

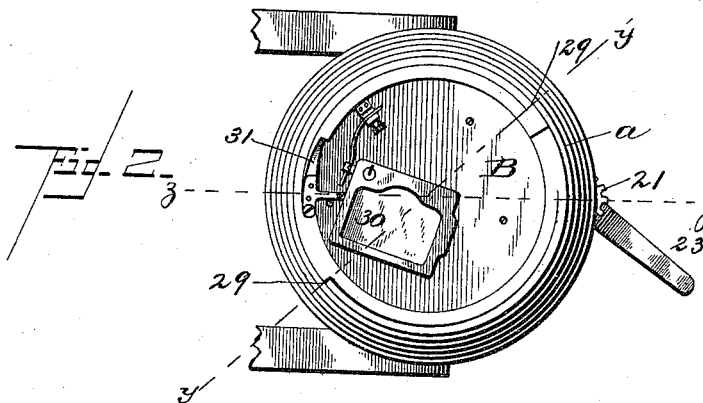
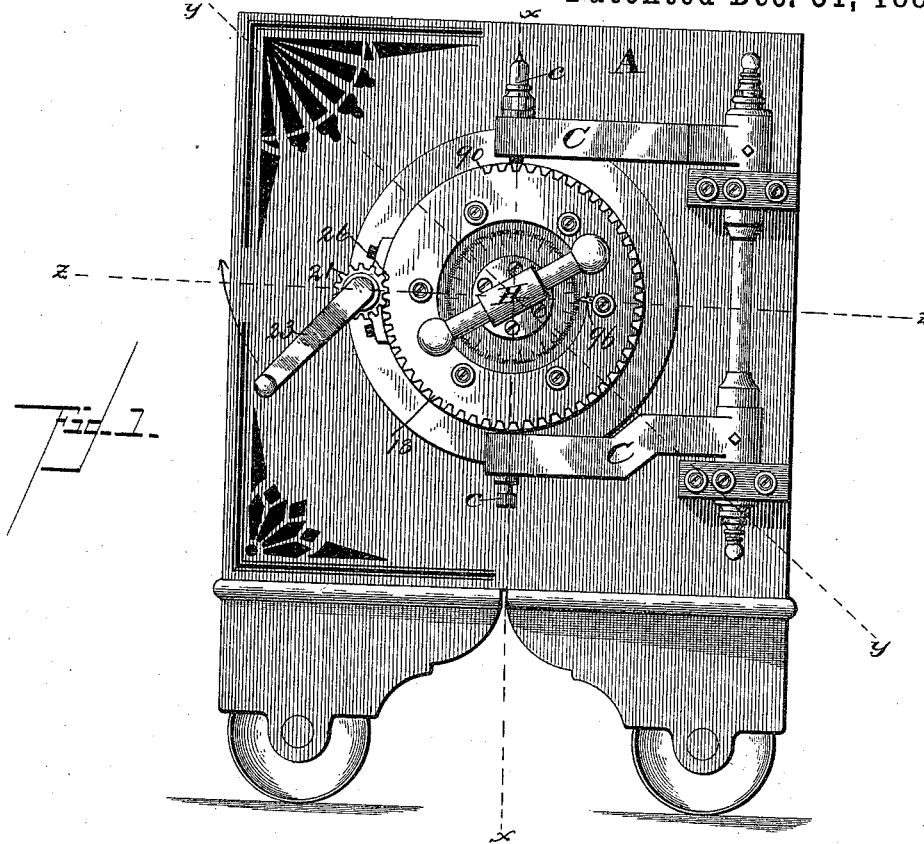
(No Model.)

3 Sheets—Sheet 1.

P. F. KING.
SAFE.

No. 418,619.

Patented Dec. 31, 1889.



WITNESSES

Frauck L. Curand
John Enders

INVENTOR

Phineas F. King.
By Higdon & Higdon
his Attorneys.

