March 23, 1948. H. S. SINES 2,438,233

CONDUCTOR GRIP FOR INSULATORS

Filed Dec. 13, 1945 3 Sheets-Sheet 1

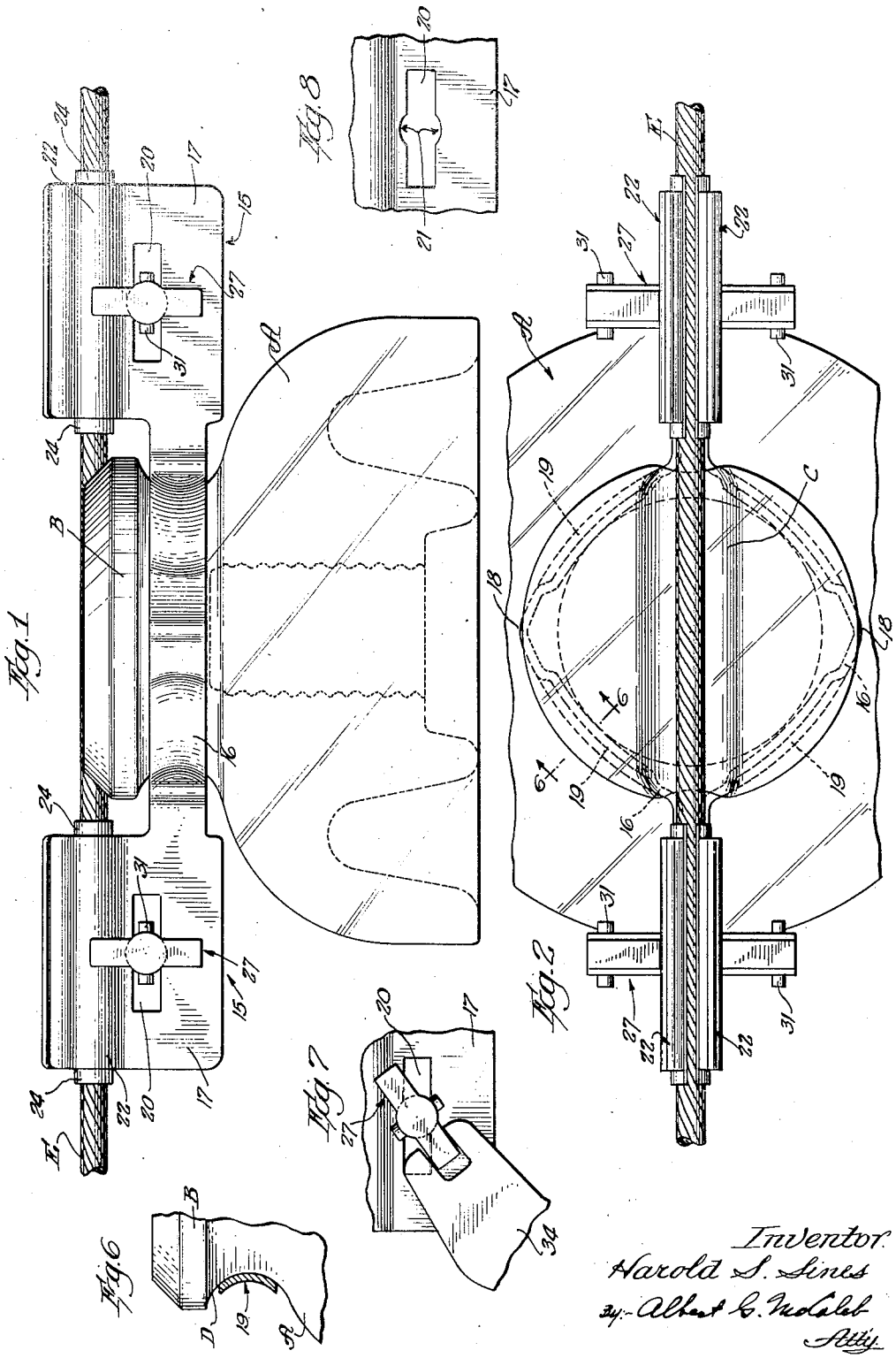


