Jan. 15, 1946. R. H. CRAMER 2,392,836

SIZING DEVICE FOR GRINDING MACHINES AND THE LIKE

Filed July 3, 1942 2 Sheets-Sheet 1

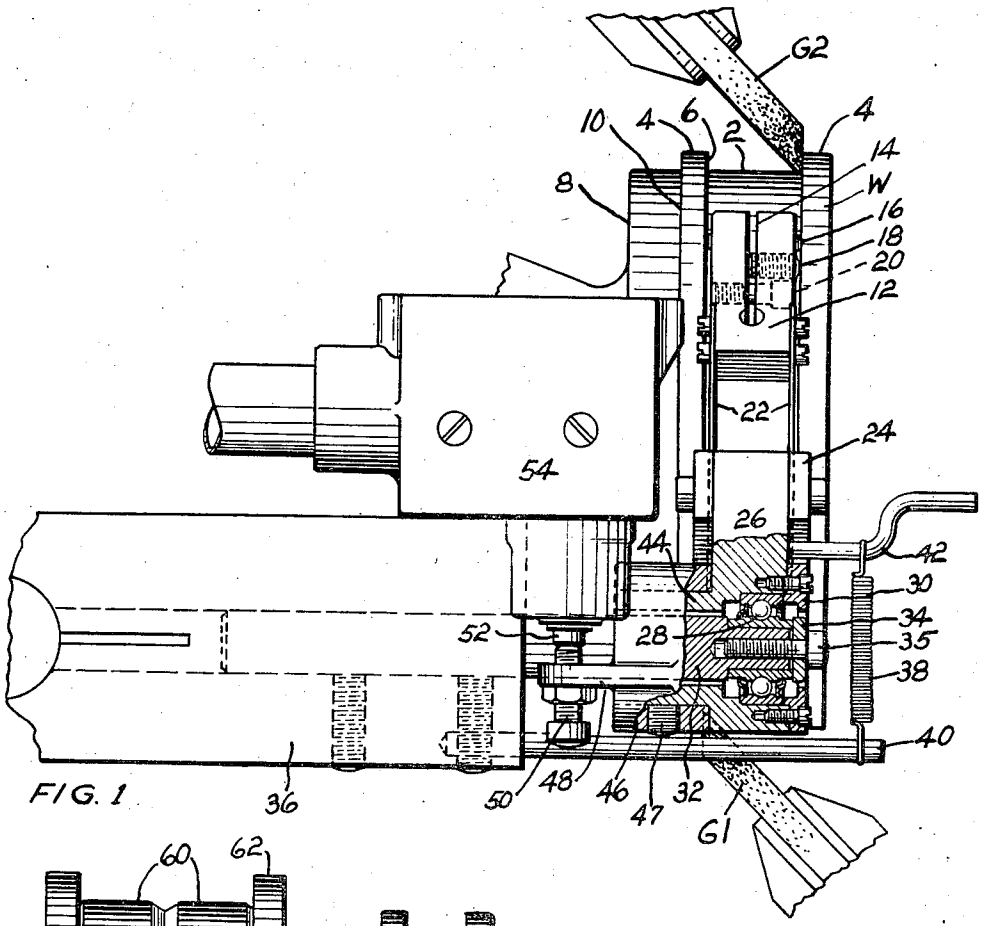


FIG. 1

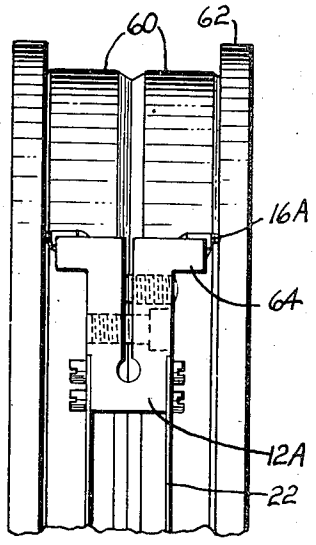


FIG. 3

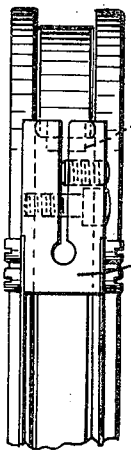


FIG. 4

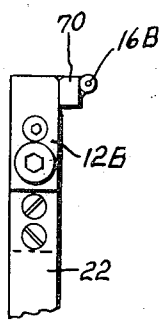


FIG. 5

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Jan. 15, 1946. R. H. CRAMER 2,392,836

