

Dec. 23, 1958

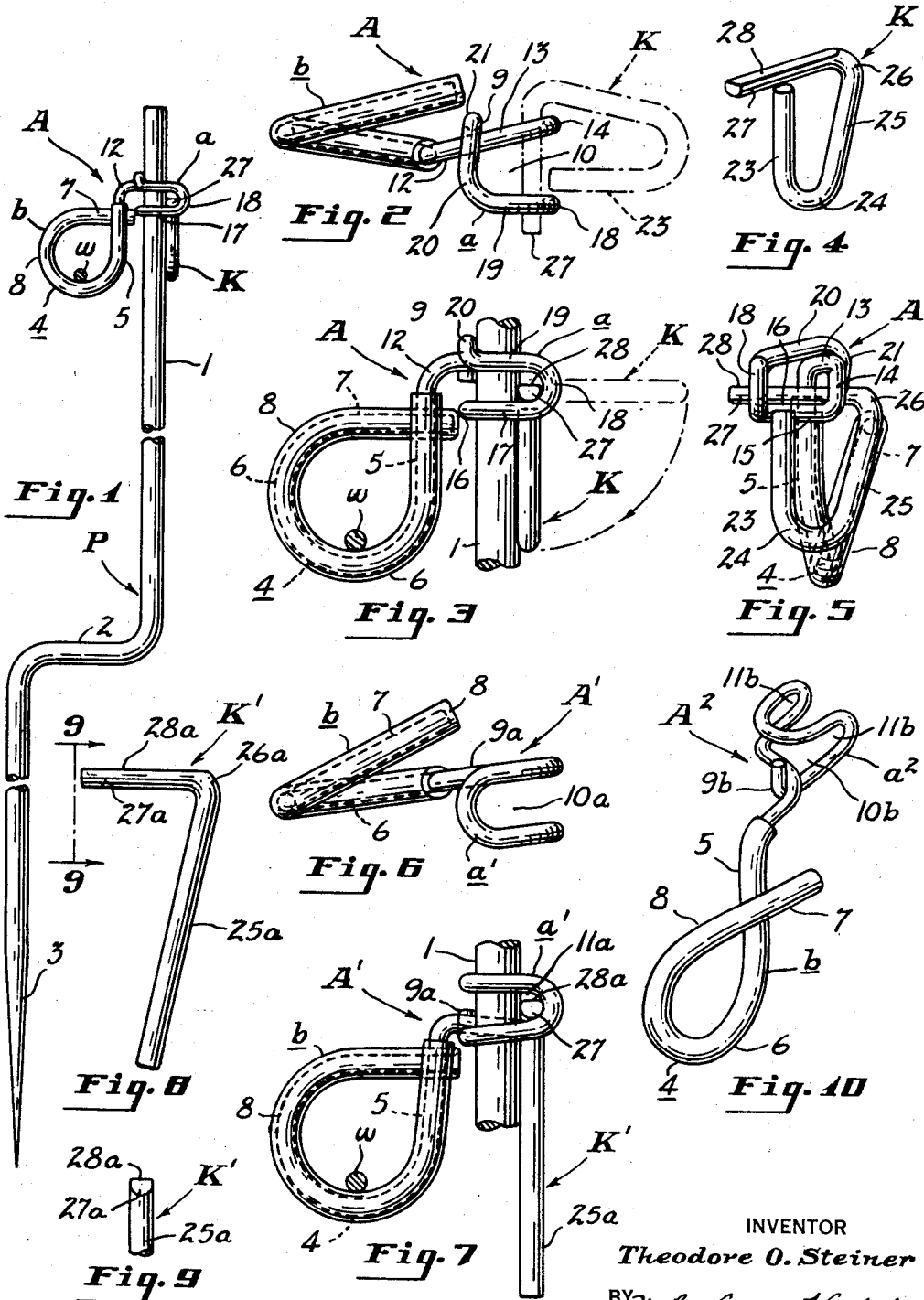
T. O. STEINER

2,865,609

INSULATED FASTENER FOR ELECTRIC FENCES

Filed Sept. 26, 1956

2 Sheets-Sheet 1



INVENTOR
Theodore O. Steiner
BY *McLoy, Greene & LeGrottenhuis*
ATTORNEYS

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I. O. STEINER

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2 Sheets-Sheet 2

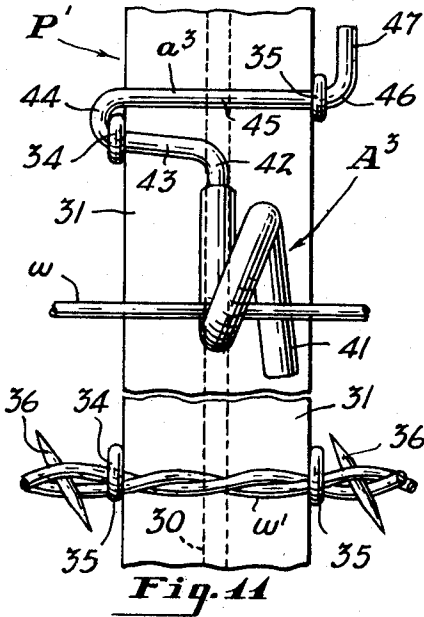


Fig. 11

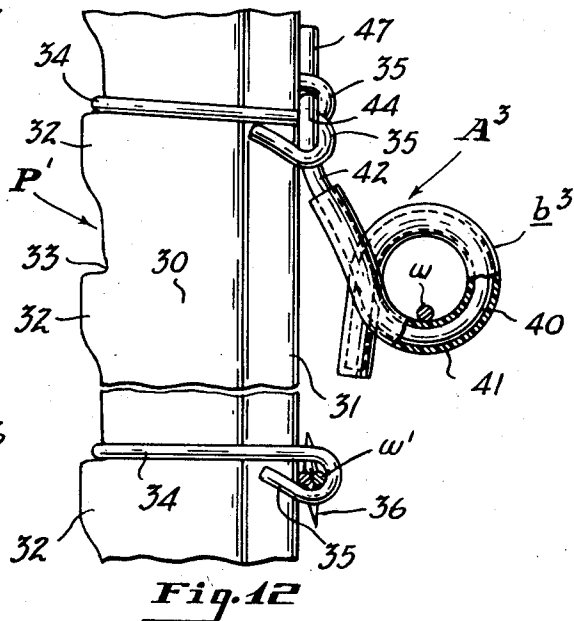


Fig. 12

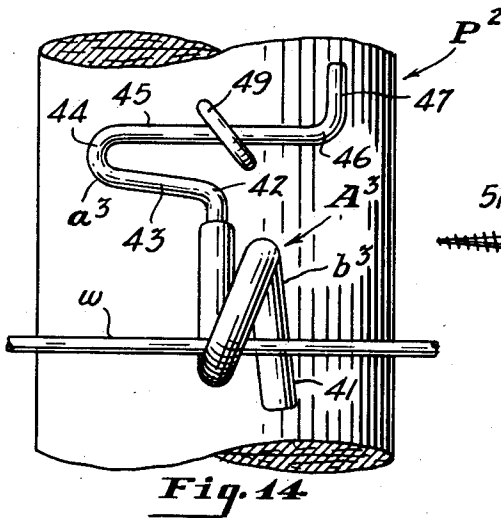


Fig. 14

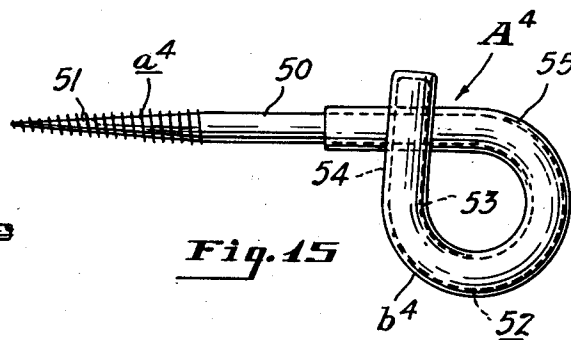


Fig. 15

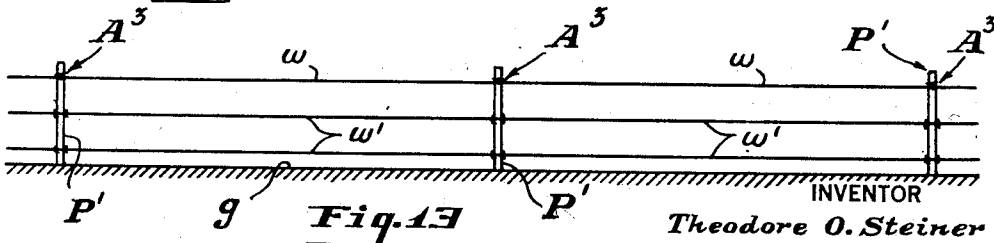


Fig. 13

INVENTOR
Theodore O. Steiner
BY *McCoy, Greene & LeProtenhais*
ATTORNEYS

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INSULATED FASTENER FOR ELECTRIC FENCES

Theodore O. Steiner, Akron, Ohio

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14 Claims. (Cl. 256—10)

This invention relates to insulated fasteners for connecting wires to fence posts of round, square or rectangular cross section and more particularly to a simple fastening device for electric fencing which may easily be attached to a fence post and which provides an insulated loop for receiving the fence wire.

The common insulator for electric fencing consists of a number of separate parts, including a spool porcelain insulator, a wire spring clamp to hold the fence wire to the porcelain spool, a leather or composition washer, and a screw clamp which extends through the spool insulator and around the fence post and is fastened thereto by tightening the screw. In place of the screw clamp, a long cotter pin is usually substituted where the spool insulator is to be fastened to posts of T-shaped or half-square cross section. While the aforementioned assemblies serve their purpose fairly well, they are clumsy to install and are easily broken (especially if tightened excessively or if dropped on a hard surface), and oftentimes the screw clamp loosens and the insulator turns and shorts the fence wire thereby rendering the fence useless.

