United States Patent [19]

Ehrenberg

[11] **3,797,950**

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[54] **CONNECTING ARRANGEMENT**

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[21] Appl. No.: **229,517**

Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 137,353, April 27, 1971, Pat. No. 3,679,245.

[30] **Foreign Application Priority Data**

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Mar. 2, 1971	Germany	2109827
Mar. 17, 1971	Germany	2112986

[52] **U.S. Cl.** ....**403/370,** 85/69, 151/19 R, 403/359

[51] **Int. Cl.** **B60b 27/06**

[58] **Field of Search** .... 85/7, 36, 69; 151/19 R, 151/21 C; 279/2; 287/52 R, 52.04, 52.06, 53 SS; 285/382.7, 341 C, 340

[56] **References Cited**

UNITED STATES PATENTS

3,578,364 5/1971 Ehrenberg .... 287/52 R

FOREIGN PATENTS OR APPLICATIONS

704,139 7/1952 Great Britain .... 287/52 R

869,892 3/1953 Germany .... 287/52 R

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Attorney, Agent, or Firm—Michael S. Striker

[57] **ABSTRACT**

A cylindrical inner member is coaxially and with clearance surrounded by an annular outer member, and in the clearance is located a connecting arrangement having one or more annular elements of elastically yieldable material, each such element having a transverse wall portion extending transverse to the longitudinal axis of the inner member, and an inner and an outer annular wall-portion extending in opposite directions axially of the clearance beyond the transverse wall portion by a predetermined distance. A stressing arrangement is provided for stressing the annular element axially so as to effect radial displacement of the annular wall portions into frictional engagement with the inner and outer member, respectively. The stressing arrangement includes a pair of annular stressing members located at opposite axial sides of the annular element in the clearance and each having a side facing the annular element and provided with at least one annular bead projecting axially by a distance which is slightly greater than the distance by which the annular wall portions project beyond the transverse wall portion.

