

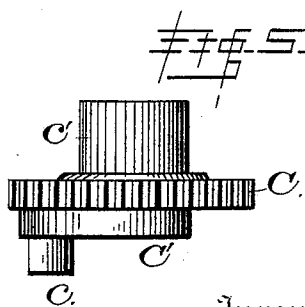
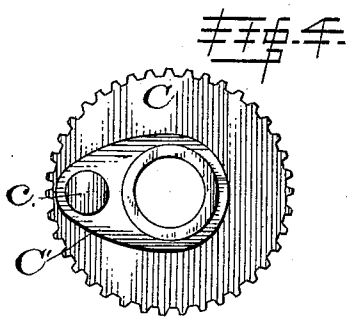
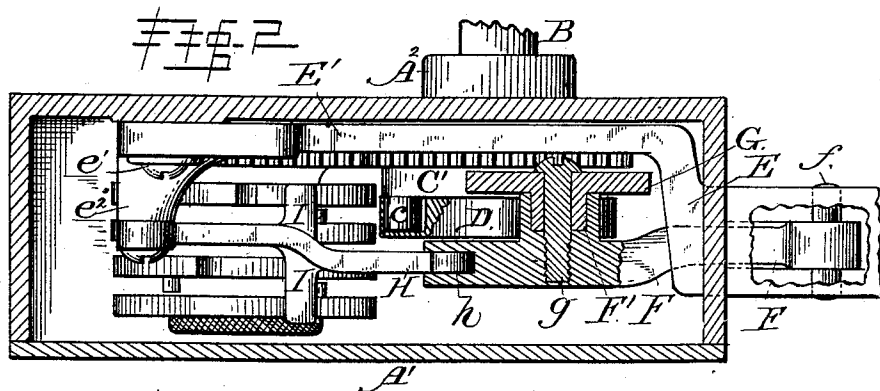
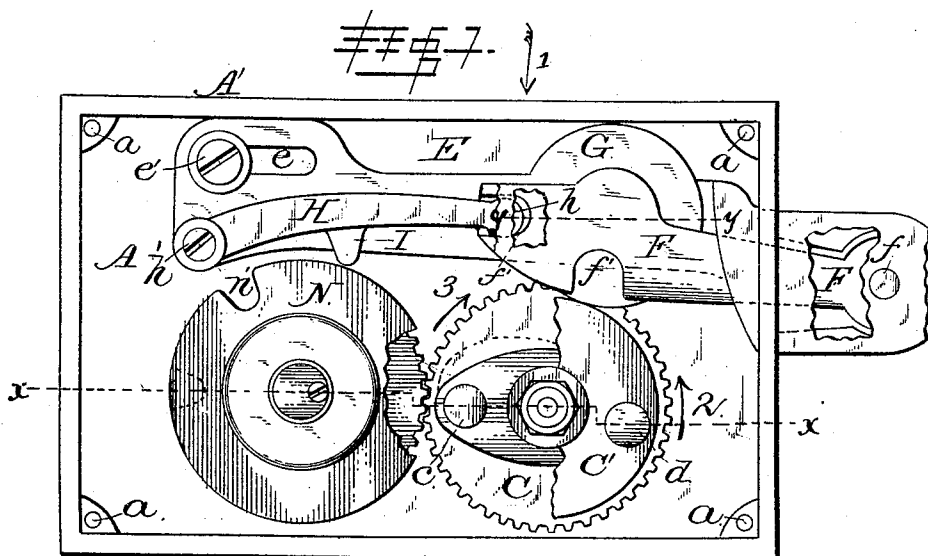
(No Model.)

3 Sheets—Sheet 1.

J. WHITE.
SAFE LOCK.

No. 481,319.

Patented Aug. 23, 1892.



Witnesses

W. E. Brown
J. M. Reynolds

Inventor

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By D. M. Leland
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(No Model.)

