July 24, 1962 R. L. COAN 3,045,268

MACHINE FOR DEBURRING THE ENDS OF TUBES AND THE LIKE

Filed March 28, 1961 4 Sheets-Sheet 1

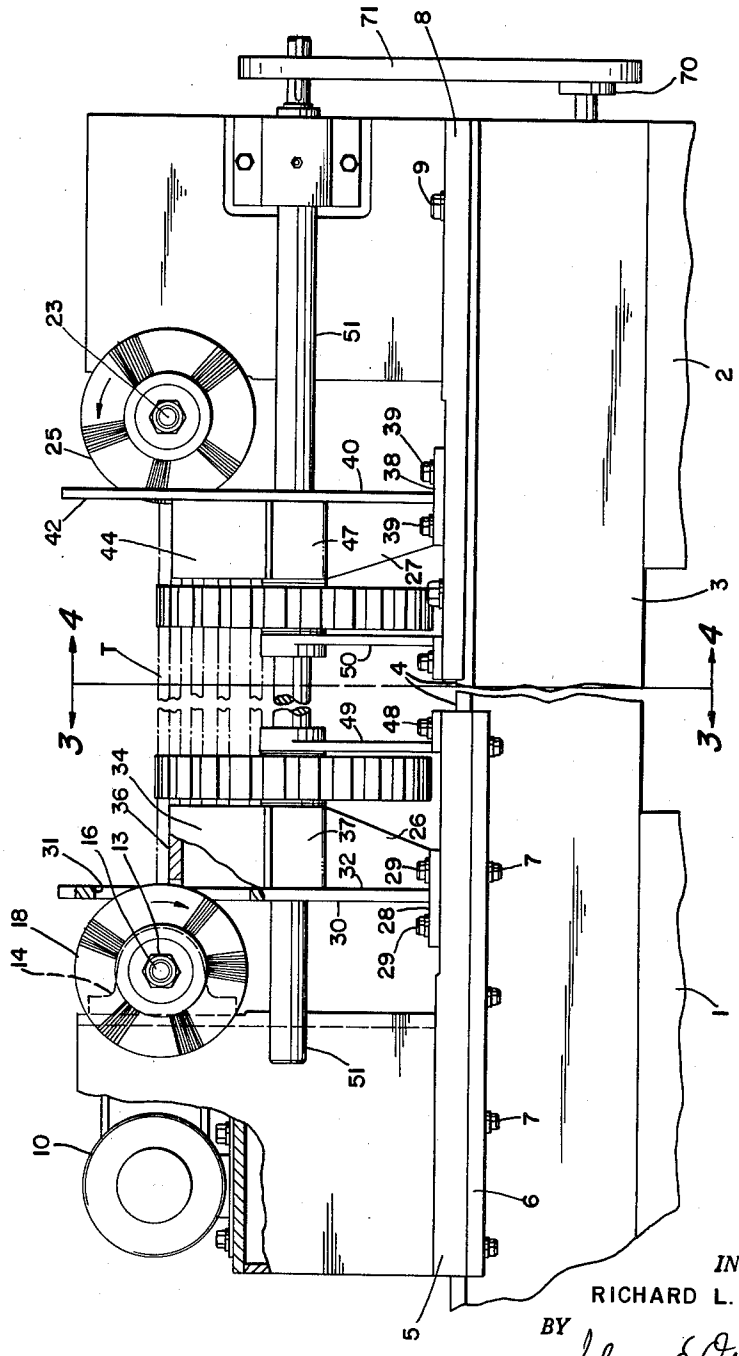


Fig. 1

