J. F. PIERCE.

BEAD ROLLING MACHINE.

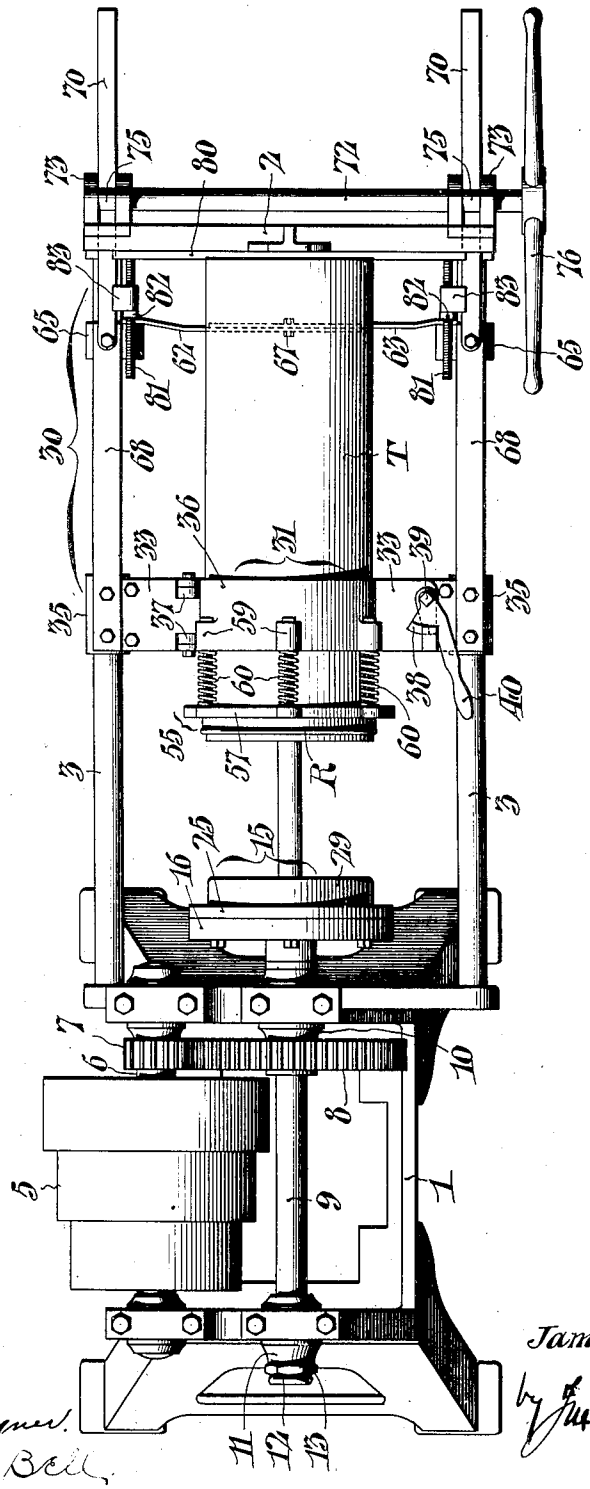
APPLICATION FILED NOV. 19, 1917.

1,370,557.

Patented Mar. 8, 1921.

6 SHEETS—SHEET 1.

FIG. 1.



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6 SHEETS—SHEET 2.