Fig. 1

Fig. 2

Fig. 8

Fig. 7

Fig. 6

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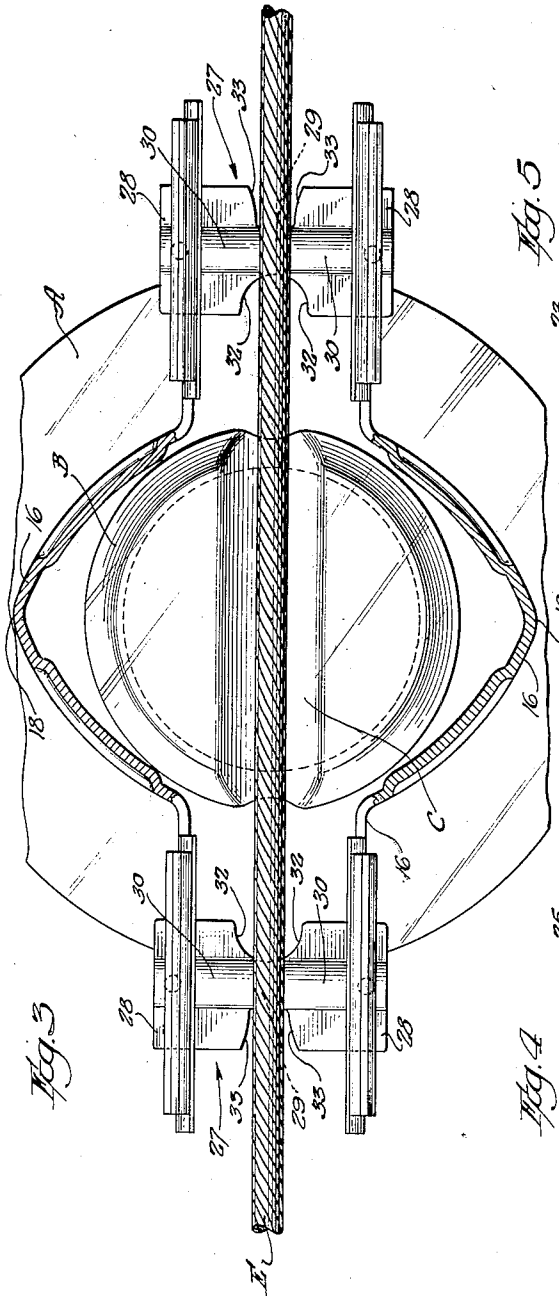


