May 17, 1949. W. A. CARLSON 2,470,429

ROTARY TURRET TYPE WORKHOLDING FIXTURE

Filed June 13, 1946 2 Sheets-Sheet 1

Fig. 1.

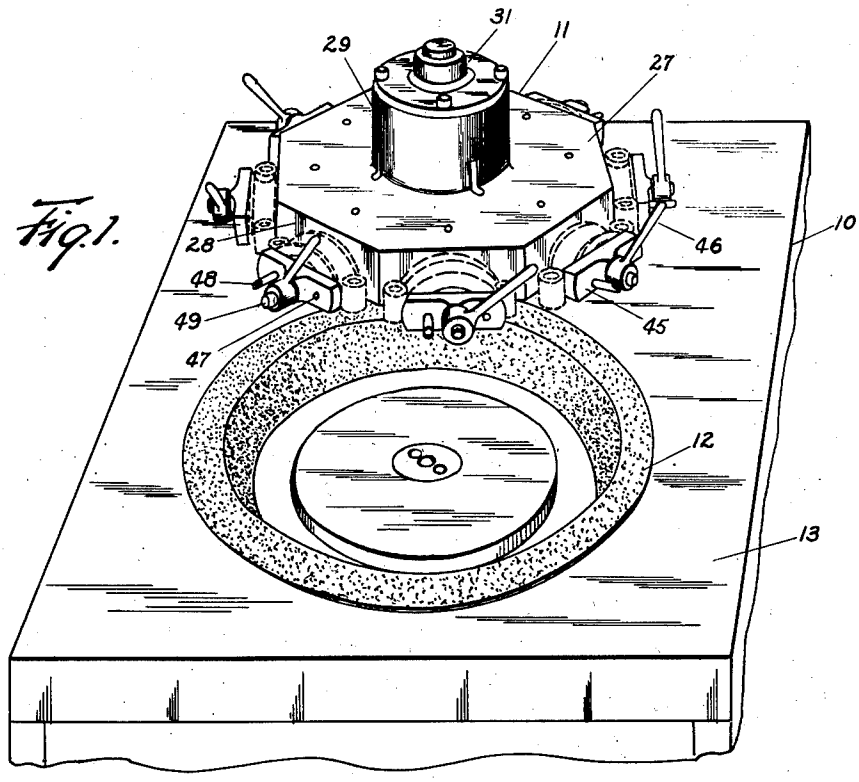
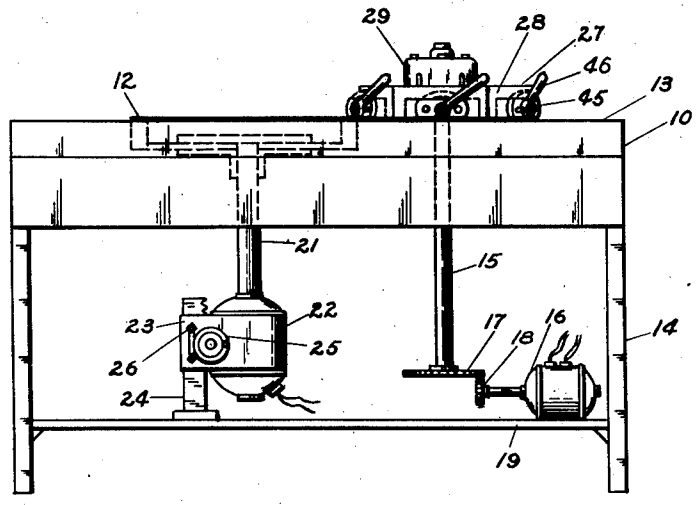


Fig. 2.



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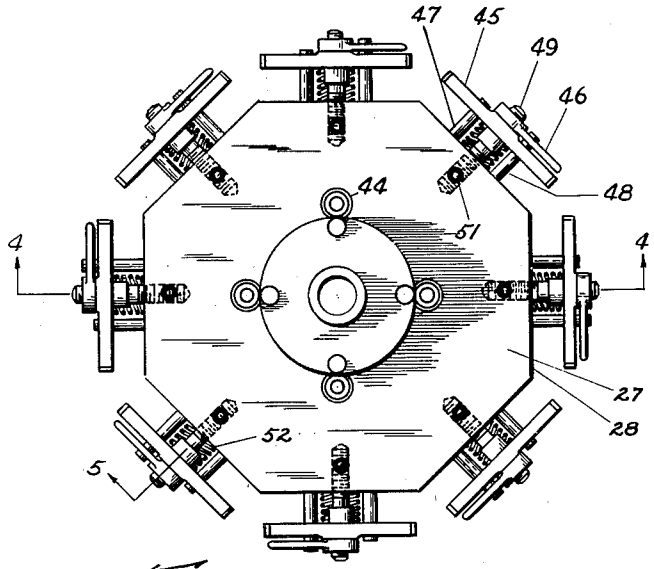


Fig. 3.

