

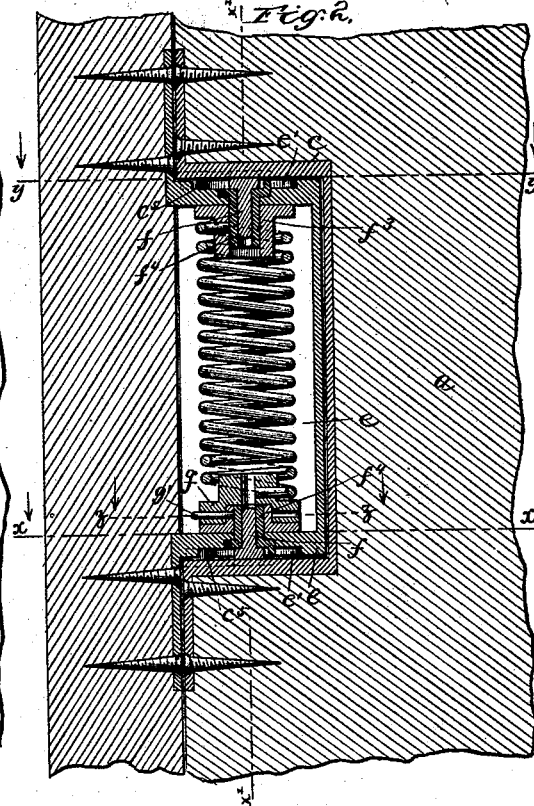
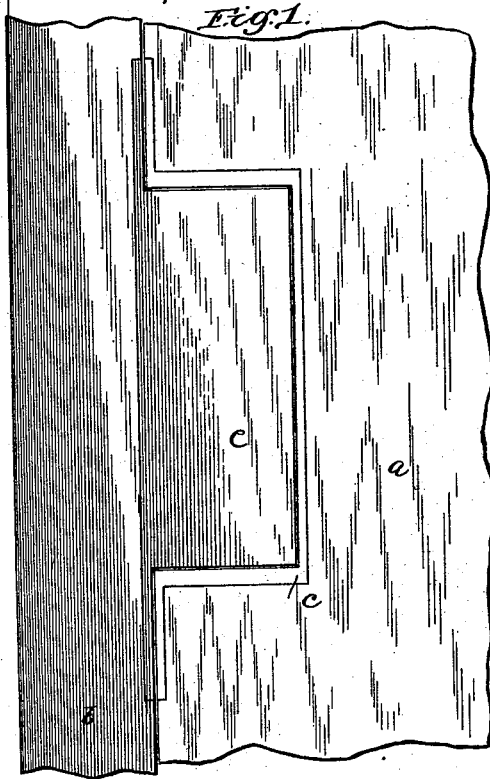
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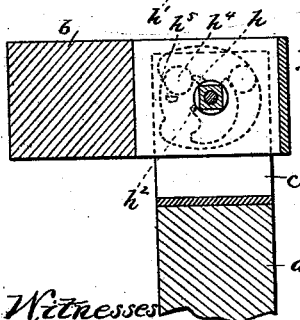
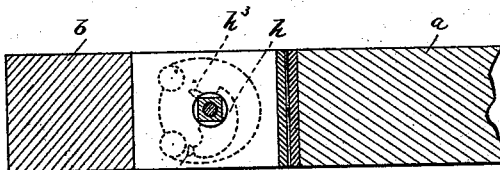
L. MOUAT, Jr.  
SPRING HINGE.

No. 522,612.

Patented July 10, 1894.



*Fig. 3.*

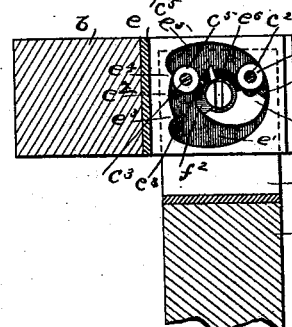
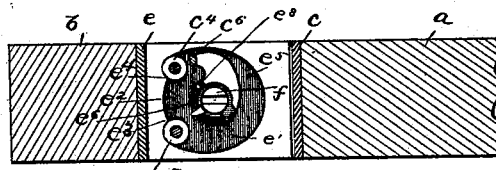


*Fig. 4.*

Witnesses

Wm. M. Rheem  
George L. Cagg.

*Fig. 5.*



*Fig. 6.*

Inventor

Lawrence Mouat Jr.  
By George P. Boston  
att'y.

(Model.)

