

Oct. 31, 1967

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3,349,595

BENDING MACHINES

Filed Oct. 14, 1964

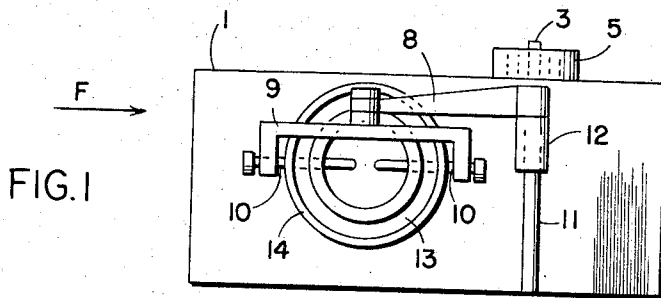


FIG. 1

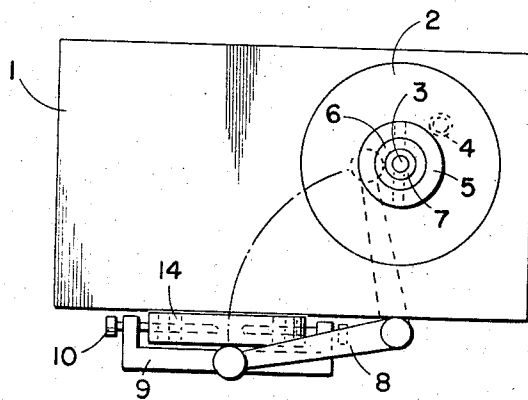


FIG. 2

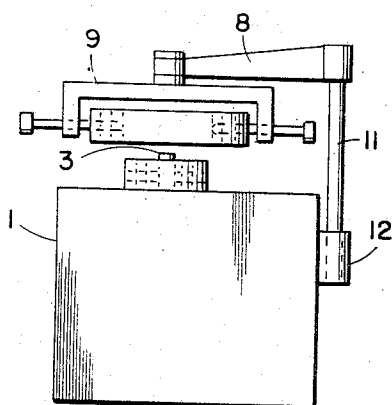


FIG. 3

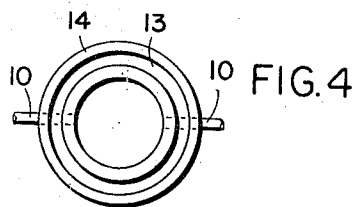


FIG. 4

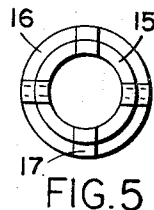


FIG. 5

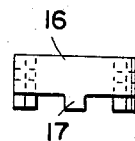


FIG. 6

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BENDING MACHINES

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Filed Oct. 14, 1964, Ser. No. 403,768

Claims priority, application France, Oct. 14, 1963, 7,021

6 Claims. (Cl. 72-156)

ABSTRACT OF THE DISCLOSURE

Bending machine for bending steel bars used in reinforced concrete, the machine being provided with ring-shaped forms, at least one movable spindle, the selection of the forms for being placed in a working position being effected by the spindle, the spindle being adapted to engage all the forms of the set, means being provided for positioning the non-working forms apart from the working portion of the machine, the nonworking forms being held by a fork pivoted at the end of a movable bracket which is fixed to the machine.

The present invention relates to improvements concerning bending machines, particularly those used to bend the steel bars serving in the technique of reinforced concrete.

As is known, the bending of the said bars is made around forms the size of which depends on the curves to be given to the bars. The said curves are extremely varied so that a bending machine should normally have several removable forms the chiefest of which are as many heavy parts, difficult to handle when they are to be placed on the machine or removed from it.

To remedy such state of things, it has already been proposed to use ring-shaped forms, concentrically arranged, but the weight of the rings, constituting the forms with large diameters, still remains too high, so that it has also been proposed to place such ring-shaped forms separately in a working position raising the same through an appropriate device, from a resting position. Unfortunately the said arrangement complicates the construction of the bending machines and substantially increases the price thereof.

The purpose of the present invention is to remedy the above state of things through inexpensive means which can be easily carried out, thus rendering the applying and use of the said bending machines more adapted to practical requirements.

My invention mainly consists in providing the bending machine with a set of ring-shaped forms the selection of which, for the placing in a working position, is effected by means of one movable spindle at least, which can enter all the forms of the set, and with means permitting to place the non-working forms apart from the working volume of the machine.

My invention further consists in some other arrangements hereinafter mentioned and preferably used together with the above mentioned main arrangement.

My invention particularly covers certain modes of application and realization of the said arrangements and also the bending machines provided with such improvements.

