

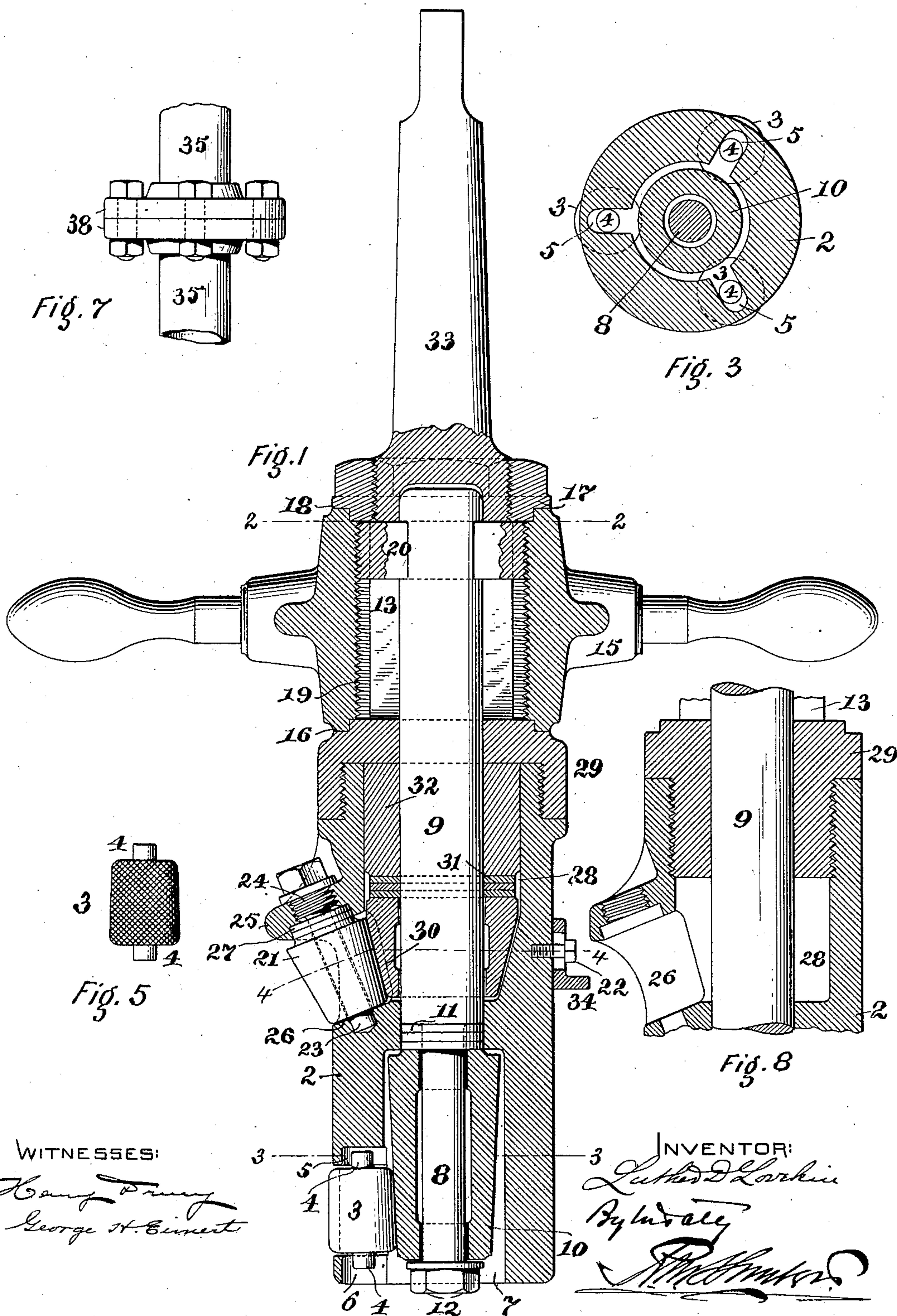
No. 734,273.

PATENTED JULY 21, 1903.

L. D. LOVEKIN.  
TOOL FOR FLANGING PIPE.  
APPLICATION FILED MAR. 28, 1902.

NO MODEL.