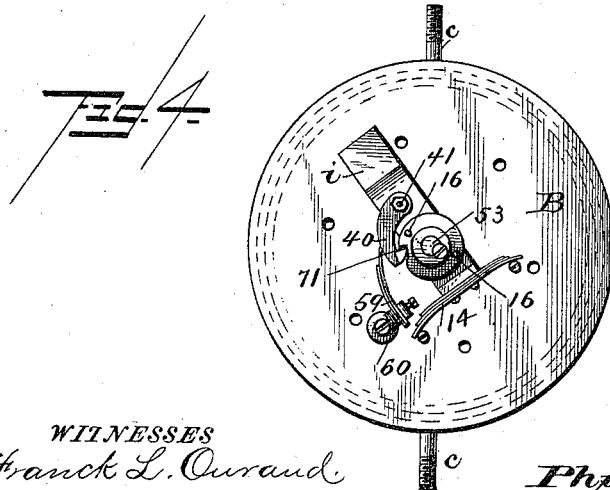
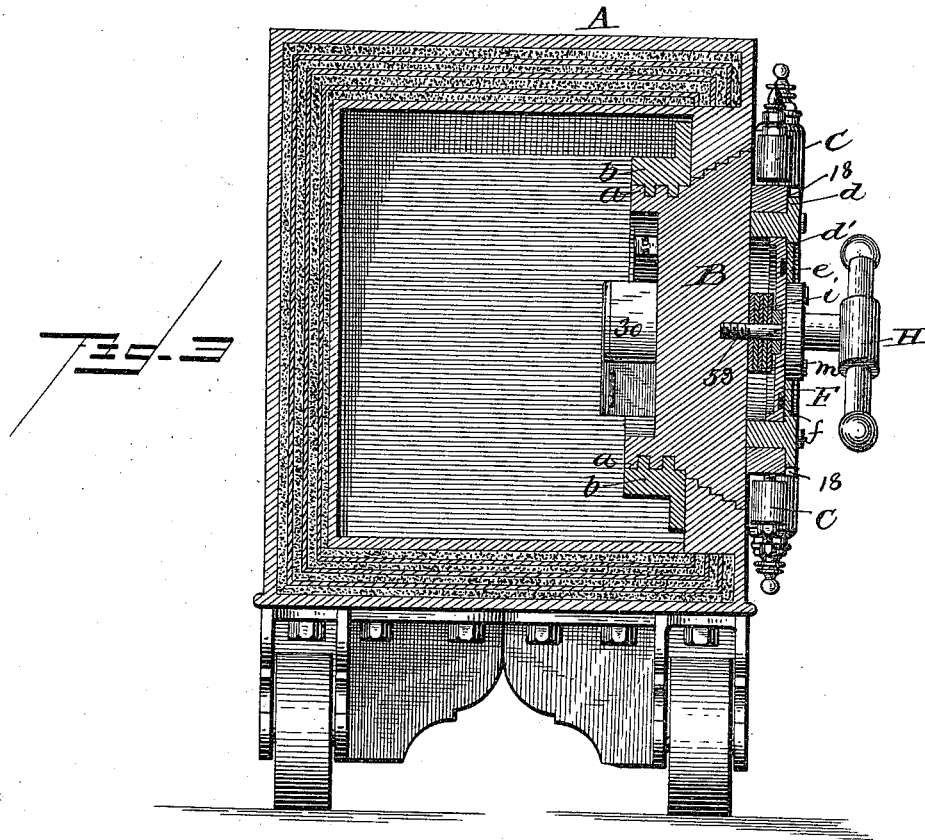
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3 Sheets—Sheet 2.

