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A. E. BECK.

MANUFACTURE OF TUBES.

APPLICATION FILED JAN. 3, 1906.

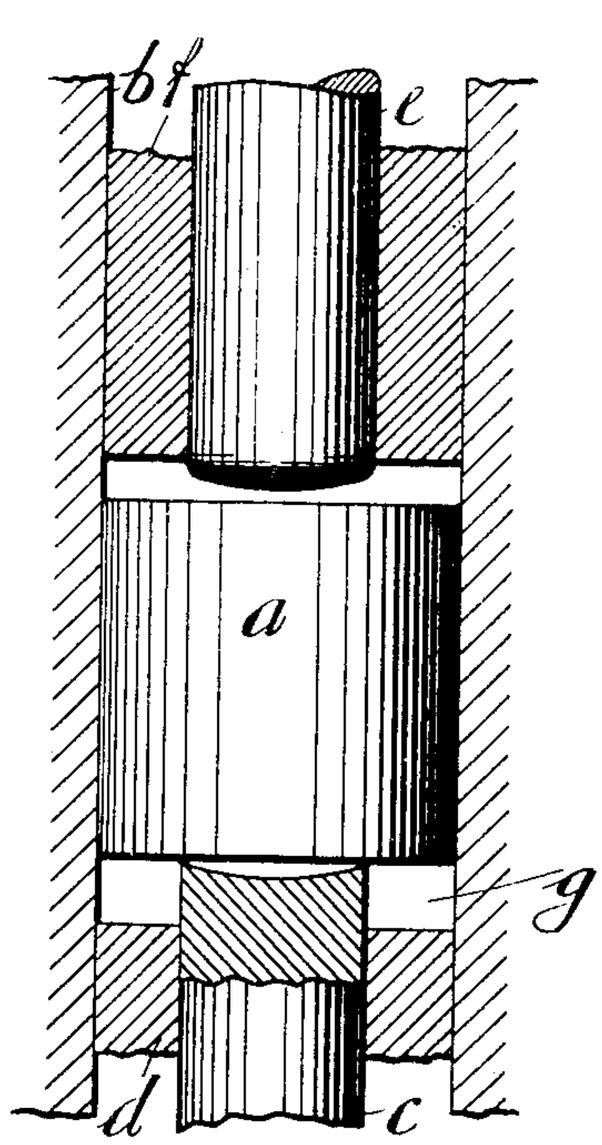

Fig. 1

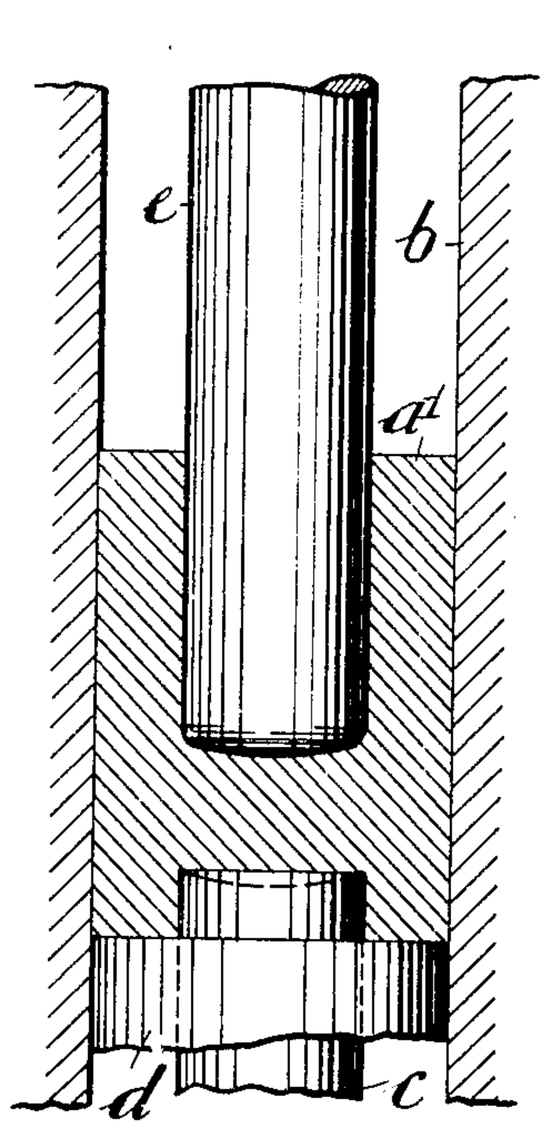

Fig. 2

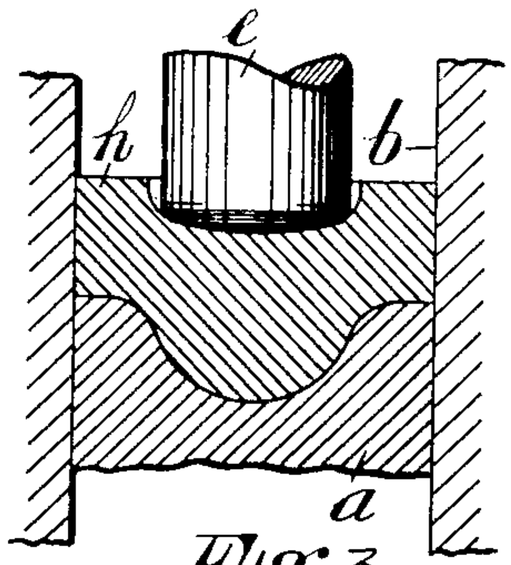

Fig. 3

Attest:

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UNITED STATES PATENT OFFICE.

ARTHUR EDWARD BECK, OF EARLSWOOD, ENGLAND, ASSIGNOR TO PERRINS LIMITED, OF WARRINGTON, ENGLAND.

