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2,466,129

COLLET CHUCK

Filed Oct. 17, 1945

3 Sheets-Sheet 1

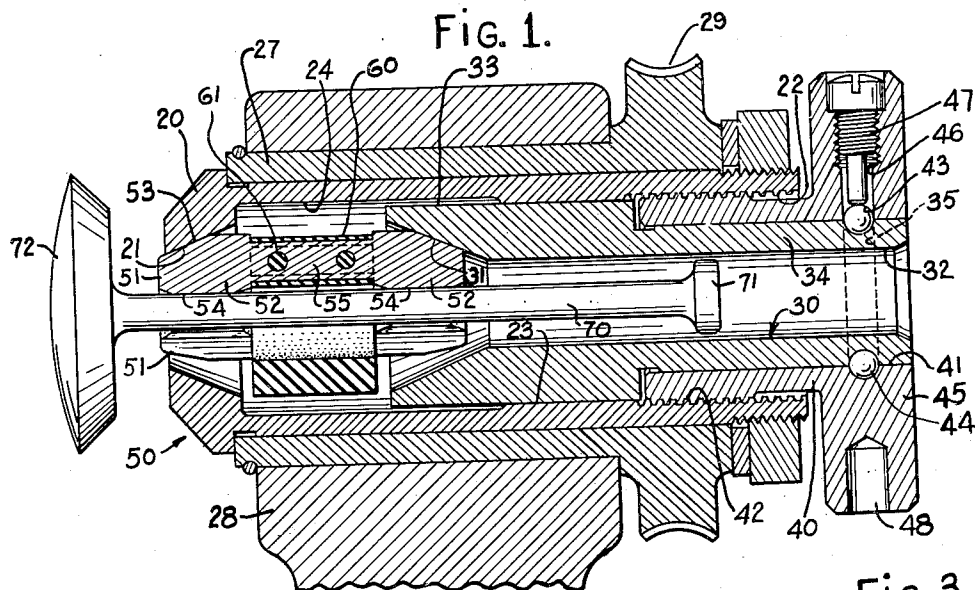


Fig. 2.

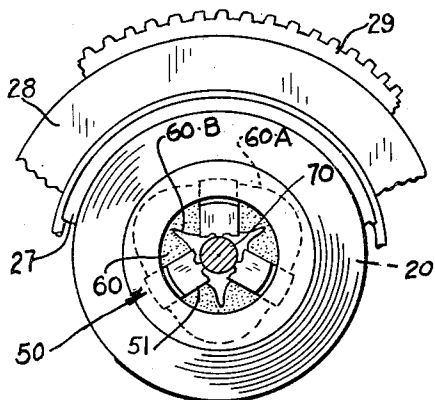


Fig. 3.

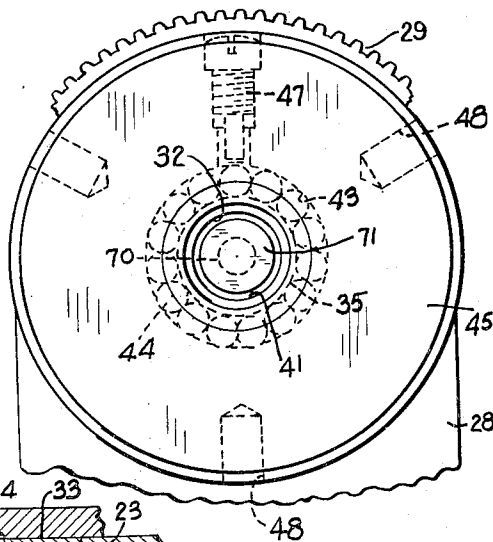
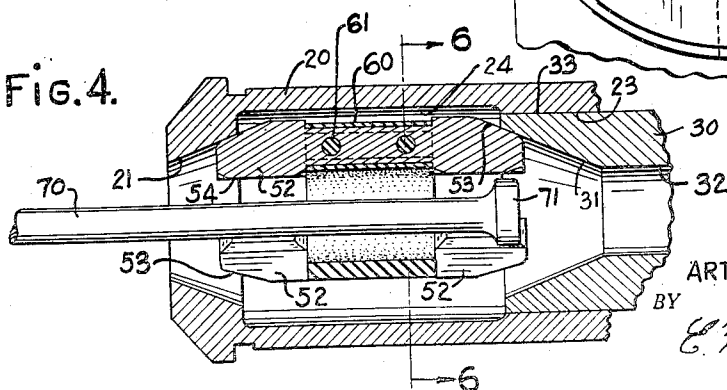


Fig. 4.



