

No. 646,200.

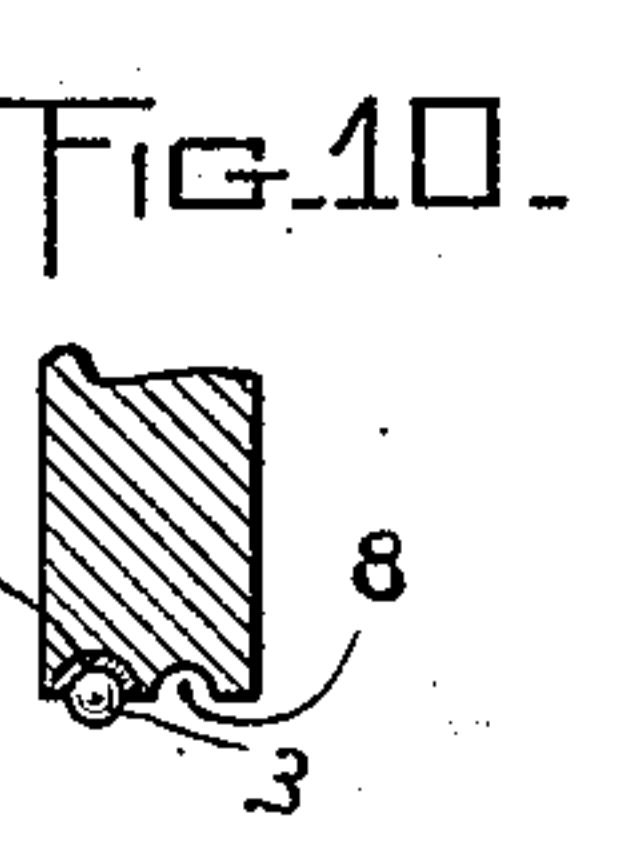
