Aug. 24, 1965 N. L. RUCKSTUHL 3,201,821

HINGE

Filed April 1, 1963 2 Sheets-Sheet 1

Fig. 1

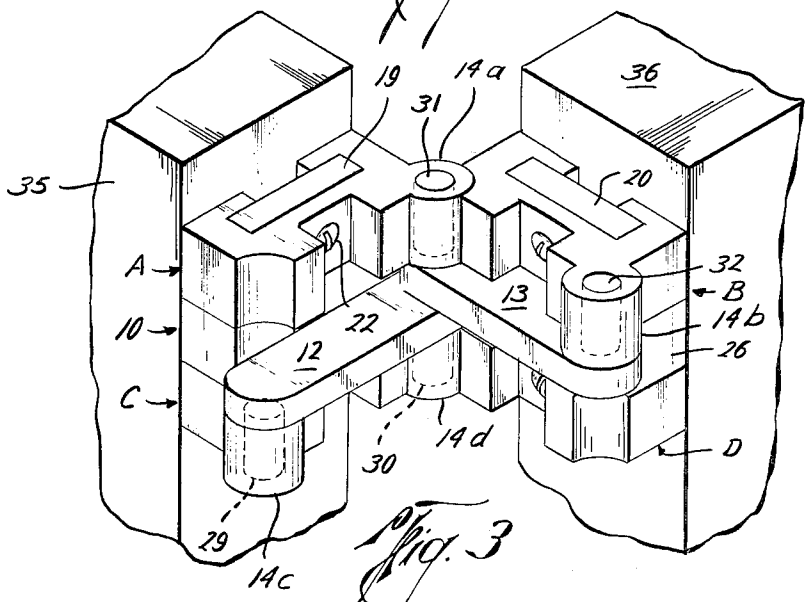


Fig. 3

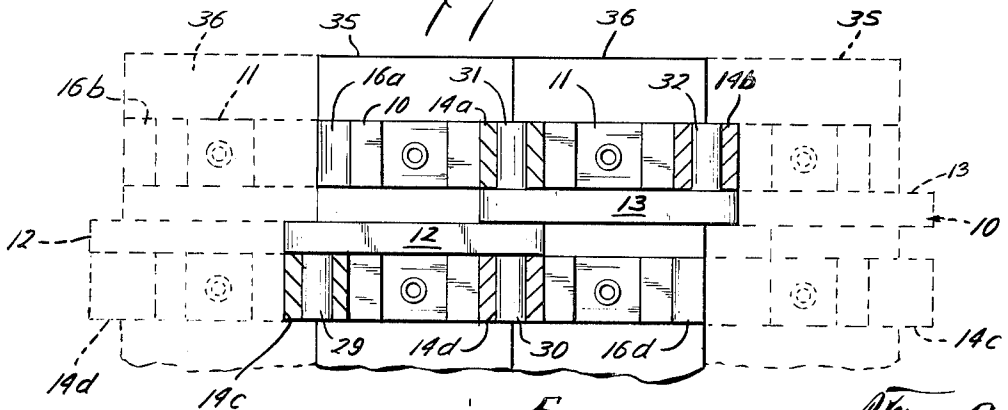


Fig. 4

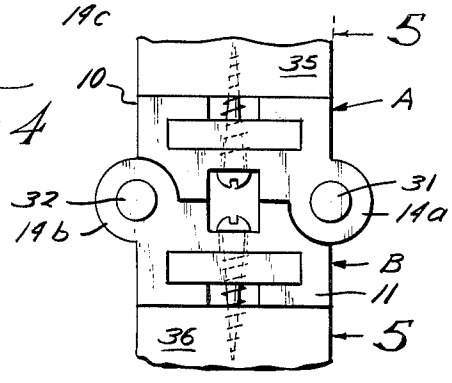
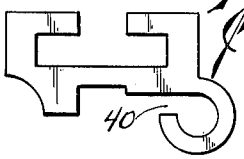


