

Aug. 7, 1962

G. M. RAULINS ETAL

3,048,358

WELL TOOLS

Filed July 20, 1959

2 Sheets-Sheet 1

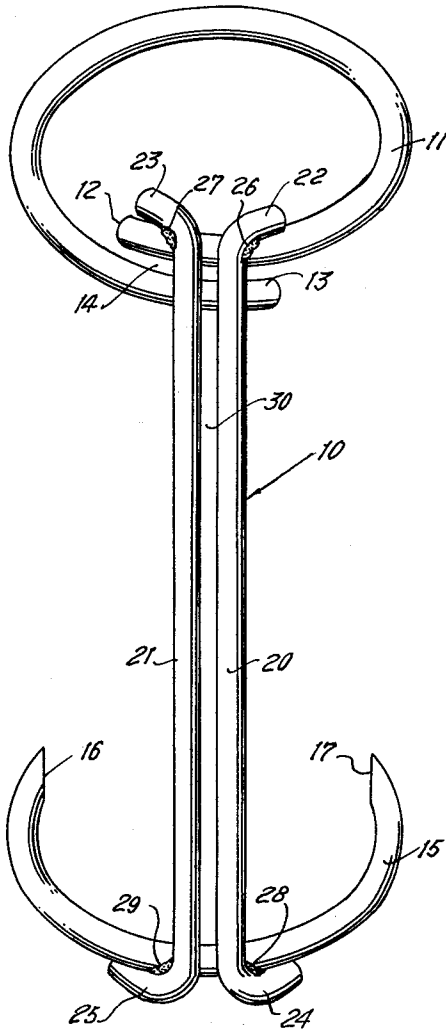


Fig. 1

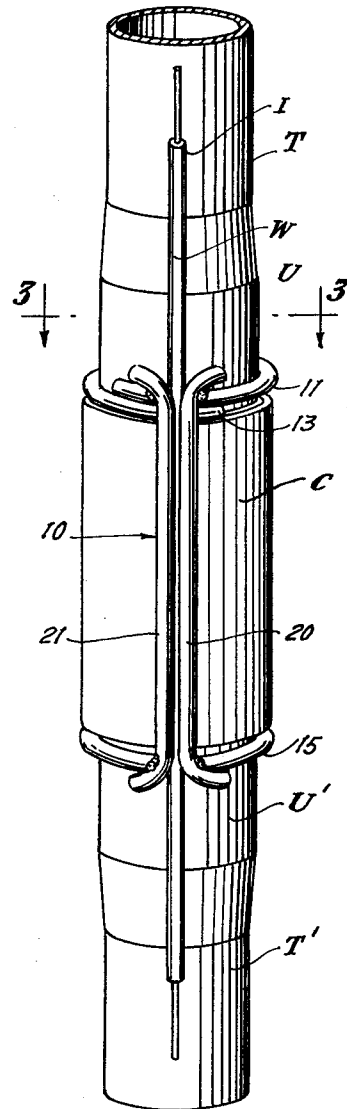


Fig. 2

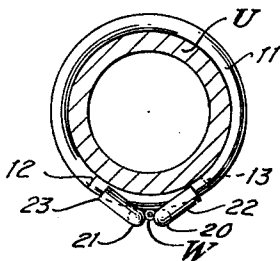


Fig. 3

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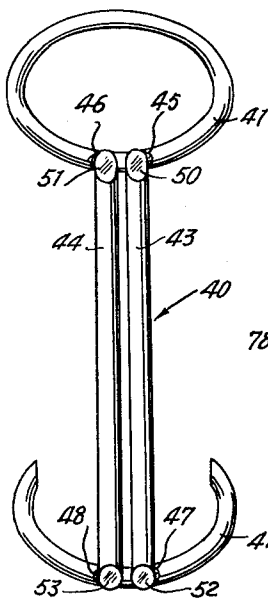


