Feb. 1, 1966 H. GRÜNERT 3,231,928

HINGE

Filed Aug. 1, 1963 4 Sheets-Sheet 1

Fig. 2

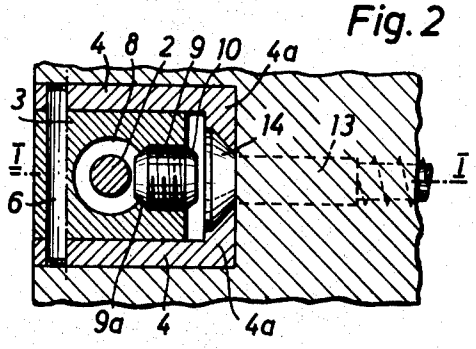


Fig. 1

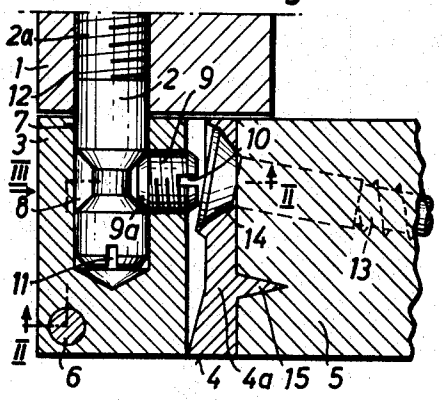
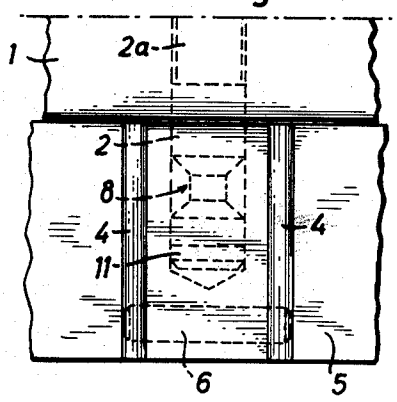


Fig. 3



INVENTOR

Hellmuth Grünert

BY

Lowry & Rinehart

ATTYS.

