2 Sheets--Sheet 1.

J. LOCH & J. STANEK.

Permutation Locks.

No. 149,490. Patented April 7, 1874.

Fig 1

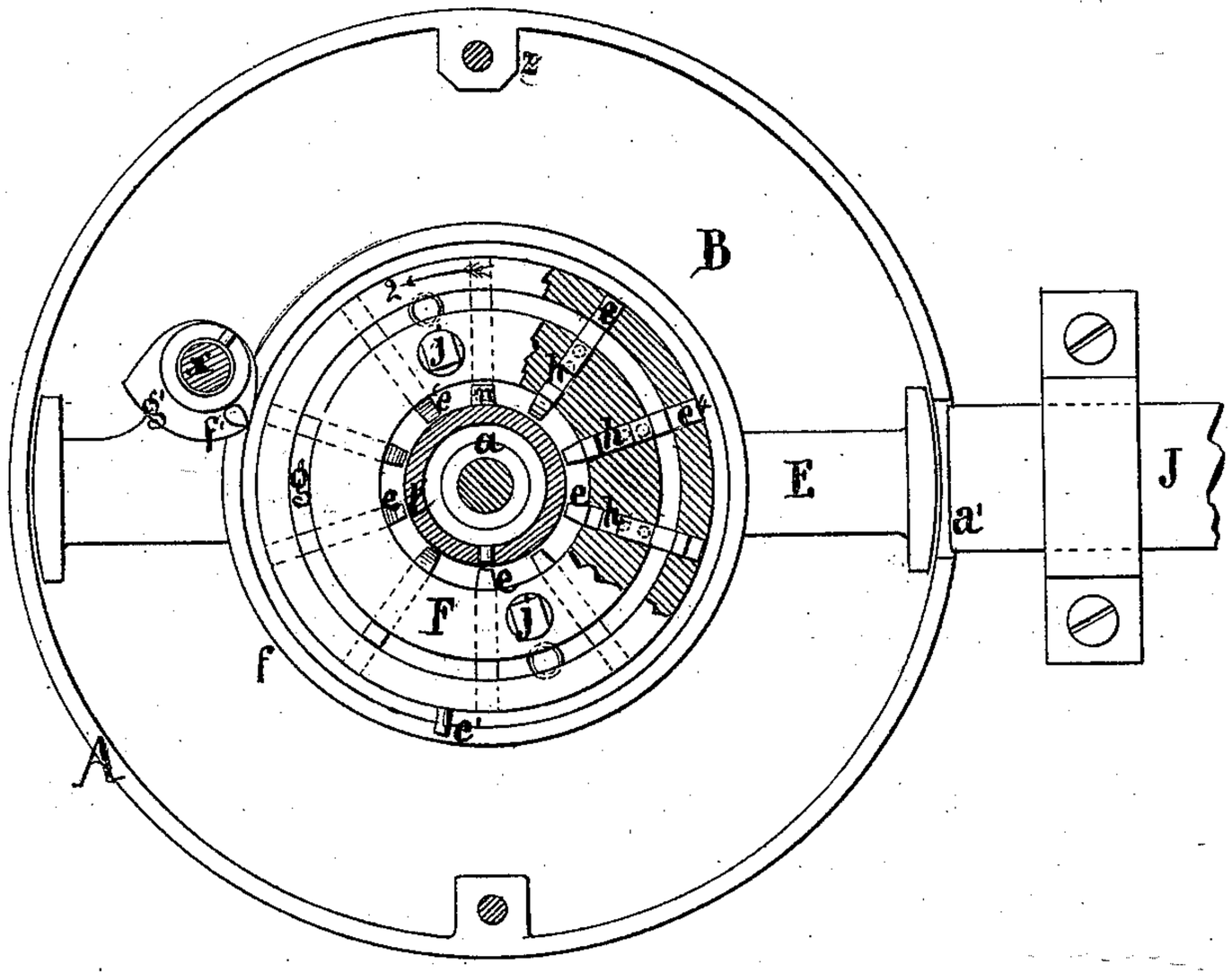
