Oct. 28, 1958 R. O. JORDAN 2,857,618

STOP HINGE WITH FRICTION CATCH

Filed June 3, 1955 2 Sheets-Sheet 1

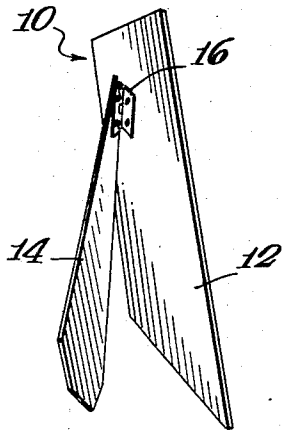


Fig. 1.

Fig. 2.

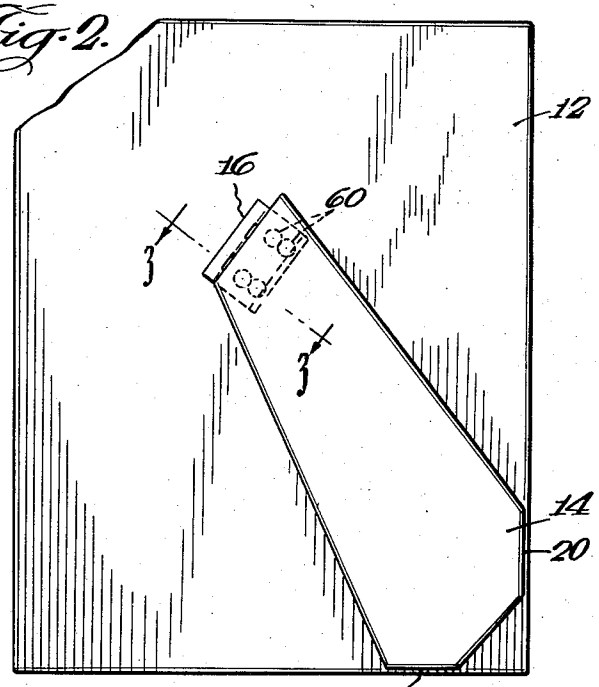
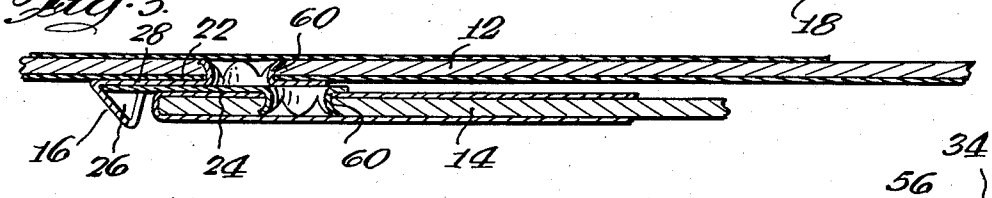


Fig. 3.



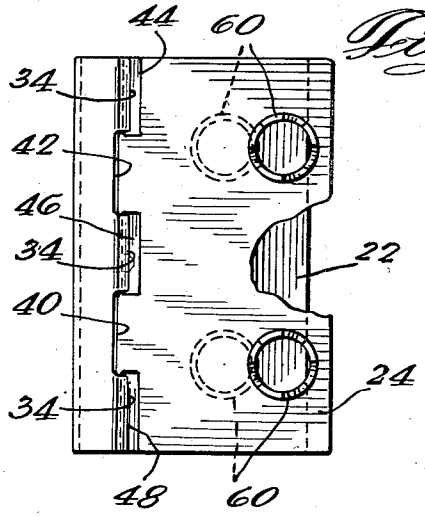


Fig. 4.

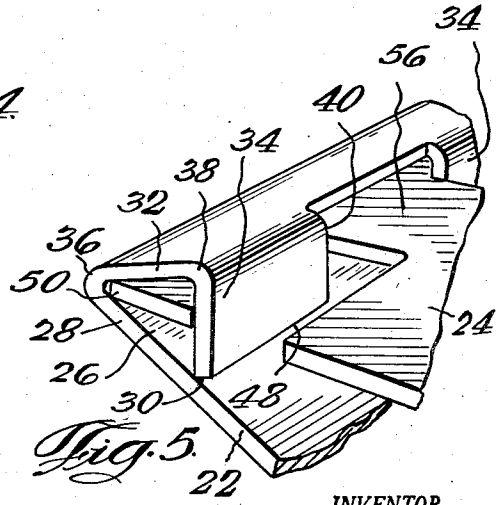


Fig. 5.

