F. J. KORB.

INVISIBLE HINGE.

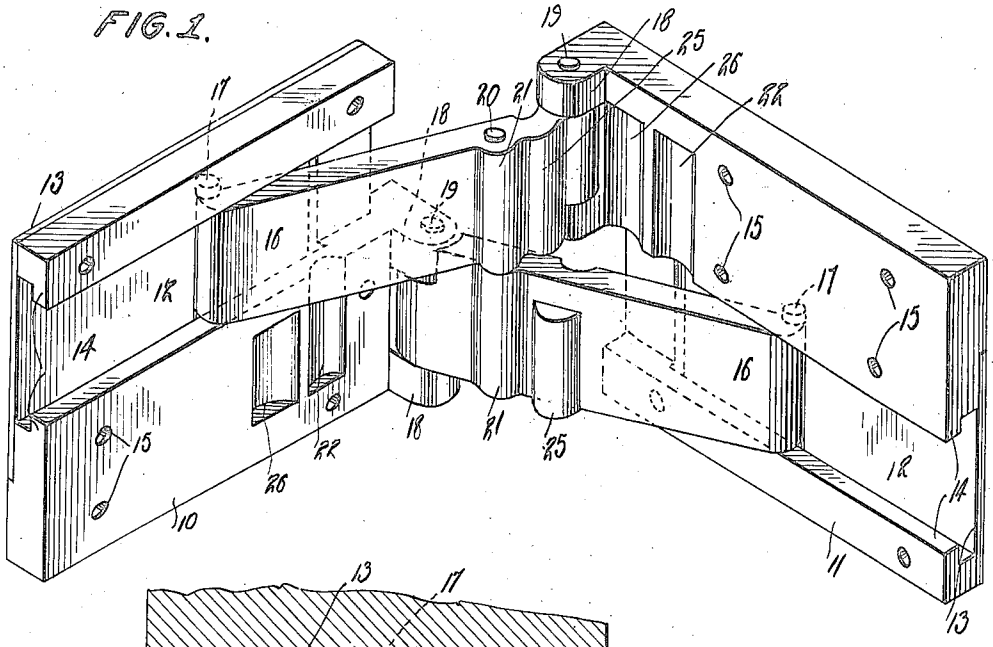
APPLICATION FILED JULY 15, 1918.

1,302,178.

Patented Apr. 29, 1919.

3 SHEETS—SHEET 1.

FIG. 1.



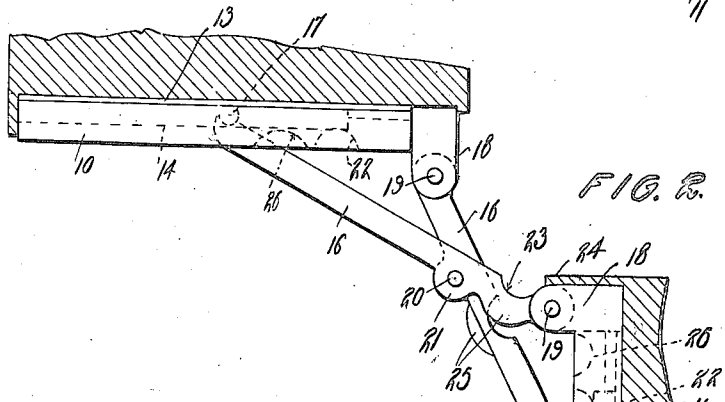


FIG. 2.

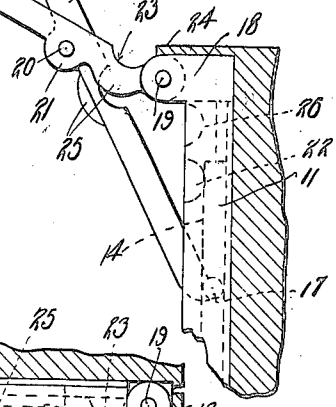
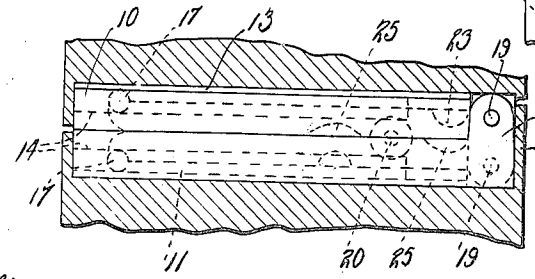


FIG. 3.



