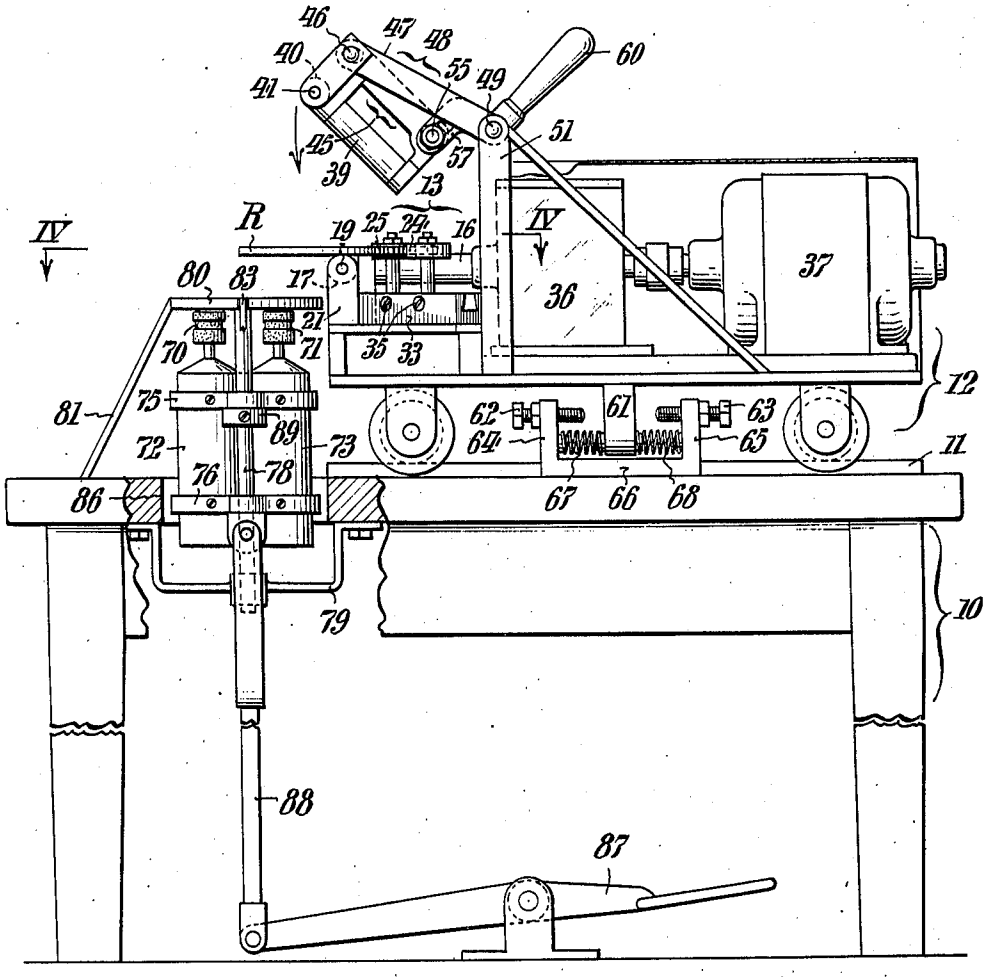
March 14, 1944. R. M. SHAW, JR 2,344,371

RING GRINDING MACHINE

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FIG. 1.



INVENTOR:
Ralph M. Shaw, Jr.,
BY Paul & Paul
ATTORNEYS.

