(No Model.) 4 Sheets—Sheet 1.

T. M. BRINTNALL & D. A. LANE.

SAFE.

No. 561,086. Patented June 2, 1896.

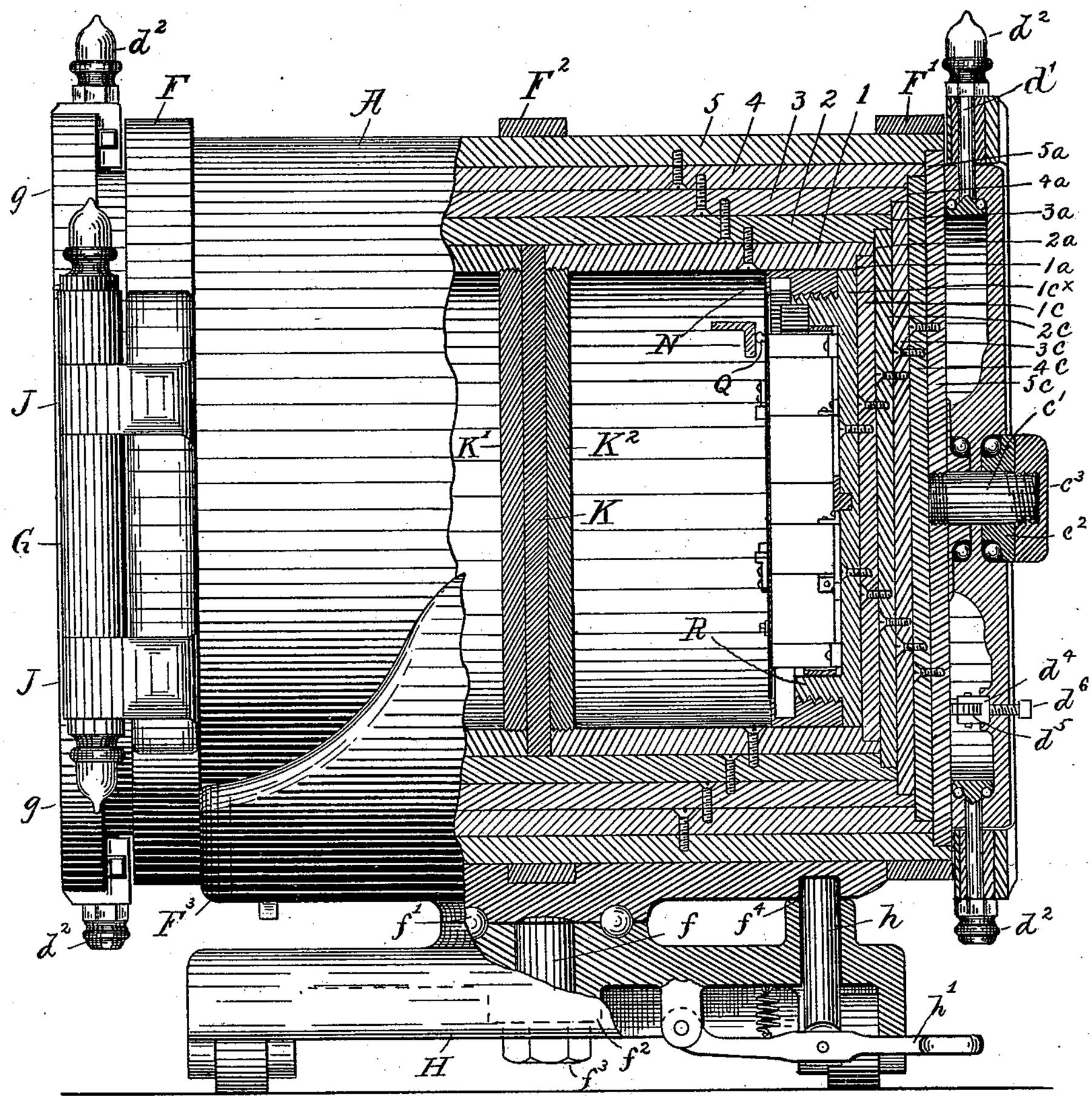


Fig. 1

Fig. 7

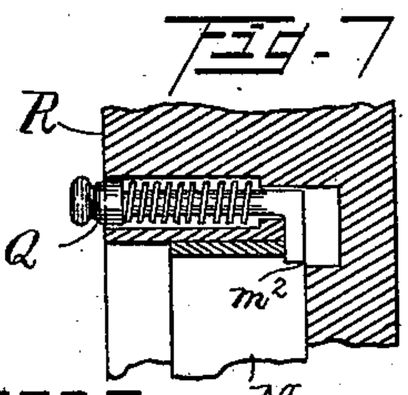
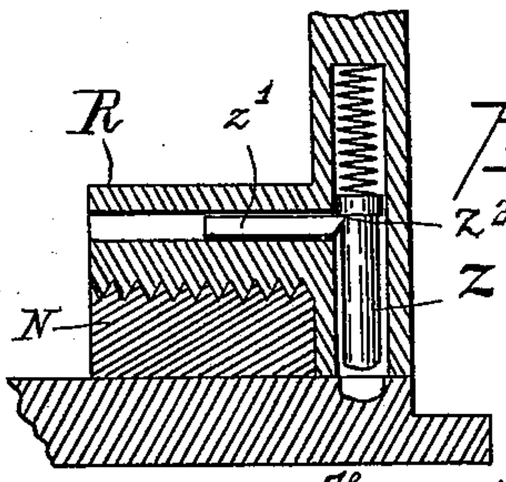


Fig. 8



Witnesses.
H. Siscoe
Helen Hutchison.

