A. LOWY.

MACHINE FOR SETTING BUNG BUSHINGS.

APPLICATION FILED JAN. 2, 1915.

1,234,680.

Patented July 24, 1917.

2 SHEETS—SHEET 1.

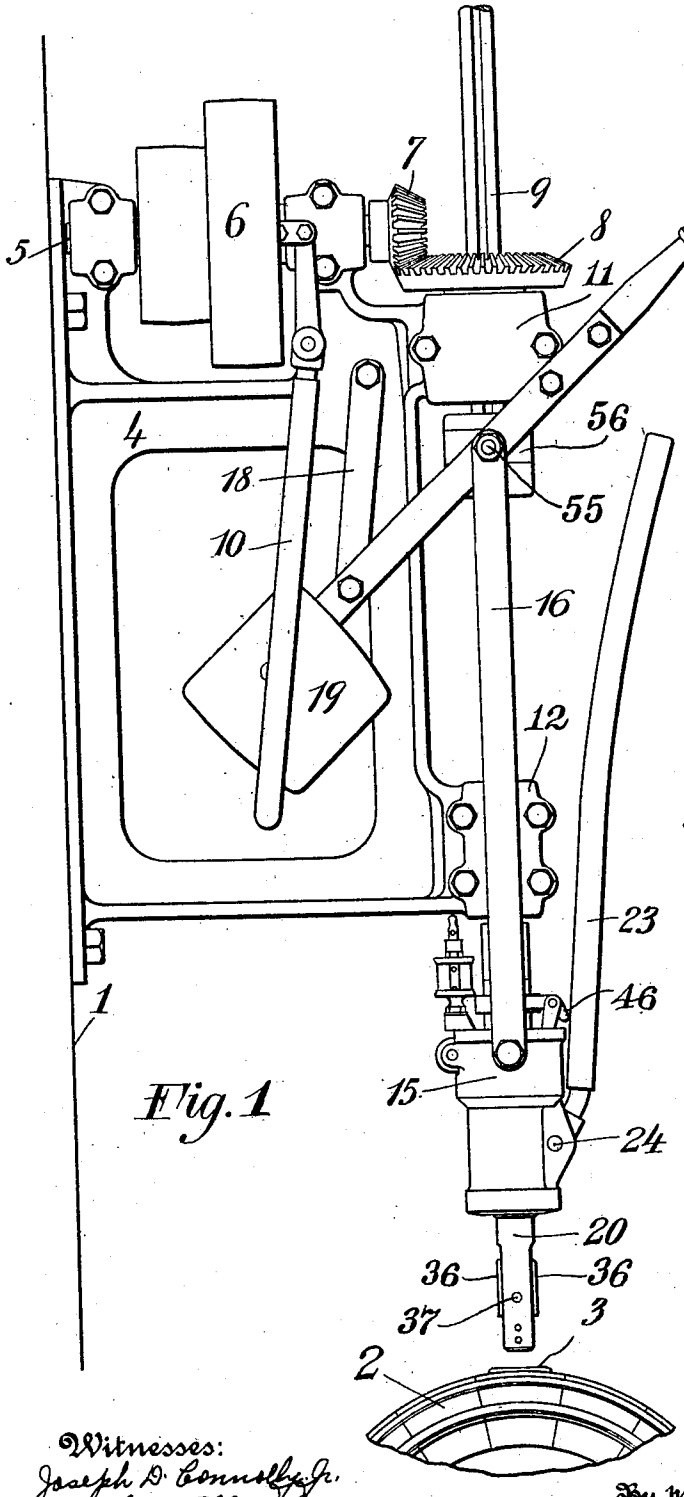
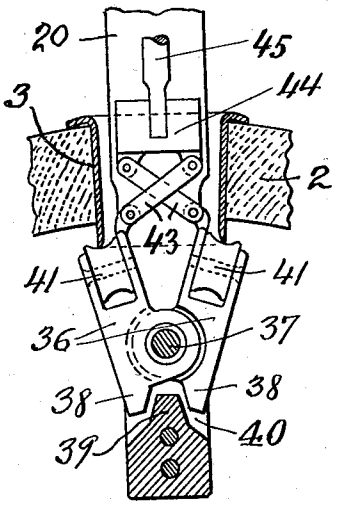



Fig. 1

Fig. 2




Witnesses:
Joseph D. Connolly Jr.
Arthur Allen Jr.

