June 9, 1959 R. Q. TRIQUET 2,890,001

EXPANDING CORE SHAFT

Filed Sept. 20, 1956 2 Sheets-Sheet 1

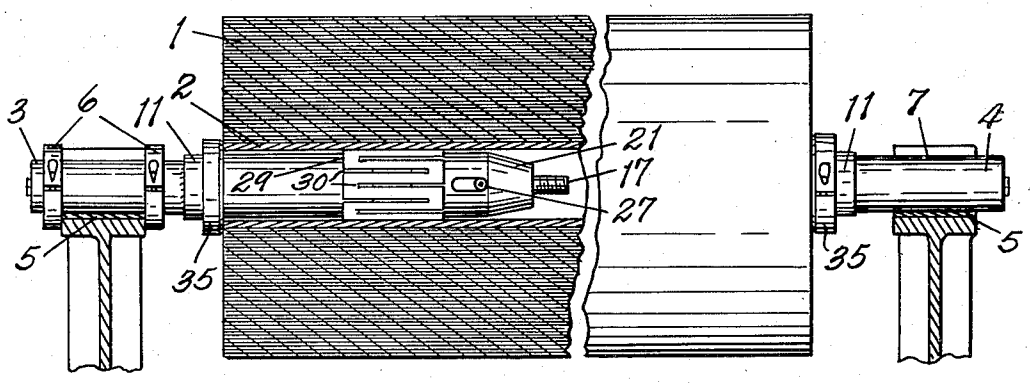


FIG. 1.

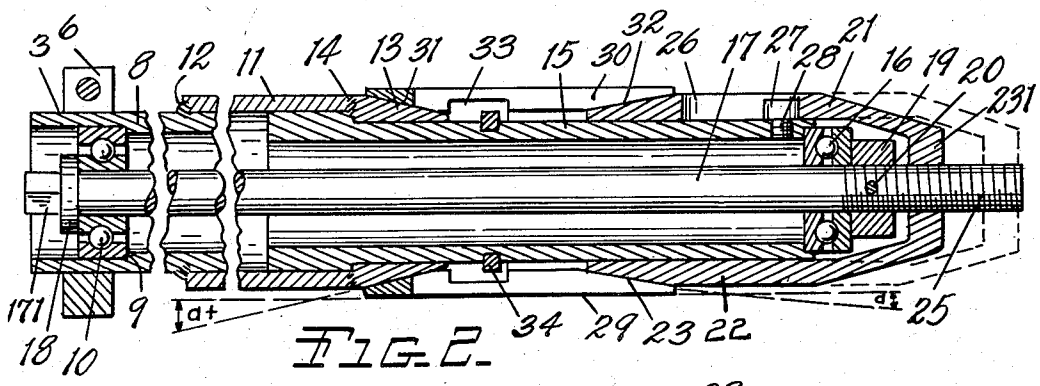


FIG. 2.

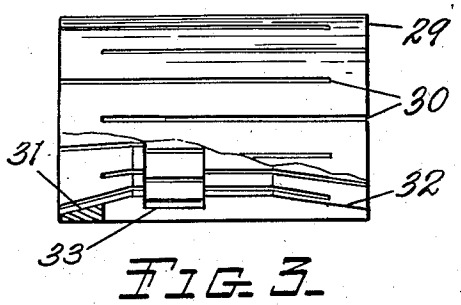


FIG. 3.

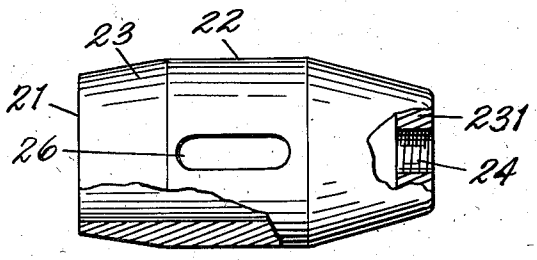


FIG. 4.

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EXPANDING CORE SHAFT

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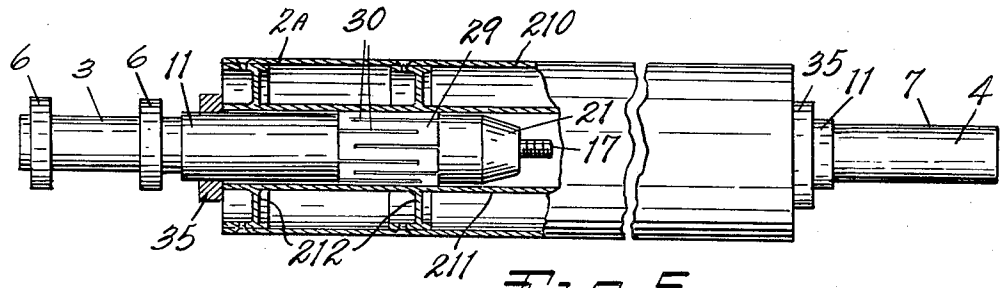


