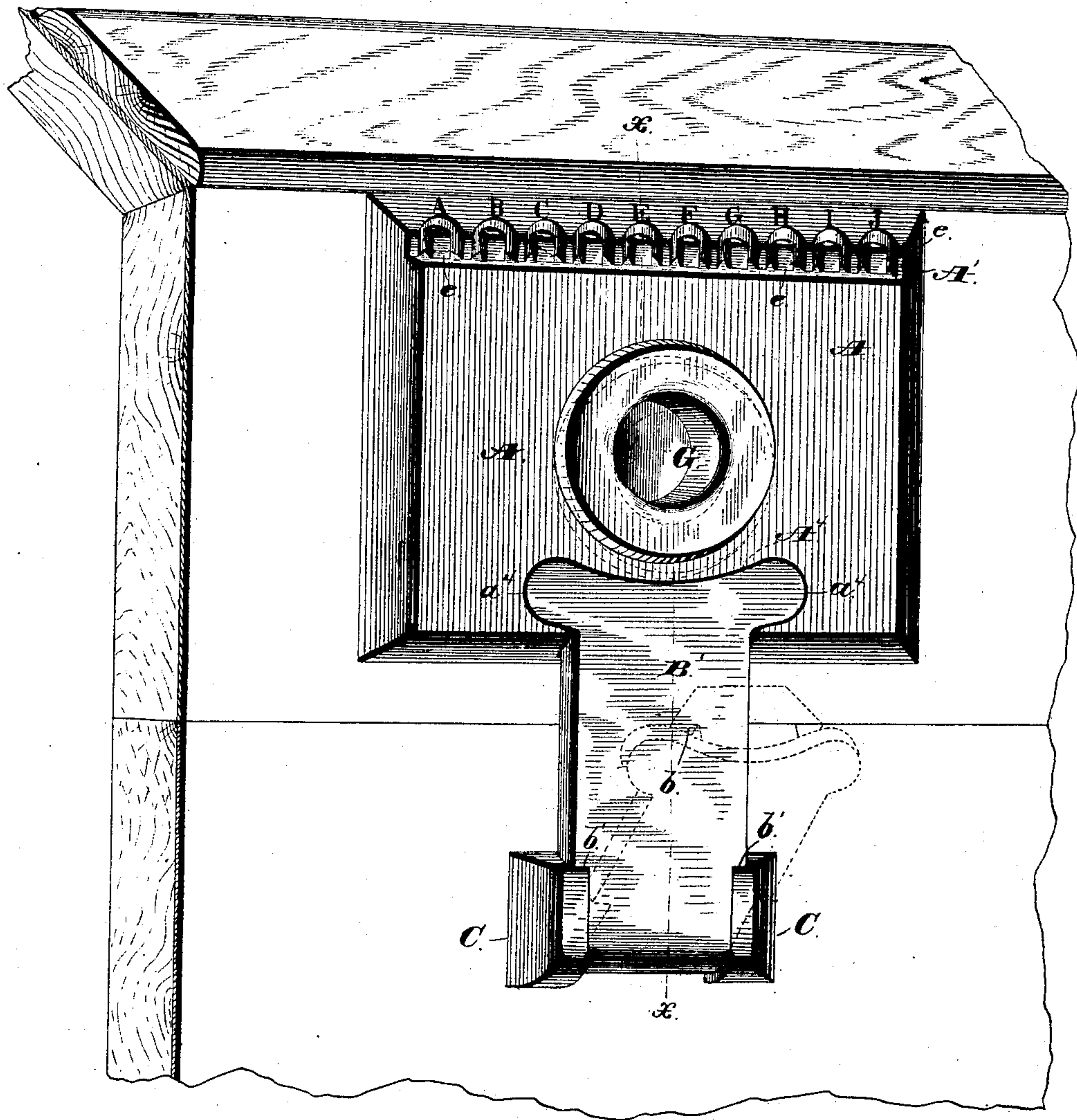
3 Sheets—Sheet 1.

H. CLARKE.
PERMUTATION LOCK.

No. 338,338.

Patented Mar. 23, 1886.

Fig. 1



Witnesses:
Jas. C. Hutchinson.
Henry C. Hazard

Inventor.
Henry Clarke, by
Kimble and Russell, his Attys.

