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E. GAIRING

UNIVERSAL MACHINE SHOP FIXTURE

Filed Dec. 13, 1924

2 Sheets-Sheet 1

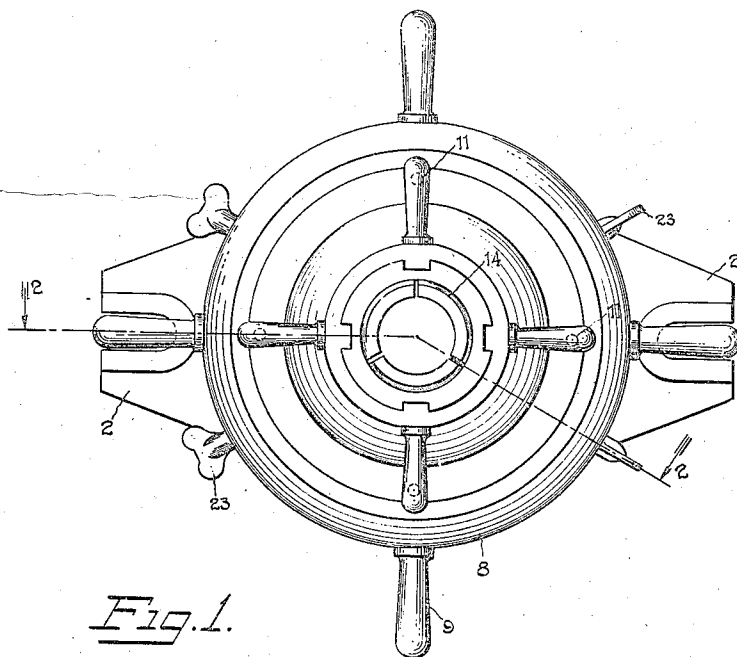


Fig. 1.

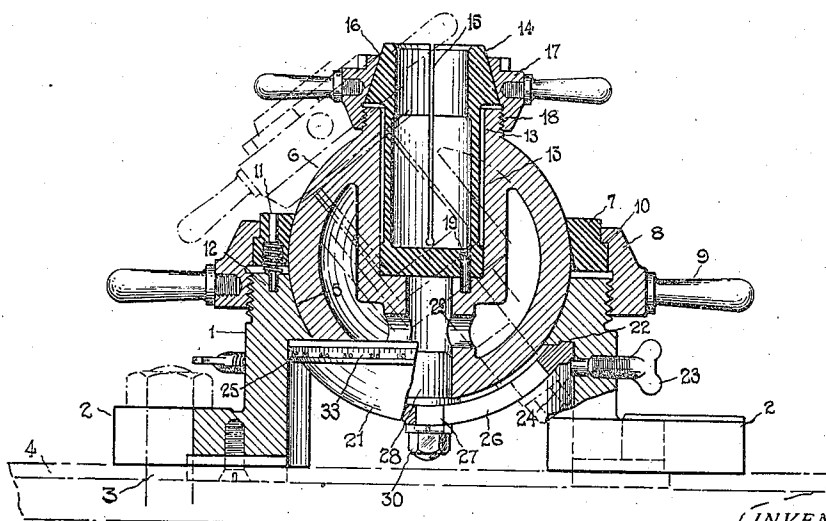


Fig. 2.

BY

Emil Gairing

Clayton E. Wyrick

ATTORNEY

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2 Sheets-Sheet 2

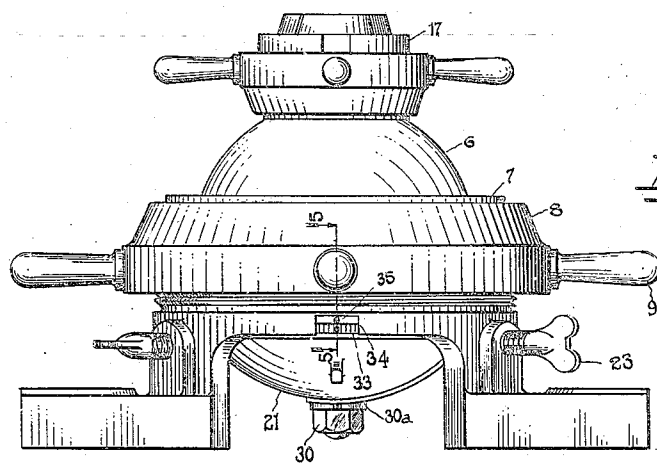


Fig. 4.

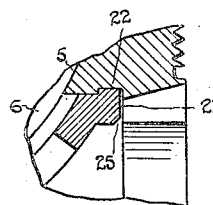


Fig. 5.

