W. GILFILLAN.
Spring-Hinges.

No. 221,168. Patented Nov. 4, 1879.

FIG. 1.

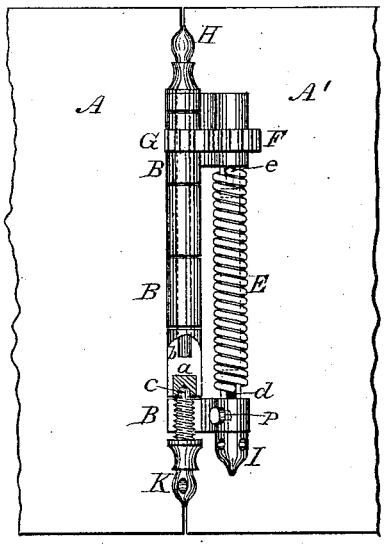


FIG. 2

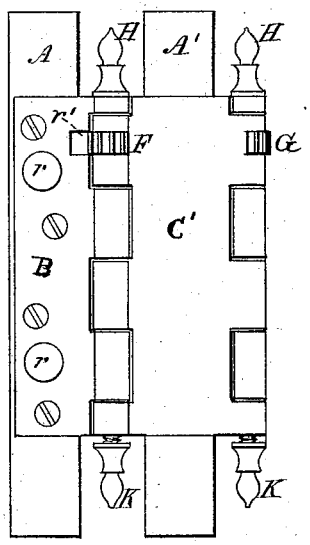
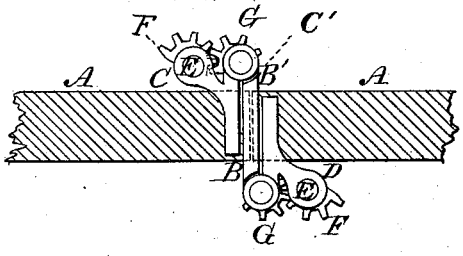


FIG. 3.



WITNESSES.

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UNITED STATES PATENT OFFICE.

WILLIAM GILFILLAN, OF SYRACUSE, NEW YORK, ASSIGNOR TO NEHEMIAH C. RYDER, OF SAME PLACE.

IMPROVEMENT IN SPRING-HINGES.

Specification forming part of Letters Patent No. **221,168**, dated November 4, 1879; application filed April 7, 1879.

To all whom it may concern:

Be it known that I, WILLIAM GILFILLAN, of Syracuse, in the county of Onondaga and State of New York, have invented certain new and useful Improvements in Spring-Hinges; and I declare the following to be a full, clear, and exact description of the same, so as to enable any person skilled in the art to which it appertains to make and use the same.

This invention relates to that class of hinges adapted to be applied to both double and single acting doors, in which springs are employed to retain the door in a closed position, and to influence the door to return to such position when the pressure applied to open the door is released.

Great difficulty has been encountered in this class of hinges to provide suitable springs which would handle the door properly, presenting the greatest resistance when the door is closed and the least when the door is at right angles to the jamb. Owing to the great tension on the spring and the varying condition of the pressure and movement of the door, coupled with its weight, the springs would soon give out or break, necessitating constant attention and frequent replacing. These difficulties have arisen from a construction radically wrong in principle, for the reason that the hinges were jointed together so as to require a uniform application of power to move the leaves on their axial pins or joints, thus requiring great power from the spring during the entire movement, without the hinge affording any assistance to the spring at any point of the orbit of travel. Again, the pressure of the wind on outside doors and the suction on inside doors add to the power required from the spring to close the door, and it will be apparent that the great tension which it is necessary to put on the springs is fatal to durability.

The object of my invention is to provide a spring-hinge constructed so as to overcome and obviate the difficulties mentioned; and to this end it consists in constructing the hinge so as to graduate the application of power and applying the pressure or power of the spring inversely to the resistance of the hinge. I accomplish this result by gearing the joints of the leaves with eccentrics, so as to require the greatest application of power to move the leaves when the door is closed, and by attaching the spring to the eccentric so as to secure the required tension by torsion on the spring, which is applied as the leaves turn on their joints, thus increasing the tension of the spring as the power required to move the hinge-leaves grows less, applying the maximum of the power required of the spring to overcome the resistance of the air while the door is closing with the minimum resistance of the hinge, and vice versa, which not only saves the spring, but obviates greatly the objection to the use of spring-hinges arising from the difficulty in opening the door, it being almost impossible for a child to open a spring-door, coupled with the danger of being caught by its rapid return. This cannot occur with my hinge, because when the spring operates to close the door it commences to lose in power, and the resistance of the hinge to increase until closed.

