April 30, 1968 W. B. RUIZ 3,380,109

SELF-CLOSING DOOR HINGE

Filed Feb. 2, 1966

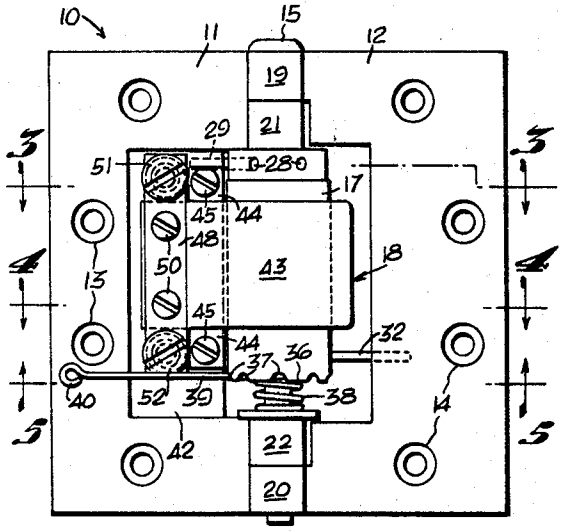


Fig. 1

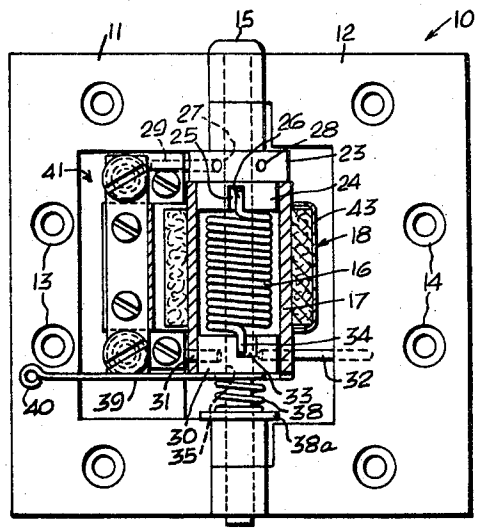


Fig. 2

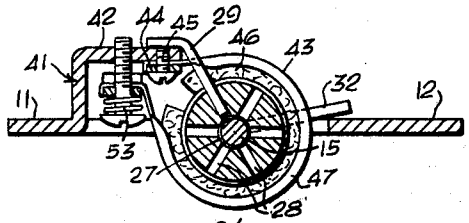


Fig. 3

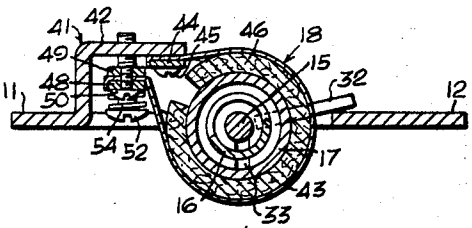


Fig. 4

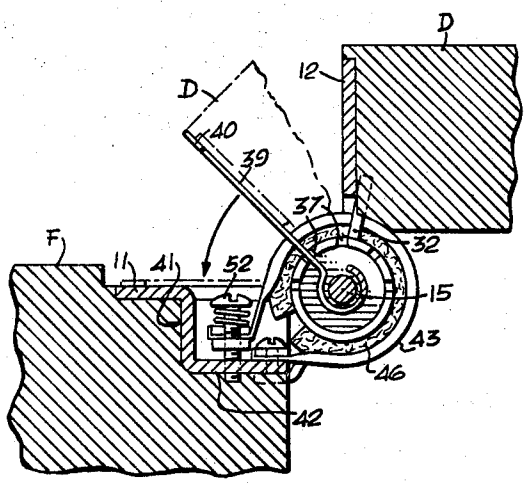


Fig. 6

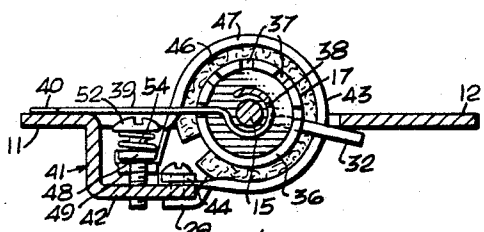


Fig. 5

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SELF-CLOSING DOOR HINGE

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ABSTRACT OF THE DISCLOSURE

A door hinge the hinge leaves of which are interconnected by a helical torsion spring circumjacent its pintle for self-closing action, and further including a cylindrical brake lining fixed with respect to one of the hinge leaves and a brake surface fixed with respect to the other of the hinge leaves and in frictional face-to-face contact with the brake lining for retarding the accelerating action of the torsion spring on the hinge leaves.

My invention relates to hinges, and is directed particularly to improvements in spring actuated self-closing door hinges.

Self-closing door hinges of the type having a torsion spring arranged about the hinge pintle and adapted to resiliently constrain the hinge leaves in door closing position are known. Such hinges, commonly used on screen doors, have a tendency to accelerate the door into closed position when the door is released from an open position, to slam into the door frame with considerable force. This acceleration is due to the fact that the inertia of the door when at its stationary open position is only gradually overcome by the action of the spring as the door closes. This action is a source of much annoyance, especially when doors so equipped are used in public places where there is much traffic, or when used by children, in the home running in and out of the house without properly handling the door. In an attempt to overcome this disadvantage in spring-actuated hinges, various types of snubbers and piston actuated decelerators have been devised to neutralize this slamming action of spring hinges. Such devices, however, are expensive to install and unsightly in appearance, and therefore have found only limited use as a adjunct to spring hinges.