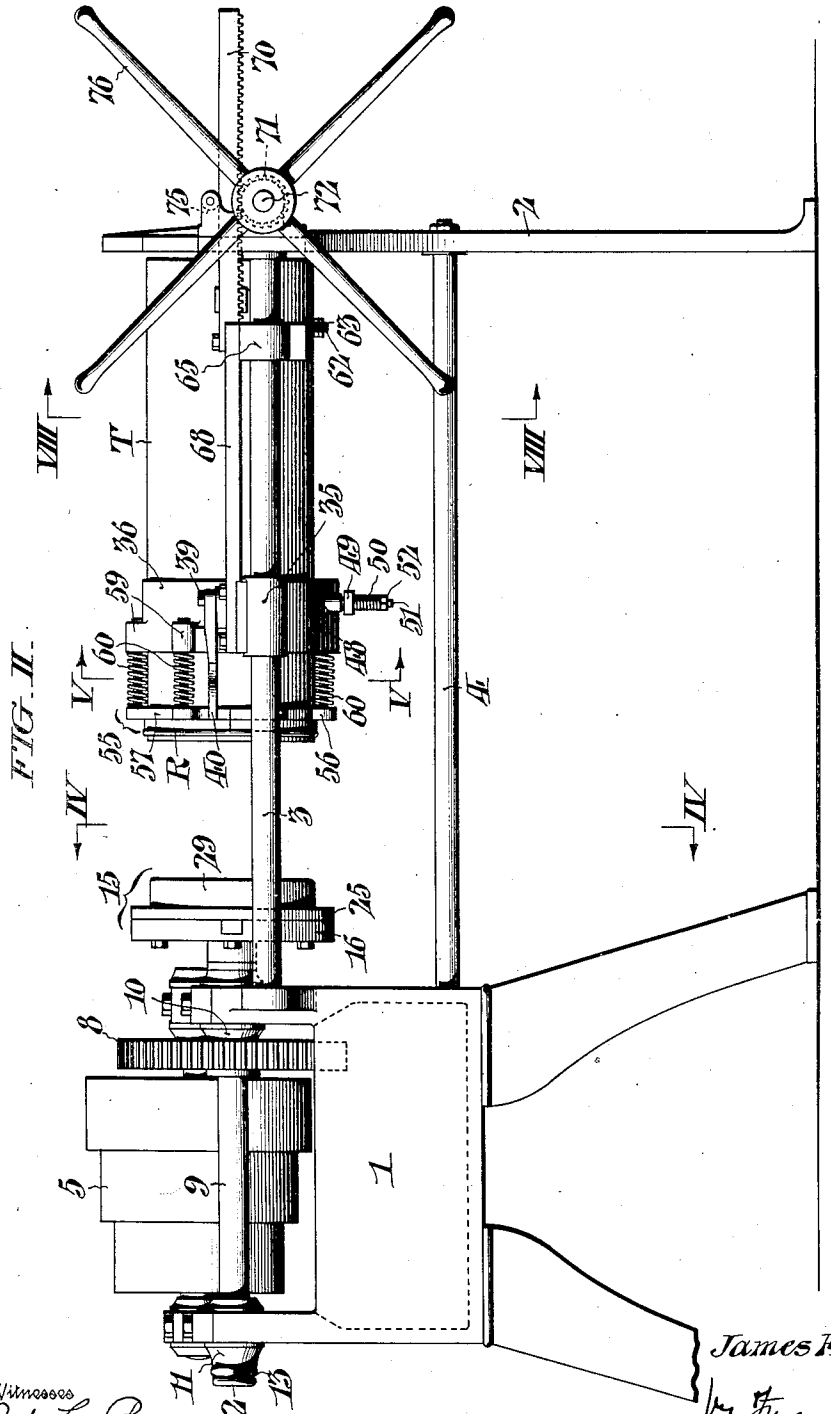


FIG. II.

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6 SHEETS—SHEET 3.

FIG. III.

