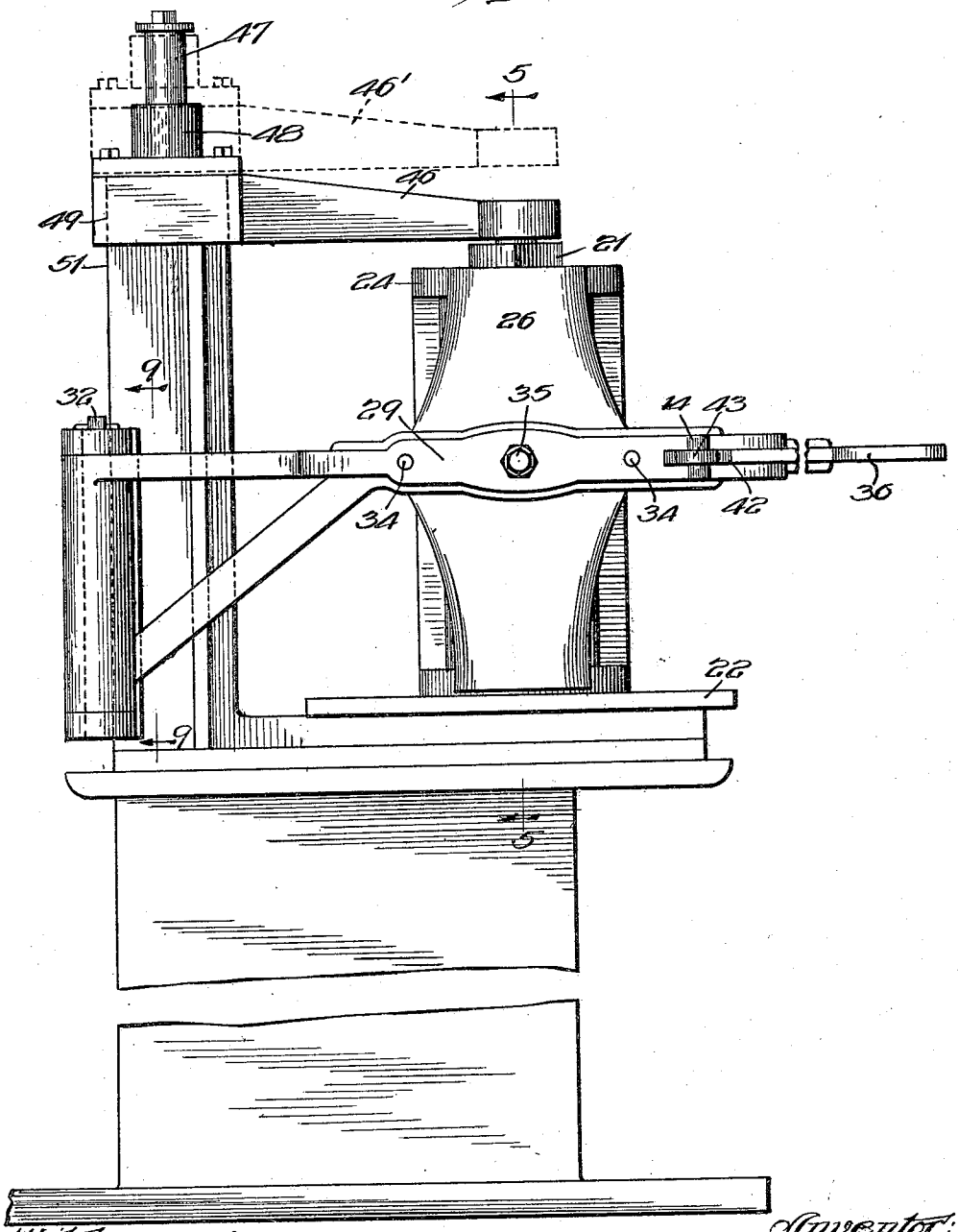
June 24, 1924. 1,498,967

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RING LOADING JACK

Filed Feb. 1, 1921 4 Sheets-Sheet 1

Fig. 1.



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RING LOADING JACK

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Fig. 2.