Inventors.
Thomas M. Brintnall.
Dillo A. Lane
By E. L. Thurston
their attr.

ANDREW B. GRAHAM, PHOTO-LITHO. WASHINGTON, D.C.

(No Model.) 4 Sheets—Sheet 2.

T. M. BRINTNALL & D. A. LANE.

SAFE.

No. 561,086. Patented June 2, 1896.

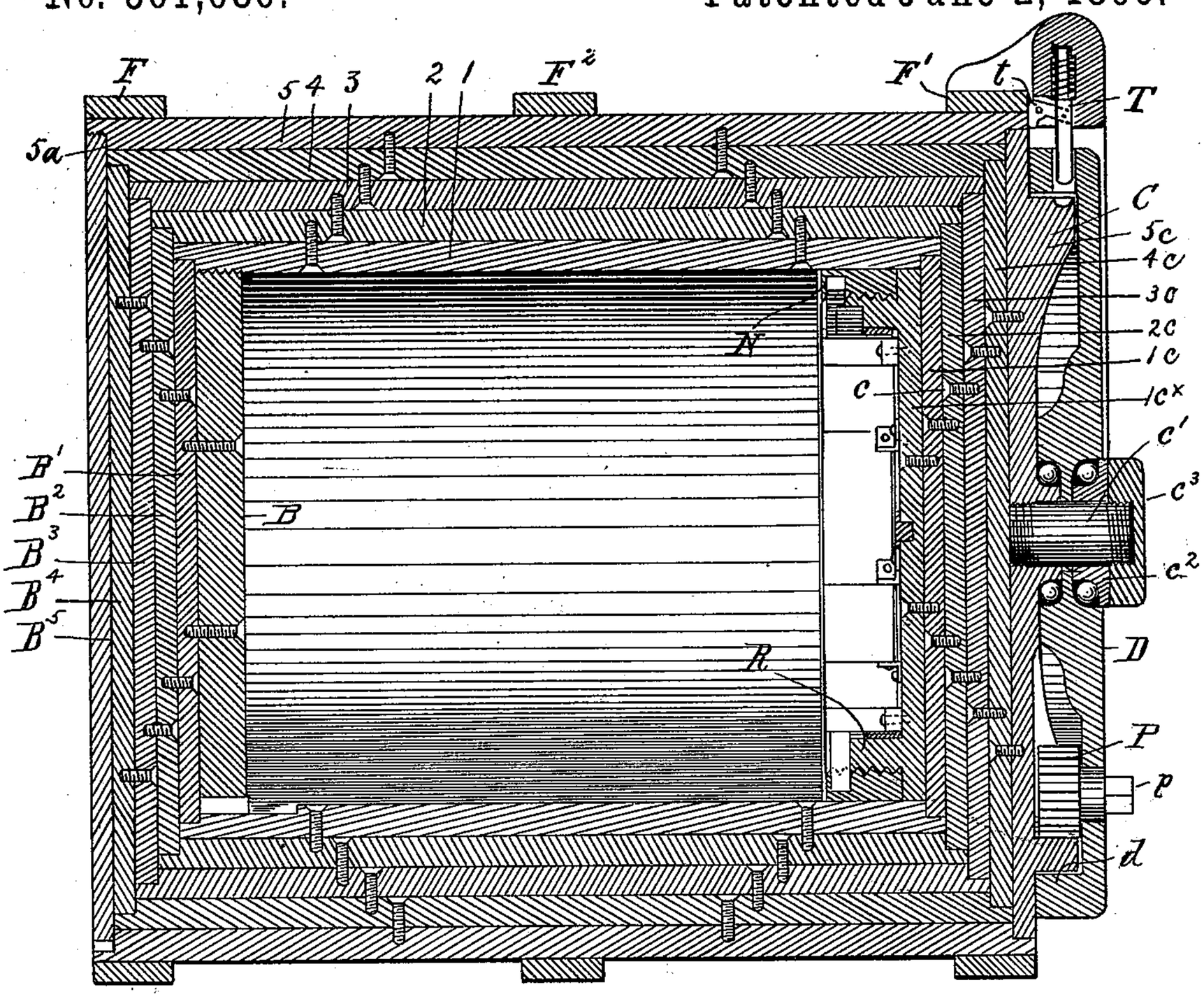


Fig. 2

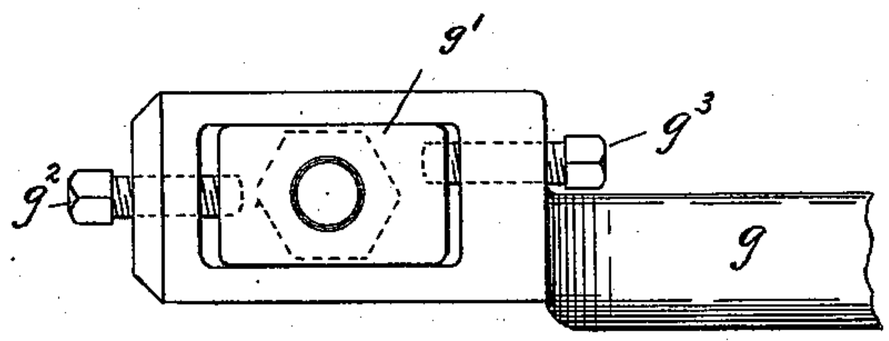


Fig. 6

Witnesses.