According to the present invention, a combination insulator and wire support is provided from a single piece of wire formed to provide a rigid attaching portion and a rigid wire-supporting portion. The attaching portion is adapted for rigid attachment to a fence post and the wire-supporting portion is bent to provide a wire-receiving loop which is covered with insulating material so that the electric wire of the fence retained in said loop cannot conduct electricity to the fence post. The attaching portion is preferably formed by bending the wire, for example so that the device may be easily stapled to a wooden post or may be easily connected to a Y-shaped metal post by the conventional short wires normally used to connect barbed wire to such metal posts.

In the preferred insulated electric wire support of the present invention, the attaching portion is bent to form an elongated loop having a length at least about twice its width, which loop is bent back upon itself to provide two, vertically spaced, superposed, post-receiving channels opening in the same direction and two, laterally spaced, aligned, key-receiving channels opening in the same horizontal direction. The wire of the attaching portion is preferably bent to provide one substantially semicircular bend located in one plane and two substantially semicircular bends located in spaced, generally parallel planes perpendicular to the first-mentioned plane, so that the fastener will fit on a post in the form of a round bar and so that the locking key may be formed from a round wire or bar. The end of the wire forming the attaching portion is preferably interlocked with another portion of the wire so as to form a strong rigid construction.

The fastening device of the present invention is rigidly mounted on a metal fence post by placing the attaching portion on the post so that the post is within the two superposed channels described above, and thereafter plac-

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ing a key of oblong cross section against the post and within the key-receiving channels described above. The larger cross sectional dimension of the key is greater than the space between the post and the wire of said attaching portion so that the key bites into the post when it is rotated to a position wherein the maximum cross sectional dimension of the key is horizontal and perpendicular to the post.

The present invention provides a way to reduce the cost of electric fencing since wire supports can be formed from single pieces of wire by mass production processes at very low cost. The wire support of the present invention is not only inexpensive to manufacture but also provides one of the highest quality supports for electric wires. The wire support is ideal for ranchers and farmers who wish to add electric wires to existing fences and may easily be connected to and disconnected from a fence post.

An object of the present invention is to provide a simple inexpensive insulator for electric fences which is easily and readily installed and removed from the fence posts.

Another object of the invention is to provide an insulator for electric fencing which when fastened in place will not turn or slip in any direction.

A further object of the invention is to provide an insulator and fastening device for electric fences which has a minimum of parts and which will last indefinitely.

Another object of the invention is to provide an insulator for electric fences in which the fence wire is easily mounted and securely held.

A still further object of my invention is to provide effective and economical means for fastening insulators and other objects to various shapes of bars and posts.

Other objects, uses and advantages of the invention will become apparent to those skilled in the art from the following description and claims and from the drawings in which:

Figure 1 is a side elevational view on a reduced scale with parts broken away showing a fence post P with the insulated fastener A of the present invention attached thereto;

Figure 2 is a top view of the insulated attaching device A of Fig. 1 on a larger scale with the key K shown in dot-dash lines in its position preparatory to locking;

Figure 3 is a fragmentary side elevational view like Fig. 1 but on a larger scale, the key K being shown in dot-dash lines in its position prior to locking;

Figure 4 is a perspective view of the locking key K of Figs. 1 to 3;

Figure 5 is an end elevational view of the fastening device A of Fig. 3 on the same scale with the post omitted showing the key K in locked position;

Figure 6 is a top view similar to Fig. 2 showing a modified form of fastening device A¹;

Figure 7 is a fragmentary side elevational view similar to Fig. 3 showing the device A¹ of Fig. 6 locked in place on a fence post P by means of a removable L-shaped locking key K¹ which is similar to the U-shaped key K of Figs. 1 to 5;

Figure 8 is a side elevational view of the key K¹ of Fig. 7;

Figure 9 is a fragmentary end elevational view of the locking key K¹ taken on the line 9—9 of Fig. 8 and on the same scale;

Figure 10 is a perspective view of another modified form of fastening device A² according to the present invention;

Figure 11 is a fragmentary front elevational view of another modified form of my invention shown mounted on a standard Y-shaped post P¹ with conventional barbed wire attached to the same post;

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Figure 12 is a fragmentary side elevational view of the Y-shaped post P¹ of Fig. 11 on the same scale;

Figure 13 is a fragmentary front elevational view showing on a reduced scale a typical section of the permanent fencing shown in Figs. 11 and 12;

Figure 14 is a fragmentary front elevational view showing another modified form of my invention attached to a wooden fence post P² by means of a single common staple; and

Figure 15 is a side elevational view showing another modified form of my invention which may be mounted on the wooden post P².