Feb. 1, 1966 H. GRÜNERT 3,231,928

HINGE

Filed Aug. 1, 1963 4 Sheets-Sheet 2

Fig.4

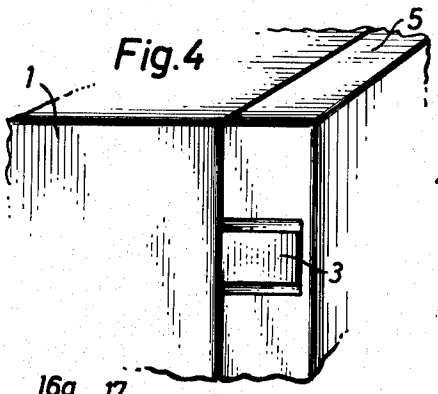


Fig.5

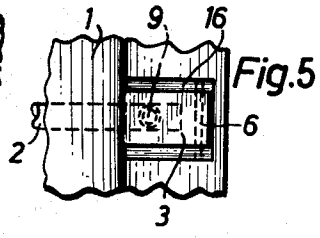


Fig.7

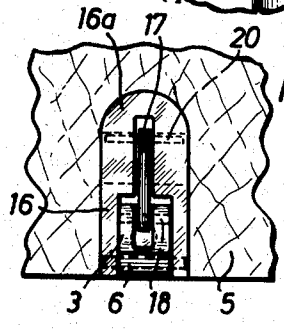


Fig.6

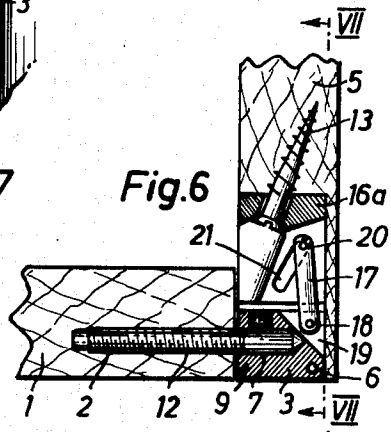


Fig.8

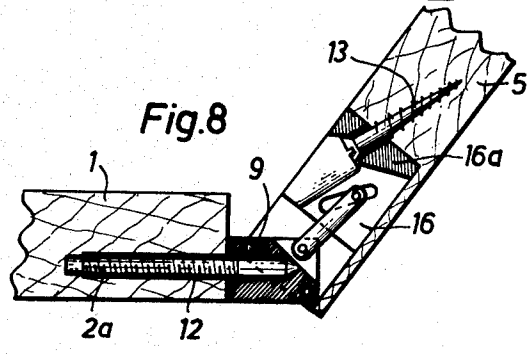
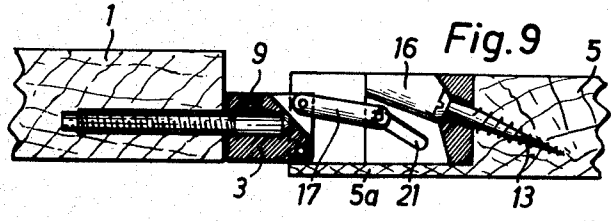


Fig.9



INVENTOR

Hellmuth Grünert

BY

Lowry & Rinehart

ATTYS.

Feb. 1, 1966 H. GRÜNERT 3,231,928

HINGE

Filed Aug. 1, 1963 4 Sheets-Sheet 3

Fig.10

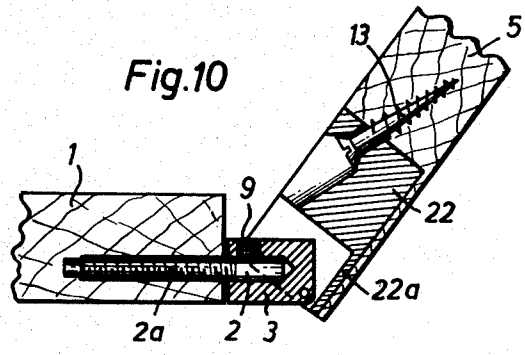
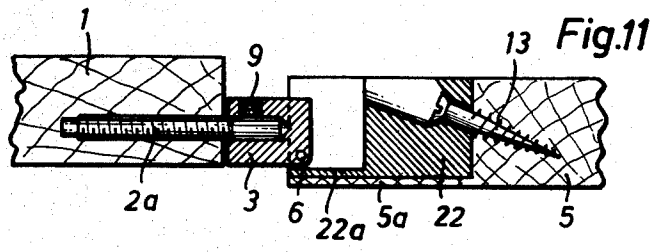


Fig.11



INVENTOR
Hellmuth Grünert
BY
Lowry & Rinehart
ATTYS.