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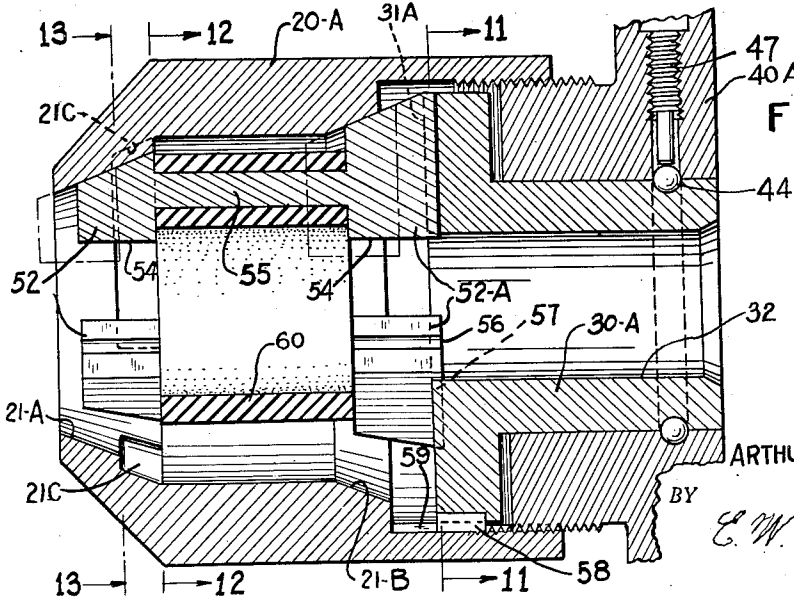
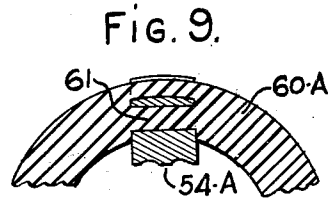
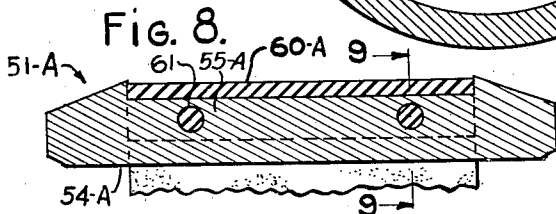
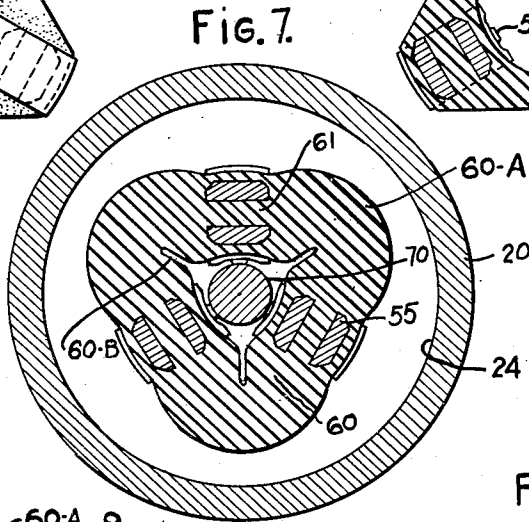
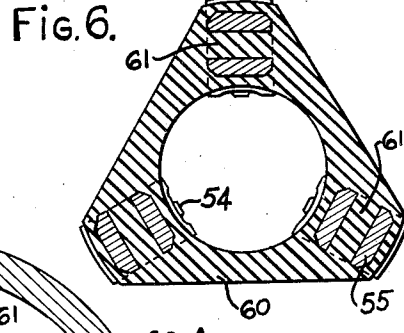
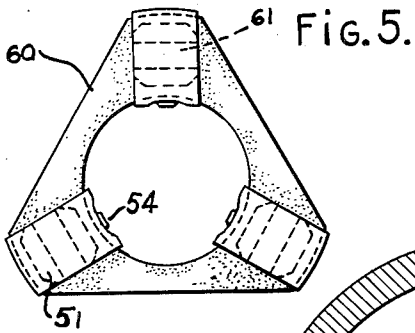
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Fig. 11.

