

PATENT SPECIFICATION (11)

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(13)

(54) IMPROVEMENTS IN OR RELATING TO HINGES

(71) I, HEINZ DROOFF, trading as PRAMETA PRAZISIONSMETALL-UND KUNSTSTOFFERZEUGNISSE G. BAUMANN & Co., a German citizen, of 5 Köln 91, Hardtgenbuscher Kirchweg 111, Germany, do hereby declare the invention, for which I pray that a patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to hinges. According to the present invention, there is provided a hinge comprising a first part for securing to a door frame and a second part for securing to a door leaf, these parts being connectable such that, when secured to said door frame and door leaf respectively, they allow pivoting of the door leaf with respect to the door frame, said first part having an elongate portion along which can be slidably guided a portion of said second part and in positions of which along said elongate portion said portion of said second part can be locked by a locking screw, said portion of said second part also being pivotably adjustable with respect to said first part about an axis, which is transverse to the longitudinal axis of said elongate portion, by means of a screw.

For a better understanding of the invention, and to show how the same may be carried into effect, reference will now be made, by way of example, to the accompanying drawings, in which:—

Figure 1 is a diagrammatic, longitudinal sectional view of a first form of hinge mounted on a door leaf and on a door frame,

Figure 2 is a plan view of a frame mounting part of the hinge shown in Figure 1, only part of the door leaf mounting part being shown,

Figure 3 is a side view of the door leaf showing part of the leaf mounting part of the hinge,

Figures 4, 5 and 6 are diagrammatic views of a modified construction of frame mounting part of the hinge to facilitate adjustability in one direction of the door leaf and in which

Figure 4 is a plan view,
 Figure 5 is a side view, and

Figure 6 is a section along the line VI—VI of Figure 5,

Figure 7 is a view similar to Figure 1 but showing a second form of hinge,

Figure 8 is a cross-section along the line VIII—VIII of Figure 7,

Figures 9 and 10 are perspective views respectively of the frame mounting part and part of the leaf mounting part of the hinge of Figures 7 and 8,

Figure 11 is a perspective view of a third form of hinge which has a jointed linkage which permits a wider opening of the door leaf as compared with the previous embodiments, the frame mounting part being that of Figures 7 to 9, and

Figure 12 is a longitudinal sectional view through the hinge of Figure 11 with the hinge in a different condition of opening.

Each of the hinges to be described is of a so-called "concealed-hinge" type and is for hingeably mounting a door leaf on a door frame and is particularly applicable to furniture where it is desirable that the hinge should not be visible when the door of the article of furniture is closed.

Referring firstly to Figures 1 to 6, the hinge, indicated generally by reference numeral 1, includes a part 4 for mounting the hinge on a door frame 2 and a part 5 for mounting the hinge on a door leaf 3.

The part 4 has a plate 4a by which the part 4 is mounted on the frame 2 and secured by means of screws 6. The part 5 is inserted into a recess in the door leaf 3, the part 5 having a curved portion 5a and a plate 5b which bears on the inner side of the recess of the door leaf 3, the part 5 being secured by means of screws 7. The part 5 also includes two curved arms 8 and 9 which are each pivotally supported at one end at 10 and 11 respectively and are hinged at their other end by means of hinge points 12 and 13 on a further arm 14 of channel section, the arms 8 and 9 forming a parallelogrammatic linkage. It is by this means that the part 5 is pivotably interconnected with the part 4.

The hinge part 4 is constructed so that the arm 14 engages in an elongated recess 15 of the part 4 and can slide longitudinally there-

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in, the side walls of the recess 15 being provided with longitudinal grooves 16 in which engage ends of a pin 17 that is mounted in and projects from either side of the arm 14. Thus, the arm 14 is slidably supported by the pin ends in the longitudinal grooves 16 to enable the position of the door leaf to be adjusted in one direction in relation to the frame.

The arm 14 is also provided with a screw 18 which extends through a tapped bore 19 of the arm 14 and whose lower end bears on the bottom 15a of the recess 15 and whose upper end bears against a surface 4c of the roof of the recess 15. The screw 18 has a notch 18a to which access can be gained through an opening 20 in the roof of the recess 15 so that the screw 18 can be turned by means of a screwdriver.

