May 13, 1924. 1,493,516

K. BÖHLE

SWAGING PRESS

Filed Nov. 27, 1920

Fig.1.

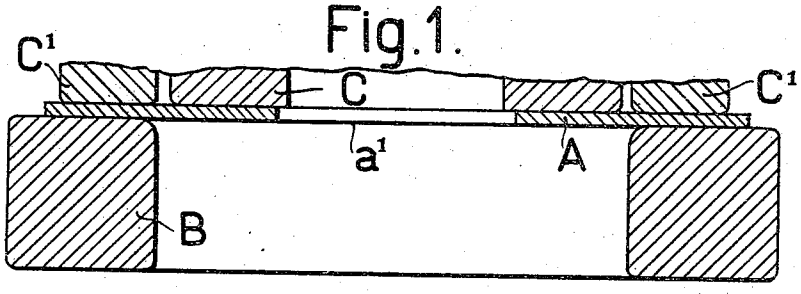


Fig.2.

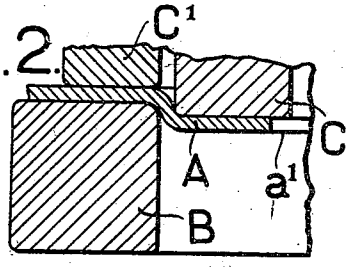


Fig.3.

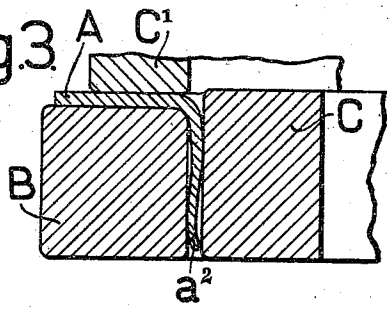


Fig.4.

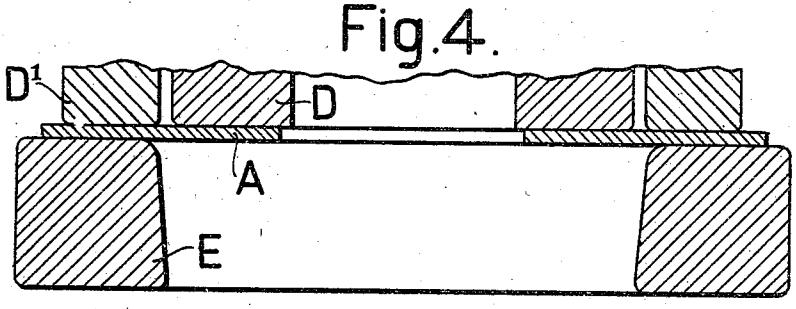


Fig.5.

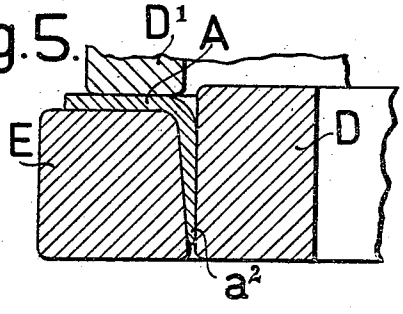
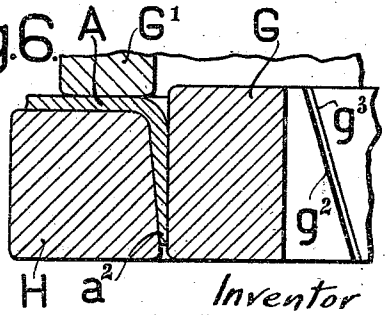


Fig.6.



Inventor
Karl Böhle
By Knight Bros
Attys

Patented May 13, 1924. 1,493,516

UNITED STATES PATENT OFFICE.

KARL BÖHLE, OF ESSEN-RUHR, GERMANY, ASSIGNOR TO FRIED. KRUPP AKTIEN-GESELLSCHAFT, OF ESSEN-ON-THE-RUHR, GERMANY.

SWAGING PRESS.