Feb. 1, 1966 H. GRÜNERT 3,231,928

HINGE

Filed Aug. 1, 1963 4 Sheets-Sheet 4

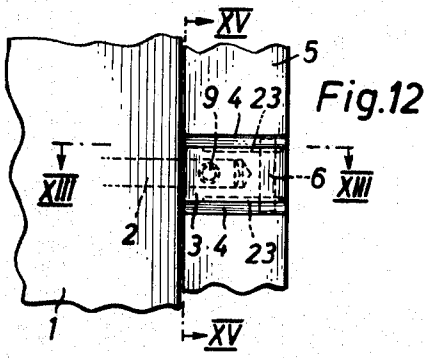


Fig.12

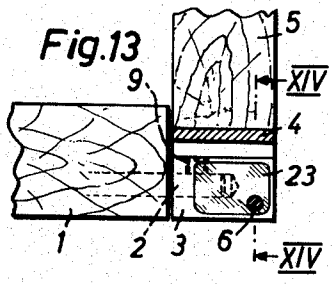


Fig.13

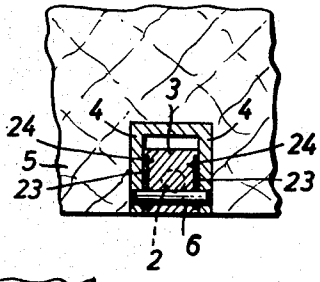


Fig.14

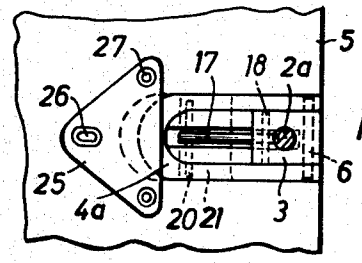


Fig.15

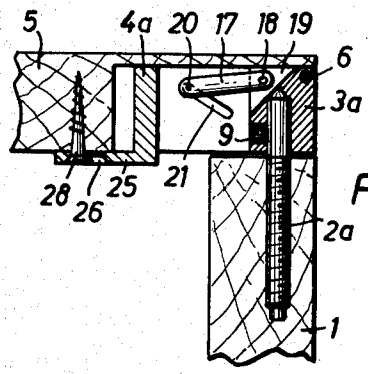


Fig.16

INVENTOR
Hellmuth Grünert
BY
Lowry & Richard
ATTYS.

United States Patent Office 3,231,928 Patented Feb. 1, 1966

3,231,928

HINGE

Hellmuth Grünert, Cologne-Hohenberg, Germany, assignor to Prameta Prazisionsmetall- und Kunstoffer-zeugnisse G. Baumann & Co., Cologne-Osthein, Germany

Filed Aug. 1, 1963, Ser. No. 299,227
Claims priority, application Germany, Aug. 6, 1962, P 29,968; Dec. 20, 1962, P 30,828; Apr. 22, 1963, P 21,492
9 Claims. (Cl. 16—166)

This invention relates to a hinge. The hinge of this invention is usable for flush-closing doors, particularly doors of furniture.

According to the present invention there is provided a hinge for pivotally connecting a movable member to a fixed member, said hinge comprising a connecting element, for example a stud, for driving into said fixed member, a first hinge part for fastening to said fixed member, a hole formed in said first hinge part for receiving said connecting element, a second hinge part for fastening to said movable member, a pivot pin interconnecting said first hinge part and said second hinge part, and locking means for releasably locking said first hinge part to said connecting element, the arrangement being such that said connecting element can be driven into said fixed member with an end zone of said element left projecting from said fixed member, and then said first hinge part can be received over said end zone so that said connecting element extends in said hole, whereafter said first hinge part can be locked to said connecting element by said locking means.

In order that the invention may be clearly understood and readily carried into effect, reference will now be made, by way of example, to the accompanying drawings in which:

FIG. 1 shows a horizontal section taken on the line I—I of FIG. 2 through a hinge pivotally connecting a closed, flush-closing door to a frame,

FIG. 2 shows a vertical section taken on the line II—II of FIG. 1,

FIG. 3 shows a side elevation taken in the direction of the arrow III of FIG. 1,

FIG. 4 shows a top perspective view of a modified version of the hinge connecting the door and the frame,

FIG. 5 shows a side elevation of the hinge,

FIGS. 6, 8 and 9 show a horizontal section through the hinge, the door being shown closed, partly open, and fully open, respectively,

FIG. 7 shows a section taken on the line VII—VII of FIG. 6,

FIGS. 10 and 11 show a horizontal section through another modified version of the hinge connecting the door and the frame, the door being shown partly open, and fully open, respectively,

FIG. 12 shows a side elevation of a further modified version of the hinge connecting the door and the frame,

FIG. 13 shows a horizontal section taken on the line XIII—XIII of FIG. 12,

FIG. 14 shows a section taken on the line XIV—XIV of FIG. 13,

FIG. 15 shows a section taken on a line corresponding to the line XV—XV of FIG. 12 through a further modified version of the hinge connecting the door and the frame, and

FIG. 16 shows a section taken on the line XVI—XVI of FIG. 15.