FIG. 5

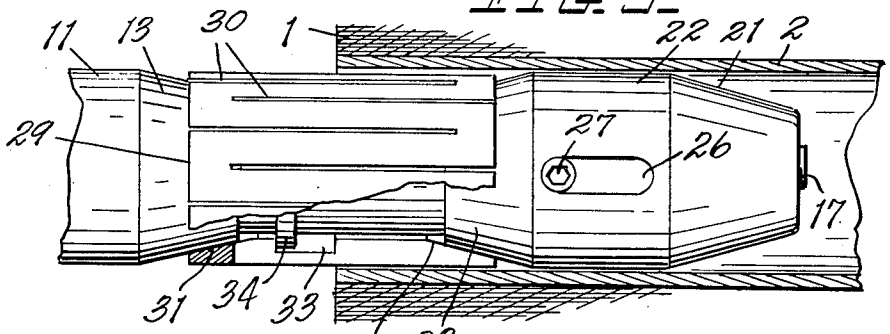


FIG. 6

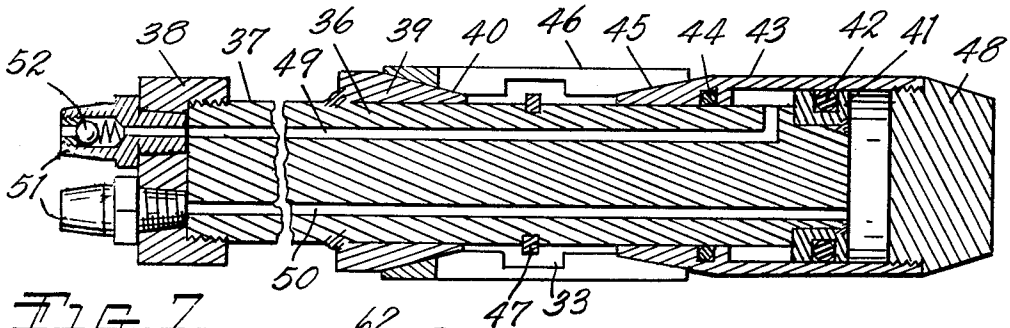


FIG. 7

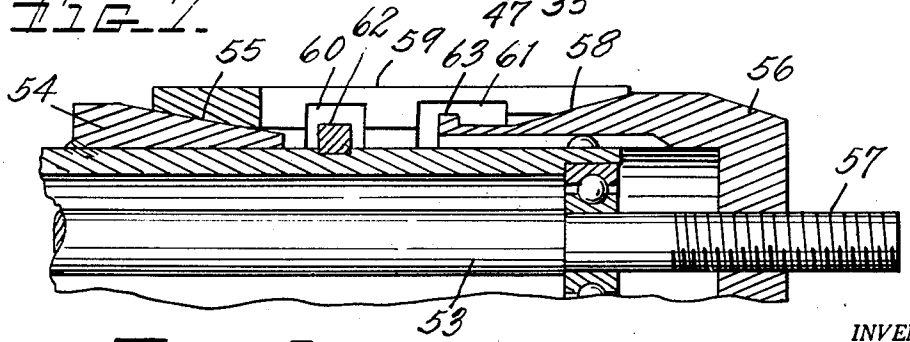


FIG. 8

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EXPANDING CORE SHAFT

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Application September 20, 1956, Serial No. 611,039

20 Claims. (Cl. 242—72.1)

This invention relates to improvements in expanding core. The principal objects of this invention are:

First, to provide an improved form of expanding core shaft that will releasably and uniformly grip the inside of a core in a roll of paper to support the roll on external bearings.

Second, to provide a stub shaft with an expansion sleeve of substantial length that can be easily inserted in the end of a roll of paper and expanded to uniformly grip the inside of the roll along the length of the sleeve.

Third, to provide a novel structure for expanding both ends of an expansion sleeve so that the sleeve is expanded first at one end and then at the other and reversely contracted to release the sleeve from engagement with a paper roll in which the sleeve is inserted.

Fourth, to provide a stub shaft and expansion sleeve that can be mechanically or pneumatically actuated to engage the inner core of a roll of paper or to be disengaged from the roll.

Other objects and advantages of the invention will be apparent from a consideration of the following description and claims.

