United States Patent

[11] 3,590,452

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[54] **ROLLER APPLICATOR DEVICE**
8 Claims, 6 Drawing Figs.

[52] **U.S. Cl.** **29/115,**
29/117, 101/375, 101/400
[51] **Int. Cl.** **B41g 1/04**
[50] **Field of Search** 29/117,
130, 129, 125, 115; 118/221, 222, 219, 211;
15/103.5, 165, 213; 51/184.1; 101/348, 375, 400;
74/230.01

[56] **References Cited**

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Also considered— 2,890,517, 158,077, Br.; 662,684 Ger.; 3,289,631, 2,465,376, 916,037, 43,741, Austria; 876,725, Ger.; 566,010 Ger.; 1,568,334, 1,395,468, 1,284,867, 1,230,190, 734,741, 175,675, 1,050,015, 1,514,109, 3,023,699, 524,913, Fr.

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Assistant Examiner—Leon G. Machlin
Attorney—Reuben Wolk

ABSTRACT: A roller applicator device wherein the device has readily changeable liquid-applying outer surface means.

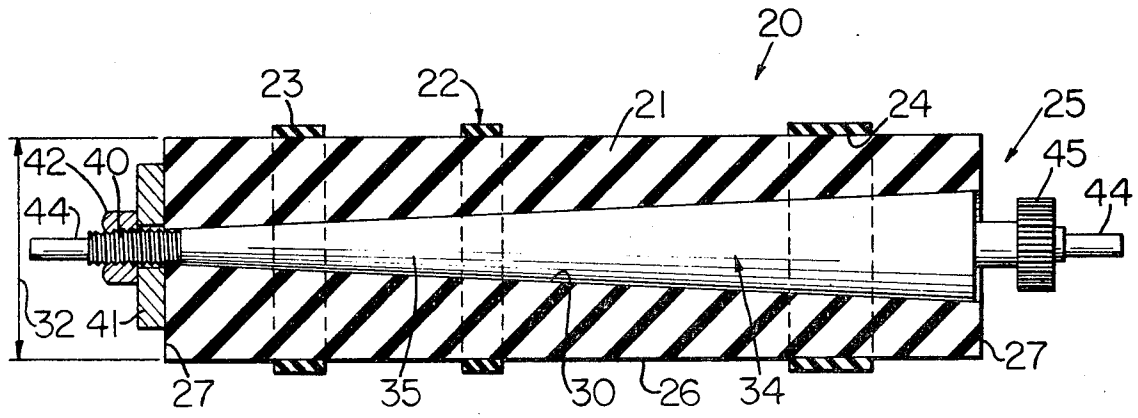


FIG-1

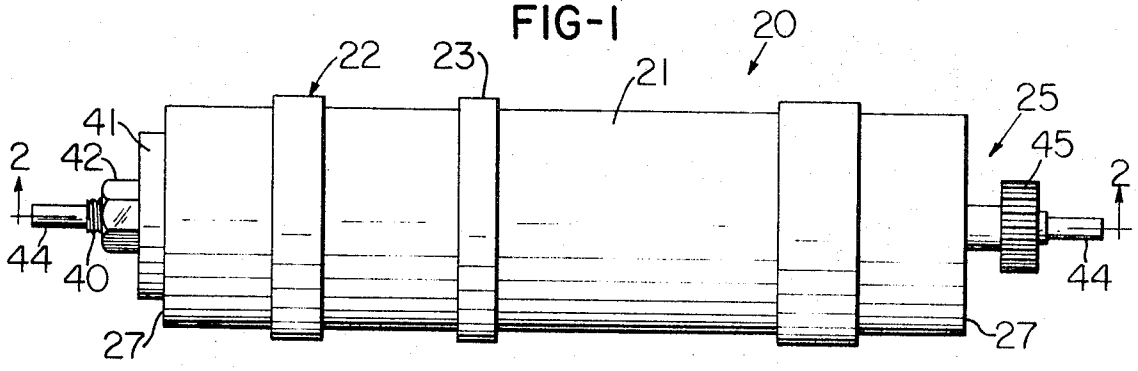


FIG-2

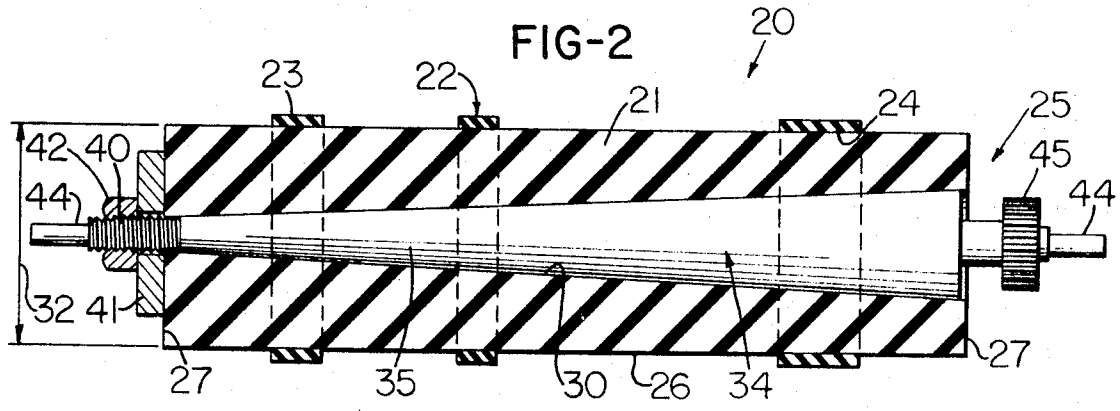
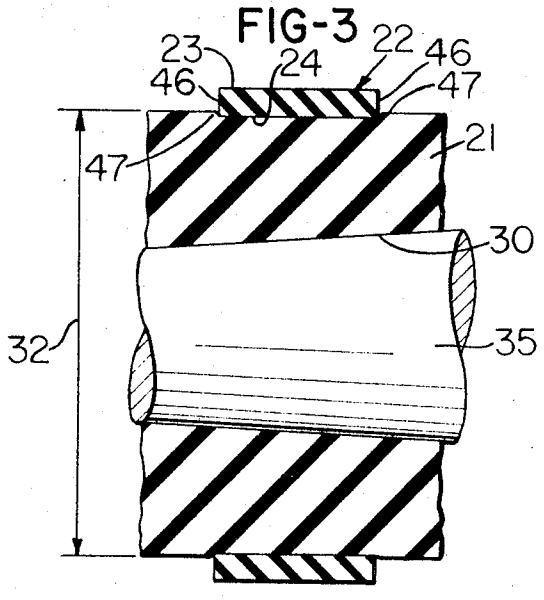


