Nov. 18, 1969 W. A. PLUMMER 3,478,404

POWER-DRIVEN SEAM CLOSING DEVICE

Filed July 17, 1967

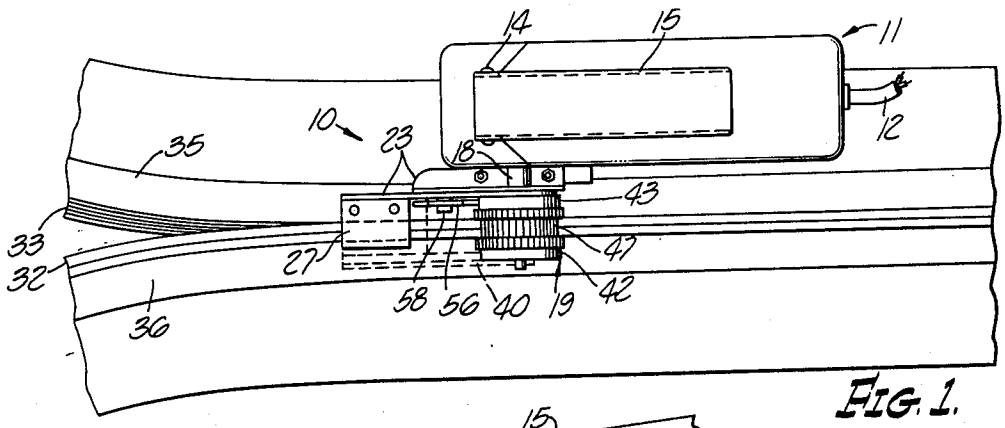

FIG. 1.

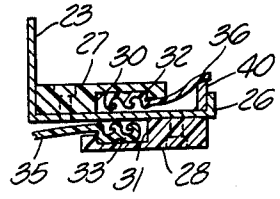

FIG. 3.

FIG. 2.

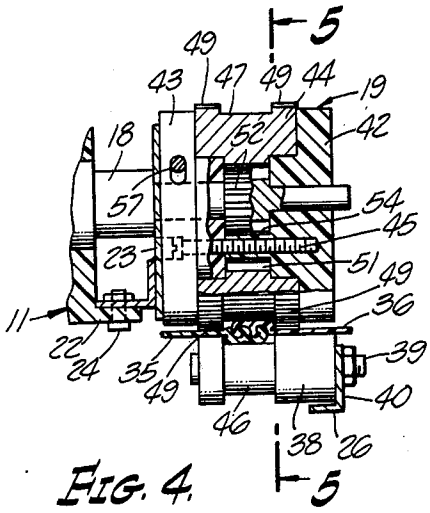

FIG. 4.

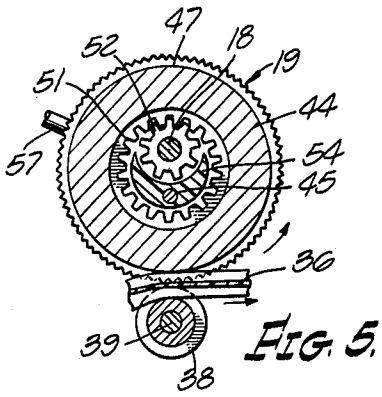

FIG. 5.

INVENTOR.
WALTER A. PLUMMER
BY
ATTORNEYS

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POWER-DRIVEN SEAM CLOSING DEVICE

Walter A. Plummer, 3546 Crownridge Drive, Sherman Oaks, Calif. 91403

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ABSTRACT OF THE DISCLOSURE

A closing device for seam-forming tapes and more particularly a power driven device adapted to be driven at variable speed to open or close a seam of the type having oppositely facing tongues and grooves effective to form a strong interlocked seam when pressed together. The device includes a suitable motor preferably arranged to provide a handgrip for the device and operable to drive traction roller means cooperating with a back-up roller to embrace the overlapped edges of seam forming tapes as the tape is fed past the rollers and is pressed together thereby. The closing rollers are preferably located laterally of one side of the handgrip to facilitate full view by the user. The device includes a pair of guide channels embracing the edges of the tapes in a manner serving to guide them between the rollers in proper position for closing. A feature of the device is the provision of fast-action manually operated means for shifting the closing rollers quickly between open and closed positions as well as for regulating the traction pressure against the tapes.

