No. 647,905. Patented Apr. 17, 1900.

D. ROCHE.

HINGE.

(Application filed Apr. 10, 1899.)

(No Model.)

Fig. 1,

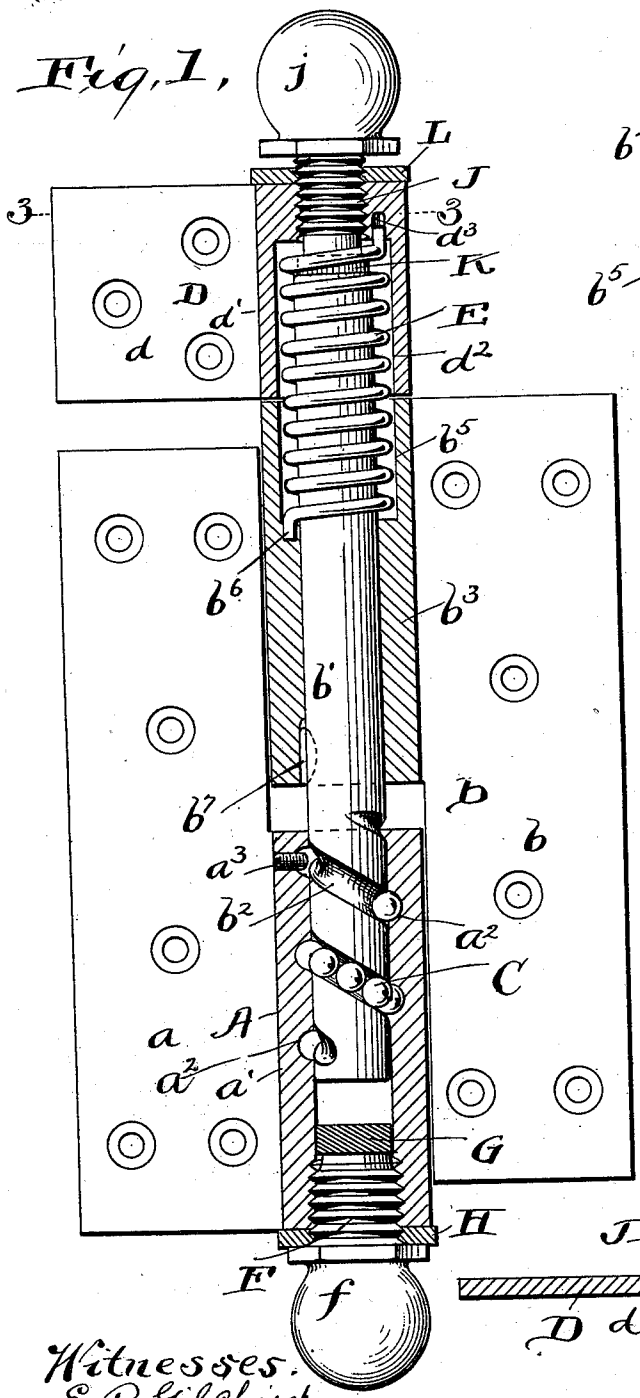


Fig. 2,

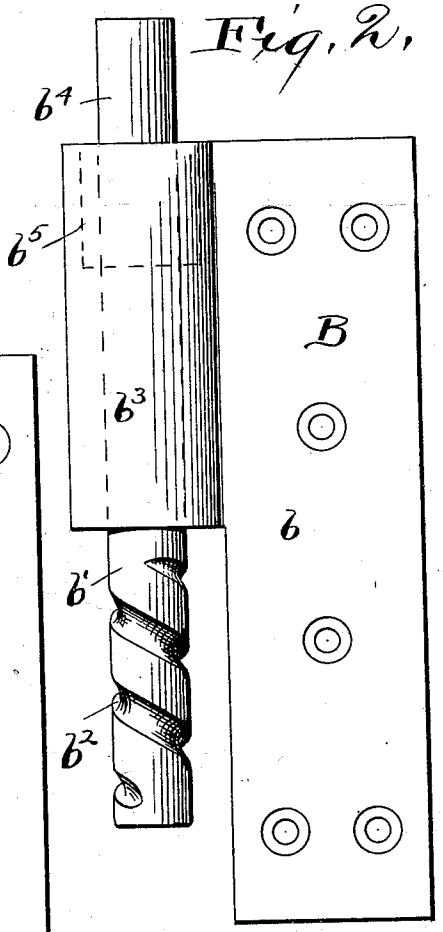
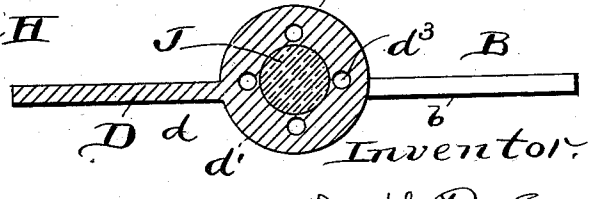