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(No Model.) 4 Sheets—Sheet 3.

T. M. BRINTNALL & D. A. LANE.

SAFE.

No. 561,086. Patented June 2, 1896.

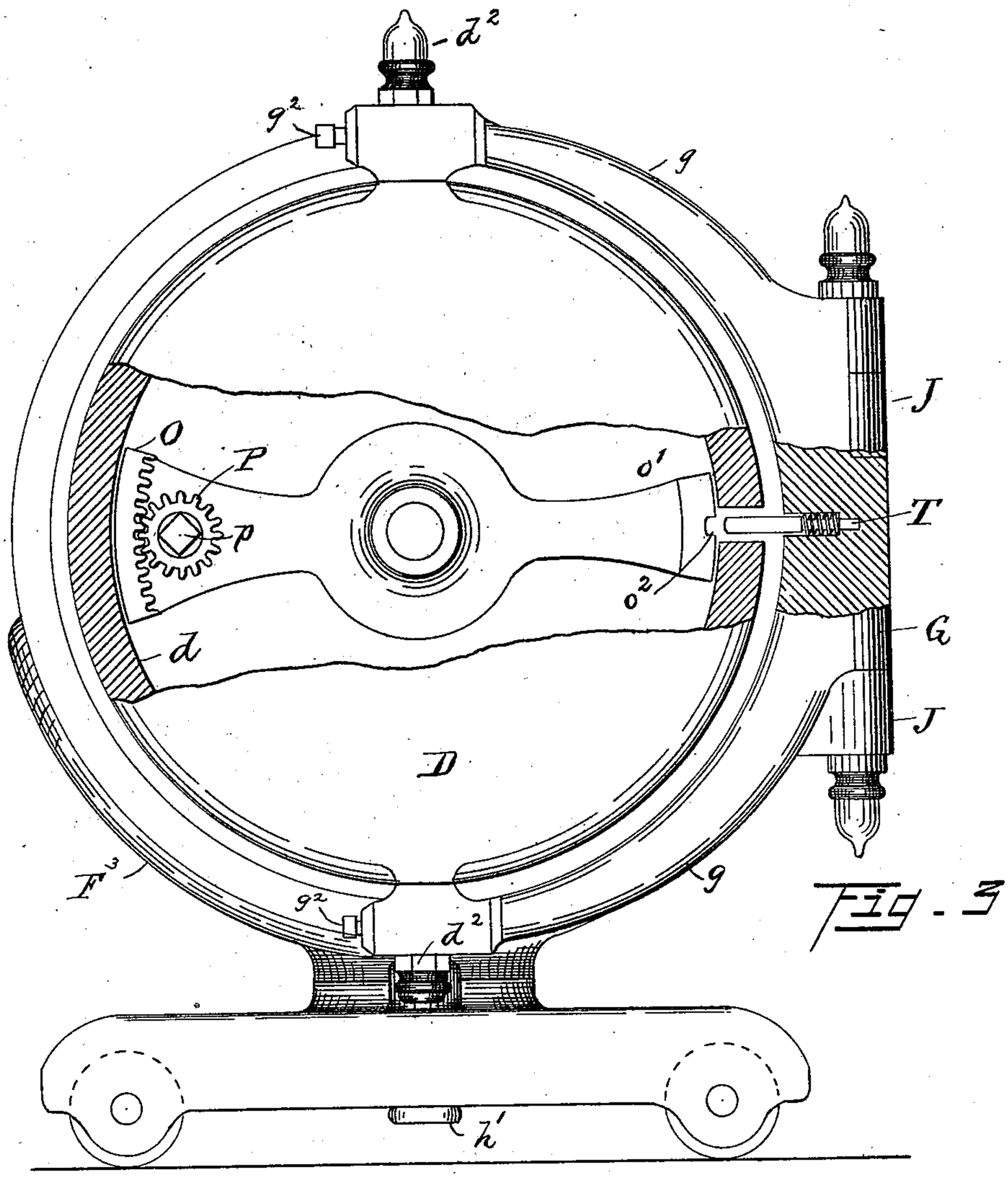

Fig. 3

Witnesses.
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(No Model.) 4 Sheets—Sheet 4.

T. M. BRINTNALL & D. A. LANE.

SAFE.

No. 561,086. Patented June 2, 1896.

