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MEANS FOR CONNECTING WINDSHIELD WIPER UNITS TO ARM UNITS

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Fig.-1

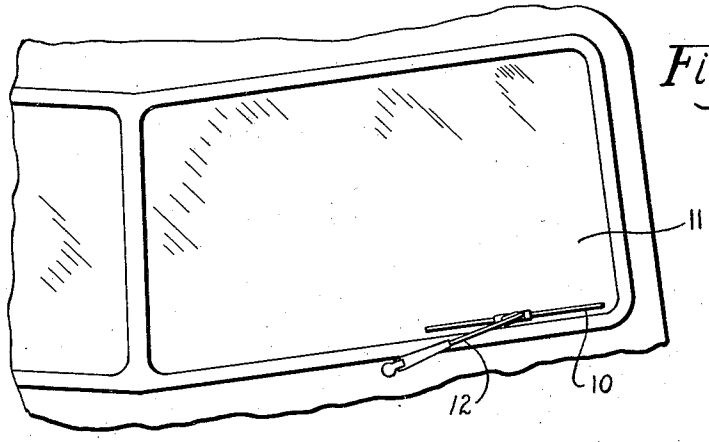


Fig.-2

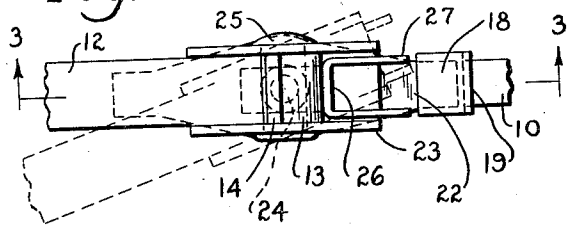


Fig.-4

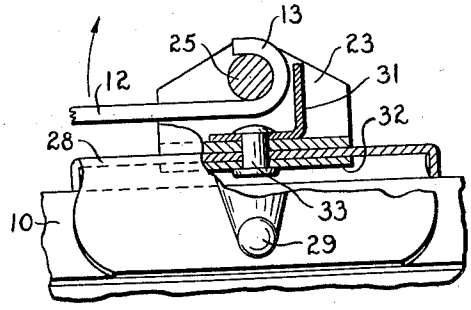
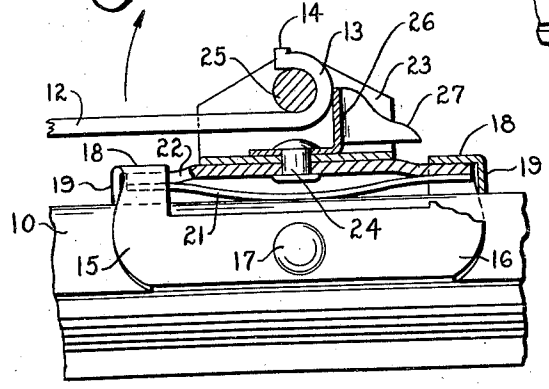


Fig.-3.



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MEANS FOR CONNECTING WINDSHIELD WIPER UNITS TO ARM UNITS

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28 Claims. (Cl. 15—250)

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My invention relates to windshield wiper blade and arm assemblies and more particularly to cooperative apparatus interconnecting the wiper arm and the wiper blade.

This application is a continuation of my application, Serial No. 474,499, filed February 3, 1943, the subject matter of the earlier application having been transferred to the present application. Other types or forms of connectors or clips are disclosed and claimed in my copending applications, Serial No. 492,252, filed June 25, 1943, for Windshield wiper arm and blade connectors; Serial No. 523,445, filed February 22, 1944, for Windshield wiper blade connectors; Serial No. 530,628 filed April 12, 1944 for Automatic blade clips; and in the application of John W. Anderson, Serial No. 673,098 filed May 29, 1946 for Connection means between operating and operated units, owned by my assignee.

