July 23, 1929. J. M. MOHR 1,721,967

DOUBLE ACTING SPRING HINGE DEVICE

Filed Aug. 6, 1928

Fig. 1.

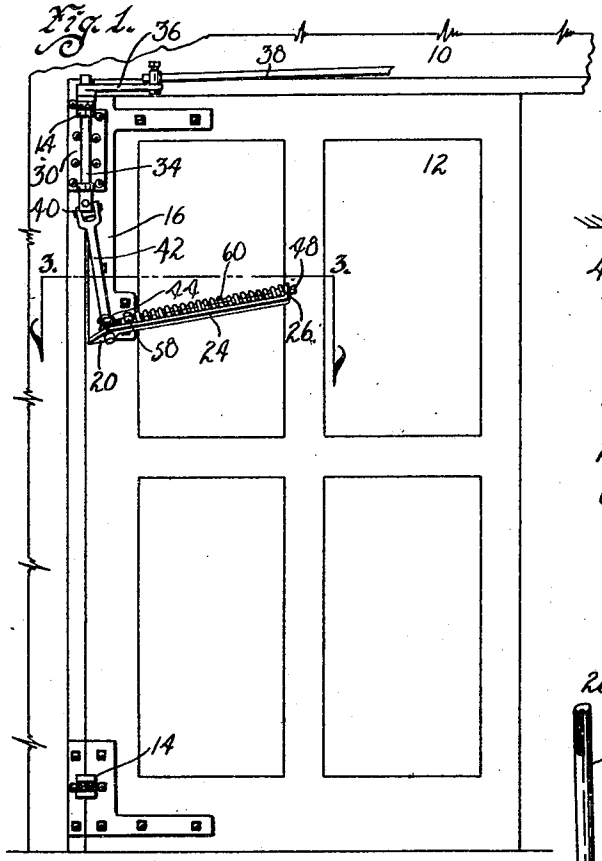


Fig. 3.

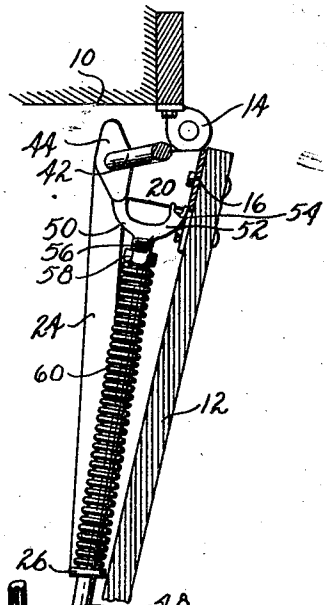


Fig. 4.

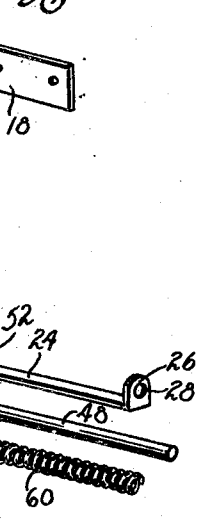
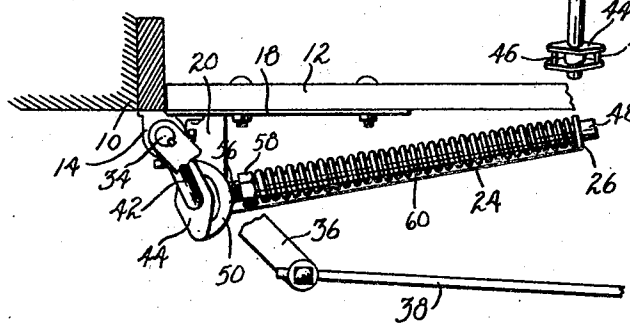


Fig. 2.



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Patented July 23, 1929. 1,721,967

UNITED STATES PATENT OFFICE.

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DOUBLE-ACTING SPRING-HINGE DEVICE.

Application filed August 6, 1928. Serial No. 297,844.

My invention has to do with a double acting spring hinge device particularly adapted for use with mechanical door openers.

It is my purpose in such a device, to provide a spring hinge connection whereby doors may be opened or closed in the usual way by a mechanical door operator and whereby it is made possible to open and close the door manually without interference with or by the mechanical operator and regardless of the position in which the door may be left by the mechanical operator.

