Z. COBB.

Door Spring.

No. 201,500. Patented March 19, 1878.

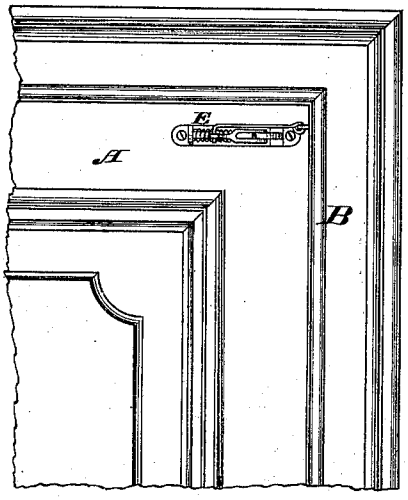


Fig. 1

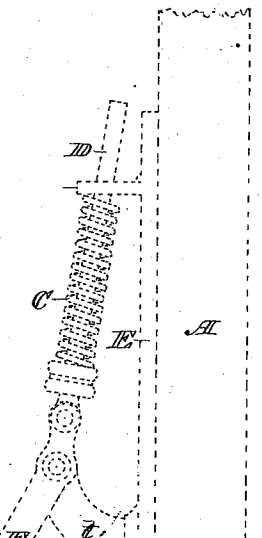


Fig. 2

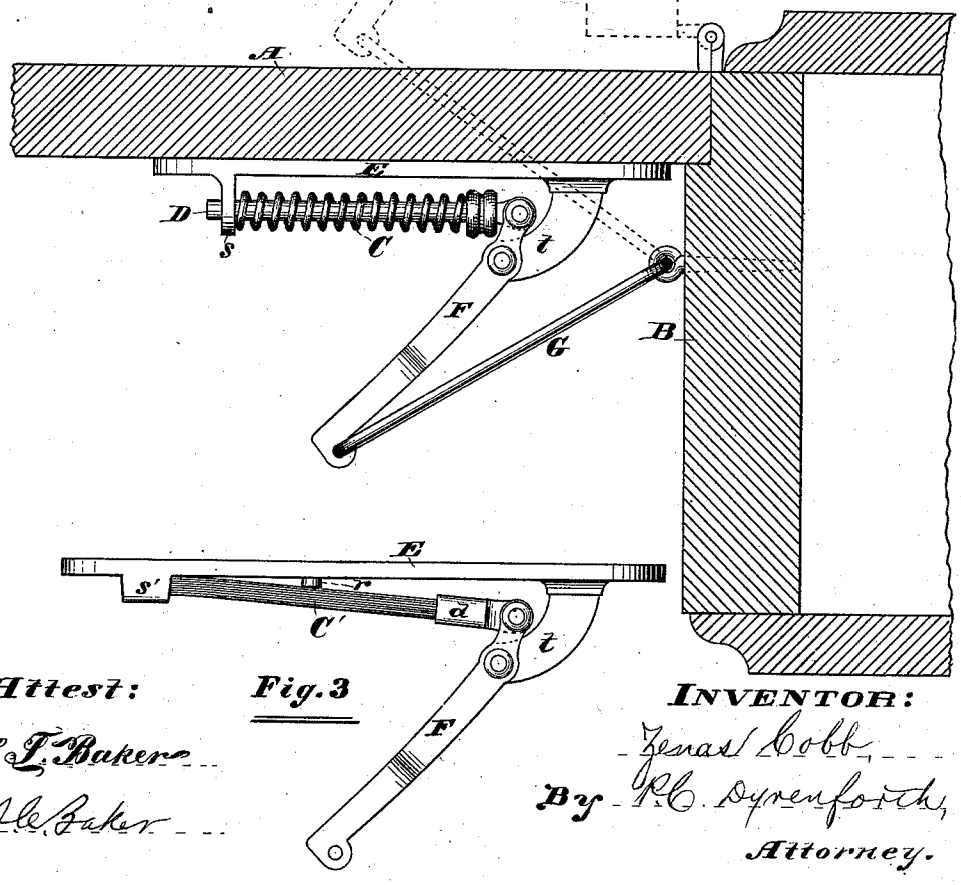


Fig. 3

Attest:

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UNITED STATES PATENT OFFICE.

ZENAS COBB, OF CHICAGO, ILLINOIS.

IMPROVEMENT IN DOOR-SPRINGS.

Specification forming part of Letters Patent No. **201,500**, dated March 19, 1878; application filed September 5, 1877.

To all whom it may concern:

Be it known that I, ZENAS COBB, of the city of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Door-Springs; and I do hereby declare that the following is a full, clear, and exact description thereof, which will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters of reference marked thereon, which form a part of this specification.

My invention relates to a device for automatically closing doors or gates, and for so holding them when closed that the exertion of considerable force is necessary to open them; and my object is to construct a device for this purpose thoroughly effective in every respect, and embodying the smallest practicable number of mechanical agents, whereby it shall be simple, inexpensive, and not liable to get out of repair.

