

No. 726,411.

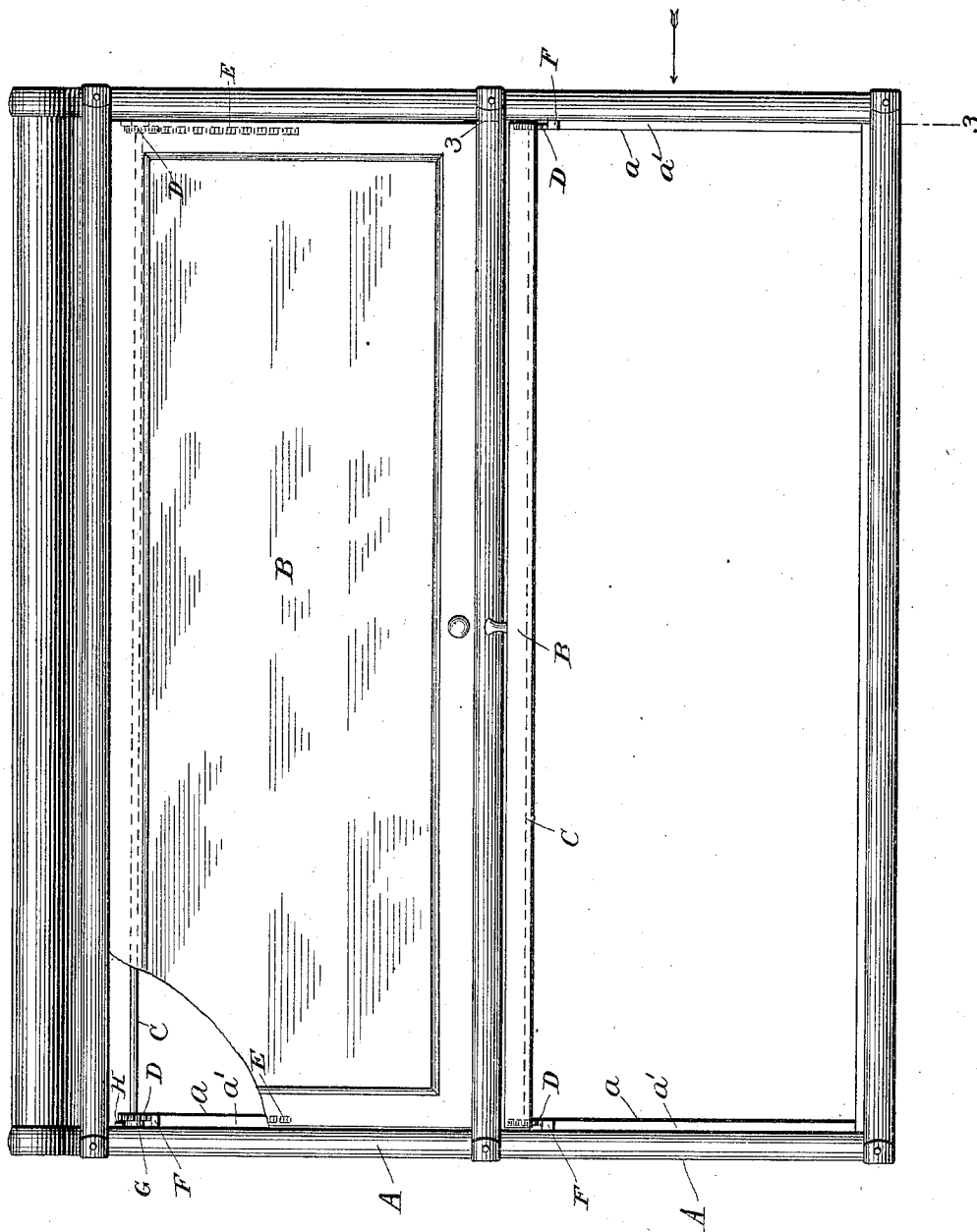
PATENTED APR. 28, 1903.

V. P. DE KNIGHT.
DOOR EQUALIZER.

APPLICATION FILED SEPT. 26, 1902.

NO MODEL.

2 SHEETS—SHEET 1.



Witnesses.