It is accordingly the principal object of my invention to provide, in a self-closing door hinge having a torsion spring, means for retarding the accelerating action of the torsion spring on the hinge leaves so as to close the door at an even, compartively slow rate without slamming.

A more particular object is to provide a self-closing door hinge of the above nature wherein the retarding means comprises a cylindrical brake drum circumjacent the hinge pintle and coopeartive with a brake band so constructed and arranged as to impede the closing movement of the hinge leaves by friction brake action.

Another object is to provide a self-closing door hinge of the character described including mechanism for staying the self-closing action for holding a door equipped with such hinges open at a plurality of positions, selectively.

Yet another object is to provide a self-closing door hinge which can be released from open staying position automatically simply by pushing the associated door toward closed position.

Still another object of my invention is to provide an improved self-closing door hinge which is simple in construction, inexpensive to manufacture, easy to adjust, and foolproof in operation.

Other objects, features and advantages of my invention will be apparent from the following description when considered with reference to the accompanying drawings.

In the drawings, wherein like reference numerals denote corresponding parts throughout the several views:

FIG. 1 is an elevational view of a door hinge embodying the invention, shown in open position;

FIG. 2 is a view similar to that of FIG. 1 but showing parts of the operating mechanism in vertical section;

FIG. 3 is a horizontal cross-sectional view, taken along the line 3—3 of FIG. 1 in the direction of the arrows;

FIG. 4 is a horizontal cross-sectional view taken along the line 4—4 of FIG. 1 in the direction of the arrows;

FIG. 5 is a horizontal cross-sectional view taken along the line 5—5 of FIG. 1 in the direction of the arrows; and

FIG. 6 is a top view of the hinge, shown installed and adjusted to stay the door at a 45 degrees open position.

