July 20, 1954 E. F. GORMAN 2,683,892

HINGE

Filed Feb. 6, 1951 2 Sheets-Sheet 1

Fig. 1

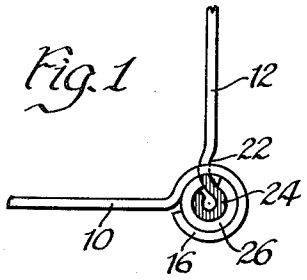


Fig. 2

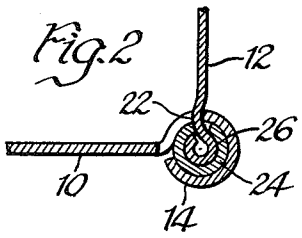


Fig. 3

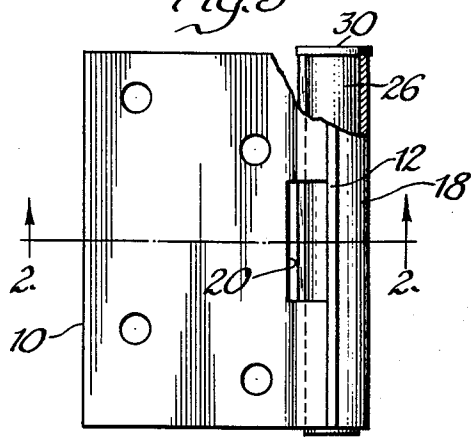


Fig. 4

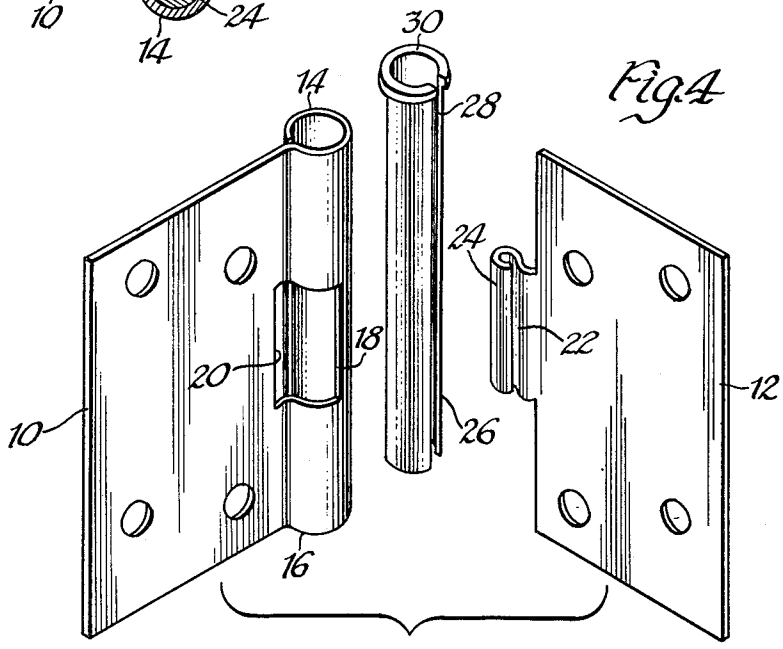


Fig. 10

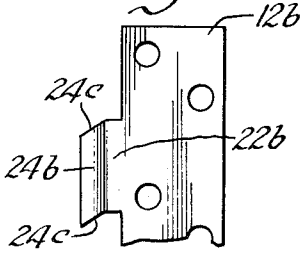
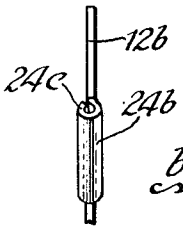