Fig. 4

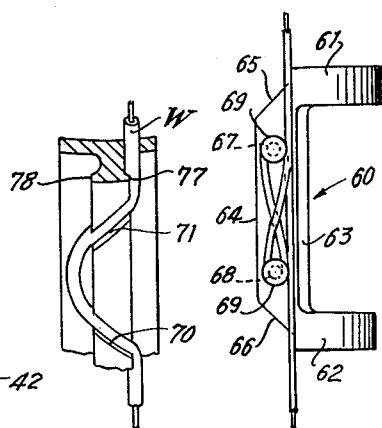


Fig. 8

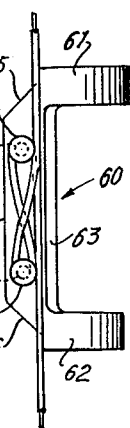


Fig. 6

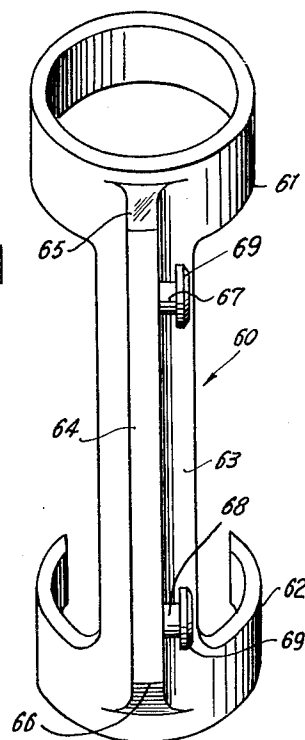


Fig. 5

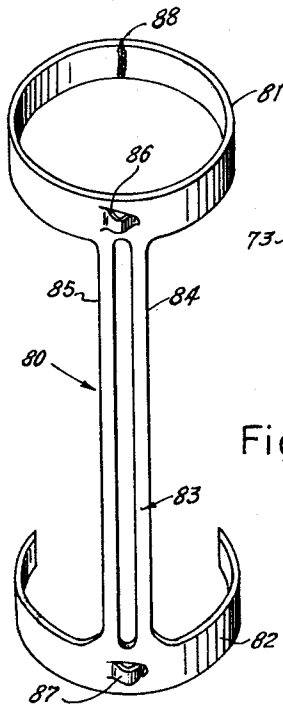


Fig. 9

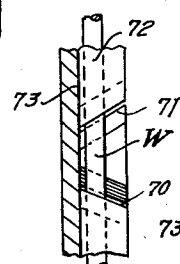


Fig. 7A

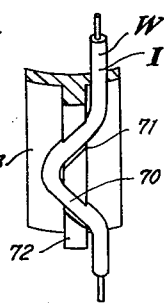


Fig. 7

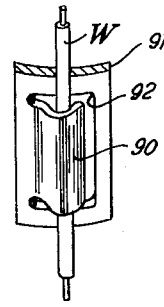


Fig. 10

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3,048,358

WELL TOOLS

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Filed July 20, 1959, Ser. No. 823,369

16 Claims. (Cl. 248-49)

This invention relates to new and useful improvements in well tools and more particularly to wire clamping devices for releasably attaching a flexible electrical conductor wire to a string of well pipe for support by such a pipe.

It is one object of the invention to provide a wire attaching and supporting device for detachably connecting the usual insulated electrical conductor wire to a string of well pipe which is particularly adapted to be releasably connected in the string of well pipe at the coupling between adjacent sections of said well pipe.

An important object of the invention is to provide a wire securing and supporting device adapted to be detachably mounted on a string of well pipe at the coupling between adjacent sections of the well pipe for a segment of insulated electrical conductor wire to be supported at intervals along the length of the well pipe in such a manner that the wire cannot readily become entangled with or wrapped around the well pipe and is not subject to or susceptible to being crushed or abraded between outer surfaces of the enlarged diameter tubing couplings and the inner wall of the well bore or well casing in which the pipe is being moved.

It is a particular object of the invention to provide a wire securing and supporting device of the character set forth which may be readily and quickly secured to the well conductor of a coupling so as not to materially increase the time required for installation of the well conductor and connection of the wire therewith.

It is a further specific object of the invention to provide a supporting and securing device of the character described which is designed to protect the relatively fragile insulated flexible electrical conductor against detachment from said device and against abrasion and crushing action as the well pipe is lowered in the well bore.