Referring now in detail to the drawings, **10** in FIG. 1 designates a self-closing door hinge embodying my invention, the same comprising, generally, a pair of hinge leaves **11, 12** having countersunk attachment screw holes **13, 14**, respectively, a pintle **15**, a torsion spring **16**, a cylindrical drum **17** and a brake assembly **18**. The hinge leaf **12** is formed along one side with a pair of aligned end pintle receiving knuckles **19, 20**. The hinge leaf **11** is formed with aligned, pintle-receiving knuckles **21, 22** registering with and abutting the inner ends of the end knuckles **19, 20**, respectively, of the hinge leaf **12**. The pintle **15** extends through the aligned openings of the registering leaf knuckles **19, 20, 21** and **22**. The helical torsion spring **16** is disposed circumjacent the pintle **15** within the cylindrical drum **17**. The upper end of the cylindrical drum **17** is fitted with a cylindrical plug member **23** having a reduced diameter portion **24** rotatably received therein. A peripheral edge portion of the reduced diameter portion **24** of the plug member **23** is formed with a slot **25** received in constraining relation within which is an upwardly projecting end portion **26** of the torsion spring **16**. The cylindrical plug member **23** is provided with an axial bore **27** through which the pintle **15** passes freely, and a plurality of equidistantly-spaced radial bores **28** adapted to receive one end of a stay pin **29**, for the purpose hereinafter described.

The lower end of the cylindrical drum **17** is fitted with a cylindrical bottom plug member **30**, secured in relatively fixed position therein as by a radial lock pin **31** (see FIG. 2). It will be noted that the plug member **30** is not only secured within the cylindrical drum **17** but is secured in a relatively fixed position thereto by means of the lock pin **31**. A stay pin **32** extends radially outwardly of the lower end of the cylindrical drum **17**, and is normally in abuttment at its outer end with an outside portion of the hinge leaf **12**, under the torsional force of the torsion spring **16** when wound as is hereinbelow more fully described. As is best illustrated in FIG. 2, the cylindrical bottom plug member **30** is provided with a slot **33** received in constraining relation within which is a downwardly-projecting end portion **34** of the torsion spring **16**. The cylindrical bottom plug member **30** is provided with an axial bore **35** through which the pintle **15** passes freely, and, at its outer or lower end, the drum **17** is formed with an outwardly-projecting annular rim portion **36** having a plurality of substantially equidistantly-spaced arcuate notches **37**. Seated within the recess defined by the rim portion **36** of the bottom plug member **30** and in circumjacent relation with respect to the pintle **15** is the helical spring portion **38** at one end of which is located an adjustment rod **39**, which may be of stiff wire. As illustrated in FIGS, 1, 2, 5 and 6, the adjustment rod **39** passes horizontally through one of the rim notches **37** and terminates in a vertically-extending loop **40** which serves as a handle for adjustment, as is hereinbelow more fully described.

The adjustment rod **39** is thin enough not to interfere with full closure of the hinge. The outer end of the helical spring portion **38** of the adjustment rod **39** is constrained against a washer **38***a* seated against the inner end of the pintle receiving knuckle **22** of the hinge leaf **11**. It will thus be apparent that the adjustment rod **39** is resiliently held in seated position in any selected one of the notches **37** of the bottom plug member **30**, and that movement from one position to another in said notches can be effected manually simply by lifting the handle end of said rod downwardly against the action of its helical spring portion **38**, and then moving it arcuately into the desired notch, for the purpose hereinbelow more fully described.

A central marginal portion at the inside of the hinge leaf **11** is formed with a right angular off-set portion **41** providing an outwardly-spaced parallel wall portion **42** against which one end of a flexible metal brake band **43** is affixed by means of a clamp bar **44** secured in place by machine screws **45**. The brake band **43** overlies a strip of brake lining material **46** surrounding the outer surface of the cylindrical drum **17**, and has turned in flange portions **47** along each side to prevent axial movement of said brake lining with respect to said brake band. The outer extremity of the brake band **43** is clamped between outer and inner clamp bars **48** and **49**, respectively, secured in place by machine screws **50**.

Means is provided for adjusting the tensional force at the outer extremity of the brake band **43**. To this end, tension adjustment screws **51**, **52** fitted with circumjacent helical springs **53**, **54**, respectively, pass through openings in opposed outwardly-projecting portions of the outer clamp bar **48** and are threadedly received in the wall portion **42** of the hinge leaf **11**.