17 Claims, 9 Drawing Figures

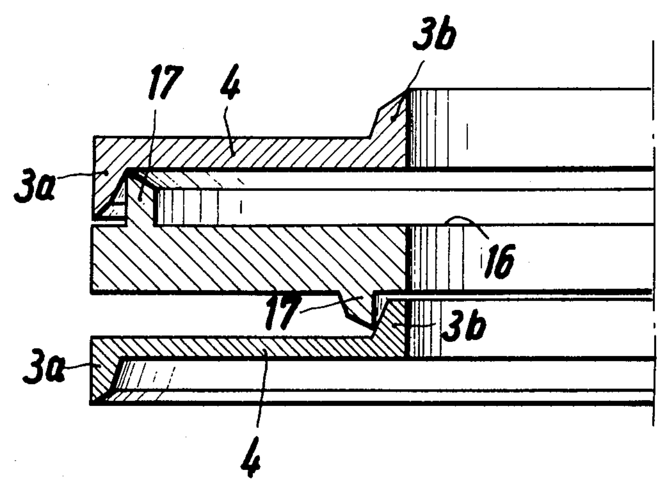


Fig.1

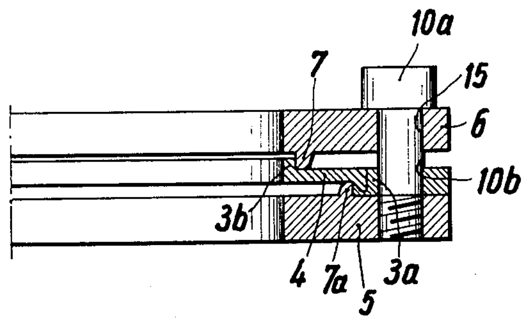


Fig.2

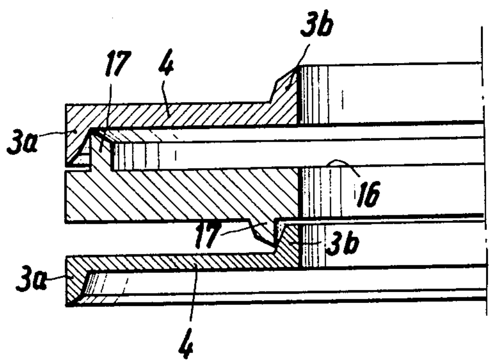
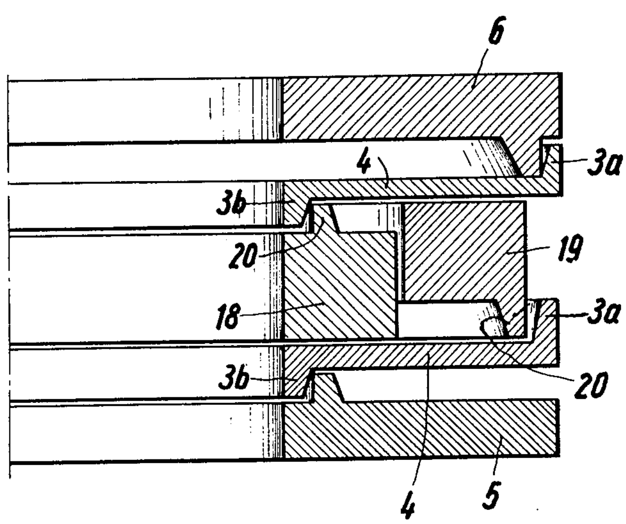


