

No. 621,341.

Patented Mar. 21, 1899.

W. H. HOLLAR & A. KENNEDY.

SAFE BOLTWORK.

(Application filed June 11, 1898.)

(No Model.)

3 Sheets—Sheet 1.

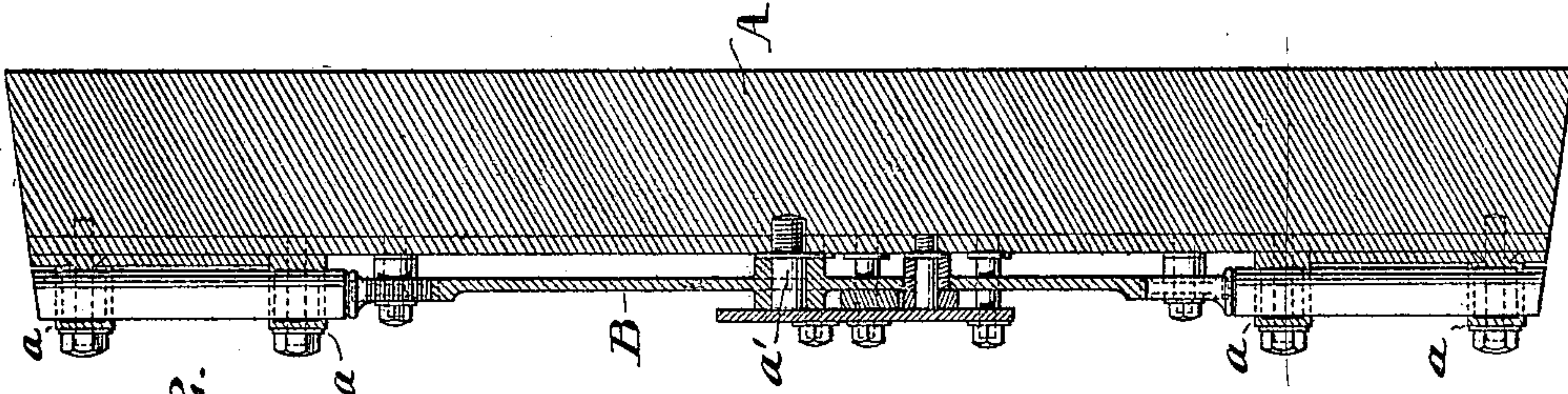


FIG. 2.

