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BRAIDING MACHINE

Filed April 27, 1965 3 Sheets-Sheet 1

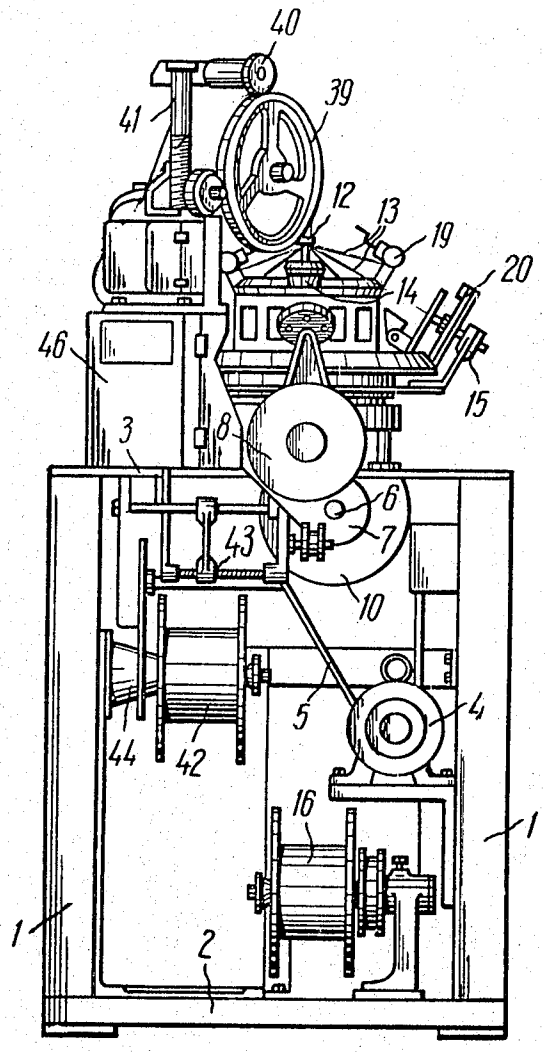

FIG. 1

BRAIDING MACHINE

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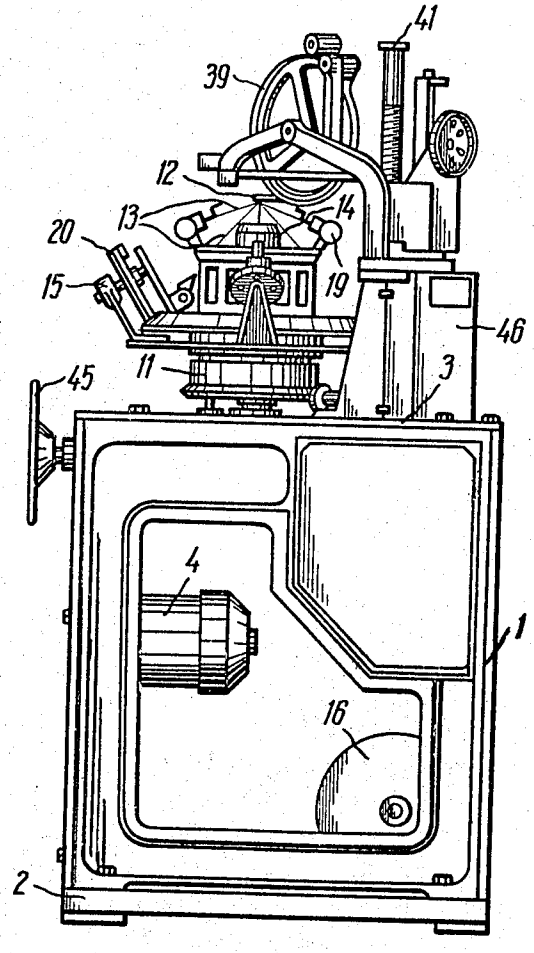

