May 20, 1924. 1,494,913

J. W. HUGHES

METHOD OF AND APPARATUS FOR SECURING PISTON RINGS PRIOR TO GRINDING OR TURNING

Filed Feb. 8, 1923 2 Sheets-Sheet 1

Fig. 1.

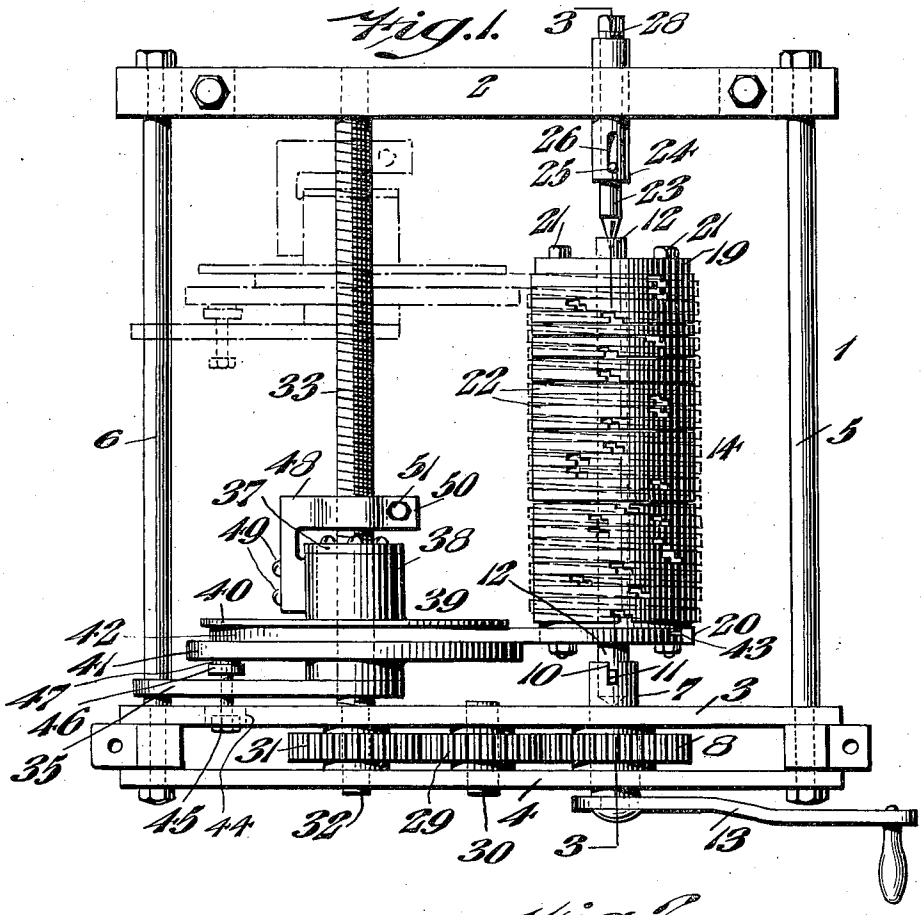
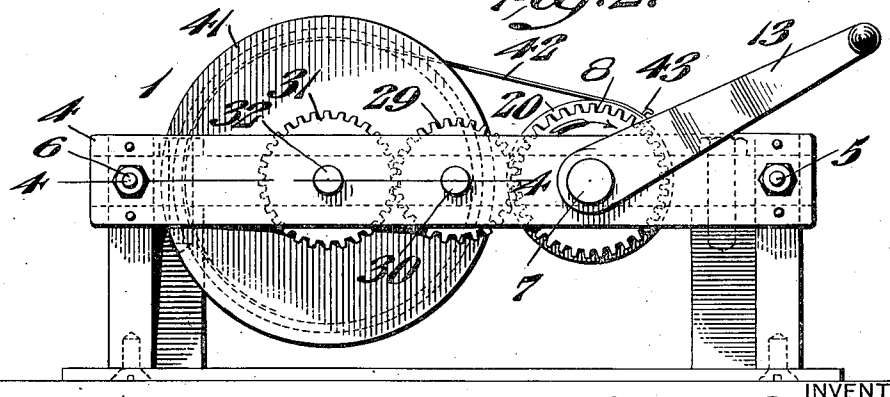


Fig. 2.