MANUFACTURE OF TUBES.

No. 869,476. Specification of Letters Patent. Patented Oct. 29, 1907.

Application filed January 3, 1906. Serial No. 294,439.

To all whom it may concern:

Be it known that I, ARTHUR EDWARD BECK, a subject of Great Britain, residing at Earlswood House, Earlswood, in the county of Warwick, England, have invented new and useful Improvements Relating to the Manufacture of Tubes, of which the following is a specification.

This invention relates to the manufacture of tubes, particularly steel or iron tubes as employed for the conveyance of gas, water, steam, and for other like purposes.

The object of my invention is to produce such tubes in a weldless or jointless form and in a more direct and economical manner than heretofore.

Hitherto it has been the practice of tube makers to commence with what I designate a finished product in contradistinction to the raw material with which, as will appear hereafter, I begin when I make tubes in accordance with my invention. For example, the makers of steel tubes have commenced their operations with a steel rolled ingot, and the makers of iron tubes have commenced with an iron bar or strip. Labor and expense is incurred in the production of these finished products before the tube making operations proper begins. Proposals have been made to produce iron and steel tubes direct from molten metal, but they have not proved successful in practice. According to my invention I dispense with the formation of such finished products, and start my tube making operations direct from raw material *e. g.* molten steel or puddled iron ball direct from the furnace, and I subject such raw material in a heated and plastic condition to the following sequence of operations viz:—compression, piercing and rolling.

One way of performing my invention may be shortly described thus:—I take the raw material *e. g.* molten steel or puddled iron ball direct from the furnace and in the case of iron ball I introduce it direct into a container, and in the case of steel I pour the metal into a number of suitably sized ingot molds, and place the ingots one at a time in the container. Thus in both cases I introduce into the container raw material which is in a suitable condition to be compressed and pierced; and in the container it is submitted to combined compressing and piercing operations and finally after it is removed from the container it is reduced by means of pilger rolls to a tube of the required diameter and thickness. The object of doing this is to further insure consolidation of the metal, and to save containers *i. e.* to enable the hollow blooms made in one particular container to be available for subsequent reduction by various sets of pilger rolls of different sizes according to the size of the tube it is desired to make at any one time.

I will now with the aid of the accompanying drawings further describe how my invention may be performed in the most economical way with which I am at present acquainted.

Figures 1 and 2 are sectional elevations representing, in diagrammatic form, the means for effecting the combined compressing and piercing operation in the manufacture of tubes in accordance with my invention. Fig. 3 is a sectional elevation showing a modified arrangement of the combined compressing and piercing appliances.

The same reference letters in the different views indicate the same or similar parts.

The hot mass of steel or puddled iron, as *a*, is placed in a container *b* and is therein subjected to a combined compressing and piercing operation whereby it is converted into a thick walled tube or hollow bloom as *a'*. In the lower end of the container *b* there is a central ram *c* and an annular ram as *d*, arranged respectively within and without each other as shown. A central ram as *e* and an annular ram *f* enter the upper end of the container.

For the insertion of the mass of metal as *a* within the container *b* the rams *e* and *f* are completely withdrawn. After the insertion of *a* the said rams *e* and *f* are set in operation and thereby caused to press upon and so consolidate the metal forming *a*. The annular ram *f* is then retreated while the central ram *e* proceeds and pierces the center of the mass *a*, the displaced metal being free to flow back along the space vacated by the annular ram *f*. The said piercing operation, which is represented in progress in Fig. 2, continues until the upper central ram *e* is in contact or nearly in contact with the central ram *c* at the lower or inner end of the container *b*. The ram *c* is then caused to recede while the upper central ram *e* continues its movement sufficiently to pierce completely through the mass of metal *a* and so convert the same into a hollow bloom. On the completion of the piercing as aforesaid, the upper annular ram *f* may be brought down into contact with the upper end of the hollow bloom to retain the same during the withdrawal of the piercing ram *e* which is then effected. After such withdrawal the lower rams *c* and *d* are advanced into the container to expel the hollow bloom and also the small disk of metal punched out from the end of *a* by the piercing ram *e* when the lower or supporting ram *c* recedes, as hereinbefore described, at or near the end of the piercing operation. The lower central ram *c* may be made, as illustrated at Fig. 1, to project into the cylinder or container *b* in advance of its surrounding an-

nular ram *b* during the preliminary pressing and throughout the greater part of the piercing operation. An annular space as *g* is thus provided for the accumulation of the more fluid impurities which are squeezed out during the initial part of the compression.

I sometimes dispense, particularly in the production of steel tubes, with the annular ram *f* at the upper end of the container *b* and in place of same employ a false nose or guiding piece as *h*, Fig. 3. The said nose is interposed between the ram *e* and the work *a* during the preliminary compressing process and so forms an initial centering or aperture for the subsequent reception, after the removal of *h*, of the piercing end of the ram *e*. It also serves to consolidate the metal before the actual piercing operation. The lower central ram *c* may be a fixed ram or core having the annular ram *d* surrounding it. In that case the final piercing through of the lower end of the work *a* is effected by a slight advance of the annular ram *d* before the commencement of the withdrawal of the piercing ram *e*. The operation of the rams is preferably effected by hydraulic power applied in any well known manner.

Having thus described my invention what I claim as new and desire to secure by Letters Patent is:—

The manufacture of tubes from raw material by subjecting the crude or partially formed mass while in a plastic condition to a consolidating action which is immediately followed as a part of the same operation by a piercing action, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

ARTHUR EDWARD BECK.

Witnesses:
EDWARD MARKS,
JOHN MORGAN.