Referring to FIGS. 1 to 3, there is driven into the frame **1** a stud **2** over a projecting end zone of which is received a hinge part in the form of a block **3**. This block is embraced by a U-shaped hinge part **4** which is inserted in the door leaf **5**. Provided as a pivot between the block **3** and the hinge part **4** is a pin **6** of which the ends fit in bores in the U-shaped hinge part **4**. The stud **2** fits in a hole **7** in the block **3**, and is provided with a peripheral annular groove **8** of trapeziform cross-section. Adapted to engage in this groove **8** is a set-screw **9** of which the forward part **9***a* is adapted to the trapeziform cross-section of the groove **8**. In order to enable adjustment of the screw **9**, which is screwed into the block **3**, a slot **10** is provided in the head of this screw to take a screwdriver. The outer end of the stud **2** is also provided with a slot **11** for a screwdriver. If desired, the head of the screw **9** and the outer end of the stud **2** could instead be polygonal for cooperation with a spanner wrench. The stud part **2***a* screwed in the frame **1** is provided with a machined screw-thread **12**. The base portion **4***a* of the U-shaped hinge part **4** is fixed in the door leaf **5** by means of a wood screw **13**. The axis of the wood screw is inclined relatively to the base portion **4***a*. The axis of a seat **14** for the head of the wood screw **13** is correspondingly inclined. The base portion **4***a* also comprises a tooth-like projection **15** which penetrates into the wood of the door leaf **5** and thus assists in retaining the hinge part **4** in the correct position in the door leaf.

To remove the door from the frame, the door **5** is opened, the screw **9** then being accessible to a screwdriver. When the screw **9** has been turned back far enough, the block **3** together with the door leaf **5** can be removed from the stud **2**. For mounting the door on the frame, first of all the stud **2** is introduced into the frame **1**. The extent to which the stud is driven into the frame can be adjusted by means of a screwdriver inserted in the slot **11**. The U-shaped hinge part **4** is inserted in a slot-like recess in the door leaf **5**, which recess can easily be produced by means of a milling cutter, and is fixed to the door leaf **5** by means of the wood screw **13**. The block **3** which is already mounted, by way of the pivot pin **6**, in the U-shaped hinge part **4** is then fitted onto the projecting end zone of the stud **2**, whereupon it can be locked to the stud by means of the screw **9**. During mounting, and also at any later time, the clearance between the door and the frame can be infinitely adjusted by turning of the stud **2**.

The wood screw **13** and the stud **2** are situated in the same horizontal plane.

In the version shown in FIGS. 4 to 9, the block **3** and the hinge part **16** (which corresponds to the part **4**) are interconnected not only by the pivot pin **6** but also by a link **17**. This link **17** is pivotably mounted at one end on a pin **18** extending across a shallow slot **19** in the block **3**. The other end of the link **17** carries a stop pin **20** which runs in slots **21** formed in both limbs of the U-shaped hinge part **16**. Alternatively, the latter pin could run in a single slot which would be formed in one of the limbs.

By means of the stop pin **20**, the hinge part **16** is arrested after pivoting through about 90° from its closed position. This eliminates the risk that with a concealed hinge, for which a certain portion **5***a* of the door leaf **3**, if left to hide the hinge in front view, might undergo excessive stress. This elimination of the risk is particularly advantageous for articles of furniture, e.g. kitchen furniture, of which the outside faces are provided by a thin plastic panel as, for example, a laminated plastic panel.

In regard to FIGS. 10 and 11, a pivotable metal hinge part **22** is provided with a wall portion **22***a* which in the closed position of the door is situated in front of the front face of the metal block **3**. When the door leaf is opened, wall portion **22***a* strikes against a side face of the block **3**, so that the movement of the door leaf is stopped by direct contact between the metal hinge part **22** and the metal block **3**.

