Jan. 20, 1970 J. M. FEIGHERY 3,490,801

KNOT-TYING DEVICE FOR FRINGES

Filed Oct. 31, 1968

FIG. 1.

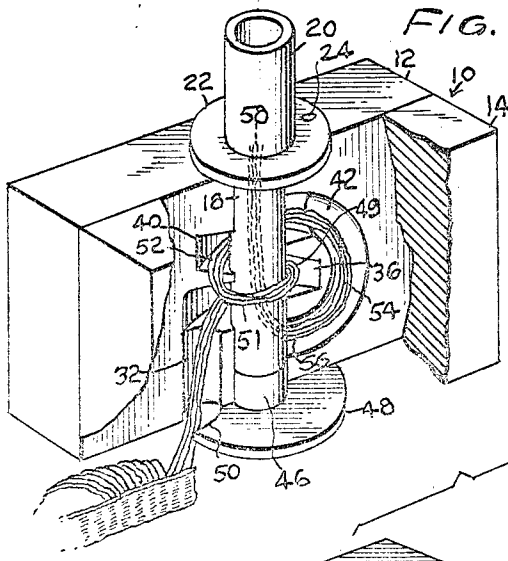



FIG. 2.

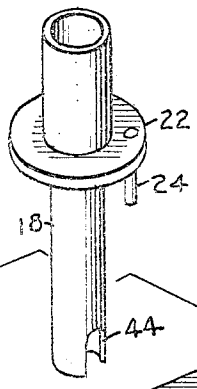
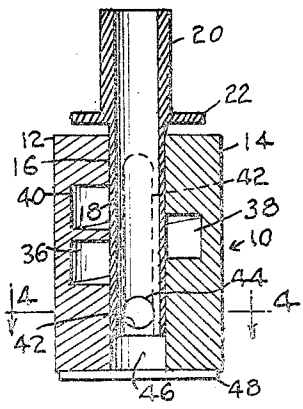



FIG. 3.



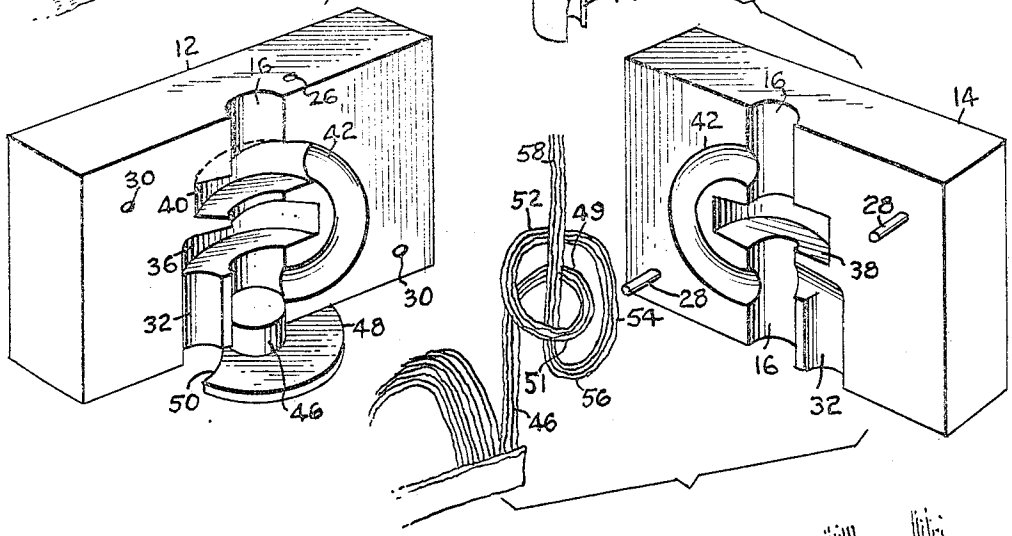




FIG. 4.

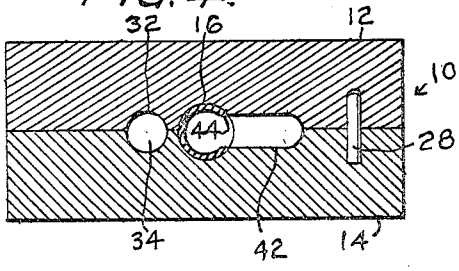
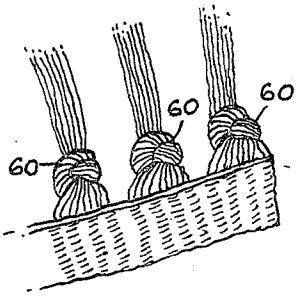



FIG. 5.




