(No Model.) 2 Sheets—Sheet 1.

J. LOEWENTHAL.

REGISTERING LOCK.

No. 405,105. Patented June 11, 1889.

Fig. 1.

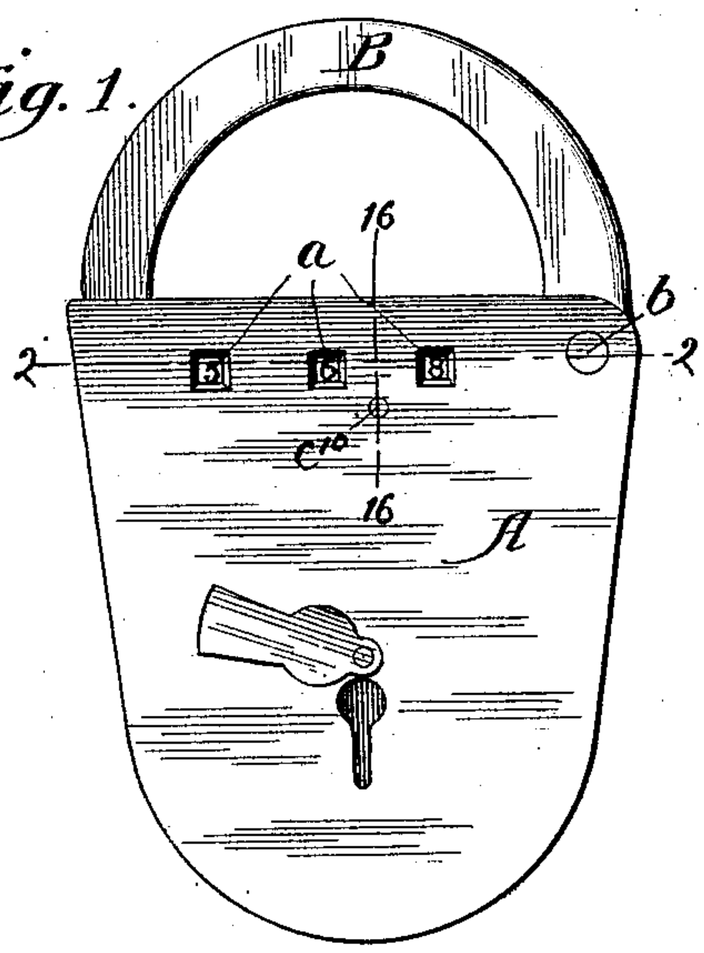


Fig. 2.

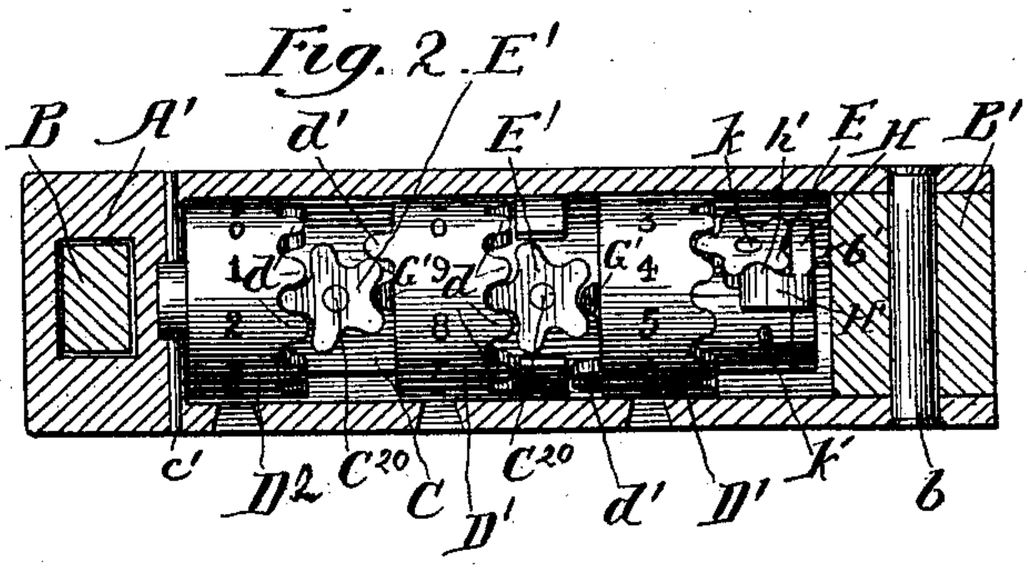


Fig. 3.