Referring more particularly to the drawings, which are drawn substantially to scale, and in which like parts are identified by the same letters and numerals throughout the several views, Fig. 1 shows an improved fence post P formed of a cold-rolled steel rod of circular cross section having a diameter of 0.3 to 0.6 inch, said rod being bent to provide a straight upper portion 1 having a length of about three to five feet, a straight horizontal portion 2 with a length of two to four inches for engaging the ground, and a tapered vertical portion 3 with a length of one or two feet which is inserted into the ground. The portion 2 may be engaged by the foot to force the post into the ground at the desired location. The portion 1 has a uniform cross section throughout its height and preferably has a diameter of 0.3 to 0.6 inch.

Figures 1 to 5 show an insulated fastener A according to the present invention, which is formed from a single piece of metal wire or rod, preferably of circular cross section, having a diameter of about 0.1 to 0.2 inch and a length of about 6 inches to 1 foot. The rod is bent to provide an attaching portion a, and an integral wire-supporting portion b, which is insulated. The portion b is formed to provide a helical loop 4 with a diameter of 0.5 to 1.5 inches having a vertical portion 5, a semicircular portion 6, and a generally horizontal portion 7, the loop being completely covered with a tube or sleeve of insulation 8 having a radial thickness of .02 to .07 inch. The material used at 8 may be rubber or various other non-conducting materials, but is preferably a flexible plastic which will last for long periods of time. The sleeve of insulation may be formed in situ by dipping the metal loop or the sleeve may be formed separately and slipped over the rod forming the loop. A neoprene tube, for example, would provide excellent insulation.

The insulating material for the wire loop of the fastener of the present invention may be made from phenol-aldehyde resins and various other non-conducting plastic materials, but it is preferable to employ linear thermoplastic materials which do not crack readily and which may be compounded to provide high resistance to deterioration by abrasion, heat and light. The preferred plastic is a polymer or copolymer of vinyl chloride which is plasticized and which is flexible so that it will not crack due to slight flexing of the wire forming the fastener. The plastic may be sufficiently hard so as to resist deformation and abrasion by the electric wire of the fence.

It is preferable to form the insulating sleeve on the metal loop in situ. The insulating layer may be applied easily by dipping the wire loop (preferably while hot) into a suitable plastisol such as one formed of a finely divided polyvinyl chloride suspended as discrete particles in a plasticizer such as dioctyl phthalate, tricresyl phosphate, or the like, with or without additional thinner. The amount of said plasticizer is preferably just sufficient to form a solid when absorbed by the polyvinyl chloride. The metal loop should be heated after it is dipped in the plasticizer sufficiently (usually 300 to 400° F.) to cause the plasticizer and polyvinyl chloride to combine so as to provide the desired plastic sleeve. It is usually more convenient to heat the metal loop before it is dipped so that it is easier to form a thick plastic covering (gel) over

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the metal. Plastisols of various plastics may be used when dipping the metal loops.

The dipping procedure is also effective using aqueous latex dispersions as will be apparent to those skilled in the art. A rubber latex may be applied readily by dipping to provide a rubber sleeve for insulating the loop. Neoprene rubber would be preferred over most other rubbers. The latex method may be used also to apply plastic insulating sleeves to the metal loop.

It will be apparent that various non-conductive high polymers would provide satisfactory insulation. Excellent results could be obtained using plasticized polyvinyl chlorides and other polymers or copolymers of vinyl chloride, vinylidene chloride, or the like with vinyl acetate, acrylonitrile, or the like, polyvinylidene chloride, polyethylene or other thermoplastic materials. Suitable materials may be added to the plastic to increase its flexibility, abrasion resistance and resistance to heat and sunlight. A polyvinyl chloride plastic may be pigmented with carbon black to provide increased resistance to sunlight and may be compounded to provide the required hardness and flexibility. The preferred material for the insulation is one which may be applied by dipping and which provides a very smooth, water-repellent surface so that drops of water will bead as on a highly waxed surface.

The attaching portion a is made by bending the metal rod and interlocking the rod with itself at 9 to form a generally rectangular loop having a length slightly greater than twice its width, said width being slightly greater than the diameter of the post portion 1. Such loop is bent reversely and back upon itself to form a pair of superposed vertically aligned post-receiving channels 10 of substantially the same size, which open in one direction, and two laterally aligned key-receiving channels 11 of the same size, which open in the opposite direction.

