No. 640,472.

Patented Jan. 2, 1900.

J. L. KNIGHT.

WEATHER STRIP.

(Application filed Sept. 5, 1899.)

(No Model.)

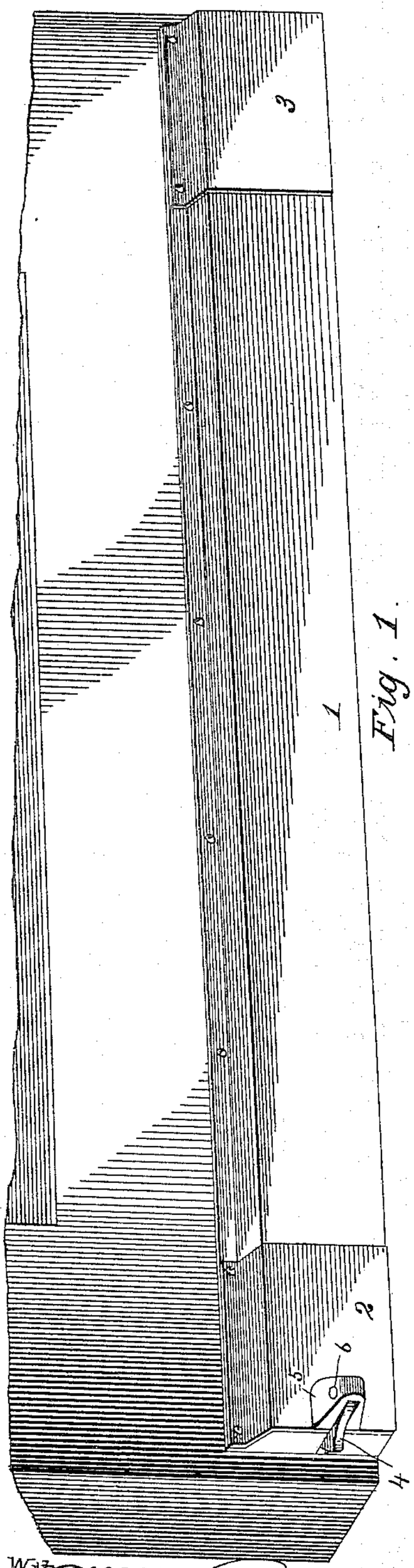

Fig. 1.

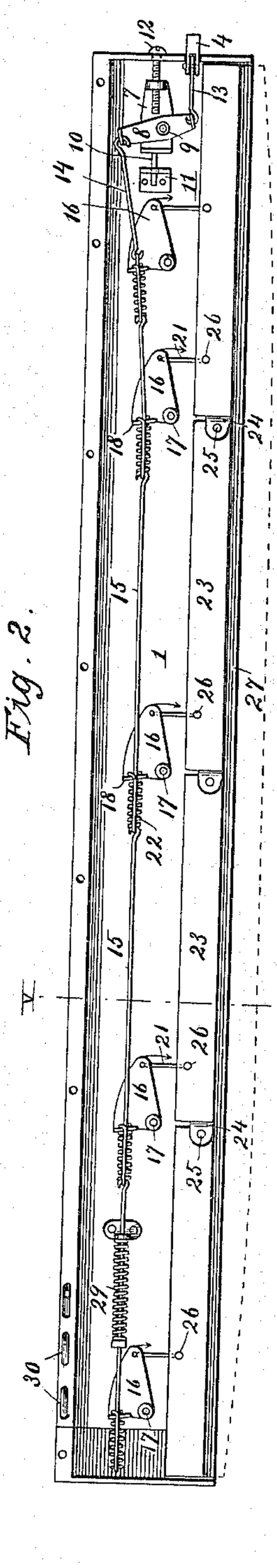

Fig. 2.

Fig. 5.

