

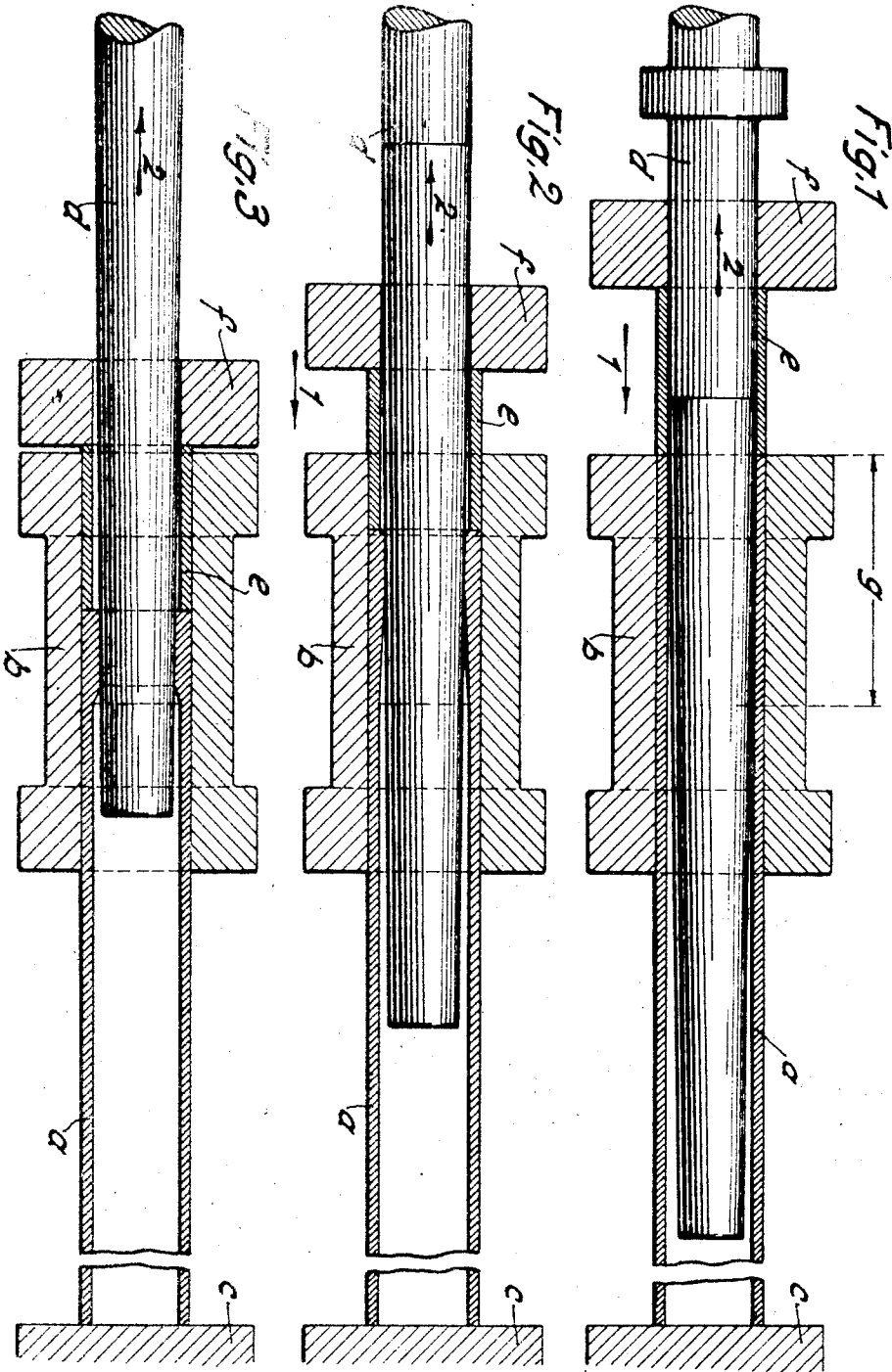
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PROCESS AND APPARATUS FOR THICKENING TUBE ENDS

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PROCESS AND APPARATUS FOR THICKENING TUBE ENDS

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The invention relates to thickening tube ends, particularly by upsetting. It is especially useful in connection with the construction of boring or drilling tools; but its use is not restricted to this type of tube.

One object of the invention is to produce a tube having a thickened end with the greatest possible speed and economy. A further object is the production of such a tube with a minimum number of process steps. Still a further object is the production of such a tube complete with a single heating. Other objects will appear upon consideration of the present specification.

The invention is shown by way of illustration in the accompanying drawings, in which—

Figure 1 is a longitudinal section of the apparatus and tube at the beginning of the upsetting operation,

Fig. 2 is a similar sectional view showing the tube and apparatus parts at an intermediate point of the upsetting, and

Fig. 3 is a similar longitudinal section at or near the end of the upsetting operation.

In the present invention the tube is thickened inwardly directly and in a single operation. The repeated heating and upsetting which has been necessary in the past, as well as the employment of several sets of tools, is thus eliminated. The process is accordingly accelerated, and the tube ends possess better mechanical properties than do those formed by previous methods.

Referring now more particularly to the drawings, it will be seen that a tube *a* has its end confined externally in a matrix *b* while an abutment *c* contacts with the tube end which is not being thickened. A tapered mandrel *d* extends within the tube *a* being in contact with the extreme end of the tube within the matrix *b*.

An upsetting ring *e* is placed over the mandrel *d* and rests against the end of the tube which is within the matrix *b*. At the outer end of the upsetting ring *e* there is provided a cross-piece *f* which is attached to the upsetting ring for a purpose which will later appear.

The end of the tube *a*, which is within

the matrix *b* is given an upsetting heat for about the length *g*, which softens the metal at the tube end. Now if pressure be applied to the cross-piece *f* in the direction of the arrow 1, this pressure will be transmitted through the upsetting ring *e* to the soft metal at the adjacent end of the tube *a*. This soft metal, being under pressure, will tend to flow in any direction in which the tube end is not confined, and if the tapered mandrel is withdrawn (see Figs. 2 and 3) the soft metal will tend to flow inwardly and to form an inward thickening at the tube end. I, therefore, apply pressure (for instance, hydraulic pressure) to the cross-piece *f*, thus forcing the upsetting ring *e* in the direction of the arrow 1. At the same time the tapered mandrel *a* is moved (preferably also by hydraulic means) in the opposite direction, that is to say, in the direction of the arrow 2, allowing the metal at the tube end to be upset gradually with an inward accumulation of material. The mandrel thus limits the extent of inward accumulation of tube material.

The present invention requires but a single heating of the tube end, and permits upsetting of the tube in a single operation, with but a single set of tools. The formation of folds is avoided and the tube end, therefore, possesses better mechanical properties than have been possible in such constructions in the past.

Of course, the upsetting ring and tapered mandrel may be operated in conjunction or independently. Also the tube end may be heated before or after being placed in the matrix. Further the abutment *c* may be made adjustable for obvious reasons.

With the understanding that the invention is not limited to the particular form here illustrated and described by way of example,

I claim:

1. A method of inwardly thickening a tube end which comprises confining externally the tube end to be thickened, upsetting the tube end over a tapered mandrel, and gradually withdrawing the mandrel to permit gradual inward accumulation of the material.

2. Apparatus for inwardly thickening a tube end, comprising a matrix for confining

the tube end externally, an upsetting ring, and a tapered mandrel withdrawable as the upsetting ring is pressed forward, to permit inward accumulation of tube material.

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

JOSEF BARTH.

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