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# KNOT-TYING DEVICE FOR FRINGES

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U.S. Cl. 289—2 9 Claims

## ABSTRACT OF THE DISCLOSURE

A block formed of separable sections is provided with passageway means therein for the movement therethrough of a gathering of fringe yarns. Vacuum means moves the yarn strands through the blocks to complete the formation of the knot.

## BACKGROUND OF THE INVENTION

It is the common practice in the making of certain types of draperies and rugs to employ fringe thereon, which comes from a fringing machine with the yarn extending freely from the tape by which it is carried. Successive numbers of strands of the yarn are then gathered and tied into knots drawn up fairly closely to the tape which is attached to the rug or draperies. These operations are usually performed by hand and are quite time-consuming.

## SUMMARY OF THE INVENTION

The present device is a part of a mechanism by which various operations are performed and the machine is automated. The present device, however, is concerned solely with the formation of knots in the fringes to be attached to rugs and draperies.

The device comprises a pair of complementary blocks having passages formed therein, including an entrance passageway for the free ends of the fringe yarns and a spiral passageway passing around the axis of a vacuum tube in the center of the blocks. After passing through the spiral passageways, the yarn passes downwardly around a substantially semi-circular passageway, half of which is formed in each block, and then enters a lateral opening in the vacuum tube. It is the creation of vacuum within this tube that provides the force necessary for the feeding of the yarn upwardly through the various passageways and then into the vaccum tube to complete the formation of the knot.

After the knot formation has been completed, the vacuum is shut off, the two blocks are separated from each other and the vacuum tube is withdrawn axially from its position. This frees the previously knotted strands with the knot loosely formed therein. This knot in the larger machine is tightened automatically, but for the purpose of the present invention it may be considered that an operator holds the free end of the yarn strands and slides the knot loop downwardly toward the tape to tighten it.

## BRIEF DESCRIPTION OF THE DRAWING

FIGURE 1 is a perspective view of the device, one of the complementary blocks being broken away to show the interior construction and the path of travel of the yarn in forming the knot;

FIGURE 2 is an exploded perspective view of the two complementary block members, showing the portions of the grooves formed in each and with the vacuum tube removed vertically, the fringe with the loose knot formed therein being shown as it will appear when removed from the device;



FIGURE 3 is a vertical central transverse sectional view through the device;

FIGURE 4 is a horizontal sectional view on line 4—4 of FIGURE 3; and

FIGURE 5 is a perspective view of a section of tape having three of the knots formed therein.

## DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to the drawings, the numeral **10** designates the body of the device as a whole comprising two complementary block sections **12** and **14** arranged in contacting face-to-face relation when the device is in operation. The blocks are provided with an axial opening **16** therethrough for the reception of the lower end of a vacuum tube **18** (FIGURE 2), the upper end **20** of which is adapted to be connected to a source of vacuum which may be disconnected therefrom in any suitable manner, such disconnecting means not being shown. The opening **16**, when the block sections **12** and **14** are assembled, obviously is cylindrical in cross section to receive the vacuum tube **18**. The vacuum tube is provided above the blocks with a flange **22** carrying a pin **24** adapted to engage in an opening **26** formed in the upper face of the block element **12** as shown at the left side of FIGURE 2. This pin positions the vacuum tube circumferentially as will become apparent. Similarly, the block **14** is provided with pins **28** (FIGURE 2) engageable in openings **30** in the inner face of the block **12** to position the blocks relative to each other.

Each of the blocks is provided with a groove **32** (FIGURE 2) cooperating when the blocks are assembled to form a passageway **34** (FIGURE 4) into the bottom of which the free end of the yarn is introduced. From the top of the passage **34**, the yarn enters a spiral groove section **36** formed in the block element **12** and as the yarn moves upwardly spirally around such groove it enters a similar groove **38** in the inner face of the block **14**, shown at the right-hand side of FIGURE 2. From the upper end of the groove **38**, the yarn enters a groove **40**, also spiralled, formed in the face of the block **12**. It will be apparent that the yarn passing through the grooves **36**, **38** and **40** will move around the axis of the vacuum tube **18**. From the top or right-hand end of the groove **40** as viewed in FIGURE 2 (left-side) the yarn enters a passage formed by complementary grooves **42** in each of the inner faces of the blocks. The yarn then passes downwardly through these grooves, as shown in FIGURE 1, to enter an opening **44** in the lower end of the vacuum pipe, as shown in FIGURES 2, 3 and 4. The lower end of the vacuum pipe is open, and is closed against the admission of air by a plug **46** which may be carried by a flange **48** secured against the bottom of the block element **12** in any suitable manner, and provided with a notch **50** (FIGURE 1) through which the end of the yarn enters into the passageway **34**.

