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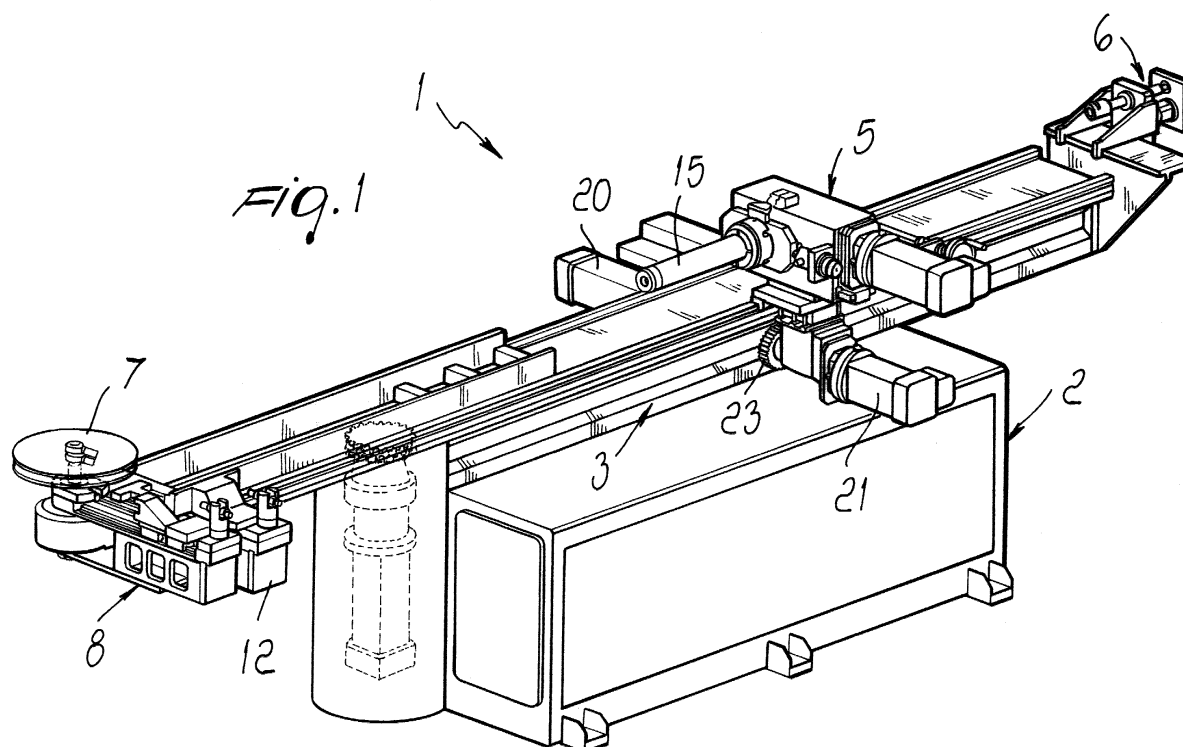
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(54) **Machine for bending tubes and the like**

(57) A machine (1) for bending tubes and the like, particularly by calendering, which comprises a frame for supporting a mandrel supporting head (5) for the advancement of the tube to be bent. A bending arm (8) is arranged at one end of the frame and supports an ele-

ment for engaging the tube to be bent which can be angularly positioned with respect to a bending wheel (7) supported by the frame. Moreover means are provided for the advancement of the mandrel supporting head (5) which act, on the frame, symmetrically with respect to the advancement direction of the tube to be bent.



EP 1 166 911 A2

Description

[0001] The present invention relates to a machine for bending tubes and the like, particularly by calendering.

[0002] It is known that so-called tube bending machines are generally constituted by a supporting frame on which a mandrel supporting head can move for the advancement of the tube to be bent, inside which there may be a core being retained by a core support arranged correspondingly at one end of the frame.

[0003] At the other end of the frame there is a bending wheel at which there is a bending arm which can move coaxially to the wheel and allows to perform bending.

[0004] In order to bend the tube, it is possible to provide, at the arm, a jaw-like element which retains the tube and which in practice causes the advancement of the tube during the rotation of the bending arm about the bending wheel through an angle that corresponds to the bending angle to be provided.

[0005] In another solution, on the bending arm there is a bending roller which engages the tube, which is advanced with respect to the wheel by a preset extent and is retained by the mandrel supporting head during the bending step, which is performed by means of the rotation of the arm about the wheel, which in practice, by placing the tube in contact with the wheel, bends it at the intended angle.

[0006] In the above described solutions, the bending radius corresponds to the radius of the bending wheel.

[0007] In another known solution, the tube is bent by calendering, being performed by arranging on the bending arm, which is arranged at a preset angle, a bending roller interacting with the tube which engages the bending wheel and is retained by an abutment roller rotatably supported by the frame of the machine.

[0008] In this embodiment, it is necessary to apply an extremely intense pressure to the tube, since deformation occurs due to the pressure that must be applied by the advancement means of the mandrel supporting head.

[0009] In these conditions it is therefore necessary to have a considerable power available which in practice has to be discharged onto the frame, which must be oversized so that it can withstand the pressure which is currently applied by a single very powerful motor axially offset with respect to the tube advancement line.

[0010] This method causes considerable constructive complexities in order to be able to contain the resulting transverse pressures.

[0011] The aim of the invention is to eliminate the drawbacks mentioned above, by providing a machine for bending tubes and the like, particularly by calendering, which is capable of applying the considerable forces required to perform the calendering action without thereby having to resort to excessively powerful motors.

[0012] Within this aim, an object of the invention is to provide a machine for bending tubes and the like, particularly by calendering, which allows to withstand the

forces applied to the frame without thereby resorting to oversizing of the structure and without resorting to particular solutions.