2 SHEETS—SHEET 1.



WITNESSES:  
*Harry D. Tracy*  
*George H. Bennett*

INVENTOR:  
*Luther D. Lovekin*  
*By [Signature]*

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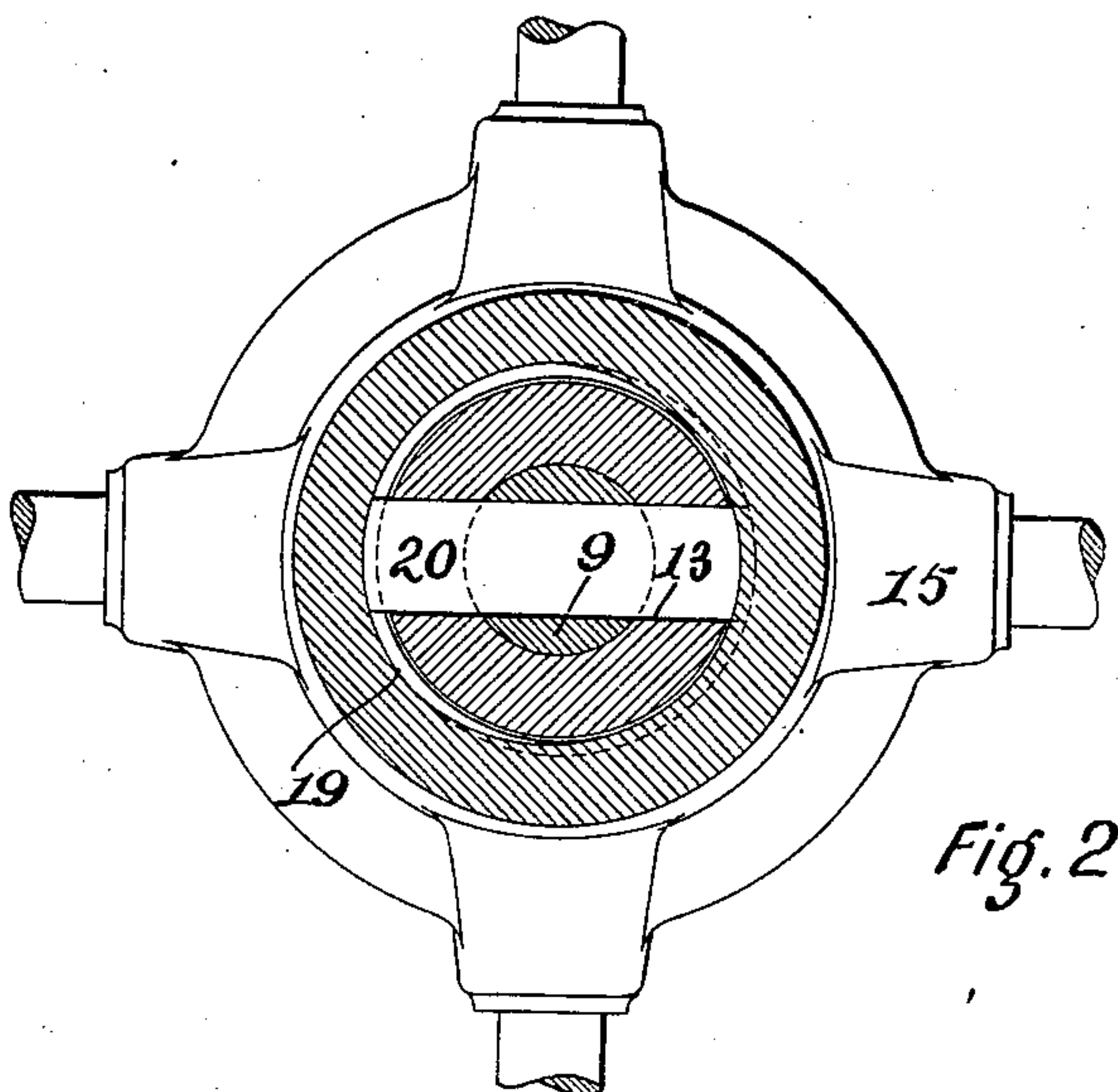


