United States Patent [19]

Moshnin et al.

[11] **3,869,776**

[45] **Mar. 11, 1975**

[54] **METHOD OF FABRICATING CURVED FITTINGS AND DEVICE FOR EFFECTING SAME**

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[21] Appl. No.: **388,913**

[52] **U.S. Cl.** ..... **29/157 A**, 72/358, 72/369

[51] **Int. Cl.** **B21d 7/06**

[58] **Field of Search** ..... 29/157 R, 157 A; 72/353, 72/356, 357, 369, 358

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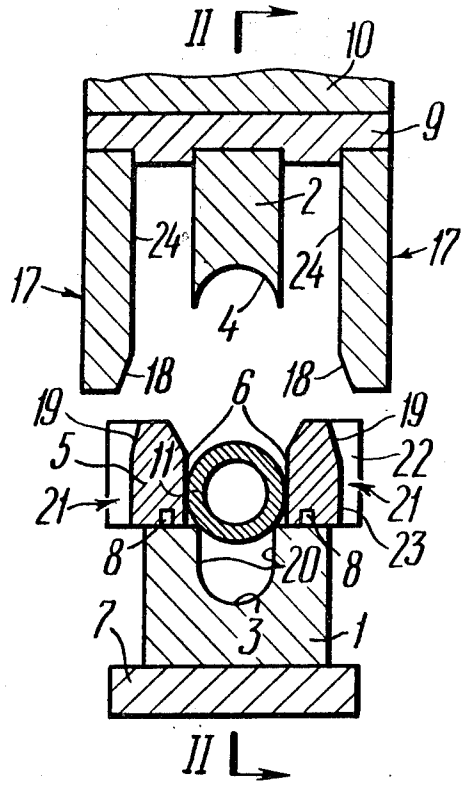
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Primary Examiner—Richard J. Herbst

[57] **ABSTRACT**

The present invention enables a manufacture of thick-walled fittings subjected to the effects of high temperatures, pressures and (or) aggressive media. Fittings manufactured according to the invention are designed for a high flow velocity. The formation of a curved fitting is effected by two pairs of dies, one thereof has flat working surfaces and the other, arcuate recesses. A tubular blank is successively reconstructed by said pairs of dies in the course of one or two strokes of a press.