[0013] Another object of the present invention is to provide a machine for bending tubes and the like which can be used according to the different known methods for bending tubes, with the possibility to adapt easily also to calendering, which is not possible with most of the currently commercially available tube bending machines.

[0014] Another object of the present invention is to provide a machine for bending tubes and the like which, thanks to its particular constructive characteristics, is capable of giving the greatest assurances of reliability and safety in use and is also competitive from a merely economical point of view.

[0015] This aim and these and other objects which will become better apparent hereinafter are achieved by a machine for bending tubes and the like, particularly by calendering, which comprises a frame for supporting a mandrel supporting head for the advancement of the tube to be bent, a bending arm being arranged at one end of said frame, said arm supporting an element for engaging the tube to be bent which can be angularly positioned with respect to a bending wheel supported by said frame, characterized in that it comprises means for the advancement of said mandrel supporting head which act, on said frame, symmetrically with respect to the advancement direction of the tube to be bent.

[0016] Further characteristics and advantages of the invention will become better apparent from the description of a preferred but not exclusive embodiment of a machine for bending tubes and the like, particularly by calendering, illustrated only by way of non-limitative example in the accompanying drawings, wherein:

Figure 1 is a perspective view of the machine for bending tubes and the like according to the invention;

Figure 2 is a top plan view of the machine;

Figure 3 is a cross-section view of the machine, illustrating the means for the advancement of the mandrel supporting head.

[0017] With reference to the figures, the machine for bending tubes and the like, particularly by calendering, according to the invention, generally designated by the reference numeral 1, comprises a supporting frame which has a footing 2 on which longitudinal members 3 are provided for supporting and guiding a carriage or mandrel supporting head, generally designated by the reference numeral 5.

[0018] At one end of the longitudinal members 3 a core supporting assembly 6 is provided for supporting the core to be optionally inserted in the tube to be bent.

[0019] At the other end of the longitudinal members 3 a bending wheel 7 is provided, at which a bending arm 8 is placed and supports an element for engaging the

tube to be bent, the tube engagement element depending on the type of bending being performed.

[0020] If bending is performed by calendering, the element for engaging the tube to be bent is constituted by a bending roller 10 which can be angularly positioned with respect to the wheel 7, so as to provide the intended calendering angle in cooperation with abutment rollers 11 supported by a fixed arm 12 arranged at the end of the frame.

[0021] A particular feature of the invention consists in that means are provided for the advancement of the head or carriage 5 which act on the frame of the machine symmetrically with respect to the advancement direction of the tube to be bent, which is retained by the mandrel 15 fitted on the head 5.

[0022] The advancement means, in a preferred embodiment, are constituted by a first motor 20 and by a second motor 21 which are arranged opposite one another and actuate a first pinion 22 and a second pinion 23, keyed to the output shafts of the motors, which mesh with a first rack 24 and a second rack 25 being both supported by the longitudinal members 3 of the frame in a symmetrical position with respect to the vertical central plane along which the mandrel is arranged.

[0023] Advantageously, the head 5 is slideable on the frame by engagement of sliding blocks 30 which engage guiding elements 31 rigidly coupled to the frame.

[0024] The arrangement of the motors 20 and 21 is extremely important, since it allows to apply a pushing action which is symmetrical with respect to the advancing tube, so that the high power levels that must be used when calendering is performed do not generate transverse force components which would require oversizing of the frame.

[0025] Moreover, the adoption of two separate motors allows to reduce the specific power of each motor, avoiding the use of a single high-power motor as instead occurs in the known art.

[0026] Moreover, the motors 20 and 21 can be operated independently, so that during normal uses of the tube bending machine it is possible to operate one motor only whenever it is not necessary to apply very intense forces.

[0027] From the above description it is thus evident that the invention achieves the intended aim and objects, and in particular the fact is stressed that the particular embodiment of the advancement means of the mandrel supporting head allows a better distribution of the forces by discharging them symmetrically onto the frame, which can thus withstand high contrasting forces without having to resort to particular oversizing.

[0028] The invention thus conceived is susceptible of numerous modifications and variations, all of which are within the scope of the appended claims.

[0029] All the details may further be replaced with other technically equivalent elements.

[0030] In practice, the materials used, as well as the dimensions and the contingent shapes, may be any ac-

cording to requirements.

[0031] The disclosures in Italian Patent Application No. MI2000A001391 from which this application claims priority are incorporated herein by reference.

[0032] Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly, such reference signs do not have any limiting effect on the interpretation of each element identified by way of example by such reference signs.

Claims

1. A machine (1) for bending tubes and the like, particularly by calendering, which comprises a frame for supporting a mandrel supporting head (5) for the advancement of a tube to be bent, a bending arm (8) being arranged at one end of said frame, said arm supporting an element (10) for engaging the tube to be bent which can be angularly positioned with respect to a bending wheel (7) supported by said frame, **characterized in that** it comprises means (20,21) for the advancement of said mandrel supporting head (5) which act, on said frame, symmetrically with respect to the advancement direction of said tube to be bent.
2. The machine according to claim 1, **characterized in that** said element for engaging the tube to be bent is constituted by a bending roller (10).
3. The machine according to claim 1, **characterized in that** said means for the advancement of said mandrel supporting head comprise a first motor (20) and a second motor (21) being arranged opposite one another and symmetrically with respect to the advancement direction of said tube.
4. The machine according to claim 3, **characterized in that** it comprises a first pinion (22) and a second pinion (23) which are respectively keyed to the output shaft of said first and second motors and respectively mesh with a first rack (24) and a second rack (25) formed on said frame.
5. The machine according to claim 3, **characterized in that** said first and second motors (20,21) are actuated independently of each other.

