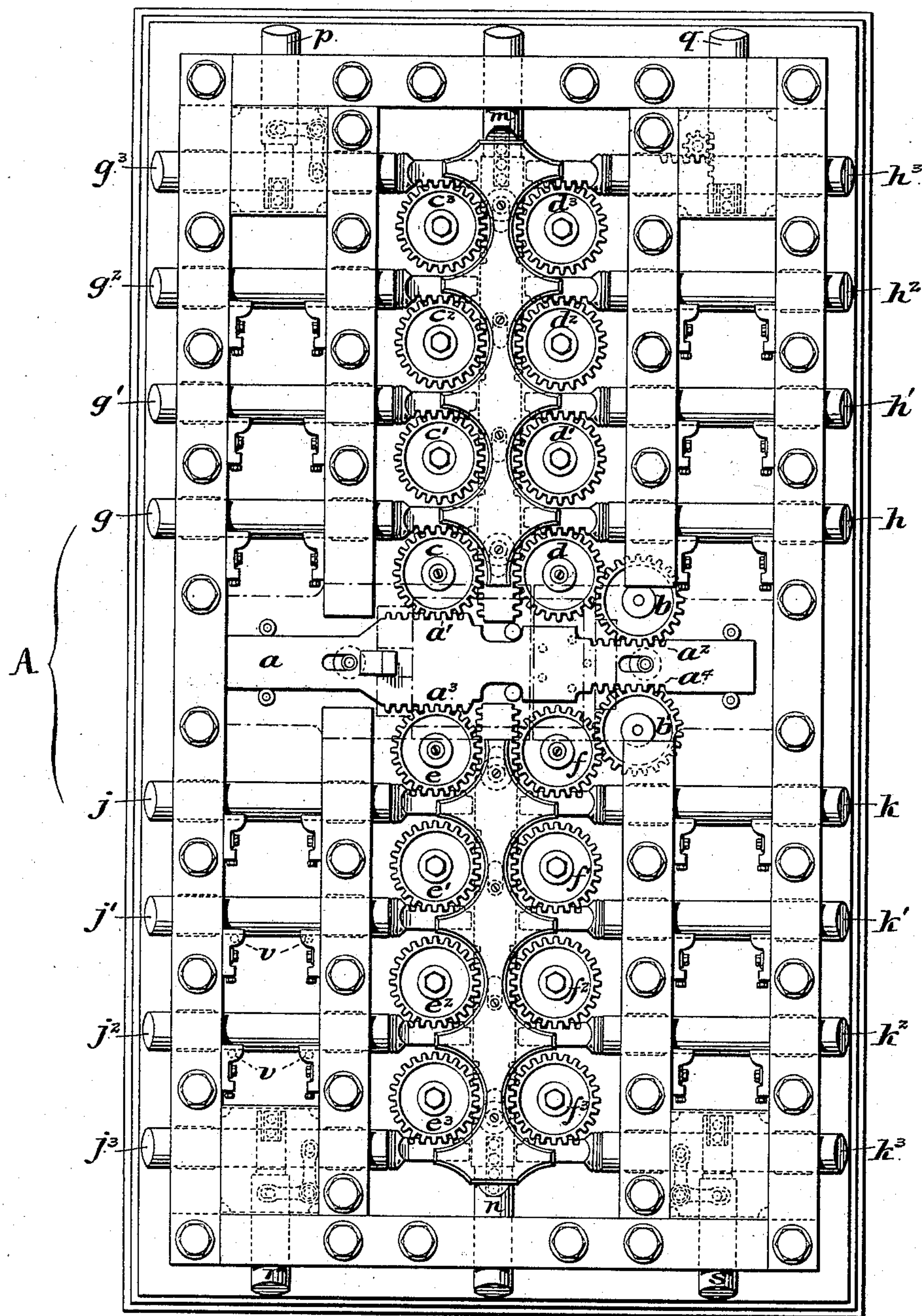


(No Model.)

W. H. HOLLAR.  
BOLT MECHANISM FOR SAFES.

No. 533,298.

Patented Jan. 29, 1895.



WITNESSES:

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# UNITED STATES PATENT OFFICE.

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## BOLT MECHANISM FOR SAFES.

SPECIFICATION forming part of Letters Patent No. 533,298, dated January 29, 1895.

Application filed February 23, 1894. Serial No. 501,264. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIAM H. HOLLAR, a citizen of the United States, residing at Philadelphia, in the State of Pennsylvania, have invented certain new and useful Improvements in Bolt Mechanism for Safe-Doors, whereof the following is a specification, reference being had to the accompanying drawing.

The object of my invention is to provide a mechanism whereby a series of bolts, such as are commonly used for fastening safe doors in place, may be simultaneously advanced or withdrawn; and more particularly my invention contemplates mechanism by which the initial force, whether that of a spring, gravity or electricity released by a timelock, or manual force applied by a handle, sets in motion either mediately or immediately a rack-bar which rotates as many pinions as there are bolts in the series to be operated, each pinion in turn gearing directly with the bolt which is advanced or retracted by its rotation.

In the accompanying drawing, A is a view of the interior of a safe door having mechanism embodying my invention attached thereto for the purpose of operating the various series of bolts whereby the door is secured in place.

