O. E. BARBER.

JIG.

APPLICATION FILED FEB. 3, 1921.

1,433,252.

Patented Oct. 24, 1922.

3 SHEETS—SHEET 1.

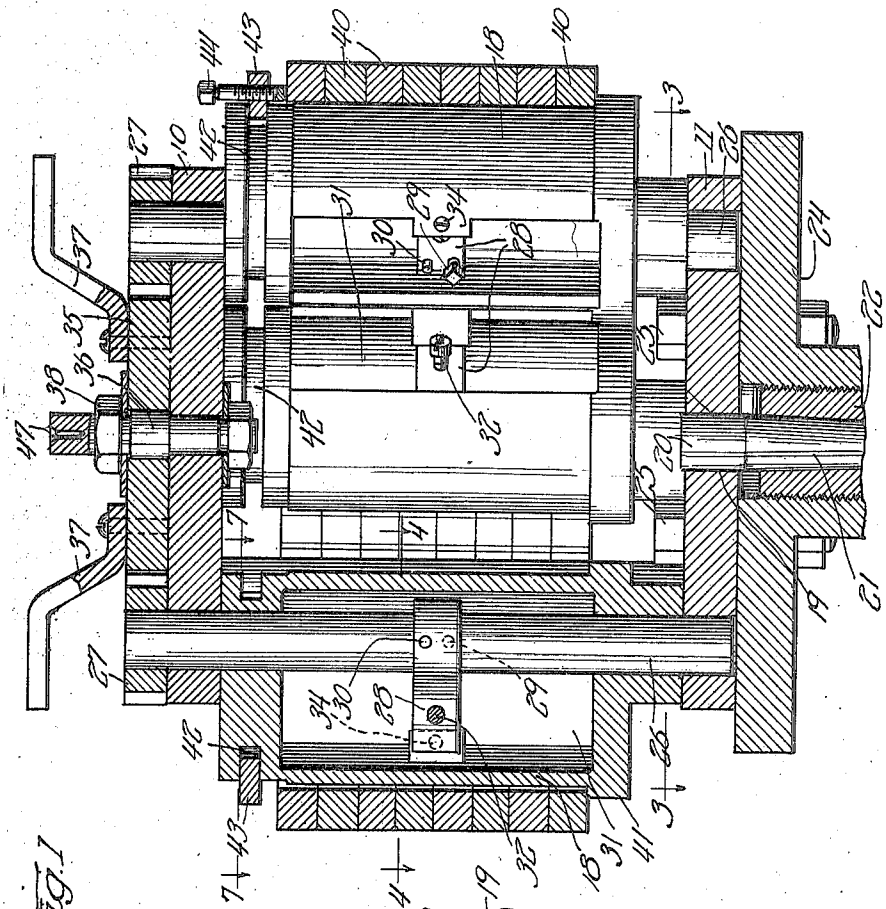


Fig. 1

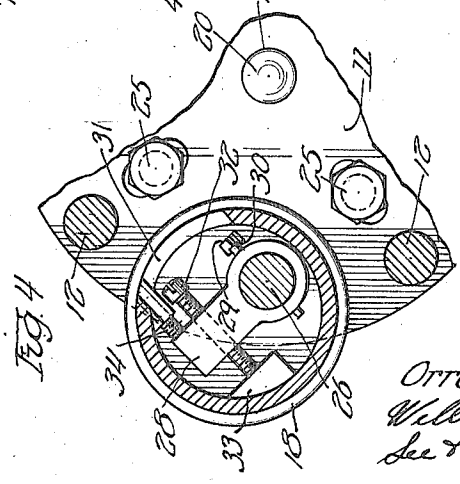


Fig. 4

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3 SHEETS—SHEET 2.

