Jan. 16, 1923. 1,442,213.

L. H. BRINKMAN.

METAL DRAWING APPARATUS AND METHOD.

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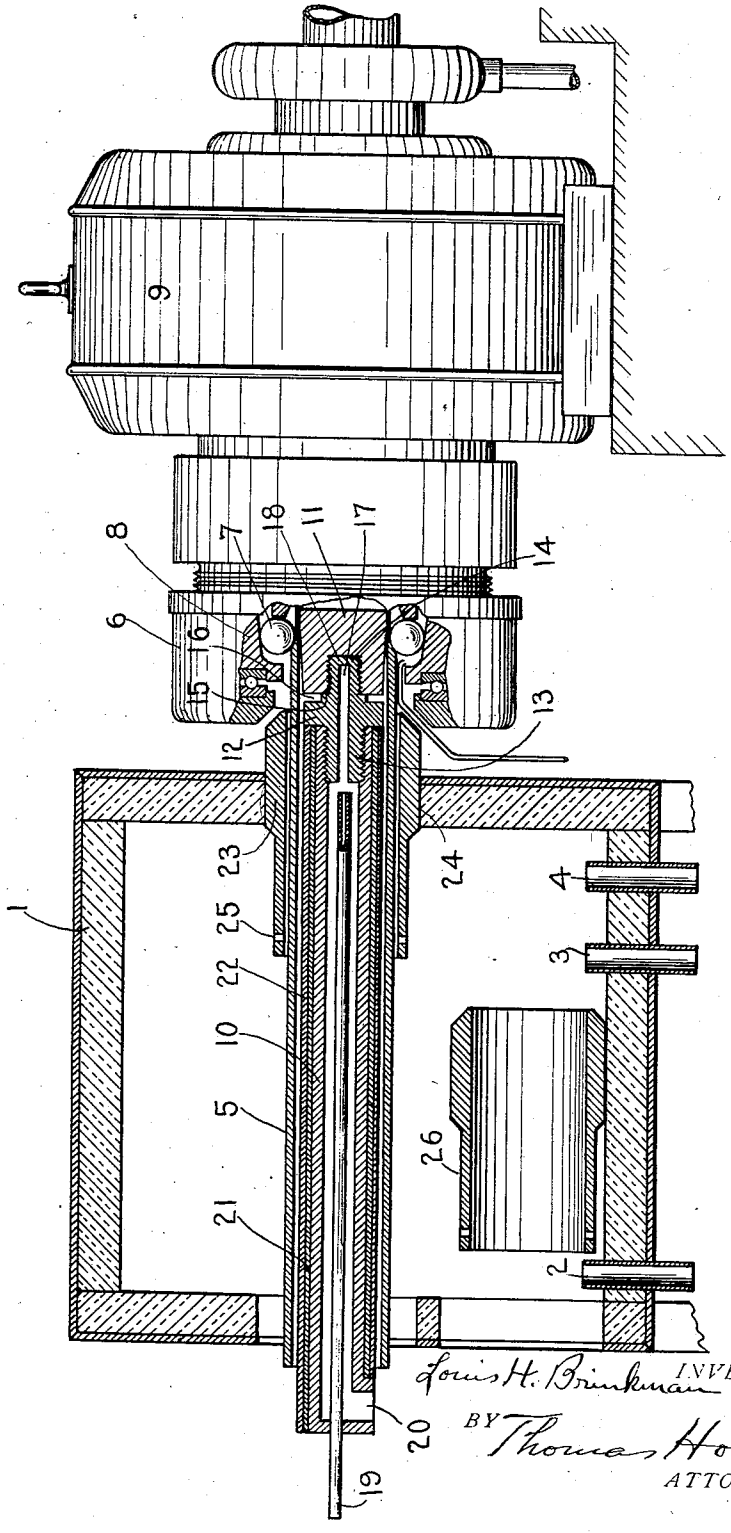

Louis H. Brinkman INVENTOR

BY Thomas Howe

ATTORNEY

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UNITED STATES PATENT OFFICE.

LOUIS H. BRINKMAN, OF GLEN RIDGE, NEW JERSEY, ASSIGNOR, BY MESNE ASSIGNMENTS, TO GENERAL SEAMLESS TUBE COMPANY, OF BLOOMFIELD, NEW JERSEY, A CORPORATION OF DELAWARE.

METAL-DRAWING APPARATUS AND METHOD.

Application filed February 10, 1919. Serial No. 275,938.

To all whom it may concern:

Be it known that I, LOUIS H. BRINKMAN, a citizen of the United States of America, residing at Glen Ridge, county of Essex, and State of New Jersey, have invented new and useful Improvements in Metal-Drawing Apparatus and Methods, of which the following is a specification.

This invention relates to the drawing of metal rods or tubes.