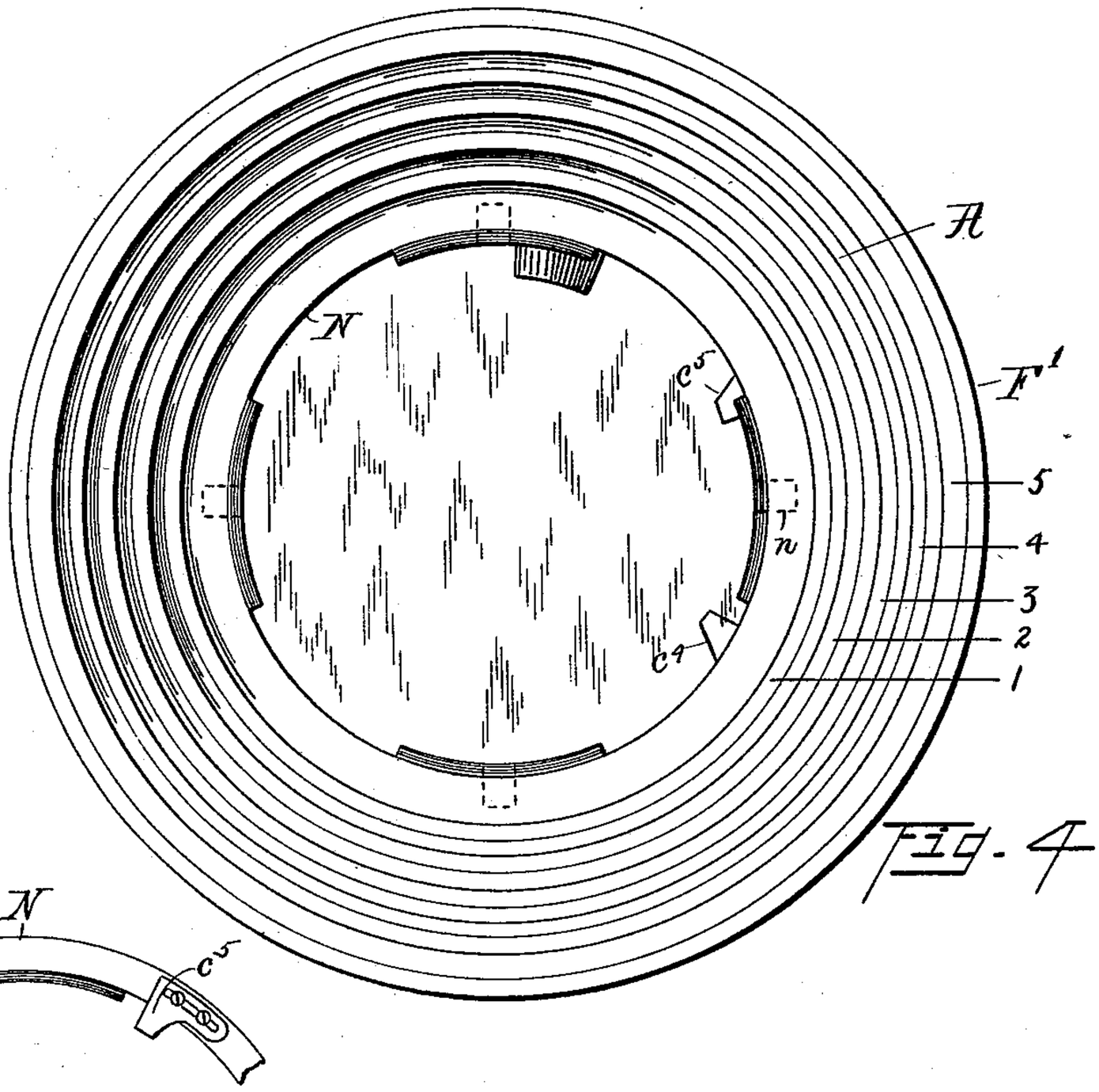

Fig. 4

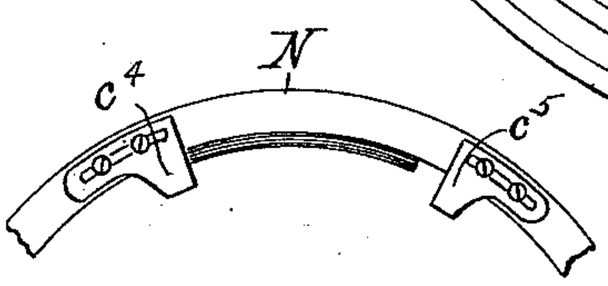

Fig. 9

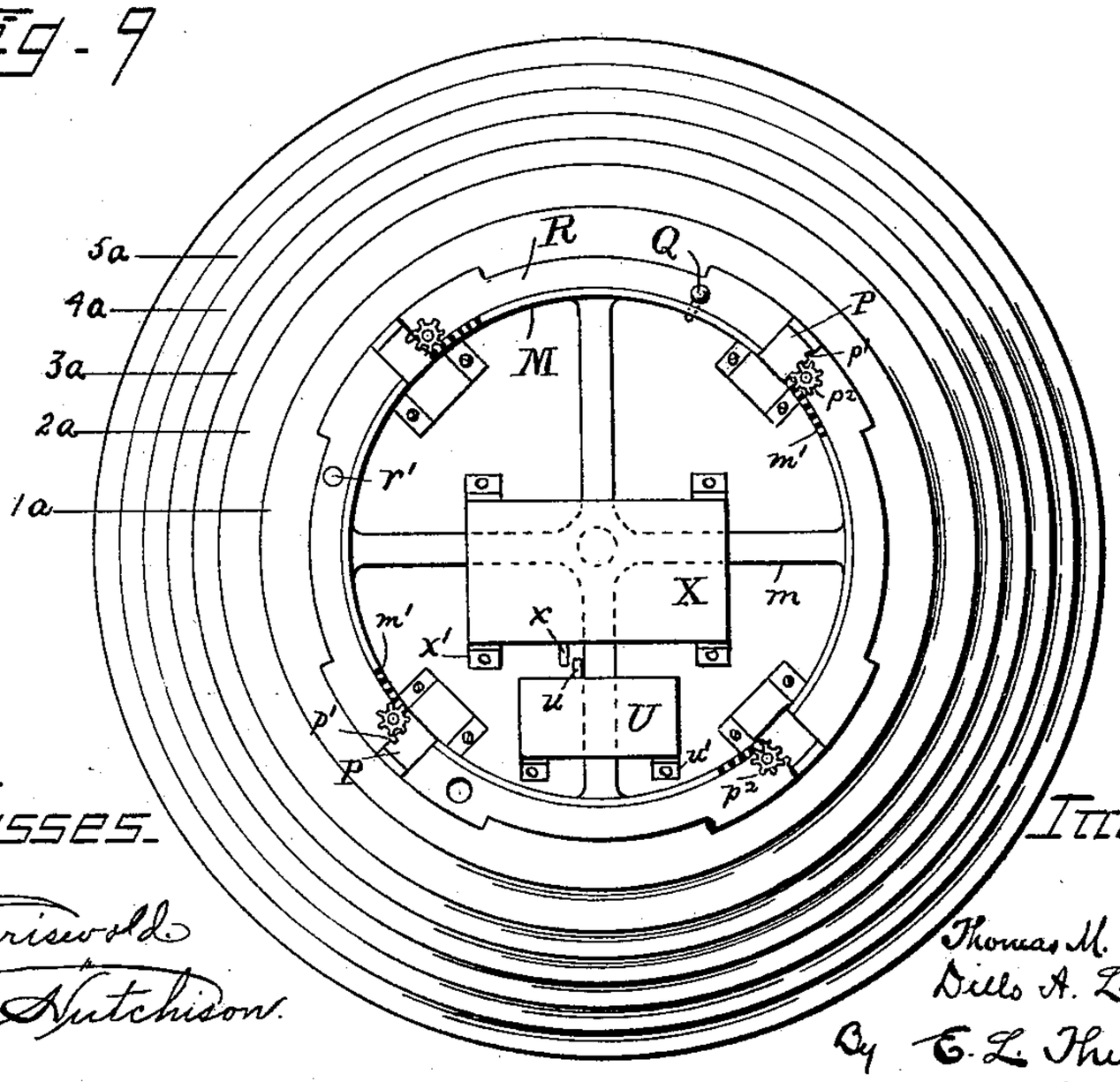

Fig. 5

Witnesses.

F. Griswold.

Helen Hutchison.

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UNITED STATES PATENT OFFICE.

THOMAS M. BRINTNALL, OF MEDINA, AND DILLO A. LANE, OF CLEVELAND, OHIO.

SAFE.

SPECIFICATION forming part of Letters Patent No. 561,086, dated June 2, 1896.

Application filed November 16, 1895. Serial No. 569,229. (No model.)

To all whom it may concern:

Be it known that we, THOMAS M. BRINTNALL, residing at Medina, in the county of Medina, and DILLO A. LANE, residing at Cleveland, in the county of Cuyahoga, State of Ohio, citizens of the United States, have invented certain new and useful Improvements in Burglar-Proof Safes; and we do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

The chief objects of our invention are to reduce the cost of burglar-proof safes, to make them more effectual for resisting the attacks of cracksmen, and to so construct them that the movable parts shall operate easily and accurately at all times.

The invention relates to the construction of the safe-body, to the construction of the door and the mechanisms for locking it, to the several mechanisms for holding it in proper position to be easily opened or closed, and to other parts of the structure, as shown, all of which will be hereinafter described and claimed.

In the drawings, Figure 1 is a side view, partly in section, of a double-compartment safe. Fig. 2 is a horizontal sectional view of a single-compartment safe. Fig. 3 is an end view of the safe when closed, and a part of the door-cap is broken away. Fig. 4 is an end view of the safe-body with the door removed. Fig. 5 is an inside view of the door when the cover-plate is removed. Fig. 