March 14, 1944. R. M. SHAW, JR 2,344,371

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FIG_2_

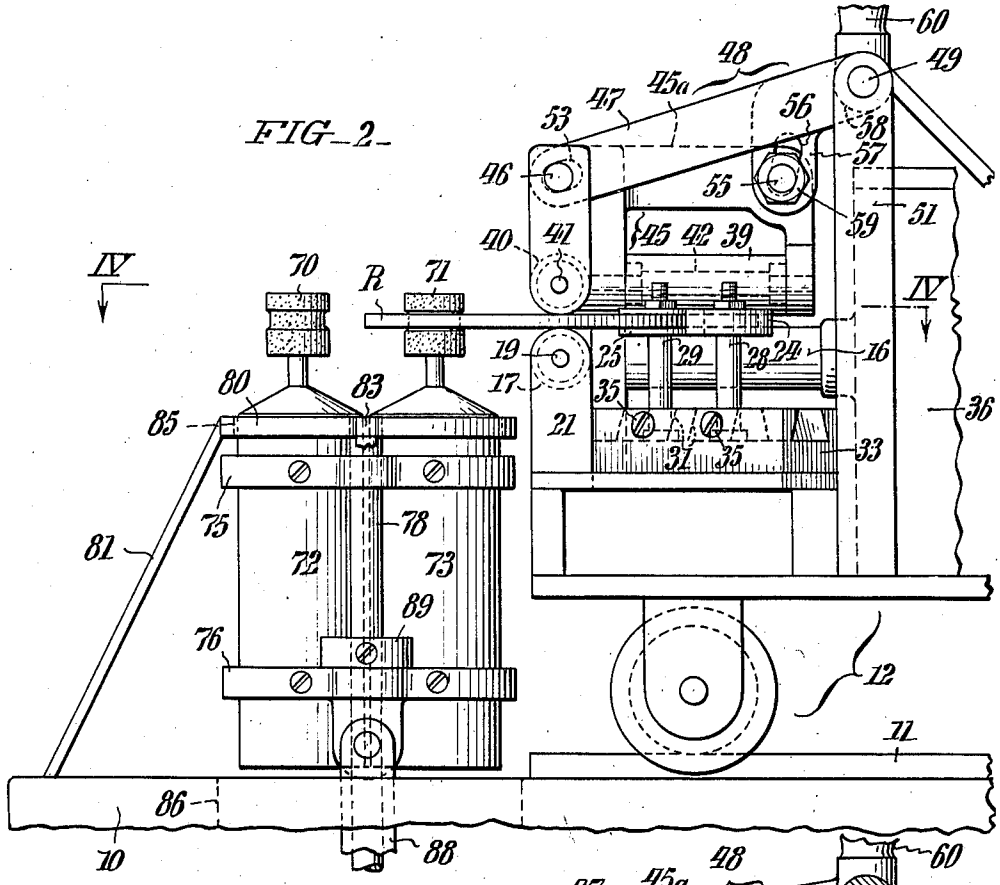
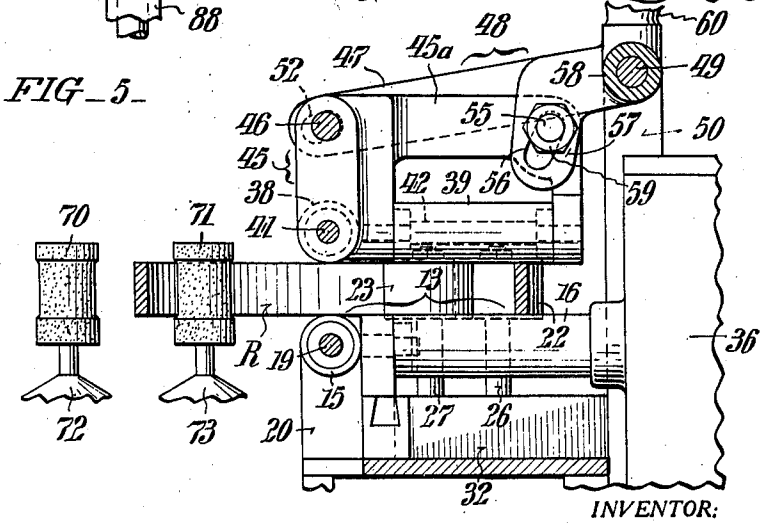


FIG_5_



INVENTOR:
Ralph M. Shaw, Jr.,
BY
ATTORNEYS.

March 14, 1944. R. M. SHAW, JR 2,344,371

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FIG. 3.