Fig. 2

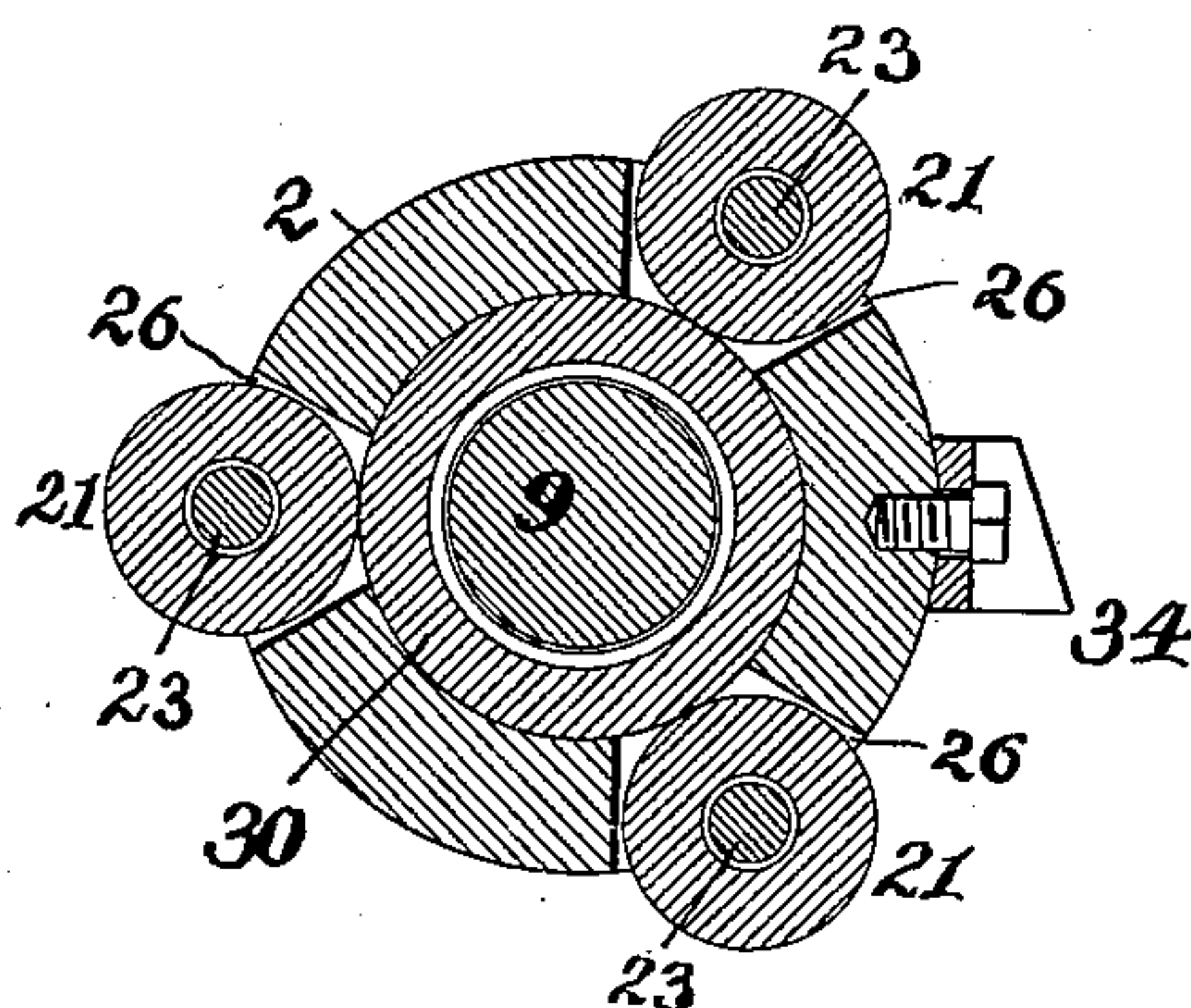


Fig. 4

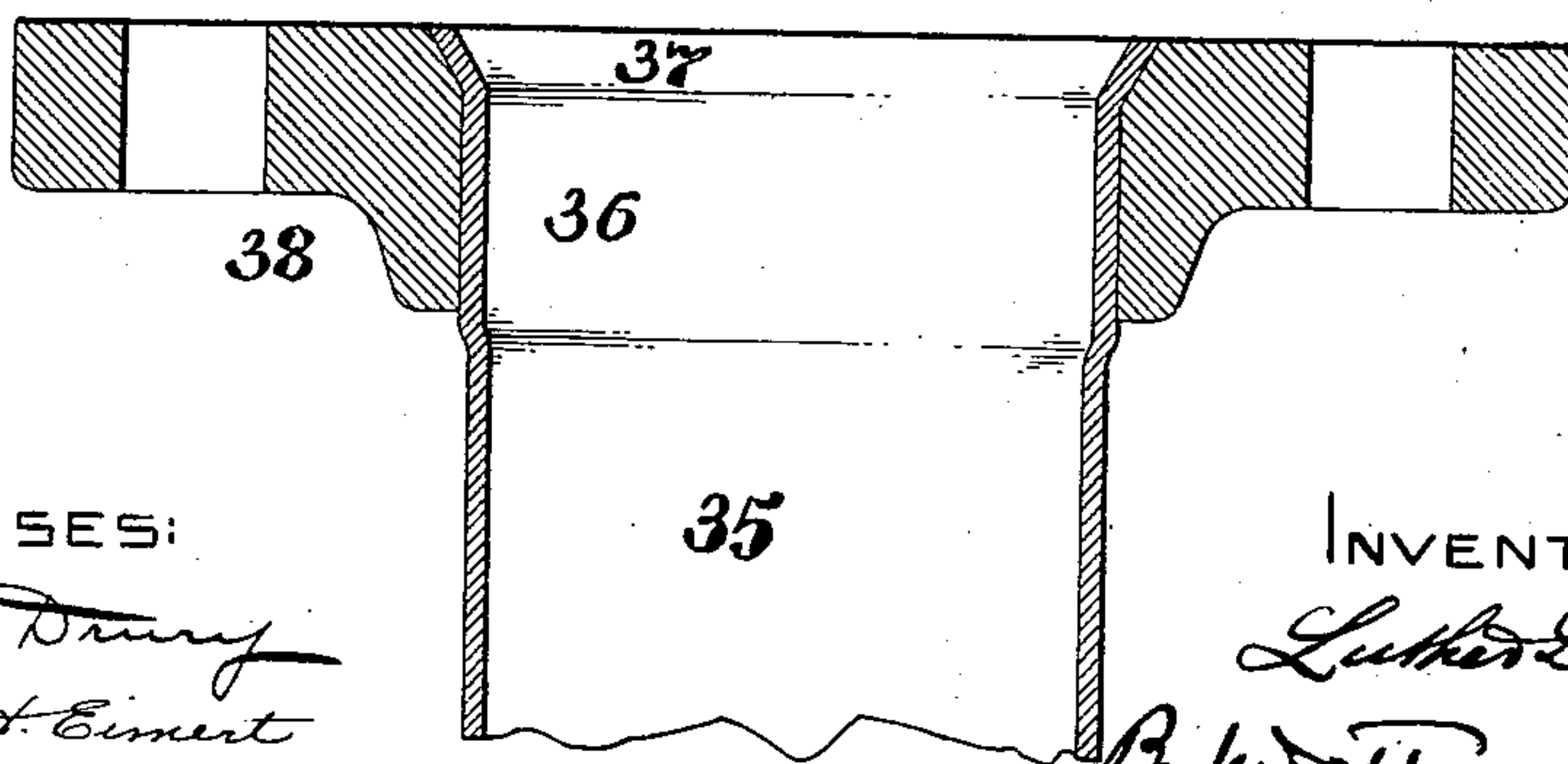


Fig. 6

WITNESSES:

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# UNITED STATES PATENT OFFICE.

LUTHER D. LOVEKIN, OF PHILADELPHIA, PENNSYLVANIA.

## TOOL FOR FLANGING PIPE.

SPECIFICATION forming part of Letters Patent No. 734,273, dated July 21, 1903.

Application filed March 28, 1902. Serial No. 100,353. (No model.)

*To all whom it may concern:*

Be it known that I, LUTHER DANIEL LOVEKIN, of the city and county of Philadelphia and State of Pennsylvania, have invented an  
5 Improvement in Tools for Flanging Pipe, of which the following is a specification.

My invention has reference to tools for flanging pipe; and it consists of certain improvements fully set forth in the following  
10 specification and shown in the accompanying drawings, which form a part thereof.

The object of my invention is the provision of a simple and efficient tool capable of being easily and expeditiously handled to expand  
15 and flange the ends of pipes or tubes of sheet metal and more especially those of comparatively small diameters.

