Dec. 12, 1950 R. T. PHILIPS 2,533,502

ADJUSTING MEANS FOR HINGES

Filed Aug. 1, 1949 2 Sheets-Sheet 1

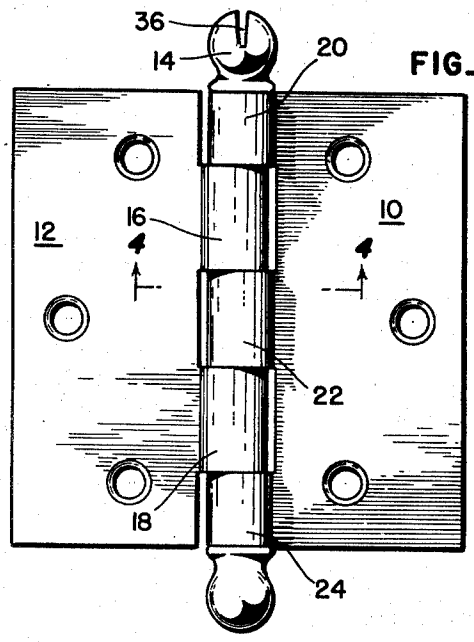


FIG. 1

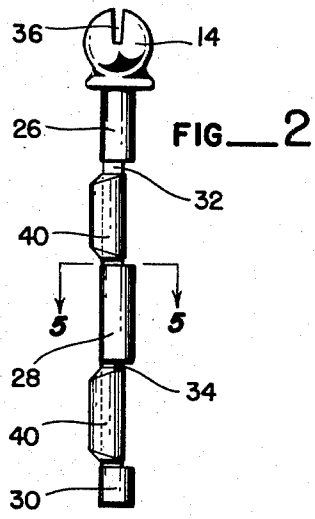


FIG. 2

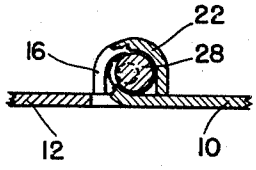


FIG. 4

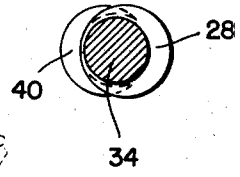


FIG. 5

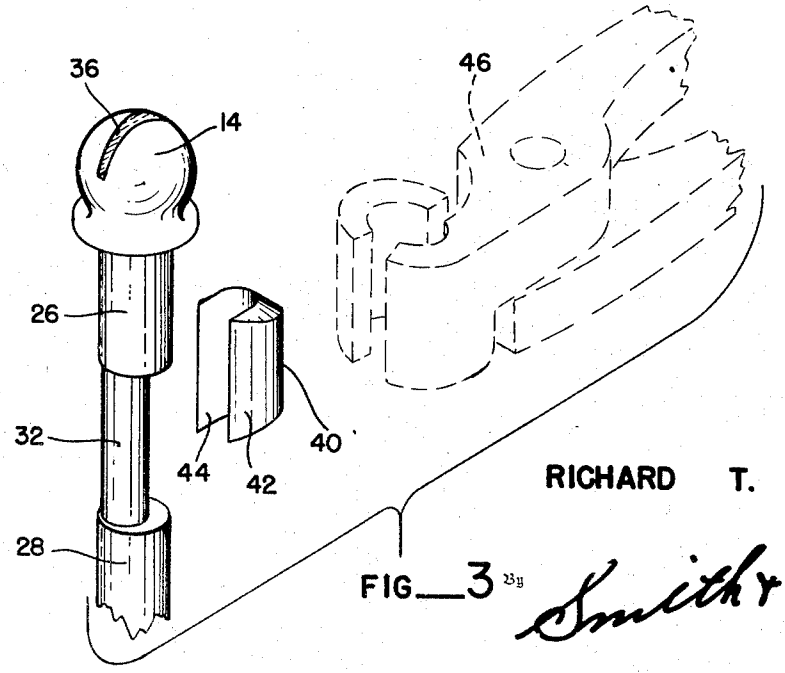


FIG. 3

RICHARD T. PHILIPS
Inventor

By Smith & Tuck
Attorneys

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ADJUSTING MEANS FOR HINGES

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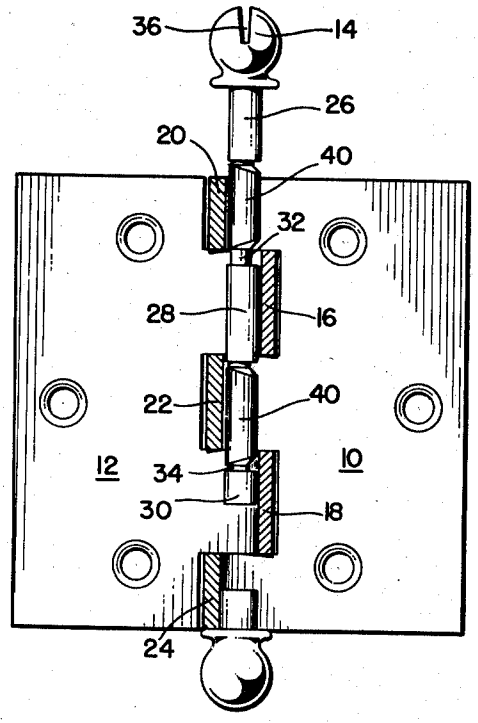
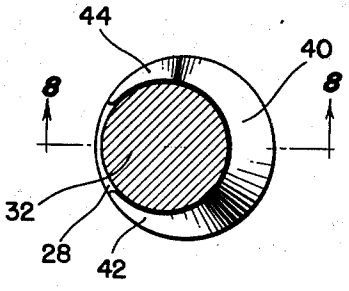


FIG. 6

FIG. 7



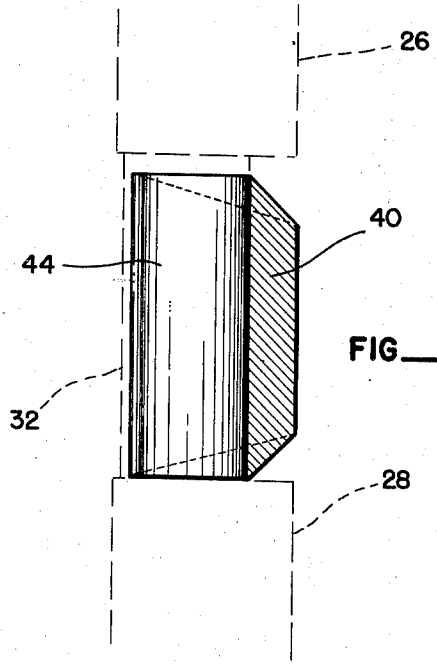


FIG. 8

RICHARD T. PHILIPS
Inventor

By Smith & Tuck

Attorneys

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ADJUSTING MEANS FOR HINGES

Richard T. Philips, Seattle, Wash.

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2 Claims. (Cl. 16—131)

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My present invention relates to hinges, such as normally are employed for the hanging of doors, and is most especially adaptable for use with butt hinges. The invention consists of providing in the two leaves of a butt hinge, the usual cylindrical bores of the same size normally in each of the leaves, and employs a pin having spaced bearing portions thereon, which serves as the pivot for one of the hinge members, and alternately disposed therewith, crank or eccentric portions, which provide an adjustment so that the exact hanging of the door can be adjusted or corrected, as desired.

It is well known that a wide variety of arrangements have been made, all purporting to achieve the adjustment of hung doors. Those devices, however, which have been studied, are generally characterized by expensive constructions, which have small bearing portions, or small lock devices, which, after a reasonable period of use, are usually worn or damaged to the point where they are of questionable worth. The majority of devices observed, have been expensive to manufacture, and because of the intricate details of design, require highly skilled workmen to make the various adjustments therein. This condition mitigates again the general workability of any such arrangement, and in producing my adjusting means for hinges, I have produced a device which can be installed as an original element, or in part installed as a replacement element, even by persons little skilled in the use of such equipment, thus making my invention available to the ordinary home owner, so that he may make his own adjustments at a minimum of cost.

