June 12, 1928. 1,673,477

A. T. YATES

ROLLING ATTACHMENT FOR BENDING MACHINES

Original Filed Sept. 28, 1926

Fig. 1.

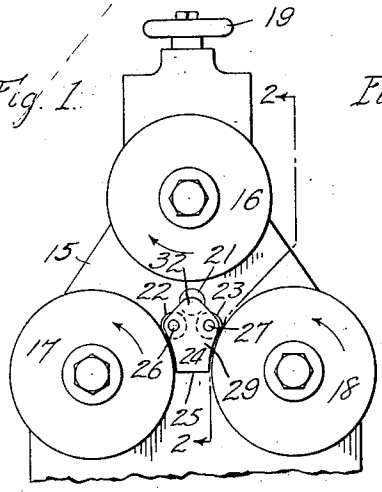
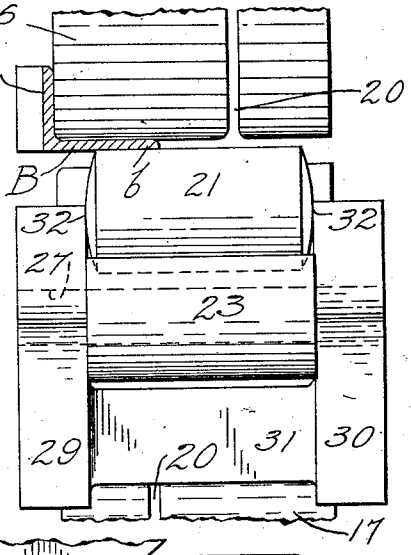


Fig. 2.



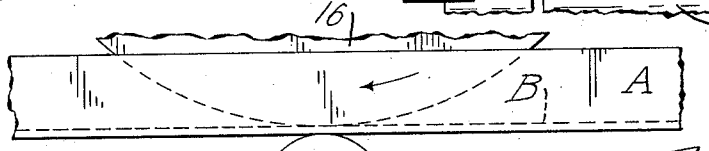


Fig. 3.

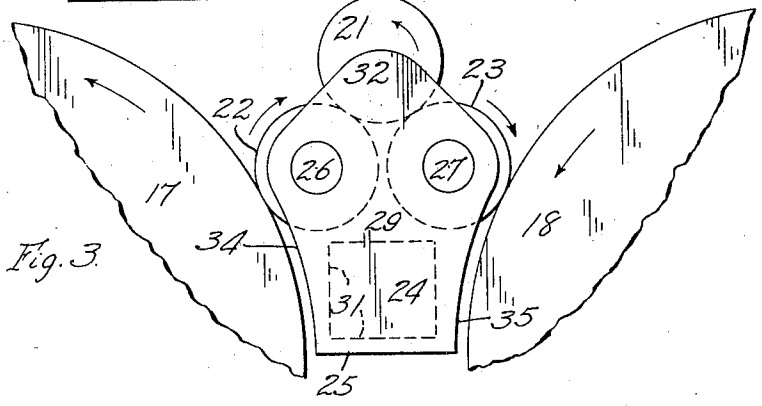
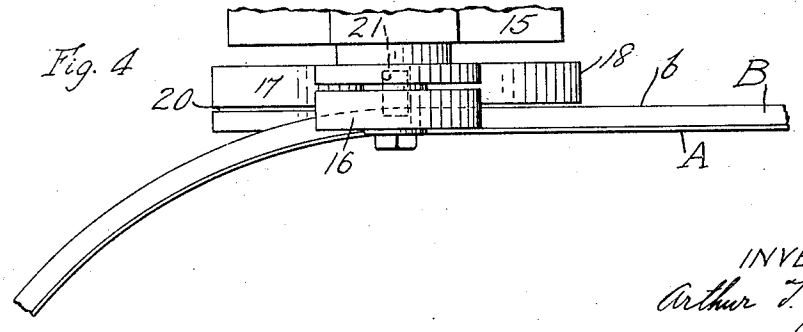


Fig. 4



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UNITED STATES PATENT OFFICE.

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ROLLING ATTACHMENT FOR BENDING MACHINES.

Original application filed September 28, 1926, Serial No. 138,139. Divided and this application filed April 28, 1927. Serial No. 187,171.

This invention relates to attachments for use in connection with bending machines of the kind including three or more rolls arranged so as to act on work to bend the same. This application is a division of my application No. 138,139, filed September 28, 1926.

In the ordinary use of a bending machine of the kind to which this invention relates, the three rolls of the bending machine apply pressure in alternately opposite directions at three different points lengthwise of the work, and the work is passed through the machine while the rolls rotate, so that a substantially uniform bending of the work along its length results. For certain kinds of work, however, it is sometimes desirable to bend the work by elongation of one edge thereof, which can be done by rolling the portion of the work adjacent to that edge, so as to produce a slight decrease in the thickness of the work which is being rolled and a corresponding elongation thereof.