A locking screw 21, which can project into a slot 22 in the roof of the recess 15, is disposed between the end of the arm 14 carrying the pin 17 and the screw 18. The bottom end of the locking screw 21 is provided with an annular cutting edge 21a by means of which the locking screw 21, upon tightening, can cut into the bottom 15a of the recess 15 to prevent sliding movement of the arm 14.

The hinge part 4 shown is divided into two parts, the plate 4a and a superimposed part 4b having the elongated recess 15 in which the longitudinal grooves 16 are disposed. To increase the pivoting range of the arm 14, the plate 4a is provided with grooves 23 which deepen as they extend along the length of the plate 4a, these grooves being able to receive the side walls of the channel of the arm 14 and so a larger pivoting angle of the arm 14 around the shaft 17 is permitted.

The part 4b of the part 4 is provided with slots 24 which extend transversely to the recess 15. The part 4b is secured to the plate 4a by screws 25 which extend through the slot 24.

The hinge 1 described above allows for adjustment of a door leaf relative to its frame in three respects. Firstly, the slidability of the arm 14 along the grooves 16 enables the door leaf 3 to be moved perpendicularly towards or away from the adjacent end surface of the frame 2 along the line of the grooves 16.

Secondly, the position of the door leaf 3 can be adjusted relative to the frame 2 by allowing the arm 14 to turn about the pin 17. This is achieved by the screw 18 which can be turned after releasing the locking screw 21. The angular position of the arm 14 in relation to the longitudinal axis of the frame mounting part 4 is altered by turning the screw 18 to a greater or lesser depth in the arm 14 so that, for example, if this adjustment is made in conjunction with the first adjustment of the door leaf perpendicu-

larly to the longitudinal axis of the hinge part 4, the end surface of the door leaf 3 can be aligned with one of the major faces of the frame 2 as at the bottom of Figure 1. If this second adjustment is made alone, then this will have the effect of turning the hinge part 5 about the pin 17, so that, when the hinge is mounted, the angle between the leaf 3 and the frame 2 can be altered (within a range defined by the depth of the grooves 23, this being the maximum in one direction the arm 14 can be pivoted, and the roof of the recess 15 which limits rotation in the opposite direction).

Once the desired position of the arm 14 has been reached, sliding thereof is prevented by locking the arm 14 by the screw 21. Pivoting of the arm 14 is prevented since the screw 18 is restrained from longitudinal axial movement by the bottom 15a of the recess and the surface 4c of the roof of the recess 15.

Finally, the division into two of the hinge part 4, namely into the plate 4a and the superimposed part 4b, enables the door leaf 3 to be adjusted in a third direction which is perpendicular to both the other directions in which the door leaf 3 can be adjusted relatively to the door frame 2. This is achieved by releasing the screws 25 whereupon the hinge part 5, together with its arm 14 and the part 4b can be moved in the direction of the slot 24 and is limited in this movement by the length of the shortest slot 24 (if one happens to be shorter than the other). The setting of the angular position of the arm 14 relatively to the longitudinal axis of the recess 15 and the engagement length of the arm 14 in the recess 15 need not be altered for this adjustment.

Referring now to Figures 7 to 10, the second form of hinge 1a has a part 26 for mounting the hinge to a door frame, the part 26 having a mounting plate 26a which is screwed by screws 6 to the door frame so that a base web 26c bears upon the frame 2. The part 26 has an elongate, central raised portion in the form of a rail. A pivotable arm 14a, of a door leaf mounting part, is of substantially channel section and is such that the sides of the channel can embrace the sides of the raised portion of the part 26. This raised portion has two webs 26b, outer side edges of which being each provided with a longitudinal slot 27 into each of which a pin 28 of the arm 14a can engage, the two pins 28 being opposed to one another and extending into the channel. It will thus be seen that the arm 14a can slide along the raised portion of the part 26, guided by the pins 28 in the grooves 27 and can pivot about the pins 28, when in the grooves 27, relatively to the part 26. These pins and grooves allow for adjustment of the hinge parts in the same direction as do the pins

17 and grooves 16 of the first embodiment.

