A. YOUNG & T ROWLANDS.

METHOD OF MANUFACTURING HOLLOW METAL RODS, BARS, AND THE LIKE.

APPLICATION FILED JAN. 7, 1908.

993,631. Patented May 30, 1911.

Fig. 1.

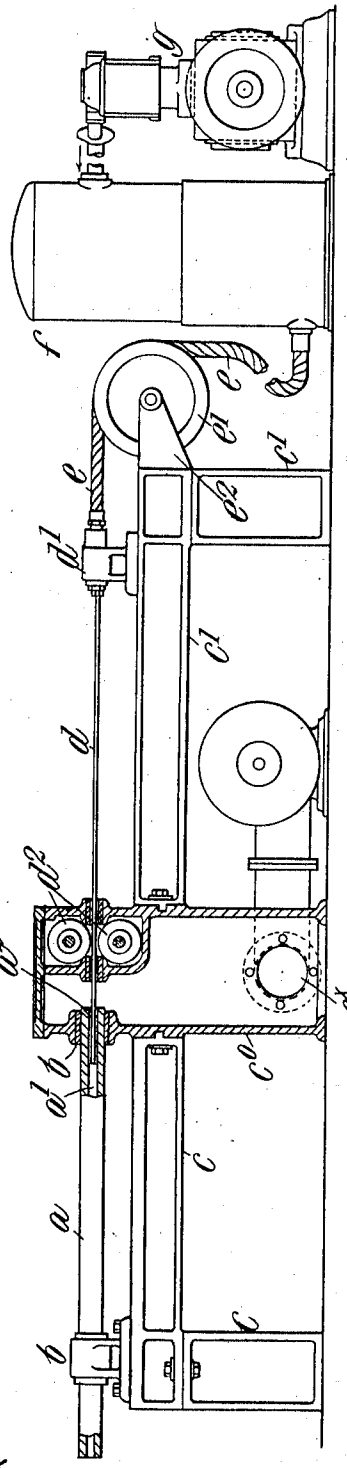
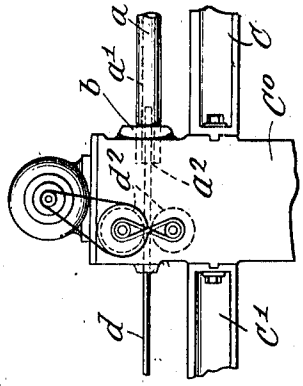


Fig. 2.



Witnesses:

Histon B. Moulton

Addison I. Gardner

Inventors.

Arthur Young.

Thomas Rowlands.

By Horace B. Ellis

Attorney

UNITED STATES PATENT OFFICE.

ARTHUR YOUNG AND THOMAS ROWLANDS, OF SHEFFIELD, ENGLAND.

METHOD OF MANUFACTURING HOLLOW METAL RODS, BARS, AND THE LIKE.

993,631. Specification of Letters Patent. Patented May 30, 1911.

Application filed January 7, 1908. Serial No. 409,711.

To all whom it may concern:

Be it known that we, ARTHUR YOUNG and THOMAS ROWLANDS, subjects of the King of Great Britain, residing, respectively, at 27 Fosters Buildings, High street, Sheffield, and 944 Ecclesall road, Sheffield, both in the county of York, England, have invented certain new and useful Improvements Relating to the Method of Manufacturing Hollow Metal Rods, Bars, and the Like, of which the following is a specification.

This invention relates to the manufacture of hollow metal rods, bars and the like, and particularly to those rods or bars known generally as "hollow drill steel."