It is an object of my invention to provide an apparatus interconnecting the arm and the blade which will permit the blade to be readily disposed laterally at any one of a plurality of angles with relation to the arm so that the blade may be positioned to park upon any desired line of contact relative to the frame of a windshield.

Another object of my invention is to provide a simple, convenient and secure connection between the arm and the blade which will prevent accidental loss of the blade from the arm through the action of severe air currents, or through lifting the blade from the windshield for manual cleaning of the windshield.

Another object of my invention is to provide an improved, simple and inexpensive form of wiper arm which will securely engage cooperative apparatus mounted on the blade so that a minimum of wear, distortion and noise will occur in operation.

Still another object of my invention is to provide an improved means for locking the arm and the blade into cooperative relationship against accidental disassembly so that special manipulation will be required to unlock or to disengage the blade from the arm.

Still another object of my invention is to provide an improved interconnecting means for an arm and a blade by which the movement of the blade with relation to the arm may be a free movement controlled by concentric members of the arm and the blade respectively.

A further object of my invention is to provide between the arm and the blade a bearing by which the pressure applied by the arm to the blade will be free from any irregularities tending

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to prevent a uniform or proportional application of pressure by the wiping edge of the wiper blade to the glass of a windshield.

Other objects and advantages will hereinafter appear.

In the drawing forming part of this specification

Figure 1 is a fragmentary view in front elevation showing a practical and advantageous embodiment of the invention in which a wiper blade and a wiper arm are connected to one another in a preselected angular relationship;

Figure 2 is a fragmentary view in front elevation on a larger scale than Figure 1 showing portions of the wiper blade and wiper arm of Figure 1 and the connecting means therebetween;

Figure 3 is a fragmentary view partly in section, the section being taken along the line 3—3 of Figure 2 looking in the direction of the arrows; and

Figure 4 is a view similar to Figure 3 illustrating another embodiment of my invention.

In the present design of automobiles the windshield is generally formed of two portions set at angles to each other and at an angle to the vertical. Each section is provided with a windshield wiper arm and blade which, during the non-operating condition of the windshield wiper, is parked so that the wiper blade is aligned with one of the edges of the windshield.

Whereas in the past windshield wiper arms have been bent so as to align the blade with the windshield frame, it has been found desirable to avoid such bending of the arm as frequently this introduces an increased twisting or torsional action which impairs proper operation of the windshield wiper blade.

In accordance with my invention a portion of an automobile windshield 11 is provided with a wiper arm 12 and a wiper blade 10 as seen in Figure 2. The wiper arm 12 generally constitutes a multi-section arm having an inner section attached to an actuating stud or shaft of a windshield wiper mechanism, and this section in turn supports one or more sections which are pivotally mounted upon it and spring biased so as to be urged in a direction toward the windshield.

In accordance with the present invention the arm 12 is not bent but there is provided an interconnecting apparatus between the free end of the wiper arm and the wiper blade which permits the wiper blade to be positioned in any one of a plurality of angles relative to the arm so that the blade may be aligned when in parked position with one edge of the windshield frame.

An apparatus of this type is shown in Figures 2 and 3 wherein the free end of the wiper arm 12 or a part or portion connected thereto is provided with a blade connector engaging or male portion 13 which is concentric to a shaft member or bridge means 25, carried by the blade 10. Obviously, the blade engaging portions 13 may be integral with the arm as illustrated or may be a separate part or portion connected to the arm. At the free end of this arm portion 13 there is provided an offset portion 14 which is arranged to engage a locking member on the connector carried by the blade 10 so as to prevent accidental disassembly of the wiper blade from the wiper arm.