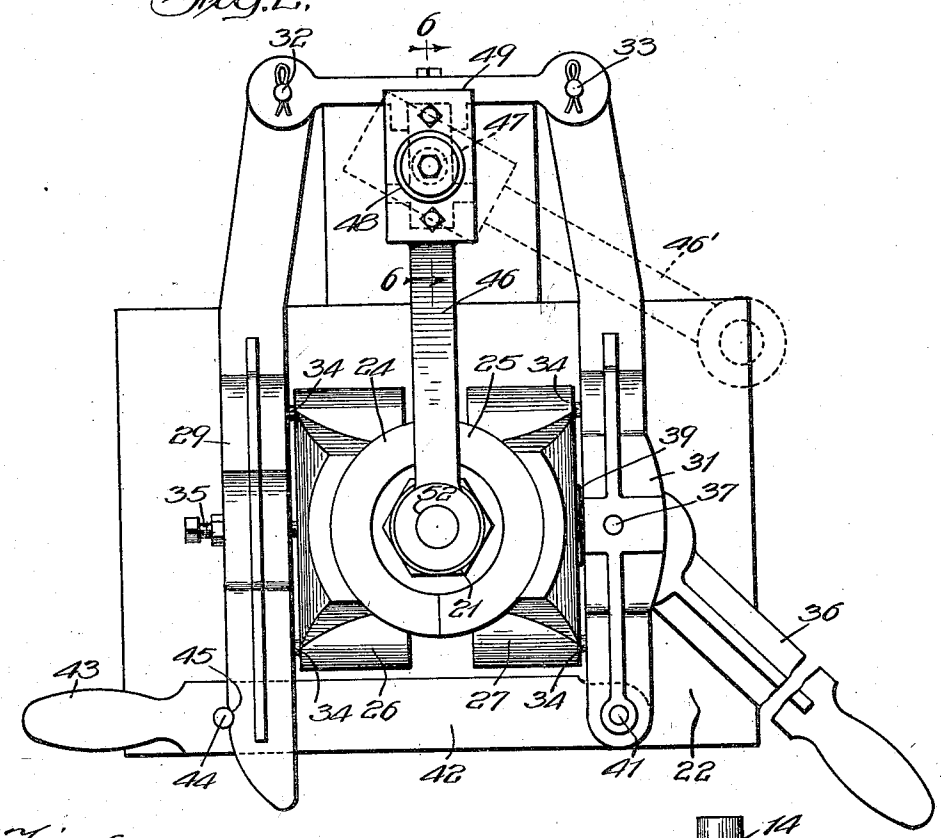


Fig. 6.

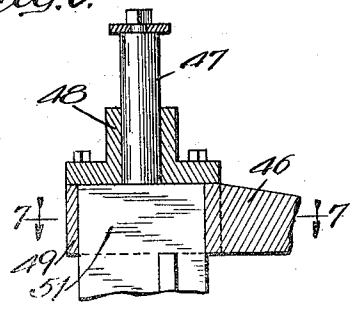


Fig. 7.

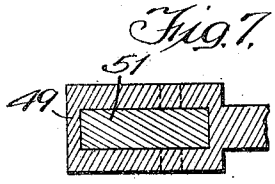
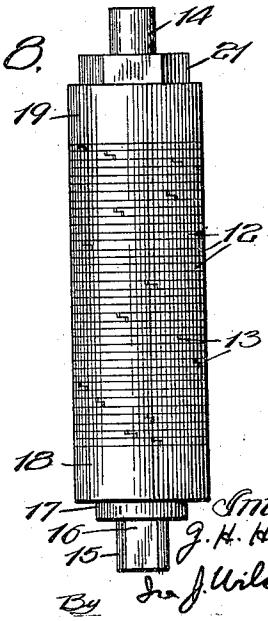


Fig. 8.



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RING LOADING JACK

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Fig. 3.