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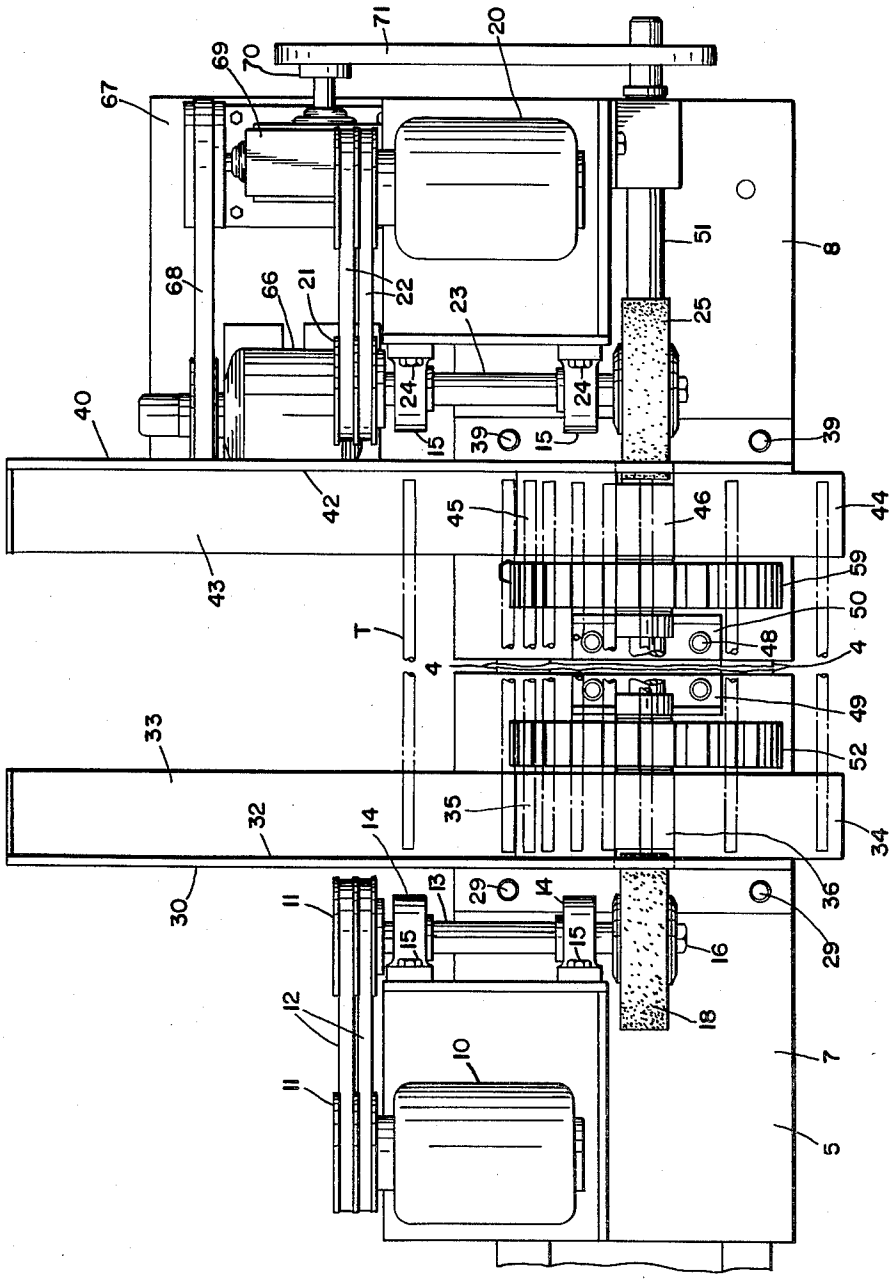


Fig. 2

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Filed March 28, 1961 4 Sheets-Sheet 3