Fig.3



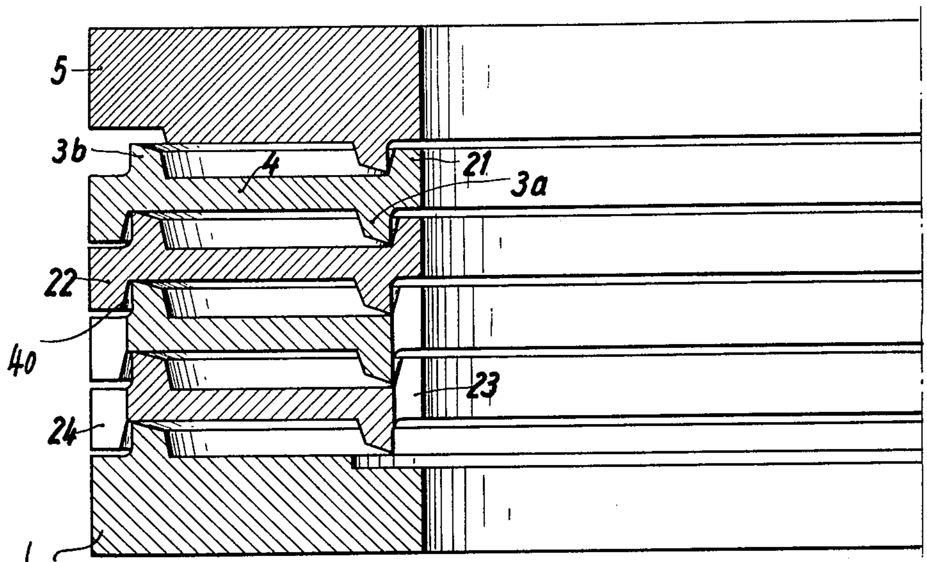


Fig.4

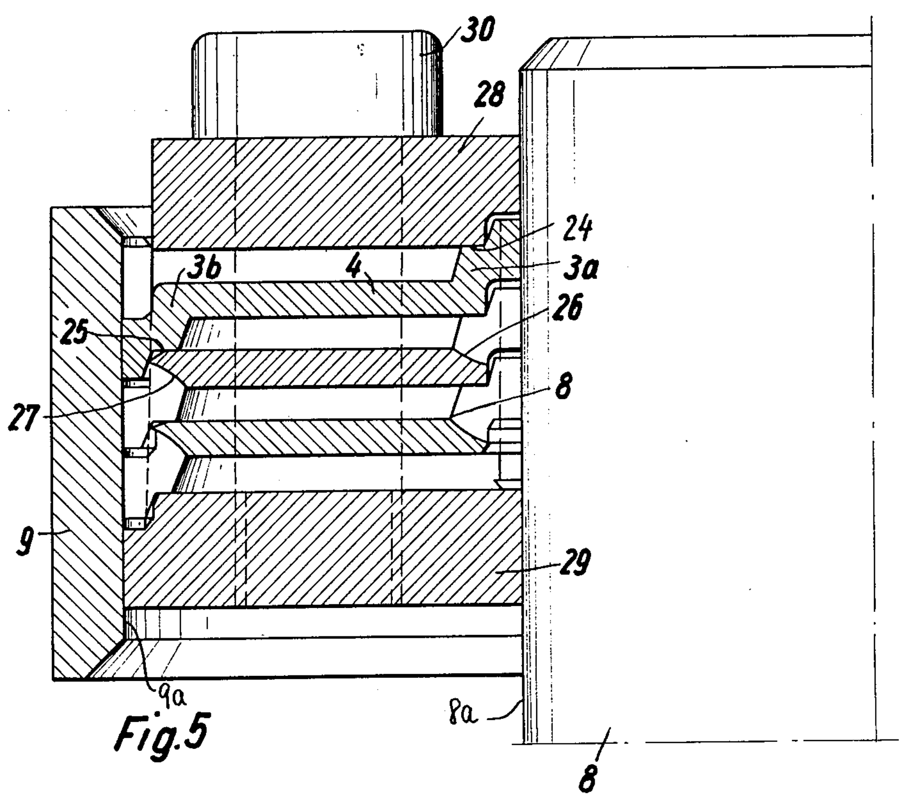


Fig.5

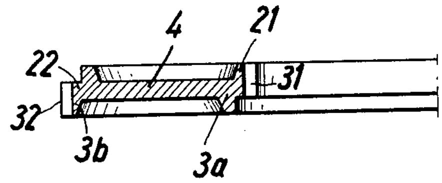


Fig. 6

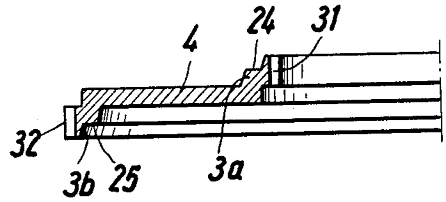


Fig. 7

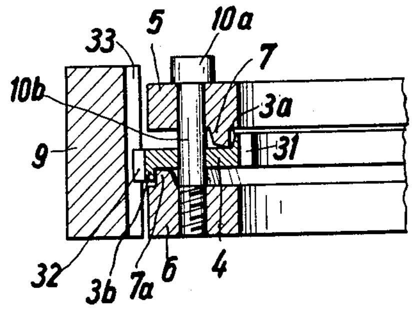


Fig. 8

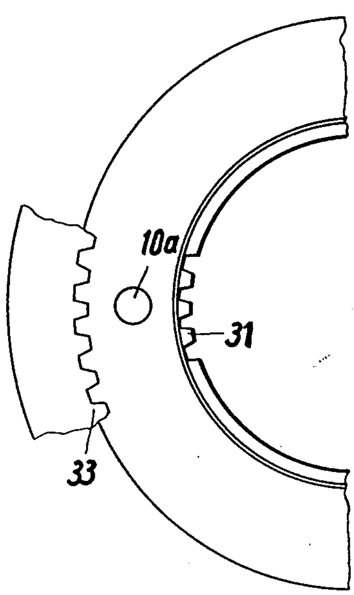


Fig. 9

CONNECTING ARRANGEMENT

CROSS REFERENCE TO RELATED APPLICATIONS

The present application is a continuation-in-part of my copending application Ser. No. 137,353, filed on Apr. 27, 1971 now U.S. Pat. No. 3,679,245.

BACKGROUND OF THE INVENTION

The invention relates to a connecting arrangement in general, and in particular to an arrangement for connecting two members one of which surrounds the other with annular clearance.

Such connecting arrangements are already known and are, for instance, employed for connecting a sleeve or a bushing with a shaft extending therethrough. Aside from the conventional expedients of using a key or similar retaining member for establishing such connection, it is also known to use dished annular springs located in the clearance between the shaft and the bushing and which, when subjected to axial pressure and thereby to deformation from dished to planar condition, will engage the shaft and the bushing with the inner and outer edges, respectively. However, in the former case the members must be weakened where they are provided with the grooves in which the key or the like can extend, and in the latter case the contact established by the inner and outer edges of the dished springs is merely a line contact and is frequently ineffective.

A further arrangement is discussed in my prior U.S. Pat. No. 3,578,364, in form of a connecting arrangement wherein one or several axially consecutive ring members are located in the clearance between the cylindrical inner member and the annular outer member. These ring members located in this clearance and constituting the connecting means are in axial section of substantially Z-shaped or substantially Y-shaped configuration and, when subjected to axial stress, are spread radially into engagement with the opposite surfaces of the inner and outer member. This results in frictional engagement with these inner and outer members and in a strong connection thereof against movement relative to one another, because such connection is of course a surface-to-surface contact rather than a line contact.

