

A. G. CARLSON.
 AUTOMATIC PEENING APPARATUS FOR PISTON RINGS.
 APPLICATION FILED AUG. 14, 1919.

1,374,877.

Patented Apr. 12, 1921.

3 SHEETS—SHEET 1.

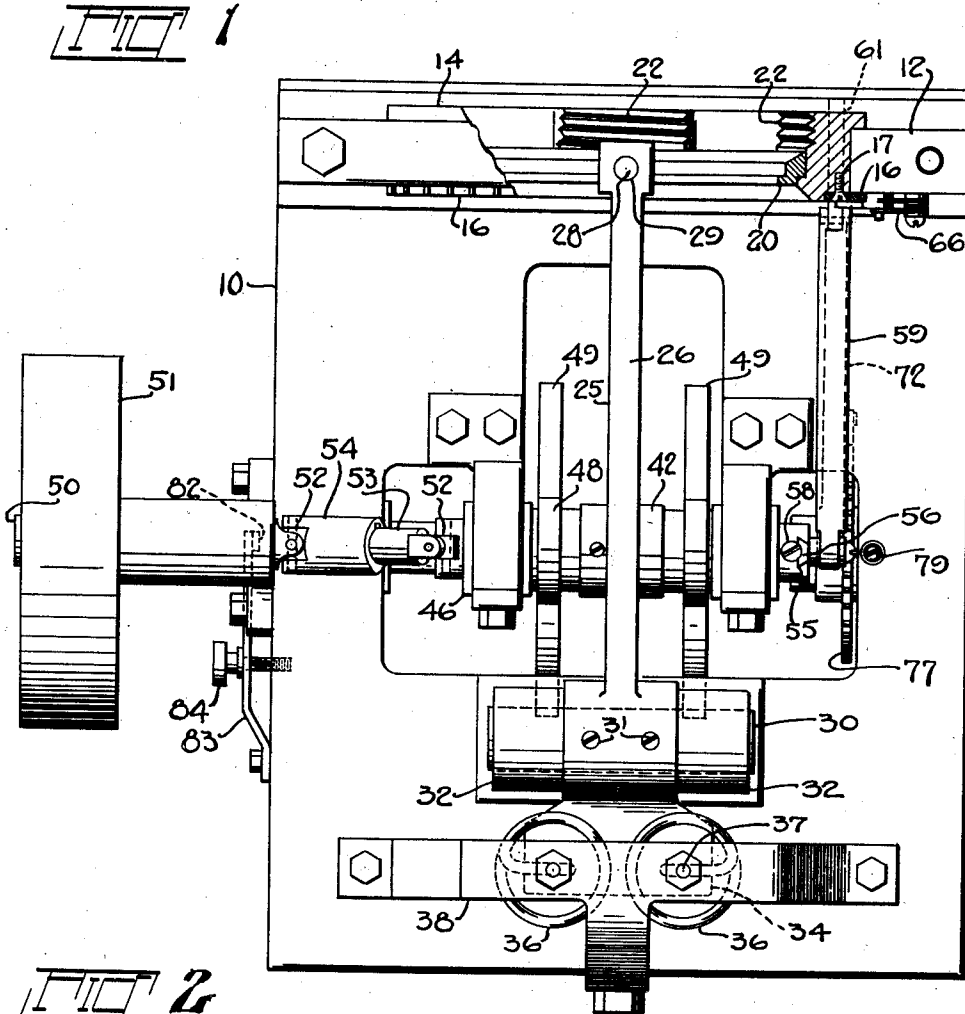
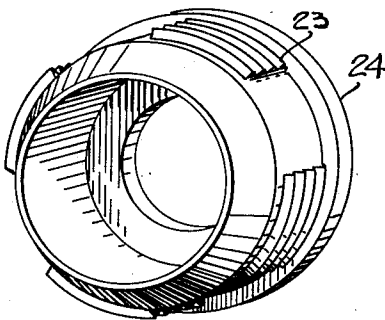


