April 4, 1967 H. A. SPITTLER 3,311,940

MACHINE FOR BRUSHING THE ENDS OF CYLINDRICAL WORKPIECES

Filed Jan. 17, 1966 3 Sheets-Sheet 1

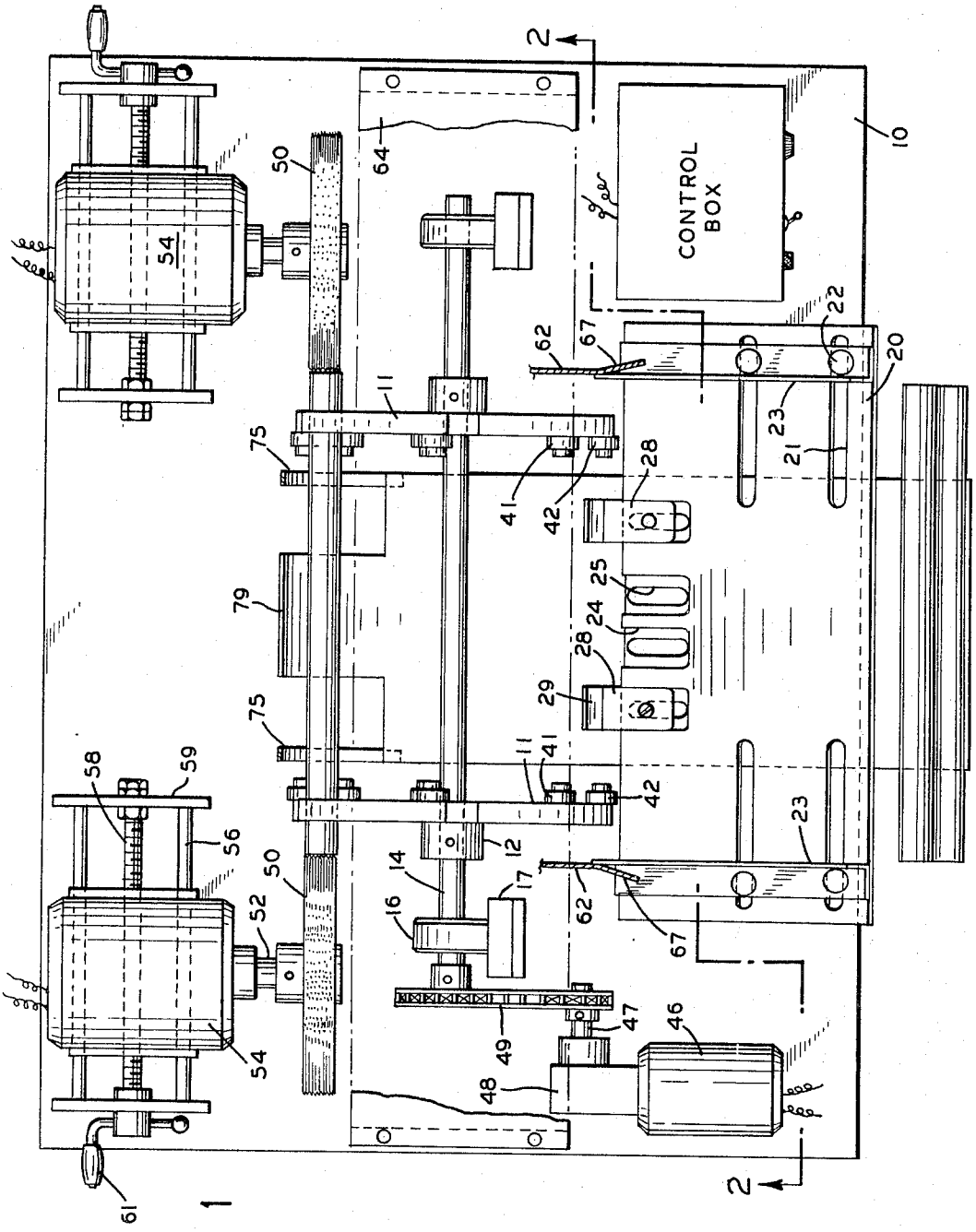


FIG. 1

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Filed Jan. 17, 1966 3 Sheets-Sheet 2

