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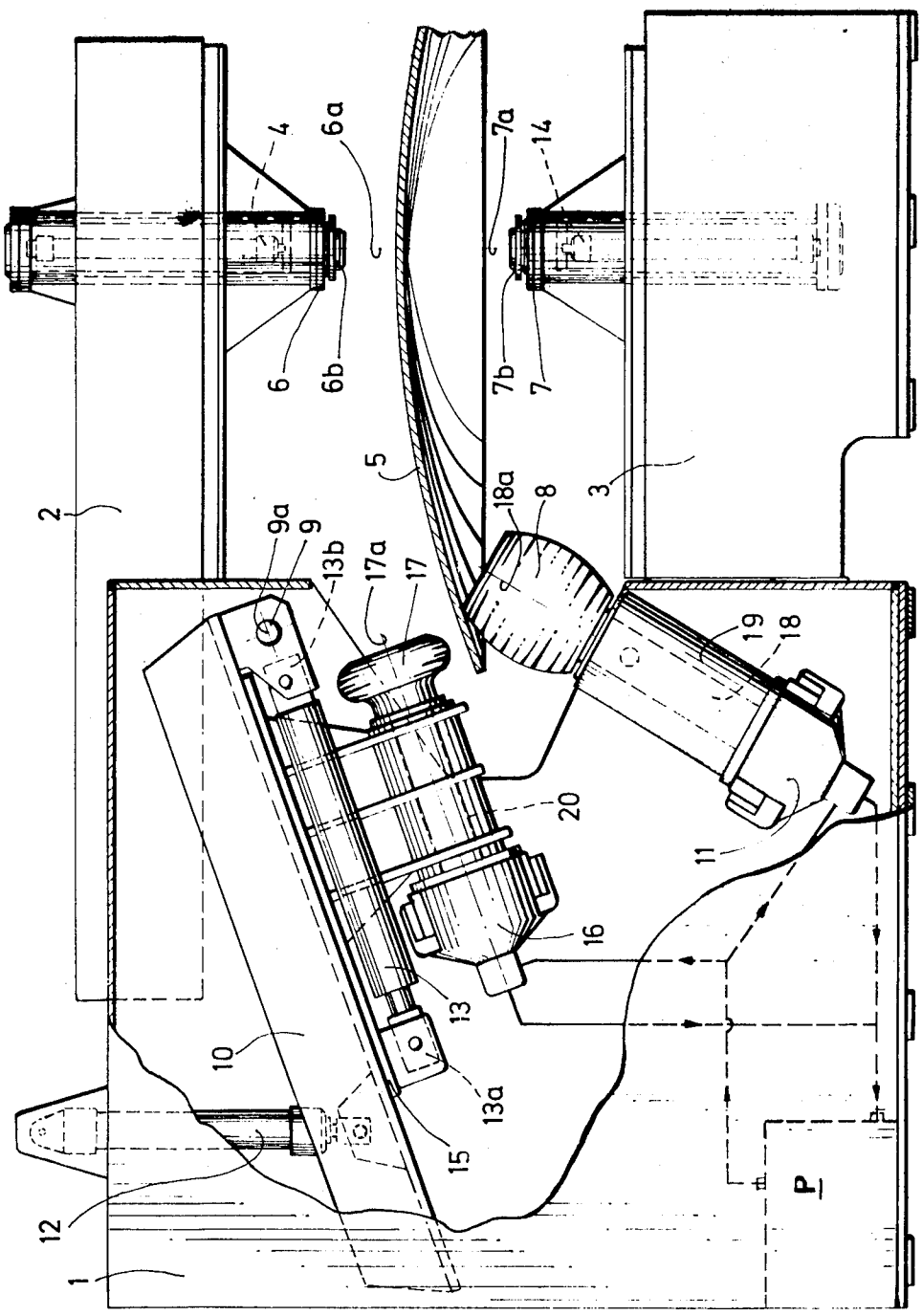

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FLANGING MACHINE FOR FLANGING BOILER ENDS

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ABSTRACT OF THE DISCLOSURE

The invention relates to a flanging machine for flanging boiler ends and similar machines comprising a centering device for securing the workpiece in a freely rotatable manner and shaping and smoothing rollers driven by hydraulic motors supplied from a common fluid pressure generator, the shaping roller being preferably pivotally adjustable and the smoothing roller being pivotally and axially adjustable for pressing the workpiece against the shaping roller.

BACKGROUND OF THE INVENTION

The present invention relates to a flanging machine for flanging boiler ends and similar articles.