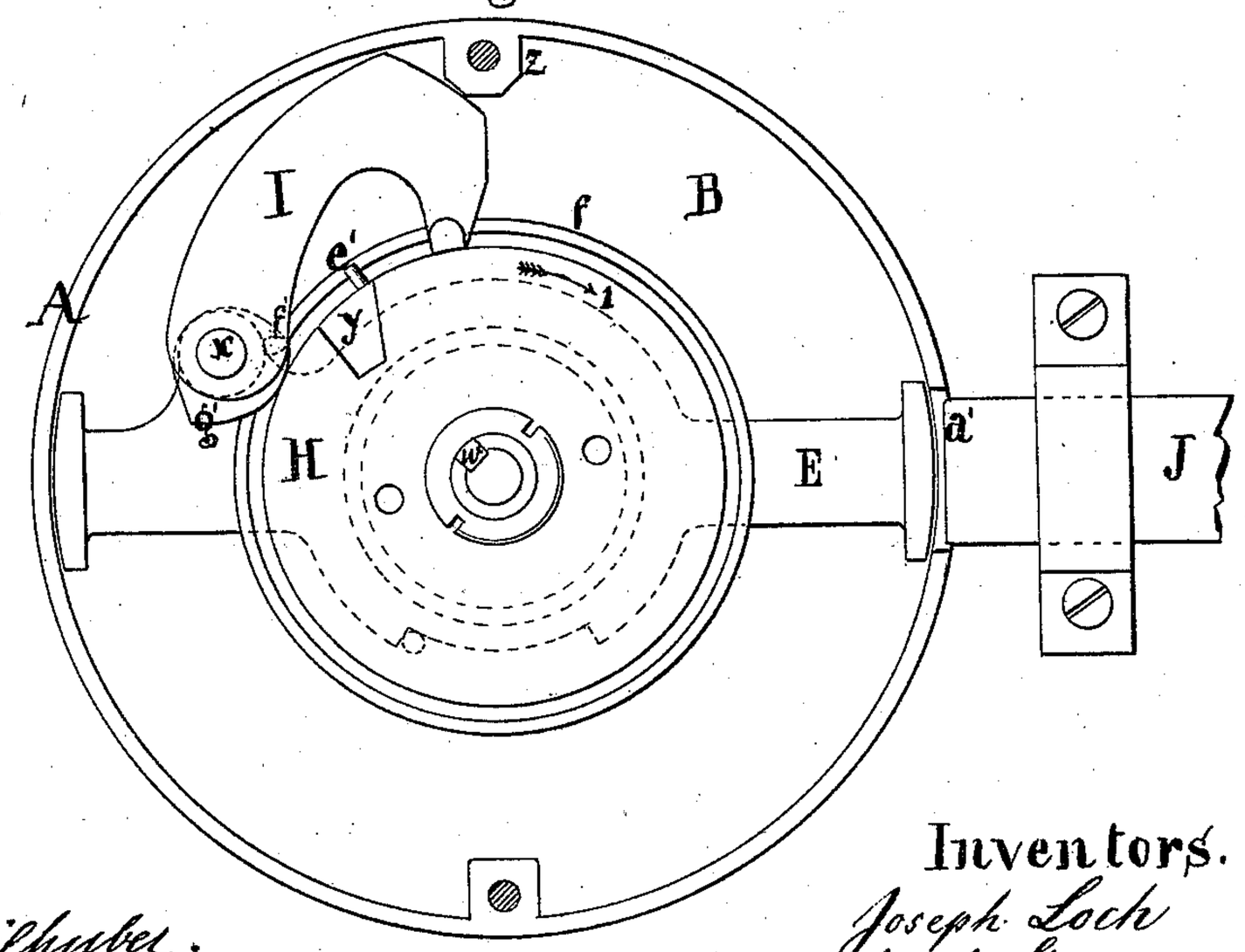


Fig. 2.



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2 Sheets--Sheet 2.

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Fig. 3.

