Feb. 23, 1943. V. F. ZAHODIAKIN 2,311,919

DEVICE FOR COMPRESSING RINGS OR THE LIKE

Filed June 23, 1939 2 Sheets-Sheet 1

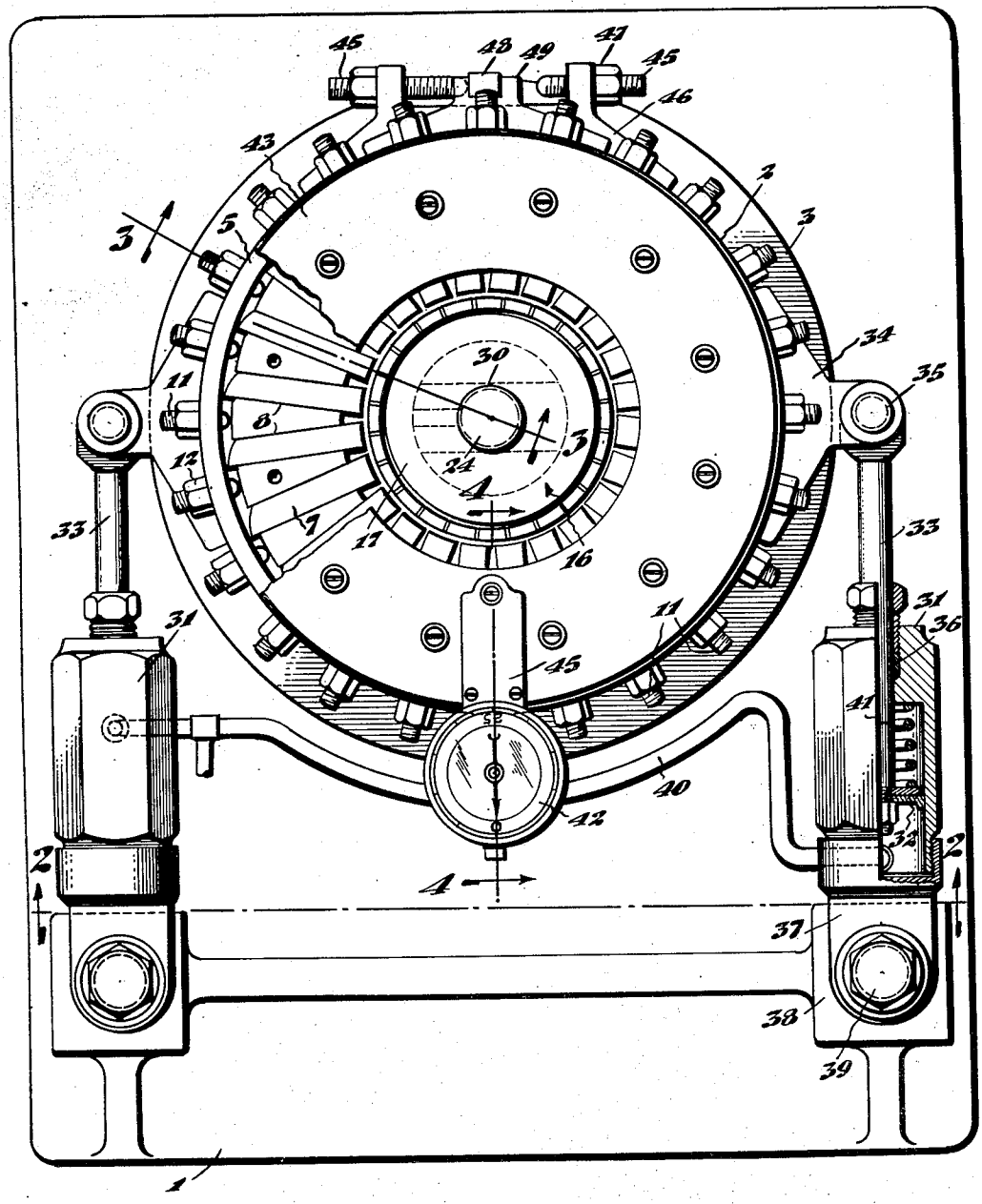


Fig. 1

INVENTOR.
Victor F. Zahodiakin
BY
Wood & Wood
ATTORNEYS.