FIG. 2



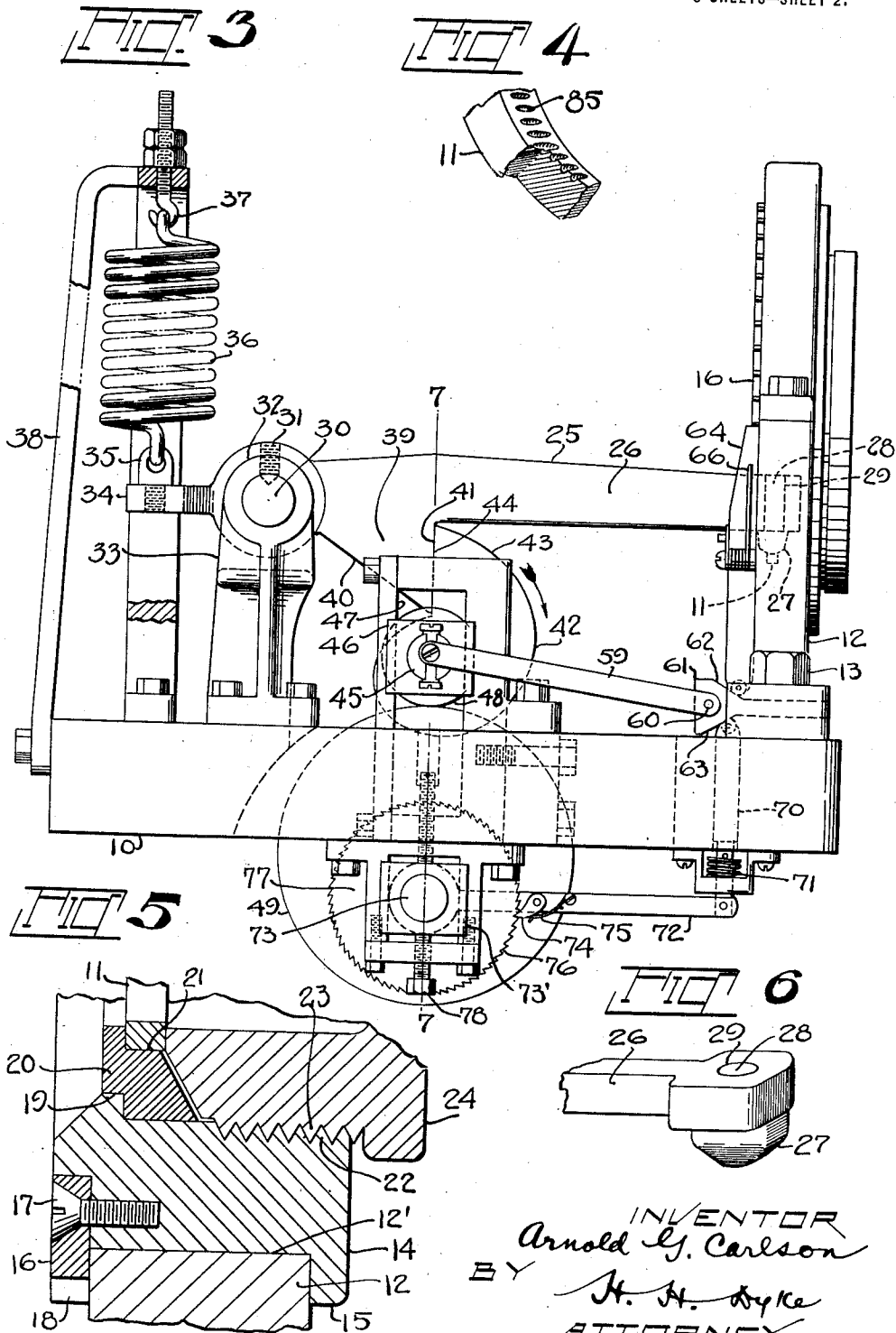
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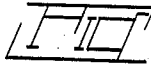
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