13 Claims, 22 Drawing Figures



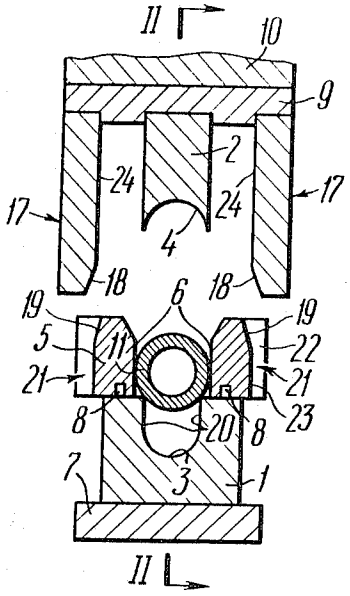


FIG. 1

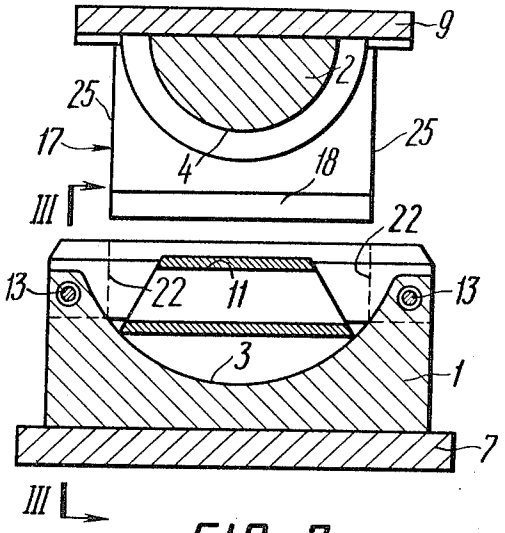


FIG. 2

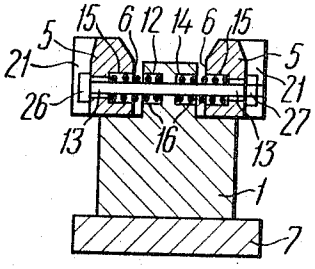


FIG. 3

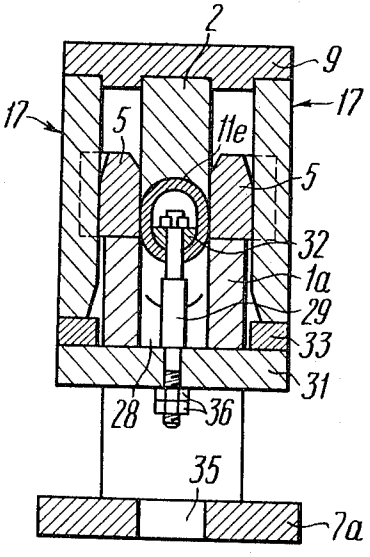


FIG. 12

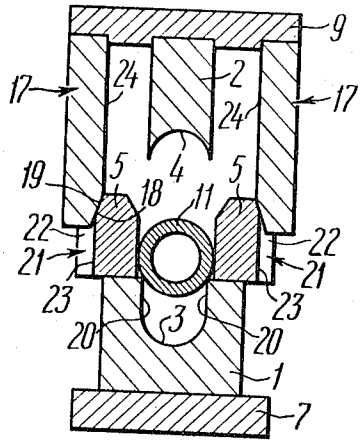


FIG. 4

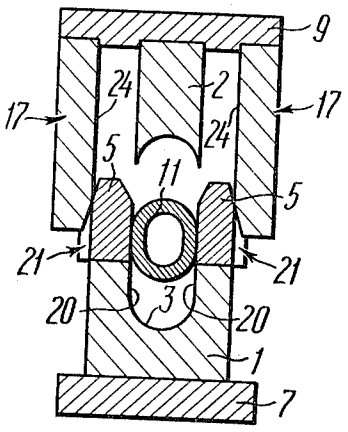


FIG. 5

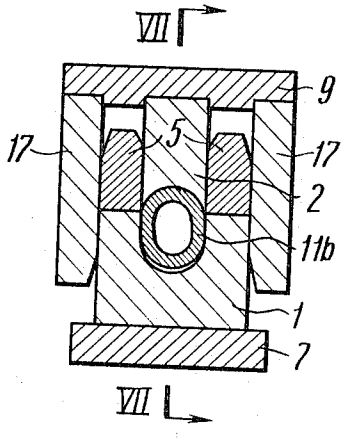


FIG. 6

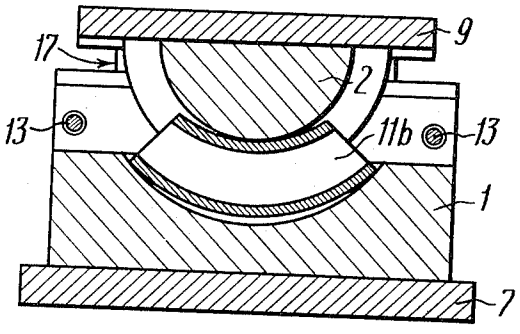


FIG. 7

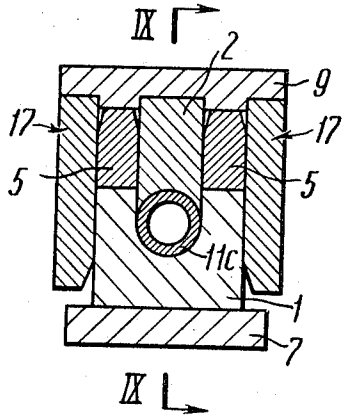


FIG. 8

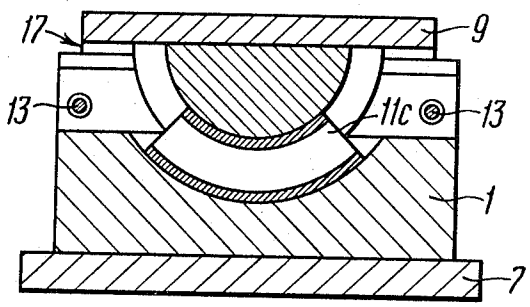


FIG. 9

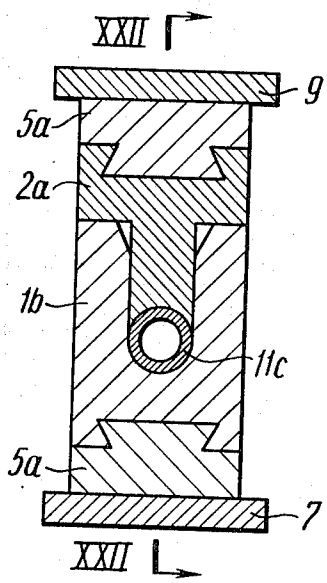


FIG. 21

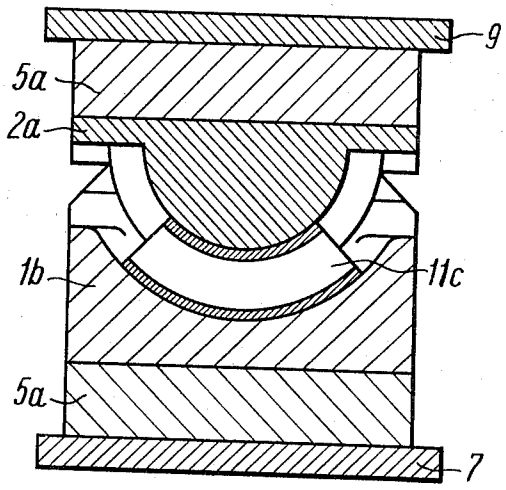


FIG. 22

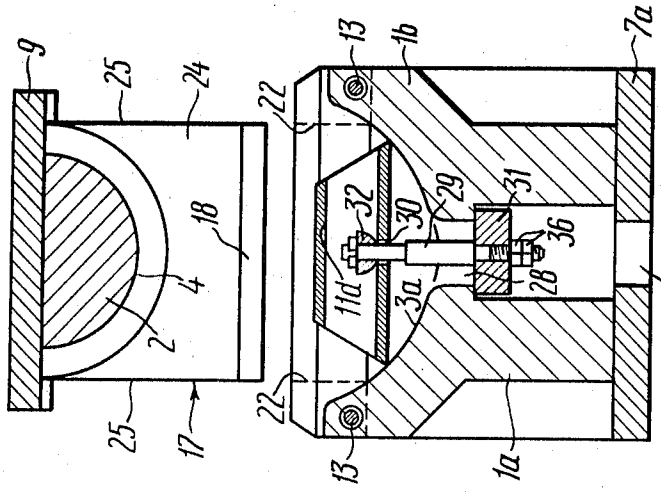

9
25
24
22
13
1b
7a
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17
22
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1a

