

June 10, 1930.

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MEANS FOR FORMING METAL TUBES

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2 Sheets-Sheet 1

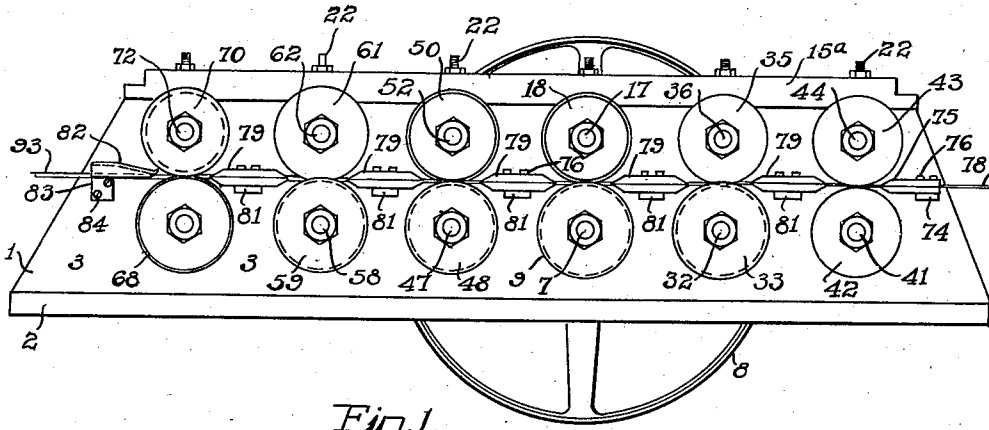


Fig. 1.

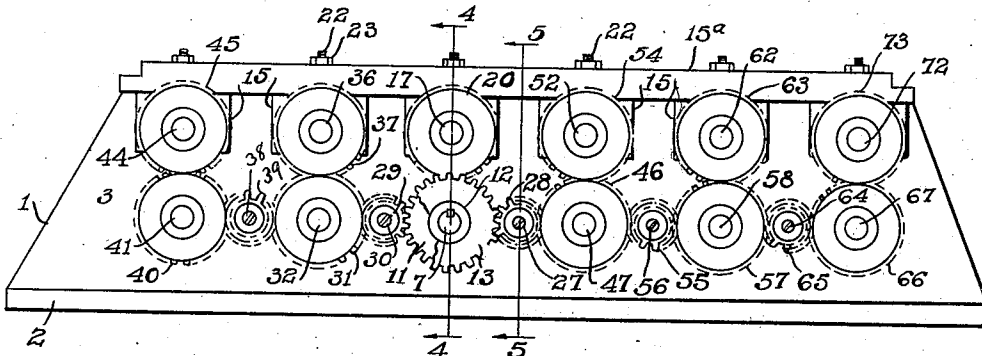


Fig. 2.

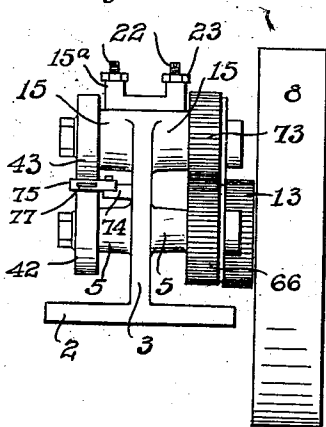


Fig. 3.

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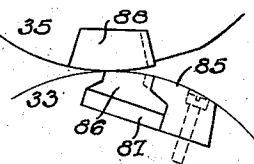
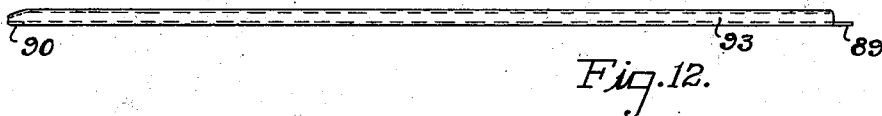
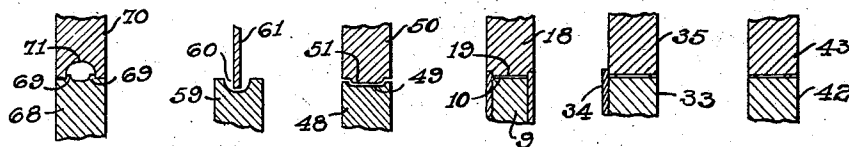
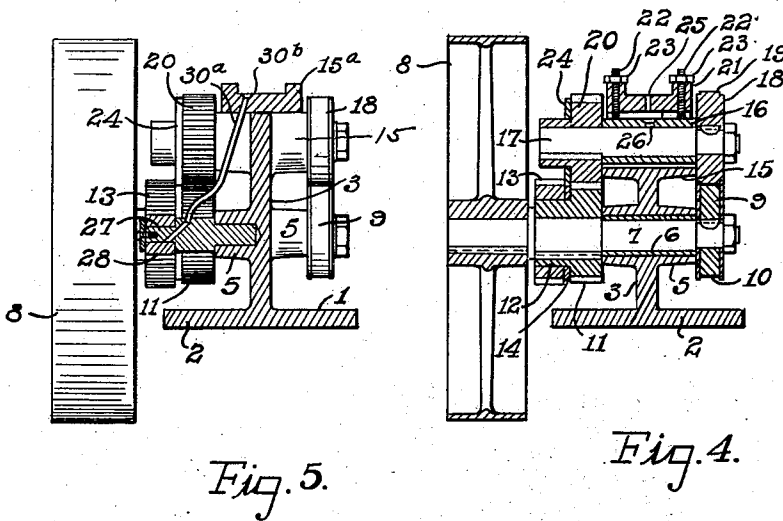
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MEANS FOR FORMING METAL TUBES

