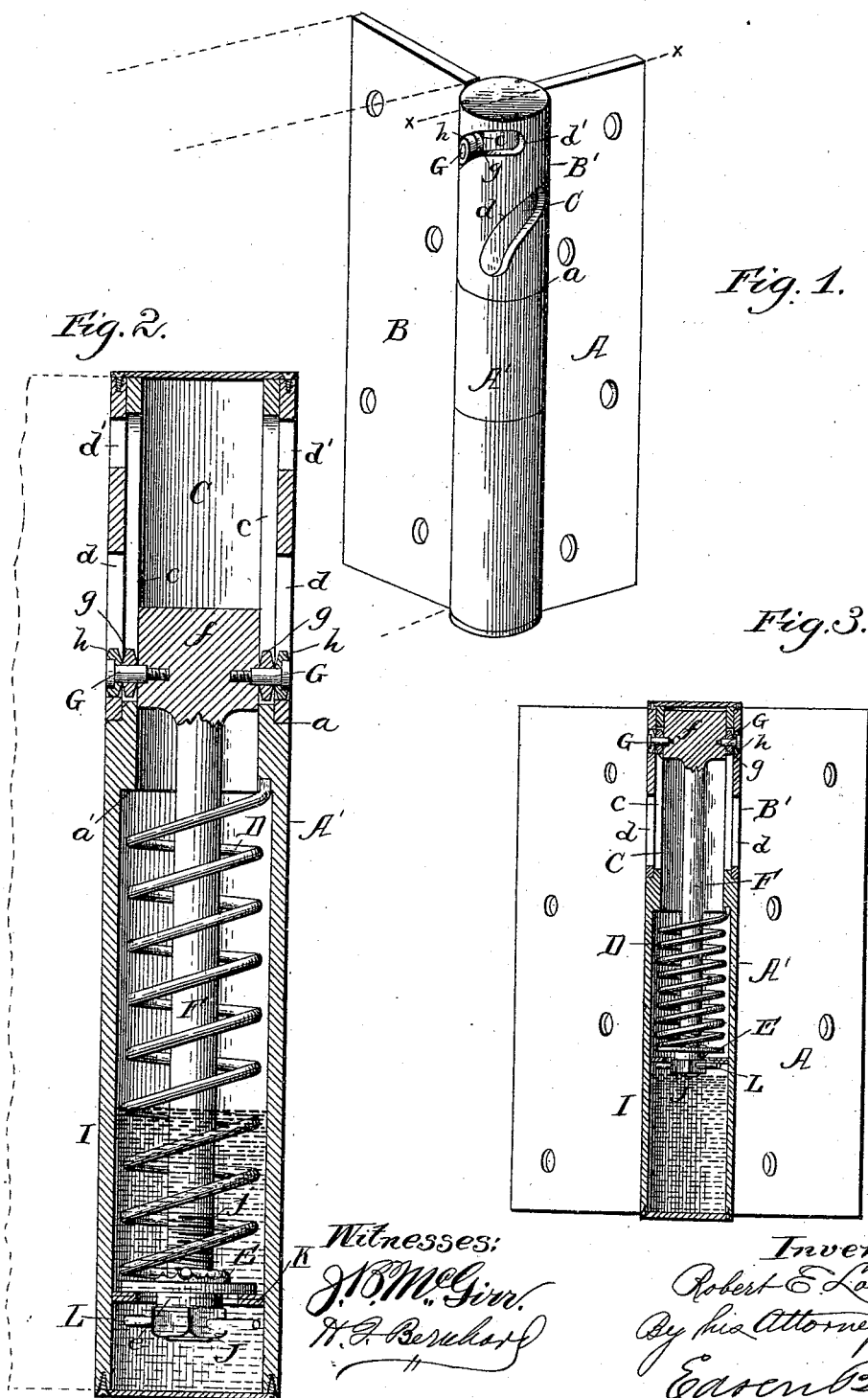


R. E. LOWE.
SPRING HINGE AND CHECK.

No. 491,898.

Patented Feb. 14, 1893.



Witnesses:
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Inventor:
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Fig. 5.