The wiper blade 10 is provided with a cooperative apparatus having an attachment clip 15 provided with depending sides 16 which engage the frame of the blade 10 and which may be secured thereto by suitable fastening means such as a rivet 17. The attachment clip 16 is provided at each end with a bight portion 18, the ends of which may be closed by the downwardly turned portions 19. The bight portions 18 are spaced apart from the top of the frame of the blade 13, and within these bight portions are positioned the ends of resilient or yieldable means preferably in the form of a bowed resilient leaf spring member 21, and the end portions of a supporting member 22. A channeled or U-shaped member 23 is frictionally and pivotally secured to the supporting member 22 by suitable fastening means such as rivet 24. Between the channel sides or spaced walls of the member 23 there is affixed shaft or bridge means 25 which is adapted to be engaged by the curved portion 13 provided adjacent the free extremity of the arm 12.

The fastening means 24 also holds in position resilient or yieldable holding means preferably in the form of a locking spring 26 which is provided with an upright shoulder adapted to engage the up-struck portion 14 adjacent the curved male entering portion 13 of the wiper arm 12. The relation of the parts including the spacing between the bridge means and the spring 26 presents a curving passageway for the curved entering or male part provided adjacent the outer end or extremity of the arm. The arrangement is preferably such that the entering part provided adjacent the outer extremity of the arm will automatically move the resilient means or spring 26 to one side in order that the entering part may more or less be snapped into position. More specifically in this respect, it is not necessary to first manually move the resilient means to one side prior to inserting the entering part into the opening formed by the bridge means and the resilient means. The spring member 26 is furthermore provided with a thumb portion 27 which may be depressed so as to move the upright portion of the spring 26, as seen in Figure 3, away from the curved portion 13 of the arm 12 so as to permit the offset portion or irregularity 14 to pass by the spring locking member 26 when the blade is to be removed from the arm.

For the purposes of simplicity in disclosure Figures 2 and 3 have shown the wiper blade in alignment with the longitudinal axis of the wiper arm, but the wiper blade 10 may be positioned at an angle relative to the arm 12 as is shown in dotted lines in Figure 2. The fastening means 24 between the support member 22 and the channel portion 23 provides a pivotal engagement between these members so that they may be adjusted relative to each other, and the frictional

engagement therebetween is sufficient to maintain the blade in the adjusted position throughout the operation of the windshield wiper arm. By providing the bridge means 25 between the channel portions of the member 23 and by forming the entering part adjacent the free extremity of the arm 12 so as to be concentric with respect to the member 25 there is provided a hinged or transversely pivoted connection between the wiper blade and the arm so that pressure exerted by the arm is readily transmitted to the wiper blade so as to provide throughout its length substantially proportional or uniform pressure between the wiping element thereof and the surface of the windshield. It furthermore will be noted that the free end of the arm 12 is formed of a strip of flat material, which may be of spring stock, and which has a width substantially equal to the distance between the sides of the channel shaped member 23. The sides of the channel 23 therefore engage a substantial portion of the sides of the free end portion 13 of the arm 12 so that substantial side play is prevented between the member 25 and the portion 13 of the wiper arm to prevent or minimize wear and noise in operation which would result from side play. The fact that the portion 13 has extensive bearing engagement with the member 25 and extensive lateral engagement with the ears 23 assures a sturdy, stable connection free from liability of distortion in use.

In order to remove the wiper blade it is necessary to depress the portion 27 of the spring 26 so as to move the shoulder thereof away from the curved portion 13 sufficiently to permit the offset portion 14 thereof to be passed by the spring member 26. The blade is rotated about the pivotal connection 25 until it is substantially inverted with respect to the arm whereupon a longitudinal motion will disengage the cylindrical member 25 from the curved portion 13 of the wiper arm 12. The spring 26 of the attachment apparatus not only serves as a lock to prevent accidental disengagement of the wiper blade from the arm but also normally serves as a stop to prevent longitudinal movement between the wiper blade and the arm.

By providing a clip such as the member 15 with bight portions 18 wherein there are positioned the ends of the support member 22 and the resilient spring 21, the wiper blade is permitted to flop through an angle at the end of each wiping stroke of the wiper mechanism. This action in certain types of wiper blades is desirable in order to provide a proper angle between the wiping element and the surface to be wiped so as to obtain the greatest wiping efficiency.