The drawings, of which there are two sheets, illustrate three highly practical forms of the shaft and two types of paper roll cores with which they may be associated.

Fig. 1 is a fragmentary side elevational view of a roll of paper supported on a first form of the core shaft with portions of the roll and supporting bearings broken away in cross section along the axis of the roll.

Fig. 2 is an enlarged fragmentary axial cross sectional view through the shaft shown in Fig. 1.

Fig. 3 is an elevational view of the expansion sleeve of the shaft partially broken away in axial cross section.

Fig. 4 is an elevational view of the operating nut of the shaft partially broken away in axial cross section.

Fig. 5 is a fragmentary elevational view of a modified form of paper roll core operatively supported on the core shaft shown in Figs. 1 to 4.

Fig. 6 is a fragmentary cross sectional view through a roll of paper illustrating the core shaft of Figs. 1 to 4 in partially assembled position in the roll.

Fig. 7 is a fragmentary axial cross sectional view through a modified form of the core shaft.

Fig. 8 is a fragmentary axial cross sectional view through a second modified form of the core shaft.

In the paper making industry and other industries handling large rolls of paper it is frequently necessary to wind and rewind paper in rolls that are built up on hollow cores.

Removable core shafts having expansion devices for gripping the inside of the core of a roll of paper have been developed, but the present invention provides a removable core shaft that is more easily mounted in a roll of paper and removed therefrom and which grips the inside of the core of the roll more uniformly and more effectively.

Fig. 1 illustrates a roll of paper 1, built up on a hollow tubular core 2, and supported at the ends by a pair of

stub core shafts 3 and 4 that are rotatably supported on bearings 5 to permit rotation of the roll about a fixed axis. The stub shafts 3 and 4 are commonly utilized in pairs with the shaft 3 having locating collars 6 to locate the load axially with respect to the bearings while the shaft 4 is provided with a plane journal end 7 permitting the shaft to adjust axially in its supporting bearing. The shafts 3 and 4 are otherwise identical particularly as regards the expansion structure thereof.

The expansion structure of the rolls is disclosed most fully in Figs. 2 to 4.

The core shaft 3 has a tubular outer journal portion 8 around which the collars 6 are mounted. The inside of the journal portion 8 has an outwardly facing shoulder 9 formed therein against which a roller bearing 10 is seated. The inner end of the journal portion 8 projects telescopically into an outer sheath 11 a sufficient distance to rigidly support the outer sheath and is permanently secured thereto as by the welding indicated at 12.

The inner end of the sheath 11 supports the first inwardly tapered cone 13 that is welded to the sheath as at 14 and positioned around an inner tube 15 that projects inwardly from the outer sheath and the cone 13. The inner end of the tube 15 is shouldered to centeringly support an inner roller bearing 16 and an adjusting shaft 17 is rotatably supported in the roller bearings 10 and 16 with a squared or non-circular end 171 located at the outer end of the journal portion 8. A collar 18 on the outer end of the shaft and a nut 19 pinned to the shaft as at 20 on the inner side of the bearing 16 axially position the shaft while permitting rotation thereof within the journal portion 8 and the inner tube 15.

Slidably fitting over the inner end of the inner tube 15 is an annular operating member 21 having a cylindrical central body 22 slidable on the inner tube and a conically tapered outer end 23 that is tapered oppositely to the cone 13. The inner end of the operating member 22 is desirably tapered for easy entry into the core 2 of a roll and is provided with an end wall 231 having a threaded hole 24 that engages the threaded end 25 of the operating shaft. The central body 22 of the operating member has a slot 26 formed longitudinally therein which slot receives the head 27 of a screw 28 threaded into the inner tube 15. The screw 28 prevents rotation of the operating member 21 on the inner tube while permitting axial sliding of the operating member on the tube in response to rotation of the adjusting shaft 17.

An annular expansion sleeve 29 is positioned around the inner tube 15 between the cone 13 and the tapered end 23 of the operating member. The sleeve 29 has a generally cylindrical outer surface and is slotted alternately from opposite ends as at 30 to permit radial expansion and contraction of the sleeve. The inner surface of the sleeve 29 is outwardly tapered as at 31 at an angle corresponding to the angle of the cone 13. The opposite end of the sleeve is internally tapered as at 32 at an angle corresponding to the angle or conical end 23 of the operating member 21. Desirably the conical surfaces 31 and 32 are formed when the sleeve 29 is radially expanded to fit in fully engaged relation around the cone 13 and the tapered end 23 when the sleeve is expanded. It is important to note that the cone 13 is pitched at a relatively large angle, a plus, of the order of 15° from the axis of the shaft while the conical surface 23 on the operating member is pitched at a relatively small angle, *a*, of the order of 10° from the axis of the shaft. The tapered surfaces 31 and 32 on the expansion sleeve are correspondingly formed.