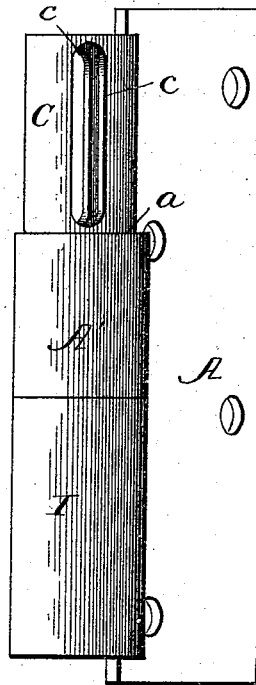
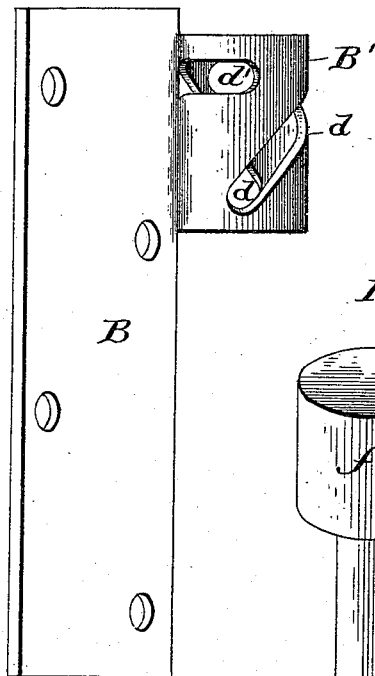


Fig. 6.

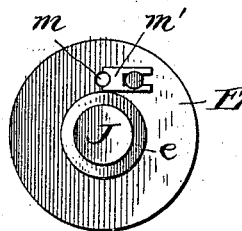
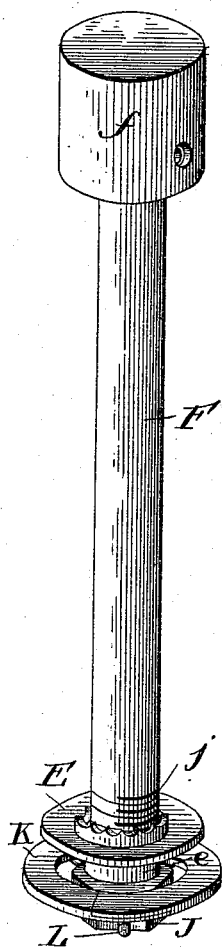


Fig. 7.

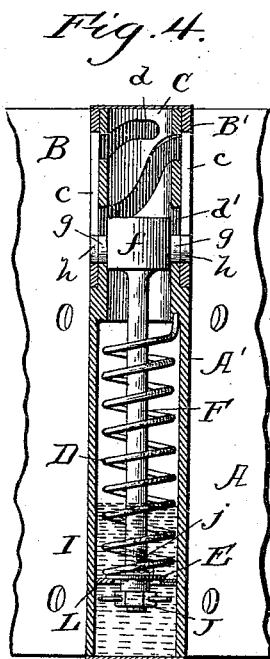


Fig. 8.

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SPRING-HINGE AND CHECK.

SPECIFICATION forming part of Letters Patent No. 491,898, dated February 14, 1893.

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To all whom it may concern:

Be it known that I, ROBERT EVERETT LOWE, a citizen of the United States, residing at Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in a Combined Spring-Hinge and Check; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to a novel spring hinge with which is combined a check adapted to counteract, in a measure, the power of the spring and insure a gradual closing of the door, whereby said door is prevented from closing too suddenly.

The first part of my invention consists in the combination of a stationary hinge-leaf having the hinge-pintle rigid therewith, a moving leaf with its knuckle fitted to turn freely on said rigid pintle, a vertically reciprocating rod or plunger operating freely in said knuckle and connected with the moving knuckle to be reciprocated positively thereby when the moving leaf is opened or closed, and a spring arranged within the knuckles, or one of them, to be put under tension by the vertical movement of the rod in one direction. By providing the hinge with the pintle which is rigid with the knuckle of the stationary leaf, I am enabled to prevent the leaves from being separated when for any cause the plunger or spring becomes disarranged or broken, and thus obviate destroying the utility of the hinge.