Fig. 6

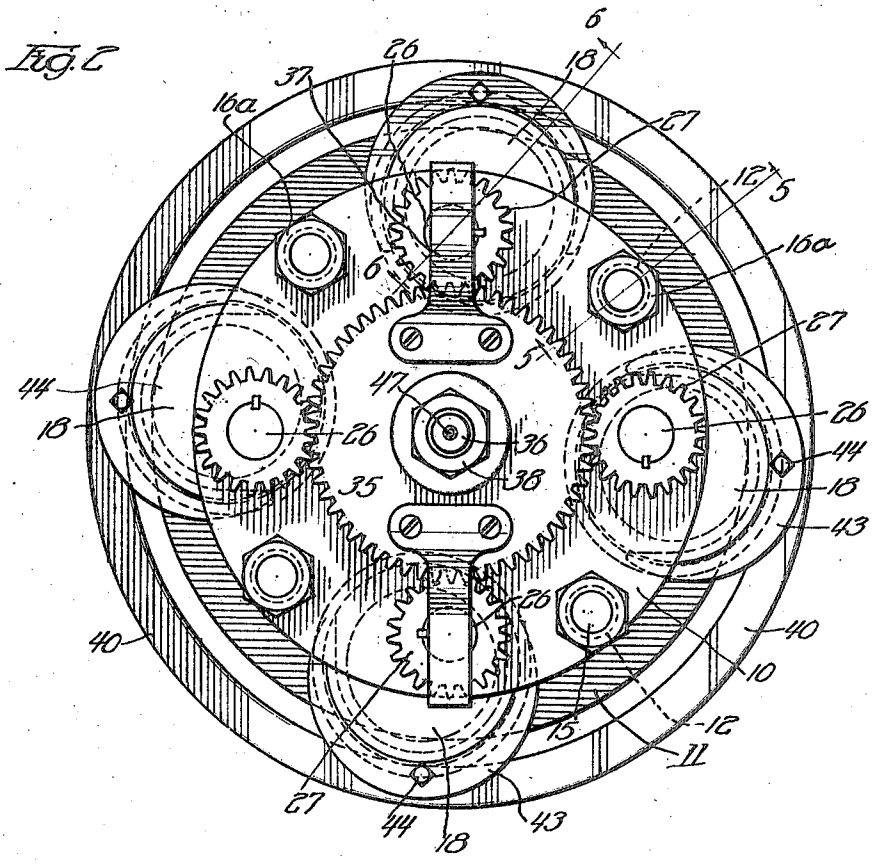
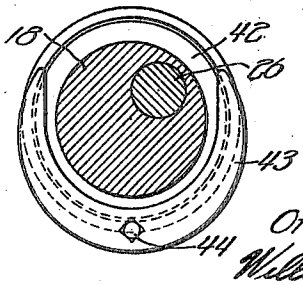


Fig. 7



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3 SHEETS—SHEET 3.