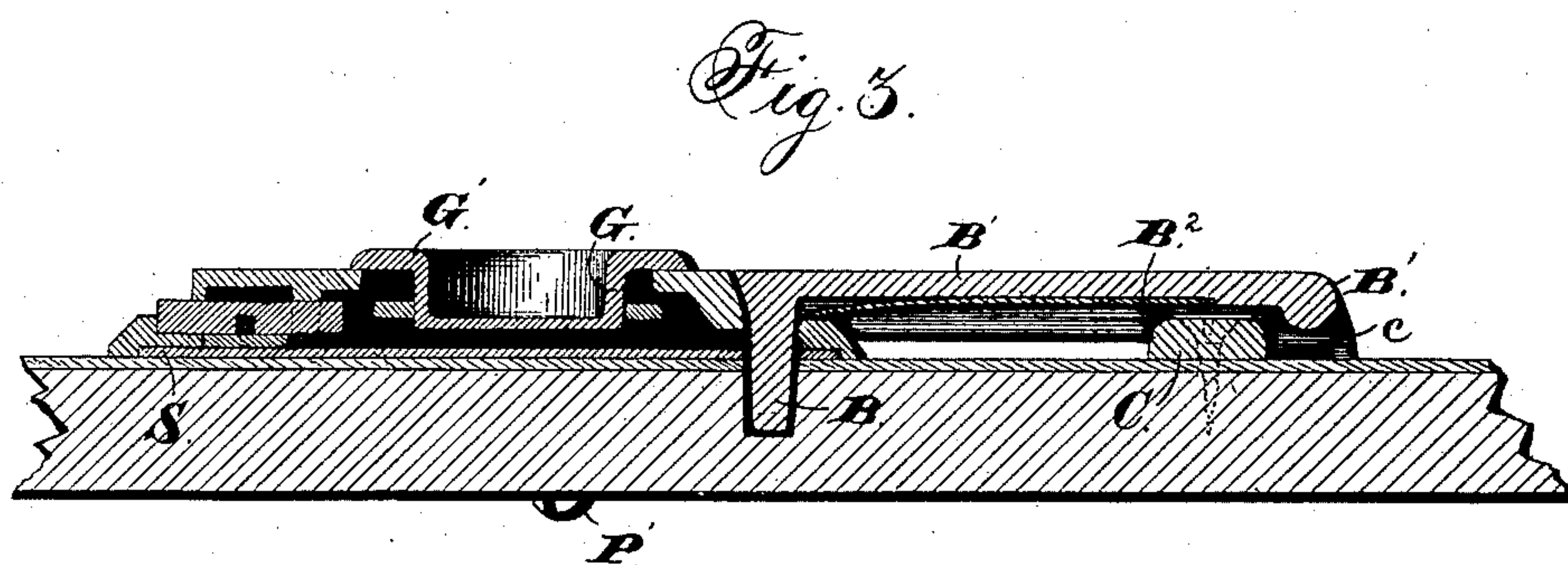
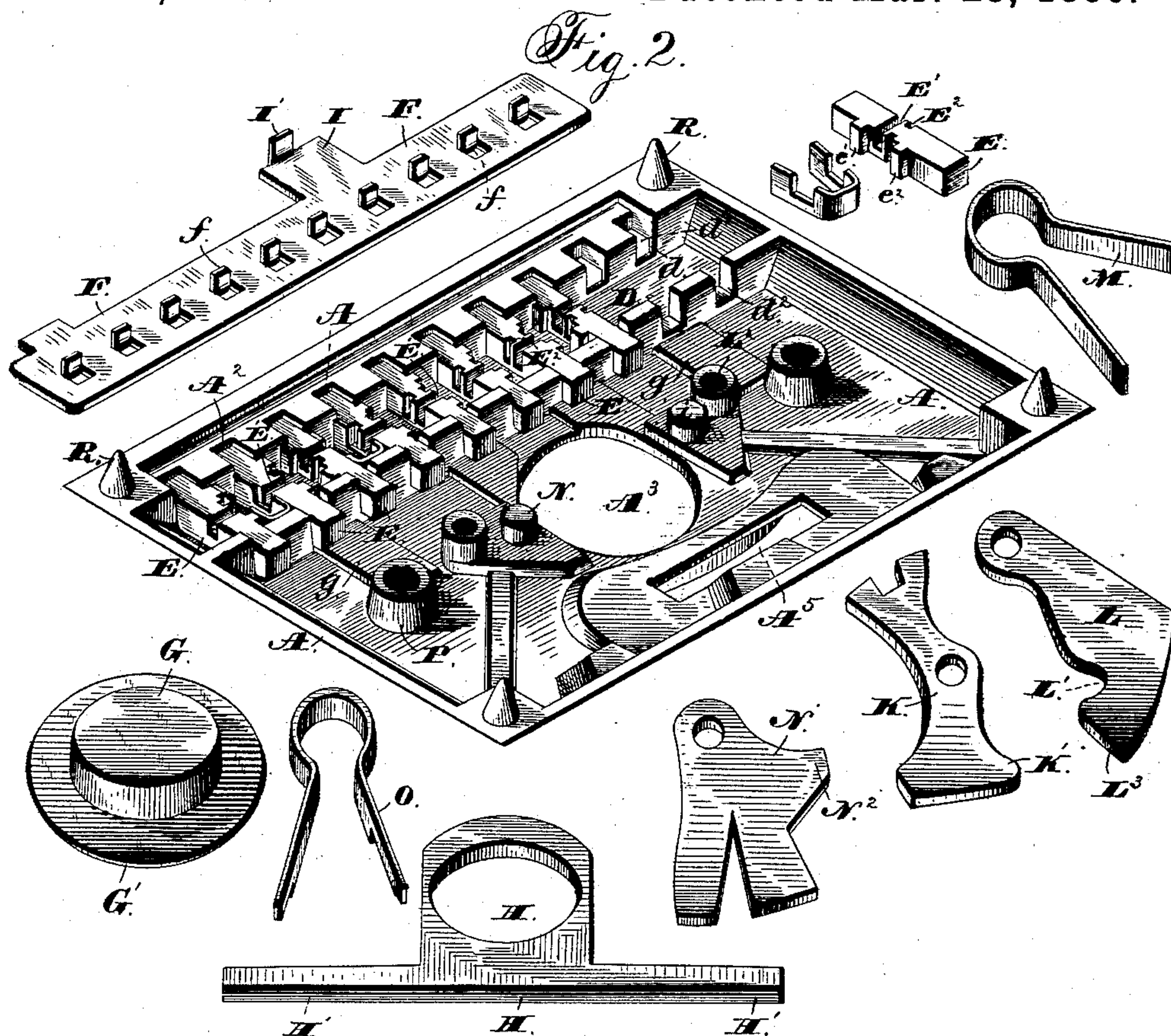
