April 20, 1965 A. A. RESTAINO 3,178,761

HINGE STRUCTURE

Filed June 12, 1963 2 Sheets-Sheet 1

Fig. 1.

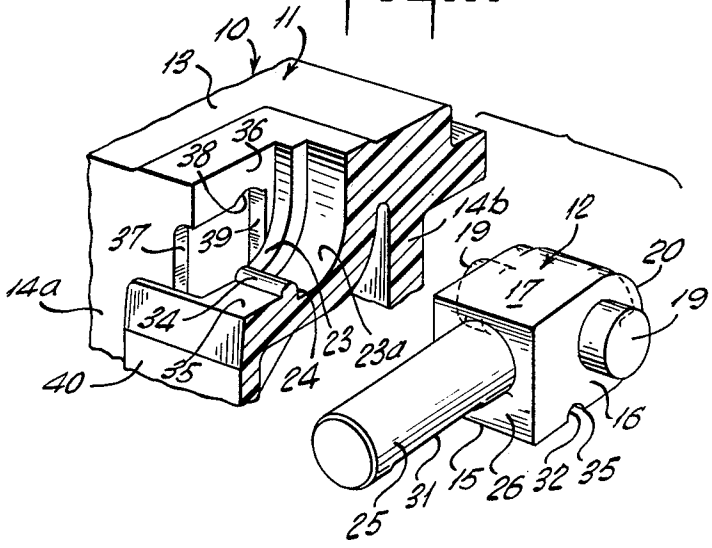


Fig. 2.

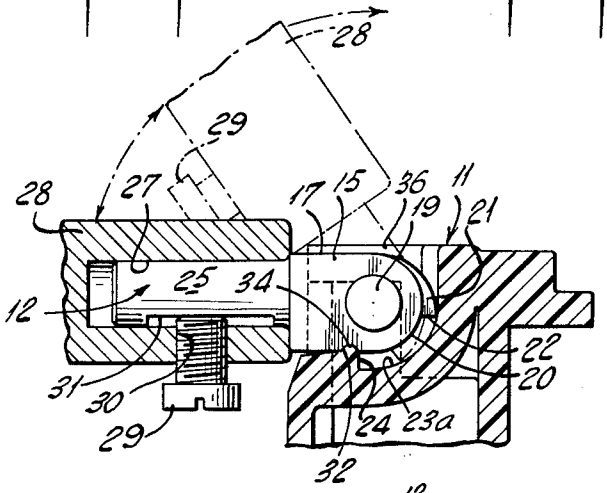


Fig. 3.

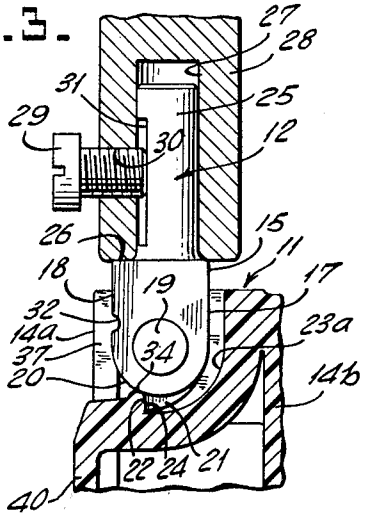
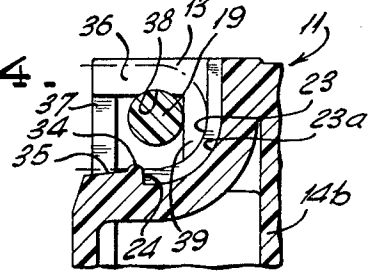


Fig. 4.



INVENTOR.
ANTHONY A. RESTAINO

BY
Burgess, Ryan & Hicks
ATTORNEYS

April 20, 1965 A. A. RESTAINO 3,178,761

HINGE STRUCTURE

Filed June 12, 1963 2 Sheets-Sheet 2

Fig. 5.

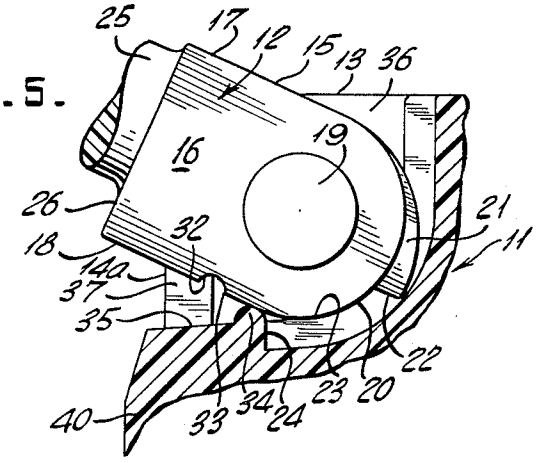


Fig. 6.

