Oct. 23, 1962 H. KRAUSE 3,059,328

METHOD OF INSTALLING HINGE

Filed Aug. 5, 1958 2 Sheets-Sheet 1

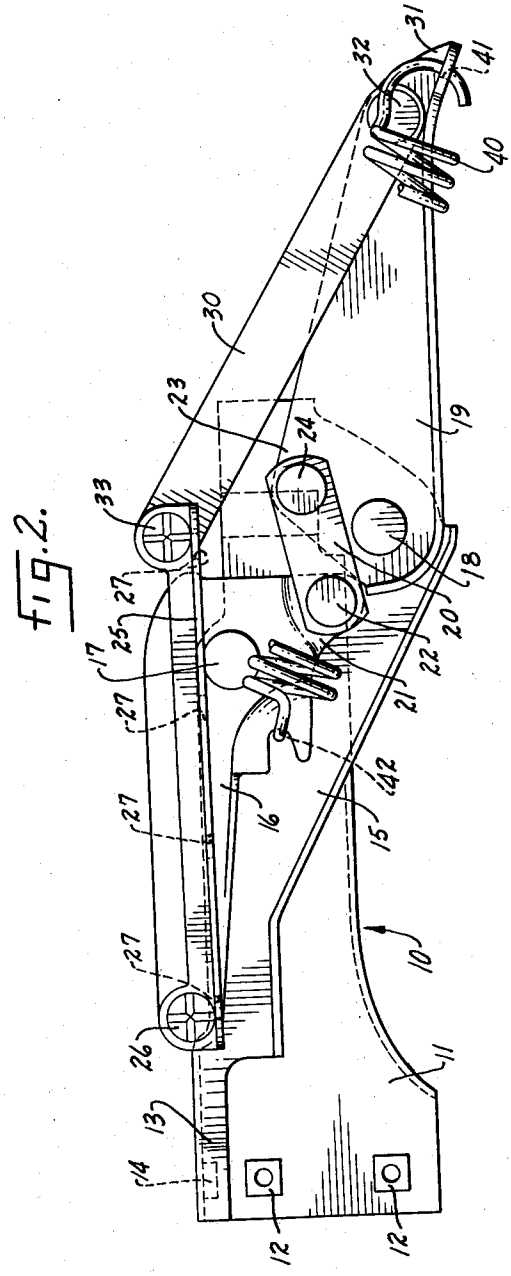


Fig. 2.

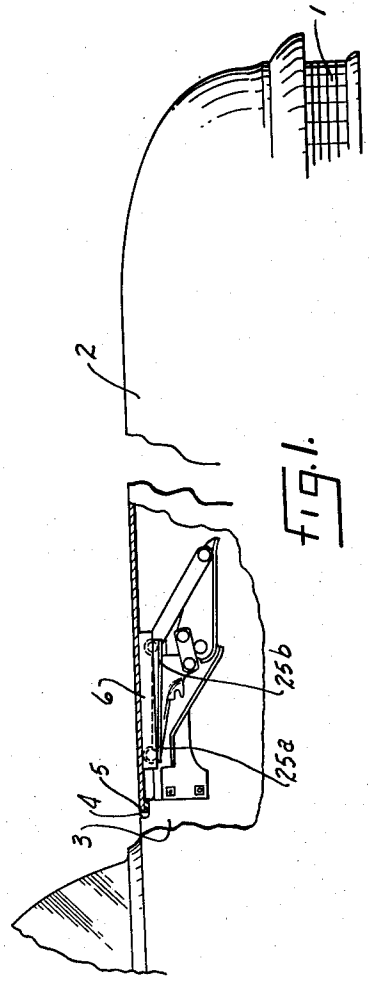


Fig. 1.

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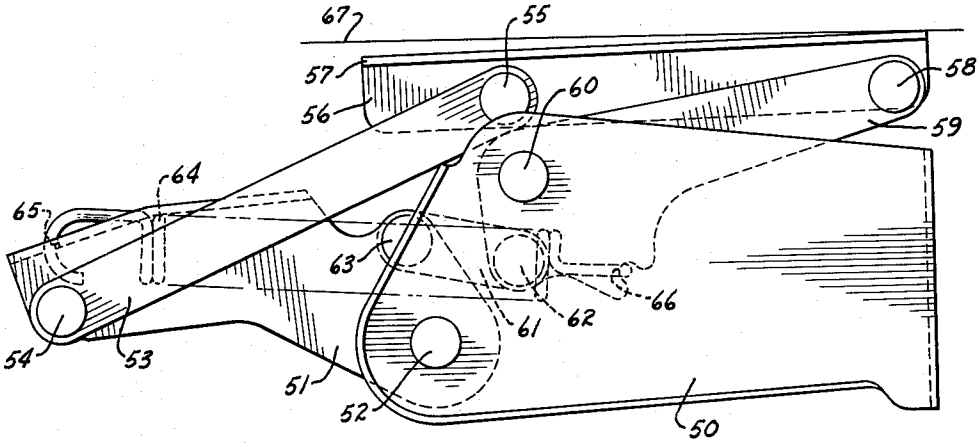