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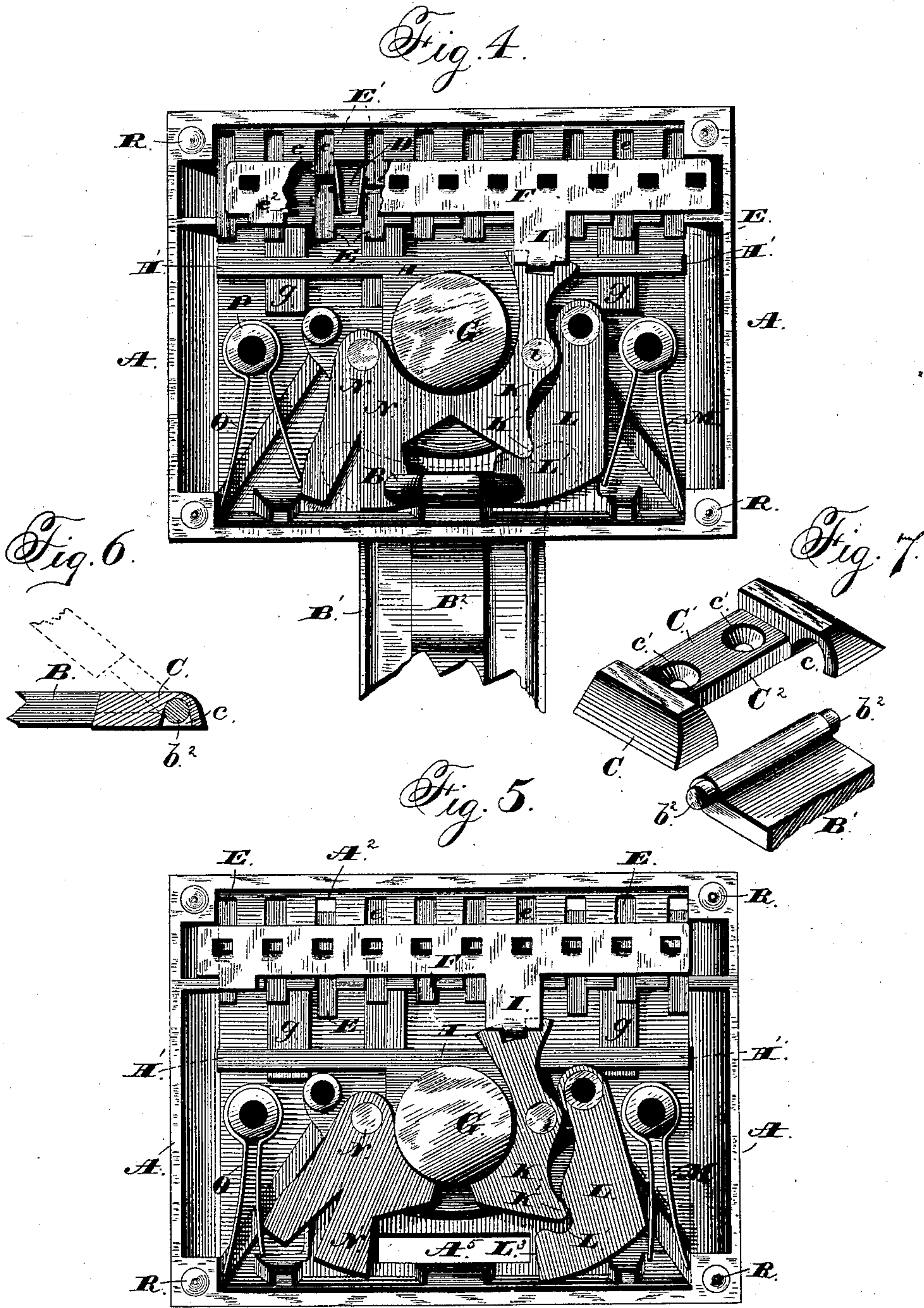
3 Sheets—Sheet 3.