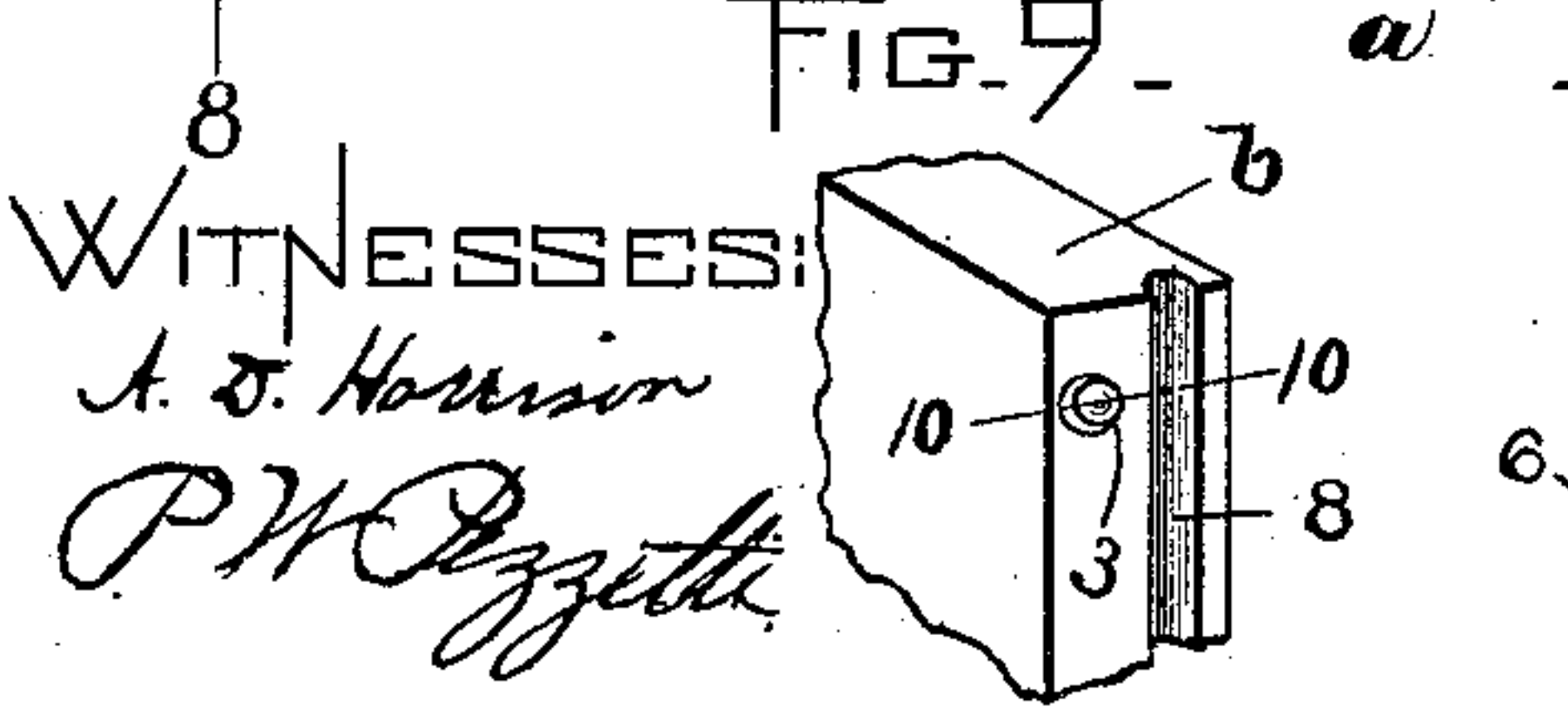
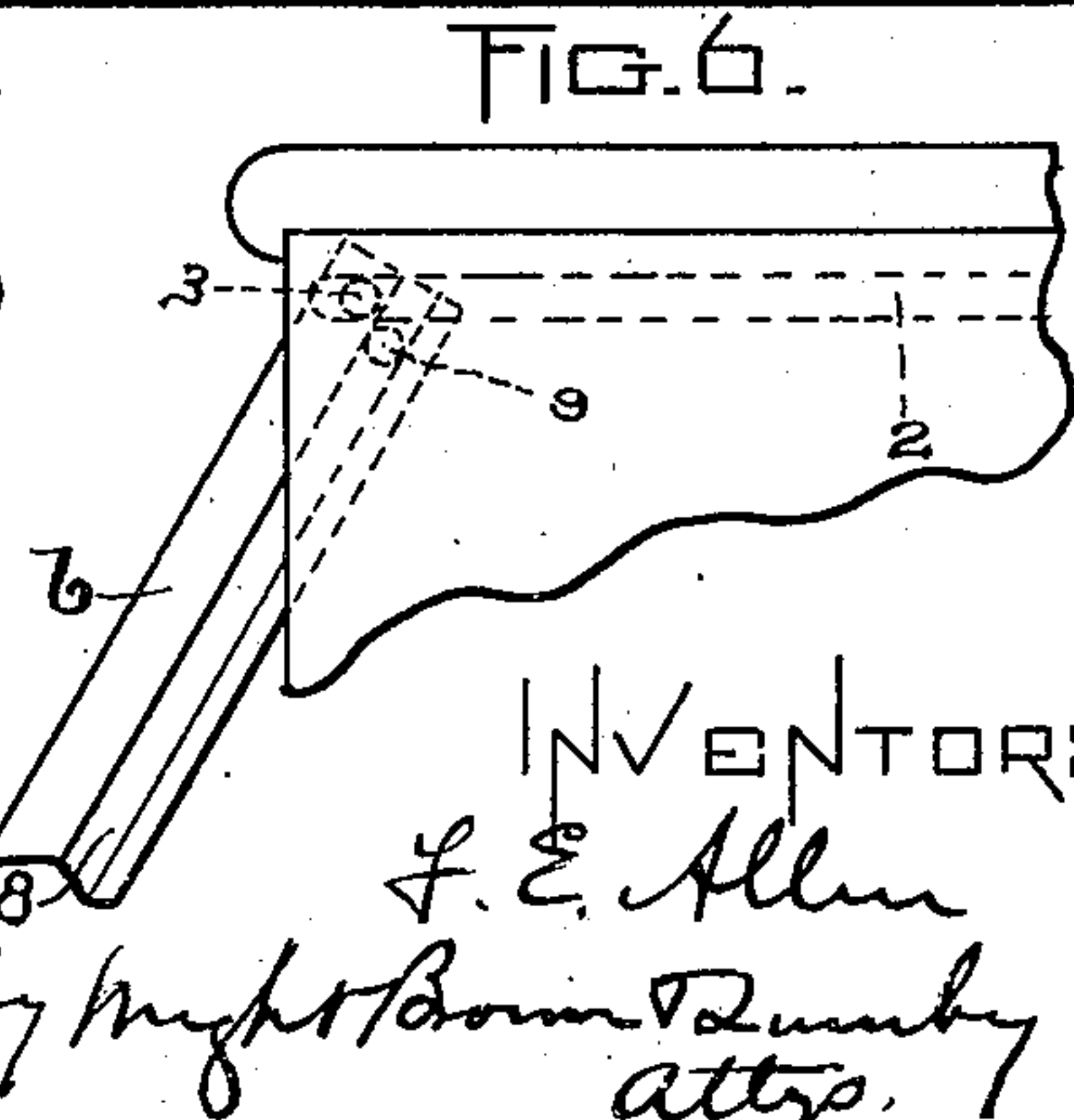
