June 22, 1937. P. W. DEMPSEY 2,084,672

LINER ASSEMBLING DEVICE

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Fig. 1

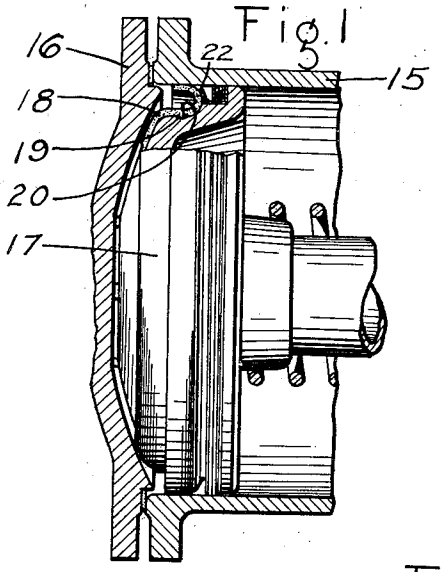


Fig. 2

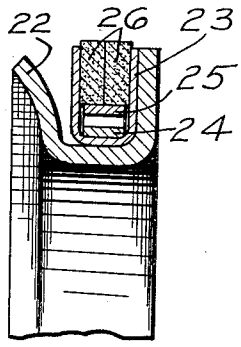


Fig. 3

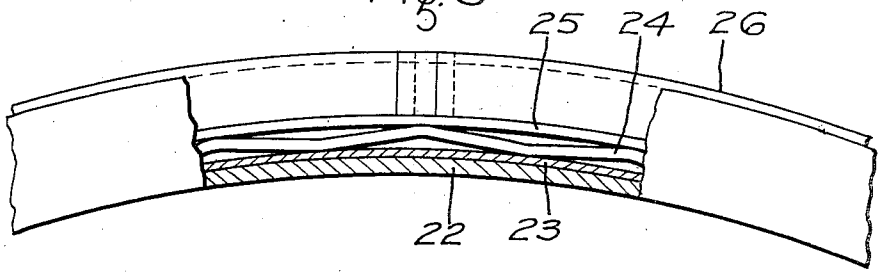
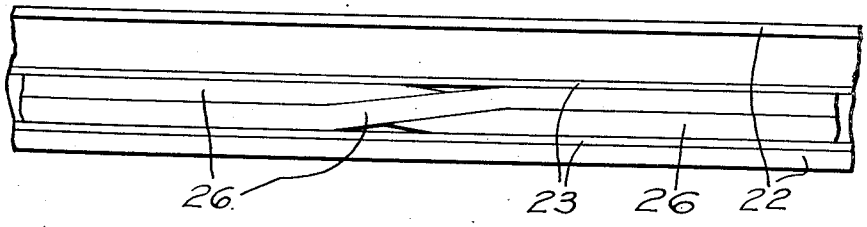