In Figure 4 there is shown a further embodiment of the present invention. Parts which are common to this embodiment and the embodiment of Figures 2 and 3 have been given the same reference characters. The blade 10 is provided with an attachment clip 28 which may be secured to the frame of the wiper blade by suitable fastening means such as a rivet 29. A U-shaped or channel-shaped member 23 forms part of an assembly which comprises a retaining spring or member 31, a resilient spring 32, and suitable fastening means such as a rivet 33. The resilient spring member 32 is positioned underneath or within the clip member 28 so as to provide the desired tension between the clip 28 and the channel member 23 whereby the desired degree of friction is obtained to retain these members in desired angular adjustment. The rivet 33 which passes through the spring 32, the clip 28, the

bottom of the channel member 23, and the spring stop 31 serves as a pivot between the upper part of the attachment means and the clip portion. The free end of the wiper arm 12 is provided with a curved portion 13, but the offset portion 14 found in the previous figures is not provided in this embodiment. Neither is there any means included for withdrawing the spring stop 31 away from the curved portion 13. The embodiment shown in this Figure 4 has been found to be satisfactory and of advantage where simplicity and economy of manufacture are important factors.

While for the purposes of illustrating and describing my invention certain specific embodiments have been shown, it is to be understood that modifications may be made therein without departing from the spirit and scope of my invention as set forth in the appended claims.

I claim:

1. In a windshield wiper blade unit which includes a rigid blade frame, the novel wiper arm connector mechanism comprising, in combination, a first member permanently secured in fixed angular relation to the blade frame with respect to a fore and aft axis, a second member constructed and arranged for effecting a quickly detachable but normally locked connection with a wiper arm in fixed angular relation to the wiper arm with respect to a fore and aft axis, and means carried by the first member and permanently connecting said members to one another with capacity for relative angular adjustment and defining a fore and aft axis of adjustment substantially midway of the length of the wiper blade, including means for causing said members to be firmly held by friction in different relatively adjusted positions.

2. In a windshield wiper blade unit which includes a rigid blade frame, the novel wiper arm connector mechanism comprising, in combination, a cage clip rigidly affixed to the blade frame, a plate having its ends trapped in said clip, a leaf spring bearing at its ends against the plate and intermediate its ends against the blade frame, a stirrup-like hanger including a cross connector, adapted to embrace a wiper arm and to interfit therewith, said plate and hanger including extensive frictional surfaces directly engaged with one another and a rivet passed through the plate and hanger members to secure them to one another and to define a fore and aft axis of relative adjustment therefor, said rivet clamping said engaged frictional surfaces firmly together to cause relative movement of the plate and hanger about the defined fore and aft axis to be strongly opposed by friction.

3. In a windshield wiper including arm and blade members, in combination, mutually engageable arm and blade carried parts constructed and arranged to effect a quick detachable connection between the arm and blade, including means forming a pivot for the blade whose axis extends transversely and is located substantially midway of the length of the blade to provide for pressure equalizing rocking of the blade, a support for said blade carried part secured to the blade in fixed angular relation thereto with respect to a fore and aft axis, and means connecting said blade carried part and said support to one another with capacity for relative angular adjustment and defining a fore and aft axis of adjustment substantially midway of the length of the wiper blade, said connecting means clamping said blade carried part and support together and causing them to be firmly held by friction in different relatively adjusted positions.

4. In a windshield wiper, in combination, an arm carried part, a member pivotally connected thereto for movement about one axis, a blade carried part, said member being pivotally connected thereto for movement about another axis, the axes of said pivots extending substantially in a common plane and intersecting substantially at right angles to one another, the one axis in a fore and aft direction and the other in a transverse direction, and means for frictionally opposing relative pivotal movement about the fore and aft axis of said member and the part to which it is connected with capacity for relative pivotal movement about such fore and aft axis.