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Filed Feb. 8, 1923 2 Sheets-Sheet 2

Fig. 3.

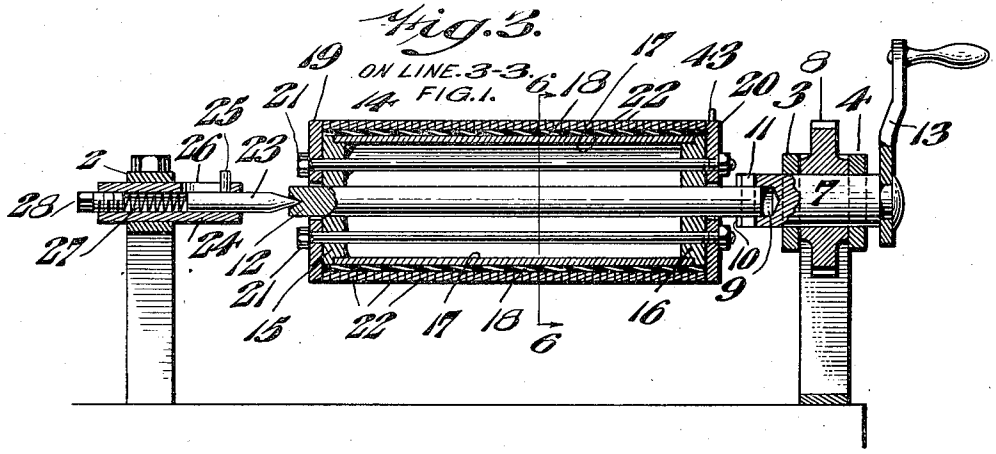


Fig. 4.

ON LINE 4-4, FIG. 2.

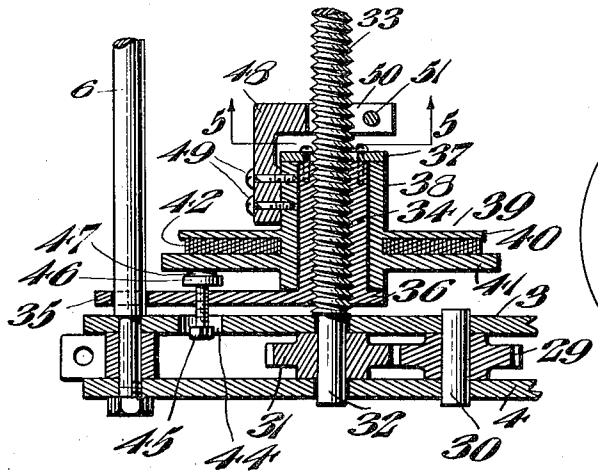


Fig. 6.

ON LINE 6-6, FIG. 3.

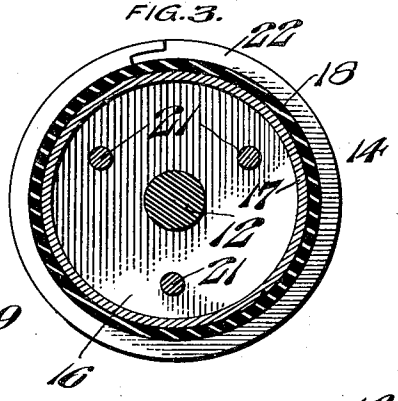


Fig. 5.

ON LINE 5-5, FIG. 4.

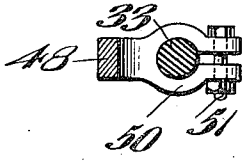
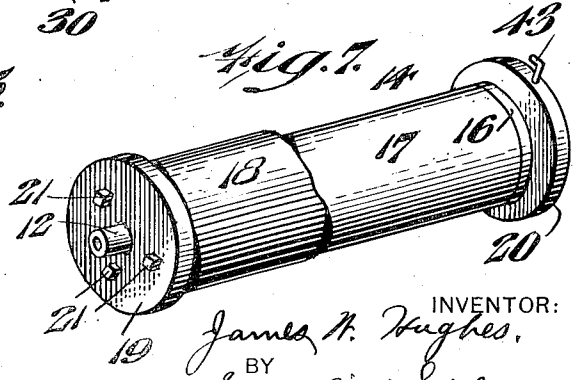


Fig. 7.



