

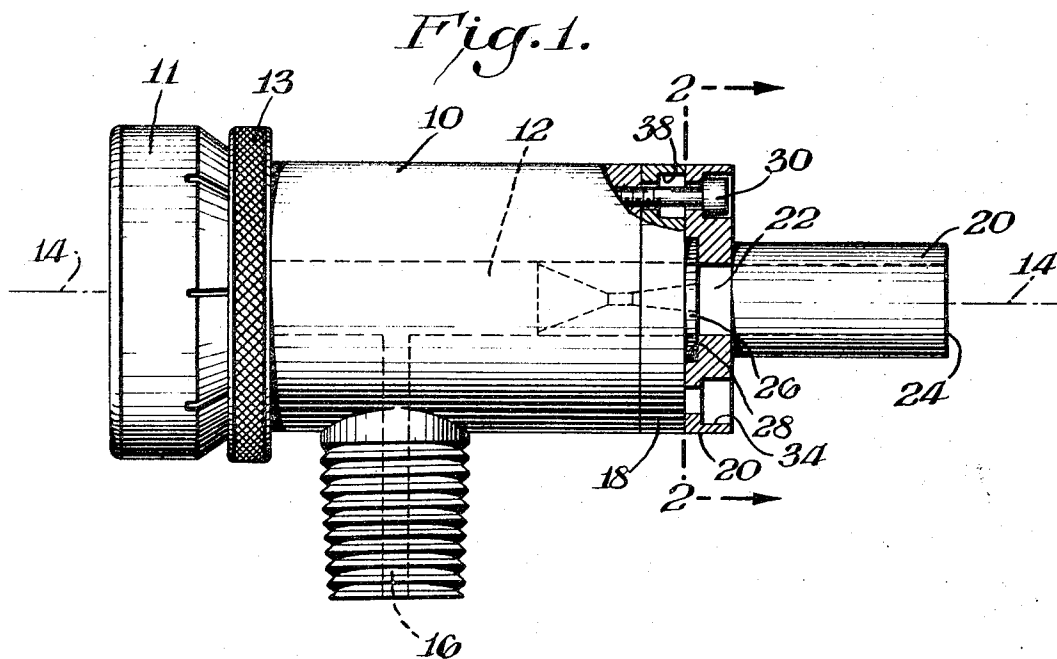
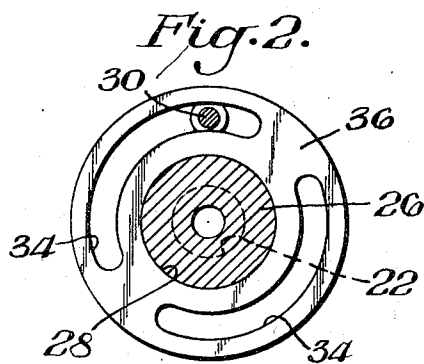
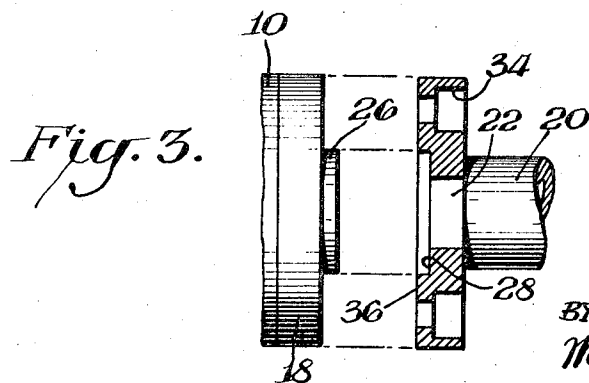
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APPARATUS FOR TREATING YARN

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APPARATUS FOR TREATING YARN

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ABSTRACT OF THE DISCLOSURE

A device is provided that allows one to lock a nozzle containing element to a housing with a venturi between the element and the housing in a manner which still allows one to adjust the venturi, the device being employed in the production of bulky yarns.

This invention relates to apparatus for treating filaments such as a yarn to produce a bulky yarn. More particularly, it relates to a control device for use in the production of a bulky yarn composed of a plurality of individually convoluted filaments.

In present day technology, artificial fibers are often produced as continuous filaments. Such continuous filaments are very strong since they have no loose ends which cannot transmit axial stresses. Unfortunately this uniformity makes these continuous filament yarns more dense than yarns made from staple fibers. It is not always desirable to produce yarn from staple fibers since it is more time-consuming. Also, it requires a series of complex operations to crimp and align the fibers into an elongated bundle and then to draw the bundle to successively smaller diameters. The final spinning operation twists these discontinuous fibers together to produce a coherent yarn with considerably increased bulk. The occluded air spaces in the yarn gives it a lightness, covering ability, and warmth-giving bulk not normally possible with continuous filament yarn. In the prior art, it has been the practice to cut continuous filament yarns such as rayon, acetate, nylon, polyacrylic fibers and polyester fibers into short lengths for spinning into staple yarn. This provides staple fibers that can be processed on conventional wool or cotton spinning equipment.

