

[54] APPARATUS FOR FORMING SPIRAL STEEL PIPE

3,606,783 9/1971 Lewis..... 29/477.3

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[51] Int. Cl..... B21f 3/02

[58] Field of Search 72/49, 50, 135, 368, 371; 29/477.3, 477.7

[56] References Cited

UNITED STATES PATENTS

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[57] ABSTRACT

An apparatus for forming spiral steel pipe by separate type forming rolls which is characterized by stands carrying rolls for forming the inner and outer surfaces of the steel pipe, the stands being each split into two portions in a direction perpendicular to the axis of the steel pipe to be formed, one of the two portions being a fixed stand formed with a smaller length than the width of material plate for the intended steel pipe and the other portion being a stand movable in the axial direction of the steel pipe to be formed.

4 Claims, 5 Drawing Figures

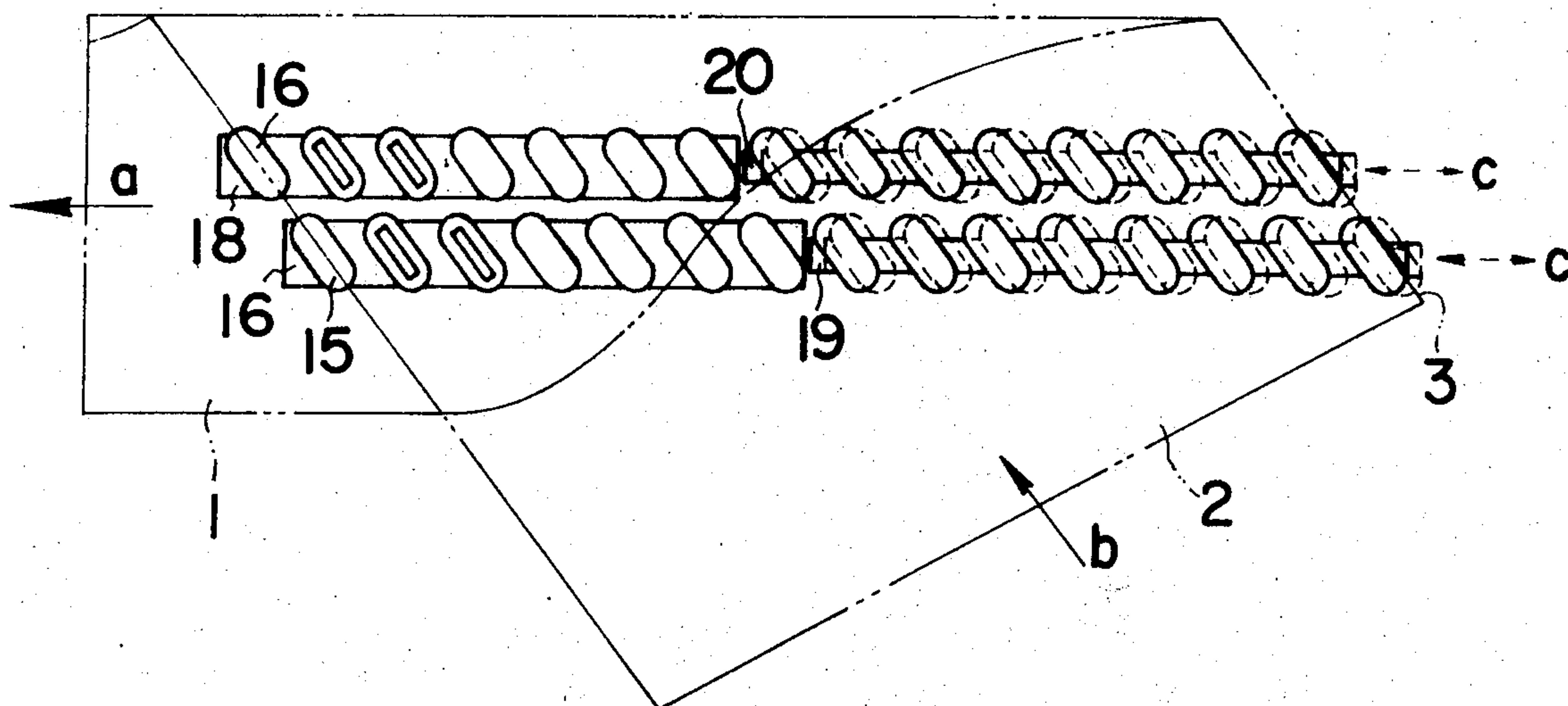


FIG. 1

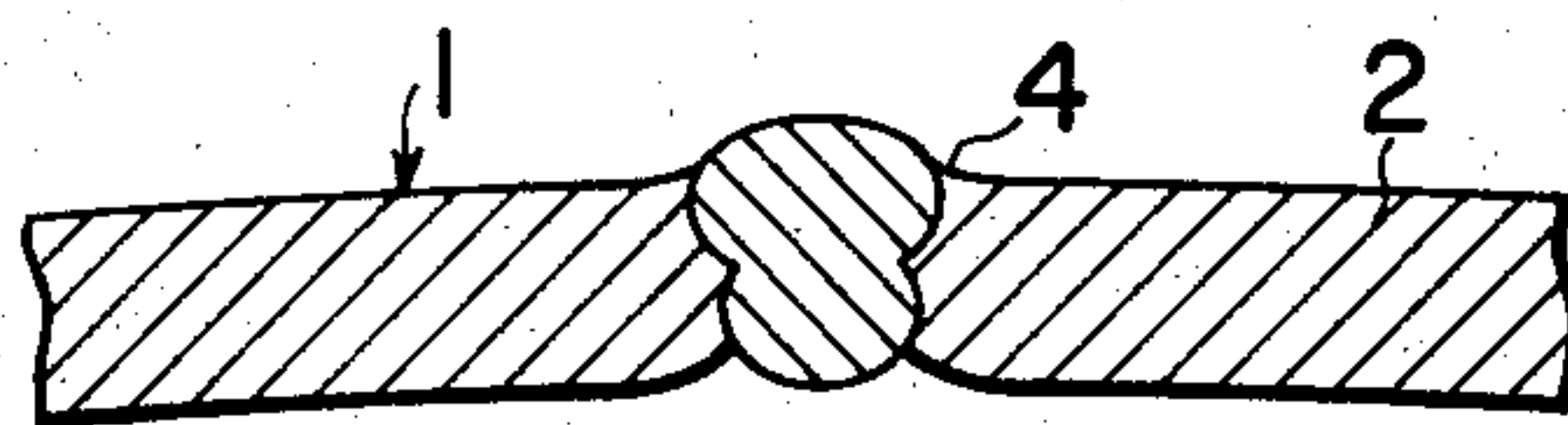


FIG. 2

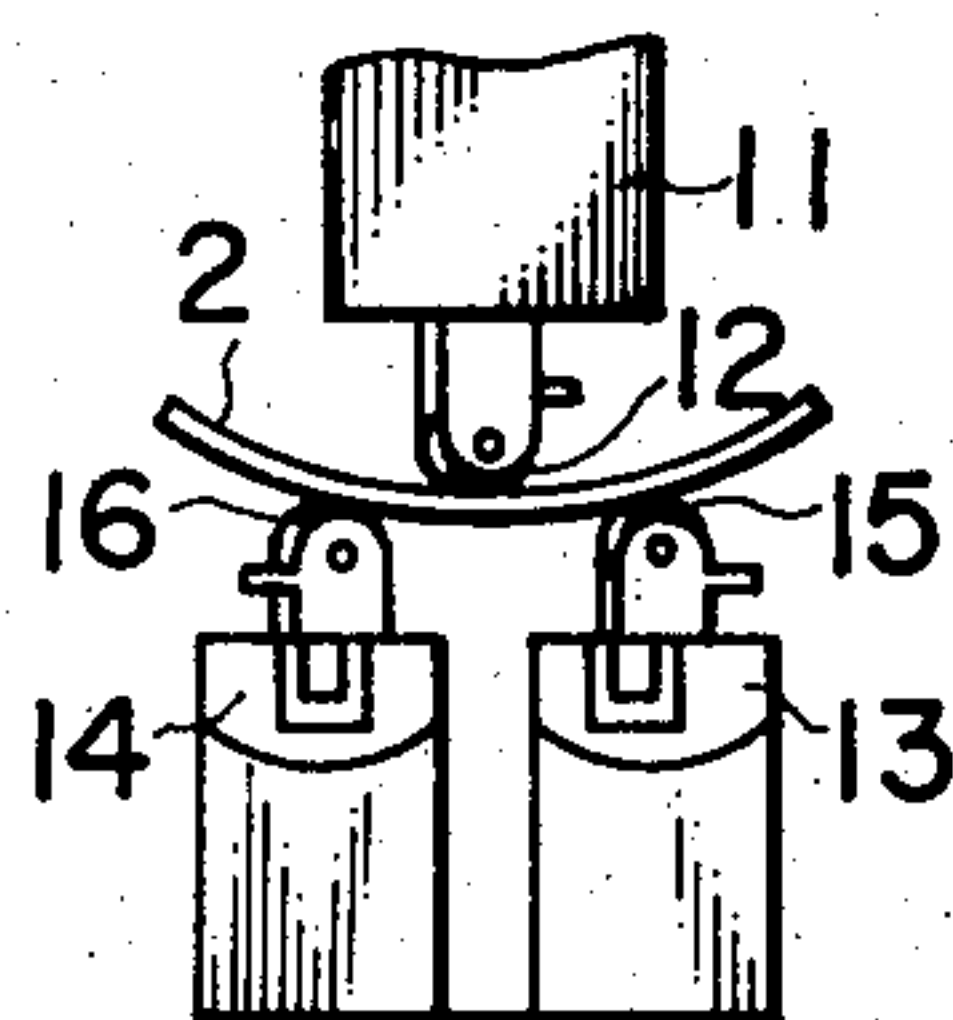


FIG. 3a

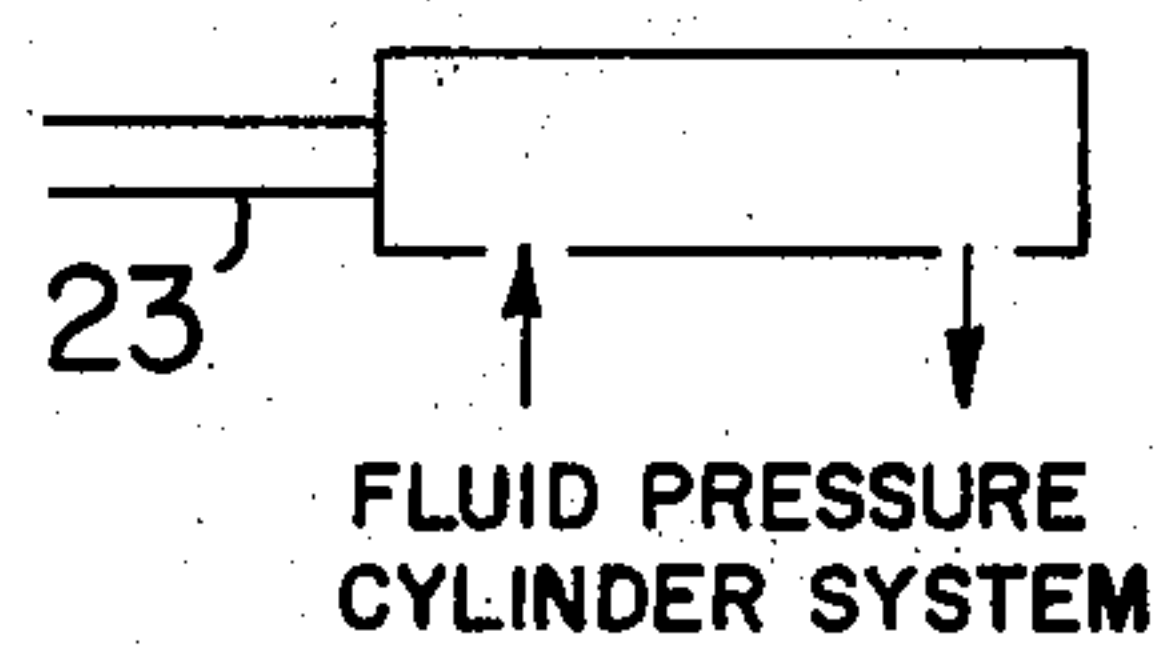


FIG. 3

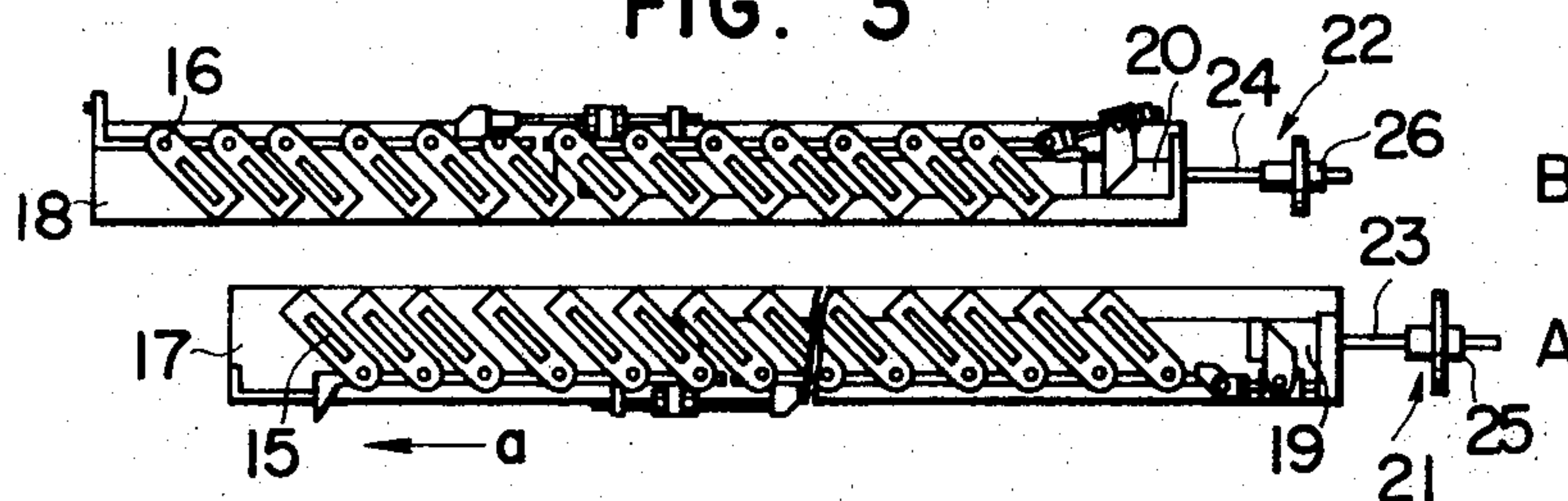
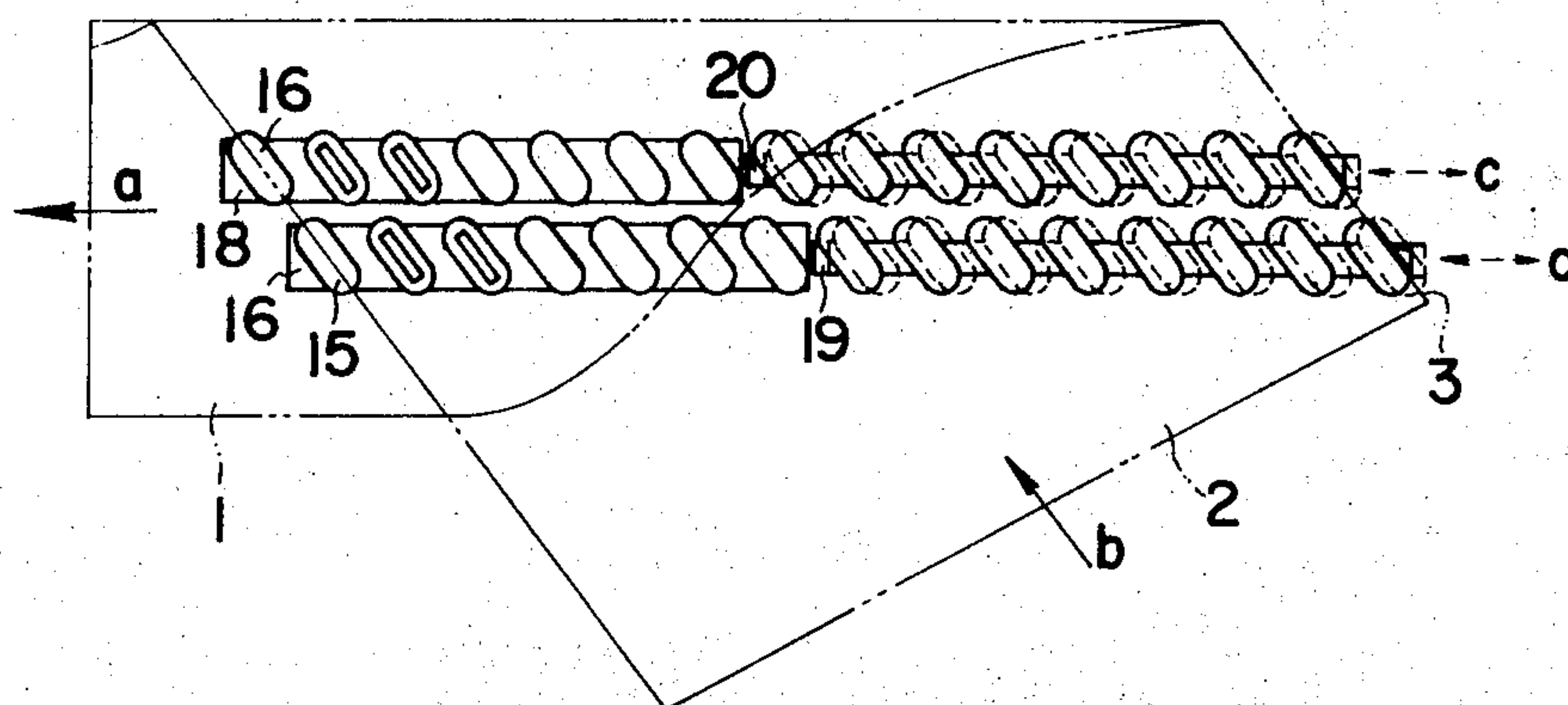


