April 17, 1951 J. W. OFFUTT 2,549,705

COLD REDUCING TUBULAR SECTIONS

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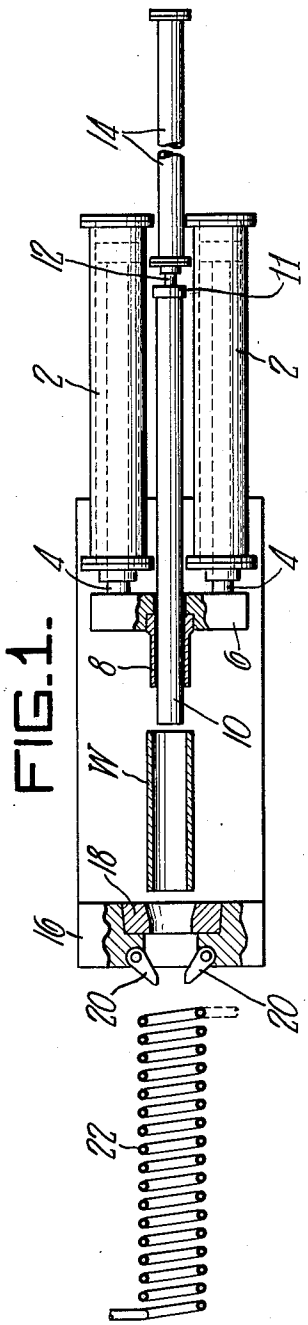


FIG. 1.

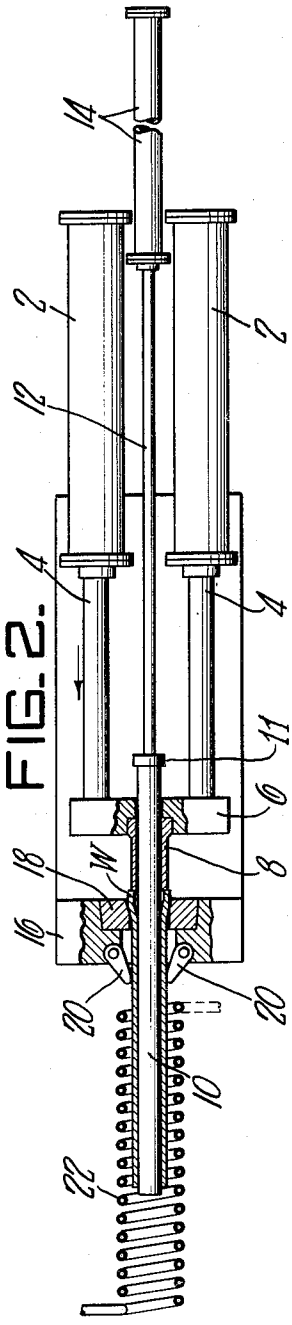


FIG. 2.

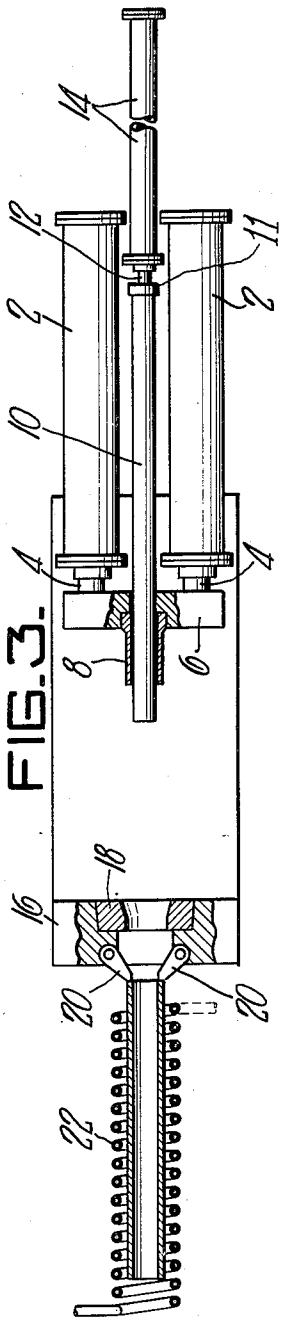


FIG. 3.

