

(No Model.)

6 Sheets—Sheet 1.

M. DONNE & C. J. MATHIAS.
HINGE.

No. 602,500.

Patented Apr. 19, 1898.

Fig. 1.

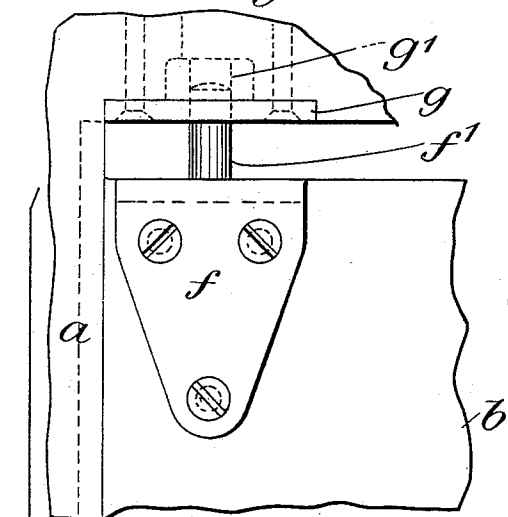


Fig. 2.

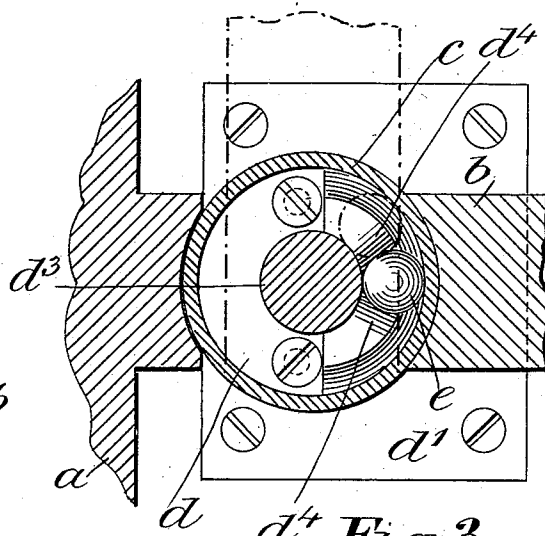
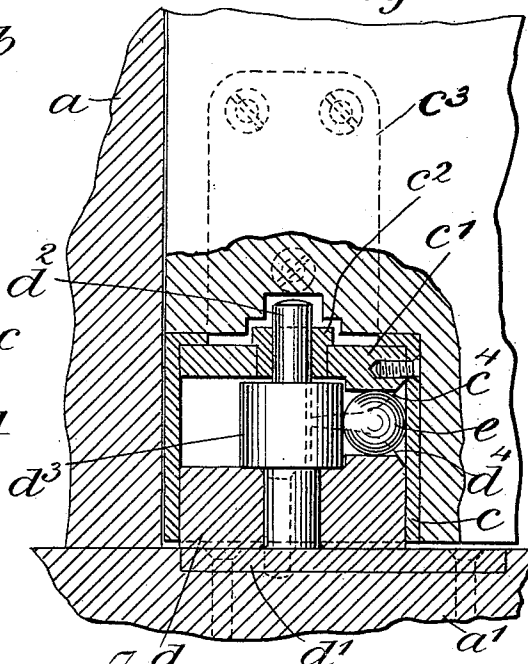
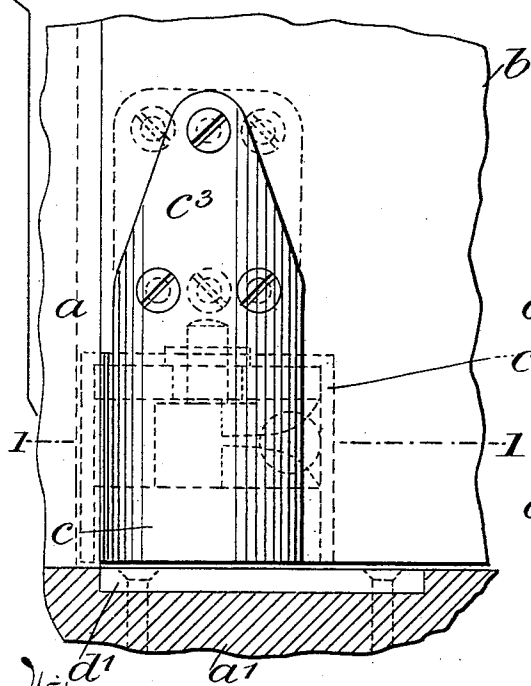


Fig. 3.