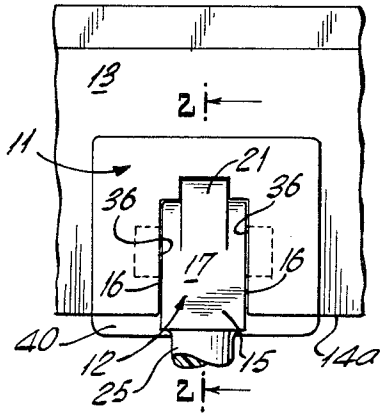


Fig. 7.

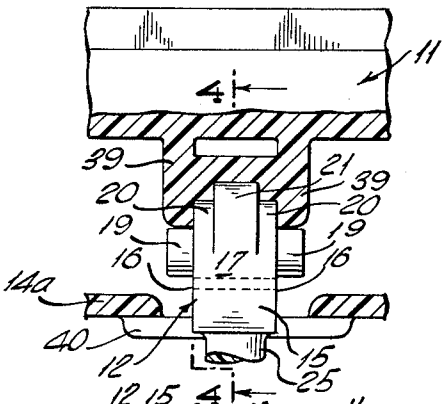


Fig. 8.

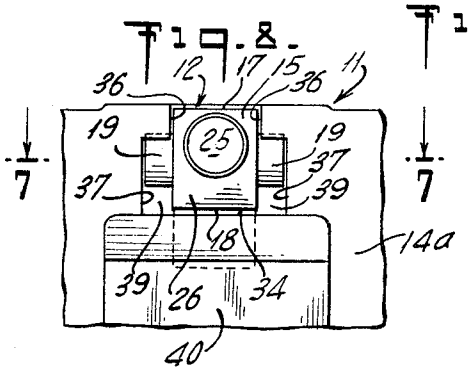
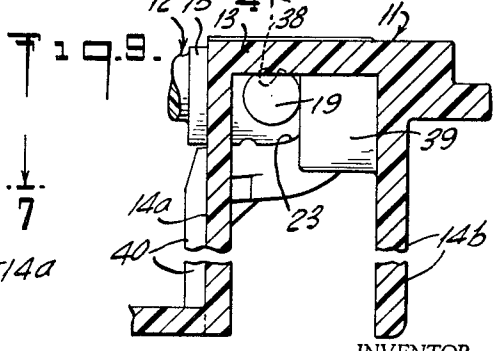


Fig. 9.



INVENTOR.
ANTHONY A. RESTAINO

BY

Burgess, Ryan, & Hicks
ATTORNEYS

United States Patent Office 3,178,761 Patented Apr. 20, 1965

3,178,761

HINGE STRUCTURE

Anthony A. Restaino, Plainview, N.Y., assignor to Mercury Electric Products Mfg. Corp., New Hyde Park, N.Y., a corporation of New York

Filed June 12, 1963, Ser. No. 287,256
10 Claims. (Cl. 16—172)

The present invention relates to a new and improved hinge. It relates, more particularly, to a novel hinge formed of two pieces which may be employed for pivotally supporting and positioning an instrument such as a sewing machine, in the base of a portable carrying case.

An object of the invention is to provide a hinge which can be manufactured and assembled at low cost. In accordance with the present invention, either or both parts of the hinge may be formed of a molded plastic material and the two parts forming the hinge can be assembled by snapping them together without the use of a securing piece such as a pin or the like.

A hinge embodying the present invention is especially suitable for use in conjunction with a portable carrying case for a sewing machine or the like where the base of the case is made of a plastic material. In such an instance, one part of the hinge may be formed integrally with the base of the carrying case by a single molding operation.

Further objects and advantages of the invention will become apparent and be more fully understood from the following description and the accompanying drawings, in which:

FIG. 1 is a fragmentary view in perspective and in partial section illustrating parts of a hinge embodying the invention in exploded relation;

FIG. 2 is a view in vertical section taken along line 2—2 of FIG. 6 of the hinge shown in FIG. 1 in assembled condition and with the movable hinge leaf being shown in its lowered or closed position with a supported member secured thereto;

FIG. 3 is a view similar to FIG. 2 with the movable hinge leaf being shown in its raised or open position;

FIG. 4 is a section view taken along line 4—4 of FIG. 7;

FIG. 5 is a fragmentary view corresponding to FIG. 2, but on an enlarged scale and with the movable hinge leaf in an intermediate position;

FIG. 6 is a top plan view of the hinge shown in FIG. 1 in assembled condition with the hinge leaf being shown in its lowered or closed position;

FIG. 7 is a section view taken along the line 7—7 of FIG. 8;

FIG. 8 is a front elevational view of the hinge shown in FIG. 1 in assembled condition; and

FIG. 9 is a fragmentary view in vertical section of the hinge shown in FIG. 6.

