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W. HERZ

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METHOD OF ROLLING TUBES

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Fig. 1

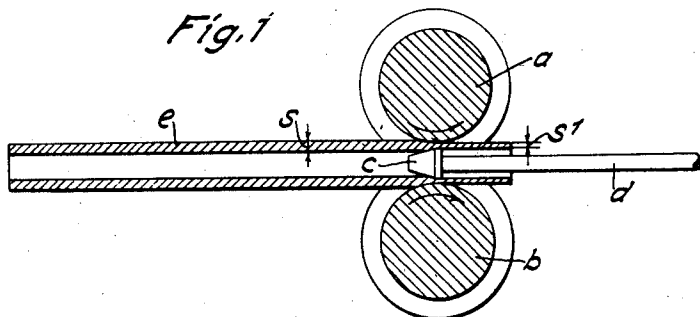


Fig. 2

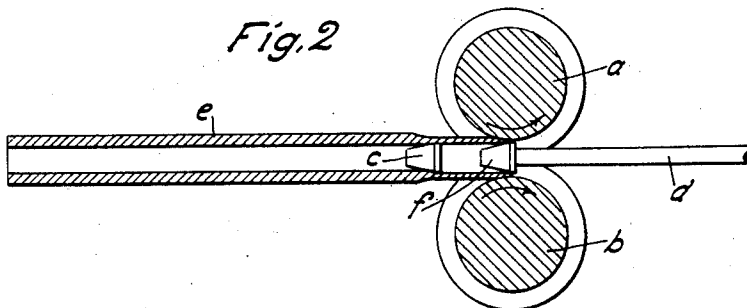


Fig. 3

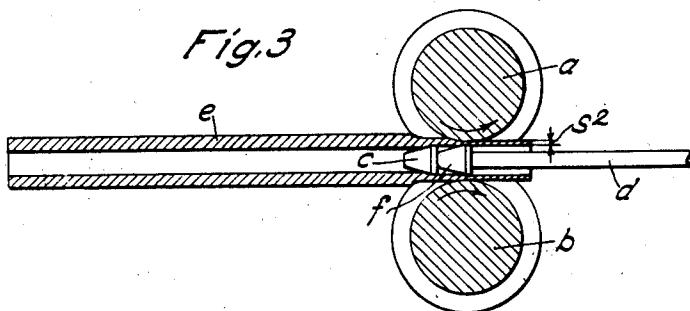
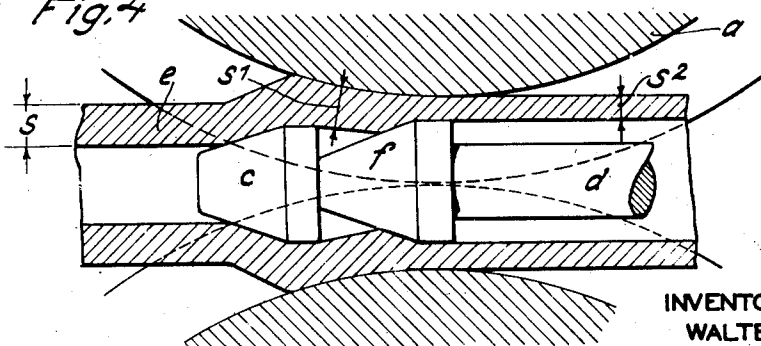


Fig. 4



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METHOD OF ROLLING TUBES

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This invention is for an improved method of rolling tubes on plug rolling mills.

With the ordinary methods of operation employed with plug rolling mills the heavy rolling operation necessitated when the walls of a tubular bloom are considerably reduced during one operation causes bulges similar to seams to be formed in the walls of the tubes produced and further the elongation of the work can only be effected, within moderate limits. These disadvantages are overcome by the present invention which consists of a method of rolling tubes on a plug rolling mill in which a tube is rolled in one operation in conjunction with at least two plug mandrels arranged in front of one another.

In order that the invention may be fully understood, reference is directed to the accompanying drawings, in which:—

Figure 1 is a diagrammatic view of a portion of a rolling mill illustrating the first stage in the method according to this invention.

Figure 2 is a diagrammatic view similar to Figure 1, illustrating the second stage of the method of treating a tube in accordance with this invention.