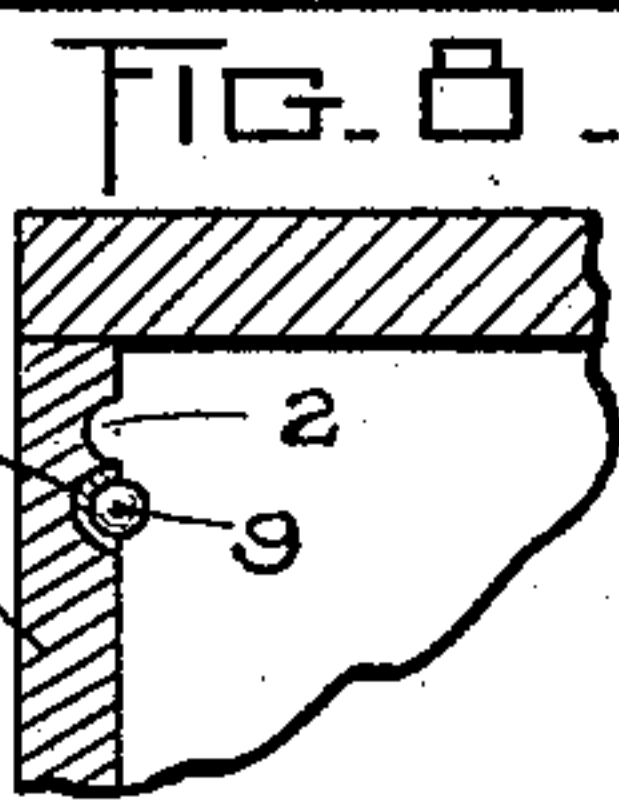
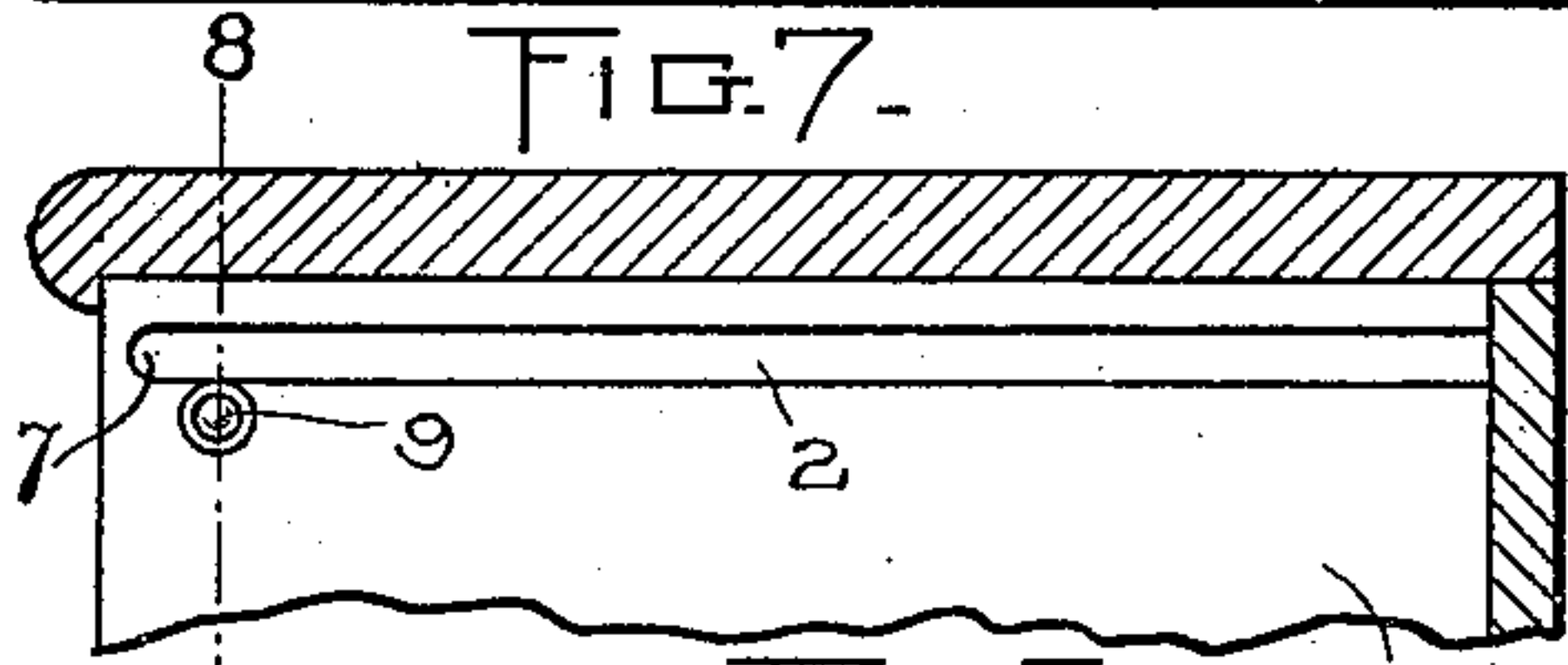