Witnesses.

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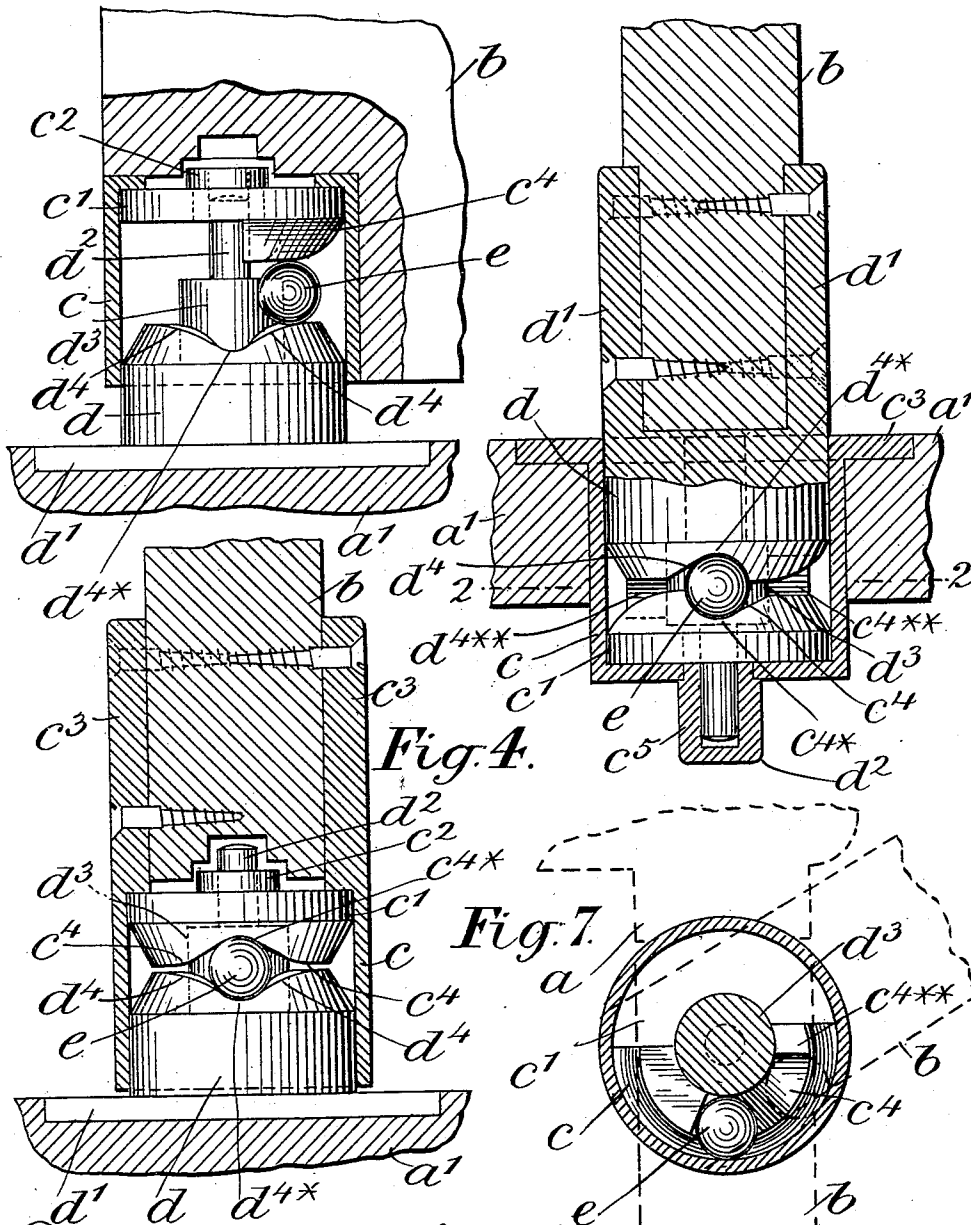
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Fig. 5.