Previously proposed flanging machines have included a clamped workpiece freely rotatable about the axis of a centering device which is engageable by a shaping roller and against which it is pressed by a smoothing roller. Such machines have suffered from the disadvantage that only limited adjustment of only the smoothing roller can be achieved in that the smoothing roller is pivoted to a slide slidable in only one direction with respect to the frame.

It is an object of the invention to provide a flanging machine having an improved adjustment capability of its smoothing roller than is provided by the aforesaid known machine.

It is a further object of the invention to provide a flanging machine capable of a wider application than the aforesaid known machine and operating in a relatively simple manner.

SUMMARY OF THE INVENTION

According to the invention there is provided a flanging machine for flanging boiler ends comprising a frame, a centering device mounted on said frame for securing the workpiece so as to be freely rotatable about the axis of said centering device, a shaping roller mounted on said frame and rotatable about an axis intersecting said axis of said centering device for shaping said workpiece from inside, a first adjustable speed hydraulic motor for driving said shaping roller, a smoothing roller for pressing said workpiece against said shaping roller, a second adjustable speed hydraulic motor for driving said smoothing roller, a slide on which said second hydraulic motor is mounted for axial movement of said smoothing roller in the plane containing the axes of said centering device and said shaping roller, a slide track on which said slide is slidably mounted, a first pressure cylinder for displacing said slide on said slide track, a pivot by means of which said slide track is mounted on said frame for pivotal movement in said plane, a second pressure cylinder for swivelling said slide track with constant force about said pivot, and a common pressure generator for supplying pressure fluid to said first and second hydraulic motors.

BRIEF DESCRIPTION OF THE DRAWINGS

One embodiment of the invention will now be described by way of example with reference to the accompanying drawing, the single figure of which shows a diagrammatical side view of a machine according to the invention.

DESCRIPTION OF THE PREFERRED EMBODIMENT

In the drawing, **1** designates the main part of the machine casing, which also serves as the machine frame. On the casing there are disposed a jib **2** at the top and a carrier **3** at the bottom, which can be detached from it. On each of these two parts **2** and **3** there is disposed a respective ram **6** and **7**, each being provided with a respective freely rotatable pressure plate **6***b*, **7***b*. The rams are mounted in such a manner that they can be moved away from and towards the main part **1**. This reciprocating sliding movement can be effected by mechanical, pneumatic, or electrical means, while additional apparatus may be provided to ensure that the two rams **6** and **7** are situated exactly coaxially to one another in their working positions. The rams **6** and **7** are also slidable towards and away from one another, for which purpose pressure cylinders **4** and **14** respectively are provided.

Between these two rams it is thus possible to clamp a plate which forms the workpiece and the edge of which is to be flanged. The drawing shows a curved boiler end **5** in the position in which it is held fast by the rams at the commencement of the machining. The shaping roller, which shapes the edge of the boiler end into a flange, is here designated by **8**. This shaping roller **8** is mounted on a shaping roller shaft **18** which is coupled to the shaft of a hydraulic motor **11**. The bearing casing **19** for the shaft **18** is mounted on the main part **1**, advantageously in such a manner that the angle formed by the shaft axis **18***a* with the respective axes **6***a* and **7***a* of the rams **6** and **7** can be varied.

A sliding track **10** is suspended inside the main part **1** on a pin **9**, which may be adjustable for height, about the axis **9***a* of which it is swingable or pivotable. This axis **9***a* is perpendicular to the plane containing the axes **6***a*/**7***a* and **18***a*. The slide track **10** is connected by a pressure cylinder **12** to the main part **1** of the machine casing or frame in such a manner that the pressure cylinder serves as swivelling means for the slide track **10**, that is to say it swivels the latter in the clockwise direction when retracted and in the counterclockwise direction when extended. A slide **15** is mounted or suspended slidably on the sliding track **10** and is adapted to be pushed to-and-fro by a pressure cylinder **13**, of which one end **13***a* is articulated to the slide and the other end **13***b* of which is articulated to the slide track **10**. A hydraulic motor **16** is mounted fast on the slide and is coupled to a shaft **20** carrying a smoothing roller **17**. The axis **17***a* of the hydraulic motor **16** and of the smoothing roller **17** lies in the plane containing the axes **6***a*/**7***a* and **18***a*, while the sliding track **10** is constructed in such a manner that, on displacement of the slide **15**, this position of the axis **17***a* is always retained. The hydraulic motors **11** and **16** are driven, for anti-slip purposes, from a common pressure fluid generator P.