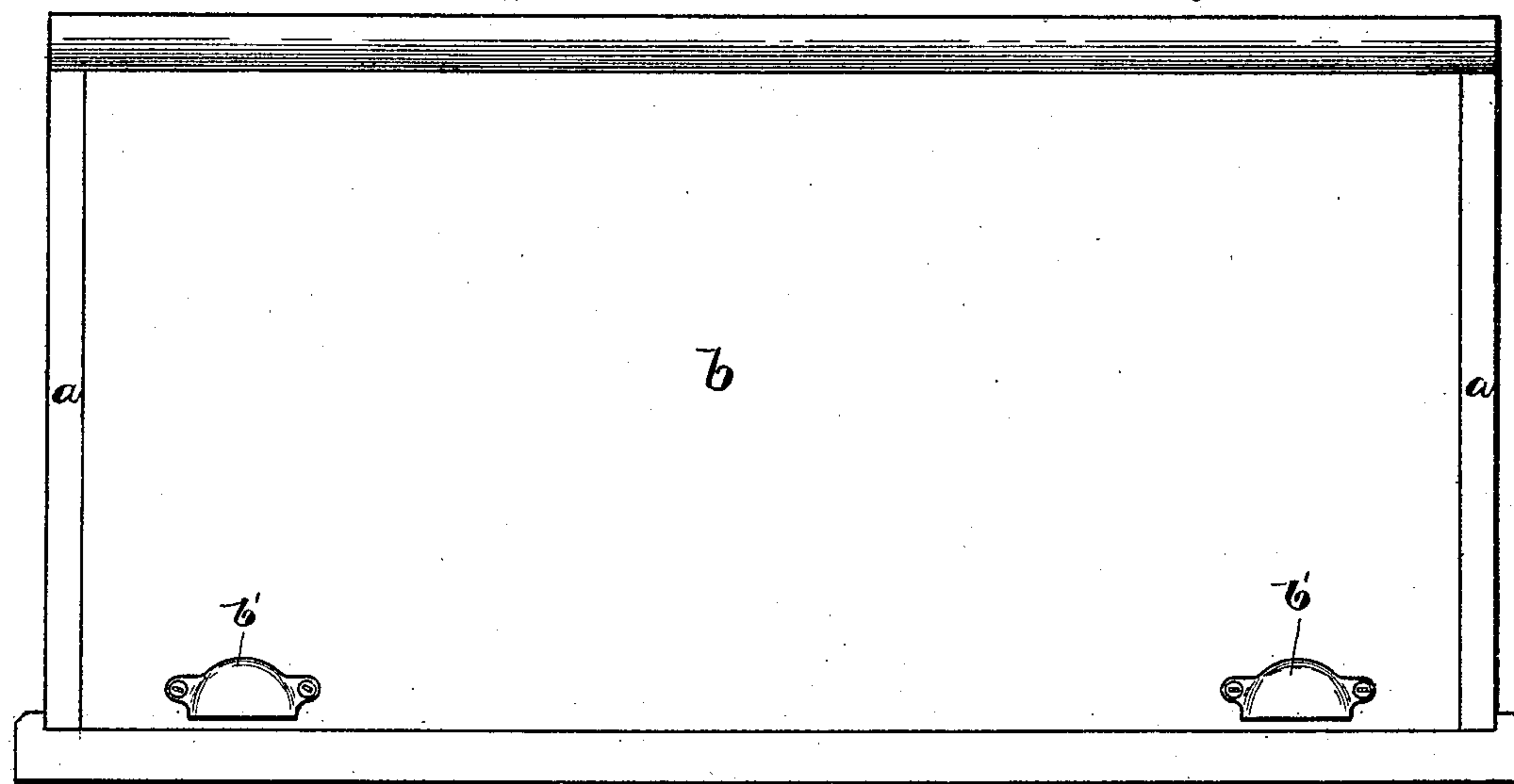
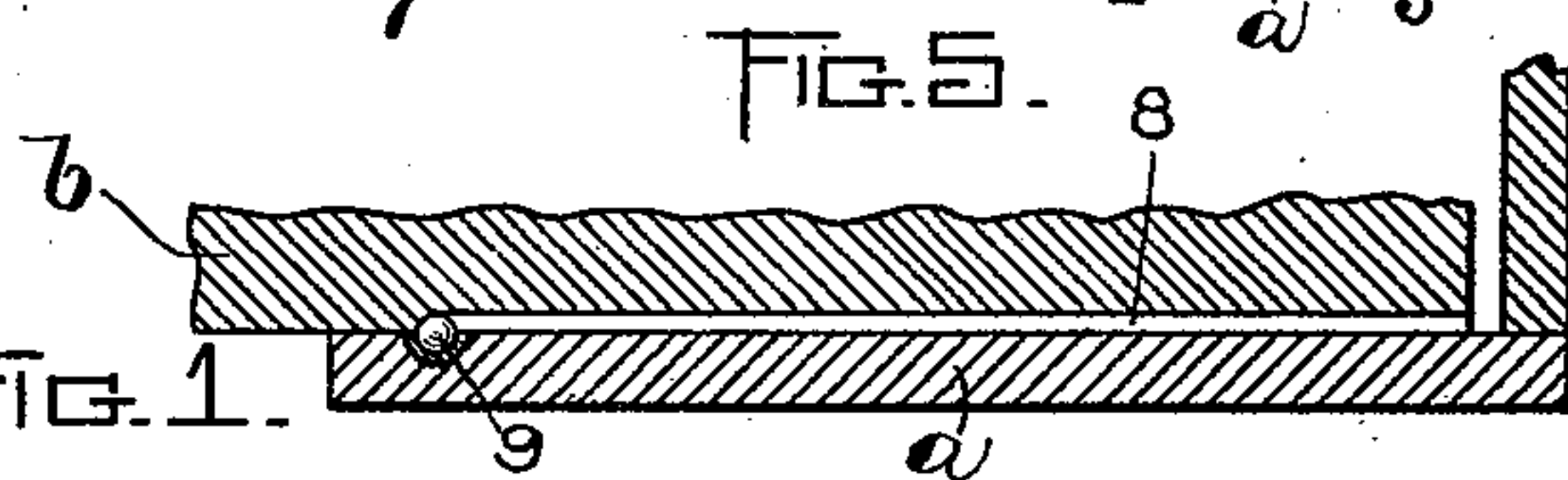
