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DEVICE FOR GAUGING THE ECCENTRICITY AND DIAMETER OF AN ANNULAR PART

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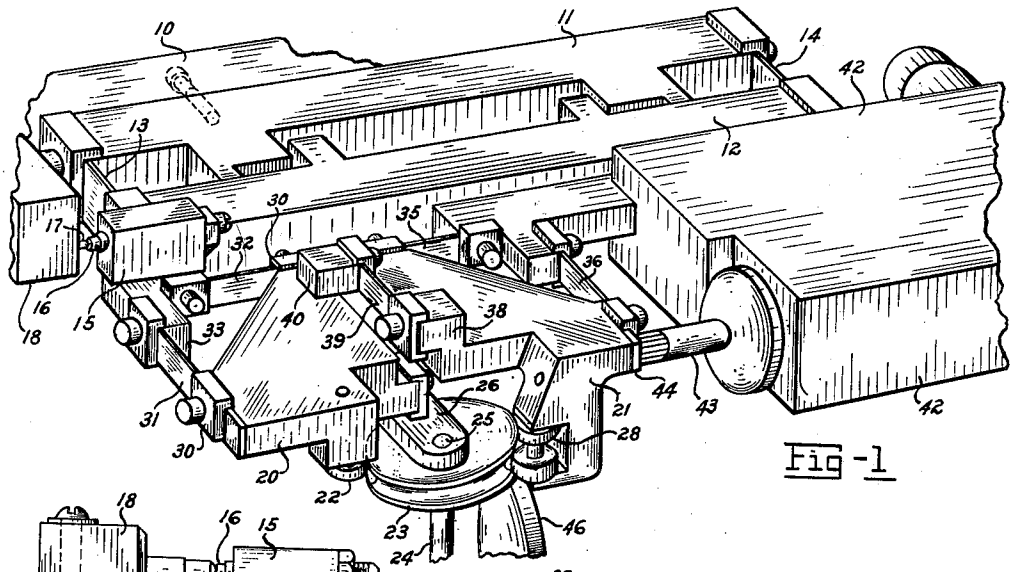


Fig-1

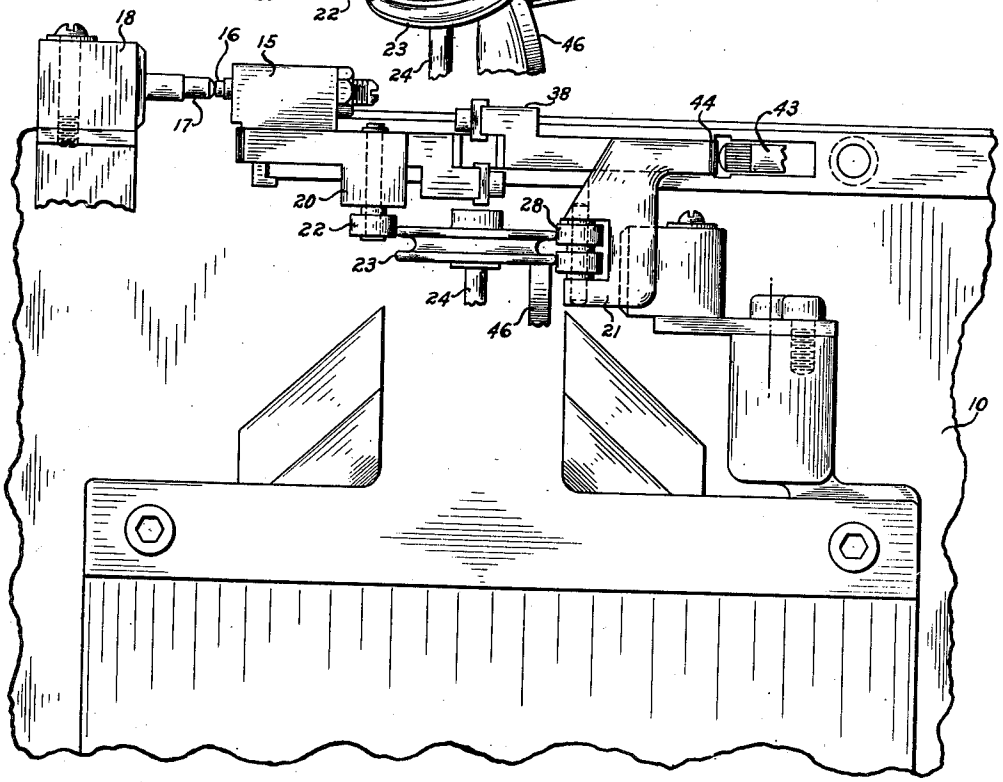


Fig-2

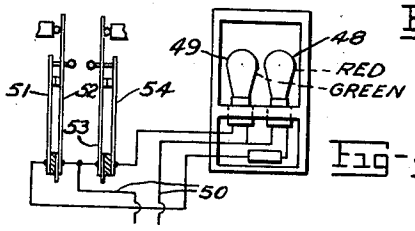


Fig-3

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DEVICE FOR GAUGING THE ECCENTRICITY AND DIAMETER OF AN ANNULAR PART

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4 Claims. (Cl. 33—174)

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This invention relates to gauging devices and more particularly to devices for gauging or comparing the eccentricity of an annular workpiece.