The central portion of the expansion sleeve 29 defines an internal annular groove 33 that fits around a split ring 34 snapped into a groove provided therefor in the inner tube 15. The sleeve 29 is assembled over the ring

34 by simply pressing the sleeve over the inner end of the inner tube 15 until the tapered surface 31 cams over the ring and expands the sleeve so it can snap over the ring 34. The operating member 21 is then sleeved over the inner end of the inner tube 15 and threaded on to the operating shaft 17 until the slot 26 uncovers the hole in the inner tube for the reception of the screw 28.

The core shaft is assembled into a roll of paper with the operating member 21 threaded inwardly toward the inner end of the tube 15 as is illustrated in Fig. 6. In this position the expansion sleeve 29 will be radially collapsed between the spaced cone 13 and the conical end 23 of the operating member so that the core shaft slides easily into the core 2 of the roll. After the core shaft is properly located in the end of the roll as by seating a collar 35 on the outer sheath 11 against the end of the roll, the operating shaft 17 is rotated to drive the operating member 21 axially outwardly along the inner tube. The relatively low pitch of the conical surfaces 32 and 23 on the expansion sleeve and operating member respectively permit the operating member to slide in expanding relation into the inner end of the expansion sleeve while the relatively high pitch of the cone 13 and the tapered surface 31 resist axial movement of the expansion sleeve. As the inner end of the expansion sleeve expands and grips the inside of the core 2, further expansion of the inner end of the core sleeve is obstructed and continued outward motion of the operating member 21 causes the expansion sleeve to move axially outwardly in expanding relation over the cone 13 until both ends of the expansion sleeve are formally engaged within the inside of the roll core 2.

To release the core shaft from within the core 2 the operating shaft 17 is reversely operated to drive the operating member 21 inwardly. The frictional force between the low tapered inner end of the expansion sleeve and operating member will be greater than the frictional force between the high tapered cone 13 and the expansion sleeve so that the sleeve will move inwardly with the operating member 21 thus permitting the outer end of the sleeve to contract radially until the snap ring 34 engages the outer edge of the annular groove 33 within the expansion sleeve. Further inward motion of the expansion sleeve is thus prevented by the snap ring 34 which constitutes a radially projecting stop on the tube 15 so that continued inward motion of the operating member draws the end of the operating member out of the inner end of the expansion sleeve permitting the inner end of the sleeve to collapse radially and release the core shaft from the core of the roll.

It will thus be seen that the expansion sleeve 29 can be of substantial length to engage a relatively large area within the core of a roll. Further both ends of the expansion sleeve are expanded to assure uniform gripping engagement between the core and the sleeve from end to end of the sleeve.

Fig. 5 illustrates how the core shaft just described can be mounted and engage in the ends of a different form of roll core. The roll core 2A illustrated in Fig. 5 consists of an outer core 210 of fibre glass material spaced from an inner core 211 by spacer discs 212. The details of the modified roll core 2A are unimportant to the present invention and are illustrated generally to point out the utility of the core shaft with various types of paper roll cores.

The modified form of core shaft illustrated in Fig. 7 constitutes a single inner shaft 36 having a journal portion 37 in its outer end with a cap 38 threaded on the end. A fixed ring 39 welded to the shaft 36 has a conical surface 40 corresponding to the cone 13 in the first form of the shaft.

The inner end of the shaft 36 carries a radially projecting ring 41 that has a deformable sealing O ring 42 in its periphery. The O ring 42 slides in sealing engagement within the cylindrical inner chamber of an operating member 43 that is slidably fitted over the end of the shaft 36 prior to assembly of the ring 41 on the shaft. The operating member 43 carries a second sealing O ring 44 in engagement with the shaft and has a tapered conical surface 45 corresponding to the conical surface 23 on the first form of the operating member. The expansion sleeve 46 is identical with the expansion sleeve 29 in the first form of the shaft and has the same internal groove 33 coacting with a snap ring 47 engaged with an intermediate portion of the shaft 36. The inner end of the chambered operating member 43 is closed by a tapered plug 48 and the shaft 36 is provided with a first passage 49 opening to the chamber in the operating member between the O rings 42 and 44. A second passage 50 opens to the inner end of the operating member against the end plug 48. Air coupling fittings 51 are mounted on the cap 38 and provided with check valves 52 to admit air selectively to the chambers on opposite sides of the sealing O ring 42 so that the operating member 43 is actuated like a piston by air pressure rather than by rotation of a threaded operating shaft. Axial movement of the operating member 43 under the influence of air pressure causes the expansion sleeve to expand and contract in the same manner as the first form of the sleeve.