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UNITED STATES PATENT OFFICE.

HENRY CLARKE, OF CHICAGO, ILLINOIS.

PERMUTATION-LOCK.

SPECIFICATION forming part of Letters Patent No. 338,338, dated March 23, 1886.

Application filed April 28, 1885. Serial No. 163,724. (Model.)

To all whom it may concern:

Be it known that I, HENRY CLARKE, of Chicago, in the county of Cook, and in the State of Illinois, 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, reference being had to the accompanying drawings, in which—

Figure 1 is a perspective view of my lock as it appears upon a trunk. Fig. 2 is a like view of the parts of the same separated from each other. Fig. 3 is a vertical section of said lock upon line *x x* of Fig. 1. Figs. 4 and 5 are elevations of the inner side of the same, and show, respectively, the relative positions of parts when the hasp is engaged by and released from engagement with said lock. Fig. 6 is a detail view in section on line *y y* of Fig. 1, showing the construction of the hasp and the pivotal fastening thereof; and Fig. 7, a detail perspective view of the hasp and fastening detached.

Letters of like name and kind refer to like parts in each of the figures.

The object of my invention is to provide an improved combination or permutation lock especially adapted for use with trunks, chests, &c., but also capable of use on the doors of closets, rooms, and elsewhere wherever a hasp-lock can be used; and to this end it consists of the lock and the construction, arrangement, and combination of parts, as hereinafter specified.

In the drawings, A designates the main casing of the lock, which, as shown, is made quite shallow, so as to take up little room and project only a slight distance beyond the front of the trunk to which it is attached. The closed side of this shallow casing is the front, as shown. The edges of the casing are preferably so as to present no shoulders or projections to catch against anything as the trunk is being handled. Along the top or upper side of the casing, on its front side, a right-angled rabbet, A', is cut, having its rear side substantially parallel to the front face of the casing. In such rear side are cut the upright grooves A² A² A², of which there can be any desired number. In the front side of the casing, about midway between the upper and

lower sides thereof, is the large oblong opening A³, having its greatest diameter vertical or perpendicular to the upper or lower side of the casing. Below this opening a recess, A⁴, is cut in the face of the casing, extending up from the lower edge of the casing a short distance, and then enlarged laterally to form the side offsets or recesses, a⁴ a⁴. The upper side of recess A⁴ can be made straight, if desired; but I prefer to make it curved downward from each side to the center, as shown in the drawings. At the top of this recess A⁴ a transverse slot, A⁵, is cut through the casing, to admit the passage of the projection B on the hasp B'. Said projection has its forward portion, or that part which first enters the slot, beveled at its sides, or made tapering, for a purpose to be hereinafter specified. The larger or base portion of this projection where it joins the hasp is provided on each side with a notch, b. Upon the inner side of the hasp is fastened a spring, B², whose free end engages and presses against the rear side of the recess A⁴, just below the slot A⁵, so as to throw the hasp outward when its projection B is released by the lock. A portion of the hasp at each side of its lower end is cut away, as shown at b' b'. From the sides of the extreme lower end of the hasp extend the pivot-lugs b² b² a short distance back of the outer face of the hasp.