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2 Sheets-Sheet 2



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MEANS FOR FORMING METAL TUBES

Application filed May 13, 1927. Serial No. 191,099.

This invention relates to new and useful improvements in means for forming tubes from metal.

It is the principal object of my invention to provide a machine for economically and expeditiously forming from metal, tubes such as type tubes. My machine first shears a strip of metal to length, with an ear formed on its end, and then by three successive steps, bends it to assume a form having a flat back and channeled front to receive T-shaped type for passage therethrough.

In the accompanying drawings illustrating my machine, Figure 1 is a front view of said machine. Figure 2 is a rear view of the same. Figure 3 is an end view thereof. Figure 4 is a cross sectional view of the machine taken on the line 4—4 of Figure 2. Figure 5 is a cross sectional view taken through said machine on the line 5—5 of Figure 2, showing the idler mounting and oil tube. Figure 6 is a sectional view taken through the feeding rolls. Figure 7 is a sectional view through the shearing rolls. Figure 8 is a sectional view taken through the second feeding rolls. Figure 9 is a sectional view taken through the first forming rolls. Figure 10 is a sectional view taken through the second forming roll and disc. Figure 11 is a sectional view taken through the final forming rolls. Figure 12 is a side view of the type tube formed by my machine. And figures 13 is a diagrammatic view showing the shearing unit of my machine.

Referring to the accompanying drawings for a detailed description of the machine I prefer for forming type tubes, the numeral 1 designates an elongated metal frame comprising a base 2 and a central, vertical supporting web 3.

Projecting laterally from the middle portion of the web 3, on each side thereof in a horizontal line, are hollow bosses 5. Within the bosses 5 in Figure 4, is a bearing 6 for a pulley shaft 7 upon one reduced end of which is secured a pulley 8. Upon the other side of the web 3 there is secured upon the shaft 7 a roll 9 having a grooved periphery 10. (See Figures 2 and 4.)

Secured upon the shaft 7 between the pulley

8 and the web 3, is a standard gear 11 formed with a hub 12 upon which there is secured a gear 13 having one more tooth than the gear 11. Secured to the outer face of the gear 11 is a spacing disc 14. (See Figure 4.)

Formed on the web 3 above and in vertical alinement with the bosses 5, are hollow bosses 15 open at the top to contain floating bushings 16. In each bushing there is journaled a shaft such as the shaft 17 in Figure 4. Upon one end of the shaft 17 there is secured a roll 18 formed on its periphery with a wide annular projection 19 adapted to enter the groove 10 in the roll 9 immediately below it. Upon the other end of the shaft 17 there is secured a gear 20 which meshes with the driving gear 11 below. (See Figures 2 and 4.)

For the purpose of adjusting the tension between the rolls 9 and 18, there is secured to the bosses 15 a top cover plate 15^a having formed in its top portion hollow vertical projections 21 that receive studs 22 which, at their lower ends, engage the floating bushings 16. These studs 22 rise above the projections 21 to receive nuts 23 by which the studs are forced downwardly to increase the pressure of the rolls upon the metal strip between them, or are drawn upwardly to relieve that tension.

In order to prevent the gears 11 and 20 being pressed more closely together when the rolls 9 and 18 are more tightly engaged, the gear 20 has secured to its outer face a disc 24 which is in peripheral contact with the disc 14. These discs 14 and 24 will maintain the gears on accurate centers irrespective of the pressure exerted upon the floating bushing by the studs.

As shown in Figure 4, there is formed in the top 15^a of the bosses 15 a vertical oil hole 25 through which oil may pass to a recessed portion 26 in the bushing 16 below.