F. S. Elmore
Agood Howell

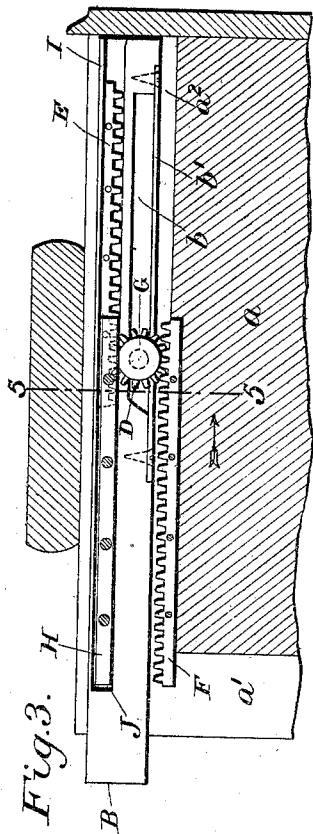
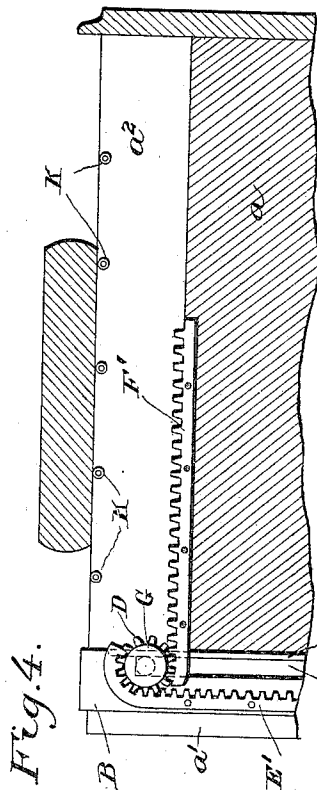
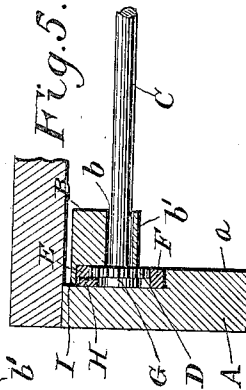
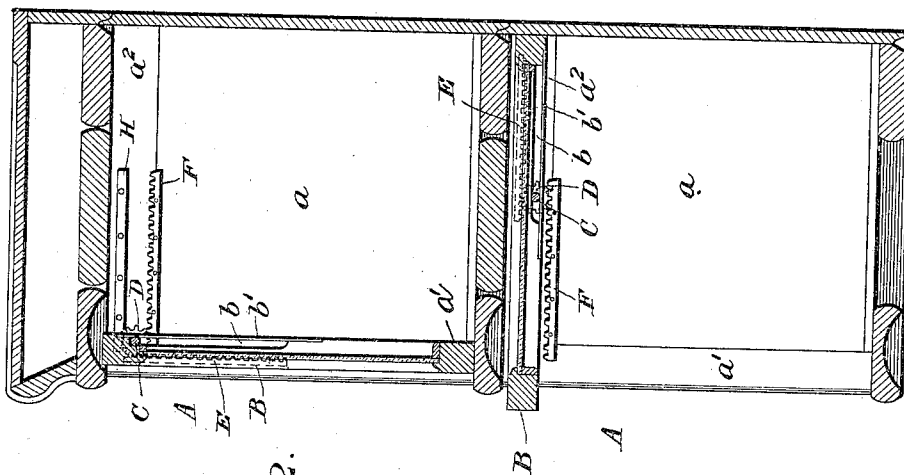
Inventors
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NO MODEL.

2 SHEETS—SHEET 2.



Witnesses.

J. S. Amore
J. H. Dowell

Fig. 2.

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UNITED STATES PATENT OFFICE.

VICTOR P. DE KNIGHT, OF WASHINGTON, DISTRICT OF COLUMBIA.

DOOR-EQUALIZER.

SPECIFICATION forming part of Letters Patent No. 726,411, dated April 28, 1903.

Application filed September 26, 1902. Serial No. 124,983. (No model.)

To all whom it may concern:

Be it known that I, VICTOR P. DE KNIGHT, a citizen of the United States, residing at Washington, in the District of Columbia, have
5 invented certain new and useful Improvements in Door-Equalizers; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as
10 it appertains to make and use the same.

This invention relates to equalizing devices for sliding doors or drawers, particularly the fronts or doors of sectional bookcases and other cases in which the doors swing outward
15 then slide back to open and slide forward then swing inward to close.

The object is to provide a simple and efficient device which will insure even movements and rapid and easy horizontal travel of
20 the door, will not get out of order nor become impaired by use, and will not take up any of the book-space nor obstruct the insertion or withdrawal of books or other articles.

The invention will first be described with
25 reference to the accompanying drawings, which form a part of this specification, and will then be pointed out more particularly in the following claims.