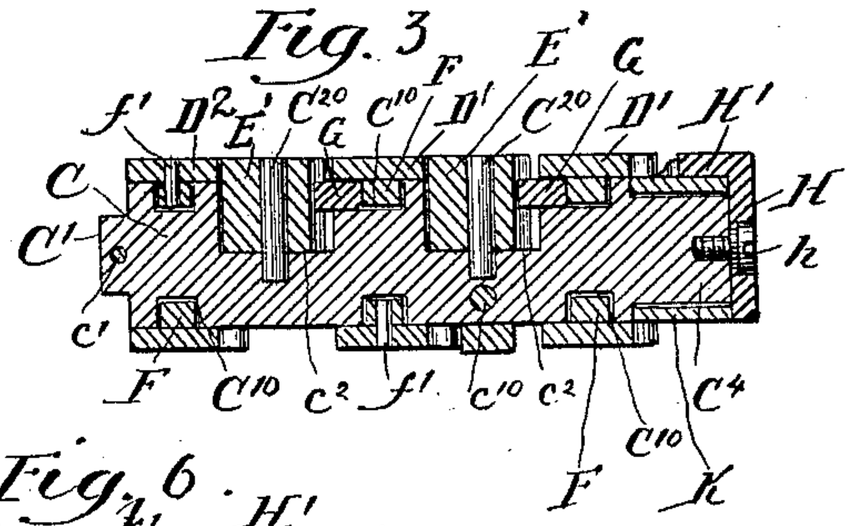


Fig. 5.

Fig. 4.

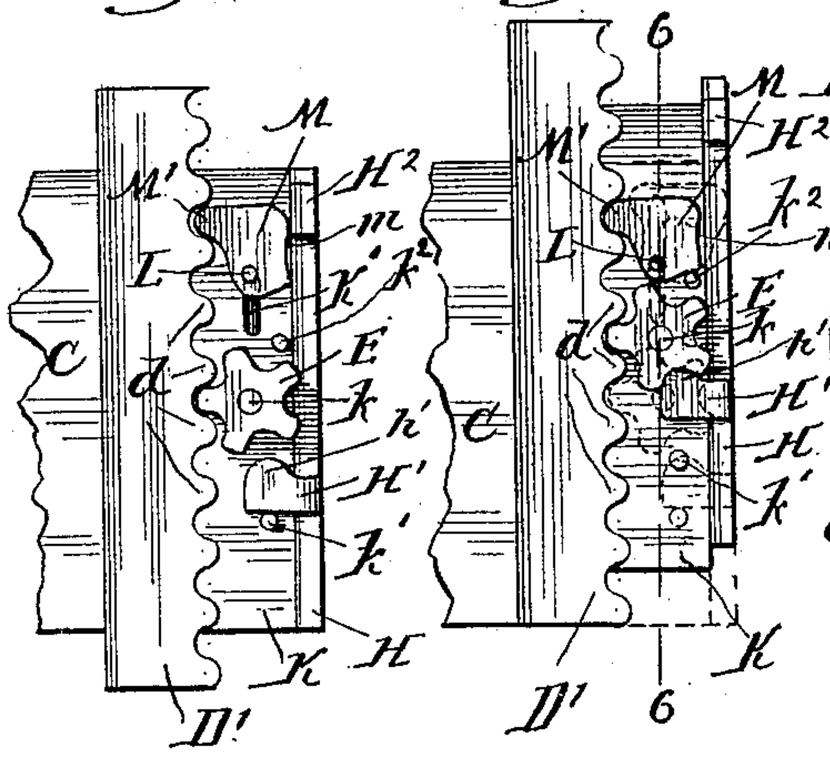
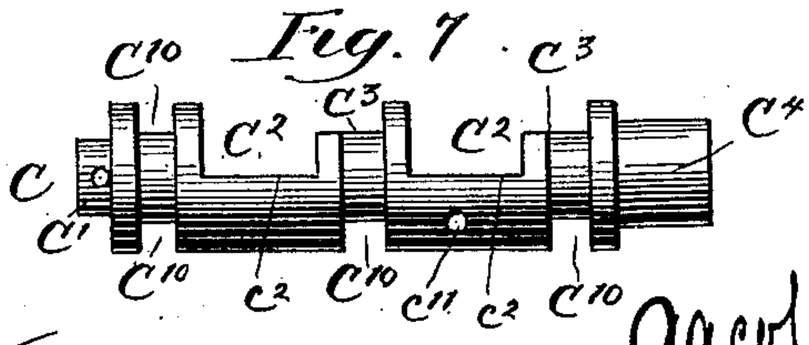


Fig. 6.

Fig. 7.



Witnesses:
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John R. Mattenstrom

Inventor:
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N. PETERS. Photo-Lithographer, Washington, D. C.

