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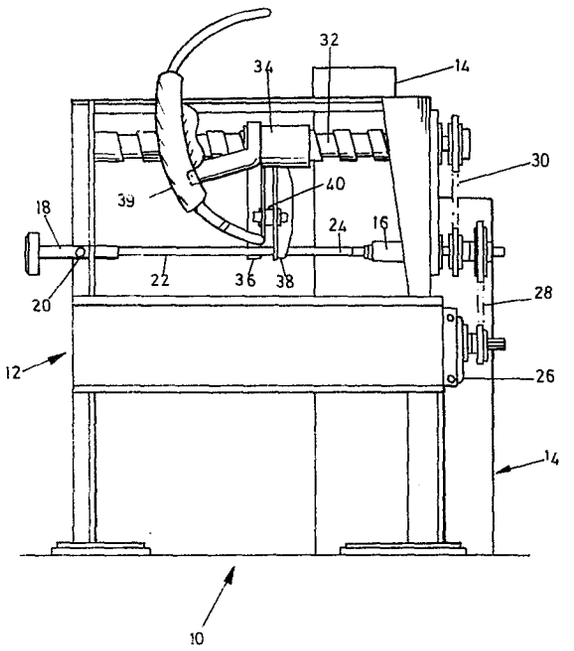
(54) Winding machine.

(57) A machine (10) for winding a metal band helically on to a cylinder includes a winding machine (12) and a corrugating machine (14). The winding machine (12) has spindles (16, 18) and a cylinder (22). Guide prongs (36, 38) guide a metal band on a tube 22 for forming a helix. A welding gun (39) welds the sides of the helix as it is formed.



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WINDING MACHINE

This invention relates to a machine for winding a metal band helically on to a cylindrical object such as a shaft or a tube. The machine finds particular application in the manufacture of mufflers for silencers for internal combustion engines and the invention will therefore be described with reference to such an application, but it will be appreciated that this is not intended to limit the invention in any way.

Silencers incorporating spiral wound mufflers have been known for a considerable amount of time. It is an object of this invention to provide a machine for the manufacture of, inter alia, such mufflers.

The terms "cylindrical" and "cylinder" are used in their widest sense to denote a generally longitudinally extending object with a section of any fixed curve, normally circular, unless the context indicates otherwise.

According to the invention a machine for winding a metal band helically on to a cylinder comprises a rotatable mounting for the cylinder and a guide for the band, the mounting being adapted to be driven rotationally to draw the band through the guide and helically on to the cylinder after one end thereof has been fastened to the cylinder and the mounting and guide being moveable with respect to one another in the axial direction of the cylinder, to vary the winding pitch.

The cylinder may conveniently be a metal tube in which case the one end of the band may be fastened to the exterior surface of the tube by welding the end of the ban to the tube.

In the preferred form of the invention the mounting comprises a driven spindle and a dead spindle which is capable of being moved axially to allow the mounting of the tube between the spindles both of which are provided with attachment means for the tube.

The mounting is preferably moveable only in the rotational direction, the guide being moveable axially with respect thereto. In the preferred form of the invention the guide is mounted on a coarse threaded driving screw, the guide comprising a pair of guide prongs mounted on an internally threaded cube within which the driving screw is freely rotatable. The guide prongs are conveniently spaced apart and the ends of the prongs are adapted to receive a tube mounted on the spindles between them and to define a slot extending transversely to the longitudinal axis of the tube. It will be appreciated that rotation of the drive screw will result in the longitudinal displacement of the guide with respect to the tube mounted within the spindles. In the preferred form of the invention the driven spindle and the drive screw are connected to the same drive means by means of power transmission means, preferably chains.

In a specific embodiment of the invention in which the machine is adapted for the manufacture of mufflers for internal combustion engine silencers in which a corrugated band is used, the machine is adapted to corrugate the band by the addition of a pair of meshing cylinderical gears through which the band may be fed prior to the attachment thereof to the tube. At least one of the cylindrical gears is driven, preferably by means of the driving means of the main machine.

To manufacture the muffler on the machine of the invention the band or corrugated band is welded on to the surface of the tube while it is being wound thereon. The muffler preferably includes a pair of end plates which are welded to the ends of the tube to close the tube.

The invention is further described with reference to the accompanying drawings in which:-

Figure 1 shows an isometric view of a helically formed tube.