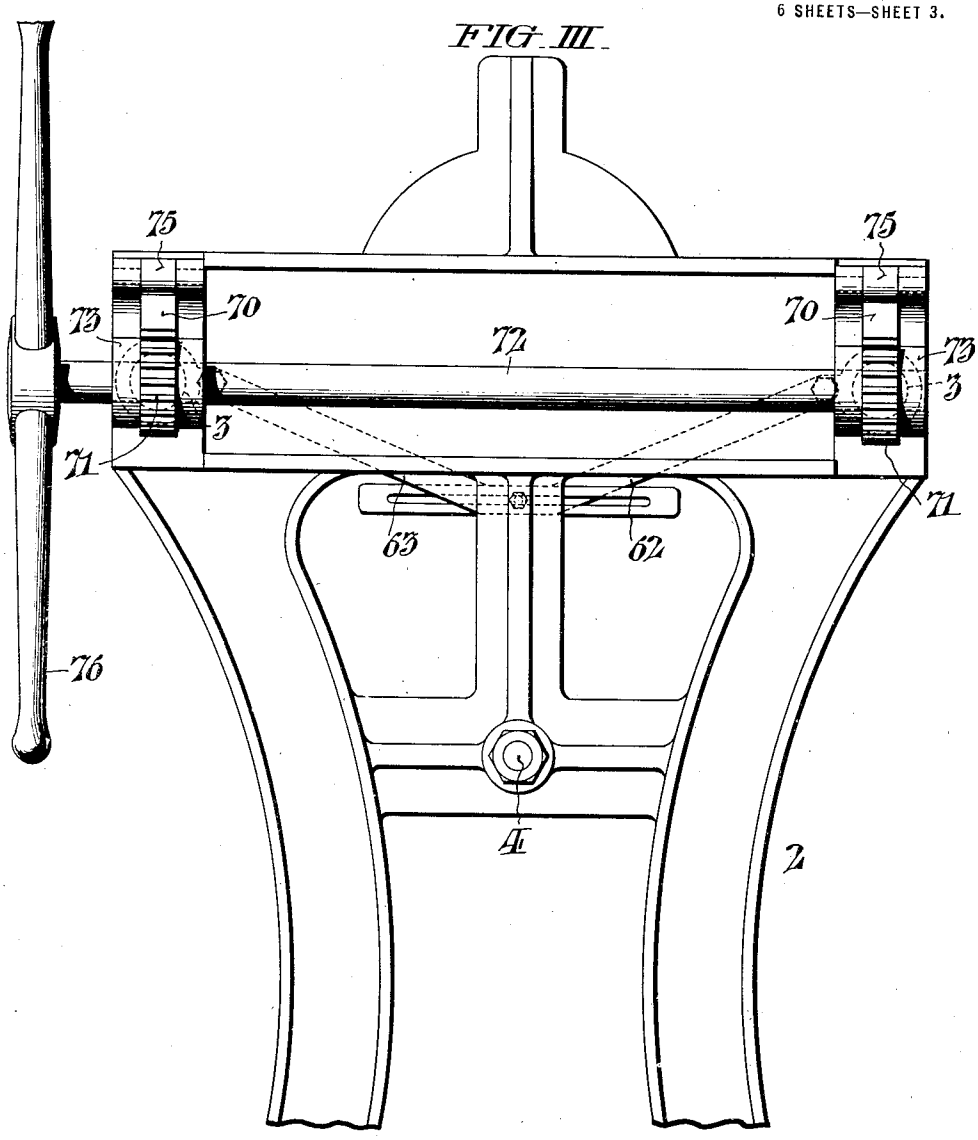
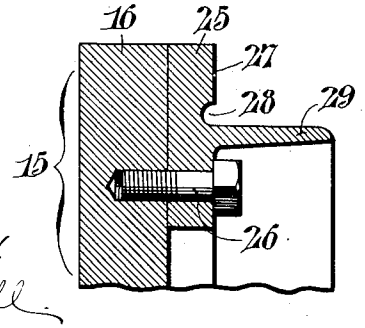


FIG. VII.