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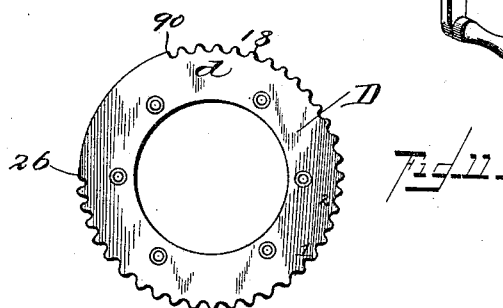
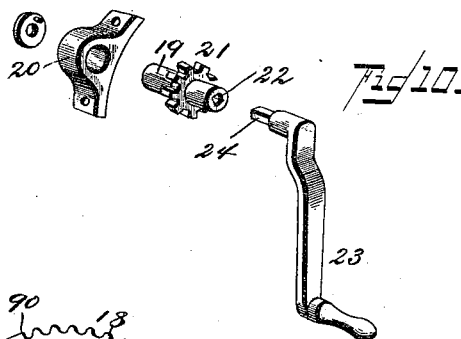
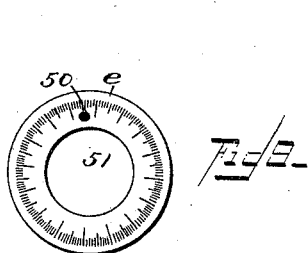
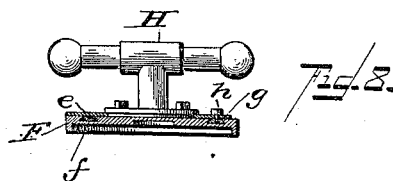
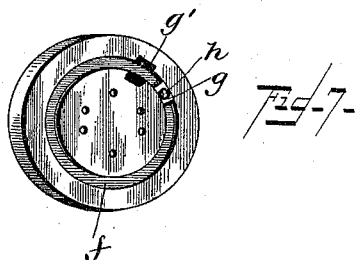
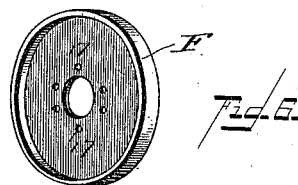
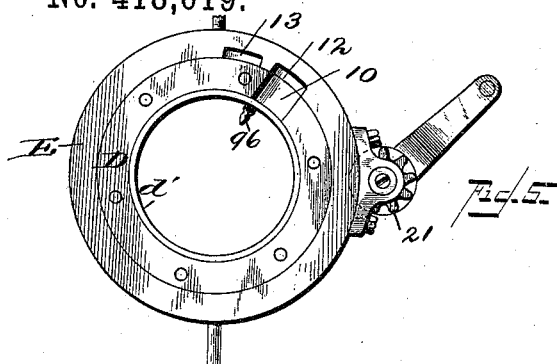
(No Model.)

3 Sheets—Sheet 3.

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WITNESSES
Frank L. Curand
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UNITED STATES PATENT OFFICE.

PHINEAS F. KING, OF CINCINNATI, OHIO, ASSIGNOR TO MOSES MOSLER, OF SAME PLACE.

SAFE.

SPECIFICATION forming part of Letters Patent No. 418,619, dated December 31, 1889.

Application filed November 30, 1889. Serial No. 332,128. (No model.)

To all whom it may concern:

Be it known that I, PHINEAS F. KING, of Cincinnati, Hamilton county, Ohio, have invented certain new and useful Improvements in Screw-Door Safes, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part hereof.

My invention relates to improvements upon the safe shown in my United States patent, No. 405,564, of June 18, 1889, the same being of that class of burglar-proof safes commonly known as "screw-door;" and it consists of the devices and the novel combination and relative arrangement of devices hereinafter set forth, and pointed out in the annexed claims.

In the drawings, Figure 1 is a front view of a safe having my improvements applied thereto. Fig. 2 is an inside plan view of the door disconnected from the safe. Fig. 3 is a vertical section on line *xx* of Fig. 1. Fig. 4 is a face view of the door having the outer door-carrying rings removed therefrom. Fig. 5 is an inside view of the door-carrying rings. Fig. 6 is a detail view in perspective of a tumbler-operating and dial-carrying plate used in making up the invention, the inner side of the same being shown. Fig. 7 is an exterior view of same, also in perspective. Fig. 8 is a sectional view of same plate, having other devices in position upon its outer surface. Fig. 9 is a face view of the dial used with the permutation devices. Fig. 10 is a detached view of a removable hand-crank and its mountings used in the process of making up the invention, and Fig. 11 is a detail view of the inner door-carrying ring detached from the other parts.

Before proceeding to the general description of my improvements, I desire to state that the whole of them (except the time-lock connection) are mounted upon and connected to the outside of the circular door.