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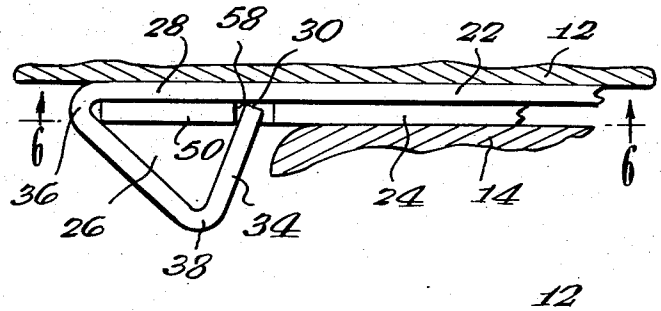


Fig. 7.

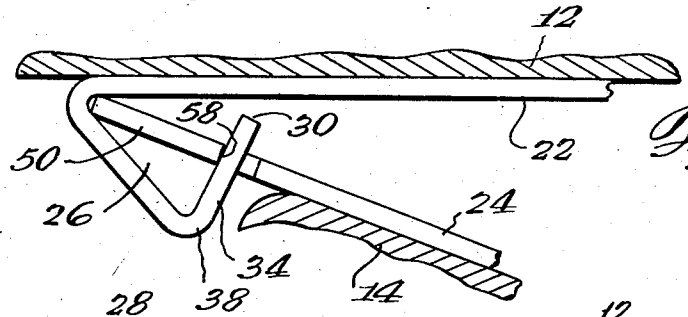


Fig. 8.

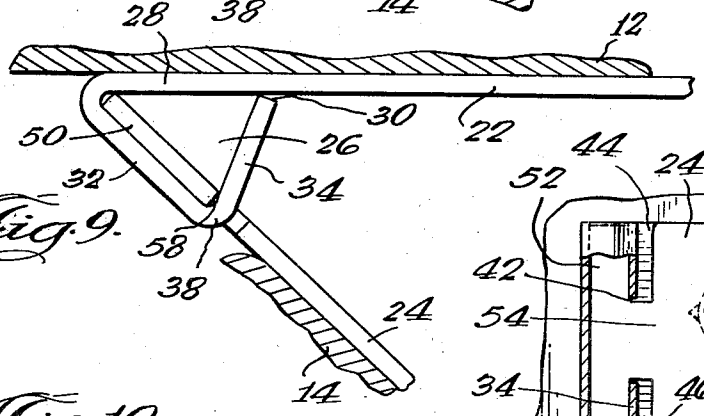


Fig. 9.

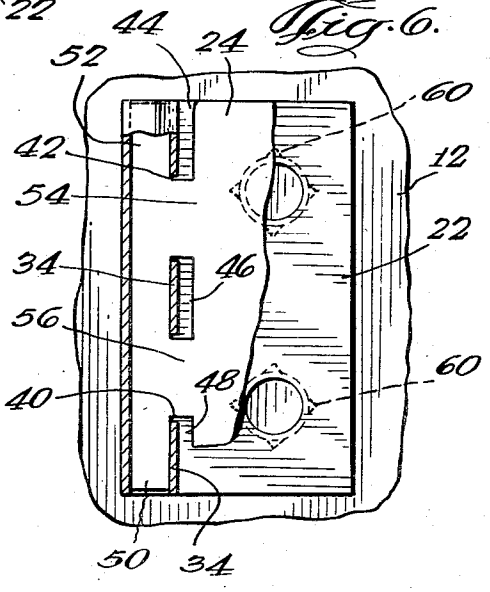


Fig. 6.

