March 11, 1930. G. M. SANDERS 1,750,195

PISTON RING FITTING MACHINE

Filed Sept. 15, 1926 2 Sheets-Sheet 1

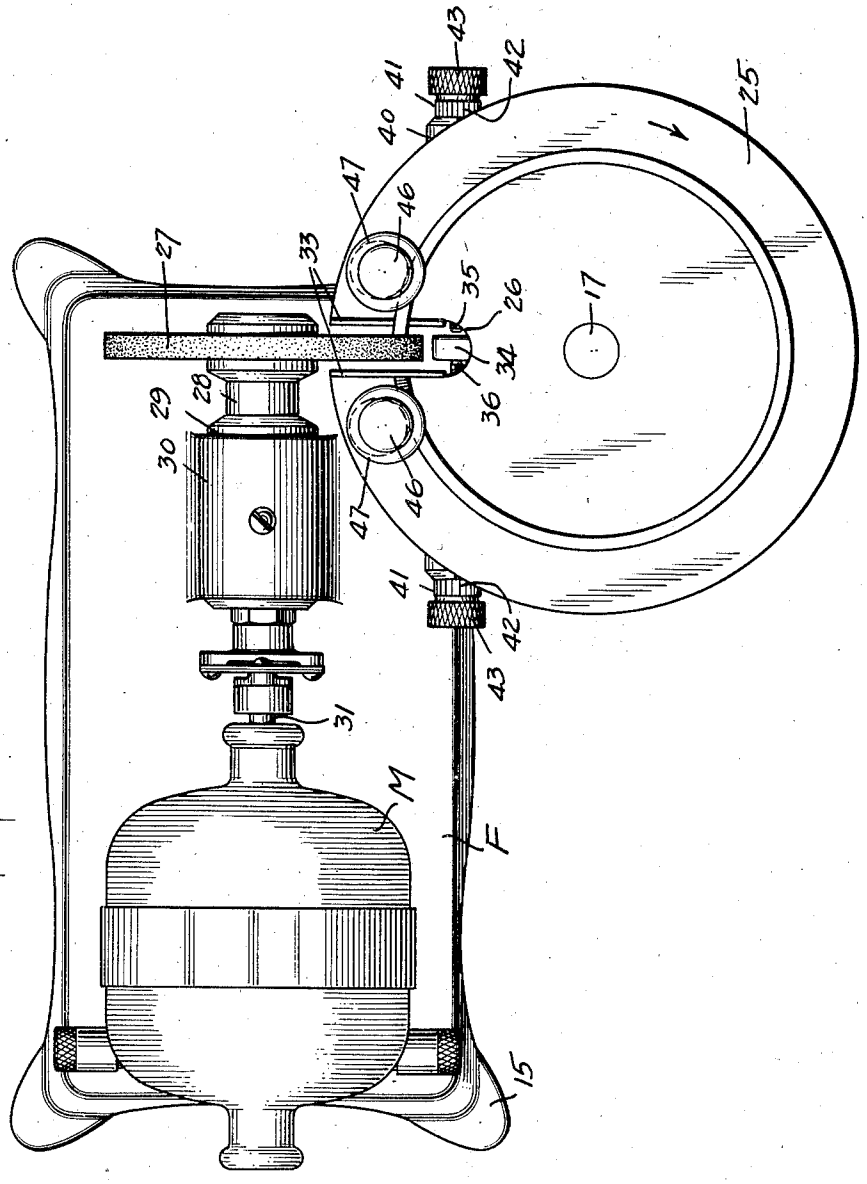


Fig. 1.

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Fig. 2.

