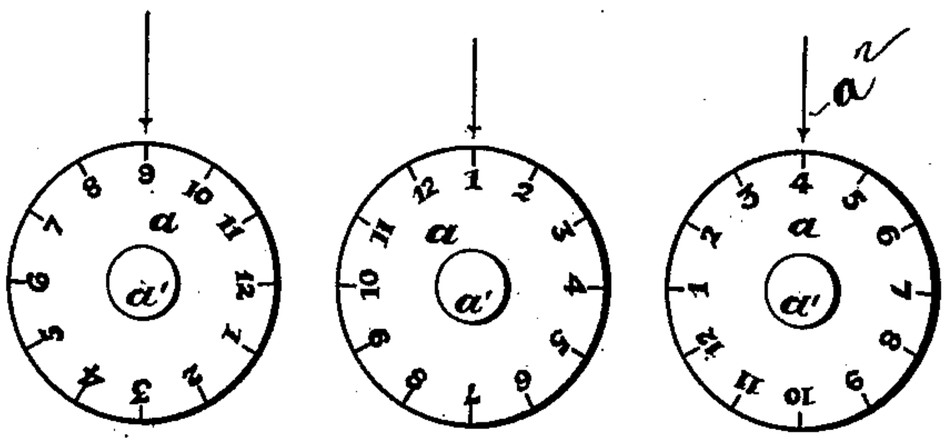
(Model.) 3 Sheets—Sheet 1.

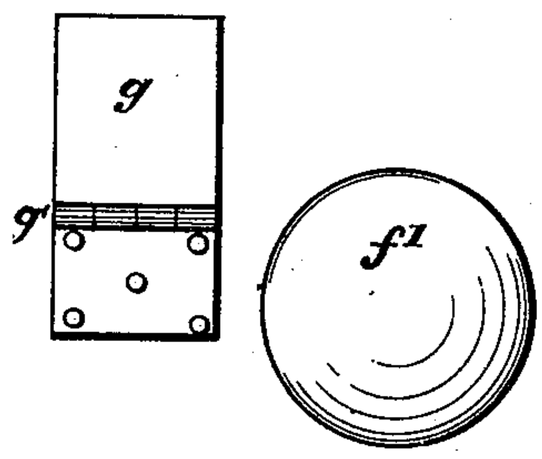
S. C. MUNRO.

PERMUTATION LOCK.

No. 406,459. Patented July 9, 1889.

Fig. 1





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(Model.) 3 Sheets—Sheet 2.

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Fig. 2.