In the practical embodiment of my invention, I prefer to provide the rigid pintle with vertical slots and the moving knuckle with spiral shaped slots, in which ride suitable devices carried by the plunger or rod which is reciprocated or moved vertically as well as turned axially to put the spring under tension. The arrangement of the spiral grooves is such that the plunger is given a quick movement when the door is opened slightly to place the spring under considerable tension and cause it to exert its greatest strain when the door is only part way opened, and when the door is fully opened the pins or rollers of the plunger are fitted in lateral prolongations of the slots so that while the

spring is under tension the door is prevented from swinging back and held in its open position when for any cause the door should be held back, as for instance when moving large objects through the door or for sweeping or other purposes.

My invention further consists in the provision of a novel valve mechanism and dash pot adapted for use in connection with the knuckles and the plunger or rod and which is so constructed as to permit of the quick passage of the working fluid around and beneath the head of the plunger or rod when the latter is raised by the opening of the door and which insures the slow return movement of the fluid through said head when the door is closed and thereby prevent the door from closing quickly.

The invention further consists in the peculiar combination of a spiral spring and the plunger or rod whereby the spring is put under tension by twisting the same around its axis and compressing or distending it longitudinally, thus securing a better action; and the invention finally consists in the novel combination of devices and peculiar construction and arrangement of parts which will be hereinafter fully described and more particularly pointed out in the claims.

To enable others to more readily understand my invention, I have illustrated the same in the accompanying drawings, forming a part hereof, and in which—

Figure 1 is a perspective of my combined spring hinge and check. Fig. 2 is a longitudinal vertical sectional view thereof on the plane indicated by the dotted line $x-x$ of Fig. 1, showing the leaves closed together and the plunger or rod lowered. Fig. 3 is a similar view with the parts reversed, showing the leaves when partially distended and the spring compressed. Figs. 4 and 5 are detail perspective views of the two leaves detached. Fig. 6 is a similar view of the plunger or rod. Fig. 7 is a bottom plan view of the head on the plunger or rod to show the slide controlled port therein. Fig. 8 is a sectional view of a modification.

Like letters of reference denote corresponding parts in the several figures of the drawings, referring to which—

A, B, designate respectively, the fixed and

moving leaves of the hinge which are provided with the usual knuckles A', B', arranged in vertical alignment with each other, each leaf having a single knuckle only. The leaf knuckles are connected by a vertical tubular pintle C which forms an integral part of the hinge, and is inseparable therefrom; and in the practical construction of my hinge I prefer to make the tubular pintle integral with the knuckle A' of the fixed leaf A, said pintle being cast with said knuckle and leaf. The pintle extends upwardly from the knuckle A', which is the lower knuckle of the hinge; and said pintle is of less diameter than the diameter of said lower knuckle, thereby forming an annular ledge or shoulder *a* which constitutes the bearing for the upper knuckle B' of the moving leaf B, said knuckles A', B', being the same in diameter and lying flush or concentric with each other to present a symmetrical appearance. The inner diameter of the tubular pintle is less than that of the knuckles thus forming a ledge *a'* within the hinge, against which bears the upper end of a coiled spring D which is thus housed or contained within the lower knuckle A' of the hinge. This coiled spring acts at its lower end against a valved-disk E which is rigidly secured to the lower end of a vertical rod or plunger F that moves freely in the knuckles and tubular pintle of the hinge; and the upper end of said plunger or rod is provided with an enlarged head *f* which is of such diameter that it fits snugly in the bore of the tubular plunger and serves to guide the plunger in its vertical play in the hinge. The upper end of the rod or plunger carries horizontally-extending arms, or a continuous shaft, G which projects beyond the head of the rod or plunger at diametric points and passes through peculiarly arranged slots in the tubular pintle and knuckle B' of the moving leaf, the arms or shaft being rigidly attached to the head *f* and carrying four friction rollers which ride on the walls of the slots in said pintle and moving knuckle.

The tubular fixed pintle is provided with straight vertical slots *c, c*, which are formed therein at diametrically opposite sides and which are arranged in alignment with each other, and extend from the lower knuckle A' nearly to the upper extremity of the pintle, and in these vertical slots operate two of the friction rollers *g, g*, of the four rollers provided on the arms or shaft G of the rod or plunger.