FIG. 2

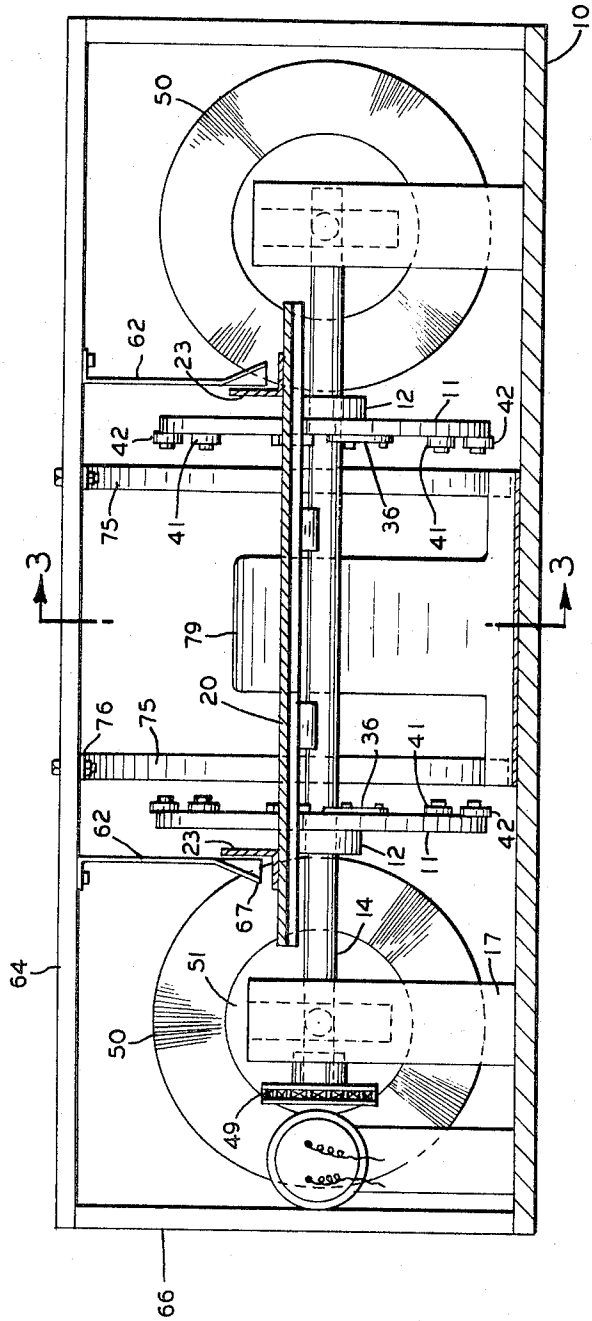


FIG. 5

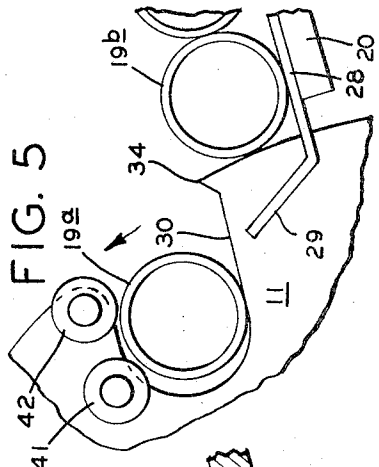


FIG. 4

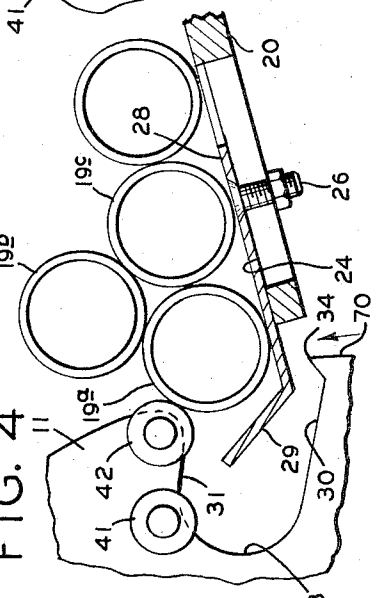
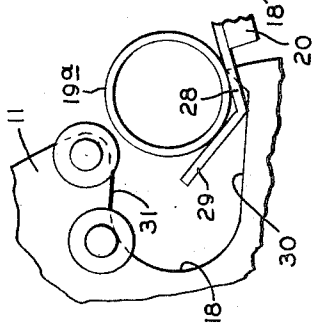