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COLD-REDUCING TUBULAR SECTIONS

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3 Claims. (Cl. 205—4)

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This invention relates to improvements in the art of cold-reducing tubular sections.

Cold-reducing tubular sections to obtain improved physical properties, accurate dimensions and smooth surfaces whereby thinner sections may be used and machining operations eliminated or reduced, is conventional practice. Such cold-reducing has heretofore been generally done by a cold-drawing operation which necessitates reducing or pointing one end of the tubular section in order to pass it through the cold-drawing die so that it can be grasped by the drawing tongs. This pointed section must later be removed and discarded as scrap which adds considerably to the cost of the product, particularly in the case of alloy and short tubular sections.

It is accordingly an object of the present invention to provide a method and apparatus for economically cold-reducing pipe sections of various lengths.

The foregoing and further objects will be apparent from the following specification when read in conjunction with the appended drawing, wherein:

Figure 1 is a plan view showing the apparatus at the start of a cold-reducing operation;

Figure 2 is a similar view showing the workpiece partially reduced; and

Figure 3 is a similar view after the cold-reducing operation has been completed and the workpiece stripped from the carrier mandrel.

Referring more particularly to the drawing, the numeral 2 designates hydraulic cylinders adapted to reciprocate rams 4 carrying a crosshead 6 which is counterbored on the forward side to receive an annular pusher member 8. A mandrel 10, having an enlarged end portion or head 11, is reciprocably mounted inside the pusher 8 and crosshead 6 and is adapted to be operated by a ram 12 and pressure cylinder 14.

Mounted forwardly of the crosshead 6 is a die holder 16 in which there is disposed concentrically about the mandrel 10 in its extended position, a reducing die 18. On the forward side of the die holder 16 are stripping fingers 20. It is noted that the outside diameter of the pusher member 8 is slightly less than the inside diameter of the die 18 so that the pusher member can be extended therethrough. The length of the pusher member 8 may be such that a workpiece can be pushed entirely through the die 18 and past the stripping fingers 20. However, it is ordinarily not necessary for the pusher 8 to extend the stripper 20 since when the workpiece clears the die 18, it will jump forward

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and clear the stripper. Thus the pusher 8 will only go far enough to clear the workpiece through the die. Further travel thereof is merely a waste of power. This permits the pusher to be of quite thin cross section since it can be quite short. In the case of long workpieces, the friction of the reduced tubing on the mandrel may, in some cases, be sufficient to clear the workpiece through the die without having the pusher 8 go therethrough. In such case, the cylinder 14 may be made heavier so that it can be used to assist in pushing the unreduced section of the workpiece through the die. These alternative modes of operation, usually depending on the length of the workpiece, are made possible because of the floating, independently acting and controllable mandrel 10 and pusher 8.

In front of the die holder 16 and in axial alignment therewith, there is preferably an electrically conductive coil 22 whereby a tubular section disposed therein may be heated by induced currents, preferably high frequency currents. However, a suitable gas furnace or other quick acting radiant heating may be used.