FIG. 11

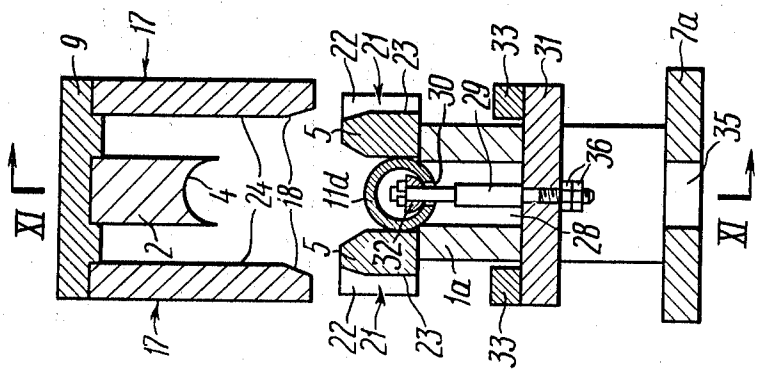

XI
9
17
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FIG. 10

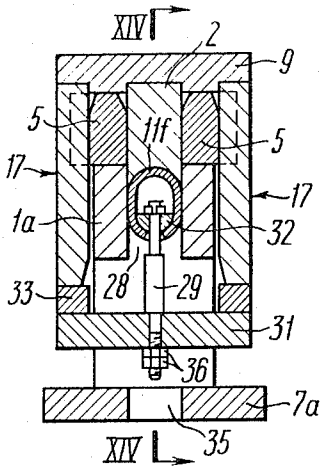


FIG. 13

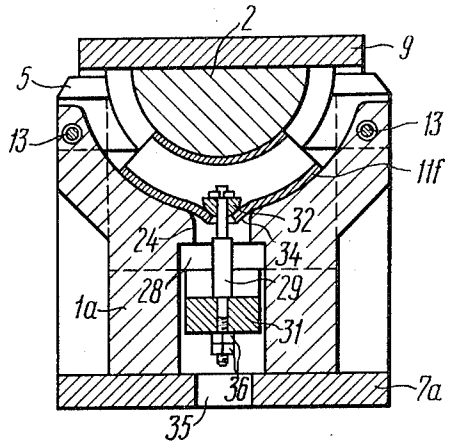


FIG. 14

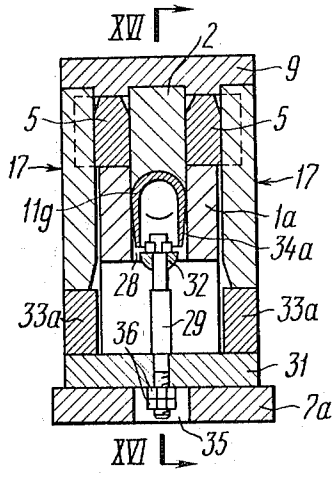


FIG. 15

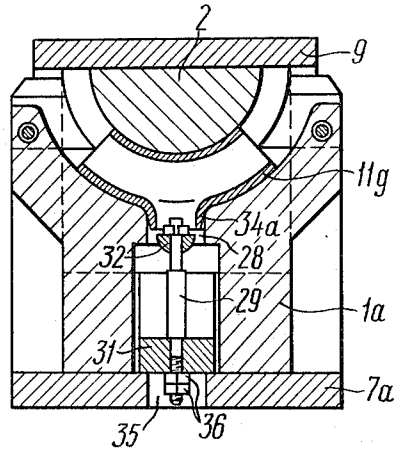


FIG. 16

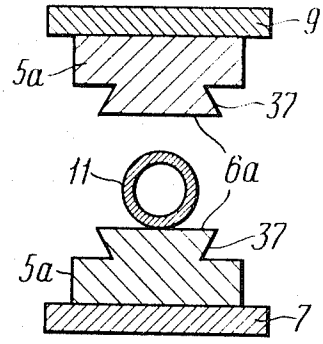


FIG. 17

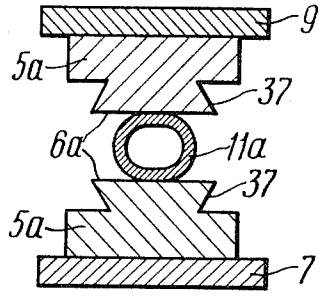


FIG. 18

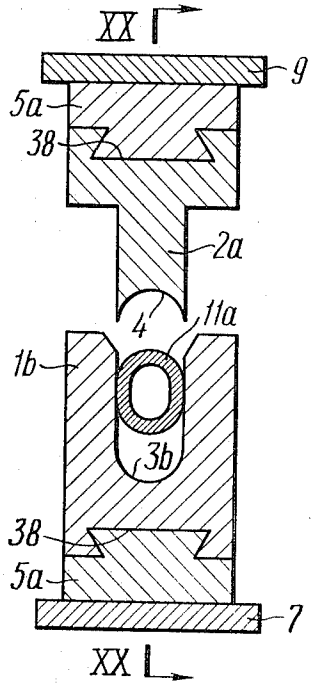


FIG. 19

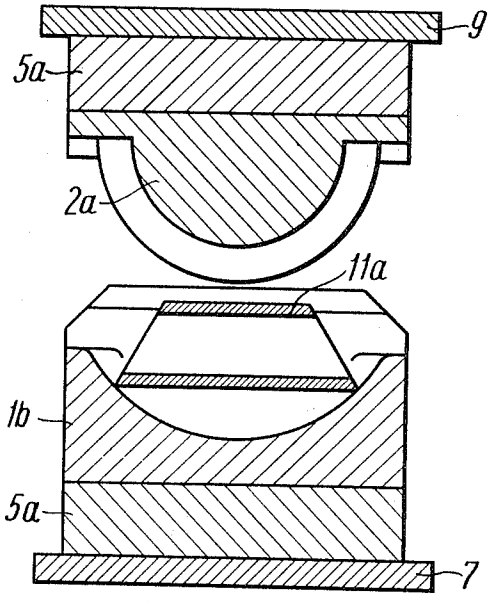


FIG. 20

METHOD OF FABRICATING CURVED FITTINGS AND DEVICE FOR EFFECTING SAME

The present invention relates to the manufacturing of fittings and more particularly to the manufacturing of fittings known as elbows which are obtained as a result of bowing a tubular blank.

The invention can be used with the greatest advantage for fabricating thick-walled fittings subjected to high temperatures, pressures and (or) the effects of aggressive media. In addition, fittings manufactured in accordance with the present invention are designed for a high flow velocity of a medium.

The foregoing advantages are due to the fact that the inner surface of a fitting is smooth.

The invention is equally effective in manufacturing curved T-branches which have all the above advantages.

Both elbows and T-branches may be manufactured from tubular blanks either obtained by cutting tubular stock material or made from sheets with subsequent welding.

At present, fittings with relatively smooth inner surfaces are obtained in the course of several operations on a single-action press with the aid of no less than four pairs of dies with arcuate recesses which complement each other in each pair of dies. As the dies approach each other, the cross-section of the recesses in each pair of dies has the shape of an oval or circle. In the first pair of dies, a tubular blank, whose outer diameter is greater that that of a finished fitting, is bowed so that its cross-section becomes oval-shaped, the longer axis of the oval being directed across the movement of the dies. In this position, when the dies are closed, the cross-section of the walls of the recesses has the shape of an oval corresponding to the shape of the cross-section of a blank as it is bowed through forced converging of its ends. In the second pair of dies, a blank is compressed in radial directions with respect to the longitudinal axis thereof, the dies moving along the longer axis of the oval. As a result, the cross-section of the blank becomes circular in shape, and the outer diameter of the reconstructed blank becomes less than that of the original blank. In the third pair of dies, the blank is bowed again, and its cross-section resumes its oval shape. In the fourth pair of dies, the blank is again reconstructed, and its cross-section again acquires a circular shape, its outer diameter being still less as compared to the outer diameter obtained in the second pair of dies.