Another purpose is to provide such a device, that if during the mechanical operation of the door the door should come into contact with a person, automobile or any other obstacle, the door may stop without injury to any of the parts under slight spring tension and the mechanical operator may complete its operation without injury to it or to the door or to my device.

Another purpose is to provide such a device having parts so constructed and arranged that when the door is manually opened or closed, it will be held by spring tension in the position to which it may be adjusted.

Still another purpose is to provide such a device which would permit the door to be freely opened manually but will prevent its movement beyond a given point.

Still a further object is to provide in such a device, means for tensioning the spring elements for permitting the convenient adaptation of the device for doors of different sizes and weights.

With these and other objects in view my invention consists in the construction, arrangement and combination of the various parts of my device, whereby the objects contemplated are attained, as hereinafter more fully set forth, pointed out in my claims, and illustrated in the accompanying drawings, in which:

Figure 1 is an elevation of a door equipped with a double acting spring hinge device embodying my invention.

Figure 2 is a top or plan view of the door and my device, parts being shown in section and parts being broken away for better illustrating other elements of the device.

Figure 3 is a horizontal sectional view taken on the line 3—3 of Figure 1, illustrating the door in open position after it has been manually opened; and

Figure 4 is a perspective view of the separate parts of my improved device.

It is a common practice to provide mechanical operators whereby doors may be opened and closed by mechanism operated from an electric motor. Such mechanical operation of doors gives rise to certain problems.

For instance, if the door in opening or closing should meet with an obstacle, it is desirable to provide some means to prevent the breaking of parts. I have in my present device provided such a means.

It is also desirable to be able to operate the door manually without interferring with or being interferred with by the mechanical door operator. By my device, this desirable result is attained.

Likewise, it is desirable in such a device, to provide means whereby the door when manually operated, shall be yieldingly held in the opened or closed position to which it may be adjusted and this problem is met by my present device.

With my device also the opening movement of the door is limited as it should be to certain positions.

In the drawings herewith, I have shown a door frame indicated generally by the reference numeral 10. A door 12 is hinged to the frame 10 by means of ball bearing hinges 14.

I will now describe my double acting spring hinge device. I use a suitable bracket which may be a variety of forms but as here shown, comprises an upright member 16 adapted to be secured to the door near the hinge edge thereof.

The upright 16 has at its upper end, a projecting member 18 adapted to be bolted or screwed to the door for better bracing effect. At its lower end, the member 16 has projected horizontally outwardly from it and from the door when it is installed on the door, a part 20 in which is a hole 22 for journaling the shaft hereinafter mentioned.

Extending from the outer end of the part 20, is a member 24 which is extended along side the door when the parts are installed and preferably inclined toward the door, for instance, as illustrated in Figure 2 to occupy a minimum of space.

At the free end of the member 24 is an upturned flange 26 which has a hole to serve for slidably mounting the rod hereinafter mentioned. Fixed to the upper part of the member 16 is a plate or the like 30 having aligned bearings or journals 32 which when the device is installed on the door, are in line with the axis of the hinges.

Journaled in the bearings 32 is an upright shaft 34 which serves as one of the operating members for the mechanical opener and also as a pintle for the upper hinge.

Fixed to the upper end of the shaft 34 in the completed device, is an arm 36 shown in Figure 1 and also in Figure 2. The arm 36 is pivoted to an operating link 38 forming part of the mechanical door opener.

The lower end of the shaft 34 is connected by means of a suitable universal joint 40 with a shaft 42.

For convenience, I will describe the parts as on the door. The parts are so arranged that the shaft 42 inclines from its upper end outwardly and somewhat toward the free edge of the door. The lower end of the shaft 42 is journaled in the hole 22 in the part 20. Fixed on the lower end of the shaft 42 are spaced plates 44 each projecting in opposite directions from the shaft and arranged parallel with each other and having between their outer ends the pins or the like 46.

Slidably mounted in the hole 28 in the member 26, is a rod 48 having at its end opposite the member 26, a yoke 50 with the arms 52, in the ends of which are grooves 54 to receive the pins 46.