The arrangement in my aforementioned United States patent provides for a uniform and simultaneous frictional engagement of any and all ring members utilized in the connecting arrangement, when the stress-transmitting means provided will impart axial stress to these annular members so that resultant radial inward deflection of the inner annular wall portions of the members, and radial outward deflection of the outer annular wall portion of the members, will take place. Depending to the extent to which axial force or stress is imparted to the single or several such annular members, the contact between the inner and outer wall portions and the associated outer and inner surfaces of the inner and outer members which are to be connected, will be over a part or over the entire axial length of the inner and outer wall portions. Axial displacement or axial shifting of the individual annular members with reference to one another, or of the annular members with reference to the inner and outer members to be connected, will not occur when axial stress is applied.

In my aforementioned copending application, Ser. No. 137,353, I have disclosed a further concept which increases the connecting effectiveness of such annular members having a substantially Y-shaped cross section. This is achieved by changing certain configurations of these members to provide for a firmer and more reliable connection between the inner and outer members, in a sense preventing their relative displacement, than is possible with the construction disclosed in my United States patent.

According to my copending application I use a novel annular connecting element having an annular member of elastically yieldable material provided with a transverse annular portion of predetermined axial thickness and provided with oppositely directed axial faces. An outer and an inner annular flange portion both project from one of these faces axially of the annular portion at an outer and inner margin thereof, respectively, and an axially projecting bead is provided on the other of the axial faces centrally thereof and has a radial thickness corresponding to at least substantially triple the thickness of the respective flange portion. In the aforementioned one axial endface there is also provided an annular groove, located centrally of the endface and opposite the bead, such groove having a depth which corresponds at least substantially to the predetermined axial thickness mentioned above.

My deliberations have shown, however, that I can still further improve the connecting effectiveness of the basic arrangement here in question.

SUMMARY OF THE INVENTION

It is, accordingly, an object of the present invention to provide for such further improvement.

More particularly it is an object of the invention to provide an improved arrangement of the type here under discussion in which not only frictional engagement but also actual physical interengagement is obtained between the inner and outer members and the connecting means utilized in the clearance between them.

Still another object of the invention is to provide such an arrangement in which an improved relationship of the axial force required for stressing the connecting arrangement is obtained, with reference to the holding force obtained when the arrangement is so stressed.

In pursuance of these objects, and of others which will become apparent hereafter, one feature of the invention resides in an arrangement of the type hereunder discussion which, when briefly stated, comprises a substantially cylindrical inner member having an outer circumferential surface and a longitudinal axis. An annular outer member coaxially surrounds the inner member and has an inner circumferential surface defining with the outer circumferential surface an annular clearance. Connecting means is received in this clearance for connecting the members against relative movement and includes at least one annular element of elastically yieldable material having a transverse wall portion extending transverse to the axis across the clearance, and an inner and an outer annular wall portion having spaced axial ends and extending in opposite directions axially of the clearance beyond the transverse wall portion by a predetermined distance.

Finally, the new arrangement also comprises stressing means operative for subjecting the annular element to axial stresses to thereby effect radial displacement of one of the axial ends relative to the other so that in the annular wall portions respectively frictionally engage these surfaces of the inner and outer members, the stressing means comprising a pair of annular stressing members located at opposite axial sides of the annular element and each having at a side facing the same at least one annular bead projecting axially by a distance slightly greater than the predetermined distance and cooperating with a respective one of the annular wall portions.

When the aforementioned annular stressing members are utilized with an annular element of substantially Z-shaped axial cross section, wherein the annular wall portions extend in opposite axial directions by identical distances, an improvement of the relationship between the stressing force acting in axial direction and the holding force obtained upon such stressing, is obtained. Furthermore, the concentric relationship of the outer annular member with respect to the connecting means is facilitated.

The connecting effectiveness of a Z-shaped annular element is further improved if it is provided on the opposite axial end faces with an inner and an outer annular ridge, respectively. The inner annular ridge projects at the outer margin of the annular member on that side where the annular member is provided with an annular wall portion projecting from its inner margin, and the outer annular ridge projects from the other axial end in the reverse relationship, that is on the outer margin where an annular wall portion projects from the inner margin. The axial extent to which these ridges project should be slightly greater than the extent to which the annular wall portions project, and if for instance two of the annular members are provided it is important that the outer diameter of the ridges with respect to the outer diameter of the annular wall portions be so selected that when an annular ridge of one of the annular members is located adjacent an annular wall portion of the other annular member, they will define a slight radial clearance with one another and will not contact. In order to maintain the concentric tensioning accuracy in the smallest possible limits, and in order to further reduce the required tensioning force with reference to the holding force obtained, it is advantageous to slot the ridges in axial direction, with the slots having a width of approximately 1 millimeter and being circumferentially offset from one another at angles of approximately 6°.