6 is a top view of the door hinge and cap when the top nut is taken off. Fig. 7 is a sectional view through the flange R, showing the device for holding the movable ring M of the automatic lock mechanism. Fig. 8 is a sectional view of said flange R, showing the dead-lock mechanism; and Fig. 9 is an inside edge view of that part of the ring N to which the adjustable stops c^4 c^5 are secured.

The body A of the safe is composed of a plurality of concentric tubular cylinders 1 2 3 4 5, nicely fitted one upon another. These cylinders may be made of any suitable material and may be secured together in any approved manner. The several cylinders progressively overhang the cylinders within them, and the end of each cylinder is rabbeted on its inner edge until the rabbeted part is flush with the end of the cylinder next within it. The purpose of rabbeting the ends of the cylinders, as above described, is to prevent the joints between the several cylinders from being in line with the joints between the cylinders and ends or doors. The object of thus breaking joints is to prevent the forcing of explosives between the cylinders by the use of wedges. This result has heretofore been obtained, but, as we believe, by constructions which are less simple and more expensive. The rabbeting of the ends of the cylinders, as described, forms vertical shoulders 1^a 2^a 3^a 4^a 5^a, each of which includes a part of two adjacent cylinders, and the plates of the doors or end fit nicely within the rabbeted ends of the said cylinders and abut against said shoulders.

To meet the demands of the trade, the safe may be made with one compartment, as shown in Fig. 2, or with two compartments, as shown in Fig. 1.

When made with one compartment, one end of the body is permanently closed, while the other end is provided with a door.