Fig. 6.



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HINGE.

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Patented Apr. 19, 1898.

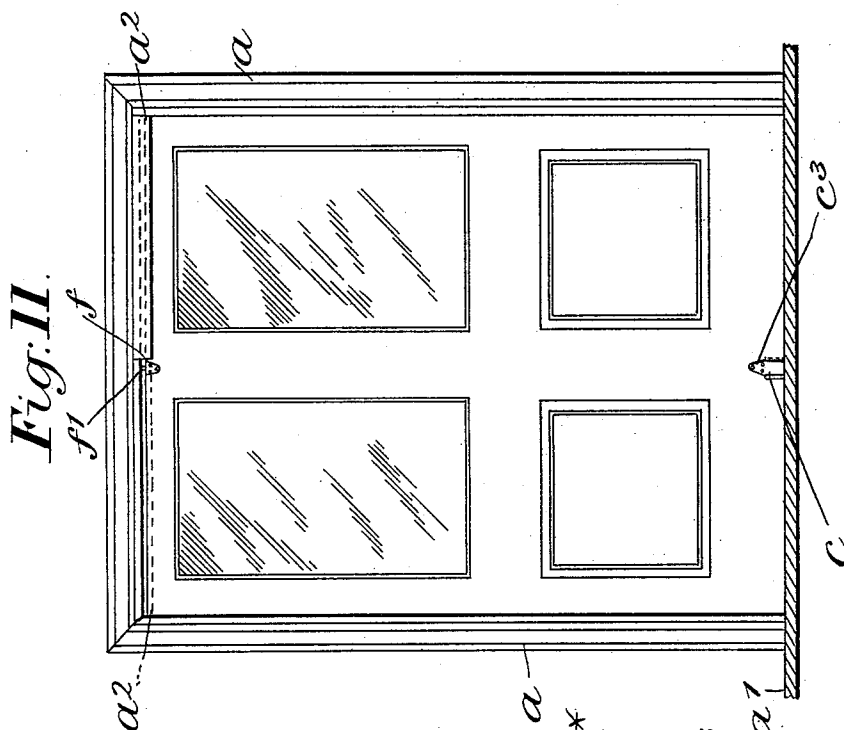
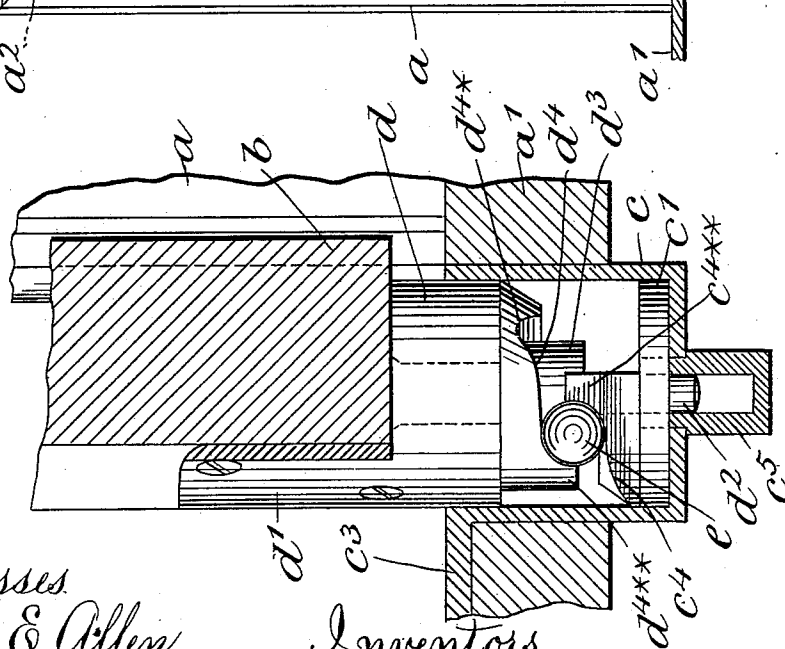