Fig. 3

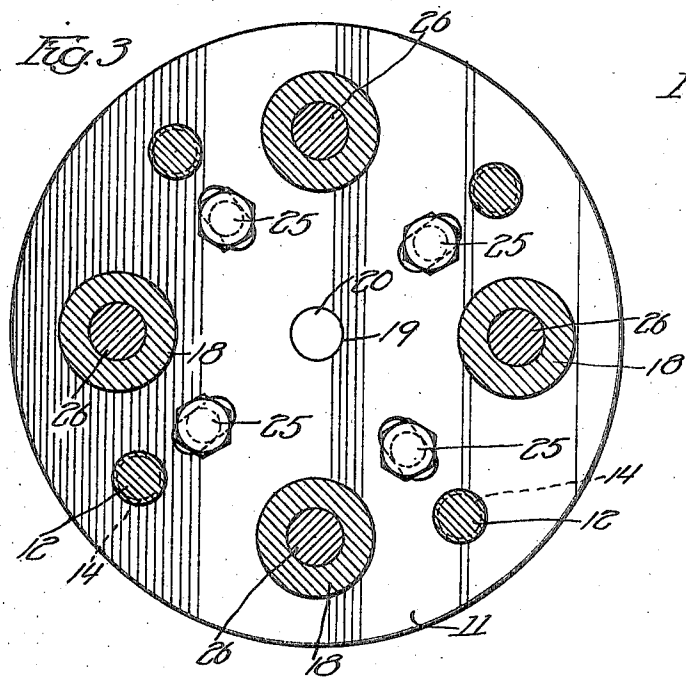


Fig. 5

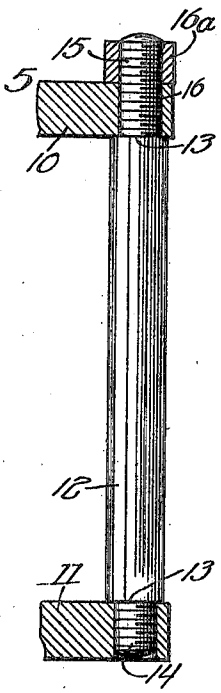


Fig. 6

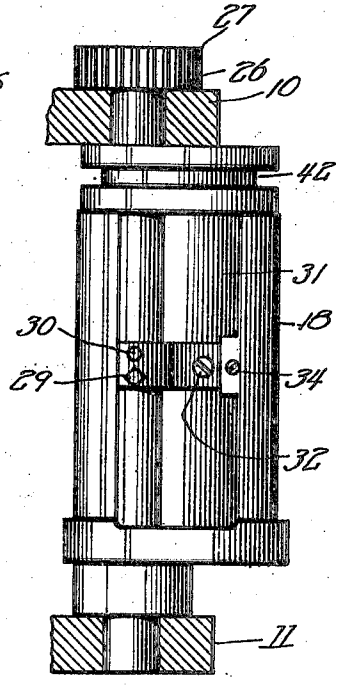
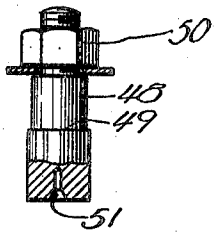


Fig. 8



Fig. 9



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UNITED STATES PATENT OFFICE.

ORREN E. BARBER, OF CHICAGO, ILLINOIS, ASSIGNOR TO KIRK-BARBER COMPANY, OF CHICAGO, ILLINOIS, A COPARTNERSHIP COMPOSED OF W. T. KIRK, A. T. KIRK, AND O. E. BARBER.

JIG.

Application filed February 3, 1921. Serial No. 442,169.

To all whom it may concern:

Be it known that I, ORREN E. BARBER, a citizen of the United States, and resident of Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Jigs, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to jigs and more particularly to jigs for centering ring-shaped objects and objects having circular apertures.

My invention contemplates a jig adapted to retain and center ring gears and the like so that machine operations may be performed upon the outer surfaces of the centered objects, the operations resulting in accurate concentricity of the machined portions relatively to the axis of a circular aperture in the object upon which the operations are performed.

The objects of my invention are to provide a jig for centering ring gears and the like, the jig comprising a plurality of rotatably journaled rolls adapted to rotate in unison about their rotary axes and having surfaces adapted to engage and position the inner surfaces of the ring gears and the like so that the axes of the centered objects will be coincident with a common central axis of the rolls; to provide a jig of the class described comprising a plurality of eccentrically journalled cylinders, each cylinder having independent means for angularly adjusting its central axis relatively to its rotary axis, and to provide a jig of the class described comprising a plurality of cylinders and means coacting with the cylinders for locking the centered objects in a position normal to their axes.

These and other objects of my invention will be more clearly set forth as the following description progresses, reference being had to the accompanying drawings, wherein,

Figure 1 is a central longitudinal section through a jig embodying the novel features of my invention.

Figure 2 is a plan elevation of the jig.

Figures 3 and 4 are sections taken on lines 3—3 and 4—4, respectively, of Figure 1 looking in the direction of the arrows.

Figures 5 and 6 are sections taken on lines 5—5 and 6—6, respectively, of Figure 2 looking in the direction of the arrows.

Figure 7 is a section taken on line 7—7 of Figure 1.

Figure 8 is a detail view of a pin used in connection with novel locking means, and

Figure 9 is a detail view of a center which may be employed when the jig is to be secured between two opposing centers of a gear cutting machine or the like.