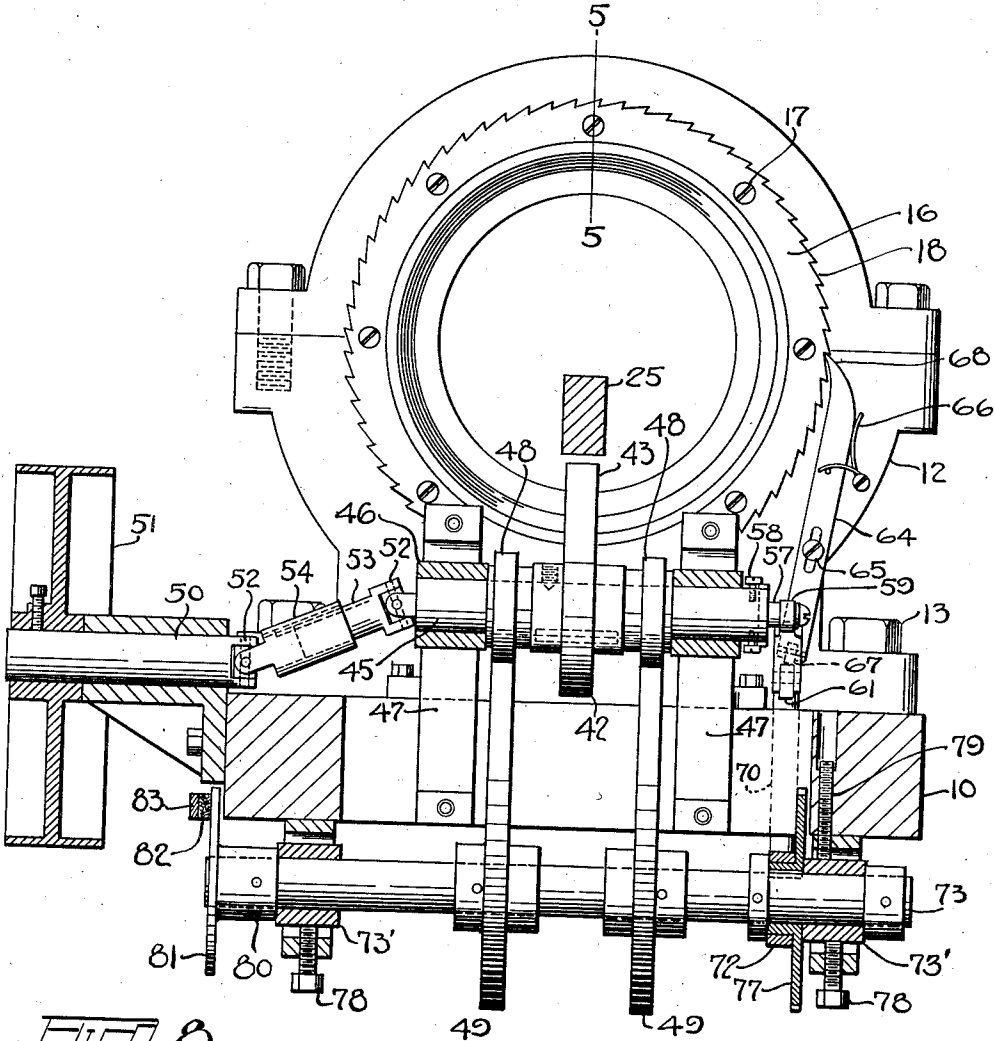
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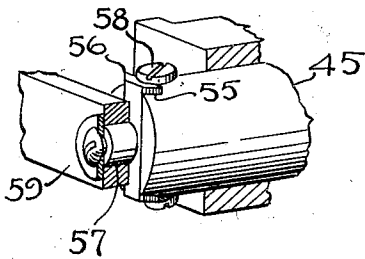
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3 SHEETS—SHEET 3.