The number of operations and, consequently, the number of die-pressing steps with curved recesses of a complex shape is determined by the thickness of the wall of a would-be fitting and the radius of curvature thereof (cf. U.S. Pat. No. 2.957.229, Class 29-157 for 1960).

Due to the fact that following the very first operation, a blank acquires a curvilinear shape, further processing of that blank requires dies with recesses of a complex shape, whose manufacture is extremely labor-consuming. Besides, the use of several dies in a press hampers the automation or mechanization of the process.

The main object of the present invention is to provide a process of fabricating a curved fitting from a tubular blank, the final shape thereof being obtained as a result of one or no more than two strokes of a single-action press due to the introduction of a new operation and the shaping of dies into a new form.

Like the process described hereinabove, the present invention envisages bowing a tubular blank by means of one pair of dies with arcuate recesses complementing each other and compressing it in radial directions with regard to its longitudinal axis, however, the bowing is preceded, according to the invention, by a double-sided compression of the blank by means of another pair of dies with predominantly flat working surfaces which results in an oval shape of the cross-section of said blank. To achieve compression, the blank is placed right between a pair of stops arranged on both sides of the longer axis of the oval and is acted upon by means of said pair of dies with arcuate recesses designed for said compression of the blank in radial directions with regard to its longitudinal axis, the dies moving along the longer axis of said oval; as a result, bowing and compression of the blank in radial directions with respect to its longitudinal axis are carried out simultaneously.

Such a sequence of operations makes it possible to shape the arcuate recesses into a form congruent with that of the outer surface of a finished fitting. It only requires two operations for a blank to be made into a finished fitting with a circular cross-section whose outer diameter is less than that of the original blank by 10–20 percent. Only one pair of dies with recesses of a complex shape takes part in the process, while the other pair of dies with flat working surfaces is extremely simple to manufacture.

The two operations can be carried out in the course of one stroke of a single-action press, if said pair of dies with predominantly flat working surfaces replaces the pair of stops placed at both sides of the longer axis of the oval.

A blank may also be shaped into an oval cross-section beforehand. In this case, the function of stops for a simultaneous bowing and compression of a blank in radial directions with regard to its longitudinal axis may be performed by flat portions of longitudinal walls corresponding to the arcuate recess in one of said dies with such recesses.