In operation, a tubular section or blank W to be reduced is disposed in front of the mandrel 8 and the cylinder 14 is operated to push the mandrel through the workpiece. When the front end of the mandrel 10 is just through the workpiece W, the cylinder 14 is made inoperative so that the workpiece enters the die positioned on the forward end of the mandrel. The cylinders 2 are then operated to advance the rams 4 and crosshead 6 whereby the pusher member 8 engages the rear end of the workpiece and as it continues to advance, forces the workpiece through the die 18 to reduce the diameter and, in conjunction with the mandrel 10, reduces the wall thickness thereof. As soon as the workpiece is partially through the die and its forward portion drawn down tightly on the mandrel bar 10, the cylinder 14 is made operative to assist or perform the drawing action, and, if necessary, when the workpiece is entirely through the die to push the mandrel with the workpiece forwardly so that the rear end of the workpiece will advance beyond the stripping fingers 20. At this point, the coil or other heating means may be energized to quickly heat the workpiece sufficiently to expand it slightly so as to permit the withdrawal of long workpieces from the mandrel. The cylinders 2 are then operated to withdraw the crosshead 6 and pusher member 8 and thereby permit the stripping fingers 20 to engage the rear end of the workpiece. Continued actuation

of the cylinders 2 causes the crosshead 6 to engage the head 11 of the mandrel and thereby withdraw or assist in the withdrawal of the mandrel from the workpiece which is held by the stripping fingers 20. The mandrel is then further withdrawn by action of the cylinder 14 to place it in workpiece loading position shown in Figures 1 and 3. The apparatus is then in position for the entry of another workpiece therein to be reduced in the foregoing manner.

The above described arrangement which provides for free longitudinal movement of the mandrel during the workpiece reducing operation, permits substantial area reductions and elongation which would not be possible if the mandrel did not have this floating action. Also by retracting the mandrel to permit positioning the workpiece, the stroke of the crosshead carrying the die can be reduced about 50% which simplifies press construction, speeds up operations and conserves power. When the workpiece is being pushed through the die, the mandrel will travel faster than the pusher sleeve 8 since a reduction of area of the workpiece is taking place which results in its elongation. In other words, the speed of travel of the unreduced portion of the workpiece is less than that of the reduced portion. As the mandrel is tightly gripped by the reduced portion of W, the mandrel will take the speed of travel of that portion and as it is loosely entered into the unreduced portion of the workpiece, it is free to travel at a different speed from that portion of the workpiece, while the pusher speed is naturally the same as that of the unreduced portion of the workpiece.

While I have shown and described one specific embodiment of my invention, it will be understood that this embodiment is merely for the purpose of illustration and description and that various other forms may be devised within the scope of my invention, as defined in the appended claims.

I claim:

1. In apparatus for reducing tubular sections by passage through a reducing die, a reciprocable mandrel constructed and arranged to be extended through the reducing die to define the interior diameter of a workpiece reduced therebetween, a cylindrical pusher member having a slightly smaller outside diameter than the inside diameter of said die reciprocably mounted concentrically and externally of said mandrel, means for pushing said member through said die and means for stripping a reducing workpiece from said die.

2. In apparatus for reducing tubular sections by passage through a reducing die, a reciprocable mandrel constructed and arranged to be extended through the reducing die to define the interior diameter of a workpiece reduced therebetween and to float with a tubular section being reduced, a cylindrical pusher member having a slightly smaller outside diameter than the inside diameter of said die reciprocably mounted concentrically and externally of said mandrel, means for pushing said member through said die and stripping fingers for stripping a reduced workpiece from said mandrel when said mandrel is withdrawn from said die.

3. In apparatus for reducing tubular sections by passage through a reducing die, a reciprocable mandrel constructed and arranged to be extended through the reducing die to define the interior diameter of a workpiece reduced therebetween and to float with a tubular section being reduced, means to positively reciprocate said mandrel, a cylindrical pusher member having a slightly smaller outside diameter than the inside diameter of said die reciprocably mounted concentrically and externally of said mandrel, means for pushing said member through said die independently of said mandrel, means on said mandrel adapted to be engaged by said pusher member pushing means whereby said mandrel reciprocating means and said pushing means may be conjointly operated to withdraw said mandrel from a reduced workpiece.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
532,434	Van Fleet	Jan. 8, 1895
1,722,787	Claus	July 30, 1929

FOREIGN PATENTS

Number	Country	Date
703,340	Germany	Mar. 6, 1941