The rod 48 is threaded as at 56 near the yoke to receive an adjusting nut 58. On the rod 48 between the adjusting nut 58 and the member 26, is a coil spring 60.

By means of the nut 58, the tension of the spring 50 may be regulated for easily adapting the device for doors of different weights and sizes.

In the use of my improved device, it will be understood that the link 38 is connected with a mechanical door operator and that when the door is closed, the parts stand in the position illustrated in Figures 1 and 2. The plates 44 are then inclined so that a line drawn through the pins 46 and extended to the plane of the door surface, would meet that plane at slightly less than a right angle.

The position of the device is clearly shown in Figure 2. In such position, the arms 52 of the yoke 50 engage both of the pins 46.

It will be understood that the arms 36 and link 38 are held in the position which they have then assumed by the mechanical door opener. If then it should be desired to open the door manually, this can be easily done and the operation is as follows:

Assuming that the parts are in the position illustrated, for instance in Figures 1 and 2, the door is grasped and shoved toward opened position. The outer arm 52 of the yoke 50 fulcrums on the outer pin 46 and the spring is compressed.

The door swings against spring pressure until it moves to fully opened position at which time the axis of the rod 48 swings over center with relation to the line between the hole 28 and the outer pin 46 (see Figure 3). Thereupon the tension of the spring 60 tends to hold the door in opened position.

When the door is fully opened, the inner arm 52 engages the door as shown in Figure 3 and thus limits its opening movement. When it is desired to close the door, the door is manually moved toward closed position and as soon as the spring and the rod 48 swing over center, the spring tends to hold the door in closed position. Thus the door can be opened manually and closed in the same way without interferring with or being interferred with, by the mechanical door opener.

It is obvious that when the mechanical opener is operated, the two pins 46 will remain in engagement with the arms 52 of the yoke 50 on the rod 48. The tension of the spring is great enough to cause the door to swing open as the shafts 42 and 34 are rotated by means of the arm 36 and link 38.

The mechanism whereby the mechanical door opener actuates the link 38 and stops the action when the door is opened, need not be here explained. Similarly, when the door is opened and the mechanical door opener is operated, the door is simply swung toward closed position and there is no change in the relative positions of the rod 48 and the pins 46.

If it should occur during the opening or closing of the door by the mechanical door opener, that any obstacle should be interposed in the way of the moving door, the mechanical operator can continue to work and rotate the shaft 42 whereupon the spring 60 will be compressed and the door can remain stationary without breaking any parts.

When the obstacle is removed, the door can then be moved to open or closed position by hand. If for any reason, the mechanical operator should fail to operate when the door is in any position, the door can be manually moved to any other of its positions without interferring with the mechanical operator and without being interferred with thereby.

It is seen that there is provided a door actuating mechanism which can be used with a mechanical operator and which will provide a sash guard against injury to persons or damage to automobiles or any other obstacle which might get in the way of the door during mechanical operation.

In such an event, no harm would be done to the mechanical operator and it may complete its operation without any harm being done.

When operated manually, the door will stand in either open or closed position under slight spring tension. When a door is opened

manually, it cannot go beyond a given point. The tension on the spring may be readily and easily varied by means of the nut 58 for regulation according to the weight and size of the door on which the device is installed.

It will be understood that some changes may be made in the details of the construction and arrangement of parts of my improved device without departing from the real spirit and purpose of my invention and it is my intention to cover by my claims any modified forms of structure or use of mechanical equivalents that may be reasonably included within their scope.

I claim as my invention:

1. In a device of the class described, a mounting adapted to be supported on a door, a substantially upright shaft mounted in the mounting having engaging elements on opposite sides of the shaft, a rod slidably mounted on the door having a yoke provided with arms for engaging said elements and means for yieldingly tending to hold the yoke in engagement with said element.

2. In a device of the class described, a mounting adapted to be supported on a door, a substantially upright shaft mounted in the mounting having engaging elements on opposite sides of the shaft, a rod slidably mounted on the door having a yoke provided with arms for engaging said elements and means for yieldingly tending to hold the yoke in engagement with said element and means for rotating said shaft whereby when the shaft is rotated, a door on which the device is mounted may be opened or closed and when the shaft is held against rotation, the door may be manually opened or closed.