In the second modified form of the shaft shown in Fig. 8, the inner shaft 53 has a tapered collar 54 secured therearound with an inwardly facing tapered face 55. The chambered operating member 56 slides on the inner end of the inner shaft under the influence of the operating shaft 57 as in the first form of the invention.

The operating member 56 has a tapered surface 58 opposed to the tapered surface 55 and the tapered surface 58 may be of higher pitch than the pitch of the surface 55 or the two surfaces may be of equal pitch.

The expansion sleeve 59 has oppositely tapered internal conical surfaces at its ends coacting with the surfaces 55 and 58 to expand and contract the sleeve. In order to insure movement of the sleeve downwardly along each tapered surface, the sleeve has two internal annular grooves 60 and 61. The groove 60 coacts with a stop ring 62 secured to the outside of the inner shaft 53. The groove 61 coacts with a radial rim or projection 63 on the outer end of the operating member.

When the operating member 56 is moved outwardly on the shaft 53 the sleeve 59 is expanded over the surfaces 55 and 58. When the operating member moves inwardly the sleeve slides down the high pitched taper or the taper having the least friction until either the ring 62 or the rim 63 engages its associated groove to draw the sleeve down on the other tapered surface.

In any of the forms of the expansion shaft the sleeve is expanded at each end to effectively grip a substantial length of the core of the roll. While the shaft has been disclosed for use in paper rolling operations it may obviously be used to support rolls of any type of material as for instance textiles. The shaft may also be used as an arbor to rotatively or non-rotatively support the center of any object depending on the type of support applied or connected to the external end of the shaft. The shaft can further be used in the form of a through shaft supported at each end by extending the length of the end operating members 21, 43 or 56.

Having thus described the invention, what is claimed as new and is desired to be secured by Letters Patent is:

1. An expansible core comprising a tubular element having a journal portion with locating collars therearound at its outer end and having outwardly facing internal shoulders at each end, a first conical collar fixedly positioned around said tubular element inwardly from said journal portion and having an inwardly converging tapered surface of relatively high pitch of the order of 15° from the axis of said element, a snap ring axially fixedly received in a groove around said element inwardly of said conical collar, a hollow actuating member having a cylin-

drical inner surface slidably mounted on the inner end of said element and having an inner end wall with a threaded aperture therein, an actuating shaft extending through said element and having a threaded inner end engaged through said aperture, bearings supporting said actuating shaft and seated against said shoulders, means including a stop screw engaged in said element and projecting radially therefrom into a slot provided therefor in said actuating member to prevent rotation of the actuating member while permitting axial movement thereof, an outwardly converging tapered end on the outer end of said actuating member having a relatively low pitch of the order of 10° from the axis of said element, and a tubular expansion sleeve positioned around said element between said tapered surfaces, said sleeve having internal conical surfaces at its ends complementary to and engageable with said tapered surfaces and having an internal annular groove of greater axial length than said snap ring surrounding the projecting portion of said ring, said sleeve being alternately slit from opposite ends to permit radial expansion and contraction of the sleeve, the internal conical surfaces on said sleeve being true cones in the radially expanded condition of said element.

2. An expansible core comprising a tubular element having a journal portion with locating collars therearound at its outer end, a first conical collar fixedly positioned around said tubular element inwardly from said journal portion and having an inwardly converging tapered surface of relatively high pitch, a snap ring axially fixedly received in a groove around said element inwardly of said conical collar, a hollow actuating member having a cylindrical inner surface slidably mounted on the inner end of said element and having an inner end wall with a threaded aperture therein, an actuating shaft extending through said element and having a threaded inner end engaged through said aperture, bearings supporting said actuating shaft, means including a stop screw engaged in said element and projecting radially therefrom into a slot provided therefor in said actuating member to prevent rotation of the actuating member while permitting axial movement thereof, an outwardly converging tapered end on the outer end of said actuating member having a relatively low pitch and a tubular expansion sleeve positioned around said element between said tapered surfaces, said sleeve having internal conical surfaces at its ends complementary to and engageable with said tapered surfaces and having an internal annular groove of greater axial length than said snap ring surrounding the projecting portion of said ring, said sleeve being alternately slit from opposite ends to permit radial expansion and contraction of the sleeve, the internal conical surfaces on said sleeve being true cones in the radially expanded condition of said element.