A screw 29, corresponding to the screw 18 of the first embodiment, and a locking screw 30, corresponding to the locking screw 21 of the first embodiment, are screwed in respective threaded apertures in the base of the channel of the arm 14a. The locking screw 30 can bind against the bottom of a depression 31 in the upper surface of the raised portion of the part 26 when the arm 14a is mounted about the raised portion.

The screw 29 has an enlarged end part 29a remote from the end adapted to receive a screw driver, this end part 29a being slidable in a longitudinal undercut groove 32 in the raised portion of the hinge part 26. The depth of the groove 32 is greater than the height of the enlarged end part 29a so that the arm 14a can pivot about the pins 28 in the grooves 27. Adjustment of the angular position of the arm 14a in relation to the part 26 is achieved by turning the screw 29. Other parts of the hinge shown in Figures 7 to 10 correspond to the parts with the same reference numerals in Figures 1 to 6.

Figures 11 and 12 show a third form of hinge 1b which has the same mounting part 26 as in Figures 7 to 10 but with a jointed linkage 33 which can permit a door leaf 3 to open by more than 90°.

The hinge has an elongate member 34 of substantially channel section interposed between the part 26 for mounting the hinge to the door frame 2 and an arm 14b which is similar to the arm 14a of Figures 7 to 10, the member 34 constituting a portion of the hinge part intended for attaching to the door leaf 3. At one end, the member 34 is provided with pins 34a which cooperate with the longitudinal grooves 27 of the part 26, the member 34 extending over the part 26 as the arm 14a of the previous embodiment. The arm 14b in turn, extends over the member 34 and is longitudinally slideably supported on the member 34 by means of pins 28a which engage in longitudinal slots 34b in the side walls of the member 34. The arm 14b of the jointed linkage 33 is directly hinged in the recess of the hinge part 5 at 35. The member 34 is pivotably connected at 40 to one end of one arm of a two-armed lever 36 which is pivotably supported at the other end of this one arm, intermediate the ends of the lever 36, at 37 on the arm 14b. The end of the lever 36 remote from the pivot connection 40 is pivotably connected to one end of a further arm 38 whose other end is pivotably mounted on the hinge part 5 at position 39. With this linkage, the door leaf 3 can be opened from the door frame 2 over a range of substantially 180°.

The member 34 is provided with the screw 29 and the locking screw 30, the screw 29 being adapted to cooperate with the undercut groove 32 of the part 26 and the locking

screw 30 being adapted to cooperate with the depression 31 of the part 26 to allow the adjustment described with reference to Figures 7 to 10.

It will be appreciated that, with the same form of hinge part 26, the linkages of the hinges of Figures 7 to 10 and Figures 11 and 12, respectively, can be interchanged so that hinges can be used with optional jointed linkages which permit the door leaf to be opened to different opening ranges. Another suitable jointed linkage can be used instead of the illustrated jointed linkage 33.

It will be further appreciated that, with each form of hinge described above, the hinge can first be secured to a door frame and to the door leaf and any desired adjustment of the relative positions of the leaf and the frame can be made afterwards. In particular, in all forms described above, the two parts of the hinge secured respectively to the door frame and to the door leaf can be moved relatively to each other along one line to move, for example, the door leaf perpendicularly towards or away from the adjacent end face of the door frame. Also, these two parts of the hinge can be given a different angular adjustment setting to ensure, for example, that the door leaf closes true to the door frame. In addition, in the embodiments of Figures 1 to 6, the relative positions of the door leaf and the door frame can be adjusted in a third direction, perpendicular to said one line, to adjust, for example, the vertical height of the door leaf relatively to the door frame where the hinge is mounted on one vertical side of the door leaf. All these adjustments can be made in steplessly variable increments and independently of one another.