Fig. 4



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Fig. 5

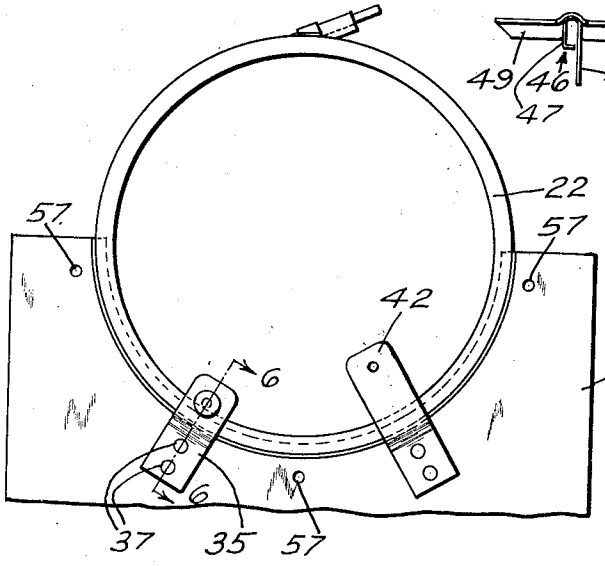


Fig. 7

Fig. 8

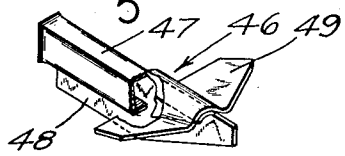


Fig. 6

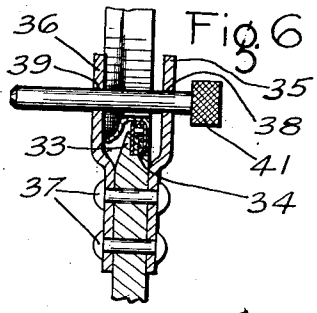


Fig. 9

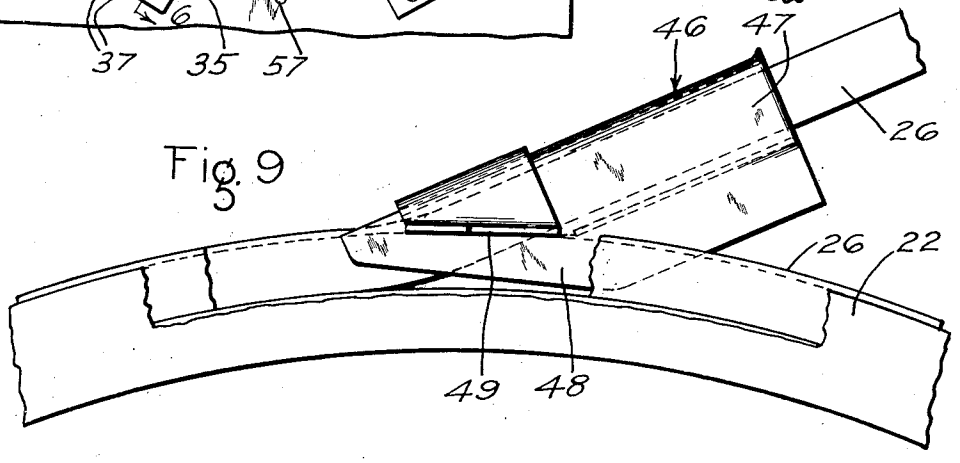
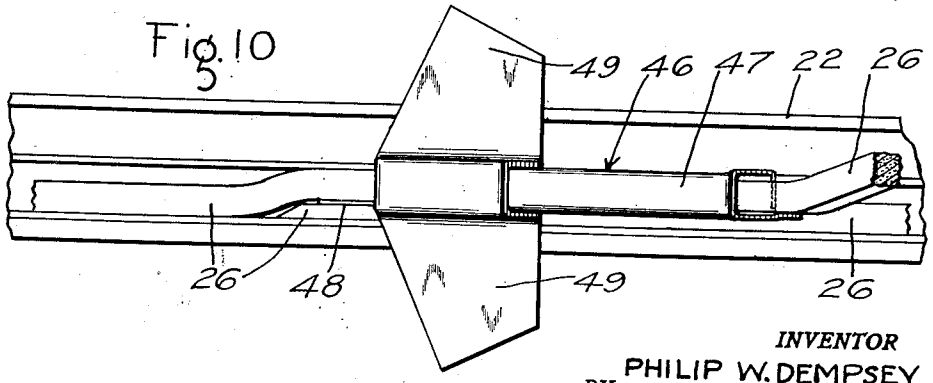


