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CHUCK

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3 Claims. (Cl. 279—116)

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The chucks utilized for holding the work to be turned on a lathe must have their jaws rigorously centered on the axis of the headstock, and keep this property even after a prolonged use.

The influence of the various plays resulting either from construction or from wear and capable of altering centering is too known for it being necessary to set forth the effects thereof.

In particular, the rim which is a member common to all types of chucks (said rim having, on one face, a bevel gear meshing with the conical control pinions and, on the other face, a spiral groove or scroll the rotation of which causes axial shifting of the jaws) turns within a hollow cylinder constituting the casing of the chuck, with clearance either on its outer periphery or on its inner periphery.

Now, it is known that concentricity of jaws is strictly dependent on the holding of said rim, the offsetting of which causes a corresponding shifting of the jaws. It is then indispensable to provide for the rim a centering with a minimum play either inside the casing or on the central male part, or hub, of said casing.

In usual practice, one is limited in this way by the fact that the rim must turn very freely in its housing or on the hub and by other considerations inherent in the method of construction of chucks (risk of jamming of jaws, etc.).

This invention has for an object to provide means whereby toothed rim of chucks are centered without play while they may rotate freely. A further object is to provide means which compensate automatically for play resulting from wear, and contribute to keep concentricity of chucks after a long use.

According to my invention, a chuck rim is mounted with an amount of play in its outer casing, and between the inner bore of the rim and the hub which carries said rim, an automatic or manually adjustable device for taking up play is provided. Said device, constituted essentially by an expansible circular bearing automatically centers the rim on the hub and consequently on the axis of the chuck.

In a first advantageous embodiment of this invention, the expansible bearing is constituted by a pair of concentric conical rings at least one of which, is split and adapted to expand when the other is axially moved by a spring or other similar member.

In another embodiment, the hub of the chuck or else the bore of the rim is conical. In this case, there is provided one conical ring made of independent segments.

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Finally, the same result may be obtained by using a row of balls or possibly conical rollers resting on a conical ball-race on the rim, and on a cylindrical ball-race centered on the hub; the latter ball-race may be axially shifted either through a thread on the hub, or by a spring. Conversely, a conical ball-race integral with the hub may be combined with a cylindrical ball-race provided in the rim. The latter ball-race is stationary when that on the hub is movable, or movable when the latter is stationary.

The following description with reference to the appended drawings given solely by way of example will show how this invention may be carried out.

Fig. 1 is a partial cross section of a chuck according to this invention.

Fig. 2 shows a detail according to another embodiment of this invention.

Fig. 3 shows a modification of the device shown on Fig. 2.

Fig. 4, correlated with Fig. 3, shows a detail common to Figs. 2 and 3.

Fig. 5 shows, as a modification, another embodiment of this invention.

Fig. 6 shows a device derived from that shown on Fig. 5.

The body 1 of the chuck represented on Fig. 1 by way of illustration constitutes the casing for said chuck and confines all the usual component members, the rim 2 alone being represented. Control pinions meshing with the bevel gearing face 3 of rim 2, and the jaws sliding in suitable grooves provided in the bottom 4 of casing 1 are not represented. It will be assumed that the cross section shown on Fig. 1 has been made by a plane containing neither the pinion axis nor that of the jaws.

A cover 5, the threaded portion 5 bis of which is screwed on the shaft of the headstock is centered in the bore 6 of casing 1, and both members are united by means of screws not shown on the figure. An amount of play is provided between the outer surface 7 of rim 2 and the inner surface 8 of casing 1; said surfaces must not, in any case, come into contact with one another.

Rim 2 bears on the face 10 of bottom 4 through its face 9 which has a spiral or scroll gearing corresponding to that of the jaws, so as to leave a normal clearance between the teeth of face 3 and those of the conical control pinions.

A ring 11, which is outwardly conical, is borne on hub 12 of casing 1. Said ring 11 comprises, for the best, a series of segments in order to preclude clearance between its bore and the outer

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surface of hub 12; said clearance would be unavoidable if ring 11 was made of one part.

An inwardly conical ring 13 is fitted on ring 11 and tends to be expanded by the thrust of a spring 14.

Spring 14 is backed by the bottom 4 of casing 1, ring 13 reacting against the spring thrust by abutting against the hub 15 of cover 5. Splits 13a which partly cut the ring 13, give the latter sufficient resiliency to cause the male and female cones, when engaged, slightly to squeeze ring 13 in the bore 16 of rim 2. Rim 2 thus turns without play on ring 13, the close fit being determined by the strength of spring 14 and the apex angle of conical rings 11 and 13.

Rim 2 wears where there is a friction, that is to say in bore 16 and on the outside of ring 13, and wear is automatically compensated for by a corresponding axial shifting of ring 11.

In the example shown on Fig. 2, a single ring 17, which is inwardly conical, is used; said ring, resting on a conical surface 18 on the hub 12 of casing 1, tends to expand and to fill the bore 16 of rim 2. This result is obtained owing to the fact that ring 17 is comprised of a series of segments, and is continuously urged by a spring 19 backed by hub 15 of cover 5. Said spring 19 may be shaped as a thin steel ring having undulations (Fig. 4). The various segments such as 17a and 17b which constitute ring 17 have a straight or an oblique cut; in the latter case, the sliding conditions in bore 16 of rim 2 when the latter turns, are improved.