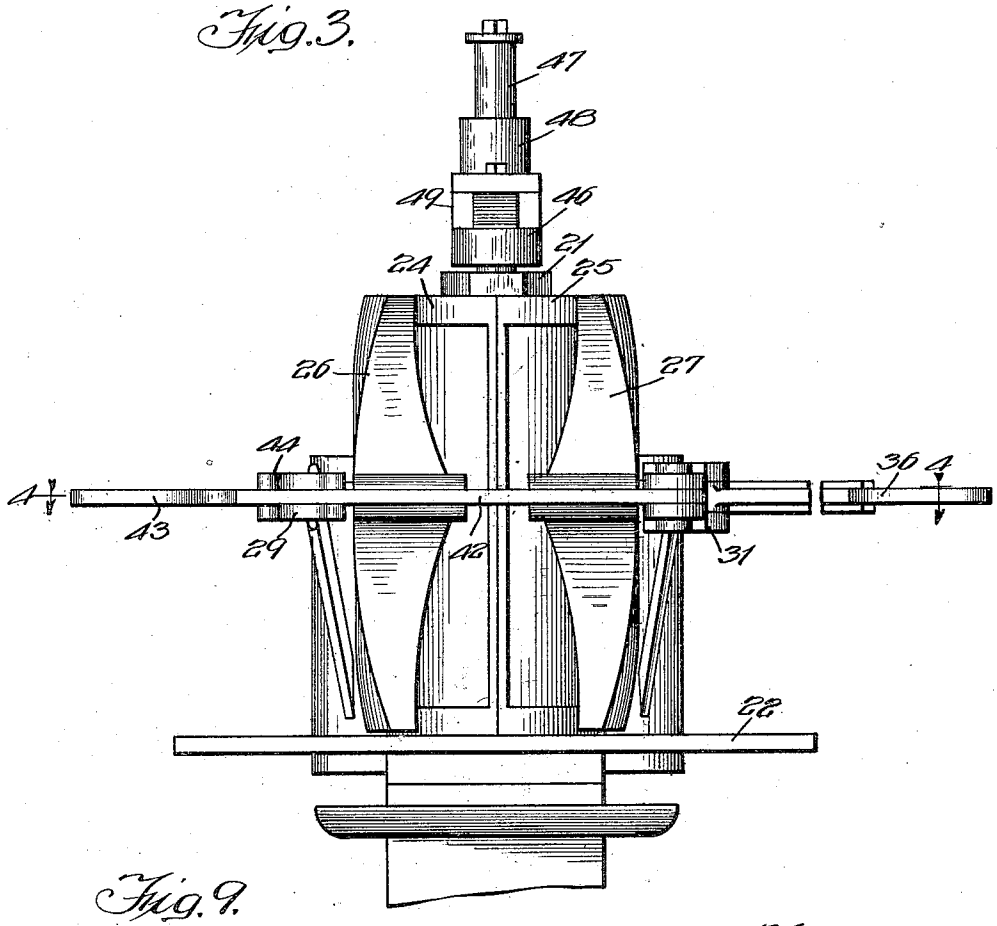


Fig. 9.

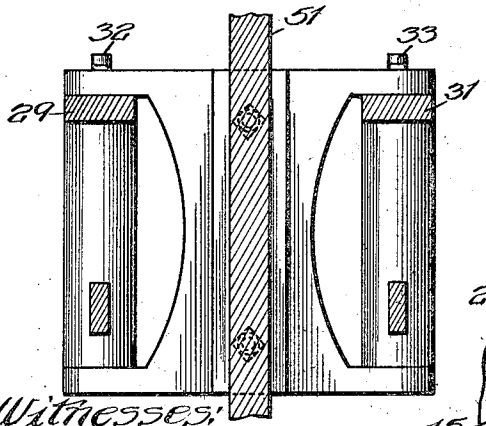


Fig. 11.

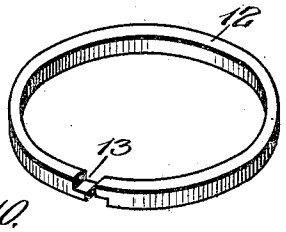
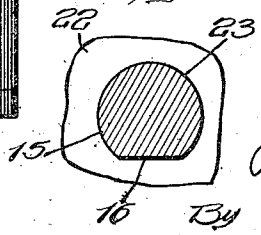


Fig. 10.



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RING LOADING JACK

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Fig. 4.