2 Sheets—Sheet 2.

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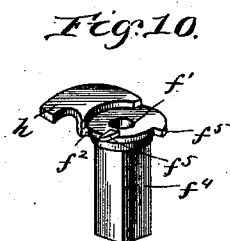
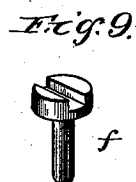
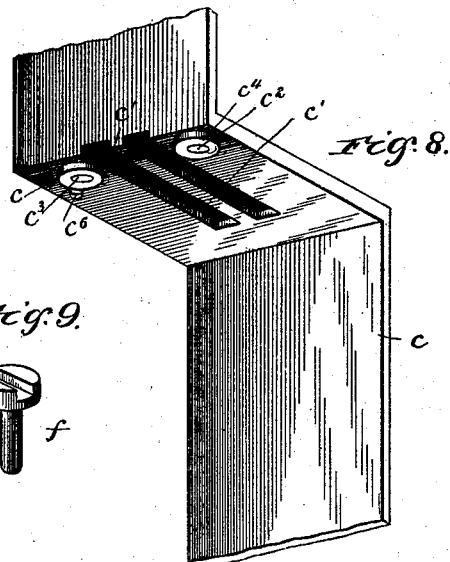
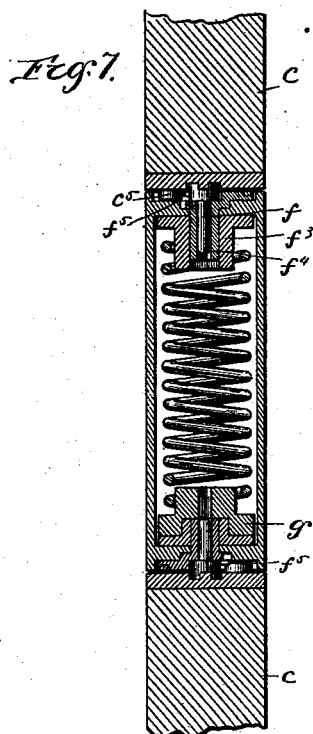
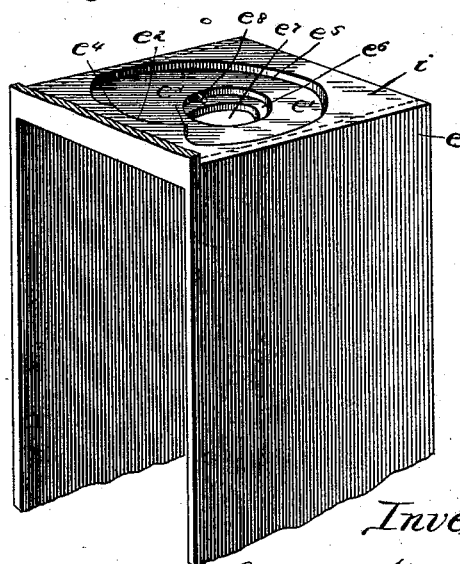
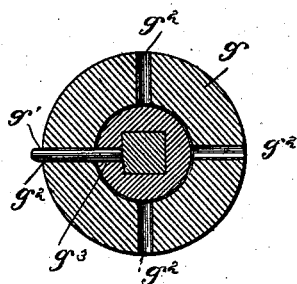


Fig. 11.



Witnesses.

N. M. Rheem.  
George L. Cagg

Inventor.

Lawrence M. Moulton  
By George L. Cagg  
Att'y.

# UNITED STATES PATENT OFFICE.

LAURENCE MOUAT, JR., OF CHICAGO, ILLINOIS.

## SPRING-HINGE.

SPECIFICATION forming part of Letters Patent No. 522,612, dated July 10, 1894.

Application filed December 30, 1890. Serial No. 376,228. (Model.)

### *To all whom it may concern:*

Be it known that I, LAURENCE MOUAT, JR., a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Spring-Hinges, (Case No. 4,) of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to double acting spring hinges, the construction being such that a door hung therewith may have square corners at the hinged edge thereof and be swung in either direction with the least possible margin as between the swinging door and the spring in the casing in which it is hung. The joint at the hinged edge is thus made close on both sides and only a very slight margin is required between the swinging or free edge and the jamb or opposite side of the casing. A rectangular notch is cut in the edge of the door for each hinge and all the working parts of the hinge are included in the notch.

The notch is cut to fit a plate or casting which is rigidly secured to the door. A second plate or casting conforming in general shape to that of the plate secured to the door, is secured to the casing. This casting which is secured to the casing is preferably provided with side plates, or, if desired, it may be cast in a single piece open on one side so as to form a chamber for the spring. A single coiled spring placed within this chamber between the inner ends of the plates or castings serves to close the door by its recoil, no matter in which direction the door may be swung.