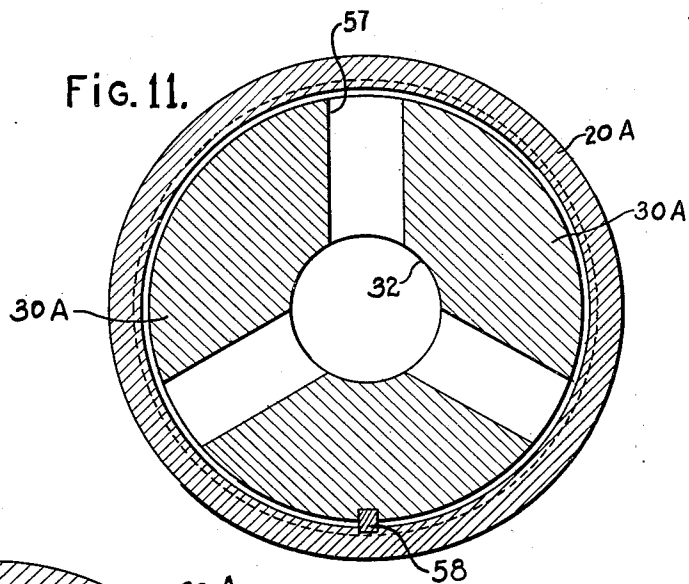


Fig. 12.

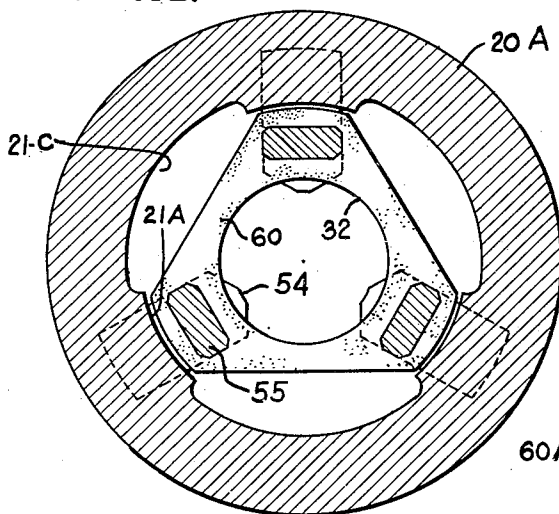


Fig. 13.

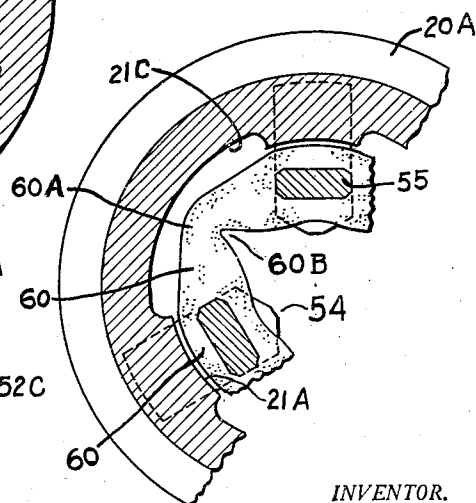
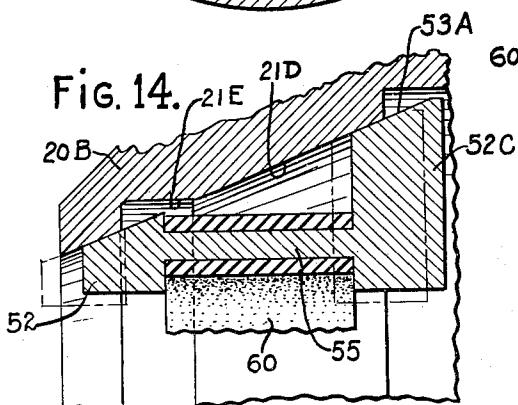


Fig. 14.



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COLLET CHUCK

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Application October 17, 1945, Serial No. 622,890

4 Claims. (Cl. 279-46)

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My invention relates to an improved collet chuck which is especially well adapted for holding valves while they are being resurfaced, although it is not limited to that particular use. Tappet valves often are constructed with integral tappet heads and collets for holding them must have a sufficiently large range of adjustment to permit the passage of such heads and to grip the valve stems which are of much smaller diameters. An object of the present invention is to provide an inexpensive collet chuck which has a large range of adjustment and which is able to centralize a desired article with great nicety.

I will describe the invention in the following specification and point out its novel features in claims.

Referring to the drawings:

Fig. 1 is a sectional side elevation of a chuck which is made according to and embodies the invention, mounted in a pedestal and engaging the stem of a valve.

Fig. 2 is a front elevation and Fig. 3 a rear view of the chuck shown in Fig. 1.