Referring to Figures 2 and 5, there is mounted on a stud 27 secured to the gear side of the web 3, and idler pinion 28 that meshes with the gear 13, which has one more tooth than the gear 11. With the latter gear there meshes an idler pinion 29 mounted on a stud 30 secured to the web 3. Each idler pinion

stud receives oil from an oil tube 30^a that leads to it from a recess 30^b in a boss 15 as shown in Figure 5.

The slower moving rolls, or those rotated by the idler pinion 29, will now be described. Meshing with the pinion 29 is a gear 31 secured to a shaft 32 journaled in a suitable bearing in a pair of the bosses 5. On the other end of this shaft there is secured a roll 33 to one face of which there is attached a retaining disc 34.

Adapted to be pressed against the roll 33 is a roll 35 secured to one end of a shaft 36 which, like the shaft 17, is floatingly mounted in bosses 15 above the bosses 5 last mentioned. Upon the other end of the shaft 36 there is secured a gear 37 that meshes with the gear 31 which drives it. To the gears 31 and 37, as well as to the gears hereinafter to be described, there are secured discs similar to the discs 14 and 24 for maintaining said gears on accurate centers. The rolls 33 and 35, as will be hereinafter described, shear the metal strip from which the type tube is formed. (See Figure 12.)

Mounted on the stud 38 is an idler pinion 39 which is in mesh with the gear 31. Meshing with the idler pinion 39 is a gear 40 secured to a shaft 41 journaled in suitable bearings in one pair of the bosses 5. On the other end of this shaft 41, there is secured a feed roll 42.

Adapted to be pressed against the roll 42 is a feed roll 43 secured to one end of a shaft 44 which, like the shaft 17, is floatingly mounted in bosses 15 above the bosses 5 last mentioned. Upon the other end of the shaft 44, there is secured a gear 45 that meshes with the gear 40 which drives it. (See Figure 2.)

The faster moving rolls, or those rotated by the idler pinion 28, will now be described. Meshing with the pinion 28 is a gear 46 secured to a shaft 47 journaled in suitable bearings in a pair of the bosses 5. On the other end of this shaft 47 there is secured a roll 48 formed with a grooved periphery 49 as shown in Figure 9, to co-act with a roll 50 to perform the first forming operation on the sheared metal strip.

The gear 13, which has one more tooth than the gear 11 with which the pinion 29 meshes, drives the idler pinion 28 at a faster rate than the pinion 29; and through its engagement with the gear 46, the pinion 28 drives these faster moving rolls 48 and 50. These rolls 48 and 50 move faster than the other rolls for the purpose of advancing the tube first to be ejected from the machine, ahead of the tube immediately behind it. If all the rolls ran at the same speed, these tubes would not be separated, but would telescope or go out joined together. The roll 50, which has formed around its periphery a wide projection 51, is secured to one end of a shaft 52 that, like the shaft 17, is floatingly mounted in bosses 15 above the last mentioned bosses

5. Upon the other end of the shaft 52 there is secured a gear 54 that meshes with the gear 46 which drives it. (See Figure 2.)

Meshing with the gear 46 is an idler pinion 55 mounted on a stud 56. In mesh with this pinion 55 is a gear 57 secured on a shaft 58 journaled in suitable bearings in a pair of bosses 5. On the other end of this shaft 58 there is secured a roll 59 having the grooved periphery 60 shown in Figure 10.

Adapted to enter the groove 60 in the roll 59 is a forming disc 61 secured to one end of a shaft 62 which, like the shaft 17, is floatingly mounted in bosses 15 above the bosses 5 last mentioned. Upon the other end of the shaft 62 there is secured a gear 63 which meshes with the gear 57 that drives it. (See Figure 2.)

For the purpose of rotating the last forming rolls, there is mounted on a stud 64, for engagement with the gear 57, an idler pinion 65 that meshes with a gear 66 secured to a shaft 67 journaled in suitable bearings in the end bosses 5. On the other end of this shaft 67, there is secured a crimping roll 68 formed in its periphery with two spaced flanges 69, 69 as shown in Figure 11.

Adapted to be pressed against the roll 68 is a roll 70 formed with a concaved periphery 71 which both annular flanges 69, 69 on the roll 68 enter to crimp the curved sides of the tube formed by the preceding rolls.

The roll 70 is secured to one end of a shaft 72 which, like the shaft 17, is floatingly mounted in bosses 15 above the bosses 5 last referred to. Upon the other end of the shaft 72 there is secured a gear 73 that meshes with the gear 66 which drives it. (See Figure 2.)

Referring to Figures 1 and 3, there is secured to the web 3 at one end of my forming machine just described, a horizontal bracket 74 for a pair of guide plates 75, 75. The latter are secured by screws 76 to the bracket 74, and are formed to provide, when screwed together, a longitudinal slot 77 to receive a metal strip 78 to guide it between the feed rolls 42 and 43.