Witnesses

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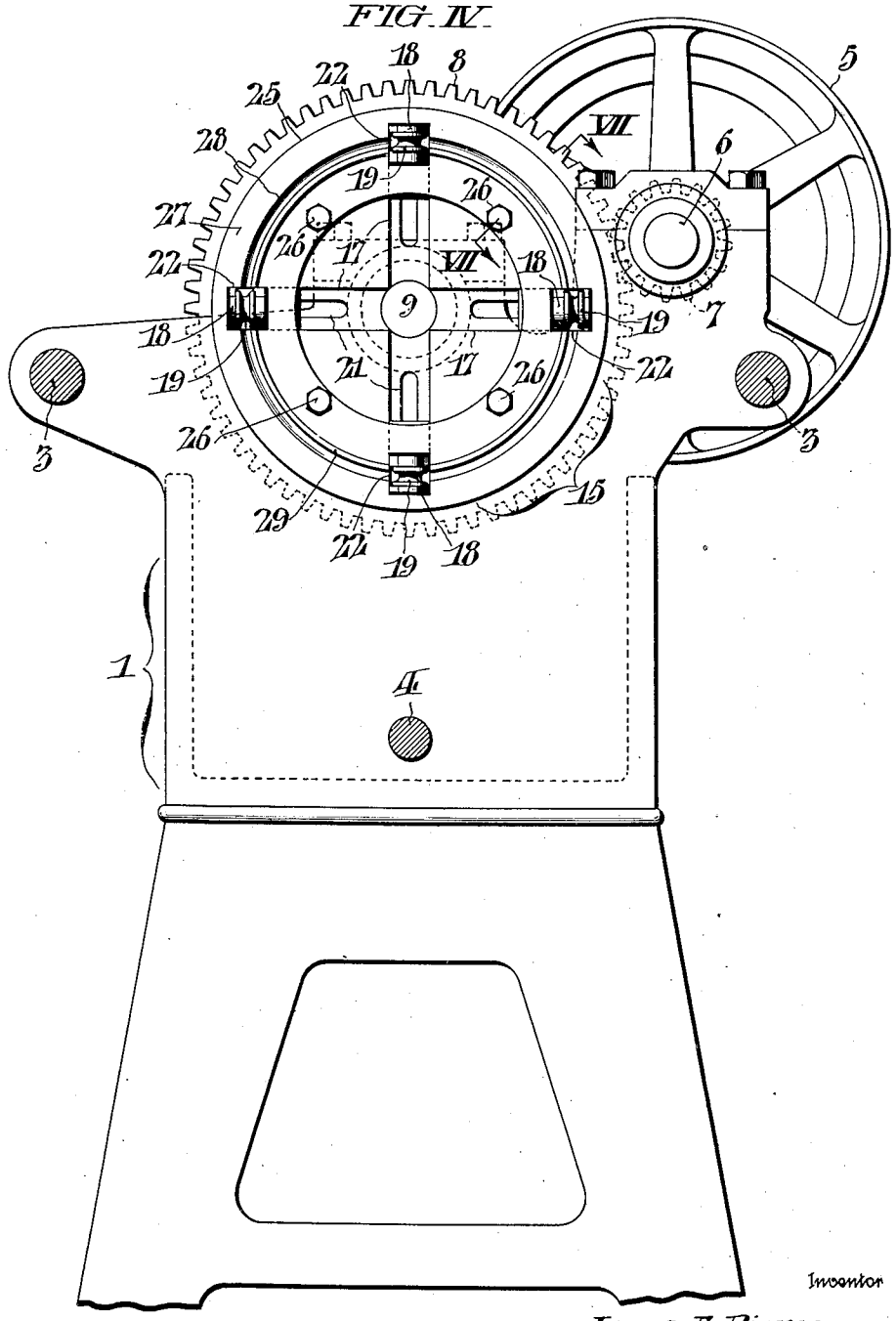
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6 SHEETS—SHEET 4.

FIG. IV.



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BEAD ROLLING MACHINE.

APPLICATION FILED NOV. 19, 1917.

1,370,557. **Patented Mar. 8, 1921.**

6 SHEETS—SHEET 5.

FIG. V.