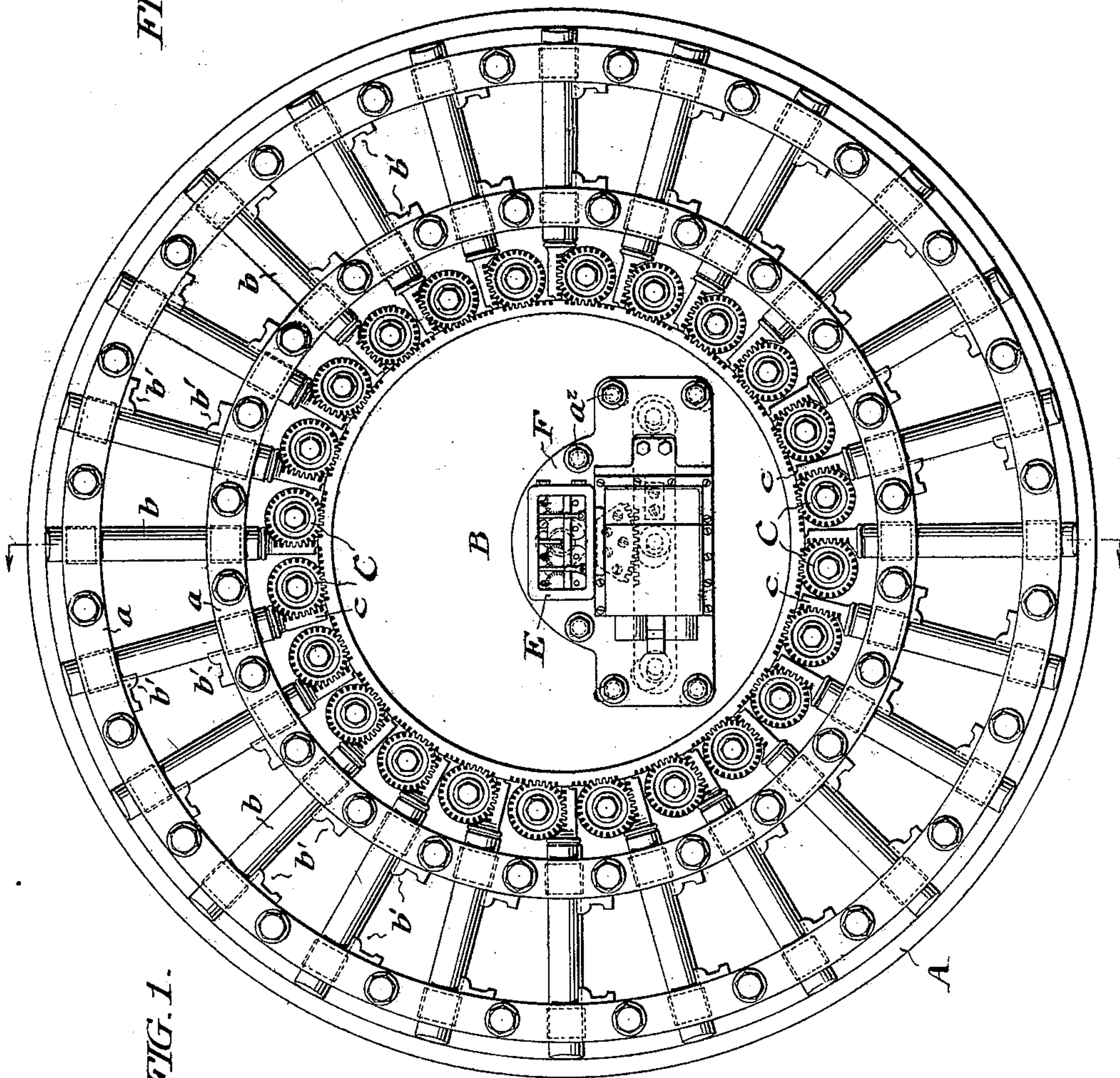


FIG. 1.

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FIG. 3.