With reference to FIGS. 12 to 14, for giving smooth sliding movement between the block 3 and the U-shaped hinge part 4, there are inserted snugly in recesses 24 in those surfaces of the block 3 facing the limbs of the U-shaped hinge part 4 plates 23 which consist of non-metallic material. These inserts are plates of a specific height and consist of wear-resistant, and yet slightly flexible, synthetic plastic material. The insert plate 23 can be slightly thicker than the depth of the recesses, so that they project slightly beyond the surfaces of the block and thus the U-shaped hinge part 4 slides merely on the plates 23. The synthetic plastic material can contain molybdenum sulphite, or graphite, for dry running. The plates 23 can be fixed in the recesses by gluing. It will be appreciated that the upper plate 23 is the load-bearing plate. The reason for having the plates 23 at both the upper surface and the lower surface of the block is that the same hinge can be used for either right-hand or left-hand fitting on an article of furniture. The hinge parts 3 and 4 can preferably be formed of zinc pressure castings.

In the version shown in FIGS. 15 and 16, a turnable U-shaped hinge part 4*a* has at the inside an integral fixing flange 25. This flange is provided with at least two, in this version three, holes through which screws can be introduced. One is in the central plane of the hinge part 4*a* and is constructed as a slot 26, while the other two holes are circular holes 27. In this way, during mounting of the door, the hinge part 4*a* can be initially screwed to the door by means of the screw 28 passed through the slot 26. Only when the alignment of the door leaf and the hinge with the frame 1 is completed, are the other two fixing screws screwed through the holes 27 into the door leaf 5. This version has the advantage over the version shown in FIGS. 4 to 9 that the tensile forces exerted by the link 17 on the turntable hinge part has a mitigated effect on the fixing screws. The flange 25 is in the form of a triangular plate.

The fixing flange 25 can also be used in a hinge which is not arranged to be concealed from a front view, and also with a door leaf which can be pivoted through more than 90°.

The foregoing specification has described a new and improved door hinge which is particularly suited to furniture doors where concealed hinges are desired. The new hinge of this invention is easily installed and readily adjusted, and provides quick and easy means for the removal of the door. In addition, the hinge is strong and in many of its modifications, reinforces the supporting structure. Since it is realized that this disclosure may indicate to others in the art other forms which this invention could take, it is intended that this invention be limited only by the scope of the appended claims.

What is claimed:

1. A hinge for pivotally connecting a movable member to a fixed member, said hinge comprising a connecting element adapted to be drivingly inserted into said fixed member, a first hinge element having a perforation therethrough adapted to removably receive a portion of said connecting element, a second hinge element to be connected to said movable member, a pivot pin pivotally connecting said first hinge element with said second hinge element, said first hinge element comprising a block, said second hinge element being constructed of a substantially U-shaped configuration defined by legs and a connecting base portion, the legs of said second hinge element being on either side of said block and said pivot pin passing through said legs and said block, a screw member for connecting said second hinge element to said movable member, said second hinge element including a hole in the base portion of the second hinge element with a portion of the hole including a head seating portion for the head of said screw member, the hole and the head seating portion being formed to guide the screw member into the movable member at an acute angle with said base portion of said second hinge element, said base portion also including means for projecting into said movable member for stabilizing purposes, and stop means for limiting the extent of rotation of one hinge element with respect to the other hinge element.

2. The hinge defined in claim 1 wherein said stop means comprises a link having one end pivotally connected to one of said first and second hinge elements and a stop member mounted on the other end of said link and moving in a slot in the other of said first and second hinge elements, said stop member halting further rotation when it reaches the end of the slot in which it moves.

3. The hinge defined in claim 1 including releasable locking means for locking said first hinge element to said connecting element whereby said connecting element may be driven into the fixed member, the first hinge element locked to said connecting element and the second hinge element attached to the movable member.

4. The hinge defined in claim 1 including releasable locking means for locking said first hinge element to said connecting element whereby said connecting element may be driven into the fixed member, the first hinge element locked to said connecting element and the second hinge element attached to the movable member, said releasable locking means includes a locking member mounted on said first hinge element, said connecting member includes an external recessed portion, and said locking member engaging said recessed portion.

5. The hinge defined in claim 4 wherein said recessed portion comprises an annular peripheral groove.

6. The hinge defined in claim 5 wherein said annular groove has a trapezoidal cross-section and said locking member is a set screw having a leading edge contoured to the configuration of said groove.