Inventor
Arthur Lowy.
By his Attorneys
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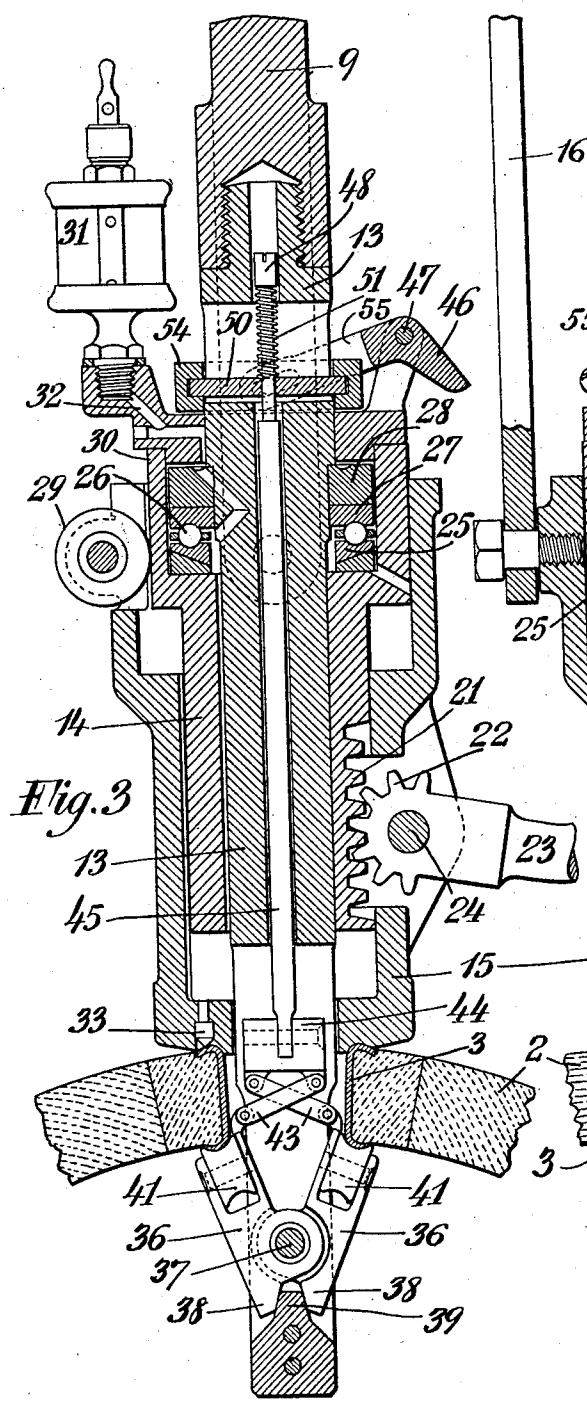