FIG-3



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FIG-4

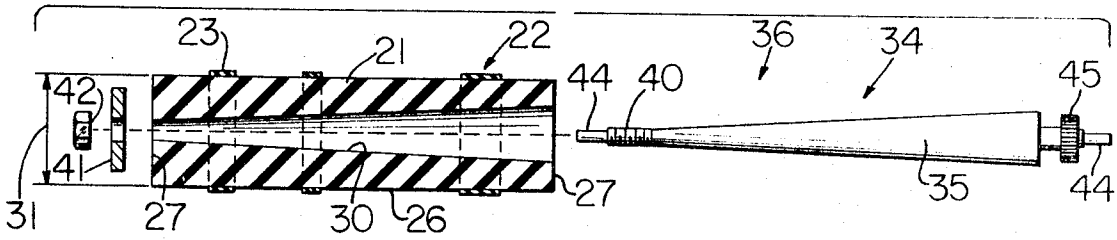


FIG-5

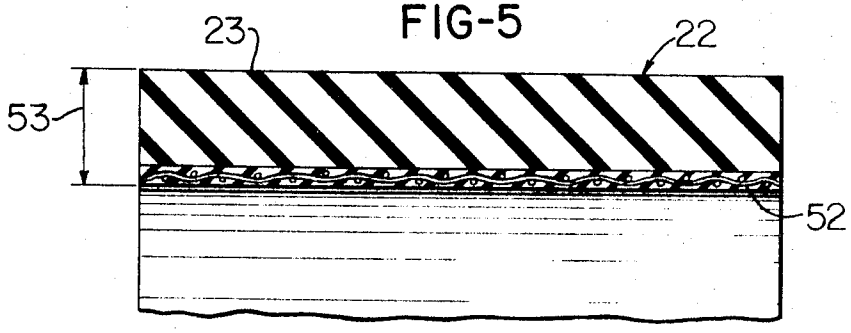
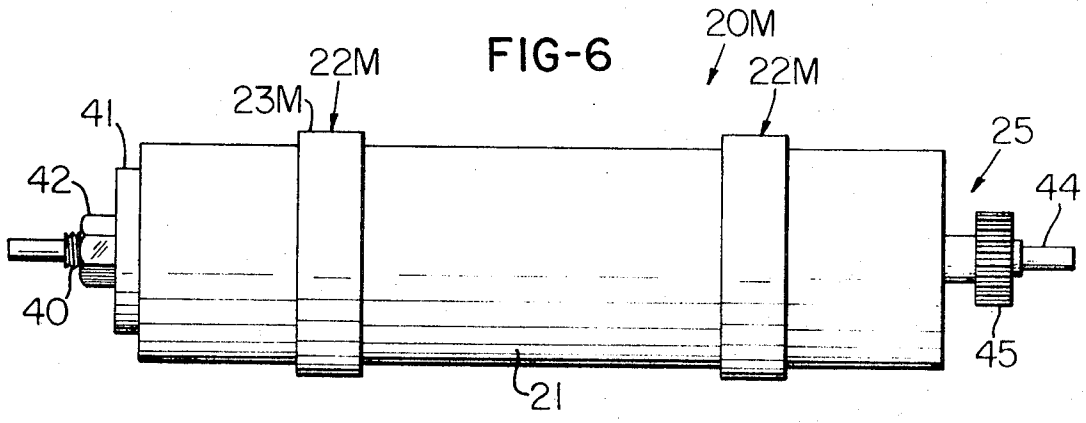


FIG-6



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ROLLER APPLICATOR DEVICE

BACKGROUND OF THE INVENTION

It is a common practice in the printing industry for a printer to apply a liquid such as a suitable varnish over selected areas of a given article being processed while leaving intermediate or other areas of such article unvarnished. The present procedure is for a printer to cut circumferential grooves into the liquid-applying surface of his roller to a predetermined depth while keeping other portions of such roller at a full diameter to, in effect, define annular liquid-applying surfaces in the roller for each particular application. This technique is very expensive and requires the forming of a special liquid-applying surface for each application. Further, after the completion of a given liquid-applying operation for a particular application it is highly unlikely that the roller can be used for another application. Thus, the printer is required to carry a large stock of rollers which must be cut for each particular application. In addition, any error made in cutting a particular roller for a given application requires that the roller be scrapped thereby increasing operating expenses.

SUMMARY

This invention provides a roller device for applying liquid means, which is of simple and economical construction, requires that only a number of component parts be stocked by a printer, and has means for precisely locating its liquid-applying surface.

Other details, uses, and advantages of this invention will become apparent as the following description of the embodiments thereof presented in the accompanying drawings proceeds.

BRIEF DESCRIPTION OF THE DRAWINGS

The accompanying drawings show present exemplary embodiments of this invention, in which

FIG. 1 is a front view illustrating one exemplary embodiment of a roller device of this invention particularly adapted for applying liquid varnish to associated sheet means;

FIG. 2 is a cross-sectional view taken on the line 2–2 of FIG. 1 and particularly illustrating a radially expandable member comprising the roller device of FIG. 1 made of a resilient rubberlike material and having sleeve means fastened in position concentrically therearound in the form of a plurality of three annular bands each having an outer liquid-applying surface;

FIG. 3 is a greatly enlarged fragmentary cross-sectional view particularly illustrating the manner in which the radially expandable member is urged tightly against an associated annular band to hold such annular band in position;

FIG. 4 is an exploded view with parts in section and parts in elevation particularly illustrating the roller device of FIG. 1 with its plurality of three annular bands arranged in position concentrically around the radially expandable member and prior to fastening a central core member of such roller device in position within the radially expandable member;

FIG. 5 is a greatly enlarged fragmentary cross-sectional view particularly illustrating the construction of the substantially unstretchable annular band arranged at the right end of the roller device of FIG. 1; and

FIG. 6 is a view similar to FIG. 1 and particularly illustrating the radially expandable member of FIG. 1 and its associated core components utilized together with a pair of identical annular bands each having a length which is different from the lengths of the annular bands illustrated in FIG. 1 and with such pair of annular bands being positioned at different axial positions along the radially expandable member.