Interlockable seam forming tapes are now available in a wide variety of designs having interlocking tongues and grooves shaped to interlock with one another to form a seam. These are commonly made of extruded plastic or elastomeric material. A problem associated with the use of such tapes is the provision of suitable easily-operated positive means for both interlocking and separating the tapes. Various slider and closure devices have been proposed heretofore for this purpose but these are subject to numerous shortcomings and disadvantages sought to be avoided by the present invention. Such slider devices are subject to jamming and are easily damaged changing the spacing between the critical surfaces. Larger sizes of the tape or those formed of higher durometer materials also present problems because of the considerable force required to force the tapes into locking engagement.

The foregoing and other shortcomings of prior seam closing devices are overcome by the present invention a preferred embodiment of which comprises a handheld power operated closing tool easily assembled over the ends of the seam forming tapes and preferably operable at any desired speed to advance along the tapes under its own power while forcing the overlapped edges of the tapes forcibly together with uniform pressure and with assurance that they are properly interlocked. The device includes a motor energized electrically or by pressurized fluid at variable speed to drive a serrated traction roller along one side of the motor. A suitable adjustment, such as an eccentric mounting for one of the seam closing rollers is operable to force the rollers against the opposite sides of the tape and in such manner as to grip both tapes and advance along them while simultaneously applying closing pressure to the seam parts.

Accordingly, it is a primary object of the present invention to provide a variable speed power operated seam closing device.

Another object of the invention is the provision of a hand held power operated seam closure tool having a pair of cooperating rollers adapted to embrace the overlapped edges of interlockable seam forming tapes and to advance the latter past the rollers as the rollers press the tapes into interlocking engagement.

Another object of the invention is the provision of simple easily manipulated means for releasing as well as clamping a seam closure tool in place on a seam to be opened or closed.

These and other more specific objects will appear upon reading the following specification and claims and upon considerating in connection therewith the attached drawings to which they relate.

Referring now to the drawings in which a preferred embodiment of the invention is illustrated.

FIGURE 1 is a top plan view of a preferred embodiment of the power driven seam closing tool according to this invention;

FIGURE 2 is a fragmentary side elevational view on an enlarged scale with portions in section;

FIGURE 3 is a fragmentary cross-sectional view taken along line 3—3 on FIGURE 2;

FIGURE 4 is a fragmentary cross-sectional view taken along line 4—4 on FIGURE 2; and

FIGURE 5 is a cross-sectional view taken along line 5—5 on FIGURE 4.

Referring to FIGURES 1 to 4 there is shown one preferred embodiment of a power driven seam closing tool designated generally **10** here shown as powered by a veriable speed electric motor **11** having a service cord **12**. The generally cylindrical body of motor **11** provides a convenient handgrip readily grasped in the hand of the user. Pivotally connected to the upper forward end of the motor by pivot pin **14** is a control lever **15** manipulatable by the user's hand while grasping the tool. Lever **15** spring-biased by a spring, not shown, to its extended position spaced from the motor body wherein the motor is de-energized. When depressed, lever **15** operates a plunger **16** connected with any suitable speed control means well known to those skilled in this art housed within the motor casing. Also housed within the forward end of the casing is suitable speed reduction gearing connected to drive shaft **18** extending through the side wall of the housing and keyed to traction roller means **19**.

Rigid with one lateral side of the motor housing is a flange **22** to which an L-shaped bracket **23** is secured by fasteners **24**. The longer leg of bracket **23** lies in a generally vertical plane along the side of the motor housing and extends forwardly of the motor as clearly appears from FIGURES 1 and 2. Its shorter horizontal leg **26** projects outwardly away from motor **11** and has rigidly secured to the opposite sides thereof a pair of channel members **27, 28** (FIGURE 3). As best appears from FIGURE 3, these guide channels have their open sides facing toward leg **26** and cooperate with this leg to form low-height oppositely facing C-shaped chambers **30, 31**. Channels **30, 31** are open at both ends and each is effective to hold captive a respective one of the interlocking tongue and groove portions **32, 33** of the seam forming tapes **35, 36**. It will be understood that channel members **27, 28** serve to hold portions **32, 33** of the tapes properly aligned and positioned for their tongues to be pressed into mating relation with their grooved portions.

