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A. DE GHETTO
WIRE SPREADER AND TENSIONER FOR
CIRCULAR LOOMS AND THE LIKE

2,459,504

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2 Sheets-Sheet 1

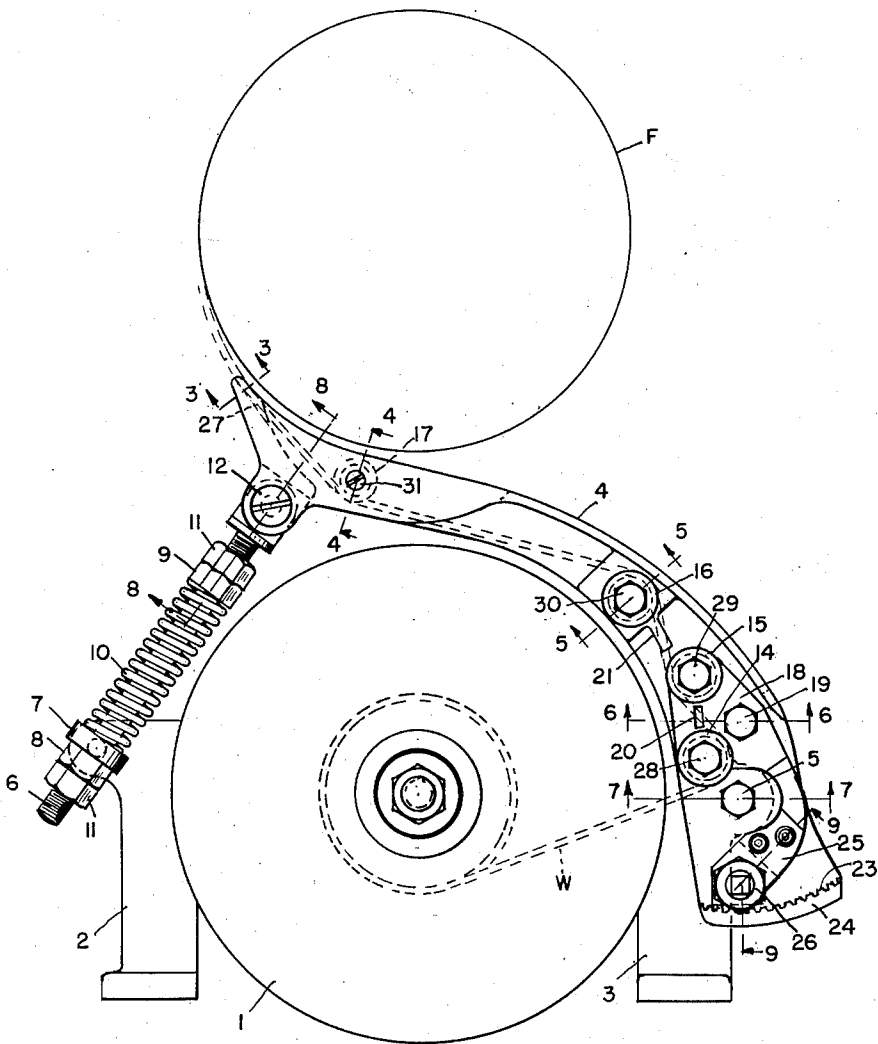


Fig. 1

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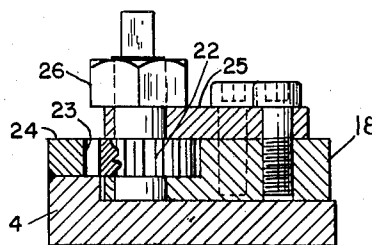
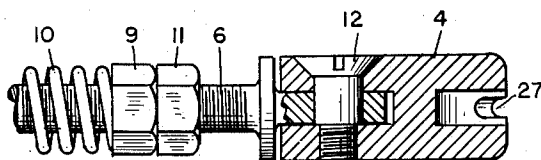
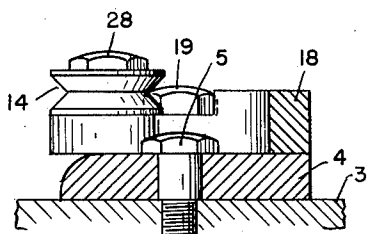
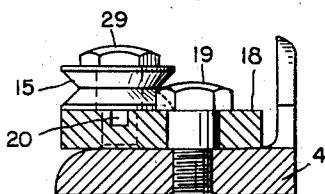
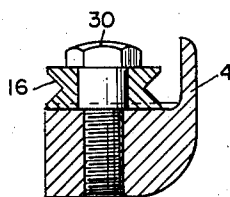
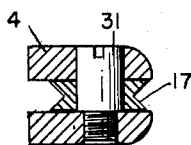
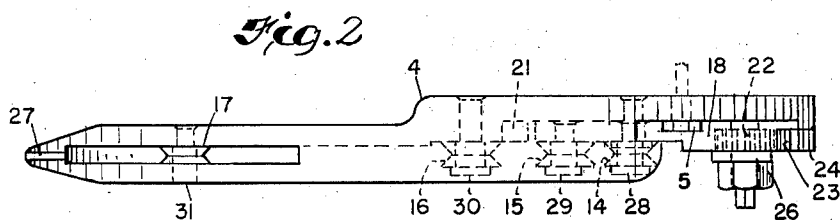
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UNITED STATES PATENT OFFICE

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WIRE SPREADER AND TENSIONER FOR
CIRCULAR LOOMS AND THE LIKEAnselm De Ghetto, Clifton, N. J., assignor to
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9 Claims. (Cl. 140—133)

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The present invention relates in general to improvements in circular looms for weaving tubular articles such as for example the woven wire sleeves which are used for reinforcing flexible hose made of rubber or like impervious but structurally weak material. More particularly, this invention is concerned with certain improvements in that portion of a circular loom which distributes or spreads the weft or woof thread and controls the tension thereof.

As is well known in the art, a typical circular loom may include several shuttles which move in a circular or other endless track and deposit their woof threads alternately above and below warp threads disposed around a block or former suspended between the warp thread carriers and the shuttle track, the fabric being thereby woven around such block. In weaving tubular sleeves for reinforcing hose, as aforesaid, the hose itself may constitute the former, or if preferred, the sleeve may be woven independently of the hose. In any case, the quality of the weave, that is its tightness, neatness and uniformity is largely dependent upon the maintenance of a predetermined uniform tension on the wire.

Such tension on the wire has been heretofore left largely to trial and error and to the skill of the operator with the result that considerable material is often spoiled before a proper tension is found. With an insufficient tension on the wire, the weave will be uneven or non-uniform and, in addition, the material may be unwound from the supply spool more rapidly than it is used, thereby necessitating shutting down of the machine to untangle such excess material. On the other hand, with an excessive tension on the wire, the shuttles are apt to be torn out of their tracks with the result that serious damage may be done to the machine.