Fig. 3.

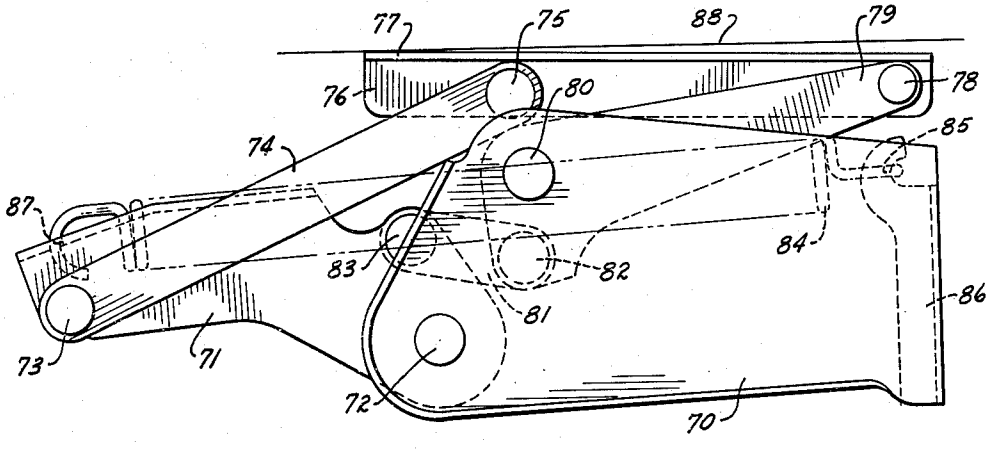


Fig. 4.

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3,059,328

METHOD OF INSTALLING HINGE

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6 Claims. (Cl. 29—404)

This invention relates to hinges and particularly to hinges employed in connection with automobile hoods or hood covers.

The hood covers of modern automobiles are designed for close-fitting streamlined appearance. A problem is created in relation to the rear edge of such hood covers in that the cover, when raised, may tend to bind along its rear edge against the cowl running transversely of the hood compartment. Accordingly a number of hinge structures have been devised to produce a simultaneous forward and upward movement of the hood cover when it is raised in order to cause the rear edge of the hood cover to move away from the opposed edge of the cowl as the hood cover is initially raised. The hinges so devised normally involve a plurality of arm members and links pivoted with relation to a mounting plate and with relation to each other and the many rivets or pivot pins necessarily employed, extend through apertures in the links or arms or straps of the hinge.

Manufacturing processes and the need for insuring freedom of movement of the hinge result invariably in a small amount of play about each of the pivot points of such a hinge. When, as is desired, the opposed edges of the hood cover and the cowl are maintained absolutely as close as possible with the hood cover in closed position, it is possible, as a result of such play, to cause contact, and therefore potential injury, of the hood cover edge with the opposed cowl edge when the hood cover is raised. It is accordingly one purpose of the present invention to provide a method of installing a hinge effective to preclude such binding or contact of the opposed edges of the hood cover and cowl.

Another purpose is to provide a hinge installing method effective to permit a very close proximity of the cowl and opposed cover rear edge and effective to permit a very close proximity of a cover edge to an opposed portion of the body to which the cover is hinged.

Another purpose is to provide a hinge installing method effective to permit realization of the maximum advantages in the use of the multi-armed hinge structures described.

Another purpose is to provide a hinge installing method therefor effective to cause immediate operation of the hinge structure in response to the initial movement of one of the hinged elements away from the other.

Another purpose is to provide a hinge installing method therefor effective to preclude the necessity for taking up play in the hinged elements as a hinged member is initially moved.

Other purposes will appear from time to time during the course of the specification and claims.

