March 2, 1971 K. E. SCHOLTEN ETAL 3,566,655

METHOD AND ROLL PASS ARRANGEMENT FOR ROLLING SEAMLESS TUBES WITH EXTERNAL FINS

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Fig. 1

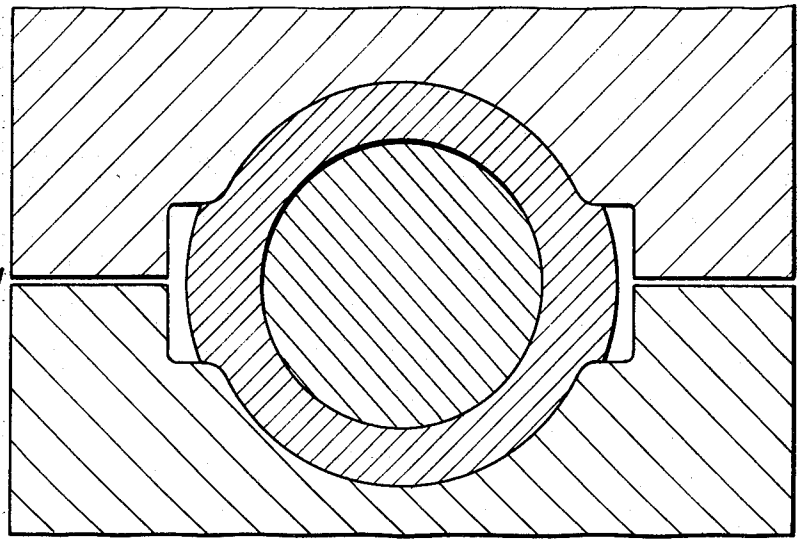


Fig. 2

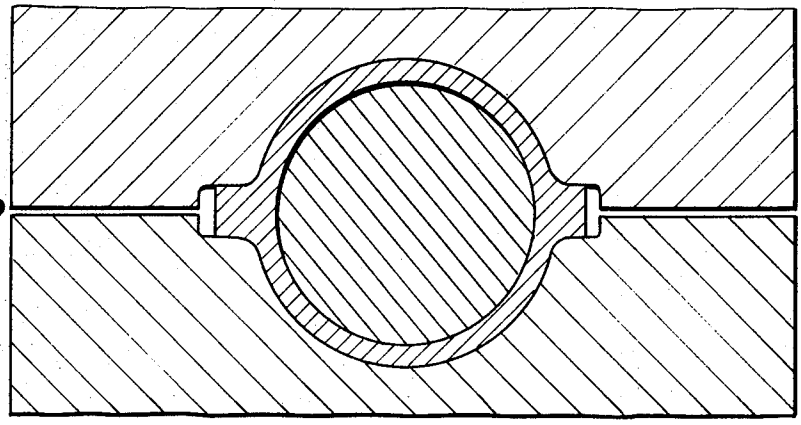
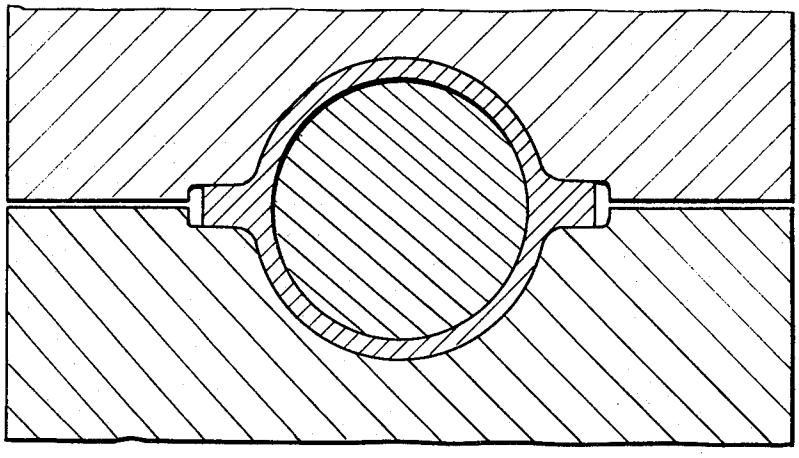


Fig. 3



Inventors:
Karl E. Scholten and
Kurt Sonnabend,
By Marmorek & Bierman,
Their Attorneys.