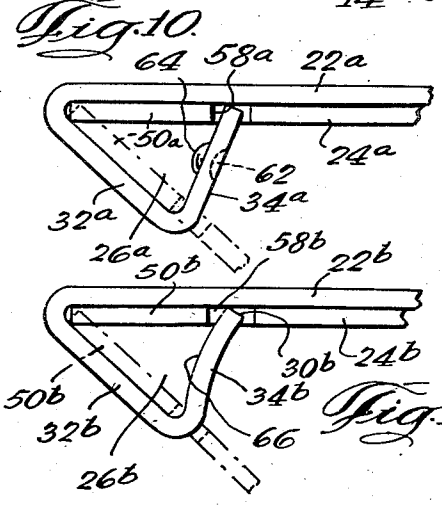


Fig. 10.

Fig. 11.

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STOP HINGE WITH FRICTION CATCH

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Application June 3, 1955, Serial No. 512,923

7 Claims. (Cl. 16—142)

This invention relates to hinges and more particularly to improvements in stop hinges in which the angle of rotation of the hinge element is limited. Specifically the invention pertains to a novel stop hinge construction having means for maintaining the relative angular relationship of the members of the hinge in a plurality of positions without however materially interfering with the manual manipulation of the hinge.

Stop hinges having automatic stop means for limiting the swinging movement of the hinged object are fairly well known in the art. Such hinges in various designs and constructions find a multiplicity of applications such as for example in furniture, appliances, household fixtures and the like. Although such hinges are indeed effective in limiting the movement of the hinged object, heretofore, however, none of these hinges were capable of maintaining the hinged object in one or more preselected angular positions. Consequently the use and application of such hinges have been somewhat limited.

It is therefore an important object of this invention to provide a stop hinge, having automatic stop means for limiting the swinging movement of the hinged object and further having means for automatically retaining hinged objects in a plurality of pre-selected positions without however interfering with the manual movement of the hinged object within the limits of its path of movement.

Heretofore photograph frames have been provided with stop members for supporting the frame on a flat surface. Such stop members have usually been hingedly affixed to the back of the photograph frame by direct fastening means positioned at the upper end of the support and the support member then provided with a crease or fold line enabling the support member to be pivoted about the axis of the crease in an arc away from the photograph, thereby providing support means for the same. Stop means comprising a ribbon connecting the lower portion of the support member to the back of the photograph frame was usually employed to limit the swinging movement of the support member.

The above described support member construction has been characterized by several inherent disadvantages. For example their design and construction did not readily lend themselves to modern production methods. Consequently considerable hand labor was required in their construction and assembly. Obviously rising labor costs resulted in excessively costly picture frames. Moreover, in the absence of any means to retain the support member in a preselected position with respect to the photograph frames, photographs were often inadvertently knocked over, resulting in glass breakage and injury to the frame and photograph or picture contained therein.

It is therefore another important object of this invention to afford means for affixing a support member in hinged relationship to the back of a photograph frame which will overcome all of the disadvantages mentioned hereinabove.

A further object is to provide a stop hinge having means for both limiting the swinging movement of the support member and further means for retaining the support member in at least two pre-selected positions without however preventing the manual movement of the support member through its arcuate path as limited by the stop means.

Still another object is to provide a hinge of simplified construction comprising a minimum number of parts, i. e. only two members.

Still a further object is to afford a photograph frame support member device which readily lends itself to modern production methods whereby the support member may be made of parts manufactured substantially automatically by machine, and the assembly of said parts may be likewise accomplished by substantially automatic operations which require minimum human attention.

Yet another object is to afford a photograph support member assembled to the back of a photograph frame by a device of substantially greater strength and durability than heretofore employed.

Yet a further object is to provide a two piece stop hinge of simple, inexpensive construction, yet sturdy and effective.

With the foregoing and other objects in view which will appear as the description proceeds, the invention consists of certain novel features of construction, arrangement and a combination of parts hereinafter fully described, illustrated in the accompanying drawings, and particularly pointed out in the appended claims, it being understood that various changes in the form, proportion, size and minor details of the structure may be made without departing from the spirit or sacrificing any of the advantages of the invention.

For the purpose of facilitating an understanding of my invention, I have illustrated in the accompanying drawings preferred embodiments thereof, from an inspection of which, when considered in connection with the following description, my invention, its mode of construction, assembly and operation, and many of its advantages should be readily understood and appreciated.