The construction for permanently closing one end of the body is as follows: The end piece is built up of a series of circular plates or disks B B′ B^2 B^3 B^4, which are secured together in the usual manner, and an outer plate B^5, which is not connected with the other plates. The inner plate B is threaded, and is screwed into the threaded end of the inner cylinder 1, and then keyed or fastened by other suitable means. The other plates fit nicely within the rabbeted ends of the cylinders 1, 2, 3, and 4, and their edges lie against the shoulders 1^a, 2^a, 3^a, and 4^a. The outer plate B^5 is also threaded and screws into the threaded rabbeted end of the cylinder 5. It is screwed up against the shoulder 5^a and plate B^4, and is keyed or otherwise fastened in this position.

When the safe is made in two compartments, the inner cylinder 1 is made in two parts. A circular partition-plate K fits the cylinder 2 and lies between the adjacent ends

of the two parts of the cylinder 1. Plates K′ and K² are threaded and screw into the threaded adjacent ends of the two-part cylinder 1, and lie, respectively, against opposite sides of the plate K. These plates K′ and K² may be keyed to place, if desired.

One or more thick metal bands F F′ F² are shrunk upon the outer cylinder, preferably near both ends and the middle thereof, and anything to be attached to the safe-body is attached to these bands, whereby it is unnecessary to drill into the outer cylinder any holes adapted to receive an explosive.

The saddle F³ is a curved piece of metal upon which the safe-body rests, and it may be secured by screws to the middle band F². It is desirable to construct the double-compartment safe so that it may be easily turned end for end, and to secure this result the saddle is provided with a circular stud *f* on its under side which enters a hole in the base H. Balls *f′* are introduced into a raceway formed between the saddle and base, and also into a second raceway formed between the under side of the base and a washer *f*², which surrounds the stud. A nut *f*³, which screws onto the lower end of the stud, affords the means for preventing the separation of the parts and for adjusting the pressure on the balls.

A spring-actuated locking-dog *h* is movable in a hole in the base, and its upper end is adapted to enter a hole *f*⁴ in the saddle. A lever *h′*, intended to be operated by the foot, is provided for withdrawing the dog.

The doors are constructed and connected in the following manner: Hinge-eyes J are connected to the band F. To these eyes is hinged the forked hinge-leaf G, to the arms of which the door-cap D is pivoted on a vertical axis. This door-cap is a circular disk having at its edge a cylindrical flange *d*. In the ends of each arm *g* of the hinge-leaf is a recess in which is placed a horizontally-adjustable box *g′*, which is moved in one direction or the other by means of the set-screws *g*² *g*³. Bolts *d′* pass through the flange *d* and through the boxes *g′*, and nuts *d*² screw onto the ends of said bolts and bear against the arms of the hinge-leaf G. By means of these bolts *d′* the door-cap is hung on a central vertical axis to the hinge-leaf G. In raceways formed between the heads of the bolts *d′* and the inner side of the flange *d* balls are placed, thereby forming a ball-bearing for the door-cap.

The door C is built up of a series of plates or disks 1ᶜˣ 1ᶜ 2ᶜ 3ᶜ 4ᶜ 5ᶜ, which fit, respectively, into the cylinder 1 and the rabbeted ends of the cylinders 1, 2, 3, 4, and 5 and are secured together by screws *c* in the ordinary manner. To the middle of the outer plate 5ᶜ a stud *c′* is secured, (it is preferably welded thereto,) which stud passes through a central hole in the door-cap. One ball-race is formed between the plate 5ᶜ and the door-cap and another between said door-cap and a washer *c*², which surrounds the stud and is held thereon by a stud-cap *c*³, which may be screwed on or otherwise fastened to the end of the stud. Balls are introduced into these raceways, and thereby a ball-bearing is formed between the door and door-cap, upon which the door may turn.

Slight adjustment of the door is sometimes necessary in order to so position it that it will enter the body in the described manner. The vertical adjustment of the door is effected by means of the bolts *d′* and the nuts *d*² thereon, which act directly upon the door-cap and, through it, upon the door. The horizontal adjustment is effected by means of the set-screws *g*² *g*³, which act upon the boxes *g′*, through which the bolts *d′* pass. A longitudinal adjustment of the lower part of the door, for the purpose of preventing the tipping of the door out of a vertical position, is effected by means of a sliding pressure-piece *d*⁴, which is seated in a socket on the inside of the door-cap. On the inner end of this pressure-piece is a friction-roller *d*⁵, which engages with the door below the axis thereof. A set-screw *d*⁶, which screws through the door-cap against the end of the pressure-piece, affords the means for moving said pressure-piece.

Secured to the inside of the inner cylinder 1 is a mutilated ring N, which is threaded on the raised portions of its inner periphery. On the inner door-plate 1ᶜˣ is a mutilated cylindrical flange R, preferably made integral with the plate, which is threaded on its outer periphery. The cut-away part of the flange R, when the door is in position to be opened or closed, is opposed to raised parts of the ring N, whereby the one may enter the other. When the door is turned upon its pivot, the threads upon the ring and flange engage with each other, thereby preventing the opening of the door and drawing the door tightly closed and pressing the plates against the ends of the cylinder.

The door is turned upon its pivot by means of a segmental rack O, secured (preferably welded) to the outer door-plate, and a pinion P, engaging therewith, which is mounted upon the inside of the door-cap. The end of the pinion-shaft *p* projects through the door-cap and is squared to receive a crank-key.