Fig. 8.



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Fig:9.

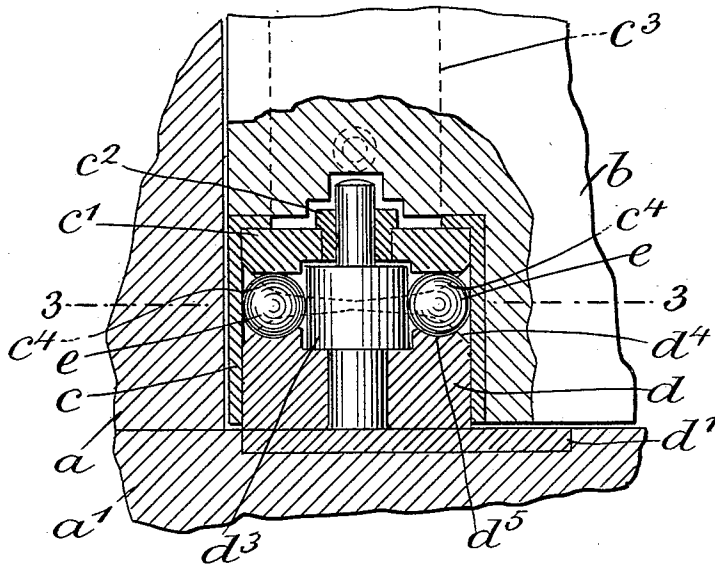
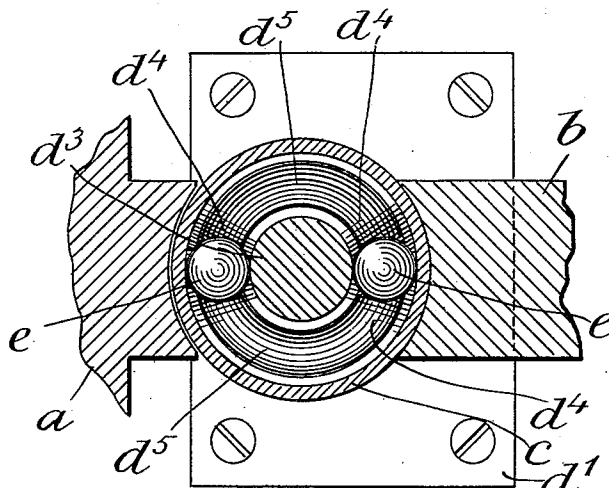


Fig:10.



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No. 602,500.

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Fig. 12.