Referring to the fringe shown at the bottom of FIGURE 2, it will be noted that strands of yarn **46** have their free ends extending normally upwardly to be received in the passageway **34**, and as the yarn passes around the groove **36**, a curved portion **49** is formed in the yarn, which continues as at **51** to form a complete loop as the yarn passes upwardly around the groove **40**, the yarn being curved around this groove as at **52**. Through the passage formed by the grooves **42**, the yarn passes downwardly as at **54** and thence laterally-inwardly as at **56** into the opening **44** to be pulled upwardly as at **58** through the vacuum tube **18**. These various spiral passages loop the yarn around the axis of the vacuum tube and thus around the end **58** of the yarn to complete the loose tying of the knot.

As previously stated, the present apparatus is a unit of a larger machine in which various operations are carried out automatically. For example, in the completed machine, the tube block members **12** and **14** will be swung open and the vacuum tube **18** raised by suitable automatic means, and the knot will be tightened by automatic means. For the purpose of the present invention, it may be assumed that an operator grasps the free end **58** of the strands of yarn with one hand and pushes downwardly with the thumb and forefinger of the other hand to form a finished knot as indicated by the numeral **60** in FIGURE 5. The present device saves a great amount of time in the formation of these knots, whereas all operations previously were performed by hand. Moreover, the apparatus very simply and quickly ties uniform knots **60** in the finished fringe to be attached to draperies or rugs.

It is to be understood that the form of the invention herewith shown and described is to be taken as a preferred example of the same and the various changes in the shape, size and arrangement of parts may be made as do not depart from the spirit of the invention.

I claim:

**1.** A knot-tying device comprising a pair of blocks having flat surfaces in face-to-face relation, and a vacuum tube extending down through said blocks between said adjacent faces, said blocks being provided with a passage having an inlet end, and an outlet end communicating with said vacuum tube, portions of said passage between said ends thereof extending around the axis of said tube whereby, when said blocks are separated and said tube removed, portions of said yarn will extend around the end of the yarn which has projected through said tube to form with such end of the yarn a knot which may be tightened.

**2.** A knot-tying device according to claim **1** wherein said vacuum tube forms the inner wall of the spiral portions of said passage.

**3.** A knot-tying device according to claim **1** wherein said passage between the ends thereof extends spirally back and forth between said bodies to form at least one loop through which the free end of the yarn will extend to form a knot when said bodies are separated and said tube removed.

**4.** A knot-tying device according to claim **3** wherein the contacting faces of said bodies are provided with positioning pins to properly position said bodies to effect a continuity of the groove portions in which said loop is formed.



**5.** A knot-tying device according to claim **4** wherein the entering end of said passage is straight and parallel to said vacuum tube, such entering passage end being formed of complementary grooves in the adjacent faces of said body members.

**6.** A knot-tying device according to claim **1** wherein the contacting faces of said blocks are provided with complementary grooves extending from top to bottom thereof and into the upper end of which said vacuum tube extends, the lower ends of said complementary grooves being plugged, said vacuum tube being provided in one side and adjacent the bottom thereof with a lateral opening with which said outlet end of said passage communicates to feed the yarn thereinto.

**7.** A knot-tying device according to claim **6** wherein the upper end of said vacuum tube is provided with means including a positioning pin engageable with the top of one of said bodies to position said tube for the proper communication of said lateral opening with said outlet end of said passage.

**8.** A knot-tying device according to claim **6** wherein said opening in the lower end of said vacuum tube is in the form of a notch extending to the lower extremity of said tube for the easy withdrawal of the latter when said bodies are separated.

**9.** A knot-tying device according to claim **6** wherein the portion of said passage adjacent said outlet end has an upper end communicating with the upper end of said spiral portion of said passage and the lower end of which communicates with said opening in said vacuum tube, said outlet end portion of said passage being smooth and curved longitudinally away from the axis of said vacuum tube and then inwardly into communication with said opening in said vacuum tube.

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