A is the safe-body, with its circular front opening to receive the door B, and said safe-body, with the crane-hinge C, forms no part of the invention. It is sufficient to state that the door is revolved bodily, and is drawn into the position shown in Fig. 3 by a double screw-thread *a* upon the inner end of the door engaging like threads in the ring *b*,

which latter is secured upon the inside of the front wall of the safe, the door being held from turning back and out by a permutation-lock located in a recess upon the front of the door, as will be explained farther on, and also by the dogging-bolt 31 of a time-lock 30, which latter is secured in a suitable manner upon the inner end of the door.

Secured to the front of the door, so as really to form an integral part of it, is an inner door-carrying ring D, which has an outwardly-projecting flange *d* to confine an outer door-carrying ring E, which is fitted to allow the door B and ring D to turn freely, while said ring E is rigidly held from turning by the pintles or pivots *c*, which are passed through the arms of the crane-hinge and into the edge of the ring E at points opposite each other. The ring D has also an inwardly-projecting annular flange *d'* to confine the circular tumbler-operating and dial-carrying plate or disk F, which is fitted to turn freely within the ring just mentioned.

Upon the front of the plate F an adjustable dial *e* is mounted in the following manner, viz: In the outer face of said plate an annular dovetailed groove *f* is formed, and in the same a correspondingly-shaped nut (the groove being of dovetail form in cross-section, and the nut also of such form in cross-section) *g* is adapted to loosely slide (except when locked to proper place by a set-screw *h*) in changing what is commonly known as the "combination." An enlargement or recess *g'*, cut inwardly through the outer face of said plate into and corresponding in depth to groove *f*, permits the placement of nut *g* in the groove and its withdrawal therefrom, should this latter operation at any time be necessary, said recess or enlargement being of sufficient size to permit the nut to be so placed and displaced. (See Fig. 7.) Said nut *g* is threaded as nuts usually are, and the screw *h* is adapted to be passed through an aperture 50 in the dial *e* and engage the nut, and thereby lock the said dial adjustably to the plate F, so that its position with respect to the tumblers of the lock may be varied for the purpose just above mentioned. Said dial has a central circular opening for the purpose of permitting the base of the

lock-handle H to be rigidly mounted and secured directly upon the outer face of plate F, which is done, and said lock-handle is so mounted and secured, and thereupon forms what is termed in ordinary permutation-locks a "knob" for the purpose of manipulating the tumblers of such locks; but in the present case said handle not only serves in the capacity of a knob, but it is also made use of (by turning at proper time) to retract the bolt of the permutation-lock, as will now be described.

Upon the outer face of door B (see Fig. 4) are mounted the lock-bolt *i* and a series of tumblers *m*, which latter are of the ordinary form, having a peripheral notch or recess 71, with the exception that they are made of larger size than usual, they having, in addition to their usual function, to act as connections between the handle and the lock-bolt to retract the latter against the force of a comparatively powerful spring, as in this lock mechanism the tumbler and bolt works are very compact and are one piece of mechanism. Said series of tumblers are mounted upon a screw or pintle 53, which is screwed into the outer face of the door, and said lock-bolt being located between the innermost tumbler of the series and said face of the door. The outermost tumbler has a pair of pins or projections 16 located upon its outer surface in diametrically opposite positions, (but there may be only one pin,) and the plate F is provided with correspondingly-located holes 17, into which these pins project when the plate is in proper position, thereby coupling said plate removably to the outermost tumbler before mentioned and enabling the entire series of tumblers to be manipulated by the handle H. A hooked dog 40 has a hook at one end for engaging the tumblers, and is pivoted at the opposite end to the bolt *i* at 41, so that by the rotation of the handle H first one way and then the other in the well-known manner the hooked dog will ultimately engage the notch of each tumbler of the series and permit the retraction of the bolt by a further rotation of said handle, as will be further explained.