Fig. 10



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Fig. 11

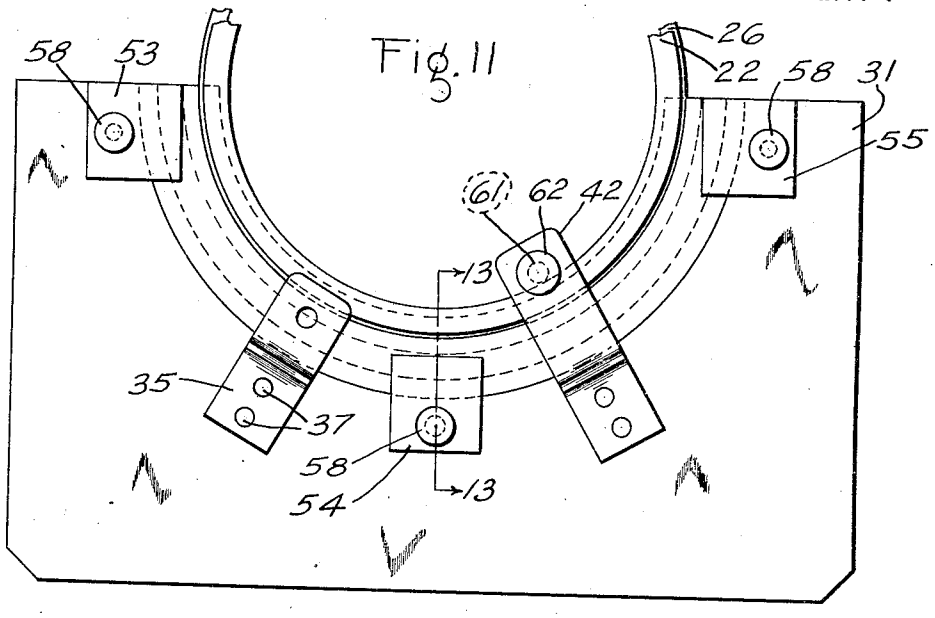


Fig. 12

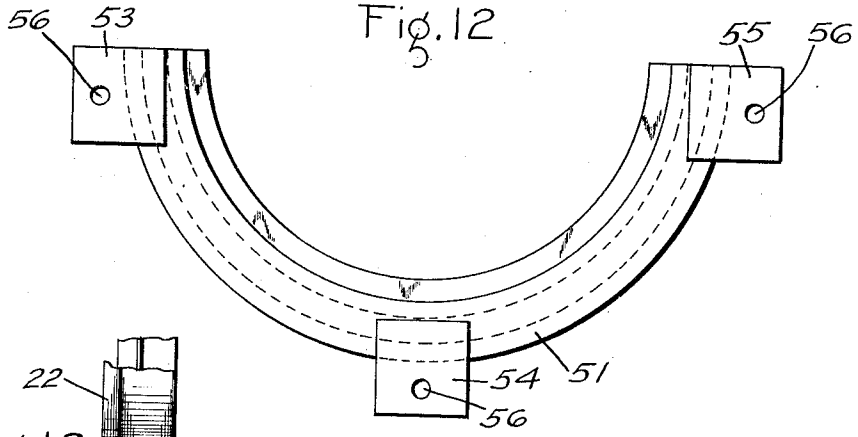
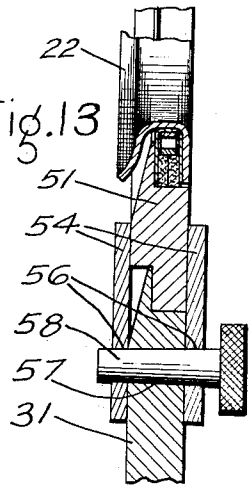


Fig. 13



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UNITED STATES PATENT OFFICE

2,084,672

LINER ASSEMBLING DEVICE

Philip W. Dempsey, Pittsburgh, Pa., assignor to The Westinghouse Air Brake Company, Wilmerding, Pa., a corporation of Pennsylvania

Application September 22, 1934, Serial No. 745,045

8 Claims. (Cl. 29—84)

This invention relates to liner assembling devices and has particular relation to devices for assembling felt or fibrous ribbon in an annular liner or channel member.

It has been proposed in the copending application of Clyde C. Farmer, Serial No. 635,312, filed September 29, 1932, Patent No. 1,972,732 and assigned to the assignee of this application, to provide a lubricating device for the interior surface of a cylinder wall, which lubricating device comprises two turns of felt or fibrous ribbon helically wound in the groove of an annular liner suitably secured to the outer periphery or pressure face of the piston in such manner that the felt ribbon is resiliently biased against the interior surface of the cylinder wall, the movement of the piston in the cylinder causing the felt ribbon to swab or wipe the cylinder wall with fluid lubricant supplied to the felt ribbon and transmitted by absorption therethrough to the interior surface of the cylinder wall.

The reason for employing two or more turns of helically wound felt ribbon in an annular liner mounted on a piston in preference to a single turn of felt ribbon is that the former construction provides a continuous unbroken surface of felt ribbon in contact with the interior surface of the cylinder wall as compared to the discontinuous or split surface provided by the latter.