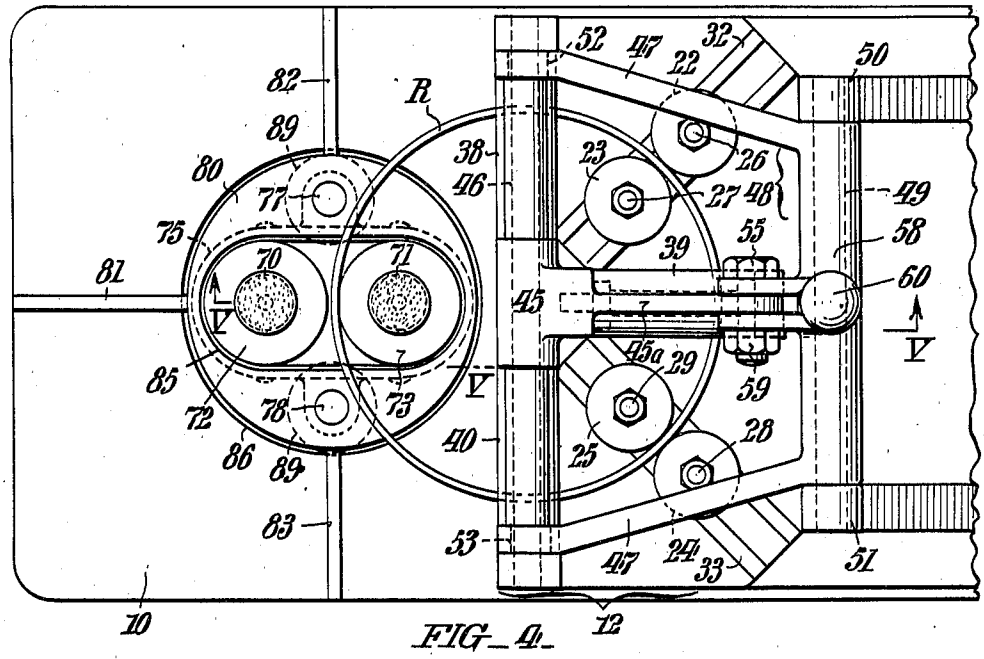
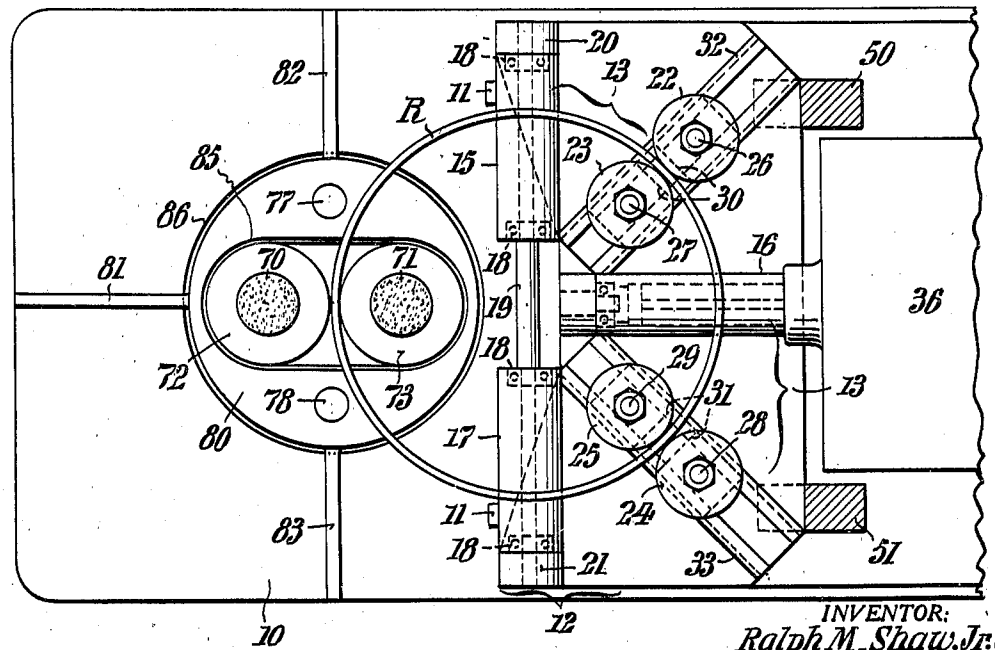


FIG. 4.



INVENTOR:
Ralph M. Shaw, Jr.,
BY
Paul & Paul
ATTORNEYS.