More recently the bulk, covering power, and recoverable elongation of continuous filament yarns have been improved without resorting to the staple spinning systems of the prior art. These improvements have been brought about by various processes. One of these processes for making stretch yarn includes the steps of twisting, heat-setting and finally backtwisting to obtain a low final twist level. Another process by which yarn of improved bulk is prepared commercially includes the steps of twisting, heat-setting, and backtwisting on-the-run using a false twisting apparatus. The yarn produced by this latter process can be further modified by hot relaxing to improve its bulk and feel. Still another process for preparing bulk yarn involves the well-known stuffer box technique by which the yarn is heat-set while compressed in the stuffer box.

Most of the prior art yarns are produced by a process which has several common elements. These common elements include deforming the yarn mechanically and then heat-setting it either with or without after-relaxing. A patent, U.S. No. 2,783,609 was recently issued to Breen. Other patents relating to process and apparatus for producing bulky yarns are described in U.S. Patents Nos. 2,994,938 and 2,852,906. In the Breen patent there is disclosed a process of manufacture for improving the bulk of continuous filament yarns. Breen's technique includes exposing a filamentary material to a turbulent fluid that is rapidly moving. This induces a multitude of crumpled filament loops at random intervals along the individual

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filaments. These loops and snarls of entangled loops appreciably increase the bulk of the continuous filament yarns which when woven yield fabrics of improved cover, bulk and feel. While the apparatus of Breene provides for the bulking of filamentary structures using a turbulent fluid, improved apparatus is needed for better control and for handling small denier filaments.

It is an object of this invention to provide an improved apparatus for producing a bulky yarn of the type described.

Another aim of this invention is to provide an improved apparatus for providing bulky yarn which apparatus facilitates adjustment of the apparatus while in actual use. These and other objectives of this invention will be seen hereinafter.

In a preferred form of the invention the apparatus for making bulky filament yarn includes a housing having a cylindrical channel in which the yarn and a fluid stream such as air are simultaneously passed. A flanged venturi is rotationally placed in the discharge end of said cylindrical channel in such a manner that it may be rotated about the axis of the channel. Additionally, an external nozzle is rotationally and concentrically positioned with the channel adjacent the venturi. During operation, it is desirable to adjust the jet texturing the yarn by rotating either or both of the venturi or external nozzle members relative to each other and the housing. Because dirt or some yarn gets lodged between the venturi and the nozzle member or because the latter has become loose and is tilted, one adjusts the nozzle member also, it being recognized that the mere rotation of the nozzle in a true concentric manner would not affect the bulking. To facilitate the adjustment, a venturi member of this invention is provided with a cylindrical protuberance concentrically disposed with the housing channel. In one form of this invention the bore in the external nozzle is counter bored to form a recess which is adjusted to engage the protuberance of the venturi member. By this arrangement or the vice-versa arrangement only rotational or axial movement between the housing or venturi member and the external nozzle is permitted, and troublesome dislocation or mis-alignment of the two is avoided.

Novel features that are considered characteristic of this invention are set forth in the appended claims. The invention, itself, however, both as to its organization and method of operation, as well as additional objects and disadvantages thereof, will be best understood from the following description when read in connection with accompanying drawings in which:

FIGURE 1 is an elevation, partly sectional view of a yarn texturing apparatus containing the modification of this invention;

FIGURE 2 is a sectionial view of the texturing jet illustrated in FIG. 1 which view is taken on line 2—2 of FIG. 1, and

FIGURE 3 is an elevational, sectional view of the venturi member with its protuberance spaced apart from and just prior to joinder with the matching recess in the nozzle element.

In the drawing the texturing jet may be of similar conventional type such as those described in the art cited above. The texturing jet includes a similar cylindrical housing 10 which is pierced lengthwise by a cylindrical channel 12 disposed along the axis 14 of the housing 10. Although not shown, the housing 10 may include as is described in U.S. Patent 2,994,938, a needle of cylindrical cross section pierced by a cylindrical channel having a flared mouth at the entrance end in cap 11 to facilitate introducing yarn into the jet. This needle is mounted in an end cap 11 which is threadedly engaged on the inlet end of the housing 10. A narrow locking washer 13 threaded on the same threads as the end cap 11 facilitates locking

the end cap in a particular rotational position and permitting axial adjustment of the needle within the housing 10.