With reference to the drawing, there is a hinge indicated generally by the reference numeral 10. The hinge, as illustrated, comprises two parts: a housing or support 11 and a movable hinge member or leaf 12 which is journaled in the housing or support.

In the embodiment illustrated, the housing or support 11 is formed integrally with a rim portion 13 which extends between the upper edges of spaced inner and outer walls 14*a* and 14*b* forming one side of the base portion of a carrying case (not shown). In this form, the hinge housing or support and the base may be molded integrally as a single unit from a suitable palstic material, such as high impact polystyrene and no assembly of these parts is required.

The movable leaf 12 of the hinge structure may also be formed from a suitable plastic material such as nylon

or nylon reinforced with glass fibers and has a block-like center body portion or barrel 15. In the illustrated embodiment, the center portion has flat parallel side faces 16, a flat top face 17 which lies flush with the upper surface of the rim when the hinge is assembled, and a flat bottom face 18 with the top and bottom faces being parallel to each other and perpendicular to the side faces. Aligned cylindrical trunnions 19 extend outwardly from each of the side faces, and define an axis of rotation about which the hinge leaf may be rotated when the hinge is assembled. A cylindrically curved surface 20 whose axis coincides with the trunnion axis extends around the rear of the center or body portion of the leaf and joins the top and bottom faces thereof.

A raised projection 21 extends from the top face of the body portion partially around the cylindrically curved end surface and terminates at stop face 22 at a point spaced from the bottom surface of the body portion. The raised projection on the leaf is accommodated in a recess 23*a* formed in a curved section 23 of a leaf-supporting strut or wall 35 extending rearwardly at the bottom of a channel formed in the housing or support. The recess in the curved section of the strut terminates at a shoulder or abutment 24 which is positioned to engage with the stop face on the leaf when the leaf is in its vertical position.

The movable hinge member or leaf 12 also carries a cylindrical stud 25 which extends outwardly from the front face 26 of the body portion or barrel. As shown in FIGS. 2 and 3, the stud 25 fits into a bore 27 in one side of a frame 28 of a device such as a sewing machine and pivotally supports one side of the instrument in the base of the carrying case. A setscrew 29 which is threaded through a hole 30 in the frame, bears against a flat face 31 on the cylindrical stud and secures the frame thereto.

The bottom face of the center portion of the movable leaf contains a transverse detent engaging or positioning groove 32. The positioning groove which may be substantially semi-circular in cross section, extends parallel to the axis of rotation of the movable leaf and is located slightly ahead or in advance of the point where the bottom face joins the curved end surface (see FIG. 5). As a result, a cusp 33 is formed along one side of the groove. When the movable leaf is in its lowered position (see FIG. 2), the positioning groove engages and interlocks with a complementary projection or detent 34 extending upwardly from the leaf-supporting strut 35 immediately in advance of the stop abutment or shoulder and the detent must ride over the cusp in movement of the leaf toward its raised position.

The housing or support which is formed integrally with the rim portion and the inner wall of the container base is hollow and has an upper wall which contains a centrally located opening or slot which leads to and forms part of the channel for the hinge leaf. The opening in the upper wall of the support is defined by the spaced vertical faces 36 located on opposite sides of the center portion of the hinge and is large enough to permit the hinge leaf to be moved between its raised and lowered positions. The slot also extends through the side wall and, as shown in FIG. 8, forms a restricted opening joining with an enlarged opening in the side wall. The enlarged opening in the side wall is defined by a second set of spaced vertical walls 37 which are spaced so as to permit passage of the trunnions of the leaf therebetween. Thus, the opening in the side wall has the configuration of an inverted-T.

As noted, the housing or support may be formed integrally with the rim and inner side wall of the container base and the sides of the slot or channel may be open. When the parts are assembled, the trunnions extending from the body of the leaf are located in the inverted T-shaped channel beneath overhanging flange-like portions

of the rim which define the slot in the top of the housing and are rotatably held in seating depressions **38** in the downwardly facing surface thereof by upward pressure of supporting strut **35** on the bottom of the body portion of the leaf.

It will be noted that the interengaging parts which form the limit stop and the locking positioning detent are arranged to permit rotation of the hinge leaf through approximately 90° from its lower or closed position (as shown in FIG. 2) to its raised or open position (as shown in FIG. 3).