(No Model.) 2 Sheets—Sheet 2.

J. LOEWENTHAL.

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Fig. 8.

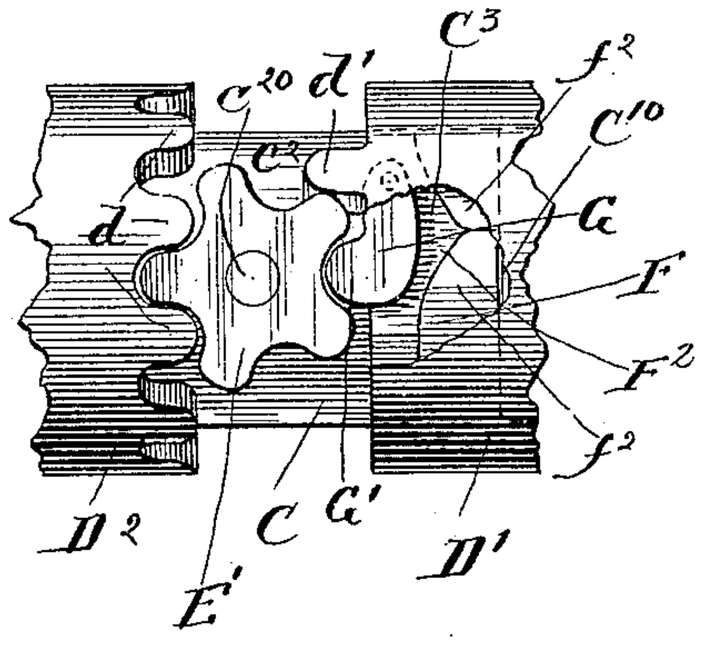


Fig. 9

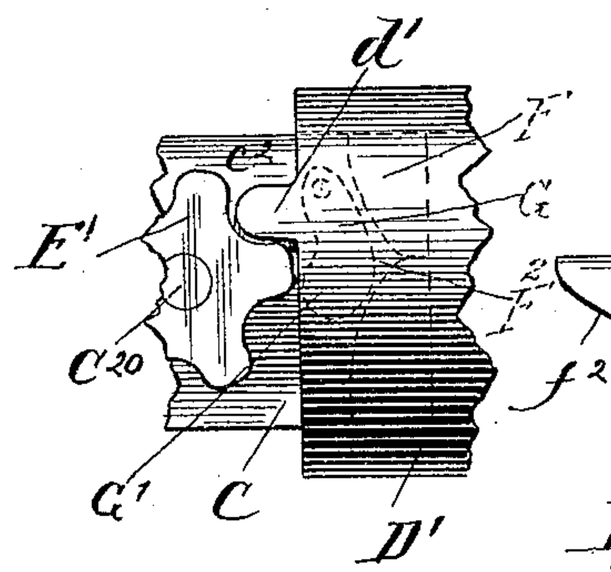


Fig. 10.

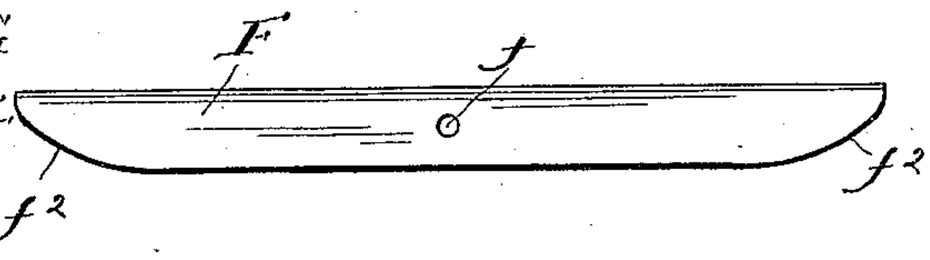


Fig. 12.

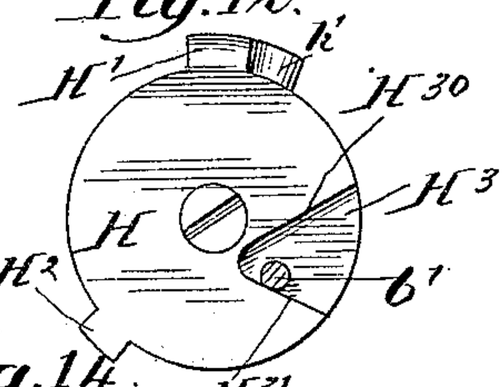


Fig. 13.