To the trunk-front is fastened the plate C, having its outer face recessed at C' to receive and fit the reduced lower portion of the hasp. The lower side of the plate C is cut away, as shown, such cut extending across the lower end of recess C'. At each side the plate is provided with a socket, c, for one of the lugs b² b² on the lower end of the hasp, such sockets being in line with the cut-away portion of the plate at the lower end of the recess C'. These sockets are cut into the plate from its rear side, being open on that side.

The screw-holes c' c' through which pass the screws for fastening the plate C in place, are made in the part C² of the plate extending across the rear side of the recess C'. With this construction, when the hasp is swung up and held by the lock above, the screws fastening the plate C in place are entirely hidden by the lower portion of the hasp fitting in recess C'. The upper ends of the rabbets or

cuts in the sides of the hasp are made square, so as to engage the top or upper side of the plate C when the hasp is swung up, as when the trunk is locked. As long as the plate remains fastened in place the pivot-lugs $b^2 b^2$ on the hasp end cannot escape from the sockets $c c$ in the plate, but are kept therein by the surface to which the plate is attached or fastened. When the plate is detached from the surface and the hasp is swung out and down, the lugs can easily be disengaged from the sockets by being moved to the rear with reference to the plate, as shown best in Fig. 7.

Across the top of the front plate of the casing, at its rear side, within the casing, is the groove or way D, having its sides made parallel to each other, and with their inner faces at right angles to the plate. In the upper side of this groove or way are cut notches $d d$, corresponding in position and number with the upright grooves $A^2 A^2$. Said notches are preferably rectangular in cross-section and cut so deep as to leave openings $d' d'$ through the rear walls of the upright grooves $A^2 A^2$ in the casing-front. The upper ends of these notches are made abrupt or square, and are all in line with each other. Notches $d^2 d^2$, corresponding in size and number with notches $d' d'$, are cut through the lower wall of groove or way D, of which each one is opposite one of the notches $d d$ in the upper wall or side of the groove. In the opposite notches in the opposite sides of the groove or way fit and slide the opposite ends of the short bars E E. A portion, e , of the squared upper end of each bar will then project through the opening d' in the plate, as shown in Fig. 1, so that it can easily be engaged by the finger and pressed down to depress the bar within the casing.

Each bar E is provided with two lugs, $e' e'$, on its side, adapted to engage, respectively, the upper and lower sides of way D after the bar has been slid a short distance up or down—that is, they are so situated as to allow some longitudinal play of the bar in its guiding-notches.

Each bar in its rear side is provided with a narrow transverse groove or notch, E' , situated nearer to one of the stop-lugs than the other. These grooves or notches are similarly situated in all the bars, so that when such bars are all turned the same way and pushed upward until the upper lugs strike the upper side of the way D the notches will all be in line with each other; but if one of the bars be turned end for end and pushed up like the rest its notch will be out of line with and above the line of the notches in the other bars. To bring the notch of this bar into line with the notches of the others, this bar will then have to be pushed down while the others stay up.

Each bar is on each side formed with a small notch, E^2 , extending from front to back of the bar close to the transverse notch E' , and between it and the stop-lug farthest from such transverse notch. These side notches, $E^2 E^2$, will then on the bar which is turned end for

end, as described, be in line with the transverse notches $E' E'$ in the other bars, as shown best in Fig. 4. In such figure the third bar from the left is shown as inverted. Any desired number of the bars E E can obviously be thus turned end for end to bring their transverse notches normally above and out of line with those in the other bars. U-shaped friction-springs are placed between the pairs of contiguous bars, with their ends bearing against the sides of such bars, as shown in the drawings. The legs of these U-springs are notched on their rear sides in line with the notches in the bars, so as not to interfere with the passage of the lugs $f f$ on the sliding plate or bar F through such notches in the bars.

