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2,961,479

MID SPAN SPACER AND SERVICE TAP ASSEMBLY

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2 Sheets-Sheet 1

Fig. 1

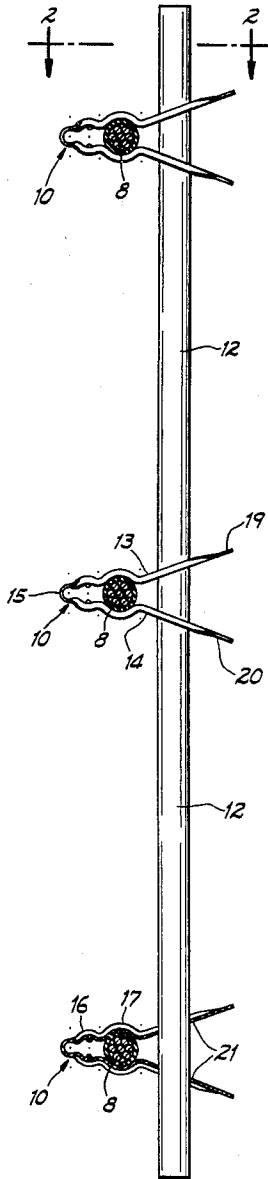


Fig. 2

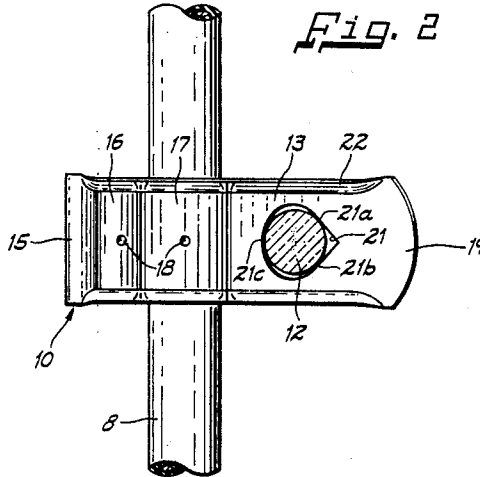


Fig. 3

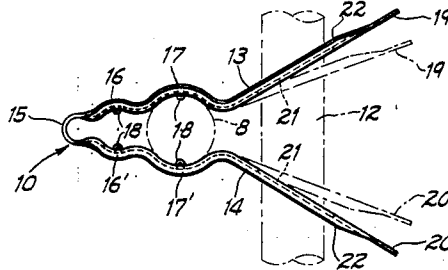
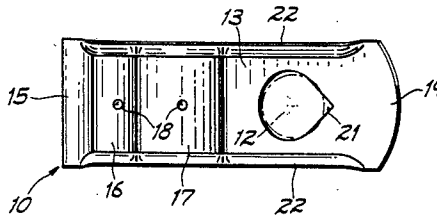