Similar characters of reference designate similar parts throughout the several views.

In the drawings, I have illustrated a jig embodying the novel features of my invention. The jig is particularly adapted to retain and center a plurality of ring gear blanks in which teeth are to be hobbed and has means whereby it may be rotatably mounted in a machine of the type commonly employed in operations of this character.

Referring to Figure 1, the reference characters 10 and 11 each designate a circular plate forming a part of my improved jig. The plates 10 and 11 are disposed at the upper and lower ends, respectively, of the jig, the axes of the plates being coincident. The plates are securely held in spaced relation relatively to each other by a plurality of rods 12 which are provided with shoulders 13 against which the inner faces of the plates rest, (Figure 5). Each rod 12 has a reduced portion 14 threaded into the plate 11 and a reduced portion 15 projecting through one of a plurality of apertures 16 provided in the plate 10. By means of a nut 16^a threaded upon each reduced portion 15, the plate 10 is rigidly secured to the several rods. The plates 10 and 11, and rods 12 constitute the frame of my improved jig, the frame serving to journal a plurality of hollow cylinders 18, presently to be described.

As hereinbefore set forth, the jig is adapted to be rotatably mounted in a machine of the gear cutting type. For this purpose, the plate 11 is provided with an aperture 19 which snugly fits the cylindrical end 20 of a tapered center plug 21. The plug 21 is shown inserted into the tapered bore of a mandrel 22 which is typical of machines employed in gear hobbing operations and

which may be driven in the usual manner. The axes of the plug 21 and the plates 10 and 11 are coincident. The frame comprising the plates 10 and 11 and the rods 12, is rotated about this common axis by means comprising a face plate 24 threaded upon the mandrel 22, the plate 11 of the frame being secured to the face plate by bolts 25. It is apparent that the axis of rotation of the mandrel 22 is also the axis of rotation of the frame and that the jig may be rotated continuously or advanced step by step in a manner and by means well known to those skilled in the art. The aforementioned hollow cylinders 18 are interposed between the plates 10 and 11 and each is eccentrically mounted relatively to its central axis upon one of a plurality of shafts 26. Each shaft 26 is disposed parallel to the axis of rotation of the frame and has its ends journalled in the plates 10 and 11, the upper end of each shaft projecting through the plate 10. A pinion 27 is rigidly secured to the projecting end of each shaft 26 for a purpose which will presently appear.

As shown in Figure 2, each of the shafts 26 is equidistantly spaced from the others and from the axis of rotation of the frame.

It is readily understood that if the cylinders 18 be secured to the shafts 26 and if the central axes of the cylinders be adjusted to occupy identical positions respectively, relatively to their rotary axes and to the axis of rotation of the frame, the several cylinders may be rotated in unison about their several rotary axes so as to accurately position a ring-shaped object disposed around them so that the axis of the object and the axis of rotation of the frame and mandrel will be coincident.

To secure cylinders 18 to the shafts 26 and to provide means whereby the central axis of each cylinder may be angularly adjusted about its rotary axis, one of a plurality of levers 28 is rigidly secured to each shaft 26 by a set screw 29 and a taper pin 30. The levers 28 are disposed within the hollow cylinders 18. In assembling this device, the lever 28 is first properly positioned upon the shaft 26 and secured thereto by the set screw 29 which may be manipulated through an aperture 31 provided in the cylindrical wall of the cylinder. The lever and shaft are then drilled and reamed for the taper pin. This construction insures rigidity and accuracy when the jig is employed in work of the character described. Disposed at right angles to the shafts are a plurality of cap screws 32 one of the cap screws being adjustably threaded into each of the levers 28 at a point intermediate its ends, (Figure 4).