It has also been the practice to have the wire controlling mechanism at that end of the spreader body which is adjacent the former and because of the limited space thereat, no graduating means could be provided.

Accordingly, it is one principal object of this invention to provide a device of the character indicated, in which the tension on the wire can be accurately controlled and adjusted even before operation of the machine is commenced.

It is another object of this invention to provide a device of the character indicated in which the tensioning of the wire is accomplished at a point remote from that end of the spreader body which is adjacent the former whereby advantage may be taken of the larger space at such remote point.

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It is another object of this invention to provide a device of the character described having novel means associated therewith for providing a wide latitude of adjustment with but little movement of the tensioning means relative to the spreader body.

It is another object of this invention to provide a device of the character indicated which has means for supporting the distributing end of the spreader body in a predetermined position closely adjacent the former but yet accommodating any imperfections or lumps in the work without disrupting the operation of the machine.

It is another object of this invention to provide a device of the character indicated which has means for facilitating the threading or bending of the wire over the several tensioning rollers on the spreader body.

It is another object of this invention to provide a device of the character indicated which is extremely simple and compact in structure and efficiently performs its intended function.

Other objects and advantages of the invention will become apparent as the following description proceeds.

To the accomplishment of the foregoing and related ends, said invention then comprises the features hereinafter fully described and particularly pointed out in the claims, the following description and the annexed drawings setting forth in detail certain illustrative embodiments of the invention, these being indicative, however, of but a few of the various ways in which the principle of the invention may be employed.

In the drawings:

Fig. 1 is a top plan view of my improved device showing the same in conjunction with a spool containing a supply of wire or like material. The shuttle bracket and the block or former are shown in part only and schematically.

