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(54) A method of producing a thin-walled pipe bend.

(57) A method of producing, from sheet metal, a thin-walled pipe bend comprises the steps of producing halves for the pipe bend, the halves being formed into one another' s mirror images in the plane of curvature of the pipe bend. Thereafter, two such halves are joined together, preferably welded, for the formation of a pipe bend. In order to reduce material consumption and rationalize production, an annular gutter (2) is formed in a sheet metal blank (1), the gutter being given a profile which corresponds to the profile of one half. On the formation, a central hole (7) is made in the blank (1) inside the gutter (2). Thereafter, the gutter (2) is separated from the blank (1) and divided into a number of halves which are joined together two-by-two.

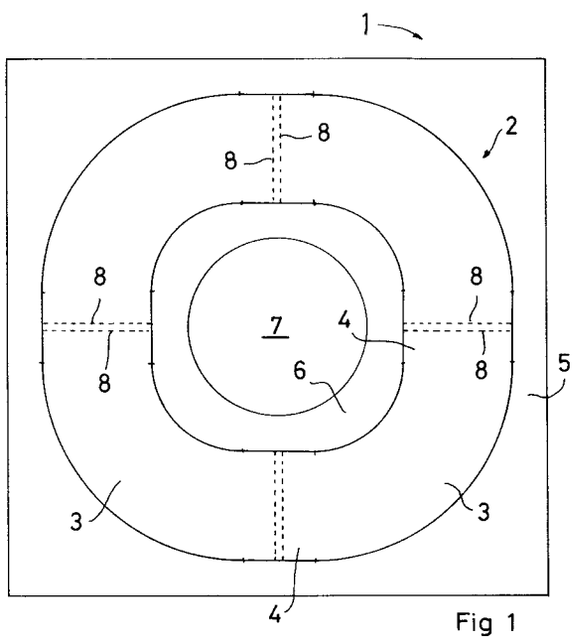

Fig 1

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TECHNICAL FIELD

The present invention relates to a method of producing a thin-walled pipe bend comprising the steps of producing pipe bend halves, the halves being formed into one another's mirror image in the plane of curvature of the pipe bend, and two halves being joined together for the formation of a pipe bend.

BACKGROUND ART

It is previously known to produce, using the above-intimated method, thin-walled pipe bends. In this instance, the point of departure is a starting material in the form of so-called skelp which is cut to parallel-trapezoidal blanks lying alternatingly in the longitudinal direction of the skelp strip. Each one of these blanks is then employed for producing half of a pipe bend, in which the halves are mirror images of one another, and consequently the pipe bend may be seen as divided along its plane of curvature. Two such halves are subsequently joined together in a suitable manner, for example by welding.

The prior art process suffers from numerous drawbacks, one of these residing in the relatively large material consumption which is caused by the fact that the halves for producing the pipe bend are employed in a pressing process, which requires a relatively large quantity of material surrounding the finally-shaped pipe bend half.

Another problem inherent in the prior art process resides in the fact that the blanks in the material strip are turned alternatingly, for which reason every second blank must be handled in an extra working phase before it can be fed to the press in which the forming operation is carried out.

PROBLEM STRUCTURE

The present invention relates to a method of the type intimated by way of introduction, the method being devised so as to obviate the above-mentioned drawbacks. Thus, the present invention relates to a method which, in particular, makes for the manufacture of pipe bends with an absolute minimum of material consumption, possibly in thinner material than has hitherto been possible, and with a minimum number of handling phases. The present invention further relates to a method which gives a finished product of superior quality and configurational accuracy.

SOLUTION

The objects forming the basis of the present invention will be attained if the method intimated by way of introduction is characterized in that an annular gutter is formed in a skelp blank, the gutter being given a profile which substantially corresponds to the profile of one half; and that the gutter is separated from the blank and is divided for the formation of a number of halves.

According to one preferred embodiment of the present invention, holes are made in the blank inside the gutter on forming of the gutter.

As a result of these features, the dimensions of the blank may be reduced further, since the hole-making entails that relatively more material is drawn from the region interiorly in the gutter, when this is formed, than would have been the case without the central hole.

The present invention is also suitably characterized in that, on division or splitting of the gutter, approximately radially directed bridges are left, these interconnecting parts of the blank located outside the gutter with parts of the blank located inside the gutter.

