Dec. 2, 1941. A. RYDQUIST 2,264,589

CHUCK FOR HOLDING POLISHING BELTS

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Fig. 1

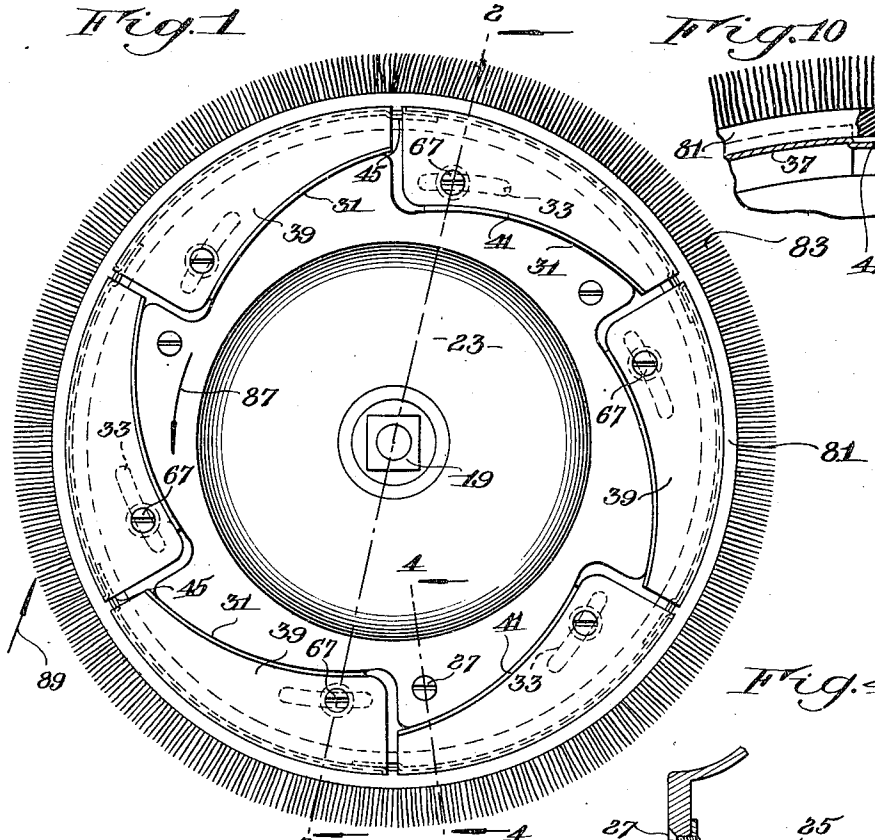


Fig. 10

Fig. 4

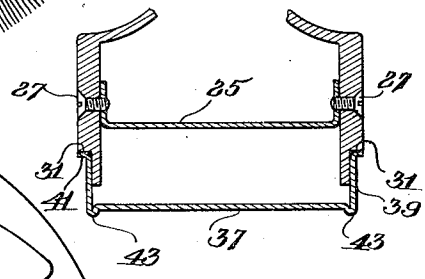
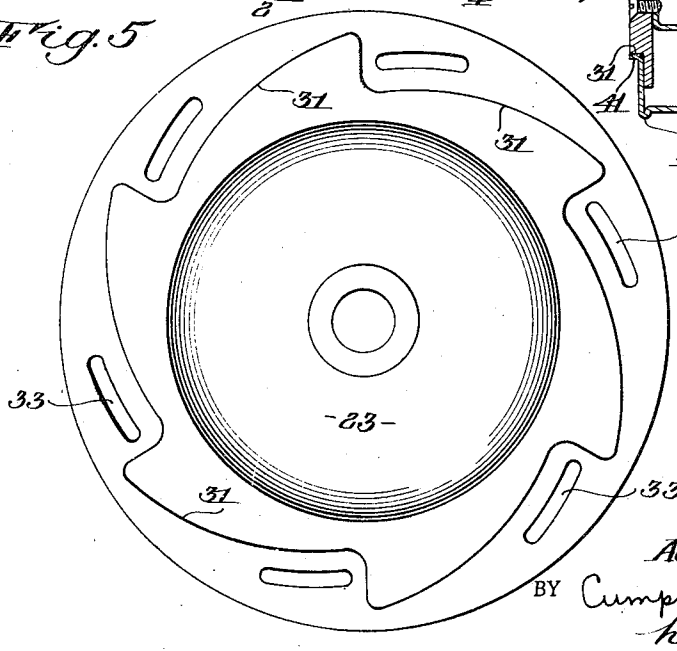