3. An expansible core comprising a tubular element having a journal portion at its outer end, means positioned around said tubular element inwardly from said journal portion and having an inwardly converging tapered surface of relatively high pitch, a ring axially fixedly positioned around said element inwardly of said tapered surface, a hollow actuating member having a cylindrical inner surface slidably mounted on the inner end of said element and having an inwardly tapering inner end wall with a threaded aperture therein, an actuating shaft extending through said element and having a threaded inner end engaged through said aperture, bearings supporting said actuating shaft in said element and preventing axial motion of the shaft, means to prevent rotation of the actuating member while permitting axial movement thereof, an outwardly converging tapered end on the outer end of said actuating member having a relatively low pitch, and a tubular expansion sleeve positioned around said element between said tapering surfaces, said sleeve having internal conical surfaces at its ends complementary to and engageable with said tapered surfaces and having an internal annular groove of greater axial length than said ring surrounding the projecting portion of said ring, said sleeve being alternately slit from opposite ends to permit radial expansion and contraction of the sleeve.

4. An expansible core comprising a tubular element having a journal portion at its outer end, means positioned around said tubular element inwardly from said journal portion and having an inwardly converging tapered surface of relatively high pitch, a ring axially fixedly positioned around said element, inwardly of said tapered surface, a hollow actuating member having an inner surface slidably mounted on the inner end of said element and having an inner end wall with a threaded aperture therein, an actuating shaft extending through said element and having a threaded inner end engaged through said aperture, means supporting said actuating shaft in said element and preventing axial motion of the shaft, means to prevent rotation of the actuating member while permitting axial movement thereof, an outwardly converging tapered end on the outer end of said actuating member having a relatively low pitch, and a tubular expansion sleeve positioned around said element between said tapering surfaces, said sleeve having internal conical surfaces at its ends complementary to and engageable with said tapered surfaces and having an internal annular groove of greater axial length than said ring surrounding the projecting portion of said ring, said sleeve being alternately slit from opposite ends to permit radial expansion and contraction of the sleeve.

5. An expansible core comprising a tubular element having a journal portion, means positioned around said tubular element inwardly from said journal portion and having an inwardly converging tapered surface of relatively high pitch, a hollow actuating member having a portion slidably mounted around the inner end of said element and having an end wall with a threaded aperture therein, an actuating shaft extending through said element and having a threaded inner end engaged through said aperture, means projecting from said element to prevent rotation of the actuating member while permitting axial movement thereof, an outwardly converging tapered end on the outer end of said actuating member having a relatively low pitch, a tubular expansion sleeve positioned around said element between said tapering surfaces, said sleeve having internal conical surfaces at its ends complementary to and engageable with said tapered surfaces, said sleeve being alternately slit from opposite ends to permit radial expansion and contraction of the sleeve, and a radial projection on said element located within said sleeve and engageable with an axially inwardly facing shoulder on said sleeve to limit inward movement of the sleeve after the sleeve is radially collapsed.

6. An expansible core comprising a tubular element having a journal portion, means positioned around said tubular element inwardly from said journal portion and having an inwardly converging tapered surface of relatively high pitch, an actuating member having a portion slidably mounted around the inner end of said element and having an end wall with a threaded aperture therein, an actuating shaft extending through said element and having a threaded inner end engaged through said aperture, means to prevent rotation of the actuating member while permitting axial movement thereof, an outwardly converging tapered end on the outer end of said actuating member having a relatively low pitch, a tubular expansion sleeve positioned around said element between said tapering surfaces, said sleeve having internal conical surfaces at its ends complementary to and engageable with said tapered surfaces, said sleeve being alternately slit from opposite ends to permit radial expansion and contraction of the sleeve, and a radial projection on said element located within said sleeve and engageable with an axially inwardly facing shoulder on

said sleeve to limit inward movement of the sleeve after the sleeve is radially collapsed.

7. In an expansible core the combination of a tubular element having a bearing engaging portion at its outer end, an inwardly converging tapered surface of relatively high pitch on said element and spaced inwardly from said bearing engaging portion, a chambered actuating member axially slidably mounted over the inner end of said element and having an outwardly converging tapered surface opposed to said first tapered surface and of less pitch than said first tapered surface, an expansion sleeve positioned around said element and having internal tapered surfaces complemental to and coacting with said first and second surfaces, said sleeve being slotted axially from opposite ends with angularly spaced overlapping slots, a stop ring on said element received in an internal annular groove in said sleeve to limit axially inward motion of the sleeve, and means operable from the outer end of said element for axially shifting said actuating member relative to said element.