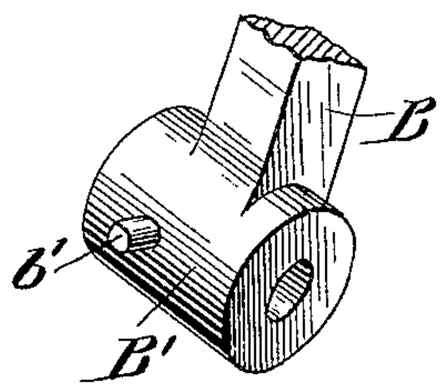


Fig. 11.

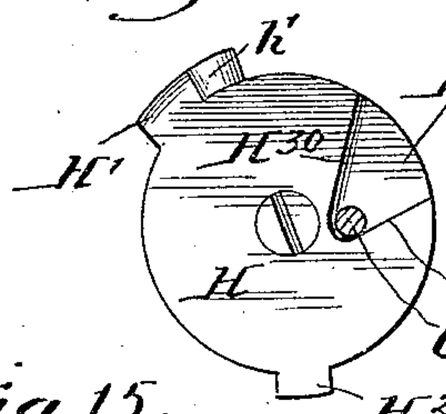


Fig. 14.

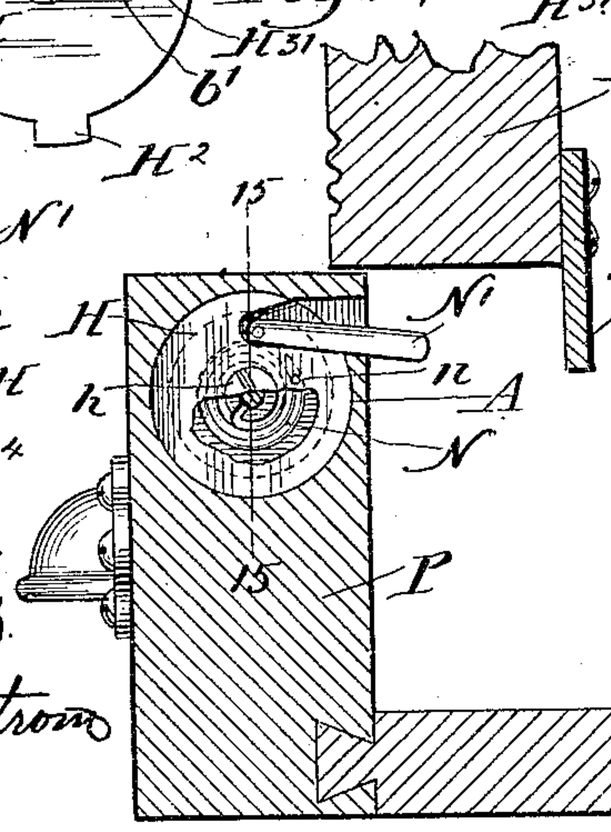


Fig. 15.

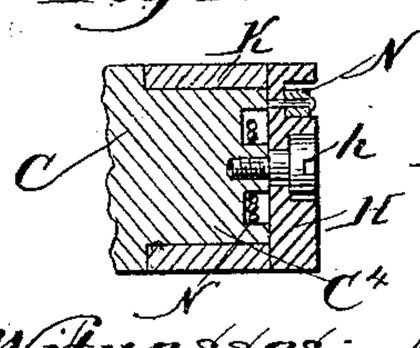
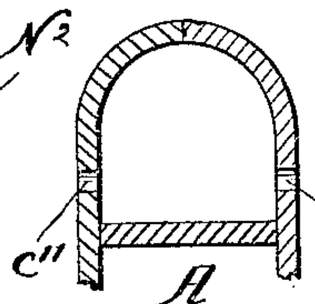


Fig. 16.



Witnesses:
Jean Elliott
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Inventor:
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By Burton & Burton
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UNITED STATES PATENT OFFICE.

JACOB LOEWENTHAL, OF CHICAGO, ILLINOIS.

REGISTERING-LOCK.

SPECIFICATION forming part of Letters Patent No. 405,105, dated June 11, 1889.

Application filed December 10, 1888. Serial No. 293,149. (No model.)

To all whom it may concern:

Be it known that I, JACOB LOEWENTHAL, a citizen of the United States, residing at Chicago, county of Cook, and State of Illinois, have invented certain new and useful Improvements in a Lock-Register, which are set forth in the following specification.

This invention relates to registering mechanism, and is especially designed to be applied to locks or locked receptacles to register the number of times the lock or receptacle is opened.

