R. G. WINTER.

HINGE.

APPLICATION FILED MAR. 9, 1907.

1,108,298. Patented Aug. 25, 1914.

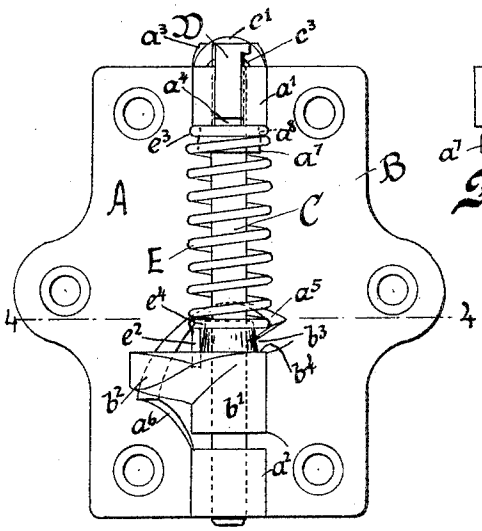


Fig. 1

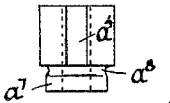


Fig. 7

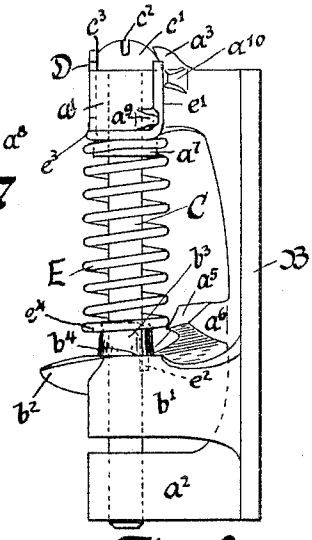


Fig. 2

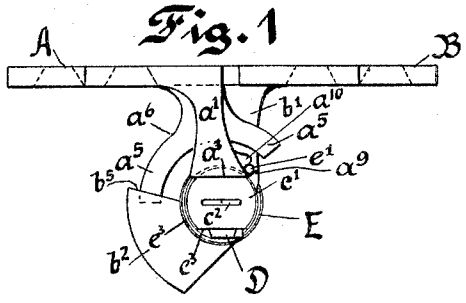


Fig. 3

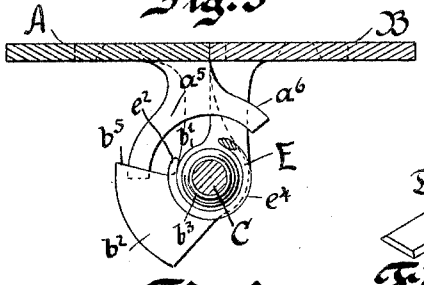


Fig. 4



Fig. 8

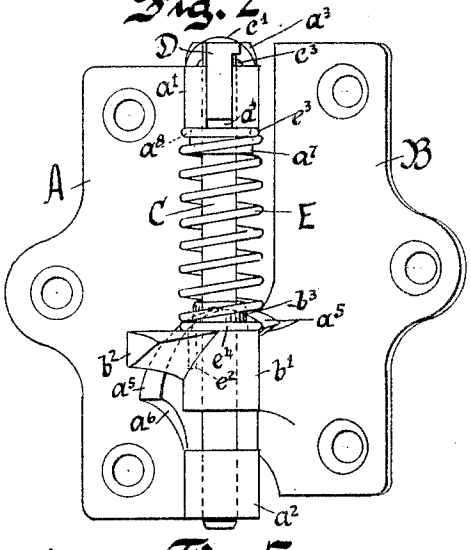


Fig. 5

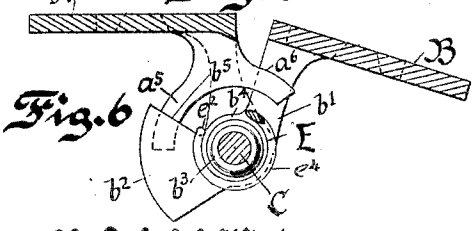


Fig. 6

Witnesses

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UNITED STATES PATENT OFFICE.

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HINGE.

1,108,298. Specification of Letters Patent. Patented Aug. 25, 1914.

Application filed March 9, 1907. Serial No. 361,502.

To all whom it may concern:

Be it known that I, RUDOLPH G. WINTER, of Milwaukee, Wisconsin, have invented a Hinge, of which the following is a specification.

My invention relates to gravity hinges, that is to say, to hinges of that type wherein the swinging-leaf with the door attached thereto rises in opening so that gravity acts automatically to close the door when released.