*a* is a horizontal rack-bar to which the initial force is directly applied. In the drawing, the dotted lines superimposed upon this horizontal rack-bar, indicate the position of a time-lock or other lock and accompanying mechanism, which may be arranged to release, at the proper moment, the rack-bar and allow it to be set in motion. It is obvious, however, that this initial force, in the case of doors not operated by a time or similar lock, may be manual force applied through a handle or other appropriate means.

*a'*, *a*<sup>2</sup>, *a*<sup>3</sup>, *a*<sup>4</sup>, are sets of rack-gearing upon different portions of the edge of the horizontal bar, *a*. The rack, *a'*, operates the pinion, *c*. The rack, *a*<sup>2</sup> operates the pinion, *b*, which in turn operates the pinion, *d*. The rack, *a*<sup>3</sup>, operates the pinion, *e*, and the rack, *a*<sup>4</sup>, operates the pinion, *b'*, which in turn operates the pinion, *f*.

Confining myself to the upper half of the door, the pinions *c* and *d*, which are thus set in motion, each in the opposite direction, by the movement of the horizontal rack-bar, gear,

each upon the opposite side, with a vertical rack-bar, *m*, running up to the top of the door and carrying, if desirable, a bolt upon its upper extremity. Upon the left hand side of this vertical rack-bar are a series of pinions, *c'*, *c*<sup>2</sup>, *c*<sup>3</sup>, gearing with it, and upon the right hand side a similar series, *d'*, *d*<sup>2</sup>, *d*<sup>3</sup>.

*g*, *g'*, *g*<sup>2</sup>, &c., are a series of horizontal bolts carrying upon their inner extremities racks which gear respectively with the pinions, *c*, *c'*, *c*<sup>2</sup>, &c. Similarly, *h*, *h'*, *h*<sup>2</sup>, &c., are a series of horizontal bolts working in the opposite direction and carrying upon their inner extremities racks which gear respectively with the pinions, *d*, *d'*, *d*<sup>2</sup>, &c. The lower half of the door shows a similar vertical rack-bar, *n*, operating on the left hand side a series of pinions, *e*, *e'*, *e*<sup>2</sup>, &c., and on the right hand side a similar series, *f*, *f'*, *f*<sup>2</sup>, &c., each series operating respectively the series of horizontal bolts, *j*, *j'*, *j*<sup>2</sup>, &c., and *k*, *k'*, *k*<sup>2</sup>, &c.

At each of the corners of the door there is also a vertically moving bolt, *p*, *q*, *r*, *s*. Three of these, *p*, *r*, and *s*, I have shown as operated by a bell-crank lever from the nearest horizontally moving bolt, the bolt, *p*, for example, being operated by the horizontal bolt, *g*<sup>3</sup>. In the upper right hand corner, however, I have shown as an alternative method the vertically moving bolt, *q*, as set in motion by the horizontally moving bolt, *h*<sup>3</sup>, through the interposition of a pinion which gears with racks upon each of these bolts.

I have illustrated in the drawing that application of my device in which the series of bolts to be simultaneously operated by individual pinion gearing consists of horizontally moving bolts. I do not wish, however, to be understood as restricting my invention to horizontal bolts, as it is equally applicable to a series of bolts moving in any direction. When, as illustrated, the series of bolts is a horizontal one, it is exceedingly desirable to reduce to a minimum the friction caused by the motion of the bolts. This is the more necessary as, though the vertically moving parts may be made to balance each other, the horizontally moving portions cannot be readily so adjusted. In order to minimize this friction, I have shown all of the horizontal bolts as supported on ball bearings, *v*, each bolt having placed beneath it one or



more cups which carry within them the small metal balls customarily used in bearings of this description.

I am aware that rack and pinion gearing is not new as applied to mechanism for operating safe bolts and other similar devices. Hitherto, however, when a series of bolts were to be operated simultaneously it has been customary to secure the entire series to a carrying-bar at right angles to them. This carrying-bar is set in motion by mechanism, either rack and pinion, or any other which may be appropriate. The advantage of my arrangement over such forms consists in the great strength and the directness of the thrust given to each bolt by a pinion operating immediately upon it. Where a carrying-bar is used some of the bolts in connection with it are necessarily at a distance from the point of direct thrust, and if the bar swerves ever so little from an absolutely parallel motion, the bolts are liable to become jammed. This cannot occur in my device as the thrust upon each bolt is direct.

A further desirable feature of my mechanism is the ease with which the ascending and descending parts may be caused to balance each other. Thus in the application of it illustrated in the drawing, when the vertical rack-bar, *m*, is ascending, the corresponding rack-bar, *n*, is descending, the one balancing

the other, and, similarly, when the vertical bolts *p* and *q* are ascending, the corresponding bolts *r* and *s* are descending, so that the only force needed to operate the entire series is that required to overcome the friction of the horizontal bolts. In addition to this advantage the symmetrically arranged pinions are ornamental in their appearance and add greatly to the beauty of the mechanism.

While I have described my invention with reference to its application to safe doors, it is similarly applicable to the doors of vaults, prisons or similar objects.

Having thus described my invention, I claim—

The combination, in a safe door or similar object, of a series of parallel bolts each with a rack upon its inner extremity; a series of corresponding pinions engaging with each of said racks; a rack-bar at right angles to the series of bolts and engaging with each of said pinions, by means of which all of the bolts are simultaneously operated; and means either mediate or immediate for effecting the movements of said rack-bar, substantially as described.

WILLIAM H. HOLLAR.

Witnesses:

H. MASON CLAPP,  
G. HERBERT JENKINS.