In said drawings, Figure 1 is a front elevation of a sectional bookcase of two sections having my invention embodied therein, the door of the upper section being closed and partly broken away and the door of the lower section being open. Fig. 2 is a vertical cross-section of the same. Fig. 3 is an enlarged detail section on line 3 3 of Fig. 1 looking in the direction of the arrow. Fig. 4 is a similar section showing a modification of the invention, and Fig. 5 is a detail section on line
30 5 5 of Fig. 3 looking in the direction of the arrow.

The drawings represent an ordinary sectional bookcase consisting of two superposed case-sections A, having glass fronts or doors
35 B, adapted to swing upward into horizontal position and then slide back into the tops of the case-sections to open them. The end walls of the case-sections are designated at their inner faces by the symbol a and are
40 formed with the usual front vertical rabbets or recesses a' to receive the end edges of the doors when shut down or closed and with the

usual top horizontal rabbets or recesses a^2 to admit the ends of the doors when raised and shoved back into the case-sections. 55

Referring to Figs. 1, 2, 3, and 5, the door or front of each case-section is swung upon a transverse shaft or equalizing-rod C, having toothed pinions D at its ends which engage racks E on the rear faces of the doors and
60 rest upon and engage similar horizontal guide-racks F on the inner sides of the said end walls of the case-section. Said shaft or equalizing-rod has no fixed bearings, but passes transversely through longitudinal slots or
65 guides in or on the end members of the door-frame, preferably through slots b , as shown, whereby the shaft is kept within the plane of the rear face of the door-frame, and thus prevented from standing beneath the door when
70 open and obstructing the insertion or withdrawal of books. The racks E may be sunk in suitable longitudinal grooves in said end members of the door-frame.

The slots b and the racks E are in length
75 equal to at least half the horizontal travel of the door and extend from the rear or upper member of the door-frame to about the middles of the end members, though they may extend farther, if desired. When the door
80 slides back and forth horizontally, the shaft or equalizing-rod turns or rolls along the slots, the length of which may limit the horizontal travel of the door, though other means may be employed for this purpose. The slots, as
85 shown, are formed by cutting away the rear faces of the end members of the door-frame and fastening suitable metal strips b' thereover. It is desirable to make the slots deeper
90 than the diameter of the rod or the parts traveling therein, so as to reduce friction; but the metal strips b' should contact with the rod, so as to hold the pinions D in engagement with racks E on the door at all times and prevent
95 dislocation thereof when the door is swung up or down or detached from the case-section. The horizontal racks F may be located in the top horizontal rabbets a^2 or in suitable recesses cut directly beneath the same, thus
100 bringing the inner sides of said racks, as well as the inner faces of the pinions D, flush with the inner sides of the end walls of the case-section. Said racks, as shown, project forward for the distance of two or three teeth

beyond the thicker parts *a* of the case-section ends or into the vertical rabbets *a'*, and they extend rearward about half the width of the case-section or for a distance equal to at least half the horizontal travel of the door.

When the door is closed, it is supported by shaft C and pinions D, which latter stand at the front extremities of horizontal racks F. As the door is swung either up or down said shaft and pinions turn therewith, the pinions remaining in fixed position with respect to racks E, but traveling several teeth on racks F. When in horizontal position, racks E rest upon pinions D, which rest upon racks F, thus supporting the door, and in this position as the door is pushed back or drawn forward racks E travel on the pinions, which in turn travel on racks F, one-half the horizontal travel of the door being taken on each set of racks. The door may thus be slid back and forth very quickly and with perfect ease, and all binding or uneven movement is positively prevented. When the door is drawn forward, the rear ends of slot *b* abut against shaft C, thus stopping the forward movement, whereupon the door drops down into place, the pinions D turning therewith and traveling the two or three teeth at the extremities of racks F.

The pinions D are shown provided with rollers G on their outer faces, and ribs or shoulders H, secured on the inner sides of the end walls of the case-section, bear upon the rollers and hold the pinions down upon the racks F, though the weight of the door is generally sufficient for this purpose. Said ribs H ride under shoulders I on the end members of the door-frame, above the slots *b*, and in grooves J, extending along the solid parts of said end members, thus keeping the door in true horizontal position and preventing the usual oscillating of the door during its horizontal movement. It is evident that the grooves J could be extended along the whole lengths of the end members of the door-frame and the rollers dispensed with, which would serve the same purpose, though the construction shown is preferred.