The cylindrical channel within the housing has a greater diameter than that of the material issuing from the needle so that an annular plenum chamber is contained in the channel. This chamber is supplied with a compressible fluid, preferably air through a radial conduit 16 connected to the housing 10. A venturi member 18 is inserted into the opposite end of the cylindrical channel 12 and typically is relatively closely fitted to prevent air leakage. The venturi member includes an axial orifice of reduced diameter through which both the yarn and the fluid pass to an external nozzle member 20 which also includes an axial passageway of increased diameter to a discharge point 24 of the apparatus, a typical venturi passageway being shown in dotted lines in FIG. 1.

During operation of this texturizing jet a fluid such as air is forced through the conduit 16 through the venturi at increased velocity and onward to discharge end 24 of the nozzle 20. In this passing the desired convolutions are produced. It is often necessary during operation to rotate the venturi member 18 or the external nozzle 20 about the axis 14 to obtain the precise texturing of the yarn desired. These adjustments are frequently made while the jet is in operation. In the prior art apparatus the faces of venturi element 18 and nozzle element 20 are flat and smooth, so that upon loosening of the screw holding them together the nozzle 20 would fall or move downwardly by gravity disrupting the alignment and frequently stopping the issue of the filaments through the venturi and/or nozzle or in damaging the filaments.

In accordance with the invention, such final adjustments are facilitated by forming the venturi member, which in some instances may be integral with the housing 10, to have a protuberance 26. The protuberance 26 is generally cylindrical and is disposed at the discharge end of the housing channel. The bore 22 of the nozzle 20 is counter bored as at 28 to form a cylindrical recess adapted to engage the protuberance 26. The bearing relationship is seen in FIGURE 3. Upon joinder, the external nozzle 20 can be rotated relative to the housing 10 (or venturi 18) without disturbing the joint.

As shown in FIGS. 1 and 2, the external nozzle 20 is held to the housing 10 by means of a screw 30. FIGURE 2 shows that annular slots 34 are provided in the flared base portion 36 of the external nozzle 20 to permit almost 180° of rotation of the external nozzle. Similar matching slots 38 (FIGURE 1) are formed in the venturi member 18. Frequently during the operation it is desired to change or readjust the relationship of the orifices in nozzle 20 and venturi 18 with themselves or with the orifices in the needle described above and contained in channel 12. Upon loosening screw 30 slightly the operator may make such adjustments quickly and safely without fear that the nozzle element 20 will fall off or become disengaged with or thrown out of basic line with the venturi element 18. Similarly, if the holding element 30 becomes loose inadvertently during the operation, generally no down time or yarn damage results, for the nozzle element is still held in place by the joint comprising protuberance 26 and recess 28.

There has been described an improved texturing jet which permits adjustments by rotation of either the venturi member, the external nozzle, or both relative to the main housing of the jet while in operation. It is, of course, recognized that other non-threaded, friction-fit holding means may be provided. For example, the outer diameter

of the flanges of the venturi member 18 and nozzle 20 need not be the same. One or the other may be larger and contain a recess at its extremities to receive the smaller flange. Thus, this invention is not limited to the holding means shown in the drawings. The apparatus of this invention, thus, comprises a housing which has a closure, usually rotatable, mounted on one end which closure has an orifice in it in conduit relationship with the chamber in the housing and in turn is in conduit relationship with a nozzle at its other end. The nozzle and perforated closure are held together in a fitting akin to a loose force fitting or one of close tolerance or a non-thread bearing relationship that permits either to be rotated independently while yet being held to the other. Also, the fitting is such that it affords axial movement between the nozzle and closure while still being in mounted, operable position with respect to themselves and the housing. Once the desired position of each has been attained the screw means is used to secure the two fixedly to the housing.

While the invention has been disclosed herein in connection with certain embodiments and certain structural and procedural details, it is clear that changes, modifications or equivalents can be used by those skilled in the art; accordingly, such changes within the principles of this invention are intended to be included within the scope of the claims below.

I claim:

1. In a device comprising a housing which is pierced by a cylindrical channel and which is adaptable at one end to have an adjustable element that contains a venturi and to receive a second element that contains an external nozzle, the improvement which comprises said adjustable element and said second element having bearing means therebetween; and a locking means for holding said second element to the said housing which comprises at least one screw which passes through said second element and said adjustable element and is threadable into a threaded bore in said housing.

2. A device in accordance with claim 1 in which said adjustable element is rotatably adjustable without the complete removal of said locking means.

3. A device in accordance with claim 1 in which said bearing means comprises a protuberance having a close tolerance fitting with a matching recess.

4. A device in accordance with claim 3 in which said protuberance is generally cylindrical and said second element has the matching recess disposed therein.

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MERVIN STEIN, *Primary Examiner*.

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