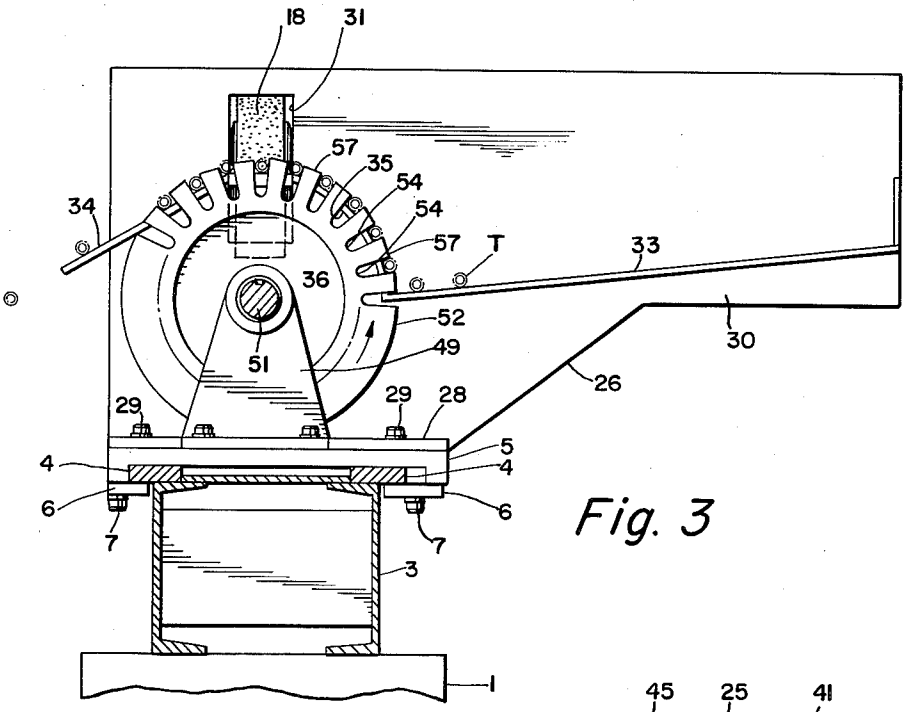


Fig. 3

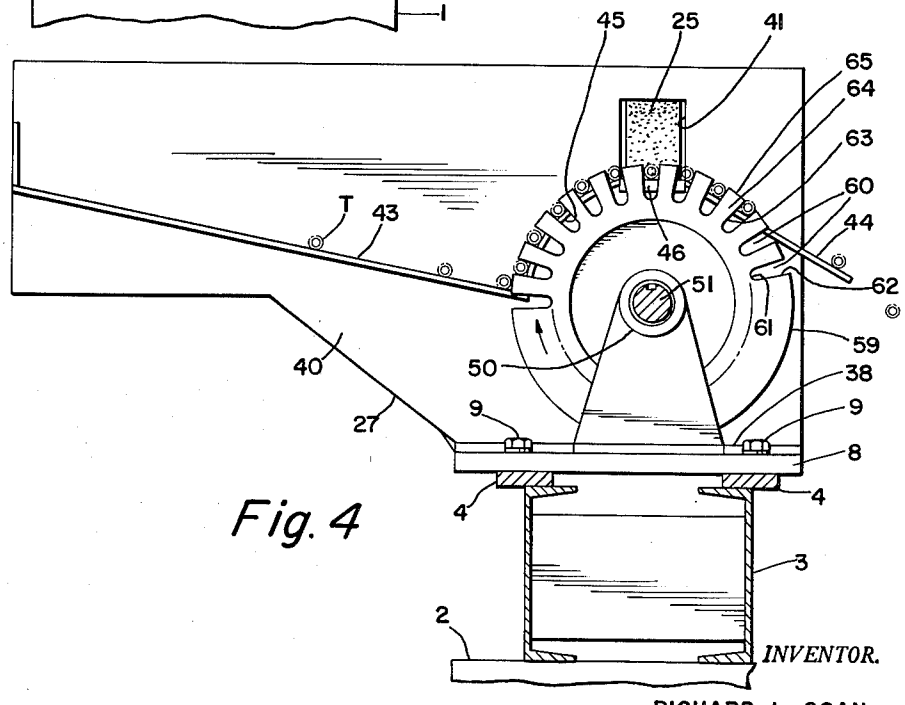


Fig. 4

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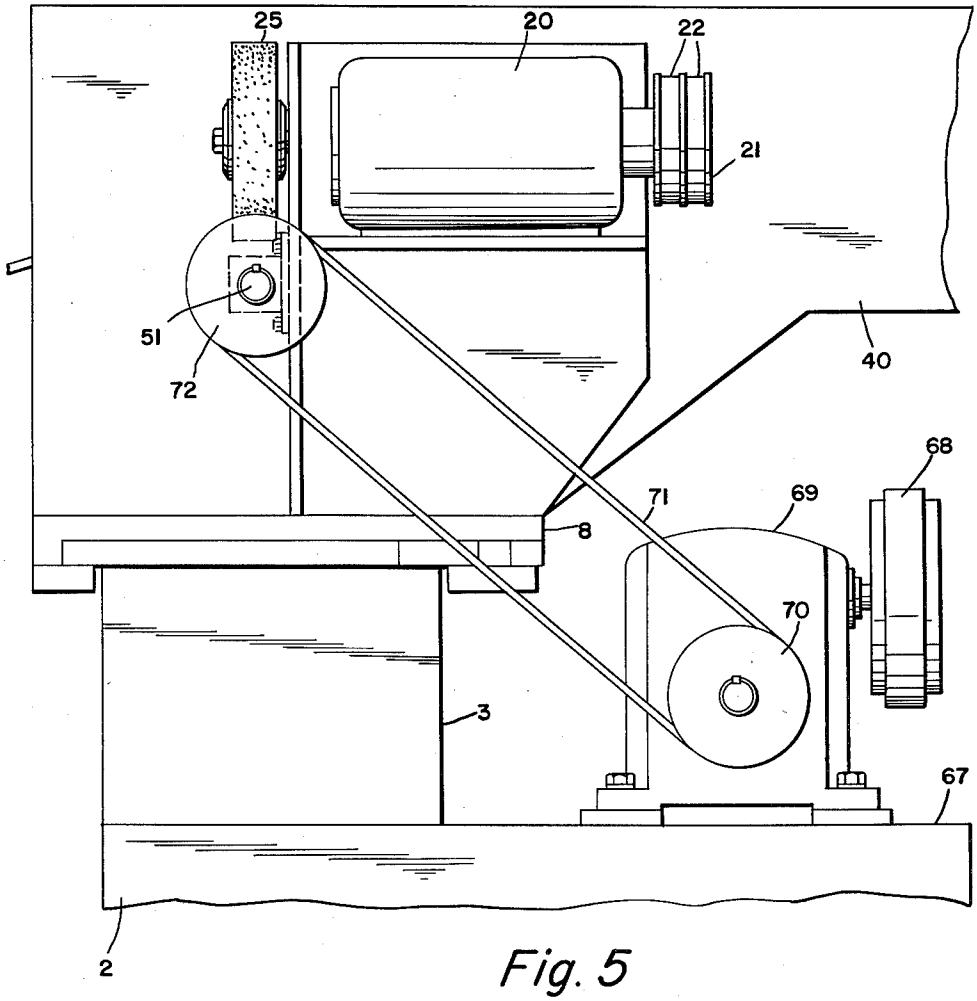


Fig. 5

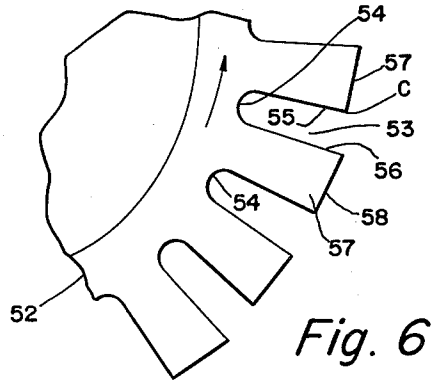


Fig. 6

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3,045,268

MACHINE FOR DEBURRING THE ENDS OF TUBES AND THE LIKE

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7 Claims. (Cl. 15—88)

This invention relates generally to a machine for deburring the ends of tubes and the like, but has reference more particularly to an apparatus which is particularly useful for deburring the ends of copper tubes cut to length from stock tubing.