One object of the invention is the provision of a gauging device having a pair of relatively movable work engaging arms supported on a carrier and connected to insure equal but opposite movement of the arms so that the movement of the carrier itself provides an indication of the eccentricity of the workpiece.

Another object is the provision of a gauging device having means for rotatably supporting an annular workpiece between a pair of work engaging arms, the arms being mounted for swinging movement on a movable carrier and so arranged that the motion of the arms is in opposite directions but is equalized to move the carrier if eccentricity is present in the workpiece.

Another object is the provision of a gauging device of the character mentioned in which the arms are mounted on the carrier by spring blades and are connected to one another by a spring blade to equalize the movements of the arms.

Another object is the provision of a gauging device of the character mentioned having provision for also gauging the diameter of the workpiece as the workpiece is rotated about its own axis.

Other objects and advantages of the invention will be apparent from the following description, the appended claims and the accompanying drawing, in which,

Fig. 1 is a perspective view of a gauging device embodying the present invention;

Fig. 2 is a front elevation of the gauging device; and

Fig. 3 is a view showing the connection between a switch and indicating lamps.

Referring more particularly to the drawing, in which the same parts are designated by the same reference numerals, 10 indicates a suitable supporting structure having an upstanding wall portion to which is fixed a supporting member 11 that carries the movable portions of the gauging device. Extending generally parallel to supporting member 11 is a carrier bar 12. Flat spaced parallel spring blades 13 and 14 are each fixed at one end to the carrier 12 and at the other end to the supporting member 11 so that the carrier can move yieldingly in the direction of its length. Fixed on the carrier 12 is a block or lug 15 carrying an adjustable button or abutment 16. The member 16 controls a switch operating plunger 17 of the switch block 18 which is

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also fixed on the support 10. The endwise movement of the carrier 12 thus controls the operation of the switch means in the switch block, and this switch or switches may be connected to a suitable indicating means such as a lamp or lamps. The switch means in the switch block 18 may be of the character disclosed in Aller Patent 2,254,812, granted September 2, 1941, and control red and green indicating lamps when the carrier 12 is displaced in one direction or the other from a normal position.

Mounted on the carrier 12 are two work engaging blocks or arms 20 and 21. The arm 20 is provided with a work engaging roller 22 that operates against the periphery of the workpiece 23 which is illustrated in the form of a pulley wheel. The pulley wheel has a central passage and is fed or supplied by any suitable means to the position in which it is illustrated, and as soon as it is in that position, a mounting stem 24 is raised and enters the passage in the pulley wheel to support the latter for rotation about the axis of the pulley wheel. After a gauging operation is completed, the stem 24 is lowered and the pulley is pushed along by another workpiece to be gauged. The upper end of the stem 24, in its raised position, is received in a hole 25 in a bracket arm 26 which is fixed with respect to the support 10.

The arm 21 has a work engaging roller 28 shown with upper and lower roller portions for engagement with the upper and lower flanges of the pulley wheel at a location directly opposite the roller 22.

The arm 20 is secured by suitable clamp plates 30 to flat spring blades 31 and 32 which are arranged at right angles to one another so as to converge to a theoretical point of support on the carrier 12. The converging ends of these spring blades are fixed to a bracket 33 on the carrier. These spring blades yieldingly carry the arm for swinging movements, and avoid any lost motion that might be present in a pivot connection.

The arm 21 is similarly mounted on the carrier 12 by flat spring blades 35 and 36, the arm 21 being mounted for swinging movement about a theoretical axis corresponding to the line where the spring blades intersect. Arm 21 has a bracket 38 which is secured to a straight, flat spring blade 39, the other end of which is fixed to a bracket 40 on arm 26. An inner portion of arm 20 is thus connected to an outer portion of the arm 21 by spring means avoiding any possibility of lost motion. The points on the arms 20 and

21 to which the spring blade 39 is secured are arranged in line with the axis of the workpiece. The spring blade 39 is thus contained in a common plane with the work axis, and by reason of this spring connection any swinging movement of one of the arms causes an equal but opposite swinging movement of the other arm. The two work engaging rollers 22 and 28 therefore move equally towards one another or away from one another and their movements are equalized with respect to the carrier. Measurement of the movement of one of the arms on the carrier therefore gives a true indication of the diameter of the part. For this purpose there is a switch block 42 fixed on the carrier 12 and having a spring pressed gauging plunger 43 operated by an abutment plate 44 which is preferably close to the plane containing the axes of the rollers 22 and 28. The gauging plunger 43 operates the switch mechanism in the switch block 42 which can control red and green indicating lamps as in Aller Patent 2,254,812.