Where tubes, and particularly thin tubes, are heated in a furnace, or by other suitable means, and are then passed from the point of heating to a pass or die, such as a ball die, for reducing either the thickness or diameter of the rod or tube, the metal to be drawn is apt to become cooled so that it is not at a proper drawing temperature at the time it reaches the die or pass. The metal would have to be heated to a much higher temperature than is necessary for it to have upon its passage through the die to allow for the cooling in passing from the furnace to the die and if this cooling is large or the metal is thin, or both, it may be impossible to heat the stock to a sufficiently high temperature so that it will have the necessary heat upon its passage through the die.

It is therefore an object of the present invention to provide a method for conserving the heat of the stock prior to its entrance into the pass or die.

It is frequently necessary in drawing certain metals that they be maintained at a temperature during the drawing operation, which necessitates the maintenance of the mandrel head over which the tube is drawn, at a high temperature. In a former application, I have set forth that such head may be made to perform the desired operations by using a refractory metal, such as high speed steel, in forming the head. The head, however, is secured to other and less refractory parts of the mandrel, which, being unable to withstand the high temperature at which the head may be worked, are liable to become softened and destroyed, and furthermore it is often desirable to cool down the high speed steel head. Care in this last operation must, however, be exercised, as cooling fluid cannot be applied directly to the high speed steel head without danger of causing it to crack.

Further objects of the invention are to suitably cool the mandrel parts.

Further objects of the invention are to provide methods for accomplishing such cooling results.

By reason of being within the heated tube and also within the furnace, the mandrel is liable to become excessively heated and may become so heated that it will soften and bend.

It is a further object of the invention to provide a method of protecting the mandrel from the injurious heating as indicated.

It is a further object of the invention to provide means for heat insulating the mandrel.

Other and ancillary objects of the invention will appear hereinafter.

In the accompanying drawing which illustrates the invention,

The figure is a view partly in side elevation and partly in section of an apparatus embodying the invention and illustrating means whereby the method may be carried out.

Referring to the drawings, 1 is a suitable furnace, which may be heated by an oil flame, fuel or fuel and air being admitted to the interior of the furnace by suitable pipes or nozzles as 2, 3 and 4. Extending through the furnace is the tube 5 to be drawn through the die 6 having a series of balls 7 arranged circumferentially of the tube 5 and constituting the members of the die which operate upon the work. The ring 8 circumscribing the balls 7 is rotated by an electric motor 9 and suitable cooling means may be provided for the die parts. It is unnecessary herein, however, to describe in further detail the structure of the die or the arrangement of it in conjunction with the motor as such an apparatus is shown and described in my Patent No. 1,203,306, issued October 31st, 1916 and particularly with reference to Figs. 1 to 8 thereof, this showing including a draw bench for drawing the tube through the die which may be used in the apparatus of the present case. Within the tube extends a mandrel comprising the tube 10 extending through the furnace and having secured at its end a high speed steel head 11 lying under the balls 7 and between which and the balls the tube is reduced. The head 11 is secured to the tube 10 by

means of a member 12, having on the one end a screw threaded nipple 13 screwed into the end of the tube and on the other end a screw threaded nipple 14, screwed into the head 11. The member 12 is provided with a shoulder 15 which spaces the head 11 away from the member 12 by a space 16, thus retarding the communication of heat from the head to the member 12. The member 12 is of iron or steel of a less refractory character than that of the head 11 and at the high temperatures at which it is possible to work the head 11, the threads in the member 12 whereby the head 11 is secured, would be liable to soften and strip off. Accordingly means is provided for cooling the member 12 and particularly the nipple 14 so that its threads will not become sufficiently heated to be distorted, care being taken to prevent the cooling fluid from being dashed against the head 11. To this end the member 12 is provided with a central passage 17 which, it will be observed, does not extend entirely through the member 12 to the head, but is separated from the head by a partition 18. Directly opposite the mouth of the passage 17 is the end of a pipe 19 which, at its other end is connected with a suitable source of cooling water under suitable pressure. As the water is ejected under pressure from the end of the pipe 19, it is projected into the passage 17 and operates to cool the member 12 and the nipple by which it is connected to the head 11 as has been before referred to. All of the water which is expelled from the pipe 19, flows back through the tube 10 of the mandrel, thereby cooling the same, and is drained out of the opening 20.

To protect the tube 10 which would not ordinarily be of highly refractory material, from undue heating in the furnace, it is surrounded by a suitable heat insulating covering 21. This may be of asbestos which may be maintained in position by means of an enclosing metal sleeve 22. Inasmuch as the function of the sleeve 22 is simply to hold the heat insulation in place, it may soften to a considerable extent without affecting the operation of the apparatus and consequently it is not necessary for it to be absolutely refractory at the temperature to which it is subjected within the furnace.