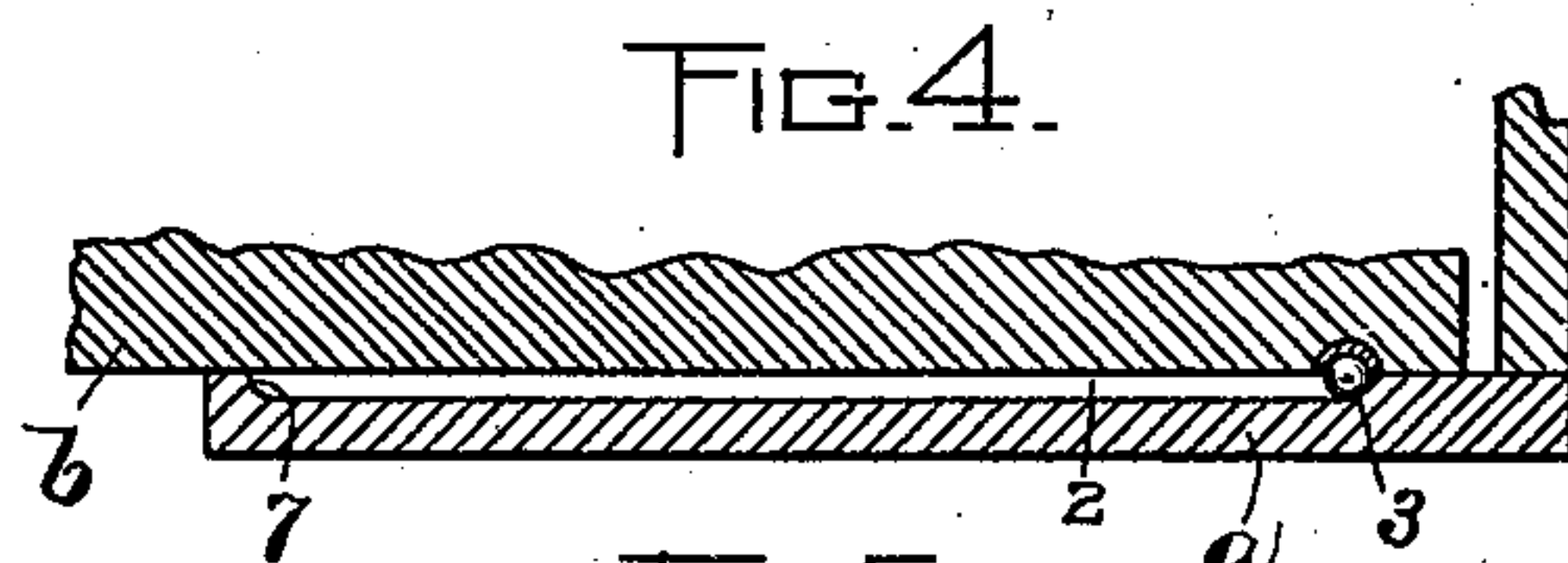
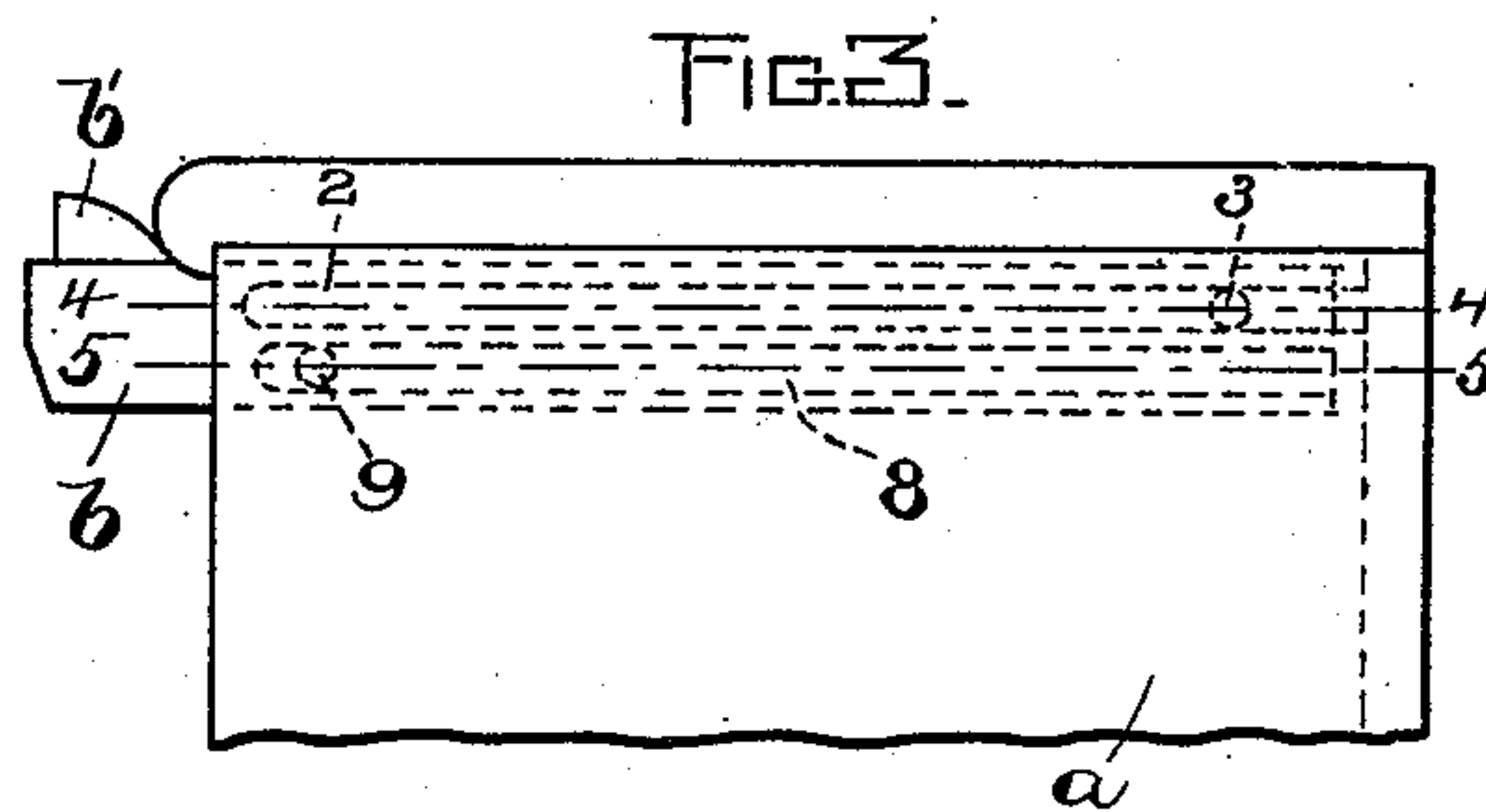