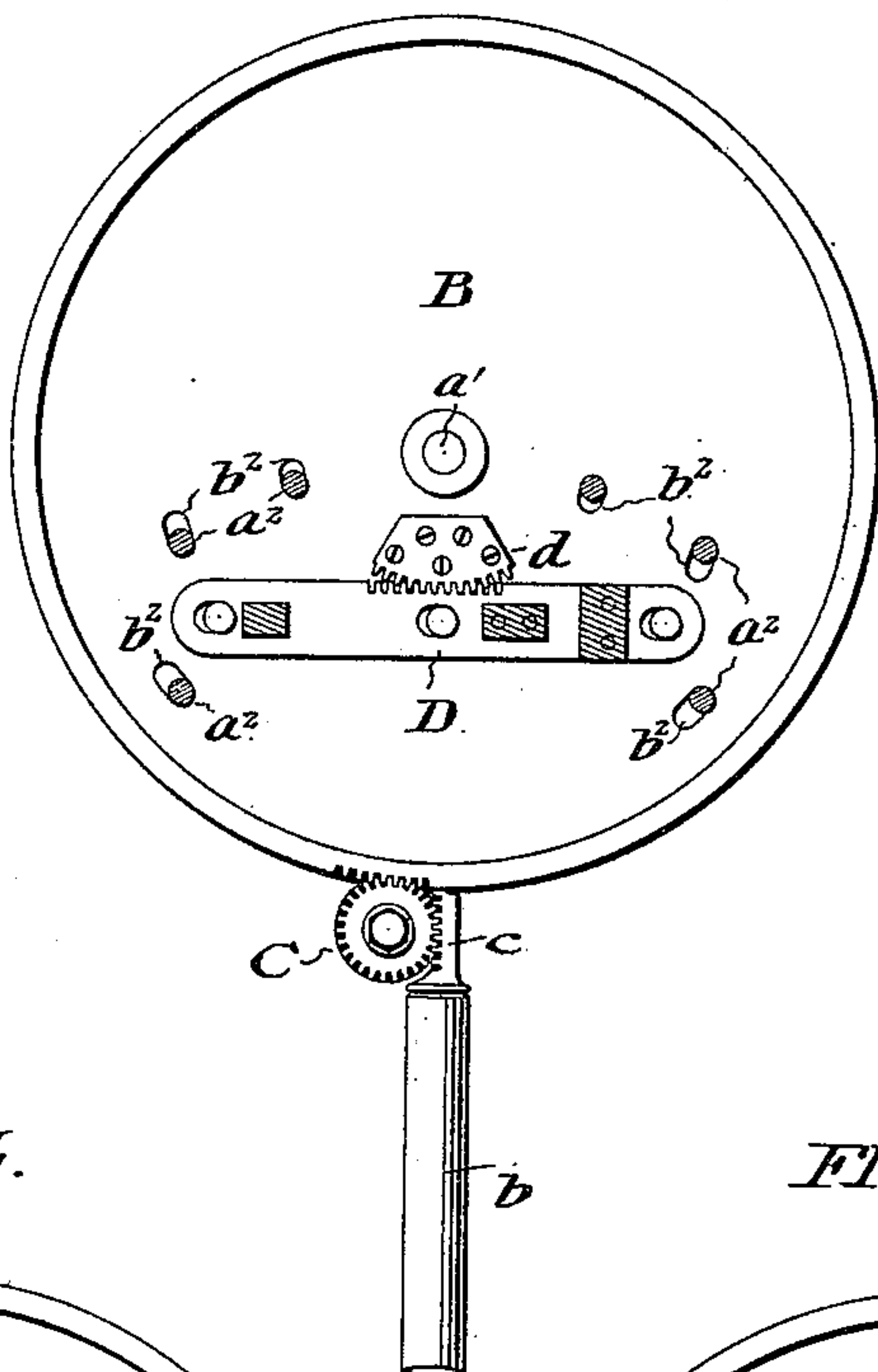


FIG. 4.

