METAL STRIP PLANING MACHINES OPERATING BY ALTERNATE BENDING

Claude Guillot, L'Horme, France, assignor to Compagnie des Ateliers et Forges de la Loire (St. Chamond, Firminy, St. Etienne, Jacob-Holtzeyer) Paris, France

Filed June 21, 1967, Ser. No. 643,248

Claims priority, application France, June 7, 1966, 64,464

U.S. Cl. 72—165

Int. Cl. B21d 1/02, 3/02; B21b 39/08

4 Claims

ABSTRACT OF THE DISCLOSURE

A metal strip planing machine operating by alternate tension and bending, comprising planing rollers bearing against a plurality of counter rollers 3, wherein the beam supporting the bearings of the counter rollers is supported and bent in turn by a single hydraulic actuator adapted to alter the shape of said beam and therefore the shape of the axes of the planing rollers.

The present invention relates to improvements in metal strip planing machines operating by alternate bendings. The method of planishing metal strip is already known wherein the strip travelling under tension is caused to conform to developable surfaces consisting of rollers having diameters small enough to impart a plastic deformation to practically the whole of the strip metal.

On the other hand, various devices based on this method are already known. Thus, FIGURE 1 of the attached drawing illustrates very diagrammatically a typical form of embodiment of a planing machine operating according to this principle. In this figure the arrow F designates the direction of travel or feed of the strip 1 to be planed. This strip, due to the tractive effort applied thereto, is caused to fit on the contour of the rollers 2, 2' equipping the planing machine. As these rollers 2, 2' have a relatively small diameter their rigidity is dispicable and therefore they must be supported by counter rollers such as 3, 3'.

When a planing machine of this type is operated it is frequently observed that the strip delivered therefrom may not be perfectly plane, the defects being in this case: either due to "long edges"; in other words, the external fibres of the strip are longer than the central fibres, thus giving a wavy shape to the marginal portions; or due to a "long centre"; this defect is the reverse of the former and gives a slightly corrugated central portion.

It is also observed that the magnitude or the direction of these defects can be varied, for example by changing from a "long centre" strip to a "long edges" strip and vice-versa, by altering the shape of the rollers 2 and 2' of the planing machine. This alteration in the roller shape consists in somewhat curving the axis of the small roller; accordingly as it is the concavity or the convexity of the roller axis that faces the strip, the machine will tend to deliver a strip having long edges or a long centre.

The present invention is therefore concerned with a device adapted to modify at will the shape of the axis of rollers such as 2 in a planing machine whereby it is possible to change gradually from a roller 2 having its concavity facing the strip to the same roller 2 having its convexity facing the same strip.

The device according to this invention is characterised in that at least one of the rollers of the planing machine in which the metal strip is subjected to alternate bendings bears against a plurality of bearing rollers of relatively reduced length, supported through their bearings by a beam adapted to be deflected by means of a hydraulic actuator such as a hydraulic jack.

The previously mentioned patent teaches that the rollers 2, 2' of the planing machine illustrated diagnostically in FIGURE 1 are not adjusted as to apply to the beam 4 and therefore to the rollers 3 and to the planing roller 2 supported thereby stresses capable of deforming said rollers.

To this end the hydraulic actuator 5 consists of a double-acting jack having its piston rod 8 provided with a head 6 pivotedly connected to the upper ends of a pair of tie-rods 7, 7' having their opposite ends pivotally connected to the ends of said beam 4. The cylinder of actuator 5 is rigid with the central portion of the beam 4.

This double-acting hydraulic jack 5 is adapted to exert stresses through said tie-rods 7, 7' against the ends of beam 4. Under these conditions the beam 4 is subjected to combined stresses (producing a reaction at the ends 6, 6' and the reaction of the actuator cylinder against the beam) eventually causing the deformation of the beam 4.

Thus, by varying the pressure of the hydraulic fluid in the actuator and changing the direction of operation of the actuator it will be possible to obtain the desired beam distortion which will obviously be transmitted to the rollers 3 through their bearings and also to the planing rollers 2 constantly pressed against said rollers 3. Therefore, the shape of the axis of this planing roller 2 can be altered at will by means of the device of this invention, so as to change smoothly from a roller 2 having its concavity directed toward the strip to be planed to the same roller 2 but having a convexity turned toward the strip, whereby a strip having either long edges or a long centre can be obtained. In a well defined position of actuator 5 the strip will be perfectly plane.

Of course, this invention should not be construed as being limited by the specific form of embodiment shown and described herein, since many modifications and variations may be brought thereto, as will readily occur to anybody conversant with the art, without departing from the spirit and scope of the invention as set forth in the appended claims.

What I claim is:

1. In a metal strip planing machine of the type operating by alternate tension and bending, and comprising at least two sets of tension and bending planing rollers of relatively small diameter disposed in substantial alignment across the direction of feed of the strip, and a pair of counter rollers of relatively larger diameter associated with each planing roller to absorb the stress applied thereto, a transverse beam supporting bearings of said counter rollers, and means for altering the shape of said beam, whereby the axes of said counter rollers and consequently of said planing rollers supported thereby are caused to have the desired concavity directed towards or away from the metal strip to be planed.

2. A planing machine as set forth in claim 1, wherein
said means for altering the shape of said beam consists of a hydraulic actuator.

3. A planing machine as set forth in claim 2, wherein said hydraulic actuator consists of a double-acting hydraulic jack adapted to alter the shape of said beam in two opposite directions to permit the distortion of said planing rollers by causing the concavity of their axes to be directed gradually towards or away from the metal strip to be planed.

4. A planing machine as set forth in claim 3, wherein the piston rod of said hydraulic jack is pivotally connected to the inner ends of tie-rods having their outer ends pivotally connected to the ends of said beam, respectively.

References Cited

UNITED STATES PATENTS

<table>
<thead>
<tr>
<th>Patent Number</th>
<th>Date</th>
<th>Inventor</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Re. 20,403</td>
<td>6/1937</td>
<td>Ungerer</td>
<td>72—163</td>
</tr>
<tr>
<td>2,091,789</td>
<td>8/1937</td>
<td>Maussness</td>
<td>72—163</td>
</tr>
<tr>
<td>2,240,020</td>
<td>4/1941</td>
<td>Christman</td>
<td>72—160</td>
</tr>
<tr>
<td>2,963,071</td>
<td>12/1960</td>
<td>Krynszy</td>
<td>72—160</td>
</tr>
<tr>
<td>3,344,637</td>
<td>10/1967</td>
<td>Powchowski</td>
<td>72—163</td>
</tr>
</tbody>
</table>

CHARLES W. LANHAM, Primary Examiner.
A. RUDERMAN, Assistant Examiner.

U.S. Cl. X.R.

72—205