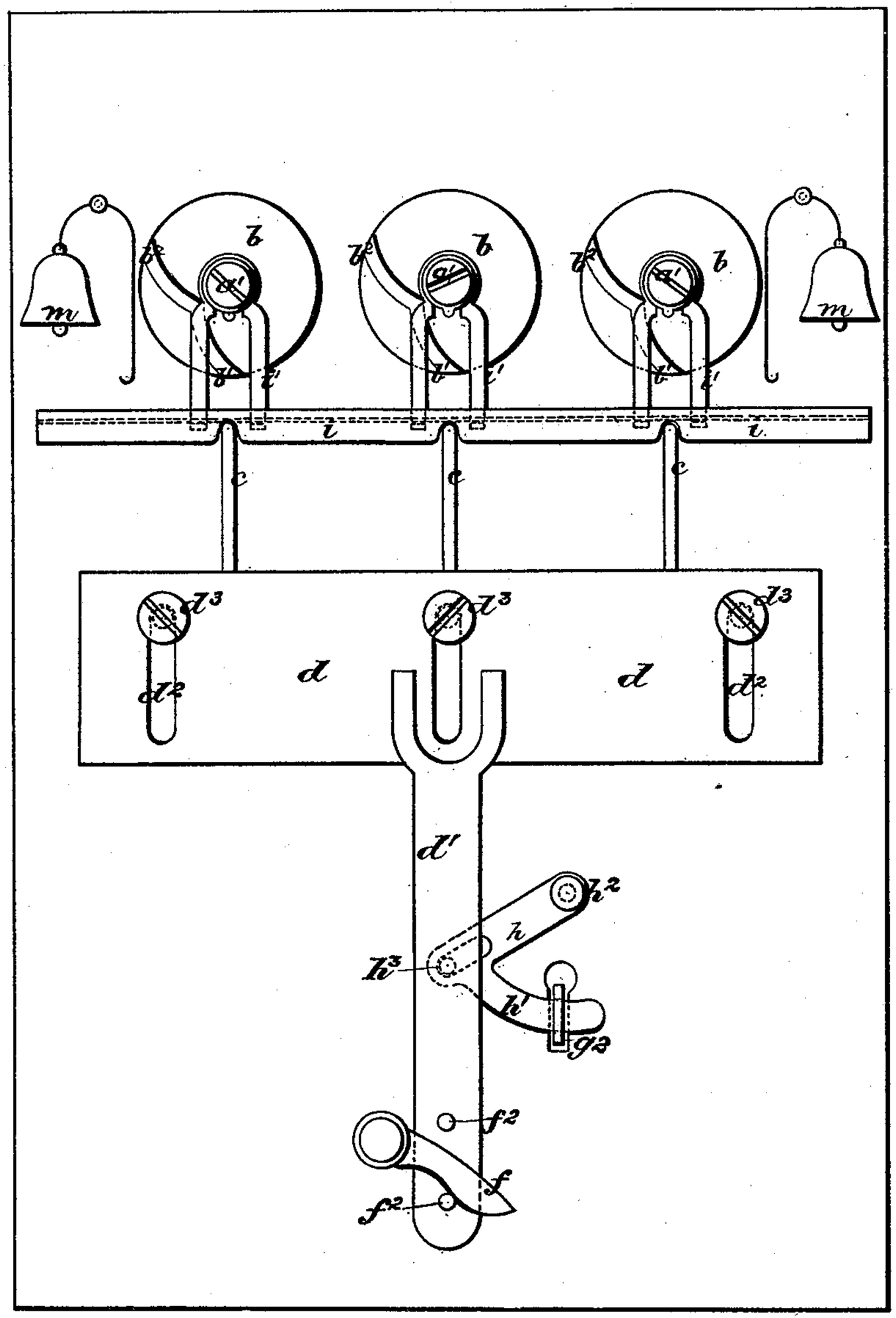
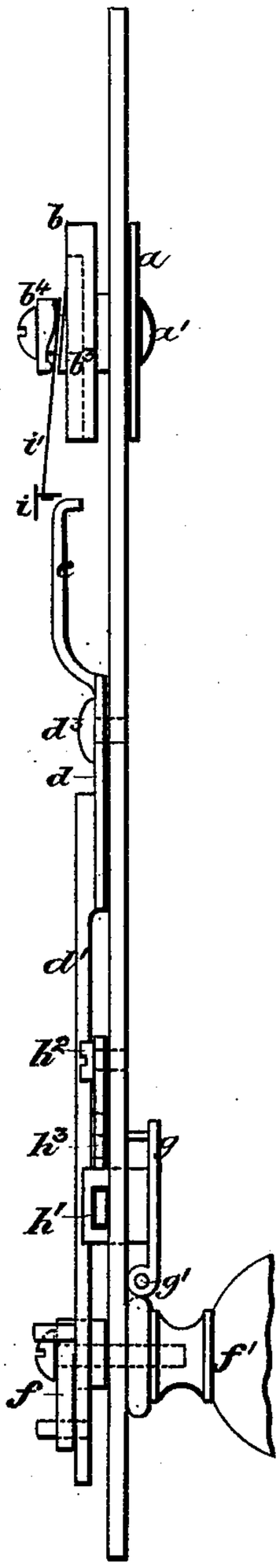


Fig. 3.



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(Model.) 3 Sheets—Sheet 3.

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Fig. 4.

