R. B. WASSON.

MACHINE FOR MAKING PACKING RINGS.

APPLICATION FILED SEPT. 28, 1910

1,016,380.

Patented Feb. 6, 1912.

3 SHEETS—SHEET 1.

Fig. 1.

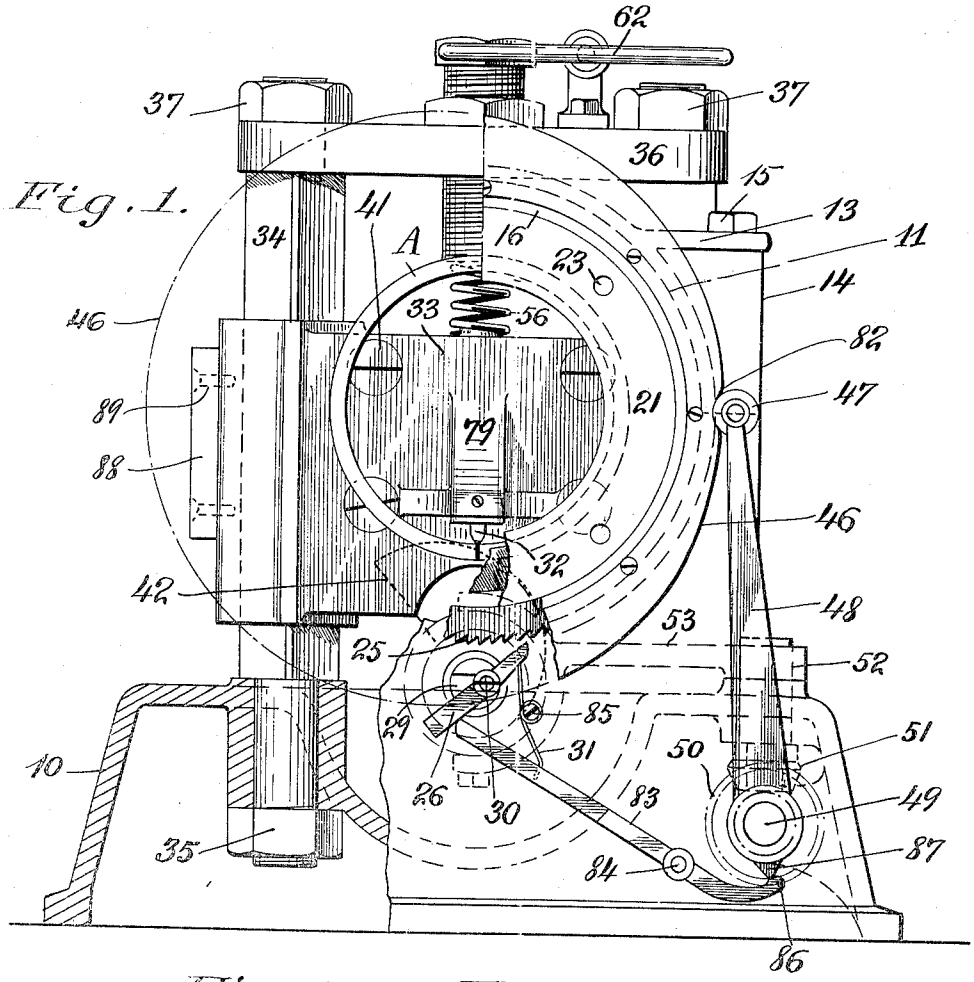


Fig. 4.

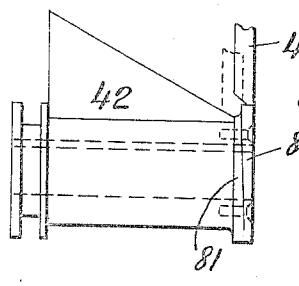


Fig. 7.

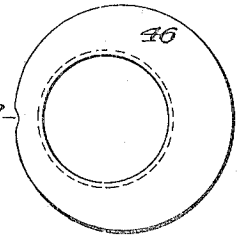
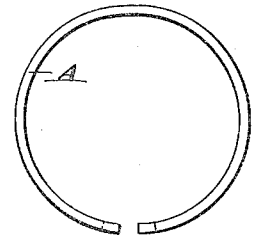


Fig. 9.



Witnesses:

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MACHINE FOR MAKING PACKING RINGS.