Still another object of the invention is to provide a securing and supporting device of a character described which is economical to manufacture whereby such devices may be connected to the well pipe at frequent intervals longitudinally of the string of well pipe to provide for frequent regular support of the wire at relatively closely spaced intervals along the length of the well pipe being lowered in the well and along the length of the wire connected therewith to reduce the possibility of tensile failure of the wire.

Additional objects and advantages of the invention will be readily apparent from the reading of the following description of a device constructed in accordance with the invention, and reference to the accompanying drawings thereof, wherein:

FIGURE 1 is a perspective view of a securing and supporting device constructed in accordance with the invention,

FIGURE 2 is a perspective view of the device of FIGURE 1 showing the same in position on a string of well pipe at a coupling connecting adjacent sections of such pipe,

FIGURE 3 is a horizontal cross-sectional view taken on line 3-3 of FIGURE 2,

FIGURE 4 is a view similar to FIGURE 1 showing a slightly modified form of the securing and supporting device,

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FIGURE 5 is a view of a modified form of supporting and securing device,

FIGURE 6 is a side view of the device of FIGURE 5 and showing a wire supported thereby,

FIGURE 7 is a fragmentary front view of a portion of a modified form of the device of FIGURE 5,

FIGURE 7a is a fragmentary side view of a modified form of the device shown in FIGURE 7,

FIGURE 8 is a fragmentary view of a portion of a modified form of the device of FIGURE 5,

FIGURE 9 is a perspective view of a still further modified form of a wire securing and supporting device of FIGURE 5; and,

FIGURE 10 is an enlarged fragmentary view of a slightly modified form of the device of FIGURE 9.

In the drawings, FIGURES 1 through 3 inclusive, the numeral 10 designates generally a preferred embodiment of the securing and supporting device of the invention. The device includes an upper securing and supporting member 11 formed of resilient wire shown as circular in cross-section and substantially helical in configuration, and having overlapping end portions between the ends 12 and 13 of the member. The overlapping end portions of the member are spaced apart as shown at 14 for a purpose which will be hereinafter more fully explained.

The securing and supporting member also includes a lower clamping and retaining member 15 arcuate in configuration and formed of the same type of resilient wire as the upper securing and supporting member. The lower member has a sector or segment removed therefrom to form an opening or mouth between the ends 16 and 17 of the member. The mouth is positioned diametrically opposite the position of the overlapping portions of the ends of the upper member 11. The space between the ends 16 and 17 of the lower securing and retaining member is less than the inside diameter of the circular arcuate portion thereof, for a reason to be hereinafter more thoroughly explained.

The upper and lower members 11 and 15 are joined by a pair of longitudinally extending laterally spaced substantially parallel clamping and protecting members 20 and 21. Each of the clamping and protecting members has its upper end portion bent outwardly away from the opposite clamping member disposed to extend inwardly over the upper surface of the upper portion of the helical member 11, and has similarly bent end portions 24 and 25 at its lower end disposed below the lower surface of the lower member 15, as clearly shown in the drawing. The upper end 22 of the clamping member 20 is welded, as at 26, or otherwise secured to the upper overlapping portion of the upper member 11, while the upper end portion 23 of the clamping member 21 is likewise welded, as at 27, or otherwise secured to such upper overlapping portion of the member 11 to hold the clamping member 20 and 21 in spaced substantially parallel position. The lower overlapping portion adjacent the end 13 of the upper member 11 is not secured to the clamping members and is free to move independently thereof. The lower end portion 24 of the clamping member 20 is welded as at 28 to the lower clamping and retaining member 15 and the lower end portion 25 of the clamping member 21 is likewise welded as at 29 to the clamping member, whereby the lower ends of the clamping members are secured to such lower member at substantially the mid-portion thereof opposite the mouth formed between the ends 16 and 17 of such lower member.

In use, as is clearly shown in FIGURE 2, the securing and supporting member 10 is adapted to be mounted on a string of well pipe, preferably tubing, at the coupling member C connecting the adjacent sections T and T' of a string of tubing and, when so positioned, is adapted to

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releasably grip, retain and support an elongate flexible insulated electrical conductor wire W in the manner shown in FIGURES 2 and 3.