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3 SHEETS—SHEET 2.

FIG. 4.

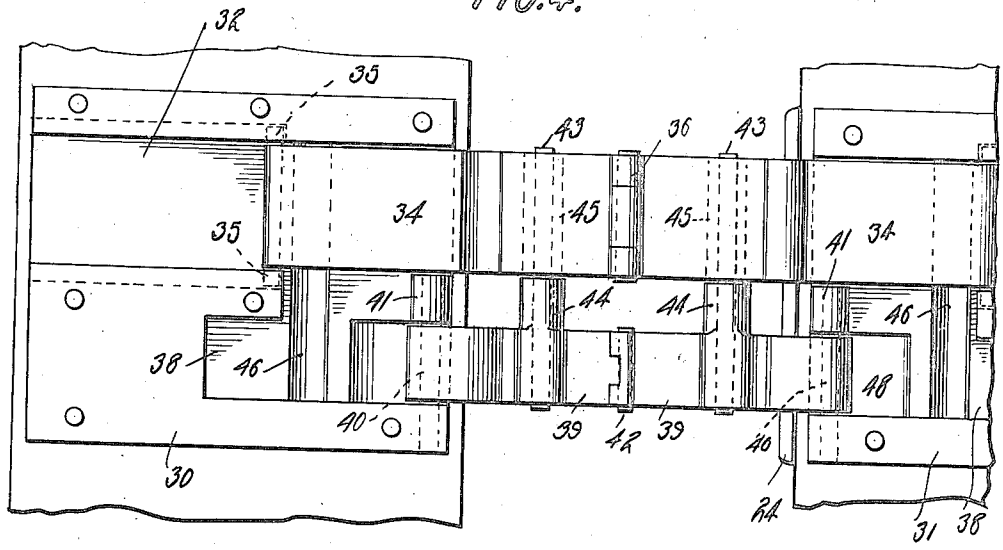
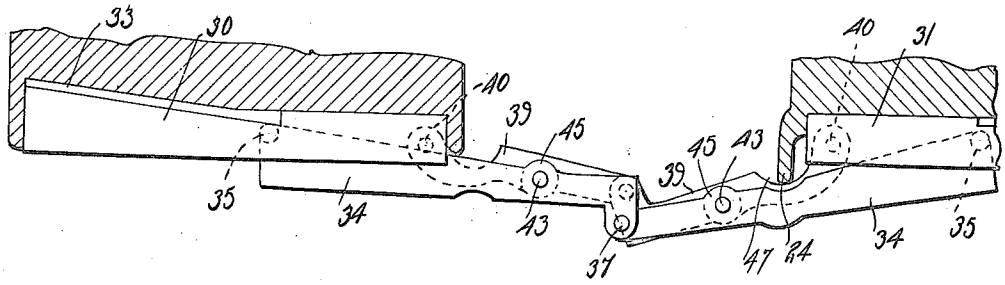


FIG. 5.



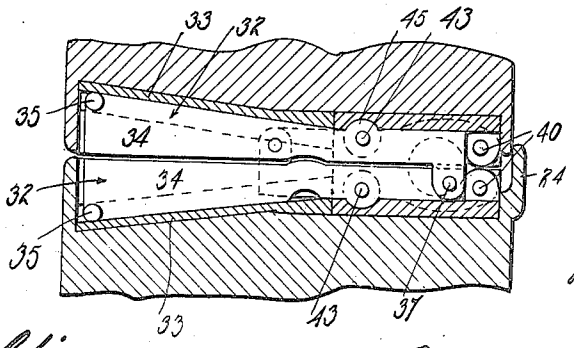


FIG. 6.

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3 SHEETS—SHEET 3.

