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⑤④ **Flanging machine for metal sheet workpieces having hollow cylindrical symmetry.**

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GB-A-2 052 332
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Description

The present invention generally relates to a flanging machine for metal sheet workpieces having a hollow cylindrical symmetry.

As it is known, the flanging machines are machines of small/middle power which form beads or rims on workpieces having a cylindrical symmetry, and formed of metal sheets having small/middle thickness. These flanging machines have generally a frame provided with a pair of parallel extending roller spindles of which the one is placed over the other, the lower spindle being in a fixed position and the upper spindle being adjustable in height to control the pressure exerted on and the depth of the rim.

After the metal sheet tube has been introduced between the pair of rollers and the upper roller has been adjusted, the pair of spindles are rotated and the rollers, by pressing on the metal sheet, form the rim or the beading.

Where it is desired to obtain a flange, that is a rim of rather important height, it is necessary to provide an adjustable step-shaped roller, the height of the step corresponding at least to the height of the flange to be obtained.

This involves obviously several disadvantages both from the standpoint of the plastic deformation of the metal sheet and the standpoint of the equipment since, as the metal sheet thickness increases, also the effort that the shaped rollers have to exert on the sheet increases, so that it should be resorted to a several pass working by means of rollers having different sizes, which may jeopardize the performance of a perfect flanging operation, is time consuming and requires also finishing operations.

US—A—1 634 057 discloses a flanging machine for rotatable workpieces comprising a shaping mechanism formed of a pair of roller spindles, a pair of adjustable rolls of cylindrical shape, a pivotal mounting of the roller/spindle assembly on the machine frame, driving means for the pivotal movement, supporting means for the rotatable workpiece on the machine frame.

The structure of this flanging machine, however, has proved to be very cumbersome, expensive and complex, since it requires several electric motors to drive the different mechanisms it is provided with.

It is the object of the present invention to obviate to all the above-mentioned disadvantages by providing a flanging machine of a new design which does not require the use of shaped rollers which are generally subjected to remarkable shear stresses, but which permits flanges to be obtained in a single and inexpensive manner on metal sheet workpieces having a hollow cylindrical symmetry and a small/middle thickness, without the necessity of resorting to roller changes during the working operations, and of having a plurality of motors for driving the different components.

It is another object of the present invention to provide a flanging machine of easiest use which

permits the formation of a rim and/or a flange which can take such an inclination with respect to the center line of the workpiece having a hollow cylindrical symmetry ranging from a few degrees to 90 degrees in a manner as elemental and simple as possible, with a very good finishing level.

These and other objects of the present invention are attained by means of a flanging machine having a hollow cylindrical symmetry, of the type comprising a shaping mechanism formed of a pair of parallel extending roll spindles, a pair of adjustable rolls of cylindrical shape, a pivotal mounting of the roll/spindle assembly on the machine frame, driving means for the pivotal movement, means for supporting the rotatable workpiece on the machine frame, characterized in that said pivoting assembly includes a motor driving the spindles with the associated driving elements and in that the supporting means for the rotatable workpiece on the machine frame comprise a ring having an outer diameter corresponding to the inner diameter of the workpiece and being supported by a wheel rotatable mounted on said machine frame, means being provided for guiding the workpiece during all the flanging operation.

Advantageously, the means for pivoting the above mentioned assembly are formed of a hydraulic and/or pneumatic cylinder connected on the one hand to the machine frame and on the other hand to the pivoting assembly.

There are also provided means for guiding the hollow cylindrical symmetry workpiece during all the flanging operation.

This invention will be now described in more detail in connection with a preferred embodiment thereof, given by way of example only and therefore not intended in a limiting sense, and illustrated in the accompanying drawings, wherein:

Figure 1 shows the flanging machine according to the present invention in a side elevation view, partially broken away; and

Figure 2 shows the same machine as that illustrated in Figure 1, but in a front view, partially broken away.

Referring now to the drawings, the flanging machine according to the invention, generally indicated with the numeral 1, includes a machine frame 2 formed of a pair of side walls 3 connected to each other by cross-beams 4 and a front upright 5. Pivotaly mounted to the side walls 3 by means of pins 7 is a pivoting frame 6 supporting the parallel extending spindles 8 and 9 placed one over the other, the lower spindle 8 being in a fixed position and the upper spindle 9 being adjustable in height by conventional means, not shown.

Each of the spindles 8 and 9 supports at the front end thereof a cylindrical roller 10 and 11 respectively, which are intended to perform the flanging operation.