The object of this invention is to provide a combination of gravity and spring hinge to overcome certain defects which I have found to exist in gravity hinges of the ordinary type wherein no spring is used; while at the same time preserving the merits of cheapness and the other advantages which characterize a gravity-hinge.

More particularly I aim to overcome an objection which commonly exists to the use of a gravity-hinge for screen-doors which are of very light construction, and consequently less subject to the influence of gravity tending to shut them than other doors, when extraneous forces act upon them tending to keep them open. If there happens to be any considerable wind or breeze blowing in such a direction as to strike against the inner face of the door when it is open it often happens that such wind will hold the door open and prevent it from acting in response to the gravity hinge to shut it. Now while this is objectionable in itself, the use of a spring hinge or of a door-spring on the door would be still more objectionable because in such case the door will always shut with a slam so long as the spring is strong enough to shut it at all, while after a short period of use the spring as a rule becomes weakened and strained to such an extent that it fails to properly close the door.

In my invention I so combine a spring with a gravity hinge that it does not act upon the door in all positions but only when it is wide open, or after a certain degree of opening movement. Thus the effect of the spring is added to that of gravity tending to close the door when it is wide open, in which position the wind is likely to act upon it to hold it so, but the action of the spring ceases when the door is nearly shut, in which position the wind is no longer effective to hold it open.

The hinge herein described is thus not only constructed upon a novel principle, but also involves other novel features of convenience and simplicity which will be hereinafter described and are set forth in my claims.

A special feature of my improved hinge comprises a novel means for locking the pintle in place and preventing it from rising in its socket, which is a frequent defect of gravity hinges.

My improved construction may best be understood from the consideration of the description taken in connection with the accompanying drawings, wherein—

Figure 1 is a front elevation of my improved hinge in the closed position of the door, Fig. 2 is a side elevation thereof in the same position, Fig. 3 is a plan view thereof in the same position, Fig. 4 is a transverse section thereof on the line 4 of Fig. 1 and taken in the same position, Fig. 5 is a front view of the hinge in a partially open position, that is to say, in the position in which the spring first begins to act, Fig. 6 is a plan section of the hinge similar to Fig. 4 but showing the leaves in the relative position of Fig. 5, Fig. 7 is a detailed view of the upper pintle-lug of the fixed leaf of the hinge, and Fig. 8 is a perspective view of the pintle-key.

In these drawings every reference letter and numeral refers always to the same part.

The hinge as shown in the drawings comprises two leaves, namely, a fixed leaf A, and a swinging leaf B, the relative functions of which may, of course, be reversed by simply turning the hinge upside down, and in referring to the respective leaves as the fixed and the swinging leaves I wish it understood that this is done merely for convenience of nomenclature and with a full comprehension of the possibility of interchanging the parts. The fixed leaf A has a pair of perforated pintle-lugs a^1 and a^2 at its upper and lower end, respectively, through which passes a pintle C which has a cup-shaped head c^1 in which is preferably formed a nick c^2 by which the pintle may be rotated for the purposes hereinafter set forth. At one side of said pintle-lug a^1 and preferably on the side at which it is joined to the base of the hinge-leaf, is formed a raised snug a^3, which overhangs the head c^1 of the pintle and holds it in such manner as to prevent the head from rising out of place when turned into the position shown in the drawings. The head c^1 has a flat surface c^3 formed upon one side

thereof, which is of such dimensions as to clear the snug a^3 when turned to register therewith and thus enable the pintle to be withdrawn from its socket. On the opposite or outer side of the pintle-lug a^1, a dovetailed groove a^4 is formed in the periphery thereof in which fits a dovetailed key D, clearly illustrated in Figs. 1 and 2. It is to be understood that the head c^1 of the pintle-bolt covers the end of the groove a^4 and prevents the key D from being inserted therein except when said pintle-head is turned until the flat c^3 thereof registers with said groove a^4, whereupon the key D being inserted and driven into place the pintle is prevented from rotating and thus is prevented from leaving its socket until said key D is removed and the head rotated until the flat c^3 registers with the snug a^3 as aforesaid.

The swinging leaf B of the hinge has at an intermediate point of its length a single pintle-lug b^1, which is arranged to slide vertically on the pintle and carries a radially projecting cam-lug b^2, which latter coacts with an arcuate helicoidal cam-surface a^5 formed upon a special cam-lug a^6 concentric with the pintle C and projecting from an intermediate point of the fixed leaf A in such manner as to project under and to support the lug b^2 of the swinging leaf B. The special form and slope of the different parts of the helicoidal cam-surface a^5 may be as described and shown in my copending application No. 264,396, filed June 9, 1905, or otherwise, but they are not claimed herein, and form no part of my present application, except as incidental to the other novel features of construction as will be hereinafter seen.