In order to tightly pack the felt ribbon into the groove of the annular liner, the ribbon is made of such thickness as to necessitate compression thereof in order to accommodate two adjacent thicknesses thereof in the width of groove of the annular liner. The manual operation hitherto employed, of placing two or more turns of felt or fibrous ribbon in compressed condition in an annular groove was found to be a difficult one requiring considerable time and some degree of skill. The labor cost incident to assembling the felt ribbon in the liner was accordingly excessively high.

It is therefore an object of my invention to enable an unskilled person to readily and simply perform the operation of assembling two or more helical turns of felt or fibrous ribbon in compressed condition in an annular groove or annular channel member, and in such a relatively short time as to greatly reduce the labor cost for the operation.

More specifically, it is an object of my invention to provide means including a threading device adapted to facilitate and simplify the placing of successive helical turns of felt ribbon into an annular groove or annular liner.

A further object of my invention is to provide a chuck device adapted to slidably support various sizes of rings or liners whereby they may be rotated about their respective axes and the threading of the felt ribbon into the groove of the liners facilitated.

The above and other objects and advantages of my invention are attained by means of an embodiment thereof described hereinafter and will be apparent from the subsequent description, when read in connection with the accompanying drawings wherein,

Figure 1 is a fragmentary view showing a portion of a cylinder and piston therein, which piston is provided with a lubricator device including an annular liner containing felt or fibrous ribbon,

Figure 2 is a fragmentary enlarged sectional view of the lubricator ring or liner employed in Figure 1,

Figure 3 is a fragmentary elevational view, with a portion broken away, disclosing in further detail the nature of the lubricator ring,

Figure 4 is a fragmentary plan view corresponding to the view shown in Figure 3,

Figure 5 is an elevational view showing the chuck device comprising my invention, with a lubricator or liner ring mounted thereon,

Figure 6 is a sectional view, on enlarged scale, taken on line 6—6 of Figure 5,

Figures 7 and 8 are end and isometric views, respectively, of the threading device comprising my invention, a portion of the device in the isometric view being broken away,

Figure 9 is an enlarged fragmentary view, showing the cooperation of the threading device with the felt ribbon during the threading operation,

Figure 10 is a plan view, corresponding to the view shown in Figure 9,

Figure 11 is a view, corresponding to Figure 5, showing a filler-piece or adapter mounted thereon for adapting the chuck device to a smaller size of lubricator or liner ring,

Figure 12 is an elevational view showing the construction of the filler-piece disclosed in Figure 11, and

Figure 13 is an enlarged sectional view, taken on line 13—13 of Figure 11.

Referring to Figure 1, wherein is shown an illustrative application of the lubricator or liner ring described herein, the construction shown includes a cylinder 15 having a cylinder head

16, and a piston 17 mounted for operation in the cylinder 15. A piston packing disc 18, conforming to the pressure face of the piston 17, is secured to the pressure face of the piston by means of an annular rib 19 which is adapted to snap into an annular groove 20 in a shoulder portion on the pressure face of the piston, the packing disc being provided with an annular peripheral U-fold or corrugation, the re-entrant lip portion of which is in biased sealing relation with the interior surface of the cylinder wall.

A lubricator or liner ring 22 is disposed in the annular outer peripheral groove between the peripheral corrugation of the packing disc and the guide flange of the piston. The ring 22 is of substantially U-shaped cross section, one flange being curved to conform to the curvature of the corrugation on the piston packing disc, and has an annular channel member 23, suitably secured within the groove thereof, as by spot welding. A corrugated split annular spring member 24 is snapped into the groove of the annular channel member 23 and closely surrounds the base portion thereof. A smooth annular split ring 25 is then snapped into the groove of the annular channel member 23 over the spring member 24 which it closely surrounds. Two complete turns of a single linear piece of felt ribbon 26 are helically disposed in compressed condition in the annular channel member 23 over the ring 25, as indicated in Figures 3 and 4, the ring 25 serving to evenly or uniformly distribute the pressure of the spring member 24 on the felt ribbon, which is thus adapted to be uniformly and firmly pressed into engagement with the interior surface of the wall of cylinder 15.