DESCRIPTION OF ILLUSTRATED EMBODIMENTS

Reference is now made to FIG. 1 of the drawings which illustrates an exemplary roller device of this invention which is designated generally by the reference numeral **20** and such

roller device is particularly adapted for applying liquid means such as a varnish to sheet means of any suitable material such as paper, cardboard, metal, and the like over controlled areas such as over elongated strips of predetermined widths. The roller device **20** has certain basic component portions which are stocked as standard reuseable items; yet the roller device has simple and economical liquid-applying surface means capable of being used with the reuseable standard items to define a roller device of optimum versatility.

As seen particularly in FIGS. **2** and **4** the roller applicator device or roller device **20** comprises a radially expandable member **21** which has continuous annular sleeve means in the form of a plurality of three annular bands **22** having different axial lengths and each being supported concentrically around the expandable member **21**. Each sleeve means or annular band **22** has an outer liquid-applying surface **23** which in this exemplary application is particularly adapted for applying liquid varnish, or the like.

The roller device **20** has means for expanding and holding the expandable member **21** against inside surface means or inside friction surface **24** of each annular band **22** and such means is designated generally by the reference numeral **25** and will be referred to as expanding means **25**. The expanding means **25** is of optimum simplicity and enables the expandable member **21** to be expanded radially outwardly so that its outer periphery may be arranged at any one of an infinite number of radial positions and as will be described in more detail subsequently.

The radially expandable member **21** is in the form of an elongated substantially tubular member having an outer right circular cylindrical surface **26**, a pair of oppositely arranged ends **27**, and a tapered inside surface **30** which in this example of the invention has a substantially frustoconical configuration, see FIG. **4**. The expandable member **21** is preferably made of a resilient rubberlike material and its outer cylindrical surface **26** has a given diameter **31** with the expandable member **21** in its unexpanded position. The expandable member **21** is expanded and held by the expanding means **25** to a diameter designated by the reference numeral **32** in FIG. **3** to thereby urge the cylindrical surface **26** against the inside surface **24** of each annular band and hold each annular band **22** firmly in position on the expandable member **21**. The expanding means **25** may be easily released or unfastened, in a manner to be subsequently described, whereby the resilient character of the material utilized to make the expandable member **21** assures that such member is restored to its original configuration having the diameter indicated at **31**.

The expanding means **25** comprises tapered means having an outside surface corresponding in configuration to the frustoconical inside surface **30** of the expandable member **21** and the tapered means in this example of the invention is shown as a substantially rigid tapered core member **34**. The core member **34** has a frustoconical outside surface **35** which corresponds to and is adapted to be received within the frustoconical surface **30** of the radially expandable member **21** and the core member **34** is adapted to be moved from the position illustrated at **36** in FIG. **4** and slid axially within the radially expandable member **21** to serve the dual purpose of supporting the member **21** and radially expanding such member depending upon the amount that the core member **34** is axially slid within the expandable member **21**. It will also be appreciated that once the core member **34** is fastened in position relative movement cannot take place between such core member and the expandable member **21**.

The expanding means **25** also comprises thread means in the form of a threaded portion **40** provided adjacent the small diameter end of the frustoconical male or outside surface **35** of the core member **34** and comprises flange means in the form of an annular flange **41** which is adapted to engage an associated end **27** of the expandable member **21**. The expanding means **25** also comprises a threaded nut **42** which has female threads provided therein which are adapted to be threaded over the threaded portion **40** so that upon inserting the core

member 34 within the tubular expandable member 21 the frustoconical outside surface 35 engages the cooperating frustoconical surface 30 of the expandable member 21 and upon tightening the nut 42 over the threaded portion 40 with the annular flange 41 being urged against its associated end 27 of the expandable member 21 the net effect is to provide a central support for the expandable member 21 while simultaneously radially expanding the cylindrical outer surface 26 against the inside surface 24 of each annular band 22 and tightly hold each band in position.

During the process of manufacturing the expandable roller 21 and the annular bands 22 it will be appreciated that these parts will be made within established tolerance limits; however, the unique construction of the roller device 20 of this invention enables the member 21 and the inside diameters of the annular bands 22 to be made to comparatively wide tolerance limits. Nevertheless, because the member 21 may be easily expanded to an infinite number of radial positions so that it may have any desired diameter of an infinite number of possible diameters all component parts of the roller device 20 are useable and may be made more economically in mass production quantities.