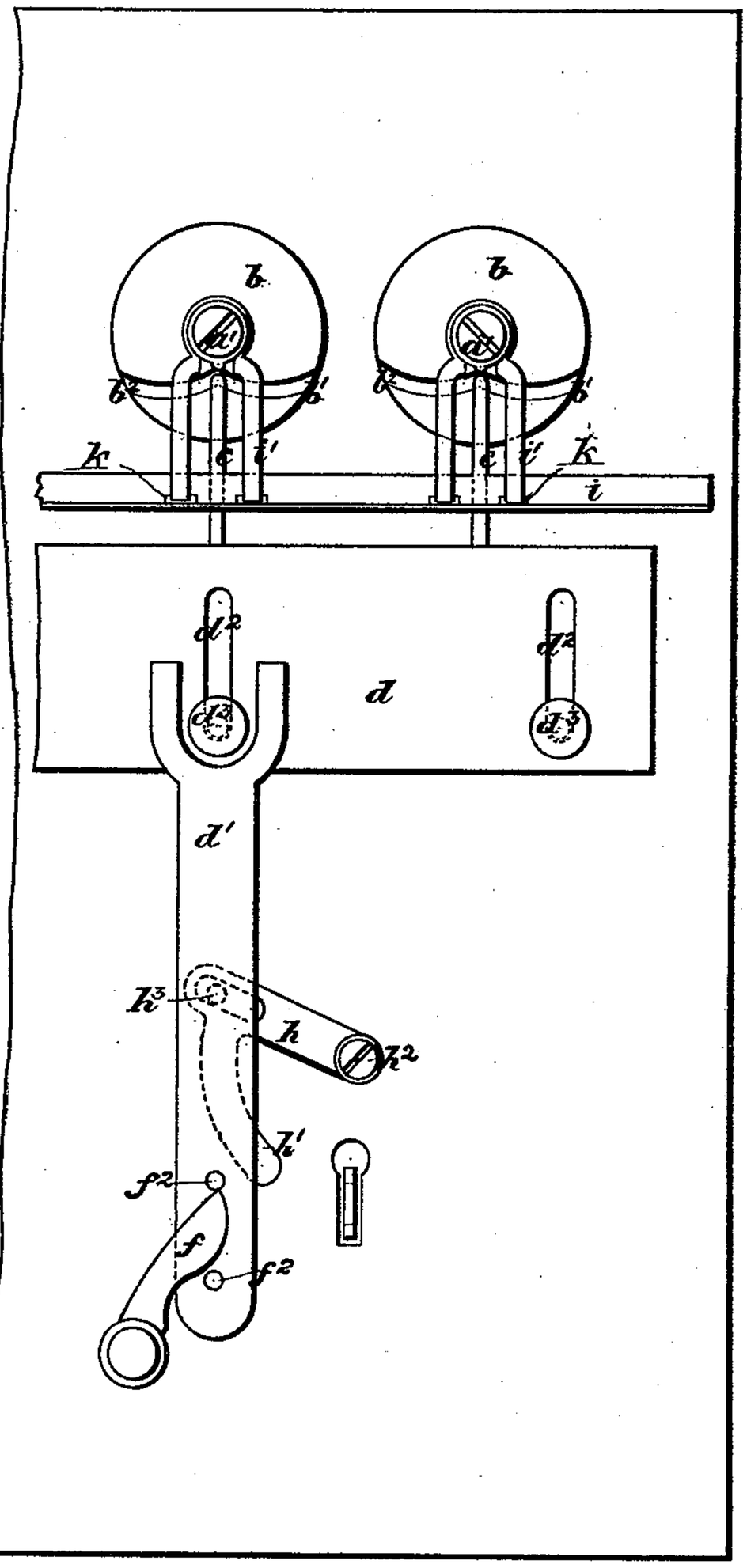


Fig. 5.