Fig. 3

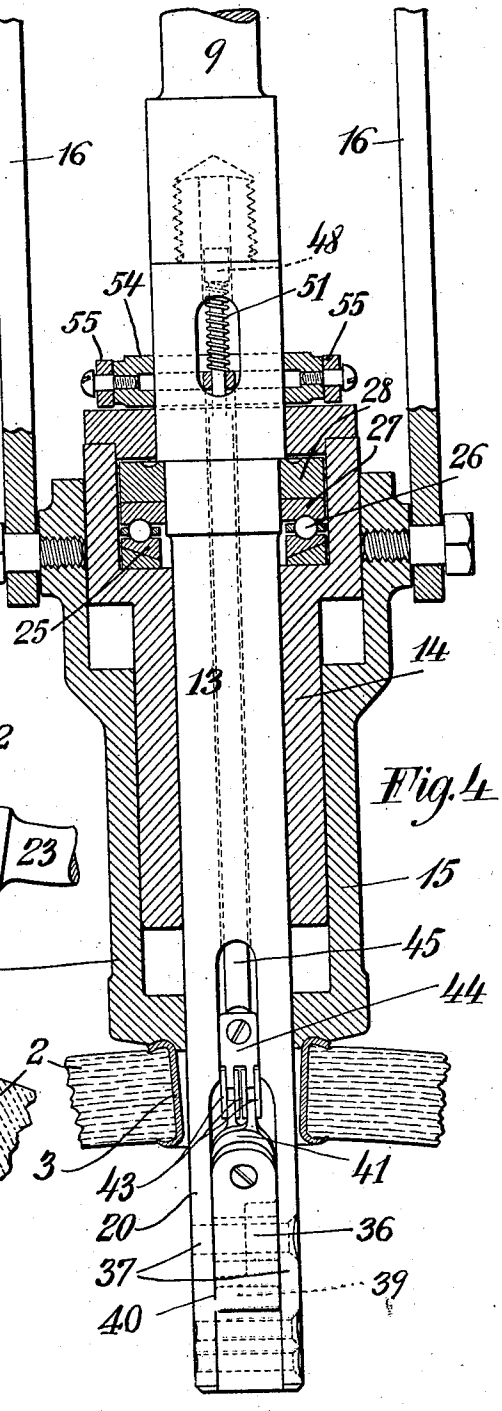



Fig. 4

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# UNITED STATES PATENT OFFICE.

ARTHUR LOWY, OF NEWARK, NEW JERSEY, ASSIGNOR TO NATIONAL BUSH COMPANY, A CORPORATION OF NEW YORK.

## MACHINE FOR SETTING BUNG-BUSHINGS.

1,234,680. Specification of Letters Patent. **Patented July 24, 1917.**

Application filed January 2, 1915. Serial No. 75.

*To all whom it may concern:*

Be it known that I, ARTHUR LOWY, a citizen of the United States, residing at Newark, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Machines for Setting Bung-Bushings, of which the following is a full, clear, and exact specification.

This invention relates to a machine for setting bung bushings, and has particular reference to a novel machine for this purpose whereby metal bushings may be set in barrels much more effectively, firmly and rapidly than in prior machines employed for this purpose.

The distinctive feature of this invention consists in the manner of holding the bushing during the flanging operation, and in flanging means so constructed that the angle of the line of thrust upon the bushing continually increases during the flanging operation and the flanging surfaces move apart to follow the spreading edge of the bead they are forming. With this invention, it is not necessary, in order to hold the bushing against rotation, even in old barrels, to provide it with prongs or to drive nails through its flange. By this invention, separate means is provided for clamping the bushing firmly to the barrel, independently of the flanging devices, and the pressure of the latter while it affects does not determine the holding pressure. This is accomplished by combining with the rotating flanging devices, a non-rotatable clamping device which directly engages the head of the bushing, and which is movable by the operator to apply any desired main clamping pressure. The flanging devices are carried by a mandrel which rotates within the clamping head, and these parts are preferably so connected that the flanging pressure can be applied by moving one oppositely to the other without relieving the main clamping pressure.

In the form of the invention shown herein, the machine comprises a vertically movable, but non-rotatable clamping head which bears upon and forces the outer end of the bushing firmly into the barrel, and an independently rotatable and movable mandrel which carries the bushing flanging devices. As herein shown the latter consist of one or more links pivoted in a slotted lower portion of the mandrel, these links each carrying a flanging roller. In operation, the line of thrust is from the rollers through the levers to the pivot pin on the mandrel, and the angle of this line of thrust with the axis of the mandrel is smallest at the commencement of the operation and gradually increases as the bushing is expanded. The rollers also spread apart to follow the expansion of the edge being bent. Thus, dependence for tightness is not had merely upon the engagement of the flanged portion of the bushing with the barrel, but owing to the independent clamping pressure and the varying angle of thrust, the entire bushing from end to end is in firm contact with the barrel. The flanging devices are also so mounted as to be collapsed within the mandrel when it is inserted and removed from the bushing, and this can be done without stopping the rotation of the mandrel. A considerable saving in time is effected by this arrangement, so that about double the number of bushings can be set by this machine in a given time, as compared with prior machines.