Referring to the drawings in which the same characters of reference are employed to indicate corresponding or similar parts throughout the several figures of the drawings:

Fig. 1 is a perspective view of a photograph frame back member and support member illustrating an application of a stop hinge embodying the principles of my invention;

Fig. 2 is an elevational view of a photograph frame support member assembly employing my improved hinge;

Fig. 3 is an enlarged fragmentary sectional view taken on the plane of line 3—3 in Fig. 2 of the drawings and viewed in the direction indicated;

Fig. 4 is a plan view of my novel hinge;

Fig. 5 is an enlarged fragmentary perspective view of the hinge illustrating certain details of construction;

Fig. 6 is a plan view, partially in section, taken substantially on the plane of line 6—6 in Fig. 7 of the drawings, and with portions of the members broken away to illustrate certain details of construction;

Figs. 7–9 inclusive are enlarged fragmentary sectional views illustrating the operation of the hinge as the support member is moved successively through a plurality of positions;

Fig. 10 is a fragmentary side view of a modified form of the hinge; and

Fig. 11 is a similar fragmentary side view of still another modified hinge construction.

Referring first to Fig. 1 of the drawings, it will be noted that reference numeral 10 indicates generally the back of a photograph frame comprising a backing member 12 and a support member 14. The top end of the support member 14 is joined to the backing member 12 by means of a stop hinge 16 embodying the principles of my inven-

tion and comprising the subject matter of this application.

It should be obvious that the support member construction is shown here primarily for the purpose of illustrating the novel application of the new hinge construction. It should further be noted that the bottom edges of the support member **14** are formed with two flat surfaces **18** and **20** so positioned that the picture may be supported by the support member with its major axis positioned in either a substantially vertical plane or a substantially horizontal plane as desired.

Referring now to Figs. 3–6 inclusive, the construction of the hinge **16** will now be described in some detail. It will be noted, especially in Fig. 5 of the drawings, that the hinge comprises only two members, **22** and **24** respectively. Sheet member **22** comprises a spring leaf made from a flat sheet or plate of material with one end portion thereof bent through a plurality of angles to afford a triangularly-shaped tubular bead or bearing socket **26**. The triangular socket **26** is defined by the straight wall portion **28** comprising merely an extension of the flat sheet **22**. The end **30** of the sheet **22** abuts the sheet at the position shown with intermediate portions **32** and **34** of the end portion comprising the other sides of the triangle and the second and third walls of the socket. This arrangement produces a socket with a cross sectional configuration in the form of a substantially closed triangular loop. It will be noted that the sheet has been bent through an acute angle at **36** and again through an acute angle at **38**. Portions of the socket segment **34** may be cut out as shown at **40** and **42**. The purpose of these cut-outs will become apparent as the description proceeds.

The other member of the hinge may comprise a leaf **24** having a plurality of slots such as **44**, **46** and **48** formed in aligned transverse position intermediate the length of the leaf **24** and adjacent a portion of its edge or periphery. It will be noted that slots **44** and **48** open to the edges of the leaf **24**, thereby affording outwardly protruding pintles such as **50** and **52**. These pintles are embraced by the socket walls, because of wall **34** extending through the slots **44**, **46** and **48**. This arrangement rotatably secures the leaf members together.

The slots **44** and **46** define between them a neck segment **54** and similarly the slots **46** and **48** define between them a neck segment **56**. The neck segments **54** and **56** connect the pintle members **50** and **52** to the leaf member **24**. The various slots and neck portions are so dimensioned in relation to each other that adequate clearance between the necks **56** and **54** and the socket segments **34** is assured. Thus it will readily be perceived that the two members are operatively joined together by means of the pintles **50** and **52** which are actually integrally formed and connected to the leaf **24**. The pintles may be manually moved in an arcuate path within the bearing socket **26**; the path being limited by the socket walls **28** and **32**. Thus it will be obvious that the socket sides **28** and **32** afford automatic stop means for limiting the arcuate movement of the member **24**, as was set forth in the statement of the objects.