Fig. 3

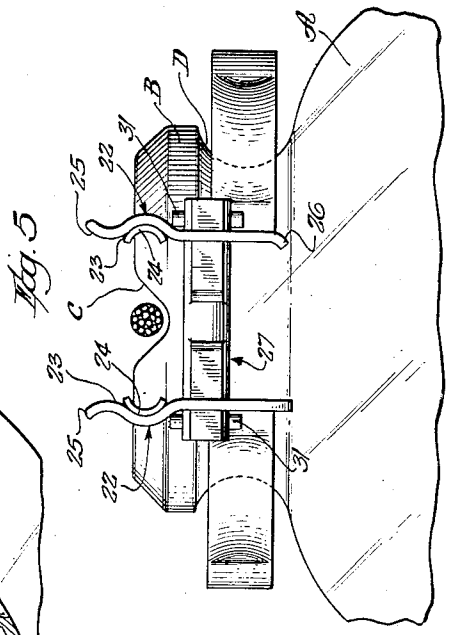


Fig. 5

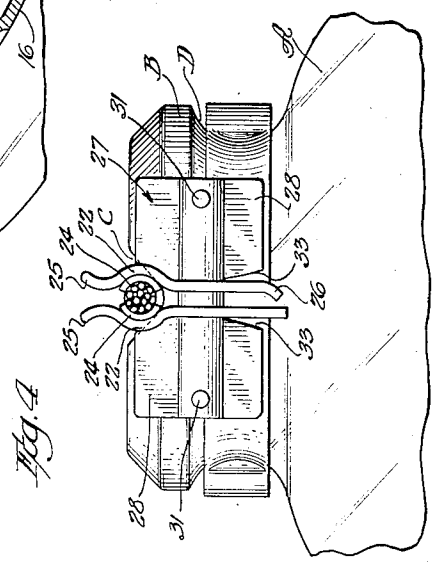


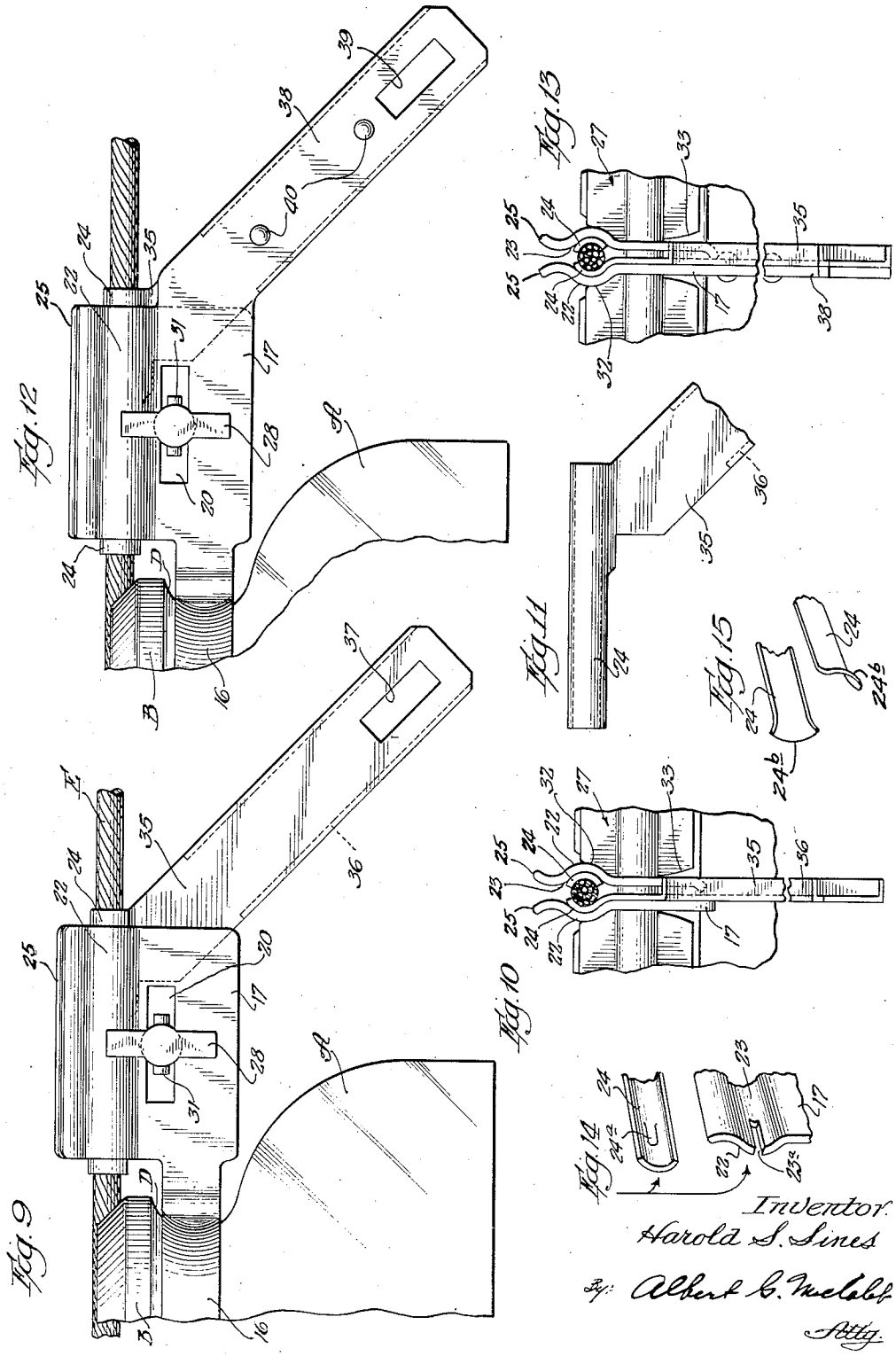
Fig. 4

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2,438,233

CONDUCTOR GRIP FOR INSULATORS

Harold S. Sines, Chicago, Ill.

Application December 13, 1945, Serial No. 634,643

6 Claims. (Cl. 174—172)

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My invention contemplates and provides new and useful improvements in conductor grips for insulators of electricity supply or communications lines.

An object of my invention is the elimination of tie wires in the attachment of line conductors to their insulators and the substitution for those tie wires of simple, sturdy, dependable devices manipulable positively to grip and attach the conductors and their insulators.