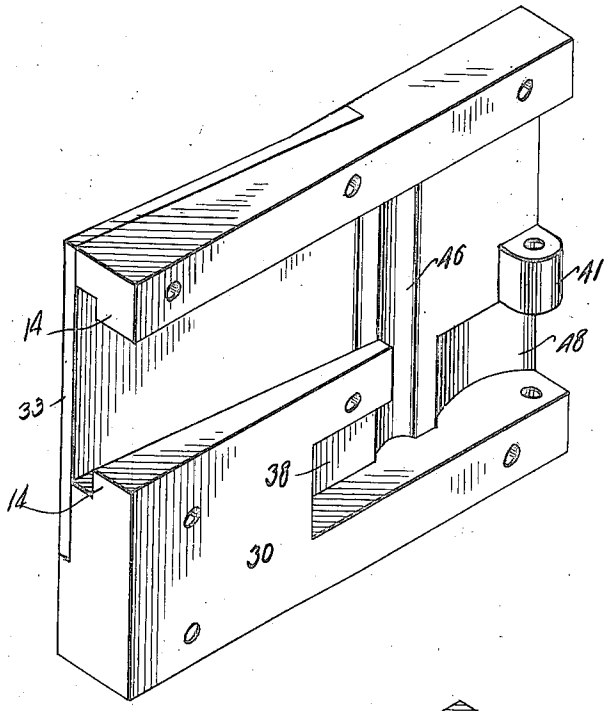


FIG. 7.

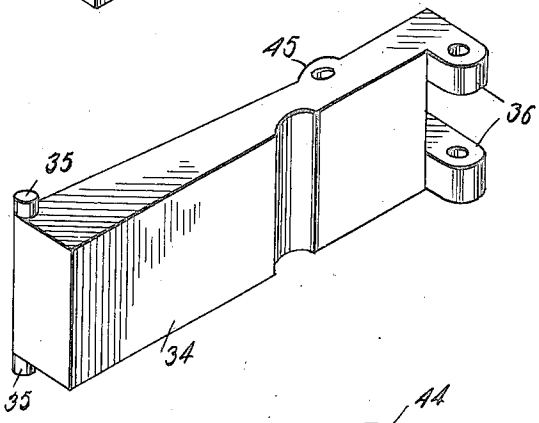


FIG. 8.

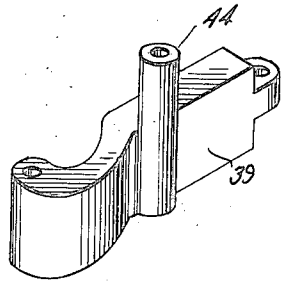


FIG. 9.

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UNITED STATES PATENT OFFICE.

FRED J. KORB, OF CHICAGO, ILLINOIS.

INVISIBLE HINGE.

1,302,178. Specification of Letters Patent. Patented Apr. 29, 1919.

Application filed July 15, 1918. Serial No. 245,093.

To all whom it may concern:

Be it known that I, FRED J. KORB, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Invisible Hinges, of which the following is a specification.

This invention relates to hinges, the primary object of which is to provide an improved hinge, which is invisible when the door is closed, the hinge disclosed herein being an improvement on that described and claimed in my co-pending application, Serial Number 188,896, filed August 30, 1917.

A further object of the invention is to provide a hinge of the character stated adaptable particularly to the bodies of vehicles, which permits of the door of the vehicle being easily swung to full open or closed positions, which obviate the possibility of the door wabbling or becoming disalined from the door frame, and which presents no unsightly protuberances when the door is closed.

A further and particular object of the invention is to provide hinges of such character that the door to which they are applied may swing outwardly from the body of the vehicle in a vertical plane, irrespective of the fact that the door when in closed position may be inclined at an angle to the vertical.

Still further objects reside in providing hinges of the character stated which may be applied to the door and jamb without altering the construction of the same, which are arranged in such manner as to enable the door to readily respond to opening and closing movements without creating excessive friction between the various movable parts, which may be readily lubricated when required, which are of extremely simple construction and which may be manufactured at low cost, and which will prove thoroughly practical and efficient in use.