Figure 2 is a front elevation of the machine of the invention;

and

Figure 3 is a front elevation of the corrugating addition to the machine.

Reference to Figure 1 shows how a metal band may be

formed into a tube 11. The edges 13 of the helically formed metal band may butt to the adjacent edge or may overlap the preceeding coil.

In Figure 2, the machine 10 comprises a winding machine 12 and a corrugating machine 14, the latter being shown in outline in Figure 2 for the sake of clarity. The winding machine comprises a rotatable mounting including a driven spindle 16 and a dead spindle 18 which is provided with a screw 20 by means of which the forming cylinder 22 onto which a band is to be welded, can be fastened to the dead spindle 18. The driven spindle 16 is fastened to the forming cylinder 22 by means of a shearing pin 24 which is passed through matching holes in the forming tube 22 and the spindle 16.

The driven spindle 16 is driven by means of a reverseable electric motor 26 the power of which is transmitted to the spindle 16 by means of a chain drive 28. A chain drive 30 provides the power for a threaded shaft 32 which is provided with a coarse thread adapted to carry a guide mount 34 with a matching internal thread. The guide mount 34 is provided with a pair of guide prongs 36 and 38 which lie respectively under and over the tube 22 when this is mounted between the spindles 16 and 18. A roller 40 is located between the prongs 36 and 38 to prevent a band located between the prongs from moving upwardly.

The corrugating attachment 14 can be seen in Figure 3 comprising a pair of cylindrical gears 42 which are driven by the motor (not shown in Figure 3) through a chain sprocket 44, bevel gears 46 and a chain drive 48, the one gear being driven and the second gear meshing therewith.

A band of stainless steel (not shown) is passed between the teeth of the two gears 42 under the urging of the motor through the various power transmission means. The corrugated band emerging from the other side of the gears 42 is led to the guide and passed below the roller 40 and between the guide prongs 36 and 38. The motor 26 is now stopped to allow the operator to tack the one end of the corrugated band to the surface of the tube forming cylinder 22 whereafter the motor 26 is once again activated so that the corrugated band is drawn through the guide prongs 36 and 38 and wound helically on to the surface of the forming cylinder 22. As the corrugated band emerges between the guide prongs, it is welded continuously on to the surface of the tube by the welding gun 39 which is attached to the travelling guide mount 34. It will be appreciated that the pitch of the helical winding will be determined by the pitch of the threads on the threaded shaft 32. It will be appreciated that the corrugations make the metal band more flexible and able to conform to the required helically formed tube.

When the required length of forming cylinder 22 has been covered with the helically wound band, the tube is removed from between the spindles 16 and 18, the shearing pin 24 being withdrawn and the cap screw 20 being unscrewed to allow the withdrawal of the dead spindle 18 so that the forming cylinder 22 can drop free. End plates of square or any other shape are now welded to the open ends of the tube and the muffler is ready to be installed in a silencer.

The machine of the invention allows a continuous operation and is therefore eminently suitable for a production line so that spiral wound mufflers of a consistently high quality can be produced more economically than hitherto.

CLAIMS:

1.

A machine for winding a metal band helically on to a cylinder comprising a rotatable mounting for the cylinder and a guide for the band, the mounting being adapted to be driven rotationally to draw the band through the guide and helically on to the cylinder after one end thereof has been fastened to the cylinder and the mounting and guide being moveable with respect to one another in the axial direction of the cylinder, to vary the winding pitch.

2.

A machine according to claim 1 in which the mounting includes a driven spindle and a dead spindle which is adapted for axial movement for mounting of the cylinder in the form of a metal tube adapted for fastening to the band.

3.

A machine according to claim 1 or claim 2 in which the guide includes at least two prongs mounted on a rotatable threaded shaft, the prongs having spaced apart ends forming a slot extending transversely to the longitudinal axis of the cylinder.

4.

A machine according to claim 3 in which the shaft of the guide and the cylinder are adapted to be driven by a common drive means.

5.

A machine according to any one of claims 1 to 3 which includes at least a pair of intermeshing gears adapted to corrugate the band.

6.

A machine according to any one of claims 1 to 5 which

includes means to weld or otherwise fuse adjacent edges of a helically formed band.