In order to facilitate the operation of assembling the felt ribbon into the annular channel member 23, I have devised a chuck device for supporting the lubricator or liner ring along a portion of its periphery in such manner as to permit rotation of the ring about its own axis. The chuck device may comprise a plate member 31 adapted to be stationarily mounted in any suitable manner, for example, in a vertical position at the end of a work bench or table, which plate member has a semi-circular opening or arcuate recess cut therein at the upper edge thereof. As shown in Figure 6, the edge of the plate member 31 defining the semi-circular opening, is provided with a sharp angular tongue portion 33 extending radially inwardly and a cylindrical shoulder 34.

In mounting the lubricator or liner ring 22 on the chuck plate member 31, the ring is moved toward the semi-circular opening in the plate member in a plane coincident with the plane of the plate member 31, the tongue portion 33 entering into the groove between the free flange of the annular channel member 23 and the curved flange of the liner ring 22, the annular channel member 23 being in alignment with the shoulder 34. The diameter of the shoulder 34 is slightly greater than the diameter of the ring to provide clearance between the outer periphery of the channel member 23 and the shoulder 34 for the felt ribbon to project beyond the outer periphery of the annular channel member 23.

It will thus be seen that when the lubricator ring 22 is in the position shown in Figure 5, it may be rotated freely about its own axis, the tongue portion 33 serving to maintain the ring against movement in the direction of its own axis.

For the purpose of retaining the lubricator ring in cooperative relation with the plate member 31 so that the ring will not tend to move away from the plate member while being rotated thereon, a yoke device is provided comprising a pair of prongs 35 and 36 secured in aligned cooperative relation on opposite faces, respectively, of the plate member 31 in any suitable manner, as by rivets 37 or by spot welding. The prongs 35 and 36 extend past opposite sides of the ring into the semi-circular opening and are provided with aligned holes 38 and 39, respectively, for receiving a pin 41 which is inserted therethrough from one face of the plate member 31. The holes 38 and 39 in the prongs are in such radial position that when the pin 41 is disposed therein, the pin restrains the lubricator ring from outward movement away from the plate member 31.

Another yoke device comprising a pair of prongs 42 which are longer than the prongs 35 and 36, and which are secured on opposite faces, respectively, of the plate member 31, in spaced angular relation to the prongs 35 and 36, is provided for a purpose which will be hereinafter explained.

For the purpose of facilitating the threading of the felt ribbon into the groove of the annular channel member 23, I have devised a threading device 46, (see Figures 7 and 8) which threading device comprises a rectangular tube portion 47, conforming substantially in contour to the dimensions of the felt ribbon, and having one face 48 thereof extended and tapered longitudinally toward a point at one end. A wing or guide portion 49 is suitably secured, as by spot welding, to the tube portion 47 and extends laterally on opposite sides of the tube portion in substantially perpendicular relation to the face 48 and parallel to the tapered edge of the face 48.

In assembling the felt ribbon into the annular liner or lubricator ring, the operator takes a single linear piece of felt ribbon, cuts the end thereof off at an angle with a knife, inserts that end in the groove of the annular channel member 23 at the upper edge of the plate member 31, and then, by holding the free portion of the ribbon taut and outstretched in alignment with the groove in the channel member 23, drops a portion of the length of the ribbon into the upper open half of the groove in the channel member. The operator then, with one hand, presses a portion of the ribbon against the ring to prevent sliding of the ribbon in the groove and turns the ring through one half of a revolution, while holding the free portion of the ribbon taut and outstretched in alignment with the groove in the channel member 23, with the other hand, so that as the ring turns, the free portion of the ribbon is fed into the groove of the channel member. Due to the fact that the shoulder 34, on the edge of the plate member 31, closely surrounds the outer periphery of the annular channel member 23, the initial half-turn of the felt ribbon is confined in the groove of the annular channel member during the half-revolution of the ring.

Upon the completion of the half-revolution of the ring, the confined end of the ribbon emerges at the upper edge of the plate member 31 on the diametrically opposite side of the ring with respect to the point at which it was inserted and since the free portion of the ribbon has been fed into the open upper half of the groove in the annular channel member 23, the first turn of the ribbon is thus completed.