My invention is more particularly an improvement upon the type of flanging-machine  
20 set out in Letters Patent to me, No. 682,726, dated September 17, 1901, and is distinguished therefrom principally in expanding-rollers and the manner of supporting and operating them.

In carrying out my invention I provide a suitable mandrel adapted to be operated in any convenient manner, the lower end of which is furnished with expanding-rollers, which are preferably made slightly tapered.  
25 Within the mandrel I arrange a follower carrying upon its lower end a tapered roller adapted to press upon the expanding-rollers for the purpose of causing them to spread as the work may require and also to reduce their resistance to rotation upon their own axes.  
30 This tapered follower-roller is, moreover, supported by the follower-shaft in such a manner that its end thrust may be taken up by anti-friction devices. The structure is designed  
35 to secure the desired results with the least expenditure of power and also with the simplest practicable construction of the operative parts making up the organized tool. The mandrel is further provided with flanging-  
40 rollers located upon its outer surface at a considerable distance from its end for the purpose of flanging the free edges of the expanded tube end, and thereby secure it in position within a pipe-flange. The follower is arranged to be fed gradually in a longitudinal  
45 direction through the mandrel to shift the position of the follower-roller relatively to

the expanding-rollers, and its movement may be secured and regulated by hand manipulation, as pointed out hereinafter.

The details of construction will be better understood by reference to the drawings, in which—

Figure 1 is a sectional elevation of an expanding and flanging tool embodying my invention. Fig. 2 is a cross-section of the same on line 2 2 of Fig. 1. Fig. 3 is a cross-section of the same on line 3 3 of Fig. 1 looking upward. Fig. 4 is a cross-section of the same on line 4 4 of Fig. 1. Fig. 5 is an elevation  
55 of a modified form of expanding-rolls. Fig. 6 is a sectional elevation of a pipe and flange after the pipe is expanded or flanged. Fig. 7 is an elevation of two complete pipe ends and flanges united, and Fig. 8 is a sectional elevation of a portion of the mandrel and follower-shaft.

2 is the mandrel and is in the main a cylindrical body, hollow or tubular on the lower part, as at 7 and 28, and having its upper portion terminating in a tapered shank 33 and flattened end adapted to be received and held in the tail-stock of a turret-lathe or other tool suitable for the purpose of supporting it. The particular shape of the shank is immaterial and would be made to suit the tool available. The mandrel-body is made of two parts screwed together at 29. This middle portion 29 of the mandrel is slotted, as at 13, and the upper portion of its body immediately above the slot is screw-threaded and provided with a nut 17. A controller-ring 15, provided with suitable handles or parts for the operator to grasp, is loosely sleeved over the mandrel-body and journaled in bearings 16 on the mandrel and 18 on the nut 17.  
60 In this manner the controller-ring may be freely rotated for purposes to be set out later on. The mandrel-body is bored through almost to the shank 33 and is fitted with a vertically-adjustable follower-shaft 9, having at its upper end a transverse key 20, which is guided in the vertical slots 13 of the mandrel, so as to prevent it from turning within the mandrel, the ends of said key projecting beyond the mandrel-body and connecting with the controller-ring by means of screw-threads upon the outer ends of the key engaging screw-threads 19 on the internal face of the  
65 70 75 80 85 90 95 100



ring. It will now be seen that by turning the controller-ring while the mandrel is stationary the follower-shaft will be caused to move longitudinally through the mandrel.

5 The lower end of the follower-shaft 9 is reduced in diameter to form a spindle, as at 8, and is extended downward into the space 7 of the mandrel. This reduced portion constitutes a spindle upon which is loosely sleeved  
10 a conical or tapered roller 10, the taper of which is downward or toward the end of the mandrel. When this roller is retracted within the space 7, it is practically inclosed and protected within the mandrel. It may be re-  
15 moved from the spindle when necessary by removing a nut 12 on the end of the spindle and which normally holds the tapered roller in place. As this roller 10 is subjected to heavy strain in an upward direction, I find it  
20 most important to provide means to take this thrust with the least possible liability of wear from friction. To this end I provide the follower with a series of antifriction-rings 11 of a diameter preferably equal to the diameter  
25 of the larger or body portion of the follower and encircling the spindle 8 thereof, so as to be interposed between the end of the large portion 9 of the follower and the end of the roller 10.