In the drawings, Figure 1 is a front elevation of a padlock containing my register. Fig. 2 is a plan of the registering mechanism, the adjacent portions of the lock-case being shown in section, as at the line 2 2 on Fig. 1. Fig. 3 is an axial section through the registering mechanism. Fig. 4 is an enlarged detail representation of the first registering-wheel and its immediate actuating mechanism, the parts being shown in the position which they occupy when the lock is closed. Fig. 5 is a similar view showing the same parts in position just after the opening of the hasp has been begun. Fig. 6 is a section at the line 6 6 on Fig. 4. Fig. 7 is a side elevation of the shaft upon which the registering-wheels are mounted. Fig. 8 is a plan of two adjacent registering-wheels and an intermediate pinion which communicates motion from one to the other, showing the locking device. Fig. 9 is a detail of the locking device in a different position from that shown in Fig. 8. Fig. 10 is a plan of a blank from which the locking-cam is formed. Fig. 11 is an elevation of a disk by means of which motion is primarily communicated to the register-train from the hasp, the actuating projection of the hasp being shown in section, the position being as when the lock is opened. Fig. 12 is a similar view, the relative position of the projection and disk being that which they occupy when the lock is closed. Fig. 13 is a detail perspective of the hub of the hasp, showing the register-actuating projection. Fig. 14 is a section through a drawer-head in which a slightly-modified form of the device is inserted, showing the registering device in end elevation, a portion of the case being broken away to show so much of the mechanism as is different from that illustrated in the former figures. Fig. 15 is a section through the registering mechanism at the line 15 15 on Fig. 14. Fig. 16 is a section through the padlock-case at the line 16 16 on Fig. 1.

I will first describe this mechanism as it is applied to a padlock.

A represents the padlock-case; B, the hasp, which is pivoted to it in the usual manner and position at *b*. The side walls of the case A are protruded somewhat farther than would be necessary for the ordinary purpose of the padlock, and they may be deflected inward so that they meet, and with the end wall A′ and the top wall make a complete inclosing-case for the registering mechanism. For convenience, this inclosing-case, as a whole, may be hereinafter referred to by the name "register-case."

The registering mechanism comprises the parts which are grouped about the shaft C. This shaft is designed to be inserted into the register-case from one end, and when applied to the padlock, as illustrated, it is inserted from the end at which the hasp is pivoted, so that when the hasp is inserted its hub B′ closes the case. The shaft C terminates at the farther end in a reduced bearing C′, which is lodged in a suitable socket in the end wall A′ of the case, and is made fast therein by the pin c', inserted through said end wall and shaft. The shaft is further secured by a pin c^{10}, inserted through the side walls of the case and piercing the shaft at c^{11}. (See Figs. 3 and 7.) The shaft is thereby rigidly secured in the register-case. Upon this shaft are mounted the registering-wheels D′ D′ and D^2, which are comparatively thin rings constituting crown-gears, which fit upon and rotate on the shaft C at the portions where it retains its full diameter. Said shaft is cut away adjacent to the location of each registering-wheel, as at C^2 C^2, a segment amounting in thickness to about half the diameter of the cylinder and in length to the diameter of the pinion E′, hereinafter described, being removed, and into the remaining portion of the cylinder, at the center of each flat face c^2 thus formed, there is inserted the stud C^{20}. Upon each of the studs C^{20} there is journaled a pinion E′, which mesh, respectively, with the adjacent crown-gears D′ D^2, and in similar relation to the first crown-gear D′, but somewhat

differently journaled, as hereinafter described, is the pinion E. Each of said crown-gears contains the continuous series of teeth d, and the gears D′ have at the opposite side from said teeth d a single tooth d', which is adapted to engage and actuate the adjacent pinion E′. Rotary motion being communicated to the first pinion E, which is journaled and actuated, as hereinafter described, it rotates the first crown-gear D′, which upon each complete rotation will, by means of its tooth d', rotate the pinion E′ the distance of one tooth, which in turn, engaging the next crown-gear D′, will rotate it one tooth. These crown-gears are each provided with ten teeth d, and thus it will result that ten complete rotations of the first crown-gear will be necessary to produce one rotation of the second, and the same ratio will obtain through consecutive gears throughout the series, however many. The periphery of each crown-gear bears a series of figures from 0 to 9, inclusive—one character for each tooth—and opposite the crown-gears one side wall of the register-case is apertured, as at a, to expose the figures successively as the wheels are rotated. The wheels being set at 0—*i. e.*, with the figures 0 exposed through all the apertures a—the number indicated by reading the figures successively from left to right will indicate the number of times the first pinion E has been actuated the distance of one cog. This indication would be corrected only in case no movement was ever given to any of the register-wheels except through the medium of the train in the manner described, and to prevent any other movement being communicated to them, as might otherwise be done by a tool inserted through the apertures a, I provide the locking mechanism, which I will now describe.