As is best seen in FIGURE 2, the upper resilient helical supporting member 11 is of a size to engage closely around the upset portion U of the tubing section T adjacent the coupling C and to engage the upper end of the coupling C to prevent downward movement of the securing and supporting member 10 past the coupling while the lower U-shaped clamping member 15 is of a size to engage around the corresponding upset portion U of the lower tubing section T below the coupling to retain the securing and supporting member in position on the tubing string at the coupling. The opening between the ends 16 and 17 of the lower clamping member 15 is such that the space between the ends is less than the diameter of the upset portion U, whereby the lower clamping and retaining member 15 is resiliently clamped in place on the upset portion below the lower end of the coupling C. The length of the clamping members 20 and 21 is such with respect to the length of the coupling C that the lower free end portion 13 of the overlapping end portions of the upper helical supporting member 11 is compressed upwardly toward the upper end portion 12 to assist in retaining the member 10 against longitudinal vibratory movement with respect to the tubing and coupling.

In making up the string of tubing, the lower clamp member 15 is engaged with the upper upset portion U of the lower tubing section beneath the coupling C in the manner shown in FIGURE 2. The lower end of the upper tubing section T is then inserted through the central opening of the upper helical member 11 and is threaded into the upper end of the coupling C in the usual manner. The wire W is then inserted in the space between the longitudinally extending clamping and protecting members 20 and 21, the wire being pressed through the space 30 between the parallel clamping members by means of a suitable inserting tool, not shown, which will cause the wire to slip readily through the opening 30 and into the substantially triangular space between the clamping members 20 and 21 and the upper member 11 and between the lower end portions of the clamping members 20 and 21 and the central portion of the retaining member 15, as clearly shown in FIGURE 3. The wire will readily enter the space 30, since the insulation I is resilient and deformable, and likewise due to such resilience the insulating material will hold the wire firmly in engagement with the upper portions of the clamping members 20 and 21 adjacent the upper end portion 12 of the supporting member 11 and in engagement with the adjacent lower end portions of the clamping members 20 and 21 and the lower retaining member 15. The lateral spacing of the clamping members 20 and 21 is so chosen in manufacture of the securing and supporting device that the insulated wire to be used therewith will be thus resiliently and frictionally gripped between the clamping members 20 and 21 and the upper and lower members 11 and 15 with a force sufficient to support the weight of several hundred feet of the insulated wire. However, it will readily be seen that due to the circular cross-sectional configuration of the clamping members and the curved end portions thereof the insulation I of the insulated wire will not be bruised or cut thereby and the wire may slip longitudinally of the securing and supporting member before breaking.

It will also be seen that the cross-sectional dimensions of the clamping members 20 and 21 are such that the outer longitudinal portions of such members project radially beyond the peripheral surface of the wire clamped therebetween and such portions of the clamping members will engage the bore wall of the well or the well casing (not shown) into which the tubing string is being moved in use to prevent contact between the well casing and the insulated wire. Furthermore, rotary movement of the

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tubing string will not damage the wire, since the wire is held tautly tensioned longitudinally by adjacent members 10 secured at suitable intervals, for example at each coupling in a string of tubing. Likewise, the curved end portions 22, 23, 24 and 25 of the clamping members will act as cams to guide the tubing as it is moved longitudinally or rotated in the casing and thus prevent scuffing or other damaging engagement of the wire with the casing or the bore wall of the well.

It will also be obvious that all the objects of the invention have been accomplished in the form of the device just described, wherein the flexible insulated electrical conductor wire is firmly held and supported by a plurality of securing and supporting members mounted at spaced intervals along a tubing string, whereby the wire is secured to the tubing string and supported therein against longitudinal tensile failure, against being bruised, crushed or broken due to abrasion or wear against the inner walls of the casing or bore wall of the well, and that the wire will be held out of contact with the casing or well bore wall in deviated holes and will thus not become entangled with or wrapped around the tubing in an undesirable manner.

It will also be seen that the securing and supporting device is economical in structure, being readily formed of resilient metal rod or wire of substantially circular cross section.