I illustrate my invention more or less diagrammatically in the accompanying drawings wherein:

FIGURE 1 is a side view with parts broken away and illustrating the hinge of my invention at one stage in the course of its installation;

FIGURE 2 is the side elevation, on an enlarged scale, and illustrating the hinge of my invention;

FIGURE 3 is an enlarged showing of the installing method of my invention illustrated on a similar scale in FIGURE 1; and

FIGURE 4 is a view similar to that of FIGURE 3 and illustrating an alternate employment of the method of my invention.

Like parts are indicated by like numerals throughout the specification and drawings.

The present application is a continuation-in-part of my application Serial No. 701,640, filed December 9, 1957, and entitled "Hinge and Method of Installing Same", now abandoned.

Referring now to the drawings and particularly to FIGURE 1 thereof, the numeral **1** generally indicates the hood of an automobile. A hood cover is indicated generally by the numeral **2**. A cowl **3** has an upper edge surface **4** opposed to a rear edge surface **5** of the hood cover **2**. A hinge-receiving or attaching plate or bracket **6** is secured to an under surface of the hood cover adjacent the rear edge **5**.

Referring now to FIGURE 2, I illustrate, for convenience, the hinge structure of my invention on an enlarged scale. While one such structure is shown, it will be realized that two are normally employed. A hinge mounting plate **10** is formed for attachment to a part of the cowl **3** beneath the hood cover **2**. While the plate **10** is illustrated as comprising a vertically mounted portion **11** attachable, for example, by the attaching means illustrated diagrammatically at **12**, an upper attaching surface **13** with its similar attaching element **14** and a spaced vertical portion **15** to which the hinge structure is pivotally attached as below described, it will be realized that any suitable mounting plate constructed to support the hinge structure on the cowl **3** may be employed without departing from the nature and scope of my invention.

A lever of the first order, indicated at **16**, is pivotally attached to the plate **10** as at **17**. Pivotally attached to the plate **10** at a point spaced forwardly and beneath the pivot **17**, as indicated at **18**, is a lever **19** of the second order. A link **20** is pivotally secured to an end **21** of the lever **16**, as indicated at **22** and to an intermediate edge surface **23** of the lever **19** as indicated at **24**. A cover-receiving or attaching plate or bracket is indicated at **25** and is pivotally connected to a rear end of lever **16** as indicated at **26**. Plate **25** has a plurality of apertures **27** arranged for reception of connector elements effective to secure the plate **25** to the plate or bracket **6** on the hood cover **2**. An arm **30** is pivotally secured at one of its ends to a forward portion **31** of lever **19** as at **32** and is pivotally secured at its opposite end to the forward edge of the plate **25** as at **33**. A coil spring **40** is secured as at **41** to the forward portion **31** of lever **19** and is secured at its rear end, as at **42** to the lever **16**.

It will be observed, from a view of FIGURE 2, that, with the hinge in closed position, an angular relationship of minimum degree exists between arm **16**, link **20**, arm **19** and spring **40**.

Referring now again to FIGURE 1, it will be observed that a rear portion **25***a* of plate **25** is in contact with the opposed rear portion of hood cover bracket **6**. The forward portion **25***b* of plate **25** is, as illustrated in FIGURE 1, downwardly spaced from the opposed forward segment or portion of plate **6**. It will be further observed that the hood cover **2** is in its fully closed and snug position. While, for illustrative purposes, the space between the opposed forward portions of plates **6** and **25** as illustrated in FIGURE 1 appears to be substantial, in relation to the remaining portions of the drawing, it will be realized that such spacing is proportionally the amount of play to be taken up about the seven pivot points illustrated and described above. A spacing, for example, of approximately .090" has been found to be adequate in most instances.

In FIGURE 3 I illustrate on a larger scale and in simplified form a structure and method of my invention relating thereto. A mounting plate **50** pivotally supports a lever **51**, at one end thereof, as indicated at **52**. A second lever **53** is pivotally supported at the opposite end

of lever 51 and at one end of lever 53 as at 54. The opposite end of lever 53 is pivotally connected adjacent one end of a mounting bracket 56 as indicated at 55. The member 56 has an angularly disposed attaching portion 57. Adjacent the opposite end of member 56, as at 58, a third lever 59 is pivotally connected. The lever 59 is pivotally supported on plate 50 adjacent the opposite end of lever 59 as at 60. A link 61 has its opposite ends pivotally connected to one end of lever 59 as at 62 and to an intermediate point on lever 51 as at 63. A coil spring 64 has its opposite ends connected to lever 51 and lever 59 as at 65, 66 respectively. The mounting surface 57 of the hinge element 56 is shown as opposed to and angularly disposed in relation to a line 67 diagrammatically illustrating the mounting surface of the hood cover to be hinged.