7. A hinge for pivotally connecting a movable member to a fixed member, said hinge comprising a connecting element adapted to be inserted into said fixed member, a first hinge element having a perforation therethrough adapted to removably receive a portion of said connecting element, a second hinge element to be connected to said movable member, a pivot pin pivotally connecting said first hinge element with said second hinge element, said first hinge element comprising a block, said second hinge element being constructed of a substantially U-shaped configuration defined by legs and a connecting base portion, the legs of said second hinge element being on either side of said block and said pivot pin passing through said legs and said block, a screw member for connecting said second hinge element to said movable member, said second hinge element including a hole in the base portion of the second hinge element with a portion of the hole including a head seating portion for the head of said screw member, the hole and the head seating portion being formed to guide the screw member into the movable member at an acute angle with said base portion of said second hinge element, said base portion also including means for projecting into said movable member for stabilizing purposes, and stop means for limiting the extent of rotation of one hinge element with respect to the other hinge element, said stop means including a wall on said second hinge element, said wall being arranged to abut the surface of said first hinge element at the limit of rotation and to conceal at least a portion of said first hinge element.

8. A hinge for pivotally connecting a movable member to a fixed member, said hinge comprising a connecting element adapted to be inserted into said fixed member, a first hinge element having a perforation therethrough adapted to removably receive a portion of said connecting element, a second hinge element to be connected to said movable member, a pivot pin pivotally connecting said first hinge element with said second hinge element, said first hinge element comprising a block, said second hinge element being constructed of a substantially U-shaped configuration defined by legs and a connecting base portion, the legs of said second hinge element

being on either side of said block and said pivot pin passing through said legs and said block, a screw member for connecting said second hinge element to said movable member, said second hinge element including a hole in the base portion of the second hinge element with a portion of the hole including a head seating portion for the head of said screw member, the hole and the head seating portion being formed to guide the screw member into the movable member at an acute angle with said base portion of said second hinge element, said base portion also including means for projecting into said movable member for stabilizing purposes, and stop means for limiting the extent of rotation of one hinge element with respect to the other hinge element, said second hinge element including a flange adapted for mounting on the inside of said movable member, means on said flange for fixing said flange to said movable member, said flange including an elongated aperture extending away from said pivot pin and an additional aperture for affixing the flange to the movable member.

9. A hinge for pivotally connecting a movable member to a fixed member, said hinge comprising a connecting element adapted to be inserted into said fixed member, a first hinge element having a perforation therethrough adapted to removably receive a portion of said connecting element, a second hinge element to be connected to said movable member, a pivot pin pivotally connecting said first hinge element with said second hinge element, said first hinge element comprising a block, said second hinge element being constructed of a substantially U-shaped configuration defined by legs and a connecting base portion, the legs of said second hinge element being on either side of said block and said pivot pin passing through said legs and said block, a screw member for connecting said second hinge element to said movable member, said second hinge element including a hole in the base portion of the second hinge element with a portion of the hole including a head seating portion for the head of said screw member, the hole and the head seating portion being formed to guide the screw member into the movable member at an acute angle with said base portion of said second hinge element, said block having a further hole receiving said connecting element and means radially projectable into said last mentioned hole for releasably fastening said connecting element in said latter hole.

References Cited by the Examiner

UNITED STATES PATENTS

357,188	2/1887	Edmondson et al.	16—191
1,174,326	3/1916	Koliha	16—130
1,696,685	12/1928	Leutz	16—191
1,821,606	9/1931	Anderson	16—159
1,864,164	6/1932	Aldeen	16—166
2,603,895	7/1952	Hardy	16—130
2,691,538	10/1954	Clausen	151—70
2,872,697	2/1959	Hizsa	16—142
3,015,126	1/1962	Ahlgren	16—136
3,017,657	1/1962	Mills.	

FOREIGN PATENTS

468,200	12/1951	Italy.
358,000	12/1961	Switzerland.

JOSEPH D. SEERS, *Primary Examiner.*

DONLEY J. STOCKING, *Examiner.*