Fig. 6



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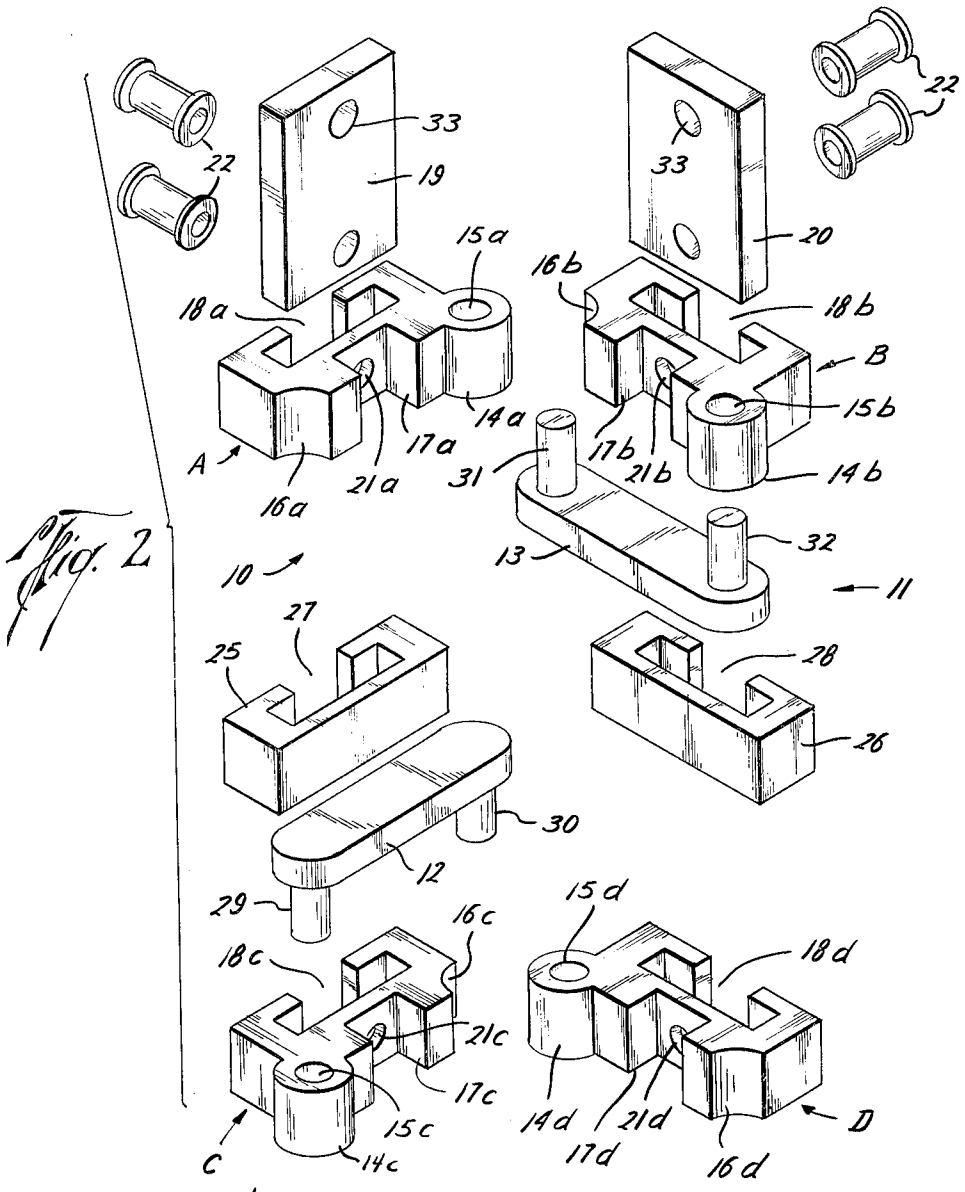


Fig. 2

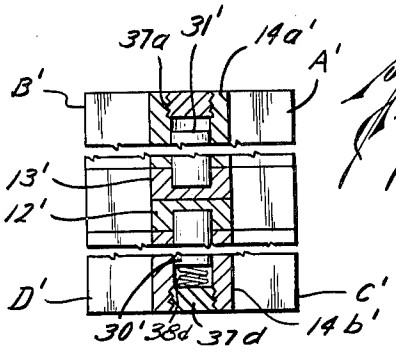


Fig. 5

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3,201,821
HINGE

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6 Claims. (Cl. 16—163)

This invention relates to improvements in two-way hinges, i.e. hinges which allow doors to be pushed or pulled open from either side and the panels of folding screens, etc. to be moved 360° from one side to the other of an adjacent panel.

An important object of the invention is to provide a two-way hinge of novel construction which is economical to manufacture and easily assembled.

It is a further object to provide a two-way hinge which can be quickly and easily assembled on panels, doors, etc., of varying lengths.

It is another object to provide a two-way hinge which employs many identically shaped parts which are easily extruded and fabricated, thus further simplifying the manufacture and assembly of the hinge.