Figure 3 is a diagrammatic view similar to Figure 2 illustrating the positions of the plug mandrels of Fig. 2, after passage of the short length of tube rolled in Figure 1; while

Figure 4 is a diagrammatic illustration on a larger scale of the tube being rolled by mandrels of larger diameter than the interior diameter of the bloom.

Referring to Figure 1, a pair of rolls *a, b* (which may be arranged for rolling tubes of circular or oval cross-section) are first caused to roll a relatively short length of a tubular bloom *e* in conjunction with a plug mandrel *c* which is initially secured to the free end of a mandrel rod *d*. This preliminary operation causes a reduction in the wall of the bloom *e* from the dimension indicated at *s* to that indicated at *s'*. The mandrel rod *d* is then removed from the plug mandrel *c* which remains within the tube and the tube is withdrawn from the rolls *a, b*.

A plug mandrel *f* which in the example illustrated in Figure 4 is of larger diameter than the plug mandrel *c* is then secured to the mandrel rod *d* and the bloom *e* is then rolled in conjunction with the plug mandrel *f*.

It will be observed that after the rolling of the relatively short length of the tube which has been previously rolled in conjunction with the plug mandrel *c* the front end of the plug mandrel *f* abuts against the rear face of the plug mandrel *c* located within the tube (see Fig. 3) and the rolling operation is thereafter effected by the rolls *a, b* simultaneously, in conjunction with the two plug mandrels *c* and *f*, and the walls of the bloom are reduced to the dimension indicated at *s*².

During the rolling operation a certain tensional stress is produced in the walls of the tube located between the two plug mandrels *c* and *f* and the mandrel *c* serves as a guide for the tube and permits a reduction in the thickness of the walls of the bloom of a relatively much greater amount than has heretofore been possible. At the same time the tension produced in the walls prevents the material of the tube from becoming forced between the flanges of the rolls.

It will be observed that the outer diameter of the tube produced may be less than the outer diameter of the bloom *e* as indicated in Figure 1, or the external diameter of the said tube may be arranged to be substantially the same as that of the bloom *e* in which case the reduction in the thickness of the walls is effected entirely from the interior of the tube. Alternatively as indicated diagrammatically in Figure 4 the external diameter of the tube produced may be larger than that of the bloom.

This latter method is particularly favourable for the production of tubes in which the formation of longitudinal grooves is eliminated, whilst a reduction in the thickness of the tube walls can be obtained by the selection of a suitable plug. In particular the opening out process effects a rounding of the tube bloom which as previously stated, arises from the fact that bulging in the space between the rolls, is prevented.

I claim:

1. A method of rolling tubes on a plug rolling mill which comprises introducing a hollow bloom between a pair of rolls, arranging a plug mandrel secured to a mandrel rod coaxially within the bloom, rolling the said bloom over the said plug mandrel for a relatively short length of the bloom, detaching the mandrel rod from the said plug mandrel, withdrawing the bloom from between the rolls, securing a second plug mandrel to the mandrel rod, re-introducing the bloom between the rolls and arranging the said second plug mandrel coaxially within the bloom, rolling the bloom over the said second mandrel until the same contacts with the first plug mandrel within the bloom and thereafter rolling the bloom over the two plug mandrels in one operation.

2. A method of rolling tubes on a plug rolling mill which comprises introducing a bloom between a pair of rolls arranged to roll a tube of smaller external diameter than the bloom, arranging a plug mandrel secured to a mandrel rod coaxially within the bloom, rolling the said bloom over the said plug mandrel for a relatively short length of the bloom, detaching the mandrel rod from the said plug mandrel, withdrawing the bloom from between the rolls, securing a second plug mandrel to the mandrel rod, re-introducing the bloom between the rolls and arranging the said second plug mandrel coaxially within the bloom, rolling the bloom over the said second mandrel until the same contacts with the first plug mandrel within the bloom and thereafter rolling the bloom over the two plug mandrels in one operation.

3. A method of rolling tubes on a plug rolling mill which comprises introducing a hollow bloom between a pair of rolls, arranging coaxially within the bloom a plug mandrel, which is adapted to produce a predetermined reduction in the thickness of the walls of the bloom, rolling the said bloom over the said plug mandrel for a relatively short length of the bloom, detaching the mandrel rod from the said plug mandrel, withdrawing the bloom from between the rolls, securing to the mandrel rod a second plug mandrel which is adapted to produce a further reduction in the thickness of the walls of the bloom, re-introducing the bloom between the rolls and arranging the said second plug mandrel coaxially within the bloom, rolling the bloom over the said second mandrel until the same contacts with the first plug mandrel within the bloom and thereafter rolling the bloom over the two plug mandrels in one operation.