A suitable spring 59 is secured to the outer face of the door by means of a stud or bracket-piece 60, fixed thereon, so as to exert pressure upon the hooked end of dog 40 and normally (and at all times, for that matter) hold the same in engagement with the outer periphery of the series of tumblers. This dog may therefore be termed a "spring-pressed" dog or hook.

In the inner face, but at only one side, of the ring D is a guiding groove or slot 10 for the free outer end of the bolt *i*, and in which the same rests at all times, and upon or in the corresponding face of ring E, but extending only a portion of the distance across such face, I provide two recesses to be engaged by the bolt when the same is shot out. The first of these recesses 12, I may term the

"day" recess, into which the bolt automatically shoots during the operation of locking the safe temporarily during business hours. As is well known, safes have often to be so locked, so that it may be conveniently and speedily opened by merely manipulating the permutation devices before referred to, while the second recess 13 is provided for the purpose of permanently locking the safe after business hours are over, and which recess I therefore term the permanent or "time" recess. It should be stated here that by thus providing and combining these recesses it will not be necessary to screw the door into the safe-body so far and so firmly when simply locking up for a few hours or a comparatively short period of time as is necessary for the more secure "burglar-proof" locking operation usually gone through with after business hours, when the door is screwed very firmly into place and secured by the bolt *i* engaging the recess 13, and also secured by the time-lock mechanism at the inner end of the door, as in this manner the safe may be doubly locked. By thus lightly screwing the door to place it may be the more easily and quickly unscrewed, while by thus firmly screwing the same into position much greater security is effected, as the joints are made proof against the insertion therein of liquid or other forms of explosives.

A spring 14, of flat or other suitable form, is secured to the inner end of bolt *i*, so as to bear against two lugs located on the door and normally urge the said bolt outward and hold the same in engagement with one or either of the locking-recesses above referred to. Said bolt is sufficiently long when shot out to pass beyond the outer periphery of ring D and engage said recesses. The pressure of the spring 14 is exerted to press the bolt outwardly, and thus couple the rings D and E (and of course the door) firmly together when the safe is locked, as will be readily seen. The outer periphery, or rather the flange *d* of ring D, is in the form of a segmental gear-wheel—that is, it is provided with a series of teeth or is toothed upon a portion of its outer periphery, the teeth being indicated by the number 18.

In mentioning the teeth or flange *d* hereinafter I shall refer to the same as ring D, as the said flange is really a part of said ring.

A toothed pinion 21 is rigidly mounted upon a short shaft 19, and this in turn is journaled in a bearing-box 20, bolted to one edge of ring E at the side of the same which is opposite the crane-hinge, so that the teeth of said pinion will mesh with the teeth of said segmental gear, forming a portion of the inner ring D. The teeth of ring D are not cut entirely around its periphery, and the particular points at which they begin and end are predetermined to accord with the relative position of the point in the revolution of the door at which the threads of the same will begin to engage the threads of the safe-body

and with the particular point at which the bolt *i* will shoot into the time recess 13. The beginning and ending of the screwing operation being predetermined, it will be seen that it is impossible for the recess to slip by the bolt—an inconvenience now experienced by users of screw-door safes. Thus it will be seen that a co-operation or combination clearly exists between this door-rotating gear and the bolt-operating mechanism.

Heretofore, as is well known in this class of safes, considerable difficulty has been experienced in endeavoring to make the threads "start" or engage each other, and much time was lost in some cases, or else the threads were often disfigured by hasty action on the part of the operator. To overcome these difficulties is the object of my improved gearing, and I find that after several months' use, by placing numbers upon the market and giving them a thorough test at the hands of ordinary operators, as I have done, such object has been achieved in a very satisfactory and commendable manner by this gearing. A blank space is left in the outer edge of the ring D, beginning at such a predetermined point (when the door is closed, as in Fig. 1) that the teeth of pinion 21 will abut against a stop or shoulder 26 (which is preferably formed by omitting the teeth, as above stated, but which may be provided in any known manner) and be firmly stopped and held from further rotation in the direction indicated by the arrow, and thereby hold the door at just the proper point in its rotation as will bring the starting-points 29 of the threads on the door and on the safe-body in proper relative position to engage each other quickly, which they will then do upon the rotation of the door in an opposite or proper direction. In Figs. 1 and 2 the dotted lines *y y* and *z z* indicate the relative location of these particular points. It is self-evident that without this construction the difficulty before referred to will be experienced by the operator in bringing and holding these particular points into the proper relative positions, and that by such construction all such difficulties may be effectually avoided, particularly so in the case of safes having large and unwieldy doors with the usual form of cross-handle, such as is shown in my patent named at the beginning of this specification. Further, such construction avoids all possibility of marring or bruising the threads of the door and safe, as has heretofore often occurred in endeavoring to start the door in its spiral forward movement into the safe-body without first carefully and quite laboriously determining the exact starting-point, all of which is well known to users of this class of safes.