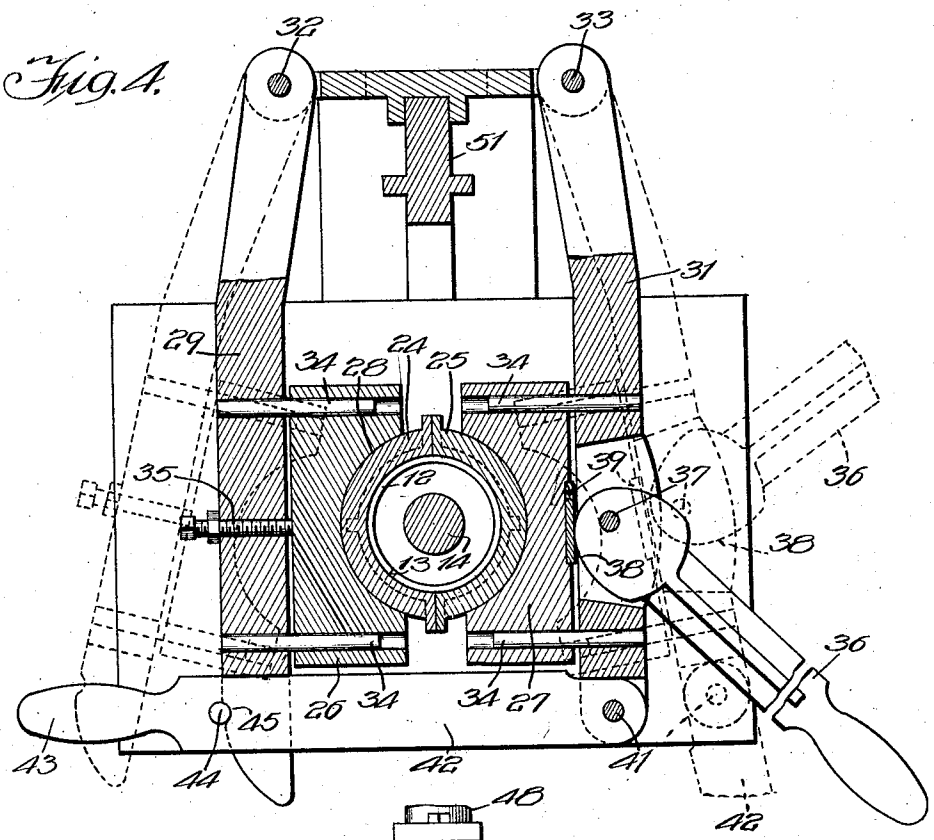
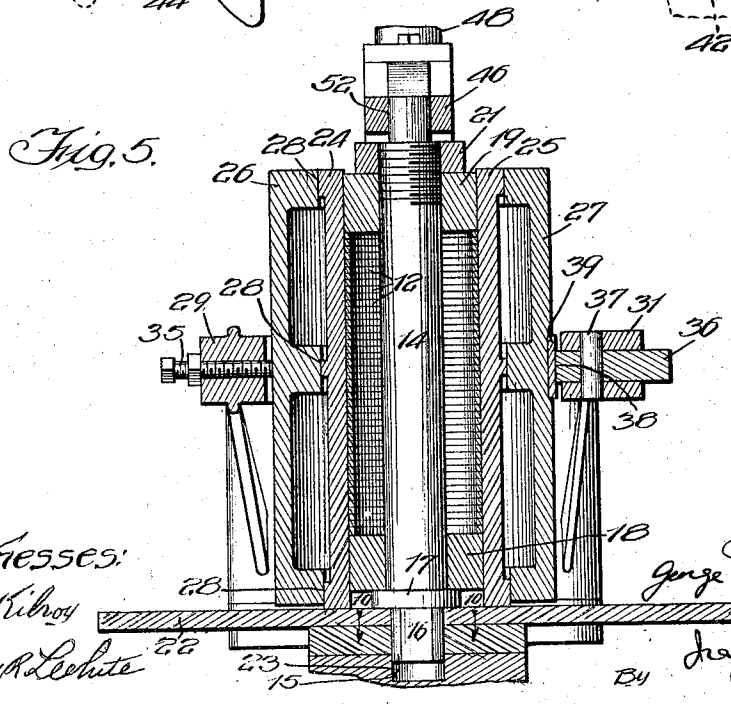


Fig. 5.



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UNITED STATES PATENT OFFICE.

GEORGE H. HIGGINS, OF ROCKFORD, ILLINOIS, ASSIGNOR TO BURD HIGH COMPRESSION RING COMPANY, OF ROCKFORD, ILLINOIS, A CORPORATION OF ILLINOIS.

RING-LOADING JACK.