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Fig. 4

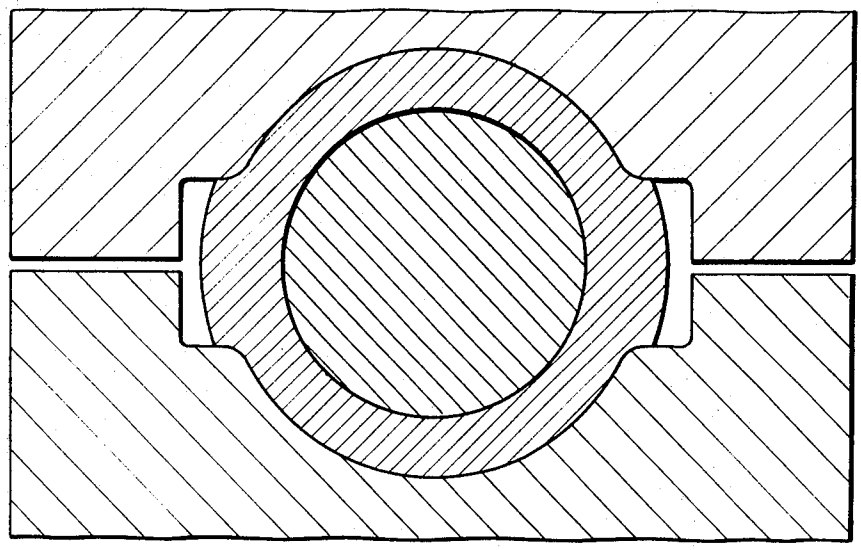


Fig. 5

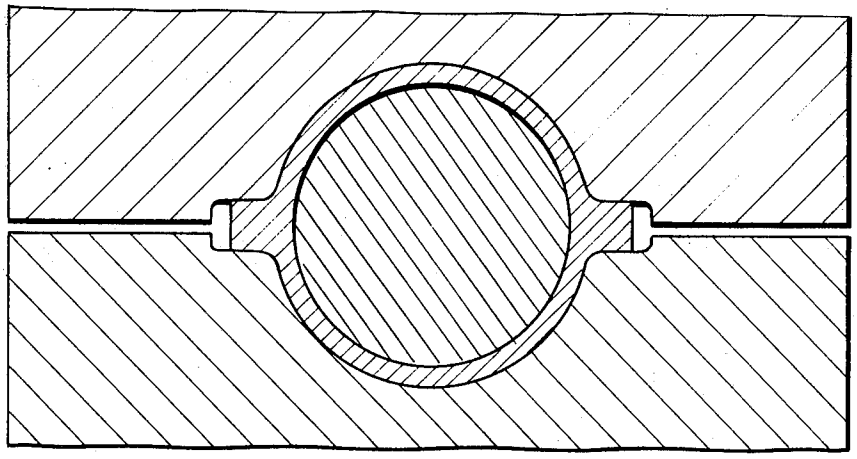
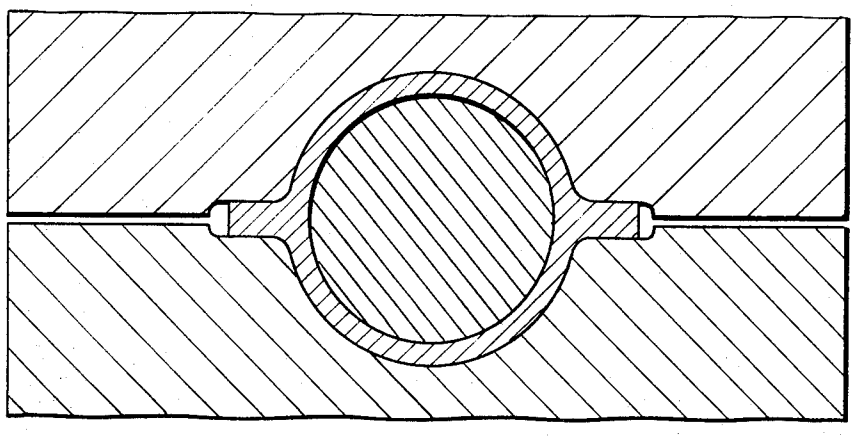


Fig. 6



Inventors:
Karl E. Scholten
and Kurt Sonnabend,
By Marmorek & Bierman,
Their Attorneys.

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METHOD AND ROLL PASS ARRANGEMENT FOR ROLLING SEAMLESS TUBES WITH EXTERNAL FINS

Karl Ernst Scholten, Witten-Bommern, and Kurt Sonnabend, Witten (Ruhr), Germany, assignors to Mannesmann A.G., Dusseldorf, Germany

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Int. Cl. B21b 17/10
U.S. Cl. 72—209 3 Claims

ABSTRACT OF THE DISCLOSURE

A seamless finned tube is produced from a bloom by cold pilger rolling in two successive roll groove sections; in the first section the tube is rolled down to final wall thickness, and in the second the fins are rolled to final size. The lengths of the unrolled two section grooves have a ratio of 3:1.

The invention relates to methods and roll pass arrangements for the rolling of seamless steel tubes with two opposite external longitudinal fins; more particularly, the invention relates to a method and arrangement of the foregoing type in accordance with which the tubular bloom is pilger cold rolled on a roll mandrel that is either partly cylindrical and partly conical, or conical throughout its length.

It has become known to produce seamless tubes with external longitudinal fins by pilger cold rolling, where recesses are arranged in the roll gaps that correspond to the fins (Geman Pat. No. 910,612). That innovation, however, has the disadvantage that it may require closed roll passes for obtaining accurate final dimensions of the external fins; with attendant complexity of roll designing. Furthermore, that innovation carries with it the hazard of the occurrence of burrs in the roll gap that require a separate removal operation.