Fig. 11



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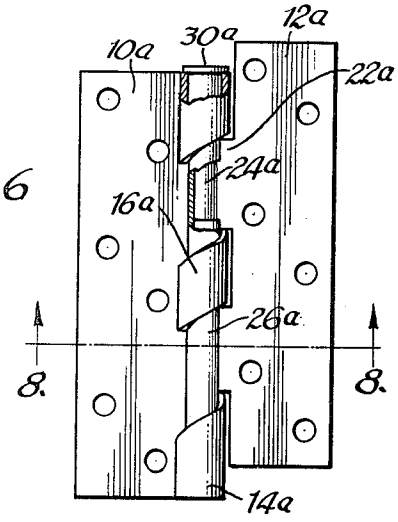


Fig. 6

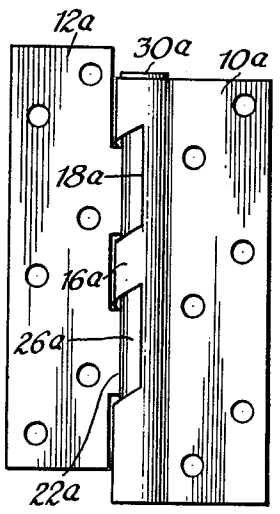


Fig. 7

Fig. 5

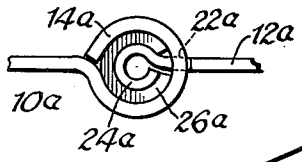


Fig. 8

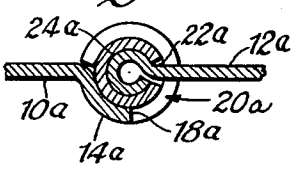


Fig. 9

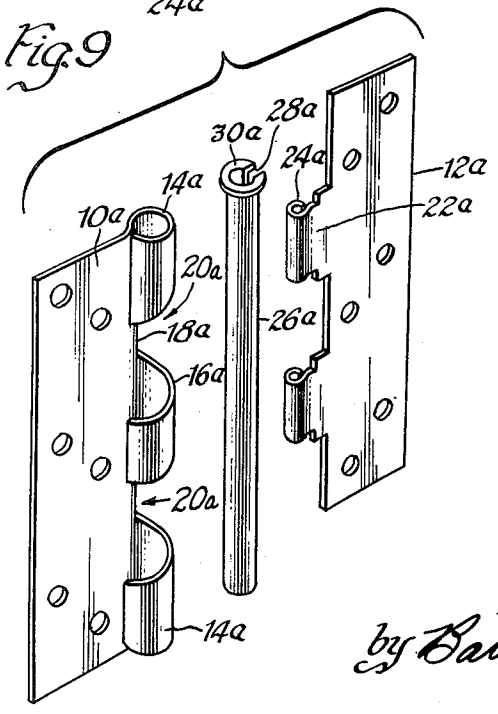
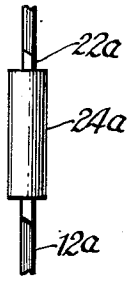


Fig 12



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UNITED STATES PATENT OFFICE

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HINGE

Edward Francis Gorman, Chicago, Ill.

Application February 6, 1951, Serial No. 209,582

3 Claims. (Cl. 16—153)

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This invention relates to a hinge.

An important object of this invention is to provide a hinge of novel construction suitably made of sheet metal by easy stamping and forming operations, and characterized by light weight and convenient assemblage.

A specific object of this invention is to provide a rising hinge having the above noted characteristics.

Other and further objects and features of this invention will be apparent from the following description and appended claims as illustrated by the accompanying drawings which show, by way of examples, hinges constructed according to the present invention. More specifically:

Figure 1 is a bottom plan view of a hinge according to the present invention in open position;

Figure 2 is a section along the line 2—2 of Figure 3;

Figure 3 is a side elevation of the hinge of Figures 1 and 2;

Figure 4 is an exploded perspective view of the hinge of Figures 1 to 3;

Figure 5 is a bottom plan view of a rising hinge according to the present invention in open position;

Figure 6 is an elevation of the hinge of Figure 5;

Figure 7 is another elevation of the hinge of Figure 5 viewed from the opposite side;

Figure 8 is a section taken along the line 8—8 of Figure 6;

Figure 9 is an exploded perspective view of the hinge of Figures 5 to 8;

Figure 10 is a fragmentary side view of a modified leaf of a hinge otherwise similar to that of Figures 5 to 9;

Figure 11 is a fragmentary edge view of the modified leaf of Figure 10; and

Figure 12 is a fragmentary edge view of a modification of one leaf of the hinge of Figures 5 to 9.