The steel rod of the attaching portion a is bent to form a curved portion 12 joining the portions a and b, a straight generally horizontal portion 13, and a generally semicircular vertical portion 14, a straight generally horizontal portion 15, a generally semicircular horizontal portion 16, a straight generally horizontal portion 17 substantially in horizontal alignment with the straight portion 15, a generally semicircular vertical portion 18 laterally aligned with the vertical curved portion 14, a straight generally horizontal portion 19 horizontally aligned with the straight portion 13, a curved generally horizontal portion 20 substantially in vertical alignment with the horizontal portion 16, and an end hook at 9 having a short vertical portion 21 which engages the side of the straight portion 13 to hold the portions 19 and 20 against movement away from the portion 13. The portions 13 to 15 are located on one side of the post and the portions 17 to 19 are located on the opposite side of the post, said portions forming the two key-receiving channels 11 which have the same width and depth. The straight portions 15 and 17 and the curved portions 16 adjoining said portions form one of the U-shaped channels 10, and the portions 13, 18 and 19 form the other post-receiving channel 10. It will be noted that the portions 12 to 21 are numbered in order moving along the wire of the attaching portion a away from the loop portion b.

Figure 4 shows a key K which is used with the insulated fastener A to connect the fastener to the post portion 1. The key K is formed from a steel rod preferably of circular cross section having a diameter of about 0.1 to 0.3 inch and a length of about 2 to 8 inches. As herein shown the key K is formed from the cold-rolled steel rod of circular cross section having a diameter of 0.1 to 0.3 inch, which is bent into a loop having a straight portion 23, a curved portion 24, a straight generally vertical portion 25, a curved edge portion 26, and a straight portion 27 of oblong cross section which preferably has a length of 0.5 to 2 inches. The portion 27 is reduced in thickness (preferably 20 to 40 percent) by grinding,

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milling or other machining operation to form a flat surface 28 on one side thereof, the remainder of the outer surface of the portion 27 being of uniform curvature at any cross section.

It will be noted that the bottom portion of each key-receiving channel 11 is semicircular and has an internal diameter only slightly greater than the external diameter of the rod forming the key K. As herein shown, the internal width of each channel 11 is substantially less than the internal width of each channel 10, the width of the channel 10 being slightly greater than the diameter of the post at 1. The depth of each post-receiving channel 10 is greater than the diameter of the post portion 1 by an amount less than the diameter of the rod forming the key K and greater than the minimum cross sectional dimension of the straight key portion 27, whereby the portion 27 fits loosely within the channel 11 when it is in the horizontal position shown in dot-dash lines in Fig. 3 and bites into the post to hold the fastener A tightly in place when it is moved to a vertical position against the post as shown in solid lines in Fig. 3. It will be noted that the depth of the channel 10 is greater than its internal width by an amount less than the internal width of each channel 11 and is at least about half said last mentioned width.

Figures 2 and 3 indicate how the fastener A may be mounted on the post portion 1. The straight portion 27 of the key K is held manually against the internal surfaces of the curved portions 14 and 18 within the channels 11 as shown in dot-dash lines in Figs. 2 and 3, with the flat surface 28 in a vertical position so that there is sufficient space between the key portion 27 and the bottoms of the channels 10 to receive the post portion 1. The fastener A is mounted on the post while the key is held as indicated above and the key is then forced downwardly against the post. Since the portion 27 is of oblong cross section it presses against the post when it is rotated and is tightly gripped between the post and the vertical portions 14 and 18. The force of said last mentioned portions on the key forces the side portions of the key into the post P so as to provide a very tight connection. However, the fastener may easily be removed by prying the key away from the post and swinging it to a horizontal position. As herein shown the key K is permanently mounted on the fastener A since the distance between the straight portion 27 and the end of the portion 23 is less than the diameter of the metal wire forming the fastener A.

However, it will be apparent that the portion 23 may be omitted and that various removable keys may be used, for example as shown in Figs. 8 and 9.

Figures 6 and 7 show a modified form of insulated fastener A', which is quite similar to the fastener A, and has a wire-supporting portion b identical to the portion b of the fastener A. The attaching portion a' of the fastener A' is formed by bending a metal wire or rod and interlocking the portions of the rod at 9a to form a generally rectangular loop with a length slightly greater than twice its width, which loop is bent reversely back upon itself to form two, superposed, post-receiving 10a and two, laterally aligned, key-receiving channels 11a. It will be apparent that the fastener A' functions in the same way as the fastener A and may employ the key K of Fig. 4. However, as shown in Fig. 7, the fastener A' is securely mounted on the vertical portion of the post P by means of an L-shaped key K' made from a metal rod of circular cross section having a diameter of 0.1 to 0.3 inch and a length of 2 to 8 inches.

The key K' has a straight handle portion 25a, a curved edge portion 26a, and a straight locking portion 27a of oblong cross section having a flat surface 28a. The portion 27a is of exactly the same size as the portion 27 described above and functions in the same manner. Since the key K' is separate from the insulated fastener A' and may be slid through the channels 11a while said

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fastener is held in place against a post, it is very easy to position the fastener on the post so that said post is within the channels 10a.