The knuckle B' of the moving hinge-leaf B is provided with irregular spiral slots *d, d*, which begin on opposite sides of the knuckle, each spiral slot *d* having a quick ascent or rise at its lower part, thence of less pitch or inclination as it approaches and passes the horizontal middle of the knuckle, and thence extended into a horizontal offset *d'* which is near the upper edge of the knuckle and lies substantially parallel with said upper edge, the horizontal offset terminating in a vertical

line drawn through the lower extremity of the other slot. I attach especial importance to the peculiar arrangement of the spiral slots *d, d'*, in which ride the friction rollers *h, h*, which with the rollers *g, g*, constitute the four rollers provided in my hinge.

With the spring hinge I combine a fluid check in which a dash-pot or receptacle I is used with the valved disk E. This receptacle I is rigid or integral with the lower knuckle A' of the fixed leaf A, and in this receptacle operates said disk E, which is of less diameter than that of the receptacle or lower knuckle A' so as to permit the working fluid to shift or flow freely around the edges of the disk when the rod or plunger F is raised. The lower end of the rod is externally screw threaded, as at *j*, and the disk E has a threaded central boss *e* which is screwed on the threaded end of the rod and is held in place thereon by a jam nut J, the boss depending from the disk and being in contact with the nut so as to leave an intermediate space between the opposing faces of the nut and disk. In this space is fitted the loose valve ring K which operates to control the passage of the working fluid around the disk E of the reciprocating rod or plunger, the movements of the valve being limited by its contact with the disk and the arms of a spider L which is rigid with and carried by the jam-nut J on the lower end of said rod or plunger. This valve is made in the form of a split ring or annulus, having its meeting ends overlapping each other so as to permit the ring to be expanded and contracted to a limited extent, and the diameter of the ring corresponds nearly to the internal diameter of the receptacle I of the dash pot so that the edges of the valve ring hug closely to the inner surface of said receptacle and provide a close or tight joint between said ring and the receptacle. As the plunger or rod is raised by the coacting inclines and vertical slots of the hinge acting on the rollers or projections of the plunger or rod when the door is opened, the valve ring K is depressed by its frictional contact with the walls of the dash-pot and the weight of the superimposed working fluid, so that the liquid is free to flow around the edges of the disk E, through the valve-ring and into the bottom part of the receptacle I, thus permitting the working fluid to shift quickly when the door is opened which is very desirable as the fluid does not retard the opening of the door; but in order to cushion the closing of the door and prevent the strong spring from violently shutting the door, I provide for the slow and gradual return of the working fluid to the upper part of the dash pot. This is accomplished by closing the valve as the plunger or rod descends to prevent the working fluid from passing around the edges of the disk and valve, and providing a small port or opening *m* in the disk E through which the fluid is forced slowly as the rod or plunger descends, the displacement of the

fluid being in proportion to the descent of the disk and plunger so that the latter controls the moving leaf B to permit a gradual closing of the door. The rate of displacement of the working fluid on the descent of the plunger or rod when the door is closed by the recoil of the spring, can be regulated by varying the area or size of the port *m* in the disk E which can be effected in any preferred way, as for instance, by a slide valve *m'* that is suitably connected to the disk E and can be adjusted more or less across the port *m*, as is obvious.

The spring in my preferred embodiment of the hinge is arranged to be compressed by the upward movement of the rod or plunger on the opening of the door, but it may be arranged to be distended or expanded on the ascent of the plunger or rod by a reverse arrangement of the coacting inclines, vertical guides and the projections on the rod or plunger. And to impart or give to the spring greater force, I arrange so that the spring is given a torsional or spirally twisted action when the plunger is reciprocated by the movement of the door, which is accomplished by securing or fastening the respective ends of the spiral spring D to the knuckle A' and the disk E and by reversing the arrangement of the slots, *i. e.*, the spiral slots are formed in the fixed tubular pintle and the straight slots in the moving knuckle as shown in Fig. 8, so that the spring is compressed when the plunger is raised and the plunger or rod is turned axially by the rollers, the spring is given a twisted or torsional strain in addition to its longitudinal compression. The lateral offsets *d'* in the spiral slots *d* of the moving knuckles effect an important purpose; after the rollers are raised by the inclines to elevate the plunger, said rollers enter the lateral offsets *d'* and are prevented from being returned to the inclined portions of the slots and thereby the spring is compressed and the door prevented from closing until it has been moved sufficiently to cause the rollers to enter the inclined slots. It is evident that under ordinary conditions, as when a person passes in or out of a building, the door will not be opened far enough to force the rollers in the lateral offsets of the irregular grooves; but when it is desired to open the door wide so that articles can be carried through the door, or for sweeping or other purposes, the door is forced back to its widest limit and the rollers enter the offsets *d'* to hold the door wide open, it only being necessary to give the door a slight push to start it as the spring is at the strongest point, being held under compressed strain.