Referring now to Figures 1 to 4, there is shown a hinge comprising a first generally rectangular leaf 10 and a second also generally rectangular leaf 12, each adapted to be attached to one of two members to be hingedly connected. The leaf 10 is provided with two spaced aligned tubular ears 14 and 16 both attached to one side of said leaf 10. Further, a web 18 spans part of the interspace between the two ears 14 and 16, leaving a longitudinal slot 20 between the web 18 and that side of the leaf 10 to which the ears 14 and 16 are attached. The web 18 is curved similarly to the ears 14 and 16 and forms a partial continuation thereof. Preferably, the leaf 10, the ears 14 and

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16 and the web 18 are formed integrally from a single piece of sheet metal stamped to provide a longitudinal slot corresponding to the slot 20, and two transversely projecting tongues. The margin of the sheet metal piece including said longitudinal slot and said transverse tongues is then bent back upon itself tubularly to form the finished leaf 10 with its ears 14 and 16 and web 18.

The leaf 12 is provided with a knuckle 22 projecting from one side thereof and adapted to be inserted between the ears 14 and 16 of the leaf 10 in general alignment with said ears. The terminal portion 24 of the knuckle 22 is considerably thicker than the remaining proximal portion of the knuckle. The leaf 12 and knuckle 22, 24 are also suitably made integrally from a single piece of sheet metal stamped to provide a transverse projecting tongue corresponding to the knuckle 22, 24. The terminal portion of this tongue is folded back upon itself, preferably tubularly, to provide the thick distal knuckle portion 24.

The hinge of Figures 1 to 4 also comprises a tubular pivot pin 26 formed with a longitudinal slot 28 of a width smaller than the thickness of the terminal knuckle portion 24 of the leaf 12. The pin 26 may also be formed, at one end with a radial flange 30 adapted to abut the terminal edge of one of the ears 14, 16 of the leaf 10.

The pivot pin 26 fits slidingly within the ears 14 and 16, while the knuckle portion 24 fits slidingly within the pivot pin 26.

The above mentioned parts are assembled by inserting the knuckle portion 24 through the slot 20 into generally concentric and aligned relationship with the ears 14 and 16. Next, the pivot pin 26 is threaded (unflanged end first) into the two ears 14 and 16, being then passed around the thick terminal portion 24 of the knuckle 22.

When the hinge of Figures 1 to 4 has been assembled, the leaves 10 and 12 are freely movable with respect to one another over an angle determined by the angular extent of the slot 20. For instance, the web 18 may extend around 270° of the tubular ears 14 and 16, and then the two leaves may be moved from abutting relationship into the 90° angular relationship shown in Figures 1 to 3.

In the hinge of Figures 1 to 4 the pivot pin 26 moves with the leaf 12, since the pivot pin slot 28 abuts the opposed sides or faces of the knuckle 22 of the leaf 12. The flange 30 of the pivot pin 26 rests upon the top edge of the ear 14 and thereby holds the pivot pin in assembled position.

For disassembling the hinge of Figures 1 to 4, it is only necessary to pull out the pivot pin 26.

The knuckle 22, 24 may then be pulled out through the slot 20 to separate the leaf 12 from the leaf 10.

The hinge of Figures 5 to 9 is constructed of parts similar to the hinge of Figures 1 to 4 and the same reference numerals are therefore used, the letter *a* being added for the numerals of Figurs 5 to 9. The hinge of Figures 5 to 9 functions essentially similarly to that of Figures 1 to 4 except for the features discussed hereinbelow.