My door-gearing is further provided with a removable hand-crank 23, constructed as follows: The outer end of shaft 19 is made into a socket-piece, and a squared socket 22 is therein formed for the loose reception of a correspondingly-squared shank 24 of the hand-crank, and which latter is adapted to be in-

serted in said socket when the door is to be rotated and removed therefrom when such operation has been completed, thus removing a considerable projection from the front of the safe, and also improving its finished and attractive appearance, facilitating shipment, storage, &c. A stop 90 is also formed in the ring D, as above mentioned, (by omitting the teeth,) which is to be engaged by the pinion 21 when the point in the rotation of the door at which the bolt *i* shoots into the time-recess 13 is reached. It will thus be observed and noted that I provide a door having an unbroken front plate that is devoid of passages for spindles, &c., that the door has an outwardly-open recess or chamber upon its outer face, that a permutation-lock and locking-bolt are located in such recess or chamber upon the exterior of the door, that this lock and locking-bolt revolve with the door as the same is rotated, but that the lock-handle and tumblers rotate independently of the door during the manipulation of the tumblers, as in unlocking the safe and locking it. The dial of the lock is revoluble with the lock handle and tumblers, while the pointer or mark 96 is fixed or non-revoluble with the ring D. The door is, however, only partially revoluble, as will be seen, as by use of the double threads provided by me the screw-connection with the safe-body is made possible with only about three-fourths of a revolution of the door. The advantages of such construction are facility of connection and disconnection, compactness, the parts being arranged very close together, and therefore they occupy a comparatively small amount of room in a vault or other location, and, lastly, as near absolute burglar-proofness as can be approximated, the same being evidenced by the fact that it has been found impossible to open the safe in the shops when inadvertently locked without the exercise of a vast amount of manual labor and the almost total disfigurement of the safe.

The time-lock 30, which may be of any usual construction, is secured upon the inner end of the door B, so that its dogging device may engage a suitable shoulder or stop of the safe-body in the manner heretofore and at present employed by me.

The operation is as follows: The combination of the permutation-lock having first been ascertained, (it may be in the shops,) and the dial *e* having been properly adjusted upon the plate F by means of the set-screw *h*, the operator first sees that the time-lock 30 is properly adjusted and in order. Then he turns the hand-crank in the direction indicated by the arrow in Fig. 1 until the teeth of the pinion are abutted by the stop 26, when he will find that the said crank can be revolved no farther in that direction. The door should now be swung toward the closing position, (or it may have been so swung before the first operation,) and it will now stand and be held in proper relative position to be