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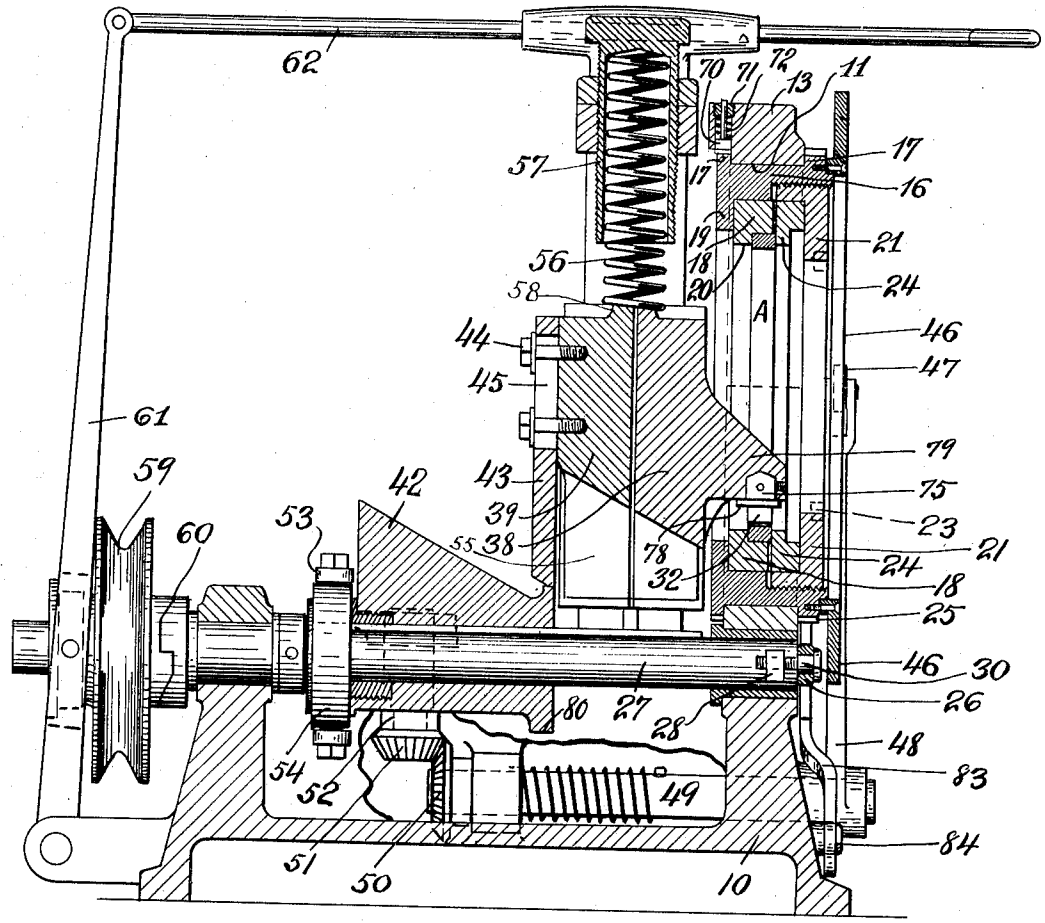
3 SHEETS—SHEET 2.

Fig. 2



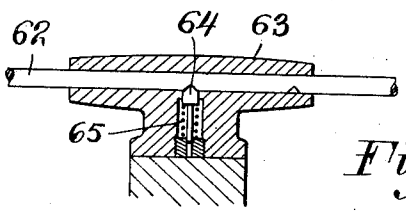


Fig. 6

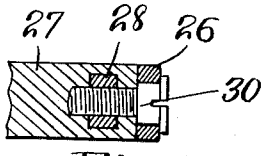


Fig. 5

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3 SHEETS—SHEET 3.