Surrounding the pintle C is a coiled spring E which has its respective ends bent at right angles parallel to its axis as shown at e^1 and e^2. The spring is not supported directly upon the pintle C nor does it touch the latter, but the pintle-lugs a^1 and b^1 are provided with cylindrical bosses a^7 and b^3 (the latter preferably somewhat tapered as shown) which coöperate with and receive the ends of the spring, being of such diameter as to pass inside said ends. When properly assembled the spring E is secured in place upon the cylindrical boss a^7, which latter is provided with an annular groove a^8 at its base, and the end coil e^3 of the spring C is made slightly smaller in diameter so that it snaps into the groove a^8 and holds the spring permanently in place on the lug a^1. To keep it from rotating there are formed on the side of the lug a^1 a pair of raised snugs a^9 and a^{10}, which are placed and formed so that the upwardly bent end e^1 of the spring snaps between them and is likewise resiliently held against coming out.

It is to be observed that at its lower end the spring does not rest upon the flat shoulder b^4 of the lug b^1 at the base of the boss b^3 in the closed position of the hinge, but only after the hinge has been opened to a greater or less extent depending upon the point at which it is desired that the spring come into action. The downwardly bent end e^2 of the spring is so disposed as to lie in the path of the cam-lug b^2 in opening as shown; and also is so placed that it does not strike upon the advance face b^5 of said cam-lug until after the door has opened to a certain angle, preferably the same angle as corresponds to the striking of the end-coil e^4 of the spring against the shoulder b^4. The position corresponding to this angle of opening at which the spring first comes into action is illustrated in Figs. 5 and 6. It will be observed therefore, that the action of the spring does not begin until after the door has opened through a certain angle and at that point the spring starts suddenly into action, and moreover, this action is of a double nature namely, axial compression, and also an axial torsion of the spring. The torsion acts directly to close the door, while the compression acts to assist gravity by pressing lug b^2 upon the cam-surface a^5. From a small opening of the door this action is slight so that the door will not be voilently slammed under ordinary circumstances, but at the same time the action of the spring is sufficient to overcome any wind-pressure directly against the face of the door when wide open.

An important result accomplished by having the spring secured practically fast to the fixed hinge-leaf (although readily removable therefrom by a slight twisting movement) is that the spring can not get lost when the door is taken off its hinges as in winter by removing the pintle. If the spring were free in place when the pintle is lifted out, the spring would fall and roll away, or if kept it would very likely get lost as being a seperate object; but according to my construction this is impossible as the spring remains firmly attached to the upper pintle-lug at all times. If desirable the same fixed leaf and spring can be used interchangeably with two or more swinging leaves fixed to different doors, as for example, where a screen door in summer is replaced by a storm door in winter, the same spring serving for both.

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

1. In a gravity-hinge the combination with a pair of hinge-leaves having interacting cam-lugs which coact to cause a closing-movement of the door by gravity, a spring acting between the two hinge-leaves which is distorted by the opening thereof beyond a certain minimum angle of opening of said leaves; the ends of said spring engaging

both hinge-leaves beyond said minimum angle and not engaging both hinge-leaves within said minimum angle; whereby said spring acts to assist the action of gravity in closing the door by any angle of opening greater than said minimum angle, said spring ceasing to act within said angle.

2. In a gravity hinge, in combination with a pair of hinge-leaves having interacting cam-lugs which coact to cause a closing movement of the door by gravity, a spring acting by joint torsion and compression to assist the action of gravity in closing the door through a limited angle of opening thereof.

3. The combination with a gravity hinge comprising a pair of hinge-leaves pivoted together, a pintle connecting and forming the pivot for said leaves, and a pair of interacting cam-lugs on the respective leaves acting by gravity to close the door, of a coiled torsion-spring surrounding said pintle and having one end abutting against a fixed part of one of said leaves, and the other free when the door is closed but arranged to abut against a fixed part of the other leaf at a predetermined point in the opening movement of the door.

4. The combination with a gravity hinge comprising a pair of hinge-leaves, one having a pair of pintle-lugs at its opposite ends and the other having an intermediate pintle-lug, and a pintle pivotally connecting said lugs, said intermediate lug being movable longitudinally on said pintle, of a coiled spring surrounding said pintle between said upper and said intermediate lug and having one end fixed to the former, the other end of said spring having an axially bent end adapted to lie in the path of a projecting portion of said intermediate lug, and to come into contact with said projection at a predetermined point in the opening movement of the door, whereby the further opening of the door tends to twist and compress said spring while the reaction thereof assists the action of gravity in the initial closing of the door.