5. In a windshield wiper including arm and blade members, in combination, a wiper arm section having an outwardly extending body portion which includes an outer end portion turned forwardly and thence inwardly into parallel relation with the body portion to form an open sided bearing whose open side is faced inward, and a blade carried connector apparatus cooperative with said arm section comprising a stirrup-like hanger which includes side walls for embracing the arm section, and a cylindrical cross pin having a diameter equal substantially to the spacing between the body portion of the arm section and the inwardly turned end portion thereof, and an abutment member affixed to the hanger and extending at the outer side of the cross pin at a distance therefrom corresponding substantially to the thickness of the end portion of the wiper arm section for engagement with said end portion to prevent relative movement of the blade and arm longitudinally of the arm, the construction and arrangement being such that the arm and blade are connected for relative rocking movement about a definitely determined and fixed transverse axis, the inwardly turned end portion of the arm section being formed at the inner extremity thereof with a forward projection which defines an outwardly facing shoulder for obstructing detachment of the blade member by engagement with the abutment, the abutment being formed of resilient material and including an operating handle portion through which it may be deformed to clear the shoulder.

6. In a windshield wiper blade unit which includes a rigid blade frame, the novel wiper arm connector mechanism comprising, in combination, a first member secured to the blade frame in fixed angular relation with respect to a fore and aft axis, a second member carried by the first and adapted for separable attachment to a wiper arm in fixed angular relation thereto with respect to a fore and aft axis, said members being relatively adjustable about a fore and aft axis, and means forming part of said wiper blade unit and securing said members against accidental disarrangement in different positions of relative angular adjustment.

7. In a windshield wiper blade unit, a wiper blade connector assembly comprising a first member which includes a base and means for effecting separable attachment of said member to a windshield wiper arm in fixed angular relation to the arm with respect to a fore and aft axis, a second member including a plate permanently connected to the blade in substantially fixed angular relation to the blade with respect to a fore and aft axis, and means forming part of said wiper blade unit for holding said base to said plate in different positions of relative adjustment with respect

to a fore and aft axis, including fastening means for connecting the base to the plate and defining said fore and aft axis of relative adjustment between them.

8. In a windshield wiper blade unit, a wiper blade connector assembly comprising a blade frame, a cage clip secured to the frame, a plate trapped in the cage clip, a spring trapped with the plate in the cage clip, said cage clip holding the plate substantially against movement relative to the blade about a fore and aft axis, an attaching member including means for effecting separable attachment to a windshield wiper arm in fixed angular relation to the arm with respect to a fore and aft axis, and means forming part of said wiper blade unit for holding said attaching member to said plate in different positions of relative adjustment with respect to a fore and aft axis, including fastening means for connecting the attaching member to the plate and defining said fore and aft axis of relative adjustment between them.

9. A connecting means for connecting a wiper blade unit to a wiper arm unit provided with a bent entering part, said connecting means comprising a housing having a pair of spaced walls adapted to be supported in spaced relation to said blade unit and provided with transverse means between said walls spaced inwardly from the outer margins of said walls, yieldable means disposed in the space substantially entirely between said walls and associated with said transverse means arranged for the reception of said entering part therebetween so that portions of said part may be disposed on opposite sides of said transverse means substantially entirely within the space between said walls and whereby said yieldable means may assist to hold the part connected to said connecting means and permit said connecting means to automatically adjust itself to said part, and means passing through said yieldable means and said housing for holding said yieldable means and housing assembled.

10. A connecting means for connecting a wiper blade unit to a wiper arm unit, means for mounting said connecting means in spaced relation to one of said units, said connecting means comprising a housing having a pair of spaced walls, abutment means between said walls and spaced inwardly from the outer margins of said walls, yieldable means disposed in the space between said walls and associated with said abutment means in a manner whereby an entering part adapted to be carried by the other unit may be inserted substantially entirely into the space between said walls and between said abutment means and said yieldable means so that the latter may act to hold the part connected to said connecting means, and means extending into a part of said housing and engaging said yieldable means for holding the yieldable means and housing assembled.