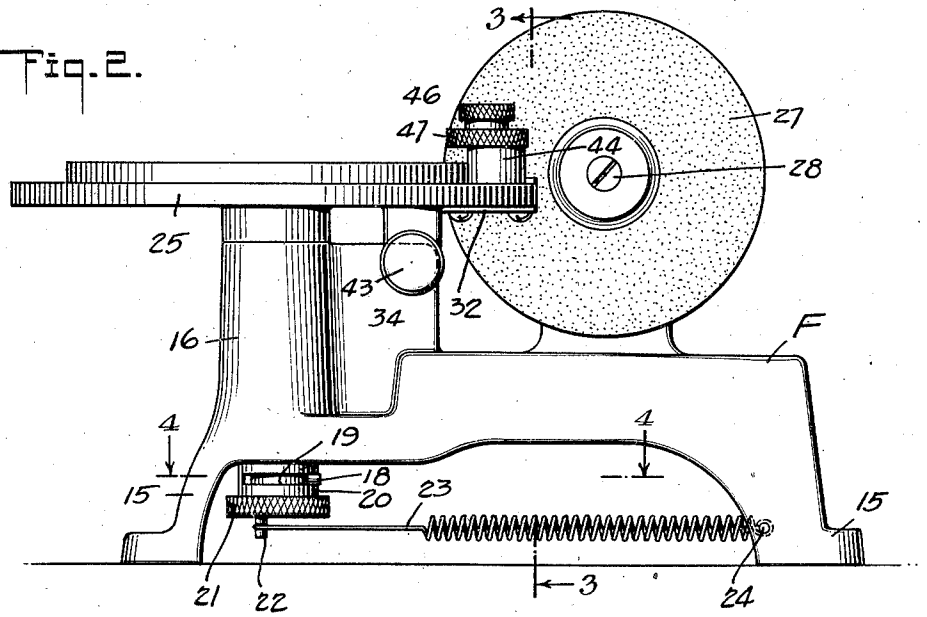


Fig. 3.

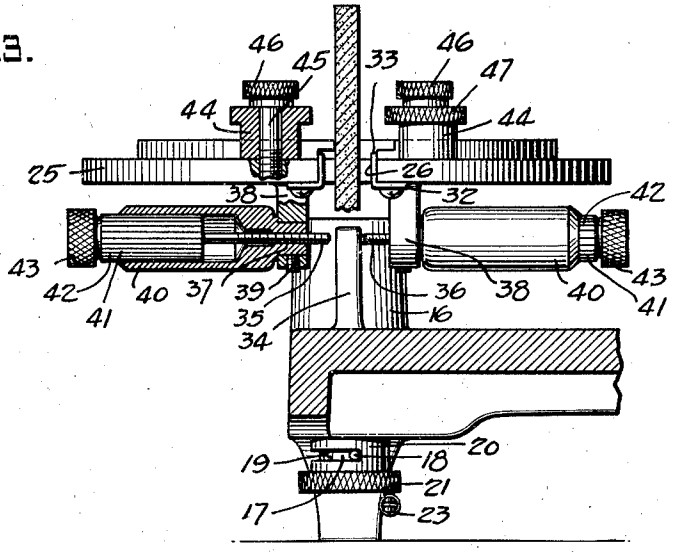
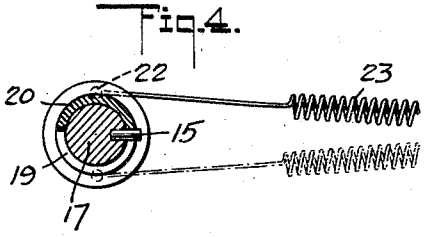


Fig. 4.



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UNITED STATES PATENT OFFICE

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PISTON-RING-FITTING MACHINE

Application filed September 15, 1926. Serial No. 135,636.

My invention relates to piston rings for internal combustion engines and the like, and a purpose of my invention is the provision of a machine by which the grinding of piston rings incident to fitting them in engine cylinders can be accomplished with facility, dispatch and a mathematical exactitude heretofore unobtainable by the hand method of fitting.

It is also a purpose of my invention to provide a ring fitting machine which is adjustable to accommodate and grind rings of different diameter and having ring end surfaces of different angularities so that the machine is adaptable to the fitting of practically all forms and sizes of rings.