Fig. 4 is a sectional side elevation of parts of the chuck shown in the preceding figures in their open positions. This figure also shows a valve stem with an integral tappet head on its end.

Fig. 5 is an end elevation on a larger scale of the collet shown in Figs. 1, 2 and 4.

Fig. 6 is a sectional end elevation of the collet, the section being taken on the line 6-6 of Fig. 4.

Fig. 7 is a view similar to Fig. 6 with the gripping members in their closed positions. A part of the body of the chuck is also shown in this figure.

Fig. 8 is a sectional side elevation of a gripping member of modified form and of a part of the resilient body which connects it with other gripping members.

Fig. 9 is a sectional end elevation of the parts shown in Fig. 8, the section being taken on the line 9-9 of the latter figure.

Fig. 10 is a sectional side elevation of a modified structure which also embodies this invention.

Fig. 11 is a sectional end elevation of the device shown in Fig. 10. The section in this view is taken on the line 11-11 of Fig. 10 with the gripping members omitted.

Fig. 12 is a sectional end elevation taken on the line 12-12 of Fig. 10.

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Fig. 13 is a sectional end elevation taken on the line 13-13 of Fig. 10 but with the gripping members in their closed positions in which they are shown by dash and dot lines in Fig. 10.

Fig. 14 is a sectional side elevation of a part of a chuck and illustrates another structural modification.

In Figs. 1-7, 20 designates the body of the chuck. This is a tubular member having an internal conical cam surface 21 at its forward end and internally threaded bore 22 at its rear end. 23 is a smooth internal cylindrical surface in the body between which and the cam surface 21 is a part 24 of enlarged internal diameter.

30 is a tubular pressure member having an internal conical cam surface 31 at its left hand end, as shown in the drawings and an internal bore 32. A part of this pressure member has an outer surface 33 which is in longitudinally slidable engagement with the surface 23 of the body. If desired, the body and the pressure member may be splined together to prevent relative rotation between them. 34 is an extension of the pressure member of smaller diameter. In it is an annular ball race 35.

40 is an adjusting collar having a bore 41 rotatively mounted on the extension 34 of the pressure member. Its inner end is provided with external screw threads 42 which engage the threads 22 in the body. 43 is a ball race in the adjusting collar in alignment with the ball race 35 and 44 designates a series of balls in these ball races which serve to interconnect the adjusting collar and the pressure member to cause them to move together longitudinally. 45 is an integral flange which extends outwardly from the pressure member beyond the end of the body 20. In it is a radial threaded hole 46 through which the balls 44 can be introduced into the ball races. This hole is closed by a threaded plug 47. Angularly spaced radial spanner wrench holes 48 are provided in the periphery of the flange.

The collet, designated generally by the reference numeral 50, comprises a plurality of radially disposed angularly spaced rigid gripping members 51. In the specific forms shown in the drawings there are three of these gripping members each of which has flat parallel sides. In Figs. 1-7 each gripping member has ends 52, the outer surfaces 53 of which are beveled to fit the cam

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surfaces 21, 31 and their inner surfaces 54 form straight aligned gripping edges parallel to the axis of the cam surfaces. 55 is an integral intermediate portion which in the form shown is of reduced cross-sectional radial dimension, which interconnects the ends 52.

60 is a body of resilient material which surrounds the reduced portions of each of the gripping members between the heads thereof so that these intermediate portions 55 are embedded in the body. This serves to hold the gripping members in desired relative positions. This body is preferably affixed to the parts of the gripping members which it surrounds, as for example, by being vulcanized to them. If desired, the portions 55 of the gripping members may be perforated, in which case parts of the resilient body pass through them as shown at 61.

Before specifically describing the modifications shown in the remaining figures of the drawings, I will point out the operation of the arrangement shown in Figs. 1-7. When the collet is open, as shown in Fig. 4, the gripping edges 54 are sufficiently far apart to permit the insertion of a valve stem 70 with an enlarged integral tappet head 71 on its end. Then by rotating the adjusting collar 40, the pressure member 30 is forced inwardly to bring the cam surfaces 21, 31 nearer together. This, by reason of the engagement of the beveled surfaces 53 of the heads 52 with the cam surfaces, moves the gripping members toward and into engagement with the valve stem 70 and the latter is engaged at longitudinally spaced parts thereof. During this operation the parts of the body 60 between adjacent gripping members will be forced outwardly, as shown at 60A in Fig. 7 and in dotted lines in Fig. 2 into the space provided by the internally enlarged part 24 of the body. Its inner edges will fold outwardly as shown at 60B. The valve 72 is accurately centered and can be ground or resurfaced by suitable equipment.