The principal object of my present invention, therefore, is to provide a simply constructed and easily installed adjusting means for hinges, of the butt hinge type preferably, which will make it a simple matter for persons unskilled in such crafts to make adequate adjustments on their hung doors.

A further object of my invention is to provide an adjusting means which can be applied to hinges already installed and in use, and which will correct the defect of hanging or settling, so that the door can be restored to a properly hung condition.

A further object of my invention is to provide an adjustable means in the form of a hinge pin, which may be employed as a replacement unit for hinge pins already installed.

A further object of my invention is to provide a hinge pin for butt hinges, having adjusting

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means embodied therein, which because of its unique construction, permits ready insertion or removal of the pin by persons unskilled in such work.

Further objects, advantages and capabilities will be apparent from the description and disclosure in the drawings, or may be comprehended or are inherent in the device.

In the drawings, Figure 1 is a front face view of a butt hinge embodying the present invention.

Figure 2 is a view taken in the same sense as Figure 1, but showing only the removable hinge pin.

Figure 3 is an exploded, bracketed perspective view, partly in dashed lines, illustrating the manner in which the eccentric bushings are formed upon the hinge pin.

Figure 4 is a fragmentary cross-sectional view along the line 4—4 of Figure 1.

Figure 5 is a cross-sectional view along the lines 5—5 of Figure 2.

Figure 6 is a face view, similar to Figure 1 but showing part of the hinge knuckles in section and illustrating the insertion of the hinge pin.

Figure 7 is a typical cross-sectional view through a bushing and its associated crank.

Figure 8 is a vertical sectional view through a bushing or lock member with the hinge pin shown in dashed lines.

Referring to the drawings, throughout which like reference numerals indicate like parts, the numerals 10 and 12 designate the two hinge leaves making up a complete butt hinge. For purposes of simplifying the description, hinge leaf 10 will be considered the fixed leaf member, in that it will be fixedly secured as to the frame of a doorway. Hinge leaf 12, on the other hand, will be considered the movable hinge leaf, and will be secured to the door and move with the same. Normally, the hinge leaves 10 and 12 are secured in operating relationship by a through pin, which forms the hinge pin as 14. The hinge pin passes through the alternately disposed knuckles of the two hinge leaves. In the showing of Figure 1, formed as part of the movable hinge 12 are the spaced knuckles 16 and 18, and on the fixed hinge 10 are the spaced knuckles 20, 22, and 24. These knuckles may be formed in several different ways. In the cheaper hinges it is common to form them by stamping operations, and in the de luxe or custom type of hinges the hinge leaves 10 and 12 are normally cast of non-ferrous metals, with the knuckle portions cast as part thereof, and solid. This requires the drilling of the knuckles longitudinally, and prefer-

ably reaming the same to accurate size. Of recent years a third method of forming these has come into quite general use, in that the material is extruded and then the various knuckles are formed as by milling out the spaces for the accommodation of the knuckles of the companion hinge leaf members. There are still other methods of making hinges, such as by die casting and other techniques. I have found, however, that my adjusting means can be adapted to all the various forms of hinge construction.

Referring to Figure 2, I have illustrated my typical form of hinge pin 14. This is provided with three aligned bearing portions as 26, 28 and 30. These bearing members are normally of full diameter and are aligned for the purpose of having them easily insertable in a bore in the hinge leaf members, which, although interrupted, is in effect, a cylindrical bore, as it passes through the various knuckle portions. Disposed alternately with the bearing portions, 26, 28 and 30, are portions of reduced diameter, as 32 and 34. These are preferably formed, cylindrically and are so disposed as to form cranks or eccentrics, the longitudinal axes of which are similarly offset from the longitudinal axes of the bearing portions, as 26, 28 and 30. There is one essential requirement in the structure; that the crank portions must have no portions which extend out beyond the cylindrical outline of the bearing members 26, 28 and 30. Otherwise it would be impossible to assemble the hinge and still retain all the desired bearing surfaces in the hinge knuckles.