On the inside of the ring N are two stops *c*⁴ *c*⁵, which are preferably adjustable, and projecting forward from the flange R is a pin *r′*, which lies between the said stops. When the door is shut, it is turned until the pin *r′* strikes the stop *c*⁴, at which time the bolts on the door are in line with the sockets in the body. When the door is turned in the opposite direction, the pin *r′* strikes the stop *c*⁵, and then the door is in position to be opened.

A spring-dog T is mounted in the hinge-leaf, and it projects through the flange *d* of the door-cap and is adapted to enter a slot *o*² in the flange *o′*, which is secured (preferably welded) to the outer door-plate. When the door is opened, this dog automatically

enters this slot and prevents the door from turning on its pivot; but when the door is closed the dog is automatically withdrawn by the following mechanism: A small bell-crank lever *t* is pivoted in a horizontal slot in the hinge-leaf. Its inner arm engages with the dog T, and its outer end projects so that it will strike the end of the safe-body when the door is closed. This causes the bell-crank to be rocked, which results in drawing the dog T backward out of engagement with the said slot o^2, whereupon the door may be turned.

We contemplate the use of a time-lock with the safe herein described; but since any well-known form of time-lock mechanism may be used it is not thought necessary to show or describe such mechanism in detail. The case thereof is represented by X and its tripping-arm by *x*.

We also contemplate the use of an "automatic lock," so called—that is to say, mechanism which is adapted to operate certain other mechanism by which the retaining-bolts are shot out when the safe-door is closed and retracted when the time-lock trips the automatic lock mechanism. Since automatic locks adapted to operate as described are well known, it is not thought necessary to describe one in detail. An automatic-lock case is indicated by U, and its tripping-lever to be engaged by the time-lock lever is indicated by *u*.

Both lock-cases X and U are secured, as shown, to the inner door-plate by means of legs *x'* and *u'*, whereby they do not interfere with the operation of the ring M or its arms.

In suitable radial grooves in the flange R the sliding bolts P are placed. These bolts, when the door has been closed and turned, are adapted to enter recesses *n* in the ring N. On one side of each bolt a rack *p'* is formed, and in a recess in the flange R adjacent to each bolt a pinion p^2 is mounted, which engages with the rack *p'*, whereby the turning of these pinions moves the bolts out or in.

A cylindrical ring M is mounted within the flange R on the door, so as to be adapted to be independently oscillated about the axis of the door. At intervals this ring is provided with teeth *m'*, which engage with said pinions, whereby the turning of the ring turns said pinions. This ring is preferably secured to a spider *m*, which is pivoted to the inner door-plate. Suitable connections will be made between one of the arms of this spider and the automatic lock mechanism, whereby until said mechanism is tripped by the time-lock a constant force will be exerted upon the ring, tending to turn it, so as to shoot the bolts out.

A spring-actuated dog Q is mounted in the flange R. Its inner end engages in a notch m^2 in the ring M and prevents the movement of said ring. The other end of the dog projects, so that it may be pressed upon for the purpose of releasing the ring. On the inside of the safe-body is an inclined wiper-plate, against which the end of the dog Q is carried when said door is revolved, as hereinbefore described. This wiper-plate is so shaped that it pushes in the dog and releases the ring when the bolts P have been brought into line with the sockets in the ring N, whereupon the ring M is turned and the bolts shoot out.

Of course when a force is applied to the ring M to move it in the reverse direction the bolts are withdrawn, and an automatic lock, as before stated, will apply such a force when it is tripped by the time-lock mechanism.

In order to more effectually prevent burglars from opening the door when they may have succeeded by the use of explosives in tripping the automatic lock, and thereby causing the bolts P to be withdrawn, a dead-lock is provided which will be released by the same explosion which trips the automatic lock. This dead-lock consists of a spring-bolt Z, which is mounted in a radial socket in the edge of the door, preferably in the edge of the plate 1^{cx}, and a retaining-dog *z'*, which is movable in a horizontal socket in the flange R, which joins the bolt-socket. The end of said dog engages with a notch z^2 in the bolt and thereby holds it in its retracted position. When the safe is severely jarred by an explosion, the dog is moved out of engagement with the spring-bolt, which immediately springs forward and engages in a socket in the cylinder 1.

Having described our invention, we claim—

1. In a burglar-proof safe, a body made up of a series of concentric cylinders, having progressively-overhanging ends at the door end of said body, the outer ends of the outer cylinder and of other cylinders being internally rabbeted, combined with a removable door built up of a series of cylinder-disks of different diameters, which disks respectively fit directly into the rabbeted ends of the outer cylinder and other cylinders, substantially as and for the purpose specified.

2. In a burglar-proof safe, the combination of a body made up of a series of concentric cylinders having progressively-overhanging ends at the door end thereof, which ends are internally rabbeted, with a support for the door connected with said body, a door mounted axially upon said support and adapted to turn upon its axis, said door being made up of a series of cylindrical plates which respectively fit into the rabbeted ends of said cylinders, an interlocking device upon said door and body respectively which are adapted to be engaged and disengaged by the movement of said door upon its axis, substantially as and for the purpose specified.

3. In a burglar-proof safe, a body consisting of a plurality of concentric cylinders secured together and having progressively-overhanging ends which are internally rabbeted so that the rabbeted portions are flush with the ends of the cylinders next within them, combined with an end built up of circular disks of increasing diameter secured together

and fitted into the rabbeted ends of the cylinders, the smallest disk being threaded and screwed into the threaded end of the inner cylinder and then secured, and an outer circular disk which is screwed into the rabbeted end of the outer cylinder and then secured, substantially as specified.