Roller means for advancing the tapes undergoing closing and for forcing their overlapped portions into interlocking engagement include a main traction roller **19** (FIGURE 1) and closely spaced smaller back-up roller **38**. Roller **38** turns freely on a shouldered bolt **39** clamped to an L-shaped bracket **40** formed along the outer end of the shorter horiontal leg **26** of bracket **23**.

Traction roller **19**, best shown in FIGURES 2, 4 and 5, is mounted eccentrically on the outer end of the motor-driven shaft **18**. Roller **19** is formed in three parts comprising an outer end disc **42**, an inner end disc **43** and a central ring **44** held rigidly assembled to one another by

a cap screw 45 (FIGURE 4). As herein shown, end caps 42 and 43 are formed of plastic whereas center ring 44 is formed of a suitable metal, as aluminum or brass. The periphery of ring 44 is provided with a shallow wide groove 47, the bottom preferably being serrated as best shown in FIGURE 1 so that it bites into the exterior of the tongue and groove portion 32 of one of the tapes to aid in propelling the tape through the tool. Additionally, the low height flanges to either side of groove 47 are provided with sharp edged serrations or teeth 49 which bite into the web portions 35, 36 and aid in feeding the two tapes past rollers 19 and 38 in a manner best understood by consideration of FIGURE 4.

The means for driving the combined seam-closing and feeding roll 19 is best shown in FIGURES 4 and 5, it being understood that the interior surface of ring 44 is formed with inwardly extending teeth 51 meshing with a pinion 52 formed on shaft 18 or keyed thereto. As is clear from the drawing, this pinion is offset from the center of roller 19 and operates within the open side of a crescent shaped spacer member 54 integral with outer end ring 42. The assembly screw 45 passes through the midportion of spacer 54. When roller 19 is positioned as shown in FIGURES 4 and 5, it is effective to drive roller 19 counterclockwise to feed the separated tapes 35, 36 to the right between rollers 19 and 38, and to press them into fully interlocked engagement as positions 32, 33 pass between rollers 19 and 38.

In order to impart ample traction to the two tapes it is important that rollers 19 and 38 be properly spaced from one another and so that the serrations on the main drive roller bite adequately into the two tapes. To this end and to facilitate assembly and disassembly of the tapes from the tool, feeder roller 19 is rotatable eccentrically about drive shaft 18 through a limited arc. As shown in FIGURES 2 and 5 roller 19 is in its normal operating position wherein the tapes 35, 36 are firmly clamped between roller 19 and the back-up roller 38. This condition is best illustrated in FIGURE 4 from which it will be observed that the serrated flanges 49, 49 are firmly gripping and biting into the webs of tapes 35, 36 and that the serrations in the bottom of groove 47 of roller 19 cooperate with groove 46 of the back-up roller to press the tongues and grooves of the two tapes into fully nested and interlocking relation.

Roller 19 is shiftable into and out of its pressure-applying position by an operating handle 56 having a shank 57 rotatable about its own axis and journalled in end cap 43 of the drive roller. Normally the looped outer end of handle 56 is rotated to the position shown in FIGURES 1 and 2 wherein a boss 58 projects through the loop as is clearly shown in FIGURE 2. To open drive roller 19 away from roller 38, the operator grasps handle 56 and rotates it about the axis of shank 57, thereby disengaging it from boss 58. When so rotated, handle 56 along with roller assembly 19 is shiftable clockwise through an arcuate path of approximately 125 degrees to the position shown in dot and dash lines in FIGURE 2. When so shifted, roller 19 is elevated away from back-up roller 38, as is indicated by the dot and dash circle 19 in FIGURE 2. When in this position tapes 35, 36 can be readily released from or assembled into overlapping registry between grooves 46 and 47 of the two rollers. Once in the proper position, roller 19 is shifted back into closed or driving position by grasping handle 56 and swinging it counterclockwise to the full line position shown in FIGURE 2 at which time handle 56 is again rotated about its own axis to engage it over the outer end of boss 58. Operation of the motor 11 by depressing the control lever 15 drives roller 19 counterclockwise to feed the tapes toward the right as viewed in FIGURE 2 while applying pressure to portions 32, 33 to interlock them. At the same time, the driving action applied to the roller tends to swing the drive roller counterclockwise but this action is limited by the fact that handle 56 is engaged over boss 58. As will be appreciated from the foregoing, initial rotation of the motor after the device has been assembled astride seam tapes to be closed functions to pivot roller 19 counterclockwise and closer to backup roller 38 thereby assuring ample pressure to interlock the tapes.