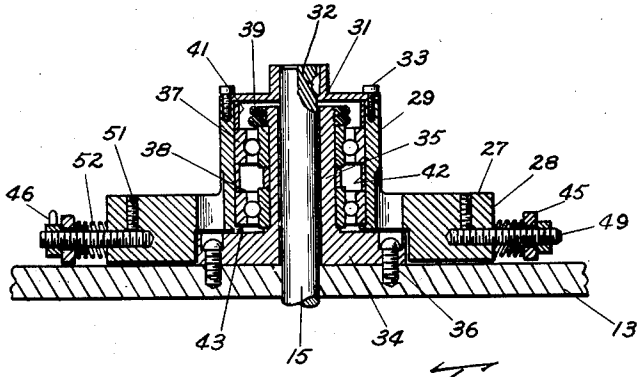


Fig. 4.

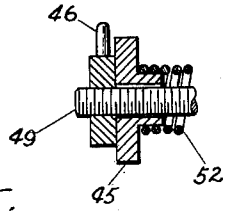


Fig. 5.

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ROTARY TURRET TYPE WORKHOLDING FIXTURE

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3 Claims. (Cl. 51—134)

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This application relates to power tools of the turret type, more particularly to such tools in which the turret is adapted to support a plurality of articles to be processed, and is adapted to move relative to a processing element, it being an object of the invention to provide improved apparatus of this character.

In the embodiment shown, the invention comprises the combination of a vertical turret and grinding wheel mounted side by side on a table so that the turret and the grinding wheel may move relative to each other, the grinding wheel rotating at a relatively high speed. The turret is illustrated as having bearing caps clamped thereto so that the turret, in moving relative to the rotating grinding wheel, serves to finish the supporting surfaces of the bearing caps by grinding off a predetermined portion thereof. The preferred embodiment of the invention is shown, but it will be understood that modifications may be made to adapt the invention for use with other processing apparatus and for various types of articles without departing from the spirit and scope of the invention. In installations where large numbers of articles need to be processed, such as in large repair establishments for internal combustion engines where a large number of bearing caps may have to be reground, it is necessary that the apparatus for this purpose be such that the minimum amount of time is utilized in the operation. The apparatus, furthermore, must be capable of accurately holding the articles in the proper position without the necessity of using a high skill in placing them in position. Accordingly it is a further object of the invention to provide a turret provided with quick-acting clamping means whereby the articles to be processed may be quickly and accurately clamped to the turret and removed therefrom.

It is a further object of the invention to provide improved apparatus of the character indicated that is simple in design and efficient in operation.

In carrying out the invention in one form, a fixture for holding articles to be ground is provided comprising a body or turret member, means for rotatably supporting the body member, a plurality of positioning surfaces on the turret, a separate quick-acting clamp for cooperation with each of the surfaces, and guide means for each of said clamps.

For a more complete understanding of the invention reference should be had to the accompanying drawings in which:

Fig. 1 is a top view in perspective of grinding apparatus embodying the invention;

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Fig. 2 is a side view on a reduced scale of the apparatus shown in Fig. 1;

Fig. 3 is a top view on an enlarged scale of a portion of Fig. 1;

Fig. 4 is a sectional view taken substantially along the lines 4—4 of Fig. 3, and

Fig. 5 is a sectional view taken substantially along the lines 5—5 of Fig. 3.