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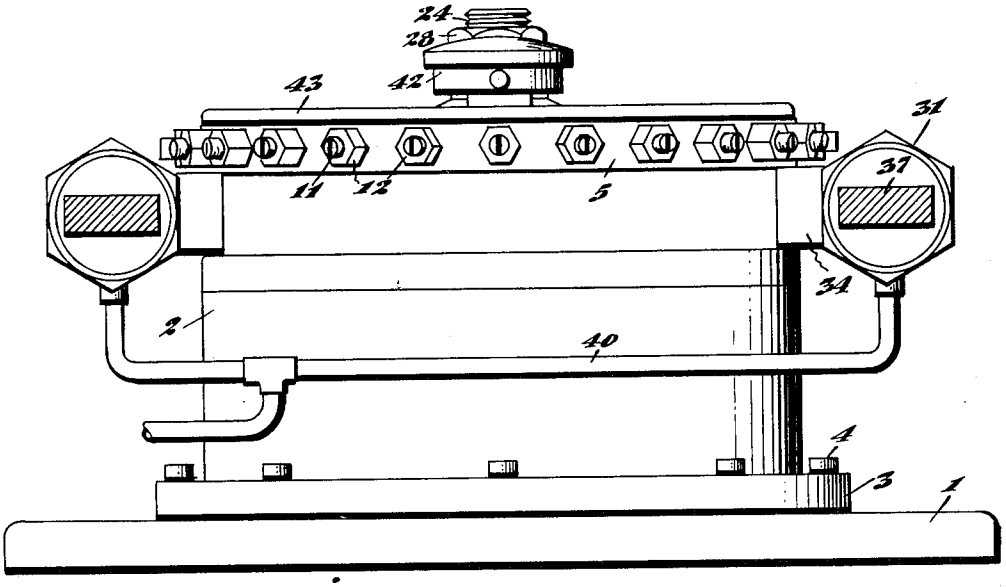


Fig. 2

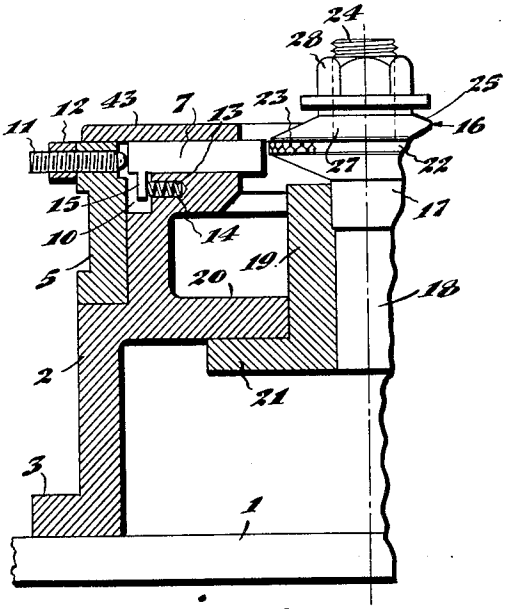


Fig. 3

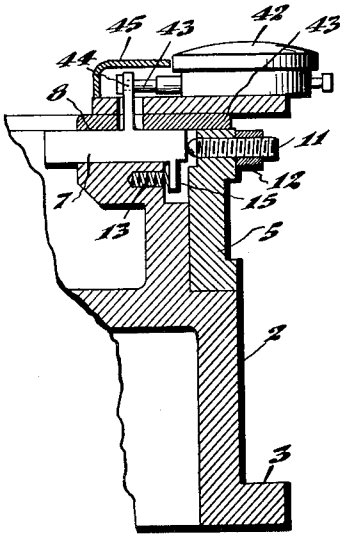


Fig. 4

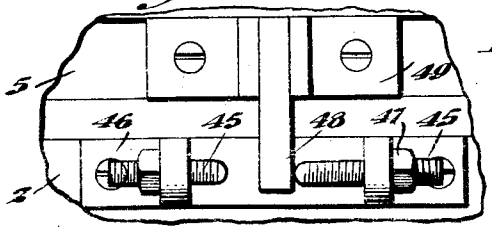


Fig. 5

INVENTOR.