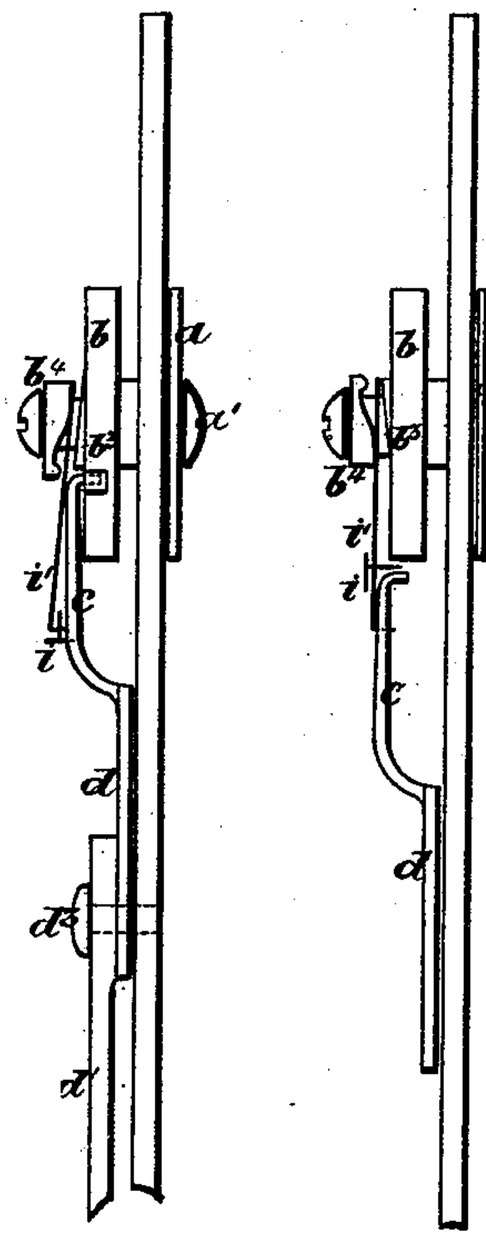
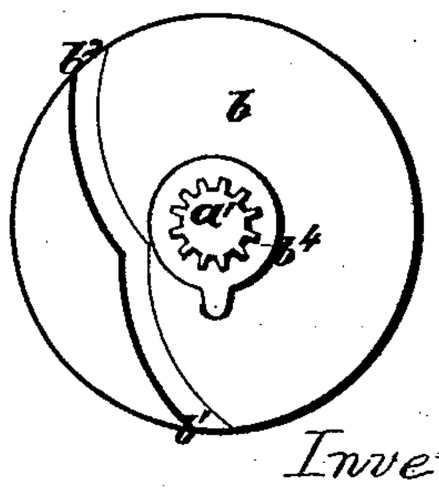


Fig. 6.

Fig. 7.



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UNITED STATES PATENT OFFICE.

STUART C. MUNRO, OF LONDON, COUNTY OF MIDDLESEX, ENGLAND.

PERMUTATION-LOCK.

SPECIFICATION forming part of Letters Patent No. 406,459, dated July 9, 1889.

Application filed August 10, 1888. Serial No. 282,457. (Model.) Patented in England April 27, 1887, No. 6,145.

To all whom it may concern:

Be it known that I, STUART CARADOC MUNRO, a subject of the Queen of Great Britain, residing at London, in the county of Middlesex, England, have invented a certain new and useful Improved Method of and Apparatus for Preventing the Fraudulent Opening of Safes, (for which I have previously obtained Letters Patent in Great Britain, dated April 27, 1887, No. 6,145,) of which the following is a full, clear, and exact description.

This invention relates to apparatus to be employed in combination with the ordinary locks used in safes, and is intended to prevent the opening of the same by means of a duplicate key.

In the accompanying drawings, Figure 1 represents an outside or front view of the door of a safe; Fig. 2, an inside view thereof; Fig. 3, an edge or side view; Fig. 4, an inside view similar to Fig. 2, showing parts in different position; and Figs. 5, 6, and 7, details hereinafter described.

a represents a series of disks numbered round their margins, and capable of being turned round on studs *a'* until any number predetermined upon shall coincide with a pointer or index a^2. The studs or axes *a'* pass through the door-plate and carry disks *b*, on the faces of which are formed grooves or channels *b'*. A series of bent pins *c* are fixed to a horizontal plate *d*, which is attached to a vertical bar *d'*. The plate *d* is slotted at d^2, and screwed studs d^3 pass through these slots into the door-plate, so as to keep the plate *d* in horizontal contact therewith, and yet leave it free to slide up and down. This sliding motion is imparted by a lever *f*, fixed to the spindle of the handle *f'*, the said lever engaging with pins f^2 on the vertical bar *d'*.

g is the key-hole guard, which is hinged at *g'*, a staple g^2, fixed to the guard, passing through the key-hole, where it is secured by the arm *h'* of a lever *h*, which passes through the slot of the staple. The lever *h* is fulcrumed at h^2, and is slotted to receive a pin h^3, projecting from the bar *d'*.