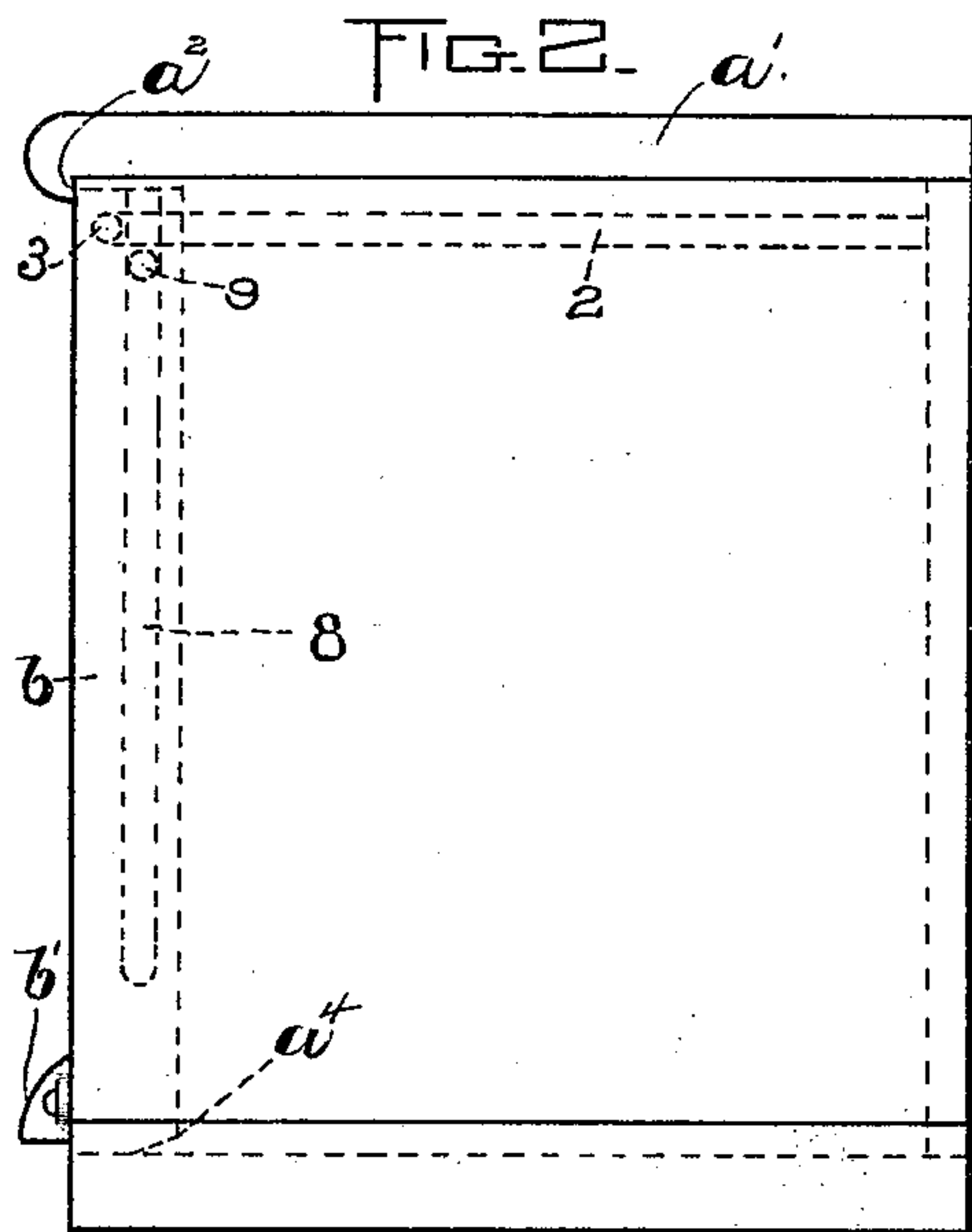
Patented Mar. 27, 1900.