Fig. 2 is an elevation view of my device as viewed from the upper right-hand corner of Fig. 1.

Figs. 3 through 9 are transverse cross section views through the spreader body taken along lines 2—3 through 9—9 respectively of Fig. 1.

The entire assemblage as shown in Fig. 1 includes a block or former F which, as previously indicated, may comprise a length of pre-formed rubber hose or the like about which a loom shuttle (not shown except for the hereinafter to be described elements thereof) is adapted to travel in a well known manner on an endless track. A bracket, not shown, on the shuttle rotatably supports a spool 1 on which is a coil of wire W or

like material. Said spool 1 may have associated therewith adjustable means for resisting free rotation thereof, thereby providing one control for the tension of the wire W unwound therefrom. The shuttle is also formed with supports 2 and 3 on which the device constituting the present invention may be mounted.

The elongated and curved body 4 of the wire spreader and tensioner is disposed radially outward of the spool 1 and is generally tangential thereto at its opposite ends. One end of said body 4 is pivotally connected as by the shoulder screw 5 to the support 3 and the other end is disposed closely adjacent the former F. Such other end is yieldably retained in any adjusted position by means of a link 6 which has a pivotal connection with such body and a sliding connection with an eye bolt 7 which is rotatably mounted on the support 2. Desired adjustment of the body 4 radially of the former F is effected as by a nut 8 having threaded engagement with that end of the link 6 which projects through the eye bolt 7. Around the link 6 and compressed between the eye bolt 7 and a nut 9 disposed adjacent the pivotally connected end of the link is a spring 10. Said nut 9 is adjustable longitudinally of the link to thus vary the compression of the spring 10. Suitable jam nuts 11 are used to lock the nuts 8 and 9 in their respective adjusted positions.

It can now be seen that engagement of nut 8 with the eye bolt 7 determines the closest position of the spreader body relative to the former F and thus as the body 4 travels around the former F any irregularities or lumps therein will simply cause the body 4 to swing about screw 5 as an axis and thus move the end thereof radially outward relative to the former F, such movement being taken up by compressing the spring 10. In this way the body will constantly remain closely adjacent the former F as is desirable and any irregularities in the former F or in the work will not necessitate interruption of the operation of the machine. The eye bolt 7 can simply have threaded engagement with the support 2, such threaded engagement permitting what little rotation of eye bolt 7 is effected by the movement of the body 4 as aforesaid. The pivotal connection between the link 6 and the body 4 preferably consists of a screw 12 which passes through a tongue on the link fitted between parallel lugs projecting laterally from the body.

The tensioner in the present case comprises a plurality of guide means 14, 15, 16 and 17 in the form of peripherally grooved rollers spaced longitudinally along the body 4 and so arranged that the wire W when drawn thereover is caused to be successively bent in opposite directions. This bending of the wire sets up a resistance to the free passage of the wire through the body and thereby necessitates application of a tensile pull thereon in order to effect wrapping of the wire around the former F. The magnitude of such resistance is, of course, dependent upon the angle of such bending of the wire as it passes over the several rollers. It is to be observed that such opposite bending of the wire is also effective to straighten the same and remove any kinks therein.

The novel means herein disclosed for varying the angle of bending of the wire W in opposite directions to thus control the tension comprises an arm 18 on which the first and second rollers 14 and 15 of three successive rollers 14, 15 and 16 are rotatably mounted. These rollers on the body 4 and arm 18 are preferably disposed gen-

erally circumferentially of the spool 1 so as to take up a minimum of space.

Said arm 18 is pivotally connected to the body 4 by a screw 19 having threaded engagement with the body. Such pivot is selected so as to be between the rollers 14 and 15 whereby rocking movement of the arm effects movement of the roller 14 in a path generally transverse to the path of the wire W as it leaves the spool and movement of roller 15 in a path generally transverse between the rollers 14 and 16. The ultimate effect of the rocking of the arm 18 is to simultaneously move the rollers 14 and 15 in opposite directions relative to the roller 16 whereby the angle of bend of the wire W around each roller is either increased or decreased depending upon the direction in which the arm 18 is rocked. Because both rollers 14 and 15 move in opposite directions transversely of the movement of the wire, a single increment of rocking movement of the arm 18 effects a change of substantially two increments in the relative positions of the rollers 14, 15 and 16.