With these objects in view, together with others, which will appear as the description proceeds, the invention resides in the novel formation, combination, and arrangement of parts, all as will be described more fully hereinafter, illustrated in the drawings, and particularly pointed out in the claims.

In the drawings:—

Figure 1 is a perspective view of one form of the hinge embodying the invention,

Fig. 2 is a horizontal sectional view taken through a portion of the jamb and the door, and illustrating in top plan the hinge shown in Fig. 1,

Fig. 3 is a view similar to Fig. 2, and illustrating the parts in the position they will assume when the door is in closed position,

Fig. 4 is an elevation showing a part of the jamb and the door butt, and illustrating the application of a hinge of slightly modified form,

Fig. 5 is a view similar to Fig. 2 and illustrating in top plan the hinge of modified form,

Fig. 6 is a view similar to Fig. 3, showing the modified form of the hinge with the parts in the position they will assume when the door is in closed position,

Fig. 7 is a detail perspective view of one of the leaves or plates of the modified form of hinge,

Fig. 8 is a similar view of one of the connecting arms of the hinge, and

Fig. 9 is a detail perspective view of one of the auxiliary connecting arms for the hinge of modified form.

Referring now to the drawings and particularly to Figs. 1 to 3 thereof, 10 and 11 indicate the leaves or plates which are to be secured to the door jamb and door butt respectively, the said leaves being of any desired size and being formed preferably of light durable metal. These leaves are each provided with a longitudinally disposed slot indicated at 12, and these slots are closed upon the rear faces of the leaves by the plates indicated at 13, the said plates being set in or countersunk upon the leaves 10 and 11 so as to lie flush upon the rear faces thereof. The metal defining the longitudinal edges of the channels or slots 12 is cut away so as to provide longitudinally disposed shoulders 14 extending a short distance into the channels, and these shoulders are co-extensive with said channels. The hinge leaves may be secured to the door jamb and door butt by passing screws or

other retaining elements through the openings indicated at 15. It will be observed that certain of these openings are so located upon the leaves that the retaining screws will pass through the plates 13, whereby the screws firmly hold these plates properly positioned upon their respective leaves.

The channels 12 are arranged in their respective plates in different relative positions, it being noted that the channel in leaf 10 is located near the upper portion thereof, while the corresponding channel in leaf 11 is located near the lower edge thereof, and the lower and upper edges respectively of the channels 12 in plates 10—11 will be substantially alined with each other when the plates are brought together one upon the other.

Each channel 12 has slidably arranged therein one end of an arm 16, the opposite ends of the arms being pivotally connected with the opposing hinge leaf. The sliding ends of the arms 16 are provided with upwardly and downwardly projecting lugs 17 engaged behind the longitudinally disposed shoulders 14 defining the upper and lower edges of the channels 12, and these lugs are rounded so as not to bind with the plates 13 or the inner walls of the shoulders 14. Each of the leaves 10—11 is provided at one end with a pair of spaced knuckles 18 projecting at substantially right angles to their respective plates, and between which the outer ends of the arms 16 are pivoted. Pins 19 are passed through the knuckles 18 and through the outer ends of the arms 16. By connecting the outer ends of the arms with the opposing plates, it is obvious that the said arms will be arranged in crossed relation, and the adjacent longitudinal edges of the said arms will be engaged with each other. A pivot pin 20 extends downwardly through suitable barrel or knuckle portions upon the arms at their points of crossing, so that the said arms are pivotally connected together. The leaves 10—11 are provided at proper points upon their adjacent faces with recesses 21 to receive the knuckle or barrel portions when the hinge leaves are swung to closed position.