The invention will be more fully understood in connection with the description of the accompanying drawings, wherein—

Figure 1 shows the machine in elevation, together with the upper portion of a barrel having a bushing therein.

Fig. 2 is a detail view showing the position of the parts at the commencement of the operation.

Fig. 3 is a vertical section in the plane of Fig. 1, showing the position of parts when the bushing has been set, and

Fig. 4 is a sectional view at right angles to Fig. 3.

The machine is preferably attached to a vertical support as 1, so as to give a clear space below to receive a barrel 2, 3 being a bushing to be set therein. It will be noted that this bushing has no spurs or prongs requiring to be first driven into the barrel to prevent rotation while being flanged. The machine consists of a frame 4 carrying a shaft 5 driven by pulley 6 and a bevel gear 7 on the end of shaft 5 driving a larger bevel gear 8 on vertical shaft 9, carried in bearings 11, 12. The vertical shaft 9 is splined to bevel gear 8, so that the shaft 9 and the parts driven thereby can be reciprocated vertically, and also allowing a range

of adjustment for barrels of different diameters. The power is controlled by a clutch lever 10, controlling a clutch within pulley 6.

The shaft 9 drives the mandrel 13, which bears in a sleeve 14 within clamping head 15. This head is grooved on its lower end to fit and center on the bushing 3, thereby bringing the mandrel 13 and its associated parts in proper relation to the end of the bushing which is to be flanged. The head 15 is connected by links 16 to a lever 17, which lever is pivoted to the frame 1 by link 18 and also carries a counter-weight 19, which normally slightly over-balances the head 15 and parts carried thereby. The lever 17 and links 16 are pivoted by pins 55′ to a collar or guide 56 which slides on shaft 9. This arrangement holds the links 16 vertical, and does not interfere with the control of clamping head 15. In the position shown in Fig. 1, the counter-weight 19 has lifted the head 15 through the links 16, so that the lower end 20 of the mandrel is outside of the barrel 2. When the lever 17 is pressed downwardly, the head 15, mandrel 13, etc. are lowered, and the range of movement is such that the mandrel can be inserted within the barrel. During these operations of raising and lowering the head 15, the shaft 9 of course slides through the gear 8, and can also be rotating.

Inasmuch as the clamping head 15 does not rotate, a special construction is necessary both to take up the various thrusts produced in expanding the bushing and also in the application of the expanding force itself to the bushing while the mandrel is rotating. Referring first to the details of the structure within the head 15, the sleeve 14 moves up and down with the mandrel 13, but the latter can turn in the former. The sleeve 14 has a rack 21 which is engaged by a pinion 22 on the end of a lever 23, the lever being pivoted at 24 on the head 15. The flanging pressure is controlled entirely by this lever 23, which is independent of the clamping lever 17. The upper end of the sleeve 14 is provided with a ball race 25, carrying balls 26 interposed below the upper ball race 27 carried by the mandrel 13. 28 is a washer behind the upper ball race 27 and bearing against a shoulder on the mandrel, so that the washer 28 and race 27 rotate with the mandrel and the race 25 remains stationary with the sleeve 14. 29 is a roller mounted on the clamping head 15 which engages a flattened surface 30 on the sleeve 14 to prevent relative rotation while permitting relative longitudinal movement. 31 is an oil cup which feeds the bearings of the mandrel through oil duct 32 and permits the excess oil to pass down between the mandrel and the sleeve 14, so as to automatically oil the flanging devices. 33 is a sharp pointed pin carried by the clamping head 15 which is intended to engage in the upper flange of the bushing to assist in preventing movement between the bushing and the clamp when the flanging pressure is applied to the lower end of the bushing. This pin is not essential and can be omitted. The necessity of using spurs or prongs on the bushing itself, which require to be driven into the wood of the barrel before the flanging operation can be commenced, is avoided by this non-rotating clamping apparatus operated by lever 17 independently of the flanging pressure controlled by lever 23.