The operator now threads the free end of the

felt ribbon through the hollow tube portion 47 of the threading device 46 and moves the threading device along the ribbon until the wing portion 49 tangentially engages the outer periphery of the lubricator ring, as shown in Figure 5, in which position the extended face 48 of the tube portion 47 extends into the groove of the annular channel member 23 adjacent one side of the end of the turn of felt ribbon already in the groove of the annular channel member, as shown in Figure 9. Furthermore, when the threading device is so positioned, the tube portion 47 thereof is on the opposite side of the extended face 48 with respect to the ribbon in the groove of the annular channel member, as shown in Figure 10, and it also extends outwardly at an angle to the periphery of the ring 22, so that the free portion of the ribbon is transversely displaced from the turn of ribbon already in the groove and so that the free portion of the ribbon is conveniently oriented for entry into the groove.

With one hand, the operator now maintains the wing portion 49 of the threading device 46 firmly in contact with the outer periphery of the lubricator ring and at the same time exerts a transverse pressure on the threading device to cause the extended face 48 of the tube portion to compress the ribbon already in the groove against one flange of the annular channel member 23, as shown in Figure 10, and with the other hand rotates the ring in a direction to cause the ribbon to be fed into the groove of the annular channel member. It will be noted that the transverse compression of the felt ribbon by the extended face 48 on the threading device provides space in the groove of sufficient width so that as the ring is turned the free portion of felt ribbon may fall readily into place adjacent the turn of felt ribbon already in the groove.

Rotary motion of the lubricator ring is continued by the operator until the second turn of felt ribbon is completed, at which time the threading device is removed by sliding it off the free end of the ribbon. The operator then cuts off the felt ribbon to the proper length and at an angle, and packs the free end into place to properly fill the groove in the annular channel member 23 at the extremity of the felt ribbon, as shown in Figure 4.

In order to adapt the chuck plate 31 to support various sizes of lubricator or liner rings, adapters or filler-pieces, such as the filler-piece 51, shown in Figure 12, may be provided. The filler-piece 51 may comprise a semi-circular member having an inner peripheral edge which is provided with a tongue and shoulder construction corresponding to that of the peripheral edge of the semi-circular opening on the chuck plate member 31 and an outer peripheral edge having a tongue and shoulder construction adapted to cooperatively engage the tongue 33 and shoulder 34 on the plate member 31, as shown in Figure 13.

The filler-piece 51 is removably secured to the plate member 31 by means of a plurality of yokes 53, 54, and 55, comprising pairs of prongs extending radially outward from the outer edge of the filler-piece, the prongs of each pair being suitably secured to the filler-piece, as by welding them, respectively, to opposite faces of the filler-piece in aligned relation. Any suitable number of yokes may be employed. For convenience and also for purposes of illustration, only three yokes are disclosed, the yokes being secured to the filler-piece 51 in spaced angular relation, two of the yokes namely yokes 53 and 55 being in diametral relation at opposite ends of the filler-piece, and the yoke 54 being in intermediate angular or quadrature relation thereto. The prongs of each of the yokes 53, 54, and 55 are provided with a tapered hole 56, the holes of each pair of prongs being in alignment with each other and in registry with a tapered hole 57 extending through the plate member 31. A tapered pin 58 is provided for each yoke 53, 54, and 55, which pin is inserted through the opening thus formed by the holes 56 and 57 and which serves to secure the filler-piece firmly to the chuck plate member 31.

The prongs 42 of the yoke device, previously mentioned, are each provided with a hole 61, the two holes being in aligned relation and adapted to receive a pin 62 which is inserted therethrough for securing the smaller size of ring against outward movement from the filler-piece 51, when the ring is rotated about its axis in slidable relation to the filler-piece 51 during the threading operation.

The inner diameter of the filler-piece 51 may be varied for other filler-pieces, to accommodate lubricator rings or liners of other diameters, the prong members 42 being constructed of suitable length for securing the smallest size of lubricator ring against movement away from the filler-piece.