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UNITED STATES PATENT OFFICE.

JAMES W. HUGHES, OF WYNCOTE, PENNSYLVANIA, ASSIGNOR TO WILLIAM H. STEHLE, OF PHILADELPHIA, PENNSYLVANIA.

METHOD OF AND APPARATUS FOR SECURING PISTON RINGS PRIOR TO GRINDING OR TURNING.

Application filed February 8, 1923. Serial No. 617,725.

To all whom it may concern:

Be it known that I, JAMES W. HUGHES, a citizen of the United States, residing at Wyncote, in the county of Montgomery, State of Pennsylvania, have invented a new and useful Method of and Apparatus for Securing Piston Rings Prior to Grinding or Turning, of which the following is a specification.

Heretofore, the ordinary method of binding or assembling and securing cut piston rings upon an arbor or mandrel prior to grinding or turning, has been to take each individual ring, squeeze it close to the piston or mandrel either manually or mechanically, and then wrap a wire around the outer periphery of each ring and twist the wire ends together until the juxtaposed ends comprising the joint of the circular piston ring are drawn tightly together, as said joint normally appears when in working position or in use.

After each ring has thus been wired they are assembled upon a mandrel in lots of 50 or 100, said mandrel being provided with a flange at either end and longitudinal bolts are provided for clamping these flanges against the outer rings and thus holding all the closed rings tightly in contact when assembled or mounted. As soon as the rings are mounted and clamped firmly together sidewise by means of the bolts and flanges until the rings can no longer spring apart, the wires are then cut from each individual ring and the rings are collectively ground in the cylindrical form while thus assembled. By the foregoing procedure, much time is expended in assembling and wiring the individual rings, and there is a considerable loss or waste in the wire used.

My invention does away with the necessity of wiring each ring individually before mounting it upon the mandrel and comprises a novel construction of mandrel, comprising a shaft, end walls, a cylindrical body common thereto and an outer covering or cylinder of rubber or other resilient material.

It further consists of a novel, manner of detachably mounting said mandrel, so that it can be readily rotated, either manually or mechanically, and readily disengaged from its support or centers when desired.

It further consists of the novel combination of a mandrel of the character above described, in conjunction with a feed screw, having a nut thereon, said nut carrying a reel loosely mounted thereon and having one end of a coiled spring secured to said reel and the other or outer end of said spring being detachably secured to a suitable portion of said mandrel or its adjuncts, whereby as the feed screw and the mandrel are simultaneously and synchronously rotated, the reel will travel longitudinally of said feed screw and the spring will be unwound therefrom and spirally wrapped around the assembled piston rings, so that the latter will be tightly compressed to the desired extent upon said mandrel, after which they are clamped while in compressed condition and the assembled mandrel and rings can then be removed so that the rings can be subjected to the subsequent grinding or other operations.

It further consists of a novel construction of a reel braking device, coacting with the above elements.

It further consists of a novel manner of mounting and actuating both my novel mandrel and the spring carrying reel.

It further consists of a novel method of binding or compressing piston rings upon an arbor or mandrel, whereby a plurality of rings, after being cut, are assembled and compressed upon a resilient arbor by automatically winding a continuous flexible spring of wire spirally over the outer periphery of said rings as they are retained contiguous to each other upon said resilient arbor, prior to their being clamped sidewise tightly together.

If further consists of other novel features of construction, all as will be hereinafter fully set forth.

For the purpose of illustrating my invention, I have shown in the accompanying drawings forms thereof which are at present preferred by me, since they will give in practice satisfactory and reliable results, although it is to be understood that the various instrumentalities of which my invention consists can be variously arranged and organized and that my invention is not limited to the precise arrangement and organization of these instrumentalities as herein shown and described.

Figure 1 represents a plan view of one

form of a novel apparatus for binding and clamping together cut piston rings, prior to grinding or turning, wherein my novel method may be carried out.