In the bearings of the crown-gears D′ D′ D^2 on the shaft C there are formed the annular grooves C^{10}, and in each of these grooves there is placed the annulus F, formed by first cutting the strip shown in Fig. 10 and bending it in the groove C^{10} until the ends meet, and said annulus is then secured to the crown-gear by means of a pin f' through the hole f. A portion of the bearing of each register-wheel is cut away at C^3, and on the flat surface thus formed there is pivoted the dog G, whose thickness is substantially equal to that of the annulus F, the plane at which the bearing is thus cut away being tangent to the bottom of the groove C^{10}. The annulus F has the indentation F^2, which is conveniently formed by shaping the ends f^2, although it might be formed elsewhere in the periphery, and this indentation causes the annulus F to act as a cam upon the dog G in the manner which will now be described.

While the crown-gear is rotated through nine-tenths of its circuit, the straight portion of the edge of the annulus F stops the dog G and holds it with its point G′ protruding laterally into one of the interstices between the cogs of the adjacent pinion and locks it fast; but at the instant that the tooth d' of the crown-gear reaches the pinion and is in contact with it and about to actuate it, the indentation F^2 in the annulus F reaches the locality of the dog, as appears in Fig. 8, and the dog is therefore free to be pushed back into the indentation as the pinion engaged by the tooth d' rotates and tends to crowd it back. The position when the tooth and pinion are thus engaged is shown in Fig. 9, the dog being shown in dotted line underneath the crown-gear. This indentation extends far enough to permit the tooth d' to rotate clear of the pinion, but before it is entirely clear the cam formed by the side f^2 of the indentation forces the dog out again, so that the pinion, before it is free from the tooth d', is engaged by the dog and again locked. Thus the pinion is never free to move except at the instant when it is being moved positively by the tooth d', and then is only free to move as it is moved by that tooth. This prevents any rotation of any of the register-wheels otherwise than as designed through the medium of the pinions, and so causes them each to register the number of complete rotations of the next preceding gear—*i. e.*, to advance one tooth only for each complete rotation of the preceding gear.

I will now describe the mechanism by which the first pinion is actuated.

The forward end of the shaft C is reduced in diameter at the portion C^4, and upon said reduced portion the cylinder K is journaled, and the pinion E is journaled upon the stud k, which protrudes radially from the outer surface of the cylinder K. The outer diameter of said cylinder K is equal to the inner diameter of the crown-gears D′, so that the pinion E, journaled as described, meshes properly with the crown-gear. The cylinder K is slotted circumferentially at K′, the angular extent of said slot being something more than thirty-six degrees, for a reason which will hereinafter appear, and a stud L, made fast in the shaft C, protrudes through said slot and projects beyond the surface of the cylinder K substantially to the level of the surface of the crown-gears. This stud L prevents the cylinder K from rotating on the shaft C more than the angular extent of the slot K′. At the center of the forward end of the shaft C the disk H is journaled on the shoulder of the screw h, which is screwed fast into said shaft. This disk has a finger H′, which is folded over longitudinally with respect to the shaft upon the outer surface of the cylinder K. Said finger has a tooth h', which is of proper shape, and is in proper position to mesh into the pinion E′, as seen in Fig. 2. Into the cylinder K there is rigidly inserted the stud k', which is located at such distance from the pinion E′ that when the straight edge of the finger H′ rests against it the tooth h' is clear of the pinion E. Upon the protruding end of the stud L there is piv-

oted the dog M, which has the tooth M′, adapted to engage with and lock the first register-wheel D′, and into the cylinder K, near its forward edge, there is inserted rigidly the stud k^2, on the opposite side of the pinion from the stud k'. The stud k^2 is adapted to collide with the end of the dog M opposite to that which has the tooth M′, and in so doing to force the dog into engagement with the register-wheel, as seen in Fig. 4. When the dog is thus engaged with the register-wheel, the edge m of the dog M opposite the tooth M′ stands in the plane of the forward end of the cylinder K. The disk H has beside the finger H′ a projecting portion H^2, which extends radially beyond the outer surface of the cylinder K, and at such angular distance from the finger H′ that when said finger is standing against the stud k' said projection H^2 stands adjacent to and abutting laterally against the edge m of the dog, so that in that position the said projection H^2 locks the dog to prevent its turning, and to prevent its tooth M′ becoming disengaged from the register-wheel. Said projection H^2, however, laps past and abuts the dog only so far that when the tooth h' is meshed with the pinion E the projection H^2 is clear of the dog.