FIG. 9



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MACHINE FOR BRUSHING THE ENDS OF CYLINDRICAL WORKPIECES

Filed Jan. 17, 1966 3 Sheets-Sheet 3

FIG. 3

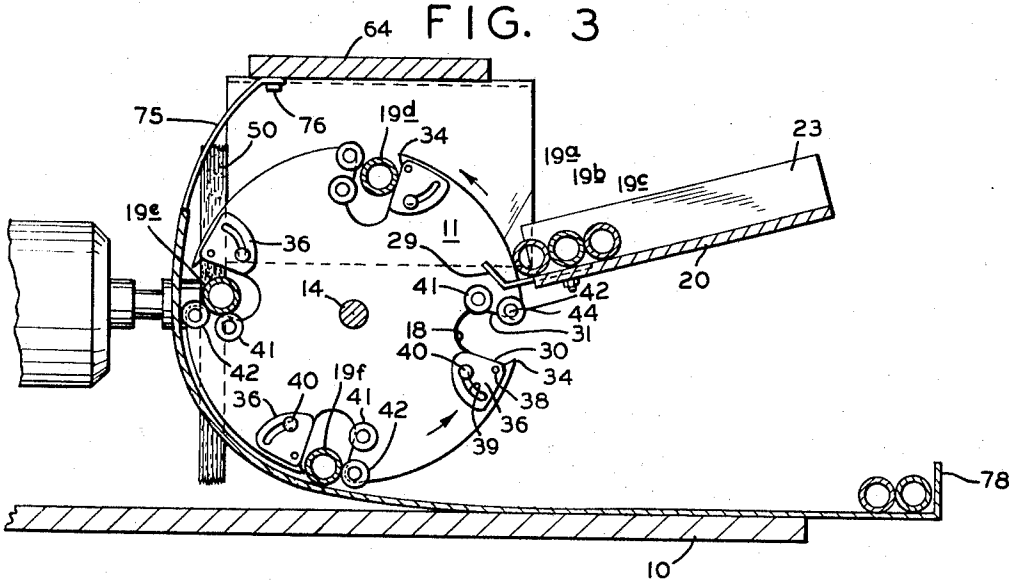


FIG. 6

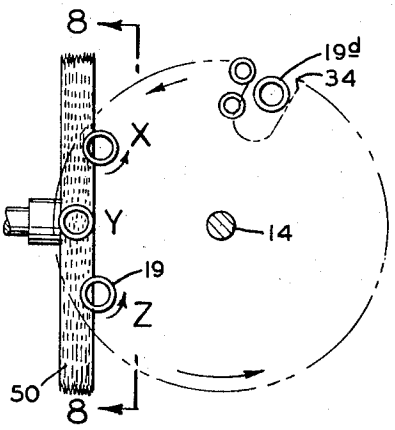


FIG. 7

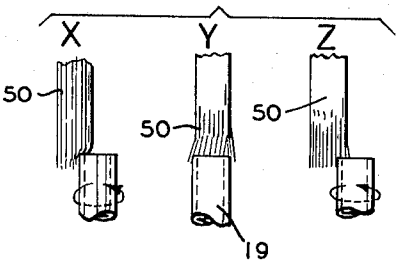
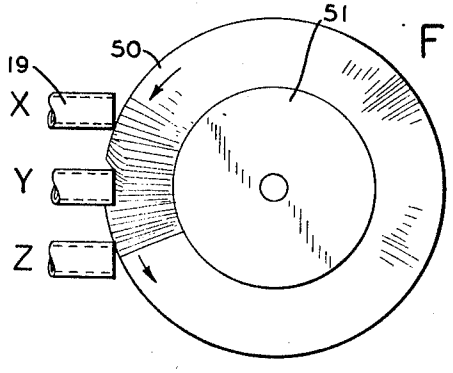


FIG. 8



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United States Patent Office 3,311,940
Patented Apr. 4, 1967

3,311,940

MACHINE FOR BRUSHING THE ENDS OF CYLINDRICAL WORKPIECES

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Filed Jan. 17, 1966, Ser. No. 521,076
7 Claims. (Cl. 15—88)

This invention relates to brushing machines and relates more particularly to an automatic assembly for feeding cylindrical workpieces to power driven wire brushes which operate on the ends of the workpieces, such as metal tubes, to remove burrs, saw markings and other imperfections resulting from cutting the workpieces to length.

An important object of the invention is to provide improved means for feeding and supporting cylindrical workpieces to the brushing elements and consisting essentially of conjointly rotatable feed wheels having a plurality of aligned, generally U-shaped recesses, one side of each of which are provided with a pair of rollers onto which the tubular workpiece is delivered. These rollers support the tube for rotative movement during the brushing operation and during which time the brushes remove the burrs and also impart rotation to the workpiece as its ends are moved at a predetermined speed past the brushes.