Another object of my invention is the provision of a conductor grip which satisfactorily will become attached to an insulator by manipulation of the same means which causes it to grip a conductor.

Another object of my invention is the provision of a conductor grip which comprises jaws for engaging spaced-apart portions of a conductor and quickly and efficiently operable means associated with the jaws for locking the conductor to an insulator.

Another object of my invention is the provision of a dependable conductor grip which readily may be attached to a line conductor while the latter is energized or deenergized or during its erection.

Another object of my invention is the provision of a conductor grip which effects damping of vibrations in an associated conductor and thus retards fatigue and failure of the conductor attributable to such vibrations.

Another object of my invention is to provide devices, in the nature of improved conductor grips, which will reenforce and protect line conductors which have been damaged and weakened by abrasion and/or corrosion and/or vibration fatigue.

Another object of my invention is to provide a conductor grip in which effective use is made of cam action when the grip is attached to a conductor.

Another object of my invention is to provide a conductor grip in which effective means is made of cam action when the grip is attached to both the conductor and its insulator.

Another object of my invention is to provide a conductor grip which comprises in its construction no bolts, nuts or other threaded members which are susceptible to "freezing" by corrosion.

Another object of my invention is to save time and reduce hazard when a lineman replaces insulators in emergency and "hot line" work.

Another object of my invention is to provide a conductor grip which presents to a conductor smooth and substantial bearing surfaces which

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tend to minimize abrasion and vibration fatigue of the conductor.

Another object of my invention is to provide a conductor grip which cooperates with a conductor and its insulator in such manner as to support the conductor free from contact with the insulator, thereby preventing abrasion of the conductor by the insulator and eliminating any necessity for those conductor armors or wire wrappings which are sometimes employed to prevent abrasion of conductors by their insulators.

Another object of my invention is to provide a conductor grip which, being itself capable of effectively damping vibrations, renders unnecessary the use of the armor rods which heretofore commonly have been applied to conductors, in the regions of their insulators, for the purpose of damping vibrations.

Another object of my invention is to provide a conductor grip, which is in the form of a single unit attachable and detachable as such single unit to and from a conductor and an insulator therefor.

Another object of my invention is to provide a conductor grip, in the form of a single unit, that will grip both an insulator and a conductor and prevent abrasion of the conductor by the insulator while damping vibration of the conductor.

Another object of my invention is to provide a conductor grip which, being in the form of a single unit from which no parts are detachable, will spare linemen those losses of time and inconvenience which they frequently experience when effecting conductor and insulator attachments which comprise separable parts.

Another object of my invention is to provide an effective conductor grip that feasibly may be assembled with an insulator on the ground prior to its installation on a pole or tower.

Another object of my invention is to provide a conductor grip in the form of a unitary device that may be adjusted to accommodate line conductor approaches to an insulator at various angles and will cooperate with various diameters and shapes of insulators.

A further object of my invention is to provide a conductor and insulator gripping unit which can be used over and over again in replacing insulators and/or conductors in an electricity supply or communications line.

Yet another object of my invention is to provide a conductor and insulator gripping unit, which may be attached to various kinds and styles of insulators.

Still another object of my invention is to pro-

vide a conductor and insulator gripping unit which affords a mechanical support and means of attachment as well as means of electrical connection, to such appurtenant devices as tap-off connectors, hot line clamps, condensers, capacitors, lightning arrestors, etc.

Still a further object of my invention is to provide a conductor and insulator gripping device that will minimize that radio interference which is commonplace at those insulators where tie wires are applied loosely or develop looseness through vibration and wear.

The foregoing and other objects, features and advantages of my invention will appear from the description to follow in which reference is made to the accompanying three sheets of drawings, wherein:

Fig. 1 is a side elevational view depicting my novel conductor grip in cooperating relationship with a conductor and an insulator;

Fig. 2 is a top plan view of the elements shown in Fig. 1;

Fig. 3 is a top plan view, partly in section, depicting the elements of Figs. 1 and 2 as they appear when the conductor grip is in non-gripping relationship to its associated conductor and insulator;

Fig. 4 is an end view of the elements depicted in Figs. 1 and 2;

Fig. 5 is a view corresponding to Fig. 4 but depicting the elements as they appear when the conductor grip is in non-gripping relationship to its associated conductor and insulator;

Fig. 6 is a fragmentary sectional view which may be regarded as taken in the plane of the line 6—6 of Fig. 2;