Figure 2 represents an end view of Figure 1.

Figure 3 represents a section on line 3—3 of Figure 1.

Figure 4 represents a section on line 4—4 of Figure 2.

Figure 5 represents a section on line 5—5 of Figure 4.

Figure 6 represents on an enlarged scale a section on line 6—6 of Figure 3.

Figure 7 represents a perspective view of the resilient arbor or mandrel, seen in Figures 1 and 3, in detached position, showing a portion of the outer resilient covering broken away.

Similar numerals of reference indicate corresponding parts.

Referring to the drawings:—

1 designates my novel construction of apparatus, the same comprising a suitable framework composed of the side or end members 2, 3 and 4, which are supported upon uprights or otherwise in any suitable manner and tied together by the front and rear rods 5 and 6.

7 designates a short driving shaft, which is rotatably mounted in the end bars 3 and 4, upon which is fastened the driving gear 8, the inner end of said shaft being provided with a seat 9, whose end walls are slotted as indicated at 10, so as to interlock with the transverse lug or pin 11, which is located near the end of the shaft 12.

The driving shaft 7 and the gear 8 fast thereon can be rotated mechanically or manually, and in the present instance, I have shown it as being provided with a crank handle 13 for manual operation.

The shaft 12 and its adjuncts, next to be described, constitute a mandrel, arbor or ring support 14 of novel design which is constructed as follows:—

The arbor, mandrel or ring support 14 is composed of the outer heads 15 and 16, which are engaged by the ends of the inner tube or cylinder 17, upon which is mounted the outer rubber cylinder or casing 18. The end heads 15 and 16 are fast upon the shaft 12, and upon the ends of the latter are loosely mounted the end plates or clamps 19 and 20, the end plate or clamp 19 being contiguous to the head 15, and the end plate or clamp 20 being contiguous to the head 16.

The outer peripheries of the clamping plates 19 and 20 extend beyond the periphery of the heads 15 and 16, so as to engage the sides of the contiguous piston rings when said plates are clamped towards each other.

21 designates rods or long bolts, which in the present instance are three in number and pass through the members 19, 15, 16 and 20 parallel to the shaft 12, and are supplied with heads at one end and nuts at the other end for the purpose of tightening the end plates 19 and 20 when desired, so as to clamp said plates sidewise upon the compressed rings.

Upon the cover or resilient cylindrical body 18 I mount the cut piston rings 22, as will be understood from Figures 1, 3, and 6. The end shaft 12 carrying the transverse pin or lug 11 is located in the seat 9, as already explained, while the opposite end of said shaft 12 revolves upon the center 23, which is mounted in the bearing 24, said center having the pin 25 projecting upwardly through the slot 26 of said bearing. 27 designates a spring bearing on the center 23, tending to push the latter inwardly into engagement with the contiguous end of the shaft 12.

28 designates a plug against which, one end of the spring 27 abuts, the other end abutting against said center 23.

Referring now to Figures 1 and 2, it will be seen that the driving gear 8 fast on the shaft 7 is in mesh with the idler 29 mounted on the shaft 30, which latter has its bearing in the end bars 3 and 4, said idler 29 being in mesh with the driven gear 31, which is fast on the end 32 of the feed screw 33, whose other end is mounted in the portion 2 of the framework or housing.

The feed screw 33 has in engagement therewith the nut 34, which has an arm 35 through the outer end of which freely passes the rod 6 (as will be understood from Figure 4) said nut 34 being provided with the shoulder 36 at one end and at the opposite end with the detachable plate 37. The engagement of the arm 35 with the rod 6 prevents the nut from rotating.

The nut 37 has loosely mounted thereon, the hub 38 of the reel 39, which is composed of the disks 40 and 41 between which the flat spring or wire 42 is contained.

The outer end of the spring or wire 42 is hooked over the hook 43, on the clamping plate 20, see Figures 1 and 2, it being understood that the inner end of said spring is fast to the hub 38, so that as the arbor 14 and the rings thereon are rotated the binding means 42 is kept taut and tightly wrapped around the contiguous compressed rings.