Another object of the invention is to provide a machine of the character described which is rapid in operation and has improved means for supporting the workpieces for free rotative movement while their ends are being operated on by a pair of rugged, rapidly rotating wire brushes that impart rotation to the tube as they brush in a myriad of directions and thus perform a more satisfactory brushing and de-burring operation than has previously been possible.

In the drawings:

FIG. 1 is a plan view of the machine of the present invention;

FIG. 2 is a front elevation thereof;

FIG. 3 is a section taken on line 3—3 of FIG. 2;

FIG. 4 shows the feeding of the tubes to the feed wheel assembly;

FIG. 5 shows one of the tubes having passed into the aligned slots in the feed wheel assembly;

FIG. 6 shows the successive positions of one tube end during the time in which it is being operated on by the circular wire brush;

FIG. 7 is a top view thereof;

FIG. 8 is a section taken on line 8—8 of FIG. 6;

FIG. 9 shows the function of a stop on the feed table limiting forward travel of the tubes.

The operative parts of the present apparatus are mounted on a base plate or frame 10 which may be supported on legs (not shown). The tubular workpieces are moved from a flat bed to a feed wheel assembly comprising a pair of spaced feed wheels 11 provided with bushings 12 adjustably secured fast on a shaft 14 journalled in bearings 16 supported on posts 17 which are mounted on the base plate. Adjustment of the position of the feed wheels is made for different lengths of tubing. Each feed wheel has a plurality of equally spaced generally U-shaped slots 18 extending inwardly from its periphery, four of such slots being shown but a different number may be provided.

These slots receive the cylindrical workpieces 19 from a bed or feed table 20 which is downwardly inclined and which is long enough to support the workpieces over substantially their full length and this table is suitably mounted in spaced relation to base plate 10 by any convenient means and the table is provided with longitudinal slots 21 which receive bolts 22 securing

spaced guide plates 23 constituting angle bars, in adjusted, fixed position, their distance apart being slightly more than the length of the tubular workpieces 19.

Adjacent the rear edge of the feed table are a plurality of recesses 24 with slots 25 to receive set screws 26 to secure fingers 28 with upturned forward ends 29 forming stops. These stops are moved to an adjusted position, depending upon the diameter of the tubes being operated upon. The feed assembly rotates in the direction of the arrows in FIGS. 3 and 6. The opposed edges 30 and 31 are disposed in a generally radial direction. More specifically the trailing edge 30 is coextensive with a straight line passing to the axis and the leading edge 31 is substantially parallel therewith. The trailing edge 30 has a triangular extension extending towards the opposed edge 31 and terminating in a point 34 for a purpose to be described.

A triangular plate 36 is pivoted at 38 along the trailing edge 30 and has a curved slot 39 at its opposite edge receiving a set screw 40 which passes through wheel 11 to secure the plate in a desired position when it is necessary to reduce the width of the slot in case smaller tubes are being operated upon. Adjacent the other edge 31 there are mounted a pair of rollers 41 and 42 mounted for free rotation on pins 44 and whose peripheries extend inwardly of leading edge 31. These rollers are spaced apart a sufficient distance to provide an ideal rolling support for the workpieces, when they reach the position of 19*e* (FIG. 3) where they are operated upon.

The rotating feed wheel assembly is constantly driven by a motor 46 having a shaft 47 and a speed reduction unit 48 between the motor and that shaft. This shaft is connected with shaft 14 by a chain drive 49 engaging a sprocket (not shown) fast on shafts 47 and 14.

The workpieces are operated on by a pair of circular wire brushes having steel bristles 50 radially disposed and supported by a hub 51 fast on motor shafts 52. Each brush is driven by a motor 54 movable toward and away from the ends of the workpieces on fixed rods 56. Adjustment to a fixed position is effected by a lead screw 58 journalled in end plates 59, which also rigidly supports the rods. Manual rotation of the lead screw is effected by a crank 61.

The workpieces are roughly centered by vertical guide plates 23 and after leaving the guide plate and entering the aligned recesses 18 in the feed wheel assembly the workpieces are guided by fixed plates 62 extending downwardly from an upper wall or bridge 64 secured in elevated position by end frames 66. The entrant portions of the fixed guide plates are bent diagonally outwardly as at 67 to correct any misalignment that may occur after leaving plates 23. Plates 23 and 62 can be adjusted, depending upon the length of the tubes. Also, the wire brushes 50 can be moved in or out on motor shaft 52 to compensate for changes in tube diameter to insure proper rotation.