It is another object of the invention to provide a two-way hinge which can be quickly adapted to doors or panels of varying length and which will substantially fill the space between the ends of the panels and the ends of the door on its supporting member when the hinge plates of the hinge are facing each other, thereby eliminating the need for cutting recesses in the ends of the doors or panels to obtain a flush joint.

Other objects, features and advantages of the invention will be apparent to one skilled in the art from a consideration of the specification, drawings and appended claims.

In the drawings,

FIG. 1 is an isometric view of the preferred embodiment of the hinge showing the position of the various parts of the hinge when the hinge plate is used in connection with two panels and the panels are at an angle of approximately 90°;

FIG. 2 is an exploded isometric view of the hinge of FIG. 1;

FIG. 3 is a front view, partly in elevation and partly in section, of the hinge of FIG. 1 illustrating the positions assumed by the various members of the hinge as the panels connected by the hinge move through 360° in both directions;

FIG. 4 is a top view of the hinge of FIG. 1 showing the position of the hinge when the panels to which it is attached are in alignment;

FIG. 5 is a sectional view taken along line 5—5 of FIG. 4 illustrating an alternate embodiment of the hinge; and

FIG. 6 is a fragmentary top view of an alternate shape for the hinge plate of the invention.

The two-way hinge of this invention comprises two hinge plates designed generally by the members 10 and 11, two link members designated generally by the numbers 12 and 13 and means pivotally connecting the ends of the link members to the hinge plates to allow either hinge plate to move 360° relative to the other. Thus, the hinge is useful whenever it is desirable to have a hinged member rotate through 360°.

In the embodiment shown in FIG. 1, hinge plates 10 and 11 comprise an assembly of several members which greatly simplifies the manufacture and assembly of the hinge. As best seen in FIG. 2, each hinge plate includes two identical support members indicated generally by the letters A, B, C and D. Since they are identical, only member A of hinge 10 will be described generally, with parts of each other member designated by the corresponding letter suffix.

The support members are generally rectangularly

shaped, having on one corner a cylindrical boss 14*a* which is provided with a hole 15*a*. On the same side at the other end, the corner of the support member is cut away to provide an arcuate, concave surface 16*a*. Vertical grooves 17*a* and 18*a* are provided on each side of the member. Groove 17*a* is rectangularly shaped whereas groove 18*a* is T-shaped to provide a key slot for key members 19 and 20. Opening 21*a* connects the two grooves to receive eyelets 22 used to hold the hinge plate assemblies together.

Located between the two support members which make up a hinge plate assembly are spacer members 25 and 26 which are also identical. They are rectangularly shaped and have T-shaped grooves 27 and 28 of the same size and shape as the T-shaped groove 17 in the support members. These spacer members, however, are not as wide as the support members and thereby provide, in effect, a groove extending transversely across the hinge plate assembly to receive the connecting link members 12 and 13 when the hinge plates are assembled as shown in FIG. 1. The hinge pin designated by the numbers 29–32, which as will be seen below provide the pivot points around which the hinge plate assemblies rotate, are integrally attached to the ends of the link members and extend outwardly from the link members in parallel directions.

The assembled hinge is shown, in FIG. 1, attached to panels 35 and 36. As assembled, the hinge plates 10 and 11 are pivotally interconnected through links 12 and 13 by means of hinge pins 29 through 32. That is, link 13 pivotally connects boss 14*a* on support member A to boss 14*b* on support member B and link member 12 pivotally connects boss 14*c* to boss 14*d* on support members C and D, respectively.

If the support members were not interconnected by key members 19 and 20, each would be free to rotate around both the pin which is located in the opening in its boss and the pin on the other end of the link member to which it is connected. For example, support member A could rotate around both pin 31 and pin 32 whereas support member B could rotate around both pin 32 and pin 31, etc. However, since support member A is connected to support member C by key 19, they must rotate together or not at all. Therefore, pin 31 must be in axial alignment with pin 30, which is one of the pins around which support member C rotates, for the hinge plate 10, comprising members A and C, to rotate. The same is true of hinge plate 11 which comprises support members B and D. Thus, as long as at least two of the pins around which both hinge plates can rotate are in axial alignment, the hinge plates can rotate relative to each other.

This ability of the hinge plates to rotate around two spaced axes of rotation produces the "two-way" or "360°" hinge effect for this allows each plate to rotate 180° around one axis and an additional 180° around the other for a total of 360°.