30 The lower end of the mandrel is provided with expanding-rollers 3, preferably three in number, said rollers being tapered with the taper directed upward. They are also provided with journals 4, guided in radial bear-  
35 ings 5 and 6, formed in the wall of the mandrel and respectively above and below openings or apertures through which the body of the rollers 3 extend, the same touching the tapered roller 10 on their inner faces and hav-  
40 ing their outer faces projected beyond the outer surface of the mandrel. These radial bearings 5 and 6, or at least one set of them, open inwardly, so as to permit the flanging-rollers 3 to be placed in position from the in-  
45 side of the mandrel and before the roller 10 of the follower is placed upon the spindle 8. As the taper on the rollers 3 is inversely that upon the follower-roller 10, it is evident that as the former roll upon the latter in the ex-  
50 panding operation the outer or active faces or expanding-surfaces are parallel to the axis of the follower, and consequently the expanded tube or pipe will retain a cylindrical shape during the expanding operation and at  
55 its completion.

The expanding-rollers 3 may be made with plain or smooth surfaces or may have roughened or knurled peripheries, as shown in Fig. 5, as desired.

60 It is preferable that there shall be some play between the roller 10 and its spindle 8 to allow the roller to adjust itself to the rollers 3 and the tube should the spindle not be in true center of the tube, it not being necessary to have a close fit of the roller 10 upon its spin-  
65 dle to secure good expanding results.

The hollow or space 7 of the mandrel is con-

siderably deeper than the length of the flanging-rollers 3, so as to provide space for the re-  
70 ception of the follower-roller 10 when retracted above said expanding-rollers, as shown in Fig. 1. The rollers 3 are held in position within the mandrel by the tapered follower-roller 10, thus simplifying the construction as far as possible.

75 At some distance above the rollers 3 the outer portion of the mandrel 2 is provided with annular bosses 25, which are perforated, and the mandrel is slotted at preferably three places  
80 26, equidistant about the mandrel and desirably above or in longitudinal alinement with the expanding-rollers 3. The slots 26 open through the mandrel into the hollow space 28 within the same. Into the boss above each of the recessed portions is screwed, at 24, inclined  
85 spindles 23, the lower ends of which are stepped in the mandrel-body. Journaled upon these spindles 23 are the flanging-rollers 21. In this manner the flanging-rollers are adapted to ro-  
90 tate on oblique axes and the three flanging-rollers, in effect, have their axes radiating from the same point of the axis of the mandrel. However, this is only necessary when the sev-  
95 eral flanging-rollers are the same size and shape. To reduce the friction, these rollers 21 rest upon antifriction-collars 27, arranged between their upper portion and the under  
100 surface of the bosses 25. The outer or flanging surface of these rollers 21 is tapered longitudinally of the roller, giving them a conical  
105 shape, so as to cause the metal of the tube to be flanged in the form of a conical surface, as clearly shown in Fig. 6. While I prefer this type of flanging-roller, I do not confine myself thereto, as the flanging may be done  
110 in other shapes to suit the character of the work to be performed.

To reduce the friction and take up the thrust of the flanging-rollers 21, I provide a conical antifriction or thrust roller 30, located  
115 within the hollow space 28 of the mandrel and through which the follower-shaft 9 loosely passes. The flanging-rollers 21 press at points equidistant upon this roller 30, thus centralizing it. As it is thus pressed upward  
120 this end thrust is received upon antifriction-collars 31, held in place by a spacing-block 32, also located within the chamber or space 28. It is evident that the roller 30 might, if desired, fill the whole of the space 28, dis-  
125 pensing with the spacing-block.

Secured to the side of the mandrel 2 is a trimming-tool or cutter 34 for the purpose of trimming the edge of the flanged pipe or tube to make it true with the surface of the pipe-  
130 flange, as shown in Fig. 6, so that two such pipes and flanges may be clamped tightly together, as in Fig. 7. This trimming-tool or cutter 34 is clamped to the mandrel by a screw 22, extending through a slot in the cut-  
135 ter, as shown in Fig. 1, so that the cutter may be adjusted to suit the requirements due to variations in thickness of metal to be flanged which would change the relative positions of



the cutter and flanging-rollers, necessitating the cutter to be farther from the end of the mandrel for thin tubes than for thick ones. The form of the cutter may be varied to suit the requirements of the work.