Fig. 5



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Fig. 3

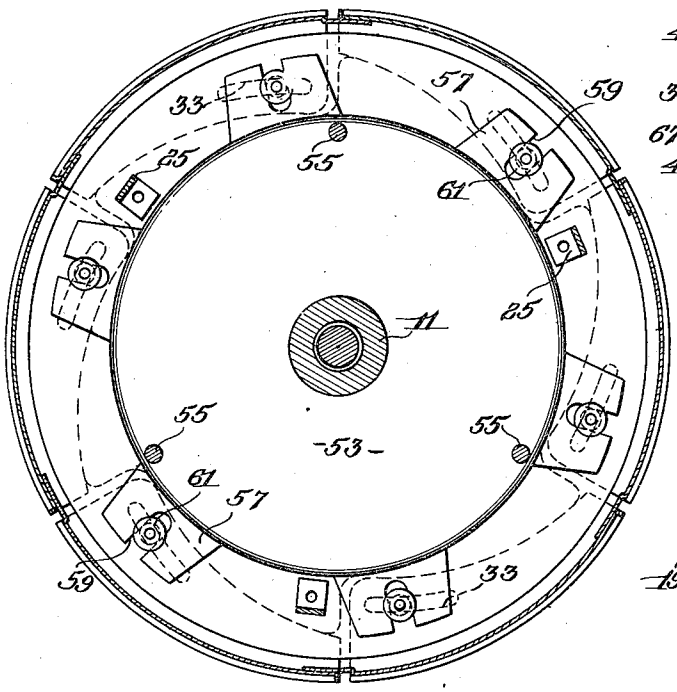


Fig. 2

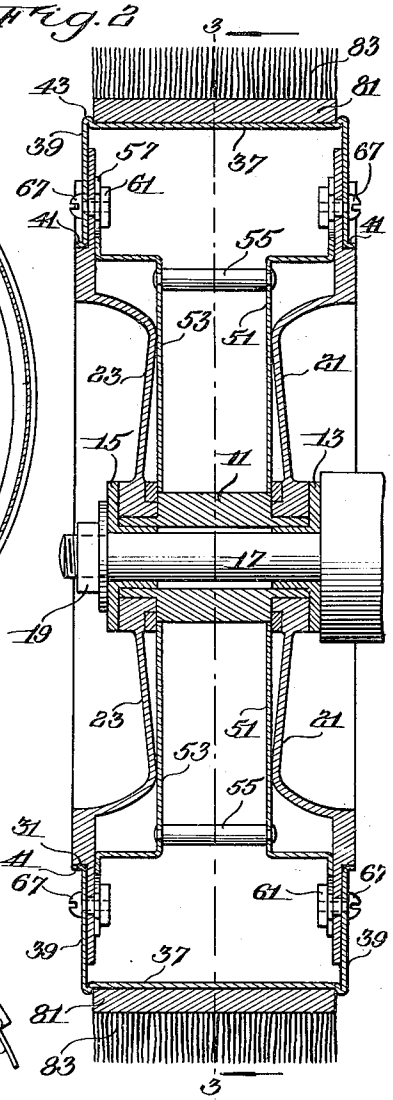


Fig. 7

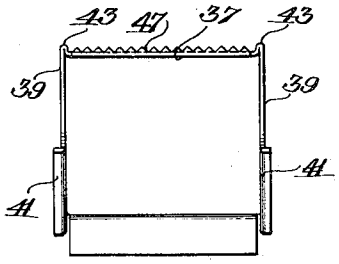


Fig. 6

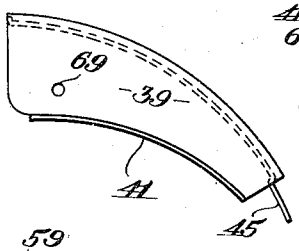


Fig. 8

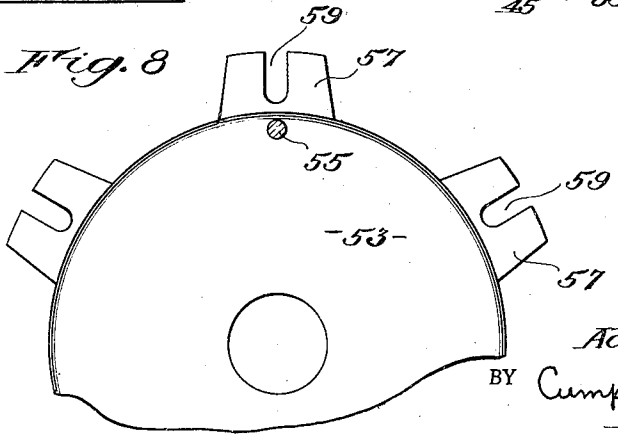
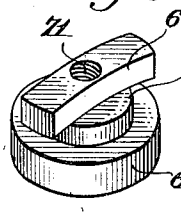


Fig. 9



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UNITED STATES PATENT OFFICE

2,264,589

CHUCK FOR HOLDING POLISHING BELTS

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Application November 15, 1940, Serial No. 365,814

10 Claims. (Cl. 279—2)

The present invention relates to a chuck or mandrel for holding annular polishing belts and the like.

An object of the invention is the provision of a generally improved and more satisfactory chuck or mandrel of this type.

Another object is the provision of such a chuck or mandrel, so designed and constructed that as the resistance to rotation of the polishing belt increases, the gripping force of the chuck or mandrel also increases.

Still another object is the provision of a chuck of this type, so designed and constructed that a belt may be removed and a fresh belt placed on the chuck in a minimum of time and with a minimum of effort.

A further object is the provision of a chuck of the above mentioned type, so designed that the weights or masses of the parts will be symmetrically disposed around the axis of the shaft or arbor, in all conditions of adjustment of the chuck, so as to produce no substantial eccentric loading of the shaft or arbor.

To these and other ends the invention resides in certain improvements and combinations of parts, all as will be hereinafter more fully described, the novel features being pointed out in the claims at the end of the specification.

In the drawings:

Fig. 1 is a side elevation of a chuck in accordance with a preferred embodiment of the invention, with a polishing belt in place thereon;

Fig. 2 is a diametrical section through the construction shown in Fig. 1, the section being taken substantially on the line 2—2 of Fig. 1;