A primary object of the invention is to provide a machine of the character described, in which the tubes to be deburred are quickly and easily fed into the machine, are carried automatically past deburring brushes, and are quickly, easily, and automatically carried or fed out of the machine, after the deburring operation.

Another object of the invention is to provide a machine of the character described, in which the tubes, in the course of the deburring operation, are rotated about their own axes, thereby greatly increasing the effectiveness and thoroughness of the deburring action.

A further object of the invention is to provide a machine of the character described having novel and highly advantageous means for feeding the tubes to the position at which the tubes are deburred.

A still further object of the invention is to provide a machine of the character described, utilizing high speed wire brushes for the deburring operations.

Other objects and advantages of my invention will be apparent during the course of the following description.

In the accompanying drawings forming a part of this specification, and in which like numerals are employed to designate like parts throughout the same,

FIG. 1 is a fragmentary front elevational view of the machine, with portions broken away, to better illustrate certain features;

FIG. 2 is a fragmentary top plan view of the machine;

FIG. 3 is a fragmentary cross-sectional view, taken on the line 3—3 of FIG. 1;

FIG. 4 is a fragmentary cross-sectional view, taken on the line 4—4 of FIG. 1;

FIG. 5 is a fragmentary end elevational view of the machine, as viewed from the right end of FIG. 1, and

FIG. 6 is an enlarged fragmentary detail of the feed wheel shown in FIG. 3.

Referring more particularly to the drawings, the machine will be seen to comprise a base consisting of spaced stands or supports 1 and 2, and a bed 3 which is supported by and is welded to the stands 1 and 2 to provide a rigid supporting structure.

The bed 3 has welded thereto spaced rails 4, to one end of which is clamped a motor stand 5, as by means of clamp bars 6 and screws 7, and to the other end of which is secured a second motor stand 8, as by means of bolts 9.

The stand 5 supports an electric motor 10, which, through the intermediary of sheaves 11, and endless belts 12, drives an arbor 13, which is supported by pillow block bearings 14, which are secured to the motor stand 5 by cap screws 15.

The arbor 13 has clamped thereon, at one end, as by a nut 16, a circular brush 18. The brush 18 is preferably a brush having closely-spaced fine or filamentary-type wire bristles, such, for example, as an Osborn Master Brush #153, about 8 inches in diameter, and consisting of .0095" wire, and is designed to rotate in the direction indicated by the arrow in FIG. 1, at a speed of approximately 1750 r.p.m.

The stand 8 similarly supports an electric motor 20, which, through the intermediary of sheaves 21 and endless belts 22, drives an arbor 23 which is supported by pillow block bearings 15, which are secured to the motor stand 8 by cap screws 24.

The arbor 23 carries a circular brush 25, which is similar in all respects to the brush 18, and is coplanar with the latter, but which is rotated in the direction indicated by the arrow in FIG. 1, and at the same speed as the brush 18.

The machine is also provided with means for feeding tubes, the ends of which are to be de-burred, past the brushes 18 and 25, so that the ends of the tubes are engaged by the brushes, as the tubes are fed through the machine.

Such means includes units, generally designated by reference characters 26 and 27, these units being of substantially identical construction, but one of which is a right unit, and the other a left unit.

The unit 26 has a base plate 28 which is secured, as by bolts 29, to the motor stand 5, in a position adjacent the brush 18. The plate 28 has welded thereto an upstanding plate or web 30 having a rectangular opening 31 through and beyond which the peripheral portion of the brush 18 passes during rotation of the latter.