A device for the realization of the proposed method in the course of one stroke of a single-action press has one pair of dies with predominantly flat working surfaces designed for a double-sided compression of a tubular blank, which results in that the cross-section of the latter acquires the shape of an oval, as well as for maintaining their position, following the compression, till the manufacturing of the fitting is over. There is also a second pair of dies with arcuate recesses complementing each other, the radii of curvature thereof in the cross-section are less than that of the tubular blank. Dies with such recesses are capable of moving along the longer axis of said oval; as a result, the tubular blank is simultaneously bowed and compressed in radial directions with regard to its longitudinal axis.

The co-ordinate the movement of the two pairs of dies, it is expedient that one of the dies with arcuate recesses be designed to be mounted by the dies with predominantly flat working surfaces and carry these dies across the direction of the movement of the pair of dies with arcuate recesses.

To set into motion the dies with predominantly flat working surfaces, a cross-piece should be used, with the other dies with an arcuate recesses being affixed to

it, as well as two plates placed symmetrically and projecting with regard to said die. It is expedient that the free ends of these plates and the peripheral portions of the dies with predominantly flat working surfaces be provided with inclined platforms designed to interact with one another, respectively; as a result, the movement of the cross-piece is accompanied by said dies approaching the die with the arcuate recess mounted upon which there are the dies with predominantly flat working surfaces.

It is possible to center the cross-piece when in motion, if the dies with predominantly flat working surfaces are provided with guides designed to interact with the plates.

Skewing of the dies with predominantly flat working surfaces may be eliminated due to holes made in these dies across said working surfaces. Passed through these holes are rods adapted to prevent skewing of said dies.

The dies with predominantly flat working surfaces may be carried by plates as the latter resume their initial position. To avoid this, it is expedient that the die with an arcuate recess, mounted upon which are said dies, be provided with projections with holes through which said rods are to be passed.

It is equally expedient that on both sides of each projection, said rods be provided with compressed springs, one end thereof being butted up against one of the pair of dies with predominantly flat working surfaces, so that these dies can resume their initial position with the aid of said springs.

To avoid an increase in the cross-section of the middle portions of a blank that moves in the course of bowing, it is expedient that the portions of the longitudinal walls of the arcuate recess of one of the pairs of dies with such recesses, that are the most remote from the bottom of that recess, be made flat, whereas the other die with an arcuate recess be partially placed between these longitudinal walls.

It is preferable that such walls be in the die with an arcuate recess, mounted whereupon there are the dies with predominantly flat working surfaces. This enables a free transfer of a blank from one pair of the dies to the other.

It is also expedient that said die with flat portions of the longitudinal walls of the arcuate recess be placed lower than the other die with the arcuate recess. This simplifies the holding and centering of the dies with predominantly flat working surfaces, as well as the placement of a tubular blank in the device.

If a fitting has to be shaped as a T-branch, it is expedient that one of the dies with the arcuate recesses be provided with an opening in its middle, connected with the recess, as well as an additional die designed to be placed by means of a rod in said opening and also designed for the formation of an additional branch of a tubular blank, in which an aperture has to be made beforehand for said rod. In addition, provision has to be made for a mechanism for a transfer of the additional die by means of said rod.

It is expedient that such a mechanism be provided with an additional cross-piece connected to said rod and designed to be transferred by means of said plates.

In accordance with a second embodiment of the proposed device, the dies with predominantly flat working surfaces for a double-sided compression of a tubular blank are also designed to be mounted by dies with arcuate recesses complementing each other, the radii of curvature thereof in their cross-sections are less than that of the outer surface of the tubular blank.

This arrangement is most advantageous after said double-sided compression, when the cross-section of the tubular blank becomes oval-shaped.

In addition, one of the arcuate recesses has to be provided with longitudinal walls in its middle having flat portions and spaced at a distance less that the shorter axis of the oval. The depth of this recess must be one and a half or two times greater than the longer axis of the oval, whereas the other die with the arcuate recess has to be designed to be placed, at least partially, in the recess with said longitudinal walls. In this case, there is no need for special placing of dies with predominantly flat working surfaces, nor for a number of means of coordinating and centering the movement of the dies.

During a simultaneous bowing and compression of a blank in radial directions with regard to its longitudinal axis, the flat portions of the longitudinal walls of said recess serve as stops preventing an increase in the shorter axis of said oval.

A substantial advantage of the present invention resides in that the labor consumption in the manufacturing of dies is cut down no less than three times, and that in the manufacturing of a fitting, no less than two-fold.

The present invention will be more fully understood from a description of preferred embodiments thereof taken in conjunction with the accompanying drawings, wherein:

FIG. 1 is a view in section of the first embodiment of the proposed device, in accordance with the invention, with a tubular blank resting upon a die with an arcuate recess;

FIG. 2 is a section along line II—II in FIG. 1;

FIG. 3 is a section along line III—III in FIG. 1;

FIG. 4 is a view in section of the first version of the proposed device in a position when the plates have come into contact with the dies having flat working surfaces;

FIG. 5 is a view in section of the first version of the proposed device in a position when the cross-section of the tubular blank has become oval-shaped;

FIG. 6 is a view of the first version of the device in a position when a tubular blank is subjected to bowing and compression at its ends in radial directions with regard to its longitudinal axis;

FIG. 7 is a section along line VII—VII in FIG. 6;