To this end my invention consists, first, in employing a spring, either flat, helical, or of any other suitable form, fixed against the door crosswise of the same, and operated by means of a lever, connected at its top by a bar with the jamb, whereby, as the door opens, the spring is compressed; and, in so arranging the bar with reference to the lever that the greatest resistance occurs at the first moment of opening, gradually diminishing until the door reaches an angle of about ninety degrees, when it ceases; and, secondly, in having the long arm of the lever bent or curved in a peculiar manner in the direction of the spring, so that when placed in position upon the door it shall lean from the jamb, whereby great additional power is gained, all as hereinafter more fully described and claimed.

In the accompanying drawings, Figure 1 is an elevation of the upper corner of a door with my device attached; Fig. 2, a top view of my device as attached to a door, and Fig. 3 a detached view, showing a modification as to the form of the spring itself.

A is the door; B, the jamb; C, the helical spring, surrounding a guide-rod, D, one end of which slides in a lug-bearing, *s*, projecting from the metal bed-plate E, the other end being journaled to the short arm of the lever F, which lever works upon the curved lug *t* as a fulcrum, this lug also projecting outward from the bed-plate. The extremity of the long arm is connected with the jamb by means of the bar G, which may be of any suitable form, and which is pivoted or hooked both to the lever and jamb, or fastened to each in any other way that will permit it to work freely at both ends.

Thus, when the door is opened the outer end of the lever is held back by the rod and the inner end correspondingly pressed forward, thereby compressing the spring. It is a physical principle of the spring that the least resistance is encountered at the beginning of the compression, the resistance thence gradually increasing; but by means of the arrangement shown of my lever and bar this property is much more than counterbalanced. This is owing to the fact that power is gained by means of a lever in proportion to the relative lengths of the arms only when the power is exerted at right angles to the lever. It will be noticed that in my device the bar G inclines inward from the extremity of the arm, whereby the door must swing a considerable distance before the power acts at right angles. This, it is obvious, would still be the case even were the lever straight; but by having it bent, as shown, the effect is very greatly increased, since the power then acts at the beginning almost in the direction of the length of the lever, and hence little, if any, leverage is gained. As the door swings open, however, the leverage rapidly increases, much more than compensating for the increased resistance of the spring. The dead-point is reached when the door is at right angles, as indicated by the dotted lines, Fig. 2; and, if the door is moved either way from this point, it is obvious that the pressure of the spring against the short arm will tend to drive it on in that direction. Thus, if opened at all beyond the dead-point, it will continue on to the wall, while, if released short of this point, it recloses with rapidly accelerating motion.

The modification represented by Fig. 3 shows no deviation whatever from the principle or character of the device above described, but only a different form of spring with the incidental change in the mode of fastening.

Springs of still other suitable form may be employed, if preferred; but I find either of these to give entirely satisfactory results.

In the above-named figure, C′ is the spring, consisting of any required number of leaves of flat steel. Its outer end fits into a lug, *s′*, upon the bed-plate, and from here it slightly inclines upward, its opposite end fitting into a suitable attachment, *d*, which is journaled to the short arm of the lever in the same manner as the corresponding end of the guide-rod D hereinbefore described. Thus, as the door swings open, the spring arches or curves upward, producing precisely the same effects as the helical spring. The stud *r* serves to prevent the inner leaves from bending in the wrong direction.

The general construction of the device is such, it will be seen, as to adapt it to be attached to the door only upon that side which is opposite the direction in which it opens—this, in most cases, of course, being the outside. By being so placed the leverage resulting from the thickness and sweep of the door is taken advantage of, and the effects are thus correspondingly increased.

The device may be attached at any point along the line of the jamb; but it is preferable, for obvious reasons, to place it near the top, as shown in Fig. 1.

What I claim as new, and desire to secure by Letters Patent, is—

1. In combination with the spring C and lever F, attached to a door, substantially in the manner described, the bar G, connecting the extremity of the long arm of the lever to the jamb, and so arranged as to form an acute angle with the said lever, whereby the force necessary to overcome the resistance of the spring is greatest at the first opening of the door, and gradually diminishes, by reason of the increase of the angle, and hence of the leverage, as the door is swung outward, as set forth.

2. The combination of the bed-plate E, having projecting lug, *s*, the guide-rod D, carrying spring C, and passing through and sliding freely in lug *s*, and the lever F, bent at its pivoted point, and connected at one end to rod D and at the other to bar G, whereby the force necessary to overcome the resistance of the spring at the first opening of the door is still further increased, substantially as set forth.

In testimony that I claim the foregoing as my own I affix my signature in presence of two witnesses.

ZENAS COBB.

Witnesses:
M. V. REED,
SAM B. COBB.