F. E. ALLEN.

BOOKCASE, &c.

(Application filed Dec. 7, 1899.)

(No Model.)



WITNESSES:
A. S. Harrison
P. W. Dyer

INVENTOR:
F. E. Allen
by M. B. Dyer
attor.

UNITED STATES PATENT OFFICE.

FREDERICK E. ALLEN, OF BOSTON, MASSACHUSETTS, ASSIGNOR OF ONE-HALF TO FRANK E. H. GARY, OF SAME PLACE.

BOOKCASE, &c.

SPECIFICATION forming part of Letters Patent No. 646,200, dated March 27, 1900.

Application filed December 7, 1899. Serial No. 739,488. (No model.)

To all whom it may concern:

Be it known that I, FREDERICK E. ALLEN, of Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Bookcases, &c., of which the following is a specification.

This invention relates particularly to bookcases or bookcase-sections having a movable front or slide which is the equivalent of a door and is adapted to swing upwardly from a vertical position at the front of the case to a substantially-horizontal position at the upper portion of the case and to slide horizontally in and out above the contents of the case.

The invention has for its object to provide improved means for connecting the case and the movable front or slide in such manner that the said swinging and sliding movements may be effected with the minimum of frictional resistance and without liability of the sticking or binding of the slide while it is being moved.

The invention consists in the improvements which I will now proceed to describe and claim.

Of the accompanying drawings, forming a part of this specification, Figure 1 represents a front elevation of a bookcase or bookcase-section embodying my invention, the door or slide being closed. Fig. 2 represents an end elevation showing the door or slide in its closed position by dotted lines. Fig. 3 represents an end elevation showing the door or slide in its open position and pushed back into the casing. Fig. 4 represents a section on line 4 4 of Fig. 3. Fig. 5 represents a section on line 5 5 of Fig. 3. Fig. 6 represents a view similar to Fig. 3, showing the door or slide between its horizontal and vertical positions. Fig. 7 represents a sectional view of the casing looking toward one end thereof, the door or slide being removed. Fig. 8 represents a section on line 8 8 of Fig. 7. Fig. 9 represents a perspective view showing one corner of the door or slide. Fig. 10 represents a section on line 10 10, Fig. 9.

The same letters and numerals of reference indicate the same parts in all the views.

In the drawings, *a a* represent the end pieces of a bookcase-section or unit, which is here shown as of suitable form to be assembled

with other sections to form a bookcase composed of a tier or series of tiers of sections. It may be here stated, however, that my improvement hereinafter described is not limited to use in a bookcase-section or unit, but may be applied to casings of any other desired form and used in connection with a sliding part and a fixed casing for any purpose to which the invention may be found applicable.

b represents the door or slide, which is formed to fill the space between the end pieces *a a* and between the top and bottom pieces of the casing when in a vertical position, as shown in Figs. 1 and 2, the door or slide *b* being adapted to swing outwardly from its vertical position, as indicated in Fig. 6, and to be moved horizontally into the upper part of the casing, above the contents thereof, as indicated in Fig. 3.

In carrying out my invention I provide anti-friction coupling devices connecting the door or slide *b* with the casing, said devices having provisions for permitting the swinging and sliding movements of the door and for supporting it in a horizontal position without liability of the sticking or binding of the door during any part of its movement. The said anti-friction coupling or connecting devices comprise two substantially-horizontal grooves 2 2, formed in the end pieces *a a* of the casing, near the upper portion thereof, and balls 3 3, carried by and projecting from the end of the door or slide *b* and projecting into said grooves, the said balls being contained in hemispherical cavities 6 in the ends of the door *b*. The outer ends 7 of the grooves 2 constitute stops against which the balls 3 abut when the door reaches the outer end of its horizontal movement, the said ends or stops 7 and the balls 3 constituting complementary anti-friction hinge members when the balls come in contact with the stops, which permit the door or slide to swing freely from its horizontal to its vertical position, and vice versa. The said coupling or connecting devices also include grooves 8, formed longitudinally in the ends of the door *b*, and balls 9, carried by and projecting inwardly from the inner surfaces of the side pieces *a a* of the casing and entering the grooves 8, the side pieces be-