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UNITED STATES PATENT OFFICE.

ARNOLD G. CARLSON, OF PATERSON, NEW JERSEY.

AUTOMATIC PEENING APPARATUS FOR PISTON-RINGS.

1,374,877.

Specification of Letters Patent.

Patented Apr. 12, 1921.

Application filed August 14, 1919. Serial No. 317,566.

To all whom it may concern:

Be it known that I, ARNOLD G. CARLSON, a citizen of the United States, and a resident of Paterson, county of Passaic, and State of New Jersey, have invented certain new and useful Improvements in Automatic Peening Apparatus for Piston-Rings, of which the following is a specification.

My invention relates to an automatic peening apparatus for piston rings for use with pistons of internal combustion engines, steam engines, pumps, etc.

One object of the invention is the provision of a spring actuated peening device or hammer adapted to produce a definite amount of peening or compressing effect on the material of the ring, according to the extent to which the spring is stretched or otherwise deformed before the hammer is released, whereupon the stroke is delivered by action of the spring. With such arrangement, the intensity of the blows delivered depends only on the extent to which the spring is deformed prior to being released, and is not affected by changes in the speed at which the device is operated, or by other similar causes.

Another object of the invention consists in the provision of common means for automatically turning the ring under the hammer and for varying the lift of the hammer before release, whereby the intensity of peening blows is automatically graduated according to the part of the ring upon which the peening blows are delivered.

The invention further consists in the improvement of apparatus of the type referred to in various respects, as will hereinafter be pointed out in detail, and with the foregoing and related objects in view the invention consists in the combinations, elements and features of construction herein described and defined in my claims.

In the accompanying drawings I have shown one embodiment of my invention, but it is to be understood that the same is for illustration and for affording a clear understanding of my invention only and not for limitation of the invention.

Figure 1 is a plan view of a machine embodying my invention. Fig. 2 is a perspective view of an interrupted screw thread clamping device for clamping a piston ring in place. Fig. 3 is a side view of the machine shown in plan in Fig. 1. Fig. 4 is a fragmentary perspective detail view of a

portion of a peened piston ring. Fig. 5 is a cross-sectional view taken on the line 5—5, Fig. 7. Fig. 6 is a perspective view of a peening hammer. Fig. 7 is a section taken on line 7—7 Fig. 3, and Fig. 8 is a detail perspective view, partly in section, of a crank mounting.

The machine base is shown at 10. Means are provided thereon for supporting the piston ring 11 rotatably, preferably in a vertical plane, so as to permit the peening device to be given a vertical stroke. In the form shown, a stationary frame 12 is attached to the base 10 by bolts 13. Frame 12 has a circular opening 12' within which is rotatably received the annular member 14. Said member 14 is provided with an annular flange 15 on one side of the frame 12, and is held in place on said frame 12 by the removable ratchet ring 16 secured to the opposite side of member 14 by screws 17. Ratchet ring 13 is provided with ratchet teeth 18. The parts are preferably so proportioned that, while member 14 may turn in the opening 12' in frame 12, there is sufficient frictional retardation to turning movement of member 14 in frame 12 to prevent backward movement of member 14 when the pawl for actuating the ratchet wheel is being moved backwardly.

Member 14 has a seat 19 for the anvil ring member 20, which is preferably of hardened steel or similar material adapted to serve substantially the purposes of an anvil supporting the ring while being struck. Anvil ring 20 in turn has a seat 21 for the piston ring 11.

Means are provided for securely clamping the ring 11 in place within the rotatable mounting therefor, and in the form shown a holder or clamp of the breech-block, or interrupted screw thread, type is provided for this purpose, annular member 14 having the interrupted screw threads 22, in which are screwed the cooperating interrupted screw threads 23 of the clamping ring 24 which is shown in perspective in Fig. 2 and serves when screwed up to firmly clamp the piston ring 11 against seat 21 in the anvil ring 20, as well as to hold the anvil ring firmly in place.

It will thus be seen that the piston ring 11 is firmly supported in a vertical plane, and is seated upon a hardened anvil ring, and the piston ring with this mounting may be turned in said plane by means of the

ratchet 16. The apparatus for actuating the ratchet 16 will be described later.