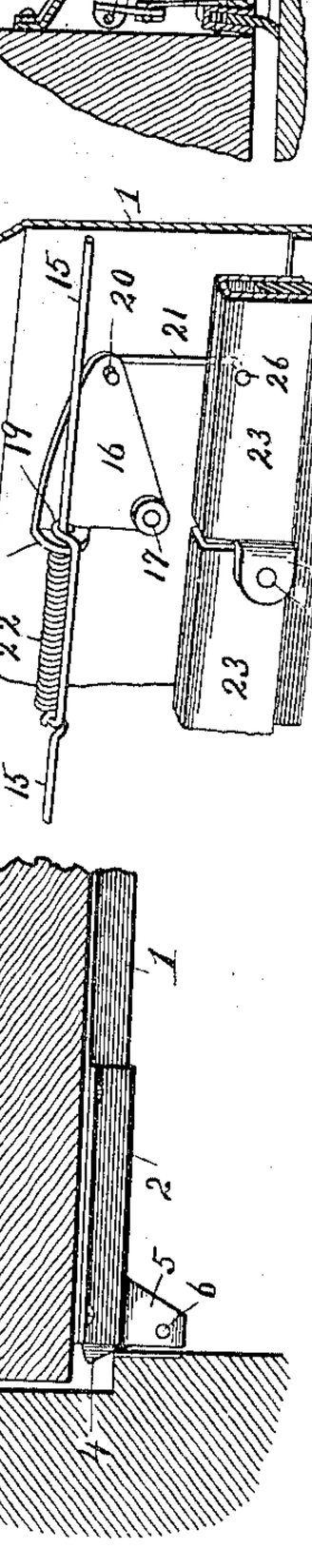

Fig. 6.

Fig. 4.

Fig. 3.

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WEATHER-STRIP.

SPECIFICATION forming part of Letters Patent No. 640,472, dated January 2, 1900.

Application filed September 5, 1899. Serial No. 729,411. (No model.)

To all whom it may concern:

Be it known that I, JONATHAN LEE KNIGHT, a citizen of the United States, residing at Topeka, in the county of Shawnee and State of Kansas, have invented a new and useful Weather-Strip, of which the following is a specification.

My invention relates to improvements in weather-strips in which the closure-strip proper is composed of several sections hinged or linked together and, with its operating mechanism, is supported in a suitable housing, preferably of thin sheet metal, extending across the door and being attached thereto in a position flush with the lower edge of the bottom rail or lower end of the door.

The objects of my invention are, first, to provide means whereby the simple act of shutting a door will automatically and completely close the opening under it, excluding rain, snow, wind, dust, cold, and insects; second, to so fashion the different parts of the mechanism that the whole may be adjustable in its operation, results, and length, thereby adapting it to all irregularities in the width of the door or the size or form of the opening under it, whether caused by imperfect workmanship, usual wear, sagging of the door, settling of the building, or the absence of a threshold entirely; third, to further so fashion the mechanism that the device may be applicable to inside as well as outside doors, sliding as well as hinged doors, and double as well as single doors, and, fourth, to provide means whereby the action of the device may at all times be under perfect control, little or much power being used, as desired, to produce motion required for closing openings of different sizes. I attain these objects by the mechanism illustrated in the accompanying drawings, in which—

Figure 1 is a perspective of the exterior side of the device as attached at lower end of a door; Fig. 2, an inner face view of the device as detached from the door; Fig. 3, a top view of that end of it situate at the free edge of the door and where the actuating-latch is located, showing also a part of the door and frame in section; Fig. 4, a detailed perspective view of a portion of the closure-strip, showing its hinged connection, also its connection with the pitman-chain by means of the links and bell-cranks which support and operate it, and the open spiral springs by which its action is adjusted, as will be hereinafter explained; Fig. 5, a vertical cross-section of the housing; Fig. 6, a detailed inner face view of the actuating-latch mechanism.

Similar numerals refer to similar parts throughout the several views.