It is desirable that external means be provided as part of pin 14, so that the same can be rotated about its longitudinal axis after it is assembled in the hinge leaves. One convenient way of achieving this is by means of a kerf, cut at 36. Such a kerf can be engaged by a screw driver or a coin and make it possible to rotate the pin for adjusting purposes. An alternate means might be the employment of a nut-like head that could be easily engaged by a wrench.

Disposed upon cranks 32 and 34, are locking members, which are made generally after the form of a bushing, having their bores eccentrically disposed with the axis of the bushing when they are shaped to their final form. One manner of forming the lock members, or bushings, is illustrated in Figure 3, in which the bushing proper, 40 is shown with a U-shaped opening throughout the length thereof. This opening is sufficient to permit seating the locking member upon the reduced diameter crank portion as 32. This bushing should, however, engage crank 32 quite snugly. For this reason it is believed most desirable that the bushing members be made by a method that will insure accurate dimensions. Such methods are available to those making extrusions, die castings, and of course, milling operations. As a locking member ultimately needs to provide a very marked degree of frictional engagement with crank 32, or 34, it would indicate that, if it were of the same material, that maximum friction would result. However, the locking members or bushings have a dual function, one of securing themselves to the cranks 32 and 34 in a manner where they can only be moved by considerable friction, and a second purpose of having the outer lips, as 42 and 44, somewhat expansible so that it will also seat frictionally in the knuckle of the hinge leaf. Experience indicates that this bushing then should be of material having considerable resiliency so that no amount of sustained compression will every fully overcome the normal spring-back effect of the material of the bushings.

In forming the bushing upon crank 32, after the showing of Figure 3, for instance, the locking member 40 is placed upon crank portion 32, and then engaged either by special forming tongs, as is illustrated by dashed lines in Figure 3 at 46, or it may be accomplished in a die seated in a punch press where preferably a series of blows would be struck, so as to produce a successive swedging or forming action upon the metal. As the pressure is applied to bend the tips 42 and 44 around crank 32, the bushing 40 will approach closely the outside dimensions of bearing portions as 28, for instance. However, to function after the teachings of this invention, the points, as 42 and 44, should never quite fully conform, but rather be outside of the cylindrical forms.

When bushing or lock members 40 are assembled and formed on their respective cranks 32 and 34, as illustrated, they should be turned so as to generally form a continuation of the cylindrical form of bearings 26, 28 and 30. In this position it is possible to assemble the hinge, but it would be very difficult to disassemble the same, and to overcome this condition I prefer to chamfer either the bores of the various knuckles, or more simply to bevel the ends of the lock members 40. When this is effected, then the fact that the bushing members are not fully formed to their cylindrical shape would mean that the hinge pin can be pressed home into position thereby completing the compression of the bushings and causing them to conform to the cylindrical form. As a further aid in the assembly and disassembly of my hinge, I prefer that bushings 40 be so arranged on pin 14 that only one end of one of the bushings need be forced at a time. In the case as illustrated, with only two such bushings, a difference in length in one or the other will achieve this. In case of a larger number of bushings, the same general effect will be maintained and this may be likened to a freight train in making its start, in which the slack is taken up in the train, and then, successively, each car is started.

Method of operation

To simplify the description of the operation it can be assumed that the leaf portions 10 and 12 are in place, and pin 14, which might be either a component of the original hinge or replacement member, is to be inserted. The first requirement is that the various bushings 40 be accurately positioned rotatively upon cranks, as 32 and 34, so that a cylindrical form, generally, is provided. It is then necessary to determine how the door should be moved in order to hang properly. Doors most commonly either become hinge-bound on their margins, or through sagging have a tipped appearance. Then there are times when the margin of the door where it meets the frame may develop too much clearance, or, on the other hand, may not have sufficient clearance. This condition must first be determined; then pin 14 with bushings 40 assembled to form a cylinder is forced through the knuckles of the hinge leaf. Force is probably the most descriptive statement of the desired condition, in that it is necessary to somewhat compress bushings 40 during this operation, and if they are not tight enough to require considerable pressure, they could not be depended upon to stay in position. Now with the pin in place, and the bushings 40, which in

turn reflects the angular position of cranks **32** and **34**, in place to form a continuous cylinder with bearings **26–30**, the adjustments of the door can be achieved by rotating pin **14** by means of engaging it as with a coin or screw-driver in kerf **36**. After this adjustment is made, the continued use of the hinge should not effect the positioning of the various parts nor change the adjustment.

