

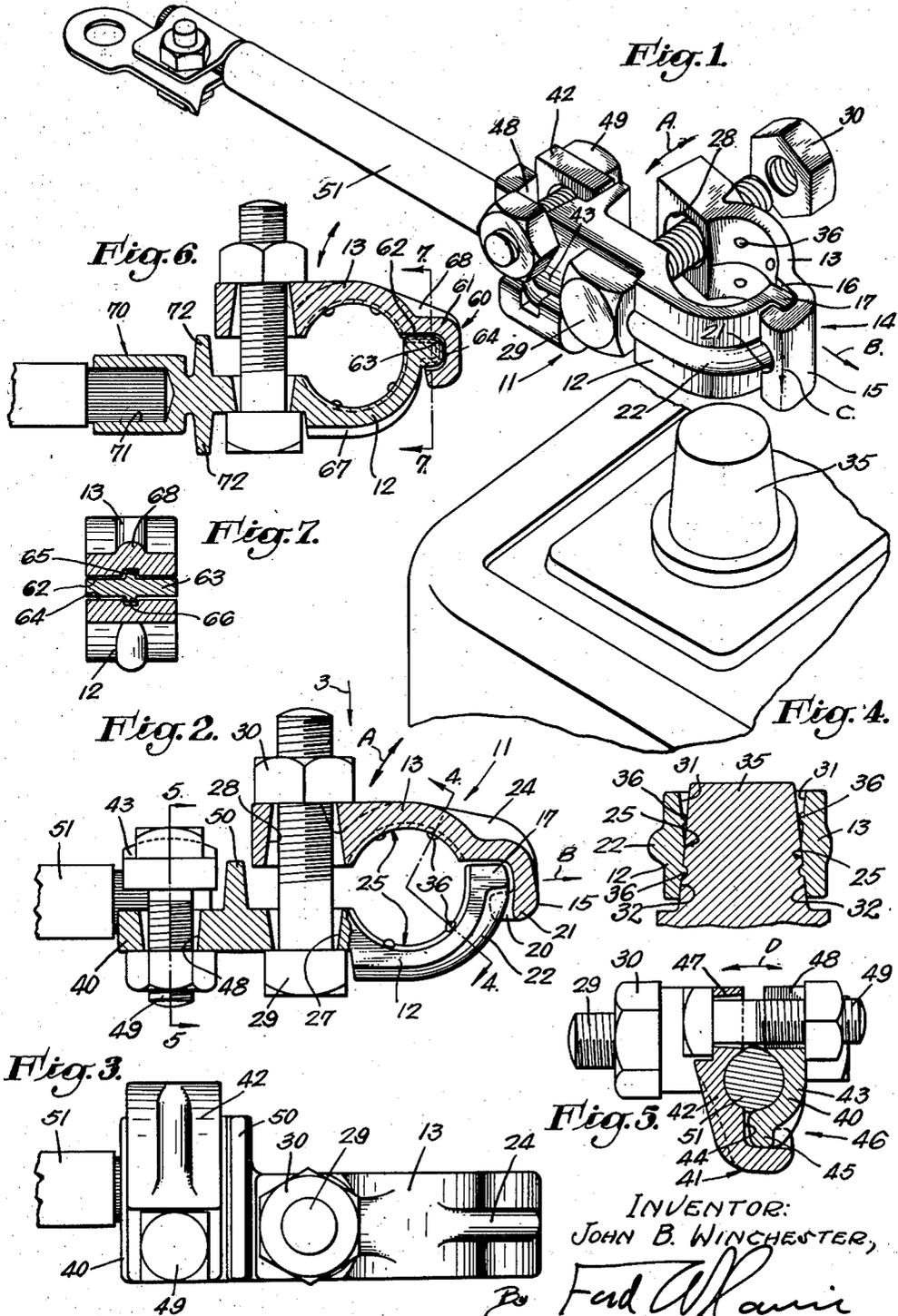
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TERMINAL CLAMP

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TERMINAL CLAMP

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The invention relates to clamps suitable for connecting electrical contacts, as, for instance, battery cables, bus bars, terminals, such as battery terminals, and the like.

5 The invention is capable of a wide range of utility as a removable clamp, and although I have chosen to illustrate the invention as comprising a terminal clamp for connecting a battery cable to the terminal of a battery, this illustrated utility should in no way limit the scope of the invention to use in this connection.