The core member 34 of the roller device 20 of this invention also has shaft means shown as a pair of oppositely arranged right circular cylindrical shaft portions 44 provided at opposite ends thereof. The shaft portions 44 are adapted to rotatably support the core member 34, expandable tubular member 21, and hence the entire roller device 20 with its annular bands 22 in a manner which is well known in the art. The shaft portions 44 of this example of the invention are shown as being made as an integral part of the core member 34.

The exemplary roller device 20 has a drive means in the form of a toothed drive gear 45 which is suitably fixed to the core member 34 adjacent an associated shaft portion 44. The gear 45 drives, i.e., rotates, the roller device 20 and may be engaged by an associated driving gear which meshes therewith in a known manner. The toothed gear 45 is merely presented as an example of a device which may be utilized to rotate the roller device 20; however, it is to be understood that any suitable known device may be utilized to rotate such roller device.

As previously indicated in the expandable member 21 is preferably made of a resilient material which may be in the form of a rubberlike material, or the like, and upon utilizing the expanding means 25 to expand the expandable member 21 radially outwardly the expansion causes annular portions of the right circular cylindrical outer surface 26 to frictionally engage the inside surfaces 24 of the annular bands 22 and frictionally hold such bands against axial movement. As the member 21 is expanded against the comparatively unstretchable bands 22 portions of member 21 adjoining opposite side edges 46 of each annular band 22 bulge outwardly and as shown at 47, see FIG. 3. The bulging of member 21 as shown at 47 assures that each annular band 22 is held more firmly in position and against axial movement relative to the expandable 21.

As mentioned earlier each annular band 22 is in the form of the substantially unstretchable band which is constructed so that its outer liquid-applying surface 23 is particularly adapted to apply a given liquid on an associated article, such as a sheet means, which is to be coated with liquid. Further, as seen particularly in FIG. 5 of the drawings, the inner portion of each band 22 is preferably made of an unstretchable material which may be reinforced with suitable cords 52 to prevent circumferential elongation.

The annular bands 22 may be made by conventional methods such as those used in the manufacture of drafting aprons and other textile sleeves and the cord members 52 may be spirally wound in a known manner so that each annular band 22 is sufficiently reinforced to assure circumferential elongation will not occur. The thickness, indicated at 53, of each annular band 22 is determined based on the intended use of each band 22 and such thickness generally takes into account the effective thickness of the resilient expandable member 21. In addition, the materials selected for the expandable member 21 and the annular bands 22 take into account the resiliency which is desired for the liquid-applying surfaces 23 of the annular bands 22.

The thickness 53 of each annular band 22 is generally the same as the depth of groove means that would ordinarily be provided in a similar roller applicator formed by conventional techniques. The outside diameter 31 of the radially expandable member 21 of this invention is also made so that it will be roughly the same as the original diameter of a conventionally formed roller applicator device minus twice the thickness of the annular band 22.

The exemplary roller device 20 is shown as having a plurality of three annular bands 22 of different axial lengths arranged concentrically therearound and each having a length which is substantially less than the length of the expandable member 21. However, it is to be understood that the length of each band, number of bands, and arrangement of such bands 22 axially along the elongated member 21 may be varied in any desired manner and depending upon the application of the roller device 20. It will also be appreciated that a particular roller device may also be provided with a single annular band having an axial length which is equal to or substantially smaller than the length of the particular roller device.

The versatility of the roller device of this invention is highlighted in FIG. 6 of the drawings, which illustrates a roller device which is designated generally by the reference numeral 20M for convenience and represents a modification of the roller device 20 with only difference being that only a plurality of two equal width annular bands are provided concentrically around the roller device 20M. The remaining component portions of the roller device 20M have been given the identical reference numerals as in the roller device 20 and to highlight the difference in only the two annular bands such bands are each designated by the reference numeral 22M and each band 22M is provided with an outer liquid-applying surface 23M.

From the above description it will be apparent that the roller device 20 of this invention has optimum versatility and the method utilized in making such roller device assures provision of a roller applicator device which has a readily changeable liquid-applying outer surface. Thus it is only necessary for a printer to merely stock sleeve means or annular bands similar to the annular bands 22 and 22M and when it is desired to change the outer liquid-applying surface of a particular roller device for a given application it is merely necessary to loosen the nut 42 and move the core member 34 axially relative to the expandable member 21, causing the frustoconical surface 35 of the core member 34 to move away from the frustoconical inside surface 30 of the member 21 whereby the resilient character of the expandable member 21 causes the right circular cylindrical surface 26 to be restored to its original diameter 31 as illustrated in FIG. 4.