According to still a further concept of the present invention it is also possible to provide the annular wall portions with recessed annular steps which are recessed from the respective axial ends of the annular wall portions and on which the respective stressing members rest, with the height of the steps and axial direction of the annular members being less than the height of the remainder of the annular wall portion in the same direction. This further improves the relationship between the stressing force required and the holding force obtained, and it is advantageous if the annular wall portions in this case are slotted from their respective axial end over the entire height of the step so provided, with the slots again being approximately 1 millimeter wide and circumferentially spaced at angles of 6°. This measure in particular affords the possibility of bridging larger-diameter differences than would otherwise be possible.

In addition, I have also found that a further improvement can be obtained in the connection between the inner and outer members via the connecting means if I rely not only on frictional connection but also on actual physical interengagement. To achieve this the annular wall portions may be provided with annuli of teeth or similar projections which interengage with corresponding engaging portions on the outer circumferential surface of the inner member and the inner circumferential surface of the annular outer member, respectively. This results in a combination of frictional and mechanical connection between the connecting means on the one hand and the inner and outer members on the other hand, and provides for a more precise coupling between them, a consideration which is of importance particularly in arrangements where for instance the direction of rotation of the inner member changes frequently and in which as a result of such frequent changes a connection merely by means of interengaging teeth would soon become so loose as to have a sufficient amount of play to lack the necessary accuracy.

The novel features which are considered as characteristic for the invention are set forth in particular in the appended claims. The invention itself, however, both as to its construction and its method of operation, together with additional objects and advantages thereof, will be best understood from the following description of specific embodiments when read in connection with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is an axial section of the right half of an arrangement according to the present invention, it being understood that the arrangement is annular and that the non-illustrated half is mirror-symmetrical with reference to the one which is shown;

FIG. 2 illustrates a further embodiment in a view analogous to FIG. 1, with the same comments concerning the mirror-symmetrical arrangement being applicable;

FIG. 3 is a view similar to FIG. 2, on an enlarged scale, illustrating a further embodiment of the invention and also with the same comments applicable as before;

FIG. 4 is a view similar to FIG. 3 illustrating still an additional embodiment;

FIG. 5 is a view analogous to FIG. 4, but illustrating also the inner and outer members which are to be connected with one another and showing still another embodiment of the invention, it being again pointed out that the arrangement is annular and that the non-illustrated half is mirror-symmetrical with reference to the one shown;

FIG. 6 is a view similar to FIG. 1 but illustrating only a novel annular element according to the present invention;

FIG. 7 is a view similar to FIG. 6 illustrating an additional novel annular element;

FIG. 8 is a view similar to FIG. 7 illustrating another embodiment of the invention; and

FIG. 9 is a top-plan view of FIG. 8.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Discussing the drawing in detail, and firstly the embodiment which has been illustrated in FIG. 1, it will be seen that the inner member and the annular outer member coaxially surrounding it, have been omitted. Such an inner member is identified with reference numeral **8** in FIG. **5**, and an outer annular member which is to be connected with it is identified in the same Figure with reference numberal **9**. It is to be understood that wherever in the drawing such inner and outer annular members have not been illustrated, they will be the same as or analogous to the members **8** and **9** of FIG. **5**, and they will be arranged in the same manner as shown in that Figure.

With this proviso in mind it is pointed out that in FIG. **1** there is illustrated an annular member having a transverse wall portion **4** and an outer annular wall portion **3***a* projecting beyond one axial end of the transverse wall portion **4**, as well as an annular wall portion **3***b* which projects beyond the opposite axial end of the wall portion **4**; the portions **3***a* and **3***b* project from the portion **4** at the outer and inner margins thereof, respectively. In the unstressed (in axial direction) condition the member **3***a*, **3***b*, **4** will have an orientation which is exactly normal to the longitudinal axis of the shaft **8** (see FIG. **5**).

