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TAPE RECONDITIONING APPARATUS

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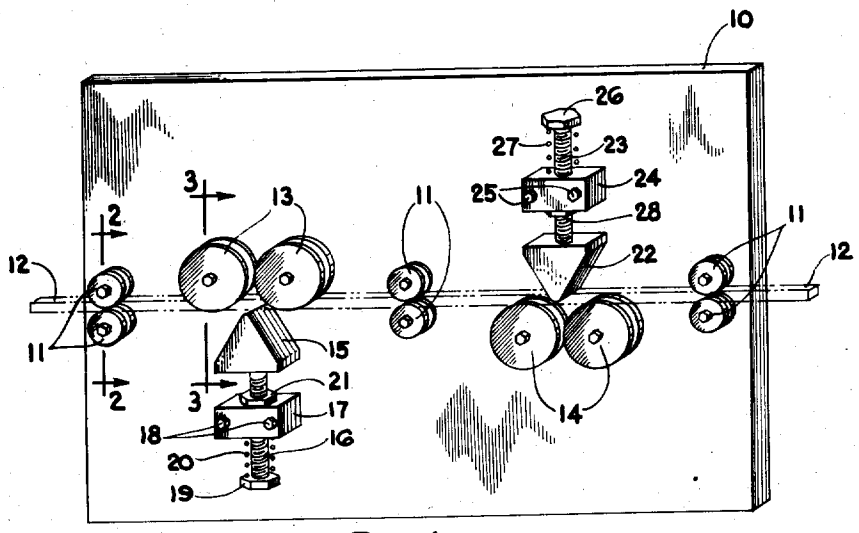


FIG. 1

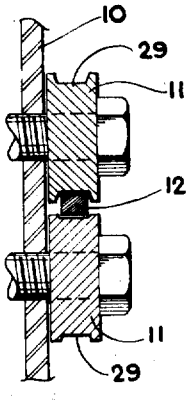


FIG. 2

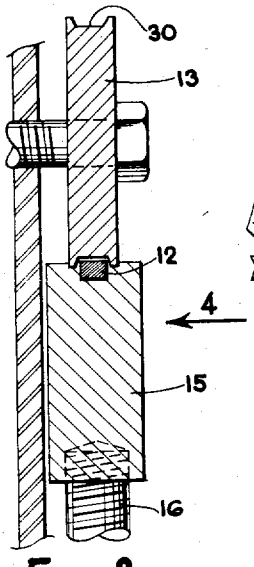


FIG. 3

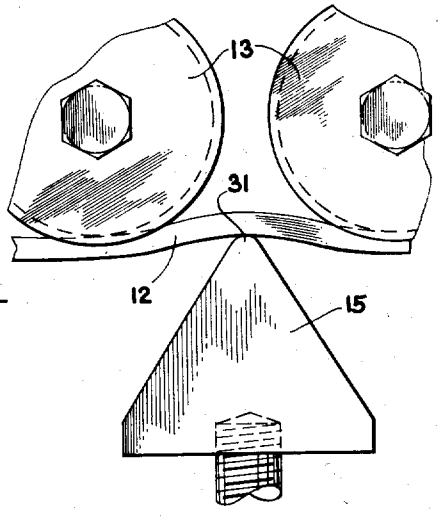


FIG. 4

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TAPE RECONDITIONING APPARATUS

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4 Claims. (Cl. 153—93)

This invention relates generally to tape reconditioning, and more particularly to an improved apparatus for straightening metallic fishing tape so that it may be re-used.

Conventional fishing tape generally comprises an elongated metallic strip having relatively stiff characteristics such that it may be pushed through a conduit without buckling. For example, in electrical work when it is desired to pass an electrical conductor through a conduit, one end of the conductor is secured to the fishing tape and the tape is then pushed through and about the corners or curves of the conduit. When the free end of the tape emerges from the other end of the conduit, it may then be used to pull the conductor through. Such tape may also be used by plumbers and similar workers for fishing obstacles out of crooked pipes and conduits.

After a fishing tape has been used one or two times, it develops several crimps and unwieldly bends and curves. The stiffness of the tape renders it difficult to manual straightening and it has been conventional practice, therefore, to simply scrap the fishing tape and use a fresh straight tape for a subsequent job. This practice is not only costly but requires that a large number of spare tapes be readily available.

Bearing the above factors in mind, it is a primary object of the present invention to provide a simple mechanical apparatus for enabling plumbers, electricians, and the like to straighten crooked tapes whereby they may be re-used with the attendant cost savings advantage.

Another object is to provide an apparatus of the above type which may be adjusted to adapt it to a particular tape stiffness.

A more general object of the invention is to provide an improved tape straightening structure which is rugged, simple and may be readily operated by unskilled personnel.