Fig. 7 is a fragmentary elevational view revealing how a suitable "hot line" or other tool may be employed for manipulating the cam blocks of the conductor grip;

Fig. 8 is an isolated fragmentary elevational view of one of the conductor grip jaws;

Fig. 9 is a fragmentary side elevational view, corresponding generally to Fig. 1, depicting a modified form of my invention;

Fig. 10 is an end elevational view of the elements depicted in Fig. 9;

Fig. 11 is an isolated fragmentary side elevational view of the conductor grip jaw liner depicted in Fig. 10;

Fig. 12 is a view corresponding generally to Fig. 9, depicting a second modified form of my invention;

Fig. 13 is an elevational view of the elements depicted in Fig. 12;

Fig. 14 is an exploded view illustrating how a conductor grip jaw and its liner may be notched and tongued to facilitate their securement each to the other without resorting to welding, soldering, brazing or other means of securement involving the application of heat; and

Fig. 15 illustrates how the ends of the jaw liners sometimes are desirably flared.

Similar characters of reference refer to similar parts throughout the several views.

In the drawings, A denotes a conventional insulator, of porcelain or other dielectric material which, for the purposes of the instant specification, may be regarded as representative of various types of insulators with which my novel conductor grip is or readily may be adapted advantageously to serve in an adjunctive capacity. The particular insulator chosen for purposes of illustration comprises a knob-like circular top B in the upper surface of which is formed a diametrically extending groove C. The insulator will be so mounted on a cross arm or other support that groove C extends in the direction of the conductor with which the insulator is associated. Encircling the insulator immediately beneath the knob-like top B is the annular groove D. In transverse section, the wall of groove D preferably is arcuate and the wall of groove C approximately so. In the ordinary use of the various types of insulators whereof insulator A may be regarded as an example, the conductor is disposed in the groove C or its equivalent and is retained therein by tie wires acting between the conductor and the insulator. The application of such tie wires requires much of linemen's time, their use in conjunction with high tension lines is hazardous to linemen, and they are undependable. The present invention eliminates the need for such tie wires.

The conductor grip of my present invention, next to be described, is a unit which may be applied to and removed from its cooperating insulator and conductor as such, which notably and preferably includes no screws, bolts, or other screw-threaded members in its construction, and which when occasion requires readily and safely may be applied to and removed from its cooperating insulator and conductor by means of a suitable "hot line" tool.

The conductor grip comprises a pair of symmetrical or substantially symmetrical members 15—15 which suitably may be formed of sheet steel. Each said member 15 is conformed to present an insulator-embracing generally arcuate band 16 interposed between, connecting and formed integral with jaws 17—17. Each jaw 17 of each member 15 is disposed in cooperating opposition to a similar jaw of the other member 15 and the band 16 of each member 15 likewise is disposed in cooperating opposition to the band 16 of the other member 15.

Each insulator-embracing band 16 suitably may present a somewhat abrupt bend 18 located midway between its ends, and be provided with portions 19—19, lying on each side of and spaced from the bend 18, which are of channeled or concavo-convex cross-section as depicted in Fig. 6. Bands 16—16 desirably are somewhat stiff and resilient.

Each jaw 17 is provided with a fenestration 20 which suitably is generally rectangular and elongated longitudinally of the conductor grip and has its longitudinal edges provided with concentric opposite portions 21—21 adapted to serve as bearings in which the cylindrical intermediate portion of one of the hereinafter mentioned cam blocks may have both rotative and axial movement.

Each jaw 17 is beaded longitudinally of the conductor grip to provide it with a convex camming surface 22 and a channel 23 which contains a conductor-engaging liner 24. Copper is a suitable material of which to form the liners 24—24, but they may be made of a variety of other metallic and non-metallic, conducting and non-conducting materials. Each liner may be retained in its appropriate jaw channel 23 in any suitable manner as for examples by welding, soldering, or brazing. If it be desired to avoid the application of heat and its annealing effects, in securing the liners 24 in their respective jaw channels 23, resort may be had to a kind of securement in which portions of the liners and the channel walls definitely are interengaged. For example, and as depicted in Fig. 14, a notch 23a may be formed

at each end of each jaw channel **23** and an integral tongue **24***a* may be struck from each end portion of each liner, each of the tongues **24***a* being adapted to extend through one of the notches **23***a* and to be turned alongside the convex surface **22** to retain the liner in the channel.