Fig. 3

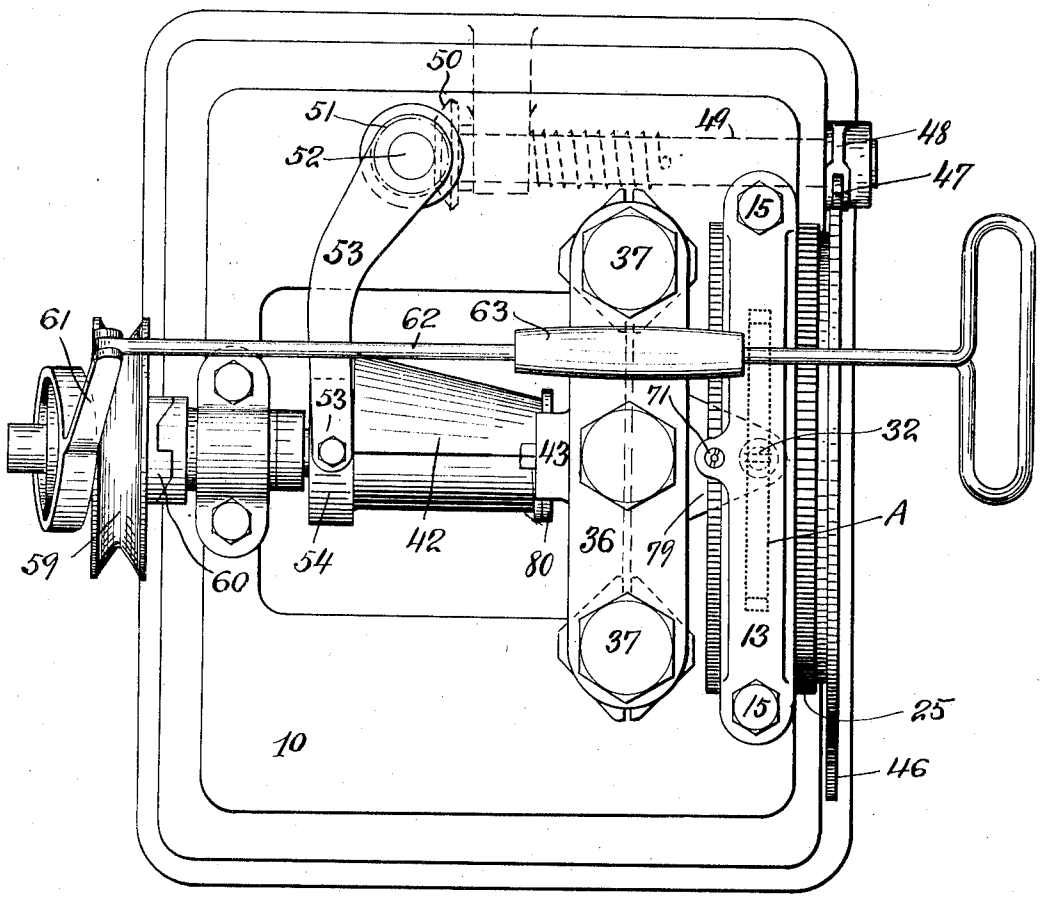
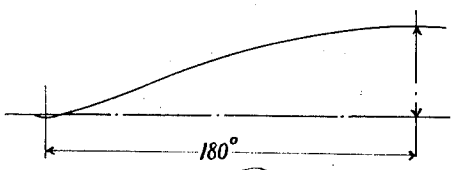


Fig. 8



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UNITED STATES PATENT OFFICE.

ROBERT B. WASSON, OF CRANFORD, NEW JERSEY.

MACHINE FOR MAKING PACKING-RINGS.

1,016,380. Specification of Letters Patent. Patented Feb. 6, 1912.

Application filed September 28, 1910. Serial No. 584,291.

To all whom it may concern:

Be it known that I, ROBERT B. WASSON, a citizen of the United States, and a resident of Cranford, county of Union, in the State of New Jersey, have invented certain new and useful Improvements in Machines for Making Packing-Rings, of which the following is a specification.

This invention relates to machinery for producing metal packing rings.

The object of the invention is to provide a machine that will operate on an annular blank of substantially equal cross-section throughout without substantially altering its cross-section, and impart to it such resilient properties that the ring will exert circumferentially uniform radial pressure under working conditions in a piston or stuffing-box or cylinder.

The invention consists in a machine adapted to apply blows or pressure to one of the circumferences of annular blanks of substantially uniform cross-section, without materially altering the cross-section of the blank, and in such manner as to produce a permanent distortion of the structure of the metal at the circumference hammered, in the nature of a densification and elongation of the metal so varied circumferentially of the ring by variation in the force of the blows that the distortion causes the ring to exert circumferentially uniform radial pressure when confined under working conditions.

The invention consists more especially in the parts, improvements and combinations hereinafter described and more particularly pointed out in the claims.

The accompanying drawings illustrate the invention as embodied in a machine designed for hammering the inner circumferences of piston rings, which exert a substantially equal outward radial pressure under working conditions, but the invention may employ other instrumentalities, and the machine may be designed as well to act on the outer circumferences of stuffing-box rings, which exert an inward radial pressure.

In the drawings: Figure 1 is a front elevation of the machine, partly in section and partly broken away; Fig. 2 is a vertical longitudinal section through the machine; Fig. 3 is a plan view; Fig. 4 is a detail view of the cam for lifting the hammer; Fig. 5 is a detail, showing the mounting of the indexing pawl; Fig. 6 is a detail of the means for throwing the clutch; Fig. 7 is a front view of the controlling cam; Fig. 8 is a profile diagram of one-half of the controlling cam; and Fig. 9 is a view of the completed piston ring, after having been hammered.