Application filed November 27, 1920. Serial No. 426,846.

(GRANTED UNDER THE PROVISIONS OF THE ACT OF MARCH 3, 1921, 41 STAT. L., 1313.)

To all whom it may concern:

Be it known that I, KARL BÖHLE, residing at Essen-Ruhr, Germany, a citizen of the German Republic, have invented a certain new and useful Improvement in Swaging Presses (for which I filed an application in Germany on February 27, 1919), of which the following is a specification.

This invention relates to swaging-presses for providing sheet metal plates with flanged sockets. More particularly it is an object of this invention to produce a press of the kind specified which will afford the possibility of manufacturing such sockets in the course of a single working operation in suchwise that the socket on one of its sides will obtain, practically, an accurately cylindrical shell surface.

Two embodiments of the subject matter of this invention are shown by way of example in the accompanying drawing, in which—

Figs. 1 to 3 are axial longitudinal sections of the parts of one of the known types of presses entering into consideration,

Figs. 4 and 5 similar views of a press constructed in accordance with the present invention, and

Fig. 6 a similar view of a modified form of construction.

As may be known when machining the flanged sockets of sheet metal plates, the sheet A, heated it may be to a red heat and provided with a circular cut a^1 (Fig. 1) is primarily placed on the die B of the swaging-press in such a manner that the centre of the opening a^1 will come to be disposed within the longitudinal axis of the press. Now in the course of the pressing operation, before the stamp C strikes against the sheet A, the holder C^1 bears down on the sheet, and keeps the outer edge of the sheet firmly down on the die B, whereupon the sheet is forced into said die by the action of the stamp C. The sheet is thus bulged in first of all by the lowering of the stamp in the manner shown in Fig. 2. This bulged portion of the sheet possesses a comparatively slight curvature, and this curvature the sheet seeks to retain in the course of the subsequent pressing operation. Besides this, the socket obtains a reduction in the plate thickness which increases toward its unattached end, this reduction of plate thickness corresponding to the increase which every diameter of a circle described on the sheet A concentrically to the longitudinal axis of the swaging-press prior to the shaping of the socket will obtain. This reduction of plate thickness conjointly with the tendency proper to the sheet to retain, as above said, at its bulged-in section a possibility slight curvature, results that when the pressing operation has terminated there will be created a clearance (Fig. 3) intermediate the socket a^2 (which is adapted to fill the annular clearance between the pressing members only at its root; see again Fig. 3) and the shell surfaces of said two members, namely the stamp and the die, so that the socket can obtain a cylindrical shape neither along its inner nor its outer face. As, however, in the case of flanged sockets of this particular kind, which are intended, say for steam boiler ends to secure the flue tubes, at least one of the shell surfaces confining the socket must obtain a cylindrical face it is necessary by means of a special working operation to give to the one of the shell surfaces of the socket the required cylindrical shape. It is the special object of this invention to render this additional working operation unnecessary and this by very simple means.

In the first form of execution disclosed in Figs. 4 and 5, the particular portion of the stamp intended to be applied to the internal shell face of the flanged socket consists of a rigidly fixed, cylindrical ring D. The plate holder is denoted by D^1. The die is formed by a rigid ring E, the internal face of which has the shape of a cone. All the shell lines of the conical internal face are disposed at an angle relatively to the longitudinal axis of the press, which angle will correspond to the angle defined after the pressing operation, by the shell lines lying in the same axial plane and appertaining to the outer and inner shell surfaces of the flanged socket, which angle results from the reduction of the plate thickness toward the free end of the socket.

When the stamp descends, the work A is likewise primarily bulged in the manner

shown in Fig. 2. In the further course of the pressing operation, however, owing to the particular shape given to the pressing members there can be formed no clearance intermediate the material of the socket a^2 and the shell surfaces of the pressing members D and E, in consequence of which the internal shell surface of the flange will obtain a cylindrical form without any subsequent machining being required.