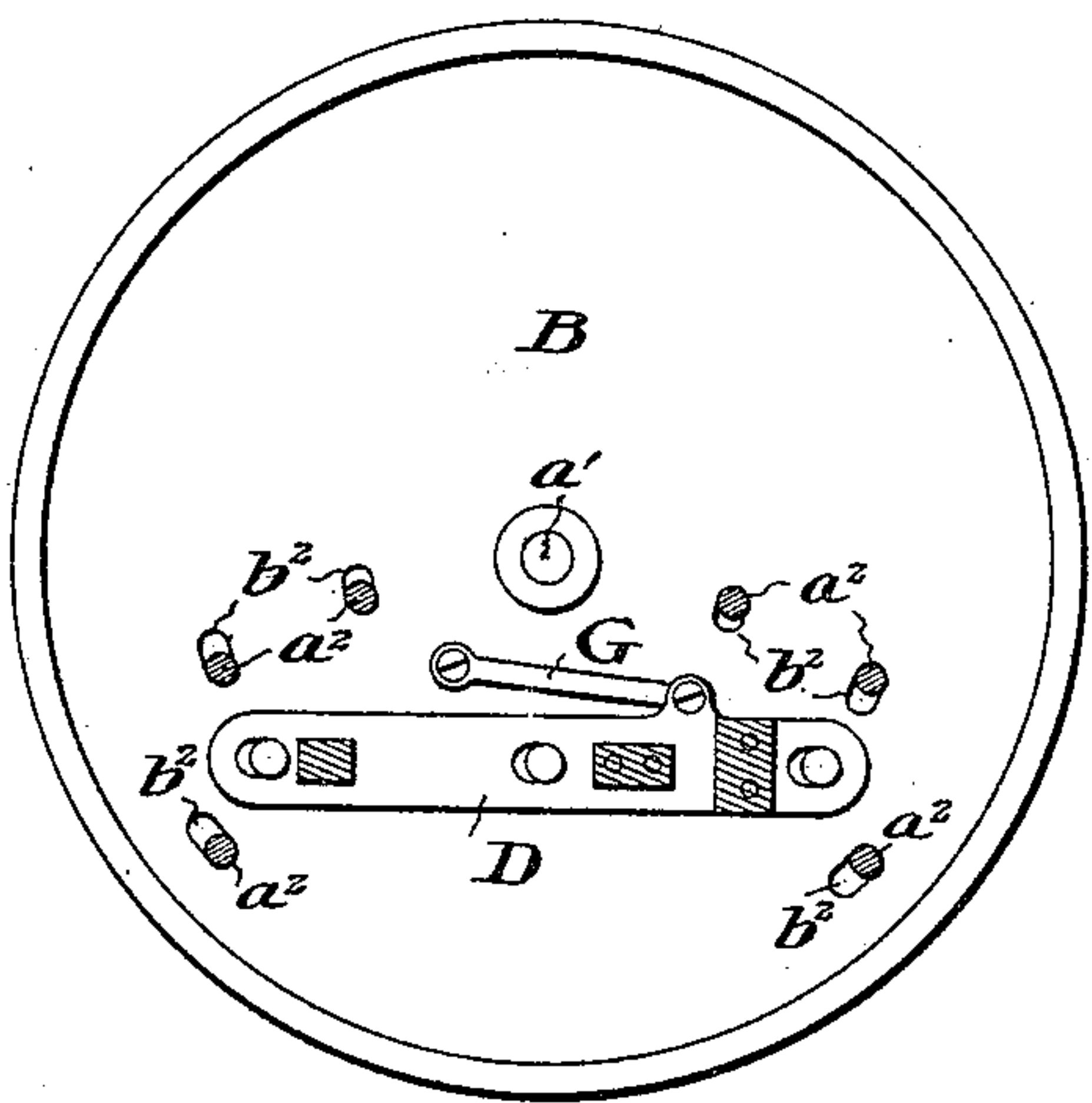
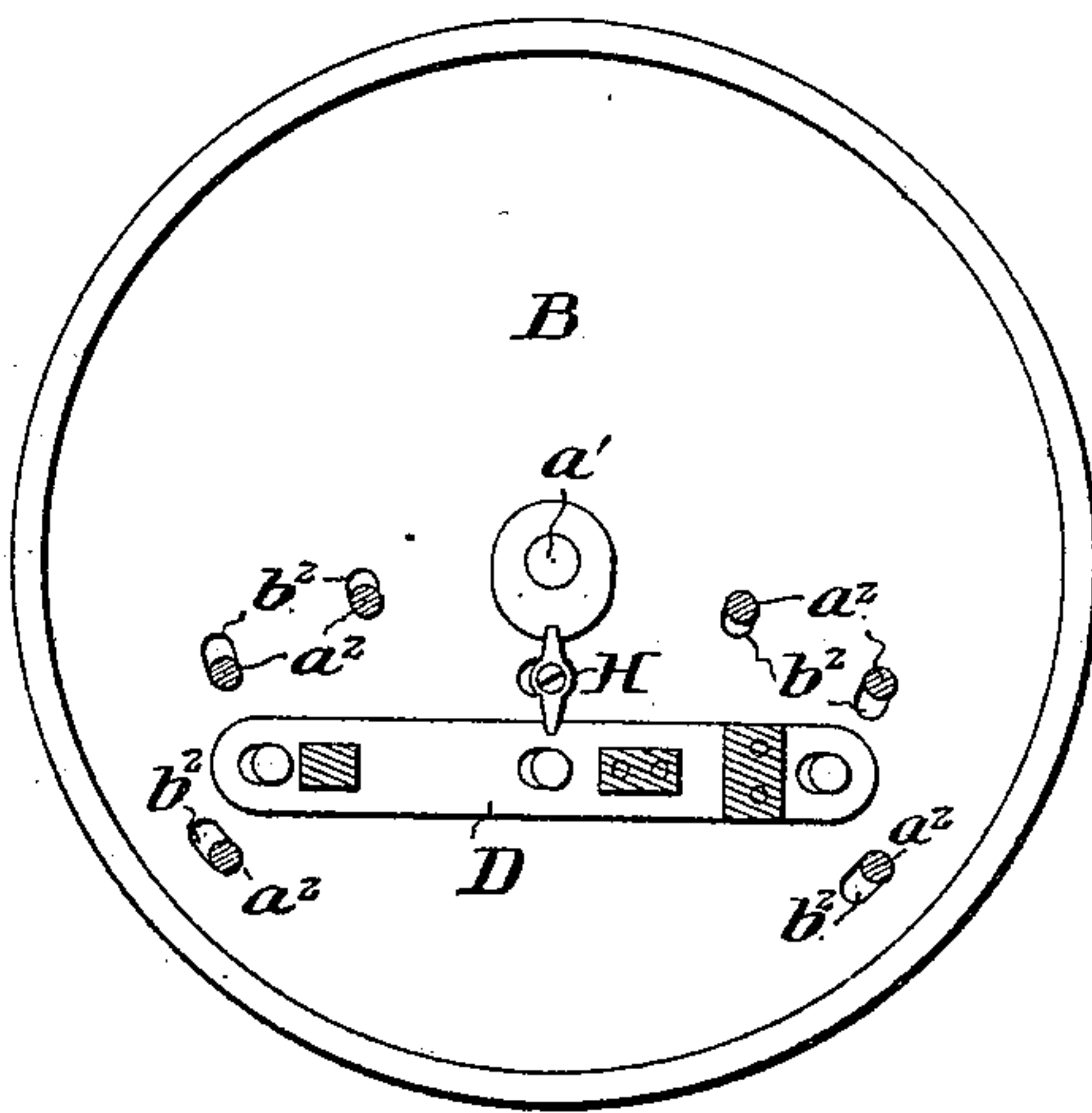