Fig. 3 is a section substantially on the line 3—3 of Fig. 2, but with the belt removed;

Fig. 4 is a fragmentary radial section taken substantially on the line 4—4 of Fig. 1;

Fig. 5 is a face view of one of the side plates of the chuck, with other parts removed;

Fig. 6 is a side view of one of the wedge segments which collectively form the belt receiving surface;

Fig. 7 is an end view thereof;

Fig. 8 is a face view of one of the spider plates employed for operatively connecting the wedge segments to each other;

Fig. 9 is a perspective view of one of the studs used in connecting the spider to one of the wedge segments, and

Fig. 10 is a section similar to a fragment of Fig. 3, on a larger scale, showing a portion of a polishing belt in place on the chuck.

The same reference numerals throughout the several views indicate the same parts.

The chuck comprises a hub made of the parts 11, 13, and 15 suitably secured to each other and adapted to be mounted on a rotatable shaft or arbor 17 and held thereon by suitable means such as a nut 19. Fixed to the hub are two side plates 21 and 23 each being a reverse duplicate or mirror duplicate of the other. These side plates are braced to each other near their peripheries by cross bracing members 25 (Figs. 3 and 4) secured by screws 27, the bracing members being arranged symmetrically around the axis of the shaft 17.

The outer marginal portion of each of these members 21 and 23 is of considerable thickness, and in the thickness of such portion are cut, cast, or otherwise suitably formed a series of wedging shoulders 31 each of arcuate shape but eccentric with respect to the arbor 17. These shoulders 31 are arranged symmetrically with respect to the axis of rotation, and may be of any desired number, six being here shown. Associated with each shoulder 31, in the portion of the side plate 21 or 23 which projects outwardly beyond the shoulder, is an arcuate slot 33 concentric with the shoulder 31 with which it is associated.