A suitable base, support or main casting 10 may be employed for affording common primary support to the various parts.

Means are provided for affording solid support to the ring and clamping it laterally while being hammered, and for producing relative advance or feed between the ring and the hammer as the hammering proceeds. In the particular construction illustrated, 11 is a large circular internal bearing, located preferably at the front of the base, and preferably in a vertical plane. The lower half of this bearing may be formed in the main casting; the upper half may be formed in a separate arched piece 13, having at its ends vertical, apertured pillars 14 through which pass securing screws 15 whose lower ends are threaded into the main casting. A vertical rotatable, ring-carrying chuck 16 is mounted in the bearing 11, and may be held against axial movement therein by means of peripheral side flanges 17. In the preferred embodiment of the invention the chuck 16 is of annular form. In order to accommodate packing rings of different sizes, the chuck is provided with a removable and replaceable annular seat 18, which has lateral support against an inward extending annular flange 19 on the rear part of the chuck. The packing ring A in the seat has lateral bearing against a similar flange or shoulder 20 on the seat. The packing ring is clamped laterally, in such manner as to expose its inner circumference and a small extent of its sides, between this shoulder 20 and a clamping nut 21, preferably of annular form, provided with external screw threads engaging internal threads in a counterbore in the chuck of larger diameter than the bore in which the seat 18 is received. The nut may be provided with spanner openings 23 for purposes of manipulation. In the preferred form of the invention the nut 21 is rabbeted at its rear side for the reception of a removable and replaceable bearing plate or annulus 24, which bears directly against the side of the packing ring A.

The chuck 16 with its seat 18 and the bear-

ing 11 are sufficiently massive in construction to afford the packing ring adequate solid support during the hammering operation.

In the preferred form of the invention the relative feed between the ring and the hammer is produced by suitable means for effecting step-by-step rotation or indexing of the chuck 16. In the particular embodiment of the invention illustrated, ratchet teeth 25 are formed on the front flange 17. The teeth of this circular ratchet are engaged by a reciprocating driving pawl 26, mounted eccentrically on the forward end of a main driving shaft 27 journaled longitudinally in the main casting 10. It is preferred to provide for adjustment of the throw of the pawl to vary the extent of each advance of the chuck and packing ring; and to this end I have shown the pawl as pivoted on a block 28, which is slidable in an undercut slot 29 in the end of the shaft but normally held in set position by the pivot screw 30 which bears against the bottom of the slot. A spring 31 serves to maintain the pawl in engagement with the ratchet. In order to prevent over-driving or retrograde movement of the chuck, I prefer to form another circular ratchet, preferably having V-shaped notches, on the rear flange 17, and engage with these notches a yielding pawl 70, which is mounted slidably in a recess in the arched piece 13, retained by a nut 71, and actuated by a spring 72 confined between the nut and the head of the pawl.

In the preferred form of the invention the distortion of the circumference of the packing ring is produced by hammering mechanism, and the hammering mechanism preferably includes a striker 32 which reciprocates vertically in the vertical plane of the chuck 16. In the construction shown the striker reciprocates over the lowermost portion of the inner circumference of the packing ring A. As shown, this striker preferably has a narrow striking face as long as the width of the circumference of the packing ring. The sides of the striker preferably converge at an angle of approximately 60 degrees, and the narrow striking face is slightly rounded from side to side. The striker preferably forms part of a weighted gravity hammer 33, and in the best embodiment of the invention is carried at the front thereof. The striker is preferably of a separate piece from the hammer, however, so that it may be replaced by a new striker when worn and by a striker of different contour for a different kind of ring. This construction also enables the striker to be made of steel and the hammer of cast iron.

In the form of the invention illustrated the striker has a shank 75 which is received in a vertical socket opening through the bottom face of a forward projection 79 of the hammer and is clamped by a radial set screw. A collar 78 on the shank of the striker bears against the under side of the forward projection of the hammer and limits the upward movement of the striker relative to the hammer. The forward projection 79 carries the striker within the vertical plane of the chuck 16. The hammer slides vertically on guides 34, which in the form of the invention shown are posts of angular cross-section held in apertures in the base by nuts 35. The guides are spaced laterally and are connected at their upper ends to a distance piece 36 by means of nuts 37. The hammer consists of a mass of metal sufficiently heavy to produce the desired distortion of the structure of the metal of the packing ring without distorting the cross-section thereof to any appreciable extent. In the preferred form of the invention it is formed in two sections, a front section 38 and a rear section 39. The two sections have complementary recesses, which together form openings for the reception of the guides 34 and correspond in cross-section thereto. These openings are preferably provided with antifriction linings and liners to compensate for wear. The sections are shown as held together by screws 41 passing through the forward section 38 and threaded into the rear section 39.