8. In an expansible core the combination of a tubular element having a bearing engaging portion at its outer end, an inwardly converging tapered surface of relatively high pitch on said element and spaced inwardly from said bearing engaging portion, a chambered actuating member axially slidably mounted over the inner end of said element and having an outwardly converging tapered surface opposed to said first tapered surface and of less pitch than said first tapered surface, an expansion sleeve positioned around said element and having internal tapered surfaces coacting with said first and second surfaces, said sleeve being slotted axially from opposite ends with angularly spaced overlapping slots, a stop on said element received behind an inwardly facing shoulder in said sleeve to limit axially inward motion of the sleeve, and means operable from the outer end of said element for axially shifting said actuating member relative to said element.

9. In an expansible core the combination of a tubular element having a bearing engaging portion at its outer end, an inwardly converging tapered surface of relatively high pitch on said element and spaced inwardly from said bearing engaging portion, a chambered actuating member axially slidably mounted over the inner end of said element and having an outwardly converging tapered surface opposed to said first tapered surface and of less pitch than said first tapered surface, an expansion sleeve positioned around said element and having internal tapered surfaces complemental to and coacting with said first and second surfaces, said sleeve being slotted axially from opposite ends with angularly spaced overlapping slots, a stop on said element received behind an inwardly facing shoulder in said sleeve to limit inward motion of the sleeve, and means operable from the outer end of said element for axially shifting said actuating member relative to said element, said means comprising a seal projecting radially from said element into contact with the inside of member and passages for directing fluid under pressure to within said actuating member on opposite sides of said seal.

10. In an expansible core the combination of a tubular element having a bearing engaging portion at its outer end, an inwardly converging tapered surface of relatively high pitch on said element and spaced inwardly from said bearing engaging portion, a chambered actuating member axially slidably mounted over the inner end of said element and having an outwardly converging tapered surface opposed to said first tapered surface and of less pitch than said first tapered surface, an expansion sleeve positioned around said element and having internal tapered surfaces coacting with said first and second surfaces, said sleeve being slotted axially from opposite ends with angularly spaced overlapping slots, a stop on said element received behind an inwardly facing shoulder in said sleeve to limit inward motion of the sleeve, and means operable from the outer end of said element for axially shifting said actuating member relative to said element, said means comprising a seal projecting radially from said element into contact with the inside of member and passages for directing fluid under pressure to within said actuating member on opposite sides of said seal.

11. In an expansible core the combination of a tubular element having a bearing engaging portion at its outer end, a tapered surface of relatively high pitch on said element and spaced inwardly from said bearing engaging surface, a chambered actuating member axially slidably mounted around said element and having a tapered surface opposed to said first tapered surface and of less pitch than said first tapered surface, an expansion sleeve positioned around said element and having internal tapered surfaces complementary to and coacting with said first and second surfaces, said sleeve being slotted axially from opposite ends with angularly spaced overlapping slots, a stop on said element opposed to an internal shoulder in said sleeve to limit motion of the sleeve away from said high pitched surface, and means operable from the outer end of said element for axially shifting said actuating member relative to said element.

12. In an expansible core the combination of a tubular element having a bearing engaging portion at its outer end, a tapered surface of relatively high pitch on said element and spaced inwardly from said bearing engaging surface, a chambered actuating member axially slidably mounted around said element and having a tapered surface opposed to said first tapered surface and of less pitch then said first tapered surface, an expansion sleeve positioned around said element and having internal tapered surfaces coacting with said first and second surfaces, said sleeve being slotted axially from opposite ends with angularly spaced overlapping slots, a stop on said element opposed to an internal shoulder in said sleeve to limit motion of the sleeve away from said high pitched surface, and means operable from the outer end of said element for axially shifting said actuating member relative to said element.

13. An expansible core comprising a tubular element having a journal portion at its outer end, a conical collar positioned around said tubular element inwardly from said journal portion and having a tapered surface, an actuating member slidably mounted on the inner end of said element, and having an inner end wall with a threaded aperture therein, an actuating shaft extending through said element and having a threaded inner end engaged through said aperture to prevent rotation of the actuating member while permitting axial movement thereof, an outwardly converging tapered end on the outer end of said actuating member, a tubular expansion sleeve positioned around said element between said tapering surfaces, said sleeve having internal conical surfaces at its ends engageable with said tapered surfaces, said sleeve being alternately slit from opposite ends to permit radial expansion and contraction of the sleeve, and radial projections on said element and said member spaced inwardly from the tapered surface thereon and engageable with axially facing internal surfaces on said sleeve to draw said sleeve down said tapered surfaces.