BY Victor F. Zahodiakin

Work & Work

ATTORNEYS

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UNITED STATES PATENT OFFICE

2,311,919

DEVICE FOR COMPRESSING RINGS OR THE LIKE

Victor F. Zahodiakin, New York, N. Y.

Application June 23, 1939, Serial No. 280,837

1 Claim. (Cl. 29—89)

This invention relates to apparatus for compressing or bending circular articles or rings and is particularly directed to a device for pressing a piston ring or the like to reduce its diameter or to move or form an article to the desired shape.

In the manufacture of piston rings of the type shown in my Patent 1,957,927 granted May 8, 1934, the ring is formed from a strip of steel. After its initial formation it must be ground so as to fit properly in the cylinder. During the grinding operation the ring should be held in compressed truly circular position and at the same time the operator should know how much grinding should be done.

Accordingly, it has been the broad objective to provide a device adapted to act upon the ring with equal pressure from all directions to compress it into truly circular shape and to the position it assumes when in use.

Additionally, it has been the object to provide a device for this purpose which is power operated for exerting considerable pressure around the ring and therefore capable of performing bending operations on the circular article if desired. A piston ring of the character described and claimed in the mentioned patent is flexible and will return to its expanded position when released by the device.

Accordingly, it has been a further object to provide a device including a mandrel upon which the ring may be compressed and by means of which the ring may be held while being ground.

It has been a still further object to provide a device which includes indicator means for indicating to the operator the amount of material which must be ground from the ring, in other words, for indicating the amount the ring varies in diameter from finished size.

The invention therefore resides in the provision of a device incorporating a mandrel upon which the ring or article to be compressed or formed is mounted and a multiplicity of pressure fingers engaging the ring radially from all sides, in other words, converging upon the ring. Means is included for applying a great deal of pressure to these fingers by the application of power means such as compressed air.

Further objects and advantages will be more fully apparent from a description of the accompanying drawings in which:

Figure 1 is a top plan view of the device.

Figure 2 is a sectional view taken on line 2—2, Figure 1.

Figure 3 is a sectional view taken on line 3—3, Figure 1, detailing the mounting of one of the pressure fingers.

Figure 4 is a sectional view taken on line 4—4, Figure 1, detailing the structure of the indicator means.

Figure 5 is a fragmentary side view showing the limit stops.

Referring to the drawings the base of the machine is indicated at 1. The main body 2 of the device is circular and includes an attaching flange 3 traversed by screws 4 securing the body to the base. The main body 2 is counterturned to provide an annular groove in which the finger actuating ring 5 is rotatively mounted.

The body includes a table 6 for supporting the slides or fingers 7 incorporating for this purpose a number of radial slots 8. These fingers project toward the center into a central bore 9. The inner faces of the fingers are curved or arcuate and lie on a circle, the diameter of which when the fingers are engaged upon the ring is substantially equal to the diameter of the finished ring.

A second groove 10 (Figure 3) is provided at the upper end of the groove receiving the actuator ring 5. This groove provides the operating clearance for the actuating means engaging the fingers. Each finger includes a curved outer end providing a cam surface engageable by the rounded inner end of a screw 11 adjustably held in position radially in the actuating ring by means of a nut 12. The fingers are returned or retracted in each instance by means of a coil spring 13 under compression between the base of socket 14 and the downwardly extended projection 15 of the finger.