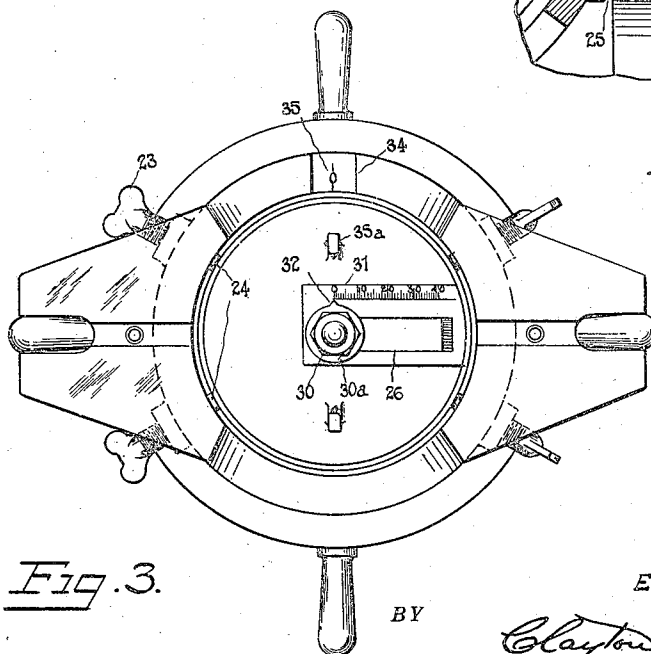


Fig. 3.

BY

INVENTOR
Emil Gairing

Clayton C. Wyrick
ATTORNEY

UNITED STATES PATENT OFFICE.

EMIL GAIRING, OF DETROIT, MICHIGAN.

UNIVERSAL MACHINE-SHOP FIXTURE.

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This invention relates to machine shop fixtures and relates particularly to adjustable tool or work holder fixture for machine shop uses.

It is the object of the invention to provide a fixture adapted for use in performing a great variety of machining operations and adjustable universally so as to permit the work or tool held by said fixture either to be axially aligned with said piece of work or to be given a desired inclination to such piece.

Another object is to provide for accurately indicating the degree of work or tool holder to the axis of the fixture.

Still another object is to provide for adjusting the tool holder rotatively about the axis of said fixture as well as establish it at selective angles to said axis.

These and various other objects are attained by the construction hereinafter described and illustrated in the accompanying drawings, wherein:

Figure 1 is a top plan view of the improved fixture.

Figure 2 is a vertical sectional view taken upon the line 2—2 of Figure 1.

Figure 3 is a bottom view of the fixture.

Figure 4 is a front elevation view of the same.

Figure 5 is a sectional detail taken on line 5—5 of Figure 4.

In these views, the reference character 1 designates an annular base, having a pair of oppositely projecting radially slotted lugs 2 for engagement by bolts 3, whereby the fixture may be mounted securely upon the member 4 which may be either the work table or driven element of a machine.

Base 1 is formed in its upper portion with an interior annular seat 5 for a ball 6. Said seat having its ball engaging face curved spherically to snugly fit the ball. The ball is further engaged about the base 1 by the socket forming ring 7, having a spherical face conforming to the ball. Said ring serves to hold the ball 6 to its seat and to clamp said ball upon said socket when desired.

Thus a clamping ring 8 is screw threaded upon the base 1 and is adapted to be rotated and to be raised and lowered upon said base by handles 9 integral with said ring.

An interior annular shoulder upon said ring engages an external annular shoulder upon the socket ring 7 as indicated at 10 so that lowering of the clamping ring will act

to draw the socket ring down upon the ball 6. A plurality of dowel pins 11 are fixed in the ring 7 and slide into bores 12 of the base, restraining said ring from rotation. Preferably springs are coiled upon said pins urging said pins upwardly so as to free said ball frictional contact of said ring so far as the clamping ring 8 may permit.

Into the top face of the ball 6 there opens a socket 13 which receives a removable spring collet 14 slotted longitudinally as indicated at 15 and having an exteriorly coned end 16 engaged by an interiorly coned portion of a clamping collar 17, having a screw threaded engagement with a flange 18 integral with the ball 6 surrounding opening 13 thereof. Thus by screwing said collar downwardly towards the ball the collet 14 will be contracted to tightly engage a part to be machined or a cutting tool (not shown).

Rotation of the collet in the socket opening 13 is prevented by a dowel pin 19 eccentrically carried by the ball 6 and projecting into said opening to engage aperture suitably provided in the closed inner end of the collet.

Into the base 1 below the ball 6 there is fitted a rotatable plate 21 which is spherically faced so that when marginally engaged with the angular internal shoulder 22 of the base, said plate is concentric with said ball. A plurality of clamping screws 23 radially engaging the base act upon the plate 21 through blocks 24 slidably mounted in the base and engaging annular shoulder 25 of the plate. Thus said screws and blocks hold the plate 21 against its seat 22 and is adapted to clamp the plate in any of its rotative positions securely to said seat.

From the central portions of the plate 21 a slot 26 extends laterally and in said slot there fits the squared portion 27 of a shank projecting integrally downward from a cylindrical head 28 fitting freely into a radial bore 29 in the ball 6, said bore and socket 13 having aligned axes. Below its portion 27, said shank is screw threaded and is engaged by a clamping nut 30 bearing upon washer 30^A seating upon the under face 21.