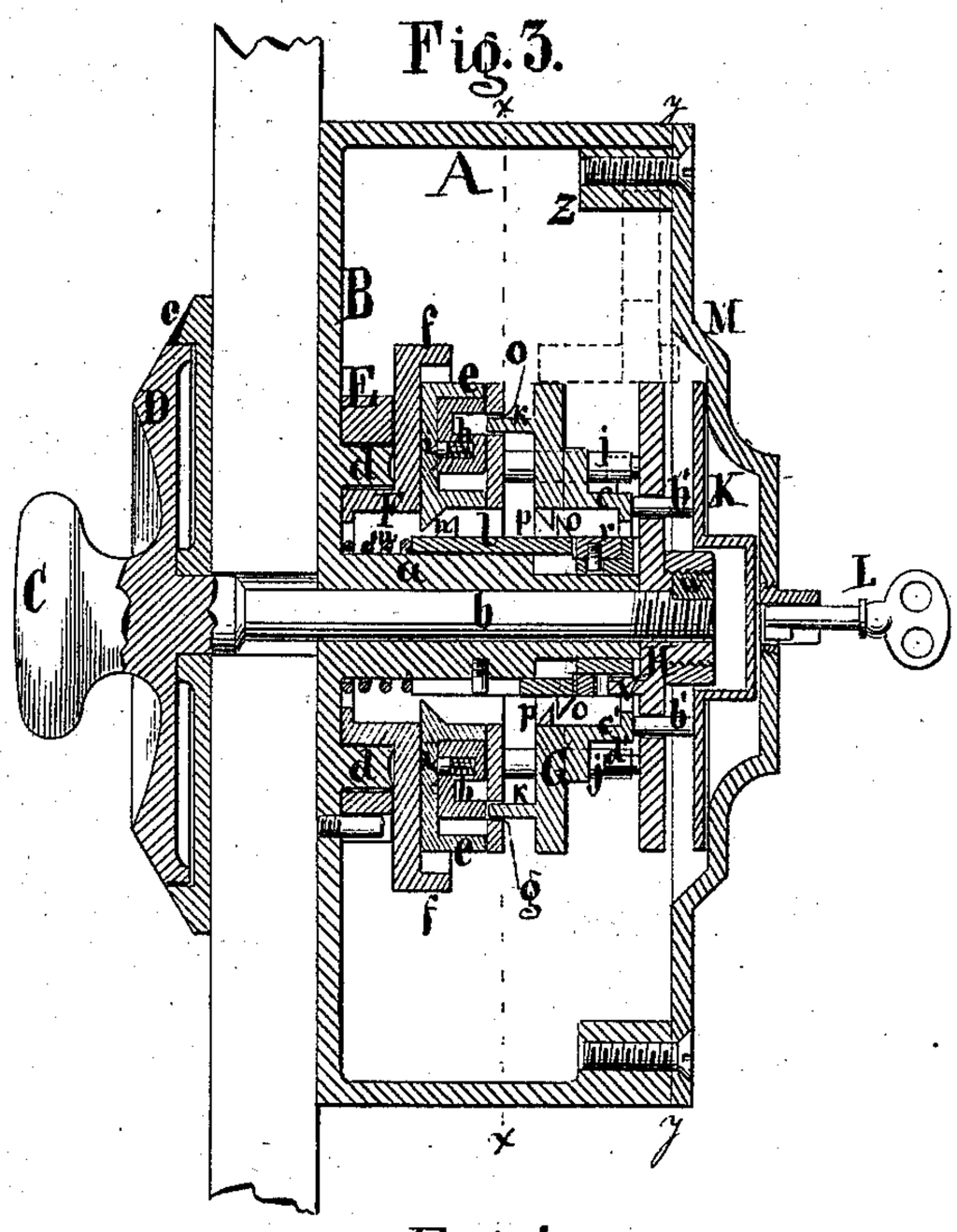


Fig. 4.