Fig. 3,



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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

DAVID ROCHE, OF CLEVELAND, OHIO, ASSIGNOR OF ONE-HALF TO ALBERT H. BATES, OF SAME PLACE.

HINGE.

SPECIFICATION forming part of Letters Patent No. 647,905, dated April 17, 1900.

Application filed April 10, 1899. Serial No. 712,490. (No model.)

To all whom it may concern:

Be it known that I, DAVID ROCHE, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented a certain new and useful Improvement in Hinges, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings.

The object of my invention is to provide a self-closing hinge suitable for doors. I find I can accomplish this result very satisfactorily by making the hinge-pintle rigid with one of the leaves and forming a helical groove entirely surrounding it and a coöperating groove in the barrel of the other hinge member and placing balls in the raceway thus formed, which entirely surround the pintle and relieve the friction in all directions.

I am aware that self-closing hinges have been heretofore devised having coöperating inclined grooves and a ball rolling between them; but this prior device has not had the groove entirely surrounding the pintle, and the single ball employed has not operated to relieve the friction in all directions.

My invention consists in the means I employ, as above mentioned, and more specifically in the embodiment hereinafter described, all of which is definitely specified in the claims.

In the drawings which clearly disclose my invention, Figure 1 is a front elevation, partly sectional, of the hinge when open. Fig. 2 is a front elevation of the member of the hinge which carries the pintle; and Fig. 3 is a horizontal section through the hinge, being on the line 3 3 of Fig. 1.

Referring to the parts by letters, A represents the member of the hinge which is intended to be secured to the jamb. It consists of the leaf a and the barrel a' integral therewith and having on its inner surface the helical groove a^2, which makes something more than a complete convolution, preferably about two convolutions. B represents the other member of the hinge, having the leaf b and the rigid pintle b', secured in place by being forced into the boss or barrel b^3, integral with the leaf, and being additionally secured by the key b^7. Surrounding the pintle below the barrel b^3 is the helical groove b^2, which makes, preferably, about two complete convolutions.

In the raceway formed by the coöperating grooves a^2 b^2 are a set of balls C, which entirely surround the pintle, and thus not only receive the downward thrust, but also all the lateral thrust, and the raceway continues beyond the space which the balls take sufficiently to allow room for them to travel when the hinge is open. This is an important matter, as if the balls only partially surrounded the pintle they would jam against the opposite side of the barrel a' and cause sufficient friction to prevent the efficient operation of the hinge, and if there was not room enough for them to roll the hinge could not of course open without the pintle sliding on the balls, which is also to be avoided. For the hinge to make a half-turn, which is all that is ordinarily required, the additional rolling space for the balls need be only a quarter-turn; but as it is desirable for the hinge to be able to entirely open the effective raceway should be at least one and one-half convolutions. To allow leeway, I prefer to make the raceway about two complete convolutions. When the door is open, the balls and raceway operate as a screw-thread and raise the door, and hence gravity tends to swing it shut at a constant rate, no matter what its position.

A stop in the form of a screw a^3 is set into the barrel a' near the upper end after the balls are in place, to lock the hinge members together by preventing the balls rolling out if the parts are inverted.

In order to give the door an additional start to close from its extreme open position, I provide another hinge member D, having the leaf d and the barrel d', which barrel takes loosely over the upper projecting end b^4 of the pintle. A helical spring E lies around this upper end of the pintle within a recess d^2 in the barrel d' and a recess b^5 in the barrel b^3. This spring may be loosely in place, relying on its compression to aid gravity, or it may, as shown in the drawings, have one end secured to the barrel b^3 and the other to the barrel d' by having projecting ends, which take into holes b^6 and d^3. In this construction the spring may be easily adjustable by having

several of the holes d^3, the upper end of the spring being caught in the desired hole according to the position of the member D before it is secured to the jamb.