As a result of these features, the advantage will be afforded that the scrap material which is left on production of an annular gutter is connected together as a unit, for which reason it can be handled more simply.

BRIEF DESCRIPTION OF THE ACCOMPANYING DRAWINGS

The present invention will now be described in greater detail hereinbelow, with particular reference to the accompanying Drawings, in which:

Fig. 1 is a top plan view of a blank with an annular gutter formed therein; and

Fig. 2 is a diametric section through the gutter according to Fig. 1.

DESCRIPTION OF PREFERRED EMBODIMENT

In its most generic form, the present invention implies that those halves of which pipe bends are joined together are produced from the point of departure of a closed, annular gutter which has substantially the same profile or cross-sectional configuration as the pipe bend half. In its turn, the gutter has been produced by pressing of a preferably square or rectangular sheet metal blank which may be taken from a metal sheet or a roll. By dividing the thus produced annular gutter, there will be realized a number of halves which are joined together two-by-two for the formation of the pipe bend.

In the production of the annular gutter, the point of departure is a sheet metal blank 1 which may preferably have substantially square or rectangular form and which may be taken from rolled so-called skelp. The employment of a square blank

obviates the need for orientation of the blank.

The finished blank 1 is fed to a press device in which a gutter 2 is formed, this being annular and being given a cross-sectional configuration which is preferably semi-circular (if the pipe bend is to have circular cross-section), but which naturally may be of any other suitable shape for the production of a pipe bend. It will be apparent from Fig. 1 that the gutter 2, in the illustrated embodiment, consists of four arcuately curved portions 3 which are connected pairwise via straight portions 4. The production of the gutter is effected by the application of a substantially conventional pressing process so that a scrap strip 5 is formed exteriorly about the gutter 2. A scrap portion 6 will correspondingly be formed inside the gutter. It will be apparent from Fig. 2 that the scrap strip 5 and the scrap portion 6 substantially lie in a common plane, and that the gutter 2 is located wholly on one side of this plane.

In order to reduce the requisite width of the exterior scrap strip 5, a central opening 7 is, during the pressing operation (preferably towards the end of this operation), cut in the central scrap portion 6 of the blank 1. In an intended pipe diameter of 120 mm in the finished pipe bend, it is appropriate to make this central opening when roughly 25 mm remains of the pressing movement in the tool, i.e. when approximately 40 per cent of the working stroke is left.

The employment of this central opening 7 affords the major advantage that the material which, during the pressing operation, forms the wall in the gutter 2 will, to a greater extent, be taken from the central portion of the blank than from its peripheral portion outside the gutter. Hereby, the dimensions of the blank 1 may be reduced so that the total material consumption will consequently be reduced to a corresponding degree.

Once the formation of the gutter 2 has been completed and, thus, the blank 1 has assumed the shape which is apparent from Figs. 1 and 2, the gutter itself is cut away from superfluous parts (i.e. the scrap strip 5 and the scrap portion 6) of the blank 1. Furthermore, the closed, annular gutter is divided into a number of halves, in Fig. 1 four in number, which are then joined together two-by-two, for example by welding, such that a complete pipe bend is formed.

On dividing the gutter 2, a cut is made along the broken lines 8 so that there are formed narrow material bridges which interconnect the outer scrap strip 5 with the central scrap portion 6. Hereby, the scrap material in the blank 1 will be held together and be consequently easier to handle.

The material saving which may be achieved according to the present invention amounts, in a pipe diameter of 120 mm, to approx. 15 per cent as compared with the prior art method of manufacture described by way of introduction using trapezoidal blanks. Since the forming of the gutter takes place wholly symmetrically, the material thickness in the blank employed can probably be reduced somewhat, possibly of the order of magnitude of between 10 and 20 per cent, whereby a further material saving may be achieved without running the risk of any deterioration in quality or other drawbacks.

DESCRIPTION OF ALTERNATIVE EMBODIMENTS

In the foregoing, it has been assumed that the pipe bends are intended for joining circular-cylindrical pipes, for which reason the cross-sectional profile of the halves of the pipe bend and the gutter is a semi-circle. However, this is not necessary according to the present invention, it being a simple matter to adapt the profile shape of the gutter 2 to any cross-sectional configuration of the contemplated pipe bend.