The longitudinal edge **25** of each jaw **17** desirably is turned outwardly, i. e., away from the corresponding edge of the opposed jaw. Moreover, one jaw of each pair desirably is provided with a longitudinal edge **26** which is turned toward the opposed edge of the other jaw.

At all times retaining the members **15—15** in a unitary structure with their bands **16** and their opposed jaws **17** in appropriate alignment, and also serving as means for drawing the members **15** each toward the other so that said bands and jaws may perform their functions, are the cam blocks **27—27**. Each of these cam blocks is associated with and extends through one of the pairs of opposed jaws **17—17**.

Each cam block **27** includes a pair of end portions **28—28** joined by an integral cylindrical portion **29** of a diameter such that it may be served as bearings by the surfaces **21—21** of the fenestrations **20** of the pair of jaws **17—17** through which such cam block extends. Convex surfaces **30** on the faces of the cam block end portions **28** are aligned with the cylindrical portion **29** and constitute continuations thereof and maintain appropriate alignment between said cylindrical portion **29** and its four cooperating bearing surfaces **21—21** when the conductor grip is open as depicted in Fig. 3.

Pins **31—31** extend through the ends of the cam blocks **28—28** to prevent their escape from the fenestrations **20** of their cooperating jaws **17**, and consequently prevent escape from each other or significant misalignment of the members **15—15**.

On the one side of the cylindrical portion **29**, the end portions **28** of each cam block are provided with opposed concave camming surfaces **32—32** (for cooperation with the camming surfaces **22—22** of the jaws) and at the diametrically opposite side of said cylindrical portion such end portions are provided with opposed convex camming surfaces **33—33** (for cooperation with the jaw exteriors at the sides of the fenestrations **20—20** which lie away from the camming surfaces **22—22**).

When employing my unitary conductor grip to attach a conductor E to insulator A, a lineman proceeds as follows: The grip having been sufficiently opened by having its members **15—15** moved apart to or toward their positions of Fig. 3, is placed over the top of the insulator and the said members **15—15** are moved toward each other longitudinally of the cam blocks **27—27** to cause loose engagement of insulator groove D by the bands **16—16**. The grip is so adjusted on the insulator that the insulator groove C extends longitudinaly of the grip. Conductor E is placed in insulator groove C. The grip jaws **17—17** of both pairs are moved closer together so that the jaw liners **24—24** of each pair grip the conductor and so that the jaws **17—17** of each pair rest upon the cylindrical portion **29** of the cam block **27** with which they are associated. Then with the aid of a suitable tool **34** (which may be a "hot line" tool if desired) the cam blocks **27—27** are rotated ninety degrees from their positions of Figs. 3 and 5 to their positions of Figs. 1, 2 and 4. In consequence of the cam blocks **27—27** being so rotated, the bands **16—16** tightly embrace the insulator groove D and the conductor E tightly is gripped by the two pairs of opposed grip jaw liners **24—24** and is by them held out of contact with the insulator.

Disconnection of the insulator and conductor is effected by reverse rotation of the cam blocks **27—27** followed by those separating movements of the bands **16—16** and grip jaws **17—17** which are possible when the end portions **28—28** of the cam blocks have been turned into registry with the fenestrations **20—20** of the jaws.

In that modification of my invention which is depicted in Figs. 9, 10 and 11, one of the jaw liners **24** at one end of the grip, being formed of copper or other suitable conducting material, is provided with an integral extension **35** which, when the grip is in cooperating relationship with the insulator A and conductor E, projects downwardly away from the grip angularly to the conductor and in the vertical plane thereof. Such extension **35** desirably is rendered rigid by flanges **36** and at its free end is provided with an aperture **37** or other suitable means facilitating its employment as a mechanical support for, and its electrical connection with, appurtenant devices such as tap-off connectors, hot line clamps, condensers, capacitors, lightning arrestors, etc. By sustaining the weight of these appurtenant devices by the grip and the insulator and the insulator support rather than by the conductor, I am enabled to avoid conductor failures and radio interference and other impairments of service caused by vibration fatigue, abrasion, loosening of conductor attachments, burning, etc., attributable to mechanical strains imposed upon the conductor by such devices. Jaw liner extension **35** also will facilitate an ideal type of electrical connection between one or more tap-off wires or cables with the conductor E, and will render the connection of such tap-off wires or cables with the conductor relatively easy and safe even though the conductor be energized with electricity at high voltage.