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2,344,371

RING GRINDING MACHINE

Ralph M. Shaw, Jr., Edgewater Park, N. J., assignor to Pedrick Tool & Machine Company, Philadelphia, Pa., a corporation of Pennsylvania

Application July 8, 1943, Serial No. 493,822

10 Claims. (Cl. 51—88)

This invention relates to ring grinding machines or apparatus, and has reference more particularly to machines useful to remove burrs from, and for finishing, piston rings and the like.

The chief aim of my invention is to enable such work to be accomplished with greater rapidity and accuracy without necessitating dependence upon judgment or skill on the part of operatives employed for the purpose.

The foregoing advantages are attained in practice as hereinafter more fully disclosed, through provision of a simple and inexpensive machine or apparatus having a support on which the rings are successively placed and rotated for subjection to the action of a pair of grinding wheels by which all roughness is removed from the outer and inner peripheral surfaces of the rings. Also incorporated in the machine is a regulatable means for limiting relative bodily movement between the ring support and the wheels during the grinding to accurately predetermine the amount of material cut away, as well as means whereby the wheels can be withdrawn from operative position out of the way after each grinding operation to enable ready and quick replacements of the rings.

Other objects and attendant advantages will appear from the following description of the attached drawings wherein

Fig. 1 is a view in front elevation of a grinding machine or apparatus conveniently embodying my invention with a portion of the structure broken away to expose certain important details.

Fig. 2 is a fragmentary view generally like Fig. 1 drawn to a larger scale.

Fig. 3 is a fragmentary view showing the machine or apparatus in top plan.

Fig. 4 is a horizontal section taken as indicated by the angled arrows IV—IV in Figs. 1 and 2; and

Fig. 5 is a fragmentary view in section taken as indicated by the angled arrows V—V in Fig. 3.

In the form herein illustrated by way of example, my improved ring grinding machine or apparatus comprises a table 10 having track rails 11 extending longitudinally of its top for guidance of a wheeled carriage 12. Mounted on the carriage 12, at the left-hand end as considered in Fig. 1, is a supporting means 13 for a ring R which is to be ground. As shown, the supporting means 13 includes three radially arranged horizontal axis rollers 15, 16 and 17 whereof the rollers 15 and 17 are axially aligned transversely of the table and mounted to rotate freely, with interposition of roller bearings 18, about a shaft 19 which is supported at opposite ends by stanchions 20 and 21 rising from said table. In preparation for grinding, the ring R is placed on the three rollers 15–17 in a manner illustrated in Figs. 3 and 4 with a considerable free arcuate portion thereof extending beyond the left-hand or front end of the carriage 12. This position of the ring is determined by two pairs of auxiliary vertical-axis rollers 22, 23 and 24, 25 which are radially arranged along diagonals intermediate the horizontal axis rollers 15, 16 and 17. The auxiliary vertical axis rollers 22, 23 and 24, 25 are independently rotatable about studs 26, 27 and 28, 29 projecting upwardly respectively from slides 30 and 31 (Fig. 4) dovetailed into guides 32 and 33 affixed to the carriage 12, each such slide being adjustable in its guide and securable in adjusted positions by a set screw as instanced at 35 in Figs. 1 and 2. The roller 16 is secured to the output shaft of a speed reduction unit 36, which, together with the driving motor 37 therefor, is mounted on the carriage 12 rearward (rightward) of the ring supporting means 13. If desired or found convenient in practice, a motor with a built-in speed reduction unit may be employed in lieu of the separately coupled elements illustrated.