A slightly modified form of the securing and supporting device 40 is shown in FIGURE 4. In this form of the device the upper securing and supporting member 41 is in the form of a continuous annular ring member, rather than in the helical form of the member 11 in the form first described. The lower member 42 is identical in all respects to the lower clamping and retaining member 15 of the form first described. The longitudinally extending clamping and protecting members 43 and 44 of this form of the device are secured to the upper and lower members 41 and 42 in substantially the same manner as in the form first described and extend therebetween in spaced parallel longitudinally extending relationship. The upper and lower ends of the clamping members 43 and 44 are welded to the upper and lower members 41 and 42 as shown at 45, 46, 47 and 48, respectively, in substantially the same manner as are the clamping and protecting members 20 and 21 of the form first described. The upper ends of the clamping and protecting members 43 and 44 are beveled upwardly and inwardly at their upper ends, as at 50 and 51, and downwardly and inwardly at their lower ends, as at 52 and 53. These beveled portions serve as camming surfaces in substantially the same manner as do the turned upper end portions 22 and 23 and the lower portions 24 and 25 of the form first described. The use and functioning of this modification of the securing and supporting member is substantially the same as the form first described and the wires are securely clamped between the members 43 and 44 and the upper ring 41 and the lower retaining member 42 in the same manner as was the wire in the form first described.

It is believed manifest that a plurality of laterally spaced pairs of clamping members 20 and 21, or of clamping members 43 and 44 may be secured to the upper and lower members 11 and 15 or 41 and 42 of the securing and supporting devices, whereby more than one wire may be secured to and supported on the exterior of the tubing if desired.

Another embodiment of the invention is illustrated in FIGURES 5 and 6, wherein the securing and supporting device 60 has an upper supporting annular ring member 61 and a lower resilient clamping and retaining member 62 connected by a longitudinally extending connecting member 63 having an external longitudinally extending rib 64 formed or secured thereon and extending from adjacent the upper end of the upper ring 61 to the lower end of the lower retaining member 62. The ring 61

and retaining member 62 are formed of substantially cylindrical cross-sectional members connected by the helical connecting member 63. The upper and lower members 61 and 62 are designed to function in the same manner as the members 41 and 42 of the form just described, the connecting member 63 spacing the members for positioning them at opposite ends of the coupling in the manner already described.

The external rib 64 has an outwardly and downwardly beveled surface 65 at its upper end and an outwardly and upwardly beveled surface 66 at its lower end which serve as camming or guiding surfaces for the rib during movement of the tubing carrying the device through the well casing or well bore.

For frictionally clamping and retaining a wire to be supported by the device, a pair of longitudinally spaced studs 67 and 68, each having a flanged head 69 thereon, are positioned or secured to one side of the rib 64 in such a manner that they do not project beyond the outer surface of the ribs and yet are spaced from the connecting member 63 a distance sufficient to admit the insulated flexible wire between the flanged heads and the connecting member 63.

In connecting the wire to the studs, the wire may be pressed between the flanged heads and the connecting member 63 and curved about the upper and lower studs as shown to effect a gripping and clamping connection between the wire and the securing and supporting member. Obviously, the upper ring 61 prevents downward movement of the member with respect to the coupling of the tubing string and the lower clamping and retaining member 62 prevents upward movement of the member with respect to the coupling.

If desired, the member 60 may be modified slightly by omitting the studs 67 and 68 with their flanged head and providing angularly positioned spaced slots 70 and 71 in the rib 72 of the connecting member 73 as shown in FIGURE 7. The other parts of the securing and supporting member for this embodiment of the member are otherwise the same as those shown in FIGURES 5 and 6. The slots 70 and 71 extend at substantially right angles with respect to each other and at angles of approximately 45 degrees with the longitudinal axis of the rib 72. The slots are placed sufficiently close together to permit the insulated wire W to be positioned in the slots in the manner shown in FIGURE 7, the slots being narrow enough to resiliently frictionally grip and hold the wire in place in the slots. If desired, the slots 70 and 71 may be convergent inwardly toward the connecting member 73 as shown in FIGURE 7a, whereby wire engaged in the slot may be urged toward the bottom of the slots adjacent the connecting member 73.