I will describe only one form of piston ring fitting machine embodying my invention, and will then point out the novel features in claims.

In the accompanying drawings

Figure 1 is a view showing in top plan one form of piston ring fitting machine embodying my invention.

Figure 2 is a view showing in end elevation the machine shown in Figure 1.

Figure 3 is a fragmentary vertical sectional view taken on the line 3—3 of Figure 2.

Figure 4 is a horizontal sectional view taken on the line 4—4 of Figure 2.

Similar reference characters refer to similar parts in each of the views.

Referring specifically to the drawings, my invention in its present embodiment comprises a frame F of rectangular form supported in an elevated position by legs 15 at the corners of the frame. As shown in Figure 2, one of the legs 15 has formed integral therewith a tubular bearing 16 in which a vertically disposed shaft 17 is journaled carrying adjacent to its lower end a pin 18 which works in an arcuate slot 19 of a sleeve 20 surrounding the lower end of the shaft and provided with a knurled collar 21. A pin 22 extends downwardly from the sleeve 20 and connected to this pin is one end of a contractile spring 23, the opposite end of the spring being connected to a pin 24 of an adjacent leg 15.

Fixed to the upper end of the shaft 17 is a table 25 provided with a radial slot 26 for receiving a grinding wheel 27 fixed to one end of the shaft 28 journaled in a bearing 29 contained in an upright 30 formed integrally with the frame F. The opposite end of the shaft 28 is operatively connected to the shaft 31 of a motor M, the latter being suitably secured upon the frame F and operating to rotate the grinding wheel 27.

The radial slot 26 has secured to the parallel walls thereof a pair of brackets 32, having upstanding portions 33 which project above the upper surface of the table 25 to form limiting lips against which the ends of a piston ring bear as illustrated in Figure 1. These brackets also serve to protect the table against accidentally engaging the grinding wheel when the latter is in operation.

As clearly shown in Figures 2 and 3, a partition 34 projects radially from the bearing 16 to cooperate with a pair of screws 35 and 36 for limiting the rotational movement of the table in either direction. These screws are threaded in heads 37 secured to hangers 38 by set screws 39, the heads 37 being formed with barrels 40 in which are rotatable cylindrical members 41 graduated circumferentially by lines 42 and provided at their outer ends with knurled heads 43. The members 41 are fixedly secured to the outer ends of the screws 35 and 36 and by virtue of the fact that the screws threadedly engage the heads 37, it will be clear that rotation of the members 41 in one direction or the other will cause an inward or outward feeding of the screws to vary the spaced relation of their ends with respect to the partition 34. The screws 35 and 36 are adapted to cooperate with the partition 34 in controlling the rotary movement of the table 25 in one direction or the other, and it will be manifest that the screws are capable of having micrometer adjustments to effect a corresponding control of the movements of the table 25 in effecting the accurate grinding of piston ring ends.

In order that the machine may be adapted for the grinding of piston rings having ends with surfaces of various angularities, the table 25 is provided at opposite sides of the slot 26 with a pair of abutments 44 eccentri-

cally mounted on screws 45 threaded in the table and having knurled heads 46 which are adapted to clampingly engage the abutments to lock them in any circumferentially adjusted position, the abutments being capable of circumferential adjustments by knurled flanges 47.

The operation of the machine is as follows: In grinding a piston ring having right angular surfaces at the ends thereof, such as shown in Figure 1, and incident to the fitting of such rings to a particular cylinder, the ring is placed on the table 25 in the manner shown in Figure 1, the ring being spread so that its ends can be brought into engagement with the outer sides of the limiting lips 33. The ring is now pushed forwardly on the table until it engages the abutments 44, the abutments then being adjusted to the position shown in order that the right angular surface of one ring end is disposed in parallelism with the adjacent side surface of the grinding wheel 27.