The operation of the seam closing tool will be quite apparent from the foregoing detailed description of its operating components. Assuming that the user wishes to apply the tool to the tape, he first shifts the drive roller to its open position by swinging the operating handle 56 to the dot and dash line position shown in FIGURE 2 in the manner described above. The free ends of each of the tapes 35, 36 are then threaded lengthwise through passages 30, 31 in the channel shaped members 27, 28, the ends of the tapes being inserted from the left hand end of the channels as viewed in FIGURE 2. The tapes are then fed into overlapped position between rollers 19 and 38 following which roller 19 is shifted counterclockwise until its operating handle 56 can be engaged over boss 58.

The tool is now ready for use and the operator grasps the motor 11 in his right hand and depresses control lever 15 to operate drive roller 19 at the desired speed. This roller rotates counterclockwise as viewed in FIGURE 2 to feed the two tapes between the rollers while pressing the tongues of each into the grooves of the other tape to interlock them.

While the particular power-driven seam closing device herein shown and disclosed in detail is fully capable of attaining the objects and providing the advantages hereinbefore stated, it is to be understood that it is merely illustrative of the presently preferred embodiments of the invention and that no limitations are intended to the details of construction or design herein shown other than as defined in the appended claims.

I claim:

1. A power driven seam closing device for use in closing together a pair of tapes formed along one face edge thereof with interlocking tongues and grooves, said device having motor-driven traction means cooperable with back-up roller means to grip a pair of overlapped seam-forming tapes therebetween and operable to advance said tapes simultaneously while pressing the overlapped portions of the tapes into interlocking engagement, and guide means upstream from said traction means for guiding each of a pair of seam-forming tapes into position for interlocking engagement with one another.

2. A seam closing device as defined in claim 1 characterized in that said motor-driven traction means includes a handgrip extending generally parallel and spaced laterally to one side of the seam undergoing closing.

3. A seam closing device as defined in claim 2 characterized in that said handgrip includes control means operable by the hand grasping said handgrip to regulate the operation of said traction means.

4. A seam closing device as defined in claim 3 characterized in that said regulating means is spring biased to non-operating position and is manually regulatable to operate said power means at increasing speed as it is depressed further from the non-operating position thereof.

5. A seal closing device as defined in claim 1 characterized in that said traction means and said back up means comprise rollers arranged to straddle the seam and to apply traction to said pair of tapes laterally to either side of overlapped portions of the seam while pressing the overlapped portions thereof forcibly into interlocking engagement.

6. A seam closing device as defined in claim 5 characterized in that the traction rims of said traction roller means include a multiplicity of serrations effective to bite into said tapes and provide a firm traction grip therewith.

7. A seam closing device as defined in claim 1 characterized in the provision of quick-action manually operable means for adjusting said traction means and said back-up roller means relative to one another between an open non-driving position and an operating position wherein the rotation of said traction means is effective to advance and close a pair of seam-forming tapes.

8. A seam closing device as defined in claim 6 characterized in that said manually operable means includes eccentric means shiftable about the axis of said rotary traction means and effective to shift the latter radially relative to said back-up roller means.

9. A seam closing device as defined in claim 1 characterized in that said tape guide means includes a pair of C-shaped channel means opening toward one another and having a common wall therebetween, the interior of said channel means being sized to receive and hold captive the interlockable edges of an associated one of said seam forming means in an area closely downstream from said back-up roller means and cooperating to guide the interlockable overlapped edge of a pair of tapes between said traction and back-up roller means properly positioned for closing by the latter means.

10. A power driven seam closing device for use in closing together a pair of tapes formed with interlockable tongue and groove means lengthwise of their facing surfaces, said device including a motor-driven roller and a

back-up roller formed and supported to straddle and grip the overlapped edges of tapes to be interlocked, and means for shifting one of said rollers toward and away from the other between open and closed positions, said rollers being effective to grip and press the tapes into interlocked engagement when the rollers are in closed position and said motor is energized, and said rollers being spaced apart and ineffective to interlock the tapes when in their open positions.

References Cited

UNITED STATES PATENTS

3,173,172	3/1965	Pasquetti.
3,264,724	8/1966	Griesser.
3,295,195	1/1967	Burgo.

THOMAS H. EAGER, Primary Examiner

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