44 designates a hole in the bar 3, in which is located the bolt or threaded stem 45, which carries the head 46 provided with the brake shoe 47, said threaded stem 45 being threaded in the arm 35, as will be understood from Figure 4, so that the degree of pressure of the shoe 47 upon the disk 41 may be regulated.

48 designates an arm, which is secured to the hub 38 by the screws 49, said arm hav-

ing the jaws or members 50, extending at a right angle thereto, and embracing the screw 33 the outer end ends of said jaws being provided with a bolt or other clamping means 51, whereby it will be seen that when the bolt 51 is tightened, the jaws will be drawn together and frictionally engage the feed screw 33 to the desired extent.

The operation is as follows:—

The mandrel 14 and its adjuncts, having been removed from the machine, the cut rings are assembled thereon, as seen in Figures 1 and 3, the inner periphery of said rings being in contact with the cylindrical rubber body 18, as will be understood from Figures 3 and 6.

The mandrel is then replaced in the machine and the end of the spring 42 engaged with the hook 43 so that the parts appear as seen in Figures 1 and 3. Upon the rotation of the crank 13, the shaft 12 will be rotated, and the gears 8, 29 and 31 and feed screw 33, the nut 34 will be rotated and the reel 39 and its adjuncts will move from the position seen in full lines in Figures 1 and 4 to the position seen in dotted lines in Figure 1. The spring or binding means 42, as it travels longitudinally of the feed screw 33 will be wound spirally upon the cut rings 22 as will be evident from Figure 1 and the rings will thus be clamped or bandaged tightly down upon the resilient arbor body 18 and will be tightly closed at their joints as is evident. The rotation of the mandrel 14 and the rings carried thereby is simultaneous or sychronous with the rotation of the feed screw 33 and the reel 39 carrying the binding spring or wire will, during its travel, effectively bind or bandage the rings tightly upon the resilient arbor body 18 as is evident.

When all the rings are bandage down upon the arbor as above described, the nuts on the elongated bolts or rods 21 are then tightened, so that the clamps 19 and 20 will be drawn together and the rings 22 will be tightly clamped thereby and positively prevented from spreading apart after the wire or binding device 42 is removed or unwound from them.

After the nuts of the bolts 21 have been firmly tightened up, the spring 42 is unwound from the mandrel by a reverse operation and is re-wound upon the reel 39, the parts now appearing as seen in full lines in Figures 1 and 4.

The mandrel 14 with the assembled compressed and clamped piston rings thereon is then removed from the machine and the rings are ground in any standard grinding machine, as may be desired. The relative movements of the nut 34 and reel 39, relative to the feed screw 33 may be adjusted by the manipulation of the bolts 45 and 51, as is evident.

It will be evident that by the employment of the novel mandrel construction above described having the resilient outer body 18, that the rings of varying sizes can be assembled upon the mandrel by reason of the resiliency of said rubber body, so that one standard sized mandrel is capable of use with piston rings of varying sizes.

The mandrel 14 and its adjuncts is readily assembled within the machine by centering the end of the shaft 12 contiguous to the center 23 and moving it outwardly against the tension of the spring 27, after which the opposite end of the shaft 12 is interlocked within the seat 9 of the driving shaft 7.

It will be apparent from the foregoing that my invention effects a greater saving in time and labor, which has heretofore been expended in assembling out piston rings prior to grinding or turning them and in addition I eliminate entirely the waste of the wire heretofore used upon each individual ring. It will be evident that changes in the framework and in the manner of supporting and actuating the various parts may be made without departing from my invention, and that the binding or bandaging element 42 may be a flat spring or round wire. Other equivalent means may be employed for simultaneously or synchronously actuating the feed screw 33 and its adjuncts and the mandrel or arbor 14 and its adjuncts, so as to effect the simultaneous unwinding of the binding means and the helical wrapping or binding or compressing of the cut rings, upon their resilient or cushioned support 18, and as I am the first in the art to effect the foregoing steps or to produce any mechanism of the character described, my claims are to be interpreted with the scope accorded to inventions of this character.