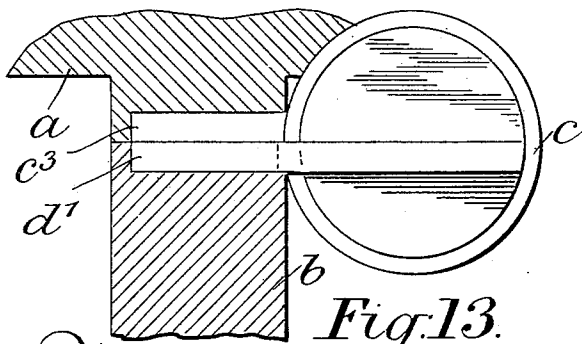
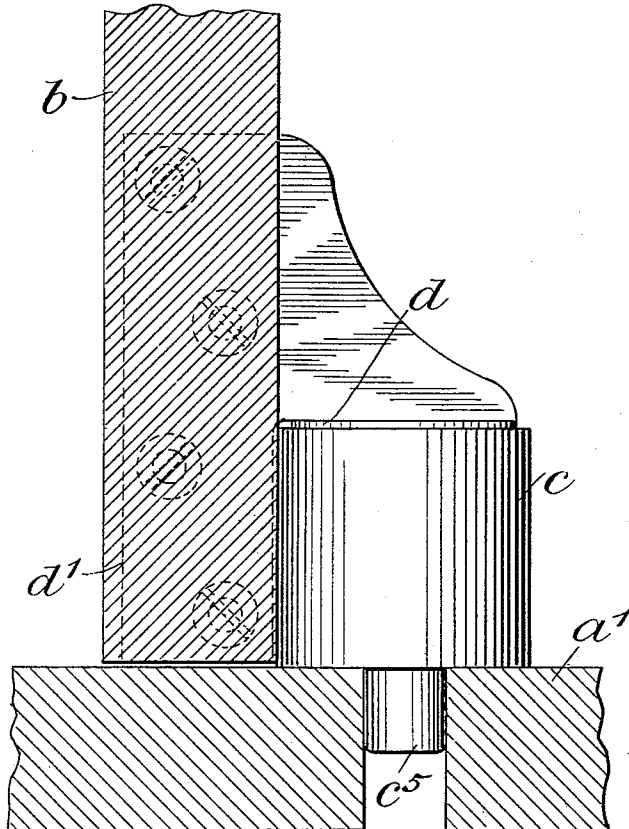


Fig. 13.

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No. 602,500.

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Fig. 14

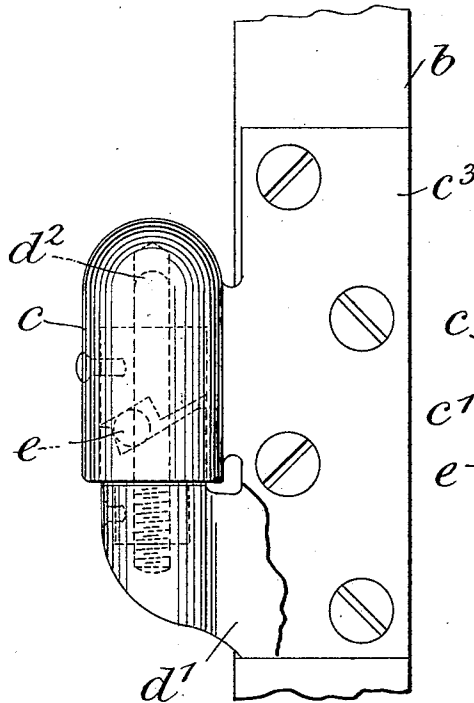


Fig. 16

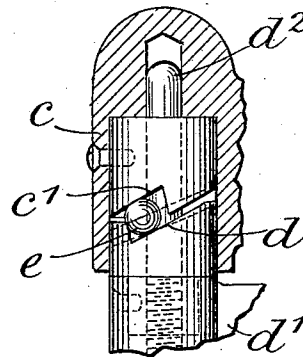


Fig. 17

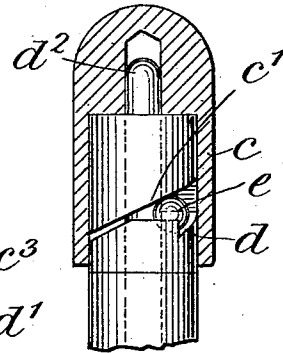
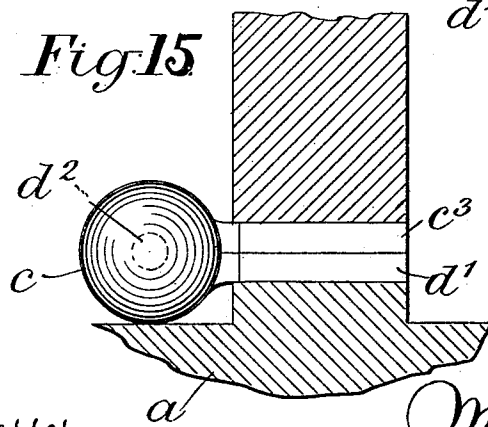


Fig. 15



Inventors

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UNITED STATES PATENT OFFICE.