FIG. 8 is a view of the first version of the proposed device in a position when a tubular blank is bowed and compressed in radial directions with regard to its longitudinal axis over its entire length;

FIG. 9 is a section along line IX—IX in FIG. 8;

FIG. 10 is a view in section of the second version of the proposed device, according to the invention, with a tubular blank designed for the formation of an additional branch;

FIG. 11 is a section along line XI—XI in FIG. 10;

FIG. 12 is a view in section of the second version of the proposed device in a position when the cross-section of a tubular blank is shaped into an oval;

FIg. 13 is a view in section of the second version of the proposed device in a position when a projection at the place of a would-be side branch is formed simultaneously with the formation of other sections of the fitting;

FIG. 14 is a section along line XIV—XIV in FIG. 13;

FIG. 15 is a view of the second version of the proposed device in a position when the side branch has been formed;

FIG. 16 is a section along line XVI—XVI in FIG. 15;

FIG. 17 is a view in section of the third version of the proposed device, according to the invention, with a tubular blank resting upon the die with a flat working surface;

FIG. 18 is a view in section of the third version of the proposed device in a position when the cross-section of the tubular blank is shaped into an oval;

FIG. 19 is a view in section of the third version of the proposed device in a position when the tubular blank is prepared for a simultaneous bowing and compression thereof in radial directions with regard to its longitudinal axis;

FIG. 20 is a section along line XX-XX in FIG. 19;

FIG. 21 is a view in section of the third version of the proposed device in a position when the formation of the fitting is over;

FIG. 22 is a section along line XXII-XXII in FIG. 21.

According to the invention, the proposed method is based upon the use of a tubular blank with a circular cross-section. At first, the blank is somewhat compressed by means of the first pair of dies so that its cross-section becomes oval-shaped; then the reconstructed blank is placed between stops which prevent an increase in the dimensions of the cross-section of the blank along the shorter axis of the oval. Another pair of dies simultaneously bowes and compresses the blank along the longer axis of the oval. The result is a curved fitting with a circular cross-section, the outer diameter thereof being by 10–20 percent less than the diameter of the original tubular blank.

The first version of the proposed device represented in FIGS. 1–9 is designed for the formation of a fitting in the course of one stroke of a single-action press (not shown).

As is seen from the above figures, the device comprises two pairs of dies: a pair of dies 1 and 2 with arcuate recesses 3 and 4, respectively, complementing each other, and another pair of dies 5 with flat working surfaces 6, respectively. The die 1 with the arcuate recess 3 is mounted on a platen 7 of a press and comprises platforms 8 resting whereupon are the dies 5 with the flat working surfaces 6, one of the dies 5 being placed to the left of the recess 3 and the other, to the right of that recess. The die 2 with the arcuate recess 4 is mounted upon a cross-piece 9 connected to a cross-piece 10 of the press. To make the description that follows less involved, the dies 1 and 2 with the arcuate recesses will be hereinafter referred to as "the lower die 1 and the upper die 2", and the dies 5 with the flat working surfaces 6 will be referred to as "the lateral dies 5."

In the initial position of the device, a tubular blank 11 with a circular cross-section rests upon the lower die 1, being placed along the recess 3. The lateral dies 5 are placed at a distance from each other by means of compressed springs 12 (FIG. 3) fitted over rods 13 which are passed through holes in the lateral dies 5 across the working surfaces 6 and through holes in projections 14 of the lower die 1.

The springs 12 are placed in recesses 15 and 16 that are found in each lateral die 5, respectively, on each side of the projection 14 and also in that projection. One end of each spring 12 is butted up against the lateral die 5, while the other end of the spring is butted up against the projection 14.

To set the lateral dies 5 into action, the upper cross-piece 5 is affixed with two plates 17 placed symmetrically with respect to the upper die 2 and also projecting with regard to it, the free ends of these plates having inclined platforms 18 designed to interact with inclined platforms 19 arranged on peripheral portions of the lateral dies 5. As the cross-piece 9 moves down due to the interaction between the plates 17 and the lateral dies 5, the latter approach each other, sliding along the guide platforms 8. The tubular blank 11 is subjected to a double-side compression and is reconstructed into a blank 11*a* (FIG. 5) whose cross-section is oval-shaped, the longer axis thereof being in the vertical position.

Skewing of the lateral dies 5 is prevented by the rods 13 (FIGS. 2 and 3). The final position of the lateral dies is predetermined by a distance between the plates 17. The difference between the longer and shorter axes of the oval is two-four times greater than the thickness of the tubular blank 11. As the cross-piece 9 moves further down, the lateral dies 5 retain their position due to a parallel placing of the plates 17, whereas the upper die 2, whose cross-section is somewhat less than the distance between the working surfaces 6 of the dies 5 in their closed position, enters the space between the dies 5 and starts bowing the blank 11*a*, thereby its middle portion moves downward. The arcuate recess 3 of the lower die 1 has in its middle flat portions 20 placed along the longitudinal walls, the flat portions being at a maximum distance from the bottom of the recess 3. The distance between the portions 20 corresponds to that between the working surfaces 6 of the lateral dies 5. The middle of the blank 11*a* moves down into the recess 3, the working surfaces 6 of the lateral dies 5 and the flat portions 20 of the walls of the recess 3 of the lower die 1 serving as stops preventing an increase in the cross-section of the blank 11*a* along the shorter axis of the oval.