FIG. 5.



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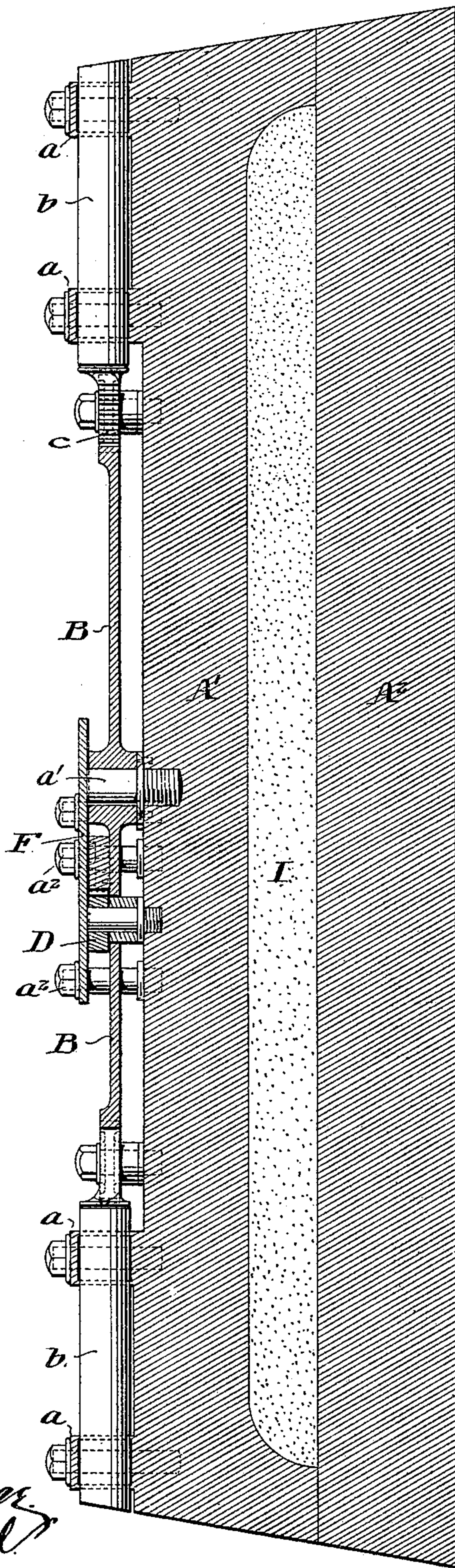
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3 Sheets—Sheet 3.