Specifically, referring again to the drawings, assume that panel 36 is originally in side-by-side relationship with panel 35, as shown by the solid lines of FIG. 3, and it is desired to move it to the opposite side. In this position, pins 30 and 31 are in vertical alignment allowing support members B and D, which are interconnected to form hinge plate 11, to rotate around the common axis of the pins. After rotating 90°, the hinge and panels are as shown in FIG. 1. After rotating 180°, the hinge and panels are as shown in FIG. 4. In this position, both pairs of pins are in axial alignment and either hinge plate can rotate in either direction. If panel 36 continues rotating, its axis of rotation will shift from the vertical axis of pins 30 and 31 to the vertical axis of pins 29 and 32. The panel can rotate around the latter axis an additional

180° to its position on the opposite side of panel 35. The panel and hinge plates in this position are shown in dotted lines on the lefthand side of FIG. 3. The dotted lines on the righthand side of FIG. 3 show the hinge when panel 35 is rotated 360° to the opposite side of panel 36.

The preferred embodiment of the hinge comprises hinge plates which are assemblies of two support members and a spacer. The spacer is designed to separate the support members sufficiently for the link members to be located between the bosses on the support members. Thus, when assembled, each hinge plate has a boss on opposite edges which are spaced vertically. For example, hinge plate 10 has bosses 14*a* and 14*c* on opposite ends and the bosses are spaced apart vertically by the width of the spacer. When assembled, the link members lie in the plane of the spacers and one is pivotally connected to the upper bosses while the other is pivotally connected to the lower bosses.

When the hinge is in the position shown in FIG. 4, with the panels in alignment, the link members overlap each other. By making the width of the spacer less than the width of the support members by at least one-half the width of the link members, the faces of the support members will be flush when the hinge is in this position and the hinge joint can be arranged to completely fill the space between the two panels.

In other words, if the hinge is attached to two panels in the manner shown in FIG. 1, when the panels are in alignment, the ends of the panels will be spaced apart by the total thickness of the hinge. This is particularly undesirable when the panels are parts of a folding screen as these gaps between the end would prevent the screen from providing the desired privacy, etc. One solution is to recess the hinge plates into the ends of the panels far enough to allow the ends of the panels to be flush. However, this involves extra labor and it is difficult to recess the hinges the exact proper distance to obtain the flush joint desired.

By providing the hinge with identically shaped support members and spacers which are capable of being extruded in any desired length, the hinge can be quickly and easily fabricated and assembled to extend the entire length of the panels and thereby provide a flush joint between the panels when the screen is extended.

For example, a flush joint can be provided between panels 35 and 36 as follows. Starting at the bottom of the panels, the distance to the first hinge joint is measured and support members C and D are cut to that length. These members are then attached either directly to the end of the panel or they are assembled with keys 19 and 20 along with spacers 25 and 26 and then attached. Link members 12 and 13 with the hinge pins attached are located with pins 29 and 30 of link 12 extending into openings 15*c* and 15*d*. The distance to the next hinge joint is then determined and support members A and B are cut to length and attached to the panel with pins 31 and 32 of link 13 in openings 15*a* and 15*b*. Since the position of the support members can be reversed without affecting the operation of the hinge, support members A and B can then become the lower support members for the next hinge joint. This can be repeated as many times as desired until the upper edge of the panel is reached. The hinged connection thus produced will provide a flush joint between the two panels as shown in FIG. 4 and eliminate any gap between the ends of the panels.

When the hinge is being assembled in place on the panels, it is usually more convenient to omit the key members and attach the support members and spacers directly to the panels. When the key members are omitted, the key slots can be omitted also, if desired.

An alternate embodiment of the hinge is shown in FIG. 5. When the hinge is being assembled on the panels rather than preassembled as shown in FIG. 1, if the hinge pins are an integral part of the link members, they

have to be installed in the hinge at the time of its assembly. The embodiment of FIG. 5 is provided to allow the hinge plates to be preassembled and interconnected by the link members as the final step. This would be particularly advantageous when it is desirable to preassemble the hinge plates on a plurality of panels at one location and assemble the panels at another location, or for hanging a door when it is inconvenient to hold the door in position adjacent the door jamb while the hinge is being assembled in place.

In this embodiment, the hinge plates are either preassembled in place on the door or panel, etc., or preassembled as shown in FIG. 1 without the link members and hinge pins. The support members are modified to the extent that plugs 37 are installed in openings 15 in the bosses. The plugs in the lower support member support coil spring 38 in the manner that plug 37*d* supports spring 38*d* in FIG. 5. These springs bias the lower pins upward and hold them partially out of their holes. The plugs in the openings of the upper support members are not necessary and can be omitted if desired. Plugs which can be installed during the assembly operation are preferred since this allows the support members to be extruded in the same manner as in the preferred embodiment.