In order to maintain the condition as outlined above it is necessary to provide that bushings **40** maintain their original position in the hinge leaves. This is normally achieved by having accurate bores in the knuckles as **16** and **18**, and to have the material of bushing **40** of a character that will insure a spring-back in the material from the normal cylindrical form after its forming. The anchoring of the bushing can be further affected if the bushings are of the same texture and type of material as the hinge leaf in which it seats. This is in keeping with the accepted principles of friction between metal surfaces.

During the period the pin **14** is being turned to properly position the door, the friction on the outer surface of bushing **40** must be greater than the friction on the inner surface engaging crank **32**, so that the pin can be turned to the optimum position without disturbing the adjustment or position of bushing **40**. After the pin has been turned to the position where the adjustment of the door is achieved, it is then necessary to insure that the friction between the bore of bushing **40** and crank **32**, in the aggregate of the various bushings and cranks is greater than the friction of the bearing portions **26**, **28** and **30** in their associated hinge leaf. The purpose of this arrangement is to insure that the working bearings for the hinge will be the members **26**, **28** and **30**, which are of maximum size permitted under this construction in relation to the reduced crank portion as **32** and **34**. Consequently they are most able to take the wear incidental to serving as a pivot. While the requirement of the frictional components of the different elements as pointed out, may appear somewhat complex from the description, actually, it is easily achieved by the proper selection of dimensions and materials, as has already been pointed out.

If it is desired to make another adjustment at a later date, it is only necessary to revolve pin **14** to the new adjusted position. On the other hand, if it is deemed desirable to withdraw pin **14** entirely, from the hinge, it follows that it will be necessary to swing the pin back to the position, with reference to bushings **40**, that it had at the time of insertion; otherwise we would no longer have a cylindrical pin to be withdrawn, and its removal could not be effected.

It is believed that it will be clearly apparent from the above description and the disclosure in the drawings that the invention comprehends a novel construction of adjusting means for hinges.

Having thus disclosed the invention, I claim:

1. An adjusting means for hinges, consisting of: a fixed hinge leaf adapted for mounting on a fixed member; a movable hinge leaf adapted for mounting on a movable member; pintle receiving knuckles on each of said leaves, alternately disposed; pintle receiving bores, of uniform size axially aligned in each of said leaves; a pintle adapted to pass through said bores, having bearing portions axially aligned to form bearings in the knuckles of one of said leaves; alternately disposed crank portions formed on said pintle, positioned in the knuckle bores of the companion hinge leaf; said crank portions being of reduced diameter and being disposed within the general cylindrical form of said bearing portions; eccentric bushings mounted on said crank portions of said pintle; said bushings being longitudinally split open at their thinnest portion and requiring externally applied pressure to make them conform to the cylindrical form of their mating hinge knuckle bore; said bushings being beveled on one end to assist entering the same in their bores, and means for adjusting the rotary position of said pintle.

2. An adjusting means for hinges, consisting of: a fixed hinge leaf adapted for mounting on a fixed member; a movable hinge leaf adapted for mounting on a movable member; pintle receiving knuckles on each of said leaves, alternately disposed; pintle receiving bores, of uniform size axially aligned in each of said leaves; a pintle adapted to pass through said bores, having bearing portions axially aligned to form bearings in the knuckles of one of said leaves; alternately disposed crank portions formed on said pintle mating with the knuckle bores of the companion hinge leaf; said crank portions being of reduced diameter and being disposed within the general cylindrical form of said pintle; eccentric bushings mounted on said crank portions of said pintle; said bushings being longitudinally split open at their thinnest portion and requiring externally applied pressure to make them conform to the cylindrical form of their mating hinge knuckle bore; said bushings being of unequal length, and means for adjusting the rotary position of said pintle.

RICHARD T. PHILIPS.

REFERENCES CITED

The following references are of record in the file of this patent:

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Number	Name	Date
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