A further modification of the rib 72 to provide a means for preventing outward displacement of the wire W from the slots 70 and 71 formed therein is illustrated in FIGURE 8, wherein the rib is provided at its outer surface with opposed laterally projecting longitudinally extending flanges 77 and 78. These longitudinally extending flanges serve to engage and retain the longitudinally extending portion of the wire W against outward displacement from the slots 70 and 71 as clearly shown in the drawing.

A further modification of the securing and supporting device, shown in FIGURE 9, is adapted to be formed of resilient sheet metal. The device 80 has an upper cylindrical securing and supporting ring 81 and a lower arcuate clamping and retaining member 82, substantially cylindrical in configuration and corresponding to the upper and lower members 61 and 62 of the form of the invention just described. The upper ring member 81 and the lower retaining member are connected by an integral connecting member 83 which is shown as comprising a pair of longitudinally extending parallel laterally spaced strips 84 and 85. Resilient clamping and retaining members 86 and 87 are formed in the upper ring member 81 and the lower retaining member 82, respec-

tively. The clamp and protecting member is formed of substantially V-shaped tab portions of the resilient metal forming the upper and lower members cut loose from such members and bent into a substantially V-shaped clip form with the free ends of such members disposed in the openings from which the V-shaped tab portions were cut. The insulated flexible wire (not shown) will be inserted within the V-shaped openings of the clip members 86 and 87 and will be frictionally gripped and retained in place between such clip members and the exterior surfaces of the upper ring 81 and of the lower retaining member 82, the outer bent portions of the clamp and protecting members projecting beyond the surface of the wire and engaging the wall of the casing or the well bore to prevent the wire from rubbing thereagainst as the tubing is lowered in the well. The upper ring 81 may be formed by joining the ends of the same as by welds as shown at 88.

A slightly modified form of clip is shown in FIGURE 10, wherein the clips 90 are substantially rectangular in configuration and are formed from rectangular tabs formed by cutting U-shaped slots in the ring 81 and the retaining member 82 to free the tab portions from the remainder of the ring 81 and the retaining member 82. The tab portions 90 are then bent outwardly from the upper ends of the arms of the U at an angle to the outer surface of the ring 81 and are bent inwardly at its mid-portion toward the openings 92 from which the tabs were cut. The wire W is adapted to be received in the V-shaped space formed between the outwardly and inwardly bent portions of the tabs 90 and the exterior surfaces of the ring 81 and the retaining member 82, whereby the wire is resiliently frictionally bent and secured in place in the ring and supported by the clip. Obviously, all forms of the securing and supporting device operate to support the wires in substantially the same manner as to provide the results sought in the objects set forth.

While the insulated wire shown has only one electrical conductor, it will be apparent that such insulated wire may comprise a plurality of conductors insulated from one another.

The foregoing description of the invention is explanatory only, and changes in the details of the construction illustrated may be made by those skilled in the art, within the scope of the appended claims, without departing from the spirit of the invention.

What is claimed and desired to be secured by Letters Patent is:

1. A securing and supporting device for securing a flexible insulated electrical wire to the exterior of a string of well pipe including: a substantially annular upper securing and supporting member; a lower clamping and retaining member; longitudinally extending connecting means connecting said upper and lower members; and wire retaining means on said connecting means disposed outwardly of said upper and lower members and disposed to engage a flexible resiliently insulated electrical conductor wire to retain and support said wire thereon externally of the upper and lower members.

2. A securing and supporting device for securing a flexible insulated electrical wire to the exterior of a string of well pipe including: a helical resilient substantially annular upper member having overlapping end portions; a lower resilient substantially arcuate clamping and retaining member; and longitudinally extending connecting means connecting said upper and lower members and disposed outwardly of said upper and lower members, said connecting means being spaced whereby a flexible resiliently insulated electrical wire may be disposed and engaged therebetween to be supported thereby externally of the upper and lower members.

3. A securing and supporting device for securing a flexible insulated electrical wire to the exterior of a string of well pipe including: a helical resilient substantially annular upper member having upper and lower overlapping end portions; a lower clamping and retaining

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member; and longitudinally extending spaced connecting means connecting said lower member and the said lower end portion of said upper member, said connecting means being disposed to engage a flexible resiliently insulated electrical wire to retain and support said wire thereon, said wire being disposable between said spaced connecting means externally of said upper and lower members.