The mandrel 16 is sectional. The lower part 17 includes a shank 18 supported in a bearing sleeve 19 fixed to the body coaxially therewith. The body includes a circular internal flange 20 supporting the bearing sleeve. The bearing sleeve provides a circular flange 21 fixed to the flange 20. The main part of the lower element 17 of the mandrel provides a circumferential groove 22 adapted to receive the ring indicated at 23. It also includes an upwardly axially projected screw-threaded stud 24. The upper element 25 of the mandrel is engaged upon the screw-threaded stud and provides a flange 27 overhanging the grooved portion of the lower element 17. A nut 28 on the stud is adapted to clamp the upper element upon the ring to hold it in position after it is compressed. In Figure 1 the mandrel is shown with the upper half removed. The mandrel is held against rotation by means of a tongue and slot generally shown at 30.

The actuator ring is rotated for moving the rounded inner ends of the screws 11 against the fingers simultaneously and causing the fingers to converge upon the ring. The rotating movement is applied by power. Two air cylinders 31 are provided. These cylinders include pistons 32 having their piston rods 33 respectively connected to the actuator ring at diametrically opposite points. The attachment in each instance is by means of a bracket 34 having a pivotal connection to the end of the piston rod through a pin 35. The end of the cylinder traversed by the rod includes the packing 36 around the rod. The other end of the cylinder is screwed into a cylinder head 37 attached to a standard 38 on the base by means of a screw 39. Since the pistons move in opposite directions, the connection of the air delivery pipe 40 is to opposite ends of the respective cylinders. Coil springs 41 disposed in the cylinders return the pistons and therefore the actuator ring when the air pressure is exhausted.

The indicator gauge 42 (Figure 4) is fixed to the circular cover plate 43 which covers the actuator fingers. The indicator finger is coupled to one of the fingers 8 by means of a rod 43 connected to an upward projection 44 of the finger. A plate or guard 45 covers the connection.

The amount of rotation of the actuator is controlled by means of adjustable limit stops consisting of screws 45 (Figure 5). The screws are disposed in axial alignment in a bracket 46 fixed to the body 2 and their contact ends are adjacent. They are locked in position by means of nuts 47. The fixed stop relative to which these screws move consists of an element 48 fixed in a bracket 49 attached to the actuator ring 5. The element 48 depends from the bracket and is disposed between the contact ends of the screws 45, where it will be engaged by these screws at the predetermined limits of travel of the actuator ring. Thus the operator may set these screws for determining the amount of compression applied to the ring.

In the operation of compressing a piston ring, the upper part of the mandrel is removed and the ring is placed in the circumferential groove. Thereupon the upper part of the mandrel is replaced loosely. The compressed air is then connected to the cylinders and the actuator ring causes the fingers to converge upon the ring. As stated the compressed diameter is determined by a stop 45. The upper part of the mandrel is then screwed in position, clamping the ring in compressed condition. Thereupon the compressed air is exhausted and the mandrel carrying the ring may be removed and placed bodily in the grinder.

The indicator finger is adjusted to point to zero if the ring is of the correct size. Deviations from the true size are shown at either side of zero.

Having described my invention, I claim:

A mechanism for compressing a piston ring, comprising a support including a multiplicity of radially disposed slideways, slides mounted in said slideways, the outer ends of the slides projecting outwardly beyond the support and including inclined end faces, a ring rotatably supported in position, surrounding said support, said ring including a multiplicity of contact members having their contact portions extending inwardly a sufficient distance in each instance for camming engagement with he inclined end faces of the slides when the ring is rotated, a stop element fixed to the support, adjustable stop elements on the ring for engaging said fixed stop element for limiting its rotation in the respective directions, lugs extended outwardly from diametrically opposite sides of the ring, cylinder elements having their axes disposed on lines taken tangentially relative to the ring and having their outer ends pivotally mounted, pistons in said cylinders, piston rods for said pistons, said rods pivotally connected to said lugs and means for supplying fluid to said cylinders for actuating the pistons and rotating the ring through said piston rod and lug connections, said pivotal connections of the piston rods to the lugs and of the cylinders permitting swinging of the cylinders in a plane transverse to the axis of the ring.

VICTOR F. ZAHODIAKIN.