The flanging apparatus is mounted at the lower end of the mandrel, and comprises a pair of links 36 pivoted on the mandrel at 37. The links have short ends 38, which engage with a projection 39 carried by the mandrel to limit the expansion of the rollers, Fig. 3 showing the rollers in maximum expanded position. The mandrel is slotted above the pivot pin 37 as at 40 so that the links 36 and the flanging rollers 41 carried thereby can be swung within, or substantially within, the diameter of the mandrel, so that it can be inserted and withdrawn through the bushing.

Fig. 2 shows in detail the initial position of the links and rollers as the flanging operation commences, and by comparing this position with the final position shown in Fig. 3, it will be seen that as the bushing is flanged and expanded by lever 23 while the mandrel is being rotated, the angle formed by the line between the rollers and the pivot pin 37, and the axis of the mandrel constantly increases, and thus the bushing is both stretched or spun and flanged. This angle is hereinafter referred to as the angle of thrust, and constitutes one of the features of distinction of the present invention over prior machines intended for the same purpose, wherein the angle of thrust produced does not continuously vary during the flanging operation.

The periphery of the rollers 41 is curved as herein shown, though the invention is not restricted to this particular curvature.

To collapse and expand the rollers, the links 36 are connected at their inturned upper ends by links 43 to a block 44 sliding within the mandrel slot, and this block is connected by a rod 45 disposed axially of the mandrel to a lever 46 pivoted at 47 on the upper end of sleeve 14. The upper end of the rod 45 is provided with a screw 48 between which and a cross-pin 50 is provided an expansion spring 51. The spring 51 is adjusted by screw 48 so as to lift the rod 45 and thereby position the rollers 41 to properly engage the bushing at the commencement of the flanging, as shown in Fig. 2. When the flanging has been completed, as in Fig. 3, the lever 23 is lifted until it

strikes lever 46 as in Fig. 1, thus automatically collapsing the flanging devices. It will be seen that lifting of the lever 23 first lowers the mandrel so that the rollers 41 can clear the bushing, and further movement of the lever 23 collapses the flanging devices as stated.

The lever 46, is connected to collar 54, within which rotates cross pin 50 mounted in a slot in the mandrel and the slotted arms 55 of lever 46 are pivoted to this collar 54, as seen in Fig. 4. The spring 51 thus produces a yielding pressure of the rollers 41 on the end of the bushing and insures proper initial positioning thereof, this spring not being normally set to collapse the rollers 41 wholly within the mandrel 13.

In operation, the bushing 3 is positioned directly under the mandrel 13, lever 17 is depressed carrying with it the clamp and mandrel and the links 36 are collapsed to pass through the bushing. This collapsing of the links may be accomplished either by pressing the handle 23 against the dog 46, or by simply forcing the mandrel through the bushing and allowing the upper edge of the bushing to engage the links and press them together lifting rod 45 and its associated parts. It should here be noted that the weight of the mandrel and its surrounding sleeve normally holds the handle 23 in a vertical position. When the clamp 15 engages the outer end of the bushing the flanging means is positioned well within the inner end of the bushing and the links have been sprung apart and are held by the spring 51 in position to present the flanging rollers in proper relation to the edge to be turned. The head 15 and associated parts constitute gripping means which engage with the bushing and through links 16, prevent it from being rotated by the flanging devices. This clamping or gripping pressure is controlled by lever 17. The lever 23 is now moved down, lifting sleeve 14 and mandrel 13 until the flanging rollers 41 engage the bushing, as in Fig. 2. The flanging pressure is then applied through lever 23, and it will be seen that the flanging pressure is independent of the main clamping pressure and is separately controllable. This is a decided improvement of this machine over prior machines, in that the bushing is positively held against rotation. Thereby, the use of spurs or nails to hold the bushing against rotation is avoided, which reduces the cost of the bushing, and also saves time in setting. There is also the advantage of being able to set a bushing just as tightly in an old barrel, as in a new one. Heretofore, it has been found that spurs or nails in bushings do not always hold in weak wood, and their rotation cuts and loosens all the wood in their path of rotation, and sometimes necessitates boring another bung hole in a barrel. As the mandrel revolves, the rollers 41 revolve with it, and continued pressure by the operator on the lever 23 causes the flanging and expansion of the bushing to be effected, the angle of thrust all the while continually increasing to the limit of stop 39, as the operation proceeds.