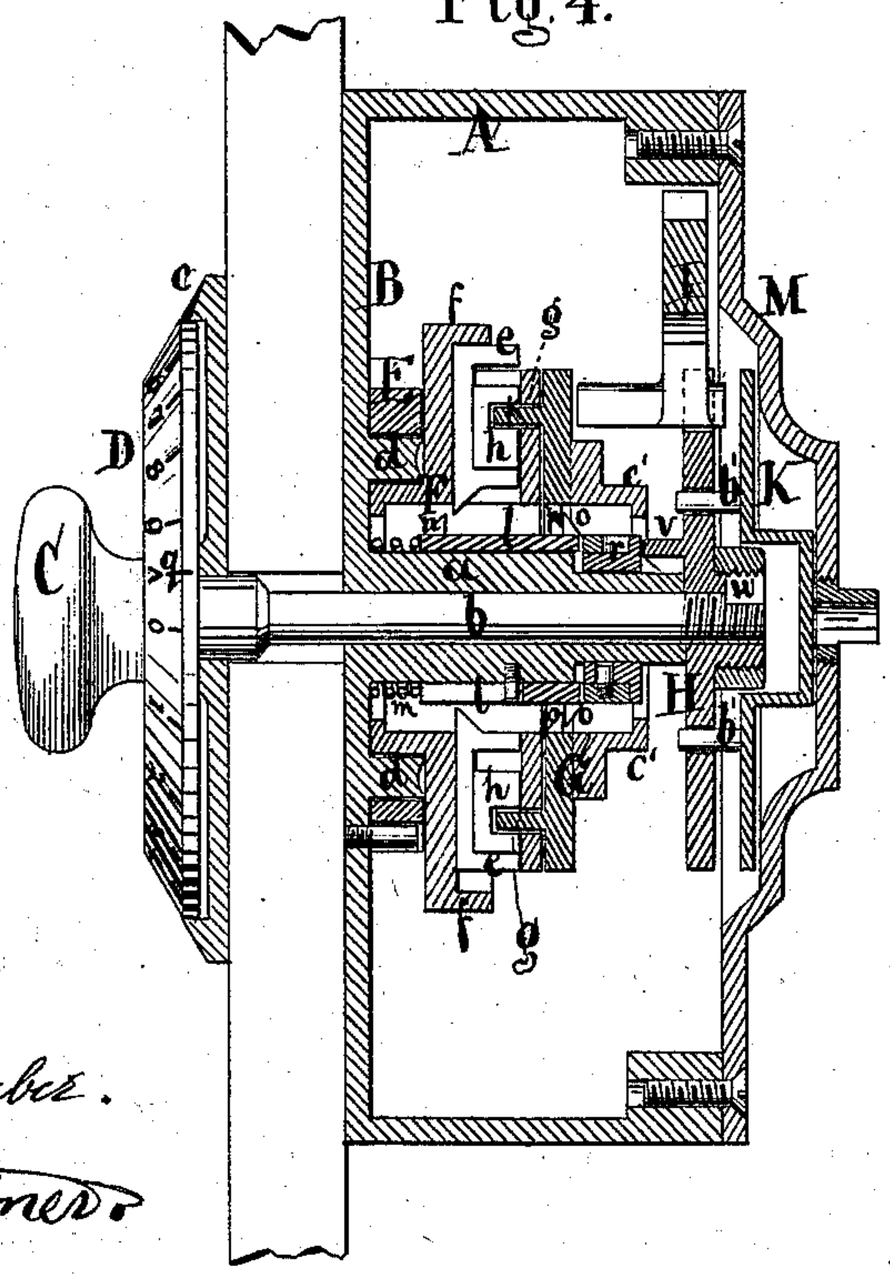


Fig. 5.

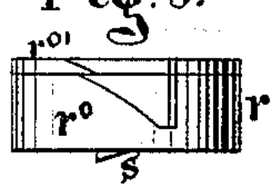
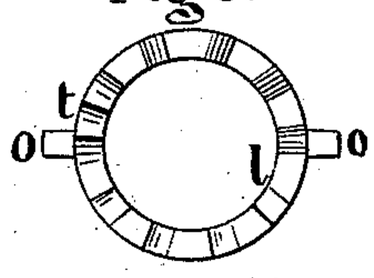


Fig. 6.