FIG. 2

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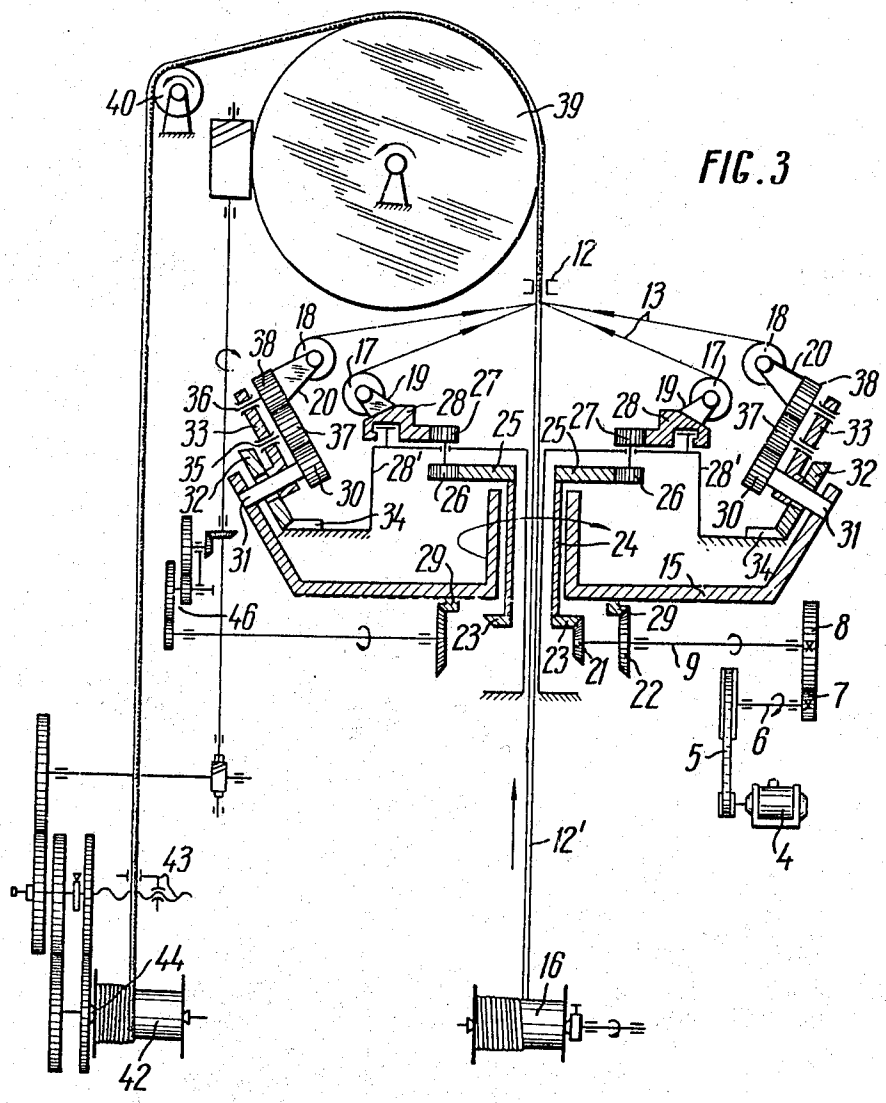
FIG. 3



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BRAIDING MACHINE

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ABSTRACT OF THE DISCLOSURE

A braiding machine in which a wire to be braided is drawn through the machine relative to an inner stationary table and an outer table arranged concentric to and rotatable with respect to the stationary table, inner bobbin holders being mounted on gear racks concentrically disposed on the inner table for sliding movement therealong and outer bobbin holders being fixed on carriers mounted on axles arranged along the perimeter of the outer table and directed toward the common center of braid, a braid thread untwisting mechanism being located on the carriers for ensuring the turning of the outer bobbin holders during braiding and a drive for rotating the outer table and sliding the gear racks carrying the inner bobbin holders for causing the threads to unwind from the bobbins onto the wire being braided.