The upright finger-grooves $A^2 A^2$ in the upper edge of the casing-plate are lettered, so that each bar is designated by a letter. Instead of letters, numbers or other signs can of course be used, and such letters, numbers, marks, or signs can, if desired, be placed on the ends of the bars, instead of on the plate above the grooves, as shown in the drawings. The sides of the way or groove D in the casing extend beyond the rear faces of the bars E E, and between them slides and is guided the bar or flat plate F, referred to above, having on its forward side the series of lugs—one for each bar E—so situated as to be in line with the transverse notches in such of the bars as are turned so as to bring their notches nearest the lower side of way D when such bars are pushed up to their normal positions. Normally the bar stands with its lugs extending down between or by the sides of the bars E E. The transverse notch in any bar which has been inverted, as described, will then be above the line of lugs $f f$ as long as such inverted bar remains pushed up like the rest, and the side notches, $E^2 E^2$, on the bar will be in line with the lugs. If, now, with all the bars up, it be attempted to slide the bar lengthwise, the lugs which are beside such of the bars as may be inverted or turned, as described, will strike into and engage the side notches in such bars and be stopped, so that the plate F cannot be moved farther. If, however, all the turned or inverted bars be pushed down before the plate is moved, their transverse grooves will be brought into line with those of the other bars and with the lugs on the plate, so that the latter can be slid freely endwise, its lugs passing into the transverse notches in all the bars.

As the bars are designated by marks or signs, the ones necessary to be pushed down to bring all the transverse notches into line can be remembered by the combination of the letters or signs for such bars. Obviously the number of the bars can be increased as desired; but ordinarily the ten, as shown in the drawings, will be found to be enough, as a great number of combinations or permutations can be made even with the letters or signs designating that number of bars.

Any desired number or any one of the bars can be inverted to make the combination of

letters, as desired, and the combination can be easily and quickly changed by turning the bars end for end, as desired.

Through the oblong opening or slot A³ in the casing-plate projects the main portion or body of the cup-shaped piece G, provided with a flange, G', around its front end of sufficient extent to cover and hide the slot or opening entirely while piece G is moved up and down in the slot. On this piece G is carried the yoke H, having at its upper end the arms H' H', extending entirely across under the lower ends of the series of bars E E, so that when the piece G is moved upward the upper end of the yoke, with its arms, will engage the bars E E and push up all that may be down. The piece G extends through beyond the yoke, as shown in the drawings. Said yoke is at its upper end supported in its movements by the ribs *g g* on the casing-plate.

From the plate or flat bar F, which I call the "stop-plate," an arm, I, extends downward, and at its lower end is provided with a lug, I', turned inward and forward.

Pivoted upon the pivot-lug *i*, at one side of the cup-shaped piece G, is the lever K, having at its upper end a notch engaging the lug I' on the sliding stop-plate. The lower end of the lever is curved under the piece G, so as to be engaged by such piece as it is forced down. Such engagement of the piece with the lever swings the lower end of the lever outward to one side, and carries the upper end inward toward a point over the center of piece G, so as to cause the stop-bar to slide in that direction when it is free to do so. On the outer side of the lower end of the lever is a heel or cam projection, K', engaging the notch L' in the plate L, pivoted at its upper end upon stud or pin L², and at its lower end extended under lever K, so that its portion L² extends inward beyond the end of the slot A⁵ in the casing-plate, when it is swung inward to the extent to which the engaging-heel on lever K will allow it, when the lower end of lever K is swung under piece G, as described.

A spring, M, is provided bearing upon the outer side of the plate, and adapted to keep it normally swung inward against the heel of lever K. On the other side of the moving piece G is the pivot pin or stud N, upon which is pivoted another swinging plate, N', having the curved portion N² projecting under and engaged by thumb-piece G. The lower portion of the plate N' is so shaped as to project inward over the end of slot A⁵ in the casing when the thumb-piece G is up, so as to allow the curved portion N² of the plate to be swung inward and upward. The spring O, pressing against the outer side of the plate, tends to keep it normally so swung inward until forced outward by the action of the thumb-piece on its curved portion as the former is pressed down.

The two swinging plates, swinging as they do and extending inward over the opposite ends of slot A³, form spring-jaws, which, when

the hasp B' is swung up so that the notched projection enters the slot, are first forced outward by the inclined sides of the projection, and then snap inward into the notches in the projection to hold it from being withdrawn again.

The lugs on the sliding stop plate, which act as described in connection with the notched sliding stops or keys E E, can be formed upon the plate or attached thereto as pins; but I prefer to make them, as shown in the drawings, by punching the plate forming such stop-bar so as to leave portions of the plate projecting downward to form the lugs.

The springs which serve to operate the swinging jaw-plates, as described, are preferably made double, with their bends surrounding and held in place by the studs P P, into which screw the ends of the screws P', used to fasten the lock to the trunk-front. Such screws pass from the inside of the trunk outward, so that when the trunk is closed and locked they cannot be seen or reached.