I also provide a device for relieving the friction occasioned by the weight of the doors bearing down the joints of the leaves, causing them to rub. My device consists of a steel screw or step operating through the lower joint and into a bushed socket of hardened steel inserted into the joint immediately over the screw-step. By means of the screw the joints are set up so as to bear thereon, instead of on each other, thus accomplishing this desirable result.

I also provide on the leaves of my double-acting hinge buffers to deaden the sound of the leaves as they strike together.

For a more specific description of my invention reference is had to the accompanying drawings, forming a part of this specification, like letters indicating corresponding parts, in which—

Figure 1 is a double-acting hinge, door closed, showing projecting joint, spring attached to the eccentric, and device for friction-bearing; Fig. 2, door open, showing buffers on the hinge-leaf; Fig. 3, cross-section through the door, showing double-acting hinge attached, eccentrics, and the springs diagonally opposite.

The letters A A′ represent a door and cas-

ing having the fixed leaves B B′ of a double-acting hinge secured thereto, the alternate opposite leaves being provided with projections C D. In these projections are journaled the movable eccentric-gears F, which mesh into corresponding fixed eccentric-gears G, secured in the joints of the movable central leaf, C′, as shown in the drawings at Figs. 2 and 3. The eccentrics are geared up in proportion of four to one, although they may be varied as desired.

In the fixed leaves B B′ a recess or channel, *r*′, Fig. 2, is provided to allow the passage of the eccentric-gears F G. A spiral, E, Fig. 1, is connected by its upper end, *e*, to the movable eccentric F. The spiral E slips over a rod or stem sitting in a projection on the foot of the hinge, and coinciding with the vertical axis of the eccentric F, the lower end, *d*, of the spiral being connected to the rod. The rod is perforated, and a stop-pin, P, Fig. 1, operating through a pin-hole in the projection, serves to retain the tension on the spring applied at I, Fig. 1. It will be observed that a torsion on the spring is caused when the leaves carrying the gears are moved, and the power is applied to the spring inversely to its application to the hinge; or, in other words, the power of the spring on the hinge is reversed by the gears, which constitutes the distinguishing feature of my invention.

The eccentric-gears G meshing with or engaging the movable gears F, to which the spiral E is attached, actuate the gears F to create a torsion on the spiral E, which increases the power of the spring so as to exert its greatest force at the desired point—*i. e.*, when the door is open, and compelling its return when the pressure applied to open the door is released. The door in its transit to a closed position reverses the operation of the eccentric-gears, and the spiral loses its power, while the gears oppose resistance from their friction and the reversed ratio of the gearing, which is one to four in closing the door. The result is that the power of the spring is controlled so as to bring the door shut with sufficient force to close it, and no more.

The metal of the lower joint of the fixed leaf B, Fig. 1, is broken away to show a friction-bearing, designed to relieve the joints of friction, and to prevent squeaking. The upper portion of the lower joint is drilled in for the reception of the joint-pin *b*, Fig. 1, and the lower part is recessed or chambered out sufficiently to allow the insertion of a hardened bush, *a*, which is preferably made of steel or analogous metal. A screw, K, having a hardened conical point, *c*, passes up through the joint and bears on the hardened bush, and can be set up so as to relieve the bearings when desirable, and forms an effective and positive device for this purpose.

Sound-deadening buffers *r r*, Fig. 2, constructed of hard rubber or other material, can be inserted in proper apertures in the fixed leaves B B′. I am aware that buffers for this purpose have been used heretofore, and I do not claim them.

All parts of my improved spring and hinge are made of metal, and are strong, compact, and durable.

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

1. A double-acting spring-hinge composed of the attachable leaves B B′, provided with projections C D, having movable eccentric-gears F journaled thereon and attached to spirals E, which are actuated by corresponding fixed gears G, secured in the joints of the movable central leaf, C′, and engaging the eccentric-gears F, the parts being combined and arranged substantially as herein specified, and for the purpose set forth.

2. In a spring-hinge, the eccentric-gears G, rigidly secured in the joints of the central leaf, C′, adapted to mesh in corresponding movable gears sustained in projections on the leaves B B′, in combination therewith, as herein described and specified.

3. In a spring-hinge, the combination of the movable eccentric-gears F, spirals E attached to said gears F and actuated thereby, the fixed eccentric-gears G, secured to the leaf C′, and adapted to mesh into the gears F, substantially as specified, and for the purpose set forth.

4. In a spring-hinge, the leaves B B′, having channels or recesses *r*′, and projections C D, forming journal-bearings for the eccentric-gears F and passage-way, allowing the movement of the engaging eccentrics F G, substantially as described and specified.

In testimony that I claim the foregoing I have hereunto set my hand this 25th day of March, A. D. 1879.

WILLIAM GILFILLAN.

Witnesses:
J. N. PERKINS,
HOMER WESTON.