The threaded end of each cap screw 32 bears against a lug 33 projecting inwardly from the wall of its associated cylinder thus permitting the central axis of each cylinder to be rotated in a counter-clockwise direction about the rotary axis of the cylinder when the cap screw is advanced. Likewise the central axis may be rotated in a clockwise direction by a headless set screw 34 threaded into the wall of the cylinder and bearing upon the free end of the associated lever 28. By manipulation of the cap screws 32 and the set screws 34, the central axes of the cylinders may be accurately adjusted relatively to their respective rotary axes and to the axis of rotation of the frame. When once properly adjusted to center in a manner hereinbefore described, a ring shaped object disposed around them, the cylinders, if rotated in unison, will, of course, center all ring-shaped objects disposed around them which have apertures of dimensions falling within the capacity of the jig.

To rotate the cylinders in unison, I provide a gear 35 rotatably journaled upon a pin 36 which is secured to the plate 10. The gear 35 meshes with the aforementioned pinions 27. The operator may rotate the gear 35 by means of a pair of handles 37 secured to the gear for this purpose. The gear may be locked in any desired position by a nut 38 threaded upon the pin 36, the nut 38 being adapted to hold the gear tightly against the outer face of the plate 10.

As illustrated in Figures 1 and 2, a plurality of ring gear blanks 40 may be disposed around the cylinders 18 and centered thereby. The lowermost gear blank rests against outwardly extending flanges 41 formed integrally with the cylinders 18 at the bottom ends thereof. This is to insure the proper positioning of the blanks in planes normal to the axis of rotation of the frame.

To securely lock the gear blanks 40 in position during the hobbing operation, I provide circumferential grooves 42 cut into the cylindrical faces of the cylinders at their upper ends (Figures 1 and 7). A plurality of U-shaped plates 43 are inserted into the grooves 42 which prevent longitudinal displacement of the plates. A set screw 44 is adjustably threaded into each plate 43 and may be advanced to bear upon the uppermost gear blank, as shown in Figure 1. The gear blanks will then be firmly secured between the several flanges 41 and the set screws 44.

If it is desired to place a lesser number of blanks upon the jigs, pins 45 may be interposed between the set screws 44 and the uppermost gear blank, (Figure 8). The pins 45 are provided with rounded ends adapted to co-act with cup pointed set-screws. Where the jig is employed in operations upon differently sized gear blanks, and upon varying numbers of gear blanks, a

number of pins similar to the pins 45 may be employed to meet the particular conditions.

While I have illustrated my improved jig as being secured to the face plate of a suitable machine, it may also be rotatably mounted between opposing centers, if so desired. For this purpose, the pin 36 is provided with a conical recess 47 in its outer end, the recess being adapted to co-act with one of two opposing centers in any suitable machine. A pin 48, Figure 9, may be inserted into the apertures 19 of the plate 11 and secured thereto by a shoulder 49 formed upon the pin, and a nut 50 threaded upon the pin. A conical recess 51 formed in one end of the pin is adapted to be engaged by the other center of the pair of centers.

In the operation of the device, the jig is properly placed in a machine of the character described, the blanks having been loosely arranged upon the jig if the machine is not of the face-plate type. If the machine is of the face-plate type, the blanks may be placed upon the jig after it is secured to the face-plate. The blanks are then held in a position in which the blank adjacent the flanges 41 is held against the flanges. The operator then rotates the gear 35 by means of the handles 37, the gear being rotated in a clockwise direction (Figure 2). The cylinders will properly center the gear blanks and they may be locked in place by the set screws 44. The nut 38 may be adjusted to lock the cylinders in their adjusted positions. The blanks are then properly positioned and secured for the hobbing operation.

The particular form of jig which is above described is adapted to center objects having circular apertures. However, it is apparent that the novel features of my invention are not limited to this class of jig, but may be embodied in a jig adapted to center cylindrical objects by contacting the cylindrical surfaces of the objects. In such a jig, the object would be interposed between the several cylinders.

While I have thus described the details of one form of my invention, it is to be understood that I am not limited to these details except by the scope of the appended claims.

What I claim is new and desire to secure by United States Letters Patent, is:—

1. A jig comprising a frame, a plurality of cylinders eccentrically journalled in the frame, the rotary axes of the cylinders being equidistantly spaced from each other and from a common central axis, and means for rotating the cylinders about their respective rotary axes in unison.