It is accordingly among the principal objects of the invention to provide for a method and roll pass arrangement for rolling seamless tubes with external fins that do not require any closed roll passes; and hence are simple; and which are not subject to the occurrence of burrs in the roll gap.

Further objects and advantages of the invention will be set forth in part in the following specification and in part will be obvious therefrom without being specifically referred to, the same being realized and attained as pointed out in the claims hereof.

Broadly speaking, the invention provides for rolling the tubular bloom on a roll mandrel that is either partly cylindrical and partly conical, or throughout its length conical, and permitting the material to spread into roll gap spaces. In a first of two succeeding roll groove sections of the roll pass, the bloom is rolled down to its final tubular thickness, and at the same time the fins which are formed in the aforesaid spaces are pre-rolled. In the second section of the roll pass, the fins are rolled to their final dimension, while the tubular bloom retains its wall thickness unchanged.

At the end of the first section, there is available for the formation of the fins an accurately predetermined amount of material. That material is flattened in the aforesaid spaces in the second roll groove section.

The surprising observation has been made that by using the instant method, seamless tubes have been obtained the external fins of which have throughout the entire length practically a uniform width and approximately plane parallel end surfaces.

The ratio of the developed lengths of the two roll groove sections is important. The first section requires a greater length than the second, as it is required to produce a greater amount of deforming labor. The aforesaid ratio of lengths of the two developed sections is about 3:1.

The height of the aforesaid spaces for the external fins decreases within the roll gap down to the final thickness of the external fins. The width of these spaces, however, throughout the entire developed length of the roll pass, exceeds the final width of the external fins for a substantial amount, at least for five millimeters each, in order to permit the free spreading of the external fins.

For a fuller understanding of the nature and objects of the invention, reference should be had to the following accompanying drawings, in which:

FIG. 1 is a fragmentary sectional view of a pilger roll groove and the tubular bloom and conical roll mandrel, at the start of the first roll groove section;

FIG. 2 is a fragmentary sectional view, similar to FIG. 1, showing the end of the first roll groove section that coincides with the beginning of the second roll groove section;

FIG. 3 is a fragmentary sectional view, similar to FIGS. 1 and 2, but showing the end of the second roll groove section; the mandrel for the method in accordance with the three stages of FIGS. 1–3 utilizes a roll mandrel that for a part of its length (FIGS. 1 and 2) is conical and for the remainder of its length (FIG. 3) is cylindrical;

FIGS. 4–6 are fragmentary sectional views, similar to FIGS. 1–3, respectively, and show three rolling stages similar to those of FIGS. 1–3, but the stages of FIGS. 4–6 are for a method that utilizes a roll mandrel which throughout its entire length is conical.

In FIG. 1 there is shown the tubular bloom in a roll pass with a tapered cone during the first roll groove section, and there is illustrated the beginning of the formation of the lateral fins.

In FIG. 2 there is shown the final position of the aforesaid first roll groove section which at the same time forms the beginning of the second roll groove section. The lateral fins have been preformed which is similar to but does not have the end dimensions, of the final fin form. The tubular thickness, however, has in FIG. 2 received its final size.

During the ensuing second roll groove section, the rolling will be performed over a cylindrical roll mandrel portion and the wall thickness of the tube will remain unchanged. During the second roll groove section, the fins will be rolled down to their final size, shown in FIG. 3.

FIGS. 4–6, as previously indicated, are similar to FIGS. 1–3, but the roll mandrel throughout its length is conical, so that in FIGS. 4–6 the internal diameters of the tube is shown of reduced sizes through the progressing stages.

We wish it to be understood that we do not desire to be limited to the exact details of construction shown and described, for obvious modifications will occur to a person skilled in the art.

Having thus described the invention, what we claim as new and desire to be secured by Letters Patent, is as follows:

1. In a method of pilger rolling, over a mandrel tapered at least throughout a portion of its length, a tubular steel bloom into a seamless tube having two opposite external fins, the pilger rolls having succeeding first and second roll groove sections, the first section including lateral open spaces outside the roll grooves for receiving a free spread of bloom material to be rolled subsequently into fins in the succeeding second section, and the second section including roll gap spaces for the finish rolling of said fins, the steps comprising

cold pilger rolling the tubular bloom in the first pilger roll groove section down to the final tubular wall thickness affording the said free spread into said lateral spaces,

and subsequently finish rolling in the second roll groove section the fins including thinning and radially widening the fins without changing the tubular wall thickness.

2. A pilger roll pass construction for use in rolling over a mandrel tapered at least throughout a portion of its length a tubular steel bloom into a seamless tube having two opposite external fins, comprising in combination,

two rolls defining succeeding first and second roll groove sections, the first section including lateral open spaces outside the roll grooves for receiving a free spread of bloom material to be rolled subsequently into fins in the succeeding second section, and the second section defining roll gap spaces for the finish rolling of said fins,

the ratio of the developed lengths of said first roll groove section as compared to the second being 3:1.

3. A pilger roll pass construction, as claimed in claim 2, said roll gap spaces having a terminal height substantially equal to the final thickness of the fin and having a terminal width substantially larger than the final width of the fin.

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MILTON S. MEHR, Primary Examiner