FIG. 4



APPARATUS FOR FORMING SPIRAL STEEL PIPE

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to an apparatus for forming spiral steel pipe and more particularly to an apparatus for forming spiral steel pipe which comprises separate rolls for forming the inner and outer surfaces of the spiral pipe.

2. Description of the Prior Art

In an apparatus for forming spiral steel pipe by spirally bending steel plate, insufficient bending of a steel plate end usually gives rise, as shown in FIG. 1, to an abnormal bulging, or peaking 4 in the vicinity of the weld in the plate 2 of the formed steel pipe 1. This abnormal deformation 4 lowers the strength of the welded joint and spoils the beauty of the appearance, thus being very undesirable in respect of the product value.

It is said however that a relatively small amount of peaking takes place in forming steel pipe by means of so-called separate type forming rolls which comprise a multiplicity of separate rolls for forming the inner and outer surfaces of the steel pipe. Nevertheless, on occasion the peaking exceeds two millimeters. A typical apparatus for forming spiral steel pipe by separate forming rolls comprises, as shown in FIG. 2, a set of inner-surface forming rolls 12 fitted to a stand 11 and two sets of outer-surface forming rolls 15 and 16 installed on stands 13 and 14 respectively, the three sets of rolls being in triangular arrangement, with the first-mentioned set of rolls 12 at the vertex of the triangle and the two other sets of rolls 15 and 16 at the opposed ends of the base thereof. The three sets of forming rolls 12, 15 and 16 act on the material plate 2 so as to bend it spirally. As shown in FIG. 4, however, the steel plate 2 employed as the material may have such a width in excess of the device such that a side end 3 of the plate fails to engage the rolls for forming the inner and outer surfaces so that the plate end is located in the space between adjacent rolls. In such a case, the side end 3 of the material plate 2, placed in the said space, is not subjected to a bending force and remains unbent, thus causing a large amount of the aforesaid abnormal deformation, or peaking.

SUMMARY OF THE INVENTION

The present invention obviates these problems by providing a forming apparatus which always enables a side end of a steel plate of any width to engage with rolls for forming the inner and outer surfaces. The invention contemplates an apparatus for forming spiral steel plate by separate type forming rolls which is characterized by having stands carrying rolls for forming the inner and outer surfaces of the steel pipe, the stands being each split into two portions in a direction perpendicular to the axis of the steel pipe to be formed, one of the two portions being a fixed stand formed with a smaller length than the width of the material plate for the intended steel pipe and the other portion being a stand which is movable in the axial direction of the steel pipe to be formed.

An object of the present invention is to provide an apparatus for forming spiral steel pipe by bending plate material in a manner so as to inhibit abnormal deforma-

tion such as peaking from taking place at the welded joint.

Another object of the invention is to provide an apparatus for forming spiral steel pipe which is effective to prevent the abnormal deformation from occurring at the welded joint and also simple in construction and easy to operate.

These and other objects of the present invention will be more clearly understood when the following description of a preferred embodiment is read in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 illustrates an abnormal deformation caused by a conventional apparatus.

FIG. 2 is a side view of an apparatus for forming spiral steel pipe by separate rolls.

FIG. 3 and 3a are generally plane views of apparatus embodying the present invention.