The operation of the machine will now be described:

The plate **5** serving as workpiece is first clamped between the pressure plates **6***b* and **7***b* of the two rams **6** and **7**, in such a manner that its center lies on the axis **6***a*/**7***a*. By means of the two pressure cylinders **4** and **14**, the plate **5** is laid against the shaping roller **8**, through lateral movement of the two rams **6** and **7** in such a manner that the flanged edge is formed where it is required. The pressure cylinder **13** is then retracted in such a manner that the smoothing roller **17** lies on the part of the workpiece **5** where the latter lies on the shaping roller **8**. The pressure cylinder **12** can now be pressurised with a set pressure and the two hydraulic motors **11** and **16**,

which are jointly fed by one and the same pressure generator, can be put into operation. The pressure applied to the pressure cylinder 12 must be adjusted in accordance with the properties (thickness and strength) of the workpiece. Because of this joint feeding, slip between the two rollers 8 and 17, or between one of the rollers and the workpiece 5, is avoided. This slipping would necessarily always occur, if a rigid drive was provided for the two rollers, when the instantaneous bearing point of one roller has a different radius from that of the other roller and the two rollers are driven at the same angular velority. By continuous extension of the pressure cylinder 13, the slide 15 is gradually displaced to the left at a speed adapted to the properties of the workpiece. Consequently, and because the cylinder 12 is under the constant preset pressure, the smoothing roller 17 is guided correspondingly slowly over the entire edge region of the workpiece 5, whereby the desired flanged edge is produced on the latter. On termination of the shaping operation the workpiece 5 is removed from the machine, the smoothing roller 17 being first swung away and the completed boiler and released by raising the ram 6.

Experiments have shown that, with a machine constructed as above described it is possible to produce boiler ends from relatively thin stainless sheets. The above described machine has a relatively simple construction and may thus be manufactured relatively cheaply. It is simple to operate and operationally reliable because of its simple construction, so that it can be operated by trained workers without difficulty or the necessity for considerable practice.

It will be appreciated that the above described embodiment is given by way of example only and that various modifications may be made to the above described embodiment without departing from the scope and spirit of the invention..

We claim:

1. In a flanging machine for flanging boiler ends, of the type including a centering device for securing a workpiece so as to be freely rotatable about the axis of the centering device, a shaping roller for shaping the workpiece from inside, and a smoothing roller adjustable during rolling for pressing the workpiece against the shaping roller, with the shaping roller being rotatable for flanging about an axis intersecting the axis of the centering device, and the smoothing roller being pivotally and displaceably mounted, during flanging, in a plane including the axis of the centering device and the axis of the shaping roller; the improvement comprising, in combination, a slideway mounting said smoothing roller for axial displacement; means mounting said slideway for swingable movement about a single axis normal to said plane; and respective hydraulic motors driving said shaping roller and said smoothing roller.

2. In a flanging machine for flanging boiler ends, of the type including a centering device for securing a workpiece so as to be freely rotatable about the axis of the centering device, a shaping roller for shaping the workpiece from inside, and a smoothing roller adjustable during rolling for pressing the workpiece against the shaping roller, with the shaping roller being rotatable for flanging about an axis intersecting the axis of the centering device, and the smoothing roller being pivotally and displaceably mounted during flanging in a plane including the axis of the centering device and the axis of the shaping roller; the improvement comprising, in combination, a slideway mounting said smoothing roller for axial displacement; means mounting said slideway for swingable movement about a single axis normal to said plane; a slide slidably mounted in said slideway and carrying said smoothing roller; a swivelling means acting on said slideway with constant force so as to press said smoothing roller against the workpiece; and a controllable sliding means for displacing said slide along said slideway.

3. In a flanging machine for flanging boiler ends, of the type including a centering device for securing a workpiece so as to be freely rotatable about the axis of the centering device, a shaping roller for shaping the workpiece from inside, and a smoothing roller adjustable during rolling for pressing the workpiece against the shaping roller, with the shaping roller being rotatable for flanging about an axis intersecting the axis of the centering device, and the smoothing roller being pivotally and displaceably mounted, during flanging, in a plane including the axis of the centering device and the axis of the shaping roller; the improvement comprising, in combination, an elongated slideway extending toward the axis of the centering device and mounting said smoothing roller for displacement parallel to its axis of rotation; means mounting said slideway for swingable movement about a single axis, intersecting and normal to said plane and spaced from said axis of rotation; a single first actuator controlling swinging of said slideway; and a single second actuator mounted on said slideway and displacing said smoothing roller longitudinally of said slideway and parallel to its axis of rotation.

4. A machine as defined in claim 1, wherein said swivelling means and said sliding means are pressure cylinders.

5. A machine as defined in claim 3 wherein the position of said slideway axis is adjustable in a direction parallel to the axis of said centering device for enabling the machining of different workpieces.

6. A machine as defined in claim 1, including a common hydroulic pressure generator supplying pressure fluid to both said hydraulic motors to avoid slip.

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