SIZING DEVICE FOR GRINDING MACHINES AND THE LIKE

Filed July 3, 1942 2 Sheets-Sheet 2

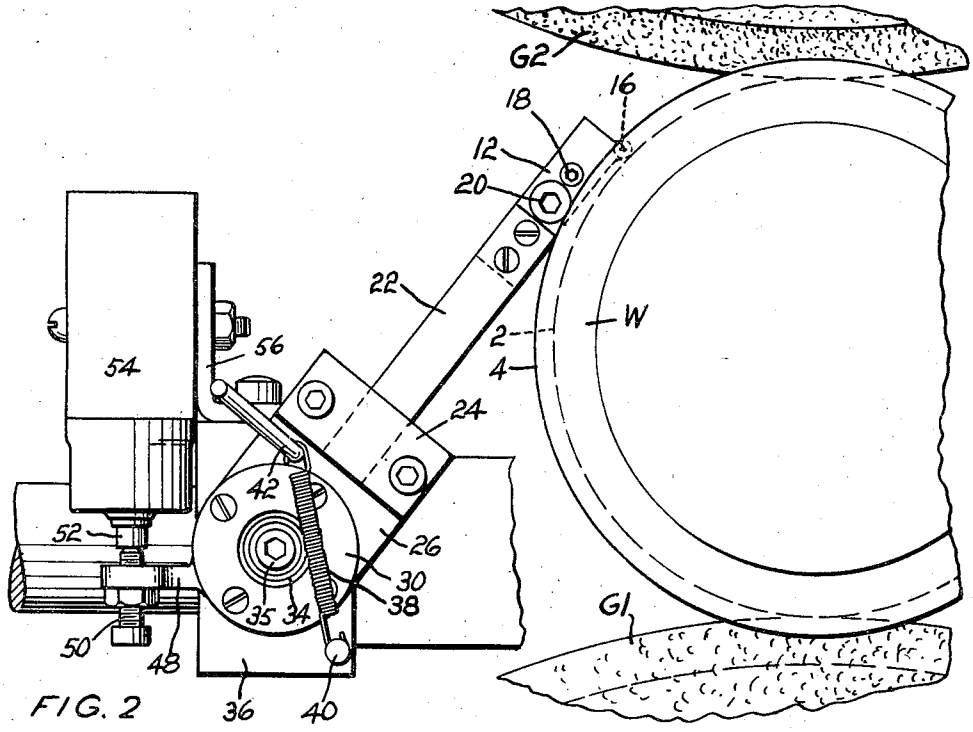


FIG. 2

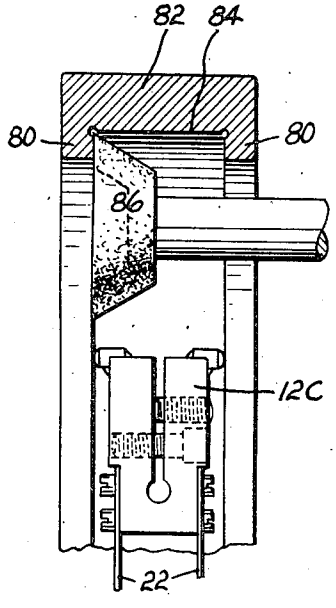


FIG. 6

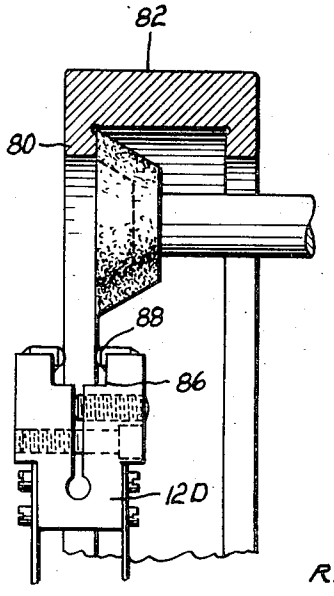


FIG. 7

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SIZING DEVICE FOR GRINDING MACHINES AND THE LIKE

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Application July 3, 1942, Serial No. 449,570

4 Claims. (Cl. 51—165)

This invention relates to sizing devices for grinding machines and the like and comprises all of the features of novelty herein disclosed. An object of the invention is to provide improved means to control the machining of a shoulder on a piece of work to a predetermined distance from a companion surface. Another object is to provide improved sizing devices for effectively controlling the accurate spacing of a pair of companion surfaces such as spaced shoulders or flanges which are being ground on a work piece. Another object is to provide an improved sizing device or gauge which will indicate when companion shoulders or other spaced surfaces have sufficient spacing or will indicate when a flange has been reduced to a predetermined thickness.

To these ends and also to improve generally upon devices of this character, the invention consists in the various matters hereinafter described and claimed. In its broader aspects, the invention is not necessarily limited to the specific embodiments selected for illustrative purposes in the accompanying drawings in which

Fig. 1 is a front view with a portion of the gauge mounting broken away and sectioned.

Fig. 2 is a side elevation.

Fig. 3 is a partial front view of another embodiment.

Fig. 4 is a front view of still another embodiment.

Fig. 5 is a side view of a portion of Fig. 4.

Fig. 6 is a sectional view showing the invention applied to internal surfaces.

Fig. 7 is a similar sectional view of a modification.