Figure 10 shows another modified form of insulated fastener A² having a different type of attaching portion a² and a wire-supporting portion b, which is identical to the portion b of the fasteners A and A'. The portion A² has a joint at 9b similar to the joints 9 and 9a described above and is formed to provide a loop which is bent back upon itself to form superposed post-receiving channels 10b and laterally aligned key-receiving channels 11b. It will be apparent that the fastener A² is equivalent to the fasteners A and A' and cooperate with the key K or K' in the same manner.

Figures 1 and 7 show how the electric wire w is mounted within the loop 4 of the insulated fasteners. The helical loop facilitates mounting of the wire w since the straight portions 5 and 7 of the loop are spaced apart axially a distance of almost ¼ of an inch and greater than the diameter of the wire w to permit dropping of the wire w between the portions 5 and 7 when the fastener is turned so that the axis of the loop 4 is perpendicular to the wire w and the wire forming said loop is substantially in a plane parallel to the wire w. When the fastener is turned so that the axis of the loop is parallel to said wire and the fastener is rigidly attached to the post by the locking key, the wire cannot come out of the loop 4. The fastener of the present invention, therefore, provides an ideal support for the electric wire w, the plastic 8 providing ideal insulation due to its self-cleaning action when subjected to water and its smooth outer surface which tends to bead the drops of water so that an electrically conductive film cannot be formed.

Figures 11 to 13 illustrate another modified form of the invention particularly well suited for conventional steel posts now being used extensively in permanent fencing to support barbed wire. These figures show a conventional steel post P' of Y-shaped cross section with a thickness of around 0.1 to 0.2 inch having a web 30 and inclined flanges 31 on opposite sides of said web, the horizontal width of the post being greater than one inch. The web is provided with a serrated edge providing a series of regularly spaced projections 32 and a series of shallow wire-receiving notches 33. Conventional barbed wires w', consisting of two wires twisted together to hold a series of barbs 36, may be mounted on the posts P' to form a fence, for example as shown in Fig. 13 wherein the posts P' are spaced several feet apart and are anchored in a vertical position in the ground indicated at g. The projections 32 are located at the same place on each of the posts P' so that the wires w' may be mounted easily on the posts in a horizontal position parallel to the ground. It is conventional practice to connect the barbed wire to the post by means of short connecting wires 34 with a length in the neighborhood of 4 to 6 inches and a diameter in the neighborhood of 0.1 inch. Each wire 34 is placed in a notch 33 and is bent around the post P', the opposite end portions 35 of said wire being bent reversely around the barbed wire w' and back upon itself so as to hold the barbed wire tightly against the flanges 31 of the post. Barbed wire fences made in this way are used extensively.

The present invention provides an inexpensive way to use the conventional Y-shaped posts P' with the conventional connecting wires 34 to make an electric fence. Figures 11 to 14 show a simple inexpensive insulated fastener A³ which may be connected readily to the post P' by a short connecting wire 34 to provide a support for a double barbed wire or a single, electrically conductive wire w of copper or other suitable metal. The fastener A³ is made from a single piece of steel wire or rod, preferably of circular cross section, having a diameter of about 0.1 to 0.2 inch and a length of about 6 inches to one foot, which wire is bent to provide an attaching portion a³ and a wire-receiving portion b³ corresponding

to the portions *a* and *b* of the first-described fastener A. The portion *b*³ is bent to provide a helical loop 40, similar to the loop 4 described above, which is completely covered by a tube or sleeve 41 of suitable insulating material, substantially the same as the sleeve 8 described above.

At the end of the loop 40 is a sharply curved portion 42 that connects the portions *a*³ and *b*³. The attaching portion *a*³ is bent to provide a straight inclined portion 43, a vertically extending semicircular portion 44, a straight horizontal portion 45 having a length of around 1 to 2 inches and slightly greater than the horizontal distance between the vertical end edges of the flanges 31, a sharply curved portion 46, and a short straight vertical portion 47 extending away from the portion 42 as is apparent from Figs. 11 and 14, which are drawn substantially to scale.

It will be apparent from Figs. 11 and 12 how the fastener A³ is mounted on the post P'. The straight horizontal portion 45 of the fastener is held in a horizontal position against the edges of the flanges 31, and the end portions 35 of the short connecting wire 34 are bent around the portions 43 and 45 of the fastener at opposite sides of the post to hold the fastener securely in position. The length of the portion 43 is preferably about half that of the portion 45 so that the curved portion 42 is located substantially in the vertical plane of the web 30. The straight portion of the loop 40 adjacent the attaching portion may be downwardly inclined as indicated in Fig. 12 or may be extended horizontally substantially perpendicular to the post P', for example like the loop 52 shown in Fig. 15. It will be apparent that the loop may be arranged in many different ways without departing from the spirit of the invention.

