

Feb. 22, 1944.

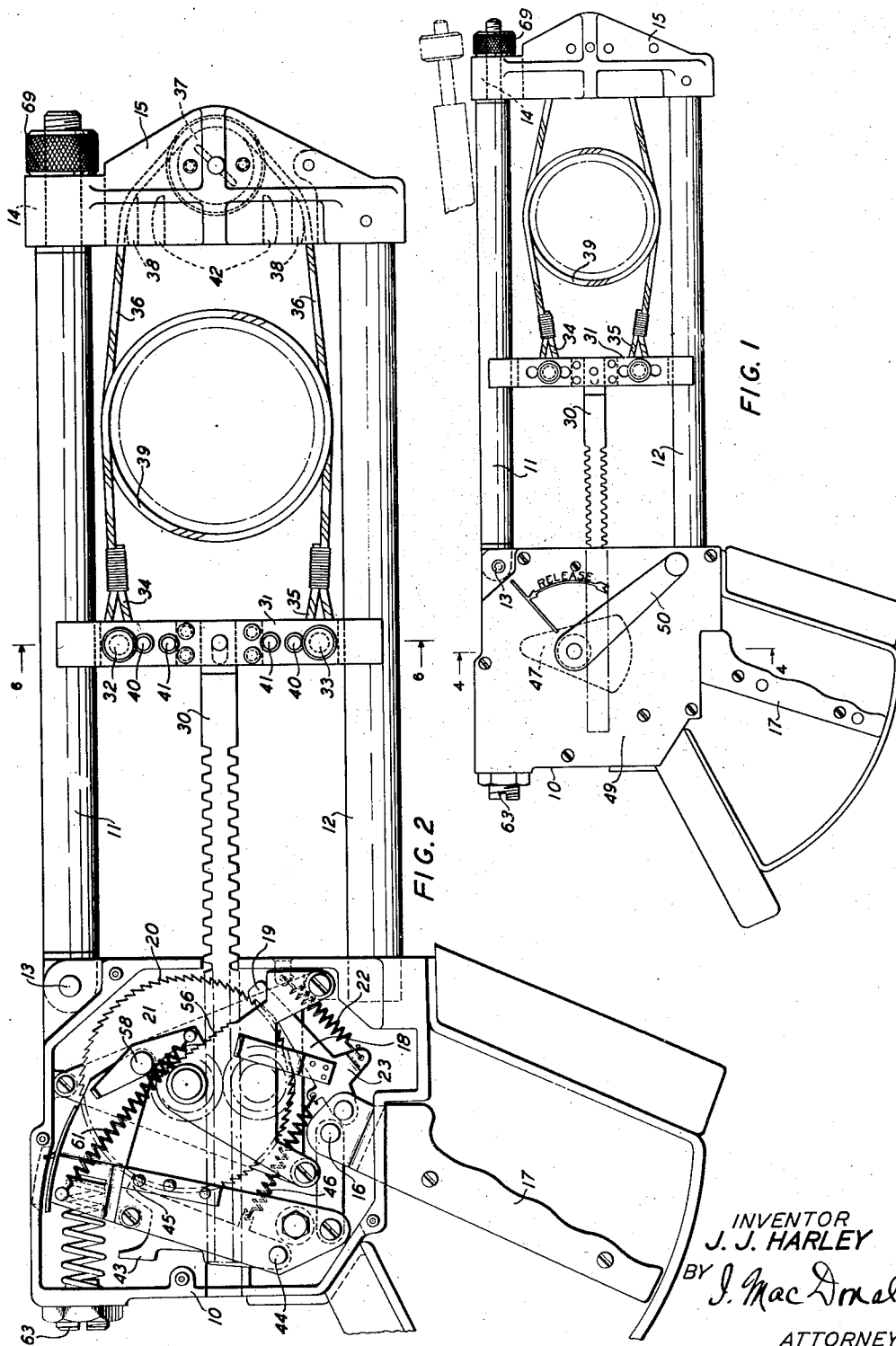
J. J. HARLEY

2,342,397

CONSTRUCTING TOOL

Filed Jan. 1, 1943

2 Sheets-Sheet 1



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FIG. 3

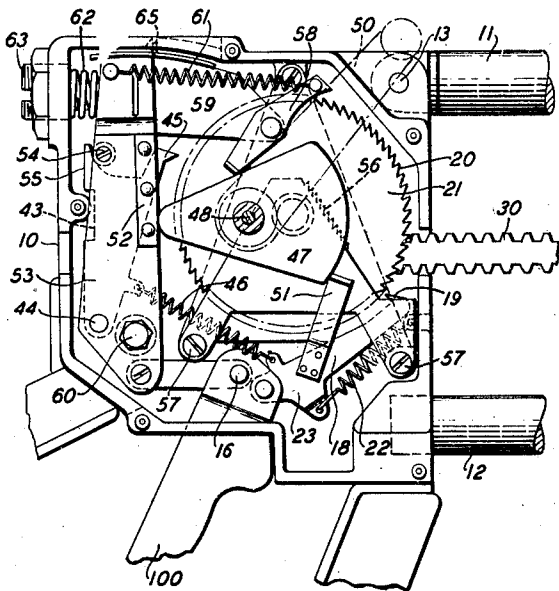


FIG. 4

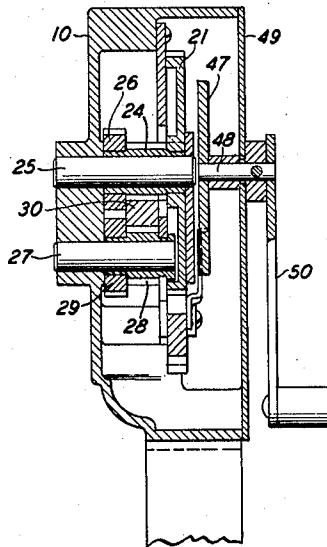


FIG. 5

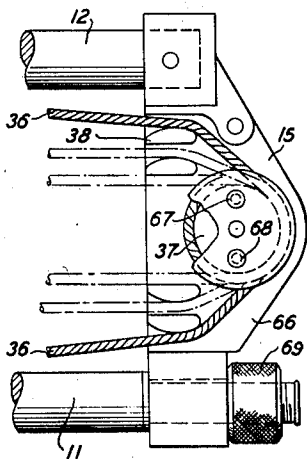


FIG. 6

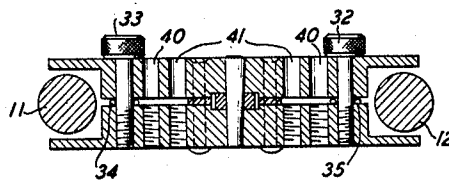


FIG. 7

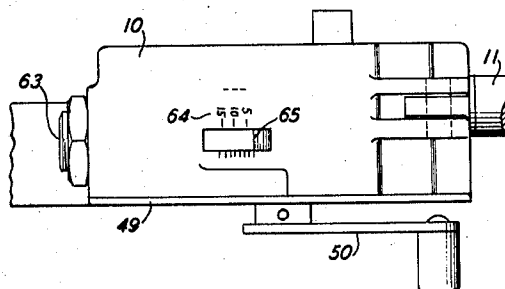
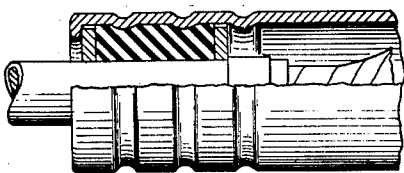


FIG. 8



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2,342,397

CONSTRICTING TOOL

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Application January 1, 1943, Serial No. 471,084

3 Claims. (Cl. 153—1)

This invention relates to a constricting tool and more particularly to a tool for making constrictions or circumferential grooves in ductile metal sleeves used in making joints in metal sheath cable of the type disclosed in W. C. Kleinfelder patent application, Serial No. 441,333, filed May 1, 1942.

The object of this invention is to provide a tool which will make a circumferential groove of uniform depth in a ductile metal sleeve with a minimum amount of effort.

A further object of the invention is the provision of a tool which may be readily adjusted to accommodate various sizes of sleeves.

A still further object of the invention is the provision of a constricting tool which is light in weight, readily portable and well balanced.

While the tool of this invention may be used for making constrictions or circumferential grooves in ductile metal sleeves, irrespective of their particular use and may have a wide variety of uses, I have chosen herein to illustrate its application in the making of joints in lead sheath cable of the type shown in the heretofore referred to patent application.

In the making of cable joints shown in the above-identified application it is necessary, in order to make the joints gas-tight, that relatively great pressure be exerted uniformly on the sleeve over the joint to provide constrictions or grooves which will compress the resilient bushings which are positioned over the cable sheath and located in each end of the sleeve.