In order to facilitate the initial threading of the wire through the body and the bending thereof over the rollers, the arm 18 is provided with a recess 20 and the body 4 with a lug 21. Such recess and lug provide fulcrums for the end of a bending bar or like tool for operating on the wire in the manner of a second-class lever.

Accurate adjustment of the arm 18 relative to the body 4 is effected through a pinion gear 22 which is rotatably mounted at one end of the arm and which gear is engageable with an internal gear segment 23 in the body. The axis of such gear segment coincides with the pivot axis 19 of the arm 18. The face 24 of said gear segment is preferably formed with suitable markings or graduations, not shown, which are registrable with an edge or a marking on the arm 18. With such registrable markings, the gear may be rotated to position the arm at any pre-selected position to tension the wire W accordingly.

The arm 18 has a bearing plate 25 secured thereto providing, with a step formed in the arm, a cavity for the pinion gear 22 and spaced ears in which the oppositely projecting shaft portions of the gear 22 are rotatably fitted. The upper shaft portion projects through the bearing plate 25 and has threaded engagement with a locking nut 26, by means of which nut the gear 22 may be locked against rotation, that is by drawing the upper face of the gear into tight frictional engagement with the lower face of the bearing plate 25. The end of the upper shaft portion is formed with a polygonal portion for rotating the gear 22 when the locking nut 26 is loose or for holding the gear from rotating when the nut 26 is being tightened.

It will be apparent from Fig. 1 that rotation of the gear 22 in a clockwise direction will effect rotation of arm 18 in a counter-clockwise direction to thus increase the angle of bending of the wire as it is drawn over the rollers 14, 15 and 16. This increases the tension which must be applied on the wire in order to draw it through the body. The tension is accordingly decreased by rotating the gear in a counter-clockwise direction.

After the wire passes over the rollers 14, 15 and 16, it passes over a fourth roller 17 which is disposed near that end of the body which is adjacent the former F and then finally passes through a longitudinal groove 27 in the body before being wrapped onto the former F. Such

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groove 27 guides the wire so that it leaves the body at that one point.

The end of the body which is adjacent the former F and particularly the groove 27 is preferably case hardened and hard chrome plated to provide a surface for effectively resisting the wear which would otherwise occur by the sliding of the wire W therethrough. Likewise the rollers 14, 15, 16 and 17 are preferably made of manganese, bronze or like material which may be heat treated to impart great strength and wear resistant characteristics thereto. The shoulder screws 28, 29, 30 and 31 by which the rollers 14, 15, 16 and 17 are rotatably supported are preferably of hardened alloy steel with the threaded ends thereof softened for staking, and thus providing a convenient means for locking the same against inadvertent loosening.

With the end of body 4 properly adjusted relative to the former F, the spring 19 compressed to the desired degree, the wire W bent over the rollers as shown in Fig. 1, and the end of the wire secured in the usual manner to the former, it will be seen that upon movement of the shuttle in its track about the former, the wire will be unwound from spool 1 and wrapped around the former. The tension of the wire will be accurately controlled by the relative positions of the rollers 14, 15 and 16 and in addition any kinks in the wire will be removed both by the tension and the bending of the wire in opposite directions as it passes over the rollers. During such rotation the end of the body will remain closely adjacent to the former in spite of any irregularities or lumps in the work whereby the machine may be continuously operated so long as there is any wire left on the spool.

It is to be observed that the spreader body is of light weight but sturdy construction and the greatest bulk of the assembly is close to the pivotal connection of the body to the support whereby the centrifugal force thereon has the least effect in tending to move the other end away from its adjusted position adjacent the former F.

Other modes of applying the principle of the invention may be employed, change being made as regards the details described, provided the features stated in any of the following claims or the equivalent of such be employed.

I therefore particularly point out and distinctly claim as my invention:

1. A device of the character described, comprising a body, an arm pivotally connected between its ends to said body, guide means on one end of said arm so arranged that wire or the like drawn thereover is successively subjected to bending in opposite directions, and a gear rotatable at the other end of said arm, said body being formed with a gear segment in engagement with said gear and coaxial with the pivotal connection of said arm on said body whereby rotation of said gear effects pivotal movement of said arm on said body.