In its passage from the furnace to the die, the tube to be drawn, particularly if it is thin, is liable to be unduly cooled. To preserve the heat of the tube in this passage so that it will be at a proper temperature when operated upon by the die, a sleeve 23 is provided which encircles the heated tube in its passage from the furnace to the die, this tube being of such a heat capacity and heated to such an extent that it will insure the proper heat of the tube to be drawn at the die balls. This sleeve 23 may be of any suitable material and is of sufficient mass to give the requisite heat capacity. It is furthermore removable from its seat 24 in the furnace wall, this seat being simply the walls of the hole through which the tube to be drawn and the mandrel pass, but enlarged sufficiently to accommodate the sleeve 23. When the tube length has been drawn through the die, the sleeve 23 may be withdrawn from its seat in the furnace walls by means of a tool inserted in the end of the furnace opposite the die, this tool having a hook adapted to be engaged in a perforation 25 in the sleeve. The rear portion of the sleeve in which these perforations are made is simply an extension for containing these perforations whereby the sleeve may be engaged and withdrawn by a tool as described. It is not therefore necessary that this rear portion of the sleeve should be of such large mass as the forward portion of the sleeve, as the latter is that portion of the sleeve which surrounds and conserves the heat of the tube to be drawn between the furnace and the die and must therefore be made of sufficient mass to provide the necessary heat capacity. It is therefore shown as thicker.

A spare heat conserving sleeve 26 is shown at one side of the furnace, this being heated up while the sleeve 23 is employed in the drawing operation. When the length of tube has been drawn through, the die sleeve 23 may be withdrawn as described and the sleeve 26 inserted in its place, the last mentioned sleeve being then heated to a degree suitable for heat conservation of the next length of tube drawn. By using a spare heat conserving sleeve, the delay incident to heating up a sleeve before each drawing operation, is to a large extent and perhaps totally avoided as, while one sleeve is being utilized, the other is being heated up.

In the operation of drawing a tube, the mandrel is withdrawn from the rear end of the furnace. A tube to be drawn is then entered within the furnace and when it has been heated to the desired temperature, a suitably heated sleeve 23 is placed in position. The tube is then passed on through the die and secured to the draw head as described in my patent above referred to. The mandrel is then entered within the tube from the rear of the furnace until the head is beneath the balls as shown in the drawing. The apparatus is then set in operation to draw the tube through the die over the mandrel, thus effecting the desired reduction. After the length of tube has been drawn through the die, the mandrel is withdrawn from the rear of the furnace, a new length of tube heated up and the operation as described, repeated indefinitely.

While the invention of apparatus has been illustrated in what is considered its best embodiment and the method has been recited in detail in connection with an apparatus

by which it may be carried out, it is to be understood that neither the invention of apparatus or method is limited to the apparatus of the drawings, nor is the method limited to the precise details recited.

What I claim is—

1. The combination with a pass for reducing metal, of a furnace for heating the metal to be drawn, a removable metal sleeve extending between said furnace and pass and through which the metal to be reduced passes, said sleeve being of heat capacity adapted to be charged with sufficient heat and also having radiating properties adapted to maintain the proper drawing temperature of the metal at the pass.

2. The combination with a pass for reducing metal tubes, of a furnace for heating the tube to be drawn, a removable metal sleeve extending between said furnace and pass and through which the tube to be drawn passes, said sleeve being of heat capacity adapted to be charged with sufficient heat and also having radiating properties adapted to maintain the proper drawing temperature of the tube at the pass, and a mandrel extending through the said furnace and sleeve into said pass.

3. The combination with a pass for reducing metal, of a furnace for heating the metal, a mandrel extending through said furnace and means for heat insulating the mandrel.

4. The combination with a pass for reducing metal, of a mandrel having a head of refractory material secured to a part of less refractory material and means for cooling the latter at its connection with said head, to prevent injury to said head.

5. The combination with a pass for reducing metal, of a mandrel having a head of high speed steel, said head being secured by screw threads to a less refractory metal part, and means for cooling said part to prevent injury to the screw thread.

6. The combination with a pass for reducing metal, a mandrel for metal drawing apparatus, comprising a refractory head, a tube of less refractory material, heat insulation on said tube, a member of less refractory metal than said head, said member having screw threaded connections with said head and tube and a passage for cooling fluid adapted to prevent impairment of the threads engaging with said head, said fluid being prevented from coming in contact with said head, and a pipe for cooling fluid extending within said tube.

7. The method of drawing metal which consists in heating an envelope and placing it in position, heating the metal to be drawn, passing the said metal through said envelope and reducing said metal, whereby the desired heating for the reducing operation, is secured.

In testimony whereof I have signed this specification this 31st day of January 1919.

LOUIS H. BRINKMAN.