In Figs. 1 and 2, the sizing device or gauge is shown in operative relation to a work piece W in the form of a roller bearing race ring having a cylindrical raceway 2 and a pair of end flanges 4 whose inner surfaces or shoulders 6 are to be gauged and properly spaced during a grinding operation. The work is mounted on a rotating chuck 8 having a locating face 10. The shoulders are ground by grinding wheels G1 and G2 which are fed simultaneously towards the shoulders, one wheel operating on one shoulder and the other wheel operating on the other shoulder at another location with respect to the work axis. In practice, it is preferable to have one wheel, as G1, complete the grinding of its shoulder or flange to the desired thickness before the other shoulder is entirely completed, the gauge then controlling the final feed of the other wheel and hence the final spacing of the other shoulder from the first shoulder and also, if desired, the retreat of the wheels. This final control is accomplished by the gauge dropping between the shoulders and thereby actuating a suitable switch, solenoid, valve, etc., to retract the wheels or otherwise stop the operation in well known ways.

The gauge comprises a block 12 which is slit at 14 to form a pair of adjustable arms each having a work feeler such as a diamond 16 or the like which initially rides on the top of its flange. A screw 18 serves to adjustably spread the arms and another screw 20 locks the arms in adjusted position. The block 12 is supported by a pair of parallel reed springs 22 fastened by screws thereto, the springs allowing the block to float laterally a slight amount for alignment with the space between the flanges. The feelers are preferably slightly rounded at the ends to facilitate this alignment and the entry of the feelers between the flanges. The springs are also fastened by clamping plates 24 to the sides of a movable member 26 which is pivotally mounted on a ball bearing 28. The outer race ring of the bearing is fastened in the hollow hub of the member 26 by an end cap 30 while the inner race ring is clamped against a shoulder on a shaft 32 by a washer 34 and a screw 35, the shaft being adjustably secured by screws to a supporting plate 36.