MORGAN DONNE AND CHARLES JOSEPH MATHIAS, OF LONDON, ENGLAND.

HINGE.

SPECIFICATION forming part of Letters Patent No. 602,500, dated April 19, 1898.

Application filed September 20, 1895. Serial No. 563,157. (No model.)

To all whom it may concern:

Be it known that we, MORGAN DONNE, engineer, residing at 30 Belleville Road, Wandsworth Common, in the county of Surrey, and CHARLES JOSEPH MATHIAS, watchmaker, residing at 3 Eddiscombe Road, Fulham, London, in the county of Middlesex, England, subjects of the Queen of Great Britain, have invented certain new and useful Improvements in or Connected with Hinges for Self-Closing Doors, Shutters, or the Like, of which the following is a specification.

The invention relates to improvements in or connected with hinges for self-closing doors, shutters, or the like, and has for its object to obtain a simple, inexpensive, and compact form of hinge which will effect the closing of a door without the necessity for the employment of springs, pneumatic devices, or the like.

Our improvements consist in novel features of construction, as hereinafter described and claimed.

In order that the said invention may be fully understood, we will now proceed to describe the same in connection with the accompanying drawings, in which—

Figure 1 represents in elevation parts of a door and door-frame having the present invention applied thereto and showing the parts in their normal position. Fig. 2 is a horizontal section taken on the line 1 1 of Fig. 1. Fig. 3 is a vertical transverse section thereof. Fig. 4 is an elevation, partly in section, taken at right angles to Fig. 3. Fig. 5 is a similar view to Fig. 4, but showing the parts in the position they would assume with the door open. Fig. 6 is a similar view to Fig. 4, but representing a modified device applicable to a door shutting against a post. Fig. 7 is a horizontal section thereof, taken on the line 2 2 of Fig. 6. Fig. 8 is a similar view to Fig. 6, but showing the parts in the position they would assume with the door open. Fig. 9 is a vertical transverse section of a modified form of hinge, and Fig. 10 is a horizontal section taken on the line 3 3 of Fig. 9. Fig. 11 represents a swing-door of peculiar form having applied thereto a hinge of the form shown at Figs. 9 and 10. Fig. 12 represents a sectional elevation of a portion of a door, showing a modified method of fixing the device

therewith; and Fig. 13 is a plan thereof. Fig. 14 is a view representing the application of the present invention to an improved form of rising butt-hinge. Fig. 15 is a plan thereof. Fig. 16 is a vertical transverse section of part thereof; and Fig. 17 is a similar view to Fig. 16, but taken at right angles thereto.

In the several figures like parts are indicated by similar letters of reference.

Referring to Figs. 1 to 5, *a* represents the door-frame. *a'* represents the floor or lower part of the door-frame, and *b* represents the door.

One part of the hinge, which rises and falls with the door as the latter is opened and closed, is formed like a cylindrical box or case *c*, fixed with the door *b* by means of lugs *c³* and screws, as represented more particularly at Fig. 1, and the cylindrical box *c* is interiorly provided with a plug or disk *c'*, of hardened steel, forming the upper end thereof and furnished with a central bush *c²*, of brass or the like, axially apertured, for the purpose hereinafter described. The other part of the hinge consists of a cylindrical plunger or block *d*, carried by a foundation-plate *d'*, which is countersunk in the floor *a'* or the like and fixed thereto by means of screws, as will be readily understood, and the plunger *d*, which enters the cylindrical box *c*, has fixed therewith an axial pintle *d²*, the upper part of which is received into the aperture of the bush *c²* of the cylindrical box *c*, while the cylindrical plunger *d* fits the box *c* with sufficient nicety to exclude dust and the like.