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UNITED STATES PATENT OFFICE.

JOSEPH LOCH AND JOSEF STANEK, OF NEW YORK, N. Y.

IMPROVEMENT IN PERMUTATION-LOCKS.

Specification forming part of Letters Patent No. **149,490**, dated April 7, 1874; application filed March 19, 1874.

To all whom it may concern:

Be it known that we, JOSEPH LOCH and JOSEF STANEK, both of the city, county, and State of New York, have invented a new and useful Improvement in Permutation-Locks; and we do hereby declare the following to be a full, clear, and exact description thereof, which will enable those skilled in the art to make and use the same, reference being had to the accompanying drawing forming part of this specification, in which drawing—

Figure 1 represents a vertical section transversely to the spindle in the plane *x x*, Fig. 3. Fig. 2 is a similar section in the plane *y y*, Fig. 3. Fig. 3 is a vertical central section in a plane at right angles to the previous sections, showing the parts in the locked position. Fig. 4 is a similar section of the same, showing the stop-plate depressed, so as to leave the lock in a condition to be opened. The remaining figures are details which will be referred to as the description progresses.

Similar letters indicate corresponding parts.

This invention consists in a barrel which carries a series of radial slides with adjustable stops, in combination with a stop-plate for the latch, which, when depressed against the slide-carrying barrel, engages with the radial slides and allows of setting the stops of said slides for various combinations. The slides are pushed out and the stop-plate is depressed by the action of noses formed on the circumference of a ratchet-sleeve which is acted upon by a pawl secured in a compound ring, and on the spindle is mounted a notched disk or tumbler with a nose on its inner surface which serves to depress the compound ring and the ratchet-sleeve under proper circumstances, and if the stops of the radial slides are so adjusted that the stop-plate can be forced back out of the way of the latch, the latch drops in gear with the tumbler and the bolt can be turned. The adjustable stops of the radial slides are set by means of a cap, which can be made to act on the stop-plate and to cover the tumbler, so that by the action of the ratchet-sleeve the desired stops can be set, the latch being prevented by the cap from engaging with the tumbler.

In the drawing, the letter A designates a case, which is, by preference, made of cast-iron in a cylindrical form, and which is intended to be firmly secured to the inner surface of the door of a safe or other device to be locked. From the inner surface of the head B of this case projects a hub, *a*, which is bored out to receive the spindle *b*, to the outer end of which is secured a handle, C, and disk D. On the face of this disk are marked a series of figures or characters, which serve to form the various combinations for which the locking mechanism can be adjusted, and said disk fits into a cavity on the edge of which is made a distinct mark, *c*, Fig. 3 and 4, the object of which will be presently explained. Round the hub *a* extends an annular projection, *d*, the outer surface of which forms the bearing for the bolt E, while its inner surface forms the bearing for the hub of a barrel, F, that contains a series of radial slides, *e*. The inner ends of these slides are beveled off, and they project beyond the inner surface of the barrel, so that by pressing against these beveled edges the slides are forced outward. A rim, *f*, on the barrel prevents the slides from being pushed out beyond the desired limit. In the face of the barrel F is a circular groove, *g*, which extends down so as to expose a portion of each of the radial slides, and on each of these slides is fitted a stop, *h*, which is connected to its slide by a spring-catch, *i*, so that if said stop is not retained, and the slide is moved, the stop will move with it, but if the stop is retained, the slide can be moved without said stop. From the barrel F projects two pins, *j j*, which form the guides for the stop-plate G, and this stop-plate is provided with a rim, *k*, that fits the circular groove *g* in the barrel. In this groove, between the slides *e*, are placed two or more springs for the purpose of forcing the stop-plate out, and for preventing the rim *k* from entering the groove *g* accidentally. When the stop-plate is depressed into the groove *g*, and one or more of the slides are pushed out, the stops *h* of these slides are retained by the rim *k* of the stop-plate while the slides move outward, and if the stop-plate is permitted to recede, and the slides previously moved out are pushed back to their original position, the stops of said slides come opposite the groove *g* in the barrel, and the stop-plate cannot be depressed until the same slides are again pushed out. The mechanism for moving the slides outward and for depressing the