These and other objects and advantages of the present invention are attained by providing a mounting plate supporting pairs of tapes straightening rollers arranged in tandem. Each pair of tandem rollers engages one side of the tape at spaced longitudinal points and has associated with it a bearing element positionable to engage the opposite side of the tape at a point intermediate the spaced points whereby a frictional pressure may be applied by the bearing element to the tape. The two pairs of tape straightening rollers are longitudinally and laterally displaced so that opposite sides of the tape are treated in an identical manner and any constant radius of curvature imparted to the tape by one set of tape straightening rollers and bearing element will be corrected by the second set of tape straightening rollers. Additionally, suitable guide rollers are positioned at uniformly spaced longitudinal points for guiding the tape in a relatively straight line through the apparatus.

A better understanding of a preferred embodiment of the invention will be had by referring to the accompanying drawings in which:

Figure 1 is a perspective view of the tape straightening device of this invention;

Figure 2 is a cross section of one pair of guide rollers taken in the direction of the arrows 2—2 of Figure 1;

Figure 3 is another cross section of one of the tape straightening rollers taken in the direction of the arrows 3—3 of Figure 1; and,

Figure 4 is a greatly enlarged elevational view of one pair of tape straightening rollers and the associated bearing element taken in the direction of the arrow 4 of Figure 3.

Referring to Figure 1, the tape straightening apparatus comprises a mounting plate 10 which may be secured to a wall or the side of a vehicle such as a truck. As shown, the plate 10 supports three pairs of guide rollers 11 longitudinally spaced along the horizontal center line of the plate. These guide rollers serve to guide a tape 12 which may be manually or otherwise pulled through the apparatus past the face of the plate 10.

Interposed between the two outer pairs of guide rollers 11 and on either side of the central pair of guide rollers, are first and second pairs of tape straightening rollers 13 and 14. The rollers 13 in the first pair are arranged in tandem to engage one side of the tape 12 at spaced longitudinal points. A bearing element 15 is adjustably positioned on the plate 10 to engage the opposite side of the tape 12 at a location intermediate points at which the rollers 13 engage the tape. As shown, the bearing element 15 is rigidly secured to the end of a bolt 16 passing through an apertured support block 17 secured to the plate 10 as by screws or bolts 18. Bolt 16 is provided with a head 19 and is biased in a direction away from the tape by a spring 20 positioned between the bolt head 19 and the bottom of the support block 17. A nut 21 is threaded on the portion of the bolt 16 above the support block 17 whereby rotation of the nut will serve to vary the distance of the bearing element 15 from the tape 12. The coil spring 20 maintains the nut 21 in pressing engagement with the upper surface of the support block 17.

Similarly, a second bearing element 22 is positioned on the side of the tape 12 opposite from the side engaged by the tape straightening rollers 14. Bearing element 22 is rigidly secured to a bolt 23 passing upwardly through an apertured support block 24 secured by screws 25 to the plate 10. Bolt 23 is provided with a head 26 similar to the head 19 on the bolt 16, and a compression spring 27 between the bolt head 26 and the upper surface of the support block 24 to bias the bearing element 22 in an upward direction away from the tape 12. A nut 28 is threaded to the bolt 23 to bear against the lower surface of the support block 24 as a result of the action of the coil spring 27. Rotative adjustment of the threaded nut 28 will accordingly adjust the distance of the bearing element 22 from the tape 12.

Referring to the cross section shown in Figure 2, it will be noted that each of the guide rollers 11 is provided with a peripheral groove of a width to accommodate the tape 12 whereby the tape 12 is prevented from sliding from between the rollers by the sides of the groove. The depth of the groove 29 is preferably half of the thickness of the tape so that when the pairs of rollers 11 are in contact there is provided a rectangular opening through which the tape 12 passes.

Similarly, the tape straightening rollers 13 and 14 are each provided with peripheral grooves such as groove 30 illustrated in Figure 4. These grooves are of a width sufficient to accommodate the tape 12 and of a depth preferably equal to the thickness of the tape or at least of sufficient extent to prevent the tape from laterally being displaced from the rollers.

Referring now particularly to Figure 4, it will be noted

that each of the bearing elements, such as the bearing element **15**, comprises a block having its opposite sides sloping towards each other to terminate in a rounded edge **31**. The edge **31** has a length at least as great as the width of the tape **12** whereby the tape is transversely engaged across its entire width by the bearing element. As will be clear from Figure 4, the bearing element is preferably positioned to provide an upward pressure on the tape **12** as it passes under the rollers **13**, so that a slight bow of constant radius of curvature will be imparted to the tape. This upward pressure of the bearing element **15** will serve to straighten out all kinks and curves in the tape **12** whose radius of curvature extends in an opposite direction to that imparted by the bearing element **15**.

The action of the tape straightening rollers **14** and bearing element **22** is similar except that the pressure is oppositely directed. Therefore, the constant radius of curvature imparted by the bearing element **15** and rollers **13** is straightened as well as any curves or crimps whose radius of curvature extends in the same direction as the radius of curvature imparted by the rollers **13** and bearing element **15**.

The operation of the overall tape straightening device will be evident from the above description. The crooked tape **12** is first passed through the guide rollers and urged towards the tape straightening rollers **13**, through the central guide rollers, past the tape straightening rollers **14**, and out between the last pair of outer guide rollers **11** as shown. When the crooked tape is initially inserted in the apparatus, the bearing elements **15** and **22** may be retracted by threading of the nuts **21** and **28** in the proper direction respectively, so that sufficient space is provided to facilitate insertion of the tape. The bearing elements **15** and **22** are then respectively raised and lowered such that they engage opposite sides of the tape.