Before proceeding further with the description of the parts I will explain the action of those already described.

Supposing that it is required to open the safe, this cannot be done until the key-hole is exposed. To effect this, the disks *a* are turned round until the predetermined letters or figures thereon have arrived opposite their index-marks. When in this position, the whole of the cam-grooves *b'* in the disks *b* are arranged as shown in Fig. 2, the openings or entrances to the grooves being opposite the ends of the pins *c*. If the handle *f'* be now turned, the lever *f* will raise the bar *d'*, the plate *d*, and the pins *c*, the bent ends *c'* of which will enter the grooves *b'*, and, continuing to pass upward, will turn round the disks *b*. During this upward motion the pin h^3 will have withdrawn the lever-arm *h'* from the staple of the key-hole guard, leaving the latter free, as shown in Fig. 4. The safe can now be opened, and when closed again the pins *c'* will not pass out by the grooves *b'*, but by the grooves b^2, which form a continuation thereof, so that a continuous rotary motion is imparted to the disks. If this were not the case, the withdrawal of the pins from the grooves *b'* would leave the disks in their original position, and so afford no safeguard; but by turning the handle sharply backward a certain amount of impetus can be imparted to the disks, which will continue to revolve indefinitely after the pins have passed down out of contact therewith.

In order to enable the person intrusted with the control of the safe to vary the key word or number at pleasure, the studs *a'*, upon which the disks *b* are mounted, are formed in the shape of small pinions, the teeth of which correspond with the letters or figures on the disks *a*, and the holes in the centers of the disks *b* are indented to fit onto these teeth, so that if there are twelve numbers on the dials each or any of the disks *b* can be turned round a twelfth of a revolution, and so every variety of combination offered by the numbers on the disks can be made use of.

In order to prevent the discovery of the key word or number by turning the handle and raising the pins *c* until they come into contact with the edges of the disks *b*, and then turning the latter round in contact therewith until the break in the periphery can be felt, I make use of a device consisting of a light metal bar *i*, which is T-shaped in section, as

shown in Figs. 3, 5, and 6. This bar is suspended from the studs a' by means of flat metal springs i', which pass through holes in the bar at k (see Fig. 4) and are bent and enlarged at the ends, so as not to slip out of the holes. On the faces of the disks b are formed cams b^3, which, when all the disks are in position for opening, can press the bar i outward, as shown in Fig. 3, and the pins c, catching against the lower edge of the horizontal web of the bar, will cause the same to tilt on its supports i' and allow the pins to pass, as shown in Fig. 5. If, however, the disks are not all in the required positions, the cams b^4 on the other side of the springs i' will press the same inward toward the door, and the pins c on rising will raise the same and jam it against the edges of the disks, so that if these be turned round they will simply be in contact with the smooth metal bar, and no irregularity in their surfaces can be detected.

To increase the difficulty of finding out the correct position of the disks, and also to render any tampering therewith more dangerous, bells m may be hung inside the door-plate, which will be set in vibration by the bar i when the latter is raised. The sound of the bells will drown any indication that might be gathered by listening to slight sound caused by the contact of the disks with the bar i.

Although I have illustrated the best method I am acquainted with of carrying my invention into practice, it must be understood that I do not confine myself to the precise details herein shown as to the number, configuration, or arrangement of parts, as the same may be varied; but

What I claim is—

1. In apparatus such as described, the combination of a series of disks having letters or figures marked thereon with a second series of disks having curved cam-grooves formed on the faces thereof, substantially as specified.

2. The combination, with a series of disks having cam-grooves on the faces thereof, of a series of pins bent or hooked at their ends, attached to a bar capable of being moved vertically upward and downward from the outside of the safe, substantially as specified.

3. The combination, with a series of grooved disks and a sliding bar and pins for operating the same, of a bar for securing the key-hole guard connected with and operated by said sliding bar, substantially as specified.

4. The combination, with a series of grooved disks, of a swinging or movable bar for covering the edges of the grooves, substantially as specified.

5. The combination, with a series of grooved disks, of a swinging or movable bar capable of being forced inward or outward by cams on the axes of the grooved disks, substantially as specified.

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