Superimposed upon the (in the drawing) upper side of the annular element is a stressing member **6** which is also annular and which is provided in the region of its inner circumferential margin with an axially projecting annular bead **7**. The cross-sectional configuration of the bead **7** is the same as or analogous to that of the wall portions **3***a* and **3***b*, that is at one side it is flat and at the other side it is bounded by a surface which diverges in directions towards the transverse wall portion or route of irrespective wall portions **3***a*, **3***b* or bead **7**. The distance by which the bead **7** projects axially from the remainder of the annular member **6** is slightly more than that by which the annular wall portion **3***b* projects from the transverse wall portion **4**, as evident from FIG. **1**.

Just as the annular stressing member **6** is superimposed upon the upper side of the annular element, so a second annular stressing member or a support member **5** is located beneath and juxtopposed with the underside of the annular element. It also has an annular bead which is identified with reference numeral **7***a* and which projects axially also by a distance which is slightly greater than that of the axial length of the wall portion **3***a*.

Reference numeral **10***b* identifies a bolt having a head **10***a* and extending through appropriate openings provided in the members **5** and **6** and the element **3***a*, **3***b* and **4**, and when the bolt **10***b* is tightened (it could also cooperate at the side opposite the head **10***a* with a suitable nut bearing upon the member **5**) axial stressing of the arrangement will take place. However, because of the transmission of axial stress to the element **3***a*, **3***b* and **4** nut via the bolt **10** (which extends through the openings **15**) not directly via bolt **10***b* which extends through the openings **15** but via the members **5** and **6**, there will be no axial stress acting only upon the outer edges of the wall portions **3***a* and **3***b*, so that an even application of axial stress is obtained, and also radial friction is avoided. Because of this a much improved relationship between the required axial stress and the obtained holding force with respect to the members **9** and **10** is achieved (the former is lower and the latter is higher).

In the embodiment of FIG. **2** I have illustrated at least two axially adjacent annular elements, each having the wall portions **3***a*, **3***b* and **4**. Located between these elements there is provided an intermediate ring **16** having at its opposite axial ends projecting ribs **17** of annular outline, with one of these ribs **17** being associated with the wall portion **3***a* of one of the annular members (the upper one in FIG. **2**) and the other rib **17** being associated with the wall portion **3***b* of the other annular element. Any axial height or length of the ribs **17** is slightly less than that of the wall portions **3***a* and **3***b*. In all other respects FIG. **2** corresponds to FIG. **1**, and this includes the manner in which the axial tensioning force can be applied.

In FIG. **3** I have shown an embodiment which is reminiscent of that of FIG. **2** except that the intermediate ring **16** of FIG. **2** is here replaced with two concentric rings **18** and **19**. The ring **18** has an axially projecting rib **20** and at the opposite axial side the ring **19** has a similar rib **20**. These ribs cooperate with the wall portions **3***a* of the one annular member and **3***b* of the other annular member, respectively, and also of slightly greater axial length than that of the wall portions **3***a* and **3***b*.

Of course, as in the embodiments of FIGS. **1** and **2**, the members **5** and **6** are again provided.

Coming now to FIG. **4**, it will be seen that here there are provided four of the annular elements each of which has the transverse wall portion **4** and the inner and outer annular wall portions **3***a* and **3***b*, respectively. It should be understood that fewer or more than four of these annular elements could be provided.

Unlike the preceeding embodiments, however, each of these annular elements is provided with an annular bead **21** located at one axial end (in FIG. **4** the one where the wall portion **3***b* projects) and an additional annular bead **22** located at the opposite axial end (in FIG. **4** the one where the wall portion **3***a* projects). These axial pressure beads **21** and **22** have a height which is slightly less than the height or axial length of the wall portions **3***a* and **3***b*, and their overall diameter is so selected that between them and the cooperating wall portions **3***a* and **3***b* there will remain a slight radial clearance or gap **40**, as illustrated, but which is small enough so that proper centering is assured.

In the illustrated embodiment the beads **23** and **24** of the two lowermost (in FIG. **4**) annular elements are provided with axial slots, having a width of approximately one millimeter and being circumferentially offset at angles of about 6°. As before, the members **5** and **6** are provided, but in this instance their axial relationship is reversed to indicate that this can be done freely as long as their previously described cooperation with the respectively adjacent annular elements remains assured.

In FIG. **5** I have illustrated an embodiment in which I have shown the members **8** and **9**, as previously indicated. In the clearance between these members there are located three (there could be fewer or more) of the annular elements each of which has the transverse wall portion **4** and the annular wall portions **3***a* and **3***b*. According to this embodiment these wall portions **3***a* and **3***b* are provided in the region of their opposite axial ends with recessed annular steps **24** and **25** which form shoulders on which a portion of the respectively adjacent annular element rests or is in contact.