11. A connecting means for connecting a wiper blade unit to a wiper arm unit, mounting means adapted to be mounted on one of said units, said connecting means comprising a housing having a pair of spaced walls and provided with abutment means in the space therebetween, yieldable means disposed in said space between said walls relative to said abutment means so that a part from the other unit may be interposed and held between said abutment means and said yieldable means and permit said connecting means to adjust itself to said part, and means extending into said housing, said mounting means, and into a portion of said yieldable means for holding the same assembled.

12. A connecting means for connecting a windshield wiper blade unit to an operating arm unit comprising a housing, means mounted on one of said units in spaced relation thereto providing a support whereby said housing may rock about the longitudinal axis of said support, said housing being provided with abutment means, and movable means disposed in said housing and mounted on said supporting means, said abutment means and said movable means being constructed and arranged whereby a part adapted to extend from the other unit may be held between said abutment means and said movable means.

13. A connecting means for connecting a wiper blade unit to an operating arm unit, means for mounting said connecting means in spaced relation to one of said units, said connecting means being provided with internal abutment means, yieldable means for urging in a direction toward said abutment means a part adapted to be inserted from the other unit into the connecting means for retarding accidental separation of said connecting means from such a part, and means associated with said connecting means, said yieldable means, and said mounting means for holding the same assembled.

14. A blade and connector unit for windshield wipers comprising, in combination, a wiper arm engaging member adapted for connection to a wiper arm with capacity for pivotal movement about a transverse axis, a plate carried by said wiper arm engaging member, means securing the plate thereto with firm frictional pressure but with capacity for swivel adjustment, a wiper blade frame, a clip rigidly united with the wiper blade frame and including a cage portion in which the plate is trapped and with which the blade frame is engageable at a series of points distributed longitudinally and laterally over an extensive area, and a bowed spring positioned within said cage portion and engaged at its ends with end portions of said plate and intermediate its ends with said blade frame whereby a floating connection is had between the clip and the plate.

15. A connecting means for connecting a wiper blade unit to a wiper arm unit provided with a bent entering part, said connecting means comprising a housing having a pair of spaced walls adapted to be supported in spaced relation to said blade unit and provided with transverse means between said walls spaced inwardly from the outer margins of said walls, yieldable means disposed in the space substantially entirely between said walls and associated with said transverse means arranged for the reception of said entering part therebetween so that portions of said part may be disposed on opposite sides of said transverse means substantially entirely within the space between said walls and whereby said yieldably means may assist to hold the part connected to said connecting means and permit said connecting means to automatically adjust itself to said part, and means passing through said yieldable means and said housing for holding said yieldable means and housing assembled, said passing through means being so constructed and arranged that the housing may be adjusted to any desirable rotative position in a plane substantially transverse to the longitudinal axis of said passing through means.

16. A connecting means for connecting a wiper blade unit to a wiper arm unit, means for mounting said connecting means in spaced relation to

one of said units, said connecting means comprising a housing having a pair of spaced walls, abutment means between said walls and spaced inwardly from the outer margins of said walls, yieldable means disposed in the space between said walls and associated with said abutment means in a manner whereby an entering part adapted to be carried by the other unit may be inserted substantially entirely into the space between said walls and between said abutment means and said yieldable means so that the latter may act to hold the part connected to said connecting means, and means extending into a part of said housing and engaging said yieldable means for holding the yieldable means and housing assembled, said extending means being so constructed and arranged that the housing may be adjusted to any desirable rotative position in a plane substantially transverse to the longitudinal axis of said extending means.