FIG. 6.



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UNITED STATES PATENT OFFICE.

WILLIAM H. HOLLAR AND ANTHONY KENNEDY, OF PHILADELPHIA, PENNSYLVANIA; SAID KENNEDY ASSIGNOR TO SAID HOLLAR.

SAFE-BOLTWORK.

SPECIFICATION forming part of Letters Patent No. 621,341, dated March 21, 1899.

Application filed June 11, 1898. Serial No. 683,165. (No model.)

To all whom it may concern:

Be it known that we, WILLIAM H. HOLLAR and ANTHONY KENNEDY, of Philadelphia, in the State of Pennsylvania, have invented certain new and useful Improvements in Safe-Doors and Bolt Mechanism Therefor, whereof the following is a specification, reference being had to the accompanying drawings.

Figure 1 is an interior view of a safe-door plate embodying our invention and showing the arrangement of the boltwork. Fig. 2 is a vertical section of the same. Fig. 3 is a detail view of parts shown in Fig. 1. Figs. 4 and 5 represent alternative methods of connecting the central revolving plate B, Fig. 1, with its actuating mechanism. Fig. 6 is an enlarged view corresponding in section to Fig. 2, but also showing the complete construction of the door.

Our invention has for its object to arrange the bolt mechanism so that the resisting power of the door shall be the same no matter from what direction a strain of separation may come. This we accomplish by radially-disposed bolts. The arrangement has the further important advantages that the entire system of boltwork is perfectly balanced; that each bolt is actuated by perfectly direct thrust; that the actuating mechanism for each bolt in the entire system is alike and therefore no more energy is required to move one bolt than any other, resulting in perfect equalization of all strains upon the mechanism, and, lastly, that the actuation of the whole system is dependent upon the very slight rotation of a single pinion.

The radial system of boltwork which forms the subject of our invention is especially applicable to circular doors, and it is in this connection that we have shown it. It is equally applicable to doors in which the actuation of the bolts is effected from the outside by means of an arbor passing through the door or to doors in which the actuation is wholly automatic, depending upon the release of a detent by time mechanism. It is very desirable in the latter class of doors by reason of its being so very light-running.

We will now describe the embodiment of our invention which we have shown in the accompanying drawings.

A represents a metal safe-door plate. It is circular in shape and its edges are beveled so as to admit the tightest possible fit into a similarly-beveled aperture in the safe. Around the inside of the door-plate are two circular projecting flanges *a a*, concentric with each other and with the plate. These flanges may either be formed of separate pieces suitably fastened or rabbeted to the inner surface of the door, or they may, if the door-plate be formed of a casting, be made integral therewith. Through these circular flanges are formed bearings in which slide a series of radially-disposed bolts *b*, all radiating from the common center of the circular flanges. The bearings may be fitted with cups *b'* on the side against which the weight of the bolt leans, containing a ball or roller bearing.

Upon the central stud *a'* there is pivoted a spur-wheel B, surrounding which are mounted a series of pinions C, all engaging therewith. The series of pinions correspond to the series of bolts, each of which carries upon its inner extremity a short rack *c*, engaging with one of the pinions. In order to make room for the largest possible number of bolts, the pinions may be made comparatively small and may be placed as near together as practicable, allowing for the necessary spaces to be occupied by the rack-bars which pass between them. The spur-wheel B is so mounted as to be capable of but slight rotation, and the extent of its rotation is limited by studs *a²*, extending from the back of the door-plate through short circumferential slots *b²* formed in the wheel, the length of the slots being determined by the extent of the throw which it is desired to impart to the bolts. Usually this is so short that the actually operative parts of the circumference of the spur-wheel will be somewhat less than the whole, in which case certain teeth of the spur-wheel may be omitted, as shown in Fig. 1. The rotation of the spur-wheel B may, if desired, be effected by an arbor passing through the safe-door, or it may be effected automatically, as shown in the drawings. In this case a slide-bar D (seen more clearly in Fig. 3) is mounted in the rear of the spur-wheel and furnished with a rack engaging with a toothed sector *d*, fastened to the back of the spur-wheel. The