stop-plate consists chiefly of a sleeve, *l*, which is fitted on the hub *a* and subjected to the action of a spring, *m*, that has a tendency to force the same away from the head B. On the outer edge of this sleeve are formed ratchet-teeth, which correspond in number and position to the radial slides and to the figures or characters on the disk D. This sleeve is feathered on the hub *a*, and from its surface project three noses, *n o o*, one below, near its outer, and two near its inner edges. The nose *n* is beveled outward and the noses *o o* inward, and if the barrel F is turned to such a position that the beveled end of one of the slides *e* comes opposite and under the nose *n*, (which position is reached whenever one of the figures or characters on the disk D comes opposite the fixed mark *c*,) and if the sleeve is then depressed the slide opposite to said nose is forced out. The noses *o o* are intended to act on projections *p p* on the inner surface of the stop-plate G, and whenever the said stop-plate is brought in the proper position, (indicated by a mark, *q*, Fig. 4, on the disk D, and the fixed mark *c*,) and the sleeve is depressed, the stop-plate is carried down, provided the slides *e* are so adjusted that said stop-plate can be depressed. The projections *p p* on the stop-plate are situated opposite to two spaces between two of the slides *e*, and the mark *q* on the disk D is placed between two of the indicating figures or characters, (see Fig. 4,) so that when the noses *o o* of the ratchet-sleeve are in position to engage with the projections *p p* of the stop-plate, and said ratchet-sleeve is depressed, its nose *n* will not actuate any of the slides *e*. With the ratchet-sleeve *l* is combined a compound ring, *r*, which turns freely on the hub *a*, and which is provided on its inner surface with a pawl, *s*, (see Fig. 5,) that engages with the teeth of the ratchet-sleeve whenever said ring is moved in one direction, but when the motion of the ring is in the opposite direction said pawl slides over the ratchet-teeth, and a certain click is produced, which assists in adjusting the mechanism in the correct position. As previously stated, the number and position of teeth on the ratchet-sleeve correspond to that of the figures and marks on the disk D, an intermediate tooth, *t*, Fig. 6, being provided, which corresponds in position to the mark *q* on said disk. The ring *r* is composed of two parts, r^{o} $r^{o\prime}$, one of which is fitted into the other and connected thereto, so that it can make a partial revolution. Both parts of the ring are provided with recesses, and, if the inner part $r^{o\prime}$ is turned, the recess in the outer part can be covered or uncovered. The motion of the ring *r* is governed by a nose, *v*, on the inner surface of the tumbler H, which is secured on the end of the spindle *b*, and which turns with said spindle in either direction, a key, *w*, being inserted into a recess of the spindle and of the hub of said tumbler to prevent the latter from turning independently of the spindle. When the spindle is turned in one direction, the nose *v* of the tumbler engages with the recess in the inner part $r^{o\prime}$ of the ring *r* and turns said inner part so as to uncover the recess in the outer part of the ring *r;* then the nose engages with this recess by the action of the spring *m* against the ratchet-sleeve *l*, and the ring is turned so as to cause its pawl, *s*, to slide over the teeth of the ratchet-sleeve and to produce a clicking noise whenever one of the figures or marks on the disk D comes opposite the fixed mark *c*. If the motion of the spindle is reversed immediately after the clicking noise has been heard, the nose *v* rides up on the surface of the compound ring, and the ring, together with the ratchet-sleeve, are depressed, carrying the stop-plate G outward, provided the slides are in the proper position to allow of such motion. In the tumbler is a notch, *y*, and from the bolt E projects a pin, *x*, on which is mounted loosely the latch I. If this latch rides on the peripheries of the tumbler and of the stop-plate, which are of equal diameter, its head bears against a projection, *z*, on the case A, and the bolt remains locked opposite the aperture *a′* in said case, so that the lock-bolt J, Figs. 1 and 2, cannot be moved back and the door cannot be unlocked; but, if the stop-plate is forced outward, as previously described, and the tumbler is turned so as to bring its notch, *y*, opposite to the latch, the latch drops in gear with the tumbler, and the bolt E can be turned away from the aperture *a′*. In order to unlock, therefore, it is necessary to adjust all the slides *e* in such a position that the stop-plate can be carried outward out of the way of the latch so as to allow said latch to engage with the tumbler. The slides *e* are adjusted for any desired figure, or combination of figures, by means of a cap, K, which is connected to the tumbler H by pins *b′* fitting loosely into holes in said tumbler, and so situated that when the cap is forced outward the pins strike the edge of the hub *c′* of the stop-plate and carry the rim of said stop-plate into the groove of the barrel F. The outside diameter of the cap is equal to that of the tumbler, so that when the cap is forced in against the tumbler it covers the notch *y* and prevents the latch from engaging with the tumbler. A key, L, introduced through the removable head M of the case A, serves to depress the cap, and to hold it depressed, until the mechanism is set to the desired combination. When the cap is thus depressed, and the spindle is turned in such a direction, indicated by arrow 1 in Fig. 2, that the pawl V of the tumbler slides over the teeth of the ratchet-sleeve, a click is produced whenever one of the marks on the disk D comes opposite the fixed mark *c*. If this motion is immediately arrested when the figure 4 of the disk, for instance, is opposite the fixed mark, and if the motion of the spindle is then reversed, the slide 4 is pushed out, its stop being retained by the stop-plate. If the cap is then released by removing the key L, it is forced back by the action of the springs in the groove *g* of the barrel, so that it does not