In Fig. 1, 1 is the housing, having at the free edge of the door the reinforcing-pilaster 2 and at the hinged edge a like pilaster 3. The housing 1 and the pilasters 2 and 3 may be of any suitable material, preferably of metal, of which thin sheets of aluminium-coated steel form a very suitable material, as being non-corrosive, easily formed, and having necessary stiffness or rigidity. The housing 1, with its overlapping pilasters 2 and 3, is attached to the door by small screws, which pass through holes along its upper edge. At the end of the housing coming to the hinged edge of the door these holes are elongated into slots in the piece 1, but remain round holes in the pilaster, thereby permitting it to be placed flush with the end of the piece 1 or project some distance beyond it, thus varying the total length at pleasure to conform to the exact distance between the inside surfaces of the door-frame or stops.

4 is the actuating-latch, secured in its bearing 5 by the pivotal rivet 6.

7 is the movable fulcrum-plate, to which is attached the oscillating lever 8 by means of the pivotal rivet 9. It has at its inner end a projecting stud or guide 10, adapted to pass freely through a hole in the projecting flange of the fixed bearing 11, and at the other end a projecting flange with screw-threaded hole, in which the adjustment-screw 12 operates.

13 is a straight link connecting the actuating-latch 4 with the oscillating lever 8. 14 is also a straight link connecting the lever 8 with the wire pitman-chain 15.

16 is a triangular link or bell-crank pivotally attached to the housing by the stud 17. At one corner it has a flange or ear 18 bent up at right angles to its flat surface, and in this flange a hole 19, through which the wire

pitman-chain 15 passes. At the other corner it has also a hole 20, in which the upper end of the clevis-link 21 is placed.

22 is an open spiral spring placed on the pitman-chain 15 in rear of the flange 18.

23 is a section of the closure-strip, showing its projecting end 24, which, with the pivotal rivet 25, forms the hinged connection between the several sections of the closure-strip.

26 is a hole near the upper edge of the closure-strip 23, in which the lower end of the clevis-link 21 is movably inserted.

27 is the lower edge of the rubber or felt packing forming the bearing portion of the closure-strip.

29 is the recovery-spring, placed on the pitman-chain, and has in front of it the bearing with bent-up flange, against which the spring rests, and is compressed when the closure-strip is forced downward and by its recoil force raises the strip again within the housing when the pressure on the latch 4 is released.

The action of the device being entirely automatic, I will now explain in consecutive detail the functions of the several parts in producing the desired results.