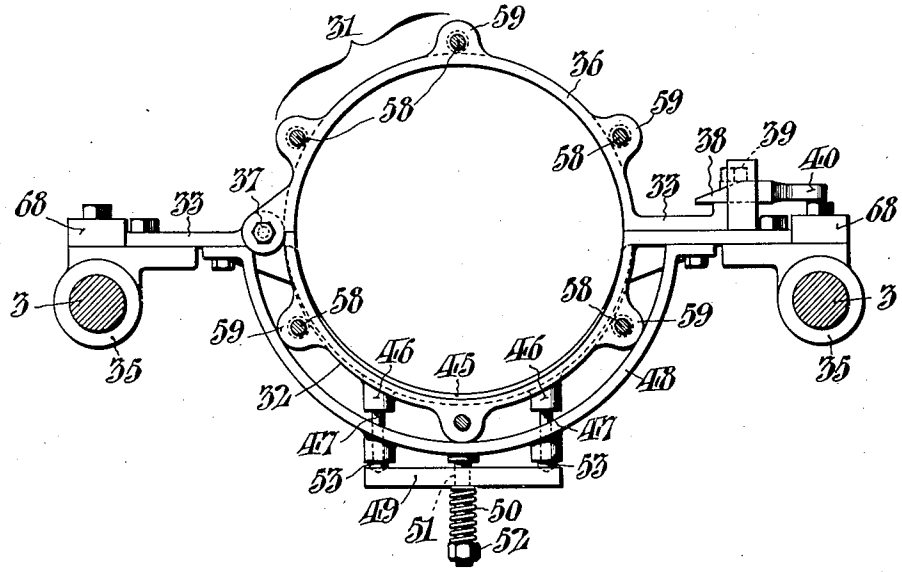
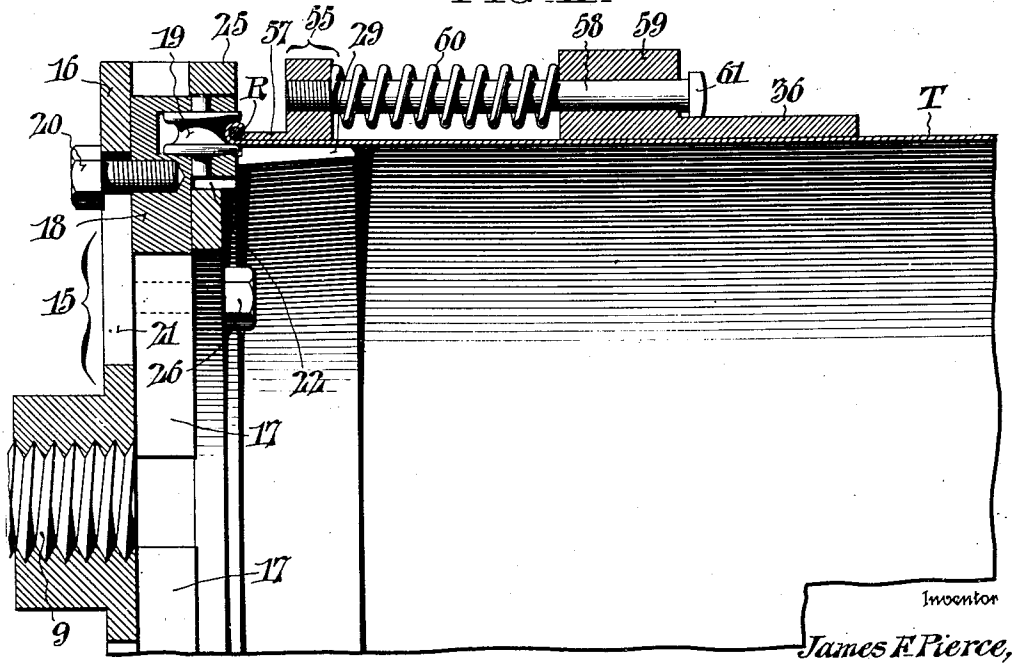


FIG. VI.



Witnesses

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BEAD ROLLING MACHINE.

APPLICATION FILED NOV. 19, 1917.

1,370,557.

Patented Mar. 8, 1921.

6 SHEETS—SHEET 6.

FIG. VIII.

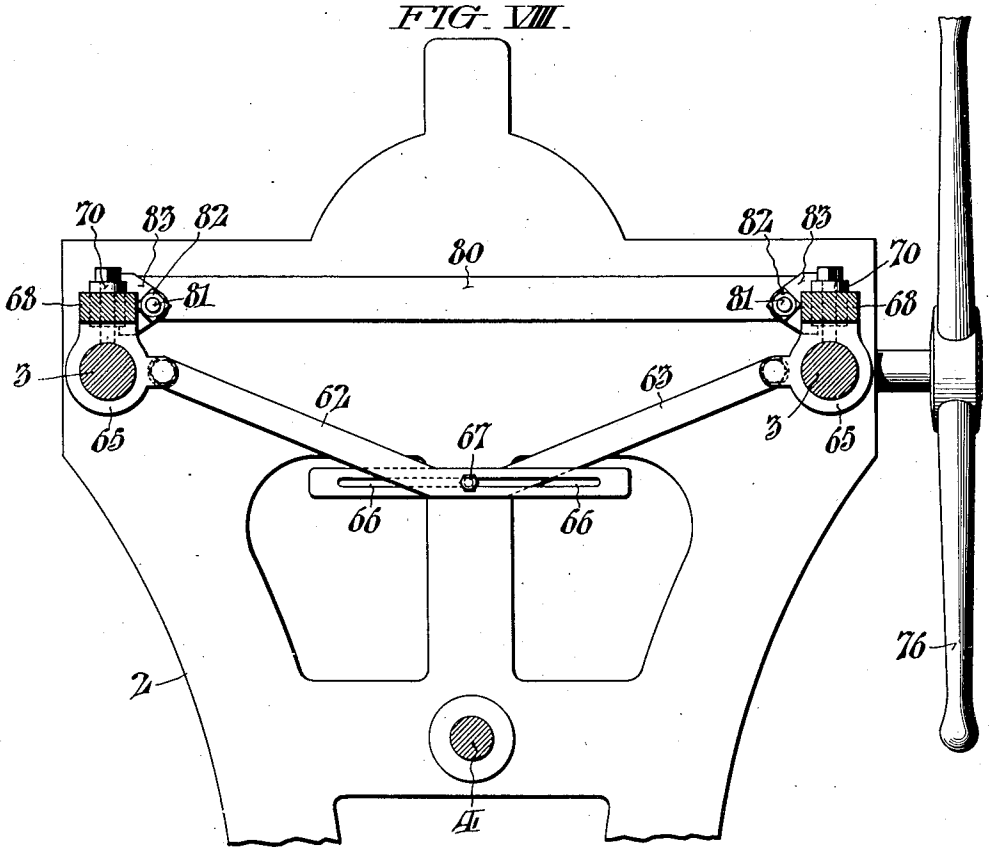
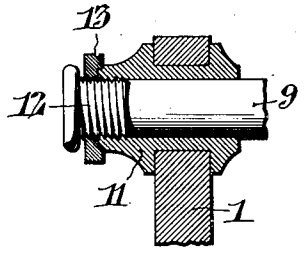