The objects of this invention are to provide an attachment for a bending machine by means of which a piece of work may be rolled under pressure in such a manner as to produce an elongation of the work; also to provide an attachment of this kind which can be readily applied to or removed from a bending machine of a heretofore common construction; also to provide an attachment of this kind which is so constructed that only a small part of the pressure to which the attachment is subjected during the rolling of the work is transmitted to the bearings of the rolls of the attachment; also to improve the construction of attachments of this kind in other respects hereinafter specified.

In the accompanying drawings,

Fig. 1 is a front elevation of a bending machine having my improved attachment in place thereon.

Fig. 2 is a fragmentary, sectional elevation of the bending machine along the line 2—2, Fig. 1, showing my attachment on an enlarged scale.

Fig. 3 is a fragmentary, front elevation thereof.

Fig. 4 is a fragmentary, top plan view of a bending machine on the same scale as Fig. 1, showing the same bending an angle bar by elongating the edge portion of one of the flanges thereof.

The bending machine to which my attachment may be applied may be of any suitable or desired construction, that shown in the drawings including a frame or housing 15 on which the shaft of three rolls 16, 17 and 18 are journalled, the rolls extending outwardly beyond the housing 15 and being arranged in triangular relation to each other. The work to be bent is passed between the rolls so that two rolls bear on one face or side of the work and the third roll engages the other face or side of the work between the points at which the work is engaged by the other two rolls. At least one of the rolls may be adjustable relatively to the other roll or rolls in any suitable or desired manner and in the construction shown this adjustment is obtained by moving the upper roll 16 toward and from the two lower rolls 17 and 18 which rotate about relatively fixed axes, a hand wheel 19 and suitable adjusting mechanism (not shown) being preferably employed for effecting the adjustment. The rolls of the bending machine are each generally made in two parts separated by annular slots or spaces 20 between the two parts of each roll into which a flange of a bar or beam which is being bent may extend. These rolls are, of course, driven by any suitable source of power so that all of the rolls rotate at the same peripheral speed.

In the particular embodiment of my invention shown in the drawings, my rolling attachment consists of three relatively small rolls 21, 22 and 23, the last two of which are pivoted in a suitable bearing or guide housing 24, provided with a downwardly extending guide portion 25 which extends between the two rolls 17 and 18 of the bending machine. In the particular construction illustrated the two lower rolls 22 and 23 are provided with shafts 26 and 27, the opposite ends of which are journalled in suitable bearings in the guide housing 24. For this purpose the guide housing 24, as illustrated in the drawings, includes front and rear frame portions 29 and 30 connected near their lower portions by a connecting member or part 31 which may be formed integral with the front and rear frame portions.

The upper roll 21 preferably has no shaft or bearing in the housing 24 but merely rests on the two lower rolls 22 and 23 and the upper roll may be held against displacement in the direction of its length by means of upwardly extending projections 32 at the upper ends of the front and rear frame portions 29 and 30. Consequently it will be obvious that the attachment may be placed between the three rolls 16, 17 and 18 of a bending machine by simply inserting the attachment in a direction parallel to the axes of these rolls into the space between the three rolls of the bending machine. The opposite sides or faces 34 and 35 of the front and rear housing members 29 and 30 are formed to cooperate with the rolls 17 and 18 to hold the attachment in correct relation to the bending machine and for this purpose are preferably shaped to correspond substantially to the curvature of the peripheries of the rolls 17 and 18. Consequently if the rolls of the bending machine are driven in the direction as indicated by the arrows in Fig. 1 for passing the work from the right to the left in Figs. 1 and 3, a corresponding rotation will be imparted to the lower rolls 22 and 23 of my attachment as indicated by the arrows in Fig. 3, which will produce a rotation of the upper roll 21 so that the surface thereof adjacent to the upper roll 16 of the bending machine will move in the same direction as the adjacent surface of this roll of the bending machine.

By adjusting the upper roll of the bending machine relatively to the rolls of the rolling attachment, the distance between the lower surface of the roll 16 and the upper surface of the roll 21 can be adjusted accurately as desired, and if this distance is adjusted to be slightly less than the thickness of the part to be rolled, a rolling out or elongation of the work will result. Figs. 2, 3 and 4 show, by way of illustration, how my attachment may be employed for bending an angle bar having flanges A and B, the outer portion *b* of the flange B being subjected to pressure between the rolls 16 and 21. This causes an elongation of the outer portion *b* of the flange B, resulting in a bending of the angle bar in the direction clearly shown in Figs. 2 and 4, the work in Fig. 4 being assumed to be passing from the right to the left.