4. A securing and supporting device for securing a flexible insulated electrical wire to the exterior of a string of well pipe including: a helical resilient substantially annular upper member having upper and lower overlapping end portions; a lower clamping and retaining member; longitudinally extending spaced connecting means connecting said upper end portion of said upper member and said lower member, said connecting means being disposed to engage a flexible resiliently insulated electrical wire to retain and support said wire thereon, said wire being adapted to be disposed between said spaced connecting means externally of said upper and lower members, said lower clamping and retaining member being arcuate in configuration and having end portions spaced apart a distance less than the diameter of the arcuate configuration of said lower clamping and retaining member.

5. A securing and supporting device for securing a flexible insulating electrical conductor wire to the exterior of a string of well pipe including: a helical resilient substantially annular upper member having overlapping upper and lower end portions; a lower clamping and retaining member arcuate in configuration and having its end portions spaced apart a distance less than the diameter of the arcuate configuration of said lower retaining member; and a pair of spaced longitudinally extending wires connecting said upper overlapping end portion of said upper member and said lower clamping and retaining member, said wires having angular portions disposed to project beyond the exterior surface of any wire clamped therebetween, said wires providing upper downwardly and outwardly extending surfaces at their upper ends and lower upwardly and outwardly extending surfaces at their lower ends which extend outwardly of any wire clamped between said wires and disposed outwardly of said upper and lower members.

6. A securing and supporting device for securing a flexible insulated electrical wire to the exterior of a string of well pipe including: a substantially annular upper securing and supporting member; a lower clamping and retaining member substantially arcuate in configuration and having its end portions spaced apart a distance less than the diameter of the arcuate configuration of said lower retaining member; longitudinally extending connecting means connecting said upper and lower member, said connecting means having a longitudinal outwardly extending rib, said ribs being provided with means disposed to be engaged by a flexible resiliently insulated electrical wire to retain and support said wire on said rib externally of said upper and lower members.

7. A securing and supporting device for securing a flexible insulated electrical wire to the exterior of a string of well pipe including: a substantially annular upper securing and supporting member; a lower clamping and retaining member substantially arcuate in configuration and having its end portions spaced apart a distance less than the diameter of the arcuate configuration of said lower retaining member; longitudinally extending connecting means connecting said upper and lower member, said connecting means having a longitudinal outwardly extending rib, said rib being provided with means disposed to be engaged by a flexible resiliently insulated electrical wire to retain and support said wire on said rib, said last mentioned means including a pair of longitudinally spaced flanged studs extending laterally outwardly of said rib.

8. A securing and supporting device for securing a flexible insulated electrical wire to the exterior of a string of well pipe including: a substantially annular upper se-

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curing and supporting member; a lower clamping and retaining member substantially arcuate in configuration and having its end portions spaced apart a distance less than the diameter of the arcuate configuration of said lower retaining member; longitudinally extending connecting means connecting said upper and lower member, said connecting means having a longitudinally outwardly extending rib, said rib being provided with means disposed to be engaged by a flexible resiliently insulated electrical wire to retain and support said wire on said rib, said last mentioned means including a pair of outwardly opening slots in said rib for receiving said wire.

9. A securing and supporting device for securing a flexible insulated electrical wire to the exterior of a string of well pipe including: a substantially annular upper securing and supporting member; a lower clamping and retaining member substantially arcuate in configuration and having its end portions spaced apart a distance less than the diameter of the arcuate configuration of said lower retaining member; longitudinally extending connecting means connecting said upper and lower member, said connecting means having a longitudinal outwardly extending rib, said rib being provided with means disposed to be engaged by a flexible resiliently insulated electrical wire to retain and support said wire on said rib, said last mentioned means including a pair of slots in said rib for receiving said wire extending laterally convergently in one direction and opening outwardly of said rib.