Fig. 3 shows how the red and green indicating lamps 48 and 49 respectively may be connected to a supply source 50 and to the switch contacts 51, 52, 53 and 54 of the switch block 42 or of the switch block 18 so as to constitute gauging means to indicate endwise movement of the carrier or the diameter of the workpiece, as the case may be.

When the workpiece is in gauging position, its lower side contacts a rotatable turning wheel 46 which may be turned at a suitable speed by any means such as a drive motor, not shown. As the workpiece or pulley wheel turns on the stem 24, if its diameter is constant, there is a constant indication by the switch 42. At the same time any eccentricity of the periphery of the pulley wheel with respect to the central hole in the wheel is indicated by the switch means 18, which is responsive to the endwise movement of the carrier 12. Since the spring pressed plunger 43 holds the gauging rollers 22 and 28 in contact with the pulley wheel, and since the axis of the pulley wheel is fixed with respect to the support, any eccentricity present in the pulley wheel will cause both gauging rollers 22 and 28 to move to the right or to the left. Since the two arms cannot both move in the same direction with respect to the carrier, the carrier itself is moved or shifted endwise, in accordance with the eccentricity present in the workpiece.

The gauging mechanism will operate over long periods of time without wear, since all of the relatively movable parts are interconnected or mounted by means of flexible spring blades, and in view of the entire absence of any lost motion, a very high degree of accuracy is obtained in the gauging operation.

While the form of apparatus herein described constitutes a preferred embodiment of the invention, it is to be understood that the invention is not limited to the precise form shown, and that changes may be made therein without departing from the scope of the invention which is defined in the appended claims.

What is claimed is:

1. A gauging device for gauging eccentricity of an annular part comprising a work centering means to support the part for rotation about its axis, a pair of work engaging arms, a carrier on which both of said arms are supported for swinging movement towards and from one another, means interconnecting said arms to provide equal but opposite movement of said arms, said means comprising a straight leaf spring fixed at one end to one of the arms and fixed at the other end to the other of said arms and extending radially of the axis of the work centering means, supporting means for said work centering means, means for mounting said carrier on said support for movement in a direction parallel to the direction in which the arms are relatively movable and so that the ends of the arms engage opposite sides of the peripheral portion of a part to be gauged arranged on said centering means, and means for indicating such movement of the carrier.

2. A gauging device for gauging eccentricity of an annular part comprising a pair of work engaging arms, a carrier, leaf springs fixed to the carrier at one end thereof and fixed to the arms at the other end thereof and supporting said arms for swinging movement on the carrier towards and from one another, a leaf spring fixed to both of said arms at opposite ends of the spring and interconnecting said arms to provide equal movement of the arms in a direction towards and from one another, a work centering means rotatably supporting the part to be gauged for movement about the axis of the part and in a position in which the ends of said arms engage opposite sides of the periphery of the part, a fixed support for said work centering means, means mounting said carrier on said support for shifting movement in the same direction as the swinging movement of the work engaging arms, and means for indicating movement of the carrier caused by eccentricity of the part as the part is rotated on the centering means.

3. A gauging device for gauging eccentricity and diameter of an annular part, comprising a pair of work engaging arms, a carrier, spring blades fixed at opposite ends thereof to said arms and to said carrier and mounting both of said arms for swinging movement on the carrier about spaced axes, a work carrying spindle for supporting the part for rotation about the axis of the part, a fixed support for said spindle, spring blades mounting said carrier on said support for movement in a direction perpendicular to the spindle axis and so that the ends of said arms engage opposite sides of the periphery of the part on the spindle, a spring blade interconnecting points on said arms which are in a common plane extending towards the spindle axis to equalize the swinging movement of the arms of the carrier and compelling the ends of the arms that engage the part to move towards one another or away from one another, switch means responsive to movement of the carrier caused by eccentricity of a part rotating on the spindle and switch means mounted on the carrier and responsive to the swinging movement of one of the arms on the carrier for gauging the diameter of the part.

4. A gauging device of the character described comprising a pair of spaced arms adapted for engagement with a part to be gauged, a carrier, spring blades fixed at opposite ends thereof to said arms and to said carrier and mounting both of said arms for swinging movement on the carrier, a spring blade interconnecting spaced points of said arms and constituting the sole means for equalizing the swinging movement of the arms on the carrier and compelling the ends of the arm to move towards one another or away from one another said blade extending in line with a point midway between the ends

of the arm, a support, spring blades fixed to said support and to said carrier and mounting said carrier for movement on said support in a direction parallel to the direction of movement of the ends of the arms on the carrier, gauging means responsive to the movement of the carrier on the support, and gauging means responsive to the movement of said arms with respect to one another.

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