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TUBE CLAMPS

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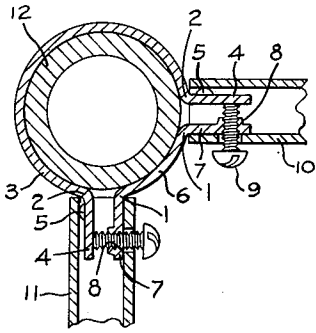


Fig. 1

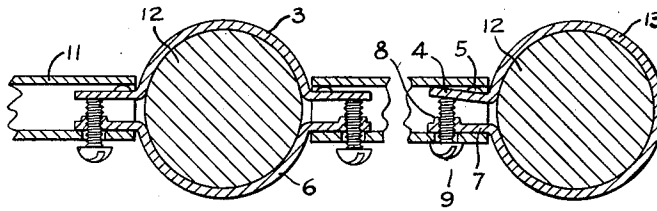


Fig. 3

Fig. 5

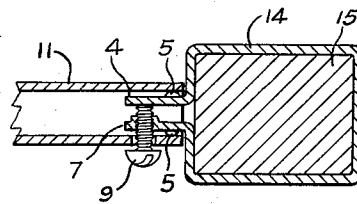


Fig. 6

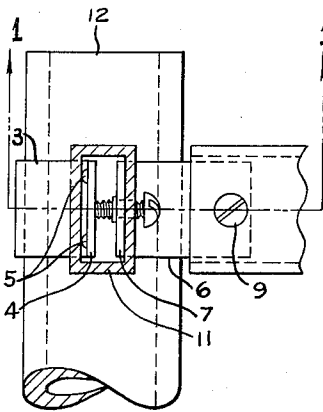


Fig. 2

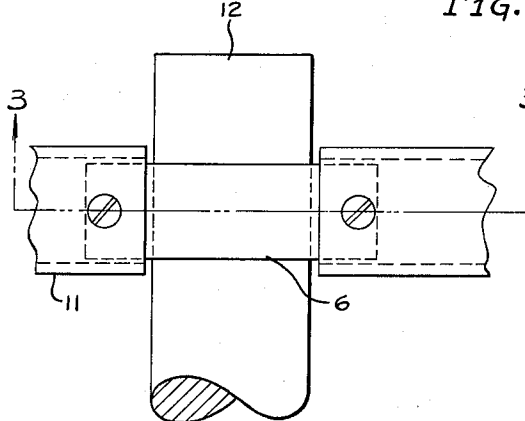


Fig. 4

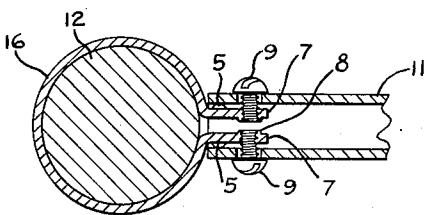


Fig. 7

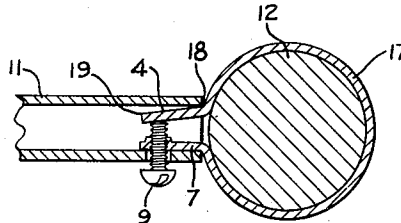


Fig. 8

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TUBE CLAMPS

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4 Claims. (Cl. 287—54)

My invention relates to the clamping of the ends of tubular sections of metal or plastics to the sides of tubular or solid sections of posts, such as is required for fence rails and posts or other structural frameworks.

One object of the invention is to provide for use in fence structure or the like an improved structural connection in which one end of a tubular element is firmly joined to a support member by simple, economical clamping means that is readily assembled to clamp simultaneously both the tubular element and the support member.

A further object is to provide an improved structural connection of the character recited in the above object in which substantially every part of the clamping structure, which might otherwise be unsightly, is concealed within the tubular element, thus affording a strikingly smart appearance.