FIG. IX.



Witnesses

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UNITED STATES PATENT OFFICE.

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BEAD-ROLLING MACHINE.

1,370,557. Specification of Letters Patent. Patented Mar. 8, 1921.

Application filed November 19, 1917. Serial No. 202,737.

To all whom it may concern:

Be it known that I, JAMES F. PIERCE, of Glynrich, in the county of New Castle and State of Delaware, have invented certain new and useful Improvements in Bead-Rolling Machines, whereof the following is a specification, reference being had to the accompanying drawings.

The invention relates to bead rolling machines, such as employed in finishing the edges of the tubular forms constructed of fiber, sheet metal or the like.

The invention is directed to a machine of the above class in which the edges of a tube may be beaded with or without the inclusion of a reinforcing ring.

The invention further includes devices whereby the tube is first accurately gaged and thereafter firmly clamped in a feed carriage preparatory to being advanced to the means by which the beading is accomplished.

The invention also comprehends a bead rolling chuck which is capable of adaptation to finishing tubes of various diameters.

The structure by which I attain these ends will be best understood by reference to the accompanying drawings, in which—

Figure I, is a plan view of a beading machine conveniently embodying my invention.

Fig. II, is a side elevation of the same.

Fig. III, is an elevation of the right hand end of the machine as viewed in Figs. I, and II.

Fig. IV, is a transverse sectional elevation of the same looking in the direction of the arrows IV—IV in Fig. II.

Fig. V, is a sectional view through the tube clamp as indicated by arrows V—V, in Fig. II.

Fig. VI, is a partial longitudinal sectional view illustrating the relative positions of the chuck and the tube clamp during the formation of a bead upon the end of a tube.

Fig. VII, is a detail sectional view through the chuck along the line VII—VII in Fig. IV.

Fig. VIII, is a partial transverse sectional view through the machine looking rearwardly in the direction of arrows VIII—VIII in Fig. II, and

Fig. IX, is a detail view through the adjustable thrust bearing for the chuck spindle.

In the drawings 1, represents the main housing for the driving elements of the machine and this is supplemented by an end frame 2, rigidly attached by means of tie bars 3—3, and tie bar 4, upon the former of which a feed carriage is supported. The driving organization for the machine includes a cone pulley 5, mounted on a shaft 6, with a pinion 7, which meshes with a gear 8, on the chuck spindle 9. Said spindle is journaled in bearings 10, and 11, of which the latter is illustrated in detail in Fig. IX. The thrust of the spindle is opposed by an adjustable screw 12, threaded into the end of the bearing 11, and fixed in adjusted position by means of a jam nut 13. Fixed upon the inner end of the spindle is a chuck comprehensively indicated at 15, and adapted for continuous rotation under the drive of the geared connections already described. The construction of this chuck will be best understood from Figs. IV, VI, and VII, wherein it will be noted that it comprises an annular supporting disk 16, which is centrally threaded to engage the end of spindle 9. The face of the disk is radially channeled at right angles as shown at 17—17 in Fig. IV, to afford slideways for brackets 18, in which rollers 19, are supported for free rotation. Brackets 18, are adjustably fixed to disk 16, by screw bolts 20, which extend through slots 21, in line with channels 17. The chuck further comprises an annulus 25, having the cross section shown in Fig. VII, but which, as illustrated in Fig. VI, is cut away as at 22, to permit the protrusion of the rollers 19. This annulus is directly bolted to disk 16, at points 26, intermediate of the radial channels 17, and its exposed face 27, is provided with a circular groove 28, which forms an unbroken continuation of the cross sectional contours of the grooves in rollers 19. Annulus 25, is further provided with a horizontally extending flange 29, which is also interrupted for the protrusion of rollers 19, but is otherwise continuous to afford a support for the tube during the beading operation. This tube is represented by the letter "T" in the several figures.