The spring 64 in the closed position lying between pivot points 52 and 60, but closer to 52, tends to impart clockwise motion to levers 59 and 51, but to a greater extent to lever 59, because of the greater moment of the anchor point 66 about pivot 60 in the closed position. When the system is in motion, as by raising the hood closure, link 60 is effective to restrict members 51 and 59 to cooperative angular relationship. As the hood closure continues to open, spring 64 exerts ever greater clockwise force on member 51, due to increasing moment of point 65 about axis 52, to overcome the ever diminishing clockwise force of member 59, due to decreasing moment of point 66 about axis 60, the latter clockwise force becoming counterclockwise as spring 64 passes over point 60 when the hood closure, urged upward, is counterpoised to remain in open position.

The working of the structure of FIG. 4 is different from that of FIGURE 3 in that there is an immediate urge to the open state after the initial unlatching of the hood closure. This, of course, is due to the rear anchorage of spring 84 to a point 85 on a fixed, rather than movable, member of the structure.

The action of the hinge structures disclosed herein produces simultaneous upward and forward motion of all points of the hood closure in substantially rectilinear paths. The paths of the rear-most points are forward and up, away from contact with the cowl. Successive points taken forwardly along the length of the hood describe progressively steeper paths, those in front rising more or less vertically.

Referring now to FIGURE 4, a mounting plate 70 pivotally supports a first lever 71, adjacent one end thereof, as at 72. The opposite end of lever 71 is pivotally connected to one end of lever 74, as at 73. The opposite end of lever 74 is pivotally connected adjacent one end of and to a mounting bracket 76 as at 75. Bracket 76 has a laterally disposed mounting surface 77. At the opposite end of bracket 76 a lever 79 has one of its ends pivotally connected as at 78. Lever 79 is pivotally connected to plate 70 adjacent the opposite end of lever 79 as at 80. A link 81 has its opposite ends pivotally connected to lever 79 as at 82 and to lever 71 as at 83, in the manner above described. A coil spring 84 has one of its ends secured to the forward portion of lever 71 as at 87 and its opposite end secured to the mounting plate 70 through the medium of a bracket portion 86 thereof as indicated at 85.

It will be observed that spring 84, with the hinge is in closed position as in FIGURE 4, lies above pivot point 82 and overlies, in part, pivot point 83 and that spring 84 is secured to plate 70 at a point above pivot points 82, 83, 72 and 73 and in substantial alinement with pivot point 80. Thus, the spring 84, as the parts are shown in the drawing, tends to urge lever 71 in a clockwise direction and thus to urge the hinge structure of FIGURE 4 toward open position.

Whereas I have described and claimed a practical and operative device and method steps, nevertheless, many changes may be made in the size, shape, number and

disposition of parts and sequence and manner of method steps without departing from the spirit of my invention. I therefore wish my description and drawings to be taken as, in a broad sense, illustrative or diagrammatic, rather than as limiting me to my precise showing.

The use and operation of my invention are as follows:

When the operator raises the hood cover from the forward end the pivot point 33 is raised causing movement of the lever 30 and through the lever 30 a rotation of lever 19 in a counterclockwise direction which in turn, through the medium of the connector link 20, causes rotation in a clockwise direction of lever 16 and a consequent forward and upward movement of pivot point 26. For an illustrated showing, by way of example, of this action, as well as a description thereof, attention is invited to pending application Serial No. 627,077, filed December 7, 1956, now U.S. Patent No. 2,956,303, issued October 18, 1960.

Referring now particularly to FIGURE 1, the installing method of my invention may involve the placement of the hood cover 2 in its fully closed position. The plate 10 is then mounted upon the cowl 3. It will be observed that the rear edge of the plate 25 is in contact with the opposed rear portion of plate 6 on hood cover 2. The plate 25 lies in a plane diverging from the opposed plane of the plate 6 so as to cause a separation throughout substantially the entire length of the plate 25 extending from the contacting portions of plates 6 and 25 to the forward edges thereof. I find a spacing of approximately .090" at the forward edge of the plate 25 between it and the opposed portion of plate 6 to be normally sufficient to take up the play about the pivot points of the hinge structure. With the hood cover in closed position the plate 25 is then joined to the plate 6, beginning at the rear portions thereof and securing any suitable attaching elements, for example, through the apertures 27 in the plate 25 as illustrated in FIGURE 1.