In assembling the two parts of the hinge, the trunnions of the hinge leaf are inserted through the entrance to the inverted T-shaped channel in the side wall of the housing with the hinge leaf being in an angular position intermediate its raised and lowered positions (as shown by the dash lines in FIG. 2) and then forcing the leaf rearwardly until the trunnions are seated. Assembly of the parts in this manner is facilitated by interaction of the stop abutment and the detent on the strut with the stop face on the leaf. By pushing the leaf inwardly toward the position shown in FIG. 2 until the stop face thereon is to the rear of the detent and then rotating the leaf toward its raised position by swinging it in the direction of the arrows in FIG. 2, the detent and the stop abutment on the support engage with the stop face on the leaf and serve as a fulcrum in forcing the trunnions past the walls defining the end of the channel and into their seated positions.

The resiliency of the materials from which the hinge parts are made allows them to distort sufficiently to permit passage of the trunnions past the walls defining the channel or recess in the housing and the leaf "snaps" into place as the trunnions move under the depressions in which they are journaled. When the leaf is in place, it cannot be removed from the housing in its closed position (solid lines, FIG. 2) since the detent engages with the positioning groove under these conditions. In the open position of the leaf (FIG. 3), the overhanging lip formed by the upper walls of the housing engage with the trunnions and prevent vertical movement of the leaf while horizontal movement is prevented by engagement of the stop members.

In order to render the curved wall at the rear of the strut more rigid, reinforcing members **39** may be provided which are formed integral with and extend between the curved wall of the housing, the outer wall of the base and the rim. The inner wall of the base immediately beneath the leaf receiving recess in the housing may be raised in the form of a panel or buttress **40**. This will permit formation of the enlarged opening at the end of the channel in the housing without using a core piece in the molding operation. The hinge housing or support may thus be formed integrally with the base by a pair of dies with mating parts. The raised panel also serves to stiffen the inner wall of the base in the neighborhood of the hinge housing or support.

It will be understood that the embodiment of the invention illustrated and described herein may be modified and changed by those skilled in the art without departing from the scope of the invention as defined by the following claims.

I claim:

1. A hinge comprising a hollow housing having a side wall and a top wall, said side wall having an opening formed therein, said top wall having a slotted opening formed therein, said slotted opening being narrower than and communicating with the opening in the side wall, said openings forming a leaf-receiving channel in the shape of an inverted-T, a leaf-supporting strut extending rearwardly from the side wall at the bottom of said channel, said strut being located beneath the slotted opening in the top wall and having a curved section joining its inner end to the top wall of the housing, a hinge leaf mounted within said channel and being pivotally movable relative to the housing, said hinge leaf including a body portion and axially aligned trunnions extending from opposite sides thereof, said body portion being supported by the strut in alignment with the slotted opening in the top wall of the housing with the trunnions extending beneath opposing portions of the top wall of the housing defining the slotted opening therein and being held in engagement with lower surfaces of said opposing portions of the top wall by engagement of the supporting strut with the body portion of the leaf, said lower surfaces of the opposing portions of the top wall containing depressions in which the trunnions are seated, interengaging stop members formed on the housing and the leaf, said stop members being positioned to engage with each other in one angular position of the hinge leaf and when thus engaged preventing movement of the trunnions out of the depressions in which the trunnions are seated toward the opening in the side wall of the housing, and interengaging detent members formed on the housing and the leaf, said detent members entering into engagement and releasably holding the leaf in a second angular position thereof relative to the housing.

2. A hinge as defined in claim 1 wherein the housing is molded from a plastic material and is formed integrally with one side of a base defining an opening for a portable instrument.

3. A hinge as defined in claim 1 wherein the body portion of the leaf has a bottom face and an end face, said faces being joined by a surface of cylindrical curvature having a common axis with the trunnions and the curved section of the supporting strut corresponds in curvature to the curved surface joining the end and bottom faces of the body portion of the leaf.