throw of this slide-bar is effected by a coiled spring or other appropriate mechanism released by a detent controlled by time mechanism. Its throw gives to the spur-wheel the necessary rotation to draw the bolts. In Fig. 1, E represents the time mechanism and F the stationary plate mounted upon the studs a^2 , extending through the slots of the spur-wheel. This stationary plate is the abutment for the spring or other actuating mechanism of the slide-bar D.

In Figs. 4 and 5 alternative methods are shown by which the throw of the slide-bar D effects the desired rotation of the spur-wheel B. In Fig. 4 the connection is made by a link G, and in Fig. 5 by a lever H, operating between the slide-bar and the central base of the spur-wheel.

In operation the slight partial rotation of the spur-wheel B, however effected, causes a similar rotation of all the pinions which in turn impart a simultaneous and equally-distributed direct thrust to each of the bolts by means of the racks upon their extremities. It will be noticed that as the result of the radial arrangement the total amounts of the upward and downward thrusts of the total series of bolts precisely balance each other. The radial arrangement presents the further advantage, which has been adverted to, that the fastening of the door is equally secure in every direction and at every point.

Of course the strength of the fastening of a safe-door is but the strength of its weakest point, and as the boltwork is ordinarily arranged there is a point at which the resistance of the door is much less than at other points. This is not true in our arrangement where the resistance is perfectly evenly distributed around the entire door. To these advantages the simplicity and beauty of the construction must be added.

In Fig. 6 we have shown the combination of our boltwork with a cast-metal backing for the door of the safe, whereby we are able at the same time to obtain by means of a single simple casting both a housing for the boltwork and a hollow space for the retention of a suitable filling between the outer face of the door and the boltwork. In said figure A' represents a single circular casting having formed upon its inner face the concentric flanges which carry our boltwork. The outer surface of this casting is formed with a large peripheral flange and central depression. Against

this outer surface is fitted a second plate A^2 to form the outside or front face of the door, which may be of armor-plate or other highly-resisting steel.

Having thus described our invention, we claim—

1. The bolt mechanism for safe-doors consisting of the combination of a centrally-disposed spur-wheel; a series of pinions surrounding the spur-wheel and engaging therewith; and a series of radially-disposed bolts carrying rack-bars upon their inner extremities which engage each with one of the pinions, whereby a simultaneous and similar operation of each bolt is effected by the partial rotation of the spur-wheel, substantially as described.

2. The bolt mechanism for safe-doors consisting of the combination of the centrally-disposed spur-wheel; one or more circumferential slots therein through which pass pins affixed to the door of the safe; a series of pinions surrounding the spur-wheel and engaging therewith; and a series of radially-disposed bolts carrying rack-bars upon their inner extremities which engage each with one of the pinions, whereby a simultaneous and similar operation of each bolt is effected by the partial rotation of the spur-wheel within the limits allowed by the circumferential slots therein, substantially as described.

3. The bolt mechanism for safe-doors which consists in two concentric circular flanges upon the interior of a safe-door; a series of radially-disposed bolts working in bearings in said flanges; rack-bars upon the inner extremities of each bolt; pinions engaging each of said rack-bars; and a centrally-disposed spur-wheel engaging all of the pinions, substantially as described.

4. The bolt mechanism for safe-doors which consists of a cast-iron backing therefor having cast integrally with itself two or more concentric circular flanges; a series of radially-disposed bolts working in bearings in said flanges; rack-bars upon the inner extremities of said bolts; pinions engaging each of said rack-bars; and a centrally-disposed spur-wheel engaging all of the pinions, substantially as described.

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