Figure 14 shows how the fastener A³ may be mounted on a wooden post. As shown in that figure the fastener is rigidly mounted on wooden post P² of generally circular cross section by means of a conventional U-shaped metal staple 49 having two sharp parallel leg portions above and below the straight portion 40 of the fastener which are pounded into the wood of the post. One staple 49 at the center of the straight portion 45 is sufficient to provide a rigid connection since the vertical portion 47 and the portion 43 press against the post to prevent twisting of the fastener in any direction. The fastener, therefore, provides an excellent support for the electric wire *w* when said wire is mounted within the loop 40 as shown in Fig. 14. However, it will be understood that two or more staples 49 could be used if desired.

Figure 15 shows another modified form of insulated fastener A⁴ which is also suitable for conventional wooden posts such as the post P². This fastener is made from a single piece of steel wire or rod with a diameter of preferably about 0.1 to 0.4 inch, having a length of about 6 inches to one foot. The wire is threaded at one end to provide an attaching portion *a*⁴, and is bent at the other end to provide a wire-receiving portion *b*⁴ which is covered with insulating material. As shown in Fig. 15, the fastener A⁴ is P-shaped and consists of a straight horizontal portion 50 with tapered threads 51 suitable for screwing into wood and a helical loop portion 52 covered with a tube or sleeve 55 of suitable insulating material, such as used in the insulating sleeves 8 and 41 described above, the loop 52 including a semicircular portion 53 and a straight vertical portion 54. The vertical portion 54 is spaced from the horizontal portion 50 so as to provide a space between the adjacent outer surfaces of the sleeve 52 slightly greater than the diameter of the wire *w*, or the wire *w'*, so that the wire may easily be dropped within the loop 40. The fastener A⁴ may be made at very low cost since it is an easy matter to roll the threads 51 and to form a single loop 40.

It will be apparent that the metal wires or rods forming the fasteners of the present invention may have different cross sections although it is preferable that the cross sec-

tion be circular. It will also be apparent that the metal wire used to form the keys K and K' may have an oblong cross section so that the key may be formed merely by bending without the necessity for any grinding or milling operation to change the cross section of the portion 27. All of the metal parts used in the fastener of the present invention may be made of stainless steel or other corrosion resistant metal. However, it is preferable to employ an inexpensive galvanized steel wire. A carbon steel wire is very inexpensive and provides excellent results. The key K or K' is made preferably of a steel with substantial hardness, for example harder than the steel forming the fastener A or the post P. The key, for example, may be made of cold-rolled steel. Where galvanized wire is used, it is preferable to form the key from a wire of oblong cross section so as to minimize rusting of the key.

It will be understood that the foregoing description is by way of illustration rather than limitation and that, in accordance with the provisions of the patent statutes, variations and modifications of the specific devices disclosed herein may be made without departing from the spirit of the invention.

Having described my invention, I claim:

1. In an electric fence having at least one vertical post and an electrically conductive wire, the improvement which comprises a removable insulated wire support comprising a single piece of untwisted wire with a diameter of 0.1 to 0.2 inch and a length of one-half to one foot having a rigid attaching portion with means including one end of said single wire for connecting the wire support to the post and having a wire-retaining portion for supporting the wire, the wire-retaining portion having a bend forming a single helical loop at the other end of the wire for surrounding and supporting the electrically conductive wire in a horizontal position generally perpendicular to said bend and having a smooth impervious sleeve of high molecular weight thermoplastic polymeric insulating material bonded to and covering the wire forming said loop, said sleeve having a radial thickness of 0.02 to 0.07 inch and having water-repelling means comprising a smooth hydrophobic external surface for causing any water contacting the sleeve to bead so as to prevent formation of an electrically conductive water film, portions of the loop being axially spaced and providing an opening to facilitate removal of the electrically conductive wire from within the loop when the wire is in a plane generally parallel to the wire forming the loop, and short wire means separate from said wire support in the form of a U-shaped piece of wire for rigidly holding said wire support to said post.

2. An electric fence as defined in claim 1 wherein the attaching portion of each wire support has a generally horizontal wire portion of substantial length for engaging the vertical face of the post and a short sharply curved wire portion at the end of the wire forming said attaching portion.

3. An electric fence as defined in claim 1 wherein the post is a rigid steel post having a thickness not in excess of about one-quarter of an inch and a horizontal width of at least about one inch, said short wire means comprising a single piece of wire on the post having its opposite end portions extending around the wire forming the attaching portion of the wire support near the opposite sides of the post and having its intermediate portion extending generally horizontally on the side of the post opposite said attaching portion.

4. An electric fence as defined in claim 1 wherein each post is a solid bar and the attaching portion of each wire support comprises a loop having a length at least about twice the diameter of the bar and a width slightly greater than said diameter which has a bend extending back upon itself to form two vertically spaced superposed channels which receive the post and two laterally aligned key-receiving channels, and wherein a metal rod

has a bend to provide a key having a generally horizontal portion of oblong cross section that extends through said laterally aligned channels and engages said post and the wire connecting the opposite side portions of said superposed channels.

5 5. A fastener as defined in claim 1 wherein said insulating material is a polymer of vinyl chloride.