Referring to the modification shown in Fig. 4, the racks on the door designated by the symbol E' are curved at their rear or upper extremities, and when drawing the door out from the case-section these curved extremities engage the pinions and stop the forward movement. The racks on the case designated by the symbol F' are shown slightly curved or upturned at their front extremities to receive the pinions D at the limit of their forward position. When closed, the door is suspended directly by the racks E', the ends of which are hooked over the pinions. The rollers on the outer faces of the pinions D, also the ribs and grooves on the inner sides of the section ends and outer sides of the end members of the door-frame, are dispensed with in this modified construction, and the door is prevented from rocking or oscillating and the pinions kept down upon racks F by

means of rollers K, of felt or other suitable material, depending from the top of the case-section.

The invention is susceptible of various modifications in details of construction and arrangement and is not limited to the specific application herein illustrated and described.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent of the United States, is—

1. In combination with a casing having a sliding door or member therein, stationary racks on the case at opposite ends of said sliding member, traveling pinions engaging said racks, an equalizing-rod or shaft connecting said pinions, and racks on said sliding member engaging said pinions, substantially as described.

2. In combination with a casing having a sliding door or member therein, stationary guide-racks on the case, confronting racks on said sliding member, interposed pinions engaging both sets of racks, and an equalizing-rod or shaft connecting said pinions, substantially as described.

3. In combination with a casing having a sliding door or member therein, stationary guide-racks on the case, confronting racks on said sliding member, interposed pinions engaging both sets of racks, an equalizing-rod or shaft connecting said pinions, and means for positively forcing the confronting racks toward each other, substantially as described.

4. In combination with a casing having a sliding door or member therein, stationary guide-racks on the case, confronting racks on said sliding member, interposed pinions engaging both sets of racks, an equalizing-rod or shaft connecting said pinions, means for holding said sliding-member racks in engagement with said pinions, rollers on the sides of said pinions, and stationary ribs on the case bearing against said rollers and keeping the pinions in engagement with the stationary racks, substantially as described.

5. In combination with a casing having a sliding door or member therein, stationary guide-racks on the case, pinions carried by said sliding member and engaging said racks, an equalizing-rod or shaft connecting said pinions, rollers on the sides of said pinions, stationary ribs on the case bearing against said rollers and maintaining the pinions in engagement with said racks, and grooves in the ends of said sliding member to receive said ribs, substantially as described.

6. In combination with a case having a door adapted to swing open from vertical to horizontal position and then slide back into the case, guides along opposite ends of the door, a shaft passing through said guides and adapted to roll therein when the door moves horizontally, pinions on the ends of said shaft, stationary racks in the ends of the case engaged by said pinions, and similar racks on the door engaging said pinions, substantially as described.

7. In combination with a case having a door adapted to swing open from vertical to horizontal position and then slide back into the top of the case, a shaft having its ends passing through longitudinal slots in the end members of the door-frame and provided with pinions, stationary racks in the ends of the case engaged by said pinions, and similar racks on the door engaging said pinions, substantially as described.

8. In combination with a case having a door adapted to swing open from vertical to horizontal position and then slide back into the case, stationary guide-racks in the ends of the case, a transverse shaft carried by slots or guides along the ends of the door and having pinions engaging said racks, racks on the door engaging said pinions, and means for stopping movement of said latter racks on said pinions at the limit of forward horizontal travel of the door, whereby the door will swing inward, the pinions turning on the stationary racks, substantially as described.

9. In combination with a case having a door adapted to swing open from vertical to horizontal position and then slide back into the case, stationary guide-racks in the ends of the case, a transverse shaft carried in slots or guides along the ends of the door having pinions thereon engaging said racks, and similar racks on the door engaging said pinions, the ends of said slots or guides by abutment against said shaft limiting forward horizon-

tal movement of the door and permitting it to swing on the shaft and pinions, substantially as described.

10. In combination with a case having a door adapted to swing open from vertical to horizontal position, stationary guide-racks in the ends of the case, a shaft carried by said door having pinions engaging said racks, rollers on the sides of said pinions, ribs on the inner sides of the case bearing on said rollers to maintain the pinions in engagement with said racks, and grooves in the ends of the door to receive said ribs, substantially as and for the purpose described.

11. In combination with a case having a door adapted to swing open from vertical to horizontal position and then slide back into the case, a transverse shaft located above the lower face of the door-frame when the latter is in horizontal position and having its ends passing through longitudinal slots or guides in the ends of said door-frame so as to permit the door to travel across said shaft, pinions on the ends of said shaft, and racks at opposite ends of the door adapted to engage with said pinions as the door is moved into or out of the case, substantially as described.

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

VICTOR P. DE KNIGHT.

Witnesses:

F. A. NEUBAUER,
STEPHEN GANO.