The arrangement for feeding the workpieces 19 to the slots 18 in the feed wheels, one at a time, is shown in FIGS. 4, 5 and 9. The tubes roll down feed table 20 until they contact the outer peripheries of wheels 11 where they dwell until a pair of aligned slots 18 permit further travel of the leading tube 19*a*. FIG. 4 shows tube 19*a* just entering the slots and FIG. 9 shows the forward movement of the tube being stopped by finger 29.

As rotation of the assembly continues, the trailing edge 30 with its pointed projection 34 causes the tube to be raised and travel inwardly to the base of slots 18 as shown in FIG. 5. When tube 19*a* has moved into the rotating feed assembly, the second tube 19*b* which

is in an elevated position takes the leading position and thus moves ahead of tube **19***c*.

Rotation of the feed wheel assembly continues and the tube, during its arcuate travel, reaches the uppermost position of **19***d* and thence over to the rearward position at **19***e* where it is supported on the two rollers **41** and **42**.

FIG. 3 shows the tube to be substantially in the center of the mass of metal bristles **50** of the brushing wheel but its progressive travel with reference to the width of the brush is shown in FIGS. 6 and 7. At position X, the tube, supported on the freely rotatable rollers, first encounter the rapidly rotating brush and the brush causes the tube to commence turning on its axis. By the time the tube gets to the position of Y, it is turning quite rapidly and then its rotation slows a bit but rotation is resumed as the tube gets further from the center of the brush as at Z. FIG. 8 shows this progressive positioning of the tube end when viewed from the side as it is attacked by the rapidly rotating wire brush. By virtue of the rotation imparted to the tube the end section is thoroughly brushed on the inner and outer edges and all burrs are removed.

There are no forces tending to throw the tube out of the aligned slots in the feed wheels but the tubes are nevertheless prevented from travelling out of the slot by means of a pair of spaced curved guides **75** secured at **76** to bridge **64** and which extend downwardly close to the periphery of feed wheels **11**. The tube arriving at **19***f* is ready to be discharged from the feed wheel assembly and it rolls to the front where it is stopped by flange **78**. Further guide means include a central curved plate **79**.

While there have been described herein what are at present considered preferred embodiments of the invention, it will be obvious to those skilled in the art that many modifications and changes may be made therein without departing from the essence of the invention. It is therefore to be understood that the exemplary embodiments are illustrative and not restrictive of the invention, the scope of which is defined in the appended claims, and that all modifications that come within the meaning and range of equivalency of the claims are intended to be included therein.

What I claim is:

1. A machine for brushing the ends of cylindrical workpieces comprising, in combination, a frame, a pair of spaced circular brushes journalled for rotation on the frame in a plane extending longitudinally thereof, a rotatable feed assembly including a shaft mounted for rotation in an area between the brushes, a pair of spaced feed wheels secured on the shaft and having a plurality of pairs of aligned, generally U-shaped recesses around their peripheries, each pair receiving a cylindrical workpiece for delivery to the brushes during rotation of the assembly, each recess having opposed, leading and trailing edges, both disposed generally radially of the assembly axis, means for rotating the feed assembly at a relatively low speed and the brushes at a relatively high speed, a feed table for the workpieces which is downwardly inclined towards the rear of the machine for delivering said pieces to a pair of slots at a point about midway between the upper and lower edges at the front of said feed wheels, said wheels rotating upwardly and rearwardly from said point, and means comprising a pair of rollers along the leading radial edges of each pair of slots for supporting each workpiece for rotation by the brushes as said brushes engage the ends of each workpiece and operate thereon while it is in a rearward position on the feed assembly, and a plate adjustably mounted adjacent the trailing edge of each slot on the feed wheels to vary the width of said slot to receive workpieces of different diameters.

2. The structure defined in claim **1** wherein at least one of the feed wheels is movable on the shaft to an adjusted, fixed position to receive workpieces of varying lengths.

3. The structure defined in claim **1** wherein the brushes are movable longitudinally of the frame to an adjusted fixed position to operate upon workpieces of varying lengths.

4. The structure defined in claim **1** wherein guides are provided at opposite ends of the feed table which are adjusted to accommodate workpieces of varying lengths.

5. The structure defined in claim **1** wherein the feed table has stop fingers extending rearwardly of the front peripehries of the feed wheels, limiting rearward travel of a workpiece into a pair of slots.

6. The structure defined in claim **5** wherein the outer end of the trailing edge of each slot has a projecting point which picks up the workpiece being fed.

7. The structure defined in claim **5** wherein each one of said plates is pivoted in spaced relation to said projecting point of the trailing edge of the slot, and pin and slot means for securing an edge of the plate in an adjusted fixed position with reference to said trailing edge of the slot.

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