17. A connecting means for connecting a wiper blade unit to a wiper arm unit, mounting means adapted to be mounted on one of said units, said connecting means comprising a housing having a pair of spaced walls and provided with abutment means in the space therebetween, yieldable means disposed in said space between said walls relative to said abutment means so that a part from the other unit may be interposed and held between said abutment means and said yieldable means and permit said connecting means to adjust itself to said part, and means extending into said housing, said mounting means, and into a portion of said yieldable means for holding the same assembled, said extending means being so constructed and arranged that the housing may be adjusted to any desirable position in a plane substantially transverse to the longitudinal axis of said extending means.

18. A connecting means for connecting a windshield wiper blade unit to an operating arm unit comprising a housing, means mounted on one of said units in spaced relation thereto providing a support whereby said housing may rock about the longitudinal axis of said support and also pivot about an axis substantially transverse to said longitudinal axis, said housing being provided with abutment means, and movable means disposed in said housing and mounted on said supporting means, said abutment means and said movable means being constructed and arranged whereby a part adapted to extend from the other unit may be held between said abutment means and said movable means.

19. A connecting means for connecting a wiper blade unit to an operating arm unit, means for mounting said connecting means in spaced relation to one of said units, said connecting means being provided with internal abutment means, yieldable means for urging in a direction toward said abutment means a part adapted to be inserted from the other unit into the connecting means for retarding accidental separation of said connecting means from such a part, and means associated with said connecting means, said yieldable means, and said mounting means for holding the same assembled, said associated means being so constructed and arranged that the connecting means may swivel with respect to said mounting means.

20. Connector means constructed and arranged to engage an entering part, a mounting, means providing a pivotal connection between said connector means and said mounting, and resilient means disposed on opposite sides of the axis of said pivotal connection, a portion of said resilient means being actable to assist in holding the entering part in association with the connector means when brought into engagement therewith and another portion of said resilient means constructed and arranged to cushion the pivotal movement between said connector means and said mounting.

21. Connector means carried by a support for rockable movement substantially transverse to the longitudinal axis of said support, said connector means including a housing, yieldable means having portions disposed on opposite sides of said support, and abutment means provided on said connector means, said abutment means and one of the portions of said yieldable means being constructed and arranged whereby an entering part may be inserted and held therebetween.

22. The structure defined in claim 21, in which the connector means and support are separate parts, including means for securing them together in a manner to permit the connector means to be adjusted to any desirable position within a predetermined plane relative to the support.

23. Connector means carried by a support for rockable movement substantially transverse to the longitudinal axis of said support, a mounting for said support, said connector means including a housing having a pair of spaced walls, yieldable means having portions disposed on opposite sides of said support, abutment means provided on said connector means, said abutment means and one of the portions of said yieldable means being constructed and arranged whereby an entering part may be inserted and held therebetween, and another portion of said yieldable means for cushioning the rockable movement between said connector means and said mounting.

24. The structure defined in claim 23, in which the connector means and support are separate parts, including means for securing them together in a manner to permit the connector means to be adjusted to any desirable position within a predetermined plane relative to the support.

25. Connector means carried by a support for rockable movement substantially about the longitudinal axis of the latter, said connector means including a housing having a pair of spaced apart side walls, yieldable holding means arranged between said walls and mounted on said support, and abutment means provided on said connector means, said yieldable holding means and said abutment means being constructed and arranged whereby an entering part may be engaged thereby when inserted and held therebetween.

26. The structure defined in claim 25, in which the connector means and support are separate parts, including means whereby the connector means may be adjusted to any desirable position within a predetermined plane relative to the support.

27. Connector means carried by supporting means for rockable movement substantially about the longitudinal axis of said supporting means, said connector means including a housing, abutment means provided on said housing, yieldable means mounted on said supporting means arranged substantially in said housing and having a portion operatively related to said abutment means, said portion of said yieldable means and said abutment means being constructed and arranged whereby an entering part may be engaged thereby when inserted and held therebetween.

28. The structure defined in claim 27, in which

the connector means and support are separate parts, including means whereby the connector means may be adjusted to any desirable position within a predetermined plane relative to the support.

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