As a consequence of this arrangement, the chuck may be adapted to rolling tubes of various diameters by replacing annulus 25, with another of the proper size, and by accordingly adjusting the rollers 19, along the radial grooves 17.

In its presentment to the chuck, the tube is supported on a carriage 30, which is

mounted for horizontal guidance upon the tie rods 3—3, already referred to. This carriage includes a clamp 31, consisting of a lower member 32, and an upper member 36, which is complementary to the lower member in completing the circle within which the tube is received. Said lower member is of semi-circular contour and provided with lateral extensions 33, which are bolted to sleeves 35, adapted to slide upon the tie bars 3—3. In order to facilitate the insertion of a tube, the upper member is hinged to member 32, at a point 37, and maintained in closed position by a locking wedge 38, fulcrumed at 39, and provided with an operating handle 40. Slight variations in the diameter of the tubes are automatically compensated for by a circular segment 45, yieldingly mounted to play within an opening formed in the lower member 32, of the clamp. Fixed in integral bosses 46, of the segment are depending pins 47, which are guided in a semi-circular bracket 48, and the protruding ends of said pins 47, are pointed to engage a bridging piece 49, which is subject to the compressive force of a spring 50. Said spring encircles a rod 51, which is fixed to bracket 48, and depends through an aperture in bridging piece 49. Tension of spring 50, may be adjusted by means of a nut 52, threaded upon rod 51. Tubes of slightly varying diameters will thus be firmly held in place in the clamp under the spring actuated segment 45.

The clamp is supplemented by a holder collar 55, which is divided into two sections 56, and 57, in correspondence with the clamp members 32, and 33, and respectively united thereto by means of a series of bolts 58, fixed in the collar sections and slidably mounted in peripheral bosses 59, on the said clamp members. Springs 60, encircle these bolts and are interposed between the collar 55, and the clamp proper and are effective under the limitations imposed by the heads 61, of the said bolts.

When a reinforcing metallic ring R, is incorporated within the head as shown in Fig. VI, the collar 55, becomes functional in keeping the ring pressed forward under the yielding pressure of springs 60, irrespective of the forward movement of the entire tube in bead formation.

At the rear end, the tube T rests upon a transverse support comprising a pair of arms 62, and 63, which are pivotally suspended from collars 65—65, also slidable upon the rods 3—3. The outer ends of the said arms are crossed and may be relatively adjusted to accommodate different sized tubes by reason of the slots 66—66, which are coöperative with a common clamping bolt 67. Collars 65, are united with the collars 35, of the tube clamp by means of spacing bars 68—68. The tube carriage thus constructed is adapted to be manually advanced in a direction toward the chuck 15, through the instrumentality of the parts about to be described.

Extending rearwardly from the collars 65, are toothed racks 70—70, which are coöperative with gear pinions 71—71, fixed upon a transverse shaft 72, journaled in brackets 73—73, of the end frame 2. Engagement between the racks and these respective pinions is positively assured by guide rollers 75—75, which are mounted for free rotation in bearing brackets 73, and engage the top edges of the said racks. Shaft may be rotated in either direction by the cross hand wheel 76.

In order that the tubes may be uniformly placed in proper position on the carriage, a gage has been provided in the form of a cross bar 80. In initially placing a tube on the carriage, its end is caused to abut against this gage bar previous to clamping. When the gage is properly set, a requisite length of the tube protrudes beyond the ring holder 55, for the proper formation of the bead, see Figs. I, and II. Adjustment of the gage is accomplished by means of screws 81—81, fixed to the ends of bar 80, and longitudinally shiftable by means of nuts 82—82, in brackets 83—83, secured to the rack members 70, within which said screws are freely received.