A series of wedge segments are mounted on the peripheries of the plates 21 and 23, each wedge segment including a curved cross plate 37 forming a segment of a cylinder and a pair of depending side flanges 39 which straddle and lie alongside the outer side walls of the plates 21 and 23, the inner edges of the side flanges 39 being bent over as at 41 to provide bearing surfaces of increased area, arcuately shaped, as seen in Fig. 6, on curves of the same radius as those of the shoulders 31, and being mounted in slidable bearing relation on these shoulders. When viewed from the end as in Fig. 7 or in radial cross section as in Fig. 2, these segment plates are of U-shaped or stirrup shaped form, and preferably they are provided with raised edges or beads 43 to hold the polishing belt more securely in place against any possibility of lateral displacement.

Preferably one end of each segment plate has a slightly depressed extension 45 fitting snugly under the adjacent end of the next segment plate, as seen in Figs. 3 and 10, to provide a substantially continuous belt-receiving surface. Preferably the other end of each segment plate has an upturned transverse flange formed with serrations or teeth 47, as seen in Figs. 7 and 10, to dig into the belt placed on the segment plate, to hold it more securely thereon.

The segment plates are all connected to each other to move in unison along their respective shoulders 31. Such connection is conveniently accomplished by means of a spider rotatable within the space between the side plates 21 and 23 of the chuck. The spider may be formed from two plates 51 and 53, the inner edges of which bear rotatably upon the hub 11 and the side surfaces of which form a fairly snug rotatable fit between the plates 21 and 23, as shown in Fig. 2. The two plates 51 and 53 may be connected to each other at intervals by the connecting studs 55. The peripheries of the plates 51 and 53 are provided with a series of outwardly extending ears 57 lying against the inner surfaces of the outer marginal portions of the plates 21 and 23, each ear being provided with a radial slot 59, as seen in Fig. 8.

A stud of the form best shown in Fig. 9 is employed to connect the spider to the wedge segments. The stud has a large head 61 lying against the inner surface of the ear 57, as shown in Fig. 2. The stud also has a shank 63 of somewhat smaller diameter, passing through the radial slot 59 of the spider, and beyond this shank 63 is a laterally elongated and arcuate shank portion 65 lying in the arcuate slot 33 of the plate 21 or 23. A screw 67 passes snugly through a hole 69 in the side flange 39 of the segment and is threaded into a tapped opening 71 in the stud, thus connecting the parts.

Each of the wedge segments is connected through each of its side flanges 39 to the spider 51, 53 by this stud and screw arangement. Thus all of the segments are connected for motion in unison, and as any one segment moves up or down its inclined or wedging shoulders 31, all of the other segments must move through the same distance in the same direction or up or down their respective shoulders.

A chuck or mandrel of this kind may be used with any annular polishing or buffing belt of the proper diameter to fit the chuck. The exact construction of the polishing belt is not material so far as the construction of the chuck is concerned. Merely as an illustrative example, the polishing belt may comprise an annular base 81 provided on its outer surface with a mass of relatively long textile pile 83.

In use, the chuck is contracted by moving the wedging segments in a counterclockwise direction relative to the plates 21 and 23, when viewed as in Fig. 1, which causes the segments to ride down the incline of the shoulders 31, reducing the effective diameter of the segment plates 37 to the minimum diameter. Then the polishing belt 81 is placed over the chuck by a lateral movement of the belt, in a direction axially of the shaft 17, and when it is properly centered between the retaining beads 43, it is slightly turned in a clockwise direction relative to the stationary plates 21 and 23, when viewed as in Fig. 1, which causes the wedging segments all to ride up the incline on their respective shoulders 31, increasing the effective diameter of the bearing surface formed by the segment plates 37, or, in other words, expanding the segments 37 until they firmly grip the inner surface of the base 81 of the polishing belt, the teeth 47 digging into the somewhat soft or displaceable inner surface of the belt to hold the belt more securely against circumferential slipping. The radius of the bearing surface plates 37 is preferably the same as the radius of the inner surface of the belt, so that when the segments are expanded to an extent sufficient to grip the belt tightly, the individual segments all are concentric with each other and form parts of a single and substantially continuous perfect circle.