Means are provided for actuating the hammer. The said means may be widely varied. In the particular embodiment of the invention shown upon the drawings, the hammer is preferably raised and permitted to fall by a cam 42 splined on the main driving shaft 27 between the guides 34 and centrally below the hammer. In the preferred form of the invention the hammer is provided with an adjustable cam follower 43 for engagement with this cam. The cam face is much wider (in a direction longitudinal of the driving shaft) than the contacting surface of this follower 43. In the form of the invention illustrated this follower is in the nature of a rigid depending finger secured against the rear side of the rear section of the hammer, by means of screws 44 which are received in vertical slots 45 in the contact piece, so that when the screws are loosened the cam follower may be raised or lowered and the screws tightened again. The adjustability of the cam follower enables the hammer to operate on piston rings of different radial thickness, and of different diameter as well as affording means for compensating for wear.

In accordance with the invention means are provided for varying the pressure or blows applied to the packing ring by varying the amount of energy supplied to the ring-distorting mechanism. In the preferred embodiment of the invention the

hammer is operated by gravity, as already indicated, and its energy is varied by raising the hammer to varying heights, thus varying the amount of energy stored up in the hammer, that is, its potential energy.

In accordance with the preferred form of the invention the energy of the hammering mechanism is varied by and in accordance with the rotation of the chuck 16 and the packing ring A being hammered. In the preferred embodiment of such means, the cam surface of the cam 42 is tapered or inclined laterally, and is slidable in an axial direction, so that when the cam follower 43 rests on the surface at one side of the cam no elevation or minimum elevation of the hammer is produced, while at the other side of the cam maximum elevation is produced, and at the various zones in between corresponding degrees of elevation. The sliding of the cam 42 on the driving shaft 27 is preferably controlled by a cam 46 secured to and rotatable with the chuck 16. In the particular construction illustrated, the high point of this cam 46 corresponds to the maximum elevation of the hammer, and the low point to minimum elevation. From the low point, the periphery of the cam 46 ascends in both directions toward the high point in a manner to cause the energy of the blows to increase in accordance with the proportions and character of the metal of the packing ring being treated. Preferably the cam 46 is secured removably, as by screws, to the chuck, so that the cam may be replaced when worn, and also so that a supply of cams of different contour may be kept on hand for varying the results obtained and to enable the machine to operate on different kinds of rings.

The means for controlling the cam 42 by the cam 46 may be widely varied. In the form of the invention illustrated, a roller 47 contacts with the periphery of the cam 46 and is mounted on the end of a swinging arm 48, which is rigid with a rock-shaft 49 journaled in the base 10. This rock-shaft carries a bevel gear 50 which meshes with a bevel gear 51 on a rock-shaft 52 also journaled in the base. The rock-shaft 52 carries an arm 53, the outer end of which is forked and embraces a collar 54 on the cam 42. The hammer 33 is recessed below, as indicated at 55, to permit the cam 42 to slide beneath it practically up to the chuck 16. A spring 56, preferably a coil spring, may be interposed between the top of the hammer 33 and the under side of the distance piece 36, its upper end being received in a recess 57 and its lower end inclosing a seat 58. The main driving shaft 27 may be driven by a pulley 59 through a clutch 60. The power may be thrown off by shifting the pulley axially on the shaft to separate the clutch, by means of a shipping lever 61, pivoted at one end to the base and at the other end to an operating rod 62 slidable in a sleeve 63 on the distance piece 36. The pulley may be held in driving position by a yielding pawl 64 which is held in a notch in the rod 62 by a spring 65.