Fig. 4



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2 Sheets-Sheet 2

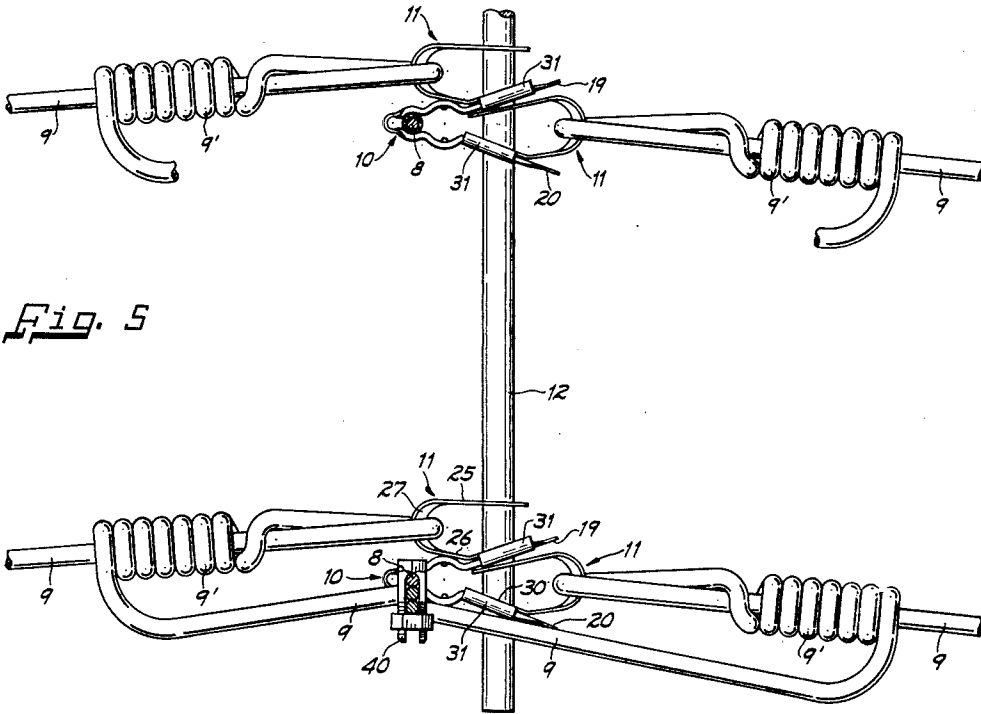


Fig. 5

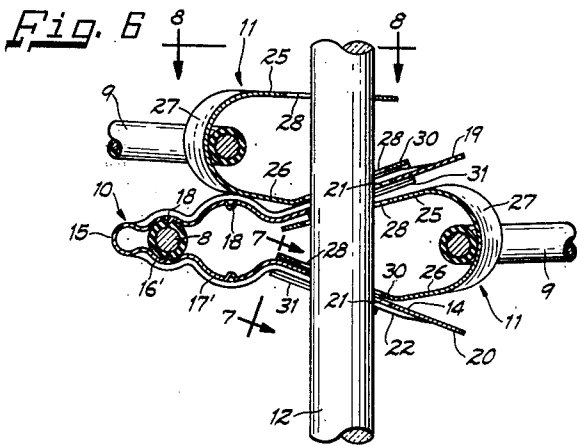


Fig. 6

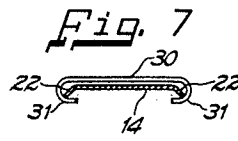


Fig. 7

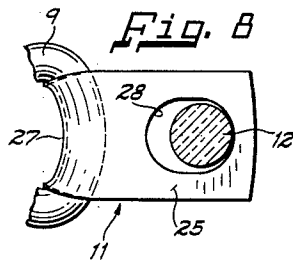


Fig. 8

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1

2,961,479

**MID SPAN SPACER AND SERVICE TAP
ASSEMBLY**

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8 Claims. (Cl. 174-43)

This invention relates, in general, to a mid span spacer and service tap assemblies for secondary distribution lines and the like and more particularly to a novel method and apparatus for spacing a plurality of conductors intermediate their supporting soles and/or for supporting suitable apparatus for tapping into said conductors.

In overhead conductor installations, it is often customary to keep the respective conductors of a set of conductors from swinging against each other by the means of so called mid span spacers located at intervals between poles. Further, in attaching service wires to the so called overhead or line conductors intermediate their supporting poles, it is also customary to apply service supports which are attached to the aforesaid spacers and to which the service wires are attached near their ends. Heretofore, these supports and spacers have been bulky in appearance since they involve a number of parts of different kinds such as right hand and left hand brackets, bolts, nuts, insulators, etc. Bulkiness is objectionable in residential areas and a large number of loose parts is objectionable since they require considerable time for installation, and constitute both a hazard and an inconvenience when dropped from overhead.

It is the general object of this invention to provide an improved mid span spacer and secondary tap assembly which is exceedingly easy to assemble in the field and is particularly adapted to be easily assembled without the use of tools by a lineman who is standing on a ladder or is otherwise elevated to work on line conductors intermediate the supporting poles.