This being the construction of my spring hinge and check, the operation is as follows:— Normally the leaves are closed together and the plunger is in its lowered position, with the rollers at the bottom of the slots. On opening the door, the coacting inclines on the moving knuckle and the vertical guides on

the tubular pintle serve to lift the plunger or rod in a straight vertical line, and at the same time the valve ring is depressed by its frictional contact with the dash-tub and the weight of the working fluid, so that the fluid can escape quickly around the edges of the disk and below the piston on the initial movement of the door to avoid retarding the same. The friction rollers have a quick ascent or rise on the inclined walls of the slots when the door is first opened, to thus put the spring under considerable tension, and as the door is further opened, the spring is further compressed, so that when the door is released, the reaction of the spring causes the plunger to start downward until the valve is closed by coming against the head E to cause the fluid to pass through the contracted port *m*, thus insuring the gradual closing of the door.

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

1. The combination of the stationary and moving leaves connected by a tubular pintle which forms an integral part of the hinge, a reciprocating plunger or rod within said tubular pintle and the knuckles, and a spring arranged to be put under tension by said rod or plunger, substantially as and for the purpose described.

2. The combination of a fixed leaf having the rigid tubular pintle, the moving leaf with its knuckle fitted on said pintle, the rod or plunger operating within the pintle and knuckles and having projections arranged to ride on coacting inclines and guides of the moving knuckle and pintle, and the spring, substantially as and for the purpose described.

3. The combination of the fixed and movable leaves connected by a tubular pintle forming an inseparable part of the hinge, the vertical rod or plunger fitted within said pintle and the knuckles, the spring a dash-pot and a valve mechanism movable with the plunger or rod and arranged to be opened to its fullest extent when the leaves are opened and to be closed on the return movement of the plunger or rod, a contracted escape orifice being provided for the working fluid to shift through as the leaves come together under the recoil of the spring, as and for the purpose described.

4. In a combined spring hinge and check employing fixed and movable leaves, a rod and a spring, the combination therewith of a valve mechanism movable with said rod and having a perforated head, a spider, and an expansible valve-ring arranged to play freely between the disk and spider and having a tight frictional contact with the walls of the dash-pot, substantially as described.

5. In a combined spring hinge and check, the combination with the fixed and movable leaves, a reciprocating rod, and a spring, of a dash-pot rigid with the lower knuckle of the hinge, the disk secured to the rod and having a slide-controlled port therein, an expansible

valve ring fitted below the disk and having frictional contact with the dash tub, and means for limiting the play of the valve-ring relatively to the disk, substantially as and
5 for the purpose described.

6. The combination of the fixed and moving leaves of a hinge connected by a tubular pintle forming an integral part of the hinge, the vertical rod within said pintle and the
10 knuckles and connected to the moving-leaf knuckle to be moved vertically and axially thereby, and a spring arranged to be put under torsional and longitudinal tension by the movement of said plunger or rod, substan-
15 tially as described.

7. The combination of the fixed and moving leaves connected by a pintle forming an inseparable part of the hinge, the moving knuckle being provided with the irregular

slots having the lateral offsets at one end, the
20 plunger or rod having projections which ride in said irregular grooves, and a spring, substantially as described.

8. The combination of a fixed leaf having the tubular pintle, the moving leaf with the
25 spiral slots which have a quick ascent or pitch at the lower parts thereof and terminate at their upper ends in the lateral offsets, the rod or plunger within the pintle and the knuckles
30 and having the projections which ride in the slots, and the spring, substantially as described.

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

ROBERT EVERETT LOWE.

Witnesses:

JACOB WELSH,

GEO. E. FREDERICK.