Means are provided for stopping the machine, preferably automatically and preferably after the ring has been hammered once around. In the preferred form of the invention means are provided for rendering the hammer inoperative and for stopping the indexing of the chuck. In the preferred embodiment of the invention the cam 42 is provided with a rest surface 80 which is preferably concentric with the driving shaft and is of a diameter sufficient to cause the hammer to remain spaced above the inner circumference of the piston ring. It is obvious that the rest surface might be of other form than concentric, but it preferably extends completely around the driving shaft. This rest surface is shown as being formed at the narrow end of the tapered cam 42, and it is preferably connected with the cam surface by means of a spiral way 81 on which the cam follower 43 travels to the concentric rest surface, which is of larger diameter than the narrow end of the tapered cam. The controlling cam 46 is provided on its periphery, in the path of the follower roller 47, with a region 82 which corresponds to the rest surface 80, that is, when the follower roller 47 runs onto the region 82 it causes the rest surface 80 to contact with the cam follower 43. This region 82 may be variously formed and arranged, but in the preferred construction illustrated it is in the nature of a notch or recess formed in the periphery of the cam 46 at the low point thereof. In consequence, when the follower roller 47 falls into this recess, it produces a continuation of the rearward movement of the cam 42, thus causing the narrow end of this cam to pass from beneath the follower and the concentric rest surface 80 to come beneath the follower, thus holding the hammer inoperative after the blows of the hammer have decreased from maximum to minimum. As already indicated, the indexing of the chuck is arrested simultaneously with the cessation of hammering. In the particular construction illustrated, a tripping lever 83 is pivoted intermediate its ends, as at 84, to the frame or support of the machine. At one end it is adapted to engage with the tail of the pawl 26 to disengage the same from the ratchet 25. The spring 31, already referred to, is preferably interposed between the pawl and this lever 83, in such manner as normally to hold the pawl in engagement with the ratchet and the lever out of contact with the pawl. As shown, the spring may be coiled intermediate its ends about a stud 85 on the frame and bear at its ends

expansively against the head of the pawl and the side of the lever facing the pawl. In the particular construction shown the other end of the lever 83 is provided with a knob or cam surface 86 arranged to contact with a tail projection 87 on the swinging arm 46. When the roller 47 falls into the recess 82, the tail projection 87 rides up on the knob 86, so as to cause the lever 83 to contact with the pawl and disengage the latter from the feed ratchet, as shown in Fig. 1.

The cam 46 has its high and low regions diametrically opposite each other and is bilaterally symmetrical. In the particular construction illustrated the high portion of the cam corresponds to the middle of the packing ring and to the region of heaviest hammering, and the low portion of the cam corresponds to the split part of the ring and to the region of lightest hammering. Obviously, this arrangement might be reversed or varied. From the high portion the cam 46 descends in both directions to the low portion, and in the best embodiment of the invention the descent is non-uniform, so that the blows are varied non-uniformly. For cast iron rings of the sizes usually employed the best results are obtained by decreasing the energy of the blows from the middle of the ring to the split, at first gradually, then more rapidly, and gradually again adjacent the split. Of course, the exact manner of the varying the blows must be arranged with reference to the conditions obtaining in any particular instance.

In Fig. 7 I have shown a front view of the cam 46 as I prefer to construct it in practice, and Fig. 8 is a profile diagram showing how one-half of the cam may be laid out from the region of heaviest hammering to the region of minimum hammering, but, as already indicated, the cam may be designed differently for different conditions, providing that the fall be non-uniform. While I have shown the cam 46 as a peripheral cam it is obvious that it may be a face cam or a cam of other type.

In addition to the alteration or replacement of the cam 46, other adjustments of the machine with regard to the hammering are preferably provided for. As already indicated, the striker 32 is replaceable by strikers having faces of different contour. The weight of the hammer may also be varied, as by attaching detachable weights thereto. Such weights may be applied to the hammer in a great variety of ways, a suitable arrangement being to attach them to the vertical ends of the hammer. In Fig. 1, I have shown such an additional weight 88 attached by means of screws 89.

In operation, a packing ring blank preferably of cast iron and preferably cut or split at one point is inserted in the removable seat in the chuck and clamped laterally. It is positioned so that its split is opposite the low point of the cam 46. The power is now thrown on and the cam 42 elevates the hammer and permits it to fall to strike a blow. After each blow the pawl 26 advances the chuck and ring so that the next blow of the striker is delivered alongside or overlapping the first. Preferably the blows are spaced apart on the rings so that the circumference of the ring is given a transversely ribbed appearance. The parts are so arranged that the feeding of the ring occurs between blows, the blows being delivered while the ring is stationary. By reason of the form of the striker, the distortion of the structure of the metal of the inner side of the packing ring is largely confined to a circumferential direction and sidewise spreading of the metal is minimized. The lateral clamping of the ring in the chuck is also important. More or less of the radial depth of the ring will be clamped between the removable parts 18 and 24, according to the thickness of the ring and depth of the groove afforded by these parts. With a thinner ring, for example, even more of the ring will be included between the clamps than is shown in the drawing. In such an instance, particularly, the lateral clamping is of value in preventing lateral spreading of the metal. As the ring is rotated, the cam 46 causes the cam 42 to shift back and forth, thus varying the energy of the blows. Thus, the blows are light at the slot in the ring, increase in force non-uniformly to the middle of the ring, and then decrease in like manner to the split again. Preferably the circumference of the ring is hammered once around only. However, the main utility of the gage is to enable the machine to be adjusted, by varying the weight of the hammer, the length of the blows, the contour of the striking face, or the contour of the cams, both of which are removable and replaceable. The hammering is preferably commenced at the split in the ring. At the completion of the revolution, the roller 47 drops into the notch in the low part of the cam 46, with the result that the hammer is held stationary and the indexing of the chuck stopped.