By way of example and to provide a better understanding of my invention, a specification of particular modes of carrying out the invention is given hereinafter, said being illustrated in a schematic and non-restrictive manner in the accompanying drawing. In said drawing:

FIGURES 1 and 2 partially show, in elevational and plan view respectively, a bending machine, improved according to the invention, in a working position;

FIGURE 3 shows in elevational view, according to arrow F of FIGURE 1, the placing or withdrawal of the forms of the machine;

FIGURE 4 shows the arrangement of the forms of the said machine when they do not work; and

FIGURES 5 and 6 show a variant of the forms, seen from under and in elevational view respectively.

Referring to the drawings, the bending machine is constituted, as now known, by a structure in the shape of a table 1 on the level of which is placed a rotating plate 2 the shaft 3 of which protrudes above the table. The plate 2, actuated by a mechanical or hydraulic device, effects, at the time of the bending, a complete or partial rotation.

The bar to be bent is placed on the plate 2 where it is taken between a roller 4 and the form 5 which will give it the required bending. The form 5 is annular; it is fitted on the plate 2 together with forms 6, 7, the curvature radii of which are smaller so as to insure its centering through shaft 3.

The forms 5, 6 and 7 belong to a set of ring-shaped forms, the nonworking forms of which are placed apart from the working volume of the machine by means of a device comprising a movable bracket 8, a fork 9 and spindles 10. The bracket 8 is fixed to a column 11 which can slide and turn in a guide 12 fixed to the structure of the machine. A suitable mechanism, not shown, for instance an hydraulic jack, permits to raise or lower the column 11 and, consequently, the bracket 8. The fork 9 is fixed and can pivot at the free end of the bracket 8; its width approximately corresponds to the diameter of the largest of the forms of the set; its ends bear the spindles 10, to the number of two, inserted in holes diametrically bored into the forms. Of course, all the forms of the set are thus bored so that the nonworking forms, such as 13, 14, can be held by the bracket 8, in the vertical position shown, on the side of the machine and under the table 1, consequently apart from the machine working volume.

To set the form 13, for instance, on the machine, the bracket 8 is elevated; the whole of the forms, maintained by the fork 9, is placed horizontally through rotating round the axis of spindles 10; then, by means of the rotation of the bracket 8 round the axis of the column 11, the fork forms are placed coaxially to the shaft 3 and the bracket 8 is lowered so as to put the forms on the plate of the machine round the form 5. The spindles 10 are then radially slid so that they should be withdrawn from the form 13; the bracket 8 is raised again, the form 13 remaining on the plate 2. The bracket 8 is turned and the form or forms still held by the fork 9 are placed vertically, then the bracket is brought down to its former position.

Obviously, similar manipulations permit the withdrawal of one or several forms put on the plate 2 by inserting the spindles 10 into the holes of the said forms, which can be done, without turning the plate 2, by the rotation of the bracket 8 and the pivoting of the fork 9.

Conveniently, the spindles 10 have visible adjusting marks permitting to know which forms are released or not by such spindles.

Eventually, the two spindles 10, which are diametrically opposite, may be simultaneously actuated by a mechanism coupling their shifting into the fork 9.

To facilitate the inserting of the spindles into the forms placed on the machine, it would be convenient to provide the said forms with visible marks corresponding to their holes. The coincidence of the holes of several forms, such as 15, 16, can be insured by providing projections 17 under the said forms, such projections entering into grooves of the plate 2 of the machine.

It can be seen from the preceding description that by using the method described, improved bending machines

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are obtained which have numerous advantages, inter alia that of permitting a quite easy change of the forms.

It goes without saying that the invention is not limited to the methods of application and to the embodiments herein described but extends to all modifications thereof.

What I claim is:

1. A bending machine comprising a set of ring-shaped forms, at least one movable spindle, the selection of said forms for being placed in a working position being effected by said spindle, said spindle being adapted to engage all of the forms of the set, means for positioning the non-working forms apart from the working portion of the machine, a movable bracket fixed to the machine, and a fork pivoted substantially at the end of said bracket for holding the non-working forms.

2. A bending machine, according to claim 1, wherein the said movable bracket turns and is raised or lowered in relation to the said machine.

3. A bending machine, according to claim 2, wherein the said movable bracket is raised by means of a jack.

4. A bending machine, according to claim 1, wherein the said fork bears two spindles inserted into the diametral holes of the forms.

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5. A bending machine, according to claim 4, wherein the shifting of the said spindles is coupled.

6. A bending machine comprising a set of ring-shaped forms, at least one movable spindle, the selection of said forms for being placed in a working position being effected by said spindle, said spindle being adapted to engage all of the forms of the set, means for positioning the non-working forms apart from the working portion of the machine, a movable bracket fixed to the machine, a fork pivoted substantially at the end of said bracket for holding the non-working forms, and a rotatably mounted plate having an upwardly protruding shaft, said plate having grooves, said forms having projections, said projections being adapted to engage said grooves.

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