In order to make the joint, heretofore referred to, practical for use in the field, it is necessary to provide a hand-operated tool which will be readily portable, which can be used by a lineman on a pole or in the confined space on a splicing platform and yet exert the tremendous pressure needed to compress the metal to provide a circumferential groove which would exert sufficient pressure on the resilient bushing to provide a gas-tight joint therebetween.

The tool of this invention, which will herein-after be described in detail, has been devised to meet all the above requirements and comprises a hand-operated rack and pinion-controlled yoke to which is secured the ends of a flexible member which is formed into sleeve-receiving loops having a portion thereof fixed to the end of the tool. The operation of a suitable handle causes the rack to be drawn inwardly carrying with it the yoke. This causes the diameter of the loops in the flexible member to decrease and form a

circumferential groove in the sleeve which it surrounds.

In order that the correct amount of tension may be applied to the loop to insure a groove of the proper depth, means is provided for visually indicating the amount of tension applied.

The features of my invention will be more readily understood from the following detailed description when made with reference to the accompanying drawings of which:

Fig. 1 is a front elevational view with the hinged portion of the frame and the sleeve shown in dot and dash lines;

Fig. 2 is an enlarged view similar to Fig. 1 with the cover over the operating mechanism removed to expose the various parts;

Fig. 3 is a fragmentary front elevational view of the operating mechanism with certain portions in their operated positions;

Fig. 4 is a cross-sectional view taken on line 4—4 of Fig. 1;

Fig. 5 is a fragmentary view in elevation of the front end of the tool with a portion thereof broken away and the cover removed to disclose the method of snubbing and guiding the flexible strand;

Fig. 6 is a cross-sectional view taken on line 6—6 of Fig. 2;

Fig. 7 is a fragmentary top plan view of the rear or operating mechanism housing and shows the tensioning indicating means; and

Fig. 8 is a fragmentary view, partly in section, of a cable joint in which the constrictions or circumferential grooves have been made with the tool of this invention.

The preferred embodiment of the tool of this invention, as shown in Figs. 1 and 2 comprises a housing or casing 10 having a pair of spaced apart arms 11 and 12 laterally extending therefrom. The upper arm 11 is hingedly secured to the casing 10 at 13 and is arranged to engage a slot 14 in the top portion of the cross member 15 while the lower arm 12 is rigidly secured to the bottom of the casing 10 and the cross member 15.

Pivotaly mounted at 16 in the lower portion of the casing 10 is the operating handle 17. This handle is connected to the operating pawl 18 which has its end 19 in engagement with the teeth 20 of the ratchet wheel 21. The pawl 18 is held in engagement with the teeth 20 of the ratchet wheel 21 by means of the coil spring 22 which is secured to a lug on the inside wall of the casing 10 and an ear 23 on the lower portion of the pawl. Thus the operation of the handle 17 will cause the pawl 18 to be drawn downward and

consequently rotate the ratchet wheel 21 in a clockwise direction.

The ratchet wheel 21 is fitted over and rigidly secured to the front end of the pinion 24 which in turn is rotatably mounted on the shaft 25, the rear end of which is journaled in a suitable bearing in the casing 10. The rear end of the pinion 24 has a reduced diameter portion and has fixedly secured thereon a pinion 26. A second shaft 27, in parallel relation with respect to shaft 25, has a pinion 28 rotatably mounted thereon and has secured to its reduced end portion a pinion 29 which is in constant mesh with the pinion 26. Thus the rotation of the ratchet wheel 21 will cause the pinions 24 and 26 to rotate and in turn will drive the pinions 28 and 29.

Located between and in mesh with the pinions 24 and 28 is a rack member 30. This rack member projects through the casing 10 and extends outwardly parallel with and midway between the arms 11 and 12. Pivotaly secured to the outer end of the rack 30 and slidably engaging the arms 11 and 12 is a yoke member 31. When the ratchet wheel 21 is rotated by means of the pawl 18 being operated by the handle 17, the pinion gear 24 will be caused to rotate. This will cause the rack 30 to move inwardly inasmuch as this pinion is in engagement with the teeth in the upper edge of the rack 30 and it will at the same time cause the pinion 26 to drive the pinion 29 which being secured to the pinion 28, causes the gear 29 to rotate and due to the fact that gear 29 is in mesh with the teeth on the lower side of the rack 30, will also exert a force thereon to withdraw the rack 30 into the housing 10 and consequently exert a pulling force on the yoke 31.