4. In a burglar-proof safe, the combination of a plurality of concentric cylinders secured one upon another, the smallest cylinder being made of two parts, with a transverse partition consisting of a middle disk which is fitted to the next-to-the-smallest cylinder and lies between the adjacent ends of the two parts of the smallest cylinder, and two circular disks which are respectively screwed into the adjacent ends of the two parts of the smallest cylinder, substantially as specified.

5. In a burglar-proof safe, a cylindrical body without holes in its outer surface, rings shrunk upon said body, doors hung at both ends to said rings, a saddle secured to one or more of said rings, a base upon which the saddle is pivoted, a ball-bearing between said base and saddle, and a spring-actuated dog mounted upon the base and adapted to engage with either of two sockets in said saddle, substantially as specified.

6. In a burglar-proof safe, the combination of a body consisting of a plurality of concentric cylinders secured one upon another and having overlapping ends which are internally rabbeted as described, with a forked hinge-leaf pivotally connected with the body, a door-cap pivoted on a vertical axis to the arms of said hinge-leaf, a door centrally pivoted on ball-bearings to said door-cap, and built up of circular plates secured together and adapted to fit into the rabbeted ends of said cylinders, substantially as specified.

7. In a burglar-proof safe, the combination of a body, a forked hinge-leaf hinged to said body, and a door-cap pivoted on a vertical pivot to the arms of said hinge-leaf, with a door having a projecting central stud which passes through a hole in the door-cap, a ball-raceway formed around said stud between the door and door-cap, a washer on the stud outside of the door-cap, a ball-raceway formed between said washer and the door-cap, balls in said raceways, and means for holding the washer on said stud and in fixed position relative thereto, substantially as specified.

8. In a burglar-proof safe, the combination of a body having a cylindrical opening of progressively-smaller diameters, a forked hinge-leaf hinged to said body, and a door-cap pivoted on a vertical pivot to the arms of said hinge-leaf, with a cylindrical door which fits the opening in said body, and is centrally pivoted to said door-cap on ball-bearings, a segmental rack secured to the door, and a pinion mounted on the door-cap in engagement with said rack, substantially as specified.

9. In a burglar-proof safe, the combination of a body having a cylindrical opening of progressively-smaller diameters, a forked hinge-leaf hinged to said body, a door-cap pivoted to the arms of said hinge-leaf, mechanism for adjusting said door-cap vertically and laterally, a door fitting the opening in the body and centrally pivoted to the door-cap, and a pressure-piece mounted on the door-cap and engaging with the door below its pivot, substantially as specified.

10. In a burglar-proof safe, the combination of the body, a forked hinge-leaf hinged to the body, a door-cap pivoted to the arms of the hinge-leaf, a door centrally pivoted to the door-cap, and a pressure-piece mounted on the door-cap, mechanism for moving said pressure-piece, and a friction-roller on said pressure-piece engaging with the door below its pivot, substantially as specified.

11. In a burglar-proof safe, the combination of the body and the door, with sliding bolts mounted on the door and having a rack on one edge, pinions mounted on the door engaging with said racks, and an oscillating ring mounted on the door and having teeth which engage with said pinions, substantially as specified.

12. In a burglar-proof safe, the combination of the body having a circular opening, a door-hinge, and a circular door carried by said hinge and adapted to turn upon its own axis, with bolts carried by said door, mechanism for operating them, a dog engaging with said mechanism to prevent its operation and projecting inward from the door, and a wiper-plate inside the safe for engaging with the projecting end of said dog, substantially as specified.

13. In a burglar-proof safe, the combination of the body having a circular opening, a door-hinge, a door-cap, a circular door mounted upon its axis on said door-cap, and a cylindrical flange upon the inner side of said door, with sliding bolts seated in said flange and having racks upon one edge, pinions mounted on the door and engaging with said racks, an oscillating ring pivoted to the door and having teeth which engage with said pinions, a movable spring-dog mounted in the flange and engaging at one end with the ring, and projecting at its other end beyond said flange, and an inclined wiper-plate on the inside of the safe adapted to engage with and move said dog, substantially as specified.

14. In a burglar-proof safe, the combination of the body, a forked door-hinge, a door-cap, and a door centrally pivoted upon said door-cap, with a spring-dog carried by the hinge and adapted to engage with the door to prevent it from turning, and a bell-crank lever pivoted to the hinge having one arm in engagement with the spring-dog and the other projecting from the hinge at a point where it will engage with the safe-body when the door is closed, substantially as specified.

15. In a burglar-proof safe, the combination of a plurality of concentric cylinders having progressively-overhanging ends which are internally rabbeted, which cylinders are secured together to form the safe-body, a forked hinge-

leaf hinged to said body, a door-cap pivoted to said forked hinge-leaf, with a door made up of a series of cylindrical plates which fit into the ends of said cylinders and are secured together, said door being mounted axially upon the door-cap and adapted to turn upon its axis, substantially as and for the purpose specified.

In testimony whereof we affix our signatures in presence of two witnesses.

THOMAS M. BRINTNALL.
DILLO A. LANE.

Witnesses:
E. L. THURSTON,
L. S. GRISWOLD.