FIG. 4 is a generally plane view illustrating the manner of operation of the apparatus embodying the invention. DESCRIPTION OF THE PREFERRED EMBODIMENT

An apparatus embodying the present invention will hereunder be described in detail. In a typical forming apparatus comprising separate type forming rolls, the outer-surface forming rolls 15 and 16 are mounted on two stands, extending in the longitudinal direction thereof, the stands being disposed in two rows A and B extending in parallel in the axial direction of the pipe 1 to be formed, as a matter of functional necessity. The rolls are adjusted so as to rotate in the direction of the advancing steel plate. As shown in FIG. 3, in the present invention the stands arranged in the two rows A and B are composed of fixed stands 17 and 18 and independent movable stands 19 and 20 splitting from the fixed stands 17 and 18 respectively. The movable stands 19 and 20 are in alignment with the fixed stands 17 and 18 respectively and located on the rear side of the fixed stands 17 and 18, that is, on the leading side thereof with respect to the direction in which the pipe 1 being formed advances. The stands 19 and 20 are movable up to one pitch of the outer-surface forming rolls 15 and 16 in the axial direction of the pipe 1 to be formed. Any stand movement exceeding one pitch of the rolls is not necessary at all in view of the fact that the major object of the apparatus of the present invention is to prevent abnormal deformation at the joint by placing an entire steel plate end on rolls without fail. The shift of the movable stands 19 and 20 can be effected by a relative slide between surfaces or by means of rollers, which should be construed as non-limitative and any other desired means may be employed for the purpose. Devices 21 and 22 which may be used for shifting the movable stands 19 and 20 employ a screw mechanism in this embodiment. That is, threaded drive shafts 23 and 24 extending in the longitudinal direction of the movable stands 19 and 20 are secured to the rear ends of the movable stands 19 and 20 respectively. The drive shafts 23 and 24 are fitted with threaded sleeves 25 and 26 respectively and rotation of the sleeves will advance the movable stands 19 and 20 through the drive shafts 23 and 24. Also it is possible as a matter of course to apply a fluid pressure cylinder system to the shift adjusting devices 21 and 22. Furthermore, the lengths of the fixed stands 17 and 18 are not particularly limited so long as the said lengths are smaller than the width of

the plate material for the steel pipe to be formed. If the fixed stands should be wider than the plate material, the function and effect of the movable stands in the apparatus of the present invention would not be displayed, and hence the feature of the present apparatus would be lost.

The stand which carries the inner-surface forming rolls is also composed of a fixed stand and a movable stand in entirely the same manner as the stands for the outer-surface forming rolls.

Operation of the heretofore described apparatus of the present invention when the steel plate material for the steel pipe to be formed is supplied to the apparatus will now be described by reference to FIG. 4. (For convenience of illustration, only the operation of the outer-surface forming rolls and their stands will be described. However, the operation is entirely the same as the operation of the inner-surface forming rolls and the stand therefor.) When a side end 3 of the steel plate 2 is not mounted on the forming rolls 15 and 16 but positioned in the inter-roll space, the screw mechanism of the devices 21 and 22 for adjusting the shift of the movable stands 19 and 20 is operated to shift the movable stands 19 and 20 to an adequate position (indicated by dashed line in the illustrated embodiment) within the pitch of the outer-surface forming rolls in the axial direction of the steel pipe 1 to be formed, thereby placing the side end 3 of the material steel plate 2 on the outer-surface forming rolls 15 and 16. The direction of advance of the steel pipe being formed is denoted by *a*, the direction of feeding the steel plate 2, by *b*, and the direction of shifting the movable stands 19 and 20, by *c*.

It will be apparent from the foregoing description

that, according to the apparatus of the present invention, the material plate for the steel pipe to be formed can be subjected to formation with a side end thereof always placed on the outer-surface forming rolls so that the abnormal deformation which is called peaking can be prevented from taking place at the pipe joint. Thus, the present apparatus displays an exceedingly desirable effect in enabling the produced steel pipe to have a high quality.

What is claimed is:

1. An apparatus for forming spiral steel pipe by separate type forming rolls which is characterized by stands carrying rolls for forming the inner and outer surfaces of the steel pipe, the stands being each split into two portions in a direction perpendicular to the axis of the steel pipe to be formed, one of the two portions as a fixed stand formed with a smaller length than the width of the material plate for the intended steel pipe and the other portion as a stand movable in the axial direction of the steel pipe to be formed.

2. An apparatus as defined in claim 1, characterized in that the shift of the movable stands in the axial direction of the steel pipe to be formed is within one pitch of the forming rolls.

3. An apparatus as defined in claim 1, characterized in that the movable stands are shifted in the axial direction of the intended steel pipe by means of a screw mechanism.

4. An apparatus as defined in claim 1, characterized in that the movable stands are moved axially of the intended steel pipe by means of a fluid pressure cylinder system.

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