Mounted on the yoke member 31 are the removable pins 32 and 33 which are for the purpose of securing the looped ends 34 and 35 of the flexible strand 36 to the yoke. As shown in Fig. 2 and more in detail in Fig. 5, the mid-portion of the strand 36 is positioned around a spool or snubbing member 37 and the guides 38—39 located in the cross member 15. Each end of the strand 36 is looped back upon itself to provide the double loop member 39. In order that various diameters of cable sleeves may be accommodated in the loop 39 the yoke member 31 is provided with additional threaded apertures 40—40 and 41—41 which are adapted to receive the pins 32 and 33. The cross member 15 is provided with corresponding guides 42—42. This arrangement permits the rack 30 to travel approximately the same distance for all sizes of sleeves since it permits the strand 36 to be shortened by snubbing it around the spool 37 and positioning it in the proper guides and securing it to the yoke by means of the pins 32 and 33 in the proper apertures so that the force of the strands will be substantially uniform. As shown in Fig. 1 the pins 32 and 33 have been relocated in the apertures 40—40 and the strand 36 has been positioned around the corresponding guide 42—42 in the cross member 15.

From the foregoing it will be readily apparent that as the rack 30 is withdrawn into the casing 10 by the action of the handle 17 and the associated gears and pawls, the loop 39 will be constricted and exert a considerable uniform pressure on the exterior of the cable sleeve which it surrounds.

Upon the release of the handle 17 the pawl 18 under the influence of the coil spring 22 will re-

turn to normal and the end 19 thereof will engage the next tooth of the ratchet wheel 21 preparing it for the next operation of the handle. In order that the tension exerted on the strand 36 may be maintained during the return to normal of the pawl 18 and the handle 17, a second pawl 43, which engages the teeth on the opposite side of the ratchet wheel 21 is provided.

As shown in Fig. 2 the pawl 43 is pivoted at 44 and has its end 45 held in engagement with the teeth of the ratchet wheel 21 by means of the coil spring 46 thereby preventing the tension on the strand 36 through the rack 30 from exerting a counter-clockwise torque on the ratchet wheel 21.

In order to disengage the pawls 18 and 43 from the teeth of the ratchet reel 21 when the sleeve has been constricted the required amount so that the rack 30 may be extended to its normal position in readiness for another operation, there has been provided, as shown in Figs. 1, 3 and 4, a cam 47 which is rotatably mounted on a shaft 48 journaled in the cover of the casing 39 and operated by means of the lever 50. Fig. 1 shows in dotted lines the normal position of the cam 47 when the pawls 18 and 43 are in engagement with the ratchet wheel 21 as shown in Fig. 2, and Fig. 3 shows the operated position of the cam 47 when the lever 50 has been moved to its release position.

When the lever arm 50 is moved to its release position and is operated in a counter-clockwise direction, the cam 47 is caused to rotate approximately 90 degrees which causes the high faces of the cam to engage an upstanding lug 51 on the pawl 18 and a boss 52 on the lever arm 53 which in turn is provided with a pin 54 on the underside thereof which engages the ear 55 on the pawl 43. This action causes both pawls to be simultaneously disengaged from the teeth 20 of the ratchet wheel 21 and to free the rack 30 and its associated gears 24, 26, 28 and 29.

In order that uniform tension may be applied to all sleeves having the same diameter and that various degrees of tension may be set up for various sizes of sleeves, a tension indicating means, as shown in Fig. 7, has been provided which will indicate the amount of tension applied to the strand 36.

The indicating device of this invention comprises a rack member 56 secured in position on the interior of the casing 10 over and in spaced relation with respect to the ratchet wheel 20, by means of the screws 57 which engage suitable lugs on the interior of the casing. The rack 56 is engaged by a pawl 58 which is pivotaly mounted on an extending arm portion 59 of the lever arm 53 which in turn is pivoted at 60. A spring 61 maintains the pawl 58 in engagement with the rack 56.

As shown in Figs. 2 and 3 there is located in the upper end of the casing 10 a compression spring 62 which bears against the upper end of the lever arm 53. This spring is adjusted by means of the screw 63 and exerts a force against the top of the lever arm 53 and is so proportioned with respect to the arm 53 that the back tension on the rack 30 through the gears 24, 26, 28 and 29 and the ratchet 21, through the pawl 43 and the lever arm 53 will cause the spring to compress an amount commensurate with the pressure being applied to the strand 36 which surrounds the sleeve.