Having first measured the internal diameter of an engine cylinder to which the ring is adapted to be subsequently applied, followed by a measurement of the ring itself, the reduction in diameter of the ring necessary to have it properly fit within the particular cylinder may thus be determined, and in accordance with this measurement the screws 35 and 36 are adjusted in the following manner to effect the necessary grinding of the ring ends in order to reduce it to such diameter. With the table 25 urged in a clockwise direction as when viewed in Figure 1 through an adjustment of sleeve 20 to the position shown in Figure 4, by adjusting the screw 36 the table is positioned so that the grinding wheel clears the left hand limiting lip 33. The table is now manually moved in a counter-clockwise direction and the screw 35 adjusted until the right hand end of the ring just contacts with the grinding wheel and its respective limiting lip 33. The table is now released and rotates in a clockwise direction under the action of the spring 23 until the screw 36 again abuts the partition 34. The screw 35 is then backed off the amount previously determined by actual measurement of the ring, which adjustment can be accurately made through the medium of the lines 42. With the screw 35 properly adjusted, it will be clear that by manually rotating the table in a counter-clockwise direction and against the tension of the spring 23 the right hand ring end will be moved in the direction of the grinding wheel and with the latter rotating it will operate to grind the end an amount determined by the adjustment of the screw 35. Following this operation the ring is reversed on the table so that the other end thereof is presented to the right side of the grinding wheel whereby, upon again moving the table 25 in a counter-clockwise direction, the other end of the ring will be ground the same amount as the first end, thus securing the desired reduction in diameter of the ring to properly fit the cylinder. It is important to note that the ring ends are maintained at right angles to the grinding surface of the wheel 27 so that a right angular surface at both ends of the ring is insured. This is an important advantage provided by my invention, as in the previous hand methods of fitting rings seldom is a right angular surface secured with the result that the ring does not fit the cylinder.

When grinding the ends of rings in which the joint between the ends is just the reverse of the joint of the ring shown in Figure 1, it is necessary that the table 25 be urged in a counter-clockwise direction, as in this form of ring first one end and then the other is presented to the left side of the grinding wheel, as when viewed in Figure 1. To urge the table 25 in a counter-clockwise direction, the sleeve 20 is adjusted so that the spring 23 occupies the position shown in dash lines in Figure 4. By an adjustment of first the screw 35 and then the screw 36 in a manner reverse to that previously described, the table can be adjusted so that upon manual rotation thereof the piston ring ends can be successively ground the required amount.

Although I have herein shown and described only one form of piston ring fitting machine embodying my invention, it is to be understood that various changes and modifications may be made therein without departing from the spirit of the invention, and the spirit and scope of the appended claims.

I claim as my invention:

1. A piston ring fitting machine comprising grinding means, ring supporting means manually movable in one direction to cause one end of a ring thereon to have grinding engagement with the grinding means, yieldable means for urging the ring supporting means in another direction to maintain said end of the ring out of engagement with the grinding means, and adjustable means for determining the degree of manual movement of the supporting means in the first mentioned direction whereby the extent to which the ring end is ground can be predetermined.

2. A piston ring fitting machine as embodied in claim 1, wherein the grinding means and ring supporting means are correlated to permit reversal of the ring on the supporting means in a manner to present the other end of the ring to the grinding means.

3. A piston ring fitting machine comprising a grinding element, a table upon which a piston ring is adapted to be supported, said table being rotatable to move the ring into grinding engagement with the element, means adjustable to control the extent of movement of the table whereby the degree of grinding

of the ring can be accurately gaged, and abutments eccentrically mounted on the table to position the ends of rings having various angular surfaces, in proper relation to the grinding element to effect grinding thereof in a manner to retain the original angle of the end surfaces.

4. A piston ring fitting machine comprising grinding means, ring supporting means manually movable in one direction to cause one end of a ring thereon to have grinding engagement with the grinding means, yieldable means for urging the ring supporting means in another direction to maintain said end of the ring out of engagement with the grinding means, and adjustable means for determining the degree of manual movement of the supporting means in the first mentioned direction whereby the extent to which the ring end is ground can be predetermined, said yieldable means being adjustable to urge the ring supporting means in the first mentioned direction to render it adaptable to another form of ring and to maintain the other end thereof out of engagement with the grinding means.