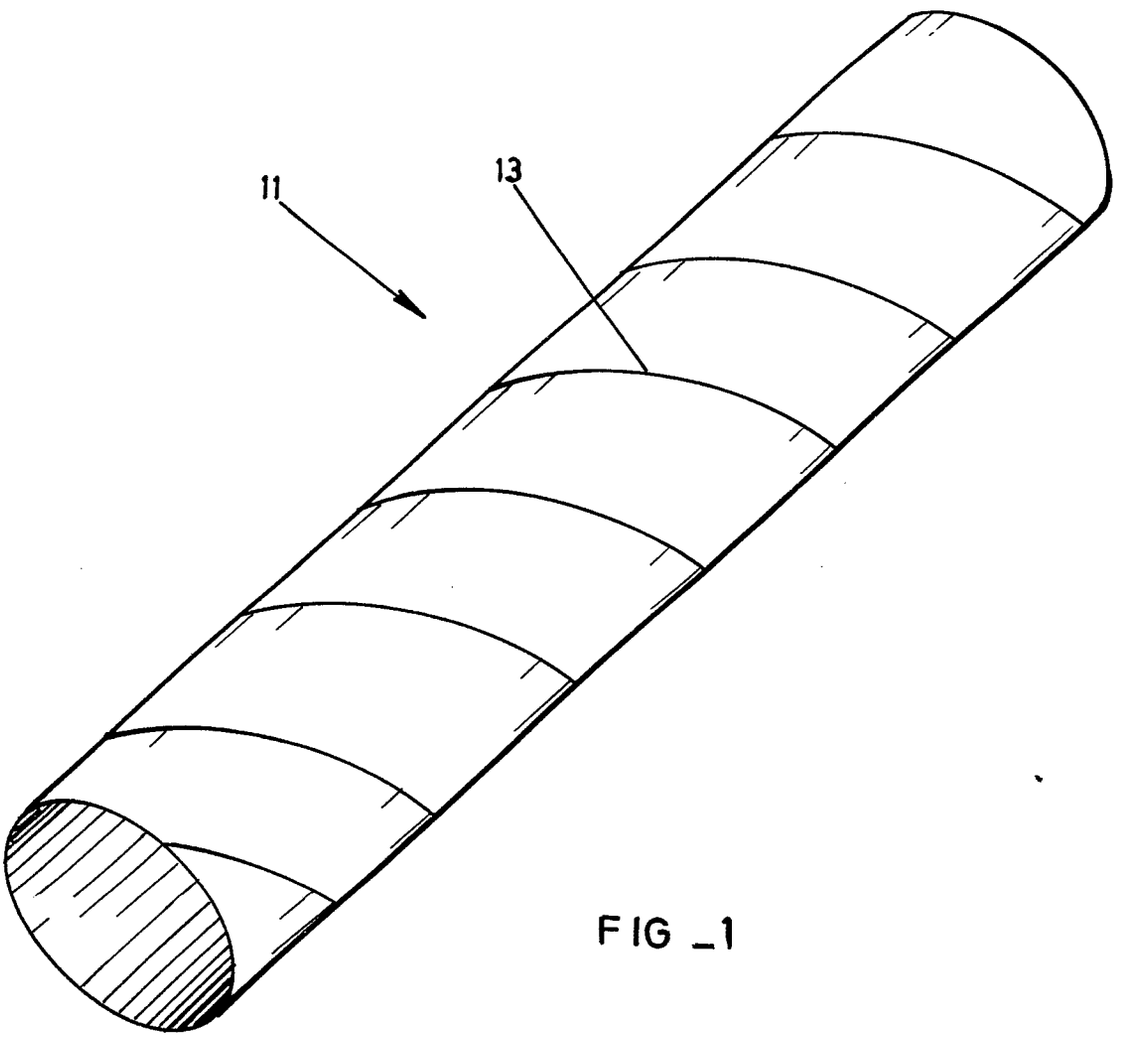

FIG _1

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