As is best seen in Figure 3 a scale 31 of degrees is marked upon the under face of the plate 21 marginally to the slot 26 and a pointer 32 projecting from the washer 30^A coacts with said scale to indicate any angle to which the ball may be tilted from its position coaxially with the base shown in full

lines in the drawing and in dash lines in Figure 2, which such tilted position of the ball is indicated. Another scale 33 reading in degrees is also marked on the plate 21 upon its peripheral cylindrical wall, as is best shown in Figure 2. Said scale being readable through notch 34 in the base 1, there being within said notch a mark 35 upon the base with which the zero of the scale 33 registers when said plate is in its position of rotation shown by the drawings. One or more lugs 35^A depend from the plate 21 to be gripped in rotatively adjusting said plate.

In the use of the described invention any suitable piece of work to be machined or any suitable machine tool may be attached to the ball 6, as illustrated, collets affording one means of effecting such attachment, such a collet is attached for use for machining drills, reamers, counterbores and like cutting tools. When such a tool, for example, is clamped in the collets and it is desired to machine a bevel to the tool axis face thereupon or to perhaps simultaneously machine two faces differentially beveled the plate 21 is rotated to position, the slot 26 in the desired vertical plane and the holder is then tilted to the desired extent in said plane. Loosening of the clamps 23 permits rotative adjusting of the said plate and the scale 33 permits accurate determination of the angle of such adjustment. Upon again tightening said clamp the plate will be securely held in its position. To tilt the holder the nut 30 is loosened as is likewise the clamping ring 8 and the ball 6 is rocked until the desired inclination is indicated by the scale 31. The nut 30 is then screwed tight and the ball is clamped against rotation by screwing tight the ring 8. After having machined the desired face it may be necessary to machine at the same inclination circumferentially removed above the axis of the holder from the face already machined. Adjustment for this next operation is effected by loosening the ring 8 so as to leave the ball substantially free and then turn said ball about the head 28 through the desired angle. The ring 8 being again tightened the second face may be machined.

From the above it will be noted that any number of faces of a tool blank or tools which is being reshaped or of any other piece of work may be very readily machined, the same angle to the axis of said tool or work and in any desired annular relation measured circumferentially of said axis.

It will also be evident that the same fixture permits a quick adjustment to properly space machined faces of the work circumferentially of the axis of the latter whether or not said faces are beveled with respect to said axis.

It will also readily appear to those familiar to the art that for certain machine

operations, the fixture may be used to advantage to hold driven tools rather than work to be engaged by such a tool.

From the foregoing description it becomes evident that the device is efficient in operation, will not easily get out of order and provides a device which accomplishes the objects described.

While it will be apparent that the illustrated embodiment of my invention herein disclosed is well calculated to adequately fulfill the objects and advantages primarily stated, it is to be understood that the invention is susceptible to variation, modification and change within the spirit and scope of the subjoined claims.

Having thus described my invention, I claim:

1. In a universal machine shop fixture comprising a chuck or work holder having a ball portion, a mounting for said holder having a spherical seat for said ball portion, means engaging the mounting for clamping the ball portion upon said seat, a plate carried by the mounting and rotative about a fixed axis, means carried by the mounting for holding the plate stationary in any position of its rotation and means engaging said plate for holding the ball portion of the holder in any position of tilting of the holder about said axis.

2. In a universal machine shop fixture, a chuck or work holder having a ball portion, a mounting for said holder having a spherical seat for said ball portion, means engaging the mounting for clamping the ball portion upon said seat, a member carried by the mounting rotative about a fixed axis diametrical to said ball portion, a head rotatively engaging said ball portion and adjustable upon said rotating member to and from said fixed axis, means for accurately indicating the angle of adjustment of said rotative member about said fixed axis and separate means for accurately indicating the angle of adjustment of said head upon the rotative member.

3. In a universal machine shop fixture, a ball member, a pair of socket members engaging said ball member at opposite sides of its center, means carried by one of said socket members and engaging the other for clamping the ball member between said socket members, a radial projection from said ball member, a plate rotatively carried by one of the socket members, and radially slotted to receive said projection, means carried by said projection for clamping engagement with said plate in selective positions of adjustment in said slot and means for clamping said plate in selective positions of rotative adjustment.

4. In a universal machine shop fixture, a member formed with a socket and further formed with a chamber adjacent to said socket, a ball member mounted for universal

movement in said socket, an index member arranged within said chamber and rotatable about an axis diametrical to said ball member, means carried by the ball member co-acting with said index member to indicate the angularity of said ball member to the axis of said index member, said means also adapting said index member to turn with the ball member about said axis, and means upon the socket member co-acting with said index member to indicate the degree of rotation of the ball member about said axis.

In witness whereof I hereunto set my hand.

EMIL GAIRING.