In the preferred embodiment of the invention the spring 56 acting on the top of the hammer when the latter is raised is of such strength and nature to serve merely as means for starting the hammer, for example, should the hammer tend to stick on its guides.

Having thus described my invention, what I claim is:

1. A machine for producing metal packing rings which exert circumferentially uniform radial spring pressure under working conditions, comprising, in combination, a

chuck for holding the ring, a compacting member adapted to operate along a circumference of the ring, mechanism for producing relative feed between the ring and the compacting member, a tripping cam for actuating the compacting member, a controlling cam, and means whereby the controlling cam predeterminedly varies the actuation of the compacting member by the actuating cam in accordance with the relative feed between the ring and the member.

2. A machine for producing metal packing rings which exert circumferentially uniform radial spring pressure, under working conditions, comprising, in combination, a chuck for holding the ring, a compacting member adapted to operate along a circumference of the ring, mechanism for producing relative feed between the ring and the compacting member, a tapered tripping cam for actuating the compacting member, a rotatable controlling cam connected with the chuck, and connections between said controlling cam and the actuating cam whereby relative axial movement of the actuating cam is produced to predeterminedly vary the length of the strokes of the compacting member in accordance with the relative feed between the ring and the member.

3. A machine for producing metal packing rings which exert circumferentially uniform radial spring pressure under working conditions, comprising, in combination, a chuck for holding the ring, a compacting member adapted to operate along the circumference of the ring, mechanism for producing relative feed between the ring and the compacting member, a cam and means whereby the cam predeterminedly varies the energy required by the compacting member in accordance with the relative feed between the ring and the member.

4. A machine for producing metal packing rings which exert circumferentially uniform radial spring pressure under working conditions, comprising, in combination, a chuck for holding the ring, a hammer reciprocable in right lines in the plane of the chuck, mechanism for producing relative feed between the ring and the hammer, a cam, and means for operating the cam for predeterminedly varying the energy acquired by the hammer in accordance with the relative feed between the ring and the hammer.

5. In a machine of the character described, the combination of a ring-holder, means for rotating the ring-holder to feed the ring, a hammer, means for actuating the same, and connections between the ring-holder and said actuating means whereby the energy imparted to the hammer is varied in a predetermined manner in accordance with the feed of the ring.

6. In a machine of the character described, the combination of a vertical ring-holding chuck, means for indexing the same, a gravity hammer, a cam for raising and tripping the hammer, and connections between the chuck and said cam whereby the lifting of the hammer is varied in a predetermined manner in accordance with the indexing of the chuck.

7. A machine for producing metal packing rings, which exert circumferentially uniform radial spring pressure under working conditions, comprising the combination of means for holding the ring, means for producing a permanent circumferentially-directed and circumferentially-varied distortion of the structure of the metal of the ring including a compressing member adapted to operate along a circumference of the ring, mechanism for producing relative feed between the ring and the compressing member, and means for automatically and non-uniformly varying the force exerted by the compressing member on the circumference of the ring in accordance with the relative feed, said means including a bilaterally symmetrical cam having substantially equidistant high and low portions, the fall between the high and low portions being non-uniform.

8. A machine for producing metal packing rings, which exert circumferentially uniform radial spring pressure under working conditions, comprising the combination of means for holding the ring, means for producing a permanent circumferentially-directed and circumferentially-varied distortion of the structure of the metal of the ring including a hammer adapted to operate along a circumference of the ring, mechanism for producing relative feed between the ring and the hammer, and means for automatically and non-uniformly varying the blows delivered by the hammer on the circumference of the ring in accordance with the relative feed.

9. In a machine for hammering metal packing rings, the combination of hammer mechanism, means for holding and laterally clamping the ring, means for advancing the ring with one of its circumferences presented to the hammer mechanism, and means including connections controlled by the advancing of the ring for automatically varying the energy supplied to the hammer mechanism in accordance with the advance of the ring.

10. In a machine for hammering metal packing rings, ring-holding means, a weighted gravity hammer, feed mechanism for causing the blows of the hammer to be applied at successive points along one of the curved surfaces of the ring, and means including connections between the ring holding means and the hammer for automatically raising the hammer to different heights

from maximum at the middle of the ring toward minimum in both directions from the middle.