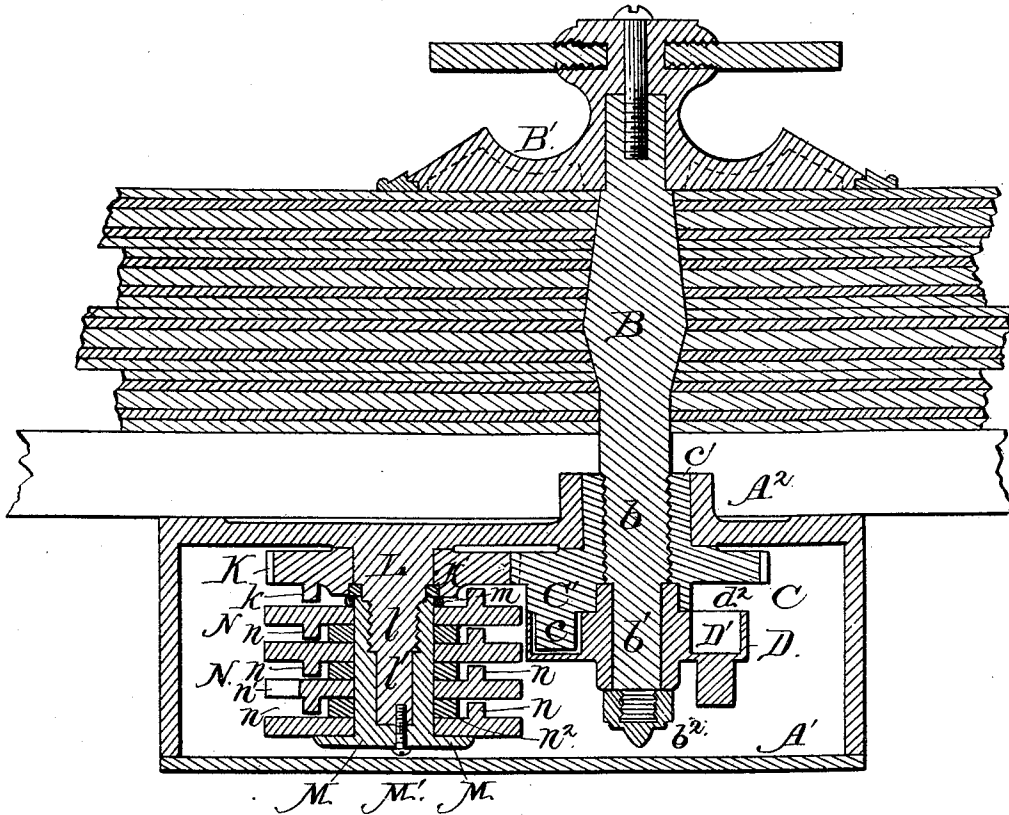
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J. WHITE.
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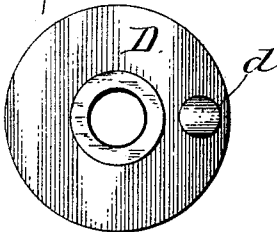
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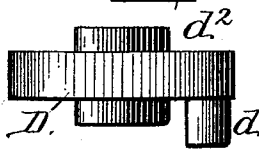
~~Fig. 3.~~



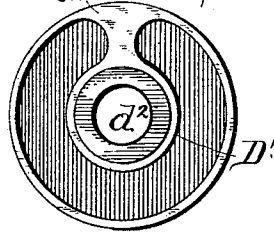
~~Fig. 6.~~



~~Fig. 7.~~



~~Fig. 8.~~



~~Fig. 9.~~

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3 Sheets—Sheet 3.

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Fig. 10.