It will thus be seen that I have provided means including a chuck device and a threading device for simplifying and facilitating the operation of assembling or placing two or more turns of felt ribbon into an annular groove or channel member. While my invention has been shown and described to be of particular utility in connection with lubricator or liner rings, obviously it may be employed in operating on other types of work, for example any cylindrical member having an annular groove cut in the outer surface thereof. Furthermore, it is understood that my invention is capable of various changes, additions or omissions without departing from the spirit thereof and it is therefore, not my intention to limit the scope of my invention except as required by the prior art and as defined in the appended claims.

Having now described my invention what I claim as new and desire to secure by Letters Patent, is:

1. A device for threading successive turns of ribbon in helical relation into a groove in a grooved member, comprising a tubular portion conforming substantially to the ribbon and through which the ribbon is fed, only one face of said tubular portion having an extension adapted to enter the groove and slide along one face of the ribbon already in the groove for pressing it into such a transverse position in the groove as to provide space in the groove for ribbon to be fed thereinto.

2. A device for threading successive turns of ribbon in helical relation into a groove in a grooved member, comprising a tubular portion conforming substantially to the ribbon and through which the ribbon is fed, one face of said tubular portion having an extension adapted to slide along one face of the ribbon already in the groove for pressing it into such a transverse position in the groove as to provide space in the groove for ribbon to be fed thereinto, and a winged portion extending transversely of the tubular portion adapted to be manually pressed into engagement with the outer surface of the grooved member for positioning the tubular portion in angular relation to the outer surface of the grooved

member with the extension of the one face of the tubular portion extending into the groove.

3. A chuck device comprising means for slidably supporting an annular externally grooved member, having a predetermined diameter, along a portion of its periphery, adapter means cooperating with said supporting means adapted to be supported along its periphery by said supporting means and adapted to slidably support an annular grooved member, of less than said predetermined diameter, along a portion of its periphery, said supporting means having securing means adapted to maintain cooperative sliding relation of an annular member with said supporting means or said adapter means.

4. Apparatus for helically winding two or more turns of ribbon into an annular groove in the peripheral face of a circular member, comprising a chuck device for removably supporting the member for rotation about its own axis, and a threading device through which the ribbon is fed adapted to position the ribbon for entrance into the groove of the member.

5. Apparatus for helically winding two or more turns of ribbon into an annular groove in the peripheral face of a circular member, comprising a chuck device for removably supporting the member for rotation about its own axis, and a threading device through which the ribbon is fed adapted to position the ribbon already in the groove of the member and the ribbon about to enter the groove, in relative transverse relation so as to provide space in the groove for ribbon to be fed into the groove adjacent the ribbon already therein.

6. Apparatus for helically winding two or more turns of ribbon into an annular groove in the peripheral face of a circular member, comprising a chuck device for removably supporting the member for rotation about its own axis, and a threading device comprising a tubular portion conforming to the ribbon and through which the ribbon is fed, one face of the tubular portion having an extension adapted to slide along the ribbon already wound in the groove of the member and to so position the ribbon already in the groove transversely of the groove as to provide space for ribbon to be fed into the remaining portion of the groove.

7. Apparatus for helically winding two or more turns of ribbon into an annular groove in the peripheral face of a circular member, comprising a chuck device for removably supporting the member for rotation about its own axis; and a threading device comprising a tubular portion conforming to the ribbon and through which the ribbon is fed, one face of the tubular portion having an extension adapted to slide along the ribbon already wound in the groove of the member and to so position the ribbon already in the groove transversely of the groove as to provide space for ribbon to be fed into the remaining portion of the groove, and a winged portion extending transversely of the tubular portion adapted to be manually pressed to the outer periphery of the circular member for positioning the tubular portion in angular relation to the outer periphery of the circular member with a portion of the extension of the one face of the tubular portion extending into the groove.

8. A chuck device comprising means having an arcuate recess therein adapting it to receive and slidably support a peripherally grooved annular member along only a portion of its periphery, means on said supporting means adapted to extend into the groove of the annular member for restraining the annular member against movement parallel to its own axis while permitting rotation of the annular member about its own axis by sliding movement of the annular member relative to the supporting means, and securing means including a removable element extending parallel to the axis of the annular member and through the central opening in the annular member for preventing movement of the annular member away from the supporting means.

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