As the drawing shows, the axial length of each of the steps **24, 25** is slightly less than the remaining axial length of the respective wall portions *3a, 3b* to the transverse wall portion **4.** The (in the drawing) lower two annular elements are slotted in their wall portions *3a, 3b* to the bottom or roots **26, 27** of the steps, with the width of the slots being approximately one millimeter and the slots being circumferentially offset at angles of about 6°. Such slotting provides the possibility of bridging substantial diameter differences.

The members **28, 29** are located at opposite axial ends of the trio of annular elements, correspond to the members **5** and **6** of the preceding embodiments, and are drawn together in order to axially stress the annular elements by means of circumferentially spaced bolts **50** of which only one is shown.

FIG. **6** shows an improved annular element having, as in the preceding embodiments, a transverse wall portion **4** and two inner and outer annular wall portions *3a* and *3b*, respectively. The wall portion *3a* is provided with an inner annulus of gear teeth (illustrated only diagrammatically) identified with reference numeral **31,** and a similar outer annulus of gear teeth **32** is provided on the wall portion *3b*. Reference numerals **21** and **22** designate the same components as in FIG. **4.** These annuli **31** and **32** of gear teeth cooperate, of course, with similar gear teeth or other mating projections or recesses provided on the inner surface of the member **9** and on the outer surface of the member **8,** respectively, with these surfaces being identified with reference numerals *9a* and *8a*, respectively.

FIG. **7** is reminiscent of FIG. **6** and like reference numerals identify like elements as in that Figure. In FIG. **7,** however, there are provided the steps **24** and **25** previously discussed with respect to the embodiment in FIG. **5,** and in addition they are provided the annuli **31** and **32** of teeth.

In FIGS. **8** and **9,** finally, I have illustrated an arrangement in which an annular element provided with the annuli **31** and **32** of teeth is utilized. It should be noted parenthetically, that in FIG. **7** it is preferred to provide the annulae **31** and **32** on the wall portions *3a* and *3b* in the regions where the steps **24** and **25** are provided.

In FIG. **8** I have illustrated an arrangement in which the embodiment of FIG. **1** is incorporated, but modified to provide it with the annuli **31** and **32** of teeth. Like reference numerals as in preceding embodiments identify like elements and it should be noted that the outer diameter of the annular portion **7** is slightly less than the inner diameter of the wall portion *3a*, so that a slight clearance remains between them.

The same is true of the relationship between the annular portion *7a* and the wall portion *3b*.

The inner surface of the outer element **9** is provided with projections capable of mating with the teeth of the annulus **32,** for instance another annulus **33** of teeth, and the non-illustrated shaft (such as the shaft **8** of FIG. **5**) will similarly be provided on its outer circumferential surface with mating engaging portions, for instance another annulus of gear teeth. A plurality of bolts **10***a*, **10***b* (only one shown) provide for axial stressing of the arrangement, in the same manner as discussed as for instance with respect to FIG. **1.** The arrangement of FIG. **8,** again minus the inner member **8** of FIG. **5,** is shown in top-plan view in FIG. **9.**

It will be understood that each of the elements described above, or two or more together, may also find a useful application in other types of constructions differing from the types described above.

While the invention has been illustrated and described as embodied in an arrangement of the type under discussion herein, it is not intended to be limited to the details show, since various modifications and structural changes may be made without departing in any way from the spirit of the present invention.

Without further analysis, the foregoing will so fully reveal the gist of the present invention that others can be applying current knowledge readily adapt it for various applications without omitting features that, from the standpoint of prior art fairly constitute essential characteristics of the generic or specific aspects of this invention and, therefore, such adaptations should and are intended to be comprehended within the meaning and range of equivalence of the following claims.

What is claimed as new and desired to be protected by Letters Patent is set forth in the appended claims:

1. An arrangement of the character described, comprising a substantially cylindrical inner member having an outer circumferential surface and a longitudinal axis; an annular outer member coaxially surrounding said inner member and having an inner circumferential surface defining with said outer circumferential surface an annular clearance; connecting means received in said clearance for connecting said members against relative movement, said connecting means including at least one annular element of elastically yieldable material having a transverse wall portion extending transverse to said axis across said clearance, and an inner and an outer annular wall portion having spaced axial ends and extending in opposite directions axially of said clearance beyond said transverse wall portion by a predetermined distance; and stressing means operative for subjecting said annular element to axial stresses to thereby effect radial displacement of one of said axial ends relative to the other so that said annular wall portions respectively frictionally engage said surfaces, said stressing means comprising a pair of annular stressing members located at opposite axial sides of said annular element and each having at a side facing the same at least one annular bead projecting axially by a distance slightly greater than said predetermined distance and cooperating with a respective one of said annular wall portions for effecting radial displacement of the same in response to exertion of axial stresses on said annular element.