By this machine, owing to the independent clamping and flanging means, bushings are much more firmly, quickly and tightly set, than with prior machines. In fact, they may be set with such pressure that the holes appear to have been countersunk before the bushing was inserted. Not only are the bushings so tightly set as to avoid even slight leakage of gas, as tends to occur unless the bushing is very tightly set, but the forces are applied in such a way that an even flanging and expansion of the bushing is secured without either upsetting the bushing longitudinally or causing it to split. If the bushing is upset longitudinally, the opening is obstructed and difficulty is experienced in either driving the bung, or making it tight, while if the bushing splits, it will not be gas tight, and will have to be removed before a new one can be set, which is a matter requiring considerable time and expense. By the tripping means herein provided, the flanging means can be tripped while the machine is running, thus permitting the bushed barrel to be withdrawn and another barrel to be replaced and bushed without the delay due to stopping the machine to insert and withdraw the flanging devices.

The invention is not to be restricted to the precise details and arrangement of parts above described, as various modifications and changes in the form and arrangement may be made without departing from the scope of the appended claims.

Having thus described my invention, what I declare as new and desire to secure by Letters Patent of the United States is:—

1. In a machine for setting bushings in barrels, the combination with a movable clamp adapted to engage the flange of a bushing inserted in a barrel, of means holding the clamp against rotation relatively to the barrel and preventing relative rotation of the bushing and clamp when clamped together, flanging means passable through the bushing to engage the inner end thereof, means for rotating said flanging means, and means for applying flanging pressure during rotation of said flanging means.

2. In a machine for setting bushings, the combination with clamping means for engaging the outer end of a bushing inserted in a barrel, of means for holding the clamping means in engagement with the bushing against rotation, a rotatable mandrel within said clamping means carrying flanging means adapted to engage and flange the in-

ner end of the bushing by rotary pressure, and means interposed between the mandrel and the clamping means for applying flanging pressure by outward movement of the mandrel relatively to the clamping means.

3. In a machine for setting bushings, the combination of a clamp adapted to be pressed against the bushing to hold it against rotation, rotatable flanging means, means for drawing said clamping means and flanging means toward each other to flange the bushing, and means for independently controlling the pressure of said clamping means during the flanging operation.

4. In a machine for flanging bushings, the combination with a support, of a clamp engaging the flange of a bushing, means between said support and said clamp for holding said clamp against rotation and pressing said clamp into engagement with the bushing, a rotatable flanger carried by said clamp and engaging the inner end of the bushing, and means for pressing said flanger in a direction opposite to said clamp to flange the bushing.

5. In a machine for flanging bushings, the combination with a clamp, of a support, means between said clamp and said support for pressing said clamp against said bushing and holding said clamp and bushing against rotation, a mandrel supported by said clamp, flanging means carried by said mandrel opposite said clamp, and means for moving said mandrel to press said flanging means toward said clamp and flange the bushing.

6. In a bushing flanger, the combination with a clamp, of means independent of both the bushing and the work for holding the clamp against rotation, a hollow rotary mandrel adapted to be inserted throught the bushing, means for moving said mandrel axially through said clamp, flanging means carried by the inserted end of said mandrel, and a rod passing through said mandrel to control said flanging means.

7. A bushing setting apparatus comprising a rotatable mandrel carrying flanging means adapted to engage and flange the inner projecting end of a bushing inserted in a barrel, a non-rotatable clamping member adapted to engage the outer flange of the bushing, a thrust bearing on the mandrel, a sleeve between the thrust bearing and the clamping member having means for effecting relative longitudinal movement between the flanging means and the clamping means, and means for rotating the flanging means independently of said clamping means and said sleeve.

8. In a bushing flanger, the combination with a rotatable and axially movable mandrel adapted to be inserted through a bushing, of separate backwardly directed thrust arms pivoted to the inserted end of said mandrel and pressed into varying flanging engagement with the inner end of the bushing by backward movement of said mandrel.