15 It should be understood that when I use the word "terminal" in the following description, I do not necessarily mean a battery terminal nor do I intend to imply any specific electrical equipment, since the clamping means embodying the features of my invention is capable of use in a structural capacity; for instance, as a connector for re-inforcing struts, guy-wires, and the like. So, also, when I hereinafter use the word "cable", I do not necessarily mean an electrical cable.

25 It is a primary object of my invention to provide a clamping means of the character described which comprises a pair of complementary clamp members hinged together in a novel manner and defining a space for receiving a body to be clamped and including means for drawing the clamping members together to effect the clamping action.

30 It is another object of my invention to provide a device of the character described in the above paragraph in which the hinge means includes means operable to permit the clamping members to be separated by a straight longitudinal movement of one member relative to the other regardless of the relative pivoted positions of the members.

35 A still further object of the invention resides in the provision of hinge means pivoting the clamping members on an axis parallel to the axis of the space for receiving a body to be clamped, the hinge means permitting the clamping members to be separated by a straight relative movement laterally with respect to the axis of the mentioned space.

40 Another object of the invention rests in the provision of a hinge means of the character described in the above paragraph which includes means for preventing relative movement of the clamping members in a direction parallel to the axis of the mentioned space.

45 It is another object of the invention to provide a hinge means for a pair of complementary clamping members, which hinge means comprises complementary tongue-and-groove elements on

the members, these tongue-and-groove elements being formed to permit a relative swinging of the clamping members.

5 It is another object of the invention to provide the hinge means comprising the complementary tongue-and-groove elements described in the above paragraph with transversely extending, interlocking portions preventing relative longitudinal movement between the tongue-and-groove elements.

10 It is another object of the invention to provide a clamping device of the character described including a pair of complementary clamping members hinged together and including means for drawing the members together for clamping purposes, and including auxiliary clamp means carried by one of the clamping members.

15 It is another object of the invention to provide a clamp means of the character described comprising a pair of hinging members providing complementary jaws having angularly disposed, upper and lower tapered engaging surfaces, the opposed upper and lower tapered surfaces being complementary to engage and substantially to conform to the contour of a tapered body positioned between the jaws.

20 Another object of the invention resides in the provision of a plurality of contact projections formed on the respective upper and lower tapered surfaces of the clamping jaws mentioned in the above paragraph, the projections on the opposed lower surfaces contacting a tapered surface in spaced relationship with the opposed upper tapered surfaces when the upper tapered surfaces engage the tapered body, and the projections on the opposed upper tapered surfaces engaging a tapered body in spaced relationship with the lower surfaces when the lower surfaces are engaging the tapered body.

25 It is another object of my invention to provide a clamp means comprising a pair of complementary clamping members hinged together for relative swinging of the members and including a bolt which extends through openings which are flared toward the inner surfaces of the members to permit the mentioned swinging action, and including a nut threaded on the bolt for drawing the clamping members together.

30 It is another object of the invention to provide a device of the character described including a pair of clamping members having one end of each member hinged together by a novel hinge means which permits the clamping members to be separated by a straight longitudinal movement of one of the clamping members relative

to the other regardless of the relative hinged positions of the members, and including a bolt extending through an inwardly flared opening in one of the members, the bolt extending through a slot formed in the other member so that the clamping members may be separated without removing the bolt from the opening.

It is another object of my invention to provide a clamp means including terminal-clamping portions and cable-connecting portions and corrosion-retarding means positioned between the terminal-clamping means and the cable-connecting means for retarding the progressive formation of corrosion toward the cable-connecting means.

These and other objects as well as several important features of the invention will be more apparent from a perusal of the following part of the specification in connection with the accompanying drawing and the appended claims.

Referring to the drawing:

Fig. 1 is a perspective view illustrating some of the parts of the device in relatively expanded positions and relatively spaced from a battery terminal.

Fig. 2 is a partially sectioned top plan view of the clamping device.

Fig. 3 is a side elevation of the device taken as indicated by the arrow 3 of Fig. 2.

Fig. 4 is a staggered section taken as indicated by the line 4—4 of Fig. 2.

Fig. 5 is a sectional view through the auxiliary clamp means included in the invention, this view being taken as indicated by the line 5—5 of Fig. 2.

Fig. 6 is a sectional view comparable to Fig. 2, but showing an alternative form of hinge means and an alternative form of cable-connecting means.

Fig. 7 is a sectional view through the alternative form of hinge means taken as indicated by the line 7—7 of Fig. 6.