Application filed February 1, 1921. Serial No. 441,617.

To all whom it may concern:

Be it known that I, GEORGE H. HIGGINS, a citizen of the United States, residing at Rockford, in the county of Winnebago and State of Illinois, have invented certain new and useful Improvements in Ring-Loading Jacks, of which the following is a specification.

This invention relates to what I term a ring-loading jack, especially designed for aligning and locking on an arbor, a stack of annular objects, such as piston rings, in an axially and radially compressed condition. The arbor with the rings thus secured thereon, may be placed between centers in a grinding machine for finishing the periphery of the rings. Heretofore, in the production of piston rings, devices have been provided for this purpose, but they have been objectionable for the reason that they require the services of a special operator for loading the rings on arbors, or that they were of complicated construction and costly to build and operate.

In the present invention, I have aimed primarily to effect a saving in the production of piston rings and of any annular objects of similar characteristics, by the provision of a novel loading jack, whereby the split rings will be radially compressed to a predetermined degree and axially aligned and secured in this condition on an arbor or the equivalent. By means of this invention, a single operator can very efficiently operate both a ring-grinding machine and a loading jack.

Another object is to provide a loading jack so constructed that the rings throughout the length of the arbor will be under equal radial compression and will be accurately aligned, irrespective of the location of the ring openings or gaps.

Other objects and attendant advantages will be appreciated by those familiar with this art as the invention becomes better understood by reference to the following description when considered in connection with the accompanying drawings, in which:—

Figure 1 is a side elevation of a loading jack embodying my invention;

Figs. 2 and 3, top and front views respectively, of the loading jack;

Fig. 4, a horizontal sectional view taken on the line 4—4 of Fig. 3;

Fig. 5, a vertical sectional view taken on the line 5—5 of Fig. 1;

Fig. 6, a detail sectional view taken on the line 6—6 of Fig. 2;

Fig. 7, a detail sectional view taken on the line 7—7 of Fig. 6;

Fig. 8, a side elevation of an arbor loaded with a stack of rings;

Fig. 9, a sectional view taken substantially on the line 9—9 of Fig. 1;

Fig. 10, a detail section taken on the line 10—10 of Fig. 5; and

Fig. 11, a perspective view of a piston ring of the type adapted to be loaded on the arbor.

The present invention designs, primarily, to effect a saving of time and labor in the loading of ring-like objects on an arbor, so that a stack of rings so loaded may be quickly and uniformly ground in a grinding machine to the requisite diameter. In illustrating the principles of my invention, I have taken as an example a conventional piston ring 12, the joint 13 of which may be of any shape, that shown being a simple lap-joint. I propose to mount a stack of these rings on an arbor designated generally by character 14, in the manner shown in Fig. 8. That is, I desire that the rings shall be in true axial alignment on the arbor and that they shall be under equal radial compression; also that they may be positioned on the arbor irrespective of the location of their respective joints. In the present case, one end 15 of the arbor has a flat cutaway 16 and an inwardly spaced rigid collar 17. The rings are stacked on the arbor between the collars 18 and 19 loose thereon, and a nut 21 threadingly engaged on the arbor is adapted for axially compressing the rings between the collars and for locking them on the arbor after they have been properly aligned and radially compressed.

In commencing the loading operation the arbor will be placed in a vertical position on the table 22 with the end 16 located in the socket 23, which as shown in Fig. 10, holds the arbor against rotation. The arbor may be loaded with a stack of rings either before or after its placement in this position, the rings being confined between the collars 18 and 19 and the nut 21 being turned down, but not tight. A sectional loading sleeve comprising in the present in-

stance, semi-circular sections 24 and 25 will now be positioned about the arbor, fittingly embracing the collars and rings. These sleeve sections normally rest on the table 22 and may be freely moved thereon. Their internal diameter is equal to the external diameter of the collars 18 and 19, this diameter being less than that of the split rings in their normal expanded condition. The sleeve sections are made sufficiently heavy as to be inflexible when under heavy radial compression at longitudinally spaced points.