ing provided with hemispherical cavities 10, which confine the balls 9. The balls 9 are located below the casing-grooves 2 and behind the stops or hinge members 7, at the outer ends of said grooves, as shown in Fig. 7, the grooves 8 being correspondingly arranged, as indicated by dotted lines in Fig. 2, so that when the door *b* is in its vertical closed position the balls 3, carried by the door, bear against the stops or hinge members 7 and are located above and forward of the balls 9, so that a line connecting the centers of said balls would stand at an angle of about forty-five degrees. When the lower edge of the door is swung outwardly, the portions of the grooves 8 that are in contact with the casing-rolls move slightly downward on the balls 9, the door swinging on the balls 3. When the swinging movement of the door brings it to a horizontal position, the door is free to slide inwardly, the balls 3 of the door being in rolling contact with the walls of the grooves 2 of the casing, while the walls of the grooves 8 of the door are in rolling contact with the balls 9 of the casing. As the door slides inwardly the balls 3 pass over and rearwardly from the balls 9, so that when the door reaches the inner end of its horizontal movement the balls stand in the relative positions shown in Fig. 3 and afford adequate support to maintain the door in its horizontal position. When the door is being closed, it is moved horizontally outward until the balls 3 pass over and outside of the balls 9 and abut against the stops or hinge members 7. The door is then free to swing downwardly, the portions of the grooves 8 in contact with the balls 9 sliding upwardly on said balls during the downward movement.

It will be seen that the balls and grooves, arranged as shown, provide for very smooth and easy movement of the door or slide and prevent any possibility of the door sticking or binding while it is being moved, the balls and grooves cooperating both as side and end thrust bearings—that is to say, they support both sidewise and endwise pressure exerted on the slide. The end-thrust bearings enable the slide to be moved easily by pressure applied at or near one end, whereas without the end-thrust bearings the slide would be liable to bind if pushed or pulled from a point at one side of its mid-length. My invention is distinguished in this respect from slides which are supported by rolls against sidewise pressure only, side thrust or pressure bearings being unable to prevent binding or sticking from endwise thrust or pressure.

The top piece *a'* of the casing has a downwardly-projecting shoulder *a''*, which abuts against the upper portion of the door or slide *b* when the latter is closed and forms a dust-excluding joint therewith. The bottom piece *a'''* of the casing is also preferably provided with a shoulder *a''''*, which abuts against the lower portion of the inner surface of the door

and forms a dust-excluding joint therewith. The lower portion of the door is preferably provided with handles *b' b'*, by which it may be conveniently manipulated.

It is obvious that the above-described improvements may be applied to casings and drawers movable therein, the drawer taking the place of the slide or door *b* and being provided with the balls 3 and grooves 8.

I desire it understood that the terms “vertical” and “horizontal” as used herein and in the following claims are used relatively and are intended to indicate that the slide may occupy two positions, one of which is substantially at right angles to the other—that is to say, any structure in which a slide or door stands in a given operative position when closed and is capable of swinging on one edge from said position to an inoperative position substantially at right angles to the operative position and is movable when in its inoperative position to and from its retracted position will be no departure from the spirit of my invention.

When the invention is embodied in a slide such as a drawer, which does not require a swinging movement, and a casing in which the slide is movable, the grooves in the two parts will not necessarily be out of alinement with each other, the balls and grooves guiding the slide in a rectilinear direction without serving as hinge members.

I claim—

1. A casing, a slide movable therein, and antifrictional coupling members connecting said parts and comprising grooves formed in opposed surfaces of said parts, and balls projecting from each part into grooves in the other part, said balls and grooves cooperating both as side and end thrust bearings.

2. A casing, a slide movable therein and having grooves in its ends, substantially-horizontal grooves in the casing, the outer ends of the grooves constituting hinge members, balls carried by and projecting from the ends of the slide and entering said grooves, the balls cooperating as hinge members with the outer ends of the grooves when the slide is at the forward end of its horizontal movement, and balls journaled in the casing and entering the grooves in the slide, the casing-balls, and the slide-grooves constituting antifrictional means for preventing the slide from swinging when the slide-balls are separated from the outer ends of the casing-grooves, said balls and grooves cooperating both as side and end thrust bearings.

3. A casing, a slide movable therein, substantially-horizontal grooves in the casing, their outer ends constituting hinge members, slide-balls carried by and projecting from the ends of the slide and entering said grooves, the slide-balls cooperating as hinge members with the outer ends of the grooves when the slide is at the forward end of its movement, casing-balls supported by and projecting inwardly from the ends of the casing, said cas-

ing-balls being below and back from the hinge-member ends of the casing-grooves, and grooves in the ends of the slide receiving the said casing-balls, the slide-grooves and
5 casing-balls cooperating with each other and with the casing-grooves and slide-balls in supporting the slide horizontally, the series of balls and grooves constituting antifric-
tional side and end thrust bearings.
10 4. A casing having substantially-horizon-
tal guide-grooves, and balls arranged out of

alinement with said grooves, combined with a slide having grooves arranged to engage the balls on the casing, and balls arranged to engage the grooves in the casing, substantially 15 as described.

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

FREDERICK E. ALLEN.

Witnesses:

C. F. BROWN,

A. D. HARRISON.