Referring first to the form of the invention illustrated by Figs. 1 to 5 inclusive, I show a clamping device generally designated by the numeral 11, which includes a pair of clamping members 12 and 13 hinged together in a novel manner by hinged means 14, this hinged means pivoting the clamping members 12 and 13 together in such a manner as to permit relative swinging of these members in directions indicated by the double arrow A of Figs. 1 and 2; and permits the members to be separated by a straight longitudinal movement of one member relative to the other, as indicated by the arrow B of Figs. 1 and 2.

The hinge means 14 includes complementary tongue-and-groove elements formed on one end of each of the members 12 and 13. The groove element of the hinge means 14 preferably is formed integrally with one of the members, such as the member 13, and comprises a substantially U-shaped wall 15 providing an inwardly facing groove 16. The tongue element of the hinge means 14 is formed integrally with the member 12 and comprises an outwardly extending tongue 17 adapted to extend into the groove 16, fitting loosely therein so as to permit the above-mentioned relative swinging action of the clamping members.

The invention includes means for preventing relative longitudinal movement between the tongue-and-groove members 16 and 17 of the clamp members 12 and 13. In one form of my invention this means comprises interlocking por-

tions formed on the respective tongue-and-groove elements in such a manner as to permit relative swinging of the members but preventing the tongue-and-groove elements from sliding longitudinally relative to each other.

As shown in Figs. 1 and 2, one embodiment of this means includes a slot 20 formed in the inwardly extending leg 21 of the U-shaped wall 15. Integrally formed on the outer surface of the clamping member 12 at right angles to the tongue 17 is a rib 22 positioned to extend into the slot 20 when the tongue 17 is mated with the groove 16, substantially in the manner indicated. It will be seen that the interlocking of the rib 22 and the leg 21 will effectively prevent relative movement of the clamping members in directions indicated by the arrow C of Fig. 1, regardless of the relative pivoted positions of these members.

Formed on each of the members 12 and 13 closely adjacent the tongue-and-groove elements 16 and 17 is a substantially semi-circular jaw 25, these jaws being complementary when the members 12 and 13 are assembled in operable relation to define a terminal-receiving space, the axis of which is parallel to the longitudinal axis of the hinge means 14.

Means for strengthening the portions of the members 12 and 13 which form the jaws 25 and for reinforcing the tongue 17 and the U-shaped wall 15 of the members is preferably provided.

To accomplish this function the rib 22 of the member 12 may be extended a substantial distance around the outer surface of the jaw. A rib 24 is likewise provided on the outer surface of the member 13, the rib extending from the U-shaped wall 15 for a sufficient distance around the member 13 to accomplish the function of stiffening the jaw 25 and the wall 15.

Formed in each of the members 12 and 13 on the opposite side of the jaws 25 from the hinge means 14 is a laterally extending opening designated respectively by the numerals 27 and 28, through which a bolt 29 extends, there being a nut 30 threaded on the bolt for drawing the jaws 25 together.

In the preferred embodiment of the invention the openings 27 and 28 are flared as best shown in Fig. 2 toward the inner surfaces of the members 12 and 13 to facilitate the relative swinging action of the clamping members.

The parts thus far described constitute one operable embodiment of my invention, the combination providing the novel hinge arrangement 14 accomplishing the function of pivoting the members 12 and 13 for relative swinging action and likewise permitting separation of the parts by relative lateral movement with respect to the axis of the terminal-receiving space regardless of the relative pivoted position of the members, together with the means for drawing the jaws 25 into clamping relation.

In one embodiment of my invention I prefer to form the inner faces of the semi-circular jaws 25 in such a manner that these jaws provide upper and lower relatively angled tapered surfaces 31 and 32, the apex formed by these tapered surfaces being preferably substantially on a median plane through the clamping members 12 and 13, as best shown in Fig. 4. These upper and lower tapered surfaces are provided to adapt the clamping device for installation in either direction on a tapered body such as a battery terminal designated by the numeral 35 in Figs. 1 and 4.

I prefer to provide a plurality of inwardly extending contact projections 36 on the upper and

lower tapered surfaces 31 and 32 of the jaws 25. As best shown in Fig. 4, the projections 36 will contact the tapered battery terminal 35 in spaced relationship with the lower tapered surfaces 32 when these surfaces are in engagement with the terminal. Likewise it will be clear that if the clamping members are installed on the tapered battery terminal so that the surfaces 31 conform to the contour of the terminal, the projections 36 on the surfaces 32 will contact the tapered terminal in spaced relationship with the surfaces 31.

The features just described are important in that the clamping device may be positioned in either position on a battery terminal, the opposed tapered surfaces on the complementary jaws 25 substantially conforming to the contour of the battery terminal. Likewise, the function of the projections 36 is important in that when the jaws 25 are clamped tightly around a body the projections bite into the surfaces of the body which prevents slippage of the clamping means relative thereto.

