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DEVICE FOR THE CONTINUOUS PREBENDING, PARTICULARLY, OF HOT-ROLLED PIPES

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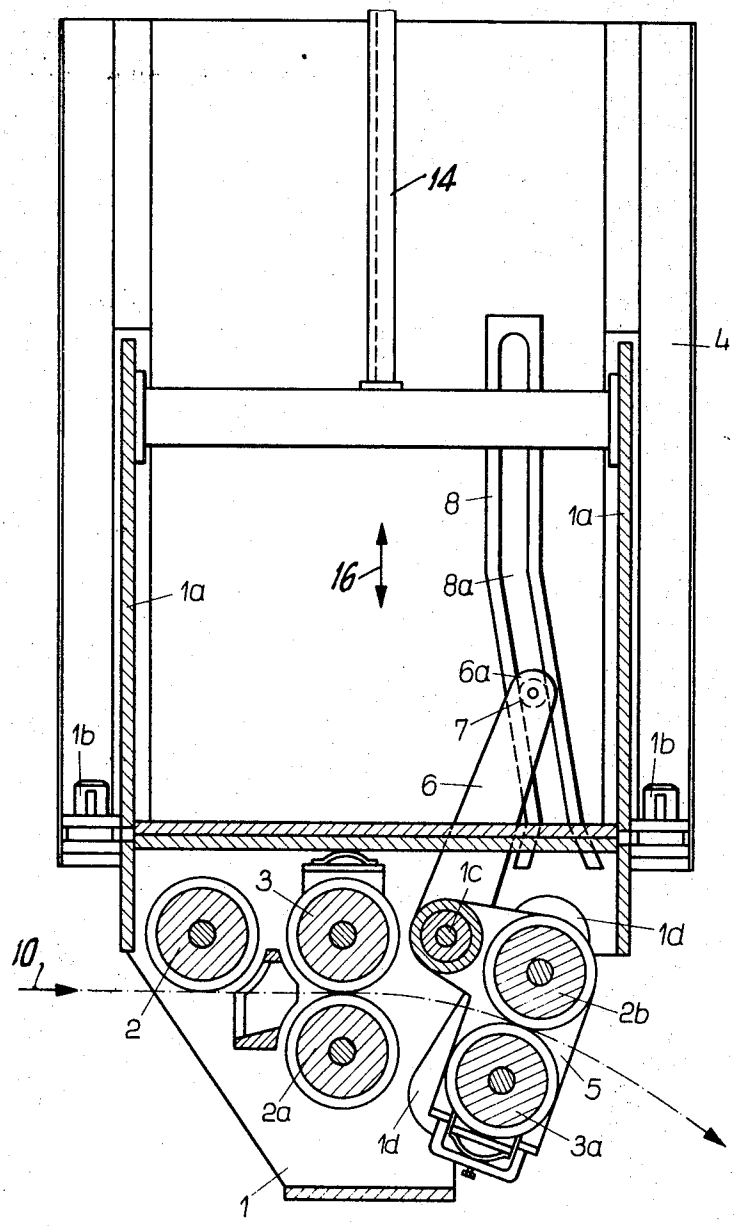

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DEVICE FOR THE CONTINUOUS PREBENDING, PARTICULARLY, OF HOT-ROLLED PIPES

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U.S. Cl. 72—173 6 Claims

ABSTRACT OF THE DISCLOSURE

A device for the continuous prebending, particularly, of hot-rolled pipes which are to be wound on a subsequent device, includes a multi-roll system having a common drive which is coupled with the supporting frame of the device. The supporting frame mounts a magazine containing a plurality of bending and calibrating rolls arranged in pairs for bending a pipe passed therebetween. The magazine is slidably mounted on the frame so it may be shifted along the frame. One cooperating pair of a calibrating roller and a bending roller is mounted on a movable holder of the magazine. The holder is pivotally mounted so that it will be shifted to vary the bending curve radius of operation of the rollers in accordance with the shifting movement of the magazine on the frame. To accomplish this, the holder is connected to a lever having a roller which is confined in a slot defined on the frame.

SUMMARY OF THE INVENTION

This invention relates in general to the construction of devices for forming piping and in particular to a new and useful device for pre-bending rolled pipes in a hot condition and which includes a shiftable magazine which is mounted on a supporting frame and which includes a plurality of bending and calibrating rollers, one set of which is mounted so as to be shifted in orientation during the shifting of the magazine to accommodate various sized pipes.

The present invention is an improvement over application, Ser. No. 782,282, filed on Dec. 9, 1968, by the inventor of the present case, particularly in respect to the mounting of a set of a single bending and a single calibrating roller on a pivotal holder contained on magazine structure such that the pipe may be wound into spiral layers which are arranged in exact superposition. The device permits the pre-bending and winding of relatively large calibrated pipes when they are in the rolled hot state. The bending roll magazine includes an inlet side carrying a bending roller and a spaced apart bending roller and calibrating roller set. The outlet end includes a bending and calibrating roller set which are mounted on the pivotal holder. The holder is controlled in its position by a fulcrum which is actuated by the action of a cam slot on a roller which is confined in the slot. The cam slot is defined on a supporting frame and when the magazine is moved relative to the frame, the roller is shifted to shift the lever to accurately position the holder in accordance with the cam outline control. Thus, the shifting of the magazine on its supporting base permits automatic adjustment of the magazine and the rollers thereon to accommodate the various sizes of pipe which are to be bent and to accommodate the selected bending radius.