At its corners the back of the lock-casing is provided with the sharp studs R R, which, when the lock is fastened in place, enter the surface to which the lock is attached, and, with the screws P' P', serve to hold it most firmly in place.

Closing the back of the casing so as to hold the parts of the lock in place is the plate S, setting at its edges into rabbets in the edge of the casing, and fastened by one or more screws extending through it and tapped into a lug or lugs, L².

The groove or way D may be formed by channeling the casing, or by forming a transverse rib upon the back of the front plate of the casing parallel to the upper edge of the latter. As the hasp is at its lower end steadied when swung up into the recess in the plate to which it is pivoted by the engagement of shoulders *b' b'* with the upper edge of the plate on each side of such recess, it will be held most firmly and steadily without bringing undue strain upon the pivot-lugs *b² b²*. As the upper end of the hasp is extended out at each side and fits closely in a correspondingly-shaped recess in the lock-casing, the cover of the trunk will be held most firmly and steadily by the hasp.

The lever K and the jaw-plate N' are so formed where they project under the piece G that their projections abut together, as shown in Fig. 4, when the piece has been raised to allow them to swing toward each other, thus limiting the inward swing of the two swinging jaw-plates.

The operation of my lock is, briefly, as follows: The combination is set as desired by the turning end for end of the desired sliding stop-bars, as already described. When the trunk is to be locked, the hasp is swung up, carrying the projection thereon into the slot A⁵ between the spring-jaws, which are forced back, as described, and then snap into the notches in the projection. If, now, before the

proper bars are depressed, the thumb-piece G be depressed, it will engage the rounded projection on the lever K, but cannot swing the same outward to force the jaw back, because the stop-plate cannot be moved, as some of its lugs engage the sides of the inverted bars, as described hereinbefore. As soon, however, as the proper stop-bars, and no others, are depressed to bring the transverse grooves thereon into line with the lugs on the stop plate or bar and with the grooves or notches on the other bars, the stop-plate is free to move so that the lower end of the lever can be swung back by the piece G to withdraw the jaw L and release that side of projection on the hasp. The other jaw is also withdrawn at the same time by the engagement of the piece G with its curved projecting portion, so as to release that side of projection B also. If even one of the wrong bars be depressed along with the right ones, or if one of the bars to be depressed remains up, the grooves on all the sliding stop bars or keys will not be in line, and the stop-plate will be prevented from moving, thus locking the lever K and preventing the piece G from moving the jaws back to release the hasp, as described. After the thumb-piece G has been depressed to open the jaws, as described, if it be let go, the springs M O swing the jaw N' and lever K and jaw L inward again, and the stop-plate is thus thrown back to its first position, with its lugs between or at the sides of the bars. After the stop bars or keys have been depressed to unlock the lock, such keys as are depressed can be pushed up again into line with the rest by raising the thumb-piece G and the yoke carried thereby.

Having thus fully set forth the nature of my invention, what I claim is—

1. The lock-casing having a rabbet along its upper edge, and a series of upright grooves in the rear wall of the rabbet, and the series of openings from the inside of the casing through the lower side of the rabbet, each situated at the bottom of one of the upright grooves, substantially as and for the purpose described.

2. In combination with the casing, the series of sliding stops for locking the lock mechanism within the casing, having portions of their outer ends projecting through and exposed along one edge of the casing, substantially as and for the purpose described.

3. In combination with the casing provided with the oblong opening, and the lock mechanism within, the cup-shaped thumb-piece for moving the mechanism within, extending through such opening, provided with the flange covering the opening, and adapted to engage and operate the lock mechanism with the sides of its depressed portion, substantially as and for the purpose described.

4. In combination with the sliding stop-plate provided with the longitudinal series of lugs, the sliding stops or bars having transverse notches or grooves in them, so located that when the bars are in line with each other the notches on all such as are turned the same

way will be in line with each other and with the lugs on the stop-plate, while the notches on such as are inverted, or turned the other way, will be out of line with the notches in the other stops until such inverted ones have been moved endwise, substantially as and for the purpose described.

5. The sliding stop-bar for a lock, having suitable lugs or shoulders to limit its movement, and provided with a transverse groove nearer one of the lugs than the other, substantially as and for the purpose described.

6. The sliding stop-bar for a lock, having lugs or shoulders on its sides to limit its movement, the transverse notch or groove, and the small notches on each side near such transverse groove or notch, substantially as and for the purpose described.