WHAT I CLAIM IS:—

1. A hinge comprising a first part for securing to a door frame and a second part for securing to a door leaf, these parts being connectable such that, when secured to said door frame and door leaf respectively, they allow pivoting of the door leaf with respect to the door frame, said first part having an elongate portion along which can be slidably guided a portion of said second part and in positions of which aling said elongate portion said portion of said second part can be locked by a locking screw, said portion of said second part also being pivotably adjustable with respect to said first part about an axis, which is transverse to the longitudinal axis of said elongate portion, by means of a screw.

2. A hinge as claimed in claim 1 wherein the last mentioned screw is threadably engaged in said portion of said second part.

3. A hinge as claimed in claim 2, wherein the last mentioned screw is restrained by said first part from moving axially of itself.



17 and grooves 16 of the first embodiment.

5 A screw 29, corresponding to the screw 18 of the first embodiment, and a locking screw 30, corresponding to the locking screw 21 of the first embodiment, are screwed in
10 respective threaded apertures in the base of the channel of the arm 14a. The locking screw 30 can bind against the bottom of a depression 31 in the upper surface of the raised portion of the part 26 when the arm 14a is mounted about the raised portion.

15 The screw 29 has an enlarged end part 29a remote from the end adapted to receive a screw driver, this end part 29a being slidable in a longitudinal undercut groove 32 in the raised portion of the hinge part 26. The depth of the groove 32 is greater than the height of the enlarged end part 29a so that
20 the arm 14a can pivot about the pins 28 in the grooves 27. Adjustment of the angular position of the arm 14a in relation to the part 26 is achieved by turning the screw 29. Other parts of the hinge shown in Figures 7 to 10 correspond to the parts with the same
25 reference numerals in Figures 1 to 6.

30 Figures 11 and 12 show a third form of hinge 1b which has the same mounting part 26 as in Figures 7 to 10 but with a jointed linkage 33 which can permit a door leaf 3 to open by more than 90°.

35 The hinge has an elongate member 34 of substantially channel section interposed between the part 26 for mounting the hinge to the door frame 2 and an arm 14b which is similar to the arm 14a of Figures 7 to 10, the member 34 constituting a portion of the hinge part intended for attaching to the door leaf 3. At one end, the member 34 is provided with pins 34a which cooperate with the longitudinal grooves 27 of the part 26, the member 34 extending over the part 26 as the arm 14a of the previous embodiment. The arm 14b in turn, extends over the member 34 and is longitudinally slideably supported
45 on the member 34 by means of pins 28a which engage in longitudinal slots 34b in the side walls of the member 34. The arm 14b of the jointed linkage 33 is directly hinged in the recess of the hinge part 5 at 35. The member 34 is pivotably connected at 40 to one end of one arm of a two-armed lever 36 which is pivotably supported at the other end of this one arm, intermediate the ends of the lever 36, at 37 on the arm 14b. The end of the lever 36 remote from the pivot connection 40 is pivotably connected to one end of a further arm 38 whose other end is pivotably mounted on the hinge part 5 at position 39. With this linkage, the door
60 leaf 3 can be opened from the door frame 2 over a range of substantially 180°.

65 The member 34 is provided with the screw 29 and the locking screw 30, the screw 29 being adapted to cooperate with the undercut groove 32 of the part 26 and the locking

screw 30 being adapted to cooperate with the depression 31 of the part 26 to allow the adjustment described with reference to Figures 7 to 10.

70 It will be appreciated that, with the same form of hinge part 26, the linkages of the hinges of Figures 7 to 10 and Figures 11 and 12, respectively, can be interchanged so that hinges can be used with optional jointed linkages which permit the door leaf to be
75 opened to different opening ranges. Another suitable jointed linkage can be used instead of the illustrated jointed linkage 33.