The shaft or arbor 17 is then set into rotation, in the direction of the arrow 87 (Fig. 1). Articles to be buffed or polished are held against the rotating belt, producing a reaction force against the belt in the direction of the arrow 89. From the relative directions of the forces, it is seen that the reaction force 89 tends to lock the belt more firmly on the chuck, rather than to release the belt from the chuck. The reaction force 89 tends to slip the belt around on the chuck, but if any actual slippage occurs, it is in a direction to cause the wedging segments to ride up the shoulders 31, thus increasing the firmness of clamping. Yet when the device is brought to rest, it is a very simple and easy matter to remove the belt from the chuck, when desired, by giving the belt a slight turn in a counterclockwise direction relative to the stationary plates 21 and 23, when viewed as in Fig. 1, which will cause the wedging segments to ride down the inclined surface 31, reducing the effective diameter of the symmetrical bearing surfaces 37 and permitting easy removal of the belt.

While one embodiment of the invention has been disclosed, it is to be understood that the inventive idea may be carried out in a number of ways. This application is therefore not to be limited to the precise details described, but is intended to cover all variations and modifications thereof falling within the scope of the appended claims.

I claim:

1. A chuck for holding a polishing belt or the like, said chuck including two plates adapted to be mounted on a rotatable shaft, each plate including a series of arcuate surfaces inclined approximately spirally with respect to the axis of rotation of the shaft, a series of segmental plates each including a surface substantially in the form of a segment of a cylinder and side flanges extending approximately radially inwardly from such surface and having arcuate inner edges resting on said arcuate surfaces, said segmental surfaces of the series of segmental plates collectively forming an approximately continuous circumferential bearing surface adapted to receive an annular polishing belt or the like, and means connecting said segmental plates to each other for conjoint movement along their respective arcuate surfaces.

2. A chuck for holding a polishing belt or the like, said chuck including two plates adapted to be mounted on a rotatable shaft, each plate including a series of arcuate surfaces eccentric with respect to the axis of rotation of the shaft, a series of segmental plates each including a surface substantially in the form of a segment of a cylinder and side flanges extending approximately radially inwardly from such surface and having arcuate inner edges resting on said arcuate surfaces, said segmental surfaces of the series of segmental plates collectively forming an approximately continuous circumferential bearing surface adapted to receive an annular polishing belt or the like, and means located between and rotatable relatively to said two first named plates for connecting said segmental plates to each other for conjoint movement along their respective arcuate surfaces.

3. A chuck for holding a polishing belt or the like, said chuck including a pair of plates adapted

to be mounted on a rotatable shaft, each plate including a circumferentially arranged series of outwardly faced arcuate shoulders each placed eccentrically so as to be inclined approximately spirally with respect to said shaft, each plate including a marginal peripheral portion projecting radially outwardly beyond said shoulders, a series of segment members each including a circumferentially extending bearing surface approximately in the form of a segment of a cylinder and each also including side flanges having arcuate inner edges eccentric with respect to said segment and corresponding in curvature to said shoulders on said plates, said segment members being mounted on said plates with said arcuate inner edges of said flanges resting on said shoulders, said segmental surfaces of the respective segment members collectively forming an approximately cylindrical circumferential surface for receiving an annular polishing belt or the like, a member located between said plates and rotatable with respect thereto, and means connecting said rotatable member to each of said segment members to cause all of said segment members to slide circumferentially in unison up or down said shoulders, to expand or contract the effective diameter of the bearing surface formed collectively by said segmental surfaces so as to grip or release said annular polishing belt or the like.

4. A construction as described in claim 3 in which said member located between said two plates includes two spider plates secured to each other, each spider plate having a series of radially extending arms, each arm being operatively connected to one side flange of one of the segment members to move circumferentially therewith.

5. A construction as described in claim 3 in which said circumferential bearing surfaces of said segment members are provided with raised marginal edges to assist in retaining said polishing belt or the like against accidental axial displacement.