Referring more particularly to the drawings, the invention is shown embodied in grinding apparatus including a bench 10, a turret 11, and a grinding wheel 12, the turret and grinding wheel being supported in bearings relative to the bench. Bench 10 includes a top surface 13 preferably made of metal so as to have a smooth, flat surface and a series of legs 14 rigidly attached thereto. Turret 11 is supported on top of bench top 13, as will be described, and is adapted to be driven by a shaft 15 and an electric motor 16, through a pair of gears 17 and 18, the motor 16 being supported upon a suitable platform 19 attached to the bench legs. The grinding wheel may be of any desired shape, having a surface for moving in overlapping relation with the turret, and is illustrated as a cylindrical member adapted to rotate within a circular opening in the bench top, the grinding wheel being supported on a shaft 21 driven by an electric motor 22 mounted on a framework 23 slidable relative to a support 24. The support 24 is provided with a series of gear teeth engaging with corresponding teeth on a shaft adapted to be rotated by a hand wheel 25, whereby motor 22 may be moved vertically up or down to vary the height of grinding wheel 12 relative to the bench top. Bolts 26 extend through a slot in frame 23, thread into support 24, whereby motor 22 and consequently the grinding wheel may be clamped in any desired vertical position.

Turret 11 and grinding wheel 12 are so spaced that articles clamped to the turret will pass over the surface of grinding wheel 12 when these two members are rotated relative to each other, the main body of turret 11 being spaced above the bench so as not to come into contact with the grinding wheel, and/or have frictional contact with the bench top.

The turret 11 comprises a main body member 27 provided with a plurality of operating or supporting surfaces 28 illustrated in the drawings as flat surfaces. However, for articles having peculiar configurations surfaces 28 may be varied in shape to conform thereto without departing from the spirit and scope of my invention. The main body member includes a horizontal portion of which supporting surfaces 28 are a part and

a vertically extending sleeve 29 forming part of the drive and bearing mechanisms, the horizontal portion and the sleeve portion preferably being integral with each other, although they may be separately formed and welded together, for example (not shown). Moreover, the body member is relatively massive in character so that it does not deform during operation and may be very accurately constructed and mounted to be capable of performing precision workmanship.

Shaft 15 for rotating turret 11 extends upwardly through sleeve 29, does not perform vertical support of the turret, the shaft being connected to a drive shaft flange 31 by a key 32, flange 31 in turn being connected to sleeve 29 by means of bolts 33. Surrounding shaft 15 and lying within sleeve 29 is a supporting member including a horizontal flange 34 and a vertical sleeve 35, flange 34 being provided with holes whereby this member may be clamped to the bench top by bolts 36, and sleeve 35 being of a diameter such that shaft 15 is loosely receivable therethrough. Axially spaced bearings 37 and 38 are mounted between vertical sleeves 29 and 35 to support the main body 27 accurately relative to the work. The bearings have their inner races held relative to vertical sleeve 35 by the jam nuts 39, and the outer races of the bearings are held relative to vertical sleeve 29 by being clamped between an inwardly extending flange 43 and the flange plate 31 by annular rings 41 and 42. Horizontal flange 34 is relatively large in diameter and thickness so as to form a very firm support with the bench and the provision of two bearings 37 and 38 provides a very rigid and precise manner of mounting the turret member so that it does not vibrate or wobble during operation.

A series of four equally spaced holes 44 through which bolts 36 may be removed or inserted are provided in the turrent body, as is best illustrated in Fig. 4. Accordingly, the manner of assembling the turret to bench top 13 is readily apparent, and whenever it is desired to remove the turret as when it is desired to use the bench for some other purpose, it is only necessary to remove bolts 36 and lift turret 11 off, since key 32 may have a relatively easy sliding fit with flange plate 31. The bearings 37 and 38, along with their spacing members, are so constructed and arranged within sleeve 29 to hold the lower surface of turret body 27 spaced upwardly from the bench top.

A clamping plate 45 and a clamping handle 46 are associated with each of the clamping surfaces 28, each clamping plate being provided with a series of three holes, two of which are adapted to receive guide pins 47 and 48 and the third of which is adapted to receive a threaded stud 49, the guide pins being attached to body 27 in any suitable manner such, for example, as by a drive fit. The guide pins serve to maintain the clamping plates in properly oriented position and one of the guide pins, 48, is longer than guide pin 47 so that the handle of clamp 46 engages it during rotation and thus has only limited movement.