After the hinge plates 10′ and 11′ are assembled, the hinge pins are installed, the lower pins being resiliently held partially out of their holes by coil springs 38. After the pins are in place the hinge is assembled by forcing the lower pins downward into the holes 15 against springs 38 and by lifting the upper pins upward against gravity until the space between the bosses is clear of the pins, allowing the link members to be installed. The pins will then enter holes provided therefor in the links, holes 39 and 40 in links 12′ and 13′ being shown in FIG. 5. The upper pins are urged into the openings by gravity and the lower pins by the springs 38. This completes the assembly of the hinge. Additional springs can be used in connection with the upper pins where desired and where the hinge is so positioned that gravity cannot be effectively employed or relied upon to hold the pins in the desired position.

FIG. 6 illustrates an alternate shape for the support members which is more readily extruded. By removing a portion of the boss to provide a slot 40, the die forming the support member can be made in one piece which reduces its cost considerably. The shape has another advantage in that unattached hinge pins can be used and, when in position, held against removal by crimping the slotted boss against the pinc with a pair of pliers, etc.

From the foregoing, it will be seen that this invention is one well adapted to attain all of the ends and objects hereinabove set forth, togehter with other advantages which are obvious and which are inherent to the structure and apparatus.

It will be understood that certain features and subcombinations are of utility and may be employed without reference to other features and subcombinations. This ss contemplated by and is within the scope of the claims.

As many possible embodiments may be made of the invention without departing from the scope thereof, it is to be understood that all matter herein set forth or shown in the accompanying drawings is to be interpreted as illustrative and not in a limiting sense.

The invention having been described, what is claimed is:

1. A two-way hinge comprising two spaced, parallel link members, four support members arranged in pairs, with the support members of each pair lying in the same plane with at least one of the link members between them at all times, the members of each pair being spaced apart sufficiently to receive both link members and allow the two pairs of support members to be moved into facing engagement with the spaces between each pair combining to enclose both links; and means for pivotally connecting

each end of the links to the edge of the adjacent support member with the links having at least two ends pivoting around the same axis at all times.

2. A two-way hinge comprising two hinge plate assemblies, said assemblies each including two support members and a spacer member, each member being provided with coinciding key slots, a key engaging the key slots in the members to hold the members assembled with the two support members located on each side of the spacer member; two connecting links located between the two support members of each assembly, each link having each end pivotally connected to the edge of a different one of the support members so that each of the four support members is pivotally connected to the end of one of the links, with at least two ends of the link members pivoting around a common pivotal axis at all times.

3. The hinge of claim 2 in which each of the support members has cylindrical bosses on one edge provided with an opening, and the links are provided with outwardly extending parallel pins at each end, the pins being received in the openings to pivotally connect the links to the support members, with a pin on one link being in vertical alignment with a pin on the other link at all times to provide the common pivotal axis for the links.

4. The hinge of claim 3 in which each boss is provided with a slot to allow the bosses to be forced into frictional engagement with the pins.

5. A two way hinge comprising two link members and four support members, each support member comprising a plate section with a boss attached to one end, the support members being arranged in pairs with the support members of each pair being located in the same plane,

with their bosses located at opposite ends, and spaced apart sufficiently to receive both link members therebetween to allow the two pairs of support members to be moved into engagement with the plate sections of one pair of support members facing the plate sections of the other pair and with the link members lying in the space between the support members of each pair; and pins pivotally connecting the ends of the links to the bosses adjacent them with each link having at least one end pivoting around the same axis as one end of the other link at all times.

6. A hinge comprising, two adjacent link members; four identically shaped support members arranged in two pairs with the support members of each pair lying in the same plane; a spacer member located between each pair of support members to space the support members apart sufficiently to allow both link members to be positioned therebetween in parallel, superimposed, relationship when the two pairs of support members are moved into facing engagement; means pivotally connecting each link member with one of the support members in each pair, with the link members each having one end pivoting around the same axis as one end of the other link member at all times.

References Cited by the Examiner

UNITED STATES PATENTS

955,674	4/10	Nordqvist	16—163
1,382,654	6/21	Korb	61—164
1,927,828	9/33	Greenhill.	
2,896,806	7/59	Vossenberg	16—163 X
2,903,735	9/59	Schneider	16—176

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