As shown in Fig. 7 a scale 64 is provided on

the top of the casing 10 and a pointer 65 is mounted on the top of the lever arm 53. Thus when the inward movement of the rack causes the strand 36 to tighten and the loop 39 to constrict around the sleeve, a back tension is applied to the rack 30. This back tension causes, as heretofore pointed out, a counter-clockwise force to be exerted on the ratchet wheel 21, and due to the fact that the pawl 43 is in engagement with the teeth of the ratchet wheel 41 a force tending to push the pawl downwards will be exerted. This force will cause the lever arm 53 to pivot about its center 60 and move counter-clockwise. This action causes the pawl 58, which is in engagement with the rack 56, to move up one notch thereby holding the arm 53 and the indicator pointer in position as the spring 62 is compressed. The pawl 58, the rear end of which engages the face of the cam 47, will be disengaged when the cam is moved as shown in Fig. 3 to free the rack in order to permit it to move freely.

The procedures used in constricting a sleeve as shown in Fig. 8 is as follows:

A suitable lubricant such as stearine is applied to the sleeve at the location where the constrictions are to be made. With the cam 47 operated by means of the lever arm 50 to the position as shown in Fig. 3 which disengages the pawls 18, 43 and 58, the yoke 31 is pulled out to the limit of its travel. The cam is then restored to its normal position by moving the lever arm to the position as shown in Fig. 1. The cover plate 66 is removed by loosening the two screws 67 and 68 and the looped ends 34 and 35 of the strand 36 freed of the yoke 31. The strand is then placed around the spool 37 and around the guides 38 or 42, depending upon the size of the sleeve to be constricted.

After the above operation has been completed the cover plate is replaced and the ends of the strand 36 are equalized. The arm 11 is now open as shown in dot and dash lines in Fig. 1 and the tool placed over the sleeve. The arm is then closed and locked in position by means of the knurled nut 69. The ends of the strand 36 are now wrapped around the sleeve and the looped ends 34 and 35 are secured to the pins 32 and 33 in the proper set of apertures for that particular type and size of sleeve.

The next step is to pull up on the yoke 31 to take up the slack and position the strands around the sleeve where the constriction is desired. The handle 17 is then actuated until the indicator 65 indicates that the proper amount of tension has been applied for that size of cable sleeve which is being worked upon. When the sleeve has been constricted the proper amount the lever arm 50 is moved to the release position, as shown in Fig. 3. This causes the cam 47 to disengage the operating pawls and free the rack 30 as heretofore described and provide slack in the strand 36. The tool is then moved along to the next location and the heretofore described operation repeated.

While there has been shown and described herein the preferred embodiment of applicant's tool it is to be understood that various modifications and changes may be made therein without departing from the spirit of the invention and I am only limited by the appended claims.

What is claimed is:

1. A tool for forming circumferential grooves in hollow cylindrical bodies comprising a housing, a pair of arms extending from said housing, one of said arms being fixed and the other hingedly mounted, a cross member secured to the end of said fixed arm and having its upper portion slotted for engagement with said hinged arm, means on said hinged arm for securing it in position in said slot, a yoke member slidably mounted between said arms, a flexible member secured at its mid-portion to said cross member, said flexible member looped and having its free ends secured to said yoke, a slidable member positioned in said housing and extending outwardly therefrom between said arms and secured to the mid-portion of said yoke, and operating means in said housing for moving said slidable member inwardly to apply tension through said yoke to said strand and to reduce the diameter of said loops.

2. A tool for forming circumferential grooves in hollow cylindrical bodies comprising a housing, a frame secured to said housing, a yoke member slidably mounted in said frame, a flexible strand having loops therein secured at its mid-portion to the end of said frame and having its free ends secured to said yoke, a slidable member positioned in said housing one end of which is secured to said yoke, gears journaled in said housing and in mesh with said slidable member, a ratchet wheel axially connected to one of said gears, a handle operatively connected to said ratchet wheel for rotating said gears for moving said slidable member inwardly to apply tension through said yoke to said strand to reduce the diameter of said loops.

3. A tool for forming circumferential grooves in hollow cylindrical bodies comprising a housing, a frame secured to said housing, a yoke member slidably mounted in said frame, a flexible strand having loops therein secured at its mid-portion to the end of said frame, and having its free ends secured to said yoke, a slidable member positioned in said housing one end of which is secured to said yoke, gears journaled in said housing and in mesh with said slidable member, a ratchet wheel axially connected to one of said gears, a pair of pawls pivotally mounted in said housing and in engagement with said ratchet wheel, operating means connected to one of said pawls for rotating said ratchet wheel and said gears for moving said slidable member inwardly to apply tension through said yoke to said strand to reduce the diameter of said loop and means associated with the other of said pawls for indicating the tension on said flexible member.

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