Mechanism is now provided for subjecting the sleeves to considerable radial pressure for compressing the rings to the diameter of the end collars 18 and 19. This mechanism comprises in the present instance, a pair of jaws or blocks 26 and 27 having sockets 28 at their ends and medially for engaging the loading sleeves 24 and 25 respectively. The jaws are carried by swinging arms 29 and 31 pivotally mounted at the rear of the table to turn about vertical pivots 32 and 33 respectively. Each jaw is movably supported upon its respective arm by means of the supporting members or pins 34. The jaw 26, however, is normally fixed with respect to its arm by means of the bolt 35, but is adjustable relatively to the arm. The opposite jaw 27 is adapted to be moved on the supports 34 relatively to its arm 31 by means of a hand lever 36 pivoted at 37 on the arm and having a cam shaped end 38, which engages a wear plate 39 on the jaw. The jaw 31 has pivoted to its outer end at 41 a coupling arm 42 adapted for co-operation with the outer end of the arm 29. This coupling arm has a handle 43 at its outer end and a pin 44, the latter of which is adapted to engage in a notch 45 in the arm 29 after the coupling arm has been swung to the position shown in Fig. 2. In this position, the jaws 26 and 27 are closed on the sleeve sections 24 and 25 respectively.

A pilot head 46 pivotally supported on an upstanding post 47, Fig. 6, at the rear of the table, is normally disposed in the idle position 46′, shown in dotted lines in Figs. 1 and 2. The inner end of the pilot head has a cylindrical portion 48 fitting the post 47, and a rectangular socket 49 adapted to fit over the rectangular end 51 of the post proper which supports said head. The purpose of this pilot head is to locate the upper end of the arbor in true axial alignment with its lower end and to hold it in this position during the ring compressing and clamping action.

The general operation is as follows: Normally, the pilot head 46 is disposed in the idle position 46′, the arms 29 and 31 are swung back out of the way, and the loading sleeves 24 and 25 are pushed aside on the table 22 sufficiently to allow the arbor to be placed in the socket 23. The arbor is generally filled with rings before placement on the machine. The sleeves 24 and 25 will then be closed on the ring-filled arbor and the arms 29 and 31 will be swung together closing the jaws 26 and 27 on the loading sleeves, the jaws being drawn fairly tight by the act of swinging the coupling arm 42 into its locked position, shown in full lines in the drawings. The next step is to center the upper end of the arbor, which is done by swinging the pilot head from the dotted line position shown in Fig. 2, to the full line position, which aligns the socket in the part 49 with the rectangular post 51, permitting the head to drop so that the upper end of the arbor will be located in the opening 52 in the outer end of the pilot head. The operator will now draw the lever 36 forwardly, causing the sleeves 24 and 25 to be compressed under substantially 5000 pound pressure. This radially compresses the rings so that their outer peripheries are in absolute alignment and concentric with the arbor, the outside diameter of the rings in this condition being determined by the outside diameter of the collars 18 and 19. While under this radial compression, the nut 21 will be tightened to axially compress the rings and securely lock them on the arbor. The lever 36 and the coupling arm 42 may now be swung back, the pilot head 46 raised, and the sleeve sections pushed aside, permitting removal of the arbor in the condition shown in Fig. 8. The arbor may now be placed between centers in a ring grinding machine, and ground to the requisite outside diameter. The foregoing operations are such that enable loading with considerable rapidity and the construction insures absolute uniformity and precision in the radial compression of the rings to a predetermined outside diameter. It will be manifest to those familiar with this art that my invention is applicable also to the loading of objects other than piston rings. For example, annular collars, washers, or any annular blanks whether split or solid, might be aligned and locked on an arbor in the manner explained herein.

It is believed that the foregoing conveys a clear understanding of the objects prefaced above, and while I have illustrated but a single working embodiment of my invention, it should be understood that various changes might be made in the construction and arrangement without departing from the spirit and scope of the invention as expressed in the appended claims, in which—

I claim:

1. In a ring loading jack, the combination of an arbor adapted to carry a stack of split rings, a collar on each end of the arbor having a peripheral surface of predetermined outside diameter less than the normal outside diameter of the rings, means for

radially compressing the stack of rings and limited in such compression by engagement with said peripheral collar surfaces, and means for longitudinally clamping the rings for securing them onto the arbor in said radially compressed condition.

2. The combination of an arbor equipped at each end with concentric collars of uniform outer diameter, between which collars a stack of split piston rings may be interposed, means for axially aligning and uniformly radially compressing the rings to an outside diameter determined by that of the end collars, and means for axially compressing the rings to lock them on the arbor in said aligned and radially compressed condition.