As the plate 25 is progressively attached to the plate 6 from its rear to its forward edge, it will be realized that the hinge structure of my invention will be moved partially toward its hood opening position and this movement will be sufficient to remove any play about the pivot points of the hinge structure in relation to its movement toward hood-open position.

Consequently, when an operator thereafter opens the hood by raising the hood cover 2 from the forward, or right hand portion of FIGURE 1 as the parts are illustrated in the drawings, it will be realized that the hinge structure of my invention is, at the moment, already partially along its way toward hood-opening position. The action of the levers or arms 30, 19, 20 and 16 is therefore immediate and is immediately effective to move the rear edge 5 of the hood cover 2 upwardly and forwardly away from the opposed edge 4 of the cowl 3. Thus, no movement of the hood cover 2 toward its open position is permitted without a corresponding effective action of the hinge of my invention. Since the hinge of my invention is connected in the manner described to the hood cover 2, with the cover 2 in its fully closed position it will be further realized that the hinge of my invention is thus precluded from ever moving to what might be termed its fully inactive or loose position and is maintained at all times out of what could be called a fully hinged-closed position.

It will be realized that, in constructing the hinge of the invention, the mounting or support plate 10 may be considered as arranged for attachment consistently in a horizontal plane or in a plane paralleling the cover 2, in which event the forward lever or arm 30 may be dimensioned to cause cover-attaching plate 25 to lie in a plane inclined downwardly from its rear to forward edge in relation to the horizontal or cover-paralleling plane of plate 10 when the hinge is in its unattached, fully closed position. Alternatively, the hinge may be constructed with plates 10 and 25 substantially parallel and reliance

may be placed upon attachment of plate **10** in a similarly inclined plane to place plate **25** in the same inclined plane with respect to cover **2**.

I claim:

1. The method of installing a hinge comprising a plurality of pivoted elements including a cover-attaching plate in an automobile hood structure comprising a hood and a cover therefor having a hinge-attaching plate, which includes the steps of positioning said hood cover on said hood in fully-closed position, mounting said hinge on said hood in such position as to cause opposed surfaces of said cover-attaching and hinge-attaching plates adjacent the rearmost edge of said cover to abut one against the other at their rear edges and to cause said plates to lie in planes diverging one from the other forwardly from said point of contact, attaching said hinge to said hood in said position while maintaining said hood in said closed position and thereafter securing said cover-attaching plate to said hinge-attaching plate progressively forwardly from said point of contact while maintaining said hood in closed position.

2. The method of installing a hinge comprising a plurality of pivoted levers and including a cover-attaching plate in an automobile hood structure comprising a hood and a cover therefor, which includes the steps of positioning said hinge to cause contact of one edge of said cover-attaching plate with said cover adjacent the opposed edge of said hood and to cause a gap between the opposite edge of said plate and the opposed portion of said cover, securing said hinge to said hood and thereafter progressively attaching said cover-attaching plate to said cover from one to the other edge of said plate to close said gap.

3. The method of mounting an articulated hinge in a body and cover therefor, which includes the step of positioning said cover in closed position on said body, attaching said hinge to said body, moving said hinge structure toward cover-opening position a distance sufficient to take up all play in said hinge structure, while maintaining said cover in closed position and thereafter attaching said hinge while maintaining said hinge in said last-named position, to said cover.

4. The method of mounting an articulated hinge in a structure comprising a body member and a cover member therefor, which includes the steps of positioning said cover member in closed position on said body member, attaching said hinge structure to one of said members, moving said hinge structure toward cover member opening position a distance sufficient to absorb all play between articulated members of said hinge and thereafter securing said hinge to the other said members while maintaining said cover member in closed position on said body member.

5. The method of mounting a hinge in a structure comprising a body member and a cover member therefor which includes the steps of positioning said cover member in closed position on said body member, attaching said hinge structure to one of said members, moving said hinge member a predetermined distance toward cover-open position and thereafter attaching said hinge to the other of said members while maintaining said cover member in closed position on said body member.

6. The method of installing a hinged mechanism comprising a support plate and an attaching bracket pivotally secured to said support plate by a plurality of pivoted arm members, which comprises the steps of securing the support plate to one of the elements to be hinged, positioning the attaching bracket in relation to the other of the elements to be hinged in such manner as to cause contact of one edge of said bracket with said other element and to space the opposite edge of said bracket from said other element and thereafter progressively attaching said bracket to said other element from said one edge to said opposite edge.

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