Means are further provided in the hinge for retaining the hinged object in any one of a plurality of pre-selected positions to which the same may be moved. Referring then to Figs. 7–9 of the drawings, this means will now be disclosed in some detail.

In Fig. 7 of the drawings it will be noted that the pintle **50** is so dimensioned that it is equivalent in width to the full length of the socket side **28**, so that its ends abut the inner apex of the angular portion **36** and the socket wall **34** respectively. As the leaf **24** with the attached support member **14** is swung outwardly in an arcuate path away from the leaf **22** attached to the photograph frame backing member **12**, the pintle **50** likewise describes an arcuate path, the apex of said path being reached at approximately midway of the length of the socket wall segment **34**. Since the length of the pintle **50** remains constant as it moves through the arcuate path mentioned hereinabove, the outer end **58** of the pintle **50** bears against the inner surface of the resilient deformable socket wall **34** flexing the same outwardly in order to accommodate the passage of the pintle. Thus as shown in Fig. 8 of the drawings, the socket wall segment **34** is bent outwardly to a position where the end **30** of the socket wall **34** is spaced from the leaf **22**. Since the hinge itself is preferably made of tempered steel, the resilience of the socket wall **34** exerts sufficient force against the end **58** of the pintle **50** to readily maintain any pre-selected position to which it has been moved. However, the force exerted by the socket wall **34** against the end **58** of the pintle is not so excessive as to prevent the pintles from being readily moved to any other position within the limitations of its arcuate path of movement by manually grasping the support member **14** and merely pushing it one way or the other.

In Fig. 9 of the drawings it will be noted that the pintle **50** has been moved further through its arcuate path until it abuts the outer wall **32** of the socket **26**. In this position the pintle end **58** no longer bears against the socket wall **34** with sufficient force to flex the socket wall **34** outwardly, because the width of the pintle is likewise substantially the same as the length of the socket wall **32**. Thus the end **30** of the socket wall **34**, by virtue of the inherent resilience of its material of construction is returned to its natural unflexed position abutting the leaf **22**.

It should further be noted that the position illustrated in Fig. 9 is the position of maximum angular displacement of the support member from the photograph. It should likewise be noted that in this position the pintle **50** is maintained in the position to which it has been moved by virtue of the resilient socket wall **34**.

It should be obvious that the above-described socket and pintle structure is repeated in each of the three segments of the hinge as shown in Fig. 3 of the drawings.

Although any suitable fastening means may be employed to mount the hinge in operational position within the device in which it is to be used, as for example, between the support member **14** and the photograph frame backing member **12**, I have illustrated in the drawings a preferred simple fastening means construction which is unitarily formed in the hinge itself.

In Figs. 1, 3 and 4 of the drawings this fastening means comprises a plurality of spikes or prongs such as **60** which protrude outwardly from each member **22** and **24** of the hinge. These prongs **60** are arcuately curved so that upon imbedding the same, one in the support member **14** and the other in the photograph frame backing member **12**, the hinge is securely mounted and retained in operational position. The prongs **60** may be readily formed by merely broaching the leaves **22** and **24** of the hinge to afford openings with the outwardly stamped marginal material formed into sharp prongs or teeth.

In Figs. 10 and 11 of the drawings there are illustrated two additional embodiments of the invention illustrating several other modified socket constructions which, like the principal embodiment enable the hinged members to be maintained in a plurality of pre-selected angular positions. In the embodiment illustrated in Fig. 10 of the drawings, similar parts are indicated by like numerals with the added suffix "*a*."

In this embodiment the socket wall **34** may be formed with a dimple **62** affording a spherical protrusion **64** protruding inwardly from the inner surface of the wall **34***a* into the path of movement of the pintle **50***a*. It will further be noted that the pintle **50***a* may be somewhat shorter than the pintle of the principal embodiment and hence need not be made with the same exacting degree of precision. Thus, movement of the pintle is unrestricted within the socket **26***a* except for the protrusion **64**. It will be noted that the length of the pintle **50***a* is such that when it is moved into the apex of its