11. In a machine for hammering metal packing rings, a ring-holding chuck, a gravity hammer, feed mechanism for rotating the chuck, a tripping cam for actuating the hammer, and means coördinated with the feed mechanism for automatically varying the height to which the hammer is raised by the actuating cam from maximum at the middle of the ring toward minimum toward the ends.

12. In a machine for hammering metal packing rings, a ring-holding chuck, a hammer, feed mechanism for rotating the chuck, a tripping cam for actuating the hammer, a controlling cam, and means whereby the controlling cam predeterminedly varies the distance to which the hammer is moved by the actuating cam.

13. In a machine for hammering metal packing rings, a ring-holding chuck, a hammer, feed mechanism for rotating the chuck, a tapered tripping cam for actuating the hammer, a controlling cam, and means whereby the controlling cam moves the actuating cam axially to vary predeterminedly the force of the blows.

14. In a machine for hammering metal packing rings, a suitable support, a vertical ring-holding chuck mounted rotatably thereon, a horizontal driving shaft, means thereon for producing step by step rotation of said chuck, vertical guides, a hammer mounted slidably on said guides, a cam mounted slidably on said shaft in driving engagement therewith and having its cam surface laterally inclined, and means actuated by said chuck for shifting said cam on said shaft to vary the lift of said hammer.

15. In a machine for hammering metal packing rings, a suitable support, a ring-holding chuck mounted rotatably thereon, a hammer, a cam for actuating and varying the length of stroke of said hammer, and means for shifting said cam to vary the length of stroke of the hammer consisting of a cam surface on the chuck, an oscillatory arm traveling on said cam surface, a second oscillatory arm connected with said cam, and gearing between said arms.

16. In a machine for hammering metal packing rings, a hammer adapted to operate along one of the circumferences of the ring, a rotatable chuck for holding the ring, a removable ring seat therein, an annular side shoulder, and a removable retaining plate for clamping said ring against said side shoulder.

17. In a machine for hammering metal packing rings, a hammer adapted to operate along one of the circumferences of the ring, a rotatable chuck for holding the ring, a removable ring-seat, an annular side shoulder, a retaining plate for holding the ring against said shoulder mounted removably in said chuck, and a replaceable bearing ring mounted in an annular recess in said retaining plate so as to bear against the side of said ring.

18. In a machine for hammering metal packing rings, a ring-holder, hammer mechanism, means for producing relative feed between the holder and hammer mechanism, a taper cam for actuating the hammer mechanism, and means for producing relative adjustment between the cam and hammer mechanism to vary the strength of the blows, said cam having at one end a rest surface for holding the hammer inoperative.

19. In a machine for hammering metal packing rings, a ring-holder, hammer mechanism, means for producing relative feed between the holder and hammer mechanism, a taper cam for actuating the hammer mechanism, and means for producing relative adjustment between the cam and hammer mechanism to vary the strength of the blows, said cam having at its narrow end a rest surface for holding the hammer inoperative and a spiral way connecting said rest surface and the narrow portion of the cam.

20. In a machine for hammering metal packing rings, a rotatable ring-holder, means for indexing the same, hammer mechanism, a taper cam for actuating the hammer mechanism, said cam having a rest surface for holding the hammer inoperative, means for automatically producing relative adjustment between the cam and hammer mechanism during the indexing of the holder to vary the strength of the blows, said means including a controlling cam and a follower, said controlling cam having a recess corresponding to said rest surface.

21. In a machine for hammering metal packing rings, a rotatable ring-holder, an indexing pawl and ratchet, hammer mechanism, a taper cam for actuating the hammer mechanism, said cam having a rest surface for holding the hammer inoperative, means for automatically producing relative adjustment between the cam and hammer mechanism during the indexing of the holder to vary the strength of the blows, said means including a controlling cam and a follower, said controlling cam having a region adapted to cause said follower to bring said rest surface into operative relation to the hammer mechanism, and pawl-disengaging mechanism adapted to be simultaneously actuated by said controlling cam.

22. In a machine for hammering metal packing rings, a rotatable ring-holder, an indexing pawl and ratchet, hammer mechanism, a taper cam for actuating the hammer mechanism, said cam having a rest sur-

face for holding the hammer inoperative, means for automatically producing relative adjustment between the cam and hammer mechanism during the indexing of the holder to vary the strength of the blows, said means including a controlling cam and a follower, said controlling cam having a region adapted to cause said follower to bring said rest surface into operative relation to the hammer mechanism, and pawl-disengaging mechanism also actuated by said region.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

ROBERT B. WASSON.

Witnesses:
LOUELLA F. LITTLE,
J. J. KOZUM.