The web 30 has welded to its inboard face 32 an inclined plate 33 along which the tubes to be de-burred are fed by gravity to the machine, and a second inclined plate 34, onto which the de-burred tubes are moved for removal by gravity from the machine. The web 30 has also welded thereto an arcuate member 35, which extends from the lower edge of the plate 33 to a point adjacent one of the side edges of the opening 31 in the web 30. Secured between the upper edge of the member 35 and the upper edge of the plate 34 is a table 36, having a horizontal upper surface which extends across the opening 31 and is disposed at a level slightly below the level of the axis of the brush 18, as clearly shown in FIGS. 1 and 3.

The unit 26 is also provided with a bearing support 37, which serves a purpose to be presently described.

The unit 27 has a base plate 38 which is secured, as by bolts 39, to the motor stand 8, in a position adjacent the brush 25. The plate 38 has welded thereto an upstanding plate or web 40, which is parallel with the web 30 and has a rectangular opening 41 through and beyond which the peripheral portion of the brush 25 passes during rotation of the latter.

The web 40 has welded to its inboard face 42 an inclined plate 43, which is coplanar with the plate 33 and along which the tubes to be de-burred are fed by gravity to the machine, and a second inclined plate 44, which is coplanar with the plate 34, onto which the deburred tubes are moved for removal by gravity from the machine. The web 40 has also welded thereto an arcuate member 45 which is coplanar with the member 35, and which extends from the lower edge of the plate 43 to a point adjacent one of the side edges of the opening 41 in the web 40. Secured between the upper edge of the member 45 and the upper edge of the plate 44 is a table 46 having a horizontal upper surface which extends across the opening 41 and is coplanar with the upper surface of the table 36.

The unit 27 is also provided with a bearing support 47, which serves a purpose to be presently described.

Secured to the motor stands 5 and 8, in spaced relation to the units 26 and 27, as by means of bolts 48, are bearing supports 49 and 50, in which a shaft 51 is journalled for rotation, this shaft being also journalled for rotation in the bearing supports 37 and 47 of the units 26 and 27 respectively.

Keyed to the shaft 51 between the bearing supports 37 and 49 is a feed wheel 52 having a multiplicity of uniformly and circumferentially spaced recesses 53 in

the periphery thereof, these recesses having semi-circular bottoms 54 and side walls 55 and 56 (FIG. 6) which extend from the ends of the bottoms 54 and diverge slightly from each other as these side walls approach the periphery of the feed wheel. The teeth or projections 57 between the recesses 53 have end faces 58 which are inclined downwardly in a direction rearward to the direction of rotation of the wheel, for a purpose to be presently described.

Keyed to the shaft 51 between the bearing supports 47 and 50 is a feed wheel 59, which is similar in all respects to the wheel 52, and has a multiplicity of uniformly and circumferentially spaced recesses 60 in the periphery thereof, these recesses having semi-circular bottoms 61 and side walls 62 and 63 which extend from the ends of the bottoms 61 and diverge slightly from each other as these walls approach the periphery of the feed wheel. The teeth or projections 64 between the recesses 60 have end faces 65, inclined similarly to the end faces 58 of the wheel 52, for a purpose to be presently described.

The shaft 51 is driven by a motor 66, which is mounted on an extension 67 of the support 2. The motor drives an endless belt 68, which, in turn, drives a gear reduction unit 69, which is also mounted on the extension 67. The reduction unit drives the shaft 51 through the intermediary of a sprocket 70, an endless chain 71, and a sprocket 72 which is secured to the end of the shaft.

The shaft 51 is designed to be rotated at a relatively low speed, that is to say, about 5 to 10 r.p.m., so that the tubes fed by the wheels 52 and 59 are carried past the brushes at a very low speed as compared with the speed of the brushes 18 and 25.

The use or operation of the machine may now be described.

The tubes, designated by reference character T, are placed on the inclined plates 33 and 43 and are permitted to roll or slide down these plates by gravity. As each tube reaches the feed wheels 52 and 59, the tube will enter recesses 53 and 60 in the wheels, the extent of such entry being limited by the engagement of the ends of the tube with the arcuate members 35 and 45, it being noted that the upper surfaces of these members are concentric with the axis of the shaft 51. As each tube enters the recesses 53 and 60, the succeeding tube is temporarily held back by the end faces 58 and 65 of the teeth 57 and 64 immediately behind the recesses 53 and 60 which have been entered by the first tube.