Intermediate guide plates 79, 79 are screwed to supporting piece 81 attached to the web 3 between the paired rolls back of the feed rolls 42 and 43. Just beyond, and a little above, the meeting point of the rolls 68 and 70, is a straightening plate 82 secured to a bracket 83 that is attached to the web 3 by screws 84.

The operation of my machine will now be described.

A metal strip 78 from a roll (not shown) is directed between the feed rolls 42 and 43 by the guide plates 75, 75. By these rolls the strip is fed between the guide plates 79, 79 to the shearing rolls 33 and 35.

Referring to Figures 1, 7 and 13 for a description of these rolls, it will be observed from

Figure 13 there is provided in the periphery of the roll 33 a recess into which is fitted a female die 85 and a stripper 86 resting on a rubber cushion 87. In a recess in the periphery of the upper roll 35 there is fitted a male die 88 which is formed and located to co-act with the female die 85 to cut the metal strip 78 into proper lengths, with an ear 89 formed on one end of each and a corresponding groove 90 formed in its other end. (See Figure 7.)

The strips so sheared and formed by the rolls 33 and 35 are directed by the guide plates 79, 79 between the next rolls 9 and 18, which feed them between the next guide plates 79, 79 to the first forming rolls 48 and 50. These rolls form each metal strip with a flat bottom 91 and two slightly upturned sides 92, 92. (See Figure 9.)

The rolls 59 and disc 61, which next receive the partly formed strip, give to the latter the more pronounced curvature shown in Figure 10. The still partly formed metal strip is then passed between the next guide plates 79, 79 to the third forming rolls 68 and 70, which crimp it to its final shape shown in end section in Figure 11. The strip is then forced against the straightening plate 82, issuing from the machine as the completed type tube 93 shown in Figure 12.

It is thus seen that by my machine there may be quickly and cheaply formed from metal rolls, tubes such as the type tubes 93.

Having described my invention, I claim:

1. In a machine of the type described, the combination with a supporting frame, of a plurality of pairs of superimposed rolls mounted in said frame adapted to receive between them a strip of metal, means carried by two of said rolls to shear said strip to proper length, a pair of subsequent rolls being formed to bend said strip to channel shape, with a flat bottom, a next succeeding pair of rolls being formed to further bend the walls of said channel, and the last pair of rolls being formed to crimp said walls closer together, and means for rotating said rolls.

2. In a machine of the type described, the combination with a supporting frame, of a plurality of pairs of superimposed rolls mounted in said frame adapted to receive between them a strip of metal, means carried by two of said rolls to shear said strip to proper length, a pair of subsequent rolls being formed to bend said strip to channel shape, with a flat bottom, a next succeeding pair of rolls being formed to further bend the walls of said channel, and the last pair of rolls being formed to crimp said walls closer together, and means for rotating the last three pairs of rolls at a faster rate than the preceding rolls.

3. In a machine of the type described, the combination with a vertical supporting web, of a transverse drive shaft projecting through

and supported by said web, a pair of shearing rolls mounted on said web, on one side of said drive shaft to receive between them a metal strip, pairs of forming rolls mounted on said web and on the other side of said drive shaft to form said strip after it has been sheared by the first rolls, and means on said drive shaft for rotating the forming rolls at a faster rate of speed than the shearing rolls.

4. In a machine of the type described, the combination with a vertical supporting web, of a transverse drive shaft projecting through and supported by said web, a pair of roll shafts mounted on each side of said drive shaft, a pair of rolls for shearing a metal strip mounted on one pair of said roll shafts, a pair of rolls for forming said strip mounted on the other pair of roll shafts, a drive gear mounted on said drive shaft, a second driving gear with a less number of teeth, also mounted on said drive shaft, a geared connection between the shearing roll shafts and the driving gear having the less number of teeth, and a geared connection between the forming roll shafts and the driving gear having the greater number of teeth.

5. In a machine of the type described, the combination with a vertical supporting web, of a pair of oppositely disposed, hollow bosses projecting horizontally from said web, one on each side of the latter, hollow bosses projecting laterally from said web above the first bosses, a horizontal bushing floatingly mounted in the upper bosses, a shaft journaled in said bushing, a forming roll mounted on one end of said shaft, a forming roll mounted on the drive shaft immediately below the first roll, a gear mounted on said drive shaft, a gear mounted on the second shaft in mesh with the first gear, and screw means projecting through the tops of the upper bosses for engagement with said bushing to force the upper forming roll toward the lower one for the purpose specified.

In testimony whereof I have hereunto set my hand this 11th day of May, 1927.

FRANK H. POEPPELMEIER