4. A hinge comprising a hollow housing molded from a plastic material, said housing including a side wall and a top wall, said side wall having an opening formed therein, said top wall having a slotted opening formed therein, said slotted opening being narrower than and communicating with the opening in the side wall, said openings forming a leaf-receiving channel in the shape of an inverted-T, a leaf-supporting strut extending rearwardly from the side wall at the bottom of said channel, said supporting strut being located beneath the slotted opening in the top wall and having a curved section joining its inner end to the top wall of the housing, a hinge leaf molded of a plastic material, said leaf being mounted within said channel and being pivotally movable relative to the housing, said hinge leaf including a body portion and trunnions having a common axis extending from opposite sides thereof, said body portion being supported on the strut in alignment with the slotted opening in the top wall of the housing with the trunnions extending beneath opposing portions of the top wall of the housing defining the slotted opening therein and being held in engagement with lower surfaces of said opposing portions by engagement of the supporting strut with the body portion of the leaf, said lower surfaces of the opposing portions of the top wall having depressions formed therein in which the trunnions are seated, interengaging stop members formed on the supporting strut and the body portion of the leaf, said stop members being positioned to engage with each other in one angular position of the hinge leaf and when thus engaged preventing movement of the trunnions out of the depressions in which the trunnions are seated toward the opening in the side wall of the housing, and interengaging detent members formed on the strut and the body portion of the leaf, said detent members entering into engagement and releasably holding the leaf in a second angular position thereof relative to the housing.

5. A hinge as defined in claim 4 wherein the body portion of the leaf has a bottom face and an end face, said faces being joined by a surface of cylindrical curvature having a common axis with the trunnion axis and the curved portion of the supporting strut corresponds in

curvature to the curved surface joining the end and bottom faces of the body portion of the leaf.

6. A two-part hinge comprising a hollow housing; a leaf pivotally mounted in the housing, said leaf including a body portion having opposite side faces and upper and lower faces, axially aligned trunnions extending from said side faces, a rear end face of cylindrical curvature joining said upper and lower faces, said curved end face having an axis coinciding with an axis of the trunnions, and a stop member formed on and extending outwardly from said curved rear face; said housing including a side wall and an upper wall extending at an angle thereto, said side wall and upper wall contining an open-ended leaf-receiving channel having the configuration of an inverted-T, the leg of said inverted T-shaped channel forming an opening in the upper wall of the housing defined by opposing portions of the upper wall, said opposing portions of the upper wall being located on opposite sides of the body portion of the leaf, a strut extending rearwardly from the side wall at the bottom of the channel beneath the slot in the upper wall and engaging with the body portion of the leaf, said strut having a section mating with the curved end face of the body portion and urging the trunnions extending sideways therefrom into engagement with lower faces of the opposing portions defining the opening in the upper wall of the housing, said lower faces containing seats for the trunnions, and a stop engaging abutment formed in the curved section of the strut, said abutment engaging with the stop member on the end face of the leaf in one angular position of the leaf relative to the housing, the engagement of the abutment and the stop member preventing movement of the trunnions through the leaf-receiving channel toward the side wall of the housing.

7. A hinge as defined in claim 6 which includes interengaging detent members formed on the body portion of the leaf and on the strut, said detent members entering into engagement and releasably holding the leaf in a second angular position thereof relative to the housing.

8. In a hinge as defined in claim 6 which includes a pair of reinforcing members formed integrally with the upper wall of the housing and the strut, said reinforcing members extending downwardly from the upper wall of the housing on opposite sides of the strut.

9. A hinge for supporting an instrument in a base portion of a portable carrying case, said hinge comprising a hollow housing including a side wall and a top wall extending at an angle thereto, said side wall and said top wall being formed integrally with a side wall and a rim portion, respectively, of a base of a carrying case, said side wall of the housing containing an opening, said top wall of the housing also containing a restricted opening communicating with the opening in the side wall and extending rearwardly therefrom, said restricted opening being defined by opposing flange-like portions of the top wall, said flange-like portions having lower surfaces with trunnion seats formed therein, a leaf-engaging strut extending rearwardly from the side wall of the housing beneath the restricted opening in the top wall thereof and a hinge leaf pivotally mounted within the channel in the housing, said leaf including a body portion, said body portion resting on and being urged toward the top wall of the housing by the strut and axially aligned trunnions extending from opposite faces of said body section, said trunnions extending beneath the flange-like portions of the top wall of the housing and being seated in the seats in the lower surfaces of the flange-like portions of said top wall of the housing and means for preventing movement of the trunions away from their seats in one angular position of the hinge leaf relative to the housing.

10. A hinge as defined in claim 9 wherein said means includes interengaging stop members formed on the leaf and housing for limiting angular movement of the leaf in said one direction relative to the housing and detent means formed on the leaf and the housing for releasably holding the leaf in a predetermined angular position relative to the housing.

References Cited by the Examiner

UNITED STATES PATENTS

2,052,465	8/36	Hardy	16—174
2,347,980	5/44	Apfelbaum	16—191
2,960,254	11/60	Kiba	16—128
3,002,218	10/61	Hollansworth	16—174
3,083,401	4/63	Lifton	16—142

FOREIGN PATENTS

634,392	1/62	Canada.

DONLEY J. STOCKING, *Primary Examiner.*