The peening hammer 25 is arranged to deliver peening blows against the interior of the piston ring 11. In the form shown it comprises a bar 26 and a head 27 provided with a shank 28 received within an opening 29 in the hammer bar 26. Bar 26 of hammer 25 has a cross shaft 30 secured thereto, as by means of screws 31, and said shaft has bearings at 32, 32 in the standard 33 on base 10.

Spring means are provided for actuating the hammer 25 to produce downward blows. In the form shown bar 26 is extended rearwardly as shown at 34, 34 and such extensions are provided with ears 35, 35 in which are received the lower hooked ends of springs 36, 36. The upper ends of said springs are adjustably supported in the adjustable hooks 37, 37, which are supported in turn in a bracket 38 mounted on the rear of the machine base.

Means are provided for raising hammer 25 against the tension of springs 36, 36 and releasing it to deliver measured blows under the influence of springs 36, 36. In the form shown, hammer 25 is provided with a downwardly extending portion 39 on the opposite side of pivot shaft 30 from springs 36, 36, and the extension 39 has a rear downwardly inclined cam or wear surface 40 and a straight front face 41. The raising means shown herein consist of a pair of cams 42, 42. These cams preferably are of the outline shown in Fig. 3 and comprise the radially projecting portion 43 and the relieved or cutaway part 44. Said cams are rotated in the direction of the arrow on Fig. 3. The hammer 25 is shown in Fig. 3 at its lowermost position, with the hammer head 27 in contact with the piston ring 11 and with the extension 39 of hammer 25 in the relieved or recessed portion 44 of the cams 42. The hammer is not supported in such position at all by the cams 42 but is free to deliver its blows directly on the piston ring 11.

The mounting for cams 42 and their shaft 45 is of such character that the shaft 45, with the cams 42 thereon, may be raised and lowered, thereby controlling the intensity of blows delivered by hammer 25 by regulating the height to which it is elevated against the springs 36, before being released to produce the striking or peening action. With the construction shown, shaft 45 is supported in bearing blocks 46 mounted to slide in slideways 47, and is provided with a pair of rollers 48 which rest on controlling cams 49. Shaft 45 is rotated from the stationary shaft 50. Shaft 50 is driven through any suitable means, as for example, by means of a belt running on belt pulley 51 and is connected to shaft 45 by suitable

flexible connections permitting relative movement between the shafts while rotating. In the form shown a pair of universal joints 52 are utilized for this purpose with the intermediate shaft 53 splined in the sleeve 54.

Cams 49 are preferably circular in form when evenly spaced blows of graduated intensity are to be delivered, but may be of other forms, and in case the blows delivered are all desired to be of the same intensity, said cams may be entirely dispensed with.

Means are provided for rotating the cams 49 and the support for piston ring 11 at a predetermined relation or ratio. With the construction shown cams 49 and piston ring 11 are rotated in unison, piston ring 11 being rotated through one turn or rotation during the same time that the cams 49 make one rotation. Such actuating devices are operated in the form shown from shaft 45, which is in turn actuated from shaft 50. Shaft 45 is provided with dovetailed slot 55 in its end, in which is received a slide piece 56 carrying a crank pin 57. The slide piece 56 can be adjusted endwise in this slideway 55 as by means of screws 58, 58 to vary the throw of the crank pin 57. Crank pin 57 actuates a connecting rod 59 which in turn is pivoted at 60 to a slide piece 61 having inclined cam surfaces 62, 63. The upper cam surface 62 serves to actuate a pawl lever 64, which has a slidable and pivotal mounting at 65 in the frame 12, and is provided with a spring 66, serving both to press the pawl lever down, with its roller 67 in contact with the cam surface 62, and to hold the point 68 thereof into engagement with ratchet teeth 18 of the ratchet ring 16. Cam surface 63 of slide 61 serves to press bar 70 downwardly against spring 71, and operates lever 72, pivoted on shaft 73 of cams 49, actuating pawl 74 which is spring pressed by spring 75 into engagement with teeth 76 of ratchet wheel 77, also secured on shaft 73.