The bottom of each recess 3 and 4 of the lower and upper dies 1 and 2, respectively, has the form of a regular cylinder, the radius of curvature of this form in the cross-section of the recess being less than that of the outer surface of the blank, due to which the bowing of the blank 11*a* is accompanied by its compression in radial directions with respect to its longitudinal axis, thereby the blank 11*a* is gradually reconstructed into a blank 11*b* (FIGS. 6 and 7), the cross-sections of the ends thereof being intermediate between an oval and a circle, after which it is made into a finished fitting 11*c* (FIGS. 8 and 9) with a circular cross-section over its entire length. At the end of the stroke of the press, the front portion of the upper die 2 is partially placed in the recess 3 of the lower die 1; in this position, the recesses 3 and 4 complement each other, and their inner surfaces become congruent with the outer surface of the fitting. In the course of the formation of the fitting, the cross-piece 9 together with the plates 17 and the upper die 2 is centered with respect to the lower die due to the fact that the outer sides of the lateral dies 5 are provided with recesses 21 with flat longitudinal walls 22 and 23 interating with wide side planes 24 and narrow side planes 25 of the plates 17, respectively, and, consequently, performing the function of guides for the movement of the cross-piece 9. During the movement of the cross-piece 9, each lateral die 5 is bounded on one side by the plate 17 and on the other, by the projec-

tion **14.** Being interconnected by the rods **13,** the dies **5** in this position are simultaneously centered with respect to the upper and lower dies **1** and **2,** respectively.

It is understood that guides for the plates **17** may also be provided on the lateral sides of the lower die **1**; this, however, is less convenient to realize.

As the cross-piece **9** moves upward, the friction which develops as the plates **17** slide along the lateral dies **5,** causes the latter to move upward, too. This movement, however, is prevented by the rods **13** backed by the projections **14** of the lower die **1.**

On their one end, the rods **13** (FIG. **3**) have a head **26,** whereas their other end is threaded and provided with a nut **27** which controls the degree of the compression of the springs **12.**

After the plates **17** cease to interact with the lateral dies **5,** the latter are separated by the compressed springs **12,** and the fitting **11***c* is removed.

The second embodiment of the present invention shown in FIGS. **10–16** also employs two pairs of dies; unlike in the previously described case, however, the lower die **1***a* has in its middle an opening **28** with a circular cross-section whose diameter is less than or equal to the cross-section of a fitting formed by the arcuate recesses **4** and **3***a* of the upper die **2** and the lower die **1***a*, respectively. The walls of the opening **28** smoothly pass into the walls of the recess **3***a*. In the opening **28,** there is a rod **29** which is passed through a hole **30** made in the middle of a tubular blank **11***d*. The rod **29** is mounted upon an additional cross-piece **31** and is provided with an additional die **32** mounted inside the blank **11***d*.

The additional cross-piece **31** is meant to be mounted by plates **33** which are to interact with the free ends of the plates **17.** This interaction starts synchronously with the bowing and compression in radial directions of the blank **11***e* when its cross-section is oval-shaped.

At the end of the press stroke, the main part of the blank acquires a circular cross-section; the drawing of the additional die **32** from the blank **11***e* results in the formation of a projection **34** on the main part of the blank. The blank **11***e* is reconstructed into a blank **11***f* (FIGS. **13** and **14**). Then the plates **33** are replaced by higher plates **33***a;* the action upon the projections **33***a* of the plates **17** results in drawing out the die **32** from the blank **11***f* which is reconstructed into a fitting **11***g* with a side branch **34***a* at the place of the former projection **34** (FIGS. **15** and **16**). The plate **7***a* is provided with a hole **35** placed wherein is the lower end of the rod **29** with nuts **36** which secure this rod with respect to the additional cross-piece **31,** as the downward motion of this cross-piece is over.

The third embodiment of the present invention shown in FIGS. **17-22** differs from the previously described embodiments in the simplicity of its design.

The upper and lower dies **5***a* have flat projections **37** made as dovetails, the greater surface **6***a* of each projection functioning as a working surface for a double-side compression of the tubular blank **11** which results in the reconstruction of the latter into the blank **11***a* with the oval-shaped cross-section. The double-side compression being over, the dies **5***a* are set apart, and another pair of dies, **1***b*, and **2***a*, with the arcuate recesses **3***b* and **4,** respectively, is mounted on them. The dies **1***b* and **2***a* have additional recesses **38** designed to engage with the projections **37.** Unlike the recess **3** in the first embodiment of the proposed device whose depth in its middle is equal to the length of the longer axis of said oval, the recess **3***a* is still deeper, the depth in its middle portion being equal to one and a half or two lengths of the longer axis of said oval, whereas the flat portions **20***a* of its longitudinal walls are still longer. The blank **11***a* is wholly placed in the recess **3***a*, hence, the flat portions **20***a* serve as stops which prevent an increase in the cross-section of the blank in the direction of the shorter axis of the oval.

The fitting **11***a* has the same shape as the one manufactured by means of the first embodiment of the present invention.

In all the foregoing embodiments of the invention, the stops preventing a change in the cross-section of a blank along the shorter axis of said oval have flat portions which interact with said blank.

The present invention does not exclude, nevertheless, certain deviations in the shape of these portions, although the flat surface is preferable, as it rules out any deviations in the cross-section of a blank over its entire length.