In that further modification of my invention which is exhibited in Figs. 12 and 13, the jaw liner extension **35** is backed up by and is coextensive with a plate-like arm **38** which is an integral extension of one of the clamping jaws **17**. Arm **38** has an opening **39** registering with the aperture **37** of the jaw liner extension **35** and desirably is directly secured to such jaw liner extension as for instance by rivets **40**.

When my improved conductor grip is put into association with a conductor which has been weakened by abrasion, vibration fatigue, or otherwise, it is often desirable to flare the ends of the liners **24** which project beyond the ends of the jaws **17**. In Fig. 15 I have depicted a pair of liners having their ends thus flared at **24***b*.

Having thus illustrated and described practical structures whereby the objects and advantages of my invention are attained and without limiting myself to the specific structures shown and described, what I claim as new and desire to secure by Letters Patent of the United States is:

1. A conductor grip attachable to a line conductor insulator and comprising spaced-apart pairs of jaws, each jaw being beaded to provide it with a channel presented to the channel of its opposed jaw, conductor engaging liners for said channels, devices associated with the respective pairs of jaws to cause them to embrace a conductor engaged by said liners, one of said liners being formed of electricity-conducting material, and an arm formed integral with said last-mentioned

liner and projecting away from the conductor grip for the support independently of the conductor of auxiliary equipment electrically connected with the conductor through said arm and the liner of which it is an integral part.

2. A conductor grip attachable to a line conductor insulator and comprising spaced-apart pairs of jaws, each jaw being beaded to provide it with a channel presented to the channel of its opposed jaw, conductor-engaging liners for said channels, devices associated with the respective pairs of jaws to cause them to embrace a conductor engaged by said liners, one of said liners being formed of electricity-conducting material, and an arm formed integral with said last-mentioned liner and projecting away from the conductor grip, beneath and in the vertical plane of a conductor associated with the grip, for the support independently of the conductor of auxiliary equipment electrically connected with the conductor through said arm and the liner of which it is an integral part.

3. A conductor grip attachable to a line conductor insulator and comprising spaced-apart pairs of jaws, each jaw being beaded to provide it with a channel presented to the channel of its opposed jaw, conductor engaging liners for said channels, devices associated with the respective pairs of jaws to cause them to embrace a conductor engaged by said liners, one of said liners being formed of electricity-conducting material, an arm formed integral with said last-mentioned liner and projecting away from the conductor grip for the support independently of the conductor of auxiliary equipment electrically connected with the conductor through said arm and the liner of which it is an integral part, and an arm which is formed integral with the jaw which provides the channel for said last-mentioned liner, said last-mentioned arm being disposed alongside of and sharing the load represented by the weight of the auxiliary equipment.

4. In a conductor grip attachable to a line conductor insulator, spaced-apart pairs of jaws each conformed to present a channel to a channel of its opposed jaw, the channel of one of said jaws being provided with an electricity conducting conductor-engaging surface, devices associated with the respective pairs of jaws to cause them tightly to engage a line conductor occupying the jaw channels, and an electricity conducting arm integral with the aforesaid electricity conducting conductor-engaging surface and projecting away from the conductor grip for the support independently of the conductor of an appurtenant device in electrical connection with the conductor through said arm.

5. A conductor grip attachable to a line conductor insulator and comprising at least one pair of cooperating jaws, each jaw being provided with a channel presented to the channel of its opposed jaw, conductor-engaging liners for said channels, devices associated with the jaws to cause them to embrace a conductor engaged by said liners, one of said liners being formed of electricity conducting material, and an arm formed integral with said last-mentioned liner and projecting away from the conductor grip for the support independently of the conductor of an appurtenant device in electrical connection with the conductor through said arm.

6. A conductor grip attachable to a line conductor insulator and comprising at least one pair of cooperating jaws, each jaw being provided with a channel presented to the channel of its opposed jaw, the channel of one of said jaws being provided with an electricity conducting conductor-engaging surface, devices associated with the opposed jaws to cause them tightly to engage a line conductor occupying the jaw channels, and an electricity conducting arm integral with the aforesaid electricity conducting conductor-engaging surface and projecting away from the conductor grip for the support independently of the conductor of an appurtenant device in electrical connection with the conductor through said arm.

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