The present invention relates to braiding machines, and more particularly to braiding machines provided with two rows of bobbin holders and which holders are contra-rotating and concentrically located.

The prior art braiding machines equipped with two rows of bobbin holders mounted on two contra-rotating and concentrically located tables of the type having a stationary inner component and a rotatable outer component comprise devices for feeding the wire which is braided and for its drawing, a device for lifting and lowering the braided material in the outer row and a device for reeling the braided wire.

During braiding in the above mentioned machines, the guiding of strands from the spools of the outer row of the bobbin holders above or below the spools of the inner row of the bobbin holders is performed either by means of rocking levers, or rotating pinions which impart a cycloidal motion to the strand. In a braiding machine employing rocking levers, the strand, while unwinding from the spools is not twisted, but, due to the reciprocating motion of the levers and the winding route passed by the strand, is subjected to impact loads which might cause breakage of the strand in case of its small diameter due to the dissimilarity in the conditions of the strand unwinding from the spools of the fore and back row bobbin holders. The strand passing through picks along a winding route in a braiding machine provided with rotating pinions is subjected to twisting which is also not permissible when the pieces are braided with metal wire.

An object of the present invention is to a machine for braiding wires and a simultaneous untwisting of the strands unwound from the spools of the outer row of bobbin holders.

Another object of this invention is to provide a braiding machine which reduces impact loads upon the strands.

In accordance with the invention, the above objects are attained in that in the means for lifting and lowering the outer row of braiding material is defined by at least one rotating casing eccentrically fixed on the outer table and carrying the bobbin holder.

In addition, to provide for the utilization of wires and strands of wires as a braiding material, the rotating component is equipped with a mechanism for untwisting the

braiding material, with such mechanism facilitating the turn of the bobbin holder about its axle and preventing the twisting of wires or a strand of wires during braiding.

More specifically the untwisting mechanism comprises at least, three or a greater odd number of pinions, with one of the pinions being stationarily mounted in the casing while the remaining pinions run around the stationary pinion with the aid of the rotating casing, and the bobbin holder axle is secured on the driven pinion.

Further objects and advantages of the present invention will become more readily apparent from the following description and the accompanying drawings, wherein:

FIG. 1 is a front elevational view of the braiding machine;

FIG. 2 is a side elevational view of the braiding machine; and

FIG. 3 is a diagrammatic view of the principal gearing of the braiding machine.

All mechanisms of the braiding machine are located on a framework cmoprising a main frame **1** (FIG. 1 and FIG. 2), a lower or base plate **2** and an upper plate **3**. An electric motor **4** disposed within the framework through a V-belt and pulley arrangement **5** drives a shaft **6** of the machine drive which in turn via changeable pinions **7** and **8** rotates a shaft **9** (FIG.3) for the drive of the mechanism for the wire braiding. The machine is started by engaging a friction clutch **10** and braking means **11** (FIG. 2) becomes operable at the engagement and disengagement of the friction clutch **10**.

The braiding of wire coiled in the process is accomplished through a gauge **12** and for which purpose a wire 12^1 to be braided (FIG. 3) and strands **13** consisting of metal wires for braiding are simultaneously supplied into said gauge. The wire 12^1 is drawn into the gauge **12** through a pipe **14** (FIGS. 1, 2) fixed on table **15** from the drum or spool **16** of the device accommodating the wire to be braided, while the strands **13** are supplied from inner and outer spools **17** and **18** (FIG. 3) set in the bobbin holders **19** and **20** respectively of the wire braiding mechanism which is located on the upper plate **3**.