Studs 49 are threaded preferably with a fine thread at the inner end and a coarser thread at the outer end, the studs being turned into correspondingly threaded holes in the turret body and held in position by set screws 51, the outer threaded portion of studs 49 cooperating with a threaded portion on handle 46 so that by rotating the handle the clamping plates 45 are moved inwardly. To obtain rapid operation, clamping of any article between a surface 28 and clamping plate 45 should be accomplished with a relatively small movement of the clamping handle. It is for this reason that the outer threads on stud 49 are of a coarser character than the inner threads. In one actual machine there are sixteen threads per inch on the outer end of the stud and twenty-four threads per inch on the inner end. Furthermore, the relatively finer threads at the inner end of the stud, together with the coarser threads on the outer end, permit proper inwardly positioning of stud 49 and relative positioning of handle 46 so that articles of varying width may be accommodated between surface 28 and clamping plates 45 while retaining the ability to obtain a firm clamping force with a relatively short movement of clamping handle 46. In order to move clamping plates 45 outwardly when the clamping handles are turned to relieve the clamping force, springs 52 surrounding stud 49 are provided.

With the foregoing structure and function of individual elements in mind, the coordinated operation of the apparatus may be visualized by reference to Fig. 1. During operation the grinding disc 12 will be rotating at a relatively high speed, whereas the turret 11 will be rotating at a very much lower speed which may be obtained by choosing a proper ratio between the gears 17 and 18. In an actual machine it was found that a single operator could completely process 12 articles such as bearing caps, for example, in one minute. Thus the rotation of turret 11 might be 1½ revolutions per minute since eight operative surfaces are provided. Body portion 27 being spaced upwardly from bench top 13, and the clamping plates being held in their proper relative positions by guide pins 47 and 48, it is only necessary that the bearing caps be placed between surfaces 28 and clamping plates 45 so that the ends of the bearing cap rest flat on the bench top, whereafter the clamping handles 46 are rotated a fraction of a revolution to tightly hold the bearing caps in position, and it is unnecessary for the machine operator to exercise any skill in properly placing the bearing caps. The bearing caps are placed in position while the turret is rotating, the operator grasping each handle 46 as it comes opposite his position of work and giving it a partial turn to loosen clamping plate 45. He, then, removes the bearing cap, inserts another, and tightens the handle 46 by giving it a partial turn, the springs keeping plates 45 in the outwardly spaced position. By rotating the handwheel 25, the height between the grinding wheel and the bench top is varied, thereby varying the amount of metal ground off of each bearing cap, since all caps initially rest on the bench top.

While I have shown particular embodiments of my invention, it will be understood, of course, that I do not wish to be limited thereto since many modifications may be made, and I, therefore, contemplate by the appended claims to cover any such modifications as fall within the true spirit and scope of my invention.

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

1. A fixture for holding articles to be ground comprising a body member, means for rotatably supporting said body member, a plurality of flat positioning surfaces on said body, a clamp bar for each of said surfaces, a pair of spaced studs projecting from each of said surfaces, one of said studs being longer than the other, holes through each of said clamp bars for relatively easily receiving the studs at the respective surfaces, a screw projecting from each of said surfaces, each clamp bar including a third hole for

relatively easily receiving the screw at the respective surface, and a threaded clamp associated with each of said clamp bars, said clamp being adapted to engage the longer one of said studs on opening to limit movement thereof.

2. A fixture for holding articles to be ground comprising a body member, means for rotatably supporting said body member, a plurality of flat positioning surfaces on said body, a clamp bar for each of said surfaces, a pair of spaced studs projecting from each of said surfaces, one of said studs being longer than the other, holes through each of said clamp bars for relatively easily receiving the studs at the respective surfaces, a screw projecting from each of said surfaces, each clamp bar including a third hole for relatively easily receiving the screw at the respective surface, and a threaded clamp associated with each of said clamp bars, said clamp being adapted to engage the longer one of said studs on opening to limit movement thereof, and a spring surrounding each of said screws for urging each of said clamp bars outwardly.

3. A fixture for holding articles to be ground comprising a body member, means for rotatably supporting said body member, a plurality of flat positioning surfaces on said body, a clamp for each of said surfaces, a pair of spaced studs projecting from each of said surfaces, one of said studs being longer than the other, holes through each of said clamp bars for relatively easily receiving the studs at the respective surfaces, a screw projecting from each of said surfaces, each clamp bar including a third hole for relatively easily receiving the screw at the respective surface, and a threaded clamp associated with each of said clamp bars, said clamp being adapted to engage the longer one of said studs on opening to limit movement thereof, said threads having a pitch such that complete release or clamping of said clamp bar is produced by less than a full turn of said clamp.

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