The connections between the spring and the castings, together with the cams forming the bearings between the two plates, constitute the principal features of my invention, the construction and arrangement of parts being such that when the door is swung in one direction one end, I will say the lower end of the spring, is prevented from turning, while the other end, that is the upper end, is turned by the movement of the door so that the recoil of the spring thus acted upon will bring the door back to its closed position. Now in case the door is swung in the other direction the spring will be acted upon also oppositely,

that is the upper end is held while the lower end is turned with the door. Thus no matter in which direction the door is moved from its closed position the tension of the spring will be made such that when the door is left free it will be self closing.

An important feature of my invention referred to is the means whereby the eccentric pivotal movement of the door is effected as is necessary when the square or rectangular edges are left to make close joints at the hinged side or edge of the door. One of the plates forming the frame of the hinge is, as before stated, secured to the door. The inner plate or box is secured to the door frame and in order that the door having rightangled corners may be swung it is necessary that the door shall move out away from the casing as it is swung in either direction.

I find it desirable to provide special anti-friction devices in the form of pins having slotted heads placed between the ends of the two plates, the slotted heads being adapted to move in slots or guides provided upon the outer plate, while the pins are free to rotate in their sockets provided in the ends of the cores of the spring. These anti-friction pins I preferably use in addition to the wheels which are more especially designed to move in the cam to give the proper pivotal movement to the door as the door is swung. These anti-friction pins sustain practically the entire weight of the door so that the friction of the hinge is very materially reduced. All spring hinges heretofore made in which a single spring has been employed have had large frictional bearing surfaces which are objectionable.

The box or plate secured to the door frame is provided at each end with a cam forming a guide for the wheels carried by the plate attached to the door to impart the desired eccentric movement to the door when it is swung in either direction. The ends of this plate or box are also provided with openings, each opening being provided with a stop or pin for limiting the movement of the spring in one direction. The cores at the different ends of the spring project through these openings and bear upon annular seats provided about these openings.

My invention will be more readily understood by reference to the accompanying drawings, in which—

Figure 1 is a side elevation showing the position of my double acting spring hinge applied to a door. Fig. 2 is a sectional view thereof. Fig. 3 is a plan view as seen from section line  $x-x$  of Fig. 2. Fig. 4 is a similar view showing the door swung open or at right angles to the closed position indicated in Fig. 3. Fig. 5 is a view as seen from section line  $y-y$  of Fig. 2. Fig. 6 is a view similar to that of Fig. 5 except that the door is swung open as shown in Fig. 4. Fig. 7 is a sectional view upon line  $x'-x'$  of Fig. 2. Fig. 8 is a perspective view as seen from below of the under side of the upper end of the plate which is attached to the door with the wheels carried thereby. Fig. 9 is a perspective view of one of the anti-friction pins. Fig. 10 is a perspective view of one of the cores or hubs and is acted upon by a pin provided upon the plate carried by the door to be rotated when the door is swung in one direction. Fig. 11 is a transverse sectional view of the hub upon line  $z-z$  of Fig. 2, showing the manner of initially setting the spring. Fig. 12 is a perspective view of the upper end of the inner plate or portion of the spring case showing the eccentric opening therein and the stop for preventing the rotary movement of the spring in one direction.

Like parts are indicated by similar letters of reference throughout the different figures.

As shown in Fig. 1 the door  $a$  is hung to the casing  $b$  by my spring hinge; the plate  $c$  of the hinge is secured in a notch cut in the edge of the door and is secured rigidly to the door, preferably by screws inserted as shown through the upper and lower extended ends of the plate  $c$ . This plate  $c$  is preferably cast in a single piece and upon each of the inner end faces thereof I provide a guide  $c'$ , which may be formed by cutting rectangular grooves or slots in said faces as shown most clearly in Fig. 8. I also provide upon these faces extensions or lugs  $c^2$   $c^3$  one for each of the wheels  $c^4$   $c^5$ . I preferably provide also the lug or projection  $c^6$  which is brought against the arm or extension  $d$  of the hub or core to turn the spring when the door is open.

The box or casting  $e$  is secured to the door frame, preferably by screws, as shown most clearly in Fig. 2, the screws being inserted through the extended ends or clips of this box or casting. The form of the cam  $e'$  in the upper end of this spring box is clearly shown in Figs. 5, 6 and 12. This cam is in outline similar to a padlock and the wheels  $c^4$   $c^5$  are guided thereby when the door is swung as shown in Fig. 6. This cam may be considered as made up of two parts, the smaller part  $e^2$  being at the rear between the points  $e^3$  and  $e^4$ , while the larger curved portion  $e^5$  forms the remaining portion thereof. An annular bearing surface  $e^6$  is provided about the opening  $e^7$  as shown. A pin or stop

$e^8$  is also provided against which the arm  $d$  is brought and thereby stopped to hold one end of the spring from turning.