In operation, the tube is placed in the supporting carriage after the manner just described and the bead reinforcing ring R placed about the end of the tube protruding forward of the clamp. The carriage is thereafter advanced by turning the wheel 76. In its forward advance, the tube end slips over the flange 29, of the chuck annulus 25, and the edges subsequently engage the beading rollers 19. During the further advance of the tube under the pressure exerted by the operator in manipulating wheel 76, the bead is gradually formed by the revolving chuck through the coöperation of its rollers 19, with the circular forming recess 28, in the face of the annulus. Coincident with the bead formation, the reinforcing ring R, is held in place by the holder collar 55, which gradually recedes under the yielding of springs 60, so that when the bead is finally completed the reinforcing ring will be completely enveloped therein.

Having thus described my invention, I claim:

1. In a machine of the class described, the combination of a revolving chuck; a carriage for the tubes to be beaded; means for advancing said carriage to present the tubes to the chuck; including a frame for slidably supporting said carriage, racks formed on said carriage; pinions coöperative with said racks; a shaft for said pinions; a hand wheel for actuating said shaft; a pair of

crossed supporting members pivotally attached to said carriage; and means for relatively adjusting said members at their point of junction.

2. In a machine of the class described, the combination of a revolving chuck; means clampingly engaging the circumferential walls of a tube to hold the same in position to be beaded; means for advancing said clamping means and chuck relatively to present the tube to said chuck; means carried by said chuck for forming a bead upon the edge of said tube; means carried solely by said clamping means for yieldingly holding a reinforcing ring in effecting its envelopment during the beading operation.

3. In a machine of the class described, the combination of a revolving chuck; means for clampingly engaging the circumferential walls of a tube to hold the same in position to be beaded; means for advancing said clamping means to present the tube to said chuck; means carried by said chuck for forming a bead upon the edge of said tube; means for yieldingly holding a reinforcing ring in effecting its envelopment during the beading operation, including a collar slidably connected to said carriage; and springs interposed between said collar and said carriage.

4. In a machine of the class described, the combination of a chuck including a radially channeled revolving disk; a series of beading rollers radially adjustable within the channels of said disk; a concentric annulus bolted to said disk and slotted to permit the protrusion of said rollers therethrough and provided with a circular beading groove coöperative with said rollers; a flange formed upon said annulus for supporting the tube to be beaded from within; a carriage for the said tube and means for advancing said carriage to present the tube to the beading devices of the chuck.

5. In a machine of the class described, the combination of a chuck including a rotating disk having its face provided with a circular beading groove, a series of beading rollers functionally coöperating with said groove, means for supporting a tube to be beaded, a cross bar forming an abutment for said tube, and means for independently adjusting said cross bar in respect to said carriage, whereby the end of the tube is caused to engage the bottom of the groove in the disk.

6. In a machine of the class described, the combination of a chuck including a radially channeled revolving disk, a series of beading rollers radially adjustable within the channels of said disk, a concentric annulus bolted to said disk and slotted to permit the protrusion of said rollers therethrough and provided with a circular beading groove coöperating with said rollers, a carriage for supporting the tube, means for adjusting the tube laterally on the carriage, and means for advancing said carriage to present the tube to the beading devices of the chuck.

7. In a machine of the class described, the combination of a chuck including a radially channeled revolving disk, a series of beading rollers radially adjustable within the channels of said disk, a concentric annulus bolted to said disk and slotted to permit the protrusion of said rollers therethrough and provided with a circular beading groove cooperating with said rollers, a carriage for supporting the tube, and means for advancing said carriage to present the tube to the beading devices of the chuck.

8. In a machine of the class described, the combination of a revolving chuck, a carriage for the tubes to be beaded, means for advancing said carriage to present the tubes to the chuck, adjustable means on said carriage constructed and arranged to clamp one end of tubes of variant size, and adjustable means on said carriage for freely supporting the other end of a tube.

9. In a machine of the class described, the combination of a revolving chuck, a carriage for the tubes to be beaded, means for advancing said carriage to present the tubes to the chuck, means on said carriage adapted to clamp one end of tubes of variant size, a pair of cross supporting members pivotally attached to said carriage for supporting the other end of the tube, and means for relatively adjusting said members at their point of junction.

In testimony whereof I have hereunto signed my name at Wilmington, Delaware, this thirteenth day of November, 1917.

JAMES F. PIERCE.

Witnesses:

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CLARENCE SOUTHERLAND.