Other objects and advantages will become apparent from the following description of the exemplary forms of the invention illustrated in the drawing, in which:

Fig. 1 is a top sectional view along the lines 1—1 of Fig. 2, showing the ends of two tubular rectangular rail sections attached horizontally to a tubular round vertical post. Rail sections are shown to form a corner or right angle attachment.

Fig. 2 is a fragmentary side elevation of the vertical post and one rail section. The second rail section is indicated as an end sectional view.

Fig. 3 is a top sectional view along the lines 3—3 of Fig. 4, similar to Fig. 1 except that the two tubular rail sections are shown attached in line to the vertical post.

Fig. 4 is a fragmentary side elevation of Fig. 3.

Fig. 5 is a top sectional view showing the termination of one horizontal tubular rail section attached to a vertical round post.

Fig. 6 is a top sectional view showing the termination of a horizontal tubular rail section attached to a vertical rectangular post.

Fig. 7 is a top sectional view showing the termination of a horizontal tubular rail section attached to a vertical round post with alternate design of clamp.

Fig. 8 is a top sectional view showing the termination of a horizontal tubular rail section attached to a vertical round post with further variation in the design of clamp.

Similar numerals refer to similar parts in all figures.

The method of clamping the tubular rail sections to vertical posts as illustrated in Figures 1, 2, 3 and 4 comprises a pair of opposing band clamps 3 and 6 formed to partially surround the periphery of the vertical posts 12. One half of each pair of clamps is referred to as the pivot clamp 3. The other half of each pair of clamps is referred to as threaded clamp 6. Opposite ends of each threaded clamp 6 are bent sharply at 1 in relation to adjacent portions of the clamp to form integral outwardly extending clamping arms 7. The outer ends of the arms 7 are provided with threaded holes 8 to receive machine screws 9. Similarly, each pivot clamp 3 has outwardly extending clamping arms 4 on opposite

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ends thereof sharply bent at 2 in relation to adjacent portions of the clamp to extend outwardly in spaced parallel relation to the arms 7. The arms 4 are provided with fulcrums 5 projecting from the side thereof opposite the arms 7. See Figs. 1 and 2. The arms of each pivot clamp 3 and each opposing threaded clamp 6 are received inside the ends of tubular rectangular rails 11. The arms of threaded clamp 7 are secured to the inside walls of rectangular rails 11 by means of machine screws 9 inserted through holes 10 in said rails 11, and engaging threaded holes 8 in said threaded clamp. The arms 4 of pivot clamp 3 are normally held from contact with the opposite inside walls of rectangular rails 11 by engagement with the rail walls of the projecting fulcrums 5 spaced somewhat from the adjacent bends 1 in the clamp and spaced a substantially greater distance from the free ends of the arms. The threaded ends of machine screws 9 are shown in contact with the arms 4 of pivot clamps 3, prior to seating of the heads of screws 9 against the outside of rails 11. Tightening of the screws 9 further secures the arms 7 of threaded clamp 6 to the inside of rails 11, and at the same time forces the arms 4 of pivot clamp 3 against the opposing inside wall of rails 11. Swinging of the arms about the fulcrums 5 simultaneously contracts the pivot clamp 3 around the periphery of vertical post 12. The completed clamped position with the head of machine screw 9 seated securely against the adjacent outer surfaces of the rail 11 is indicated in Fig. 5.

Fig. 5 shows a one piece band clamp 13 substantially surrounding a vertical round post 12 terminating with outwardly extending arms; one arm 7 provided with threaded hole 8 and the opposing arm 4 provided with projecting fulcrums 5.

Fig. 6 indicates a construction similar to Fig. 5 except that the band clamp 14 is formed to surround a rectangular post 15 and both terminating arms 4 and 7 are provided with projecting fulcrums 5. In tightening screw 9 both terminating arms 4 and 7 act to contract the band clamp 14 around post 15 while forcing the said terminating arms against the inside walls of tubular rail 11.