To show the adaptability of my improved tool, I will now refer to Figs. 6 and 7. In Fig. 6 is shown the end of the pipe or tube 35 to be expanded and flanged in the ring or flange 38. This flange is properly turned and formed with the annular tapered end. These parts are clamped in the face-plate of the lathe and adapted to be rotated. The end of the mandrel 2 is then inserted into the tube, and while the latter rotates the controller-ring 15 is turned by hand, with the object of moving the follower and its roller 10 toward the tube and the expanding-rollers 3 within it. The result of this is that the metal of the tube 35 is expanded to fit tightly into the bore of the flange 38, as shown in Fig. 6. In this operation the rollers rotate by frictional contact with the pipe or tube 35 and their rotation is accomplished with but little friction, first, because of the freedom to rotation of the roller 10 of the follower, due to the use of the antifriction rings or collars 11, and, secondly, because the thrust of the rollers 3 is received upon a rotating body. When the expansion of the tube has been completed, the controller-ring is rotated in a reverse direction and the pressure by the rollers 3 relieved. The mandrel is then advanced within the tube and guided thereby until the flanging-rollers 21 touch the outwardly-extending edge of the tube. The tail-stock and tool are then moved gradually toward the tube and flange 38, and the result is that the rollers 21 gradually flange outwardly the edge of the tube, as shown in Fig. 6, causing it to fit tightly down upon the conical edge of the flange-ring, as at 37. Simultaneously with this flanging operation the cutter 34 on the mandrel turns off the surplus metal from the flanged end of the tube and makes it perfectly flat and true with the upper surface of the flange, as shown in Fig. 6.

Now while I have described my invention as adapted to be used in the lathe of the turret or other suitable type it is to be understood that the same results can be secured by revolving the tool and holding the pipe or tube stationary, or both may have rotary motion given to them. My invention is independent of the particular means employed for holding the tool, and is not to be restricted thereby.

While I prefer the construction shown as being excellently adapted for the purposes of my invention, I do not limit myself to the details, as they may be modified without departing from the spirit of the invention.

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

1. In a tool for expanding tubes, the combination of a mandrel adapted to be held when

using the tool, expanding-rollers carried by the mandrel and adapted to project beyond the outer surface thereof, a longitudinally-adjustable and non-rotatable follower carried by the mandrel and having a shouldered spindle, a tapered roller journaled upon the spindle of the follower and moved thereby and adapted to receive the thrust of the expanding-rollers when in the act of expanding the tube, antifriction-collars surrounding the spindle and between the tapered roller and shoulder of the follower and a trimming-tool or cutter carried by the mandrel.

2. In a tool for expanding tubes, the combination of a mandrel adapted to be held when using the tool, tapered expanding-rollers carried by the mandrel and adapted to project beyond the outer surface thereof, a longitudinally-adjustable follower carried by the mandrel, a tapered roller journaled upon the follower and moved thereby and adapted to receive the thrust of the expanding-rollers when in the act of expanding the tube the taper of the follower-roller being inverse to that of the expanding-rollers, flanging-rollers carried by the mandrel above the expanding-rollers, and a trimming-tool or cutter secured to the mandrel in transverse alinement with the flanging-rollers.

3. In a tool for expanding tubes, the combination of a mandrel adapted to be held when using the tool, expanding-rollers carried by the mandrel and adapted to project beyond the outer surface thereof, a longitudinally-adjustable follower carried by the mandrel, a tapered roller journaled upon the follower and moved thereby and adapted to receive the thrust of the expanding-rollers when in the act of expanding the tube, antifriction-bearings between the end of the follower-roller and the follower, means to move the follower longitudinally through the mandrel, flanging-rollers journaled to the mandrel on oblique axes, and an antifriction thrust-roller within the mandrel for receiving the thrust of the flanging-rollers.

4. In a tool for flanging tubes, the combination of a hollow mandrel adapted to be held when using the tool, flanging-rollers carried by the mandrel and projecting beyond the outer surface thereof, and a tapered roller journaled within the mandrel and adapted to receive the thrust of the flanging-rollers when in the act of flanging the tube.