The invention includes a cable-connecting means for removably connecting a battery cable, guy-wire, or the like, to the clamping device 11. It should be understood that the combination of parts thus far described could be utilized with any form of cable-connecting means and embody a patentable combination having a new coaction of parts and obtaining a new result. However, I prefer to disclose one embodiment of my invention which includes an auxiliary clamping means comprising a pair of parts hinged for relative swinging action and providing segments defining a cable-receiving space, the hinged parts being adapted for separation by a straight relative movement laterally with respect to the axis of the mentioned space regardless of the relative hinge positions of the parts.

One embodiment of this auxiliary clamping means is shown as including a stationary part 40 formed integrally on the clamping member 12 on the opposite side of the bolt 29 from the jaws 25. Hinged to the stationary part 40 by a hinge means generally designated by the numeral 41 is a movable part 42. The parts 41 and 42 are provided with inwardly facing, substantially semi-circular segments 43 which are complementary to define a cable-receiving space as best shown in Fig. 5. The hinge means 41 of the auxiliary clamping means is substantially identical with the hinge means 14 of the main clamping device 11, an inwardly facing groove 44 being formed on the movable part 42 and an outwardly extending tongue 45 being formed on the stationary part 40; these tongue-and-groove elements being operable to permit swinging of the parts 40 and 42 as indicated by the arrow D of Fig. 5.

The auxiliary clamping means also includes a means for preventing relative movement of the parts in a direction parallel to the axis of the cable-receiving space. This means generally designated by the numeral 46 comprises interlocking portions on the tongue-and-groove elements 45 and 44 which are identical with the groove 20 and the rib 22 of the main clamping means.

Formed in the end of the part 42 on the opposite side of the segment 43 from the hinge means 41 is an opening 47 which extends laterally with respect to the axis of the cable-receiving space. Formed in the adjacent end of the stationary part 40 is a slot 48. The opening 47 is adapted to receive a bolt 49 which bolt also extends through the slot 48 substantially in the

manner shown, there being a nut threaded on the bolt to draw the segments 43 together in clamping relationship.

It will be seen that the parts 40 and 42 of the auxiliary clamp are capable of separation by a straight relative movement laterally with respect to the axis of the cable-receiving space regardless of the relative pivoted position of the parts. It will also be seen that the slot 48 permits the members to be separated without removing the bolt from the opening 47. These are important features with respect to the operation of installing the clamp means in its various uses which will be described later.

My invention also includes a corrosion-impeding means one form of which comprises a baffle wall 50 formed on the member 12 and projecting therefrom in a position between the terminal-engaging jaws 25 and the cable-connecting means. The baffle wall 50 provides a tortuous surface which effectively impedes the progressive formation of corrosion toward the cable-connecting means, materially reducing the amount of corrosion forming on a cable which is clamped between the clamps 43, in the manner indicated at 51 in Figs. 1, 2, and 5.

Referring to the alternative form of the invention illustrated in Figs. 6 and 7, the relative parts and the operation thereof are substantially the same as the form described above. Therefore, identical characters will be used to designate similar parts.

The alternative form of hinge means, generally designated by the numeral 60, comprises a U-shaped wall 61 formed on one of the clamping members and providing an inwardly facing groove 62 into which loosely projects a tongue 63 formed on the other of the pair of clamping members. Formed in the inner surface 64 of the groove 62 is a transverse slot 65 which extends substantially entirely around the inner surface of the groove. Formed on the exterior surface of the tongue 63 is an outwardly projecting web 66 which fits into the slot 65, as best shown in Fig. 7, when the complementary clamping members are assembled in hinging relationship as shown in Fig. 6.

It will be seen that the interlocking relationship of the transversely extending web and slot will effectively prevent relative longitudinal movement between the tongue-and-groove elements 62 and 63 comprising the hinge means 60.

Reinforcing means for the jaws 25 of this form of the invention is preferably provided in the form of a rib 67 formed on the member 12, and a rib 68 formed on the member 13, as shown.

I have shown this embodiment of the invention as including a terminal-connecting means generally designated by the numeral 70 which comprises a socket portion formed on the clamping member which carries the tongue 63 and which provides a recess 71 for the reception of a cable which may be soldered or otherwise suitably secured therein.

I have shown in this form of invention a corrosion-impeding means which includes a baffle wall 72 formed on each side of the clamping member carrying the tongue 63 so that a tortuous path is provided on each side of this clamping member which serves to impede the progressive formation of corrosion toward the terminal connector 70.