The operation of this construction is as follows: The parts being shown in the position shown in Fig. 5, the projection H^2 locks the dog M in its engagement with the register-wheel. The disk H, being rocked on its pivot-screw h, first carries the finger H′ into mesh with the pinion E and simultaneously carries the projection H^2 clear of the dog M. The disk H being further rocked, the cylinder K is rotated by reason of the engagement of the finger H′ with the pinion E, which, by reason of the tooth h', cannot rotate on the stud-axle, by which it is secured to the cylinder, and said pinion and cylinder thus rotating, the pinion being in engagement with the register-wheel, rotates it also an angular distance of one tooth—that is, until the cylinder K is stopped by the stud L reaching the end of the slot K′. This position is shown in Fig. 4. The rotation of the cylinder K would be stopped also by the collision of the stud k^2 with the forward end of the dog M, which causes it to rock the dog into engagement with the register-wheel, as also seen in Fig. 4. No further movement of the parts can occur, except upon the reversal of the movement of the disk H. When this occurs, the finger H′ is first withdrawn from engagement with the pinion E, and simultaneously the projection H^2 moves up alongside of the edge m of the dog M and locks it as before. Continuing the reverse movement, the finger H′, having now collided with the stud k', carries with it in reverse direction the cylinder K, and the pinion E, mounted thereon, rotates on its stud-axle by reason of its engagement with the register-wheel, which cannot rotate on account of the dog M locking it to the shaft C, to which said dog is pivoted on the stud L. The reverse movement may therefore continue until the stud L reaches the limit of the slot K′ in the cylinder, and the parts are then in the initial position shown in Fig. 5.

The rocking movement described alternately in opposite directions is communicated to the disk H by means of the following mechanism. Said disk H has formed in its forward face the cam-recess H^3, and from the hub B′ of the hasp the stud b' projects into said recess H^3. When the parts shown in Fig. 5 are in the position therein illustrated, the stud b' stands in said recess in the position shown in Fig. 12, and in this position the hasp projects into the lock, as when the lock is closed and locked. The lock being supposedly unlocked and the hasp freed and rocked on its pivot to withdraw its point from the lock, the stud b', moving upward across the recess H^3, first collides with the cam-track H^{30}, and as the opening movement of the hasp continues the said stud, engaging said cam-track, rotates the disk until the stud reaches the position shown in Fig. 11, wherein the cam-track stands vertical—*i. e.*, parallel to the plane of movement of the hasp. This amount of movement is calculated to be only sufficient to bring the point of the hasp out of the lock, but not sufficient to leave an interval so that the padlock could be removed from the securing-staple. If the opening movement continues, the stud b' continues to move upward along the cam-track H^{30} without further actuating the disk H; but whether further opened or not, when a reverse movement is given it to carry the point down again into the lock, the stud, engaging the cam-track H^{31}, rotates the disk H in a reverse direction until the point of the hasp is carried home into the lock, and the position of the parts is again as shown in Fig. 12. Thus the opening and closing movement of the hasp through so much of its course as is necessary to withdraw the point of the hasp from the lock and reinsert it therein produces the rocking movement of the disk H, which is necessary for the actuation of the registering mechanism in the manner described. This registering mechanism may be applied to register the number of times any receptacle is opened and closed without regard to the presence or absence of a lock in connection with such receptacle, and when thus applied the device for giving the rocking movement to the disk H may be modified, as shown in Figs. 14 and 15, wherein the device is applied to a drawer, being inserted in the head P of such drawer, and in that instance mounted in an independent cylindrical case A, which is merely a substitute for the register-case formed by the walls of the padlock in the above-described construction. In this modified construction the cam-recess H^3 is dispensed with, and the disk H is connected to the shaft by a spiral spring N, which tends to resist rotary motion of the disk in one direction and retract it if it is so rotated. To

the face of the disk there is pivoted the link N′, which protrudes from the register-case and from the drawer-head inward. Any suitable stop—as the projection N^2—may be provided on the cabinet-front P′, so that when the drawer-head is moved shut the collision of the protruding end of the link N′ with said stop causing said link to recede into the register-case causes it to give rotary rocking movement to the disk H, and when the said part having the receptacle is withdrawn the spring N, reacting, reverses said rotary rocking movement, thus producing the action of the registering mechanism in the same manner as when said movement of the disk is caused by the rocking movement of the hasp in the instance of the padlock.

I claim—

1. In a register, in combination with a register-case, a shaft fixed rigidly in said case, a plurality of crown-gears constituting register-wheels journaled on said shaft and having the register-characters on their peripheries, such crown-gears being continuously cogged upon one edge, and each, except the last, having a single cog upon the opposite edge, a pinion intermediate each two consecutive gears having its axis fixed with respect to the shaft and meshing with the continuously-cogged rim of one gear, and adapted to be engaged by the single cog of the other, a dog associated with each of the crown-gears which have the single tooth, and having its pivot fixed with respect to the shaft, said dog being adapted to engage the pinion, and a cam actuated by the crown-gear and controlling the dog to protrude it into engagement with the pinion, except when the single tooth of the crown-gear engages the pinion, substantially as set forth.