quickly screwed into connection with the safe-body. Then, in order to screw the door into the safe-body, the direction in which the crank was turned is to be reversed and the same revolved a few times until the bolt *i* shoots into the first recess 12 in ring E, unless it is desired to lock the safe more securely or for a predetermined length of time by means of both permutation and time locks. If so, the first recess 12 reached by the bolt *i* is passed by by holding the bolt back against the power of spring 14, which is accomplished by means of handle H and its connections before described, and as the movement of the door continues the bolt will reach and shoot automatically into the second or time recess 13, when, lastly, the said lock-handle should be turned a number of times to the right or left (according to the number of tumblers in the series used) for the purpose of disturbing the alignment of the notches in said tumblers, when the hooked dog 40 will rest upon the peripheries of the tumblers, and they (the tumblers) may then be turned an innumerable number of times by a person unfamiliar with the combination without retracting the locking-bolt *i*, as will be readily understood. The operation of the time-lock is so well understood that it need not be referred to further. In opening the safe, after the time-lock has withdrawn its dogging device, (or it may be the time-lock has been adjusted for inoperativeness,) the lock-handle H is manipulated by first turning in one direction and then in the other until the series of tumblers have been brought into proper relative position to permit the retraction of bolt *i*. Then said bolt is retracted, as before stated, and the square shank 24 of crank 23 is replaced in engagement with socket 22 of shaft 19, (if it has been previously removed,) and then said crank is to be turned in the direction of the arrow until the door is screwed out of the safe-body, when it may be at once swung open and around upon the pivots *c*. Thus it will be seen that my permutation mechanism is located wholly upon the outside of the door, rendering entirely unnecessary any opening whatever through the same, said mechanism being completely located within the chamber or recess formed by the ring D upon the outer surface of the door.

The lock-handle H is made quite short and light in contradistinction to the handle shown in my patent before referred to and to all such large and unwieldy handles as are used for the purpose of turning screw-doors, my handle here shown being used solely for the purpose of manipulating the tumblers and bolt of the permutation-lock. In fact, the handle H cannot possibly be used to revolve the door, because of its peculiar connection with the door. It is simply a lock-handle having no connection with the door, which could be used to revolve or rotate the latter.

It should be evident that the above-de-

scribed door-gearing and lock mechanism are so combined and adapted to co-operate that the operations of closing, opening, locking, and unlocking the door and the safe by both permutation and time locks are rendered very convenient and precise.

I am aware that a pinion and gear have been heretofore applied to a safe-door for the purpose of sliding a certain form of door on and off the body of a safe, also to slide a non-rotative door on and off the body of a rectangular safe, such construction being shown in the United States Patent No. 391,041; but in such construction the gear-wheel in the first-mentioned case is not mounted upon the door, but is in the form of a "sliding toothed ring," embracing and being mounted directly upon the body of the safe in rear of the door and slides thereon as the door is screwed on and off, which is apparently a very different arrangement from that illustrated in the annexed drawings and claimed by me.

It has been explained that my gear-wheel is in the form of a flanged ring D, forming a portion of the outer surface of the door and being mounted directly thereon and having no "sliding" connection whatever with the safe-body. In the second case (also Patent No. 391,041) the door there shown is non-rotative, being hinged by an ordinary hinge to one side of the body of the safe, and a "jack-screw" gearing is made use of for "jacking" the door out of sliding connection with the safe. The door proper does not revolve, and therefore the construction may readily be distinguished from that which I show and claim, and which is an improved screw-door constructed to be revolved bodily during the operation of connection and disconnection with the safe-body. The differences are so apparent that further comment upon them is thought to be unnecessary and will not be made.

I am further aware of United States Patent No. 183,192, the same showing a pinion and gear that is mounted upon the outer face of a screwless door for the simple purpose of actuating bolt-work and permutation mechanism, which is all mounted upon the inner end of said door; but in this patent the door is devoid of screw-threads and must be revolved bodily simply to operate the lock and bolt-work, the crane-hinge being also located upon the interior of the safe. Such construction is necessarily different from that herein described by me, as are also its operation and the results produced by such operation. Its door is entirely devoid of a screw-fastening, and therefore cannot well be termed a "screw-door." It is devoid of the lock chamber or recess upon its outer surface and of many other improvements herein embodied and shown by me, as should be clearly apparent.

I make no claim to the construction exhibited in the above patents, or to other prior devices which are known to the public at large; but, on the other hand, I do not desire

to limit myself to the exact details of the locking mechanism which I here show, as it is obvious that many small changes, such as would suggest themselves to a mechanic skilled in the art, may be made without departing from the legitimate scope of my invention. For instance, the particular relative location of the blank space on the flange *d* of the ring D and the recess or recesses in the non-revoluble ring E for the reception of the lock-bolt may be changed, as may also the relative position of said blank space and the starting-points of the threads on the door and safe-body.