What is claimed is:

1. A method of fabricating a curved fitting from a tubular blank having a round cross-section through the intermediary of a first pair of dies having substantially flat working surfaces and a second pair of dies having arcuate recesses extending in longitudinal and transverse sections thereof, comprising the steps of:

a. imparting double-sided compression to said tubular blank by said first pair of dies so as to deform the round shape of the cross-section of said tubular blank into a shape having an oval cross-section;

b. positioning said deformed tubular blank in close contact between the dies forming said second pair of dies, said dies being disposed on either side of the major axis of said oval cross-section of said blank until completion of the sequence of fabricating said curved fitting; and

c. simultaneously bowing and compressing said deformed tubular blank by closing the dies forming said second pair, and moving said dies along the major axis of the oval cross-section of said deformed blank so as to shape said blank into said curved fitting.

2. A device for manufacturing a curved fitting from a tubular blank of a round cross-section, comprising a first pair of dies having substantially flat working surfaces movable in relative opposite directions, said dies being retainable in a fixed position at a predetermined minimum distance therebetween until completion of the manufacturing sequence for said curved fitting; and a second pair of dies including a first die and a second die each having arcuated recesses extending in both longitudinal and transverse sections thereof, the radius of curvature of each recess of said dies in the transverse section being smaller than the radius of curvature of the outer surface of said tubular blank, the dies of said second pair being movable towards each other transversally relative to the direction of movement of the dies of said first pair, said relative movement of the dies of said first pair towards each other being adapted to reshape the round cross-section of said tubular blank into an oval cross-section, and said movement of the dies of said second pair towards each other imparting simultaneously bowing and compressing to said reconstructed tubular blank, so as to form said blank into said curved fitting.

3. A device as claimed in claim 2, comprising said first die of said pair of dies with the arcuate recesses designed to be mounted by said dies with the predominantly flat working surfaces and a transfer of these dies across the direction of the movement of said pair of dies with the arcuate recesses.

4. A device as claimed in claim 3, comprising a movable cross-piece affixed whereto is the second die of said pair of dies with the arcuate recesses; two plates placed symmetrically with regard to said second die, also mounted upon said movable cross-piece and projecting with regard to said second die; inclined platforms upon free ends of said plates and inclined platforms upon peripheral sections of said dies with the predominantly flat working surfaces; said inclined platforms upon said plates and said dies being designed to interact with each other, thereby said dies with the predominantly flat working surfaces approach each other as said cross-piece moves to said first die with the arcuate recess.

5. A device as claimed in claim 4, comprising guides in said dies with the predominantly flat working surfaces, designed to interact with said plates mounted upon said cross-piece and for centering that cross-piece in the course of its movement.

6. A device as claimed in claim 5, comprising holes in said dies with the predominantly flat working surfaces, placed across said surfaces; rods passed through said holes and designed to prevent skewing of said dies in the course of their movement.

7. A device as claimed in claim 6, comprising in said first die with the arcuate recess projections with holes passed through which are said rods, thereby preventing a transfer of said dies with the predominantly flat working surfaces in the direction of the movement of said cross-piece.

8. A device as claimed in claim 7, comprising compressed springs fitted over said rods on both sides of each projection with said holes, one end of each spring being butted against one die of said pair of dies and the other, against said projection, thereby these springs separate said dies with the predominantly flat working surfaces from each other, as said plates cease to act upon these dies.

9. A device as claimed in claim 8, comprising in said arcuate recess of said first die flat longitudinal walls placed at a maximum distance from the bottom of this recess and designed for said second die of said pair of dies with the arcuate recesses to be placed between these longitudinal walls.

10. A device as claimed in claim 9, comprising said first die with the arcuate recess placed lower than said second die with the arcuate recess.

11. A device as claimed in claim 10, comprising an opening in the middle of said arcuate recess of said first die; an additional die designed to be arranged by means of a rod in said opening and for the formation of an additional branch in said tubular blank, wherein a hole is made beforehand, whereto said rod is to be plassed; a means for a transfer of said additional die with the aid of said rod.

12. A device as claimed in claim 11, comprising an additional cross-piece affixed to said rod with is connected to the additional die, said additional cross-piece being designed to be transferred by means of said plates.

13. A device for manufacturing a curved fitting from a tubular blank comprising a first pair of dies with predominantly flat working surfaces designed for a double-sided compression of said tubular blank, thereby the cross-section of the latter acquires the shape of an oval, and also designed to be mounted by a second pair of dies having a first and a second dies with arcuate recesses complementing each other, the radii of curavture thereof in their cross-sections are less than that of the outer surface of said tubular blank following said double-sided compression; longitudinal walls in an arcuate recess of said ones in said first die having in their middle flat portions placed at a maximum distance from the bottom of said recess and spaced at a distance equal to the shorter axis of said oval; said arcuate recess having a depth which is one and a half or two times the length of the longer axis of said oval; said second die designed to be placed at least partially in said arcuate recess of said first die; a means for a transfer of said first pair of dies together with the dies of said second pair; following said double-sided compression, said tubular blank being placed in said recess on said first die and simultaneously bowed and compressed in radial directions with regard to its longitudinal axis by means of the second pair of dies, said longitudinal walls of said recess of said first die acting as stops placed on both sides of said longer axis of said oval throughout entire said process of bowing accompanied by compression of said tubular blank in radial directions with regard to its longitudinal axis.

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