Fig. 7 shows a one piece band clamp 16 substantially surrounding a vertical round post 12 and terminating with outwardly extending arms 7. Both arms 7 are provided with threaded holes 8 and projecting fulcrums 5. In this construction two screws 9 are required; each screw to draw the arms 7 in contact with inside walls of tubular rail 11 while contracting the band clamp around post 12.

In Fig. 8 the one piece band clamp 17 is provided with one threaded arm 7 shown in contact with the inside wall of tubular rail 11. The opposing arm 4 is so formed to make contact only at the termination 18 of the opposing inside wall of tubular rail 11 and its end 19 is normally free of contact with said inside wall of tubular rail 11. In tightening screw 9 to force the end 19 of arm 4 in contact with said inside wall a fixed fulcrum is provided at the point of contact 18 to contract the band clamp 17 around the vertical post 12.

It should be apparent that the rectangular tubular rail sections shown in the accompanying drawing could be round or other sectional shapes and that the arms of the band clamps could be suitably shaped to fit. These variations could be employed without departing from the underlying principles of my invention.

Having thus described my invention, I desire by the following claims to include within the scope of the invention all such variations and modifications which may be obtained through substantially the same or equivalent means.

I claim:

1. A clamped structural connection comprising, in combination, an elongated member, a tubular member

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perpendicular to said elongated member and having one end disposed in adjacent substantially coplanar relation to said elongated member, clamping band means encircling said elongated member up to the adjacent end of said tubular member, said band means including two adjacent end segments bent at sharp angles to the adjacent portions of the band means to form clamping arms extending in generally parallel relation to each other into the adjacent end of said tubular member, a fulcrum projection on the side of one of said arms opposite from the other arm and spaced somewhat from the adjacent bend at the base of the one arm and spaced a greater distance from the free end of said one arm, a screw extending through said tubular member and threaded through the free end of said other clamping arm to engage the opposed free end portion of said one clamping arm to rock the latter about said fulcrum projection to simultaneously tighten said band means about said elongated member and press said clamping arms against the opposed inner surfaces of said tubular member.

2. A clamped structural joint comprising, in combination, an elongated member, a tubular member generally perpendicular to said elongated member and having one end disposed in adjacent substantially coplanar relation thereto, clamping band means closely encircling said elongated member and terminating in two generally parallel clamping arms extending into the adjacent end of said tubular member, a fulcrum projection on one of said arms spaced a substantial distance from the free end thereof on the side thereof remote from the other arm and engaging the inner end of said tubular member, and screw means threaded into the free end of one of said arms and engaging the other arm to spread the free ends of the two arms to cause simultaneous high leverage clamping of both of said members.

3. A structural joint suitable for use in fence construction or the like, comprising, in combination, an elongated member; a tubular member disposed at a sharp angle to said elongated member and having one end disposed in adjacent, generally coplanar relation thereto; band

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means substantially encircling said elongated member and having adjacent ends terminating in clamp arms bent sharply in relation to the adjacent portions of the band means and extending in generally parallel relation into the adjacent end of said tubular member, said arms each having a fulcrum projection on the side thereof opposite from the other arm and spaced somewhat from the bent base of the arm and spaced a greater distance from the free end of the arm; and screw means engaging the free ends of both arms inwardly, with respect to said tubular member, from said fulcrum projections for spreading said free ends away from each other to simultaneously tighten said band means around said elongated member and clamp said arms within said tubular member.

4. For use in clamping a tubular member to a support member, sheet metal band means having an intermediate segment adapted to substantially encircle a support member and having two end sections integrally joined with and bent sharply with respect to the respective opposite ends of said member encircling segment to form two opposed generally parallel clamping arms adapted to extend into the end of a tubular member, threaded screw means coacting with the free ends of said arms for spreading the latter from each other, and at least one of said arms having a fulcrum projection thereon on the side thereof more remote from the other arm and located along said one arm between and in spaced relation to said screw means and the bent junction of said one arm with said member encircling band segment.

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