arcuate path the end **58***a* will abut the protrusion **64**. Thus it will readily be perceived that the pintle is retained on one side or the other of the protrusion **64** so that the arcuate path of movement is restricted into the comparatively narrow paths on each side of the protrusion **64**. When it is desired to move the leaf **24***a* from the position shown in solid outline in Fig. 10 to its outward position shown in dotted outline, the leaf is merely swung outwardly and as it passes over the protrusion **64**, the socket member **34***a* is flexed outwardly as in the principal embodiment permitting the pintle end **58***a* to pass over the protrusion **64** until it has reached the other side of the protrusion. At this point socket member **34***a* springs back to its original position blocking the pintle **50***a* in its new position and permitting only limited movement between the socket wall **32***a* and the protrusion **64**.

In Fig. 11 of the drawing the embodiment illustrated has similar parts designated by like numerals with the added suffix "*b*." In this embodiment the socket wall member **34***b* is formed with a concavo-convex shape with the inner wall thereof arcuately curved inwardly so that the apex thereof protrudes into the arcuate path of the pintle **50***b*. Again it will be noted that the length of the pintle **50***b* may be such that the end **58***b* of the pintle is spaced from the end **30***b* of the socket wall **34***b*. As in the previously described embodiment, this construction reduces the degree of precision required in making the same.

The operation of the hinge is similar to the operation of the previously described embodiment. As the pintle **50***b* is moved through its arcuate path, pintle end **58***b* is moved until it abuts the inner surface **66** of the socket wall **34***b* at a position approximately midway between the position of the pintle illustrated in solid outline and the position illustrated in dotted outline in Fig. 11 of the drawings. Again the flexing outwardly of the socket wall **34***b* permits movement of the pintle **50***b* to the various positions desired, but at the same time maintains the pintle in any pre-selected position.

From the above description and the drawings it will be apparent that I have provided a two-part stop hinge of simple construction having automatic stop means for limiting the arcuate path of movement of one part of the hinge. The hinge is further provided with means for maintaining the hinged member in any pre-selected position. However, the latter-mentioned means is so designed that it does not prevent manual movement of the hinged part to any other position. The hinge is admirably adapted for use in joining a support member to a photograph frame assembly, although it may be used equally as well in any of a large number of other applications.

It is believed that my invention, its mode of construction and assembly, and many of its advantages should be readily understood from the foregoing without further description, and it should also be manifest that while preferred embodiments of the invention have been shown and described for illustrative purposes, the structural details are nevertheless capable of wide variation within the purview of my invention as defined in the appended claims.

What I claim and desire to secure by Letters Patent of the United States is:

1. A plural position hinge comprising first and second leaf members, a tubular bead secured to a portion of said first leaf member, the cross sectional configuration of said tubular bead being in the form of a substantially closed loop, said second leaf member having at least one slot adjacent a portion of its periphery, part of the walls of said tubular bead extending through said slot to embrace the portion of said second leaf member between said slot and said adjacent periphery whereby to rotatably secure said leaf members together, said embraced portion of said second leaf comprising at least one pintle, said pintle being elongated in cross section, one portion of the walls of said tubular bead comprising a first stop to engage said pintle in one hinge position and limit further relative rotation of said leaf members in one direction, another portion of the walls of said tubular bead comprising a second stop to engage said pintle in a second hinge position and limit further relative rotation of said leaf member in the opposite direction, a resilient deformable portion of said walls intermediate said first and second stops, and a semi-spherical protrusion positioned on said resilient deformable wall portion, said protrusion extending into the path of movement of said pintle, said protrusion being positioned to be engaged by said pintle as the hinge leaves are rotated from one fixed position to another whereby the hinge rests in one or the other fixed position until sufficient force is exerted on the leaves to force the pintle past said semi-spherical protrusion into the other fixed position.