The successive tubes will thus be carried by the teeth 57 and 64 of the wheels along the upper surfaces of the arcuate members 35 and 45. The entry of each tube into the recesses 53 and 60 is greatly facilitated by reason of the rearward inclination of the end faces 58 and 65 on the teeth 57 and 64 respectively. Thus, the tubes will fall onto the surfaces or side walls 56 and 63 of the recesses in the teeth, as best seen in FIGS. 3 and 4, before the tubes are engaged by the corners C (FIG. 6) of the teeth, and will therefore not become wedged between the plates 33 and 43 and the teeth of the feed wheels.

As the tubes reach the upper horizontal surfaces of the tables 36 and 46, the wheels push the tubes along these tables, and as they are thus pushed, the ends of the tubes are engaged by the high speed brushes 18 and 25 and are effectively deburred by these brushes.

Due to the downward pressure exerted by the brushes on the ends of the tubes as the tubes are pushed along the tables 36 and 46, the tubes will be rotated about their own axes during their entire movement across these tables, and this rotation is effective to secure an improved and more thorough deburring of the ends of the tubes. In practice, the tables 36 and 46 should be of a length approximately twice the circumference of the tubes, in order to obtain a good deburring action.

As the deburred tubes reach the forward ends of the tables 36 and 46, they are carried by the feed wheels to the inclined plates 34 and 44, so that the tubes thereafter roll or slide down these plates by gravity and onto a canvas belt or catcher, from which they may be removed.

It is thus seen that I have provided a machine which is highly effective for quickly and easily deburring the ends of tubes, as well as a machine which is entirely automatic in its operation.

Although the invention has been described particularly with reference to the deburring of tubes, it will be readily understood that it is also applicable to the deburring of the ends of rods, wires, non-circular articles, and the like.

It is to be understood that the form of my invention, herewith shown and described, is to be taken as a preferred example of the same, and that various changes may be made in the shape, size and arrangement of parts thereof, without departing from the spirit of the invention or the scope of the subjoined claims.

Having thus described my invention, I claim:

1. In a machine of the character described, a pair of circular brushes disposed in substantially a common plane, means for rotating said brushes at a relatively high speed, surfaces adjacent said brushes along which tubes to be deburred are moved with the axes of the tubes substantially perpendicular to the axes of rotation of said brushes, and means for causing said tubes to traverse said surfaces, whereby said brushes engage the ends of said tubes and deburr such ends, said last-named means comprising spaced feed wheels disposed adjacent said surfaces and rotatable about an axis which is parallel with the axes of said tubes, said feed wheels having uniformly and circumferentially-spaced recesses in their peripheries, said recesses adapted to receive said tubes for feeding movement past said brushes, said recesses having wall portions adapted to engage said tubes as they traverse said surfaces, whereby to cause the tubes to roll on said surfaces, as the ends of the tubes are being deburred.

2. A machine, as defined in claim 1, in which said surfaces are in a plane slightly below the common horizontal plane of the axes of said brushes.

3. A machine, as defined in claim 2, in which said recesses are of a depth such that the tubes can rest on said surfaces as the tubes traverse said surfaces.

4. A machine, as defined in claim 3, including inclined plates for gravity feeding of said tubes into said recesses.

5. A machine, as defined in claim 4, including arcuate members concentric with the axes of said wheels and along which said tubes are carried by said wheels to said surfaces.

6. A machine, as defined in claim 5, including plates along which said tubes move by gravity after leaving said surfaces.

7. A machine, as defined in claim 6, in which said feed wheels are provided with circumferentially-spaced teeth having end faces which are inclined downwardly in a direction rearward to the direction of rotation of the wheels, whereby the tubes can more readily fall into the recesses.

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