6. A chuck for holding a polishing belt or the like, said chuck including a plurality of members adapted to be mounted in fixed relation on a rotatable shaft, said members being provided on opposite side faces with a circumferentially arranged series of outwardly faced arcuate shoulders placed eccentrically with respect to said shaft and also including a marginal peripheral portion projecting radially outwardly beyond said shoulders, a series of segment members each including a circumferentially extending bearing surface approximately in the form of a segment of a cylinder and each also including side flanges having arcuate inner edges eccentric with respect to said segment of a cylinder and corresponding in curvature to said shoulders, said segment members being mounted on said first mentioned members with said side flanges in straddling relation to said first mentioned members and with said arcuate inner edges of said flanges resting on said shoulders, said segmental surfaces of the respective segment members collectively forming an approximately cylindrical circumferential surface for receiving an annular polishing belt or the like, a control member located between said plurality of first-mentioned members and rotatable with respect thereto, and means connecting said control member to each of said segment members to cause all of said segment members to slide circumferentially in unison up or down said shoulders, to expand or contract the effective diameter of the bearing surface formed collectively by said segmental surface.

7. A chuck for holding a polishing belt or the like, said chuck including a plurality of members adapted to be mounted in fixed relation on a rotatable shaft, said members being provided on opposite side faces with a circumferentially arranged series of outwardly faced arcuate shoulders placed eccentrically with respect to said shaft and also including a marginal peripheral portion projecting radially outwardly beyond said shoulders, an arcuate slot associated with each shoulder and formed in the portion of each member projecting beyond each shoulder, each slot being concentric with its associated shoulder, a series of segment members each including a circumferentially extending bearing surface approximately in the form of a segment of a cylinder and each also including side flanges having arcuate inner edges eccentric with respect to said segment of a cylinder and corresponding in curvature to said shoulders, said segment members being mounted on said first mentioned members with said arcuate inner edges of said flanges resting on said shoulders, said segmental surfaces of the respective segment members collectively forming an approximately cylindrical circumferential surface for receiving an annular polishing belt or the like, a control member located between said plurality of first-mentioned members and rotatable with respect thereto, a stud slidable in each of said arcuate slots in said plurality of members and connected to one flange of the associated segment member to hold said segment member against uncontrolled radial outward movement, and means connecting each stud to said control member to control the circumferential movements of all of said studs in unison so that said segmental members will move circumferentially in unison to expand or contract the effective diameter of the bearing surface formed by said segmental surfaces.

8. A chuck for holding a rotating polishing belt or the like, said chuck including frame means adapted to be mounted fixedly on a rotatable shaft, a series of guiding surfaces on said frame means, each guiding surface being of generally spiral form, a series of movable segment plates having outer surfaces collectively forming an approximately cylindrical bearing surface for receiving an annular polishing belt or the like, said segment plates being movable circumferentially with respect to said frame means and cooperating with said guiding surfaces so as to move outwardly or inwardly as they move circumferentially in one direction or the other, and control means rotatably mounted on said frame means and operatively connected to all of said segment plates to control the movements of all of them approximately in unison.

9. A chuck for holding a rotating polishing belt or the like, said chuck including frame means adapted to be mounted fixedly on a rotatable shaft, a series of guiding surfaces on said frame means, each guiding surface being of generally spiral form, a series of movable segment plates having outer surfaces collectively forming an approximately cylindrical bearing surface for receiving an annular polishing belt or the like, said segment plates being movable circumferentially with respect to said frame means and cooperating with said guiding surfaces so as to move outwardly or inwardly as they move circumferentially in one direction or the other, outwardly projecting teeth formed on at least some of said segment plates to engage said belt or the like to hold the same more securely against circumferential movement rela-

tive to said plates, and control means rotatably mounted on said frame means and operatively connected to all of said segment plates to control the movements of all of them approximately in unison.

10. A chuck for holding a rotating polishing belt or the like, said chuck including frame means adapted to be mounted fixedly on a rotatable shaft, a series of guiding surfaces on said frame means, each guiding surface being of generally spiral form, a series of movable segment plates having outer surfaces collectively forming an approximately cylindrical bearing surface for receiving an annular polishing belt or the like, said segment plates being movable circumferentially with respect to said frame means and cooperating with said guiding surfaces so as to move outwardly or inwardly as they move circumferentially in one direction or the other, each of said segment plates having one end depressed and closely underlying the adjacent end of the next segment plate, and control means rotatably mounted on said frame means and operatively connected to all of said segment plates to control the movements of all of them approximately in unison.

ADOLPH RYDQUIST.