Furthermore, the length of the straight portions 4 disposed in the gutter may naturally be varied within broad limits, depending upon the final shape of the contemplated pipe bend. In one extreme case, the straight portions 4 may possibly be eliminated entirely. In addition, the straight portions need not be of equal length at both of the ends of a half.

According to the invention, it is also possible to produce pipe bends of different diameters in the different ends. According to the present invention, it is merely necessary that the annular gutter be given a corresponding configuration such that it has greater radial extent to every second cutting point 8 than to the remaining cutting points. In one embodiment according to Fig. 1, the radial extent could, for example, be 160 mm in the upper and lower cutting points 8 in the Figure (the profile here being thus a semi-circle with a radius of 80 mm), while the radial extent at the two horizontal cutting points could be 120 mm (the profile here being thus a semi-circle with a radius of 60 mm). Such a dimensioning would result in a transition bend from 120 to 160 mmØ.

In Fig. 1, it has been assumed that the pipe bend is to be 90°, for which reason four halves are produced in one and the same ring. However, according to the invention, other angles of curvature may readily be produced for the pipe bend in that the annular gutter is divided into a different number of parts than that shown on the Drawing. Thus, for example the gutter may be divided into only two parts, which would result in a U-shaped pipe bend. Similarly, the division of the gutter may be effected in three points of division, which would result in a pipe bend with an angle of curvature of

120°. Correspondingly, the gutter may, of course, also be divided into a larger number of parts than those shown on the Drawing.

Further modifications are conceivable without departing from the spirit and scope of the appended Claims.

Claims

1. A method of producing a thin-walled pipe bend, comprising the steps of producing halves for the pipe bend, the halves being formed into one another's mirror image in the plane of curvature of the pipe bend, and two halves being joined together for the formation of a pipe bend, **characterized in that** an annular gutter (2) is formed in a skelp blank (1), the gutter being given a profile which substantially corresponds to the profile of one half; **and that** the gutter (2) is separated from the blank (1) and divided for the formation of a number of halves.

2. The method as claimed in Claim 1, **characterized in that** a hole (7) is made in the blank (1) inside the gutter on forming of the gutter (2).

3. The method as claimed in Claim 1 or 2**, characterized in that** approximately radially directed bridges are left on division of the gutter (2), said bridges interconnecting parts (5) of the blank (1) located outside the gutter (2) with parts (6) of the blank located inside the gutter (2).