2. A plural position hinge comprising first and second leaf members, a tubular bead secured to a portion of said first leaf member, the cross sectional configuration of said tubular bead being in the form of a substantially closed loop, said second leaf member having at least one slot adjacent a portion of its periphery, part of the walls of said tubular bead extending through said slot to embrace the portion of said second leaf member between said slot and said adjacent periphery whereby to rotatably secure said leaf members together, said embraced portion of said second leaf comprising at least one pintle, said pintle being elongated in cross section, one portion of the walls of said tubular bead comprising a first stop to engage said pintle in one hinge position and limit further relative rotation of said leaf members in one direction, another portion of the walls of said tubular bead comprising a second stop to engage said pintle in a second hinge position and limit further relative rotation of said leaf member in the opposite direction, a resilient deformable portion of said walls intermediate said first and second stops, said resilient deformable wall portion being concavo-convexly curved with the convex side protruding into the path of movement of said pintle and positioned to be engaged by said pintle as the hinge leaves are rotated from one fixed position to another whereby the hinge rests in one or the other fixed position until sufficient force is exerted on the leaves to force the pintle past said concavo-convexly curved wall portion into the other fixed position.

3. A plural position hinge comprising first and second leaf members, a socket secured to said first leaf member, the cross sectional configuration of said socket being in the form of a substantially closed triangular loop, said socket including two intersecting side walls and a third resilient wall, said second leaf member having at least one slot adjacent a portion of its periphery, one of the walls of said socket extending through said slot to embrace the portion of said second leaf member between said slot and said adjacent periphery thereby rotatably securing said leaf members together, said embraced portion of said second leaf member comprising at least one pintle, said pintle being elongated in cross section, one of the walls of the socket comprising a first stop to engage said pintle in one hinge position and limit further relative rotation of said leaf members in one direction, another of the walls of the socket comprising a second stop to engage said pintle in the other hinge portion and limit further rotation of said leaf members in the opposite direction, said third resilient wall being positioned intermediate said first and second stops and having a portion thereof positioned to be engaged by said pintle as the pintle is forced from one fixed position to another whereby the pintle rests in one or the other fixed position until sufficient force is exerted on the leaves to force the pintle past the engaged portion of the resilient wall and to the other fixed position.

4. The hinge of claim 3 wherein the leaf members are planar, said first leaf member having an end portion bent

to form one of the side walls, the other of said side walls lying in the adjacent plane of said first leaf member, the end of said bent side wall being bent back toward the plane of said first leaf member to form the third resilient wall.

5. In a photograph frame including a backing member and support member; a two position hinge, said hinge comprising first and second leaf members, one of said leaf members being secured to said backing member and the other to said support member, a socket secured to said first leaf member, the cross sectional configuration of said socket being in the form of a substantially closed triangular loop, said socket including two intersecting side walls and a third resilient wall, said second leaf member having at least one slot adjacent a portion of its periphery, one of the walls of said socket extending through said slot to embrace the portion of said second leaf member between said slot and said adjacent periphery whereby to rotatably secure said leaf members together, said embraced portion of said second leaf member comprising at least one pintle, said pintle being elongated in cross section, one of the walls of the socket comprising a first stop to engage said pintle in one hinge position and limit further relative rotation of said leaf members in one direction, another of the walls of the socket comprising a second stop to engage said pintle in the other hinge position and limit further rotation of said leaf members in the opposite direction, said third resilient wall intermediate said first and second stops and having a portion positioned to be engaged by said pintle as the hinge is forced from one fixed position to another whereby the hinge rests in one or the other fixed position until sufficient force is exerted on the leaves to force the pintle past the engaged portion of the resilient wall and the hinge reaches the other fixed position.

6. A plural position hinge comprising first and second leaf members, a longitudinally extending substantially closed-loop socket integrally formed at one edge of said first leaf member, said socket defining in cross-section an isosceles triangle, and a rectangular pintle integrally formed in a marginal edge of said second leaf member, the cross-sectional length of said pintle being substantially the same as the equal sides of said triangle, said pintle being rotatably positioned in said socket, said equal sides being adapted to cooperate with said pintle to limit rotation of said second leaf member, the base of said triangle affording means adapted to cooperate with said pintle for holding the same in positions adjacent either of said equal sides.

7. The hinge of claim 6 in which said triangle base comprises a resilient deformable wall bearing with varying pressure against an edge of said pintle as the same is rotated, said pressure being greatest when said pintle is moved to coincide with the altitude of said triangle, whereby said second leaf member is held adjacent one or the other of said equal sides until sufficient force is exerted to move the same.

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