6. An insulated fastener and wire support for electric fences comprising a single piece of wire having one end portion with a bend that provides a rigid wire-receiving loop and its remaining portion with a bend that provides an attaching means including a loop having a length at least about twice its width which has a bend extending back upon itself to form two rigid vertically spaced superposed post-receiving channels opening in the same direction and two horizontally spaced laterally aligned key-receiving channels opening in the same direction which is opposite said first mentioned direction, and means for insulating said wire-receiving loop comprising a sleeve of insulating material covering the portion of the wire forming said loop.

7. A fastener as defined in claim 6 wherein each of said channels has substantially the same depth which is greater than its width.

8. A fastener as defined in claim 7 wherein the bottom portion of each key-receiving channel is generally semi-circular and the internal width of each said channel is substantially less than the internal width of each post-receiving channel, the depth of each post-receiving channel being greater than its internal width by an amount less than the internal width of each key-receiving channel and not less than one-half said last-mentioned width.

9. A fastener as defined in claim 6 wherein said insulating material is a high molecular weight linear polymeric material.

10. A fastener as defined in claim 9 wherein said material is a flexible thermoplastic material that is bonded to the wire.

11. A fastener and wire support for electric fences comprising a single piece of wire with a diameter of about 0.1 to 0.2 inch and a length of about one-half to one foot having a bend that provides an attaching portion near one end of the wire and a wire-retaining portion near the other end of the wire, said attaching portion having a substantially straight post-engaging portion with a length of about 1 to 2 inches terminating at one end at a portion with a sharp bend near the end of the wire and terminating at the opposite end at a U-shaped portion joining the attaching portion and the integral wire-retaining portion, and said wire-retaining portion having a bend that provides a helical electric-wire-receiving loop of at least one turn having an axis generally parallel to and spaced from said generally straight portion, and a sleeve of flexible high molecular weight polymeric insulating material covering the wire forming said helical loop and having a smooth hygrophobic external surface that causes any water contacting the sleeve to bead so as to prevent the formation of an electrically conductive water film.

12. Means for attaching an electrically conductive wire to a rigid upright bar of substantially circular cross section having a diameter of about 0.3 to 0.6 inch comprising a single piece of metal wire of generally circular cross section having a diameter of about 0.1 to 0.2 inch and a length of about one-half to one foot, and a key in the form of a metal rod of generally circular cross section having a diameter of about 0.1 to 0.3 inch and

a length of about 2 to 8 inches, one end of the rod forming said key and having an L-shaped bend with a straight portion of the key being reduced in thickness and flat so that it has an oblong cross section, said straight portion having a length of at least about one-half an inch, one portion of said metal wire having a helical loop that is covered with a tube of insulating material and the remainder of said metal wire having a bend that provides two superposed channels with a width only slightly greater than the diameter of said post and a depth that is greater than said width by an amount greater than the minimum and less than the maximum cross sectional dimension of the straight portion of said key which channels are spaced apart vertically a distance only slightly greater than said maximum cross sectional dimension and to provide two laterally aligned U-shaped channels of a size to receive said straight portion of said key, said metal wire, when locked by the key in position on the post, extending from said helical loop on the side of the post opposite said key around said straight portion of said key in a vertical plane at one side of the post to form one of said laterally aligned channels, extending from the key in a semi-circular path in a horizontal plane around the side of the post opposite said straight portion of the key to form one of said superposed channels, extending in a vertical plane at the side of the post opposite said first-mentioned vertical plane around the straight portion of said key and back toward said helical loop, and having a sharp bend at its end to interlock with itself on the side of the post opposite said key, whereby the rigid attaching portion formed by said metal wire may readily be rigidly locked to and released from said post by rotating said straight portion about its axis.

13. In an electric fence having at least one vertical post, an insulated fastener and wire support comprising a single untwisted piece of wire with a length of one-half to one foot and a diameter of 0.1 to 0.2 inch having an attaching portion with bends therein providing two aligned superposed post-receiving channels of a size to receive a cylinder with a diameter of 0.3 to 0.6 inch and two aligned key-receiving channels of smaller size and having a wire-retaining portion with a bend providing a single wire-receiving loop with a diameter of 0.5 to 1.5 inches at one end of the said single wire, the other end of said single wire being located in said attaching portion, and a sleeve of impervious thermoplastic polymeric insulating material bonded to and covering the wire forming said loop, said sleeve having a radial thickness of 0.02 to 0.07 inch and having a water-repelling means comprising a smooth hygrophobic external surface for causing any water contacting the sleeve to bead so as to prevent formation of an electrically conductive water film, and a second piece of wire with a diameter of 0.1 to 0.3 inch providing a key having a non-circular portion fitting in said key-receiving channel.

14. An insulated fastener as defined in claim 13 wherein the sleeve is a polymer of vinyl chloride formed by dipping the loop in said polymer.

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