It will be understood that the pin  $f$  provided with the slotted head is placed in the opening  $f'$  of the hub or core and that this hub or core is inserted in the opening  $e^7$  of plate  $e$  so that the point  $f^2$  of the arm  $d$  comes just back of the pin or stop  $e^8$ . The spring is provided with a separate core or hub at each end, with which cores the ends of the springs are connected respectively.

The core, speaking generally, may be considered as consisting of the thimble  $f^3$  into which the portion  $f^4$  of the hub is inserted. The hub is preferably provided with a projection or finger  $f^5$  for limiting the movement of one of the cam wheels, that is to say the cam wheel  $c^4$ , so that it may not pass beyond the spur or point  $e^3$  when the door is swung in the opposite direction to that indicated in Fig. 6.

It will be understood that the cams at the different ends of the casting  $e$  are symmetrical, and the two ends might be said to be identical in construction, but for the fact that the stop  $e^3$  at the upper end should be on the opposite side from the corresponding stop at the other end. I therefore do not deem it necessary to describe in detail the construction of the cam and the connections between the spring, the cam and the core at the lower end of the hinge as Figs. 3 and 4 being taken upon line  $x-x$  of Fig. 2 clearly indicate the construction and operation of the cam, the core and the different parts thereof when considered in connection with the description of the corresponding parts described in detail in connection with Figs. 9, 10 and 12.

In order that the spring may be initially set at the proper tension the collar  $g$  is provided to which the lower end of the spring is secured. A pin  $g'$  inserted through any one of the openings  $g^2$   $g^3$  of this collar when opposite the pin hole  $g^3$  may be used to retain the spring in position after it has been set.

As before stated the hub  $f^4$  is inserted through the opening  $e^7$  into the sleeve  $f^3$  of the core, the portion  $f^2$  of arm  $d$  being placed in position to come just back of the stop  $e^8$ . The anti-friction pin  $f$  is also inserted in the opening  $f'$ , the under side of the head of said pin resting upon the upper end of the hub  $f^4$  as shown in Figs. 2 and 7. The slot in the pin  $f$  is adapted to slide upon the guide  $c'$  of the plate  $c$  and thus the weight and friction of the door is brought upon the head of pin  $f$  above and below.

In case the door is swung inwardly as shown in Figs. 4 and 6 with the spring connected as shown, the lug  $c^6$  will be forced against the arm  $d$ , thus rotating the core in the upper end of the spring and thereby the upper end of the spring, while the lower end of the spring is prevented from turning. Now when the door is opened as shown the wheel  $c^4$  (see Fig. 6) will be carried along the curve

5  $e^5$  of the cam away from its normal position near the point  $e^4$  while the wheel  $c^5$  will be carried over point  $e^3$  of the cam along the curve or side  $e^2$  to the point  $e^4$ . Considering now the action of the hinge at the other end of the spring it will be seen that the arm  $h$  is not acted upon by the lug  $h'$ . Moreover the pin  $h^2$  serves as a stop to prevent the rotation of the lower hub. Therefore the wheels below will be carried as indicated in Fig. 4 about the cam and the lower end of the spring will be held from turning. The finger  $h^3$  projecting from the hub serves to prevent the wheel  $h^4$  from passing over the point  $h^5$ . Thus when the door is swung to bring the wheel  $h^4$  between point  $h^5$  and projection or finger  $h^3$  further travel of the wheel  $h^4$  will be prevented and any further opening of the door will be as it were with the wheel  $h^4$  as the pivotal axis.

15 The studs or pins  $c^2$   $c^3$  for the wheels  $c^4$   $c^5$  are preferably of steel and may be conveniently inserted after the other parts are assembled through openings tapped out in the end of the plate  $c$ , that is to say, the box  $e$  with the spring placed therein and the wheels of the cams in proper position, is placed within the plate  $c$ , the anti-friction pins  $f$  being arranged so as to register with the guides  $c'$ . The pins  $c^2$   $c^3$  and the corresponding pins at the other end of the plate  $c$  are then inserted through the openings tapped out in said ends.

20 The parts of the hinge being thus assembled it is ready for the market.

25 The casting attached to the door articulates with the casting containing the spring which is attached to the casing and the pivotal connections between are such that when the door is swung in either direction the tension of the spring will be changed so as to cause the door to close, the cams being so arranged as to give the door an eccentric pivotal movement so as to permit it to open and close, notwithstanding the hinged edge or side of the door is provided with square corners so as to form a tight joint between the door and the casing.