In the second form of execution diagrammatically shown in Fig. 6, the stamp consists of a steel ring G slotted obliquely. The plate holder is designated by G^1. The portion of the die adapted to be applied to the outer shell surface of the flanged socket consists of a rigid ring H, the internal shell face of which possesses the same shape as that according to the construction shown in Figs. 4 and 5. The dimensions of the obliquely slotted ring G are so chosen that when subjected to no pressure, i. e. when at the slot portion the surfaces of separation g^2 and g^3 are at the greatest distance the one from the other, its radius will be somewhat larger than the radius of the cylindrical shell surface which the socket a^2 is to obtain along its internal face.

When the stamp is lowered, the resilient ring G is first of all pressed together in a radial direction for such an extent that its radius will be equal to the radius of the cylindrical shell surface to be given to the socket on its inner face. As the pressing operation proceeds, ring G acting under pressure bears against the internal shell surface of the flange a^2 in making with the result that this latter will definitely obtain a cylindrical internal face.

Both in the form of execution according to Figs. 4 and 5, as well as in that according to Fig. 6 it is assumed that the socket shall obtain the cylindrical shell surface along its internal face; it is, however, obvious that the swaging-press constructed in accordance with this invention may be so modified that the socket will obtain the cylindrical shell surface along its outer face. Such a form of construction will be readily obtained, for example, in the form of construction shown in Fig. 6 by providing the ring H with the cylindrical and the ring G with the conical shell surface.

Claims:

1. A swaging press for making flanged sockets abutting from sheet metal plates comprising an annular die member, a plate holder cooperating with the front portion of said annular die member and a stamp movable relatively to the annular die member in axial direction independently of said plate holder for entering said annular die member, the portions of said stamp and said die member adapted to be applied to the shell surfaces of the flanged socket being provided, the one with a cylindrical, and the other with a conical shell surface, the line of this conical shell surface being suitably inclined in accordance with the automatic reduction in thickness of plate which the flanged socket suffers in the course of the pressing operation.

2. A swaging press for making flanged sockets abutting from sheet metal plates comprising an annular die member, a plate holder cooperating with the front portion of said annular die member and a stamp movable relatively to the annular die member in axial direction independently of said plate holder for entering said annular die member, the portions of said stamp and said die member adapted to be applied to the shell surfaces of the flanged socket being provided, the one with a cylindrical, and the other with a conical shell surface, the lines of this conical surface being suitably inclined in accordance with the automatic reduction in thickness of plate which the flanged socket suffers in the course of the pressing operation, the particular portion of the one of the two pressing members adapted to be applied to the sides of the flanged socket being formed by a resilient, slotted ring.

3. A swaging press comprising male and female members and a separate means for holding the work fast peripherally about the female member, one of the members being of cylindrical outline and the mating member being of conical outline, the inclination of the two outlines being such as to automatically accord with the reduced thickness of the work to be swaged when said work is originally perforated centrally.

4. A swaging press comprising male and female members, one of said members comprising a resilient die member and a separate means for holding the work fast peripherally about the female member, one of the members being of cylindrical outline and the mating member being of conical outline, the inclination of the two outlines being such as to automatically accord with the reduced thickness of the work to be swaged for perforated plate.

5. A swaging press comprising male and female members and a separate means for holding the work fast peripherally about the female member, one of the members being of cylindrical outline and the mating member being of conical outline, the inclination of the two outlines being such as to automatically accord with the reduced thickness of the work to be swaged when said work is originally perforated centrally, the male die member being of such length as to pass through the perforation in said plate.

6. A swaging press comprising male and female members, one of said members comprising a resilient die member and a sepa-

rate means for holding the work fast peripherally about the female member, one of the members being of cylindrical outline and the mating member being of conical outline, the inclination of the two outlines being such as to automatically accord with the reduced thickness of the work to be swaged for perforated plate, the male die member being of such length as to pass through the perforation in said plate.

The foregoing specification signed at Essen, Germany, this 23rd day of July, 1920.

KARL BÖHLE.

In presence of—
HANS GOTTSMANN,
JOHANN DECKERS.