In the manufacture of hollow steel bars or rods the following method has been proposed:—A steel bar, billet or ingot is formed with a central hole which is filled with appropriate refractory material such as siloxicon, silica, alumina, or other suitable substance, to serve as a core and the ends are plugged. Siloxicon is a well-known substance made by heating carbon and silica in an electric furnace to an extremely high temperature, and its approximate formula is Si_2C_{20}. The bar, billet or ingot together with its core is then heated and submitted to repeated rolling operations until a rod or bar of the required dimensions is obtained, after which the core is removed. This removal of the core has hitherto been effected by a drilling operation. This operation gives rise to considerable trouble, particularly when the diameter of the core is small and consequently difficult to remove by drilling, and partly because the core in the course of the rolling operation generally assumes a more or less oval or irregular cross section, so that parts of it remain in the hole after the drilling. Furthermore the drilling entails a considerable amount of time, and consequently adds to the expense of the manufacture. Moreover the material of the core is hard. and quickly dulls and wears a drill.

The chief object of our invention is to overcome the above stated difficulties.

According to our invention the removal of the core after the rolling operation, is effected by means of a fluid which, in the form of a fine jet at a high pressure, is caused to progressively follow, and impinge upon the core whereby the latter is continuously worn down or disintegrated and blown out or discharged from the hollow bar. In this manner the hole in the bar, even if it has become of oval or irregular section in the course of the rolling operations, will be cleared of the core.

In order that the said invention may be clearly understood and readily carried into effect we will proceed to describe the same with reference to the accompanying drawing Figure 1 of which illustrates diagrammatically a form of apparatus adapted for accomplishing the objects aimed at, and Fig. 2 of which shows diagrammatically a means to progressively enter the fluid conveying tube into said hollow steel bar.

In the exemplary embodiment of the apparatus adapted for carrying the invention into practice, the hollow drill steel or other hollow rod or bar a is secured in holders b b mounted on a suitable standard or support c and the plugs usually inserted for retaining the refractory core a' during the rolling operations having been removed, a small tube d, which may be of steel, is introduced into the hole or bore a^2. The tube d is supported at one end by a block or holder d' and at the other end is fed forward and guided by rollers d^2 d^2 which may be driven by a suitable motor or other device. The said tube d is in communication, by means of a flexible pipe or tube e, with a compressed air reservoir f; the aforesaid pipe or tube e being guided and supported by a grooved pulley or sheave e' mounted in brackets e^2 carried by the standard c' forming a continuation of the standard or support c. The compressed air may be supplied to the reservoir f by means of an air compressor g operated in any suitable or convenient manner. By these means fluid under pressure such as air is supplied to the tube d which progressively enters the hollow drill steel and from which the said fluid issues in the form of a fine jet and impinges upon the core a' so that the latter is continuously worn down as herein described, and discharged from the aforesaid hollow rod or bar a and the bore thereof cleared of the said core. The end of the tube d projects into a closed chamber c^0 which may be formed or provided with an aperture c^x arranged in connection with a fan or other exhausting or removing means so as to provide for the removal of the fine particles resulting from the method of removing the core.

In the operation of removing the core it will be understood that, in the arrangement illustrated, the tube d is caused to advance and for this purpose the support d' may be

adapted to travel along the upper surface of the support c'. Instead of the tube d being adapted for traveling, the hollow drill steel a may be mounted in such a manner as to be capable of longitudinal movement, thus also effecting a progression of the jet through the tube, and instead of compressed air any other suitable fluid which will not substantially chemically affect the material of the hollow tube or rod may be used without departing from the spirit and scope of the invention.

What we claim and desire to secure by Letters Patent of the United States is:—

1. The method of removing a refractory core from a hollow rod or bar which consists in discharging a jet of a gaseous fluid under pressure directly against the end of said core, and progressing said jet through said rod or bar as rapidly as said core is disintegrated by the action of said jet.

2. The method of removing a refractory core from a hollow rod or bar which consists in discharging a jet of a gaseous fluid under pressure directly against the end of said core, progressing said jet through said rod or bar as rapidly as said core is disintegrated by the action of said jet, and conveying away the particles of said core as they are delivered from said bar by the action of said jet.

In testimony whereof we affix our signatures in presence of two witnesses.

ARTHUR YOUNG.
THOMAS ROWLANDS.

Witnesses:
ALICE L. JOHNSTON,
JOHN B. HOPKINS,
A. C. MANDOTY,
F. MASTERS.