10. A securing and supporting device for securing a flexible insulated electrical wire to the exterior of a string of well pipe including: a substantially annular upper securing and supporting member; a lower clamping and retaining member substantially arcuate in configuration and having its end portions spaced apart a distance less than the diameter of the arcuate configuration of said lower retaining member; longitudinally extending connecting means connecting said upper and lower member, said connecting means having a longitudinal outwardly extending rib, said rib being provided with means disposed to be engaged by a flexible resiliently insulated electrical wire to retain and support said wire on said rib, said last mentioned means including a pair of slots in said rib for receiving said wire extending laterally convergently in one direction and divergently outwardly from said connecting member.

11. A securing and supporting device for securing a flexible insulated electrical wire to the exterior of a string of well pipe including: a substantially annular upper securing and supporting member; a lower clamping and retaining member substantially arcuate in configuration and having its end portions spaced apart a distance less than the diameter of the arcuate configuration of said lower retaining member; longitudinally extending connecting means connecting said upper and lower member, said connecting means having a longitudinally outwardly extending rib, said rib being provided with means disposed to be engaged by a flexible resiliently insulated electrical wire to retain and support said wire on said rib, said last mentioned means including a pair of outwardly opening slots in said rib for receiving said wire, said rib having a pair of lateral outwardly extending flanges engageable by a wire for preventing outward displacement of the wire from the rib.

12. A securing and supporting device for securing a flexible insulated electrical conductor wire to the exterior of a string of well pipe including: a substantially annular upper securing and supporting member; a lower clamping and retaining member arcuate in configuration and having its end portions spaced apart a distance less than the diameter of the arcuate configuration of said lower retaining member; longitudinally extending connecting means connecting said upper and lower members; and wire retaining means disposed on said device outwardly of said upper and lower members for engaging a flexible

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resiliently insulated electrical wire to retain and support said wire on said device.

13. A securing and supporting device for securing a flexible insulated electrical conductor wire to the exterior of a string of well pipe including: a substantially annular upper securing and supporting member; a lower clamping and retaining member arcuate in configuration and having its end portions spaced apart a distance less than the diameter of the arcuate configuration of said lower retaining member; longitudinally extending connecting means connecting said upper and lower members; and means disposed on said device to engage a flexible resiliently insulated electrical wire to retain and support said wire on said device outwardly of said upper and lower members, said last means comprising a resilient arcuate tab having a free end portion extending toward a slot provided in said upper and lower member, said tabs being substantially triangular in configuration.

14. A securing and supporting device for securing a flexible insulated electrical conductor wire to the exterior of a string of well pipe including: a substantially annular upper securing and supporting member; a lower clamping and retaining member arcuate in configuration and having its end portions spaced apart a distance less than the diameter of the arcuate configuration of said lower retaining member; longitudinally extending connecting means connecting said upper and lower member; and means disposed on said device to engage a flexible resiliently insulated electrical wire to retain and support said wire on said device, said last means comprising a resilient arcuate tab having a free end portion extending toward a slot provided in said upper and lower member, said tabs being substantially rectangular in configuration.

15. A securing and supporting device adapted for use with well pipe having a plurality of sections connected by couplings to secure and support a flexible insulated

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electrical conductor wire on the exterior of said pipe, said device including: an upper substantially annular supporting member adapted to surround a portion of the pipe above a coupling; a lower arcuate resilient clamping member adapted to engage a section of the well pipe below the coupling; a connecting member extending between and connecting the upper and lower members and retaining the same in close proximity to the upper and lower ends of the coupling; and wire retaining means on said device disposed outwardly of said upper and lower members for retaining a flexible insulated electrical wire on said device externally of said upper and lower members against lateral and longitudinal displacement with respect thereto, said upper and lower members being adapted to engage a coupling of a well pipe for limiting movement of said device longitudinally of the well pipe.

16. A securing and supporting device for securing a flexible insulated electrical wire to the exterior of a string of well pipe, including: a substantially annular upper member; a lower clamping and retaining member; longitudinally extending spaced connecting means disposed outwardly of said upper and lower members connecting said upper and lower members, said wire being disposable outwardly of said upper and lower means and between said spaced connecting means to be engaged by said spaced connecting means whereby said spaced connecting means retain and support the wire on said device.

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