2. An arrangement as defined in claim **1,** wherein the cross-sectional contour of each of said beads corresponds at least substantially to the cross-sectional contour of the annular wall portion with which the bead cooperates.

3. An arrangement as defined in claim **1,** said annular element having a first axial side from which said inner annular wall portion projects and a second axial side from which said outer annular wall portion projects; and further comprising an outer annular ridge projecting from said first axial side and an inner annular ridge projecting from said second axial side, each of said ridges projecting from the respective axial side a distance slightly smaller than said predetermined distance.

4. An arrangement as defined in claim **3,** wherein the overall diameter of said inner annular wall portion is slightly smaller than the overall diameter of said inner annular ridge.

5. An arrangement as defined in claim 3, wherein the overall diameter of said outer annular wall portion is slightly greater than the overall diameter of said outer annular ridge.

6. An arrangement as defined in claim 1, wherein said annular element is of substantially Z-shaped axial sectional configuration.

7. An arrangement as defined in claim 1, wherein said annular portions of said annular element are of substantially identical axial length.

8. An arrangement as defined in claim 1, wherein said material is metallic material.

9. An arrangement as defined in claim 1, said annular wall portions having at the respective axial ends recessed annular steps which engage the respective stressing members; and wherein the axial length of said annular steps is smaller than the axial distance between said steps and said transverse wall portion.

10. An arrangement as defined in claim 9; further comprising slots provided in said annular wall portion and extending from the respective axial ends towards said transverse wall portion over the entire axial length of the respective steps.

11. An arrangement as defined in claim 10, each of said annular wall portions being provided with a plurality of said slots; and wherein said slots have a width of substantially 1 mm and are circumferentially spaced at angles of substantially 6°.

12. An arrangement as defined in claim 1, said inner and outer circumferential surfaces being provided with respective first teeth; and further comprising respective second teeths provided on said inner and outer annular wall portions and extending into meshing engagement with said outer and inner first teeth, respectively.

13. An arrangement as defined in claim 1; further comprising at least one additional annular element similar to the first-mentioned one and located adjacent one axial side of the same, said stressing members being respectively located at the axial sides of said annular elements which face away from one another; and further comprising a ring member located in said clearance and between said annular elements, said ring member having oppositely directed axial endfaces and being provided on one of these with a radially outer annular rib and on the other of these with a radially inner annular rib, each of said ribs projecting axially by a distance slightly greater than said predetermined distance and cooperating with one of said annular wall portions of the respectively adjacent annular element for effecting radial displacement of the respective annular wall portion in response to said exertion of axial stresses.

14. An arrangement as defined in claim 1; further comprising at least one additional annular element similar to the first-mentioned one and located adjacent one axial side of the same, said stressing members being respectively located at the axial sides of said annular elements which face away from one another; and further comprising a pair of concentric ring members located in said clearance and between said annular elements, one of said ring members having a radially outer annular rib projecting in one axial direction and the other of said ring members having a radially inner annular rib projecting in the opposite axial direction, said ribs each projecting from the associated ring member by a distance slightly greater than said predetermined distance and each cooperating with one of said annular wall portion of the respectively adjacent annular element for effecting radial displacement of the respective annular wall portion in response to said exertion of axial stresses.

15. An arrangement as defined in claim 1; and further comprising cooperating engaging portions provided on said surfaces and on said annular wall portions, respectively.

16. An arrangement as defined in claim 15, said annular wall portions having at the respective axial ends recessed annular steps which engage the respective stressing members; and wherein the engaging portions on said annular wall portions are provided at least in the region of said annular steps.

17. An arrangement as defined in claim 15, said annular element having at its opposite sides a respective inner and outer annular ridge each projecting axially by a distance slightly smaller than said predetermined distance and each radially spaced from the respectively associated wall portion; and wherein the engaging portions of said annular element are provided on the respective annular ridges.

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