5. In a tool for flanging tubes, the combination of a hollow mandrel adapted to be held when using the tool, flanging-rollers carried by the mandrel and projecting beyond the outer surface thereof, a tapered roller journaled within the mandrel and adapted to receive the thrust of the flanging-rollers when in act of flanging the tube, and a trimming-tool or cutter attached to the mandrel in transverse alinement with the flanging-rollers.

6. In a tool for flanging tubes, the combination of a hollow mandrel adapted to be held when using the tool, flanging-rollers carried



by the mandrel and projecting beyond the outer surface thereof, a tapered roller journaled within the mandrel and adapted to receive the thrust of the flanging-rollers when in act of flanging the tube, and antifriction-bearings between the end of the tapered roller and the mandrel consisting of a series of rings or collars resting upon each other.

7. In a tool for flanging pipe, the combination of a hollow mandrel to enter the pipe, flanging-rollers carried in the annular wall of the mandrel, a tapered thrust-roller within the hollow mandrel and adapted to receive the thrust of the flanging-rollers and support them in the act of flanging the tube, and means for centering the thrust-roller in the mandrel.

8. In a tool for flanging and expanding tubes, the combination of a mandrel adapted to be held when using the tool, expanding-rollers carried by the mandrel and adapted to project beyond the outer surface thereof, a longitudinally-adjustable follower carried by the mandrel, a tapered roller journaled upon the follower and moved thereby and adapted to receive the thrust of the expanding-rollers when in the act of expanding the tube, one or more flanging-rollers journaled upon the mandrel at considerable distance from its end so as to be out of transverse alinement with the expanding-rollers, and a thrust-roller within the mandrel for receiving the thrust of the flanging-rollers.

9. In a tool for flanging and expanding tubes, the combination of a mandrel adapted to be held when using the tool, expanding-rollers carried by the mandrel and adapted to project beyond the outer surface thereof, a longitudinally-adjustable follower carried by the mandrel, a tapering roller journaled upon the follower and moved thereby and adapted to receive the thrust of the expanding-rollers when in the act of expanding the tube, one or more flanging-rollers having conical surfaces journaled upon the mandrel on oblique axes at a considerable distance from its end so as to be out of transverse alinement with the expanding-rollers, and a tapered thrust-roller within the mandrel for receiving the thrust of the flanging-rollers.

10. In a tool for flanging pipe, the combination of a mandrel, a series of flanging-rollers presenting oblique outer surfaces carried by the mandrel for spreading the tube end into substantially conical form, and a trimming or cutting tool secured to the mandrel in

transverse alinement with the flanging-rollers for trimming the flanged end of the pipe simultaneously with the flanging of the same.

11. In a tool for flanging pipe, the combination of a mandrel, a series of flanging-rollers presenting oblique outer surfaces carried by the mandrel for spreading the tube end into substantially conical form, and an adjustable trimming or cutting tool secured to the mandrel in transverse alinement with the flanging-rollers for trimming the flanged end of the pipe simultaneously with the flanging of the same.

12. In a tool for flanging pipe, the combination of a hollow mandrel, a series of flanging-rollers carried by the mandrel, a central thrust-roller within the mandrel and against which the flanging-rollers rest and upon which they revolve when doing their work of flanging the tube, and a central support for the central roller for supporting it within the mandrel but out of contact with its interior walls.

13. In a tool for flanging and expanding tubes, the combination of the mandrel adapted to be held when using the tool, expanding-rollers carried by the mandrel and adapted to project beyond the outer surface thereof, a longitudinally-adjustable follower carried by the mandrel, a tapered roller journaled upon the follower and moved thereby and adapted to receive the thrust of the expanding-rollers when in the act of expanding the tube, one or more flanging-rollers journaled upon the mandrel on oblique axes at a considerable distance from its end so as to be out of transverse alinement with the expanding-rollers, a thrust-roller within the mandrel for receiving the thrust of the flanging-rollers, and a trimming-tool or cutter secured to the mandrel in transverse alinement with the flanging-rollers.

14. In a tool for flanging pipe, the combination of a hollow mandrel, a series of flanging-rollers carried by the mandrel, and a central thrust-roller within the mandrel and against which the flanging-rollers rest and upon which they revolve when doing their work of flanging the tube.

In testimony of which invention I have hereunto set my hand.

L. D. LOVEKIN.

Witnesses:

R. M. HUNTER,  
GEORGE H. EIMERT.