9. In a bushing flanger, the combination with a rotatable and axially movable mandrel adapted to be inserted through a bushing, of backwardly directed thrust arms pivoted to the inserted end of said mandrel and pressed into flanging engagement with the inner end of the bushing by backward movement of said mandrel, and resilient means holding said arms in an intermediate position for yielding movement in either direction.

10. In a machine for flanging bushings, the combination with non-rotatable clamping means adapted to engage the outer flanged end of a bushing inserted in a barrel, of a rotatable mandrel adapted to engage and flange the inner projecting end of a bushing, a plurality of thrust links separately pivoted at the inner end of the mandrel and directed backwardly, flanging means on the ends of said thrust links engaging said inner end of the bushing, and means for rotating and moving the mandrel axially to flange the bushing while continually varying the angle between the line of thrust and the mandrel axis.

11. In a machine for flanging bushings, the combination with a rotatable mandrel, of relatively movable thrust links pivoted thereon at one end and carrying flanging means at their other ends, resilient means holding said links in position to engage the bushing, and means for moving said mandrel axially to spread said links and increase the angle of flanging thrust on the bushing.

12. In a machine for flanging bushings, the combination with a rotatable and axially movable mandrel adapted to be inserted within a bushing, of pivoted thrust links at the inserted end of said mandrel, means at the ends of said links normally in position to engage the bushing, and means whereby axial movement of said mandrel will collapse said thrust links within said mandrel.

13. In a machine for flanging bushings, the combination with a non-rotatable clamp, of means for pressing said clamp into engagement with the bushing, a rotatable mandrel carried by said clamp and passing through said bushing, flanging arms freely pivoted to said mandrel opposite said clamp, and means for pressing said mandrel toward said clamp to flange said bushing and expand said arms.

14. The combination with means for clamping a tube against longitudinal movement, of a rotatable mandrel within said clamping means and relatively longitudinally movable therein, flanging means carried by said mandrel movable relatively thereto to continuously vary the angle of

thrust during the flanging operation, and means for effecting relative longitudinal movement between the clamping means and the mandrel, said means comprising a rack and pinion for simultaneously moving the mandrel and clamp in opposite directions.

15. The combination of a mandrel, links pivoted adjacent the end of said mandrel, flanging means carried by said links, said links and flanging means being collapsible within the mandrel, clamping means surrounding said mandrel, means for oppositely moving the flanging and clamping means, and means for simultaneously moving the flanging and clamping means.

16. The combination with flanging means comprising a mandrel, means for rotating said mandrel, and flanging links pivoted adjacent the end of said mandrel, said links being collapsible within the mandrel, of clamping means, means for oppositely moving the flanging and clamping means, and means for simultaneously moving the flanging and clamping means.

17. The combination with a driving gear, of a shaft splined thereto, a mandrel carried by said shaft and movable therewith, links pivoted adjacent the end of said mandrel, flanging means carried by said links, said links and flanging means being collapsible within the mandrel, clamping means surrounding said mandrel, means for oppositely moving the flanging and clamping means, and means for simultaneously moving the flanging and clamping means.

18. The combination with a rotatable slotted mandrel carrying links pivoted in said slot, of flanging means carried by said links and movable with the links into and out of said slot, and means for controlling said links comprising a rod movable within the mandrel and pivoted at one end to said links, the other end of said rod being connected to relatively stationary actuating means.

19. The combination with a rotatable slotted mandrel carrying links pivoted in said slot, of flanging means carried by said links and movable with the links into and out of said slot, and means for controlling said links comprising a rod movable within the mandrel and pivoted at one end to said links, the other end of said rod being connected to relatively stationary actuating means, and means for partially counterbalancing said rod.

20. The combination with a rotatable and longitudinally movable mandrel, of collapsible flanging means adjacent one end of said mandrel, a sleeve surrounding said mandrel, a thrust bearing between said sleeve and mandrel, a relatively movable clamping member exterior of said sleeve, means engaging both the clamping member and said sleeve to effect simultaneous opposite movement of said mandrel and clamping member, and guiding means between said sleeve and said clamping member.

In testimony whereof I affix my signature, in presence of two witnesses.

ARTHUR LOWY.

Witnesses:

JOSEPH D. CONNOLLY, Jr.,

K. G. LE ARD.

**Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."**