Upon the end *c'* of the box *c* are formed two inclined planes *c⁴*, arranged in a curve struck from the axis of the apertured bush *c²*, and these inclined planes *c⁴* rise in opposite directions to their highest point.

Upon the face of the cylindrical plunger *d* are formed two corresponding inclined planes *d⁴*, so that in the normal position of the parts the several inclined planes *c⁴ d⁴* form the figure of a diamond, as represented more particularly at Fig. 4, the opposite faces of co-acting inclines *c⁴ d⁴* being so formed as to lie parallel to each other or approximately so. Between these inclines *c⁴ d⁴*—that is to say, within the diamond—is placed a steel ball *e*, of suitable diameter, and the inclines *c⁴* of the cylindrical box rest thereon, so that the ball

e supports the entire weight of the door b , while the ball e is laterally guided by means of the inner face of the box c and the face of a boss or enlargement d^3 , formed upon the axial pintle d^2 .

The axial pintle d^2 forms the axis upon which the lower part of the door b turns, while the upper part of the door has fixed therewith by means of a fitting f , secured thereto by screws, a stud or spindle f' , which enters a corresponding bearing g' , formed in a fitting g , secured to the under side of the top of the door-frame by means of screws, and both the axial pintle d^2 and the stud or spindle f' are of sufficient length to render the door capable of slight vertical movement for the purpose hereinafter described.

Upon the door b being turned upon its axial pintle d^2 and stud or spindle f' to open it the ball e will ride up to the top of one set of parallel or coacting inclines $c^4 d^4$, as shown at Fig. 5, in which position of the parts the door b will stand at right angles with its frame a and open, as represented by the dotted lines in Fig. 2. Upon the door being released the ball e will, by reason of the weight of the door b , run down the inclines $c^4 d^4$ and the door b will swing toward its normal or closed position and perhaps beyond the same, the ball running a short distance up the opposite inclines $c^4 d^4$, while ultimately the door b will resume its normal position, as represented at Figs. 1 to 4.

The device hereinbefore described is adapted to allow the door to swing freely in either direction; but in order to normally retain the door in its closed position a sharp depression $c^{4*} d^{4*}$ is formed at the bottom of each pair of inclines, into which the ball e will be received, thus holding the door against any light wind or other pressure and at the same time allowing the bottom of the door b to come close down to the floor, and thus act as an efficient draft-excluder, the sudden rise from the depressions $c^{4*} d^{4*}$ upon the opening of the door at once freeing it from the floor a' .

In the foregoing example the cylindrical box c is shown fixed with the door b , while the plunger d is shown fixed with the door-frame or floor a' ; but it is obvious that this arrangement might be reversed, as will be presently shown.

In the example given at Figs. 6, 7, and 8 the device is shown applied to a door b of the ordinary type employed in a dwelling-house and designed to close against a shutting-post. In this example the position of the parts is reversed as compared with that previously described—that is to say, the cylindrical box c is by means of a countersunk plate c^3 and screws fixed with the floor or frame a' , while the cylindrical plunger d is by means of lugs d' and screws fixed with the door b ; but it is obvious that the same arrangement as that hereinbefore described might be employed in this connection.

In lieu of providing both the cylindrical

box c and plunger d with double inclines, as hereinbefore described with respect to Figs. 1 to 5, in this case, inasmuch as the door is only required to swing through an arc of about one hundred and twenty degrees, a single incline $c^4 d^4$ is employed upon each part $c d$; but in order to prevent the door b opening beyond a given limit stops consisting of short inclines $c^{4**} d^{4**}$ are formed at the ends of the inclines c^4 and d^4 in order to limit the movement in that direction of the ball e , the extreme movement of the door b and ball e being indicated by the dotted lines in Fig. 7.