The feelers are urged towards the work by a coil spring 38 fastened to an anchoring pin 40 on the plate 36 and to a bent pin 42 on the member 26. The gauge block 12, reed springs 22 and member 26 form a swingable arm which can be swung towards or away from the work on a pivotal axis parallel to the axis of the work so that the feeler mounting swings the feelers in parallel planes which substantially coincide with the operative portions of the grinding wheels where the latter engage the radial shoulders or flanges. On an axial extension 44 of the member 26 is a collar 46 fastened by a set screw 47, the collar having an arm or lug 48 which will engage the pin 40 which acts as a stop when the arm is swung back, the spring 38 also serving to hold the arm in such retracted position. The arm or lug 48 carries an adjusting screw 50 arranged to abut against the plunger 52 of a switch in a switch housing 54 fastened to an angle bracket 56. The switch may signal or otherwise control the completion of the grinding operation according to well known practice when the gauge points drop between the ground flanges or shoulders. Of course, if one flange is previously ground, only one grinding wheel need be used to grind the other flange to the correct distance from the first.

When the work piece has more widely spaced

flanges than in Fig. 1 or when it is desired to grind similar flanges on two individual race rings, the gauge may be modified as indicated in Fig. 3. Here two race rings, each having a raceway 60 and a single shoulder or flange 62, are mounted in abutting contact on the chuck. The gauge block 12A is similar to the block 12 but has lateral extensions 64 on which the diamonds 16A are mounted to place the latter far enough apart.

When the work piece has more closely placed flanges than in Fig. 1 so that the gauge block could not drop between them, the construction shown in Figs. 4 and 5 is desirable. In this case the gauge block 12B has a pair of narrow extensions or lugs 70 fastened thereto, as by welding, adjacent to the slit, each lug carrying a gauge point or diamond 16B. This construction allows the desired motion of the arm to actuate the switch.

In Fig. 6, the gauge block 12C is utilized to control the distance between a pair of inwardly extending shoulders or flanges 80 on an outer race ring 82 having a cylindrical raceway 84. The adjacent faces of the flanges are ground by the ends of cupped grinding wheels 86 which are externally conical or otherwise formed to clear the raceway 84.

In Fig. 7 the gauge is adapted to control the grinding operation by gauging the thickness of one of the flanges 80. The gauge block 12D is not only slit but is also notched or cut out adjacent to the flange as at 86 so that the gauge points or diamonds 88 which are located below the block 12D can finally embrace or straddle the flange 80 when the desired thickness is reached.

I claim:

1. In a machine for grinding a shoulder on a piece of work to a predetermined distance from a companion surface, a grinding wheel engaging the shoulder, a gauge block having a pair of feelers spaced apart at the predetermined distance to initially ride on other portions of the work which have a different spacing and are out of contact with the grinding wheel, means for mounting the gauge block for movement towards and from the work and for a slight lateral floating in the direction of the distance to be gauged, and means operated by a movement of the feelers along the shoulder and its companion surface for controlling the grinding operation.

2. In a machine for grinding a shoulder on a piece of work at a predetermined distance from a companion shoulder, a grinding wheel engaging a shoulder, a gauge block having a pair of feelers spaced apart at the predetermined distance, a pivoted member, springs connecting the gauge block to the pivoted member, means for urging the feelers towards the work, and means operated by a movement of the feelers along the shoulder and the companion surface for controlling the grinding.

3. In a sizing device, a pair of work feelers spaced apart a predetermined distance, a gauge block supporting the feelers, a pivoted member, parallel springs connecting the gauge block to the pivoted member, a spring for urging the pivoted member in a direction to carry the feelers along companion surfaces which project from a work piece, and means for utilizing said movement to determine correct spacing of the surfaces.

4. In a sizing device, a pair of work feelers spaced apart a predetermined distance, a gauge block supporting the feelers, a pivoted member having yieldable means to support the gauge block for lateral floating movement in the direction of the spacing of the feelers, means for urging the pivoted member in a direction to carry the feelers along companion surfaces which project from a work-piece, and means for utilizing said movement to determine the spacing of the surfaces.

RAYMOND H. CRAMER.