Shaft 73 may also be made vertically adjustable to some extent, if desired, as by mounting same in slide bearing blocks 73', adjustable by means of screws 78. When so adjusted shaft 73 may be locked in adjusted position as by means of the lock screw 79.

Friction means are preferably resorted to for preventing undesired rotation of shaft 73 and its cams 49 and holding said shaft stationary, except when positively rotated by means of pawl 75. In the form shown the collar 80 fixed on shaft 73 is provided with a disk or flange 81 against which a brake shoe 82 is lightly pressed by spring 83, which may be adjusted by means of screw 84.

The hammer head 27 is preferably rounded, and of such form that cross sections thereof adjacent to its striking surface are

oval or substantially elliptical in form, whereby it is adapted to produce peened or compressed surfaces or depressions in a piston ring having the form of a shallow depression of generally oval or elliptical outline, and with the longest axis or dimension thereof extending in the direction of the width of the piston ring, as disclosed and claimed in my copending application filed Aug. 14th, 1919, Serial No. 317,565. A section of the ring 11 with the preferable form of peened or compressed regions is shown in Fig. 4, in which the depressions or peened regions of ring 11 are indicated at 85, 85.

To operate the apparatus a piston ring 11 is placed in the holder and clamped therein and shafts 50 and 45 are rotated continuously.

Upon rotation of the cams 42 the cam surfaces 43 contact with the wear surfaces 40 on extension 39 of hammer 25 and raise the hammer upon each rotation of cams 42 and as soon as the recesses 44 of the cams are reached, the hammer is released and delivers a blow under the action of springs 36. During the intervals between blows, cams 49 and ring 11 are turned, each through the same part of a revolution, and in this way evenly spaced blows are delivered with intensity dependent upon the position of cams 49 and the corresponding elevation of shaft 45.

Various changes and modifications of the embodiment of the invention shown for purposes of illustration, may be resorted to, within the scope of my claims, without departing from my invention or sacrificing the advantages thereof.

I claim:

1. In piston ring peening apparatus, a hammer, a shaft provided with means for moving said hammer, and means operated from said shaft for producing movement of the shaft toward and away from said hammer.

2. In piston ring peening apparatus, a hammer, a spring for actuating the hammer in its striking action, a movable shaft and a cam thereon for moving the hammer to put the spring under tension and then re-

leasing the hammer, a rotatable cam for moving said shaft and its cam toward and away from the hammer, rotatable piston ring supporting means, a slide reciprocated from said shaft, and means actuated by said slide and including pawls and ratchets for operating said rotatable cam and said piston ring support to rotate in unison.

3. In piston ring peening apparatus, a hammer, a shaft having a cam thereon adapted to actuate the hammer, and means for moving said shaft and cam toward and away from said hammer.

4. In piston ring peening apparatus, a hammer, a cam for actuating the hammer, and means for bodily raising and lowering said cam, whereby the hammer is caused to strike blows varying in force.

5. In piston ring peening apparatus, a hammer, a shaft, a cam on the shaft adapted to move the hammer, and cam means actuated from said shaft for moving said shaft and cam bodily toward and away from the hammer.

6. In a piston ring peening apparatus, a hammer, a cam under said hammer and adapted to move the hammer, and means for raising and lowering the cam.

7. In piston ring peening apparatus, a hammer, a cam for moving the hammer, a bodily movable shaft on which the cam is mounted, rotatable ring supporting means, and means actuated from said shaft in its different positions for imparting intermittent rotary movement to said ring supporting means.

8. In a piston ring peening apparatus, a frame having a continuous circular opening therein, a piston ring supporting member mounted to turn therein and having a flange formed thereon to engage said frame on one side, and a separate ratchet ring secured to the opposite side of said member and serving as a bearing flange against the opposite side of said frame.

In testimony that I claim the foregoing, I hereto set my hand, this 13th day of August, 1919.

ARNOLD G. CARLSON.