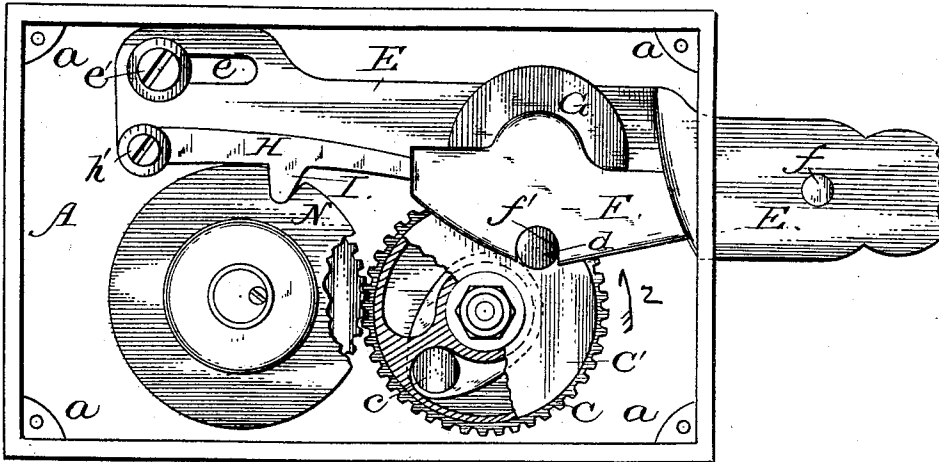
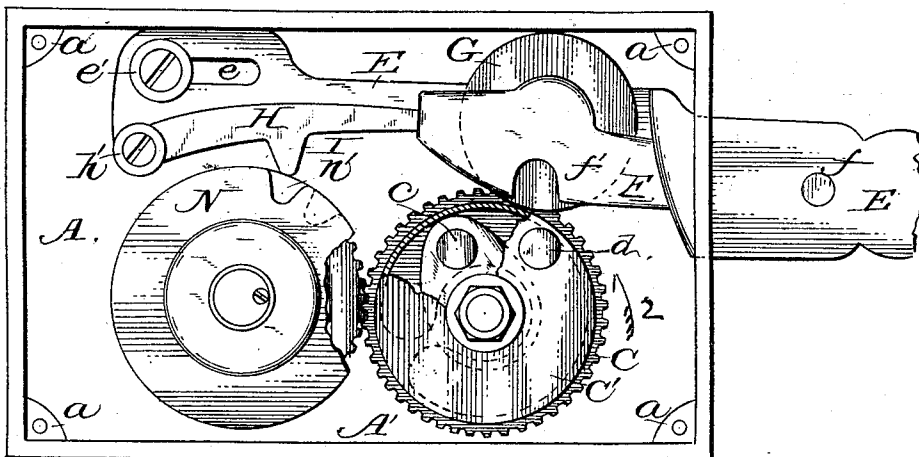


Fig. 11.



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UNITED STATES PATENT OFFICE.

JAMES WHITE, OF CLEVELAND, OHIO.

SAFE-LOCK.

SPECIFICATION forming part of Letters Patent No. 481,319, dated August 23, 1892.

Application filed September 5, 1891. Serial No. 404,919. (No model.)

To all whom it may concern:

Be it known that I, JAMES WHITE, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Safe-Locks, of which the following is a specification, reference being had therein to the accompanying drawings.

Figure 1 is a front elevation of the lock, the inner wall or cover of the casing having been removed. Fig. 2 is a top view looking in the direction of the arrow 1, Fig. 1, part of the devices being in section on the line *yy*, Fig. 1. Fig. 3 is a section on line *xx*, looking in the direction of the arrow 1, Fig. 1, this view showing, also, the spindle, dial, and part of the safe door also in section. Fig. 4 is a front view of the main driving-wheel. Fig. 5 is a top view of Fig. 4. Fig. 6 is a front view of a loose connecting-wheel. Fig. 7 is a top view of same. Fig. 8 is a rear view of same. Fig. 9 shows two rings. Fig. 10 is a front elevation, partly broken away, showing the position of parts at the close of the movement as the bolts are shot. Fig. 11 is a similar view showing the position of parts when the combination is being broken.

Like reference-letters indicate like parts in all the figures.

A A A' is the case or shell, of which A' is the cover or inner wall, preferably secured in place by screws which pass through its four corners and into screw-threaded seats at *a a*.

B is the spindle, which may be of any approved kind or pattern extending outward through the door and carrying a dial B'. (See Fig. 3.) Near its inner end the spindle is threaded at *b* with a cylindrical section *b'*, its extreme inner end being preferably threaded to receive a nut *b*².

C is the main drive-wheel, toothed upon its periphery and screwed firmly upon the threaded part of the spindle at *b*.

In a former patent of mine I employ a cam mounted upon and revolving about a pivot other than the spindle or arbor, but lying parallel therewith, for the purpose of lifting the fence out of the notches of the tumblers. In my said earlier patent that cam is operated not by the spindle directly, but by means of a series of gears and tumblers which are interposed between the spindle and the cam and

are separated from the spindle for the purpose of changing the combination, so that there is liability when replacing such parts of getting the cam back into the lock in a different position relative to the spindle from that which is occupied before removal, whereas in this invention the cam is rigidly connected to and operated by the spindle, so that the spindle and cam maintain a fixed relation as regards their rotating together under all circumstances.

C' (see particularly Figs. 2, 3, and 4) is a cam moving with the drive-wheel and preferably cast in one piece therewith.

c is a pin projecting inward from the cam to actuate the connecting-wheel.