A further object of this invention is to provide a mid span spacer assembly wherein there is a positive clamping of the line conductors to the assembly in such a manner as to both prevent the wearing or eroding of the conductors and to prevent the sliding of the mid span spacer assembly along the conductors where there is a service tap taken off therefrom at an angle other than 90°.

A further object of this invention is to provide an apparatus of the above general character affording the variable spacing and supporting of any number of a plurality of conductors as suitable or desired, said assembly also being particularly adaptable for use with both triplex and/or open wire for standard tapplings, thus providing a versatile assembly requiring a minimum inventory of parts by utilities and the like.

A further object of this invention is to provide an assembly that is particularly well adapted for temporary service cutins by contractors and the like and which may be reused several times since assembly and disassembly causes no adverse effect upon the component parts.

A further object of this invention is to provide apparatus of the aforementioned character which is formed of

2

corrosion resistant materials which have a minimum of electrolytic activity with the various standard line conductors presently in use and thus will have a long trouble-free field life.

Another object of this invention is to provide an apparatus for overhead conductors that is exceedingly light in weight, is generally pleasing in appearance, is relatively thin and, thus, does not unduly block out light and air.

Another object of this invention is to provide a device of aforementioned characteristic that is easy to fabricate in that the metal parts may be formed by a stamping operation and the insulator part may be formed out of rod or tube stock requiring only a simple cutoff operation.

It is the further object of this invention to provide a novel assembly as aforescribed that is particularly easy to package for original shipment by the manufacturer, that requires a minimum amount of shelf inventory by utilities and is easy to transport between the place of inventory and the field.

A further object of this invention is to provide a mid span spacer assembly as set forth above which, because of a positive clamping action, is well adapted to withstand the vibrations caused by normal field conditions.

A more specific object of this invention is to provide a novel spring conductor clip which may be clamped onto a conductor and then frictionally attached to a rigid insulating rod, said operations requiring no nuts, washers, bolts or other threaded members and requires only a simple squeezing operation by the lineman.

A further object of the invention is to provide a novel clip as aforesaid formed such that the edges thereof are rounded or belled in the conductor clamping areas thereof in a manner to prevent troublesome wear spots where contact is made with the conductors.

A further object of this invention is to provide a single novel conductor clip of the above character which is very versatile in application since it is adaptable for use with a plurality of conductors of different sizes.

Another object of this invention is to provide a novel U-shaped service clip having a base portion adapted to form a dead end thimble for a service conductor, said service clip being cooperable with the conductor clip so as to align the former for coaction with the service tap conductor.

Another object of this invention is to provide apparatus which has no moving parts to rust or otherwise get out of order and which is otherwise well adapted for the purposes for which it was designed.

The novel features that are characteristic of the invention are set forth with particularity in the appended claims. The invention itself, however, both as to its organization and its method of operation, together with additional objects and advantages thereof may best be understood by the following description of specific embodiments when read in connection with the accompanying drawings, in which:

Fig. 1 is a side view of a mid span spacer assembly for three line conductors, part of said assembly being shown in section;

Fig. 2 is an enlarged fragmentary sectional view taken along lines 2-2 of Fig. 1;

Fig. 3 is an enlarged full line side view of the V-shaped conductor clip shown in Fig. 1 in its free length position, the dot dash lines indicating the position the clip assumes when positioned on an insulating rod;

Fig. 4 is top plan view of the clip shown in Fig. 3 said clip being in its free length position;

Fig. 5 is a side view of a portion of a mid span spacer and service clip assembly for open wire service taps from opposite sides of the line conductors;

Fig. 6 is an enlarged detailed sectional view of a portion of the assembly shown in Fig. 5;

Fig. 7 is a view along line 7—7 of Fig. 6; and

Fig. 8 is a view along line 8—8 of Fig. 6.

Referring now to Figs. 1 to 4, inclusive, the mid span spacer assembly comprises an elongate rod member 12 of suitable insulating material having thereon a plurality of conductor clip means 10 each of which serve the dual function of clampingly and fixedly engaging a line conductor as shown at 8 and fixedly and frictionally engaging the insulating rod 12 to thereby fix and maintain each of said conductors in any desired spaced relation on said rod. The elongate member 12 may be formed of fibre glass rod stock or the like and is preferably circular in cross section, the length thereof depending on the application.