The operation of both forms of the invention is substantially the same. It will be understood that the clamping device embodying the above described features of the invention may be installed on a body such as the battery terminal 35

so that the auxiliary clamping means 41 extends either upwardly or downwardly. It will also be clear that the clamping means may be removed from the terminal either by merely loosening the nut 30 on the bolt sufficiently to permit a relative swinging of the members 12 and 13, as indicated by the arrow A of Figs. 1 and 2, or by entirely removing the bolt 29 from one or both of the openings 27 and 28 whereupon one of the members, such as the member 13, may be moved relative to the member 12 in a straight line laterally with respect to the axis of the terminal-receiving space, regardless of the relative pivoted positions of the clamping members. This is an important feature in that the clamping members 12 and 13 may thus be separated for removal of the clamping means from the terminal without swinging the clamping members into any particular pivoted position, which allows the convenient installation and removal of the clamp means in cramped spaces in which any substantial pivoting of the clamping members would be impossible.

Likewise, in connection with the auxiliary clamp means, it will be clear that a cable, such as the cable 51, may be inserted and removed from the cable-receiving space either by relatively swinging the parts 42 and 43, as indicated by the arrow D, or the bolt 49 may be loosened sufficiently to permit the movable and stationary parts to be separated by a straight relatively lateral movement with respect to the cable-receiving space as above described.

Although I have illustrated and described my invention in simple practical form, it should be understood that I am aware of various features thereof which might be changed and numerous embodiments thereof which might be devised without departing from the spirit and scope of the invention which should be interpreted by the appended claims.

This application is a continuation-in-part of my pending application, Serial No. 735,544, filed July 17, 1934, for "Connectors for electrical contacts."

I claim as my invention:

1. A terminal clamp comprising: a pair of clamp members connectible in hinging relation and providing jaw elements having upper and lower tapered surfaces, the opposed upper surfaces of said jaws being complementary to engage and substantially conform to a tapered body, and said lower jaws being complementary to engage said tapered body when said clamp is reversed; contact projections on each surface of said jaw elements relatively spaced from the central horizontal plane of said clamp and extending radially inward therefrom a sufficient distance so that when either said opposed upper or lower surfaces engage said tapered body said projections on the other opposed surfaces engage a smaller diameter of said tapered body; and means for drawing said jaw elements together in clamping relation.

2. A terminal clamp comprising: a pair of

clamp members providing a terminal-receiving space adapted to receive a terminal and one of which clamp members provides walls forming an inwardly facing U-shaped vertical groove and the other of which provides a tongue element extending into said groove in hinging relationship, said clamp members having upper and lower tapered surfaces, the opposed upper surfaces of said clamp members being complementary to engage and substantially conform to a tapered body, and said opposed lower surfaces being complementary to engage said tapered body when said clamp is reversed; contact projections on each of said upper and lower tapered surfaces of said clamp members and extending radially inward therefrom a sufficient distance so that when either said opposed upper or lower surfaces engage said tapered body said projections on the other opposed surfaces engage a smaller diameter of said tapered body; a clamping bolt associated with said clamp members and disposed on that side of said terminal-receiving space opposite the tongue and groove; a laterally extending reinforcing web on said tongue element; walls forming a slot in that one of said clamp members which provides said vertical groove complementary to said web to prevent relative movement of said clamp members longitudinally relative to the terminal to which the clamp is applied; and means for attaching a cable to one of said members.

3. A terminal clamp comprising: a pair of clamp members providing a terminal-receiving space adapted to engage a terminal and one of which clamp members provides walls forming an inwardly facing U-shaped vertical groove and the other of which provides a tongue element extending into said groove in hinging relationship, said clamp members having upper and lower tapered surfaces, the opposed upper surfaces of said clamp members being complementary to engage and substantially conform to a tapered body, and said lower jaws being complementary to engage said tapered body when said clamp is reversed; contact projections on each of said surfaces of said clamp members relatively spaced from the central horizontal plane of said clamp and extending radially inward therefrom a sufficient distance so that when either said opposed upper or lower surfaces engage said tapered body, said projections on the other opposed surfaces engage a smaller diameter of said tapered body; a clamping bolt associated with said clamp members and disposed on that side of said terminal-receiving space which is opposite said tongue and groove; a laterally extending reinforcing web on said tongue element; walls forming a slot in that one of said clamp members which provides said vertical groove complementary to said web to prevent relative movement of said clamp members longitudinally relative to the terminal to which the clamp is applied; and means for attaching a cable to one of said members.

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