The drive-wheel is further provided, preferably, with an out-ward-projecting sleeve or thimble *c'*, fitting closely inside a seat formed therefor in the outer wall of the box or casing, which is preferably expanded to form a hollow hub A², so as to provide a long bearing for the sleeve.

D (see particularly Figs. 6, 7, and 8) is the connecting-wheel, mounted loosely on the cylindrical part *b'* of the spindle.

d is a pin projecting from the inner face of the connecting-wheel to throw the bolt, as will be explained. The outer face of this connecting-wheel has a circular way or track D' with a bridge *d'*, the opposite sides of which serve as abutments to engage with the pin *c* of the drive-wheel, which enters this sunken way and travels therein. By an examination of Figs. 3, 5, and 6 it will be readily understood that the spindle can make nearly a complete rotation without actuating the connecting-wheel D; but after it has been turned around until the pin *c* engages with the bridge a further rotation of the spindle in the same direction will carry with it the connecting-wheel.

E E' is the bolt. The part E projects through an end wall of the shell or casing is to be connected with boltwork of any usual or approved construction, it being broken off in the drawings. It is desirable that the thrust of the drag-bar be applied to the bolt as nearly as is practicable on a line which is coincident with the axis of the bolt and as far forward—that is to say, toward the vertical bolt-bar—as is practicable.

Compactness of parts is also important in a

lock, and in order to accomplish satisfactorily both of these ends I have invented a new construction of bolt, which, while it is particularly adapted for use in a lock containing the
 5 other novel features to be hereinafter described, is also adapted for use with operating devices which in their general construction may differ materially from those which I have illustrated in this patent. Therefore
 10 I wish to cover the construction of the bolt irrespective of its combination with any particular appliances for operating it. While the part E projects through the casing about midway between the front and rear walls, the inner
 15 portion E' lies, by preference, in a different parallel plane and immediately adjacent to the rear wall. (See Fig. 2.) The inner end of the bolt has a horizontal slot *e* with a set-screw or guiding-pin *e'* in the slot to facilitate
 20 the proper guiding of the bolt. At the lower inner corner of the bolt it is expanded into a bracket-like projection or arm *e*². (See Fig. 2.)

F is the drag-bar. The front end of this drag-bar enters a chamber or socket formed
 25 for its reception in the part E of the bolt, to which it is pivoted or otherwise connected so that when it moves endwise it will carry the bolt with it. A convenient way of connecting these parts so as to permit the necessary
 30 freedom of movement is by a transverse pivot *f*. This drag-bar has an outward-projecting tubular hub or boss F'. (See Fig. 2.)

G is an anti-friction wheel.

g is a screw-threaded stud passing through
 35 the anti-friction-wheel and into the drag-bar.

In order to provide a very satisfactory bearing for the anti-friction wheel, I propose to form it with a tubular hub or sleeve, which surrounds the stud *g* and fits within the tubular
 40 hub or boss F'. (See Fig. 2.) During most of the movements of the lock this anti-friction wheel performs no function; but at a particular juncture the cam C' engages with it and lifts the drag-bar up out of the path of
 45 the pin *d*.

H is the fence-lever pivoted at its rear end to the projecting arm *e*² of the bolt, preferably by a pivot-pin or set-screw *h'*. The front end of this fence-lever at *h* is seated loosely in a
 50 socket or recess *f*, formed for its reception in the inner end of the drag-bar. (See Figs. 1 and 2.) The fence *l* projects downward from the fence-lever, the relation of parts being substantially that shown in Figs. 1, 10, and 11,
 55 so that when the fence is riding upon the periphery of the tumblers, the drag-bar is held up out of the path of the pin *d*.