5. The combination with a gravity hinge comprising a pair of hinge-leaves, one having a pair of pintle-lugs at its opposite ends and the other having an intermediate pintle-lug, and a pintle pivotally connecting said lugs, said intermediate lug being movable longitudinally on said pintle, of a coiled spring surrounding said pintle between said upper and said intermediate lug and having one end fixed to the former, the other end of said spring in its normal length being separated by a certain distance from the upper face of said intermediate pintle-lug corresponding to the rise of said pintle-lug in opening said swinging-leaf through a given angle of movement; and said end of said spring carrying an axially bent extension which at the same point in angular opening of the hinge engages a radially projecting part of said intermediate pintle-lug and is twisted thereby whereby the action tends to assist gravity action to close the door upon any further opening thereof.

6. The combination with a gravity hinge comprising a fixed hinge-leaf having a pair of pintle-lugs at its upper and lower ends, respectively, a pintle mounted in said lug, a swinging hinge-leaf having an intermediate pintle-lug mounted on said pintle and longitudinally movable thereon, and a cylindrical boss of less diameter than the upper pintle-lug formed thereon and having an annular groove at its base, of a coiled spring surrounding said pintle and embracing said boss, the upper turn of said spring engaging resiliently in said annular groove and having on its upper end an axially bent extension, and snugs formed on said upper pintle-lug engaging said axially-bent extension so as to prevent rotation thereof.

7. In a hinge, the combination of a hinge-leaf having one or more pintle-lugs, a pintle mounted in said lug and having an enlarged head, said head having a flat side, a raised snug on the pintle-lug immediately under said head, said snug overhanging said head, whereby to prevent the latter from rising from its position in said lug except when said flat side registers with said snug; said pintle-lug having a dovetailed longitudinal groove on one side thereof, and a dove-tailed key slidably mounted in said groove and projecting beyond the same into the position occupied by the cut-away portion of the flat side of said head whereby the latter is prevented from rotating.

8. The combination with a gravity hinge, comprising in its construction a fixed hinge-leaf having a pair of pintle-lugs at its upper and lower ends respectively, a pintle mounted in said lugs, a swinging hinge-leaf having an intermediate pintle-lug mounted on said pintle and rotatably movable thereon, a cylindrical boss of less diameter than the pintle-lugs formed on the lower face of said upper pintle-lug, and a similar boss formed on the upper face of said intermediate pintle-lug, of a coiled spring surrounding said pintle and of such diameter as to fit upon said bosses at its ends whereby it is held concentrically with the pivotal axis and kept out of contact with said pintle, and means for securing the upper end of said spring in a fixed manner to said upper pintle-lug; said spring having a normal length less than the distance between the opposing faces of said upper and intermediate pintle-lugs when the hinge is shut, whereby said spring comes into action only after a predetermined angle of opening of the hinge.

9. The combination with a gravity hinge comprising a fixed hinge-leaf and a swing-

ing hinge-leaf both having pintle-lugs, a pintle passing through said lugs and pivotally connecting said leaves, interacting cams upon the respective lugs whereby the swinging leaf is raised with respect to the fixed leaf in opening the door, a coiled spring surrounding said pintle and fixed to one of said leaves concentrically with said pintle but out of contact therewith, and an annular boss or nipple on the other hinge-leaf adapted to extend within the coil of said spring and hold it in said concentric position; there being at the base of said boss or nipple a transverse shoulder against which the spring is adapted to seat; said spring having a normal length shorter than the distance between the opposing faces of said pintle-lugs; whereby said annular boss or nipple advances into the free end of said spring upon the opening movement of the door and maintains it in said concentric position and guides it to a seat upon said shoulder.

10. In a hinge, a pintle having an enlarged head, said head having a flat side, in combination with a pintle-lug in which said pintle is adapted to be mounted, a raised overhanging snug formed on one side of said pintle-lug, said snug projecting over the upper face of said head whereby to prevent said pintle from rising out of said lug except when it is turned into position where said flat side registers with said snug, and a removable key or like member mounted on said pintle-lug in position to abut against the flat side of said pintle, whereby the latter is prevented from turning.

11. In a gravity-hinge, in combination with a pair of hinge-leaves having interacting cam-lugs which coact to cause a closing movement of the door by gravity, a spring which interacts between said hinge-leaves and is caused to be compressed by the opening movement thereof, said spring acting by compression through said cam-lugs to assist the action of gravity in closing the door; and said spring further having its ends so connected with said hinge-leaves as to be twisted thereby beyond a certain minimum angle of opening of the leaves, whereby said spring further acts directly by torsion to turn the leaves into closed position at any angle beyond said minimum angle.

In witness whereof, I have hereunto set my hand this seventh day of March, 1907.

RUDOLPH G. WINTER.

In presence of—
GEORGE W. COLLES,
ELSIE M. HOTZ.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."