2. A device of the character described, comprising a body, an arm pivotally connected between its ends to said body, guide means on one end of said arm so arranged that wire or the like drawn thereover is successively subjected to bending in opposite directions, a gear rotatable at the other end of said arm, said body being formed with a gear segment in engagement with said gear and coaxial with the pivotal connection of said arm on said body whereby rotation of said gear effects pivotal movement of said arm on said

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body, and means on said arm for locking said gear against rotation relative to said arm.

3. A device of the character described, comprising a support member, a body pivotally connected at one end to said support, means on said support bearing against the other end of said body for retaining said body in a predetermined position relative to said support, an arm pivotally connected between its ends to said body, guide means on said arm so arranged that wire or the like drawn thereover is successively subjected to bending in opposite directions, and a gear rotatable on said arm, said body being formed with a gear segment engageable with said gear whereby rotation of said gear effects rotation of said arm and thus the guide means thereon relative to said body.

4. The combination with a spool containing a supply of wire or the like, of a body generally tangent to said spool, an arm pivotally connected to said body, and guide means on said body and arm so arranged that wire or the like from said spool when drawn thereover is successively subjected to bending in opposite directions, said guide means including at least three elements lying along a line around a portion of the periphery of said spool, two successive ones of which are on said arm, the pivotal axis of said arm being so disposed that upon rotation of said arm, one of such elements on said arm moves in a path generally transverse between the other two elements and the other of such elements on said arm moves in a path generally transverse to the direction of movement of the wire or the like as it leaves the spool but in an opposite direction relative to the movement of said one of such elements.

5. A device of the character described, comprising a support, an elongated body having one end pivotally connected to said support, a link pivotally connected to the other end of said body and having a sliding connection with said support, and a spring around said link compressed between said support and said body for yieldably retaining such other end of said body in a predetermined position relative to said support, the sliding connection of said link and support including a screw threaded into said support and formed with a transversely disposed opening slidably receiving said link.

6. A device of the character described, comprising a body, an arm pivotally connected to said body, guide means on said body and arm so arranged that wire or the like drawn thereover is successively subjected to bending in opposite directions, said guide means including at least one element on said body and at least two elements on said arm disposed in advance of the element on said body, the pivotal connection of said arm on said body being disposed between the elements on said arm whereby rotation of said arm in one direction effects movement of the elements thereon in opposite directions generally transverse to the movement of the wire over said guide means.

7. A device of the character described, comprising a body, an arm pivotally connected to said body, guide means on said body and arm so arranged that wire or the like drawn thereover is successively subjected to bending in opposite directions, said guide means including at least one element on said body and at least two elements on said arm disposed in advance of the element on said body, the pivotal connection of said arm on said body being disposed between

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the elements on said arm whereby rotation of said arm in one direction effects movement of the elements thereon in opposite directions generally transverse to the movement of the wire over said guide means, and interengaging means on said arm and body for retaining said arm in a selected rotative position relative to said body.

8. A device of the character described, comprising a body, an arm pivotally connected between its ends to said body, guide means on one end of said arm so arranged that wire or the like drawn thereover is successively subjected to bending in opposite directions, a gear rotatable at the other end of said arm, said body being formed with a gear segment in engagement with said gear and coaxial with the pivotal connection of said arm on said body whereby rotation of said gear effects pivotal movement of said arm on said body, and means on said arm for locking said gear against rotation relative to said arm, said locking means comprising a shaft journaled in said arm and fixed on said gear, one end of said shaft projecting through said arm and formed with threads thereon and a nut threaded on said shaft operative through the latter to draw said gear into frictional engagement with said arm.

9. A device of the character described, comprising a support member, a body pivotally connected at one end to said support, means on said support bearing against the other end of said body for retaining said body in a predetermined position relative to said support, an arm pivotally connected between its ends to said body, guide

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means on said arm so arranged that wire or the like drawn thereover is successively subjected to bending in opposite directions, and gearing on said body and arm comprising meshing gear elements respectively rotatable on one of them and fixed on the other of them, the pitch line of the fixed gear element being coaxial with the pivotal connection of said arm on said body whereby rotation of the rotatable gear element effects pivotal movement of said arm and thus the guide means thereon relative to said body.

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