80 It will be further appreciated that, with each form of hinge described above, the hinge can first be secured to a door frame and to the door leaf and any desired adjustment of the relative positions of the leaf and the frame can be made afterwards. In particular, in all forms described above, the two parts of the hinge secured respectively to the door frame and to the door leaf can be moved relatively to each other along one line to move, for example, the door leaf perpendicularly towards or away from the adjacent end face of the door frame. Also, these two parts of the hinge can be given a different angular adjustment setting to ensure, for example, that the door leaf closes true to the door frame. In addition, in the
85 embodiments of Figures 1 to 6, the relative positions of the door leaf and the door frame can be adjusted in a third direction, perpendicular to said one line, to adjust, for example, the vertical height of the door leaf
90 relatively to the door frame where the hinge is mounted on one vertical side of the door leaf. All these adjustments can be made in steplessly variable increments and independently of one another. 105

WHAT I CLAIM IS:—

1. A hinge comprising a first part for securing to a door frame and a second part for securing to a door leaf, these parts being connectable such that, when secured to said door frame and door leaf respectively, they allow pivoting of the door leaf with respect to the door frame, said first part having an elongate portion along which can be slidably guided a portion of said second part and in positions of which aling said elongate portion said portion of said second part can be locked by a locking screw, said portion of said second part also being pivotably adjustable with respect to said first part about an axis, which is transverse to the longitudinal axis of said elongate portion, by means of a screw.

2. A hinge as claimed in claim 1 wherein the last mentioned screw is threadably engaged in said portion of said second part.

3. A hinge as claimed in claim 2, wherein the last mentioned screw is restrained by said first part from moving axially of itself.

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4. A hinge as claimed in claim 1, 2 or 3, wherein said locking screw has an annular cutting edge at one end for biting into said first part.
- 5 5. A hinge as claimed in any one of the preceding claims, wherein said locking screw is threadably engaged in said portion of said second part and is disposed between the pivot axis of this portion and the other screw.
- 10 6. A hinge as claimed in any one of the preceding claims, wherein said first part has an elongated recess with side walls having longitudinal grooves in each of which can slide a pin of said portion of said second part, each pin being coincidental with the axis about which said portion of said second part can be adjustably pivoted.
- 15 7. A hinge as claimed in claim 6 wherein said first part comprises a plate securable to the door frame and a part superimposed on said plate and slideable relatively thereto in a direction transversely of the longitudinal extent of said recess and being securable to restrain such sliding movement.
- 20 8. A hinge as claimed in claim 7 wherein said superimposed part has slots which extend transversely to the longitudinal extent of said recess through which slots extend screws mounting said superimposed part on said plate and providing for the sliding and securing of said superimposed part on said plate.
- 25 9. A hinge as claimed in any one of the preceding claims, wherein said portion of said second part is of substantially channel section.
- 30 10. A hinge as claimed in any one of claims 1 to 5, wherein said first part has an elongate, central raised portion with longitudinal grooves in the sides of this portion extending along the length thereof and wherein said portion of said second part is of substantially channel section and has two opposed pins extending into the channel and being coincident with said axis about which said portion of said second part can be adjustably pivoted, said pins respectively engaging in said grooves of said elongate, central raised portion of said first part and the walls of said channel embracing this portion.
- 35 11. A hinge as claimed in claim 10, wherein said elongate, central raised portion has a longitudinal, undercut groove to receive an enlarged end part of said screw for adjustably pivoting said portion of said second part, this screw being threadably engaged in this portion and the depth of said undercut groove being greater than the height of said enlarged end part of said screw.
- 40 12. A hinge as claimed in claim 10 or 11 wherein side walls of the channel of said portion of said second part have longitudinal slots in which are longitudinally slideably supported pins of a further member of channel section which embraces said portion of said second part.
- 45 13. A hinge as claimed in claim 12 wherein said portion of said second part and said further member are each connected to a lever linkage which enables, in use of the hinge, a door leaf to be opened with respect to a door frame over a range of substantially 180°.
- 50 14. A hinge, substantially as hereinbefore described with reference to Figures 1 to 6 of the accompanying drawings.
- 55 15. A hinge, substantially as hereinbefore described with reference to Figures 7 to 10 with or without the modification of Figures 11 and 12 of the accompanying drawings.
- 60 16. An article of furniture having a hinge as claimed in any one of the preceding claims.
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