As perhaps best shown in Figs. 2—4, the conductor clip means 10 comprises a generally V-shaped or tweezer-like stamping which is preferably formed out of a corrosion resistant spring-like material such as stainless steel and the like. The conductor clip means 10 may be formed with a pair of resilient arms 13 and 14 having free ends 19 and 20 respectively, said arms being connected at their common end 15. Each of the arms 13 and 14 are formed with upset conductor clamping portions 16—16' and 17—17' respectively near their common end 15 said upset portions being of generally semi-circular configuration and each being adapted to receive and clampingly engage line conductors such as shown at 8 in Figs. 1 and 2.

It will be noted that in the center of each of the cable clamping portions 16—16' and 17—17' a detent or bump 18 is formed for the purpose of helping to prevent rotational relative movement of the line conductors when that latter are clamped within the clip means 10. However, the detent 18 is optional and may be dispensed with when soft insulating means surrounds the line conductors.

An aperture 21 of generally teardropped shape is formed in each of the arms 13 and 14, respectively, said apertures preferably being formed near the center of the free ends 19 and 20 of said clip. As perhaps best shown in Figs. 2 and 4, the clip 10 may be rolled or belled at the edges of the arms to both provide rigidity and strength to the arms in the area near the apertures 21 and to preserve the conductors in the areas near the conductor clamping portions 16—16' and 17—17' by lessening the opportunity of engagement of the conductors by said edges.

As aforementioned, the clip means 10 is preferably made of stainless steel with the arms 13 and 14 being resilient in nature such that they tend to assume the free length position shown in full line of Fig. 3. It will be noted that the free ends 19 and 20 of the clip means 10 are susceptible of being grasped between the thumb and forefinger and compressed thereby bringing the apertures 21 in the free ends into a fuller registry such that the elongate insulating rod 12 may be freely inserted therein. The position assumed by the clip arms 13 and 14 when said clip is in frictional engagement with the rod 12 is shown in dot and dash lines of Fig. 3. It will be noted, as shown in Fig. 2, that the teardrop shape aperture 21 affords 3 points of marginal contact upon the rod 12, said points being 21a, 21b and 21c. This relationship affords good vibrational stability. If desired, the apertures 21 may be made in a diamond shape, or any other shape which will provide more than two frictional bearing surfaces between the margins of the apertures and the insulating rod.

In the assembly of the mid span spacer assembly in the field, and assuming a conventional 3 wire span, the lineman generally will first install the individual clips on

the individual line conductors, compress the ends of the center conductor clip and then insert the rod through the apertures 21 in the arms 13 and 14 while said clip is in the compressed state. It will be noted that the free ends 19 and 20 of arms 13 and 14 are cut and formed in a manner to minimize the possibility of cutting or tearing the lineman's gloves. After adjusting the clip 10 relative to the rod 12 as desired, the free ends 19 and 20 are released allowing the marginal surfaces of the aperture at points 21a, 21b and 21c on each arm to engage said rod to be frictionally maintained in position thereon. The other clips are then compressed and placed upon the rod in a similar manner in any predetermined desired spaced relationship.

It will be noted that the cable clamping portions 16—16' and 17—17' respectively are of different diameters. Each of the diameters 16—16' and 17—17' are specifically designed to accommodate a plurality of various standard sizes presently in use in the field as line conductors. When a so-called bare wire line conductor is used by the utility the smaller cable clamping portion 16—16' may be used and when a larger or insulated line conductor 8 is used, the cable clamping portion 17—17' may be used. It is desirable to have the sizes of the cable clamping portions be such that they will clampingly engage in a positive manner a large number of conductors while still allowing the accommodation of the clip apertures 21 with the insulating rod 12.