The rolling device or attachment shown is so constructed that the pressure exerted on the roll 21 resulting from the passing of work between the rolls 16 and 21, is transmitted from the roll 21 to the rolls 22 and 23 and from the rolls 22 and 23 to the rolls 17 and 18 in such a manner that very little pressure is exerted on the bearings of the rolls 22 and 23 in the housing 24, the pressures being transmitted mainly through the rolls themselves. The bearings of these rolls 22 and 23, therefore, serve mainly to hold the rolls in correct relation to each other and to the bending rolls 16, 17 and 18. The downwardly extending guide portion 25 of the housing of the rolling attachment, by extending between the rolls 17 and 18, serves to hold the rolling attachment in correct relation to the rolls of the bending machine, so that no securing of the attachment to the bending machine is necessary, but merely a placing or positioning of the rolling attachment between the rolls of the bending machine. In case there is any tendency of the rolling attachment to tilt, the curved surfaces 34 and 35 of the guide portion 25 will engage one or another of the rolls 17 or 18 and thus limit the tilting movement of the rolling device or attachment. If desired, a bar or other piece of work may be passed between the rolls 16 and 21 a number of times until the desired curvature and elongation of the edge which is being rolled, is obtained, the rolls being gradually brought closer together so that a gradual rolling out or elongation is effected. When it is desired to use the bending machine in its usual manner for bending a bar or other work, the rolling attachment can be quickly removed from its position between the rolls 17 and 18.

The bending of a bar, rod or other piece of work by means of pressure rolling, has the important advantage that work may be bent edgewise without any tendency on the part of the work to buckle or bend out of the original plane of the flat face which is being rolled. The use of the pressure rolling attachment also has the advantage that the work can be uniformly curved from end to end thereof, while with bending machines such as heretofore used, a certain length of the work at each end thereof could not be bent or curved and therefore had to be cut off and became waste.

I claim as my invention:—

1. A rolling attachment for use in connection with bending machines having three rolls arranged in substantially triangular relation to each other, said attachment including three smaller rolls adapted to be positioned between the three rolls of the bending machine, two of said smaller rolls being in engagement with two rolls of the bending machine and receiving movement therefrom, and the third of said smaller rolls being driven by engagement with said other two smaller rolls and extending into proximity to the third roll of the bending machine so that work passed between said third roll of the bending machine and said third small roll will be rolled under pressure.

2. A rolling attachment for use in connection with bending machines having three rolls arranged in triangular relation to each

other, said attachment including three smaller rolls also arranged in triangular relation to each other and adapted to be positioned between the three rolls of the bending machine so that work passed between one of the rolls of the bending machine and the adjacent small roll of said attachment will be rolled under pressure.

3. A rolling attachment for use in connection with bending machines having three rolls arranged in triangular relation to each other, said attachment including three smaller rolls also arranged in triangular relation to each other and adapted to be positioned between the three rolls of the bending machine so that work passed between one of the rolls of the bending machine and the adjacent small roll of said attachment will be rolled under pressure, the pressure exerted by the work on the small roll engaging the work being transmitted from said small roll to the other two small rolls and then to two rolls of the bending machine.

4. A rolling attachment for use in connection with bending machines having three rolls arranged in triangular relation to each other, said attachmeint including three smaller rolls also arranged in triangular relation to each other and adapted to be positioned between the three rolls of the bending machine so that work passed between one of the rolls of the bending machine and the adjacent small roll of said attachment will be rolled under pressure, and a housing in which the small rolls are held in operative relation to each other and which has a part adapted to engage with two of the rolls of the bending machine to hold said attachment in proper relation to the bending machine.

5. A rolling attachment for use in connection with bending machines having three rolls, two of which engage one face of the part to be rolled and the other of which engages another face, said attachment consisting of three smaller rolls adapted to be positioned between the three rolls of the bending machine and in engagement with the first mentioned two rolls of the bending machine, such small rolls being freely rotatable by contact with said two rolls of the bending machine, and one of the three small rolls resting upon the other two small rolls and receiving its movement therefrom and being positioned adjacent to said other roll of the bending machine to roll work passed between said small roll and said other roll of the bending machine.

6. The combination of a bending machine having three rolls arranged so that two of the three rolls engage one face of the work to be bent and the third roll engages the opposite face thereof at a point intermediate of the engagement of the work by said other two rolls, and a rolling attachment consisting of three small rolls, two of which engage said two rolls of the bending machine and the third of which is supported from said two small rolls and is positioned adjacent to said third roll of the bending machine, so that work passed between said third small roll and said third roll of the bending machine will be rolled under pressure.

7. An attachment to be inserted between the three rolls of a bending machine consisting of three small rolls, two of which are adapted to contact with two rolls of the bending machine, the third small roll being mounted to roll on the faces of the other two small rolls and arranged in proximity to the third roll of the bending machine, and a housing on which said other two small rolls of said attachment are journalled, said housing fitting between two of the rolls of the bending machine for holding said three small rolls in correct relation to the rolls of said bending machine.

8. A rolling attachment for a bending machine having three bending rolls, said attachment including a pair of small rolls arranged to contact with two of the rolls of the bending machine, a guide frame on which said two small rolls are journalled, said guide frame having a portion extending between two of the rolls of the bending machine to engage with said rolls to position said small rolls on said bending rolls, and a third small roll mounted on said two small rolls and driven therefrom and extending into close proximity to the third roll of the bending machine so that work may be passed between said third roll of the bending machine and said third small roll for rolling said work under pressure.

9. A rolling attachment in accordance with claim 1 including a housing in which said two small rolls are journalled said housing being adapted to be placed between said two rolls of the bending machine to position the attachment correctly with reference to said bending machine, said housing having extensions adapted to engage the ends of said third small roll to hold the same against endwise movement relatively to said other two small rolls.

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