5. A piston ring fitting machine comprising a piston ring supporting table having a radial slot therein, lips on the walls of the slot against which the ends of a piston ring are adapted to bear, abutments eccentrically mounted on the table at opposite sides of the slot, for positioning the rings in respect to the lips, a shaft to which the table is fixed for rotary movement, a sleeve on the shaft having a pin and slot connection therewith to provide an operative connection between the two and to permit the sleeve to be adjusted to either of two extreme positions, a spring operating to urge the sleeve to either position whereby the shaft is likewise urged to bias the table in one direction or the other depending upon the adjustment of the sleeve, a grinding wheel rotatable in the slot, a stationary partition, and screws having micrometer adjustments and coacting with the partition to control rotative movement of the table in either direction.

6. A piston ring fitting machine comprising grinding means, ring supporting means movable in one direction to cause one end of a ring thereon to have grinding engagement with the grinding means, means for urging the ring supporting means in another direction to maintain said end of the ring out of engagement with the grinding means, and means for controlling the degree of movement of the supporting means in the first mentioned direction.

7. A piston ring fitting machine comprising a slotted ring supporting table mounted for movement, a grinding element projecting into the slot of the table, means on the table adapted to be engaged by a ring supported on the latter for maintaining the ring ends spread apart with the grinding element interposed between the ends, and means for urging the table in one direction to maintain one of the ring ends out of engagement with the grinding element and yet permit movement of the table in another direction to bring said ring end into grinding engagement with the grinding element.

8. A piston ring fitting machine comprising a slotted ring supporting table mounted for movement, a grinding element projecting into the slot of the table, means on the table adapted to be engaged by a ring supported on the latter for maintaining the ring ends spread apart with the grinding element interposed between the ends, means for urging the table in one direction to maintain one of the ring ends out of engagement with the grinding element and yet permit movement of the table in another direction to bring said ring end into grinding engagement with the grinding element, and means by which the urging action of the last means upon the table can be reversed so as to urge the table in the second mentioned direction and maintain the other ring end out of engagement with the grinding element, yet permitting movement of the table in the first mentioned direction to bring said other ring end into grinding engagement with the grinding element.

9. A piston ring fitting machine comprising a slotted ring supporting table mounted for movement, a grinding element projecting into the slot of the table, means on the table adapted to be engaged by a ring supported on the latter for maintaining the ring ends spread apart with the grinding element interposed between the ends, means for urging the table in one direction to maintain one of the ring ends out of engagement with the grinding element and yet permit movement of the table in another direction to bring said ring end into grinding engagement with the grinding element, and means adjustable to control the extent of movement of the table whereby the amount of grinding of the ring can be accurately gaged.

10. A piston ring fitting machine comprising grinding means, means upon which a piston ring is adapted to be supported with an end thereof in grinding relation to the grinding means, the grinding and ring supporting means being relatively movable to permit said end of the ring to be brought into grinding engagement with the grinding element, means by which the extent of movement of the movable means can be accurately gaged to effect grinding of said ring end a predetermined amount, and means for positioning an end of a ring irrespective of its angularity, in proper relation to the grinding element to effect grinding of the end in a manner to retain its original angle.

11. A piston ring fitting machine as embodied in claim 10 wherein said last means

comprises abutments adjustably mounted on the ring supporting means.

12. A piston ring fitting machine comprising a grinding wheel, means for supporting a piston ring for movement to cause an end thereof to have grinding engagement with the wheel, means by which the extent of movement of the first means can be accurately gaged to effect grinding of the ring end a predetermined amount, and means for positioning an end of a ring irrespective of its angularity in proper relation to the grinding wheel to effect grinding thereof in a manner to retain its original angle.

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