When the mid span assembly also serves as a service tap assembly, and when the line conductors are of size that may be accommodated in the smaller cable clamping portion 16—16', a service tap dead end may be made by anchoring around the rod 12 itself, preferably by utilizing the portion of the rod 12 intermediate the arms 13—14 when the latter are assembled on said rod. However, when the larger types of line conductors are in use necessitating the larger clamping portions 17—17' (such as shown in the drawings) other means are preferably provided for dead ending the service tap conductors such as service clip means 11 which are attached to the conductor clips 10 for cooperation therewith.

More particularly the service clip means 11 takes the form of a generally U-shaped member having an imperforate arcuate base 27 and a pair of apertured legs 25 and 26. The service clip member 11 is perhaps best shown in the enlarged fragmentary sectional view comprising Fig. 6. As shown, the service clip means 11 is formed such as the base 27 takes the form of a conductor thimble having compound curves of fairly large radius to help preserve the service conductor 9 from the effects of short radius dead ending. The U-shaped service clip member 11 has a pair of apertures 28 one formed in each of its legs 25 and said apertures being larger than the rod 12 for easy accommodation of the latter even when the service clip is assembled on the conductor clip 10 and the latter is in its compressed position. As shown, leg 26 of the service clip 11 has a portion 30 which is inclined inwardly toward the other leg 25 at an angle substantially equal to one-half of the included angle formed by the arms 13 and 14 of the V-shaped conductor clip. The inclined portion 26 is also formed with ears or tabs 31 which form a guide slot for connecting receipt of one arm of the conductor clip 10.

As best shown in Fig. 7, the guide slot tabs 31 are adapted to slidably receive and maintain the clip in connecting relationship preventing relative movement there between. It will be noted that when the service clip is assembled upon the conductor clip 10 and rod 12, the thimble base 27 of the service clip 11 is disposed substantially at right angles to the mid span spacer rod 12 and perpendicular to a plane bisecting the V-shaped clip member 10. Thus the service clip 11 is correctly aligned for receipt of the service conductor 9.

As shown in Fig. 5, a separate service clip may be attached to each of the arms of 13 and 14 the clip 11 to

provide a double or two-way service tap dead end for the service conductors 9 coming in from opposite sides of the span of line conductors. If desired, a suitable connection such as the split bolt connector shown at 40 may be provided to connect the ends of the service conductors 9 to the line conductor 8.

Although specific embodiments of the invention have been shown and described, it is with full awareness that many modifications thereof are possible. The invention, therefore, is not to be restricted except insofar as is necessary by the prior art and by the spirit of the appended claims.

What is claimed as the invention is:

1. In a mid span spacer assembly for a plurality of line and service conducting means of electricity, elongated rigid insulating means, a plurality of fastening means affording adjustable rigid fastening of, at any one of a preselected plurality of places, each of said line conducting means in a fixed relation to said elongated insulating means, each of said fastening means comprising clip means having first and second portions, said first portion being adapted to clampingly engage at least one of said line conductor means and said second portion being adapted for adjustable connection to said rigid insulating means, and a plurality of service clip members each cooperable with one of said clip means and each being operable to afford a dead end for at least one of said service conducting means, whereby each of said plurality of line and service conducting means may be secured to said insulating means in a predetermined desired relationship.

2. In combination, a V-shaped conductor clip having a pair of resilient arms, a generally U-shaped member cooperable with said V-shaped conductor clip and formed with a base and a pair of upstanding legs, one portion of one of the legs of said U-shaped member being formed with guide slot tabs receiving one of the arms of said V-shaped clip, said one portion being inclined from a parallel relationship inwardly toward the other leg at an angle substantially equal to one-half of the included angle of said V-shaped clip whereby positioning of one arm of said clip within said guide slot tabs formed on said U-shaped arm affords a generally right angle relationship between the base of said U-shaped member and a plane bisecting said V-shaped conductor clip.