In the hinge of Figures 5 to 9, the ears 14*a* and 16*a* have their opposed edges extending along parallel spiral lines. The slots indicated at 20*a* provide for entrance of the knuckle portions 24*a* between the ears 14*a* and 16*a*. These slots 20*a* are defined by the opposed surfaces of the spaced ears 14*a* and 16*a*. The web portion 18*a* located between said pair of ears 14*a* and 16*a* defines the angular extent of slot 20*a* and serves to limit the range of swinging of the leaves 10*a* and 12*a* with respect to each other. Further, the relatively thick terminal knuckle portions 24*a* are restricted lengthwise with respect to the proximal relatively thin knuckle portion 22*a*. The upper and lower edges of the proximal knuckle portion 22*a* slide over the spiral edges of the ears 14*a* and 16*a* as the hinge is opened and closed. As a consequence, the leaf 12*a* rises and falls as the hinge is opened and closed. The hinge of Figures 5 to 9 is therefore a hinge of the type known as a rising hinge. The reason for the restriction of the terminal knuckle portion 24*a* is the fact that in the absence of such a restriction the terminal knuckle portion 24*a* could not pass through the slots defined by the opposed surfaces of the ears 14*a* and 16*a* due to the thickness of this knuckle portion. In other words, the upper and lower transversely opposed corners of the terminal knuckle portion 24*a* could not clear the opposed spiral edges of the ears 14*a* and 16*a*.

As shown in Figure 12, the upper and lower surfaces of the knuckle portions 22*a* may be sloped similarly to the opposed surfaces of the ears 14*a* and 16*a* to provide extended surface contact therewith.

Instead of restricting the terminal portions 24*a* in the manner shown in Figures 5 to 9 (by having one or both ends of the terminal knuckle portion 24*a* extending short of the proximal knuckle portion 22*a*) to permit assemblage of the hinge, the same end may be reached by the structure shown in Figures 10 and 11, which illustrate another rising hinge constructed according to the principles embodied in the hinge of Figures 5 to 9. As shown in Figures 10 and 11, a leaf 12*b* is formed with a knuckle 22*b* having a terminal relatively thick portion 24*b*. The upper and lower surfaces 24*c* of the terminal knuckle portion 24*b* slope downwardly in parallelism. The slope of these surfaces 24*c* conforms with the slope of the parallel edges of the ears 14*a* and 16*a* to permit insertion therebetween of the knuckle portion 24*b*.

The hinge of Figures 5 to 9 may be fabricated from sheet metal similarly to the hinge of Figures 1 to 4.

The hinges shown by way of examples in the drawings are formed with specific numbers of ears and knuckles. It will be understood that other numbers of ears and knuckles may be provided. Further, the ears 14*a* and 16*a* may have opposed edges of other curvature than the spiral form shown in the drawings.

Many other details of construction may be varied without departing from the principles of this invention, and it is therefore not my purpose to limit the patent granted on this invention otherwise than necessitated by the scope of the appended claims.

What I claim is:

1. A hinge comprising a first hinge leaf having at least two spaced aligned tubular ears attached to one margin of said first leaf, an elongated tubular pivot pin of smaller external diameter than the internal diameter of said tubular ears extending completely through a first of said tubular ears and across the space between the spaced ears and at least partially through the other tubular ear, an outwardly extending circumferential flange formed on one end of said pivot pin and adapted to abut a portion of said first tubular ear to limit the movement of said pivot pin through said first tubular ear, said pivot pin being slotted along its entire length, a second hinge leaf having a knuckle attached to one margin thereof, said knuckle extending into the space between said spaced ears on the first leaf and through the slot in said pivot pin into the interior of said tubular pivot pin, the end portion of said knuckle within said pivot pin having a transverse dimension larger than the width of said pivot pin slot, said tubular ears on the first hinge leaf having their opposed edges extending along parallel curved lines which define inclined tracks, said second hinge leaf knuckle having a bearing portion which is located in alignment with and between said inclined tracks when the hinge is assembled, said bearing portion being located between the second hinge leaf and the end portion of the knuckle within said pivot pin and being thinner than said end portion, said second hinge leaf knuckle having its width measured parallel to the axis of the pivot pin, the width of said bearing portion being just slightly smaller than the spacing between said inclined tracks, an edge of said bearing portion being adapted to engage one of said inclined tracks and ride thereon, and said end portion of the knuckle being of smaller width than said bearing portion, so as to afford easy entrance of said end portion of the knuckle between said inclined tracks.