In order to prevent ring 17 from being driven round by rim 2 pins 21 set in hub 12 are inserted in each gap such as 20 which separate the segments of ring 17.

In the modification shown on Fig. 3, ring 22 is conical outwardly and tends to fill the inner cone 23 of rim 2. Like ring 17, ring 22 is constituted by a series of segments, this allowing of removing clearance both along hub 12 and rim 2. The device acts exactly like that of Fig. 2.

In the embodiment shown on Fig. 5, the ring 24 made of special steel is forced into a housing 25 provided in the centre of rim 2. The diameter of the bore 26 of rim 2 is appreciably greater than the diameter of part 27 of hub 12 which faces said bore.

Rim 2 is centered through a row of balls 28 rolling both in the inner cone 29 of ring 24 and on the inner ring 30, itself screwed on hub 12. When mounting the chuck, it is only necessary to screw ring 30 by means of castellations 31 until there is no more play between balls 28 and the two ball-races 29 and 30; however care should be taken in order that rim 2 may still turn freely.

The play resulting from wear is periodically removed; to this end, the chuck cover 5 is disassembled and ring 30 is screwed by the required amount.

The same result is automatically obtained with the device shown on Fig. 6, in which a spring 32, similar to above mentioned springs 14 or 19, allows of compensating for wear by constantly pushing race 33 in which roll balls 28.

The embodiment shown on Figs. 5 and 6 is based on the use of balls. The latter may advantageously be replaced by conical rollers rolling on rings similar to rings 24 and 30 or 33. In this order of idea, it is advisable to use commercial bearings of the "Timken" kind, the outer ring of which would be forced into rim 2 while the inner ring would slide on hub 12, being urged by a threaded washer or a spring.

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It will be obvious that minor alterations may be brought about in the foregoing embodiments, especially by using equivalent technical means, without departing from the spirit of the appended claims.

What I claim is:

1. In a chuck of the type described, the combination of a chuck body having a hub; a jaw control ring loosely mounted on said hub for rotation thereon; and radially expansible means interposed between said hub and the inner periphery of said ring for bearing said ring from said hub and taking up clearance therebetween.

2. In a chuck of the type described, the combination of a chuck body having a hub; a jaw control ring loosely mounted on said hub for rotation thereon; a radially expansible means, adapted to be operated by axial thrust thereon, interposed between said hub and the inner periphery of said ring, for bearing said ring from said hub and taking up clearance therebetween; and resilient means backed from said chuck body, for axially pushing the expansible means.

3. In a chuck of the type described, the combination of a chuck body having a hub; a ring on said hub, having a close fit therewith, the outer periphery thereof being conical; a split ring with a cylindrical outer periphery and an inner conical periphery on the first ring; a jaw control ring revolvably borne with a close fit on said split ring; and resilient means for urging the first two rings towards one another in axial direction.

4. In a chuck of the type described, the combination of a chuck body having a hub; a ring on said hub, having a close fit therewith, the outer periphery thereof being conical; a split ring with a cylindrical outer periphery and an inner conical periphery on the first ring; a jaw control ring revolvably borne with a close fit on said split ring; means on said hub providing abutments for each one of the first two rings, on either side of said rings, one of said abutments being resilient and one of said abutments being adjustable.

5. In a chuck of the type described, the combination of a chuck body having a hub with a stationary abutment thereon; a ring on said hub, on one side of said abutment, having a close fit with said hub; a split ring with a cylindrical outer periphery and an inner conical periphery, on the first ring; a jaw control ring revolvably borne on the split ring; resilient means operatively interposed between one of the first two rings and the stationary abutment, for urging said ring in one axial direction; and means adjustably secured on said hub, providing an adjustable abutment for the other of said first two rings.

6. In a chuck of the type described, the combination of a pair of members, to wit a chuck body having a hub, and a jaw control ring loosely fitted on said hub for rotation thereon, one of said members having a conical bearing surface facing the other member; means in discontinuous ring formation, between said members, having a conical surface for contact with said conical bearing surface of one of said members, providing a bearing for the jaw control ring on the chuck hub; an abutment member secured on said hub in an axially adjustable position; and a sinuous resilient steel strip in ring formation, interposed between said means and said abutment member.

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7. In a chuck of the type described, the combination of a pair of members, to wit a chuck body having a hub, and a jaw control ring loosely fitted on said hub for rotation thereon, one of said members having a conical bearing surface facing the other member; means in discontinuous ring formation, between said members, having a conical surface for contact with said conical bearing surface of one of said members, providing a bearing for the jaw control ring on the chuck hub; at least one stop member in outwardly protruding position on said hub, projection into a gap of said discontinuous ring means, for holding the latter against rotation; and means adjustably secured on said hub, in operative contact with the first-named means for urging the same in wedging direction.

8. In a chuck of the type described, the combination of a chuck body having a hub; a jaw

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control ring loosely fitted on said hub for rotation thereon; and means providing a bearing for said ring on said hub, including a set of rollers between non parallel, co-axial roller races one of which is adjustable in axial position.

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