3. In combination, a V-shaped conductor clip having a pair of resilient arms, each of said arms being formed with an aperture near the free end thereof, a generally U-shaped member cooperable with said V-shaped conductor clip and formed with a base and a pair of upstanding legs, each of said legs being formed with an aperture near the free ends thereof, one portion of one of the legs of said U-shaped member being inclined from a parallel relationship inwardly toward the other leg at an angle substantially equal to one-half of the included angle of said V-shaped clip, said one portion being formed with guide slot tabs receiving one of the arms of said V-shaped clip for alignment of the apertures of said clip with the apertures of said U-shaped member, whereby positioning of one arm of said clip within said guide slot tabs formed on said U-shaped arm affords a generally right angle relationship between the base of said U-shaped member and a plane bisecting said V-shaped conductor clip.

4. In combination, an elongated insulating member, a V-shaped conductor clip adjustably attached to said insulating member and having a pair of resilient arms each being formed with an insulating member receiving aperture near the free end thereof, said V-shaped clip being so attached to said insulating member that a plane bisecting said V is disposed in generally right angle relationship to said elongated insulating member, a generally U-shaped member cooperable with said V-shaped conductor clip and formed with a base and a pair of upstanding legs, each of said legs being formed with an insulating member receiving aperture near the free ends thereof,

one portion of one of the legs of said U-shaped member being inclined from a parallel relationship inwardly toward the other leg at an angle substantially equal to one-half of the included angle of said V-shaped clip member, said one portion also being formed with guide slot tabs receiving one of the arms of said V-shaped member for alignment of the apertures of said clip with the apertures of said U-shaped member, whereby positioning of one arm of said clip member within said guide slot tabs formed on said U-shaped arm affords a generally right angle relationship between the base of said U-shaped member and a plane bisecting said V-shaped conductor clip and a generally parallel relationship with said elongated insulating member.

5. In combination, a V-shaped conductor clip having a pair of arms having a common end and free ends, a generally U-shaped member cooperable with said conductor clip and formed with a base and a pair of upstanding legs, one portion of one of the legs of said U-shaped member being formed with connecting means for receiving one of the arms of said clip and inclined inwardly toward the other leg whereby positioning of either of said arms of said clip in connecting relation with said one portion of said U-shaped arm affords a generally right angle relationship between the base of said U-shaped member and a plane bisecting said V-shaped conductor clip.

6. A clip for securing an electric conductor to an elongated insulator comprising a generally V-shaped member having a pair of resilient arms each having a free length position and a compressed position and each being formed with a plurality of generally semicircular conductor gripping portions located near the common end of said arms, detent means formed on said conductor gripping portions, each of said arms also being formed with a tear drop shaped aperture located near the free end of said arms, each of said apertures being so disposed and so located on said arms that when each of said arms are in their said compressed positions said apertures afford a first registry of predetermined size larger than the peripheral dimension of said elongated insulator, and when said arms are in said free length position said tear drop shaped apertures afford a secondary registry of predetermined smaller size to marginally engage said elongated insulator with three points of contact.

7. In a mid span spacer assembly for electrical conductors, rigid elongated insulating means, and means for adjustably rigidly fastening one of said electrical conductors to said insulating means, said fastening means comprising a generally V-shaped clip having a pair of resilient arm portions, each of said arm portions being formed with an upset conductor-retaining portion intermediate the ends thereof, said conductor-retaining portions of said arm portions being opposed and clampingly engaging said one electrical conductor therebetween, each of said arm portions having an aperture near the free end thereof adapted to receive and engage said insulating means, whereby said conducting means is secured to said insulating means.

8. In a mid span spacer for electrical conductors, rigid elongated insulating means, and means for adjustably rigidly fastening one of said electrical conductors to said insulating means, said fastening means comprising a generally V-shaped clip having a pair of resilient arms each having a free length position and a compressed position and each being formed with at least one curved conductor gripping portion intermediate the ends thereof, each of said arms also having an insulator-receiving aperture near the free end thereof such that when said arms are in their said compressed position said apertures afford a first registry of predetermined size larger than the peripheral dimension of the cross section of said elongated insulator, and when said arms are in said free length position said apertures afford a secondary registry of predetermined size smaller than said peripheral dimen-

sion of said elongated insulator, whereby said V-shaped member is fixedly fastened to said elongated insulator and clampingly grips said one electrical conductor.

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