15 Having thus described my invention, what I claim is—

1. The screw-door of a safe constructed with a screw-thread upon its inner end for engaging a corresponding thread upon the safe-body, a permutation-lock located upon the front face of said door, and a gear-wheel having a portion of its teeth omitted for limiting the rotative movement of the door, and a pinion for operating said gear-wheel, substantially as hereinbefore specified.

2. The screw-door of a safe having a double screw-thread *a* upon its inner end for engaging a like thread upon the safe-body, in combination with the ring D, fixed upon the outer face of said door so as to form a lock-receiving recess thereon, and said ring provided with gear-teeth upon its outer periphery and a stop, and having a bolt-guiding slot formed at a predetermined point in one edge, an outer, non-rotative ring E, which embraces and supports the inner ring and to which the hinge is applied, a pinion 21, mounted upon said outer ring, so that its teeth will mesh with the teeth of said inner ring, and said outer ring having a locking-recess 12, for reception of the bolt of the lock, a lock having a bolt and mounted in the recess upon the outer face of the door, so that its bolt may engage said locking-recess in the outer ring, and means, substantially as described, for shooting and retracting the bolt of the lock.

3. The screw-door of a safe having suitable screw-threads upon its inner end, in combination with means for imparting a partial or rocking movement thereto—such as a pinion and gear-wheel having a stop, as herein described—a ring D, fixed upon the outer face of said door, so as to form a portion thereof, and having a bolt-guiding slot formed therein at a predetermined point, another ring having a locking-recess for the reception of said bolt and locking the door against rotative movement when the same is to be so locked for a temporary purpose, and said last-named ring having an additional or second recess, into which the bolt of the lock is to be shot after the door has been rotated to the limit of its inward movement, a lock having a bolt, and means, substantially as described, for shooting and retracting the bolt of the lock.

4. The screw-door of a safe having a screw or pintle centrally mounted upon its outer face and a series of permutation-disks or tumblers journaled to rotate upon this screw or pintle, in combination with a spring-pressed dog and a handle for manipulating these tumblers and bolt, substantially as hereinbefore specified.

5. The screw-door of a safe having a screw or pintle 53, centrally mounted upon its outer face, and a series of circular tumblers *m*, journaled on this pintle, in combination with a lock-bolt *z*, also mounted on the outer face of said door between said series of tumblers and said outer door-face, a spring 14, which normally urges said lock-bolt toward a locked position, a spring-pressed dog which has a hook at one end and is pivoted at its opposite end to said lock-bolt, a dial-carrying plate or disk F, loosely mounted to be revolved with said series of tumblers, a dial mounted on this disk, and a handle H, also mounted thereon and revoluble therewith, substantially as hereinbefore specified.

6. The adjustable dial having a screw-hole therethrough, in combination with a dial-carrying plate having an annular dovetail groove in its face, a threaded nut having its body correspondingly shaped in cross-section to the cross-section of the groove in said dial-carrying plate and adapted for circular adjustment in said groove, and a screw for engaging the hole in the dial and locking the nut, dial, and plate in the desired relative adjustment, substantially as hereinbefore specified.

7. The screw-door of a safe having a permutation-lock comprising a series of circular tumblers and a locking-bolt centrally mounted upon its outer face, a dial-carrying plate F, mounted upon the outermost of the series of tumblers and having removable connection therewith, a dial adjustably mounted upon the outer face of this plate, and a lock-handle rigidly mounted upon the same plate, substantially as hereinbefore specified.

8. In a safe of the class described, a screw-door adapted to be revolved by means of gearing mounted thereon, in combination with a fixed bracket or journal-box 20, mounted upon the edge of ring E, carrying a crank-shaft 19 and pinion 21, said shaft having a rectangular socket 22, and a hand-crank 23, having a rectangular shank 24, adapted for removable engagement with the socket of said crank-shaft, substantially as hereinbefore specified.

In testimony whereof I affix my signature in presence of two witnesses.

PHINEAS F. KING.

Witnesses:

WILLIAM MOSLER,
J. C. HIGDON.