A buffer resisting the closing action of the hinge as it is just about to come into final position, and thus preventing slamming of the door, is provided by a plug F, screwing into the lower end of the barrel a'. This plug may support a rubber cushion G, adjustable by screwing in or out the plug and locking it by the jam-nut H, or, if desired, the cushion may be pneumatic, a suitable orifice being provided for the escape of air. The head of the plug is preferably made in an ornamental form, as the ball f.

In order to form either a buffer to receive the opening thrust of the hinge or an absolute stop limiting the same, I screw into the barrel d' the plug J, preferably having the ornamental head j, and let it stand in the path of the pintle b'. When the door has opened the desired amount, the pintle will have raised sufficiently to bear against the plug and further movement will be prevented. An elastic cushion K may be between the plug and the pintle to cushion this stop. The jam-nut L locks the plug in its desired position. If the plug is screwed down tight, the door may be thereby locked shut.

Having described my invention, I claim—

1. In a hinge, in combination, two leaves, one of them having a barrel and the other a pintle, coöperating helical grooves around the inner surface of the barrel and the outer surface of the pintle, said grooves making something over a complete convolution, and a set of balls within the raceway thus formed and extending clear around the pintle, substantially as described.

2. In a hinge, the combination of a hinged member having a barrel, another hinge member having a pintle extending into the barrel, a raceway formed by coöperating helical grooves on the outer surface of the pintle and the inner surface of the barrel, said raceway making at least one and one-fourth convolutions about the pintle, balls in said raceway sufficient to completely surround the pintle whereby the hinge may be opened one hundred and eighty degrees without the balls passing out of the raceway, and means for preventing the balls rolling out of the raceway if the hinge is inverted, substantially as described.

3. In a hinge, in combination, a pair of leaves, one carrying a barrel, the other a pintle, coöperating helical grooves on the inner surface of the barrel and the outer surface of the pintle, balls rolling in the raceway thus formed, and a plug screwing into the end of the barrel and operating to retard the closing movement of the pintle, substantially as described.

4. The combination of a pair of hinge members, one having a barrel and the other a pintle extending into said barrel, coöperating helical grooves on the inner surface of the barrel and the outer surface of the pintle, and balls in said grooves, a plug screwing into the barrel, and an elastic cushion held by the plug within the barrel in adjustable position, substantially as described.

5. In a hinge, a pair of coöperating members connected together by a helical thread whereby as the members open one of them rises, a third member, and an adjustable stop carried thereby and limiting such rising movement, substantially as described.

6. In a hinge, in combination, a pair of hinge members connected together by a helical thread whereby as the hinge opens one member rises, a pair of plugs operating to limit the longitudinal movement of said rising member, one of said plugs thus limiting the opening movement of the hinge and the other the closing movement, substantially as described.

7. In a hinge, in combination, the member B having a barrel b^3 and a pintle b' which projects beyond each end of the barrel, a member A having a barrel a', a helical raceway formed partly in the barrel a' and partly in one of the projecting ends of the pintle, balls in said raceway, a hinge member D having a barrel d' into which the other projecting end of the pintle takes, a spring E surrounding said projecting end and lying within said barrel d', substantially as described.

8. In a hinge, in combination, a member A having a barrel a', a member B having a pintle b' and a barrel b^3 in which is a recess b^5, there being coöperating helical grooves in the barrel a' and on the pintle, balls in said grooves, a hinge member D having a barrel d' in which is a recess d^2, and a spring E lying in both of said recesses d^2 and b^5, substantially as described.

9. In a hinge, in combination, a member A having a barrel a', a member B having a pintle b' projecting in each direction, there being coöperating helical grooves formed in the barrel a' and on one of the projecting portions of the pintle, balls rolling in said grooves, a member D having a barrel taking loosely over the other projecting portion of the pintle, and a spring around said projecting portion within said barrel d', said spring having an upturned end taking into one of a plurality of holes d^3 in said barrel, whereby the force of the spring may be adjusted by varying the hole with which said upturned end engages, substantially as described.

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

DAVID ROCHE.

Witnesses:
ALBERT H. BATES,
PHILIP E. KNOWLTON.