4. A method of rolling tubes on a plug rolling mill which comprises introducing a bloom between a pair of rolls arranged to roll a tube of smaller external diameter than the bloom, arranging coaxially within the bloom a plug mandrel which is adapted to

produce a predetermined reduction in the thickness of the walls of the bloom, rolling the said bloom over the said plug mandrel for a relatively short length of the bloom, detaching the mandrel rod from the said plug mandrel, withdrawing the bloom from between the rolls, securing to the mandrel rod a second plug mandrel which is adapted to produce a further reduction in the thickness of the walls of the bloom, re-introducing the bloom between the rolls and arranging the said second plug mandrel coaxially within the bloom, rolling the bloom over the said second mandrel until the same contacts with the first plug mandrel within the bloom and thereafter rolling the bloom over the two plug mandrels in one operation.

5. A method of rolling tubes on a plug rolling mill which comprises introducing a hollow bloom between a pair of rolls arranged to roll a tube of substantially the same external diameter as that of the bloom and arranging a plug mandrel secured to a mandrel rod coaxially within the said bloom over the said plug mandrel for a relatively short length of the bloom, detaching the mandrel rod from the said plug mandrel, withdrawing the bloom from between the rolls, securing a second plug mandrel to the mandrel rod, re-introducing the bloom between the rolls and arranging the said second plug mandrel coaxially within the bloom, rolling the bloom over the said second mandrel until the same contacts with the first plug mandrel within the bloom and thereafter rolling the bloom over the two plug mandrels in one operation.

6. A method of rolling tubes on a plug rolling mill which comprises introducing a hollow bloom between a pair of rolls arranged to roll a tube of substantially the same external diameter as that of the bloom and arranging coaxially within the bloom a plug mandrel which is adapted to produce a predetermined reduction in the thickness of the walls of the bloom, rolling the said bloom over the said plug mandrel for a relatively short length of the bloom, detaching the mandrel rod from the said plug mandrel, withdrawing the bloom from between the rolls, securing to the mandrel rod a second plug mandrel which is adapted to produce a further reduction in the thickness of the walls of the bloom, re-introducing the bloom between the rolls and arranging the said second plug mandrel coaxially within the bloom, rolling the bloom over the said second mandrel until the same contacts with the first plug mandrel within the bloom and thereafter rolling the bloom over the two plug mandrels in one operation.

7. A method of rolling tubes on a plug rolling mill which comprises introducing a hollow bloom between a pair of rolls, arranging coaxially with the bloom a plug mandrel

which is secured to a mandrel rod and adapted to produce, in conjunction with the rolls, a tube of larger external diameter than that of the bloom, rolling the said bloom over the said plug mandrel for a relatively short length of the bloom, detaching the mandrel rod from the said plug mandrel, withdrawing the bloom from between the rolls, securing a second plug mandrel of at least the same diameter as the first plug mandrel, to the mandrel rod, re-introducing the bloom between the rolls and arranging the said second plug mandrel coaxially within the bloom, rolling the bloom over the said second mandrel until the same contacts with the first plug mandrel within the bloom and thereafter rolling the bloom over the two plug mandrels in one operation.

8. A method of rolling tubes on a plug rolling mill which comprises introducing a hollow bloom between a pair of rolls, arranging a plug mandrel secured to a mandrel rod coaxially within the bloom, the said rolls and plug mandrel being arranged to produce a tube of larger external diameter than that of the bloom and a predetermined reduction in the thickness of the walls of the bloom; rolling the said bloom over the said plug mandrel for a relatively short length of the bloom, detaching the mandrel rod from the said plug mandrel, withdrawing the bloom from between the rolls, securing to the mandrel rod a second plug mandrel which is arranged to produce a further reduction in the thickness of the walls of the bloom, re-introducing the bloom between the rolls and arranging the said second plug mandrel coaxially within the bloom, rolling the bloom over the said second plug mandrel until the same contacts with the first plug mandrel within the bloom and thereafter rolling the bloom over the two plug mandrels in one operation.

In testimony whereof I have signed my name to this specification.

WALTER HERZ.