By constructing the leaves of the hinge in this manner it is obvious that one leaf may move relative to the other in an arcuate course, the radius of the arc being determined by the length of the arms, and the location of their points of pivotal connection. Assuming the leaf 11 to be connected to the butt of the door, outward swinging movement of the latter will cause the leaf 11 to move away from leaf 10, and the outer ends of the arms 16 will rotate upon their respective pivot pins 19. As the plates move away from each other, the inner ends of arms 16 will slide within their respective channels, and the said arms will move relative to each other around the pivot pin 20. The weight of the door is in this manner equally borne by the hinge leaves and the cross arms 16. When the door is swung to closed position, the knuckles 18 of the leaf 11 will move into the recess at the outer end of plate 10 and will be disposed above the uppermost knuckle on leaf 10, the arm 16 will move into the channel 12 in plate 10, while the arm 16 which is pivotally connected to plate 10 will be similarly confined within the channel 12 of leaf 11. It will be observed that the leaves and arms are of such relative thicknesses that the said arms will be wholly confined within their respective channels when the leaves are engaged face to face with each other.

Should it be desired to use a hinge of this character in connection with a door having a lap joint, the arms 16 will be provided with recesses or channels 23 to receive the bead or overhang portion 24 upon the door. These recesses are formed by depressing the plates 16 laterally and in such position that the recesses will aline with each other when the hinge has been swung to full open position. Reinforcing bosses 25 may be provided upon the rear faces of arms 16 near the recesses 23, and these bosses will be accommodated in recesses 26 when the hinge is in closed position. A door equipped with a hinge of the above character will be permitted to freely swing to open or closed position, and by reason of the particular crossed arm arrangement the butt of the door will be permitted when in open position to move away from the side of the body with which the door is connected, and the door will be permitted to swing back against the side of the body irrespective of the fact that the door butt may be equipped with a bead or lap joint. In instances where the side of the body is inclined to the vertical, it is necessary that one of the hinges connecting the door to the body is capable of allowing the door butt to move from the jamb a greater distance than that permitted by the other hinge. This is necessary in order that the door may be permitted to swing upon a true vertical axis. The hinge for producing this result is illustrated in the modified form shown in Figs. 4 to 9 inclusive.

The jamb and door leaves in the modified form of the invention are indicated at 30 and 31 respectively. These leaves are countersunk into the jamb and door butt as shown, so that the outer faces of the same will be substantially flush when the door is swung to closed position. The leaves in the modified form of the invention are of identical size, shape, and formation, and each is provided with a longitudinally disposed channel 32, the channels being so arranged

upon their respective plates as to be in registration with each other when the plates are swung together one upon the other. A plate 33 closes the rear side of each plate, similar to the construction described in connection with the form of the invention illustrated in Figs. 1 to 3 inclusive. It will be observed that each of the leaves 30—31 is provided with the overhanging shoulders 14 at the edges of the slots or channels, and it will be observed that the leaves 30—31 are deeper at their outer ends than at their inner ends, thus providing an angularly disposed channel. These channels receive the outer ends of arms 34, each of which is provided with vertically disposed lugs 35 at its extreme outer end to engage behind the shoulders 14 of the leaves. The arms 34 are provided at their inner ends with angularly disposed knuckles 36, by means of which the arms on the opposing leaves are pivotally connected together. A hinge pin 37 connects the knuckles 36.

The adjacent faces of the leaves 30—31 are provided with relatively short recesses or channels 38, the same being designed to receive auxiliary arms 39 pivotally connected as at 40 with the outer ends of their respective plates. The channels 38 are arranged directly below the larger channels of the leaves, the pivot pins 40 for the auxiliary arms are secured at one end in bosses 41 and at their opposite ends in the body of the leaves. The auxiliary arms are pivotally connected at their free ends by a pin 42, and each is pivotally connected with one of the arms 34 by a pivot pin 43. These pins 43 pass through barrel or knuckle portions 44 and 45 in the arms 39—34 respectively. These barrels or knuckles are received within the recesses 46 disposed vertically in the leaves 30—31, so that the arms 34—39 will be permitted to lie wholly within the leaves when the door is swung to closed position.

The arms 39—34 which are connected to the leaf carried by the door butt are recessed as indicated at 47, to accommodate the bead 24 upon the door. It will be understood, particularly with reference to Fig. 5 of the drawings, that these recessed portions register with each other when the door is swung to full open position, and the door will thus be enabled to swing back upon the side of the body.