3. In a device of the class described, a mounting adapted to be supported on a door, a substantially upright shaft mounted in the mounting having engaging elements on opposite sides of the shaft, a rod slidably mounted on the door having a yoke provided with arms for engaging said elements and means for yieldingly tending to hold the yoke in engagement with said element and means for rotating said shaft whereby when the shaft is rotated, a door on which the device is mounted may be opened or closed and when the shaft is held against rotation, the door may be manually opened or closed, the parts being so arranged that when the shaft is in door opening or door closing position, the door on which the device is installed, may be closed or opened manually and when either closed or opened manually, said rod will swing over center with relation to the line between the slidable mounting and the element with which the yoke is engaged for causing the door to be yieldingly held in the position to which it may be adjusted and whereby also when the door meets with an obstacle when being mechanically operated, the shaft may continue to rotate, yielding means will be tensioned and the yoke rocked on one of said elements without injury to any of the parts.

4. In a door opener, a mounting adapted to be supported on a door and provided with a part for projecting from the door having a journal and a member projecting from said part along side the door having spaced from said part, means for slidably receiving a rod, a shaft on said journal, spaced engaging elements on opposite sides of the shaft, a rod slidable in said means having a yoke with arms for engaging the respective elements, a spring on said rod for impelling its yoke toward said element.

5. In a door opener, a mounting adapted to be supported on a door and provided with a part for projecting from the door having a journal and a member projecting from said part along side the door having spaced from said part, means for slidably receiving a rod, a shaft on said journal, spaced engaging elements on opposite sides of the shaft, a rod slidable in said means having a yoke with arms for engaging the respective elements, a spring on said rod for impelling its yoke toward said element and means for regulating the tension on said spring.

6. In a device of the class described, a mounting adapted to be supported on a door, provided with a journal and having spaced from the journal means for slidably supporting a rod at substantially right angles to the journal, a shaft in the journal having on opposite sides engaging elements, a rod slidably mounted in said means having a yoke with arms for engaging said elements and yielding means for pressing the rod toward the elements and means for regulating the tension of said yielding means.

7. In a device of the class described, a mounting adapted to be supported on a door having a part projecting away from said door, a shaft journaled in said part, a second shaft journaled on said mounting and adapted to be arranged in the hinge axis of the door and having universal joint connection with the first shaft, an arm for rocking said second shaft, spaced engaging members on opposite sides of said first shaft, a rod slidably mounted on said door having a yoke with arms for engaging said engaging elements, a spring on said rod tending to yieldingly hold the arms of said yoke against said engaging elements and means for varying the tension of said spring.

8. In a device of the class described, a mounting adapted to be supported on a door having a part projecting away from said door, a shaft journaled in said part, a second shaft journaled on said mounting and adapted to be arranged in the hinge axis of the door and having universal joint connection with the first shaft, an arm for rocking said second shaft, spaced engaging members on opposite sides of said first shaft, a rod slid-

ably mounted on said door having a yoke with arms for engaging said engaging elements, a spring on said rod tending to yieldingly hold the arms of said yoke against said engaging elements and means for varying the tension of said spring, the parts being so arranged that when the parts are in door closing position and the shafts are held against rotation, the door may be manually opened and the yoke will rock on one of said engaging elements for compressing said spring until the door is fully opened whereupon said yoke will engage the door and prevent its further opening movement.

9. In a device of the class described, a substantially upright shaft, means for mounting said shaft for rotation, an actuating member connected with said shaft, and means for operatively connecting said shaft with a hinged door, including a member adapted to be mounted on the door for yieldable slidable movement, a member adapted to be operated from said shaft and having operative connection with said last described member, whereby the rotation of said shaft serves to actuate said last two described members for opening or closing the door, while permitting the door to be opened or closed manually without rotating said shaft.

10. In a device of the class described, a slidable member, means for mounting said member on a door for yieldable sliding movement, said member having at one end spaced arms and means mounted independently of the door having members for cooperating with said arms, whereby the actuation of said last means will serve to actuate said first-described member for opening or closing the door, whereas the door may be opened or closed manually without necessarily actuating said last means.

Des Moines, Iowa, July 17, 1928.

JOSEPH M. MOHR.