2. A jig comprising a frame, a plurality of cylinders eccentrically journaled in the frame, the rotary axes of the cylinders being equidistantly spaced from each other and from a common central axis, means for independently adjusting the normal axis of each cylinder relatively to its rotary axis and means for rotating the cylinders about their respective rotary axes in unison.

3. A jig comprising a frame, a plurality of rolls eccentrically journalled in the frame, the rotary axes of the rolls being spaced equidistantly from each other and from a common central axis, and means for rotating the rolls about their rotary axes in unison, the surfaces of the rolls being adapted to position a circularly apertured object disposed around the several rolls so that the axis of the aperture and the common central axis of the rolls will be coincident.

4. A jig comprising a frame, a plurality of rolls eccentrically journalled in the frame, the rotary axis of the rolls being spaced equidistantly from each other and from a common central axis, means for independently adjusting each roll angularly about its rotary axis, and means for rotating the rolls about their rotary axes in unison, the surfaces of the rolls being adapted to position a circularly apertured object disposed around the several rolls so that the axis of the aperture and the common central axis of the rolls will be coincident.

5. A jig comprising a rotatably mounted frame, a plurality of cylinders journalled in the frame each cylinder being eccentrically journalled relatively to its central axis, the rotary axes of the cylinders being equidistantly spaced from each other and from the axis of rotation of the frame, and means for rotating the cylinders about their respective rotary axes in unison.

6. A jig comprising a rotatably mounted frame, a plurality of cylinders journalled in the frame, each cylinder being eccentrically journalled relatively to its central axis, the rotary axes of the cylinders being equidistantly spaced from each other and from the axis of rotation of the frame, means for independently adjusting the central axis of each cylinder relatively to its rotary axis, and means for rotating the cylinders about their rotary axes in unison.

7. A jig comprising a frame adapted to be rotatably mounted in a gear cutting machine or the like, a plurality of shafts journalled in the frame and disposed parallel to the axis of rotation of the frame, the shafts being equidistantly spaced from each other and from the axis of rotation of the frame, a cylinder eccentrically mounted upon each shaft, means disposed within each cylinder for adjusting the central axis of the cylinder relatively to its rotary axis, a pinion rigidly secured to each shaft and means for rotating the pinions in unison.

8. A jig comprising a frame, a plurality of cylinders rotatably journalled in the frame, each cylinder being eccentrically journalled relatively to its central axis, the rotary axes of the cylinders being equidistantly spaced

from each other and from a common central axis, means for rotating the cylinders about their rotary axes in unison, the cylinders being adapted to position a circularly apertured object disposed around the several cylinders so that the axis of the aperture and the common central axis will be coincident, and means for preventing longitudinal displacement of the object.

9. In a jig for centering circularly apertured objects, the combination with a plurality of rollers, of means coacting with the rollers for locking the objects against longitudinal displacement when the objects are disposed around the rollers.

10. In a jig comprising a plurality of rolls for centering a circularly apertured object, each roll having a circumferential groove at one end and an outwardly extending flange at the other end, a plate adapted to coact with the groove, and means carried by the plate for locking the object against the flange.

11. A jig comprising a frame at least three cylinders eccentrically journalled in the frame, the rotary axes of the cylinders being equidistantly spaced from a common central axis, a common actuating device for adjusting the normal axes of the several cylinders relatively to their respective rotary axes, and means for adjusting the normal axis of each cylinder with respect to its rotary axis independently of the common actuating means aforesaid.

12. A jig comprising a frame, a plurality of cylinders eccentrically journalled in the frame, the rotary axes of said cylinders being equidistantly spaced from each other and from a common central axis, pinions fixed to said cylinders and disposed concentrically with the rotary axes thereof, a master gear meshing with all of said pinions, and means for operating said master gear to rotate said cylinders around their rotary axes in unison.

In witness whereof, I hereunto subscribe my name this 19th day of January, 1921.

ORREN E. BARBER.

Witnesses:
ARTHUR W. CARLSON,
ANDREW F. WINTERCORN.