The strands unwound from the spools **17** of the inner row during braiding are rotated about the machine axis. The strands unwound from the spools **18** of the outer row are contra-rotated, simultaneously perform a rocking motion in relation to the strands unwound from the spools **17** of the inner row. This motion of the strands is effected in the following manner. The shaft **9** driven by the electric motor **4** rotates bevel pinions **21** and **22** mounted thereon (FIG. 3). The pinion **21** meshes with a pinion **23** provided on a central hollow shaft **24** having a larger pinion **25** at its upper end and planet gears **26** mesh with the pinion **25**. Planet gears **27** on the shafts or axles carrying the gears **26** mesh with a sectioned gear rack **28**. Hence, rotation of the pinion **21** effects rotation of the bobbin holders **19** located on a stationary table 28^1 about the axis of the machine.

In addition, the pinion **22** through pinion **29** rotates the table **15** provided with a stationary pinion **30** carried by axle **31** in the opposite direction. On the axle **31** are located a rigidly connected pinion **32** and a carrier **33** which are rotated about the axle **31** while running around a stationary wheel **34**. The axle **31** is located at an angle to the horizontal plane thereby enabling the pinion **32** and the carrier **33** fixed on said axle raise and to lower the braiding wire during rotation. The carrier **33** is provided with two axles **35**, **36** mounting a planet pinion **37** and a driven pinion **38** carrying the bobbin holders **20** for the outer row spools **18**.

Thus, the strand **13** which is unwound from the outer row spools **18** accomplishes two types of motion, i.e. a cycloidal motion resulting from the running of the pinion

32 around the stationary wheels 34 and a rotary motion resulting from the running of the driven pinion 38 and the planet pinion 37 about the stationary pinion 30. The strands unwound in such a manner from the spools of the outer row execute a cycloidal motion untwisting around the strand axis. A cycloidal motion of the strands provides for similar conditions for the unwinding of wire laces from the spools of the fore and back rows and which condition is especially important for the even tightening of the strands.

During braiding, the motion to the wire is imparted by a pulling wheel 39 located at the upper part of the machine. The braided wire is guided by a guide roller 40 and the pulling wheel 39 can be cranked manually by means of cranking mechanism 41. The braided wire is reeled onto a drum 42 of the reeling means for the completed wire which is spread evenly along the drum 42 length by a suitable even wind mechanism 43.

An adjustable tightening of the wire during braiding and the reeling on the drum 42 is effected by a friction clutch 44 for the reeling means for the braided wire. The machine mechanisms can be cranked manually by means of a fly-wheel 45 (FIG. 2) and the speed of the pulling wheel 39 may be changed by means of compound changeable pinions 46.

The absence in the present machine of any curved channels, levers and lace bobbins diminishes considerably the operational noise, simplifies manufacture and service of the machine and lessens the impact loads upon the strand.

While the invention has been described with reference to a particular embodiment, it will be appreciated by persons skilled in the art that changes and modifications may be made and equivalents substituted therefor without departing from the spirit and scope of the appended claims.

What we claim is:

1. A wire braiding machine comprising a drum for accommodating the wire to be braided, means for unwinding the wire from the drum and drawing the wire through the machine, an inner stationary table, an outer table concentric to and rotatable about the inner stationary table, concentrically disposed gear racks mounted for sliding movement along the inner stationary table, inner bobbin holders supported by said gear racks, axles arranged along the perimeter of the outer rotatable table and directed towards the common center of braidings, carriers mounted on the axles, outer bobbin holders fixed on the carriers and capable of turning with respect to the axles, braid thread untwisting means located on said carriers for ensuring the turning of the outer bobbin holders during braiding, a drive means operably related to said gear racks and said outer table for moving the inner bobbin holders and rotating the outer table respectively for causing the braid threads to unwind from the bobbins onto the wire being braided, and a take-up drum for receiving the braided wire.

2. The wire braiding machine as claimed in claim 1 in which said untwisting means includes at least three pinions, one of said pinions being fixed immovably on each axle of the outer table with the other pinions running with respect to a fixed pinion and said outer bobbin holder having an axle secured to the last running pinion and retaining a horizontal position during rolling.

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