With the construction, the last roll group is provided with the special adjusting means which can be adapted within wide limits to the selected bending and winding radius. The guide roller which controls the pivotal mounting of the holder for the last roller group is advantageously confined in a substantially U-shaped slot of the guide cam which is carried on the supporting base. The guide cam is advantageously made so that it can be exchanged with another guide having a different motion characteristic.

In addition to the fact that the device provides an extremely simple, safe and inexpensive construction of a pipe bending device, a particular advantage in the construction is that it permits precision winding, that is, all spiral layers of the wound pipe will have substantially the same radii and thus they can be exactly superposed. This advantage becomes particularly manifest if, for example, in the manufacture of cooling and heating coils, a predetermined number of turns for a corresponding length of pipe has to be produced without requiring subsequent deformation of the bent pipe.

A further advantage of the construction is that the carriage is mounted on a supporting base so that it can be moved over the entire width of the winding cage and the correct, or desired, bending radius can always be set in the range of the cage width in any position of the bending machine. Because the guide rail may be exchanged to provide one of different geometric form, the bending radius can be adapted in an extremely simple and rapid manner to the new operating requirements, for example, to pipes which may have smaller bending radii than the preceding ones.

Accordingly, it is an object of the invention to provide an improved bending machine which includes a magazine which is mounted on the supporting frame for movement therewith and wherein the last one of a group of sets of bending and calibrating rollers is mounted on a holder which may be shifted in accordance with the movement of the magazine on the frame.

A further object of the invention is to provide a bending device, which is simple in design, rugged in construction and economical to manufacture.

The various features of novelty which characterize the invention are pointed out with particularity in the claims annexed to and forming a part of this specification. For a better understanding of the invention, its operating advantages and specific objects attained by its use, reference should be had to the accompanying drawings and descriptive matter in which there is illustrated and described a preferred embodiment of the invention.

BRIEF DESCRIPTION OF THE DRAWING

The only figure of the drawing is a horizontal sectional view of a portion of a bending machine constructed in accordance with the invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to the drawing, in particular, the invention embodied therein includes a bending machine having a magazine generally designated **1** which is slidable on a mounting base or frame **4**. The magazine carries bending rolls or rollers **2** and **2***a* which are adapted to be arranged on respective sides of a pipe which is fed in the direction of arrows **10** and which are located at the entrance end of the device. A guide or hopper **12** is located between bending rollers **2** and **2***a* and, in addition, a calibrating roller **3** is arranged directly adjacent the roller **2***a* for cooperating therewith and forming the pipe to the predetermined bending radius and size.

In accordance with the invention, a further set of rollers comprising a bending roller **2***b* and a calibrating roller **3***a* are mounted on a holder **5** which, in turn, is pivotally mounted on a pivot pin or shaft **1***c*. In order to permit the pivotal movement, the magazine is recessed as at **1***d*.

The magazine **1** may be slid backwardly and forwardly by a driving mechanism (not shown) which is operative through a connecting rod **14** to effect the desired movement backwardly and forwardly in the directions of the

double arrows **16**. This selected backward or forward movement for positioning the bending elements in proper relation to the pipe being bent is also effective to shift the roller set comprising the rollers **2***b* and **3***a* on the holder **5**. This shifting is accomplished by moving a lever **6** secured to the holder **5** to rotate the holder **5** about its pivot **1***c* in accordance with the amount with which a roller follower **6***a* is shifted by a cam slot **8***a* on a cam member **8** which is secured to the frame **4**. The cam slot **8***a* is advantageously made of U-shaped configuration and the roller **6***a* of the lever **6** is confined therein for movement therealong. The roller **7** moves along the curved track of guide rail **8** as determined by the cam slot **8***a* and sets the rolls **2***b* and **3***a* of the roll unit to the respective desired or required pipe bending radius during the shifting of the magazine.

With the arrangement of the invention, it is possible to move the magazine carriage **1***a* along the entire width of the winding cage (not represented). The curved track member **8** with its associated slot **8***a* controls the holder **5** with the cooperative rollers **2***b* and **3***a* so that the radius for the pipe to be bent will correspond to the carriage position. Such an arrangement permits the winding of the pipe into coils which may be exactly superposed in spiral layers.

Rollers such as rollers **2** and **2***a* are advantageously driven by a driving mechanism (not shown) which is carried on the frame above the magazine **1**.

What is claimed is:

1. A bending device particularly for bending hot-rolled pipes which are to be subsequently wound on a device such as a reel, comprising a mounting base, a magazine movable backwardly and forwardly along said mounting base, said magazine having at least one stationary bending roller and one calibrating roller adjacent the entrance end thereof, a holder pivotally mounted on said magazine and

carrying a bending and calibrating roller arranged in a cooperative roller set between which the pipe to be bent is adapted to be passed, and means connected between said holder and said mounting stand for shifting said holder in accordance with the movement of said magazine along said mounting stand.

2. A device, according to claim **1**, wherein said holder is pivotally mounted on said magazine, a lever connected to said holder for shifting said holder about its pivotal mounting, said lever having a follower portion, and a member carried on said frame and having a slot cam defined therein engaged with said follower portion of said lever and comprising said means for shifting said holder during movement of said magazine relative to said stand.

3. A device, according to claim **2**, wherein said cam follower on said lever comprises a roller engaged in said slot.

4. A device, according to claim **3**, wherein said member comprises a guide rail detachably connected to said frame.

5. A device, according to claim **4**, wherein said guide rail extends along the length of said frame.

6. A device, according to claim **5**, including a bending roller arranged at the entrance of said magazine, a hopper guide disposed between said first bending roller and said cooperative bending roller and calibrating roller on said magazine.

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