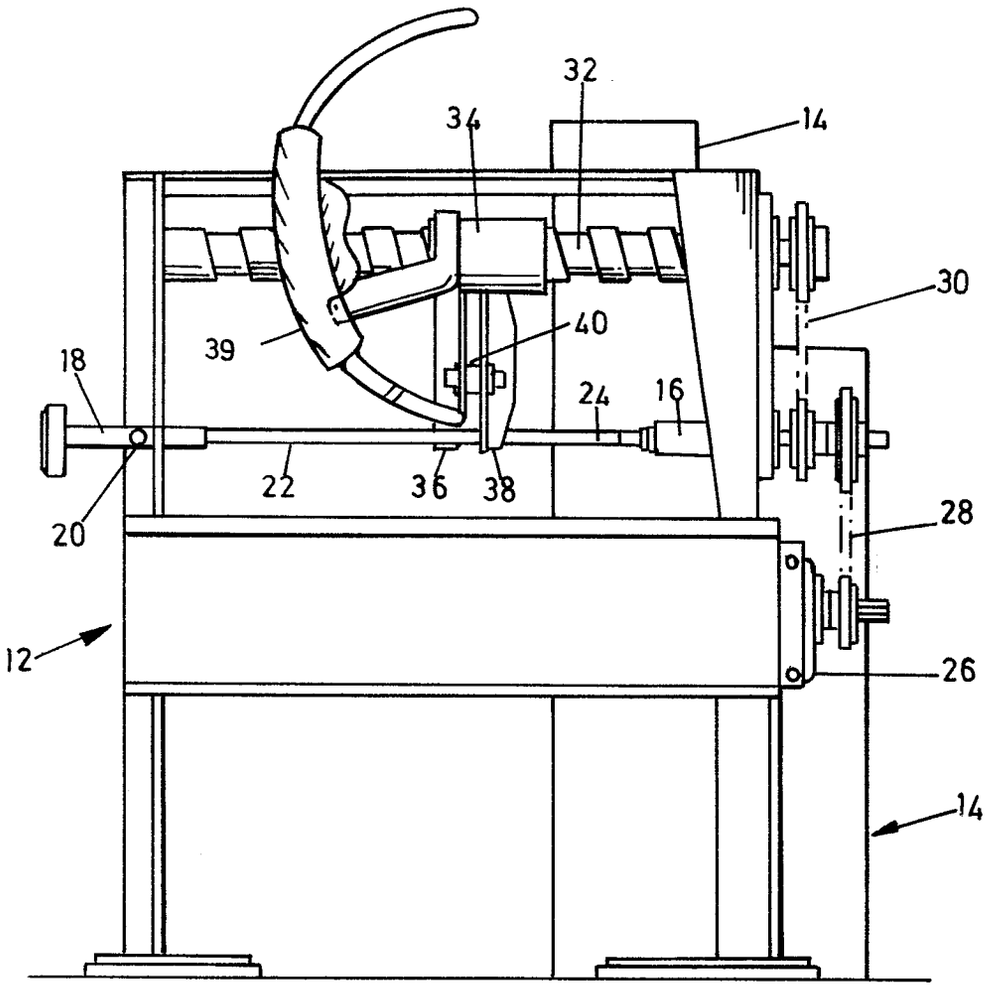

FIG _ 2

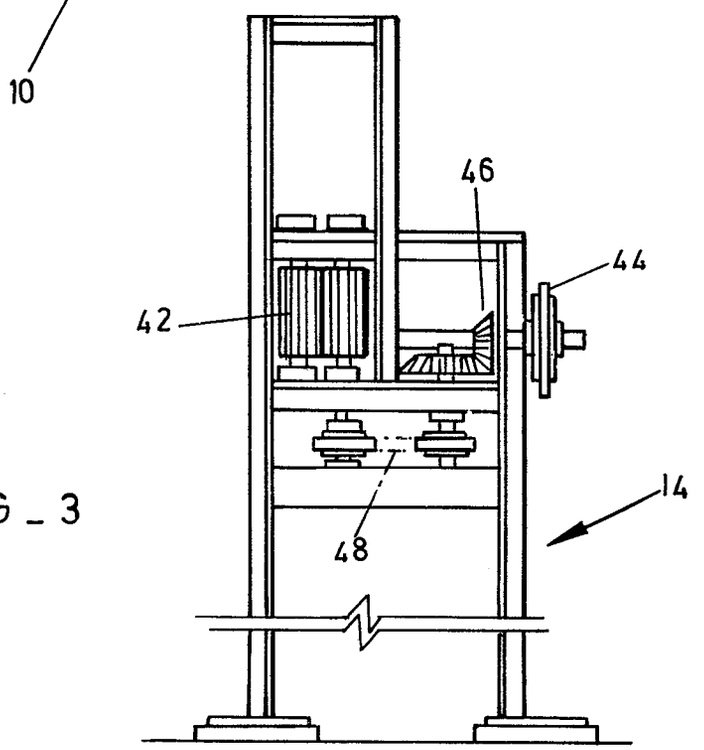

FIG _ 3