interfere any more with the motion of the latch. The slide 4 is then forced back by turning the spindle in the direction of arrow 1, Fig. 2. By this motion pins *d'*, which project from the inner surface of the tumbler, are brought in contact with the guide-pins *j* of the stop-plate, and the barrel is caused to turn so that a pin, *e'*, projecting from it will strike a toe, *f'*, on a cam-disk, *g'*, which is mounted loosely on the pivot *x* of the latch, being retained in position simply by a friction-spring. By this motion the cam-disk *g'* is turned to the position shown in Fig. 2, and, as the motion of the barrel continues, all the slides which have been forced out are thrown back. The stop of slide 4, the position of which has been changed, as above described, is thereby brought opposite the groove *g* in the barrel, and the stop-plate cannot be depressed, and, consequently, the lock cannot be opened until the slide 4 is again pushed out. If two or more of the stops have been thus disturbed, the corresponding slides must be pushed out before the lock can be opened. For the purpose of restoring the stop of slide 4, or of any other slide which has been disturbed, this slide is moved out; then the stop-plate is depressed by the key L and cap K, and by turning the barrel F in the direction of arrow 1 the slide is pushed back, while the stop is retained by the stop-plate. When the barrel F is turned in the direction of arrow 2, Fig. 1, the pin *e'* throws the cam-disk *g'* in the position shown in this figure, and the slides which may have been pushed out can pass freely.

What we claim as new, and desire to secure by Letters Patent, is—

1. The combination of a series of radial slides in a revolving barrel, each slide carrying an adjustable stop, with a stop-plate, G, a device for depressing said stop-plate and for moving the radial slides, and with a latch for moving the bolt, all constructed and operating substantially as shown and described.

2. The combination of a ratchet-sleeve and compound ring, substantially such as herein described, with a tumbler, H, having on its under surface a nose, *v*, and with the stop-plate G, and slide-carrying barrel F, all constructed and operating substantially in the manner set forth.

3. The combination of the cap K with the tumbler H, ratchet-sleeve *l*, compound ring *r*, stop-plate G, and slide-carrying barrel F, all constructed and operating substantially in the manner shown and described.

4. The arrangement of a key, *w*, having a screw-thread on its outer surface and fitting in a groove in the spindle *b* and in a recess in the hub of the tumbler H, said spindle being provided with a screw-thread to receive a nut for fastening the tumbler and the key in position, substantially as set forth.

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