2. In a register, in combination with a register-case, a shaft fixed rigidly in said case, a plurality of crown-gears constituting register-wheels journaled on said shaft and having the register-characters on their peripheries, such crown-gears being continuously cogged upon one edge, and each, except the last, having a single cog upon the opposite edge, a pinion intermediate each two consecutive gears, having its axis fixed with respect to said shaft and meshing with the continuously-cogged rim of one gear, and adapted to be engaged by the single cog of the other, a dog associated with each of the crown-gears which have the single tooth and pivoted upon the shaft, and located between the shaft and the crown-gear with which it is associated, and having one end adapted to engage the pinion, and the cam actuated by the crown-gear and controlling the dog to protrude it into engagement with the pinion, except where the single tooth of the crown-gear engages said pinion, substantially as set forth.

3. In a registering mechanism, in combination with a fixed shaft and crown-gear, registering-wheels journaled thereon, intermediate pinions communicating motion from each crown-gear to the succeeding one, a dog associated with each gear to lock the pinion which such gear actuates, a cam, which controls said dog, located interiorly to the crown-gear and secured thereto, and a groove in the bearing of said crown-gear to receive the cam, whereby such cam serves the double purpose of controlling the pinion and securing the crown-gear in proper position longitudinally with respect to the shaft, substantially as set forth.

4. In a registering mechanism, in combination with the fixed shaft and the plurality of registering-wheels thereon, an annulus journaled on the shaft forward of the first register-wheel, a pinion journaled on such annulus, and a disk suitably pivoted, having a finger H′ adapted to lock the pinion, the annulus having a stop to arrest the pinion-locking finger after it has withdrawn from the pinion, whereby such finger upon being rocked toward the pinion locks the same, and thereafter, by means thereof, rotates the annulus and first register-wheel, and upon being rocked in the reverse direction releases the the pinion, and afterward, colliding with the stop, rotates the annulus while the pinion is rotated on its own axis by its engagement with the register-wheel without rotating the latter, substantially as set forth.

5. In a registering mechanism, in combination with the fixed shaft and plurality of registering-wheels thereon, an annulus on the shaft forward of the first register-wheel, a pinion journaled thereon and meshing with the first register-wheel, a stop projecting from the annulus at a short distance from the pinion in one direction, a dog having its pivot fixed with respect to the shaft and adapted to engage the register-wheel, a stop on the annulus to engage the dog and force it into engagement with the register-wheel, and a suitably-pivoted disk having a finger adapted to lock the pinion when rocked in one direction, and to collide with the first-mentioned stop when rocked in the other direction out of engagement with the pinion, the stop which engages said dog being so located as to collide therewith when the finger has been rocked after locking the pinion an angular distance equal to the angular distance between two consecutive teeth on the register-wheel, all substantially as and for the purpose set forth.

6. In combination, substantially as set forth, the fixed shaft, the plurality of register-wheels thereon, the annulus K on the shaft forward of the first register-wheel having the stops k' and k^2 protruding therefrom, the pinion E′, journaled on said annulus between said stops and meshing with the register-wheel, the disk H, pivoted on the shaft and having the finger H′ protruding between the pinion and the stop k', and adapted to lock the pinion, and having the radial projection H^2, and the dog M, having its pivot fixed with respect to the shaft and adapted at one end to engage the register-wheel and at the other to

be engaged by the stud k^2, and having the edge m in the plane of the surface of the disk H when the dog is engaged with the register-wheel, the projection M^2 being so located on the disk H that it laps and abuts against the edge m when the finger H is against the stop k', and is clear of the dog M when said finger is meshed with the pinion.

7. In combination with a padlock, a registering mechanism comprising a plurality of register-wheels on a common shaft, and mechanism which communicates the rotary motion of each wheel to the next succeeding, such shaft having its axis at right angles to the pivot of said hasp, the disk H, pivoted at the end of the shaft and operating the registering mechanism and having the cam-recess H^3, and the hub of the hasp having the projection h', engaging in said cam-recess, substantially as described, whereby it rocks the disk back and forth as the hasp is opened and closed, substantially as set forth.

In testimony whereof I have hereunto set my hand in the presence of two witnesses.

JACOB LOEWENTHAL.

Witnesses:

JEAN ELLIOTT,

CHAS. S. BURTON.