To enable this resurfacing to be done, the body 20 of the chuck is mounted in a sleeve 27 which is rotatively supported in a pedestal 28. A gear 29 is provided near an end of the sleeve by means of which it and the chuck may be rotated.

The gripping member 51A shown in Figs. 8 and 9 is similar to that previously described, but in this case the gripping edge 54A is a continuous straight edge and the resilient body 60A surrounds three sides instead of four of the intermediate part 55A.

In the modification illustrated in Figs. 10-13, the body 20A is constructed with longitudinally spaced cam surfaces 21A and 21B of unlike size, both bevelled in the same direction. The enlarged head 52 is similar to that previously described but the head 52A is larger. The gripping edges 54 are parallel and in mutual alignment. The rear end 56 of the head 52A is in a straight line normal to the axis of the chuck. The resilient body surrounds intermediate portions 55 between the enlarged heads as in the construction before described.

In this case the gripping action is effected by a longitudinal movement of the collet. This is produced by moving a pressure member 30A against the collet. This pressure member has a transverse end 31A which abuts the rear ends 56 of the gripping members and may be radially slotted as shown at 57 to receive them and to prevent relative rotation between the pressure member and the gripping members. Relative rotation between the pressure member 30A and the

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body 20A is prevented by a key 58 in the pressure member and in a longitudinal slot 59 in the body 20A. 40A is an adjusting collar in threaded engagement with the body 20A.

When the gripping members are thus held against rotating in relation to the body, the conical cam surface 21A is cut back longitudinally between adjacent gripping members as shown at 21C in Figs. 10, 12 and 13 to provide clearance spaces for the extended parts 60A of the resilient body.

In the construction shown in Fig. 14 there is a single cam surface 21D formed in the body 20B. This cam surface is continuous except for an annular pocket 21E cut in it to receive the expanded part 60A of the resilient body. The heads 52C of the gripping members are larger than in the former cases and their beveled surfaces 53A are in alinement with the surfaces 53 of the heads 52. The operation of this device is obviously similar to that of the device shown in Fig. 10.

Various modifications in construction, mode of operation, method and use of an invention may and do occur to others, especially after benefiting from knowledge of such a disclosure as that herein presented of the principles involved, but the invention itself is not confined to the present showing.

I claim:

1. A collet comprising a plurality of angularly spaced rigid gripping members radially disposed about an axis and parallel with said axis, said gripping members being provided with transverse perforations and having sides and enlarged tapered ends and intermediate portions of smaller cross-sectional dimension, and a circumferentially continuous body of resilient material abutting the sides of the gripping members passing through the perforations therein and around said intermediate smaller portions thereof.

2. A collet comprising a plurality of angularly spaced rigid gripping members radially disposed about an axis and parallel with said axis, said gripping members being provided with transverse perforations and having sides and enlarged tapered ends and intermediate portions of smaller cross-sectional dimension, and a circumferentially continuous body of resilient material abutting the sides of the gripping members passing through the perforations therein and around and surrounding said intermediate smaller portions thereof.

3. A chuck having a pair of cams having conical surfaces, at least one of the cams being recessed to form spaces in its conical cam surface, combined with a collet comprising a plurality of angularly spaced rigid gripping members radially disposed about the axis of the cam surfaces and parallel with said axis, said gripping members having enlarged ends with inclined outer surfaces adapted to be engaged by said cam surfaces and intermediate portions of smaller cross-sectional dimension, a circumferentially continuous body of resilient material between the gripping members passing around the intermediate smaller portions of said members, means for preventing relative rotation between the cam surfaces and the collet, and means for imparting relative longitudinal movement between the cam surfaces and the collet.

4. A chuck having a pair of longitudinally spaced cams having surfaces inclined symmetrically to a common axis at least one of the cams being recessed to form spaces in its inclined sur-

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faces, and a collet comprising a plurality of similarly spaced rigid gripping members radially disposed about the same axis and parallel with said axis, said gripping members having enlarged ends with inclined outer surfaces arranged to be engaged by said cam surfaces and intermediate portions of smaller cross-sectional dimension, a circumferentially continuous body of resilient material between the gripping members and passing around the smaller intermediate portions of said members, means for preventing relative rotation between the cam surface and the collet, and means for imparting relative longitudinal movement between the cam surfaces and the collet.

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