Arranged to cooperate with the rollers 15, 16 and 17 are superposed mating idler hold-down rollers 38, 39 and 40 which are adapted to engage the upper surface of the ring R as shown in Fig. 5, and which are freely rotatable, with interposition of ball bearings (not illustrated), about shafts 41, 42 whereof the ends are suitably secured in a frame 45 which is T-shaped in plan, see Fig. 3. At its outer end, the frame 45 is pivoted by a pin 46 to the side arms 47 of a yoke lever 48 which is in turn pivoted by a pin 49 to a pair of posts 50 and 51 respectively at opposite sides of the carriage 12, said side arms being longitudinally slotted as at 52 and 53 in Figs. 2 and 3 for passage of said pin 46. The mid portion 45a of the frame 45 is pierced at its inner end for passage of the shank of a screw bolt 55 which also passes through an arcuate slot 56 in a central lug 57 on the hub portion 58 of the yoke lever 48. The arrangement just described permits adjustment of the frame 45 for adaptation of the machine to rings of different widths with maintenance of the rollers 40, 41 and 42 horizontally in direct vertically aligned relation to the ring supporting rollers 15, 16 and 17 when in active position as shown in Fig. 2. After adjustment, the frame 45 is securable against accidental displacement relative to the yoke lever

48 by a clamp nut 59 associated with the screw bolt 55. By means of a handle shown at 60, the yoke lever 48 can be swung to the position in which it is shown in Fig. 1 to withdraw the idler rollers 38–40 and thereby permit placement and removal of the rings.

The carriage 12 is limited in its movement in opposite directions by a pendent stop 61 thereon which is adapted to alternately engage stop screws 62 and 63 adjustably set in upstanding lugs 64 and 65 of a bracket 66 secured to the top of the table 10 beneath said carriage, see Fig. 1. Springs 67 and 68 in compression between the stop projection 61 and the lugs 64 and 65 of the bracket 66 tend to maintain the carriage 12 normally in the centralized or neutral position in which it is shown in Fig. 1.

The grinding is accomplished by a pair of vertical axis grinding wheels 70 and 71 which are secured to the top ends of the shafts of a pair of vertically arranged electric motors 72 and 73. As shown, the casings of the motors 72 and 73 are bound together by vertically spaced clamp members 75 and 76 which are slidable up and down on guide rods 77 and 78. At their lower ends the guide rods 77 and 78 are fixed in a bracket 79 secured to the under side of the table top, while their upper ends are secured in a plate 80 which is supported by three struts 81, 82 and 83 at an elevation above the table top, and which has an opening 85 therein for passage of the grinding wheels 70 and 71. By virtue of this arrangement the grinding wheels 70 and 71 can be moved bodily up and down through the opening 85 in the plate 80 and their motors 72 and 73 through a registering opening 86 in the table top beyond the forward ends of the carriage tracks 11. The means provided for so moving the grinding elements includes a foot treadle 87 and a link 88 connecting said treadle to the lowermost clamp member 76 by which the motors are secured one to the other. The up-and-down movement of the grinding units is limited by collars such as the one indicated at 89 in Fig. 1 affixed to the guide rods 77 and 78 and adapted to be contacted alternately by the clamp members 75 and 76.

Normally the grinding wheels 70 and 71 are maintained in the position shown in Fig. 1 below the level of the ring R by the weight of their motors 72 and 73, but upon depression of the foot treadle 87 they are elevated to the plane of the ring R so that the free portion of the latter may pass between them as shown in Figs. 2 and 5. From the latter illustrations it will be noted that the spacing of said wheels is somewhat in excess of the thickness of the ring R which is to be ground. With the wheels 70 and 71 elevated as just explained and the ring held in the machine in the manner previously explained, the operator grasps the handle 60 and moves the carriage 12 first in one direction and then in the other, whereby the outer and inner surfaces of the ring R are brought into contact respectively with said wheels and said surfaces thereby finished with incidental removal of any projections or burrs which may have remained after the initial rough grinding or stamping of said rings. By adjusting the stop screws 62 and 63, it will be seen that the depth of cut on the outside and inside peripheral surfaces of the ring can be actively predetermined, so that uniformity is had in rings successively machined in the apparatus. During the grinding the ring R is, of course, rotated about its own axis under the drive of the roller 16 in a manner readily understood from Figs. 3 and 4. After the ring R has been ground, the operator releases the treadle 87 to allow the grinding wheels 70 and 71 to drop, and swings the yoke lever 48 to retract the rollers 38–40 from the rollers 15–17 as shown in Fig. 1. With this accomplished, the finished ring R is removed from the machine and replaced by a new one to be ground.