Referring particularly to Figure 4, the adjustment of the bearing element **15** is such that the upper bearing edge of the element will intersect a straight line connecting the two longitudinally spaced points on the tape **12** engaged by the tandem rollers **13**. By this arrangement, a frictional pressure will be applied to the underside of the tape by the bearing element **15** as the tape passes under the rollers **13**. The bearing element **22** is similarly positioned to intersect the straight line connecting the engagement points of the tandem rollers **14**. With the bearing elements **15** and **22** adjusted as described, the tape **12** is then pulled through the apparatus by any suitable means.

As the tape is drawn over the bearing element **15**, a constant radius of curvature will be imparted to the tape dependent upon the position of the bearing edge of the element **15** with respect to the straight line connecting the points of engagement of the tape by the rollers **13**. The frictional pressure imparted to the underside of the tape during this movement is such as to straighten out any kinks or bends in the tape whose radius of curvature extends in an opposite direction as previously described. By subsequently passing the tape through the second straightening rollers **14** and second bearing element **22**, an opposite radius of curvature is imparted to the tape which compensates for the initially imparted radius of curvature, such that the tape **12**, in emerging from the outer set of guide rollers **1**, is substantially rectilinear.

It has been found that the use of the tapered bearing elements **15** and **22** in frictional pressure engagement with opposite sides of the tape at spaced points as described, serves to straighten fishing tapes more effectively than any means known heretofore.

It is to be noted that the bearing elements **15** and **22** may be independently adjusted. By such an arrangement, it is possible to adapt the tape straightening apparatus to particular tapes depending upon their stiffness. For example, if a tape is relatively stiff and inflexible whereby only a slight bending will cause a permanent set, it would be desirable to adjust the bearing element **15** such that its bearing edge **31** is spaced at or just below the line connecting the points of engagement by the rollers **13**. By this adjustment a relatively small bend is imparted to the tape. The bearing element **22**, on the other hand, would be positioned even further from the line connecting the points of contact of the rollers **14** in order that the reverse bend would be just sufficient to straighten the tape and not cause a permanent constant radius of curvature bend to occur in the opposite direction. In other words, for a relatively stiff tape it is desirable that the bearing element **15** be positioned to impart a greater bend than the element **22**, assuming that the tape is moving from left to right as viewed in Figure 1.

For a relatively flexible tape, on the other hand, in which a relatively large bend is necessary in order to make a permanent set to remove a crooked portion, the bearing elements **15** and **22** should be correspondingly positioned closer to, and preferably beyond the straight line connecting the points at which the tape straightening rollers engage the tape. Thus, while a relatively large curvature will be imparted, the flexibility of the tape will tend to spring it back towards a rectilinear position. The permanent set acquired by the tape, however, will be such that proper straightening will result.

The entire apparatus is rugged and simple in construction and may be readily operated by unskilled personnel.

Modifications within the scope and spirit of the present invention will occur to those skilled in the art. The apparatus is, therefore, not to be thought of as limited to the specific embodiment shown and described for illustrative purposes.

What is claimed is:

1. A tape reconditioning apparatus for straightening a crooked tape comprising, in combination: a mounting plate; a first pair of rollers secured in tandem to said plate for engaging one side of said tape at spaced points; a second pair of rollers secured in tandem to said plate for engaging the opposite side of said tape at spaced points; said second pair of rollers being longitudinally and laterally spaced from said first pair of rollers; first and second bearing elements associated with said first and second pairs of rollers respectively; each of said first and second bearing elements comprising a block having opposite sides tapering together to terminate in an elongated rounded edge having a length at least equal to the width of said tape so that said tape is subjected to frictional pressure on opposite sides by said bearing element edges respectively; means supporting said bearing elements to said plate in position to engage the sides of said tape opposite the sides engaged by corresponding rollers at points between said spaced points respectively; and means for independently adjusting the distances between said bearing elements and straight lines connecting said spaced points respectively whereby the degree of pressure applied to said tape by said bearing elements may be varied and a constant radius bend, imparted to said tape by said first rollers and bearing element, may be straightened by said second rollers and bearing element.

2. An apparatus according to claim 1, including means for guiding said tape past said first and second pairs of rollers.

3. An apparatus according to claim 2, in which said means comprises two outer pairs of guide rollers and one central pair of guide rollers, each pair of guide rollers engaging opposite sides of said tape and being secured to said plate in longitudinally uniformly spaced relationship, said first and second pairs of rollers being positioned on either side, respectively, of said central pair of guide rollers between said outer pairs.

4. An apparatus according to claim 3 in which each of said guide rollers and each of said pairs of rollers in tandem are provided with peripheral grooves of width

sufficient to accommodate the width of said tape whereby said tape is prevented from lateral movement from said guide rollers and from said pairs of rollers in tandem.

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