3. A loading jack comprising a table, an arbor supported in a socket on the table and held against rotation, end collars on the arbor between which it is adapted to be positioned, a stack of rings, sleeve sections adapted to align and radially compress the rings on the arbor as determined by the diameter of the collars, means for applying radial pressure to said sleeve sections, and means for longitudinally compressing the rings on the arbor, and for locking the rings in such compressed condition.

4. A ring loading jack comprising an arbor adapted to carry a stack of rings, sectional sleeve sections for peripherally clamping the rings, mechanism for imposing a powerful radial clamping action on said sleeve sections, and means for compressing the rings longitudinally of the arbor while under said radial compression and for locking them in such compressed condition.

5. A loading jack comprising in combination with an arbor having end collars between which may be interposed a stack of annular objects and having also a threaded member for tightening the collars and said objects by axial compression, of a support adapted to hold the loaded arbor in upright position against rotation, a sectional sleeve adapted to radially compress said objects and limited by the collars in approach to the arbor, a pilot head for holding the upper end of the arbor in vertical alignment with the lower end, and means for subjecting said sleeve sections to powerful radial compression for aligning the rings and compressing them to predetermined outer diameter.

6. A loading jack comprising in combination with an arbor having end collars between which may be interposed a stack of annular objects and having also a threaded member for tightening the collars and said objects by axial compression, of a support adapted to hold the loaded arbor in upright position against rotation, a sectional sleeve adapted to radially compress said objects and limited by the collars in approach to the arbor, a pilot head for holding the upper end of the arbor in vertical alignment with the lower end, a pair of pivoted arms adapted to be swung into and out of closing relation with said sleeve sections and one of said arms having a coupling member adapted to connect with the opposite arm when in said closed relation, and a cam lever on one of said arms operable to impose a powerful radial compression on the sleeve sections.

7. A loading jack comprising in combination with an arbor having end collars between which may be interposed a stack of annular objects and having also a threaded member for tightening the collars and said objects by axial compression, of means for supporting the arbor against rotation, sleeve sections embracing the rings and collars, and means for radially compressing said sleeve sections including a cam and operating means therefor.

8. A loading jack comprising a table adapted to support an arbor in upright position, and to hold the arbor against rotation, end collars on the arbor between which may be interposed a stack of annular objects, sleeve sections embracing the annular objects and collars throughout substantially the length thereof, a pair of jaws adapted for radially clamping the sleeve sections, means pivotally supporting the jaws so that they may be swung into and out of clamping position, cam-operated means for imposing a powerful radial clamping action on the jaws, and a nut on the arbor for axially compressing and locking the annular objects to the arbor.

9. A loading jack for aligning, radially compressing and locking piston rings on an arbor, comprising means for supporting the arbor in upright position against rotation, a pair of arms pivotally supported at the back of the table and each equipped with means adapted to be brought into clamping relation with the rings and to be swung outwardly on the arm pivots to inoperative position, means for coupling said arms in clamping relation, and a cam lever mounted on one of said arms for imposing a powerful radial compression on said clamping means.

10. Means for aligning, axially compressing and locking a stack of split rings on an arbor, comprising a table for supporting an arbor in upright position against rotation, a pilot head for holding the upper end of the arbor in vertical alignment with the lower end, longitudinally split sleeve sections embracing the rings, a pair of levers pivotally mounted at the rear of the arbor and reaching forwardly, one at each side thereof, a jaw carried by each arm for clamping one of said sleeve sections, means

for coupling the forward ends of said arms to prevent spreading, a cam lever on one of said arms operable for imposing a powerful clamping action on said jaws to thereby align and radially compress the rings, and a nut on the arbor for axially compressing and locking the rings on the arbor.

11. The combination of a table, an arbor supported thereon in upright position and held against rotation, concentric end collars on the arbor between which are adapted to be interposed a stack of split piston rings, a nut on the arbor above the uppermost collar, a pilot head for holding the upper end of the arbor in axial alignment with the lower end, a pair of semi-circular elements reaching from collar to collar and adapted for radially compressing the rings to a diameter determined by the outside diameter of said collars, and means for subjecting said elements to a powerful radial compression.

GEORGE H. HIGGINS.