The driving elements of the spindles 8 and 9 are enclosed within a box 12 to which the driving motor 13 is secured which is connected to a reduction gear 14 through a pulley and belt drive,

generally indicated with 15. Thus, the spindles 8, 9, the cylindrical rollers 10, 11, the motor 13, the reduction gear 14 and the driving elements enclosed within the box 12 are fastened to the pivoting frame 6. The pivoting frame 6 is also connected to the machine frame 1 through a hydraulic cylinder 16 operated by a pump 17.

On the upright 5 of the machine frame 1 a pin 18 is mounted, which carries a flanged wheel 19 supporting a calibrating ring 20 placed directly in front of the lower cylindrical roller 10 and forming an upper tangential point therewith. A spacer 21 serves to the exact positioning of the supporting flanged wheel 19 and therefore of the calibrating ring 20 in front of the lower roller 10. The calibrating ring 20 bears also on a pair of rolling bearings 22 secured to the upright 5 of the machine frame 1, in an adjustable manner to accommodate different diameters of rings 20.

The calibrating ring 20 is provided to support the end of the tube to be flanged and to prevent this tube end from being deformed during the flanging operation, since the ring has an outer diameter corresponding to the inner diameter of the tube to be flanged. At the outer end of the pin 18 a disc 23 is provided, which supports and guides the tube to be flanged, and is rotatably mounted in the pin 18.

The pivot axis 0 of the pivoting frame 6 exactly intersects the tangential points of the pair of cylindrical rollers 10, 11 therebetween and of the calibrating ring 20 with the lower roller 10.

The operation of the flanging machine according to the invention is very simple. Assume that a metal sheet tube is to be flanged having an outer diameter of 300 mm and a wall thickness of 2 mm, on the supporting wheel 19 a calibrating ring having an outer diameter of 286 mm will be applied, which will be retained in position by the wheel 19 through the flanged portion thereof and the rolling bearings 22 will be adjusted accordingly.

Then, the tube to be flanged is inserted on the guide disc 23 and is slid until the end thereof is placed between the cylindrical rollers 10 and 11 against an abutment 24 provided on the spindle 8 acting as a stop for the edge of the tube on the rollers 10, 11.

Then, the upper roller 11 is adjusted in height until it bears against the outer surface of the tube and the motor 13 is energized, which will rotate the spindles 8 and 9 and therefore the cylindrical rollers 10, 11 and the tube.

By actuating now the hydraulic cylinder 16, the pivoting frame 6 will be slowly pivoted in a clockwise direction in Figure 1 so that the portion of the tube pressed between the rollers 10, 11 begins to bend outwardly with respect to the tube axis about the rotation axis 0.

After a rotation of 90° has been attained the rollers 10, 11 lie with their axes perpendicular to the tube axis and the tube length pressed between the rollers is bent at 90° to the tube axis. Thus, it will be obtained a flange having a height corresponding to the length of the rollers 10, 11

and the pivoting frame 6 will be in the position shown in dashed line in Figure 1.

Thus, it can be seen that by means of the flanging machine according to this invention straight flanges having any inclination angle from a few degrees up to 90 degrees with respect to the tube axis can be obtained, and this by the simple pivotal movement of the frame 6 up to the desired angle, which represents a great advantage both from the construction and from the operation standpoint since the compression component of the plastic deformation of the metal sheet is minimized.

By means of this flanging machine metal sheets up to 8 mm of thickness and tube sections having a nearly infinite theoretical length can be obtained since the tube is not subjected to axial movements during all the flanging operation.

While the invention has been described and shown in connection with an embodiment only, it will be apparent to those skilled in the art that various changes and modifications can be made thereto without departing from the scope of the invention as claimed.

Claims

1. A flanging machine for metal sheet workpieces having a hollow cylindrical symmetry, of the type comprising a shaping mechanism formed of a pair of parallel extending roll spindles (8,9), a pair of adjustable rolls (10, 11) of cylindrical shape, a pivotal mounting of the roll/spindle assembly (8, 9, 10, 11) on the machine frame (2), driving means (16) for the pivotal movement, means for supporting the rotatable workpiece on the machine frame (2), characterized in that said pivoting assembly (6) includes a motor (13) driving the spindles (8, 9) with the associated driving elements and in that the supporting means for the rotatable workpiece on the machine frame (2) comprise a ring (20) having an outer diameter corresponding to the inner diameter of the workpiece and being supported by a wheel (19) rotatable mounted on said machine frame (2), means (23) being provided for guiding the workpiece during all the flanging operation.

2. A flanging machine as claimed in claim 1, characterized in that said means (16) for causing the pivoting movement of said assembly (6) include a hydraulic and/or pneumatic cylinder (16) connected on the one hand to the machine frame (2) and on the other hand to said pivoting assembly (6).