Having thus described my invention, I claim:

1. In a machine for grinding piston rings and the like, means for supporting a ring with an arcuate portion thereof in the clear and for rotating it about its axis while so supported; a pair of grinding wheels spaced by a distance somewhat greater than the thickness of the ring and between which the free arcuate portion of the ring is passed as the latter rotates; and means for laterally moving the ring-supporting means and the two grinding wheels alternately in opposite directions relative to each other to cause contact between the outer and inner peripheral surfaces of the ring and the respective grinding wheels.

2. The invention according to claim 1, further including means for limiting the relative movement between the ring-supporting means and the two grinding wheels to control the depth of the cut.

3. In a machine for grinding piston rings and the like, a reciprocable carriage with means thereon for rotatively supporting a ring with an arcuate portion projecting clear of one end of the carriage; drive means on the carriage for rotating the ring about its axis while so supported; a pair of grinding wheels spaced by a distance somewhat greater than the thickness of the ring and between which the free arcuate portion of the ring is passed as the latter rotates; and means for confining the carriage to straight-line movement in the direction of the plane through the axes of the two grinding wheels so that as said carriage is reciprocated the outer and inner peripheral surfaces of the ring are caused to contact in alternation with the respective grinding wheels.

4. The invention according to claim 3, further including means for limiting the movement of the carriage in opposite directions to control the depth of the grinding.

5. The invention according to claim 3, further including means for supporting the two grinding wheels with capacity for bodily withdrawal from the plane of the ring to facilitate initial placement of the latter in the machine and its removal from the carriage after the grinding; and means for limiting such bodily movement of the wheels and for maintaining them in a neutral position with respect to the ring when in active position.

6. The invention according to claim 3, wherein the ring is mounted on the carriage with its opposite side faces engaged by two rollers arranged radially of the ring axis; wherein the ring is held in position with its outer and inner peripheral surfaces engaged by other pairs of rollers likewise radially arranged with respect to the ring axis; and wherein the drive means is coupled with one of the rollers of the first mentioned pair.

7. The invention according to claim 3, wherein the ring is mounted on the carriage with its opposite side faces engaged by two rollers arranged radially of the ring axis; wherein the ring is held in position with its outer and inner peripheral surfaces engaged by other pairs of rollers like-

wise radially arranged with respect to the ring axis; and wherein the drive means is coupled with one of the rollers of the first mentioned pair; and further including means whereby one of the rollers of said first mentioned pair is connected to the carriage with capacity for retraction from its mate to enable placement and removal of the ring.

8. The invention according to claim 3, wherein the ring is mounted on the carriage with its opposite side faces engaged by two rollers arranged radially of the ring axis; wherein the ring is held in position with its outer and inner peripheral surfaces engaged by other pairs of rollers likewise radially arranged with respect to the ring axis; and wherein the drive means is coupled with one of the rollers of the first mentioned pair; and further including means whereby the said first mentioned pair of wheels can be spacially adjusted relative to each other for reception of rings of different widths between them.

9. The invention according to claim 3, wherein the ring is mounted on the carriage with its opposite side faces engaged by two rollers arranged radially of the ring axis; wherein the ring is held in position with its outer and inner peripheral surfaces engaged by other pairs of rollers likewise radially arranged with respect to the ring axis; and wherein the drive means is coupled with one of the rollers of the first mentioned pair; and further including a bracket carrying one of the rollers of the first mentioned pair and pivotally connected to the carriage to enable retraction of such roller from its mate to enable placement and removal of the ring; and a handle on said bracket serviceable as a grasp for manual manipulation of the carriage.

10. In a machine for grinding piston rings and the like, a table; a reciprocable carriage on the table; means on the carriage for horizontally and rotatatively supporting a ring with an arcuate portion thereof projecting clear of one end of the carriage; a pair of grinding wheels spaced by a distance somewhat greater than the thickness of the ring and between which the free arcuate portion of the ring is passed as the latter rotates; a vertically shiftable support for the wheels confined to vertical movement; means for actuating the support to move the wheels from a normal retracted position to facilitate initial placement of the ring in the machine to the plane of the ring in preparation for the grinding; and means for actuating the carriage to cause the outer and inner surfaces of the ring to contact in alternation with the respective grinding rollers.

RALPH M. SHAW, JR.