With cylindrical surface 26 restored to its original diameter, it is then a simple matter to position along the cylindrical outer surface 26 of the member 21 and again tighten the nut 42 whereby the new annular bands are held in position by friction and the bulging action as indicated at 47 in FIG. 3. The positions of the annular bands 22 being used for a particular application may also be readily adjusted along the outer cylindrical surface 26 merely by loosening the nut 42 and then again tightening such nut with the annular bands at their new positions.

The core member 34 may be made of any suitable comparatively inexpensive material such as a hard plastic or a metallic material. Also, to further reduce costs, a printer may stock members 21 which can be expanded to comparatively larger diameters whereby such printer may also carry unstretchable bands of different diameters, within predetermined limits, whereby roller applicators of different outside diameters may be readily available to the printer by stocking a bare minimum of component parts.

As previously explained, the roller device of this invention may be made very inexpensively because its components can

be made to looser tolerances without detriment to the overall performance of such device. To further minimize operating costs associated with the device of this invention marking means may be provided on the outer periphery of the right circular cylindrical surface **26** of the expandable member **21** to aid in the precise placement of the annular bands **22**. The marking means may be in the form of circumferential lines and once a job has been started it would not be necessary to completely change the set up of the machine if it is desired to change the location at which a strip of liquid, such as varnish, is being applied against an associated sheet; instead the bands would be precisely shifted with the aid of the marking means.

While present exemplary embodiments of this invention, have been illustrated and described, it will be recognized that this invention may be otherwise variously embodied an practiced within the scope of the following claims.

I claim:

1. A roller device for applying liquid means, comprising; a radially expandable substantially tubular member made of a resilient rubberlike material and having a tapered inside surface; annular sleeve means having an outer liquid-applying surface; and expanding tapered means having an outside surface corresponding in configuration with and being adapted to engage said inside surface to radially expand said member against the inside surface of said sleeve means to hold said sleeve means firmly in position.

2. A roller device for applying liquid means, comprising; a radially expandable substantially tubular member made of a resilient material and having a substantially frustoconical inside surface; annular sleeve means having an outer liquid-applying surface; and expanding means comprising a rigid core member having a frustoconical outside surface corresponding in configuration to said inside surface; said core member being axially movable relative to said expandable member, causing said outside surface to wedge against said inside surface and radially expand said expandable member against the inside surface of said sleeve means to hold said sleeve means firmly in position.

3. A device as set forth in claim **2** in which said tubular member has a generally cylindrical outer surface and said annular sleeve means comprises a substantially unstretchable band having a length smaller than the length of said tubular member, said band being adapted to be readily positioned to an infinite number of axial positions along the length of said expandable member.

4. A device as set forth in claim **3** in which said radially expandable member is expanded against said inside surface means of said substantially unstretchable band causing portions of the outer surface of said expandable member to bulge outwardly against opposite side portions of said unstretchable band.

5. A device as set forth in claim **2** in which said core member has shaft means extending from opposite ends thereof, said shaft means being adapted to rotatably support said device.

6. A device as set forth in claim **5** and further comprising drive means fixed to said core member to enable rotation of said core member and hence said device.

7. A device as set forth in claim **2** in which said expanding means comprises thread means adjacent the small diameter end of said frustoconical outside surface of said core member and means threadedly engaging said thread means an contacting an associated end of said radially expandable member to provide adjustable radial expansion of said expandable member to an infinite number of radial positions.

8. A device as set forth in claim **7** in which said means threadedly engaging said thread means and contacting said associated end comprised an annular flange engaging said associated end and a threaded nut engaging said thread means and urging said annular flange tightly against said associated end.

PO-1050
(5/69)

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,590,452 **Dated** July 6, 1971

Inventor(s) John A. Macleod

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 3, line 41, delete "in"

Column 4, line 54, after "position" insert --- new annular bands at any desired axial position ---

Column 5, line 15, change "an" to --- and ---

Claim 7, line 4, change "an" to --- and ---

Claim 8, line 3, change "comprised" to --- comprises ---

Signed and sealed this 11th day of April 1972.

(SEAL)
Attest:

EDWARD M.FLETCHER,JR.
Attesting Officer

ROBERT GOTTSCHALK
Commissioner of Patents