Referring particularly to Fig. 3, K is a cogged gear having, preferably, the same number of
 60 teeth with gear-wheel C and provided upon one face with a pin *k*. L L' is a stud projecting inward from one wall of the case or shell. The part L is cylindrical to receive the cog-wheel K. The part *l* is preferably
 65 screw-threaded, the end *l'* being, preferably, cylindrical. The part L is shouldered, while the opening through the cog-wheel K is also

shouldered to receive a ring *k'*, fitting tightly the spindle, so as to hold the cog-wheel in place and prevent its slipping off or getting
 70 out of mesh with cog-wheel C in the absence of the tubular rosette, to be described. To insure a satisfactory frictional grip, I prefer to cut this ring as shown in Fig. 9. The rosette consists, essentially, of a cylindrical section M
 75 with an outwardly-projecting flange or rim M'. This rosette is hollow and of such internal conformation as to fit quite accurately the stud on which it is mounted—that is to say, the open end of the recess within the rosette is
 80 somewhat enlarged and screw-threaded to engage with a corresponding thread on the stud. After the rosette is screwed home it is prevented from being accidentally turned backward by a suitable device, preferably an eccentric-pin screwed or driven through the rosette into the end of the stud. N N are the
 85 tumblers, each rotating independently within certain limits upon the rosette. These tumblers have the usual actuating-pins *n* and fence-notches *n'*. *n*²*n*² are the ordinary spacing-rings interposed between the tumblers,
 90 and after the tumblers and spacing-rings have been strung upon the rosette I confine them thereto by means of a clamping-ring *m*, (see
 95 Figs. 3 and 9,) so that they will not accidentally slip off during their ordinary handling. Thus it will be seen that the spacing-rings and tumblers are secured upon the rosette by
 100 a detachable fastener, which is carried by the rosette, and that the gear K is secured in its position in the lock by a detachable fastener during the removal and replacing of the tumblers, these fasteners being secured by friction to the parts which carry them.

By an examination of Fig. 2 it will be readily understood that in some positions of the
 105 tumblers the fence will at one end only rest upon the periphery of either the outer or inner tumbler, the notches of the other three
 110 tumblers being aligned below the fence, and in such position of parts the tendency of the weight of the fence and fence-lever is to twist the lever upon its pivot *h'*; but by making the front end of the fence-lever to fit somewhat
 115 accurately between the side walls of the socket *f* of the drag-bar all of the twisting strain will be borne by the drag-bar, and in turn by the boltwork instead of by the pivot *h'*.

Referring now to the position of parts shown
 120 in Fig. 1 with the bolts shot, in order to unlock the safe I turn the spindle in opposite directions, according to the combination, until the notches of the tumbler are all immediately
 125 below the fence and in position to receive the fence, when of course as the swinging end of the fence-lever falls the inner end of the drag-bar drops into such position that the reverse rotation of the spindle will cause the pin *c* to engage with the bridge *d'* and
 130 move the pin *d* of the connecting-wheel in the direction indicated by the arrow 2, Fig. 1, into the notch *f'* of the drag-bar, when a continued movement of the spindle in the same di-

rection will withdraw the bolts and unlock the safe. Under ordinary circumstances the pin *d* of the connecting-wheel will remain in the notch *f'* while the bolts are withdrawn. The bolts may be shot by turning the spindle in the direction indicated by the arrow 3, Figs. 1 and 10, until the pin *c* engages with the opposite side of the bridge *d'*, when, continuing the rotation, the parts will be moved into the position shown in Fig. 10.

In order to break the combination after the door is thus locked, the spindle may be turned in the direction indicated by arrow 2, Figs. 1, 10, and 11, when the pin *c* will leave the connecting-wheel *D* standing in the position shown in Fig. 10, and as the cam *C'* passes underneath the anti-friction wheel *G* it will lift the drag-bar out of the path of the pin *d* and at the same time lift the fence out of the notches in the tumblers, thus permitting them to be rotated. As the cam passes from underneath the anti-friction wheel to the position shown in Fig. 11, the pin *k* of the cog-wheel *K* moves the adjacent tumbler so that its notch will occupy about the position shown in dotted lines at *n*, Fig. 11, with the fence resting upon the edge of that tumbler, thus supporting the drag-bar above the path of the pin *d* and permitting perfect freedom of rotation of the spindle and the wheels mounted thereon, together with the tumbler, without withdrawing the bolts until by the use of the combination the notches in the tumblers have all been aligned underneath the fence, when the drag-bar will drop down into position to engage with the pin *d*.

In order to insure a satisfactory operation of the cam in lifting the fence out of the tumbler-notches and supporting it there until one of the tumblers shall have been rotated far enough to engage with the bridge and hold it up, the outer end of the cam may be made somewhat wider, as is indicated in dotted lines in Fig. 1.