2. A hinge comprising a first hinge leaf having at least two spaced aligned tubular ears attached to one margin of said first leaf, an elongated tubular pivot pin of smaller external diameter than the internal diameter of said tubular ears extending completely through a first of said tubular ears and across the space between the spaced ears and at least partially through the other tubular ear, an outwardly extending circumferential flange formed on one end of said pivot pin and adapted to abut a portion of said first tubular ear to limit the movement of said pivot pin through said first tubular ear, said pivot pin being slotted along its entire length, a second hinge leaf having a knuckle attached to one margin thereof, said knuckle extending into the space between said spaced ears on the first leaf and through the slot in said pivot pin into the interior of said tubular pivot pin, the end portion of said knuckle within said pivot pin having a transverse dimension larger than the width of said pivot pin slot, said tubular ears on the first hinge leaf having their opposed edges extending along parallel curved lines which define inclined tracks, said second hinge leaf knuckle having a bearing portion which is located in alignment with and between said inclined tracks when the hinge is assembled, said bearing portion being

located between the second hinge leaf and the end portion of the knuckle within said pivot pin and being thinner than said end portion, said second hinge leaf knuckle having its width measured parallel to the axis of the pivot pin, the width of said bearing portion being just slightly smaller than the spacing between said inclined tracks, an edge of said bearing portion being adapted to engage one of said inclined tracks and ride thereon, said end portion of the knuckle being of smaller width than said bearing portion, so as to afford easy entrance of said end portion of the knuckle between said inclined tracks, and a web displaced from the plane of said first hinge leaf and spanning a part of the interspace between said ears on the first hinge leaf, said web adapted to engage a portion of the knuckle of said second hinge leaf to limit the range of swing of the second hinge leaf away from the first hinge leaf.

3. A hinge comprising a first hinge leaf having at least two spaced aligned tubular ears attached to one margin of said first leaf, an elongated tubular pivot pin of smaller external diameter than the internal diameter of said tubular ears extending completely through a first of said tubular ears and across the space between the spaced ears and at least partially through the other tubular ear, an outwardly extending circumferential flange formed on one end of said pivot pin and adapted to abut a portion of said first tubular ear to limit the movement of said pivot pin through said first tubular ear, said pivot pin being slotted along its entire length, a second hinge leaf having a knuckle attached to one margin thereof, said knuckle extending into the space between said spaced ears on the first leaf and through the slot in said pivot pin into the interior of said tubular pivot pin, the end

portion of said knuckle within said pivot pin having a transverse dimension larger than the width of said pivot pin slot, said tubular ears on the first hinge leaf having their opposed edges extending along parallel curved lines which define inclined tracks, said second hinge leaf knuckle having a bearing portion which is located in alignment with and between said inclined tracks when the hinge is assembled, said bearing portion being located between the second hinge leaf and the end portion of the knuckle within said pivot pin and being thinner than said end portion, said second hinge leaf knuckle having its width measured parallel to the axis of the pivot pin, the width of said bearing portion being just slightly smaller than the spacing between said inclined tracks, an edge of said bearing portion being adapted to engage one of said inclined tracks and ride thereon, said end portion of the knuckle being of smaller width than said bearing portion, so as to afford easy entrance of said end portion of the knuckle between said inclined tracks, and said edge of the bearing portion which engages said inclined tracks sloping in parallelism with said inclined tracks.

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