Having thus described my invention what I claim as new and desire to secure by Letters Patent, is:—

1. The method of securing cut piston rings, prior to grinding, which consists in assembling a plurality of said rings upon an arbor, winding a binding means spirally on the outer peripheries of said rings to compress the latter upon said arbor and bring the opposed cut ends into juxtaposition, and lastly clamping said rings sidewise to retain them in compressed condition during subsequent operations.

2. The method of compressing and clamping cut piston rings upon an arbor prior to grinding, which consists in assembling a plurality of cut compressible rings upon an arbor having a resilient body, tightly winding a binding means spirally on the outer peripheries of said rings to compress the latter tightly upon said arbor, clamping said rings tightly together sidewise, and lastly unwinding said binding means from the compressed clamped rings.

3. In a machine of the character stated, an arbor for supporting piston rings, and means for winding a ring compressing device spirally with respect to said arbor.

4. In a machine of the character stated, an arbor for supporting piston rings, means for winding a ring compressing device spirally with respect to said arbor, and end clamping plates carried by said arbor.

5. In a machine of the character stated, an arbor having a resilient outer body for supporting piston rings, means for winding and unwinding a ring compressing device spirally with respect to said arbor, and end clamping plates carried by said arbor.

6. In a machine of the character stated, the combination of an arbor, a plurality of cut piston rings thereon, and means for winding a compressing device spirally around the outer peripheries of said rings.

7. In a machine of the character stated, an arbor, a plurality of cut piston rings thereon, means for tightly winding a compressing device spirally upon the outer peripheries of said rings, to compress the latter and means for clamping said rings sidewise tightly together.

8. In a machine of the character stated, an arbor, a plurality of cut piston rings thereon, means for winding a compressing device spirally upon the outer peripheries of said rings to compress the latter, means for clamping said rings sidewise tightly together, and means for unwinding said compressing means.

9. In a machine of the character stated, an arbor for supporting piston rings, comprising a resilient outer cylinder, end clamping plates of greater diameter than said cylinder, and means for drawing said plates towards each other.

10. In a machine of the character stated, an arbor for supporting piston rings, comprising a shaft, end heads fast thereon, an inner cylinder common to said end heads, an outer resilient cover mounted on said cylinder, clamping plates loose on said shaft and contiguous to said end heads, and means for drawing said clamping plates toward each other.

11. In a machine of the character stated, an arbor for supporting piston rings, comprising a shaft, end heads fast thereon, an inner cylinder common to said end heads, an outer resilient cover mounted on said cylinder, clamping plates loose on said shaft and contiguous to said end heads, means for drawing said clamping plates towards each other, a driving means for one end of said arbor, a center for the other end of said arbor and devices actuated from said arbor driving means for winding a binding wire spirally with respect to said arbor.

12. In a machine of the character stated, an arbor to support piston rings, a feed screw, gearing common to said arbor and feed screw, a nut for said feed screw, a reel loose on said nut, and a binding wire wound on said reel, and having one end attached thereto and the other end secured to a portion of said arbor.

13. In a machine of the character stated, an arbor, adapted to support piston rings, a feed screw, gearing common to said arbor and feed screw, a nut for said feed screw, a reel loose on said nut, a binding wire wound on said reel and having one end attached thereto and the other end secured to said arbor, and braking means common to said nut and reel and to said reel and feed screw.

14. In a machine of the character stated, an arbor for supporting piston rings, means for winding and unwinding a binding device helically with respect to said arbor, and means for adjusting and regulating the speed of the winding and unwinding operations.

15. In a machine of the character stated, an arbor for supporting cut piston rings, a driving shaft with which one end of said arbor is detachably interlocked, a spring pressed center engaging the opposite end of said arbor, means for winding and unwinding a binding member spirally with respect to said arbor, and end clamping plates carried by said arbor for clamping the compressed piston rings sidewise.

16. In a machine of the character stated, an arbor having a resilient outer covering, a feed screw arranged in parallelism to said arbor, gearing common to said arbor and feed screw, a nut for said feed screw, means for preventing said nut from rotating, a reel loose on said nut and carried thereby, and a binding wire wound on said reel and having one end attached thereto, and the other end detachably secured to a portion of said arbor.

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Witnesses:
C. D. McVay,
Emily Izora Vogdes.