It is to be observed that the particular arrangement of the arms 34 and the auxiliary arms 39 permit of the door butt moving laterally a relatively great distance beyond the jamb, so that the door may swing upon a true vertical pivot.

In order that the curved or recessed portions of the auxiliary arms 39 may be accommodated and wholly confined within their respective leaves, the latter are cut away or recessed at 48 adjacent the point of connection of the said auxiliary arms with their respective leaves.

The hinge disclosed in Figs. 1 to 3 of the drawings is designed for use upon that part of the door which need not necessarily move a great distance beyond the jamb, while the hinge disclosed in the remaining figures of the drawings is to be used upon that end of the door which it is essential to be moved beyond the jamb a relatively great distance to maintain a true vertical pivot for the door. The arms of the respective hinges must therefore be constructed so as to permit of the door butt swinging the desired distance during the opening of the door. By reason of the fact that the door is capable with a hinge of this character of being swung back against the side of the body, danger of wrenching the door loose from the hinges is entirely overcome, and the particular arrangement of the hinges and the various parts thereof enables the weight of the door to be evenly distributed to all of the supporting parts, whereby danger of breakage of the hinges or loosening the same from their respective jamb portions or door butts is eliminated.

The foregoing description and the drawings have reference to what may be considered the preferred, or approved, form of my invention. It is to be understood that I may make such changes in construction and arrangement and combination of parts, materials, dimensions, et cetera, as may prove expedient and fall within the scope of the appended claims.

Having thus fully described my invention, what I claim as new and desire to secure by Letters Patent, is:—

1. In an invisible hinge, a pair of plates, a pair of arms hingedly connected together at one end and each slidably engaged at their opposite ends with one of said plates, a second pair of arms hinged together at one end and each pivoted at its opposite end to one of said plates, and pivot pins connecting each of the arms of said second pair with one of the arms of the first pair.

2. In an invisible hinge, a pair of plates each having a longitudinal channel therein, a pair of arms hingedly connected together at one end and having their opposite ends slidably engaged in said channels, a second pair of arms hingedly connected together at one end and each hinged at its opposite end to one of said plates below the arms of said first pair, and pivot pins connecting the arms of the first pair with those of the second pair.

3. In an invisible hinge, a pair of plates each having a longitudinal channel therein, shoulders protruding into said channels, a pair of arms hingedly connected together at one end, lugs protruding from the edges of said plates at the free ends thereof and

slidably engaged behind said shoulders, a second pair of hingedly connected arms pivoted at their outer ends to said plates, and pivot pins connecting the arms of said second pair with the arms of the first pair.

4. In an invisible hinge, a pair of plates each having a pair of channels arranged in parallel relation therein, a pair of arms hinged together at one end and each having its opposite end slidably engaged in one of said channels, a second pair of arms hinged together at one end and having their opposite ends pivoted to said plates opposite the second pair of channels, the arms of the first and second pairs being pivotally connected, and the said pairs of arms being wholly confined in their respective channels when the said plates are brought together face to face.

5. In an invisible hinge, a pair of plates each having a pair of channels arranged in parallel relation therein, a pair of arms for each channel, the arms of each pair being hinged together at one end, the free ends of one of said pairs of arms being slidably engaged in their respective channels, the outer ends of the other of said pairs being pivoted to said plates, certain of the said arms being provided with recesses adapted to aline when the arms are in certain positions, reinforcing ribs on the rear faces of said arms, and the said plates being provided with grooves to receive said ribs when the hinge is closed.

6. In an invisible hinge, a pair of leaves, each having a channel therein, shoulders projecting into said channels from the sides thereof and being coextensive therewith, a plate on the rear face of each leaf closing the channels thereof, a pair of arms hingedly connected together at one end, and lugs on the opposite ends of said arms slidably engaged in said channels and confined by said shoulders.

In testimony whereof I affix my signature in presence of two witnesses.

FRED J. KORB.

Witnesses:
Mrs. Robt. MacFarlane,
Thomas Mullen.