14. In an expansible core the combination of a tubular element having a bearing engaging portion at its outer end, an inwardly converging tapered surface on said element and spaced inwardly from said bearing engaging surface, a chambered actuating member axially slidably mounted over the inner end of said element and having an outwardly converging tapered surface opposed to said first tapered surface, an expansion sleeve positioned around said element and having internal tapered surfaces coacting with said first and second surfaces, said sleeve being slotted axially from opposite ends with angularly spaced overlapping slots, a radial projection on said member engageable with an internal axially facing surface on

said sleeve to move the sleeve axially after the sleeve has contracted radially along the tapered surface on the member, and means operable from the outer end of said element for axially shifting said actuating member relative to said element.

15. In an expansible core the combination of a shaft member having a bearing engaging portion at its outer end, a chambered actuating member axially slidably mounted over the inner end of said shaft member, opposed converging conical surfaces on said members with one tapered surface being of less pitch than the other tapered surface, an expansion sleeve positioned around said shaft member and having internal tapered surfaces coacting with said first and second surfaces, said sleeve being slotted axially from opposite ends with angularly spaced overlapping slots, a radially projecting stop on the member having the high pitch tapered surface engageable in an internal annular groove in said sleeve to limit motion of the sleeve axially with respect to the high tapered surface, and means operable from the outer end of said shaft member for axially shifting said actuating member relative to said shaft member.

16. In an expansible core the combination of a shaft member having a bearing engaging portion at its outer end, an actuating member axially slidable on said shaft member, opposed converging conical surfaces on said members with one tapered surface being of less pitch than the other tapered surface, an expansion sleeve positioned around said shaft member and having internal tapered surfaces coacting with said first and second surfaces, said sleeve being slotted axially from opposite ends with angularly spaced overlapping slots, a radially projecting stop on the member having the high pitch tapered surface engageable in an internal annular groove in said sleeve to limit motion of the sleeve axially with respect to the high tapered surface, and means operable from the outer end of said shaft member for axially shifting said actuating member relative to said shaft member.

17. An expansible arbor for supporting and gripping the inside of an object positioned therearound comprising a shaft member, an actuating member axially sildable on said shaft member, opposed converging tapered surfaces on said members with one tapered surface being of less pitch than the other, an expansion sleeve positioned around said shaft member and having internal tapered surfaces coacting with said converging tapered surfaces, said sleeve being slotted axially from opposite ends with angularly spaced overlapping slots, a radially projecting stop on the member having the high pitch tapered surface positioned inwardly from such surface, an axially facing internal surface on said sleeve engageable with said stop to limit motion of the sleeve axially with respect to the high tapered surface, and means operable from an end of said shaft member for axially shifting said actuating member relative to said shaft member, one of said members having a support engaging portion on its exterior end.

18. An expansible arbor for supporting and gripping the inside of an object positioned therearound comprising a shaft member, an actuating member axially slidably supported by said shaft member, opposed converging tapered surfaces on said members with one tapered surface being of less pitch than the other, an expansion sleeve positioned around said shaft member and having internal tapered surfaces coacting with said converging tapered surfaces, said sleeve being slotted axially from opposite ends with angularly spaced overlapping slots, a radially projecting stop on the member having the high pitch tapered surface, an axially facing internal surface on said sleeve engageable with said stop to limit motion of the sleeve axially with respect to the high tapered surface, and means for axially shifting said actuating member relative to said shaft member, one of said members having a support engaging portion on its exterior end.

19. An expansible arbor for supporting and gripping the inside of an object positioned therearound comprising a shaft member, an actuating member axially slidably supported by said shaft member, opposed converging tapered surfaces on said members, an expansion sleeve positioned around said shaft members and having internal tapered surfaces coacting with said converging tapered surfaces, said sleeve being slotted axially from opposite ends with angularly spaced overlapping slots, radially projecting stops on the members, axially facing internal surfaces on said sleeve engageable with said stops to limit motion of the sleeve axially with respect to the tapered surfaces, and means for axially shifting said actuating member relative to said shaft member, one of said members having a support engaging portion on its exterior end.

20. An expansible arbor comprising a shaft member, an actuating member supported by said shaft member and axially slidable thereon, opposing converging tapered surfaces on said members, an expansion sleeve positioned around said members and having internal tapered surfaces coacting with said converging tapered surfaces, the sleeve being slotted axially from opposite ends with angularly spaced overlapping slots, coacting axially facing stops extending radially with respect to the interior of said sleeve and the exterior of said actuating member engageable when the sleeve is contracted around the smaller end of the tapered surface on the actuating member and opposing axial motion of the sleeve relative to the actuating member and away from the tapered surface on the actuating member, and means for axially shifting said actuating member relative to said shaft member.

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