3. A flanging machine as claimed in claims 1 or 2, characterized in that said ring (20) is arranged so as to form an upper tangential point with the lower roll periphery (10) of the flanging machine.

4. A flanging machine as claimed in claim 1, characterized in that said means for guiding the workpiece having a cylindrical symmetry include at least two rolling bearings (22) contacting the periphery of said ring (20) and a disc (23) rotatably mounted on the machine frame (2).

Patentansprüche

1. Vorrichtung zur Formung von Flanschen an hohlzylindrischen Blechwerkzeugen von der Art bestehend aus einem Formungsmechanismus, der gebildet ist aus zwei sich parallel erstreckenden Walzenspindeln (8,9), zwei regulierbaren zylinderförmigen Walzen (10,11), einer schwenkbaren Montage der Walzen/Spindeleinheit (8,9,10,11) am Rahmen (2) der Vorrichtung, Betätigungsmitteln (16) für die Schwenkbewegung, Stützmitteln für das rotierende Werkstück am Rahmen (2) der Vorrichtung, dadurch gekennzeichnet, daß die schwenkbare Einheit (6) einen die Spindeln (8,9) mit den zugehörigen Übertragungselementen antreibenden Motor (13) umfaßt, und daß die Stützmittel für das rotierende Werkstück am Vorrichtungsrahmen (2) einen Ring (20), der einen dem Innendurchmesser des Werkstückes entsprechenden Außendurchmesser aufweist und der durch ein auf den Vorrichtungsrahmen (2) drehbar montiertes Rad (19) abgestützt ist, wobei Mittel (23) zur Führung des Werkstückes während des gesamten Flanschformungsvorganges vorgesehen sind.

2. Vorrichtung zur Formung von Flanschen nach Anspruch 1, dadurch gekennzeichnet, daß die Mittel (16) für die Schwenkbewegung der Einheit (6) einen hydraulischen und/oder pneumatischen Zylinder (16) einschließen, der einerseits mit dem Vorrichtungsrahmen (2) und andererseits mit der schwenkbaren Einheit (6) verbunden ist.

3. Vorrichtung zur Formung von Flanschen nach Anspruch 1 oder 2, dadurch gekennzeichnet, daß der Ring (20) derart angeordnet ist, daß mit dem unteren Walzenumfang (10) der Vorrichtung ein oberer Tangentialpunkt gebildet wird.

4. Vorrichtung zur Formung von Flanschen nach Anspruch 1, dadurch gekennzeichnet, daß die Mittel zur Führung des Werkstückes von zylinderförmiger Symmetrie wenigstens zwei Wälzlager (22), die den Umfang von Ring (20) berühren, und eine auf den Vorrichtungsrahmen (2) drehbar montierte Scheibe (23) einschließen.

Revendications

1. Machine pour réaliser des cornières aux pièces en tôle de forme cylindrique creuse du type ayant un mécanisme à façonner constitué d'une paire des broches de rouleau (8,9) s'étendant parallèlement, d'une paire de rouleaux réglables (10,11) de forme cylindrique, un montage pivoté de l'ensemble rouleau/broches (8,9,10,11) sur le châssis (2) de la machine, des moyens d'entraînement (16) pour le mouvement pivotant, des moyens pour supporter la pièce tournante sur le châssis (2) de la machine, caractérisée en ce que l'ensemble pivotant (6) comporte un moteur (13) qui entraîne les broches (8,9) avec les respectifs éléments d'entraînement et en ce que les moyens de support pour la pièce tournante sur le châssis (2) de la machine comportent un anneau (20) ayant un diamètre extérieur correspondant au diamètre intérieur de la pièce et étant supporté par une roue (19) montée tournant sur le châssis (2) de la machine, des moyens (23) étant pourvus pour guider la pièce pendant toute l'opération de réalisation des cornières.

2. Machine pour réaliser des cornières selon la revendication 1, caractérisée en ce que les moyens (16) pour provoquer le mouvement pivotant de l'ensemble (6) comportent un cylindre hydraulique et/ou pneumatique (16) à relier d'une part au châssis (2) de la machine et d'autre part à l'ensemble pivotant (16).

3. Machine pour réaliser des cornières selon la revendication 1 ou 2, caractérisée en ce que l'anneau (20) est disposé de façon à constituer un point de tangence supérieur avec la périphérie du rouleau inférieure (10) de la machine pour réaliser des cornières.

4. Machine pour réaliser des cornières selon la revendication 1, caractérisée en ce que les moyens pour guider la pièce ayant une symétrie cylindrique comportent au moins deux paliers de roulement (22) en appui sur la périphérie de l'anneau (20) et un disque pivoté sur le châssis (2) de la machine.

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Fig. 2