In order to inclose the working parts, the cylindrical box c is provided with an axial extension c^5 to receive the end of the axial pintle d^2 , and the box c when employed as the lower part of the hinge forms a convenient receptacle for grease, assuming that the device should need lubricating.

In the example given at Figs. 9 and 10 the inclines $c^4 d^4$ are formed double, as in the arrangement shown and described with respect to Figs. 1 to 5; but in order that the weight of the door may be distributed over a larger bearing-surface a set of such double inclines is employed upon each side of the axial pintle d^2 and will be clearly understood upon reference to Fig. 10, while in order that the balls e may run with as little friction as possible the face of the plunger d , upon which are formed the inclines d^4 , is provided with an annular groove or ball-race d^3 , in which the balls run; but apart from these differences the device is similar to that represented at Figs. 1 to 5.

In the example given at Fig. 11 the device represented at Figs. 9 and 10 is shown applied to a door of double width, mounted upon the hinge in such manner that the latter forms a central axis and the door is free to swing in either direction thereon. The double door b instead of being permitted to swing in either direction may shut against the door-frame a , and in this case the upper part of the frame would be provided with beads or draft-excluders a^2 upon opposite sides thereof, each extending half across the upper part of the frame, which will close the gaps which would otherwise be left between the upper part of the door-frame and the door when the latter is in its closed position consequent upon the balls e descending the inclines $c^4 d^4$.

In the example given at Figs. 12 and 13 the device is similar to that represented at Figs. 6, 7, and 8; but it is shown set off from the door and door-frame after the manner of an ordinary hinge, and in this case the cylindrical box c and the plunger d are each provided with a leaf or plate $c^3 d'$, similar to that of an ordinary hinge, and which parts are secured to the door b and door-frame a in the ordinary manner, and inasmuch as the cylindrical box c is shown to be the under part of the device, as in Figs. 6, 7, and 8, the extension c^5 is countersunk in the floor or frame a' .

In the example given at Figs. 14 to 17 the

invention is shown in the form of an improved rising butt-hinge, in which the cylinder *c* is cast or formed as an integral part of the hinge, while the other parts of the hinge are substantially the same as those hereinbefore described with respect to Figs. 6 to 8 and 12 and 13, except that the cylinder *c* forms the upper part of the hinge and the plunger *d* forms the lower part thereof.

Having now particularly described and ascertained the nature of the said invention and in what manner the same is to be performed, we declare that what we claim is—

1. A hinge for self-closing doors and shutters in which is combined an axial pintle providing an inner bearing for a spherical ball, the plug formed with an inclined plane and surrounding the pintle, the plunger formed with a correspondingly-inclined plane and surrounding the pintle, a loose rising-and-falling spherical ball located in the spiral runway formed by the inclined planes, and a cylindrical casing providing a housing for the plug and for the plunger and also an outer bearing for the spherical ball; substantially as described.

2. A hinge for self-closing doors and shutters in which is combined an axial pintle providing an inner bearing for a spherical ball, the plug formed with an inclined plane and with a sharp depression at the inner end of its inclined plane and surrounding the pintle,

the plunger formed with a correspondingly-inclined plane and with a sharp depression at the inner end of its inclined plane and surrounding the pintle, a loose rising-and-falling spherical ball located in the spiral runway formed by the inclined planes, and a cylindrical casing providing a housing for the plug and for the plunger and also an outer bearing for the spherical ball; substantially as described.

3. A hinge for self-closing doors and shutters in which is combined an axial pintle, a cylindrical boss surrounding the axial pintle and providing an inner bearing for a spherical ball, the plug formed with two oppositely-inclined planes and with a sharp depression joining its inclined planes, the plunger formed with two correspondingly oppositely-inclined planes and with a sharp depression joining its inclined planes, a loose rising-and-falling spherical ball located in the spiral and diamond-shaped runway formed by the oppositely-inclined planes, the bush surrounding the pintle within the plug and a cylindrical case providing a housing for the plug and for the plunger and also an outer bearing for the spherical ball; substantially as described.

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