The metal housing 1, with its overlapping pilasters 2 and 3, being attached to a door flush with the lower edge of the bottom rail and adjusted in length, so that its ends just clear the rabbet in which the door fits when fully shut, the adjustment-screw 12 is screwed inward, which results in drawing the fulcrum-plate 7, with its attached lever 8, outward or toward the free edge of the door. This causes the actuating-latch 4 to turn on its pivotal bearing 6 and its widened free end to project more or less beyond the end of the reinforcing-pilaster 2. In effect this is setting the machine for automatic action or throwing it into gear, and, as will be seen, may be carried to any desired extent, according to the size of the opening under the door which is required to be closed. The actuating-latch 4 being at the free edge of the door, the recovery-spring 29 holds the closure-strip 23 in position flush with the bottom of the housing until the door in being closed enters approximately half its thickness into the rabbet. Then the latch 4, projecting beyond the end of the housing, comes in contact with the face of the door-frame or stop, and the motion of the door in being continued to complete closing forces the projecting portion of the latch inward (see Fig. 3) until it is flush with the end of the housing. This slight movement of the latch affords the power which operates the device. The inner free corner of the latch 4 impinging against the stop or frame of the door causes its inner free corner to move in the arc of a circle whose center is the pivot-bearing 6. At this free corner one end of the connecting straight link 13 is pivotally attached, the other end being attached in like manner to the lower end of the oscillating lever 8. To the upper end of the lever 8 the straight link 14 is attached, connecting it with the pitman-chain 15, and in effect the link 14 is a continuation of the pitman-chain. It will be seen that the circular motion of the latch 4 is taken up by the connecting-link 13 and in that member becomes reciprocating motion by thrust or push. Being communicated to the lever 8 it again becomes circular motion and then reaching the connecting-link 14 is changed to reciprocating motion by stress or pull on the pitman-chain 15. With this pitman-chain the triangular links or bell-cranks 16 are connected, and the reciprocating motion of the pitman-chain in a horizontal plane becomes circular motion in the triangular links 16, through which it is transmitted to the connecting-links 21, becoming reciprocating motion in a vertical plane. The links 21 in turn transmit it to the closure-strip 23, with which they are connected, resulting in pushing that member downward along its entire length, so much of its width projecting below the bottom of the door and housing as may be necessary to close the opening between the bottom of the door and the threshold or floor. If this opening be of equal size along its entire length or full width of the door, or if it be wedge-shaped, the closure-strip will remain straight as it descends. If the opening be segmental in form, as a result of wearing away of the threshold along its middle portion, a condition most frequently occurring, at the ends where the threshold is not worn away the closure-strip, meeting with resistance, will bend upward, the motion of the bell-cranks at such points of resistance ceasing, and the power moving them be expended in compressing the open spiral springs 22 on the pitman-chain 15. This allows the chain to continue its motion, transmitting power through the bell-cranks 16 and the clevis-links 21 to the closure-strip 23 at such points along its length as has met no resistance, the hinges 25 allowing the closure-strip to bend in cases of curved openings, the open spiral springs neutralizing the downward motion wherever and to the extent that resistance occurs, as in case of either curved or wedge-shaped openings, while the rubber or felt packing by its elasticity conforms to any minor irregularities or roughness from wear.

The hemming or bending up on the inside of the lower edge of the metal sheet composing the housing 1, as shown in cross-section, Fig. 5, has a threefold purpose—first, to strengthen or stiffen it at the extreme lower edge, where no supporting-bridges between it and the door are possible on account of the location and necessary free action of the closure-strip; second, to reduce the space at that point between the door and the housing, so that the thickness of the closure-strip will almost fill it, having only room for free action, the space above the strip being necessarily greater in order to accommodate the

operating mechanism composed of the latch, pitman-chain, links, &c., and, third, to carry the closure-strip over against the front face of the door and maintain it there in a slanting position, two conditions of the utmost importance in attaining the chief object of my invention—viz, the forming of practically air-tight joints in closing the opening, as will be explained. The lower edge of the strip being practically in contact with the face of the door and the upper edge inclined away from it toward the wall of the housing gives the strip a slanting position, by reason of which when the motion downward begins the strip descends in that line instead of in a direct vertical line. This carries it somewhat under the door, and the movement of the door while the last half of its thickness is entering the rabbet and the closure-strip begins to be retarded by friction on the threshold brings the lower corner of the door firmly against the flat side of the strip, thus forming a tight joint. At the same time the power being applied at its upper edge through the clevis-links 21 tends to increase the slanting position by carrying the upper edge over closely against the hem or bent-up portion of the housing, and thereby forming another tight joint at that point. The greater the amount of power applied by the adjustment of the actuating-latch 4 for the purpose of giving extra pressure on the rubber or felt to secure a perfectly-tight joint between it and the threshold the greater will be the pressure of the door against the strip by reason of its extra friction on the threshold and the greater also will be the tendency to increase its inclining position and press it more firmly against the inner wall of the housing at its upper edge. Thus it will be seen that the closure-strip forms a joint on the threshold that may be made air-tight, while its main body is firmly clamped between the lower corner of the door and the inwardly-projecting hem of the housing, forming a double joint at that point, thus effectually closing the opening under the door regardless of its form or size and by the purely automatic action of the mechanism fully accomplishing the objects of the invention.