7. In combination with the casing provided with a transverse way and with corresponding series of notches in the opposite walls of the way, the series of stops fitting and sliding at their opposite ends in such notches, and the U-shaped friction-springs placed between the stops, substantially as and for the purpose described.

8. In a lock, in combination with the casing provided with the way or channel, having in its opposite sides corresponding series of opposite notches, the stops or bars having their opposite ends fitting and sliding in such notches, each stop or bar being provided with lugs or shoulders on its sides to limit its motion, and with a transverse groove nearer one of the limiting-lugs than the other, substantially as and for the purpose described.

9. In combination with the casing provided with the way or channel, having corresponding notches in its opposite sides, the sliding stops having their outer ends exposed through openings in the casing, and provided with stop-lugs on their sides adapted to strike the channel-sides, and with transverse grooves situated in each stop nearer one of the limiting-lugs than the other, so that when all the stops are turned the same way and are in line all the transverse grooves will be in line, but if one of the stops be inverted it must be moved longitudinally to bring its groove into line with the grooves on the others, substantially as and for the purpose described.

10. In combination with the sliding stop-plate for locking the lock mechanism, provided with a longitudinal series of lugs, the series of sliding stops or bars having their upper or outer ends exposed at the front of the casing, provided with transverse grooves so situated that when the stops are all turned one way and moved upward or outward the grooves will be in line with each other, but if any of the stops be inverted or turned end for end its groove will be out of line with the grooves on the others until the stop is pushed down or in, substantially as and for the purpose described.

11. In combination with the casing provided within with a transverse way or chan-

nel, the series of stops sliding in notches in the oppositesides of the channel, and provided with transverse grooves and with the side lugs, of which one is nearer the transverse groove than the other, which are adapted to strike against the sides of the channel when the stops are slid longitudinally, and the sliding stop-plate provided with a longitudinal series of lugs, one for each stop, substantially as and for the purpose described.

12. In combination with the casing provided with the transverse way or channel, the sliding stop-plate provided with the longitudinal series of lugs, and the sliding stops alongside such lugs having their outer ends exposed through suitable openings in the casing, some of said stops being provided with transverse grooves in line with the lugs on the stop-plate when the stops are pushed outward, and others having similar grooves situated out of line with such lugs when said stops are pushed out, and adapted to be brought into line with them when the stops are pushed in, substantially as and for the purpose described.

13. In combination with the stop-plate and the lugs thereon, the series of stops adapted to lock or release the plate as they are moved, the lever engaging a lug on the plate or an arm thereon, the spring-jaw engaged by the other end of the lever, so as to be swung back or withdrawn thereby, and the movable thumb-piece or knob adapted to engage a portion of the lever to swing it so as to withdraw the jaw, substantially as and for the purpose described.

14. In combination with the sliding stop-plate provided with an arm having a lug, means, substantially as described, for locking and releasing the plate, the pivoted lever notched at its upper end to engage the lug on the arm of the stop-plate, the spring-jaw for engaging a notch in one side of a projection on the hasp, provided with a notch or recess engaged by a tongue or heel on the lever, the sliding thumb-piece engaging a projecting portion on the lower end of the lever,

so as to force the same outward to withdraw the jaw, substantially as and for the purpose described.

15. In combination with the casing, the thumb-piece G, moving in an opening therein, the lever pivoted at one side of such opening, having its lower end extended under the piece G, the swinging jaw engaged by the outer side of the lower end of the lever, the spring pressing such jaw inward over the hasp-opening in the casing, means, substantially as described, for locking and releasing the upper end of the lever, as desired, substantially as and for the purpose described.

16. In combination with the cup-shaped thumb-piece extending through and moving in an opening in the casing, the jaw pivoted at one side of the opening, having a projection extending under or in the track of the thumb-piece as it is moved along the opening, a spring adapted to swing the jaw inward over the hasp-opening in the casing, the lever pivoted to the other side of the opening for the thumb-piece, having a portion projecting into the path of the thumb-piece, the jaw pivoted outside of and engaged by such lever, and the spring adapted to swing such jaw normally inward over the hasp-opening, substantially as and for the purpose described.

17. In combination with the series of sliding stop-keys for locking the lock mechanism, the movable thumb-piece for swinging back the jaw or jaws, and the yoke attached to or carried by such piece, adapted to move all the keys outward and return them to their normal positions, substantially as and for the purpose described.

In testimony that I claim the foregoing I have hereunto set my hand this 4th day of April, A. D. 1885.

HENRY CLARKE.

Witnesses:

MOSES NORRIS,
THOS. M. NORRIS.