30 It is more convenient to hang a door with my hinges when there is no tension upon the springs. The casting  $e$  is preferably first screwed to the casing and the door being then held up in proper position the plate  $c$  is screwed to the door; the spring being now set at the proper tension the door will be held close to the casing.

35 It should be observed that the cam is so shaped that the wheels rest just outside the points  $e^3$   $e^4$  when the door is closed. Therefore when the door is closed considerable force will be required to cause the wheels to start since one wheel must pass over one of the points  $e^3$   $e^4$ . There will therefore be no liability of the door being opened by any ordinary gusts of wind.

40 In case of light doors it is evident that one

spring might be enough to do the work, in which case the spring of the lower hinge might be omitted.

45 The cam may be formed, if desired, in a separate plate  $i$ , preferably of steel, which may be adapted to slide or to be inserted into the ends of the box  $e$  as indicated in Fig. 12.

50 My invention admits of various modifications which would readily suggest themselves to those skilled in the art and I therefore do not limit myself to the details of construction shown.

55 Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. In a hinge, the combination with an anti-friction pin  $f$  having a slotted head, of the angle plate  $c$  having the guide  $c'$  to engage the slotted pin head, the box plate  $e$  having an opening  $e'$ , and hub  $f^4$  mounted in said opening  $e'$  and provided with an opening  $f'$  to receive said pin when in engagement with said guide; whereby the weight and friction of the door is brought upon the upper and under sides of the pin head, substantially as described.

2. In a hinge, the combination with eccentrically pivoted castings secured respectively to the door and the casing, of a spring contained in said casing casting, cores provided upon the ends of said spring, parts provided upon said door casting adapted to engage respectively with said cores; whereby said spring is placed in tension in whichever direction said door is opened, substantially as described.

3. In a hinge, the combination with a spring, of a thimble  $f^3$  provided upon the end thereof, a hub  $f^4$  adapted to be inserted in said thimble, said hub being provided with an arm  $d$ , a lug  $c^6$  movable with the door adapted to press against said arm  $d$ , a stop  $e^5$  against which a projection  $f^2$  provided upon said hub is adapted to bear, substantially as described.

4. The combination with the hub forming a part of the core of the spring of a hinge, of the cam and cam wheels and a finger  $f^5$ , whereby when the door is swung in one direction one of the wheels as  $c^4$  is prevented from being carried beyond the point  $e^3$  of the cam, substantially as and for the purpose specified.

5. In a hinge, the combination with a casting secured to the door, of a casting secured to the casing, said casing casting being provided with the cam of padlock shape carrying the projecting points  $e^3$   $e^4$ , and cam wheels carried upon said door casting adapted to rest outside of said points  $e^3$   $e^4$  when the door is closed, substantially as described.

6. In a hinge, the combination with the casting  $e$ , of the plate  $i$  adapted to be inserted in the end thereof, said plate being provided with the internal cam surfaces  $e^2$   $e^5$ , substantially as described.

7. In a hinge, the combination with a casting secured to the casing and provided with

- cams upon its ends, of a casting secured to the door and provided with rollers adapted to move about said cams, a spring within said casing casting, cores upon the ends of said spring and provided with arms, said door casting being provided with projections adapted to engage said arms, and stops provided upon said casing casting for preventing the movement of the cores in one direction, substantially as described.
8. In a hinge, the combination with the stationary and movable parts thereof, of a cam connection between said parts, a spring inclosed within the stationary part, cores provided with arms attached to the ends of said spring and extending through the ends of said stationary part, projections provided upon said moving part adapted to engage alternately the arms on said cores, as the door is swung in one or the other direction, substantially as described.
9. In a hinge, the combination with a casting provided with cams recessed in its ends, of a casting provided with rollers adapted to travel in said cams to impart an eccentric

pivotal movement to the door, substantially as described.

10. The combination with the two parts of a spring hinge, one part being provided with a friction reducing pin provided with a slotted head which is adapted to move in a guide provided in the other part and prevent lateral movement of said other part, substantially as and for the purpose specified.

11. In a hinge, the combination with the castings provided with an eccentric cam connection, of a spring contained in one of said castings, thimbles on the end of said spring provided with central openings, hubs passing through said openings, and means for rotating one of said hubs and maintaining the other fixed in position, substantially as described.

In witness whereof I hereunto subscribe my name this 20th day of December, A. D. 1890.

LAURENCE MOUAT, JR.

Witnesses:

ELLA EDLER,

GEORGE L. CRAGG.