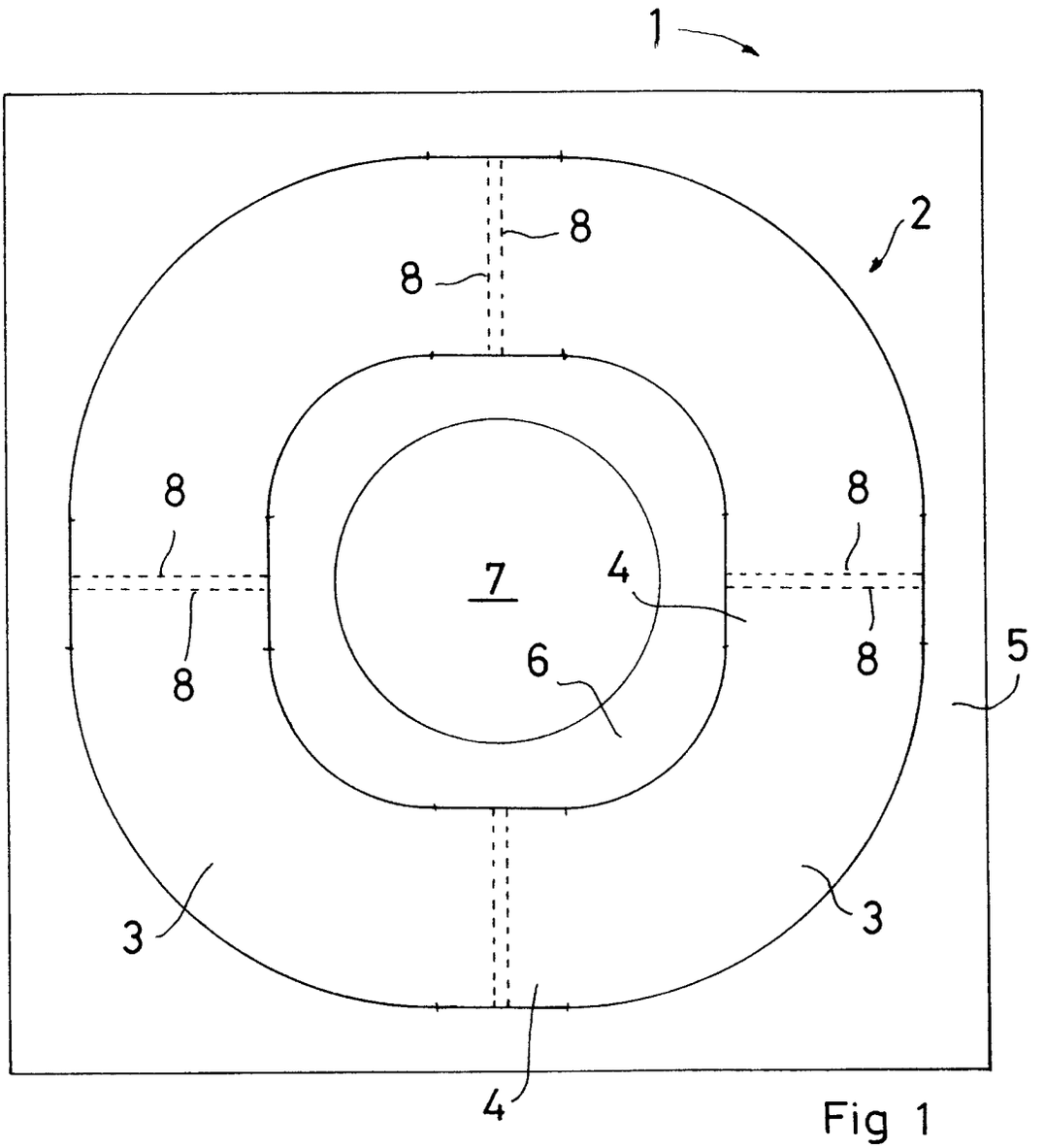

Fig 1

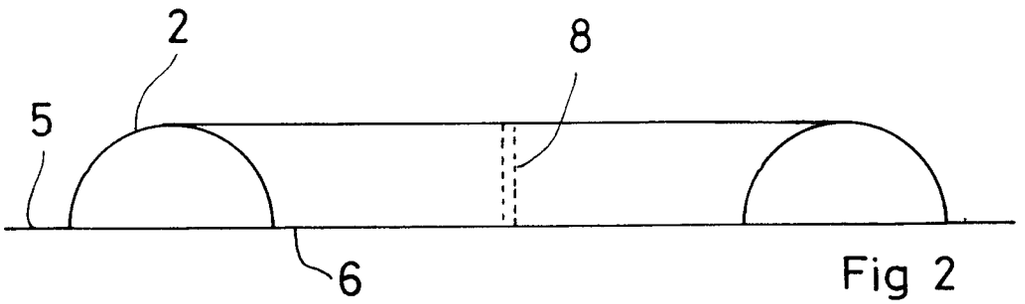

Fig 2

European Patent Office

EUROPEAN SEARCH REPORT

Application number
EP 92201075.6

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int Cl 5)
X	DE,C, 355 286 (RHEINISCHE SCHWEISSWERKE G.M.B.H.) *See the whole document* - - -	1-2	B21C 37/28
X	US,A, 2 192 471 (EARL J. HARBISON) *See the whole document* - - -	1-2	
A	EP,A1, 0 214 054 (WANNER ISOFIISOLATION) *See the whole document* - - -	1-3	
A	GB,B, 1 327 005 (JOHN DAVID BERTIL OSTBO) *See the whole document* - - -	1-3	
A	FR,A, 1 551 735 (SULZER FRÈRES SOCIÉTÉ ANONYME) *See the whole document* - - - - - - -	1-3	

TECHNICAL FIELDS SEARCHED (Int Cl 5)

B21C

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
STOCKHOLM	24-07-1992	Andréasson, I

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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A : technological background
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