In operation, the torsion spring **16** is activated by turning the drum **17** in the anti-clockwise direction (as seen in FIG. 3) and is retained in wound condition by means of the stay pin **29**, the outer end of which abuts the outside of the wall portion **42** of the hinge leaf **11**. Since the lower end of the torsion spring **16** is supported in fixed relation with respect to the cylinder drum **17**, and since the stay pin **32** secured to the lower end of said cylinder drum abuts against an outside marginal portion of the hinge leaf **12**, it will be apparent that the activated torsion spring will normally resiliently urge the two hinge leaves together, viz., into door closing relation. The brake assembly, however, inhibits the free rotational movement of the drum **17** to prevent "slamming" of a door on which the hinge is used, and the retarding action of the brake mechanism can readily be controlled by adjustment of the brake band tension adjustment screws **51**, **52**. In this connection it is to be noted that while the brake mechanism is operative when the dor closes, opening of the hinge has a tendency to lift the outer end of the brake band **43** away from its inner end against the compressional force of the springs **53**, thereby releasing the gripping action on the brake lining **46**. The braking mechanism thus offers substantially no resistance to opening of the door, while becoming immediately effective upon the door moving in the closing direction.

FIG. 6 illustrates how a door D in a frame F can be held or stayed in 45 degree open position by abutment of the adjustment rod **39** against the inside of the fixed hinge leaf **11**, said rod being positioned in one of the arcuate notches **37** wherein said rod acts as a wedge against the torsional expansion of spring **16**. (See broken line representation thereof in FIG. 6.) Placement of the adjustment rod **39** in other of the arcuate notches **37** as described above, would serve to hold the door open at other positions, for example at 90, 135 and 180 degrees, selectively. Closure of a door so held open is effected simply by pushing the door into closing position, whereupon the adjustment rod will be forced to ride out of its notch **37** and any other notches as the hinge drum **17** turns in closure.

While I have illustrated and described herein only one form in which my invention can conveniently be embodied in practice, it is to be understood that this form is presented by way of example only and not in a limiting sense. The invention, in brief, includes all the forms and embodiments coming within the scope and spirit of the following claims:

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

1. In a self-closing door hinge, the combination comprising, a pair of hinge leaves having interfitting knuckles providing a common pivotal opening, a pintle received in said pivotal opening and holding said hinge leaves in relatively swinging relation, a helical torsion spring circumjacent said pintle, mechanism interconnecting the opposed ends of said helical torsion spring with one each of said pair of hinge leaves for urging said hinge leaves in mutually closed position, a brake surface fixed with respect to one of said hinge leaves, a brake lining in face-to-face contact with said brake surface, a brake band fixed with respect to the other of said hinge leaves and in face-to-face contact with the outer face of said brake lining, and means for adjusting contact force between said brake lining and said brake band.

2. The invention as defined in claim **1** including mechanism for holding said hinge leaves in one of a plurality of relatively open positions, selectively against the urging of said torsion spring.

3. In a self-closing door hinge, the combination comprising, a pair of hinge leaves having interfitting knuckles providing a common pivotal opening, a pintle received in said pivotal opening and holding said hinge leaves in relatively swinging relation, a helical torsion spring circumjacent said pintle, mechanism interconnecting the opposed ends of said helical torsion spring with one each of said pair of hinge leaves for urging said hinge leaves in mutually closed position, a cylindrical brake drum surrounding said helical torsion spring, means constraining said brake drum to rotary movement in unison with one of said hinge leaves, a brake lining surrounding said brake drum, a brake band secured to the other of said hinge leaves and surrounding said brake lining in closely embracing relationship, and means for adjusting the contact force between said brake lining and said brake band.

4. The invention as defined in claim **3** wherein one end of said brake band is rigidly secured to said other of said hinge leaves, and resiliently mechanism securing the other end of said brake band to said other of said hinge leaves.

5. The invention as defined in claim **4** including mechanism for holding said hinge leaves in one of a plurality of relatively open positions, selectively, against the urging of said torsion spring.

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