By providing the bolt with a chamber or socket opening into the lock and pivoting the outer end of the drag-bar in the chamber I am enabled to use such length of drag-bar as provides conveniently for the requisite swing without unduly increasing the length of the lock. It also enables me to apply the power for thrusting and withdrawing the bolts in a line which is practically parallel with the line of travel of the bolt.

What I claim is—

1. In a safe-lock, the combination, with a chambered bolt, of a drag-bar having its outer end connected to the bolt within the chamber and means for moving the drag-bar and bolt endwise, substantially as set forth.

2. In a safe-lock, the combination, with the bolt, of a drag-bar connected at its front end with the bolt, means for moving the drag-bar and bolt endwise, and a fence-lever connected at its front end to the rear end of the drag-bar and having its rear end pivoted to the bolt, substantially as set forth.

3. In a safe-lock, the combination, with the spindle, of a toothed wheel, a cam, a drag-bar engaging with the cam, a connecting-wheel mounted loosely on the spindle, and means for alternately engaging the drag-bar with the connecting-wheel and detaching the drag-bar from the connecting-wheel, substantially as set forth.

4. In a safe-lock, the combination, with the spindle, of a toothed wheel, a series of tumblers, and a toothed wheel mounted by the side of the toothed wheel of the spindle, a fence engaging with the tumblers, a drag-bar pivoted to the bolt of the lock, and a cam mounted on and operated by the spindle to lift the drag-bar, substantially as set forth.

5. In a safe-lock, the combination, with the spindle, of the bolt, a drag-bar pivoted to the bolt, a cam on the spindle, a connecting-wheel mounted on the spindle and having a circular track open toward the cam, and a pin carried by the spindle and traversing the track, substantially as set forth.

6. In a safe-lock, a bolt having that portion which projects through the wall of the lock lying in a plane parallel with the plane of another portion which lies in close proximity to the front of the lock and having at its rear end a bracket-like projection, a fence-lever supported at one end on the bracket, and a drag-bar connected at its front end to that part of the bolt which projects through the casing, in combination with an anti-friction-wheel mounted on the drag-bar between the drag-bar and the bolt and a cam adapted to engage with the anti-friction-wheel for lifting the inner end of the drag-bar and fence, substantially as set forth.

7. In a safe-lock, a bolt having that portion which projects through the wall of the lock lying in a plane parallel with the plane of another portion which lies in close proximity to the front of the lock and having at its rear end a bracket-like projection, in combination with a drag-bar connected at its front end to that part of the bolt which projects through the casing, a spindle, a gear-wheel on the spindle below the bolt, a cam on the spindle inside of the gear-wheel, an anti-friction-wheel mounted on the drag-bar between the drag-bar and the bolt to engage with the cam for lifting the inner end of the drag-bar, and a fence-lever connected at one end to the drag-bar and at its opposite end to the bracket-like projection of the bolt, substantially as set forth.

8. In a safe-lock, the combination of a spindle, a gear-wheel mounted on the spindle in close proximity to the front wall of the lock, a pin mounted upon and driven by the spindle for moving the bolt, another gear mounted upon a pivot other than the spindle and meshing with the first-named gear-wheel, and a series of tumblers mounted upon and rotating about the pivot inside of the gear-wheel and separable therefrom, substantially as set forth.

9. In a safe-lock, the combination of a spin-

dle, a gear-wheel mounted on the spindle in close proximity to the front wall of the lock, a pin mounted upon and driven by the spindle for moving the bolt, another gear mounted upon a pivot other than the spindle and meshing with the first-named gear-wheel, a series of tumblers surrounding the pivot, and the rosette between the pivot and the tumblers to facilitate the removal of the tumblers without disturbing the gear-wheel, substantially as set forth.

10. In a safe-lock, the combination of a spindle which rotates, a non-rotating pivot parallel with the spindle, a gear-wheel mounted upon the spindle and fixed thereto, a gear-wheel mounted on the pivot and meshing with the gear-wheel of the spindle, a series of tum-

blers mounted on and rotating about the pivot, and a clamp interposed between the tumblers and the gear-wheel on the pivot to retain the gear-wheels in mesh when the tumblers are removed, substantially as set forth.

11. In a safe-lock, a non-rotating pivot, in combination with a series of tumblers, a rosette interposed between the tumblers and the pivot, and fastening devices carried by the rosette and the pivot for securing those parts to each other, substantially as set forth.

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

JAMES WHITE.

Witnesses:

E. J. SATRINE,
J. C. STUBER.