

# UNITED STATES PATENT OFFICE.

WILLIAM A. MCCOOL, OF BEAVER FALLS, PENNSYLVANIA.

## METHOD OF MANUFACTURING DRAWN TUBING.

SPECIFICATION forming part of Letters Patent No. 602,416, dated April 12, 1898.

Application filed September 12, 1896. Renewed March 24, 1898. Serial No. 675,038. (No specimens.)

*To all whom it may concern:*

Be it known that I, WILLIAM A. MCCOOL, a citizen of the United States, residing at Beaver Falls, in the county of Beaver and State of Pennsylvania, have invented certain new and useful Improvements in Methods of Manufacturing Drawn Tubing, (for all or parts of which there have been issued to me Letters Patent in the Kingdom of Great Britain and Ireland, No. 25,686, dated November 14, 1896; in France, No. 270,462, dated September 14, 1897, and in the Kingdom of Belgium, No. 130,827, dated September 24, 1897;) and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My present invention relates to improvements in the manufacture of cold-drawn tubing. Heretofore it has been customary in the manufacture of this class of tubing to subject the tubular blank, which has generally been composed of specially-prepared steel, to the action of acid to loosen the oxid or scale therefrom, then remove such loose scale, and subject the blank to the action of lime to prevent further oxidation. After this the blank is drawn over a mandrel and through a die to increase its diameter slightly, and the above-described steps will be repeated until a tube of the desired diameter is produced. Such a process of manufacture is objectionable, however, because of the length of time and expense incident to its use and because the tube could be expanded but slightly at each passage through the die; also, the action of the acid tends to destroy the strength of the metal and injuriously affects the die and mandrel.

The object of my present improvement is to provide a method in which it will be unnecessary to employ either lime or acid and by which a relatively larger expansion of a blank can be effected at each passage through the die.

In carrying out my invention I take a tubular blank which may be prepared according to the manner described in my application Serial No. 609,982 or other suitable manner, such blank having been annealed, and remove all "scale" from both exterior and in-

terior surfaces thereof by means of a blast of chilled shot or similar material. This acts to remove the scale and also pit the surfaces of the metal, so that in the subsequent drawing the surface metal will flow more readily, and I am enabled to effect a relatively larger expansion of the tube by a single passage through the die than would be possible if the blank had been treated in the manner heretofore followed. After the tube has been drawn or subjected to the action of the die and mandrel the ends thereof are plugged tightly with asbestos plugs and it is placed in an annealing-furnace. The asbestos plugs exclude air and gas from the interior of the pipe and prevent material oxidation of the inner surface.

The steps above described are repeated until the tube has reached the desired diameter.

From time to time during the above-described process of manufacture the tubes are washed in a soda solution to prevent the formation of rust and to remove any grit or dirt that may lodge thereon.

From the above description it will be seen that in carrying out my process neither acid nor lime is employed at any stage, and thereby I avoid weakening the metal being drawn, deleteriously affecting the dies and mandrels employed, &c., which, as above noted, are some of the objectionable results of the acid processes commonly employed. As pointed out above, also, by closing the ends of the tube to be annealed a relatively light or thin scale is formed on the inner surface of the tube during the annealing process. This is very important, as it enables me to effectively clean the inner surface prior to any subsequent drawing by a light blast.

While I have above described my improved process as applied to the manufacture of tubing, I am aware that it is also applicable to the manufacture of other forms.

What I claim is—

1. The herein-described method of drawing metal, it consisting in removing oxid or scale from a blank by the action of a blast charged with abrading material, in contradistinction to subjecting the blank to the action of an acid, washing the blank in a soda solution,

and subjecting the cleaned blank to the action of a draw-bench, substantially as described.

2. The herein-described method of manufacturing drawn tubing, it consisting in removing scale from both the exterior and the interior surfaces of a tubular blank by the action of a blast charged with abrading material, in contradistinction to the use of acid, subjecting said cleaned blank to the action

of a draw-bench, and closing the ends of the blank and annealing it, substantially as described. 10

In testimony whereof I affix my signature in presence of two witnesses.

WILLIAM A. McCOOL.

Witnesses:

JOHN W. CULMER,

JAMES F. MERRIMAN.