In double doors the actuating-latches may be so placed as to bear each against the other for the generation of power, and this may be done whether the doors be hinged or sliding. By means of the adjustment-screw 12 the actuating-latch 4 may be made to project more or less, as desired, to meet the requirements of closing a large or small opening or to draw the latch in flush with the end of the housing, in which position the entire mechanism is thrown entirely out of gear and no action whatever results from closing the door.

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

1. An automatic weather-strip, comprising a housing, a closure-strip therein suitably supported to play vertically, an oscillatory lever operatively connected to impart vertical movement to said strip, a pivoted latch connected to said lever and projecting beyond the free end of the housing, and means for adjusting the fulcrum-point of said lever, substantially as described.

2. An automatic weather-strip, comprising a housing, a closure-strip therein suitably supported to play vertically, an adjustable slide-plate having a lever fulcrumed thereon, operatively connected to impart movement to the closure-strip, and a pivoted latch projecting beyond the free end of the housing and linked to said lever, substantially as described.

3. In an automatic weather-strip, a housing, a closure-strip therein, composed of a plurality of sections pivoted together, a series of bell-cranks mounted within the housing and linked to said strip-sections, a pitman-chain linking said bell-cranks together, and adapted when moved in one direction to impart movement to all the bell-cranks and thereby elevate the closure-strip, a series of neutralizing-springs along the line of said chain and adapted under a longitudinal application of power on the chain in the opposite direction, to operate the bell-cranks and depress the closure-strip until the latter comes in contact with a resisting-surface, one or more of said springs being adapted to yield under such resistance, in order that the downward movement of the closure-strip may be continued at other points where no obstruction has been encountered, and thus accommodate itself to any inequalities in the vertical dimensions of the opening to be closed, substantially as described.

4. In an automatic weather-strip, a housing, a closure-strip therein, composed of a plurality of sections pivoted together, a series of bell-cranks mounted within the housing and linked to said closure-strip sections, a pitman-chain linking said bell-cranks together and adapted when moved in one direction to impart movement to all the bell-cranks and thereby elevate the closure-strip, a series of neutralizing-springs along the line of said chain and adapted under a longitudinal application of power on the chain in the opposite direction to operate the bell-crank and depress the closure-strip until the latter comes in contact with a resisting-surface, one or more of said springs being adapted to yield under such resistance in order that the downward movement of the closure-strip may be continued at other points and thus accommodate itself to the opening to be closed, a slide-plate, a screw for adjusting the same, a lever fulcrumed on said plate and linked to said chain, a latch pivoted to the housing and linked to said lever, and a recovery-spring to be compressed by the depression of the closure-strip, and by expansion to reëlevate the closure-strip, substantially as described.

5. In an automatic weather-strip, a housing

composed of metal or other suitable material, provided with an adjustable reinforcing-pilaster, 3, the body portion of said housing covered by said pilaster having elongated holes or slots horizontally registering with the holes in the pilaster through which the screws pass to attach both to the door, thus permitting the pilaster to be moved laterally, and the total length of the housing made to conform to the exact distance between the inside faces or stops of the door-frame, substantially as described.

6. In an automatic weather-strip, a housing having a hem, or enlarged inward-projecting and wedge-shaped portion along its lower edge, a closure-strip suspended within the housing and adapted to play freely between the door and said hem, or enlarged portion of the housing, and by the form of said hem or enlargement, assume a slightly-inclined or angular position as related to the vertical face of the door, whereby the movement of the door in final closing brings its lower corner edge firmly against the inner flat side of the closure-strip, the lower edge of the strip being carried downward against the threshold or floor, and the upper edge, at same time being borne over hard against the inclined inner wall of the housing, all simultaneously, and by the same power, acting coincidently at all points, forming tight joints, both on the threshold and within the housing, substantially in the manner, and for the purposes shown and described.

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