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P. A. E. ARMSTRONG

APPARATUS FOR REMOVING SAND CORES FROM HOLLOW DRILL ROD BY SAND BLAST

Original Filed Dec. 13, 1919

FIG 2

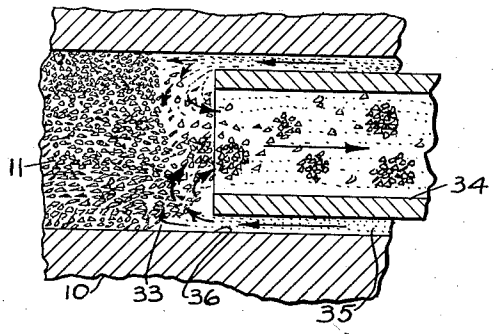


FIG 3

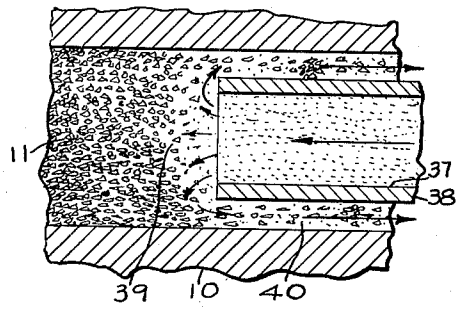
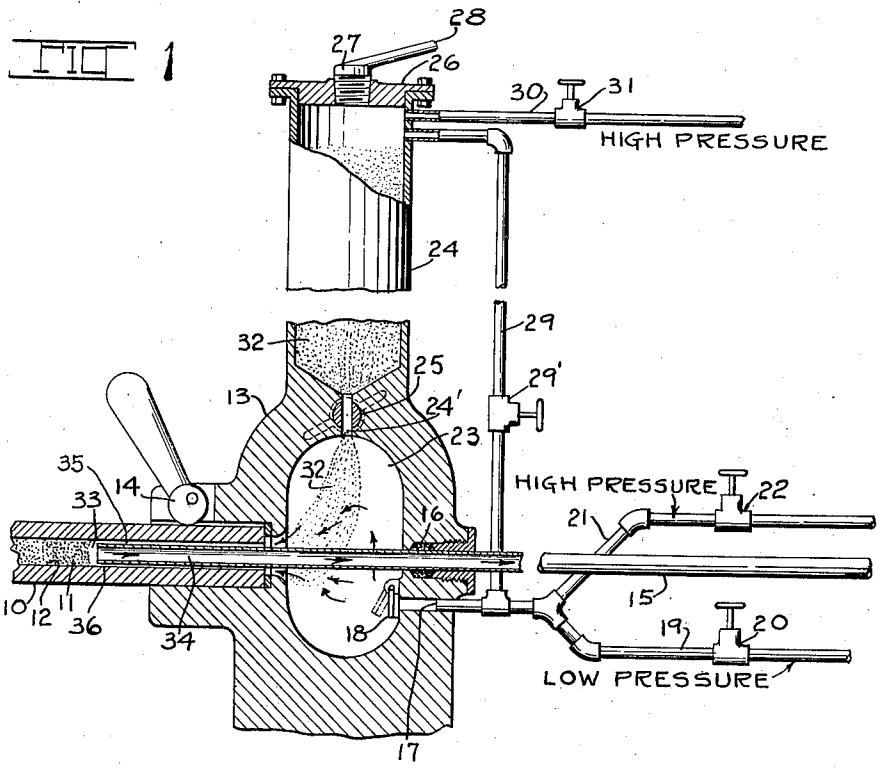


FIG 1



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UNITED STATES PATENT OFFICE.

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APPARATUS FOR REMOVING SAND CORES FROM HOLLOW DRILL ROD BY SAND BLAST.

Original application filed December 13, 1919, Serial No. 344,738. Divided and this application filed October 28, 1920. Serial No. 420,186.

To all whom it may concern:

Be it known that I, PERCY A. E. ARMSTRONG, a subject of the King of Great Britain, and a resident of Loudonville, county of Albany, State of New York, have invented certain new and useful Improvements in Apparatus for Removing Sand Cores from Hollow Drill Rod by Sand Blast, of which the following is a specification.

My invention relates to apparatus for removing sand cores from tubular bodies, such as hollow drill rod, by means of a sand blast. The term sand core is used herein as a convenient expression to cover cores of various refractory materials, such as sand, dead burned magnesite, talc powder, lime, zirconia and the like. The present application is a division of my prior copending application Serial #344,738, filed December 13th, 1919.

In the manufacture of tubular bodies such as hollow drill rod by hot working a hollow ingot with a sand core therein for elongation and reduction of cross section of the ingot and core, as by rolling, the core in the resulting elongated rod of reduced cross section is extremely compact and difficult to remove.

Heretofore, so far as I am aware, such removal has been accomplished by drilling or by air blast. Drilling operations are troublesome, slow, and expensive; and while compressed air may be used for this purpose, the difficulty with the use of the air blast, not laden with abrasive particles, resides in the comparatively weak original attack of the air upon the resistant core. When the air or other gaseous fluid is laden with abrasive particles, making what is known as a sand blast, this difficulty is avoided, the initial attack is highly powerful and effective, and the material of the core is rapidly broken down and removed.

The accompanying drawings illustrate forms of apparatus embodying my invention.

In the drawings Fig. 1 is a transverse section of an apparatus in which the débris of the core is discharged through a pipe and the abrasive laden air enters around the pipe and between it and the bore walls. Fig. 2 is an enlarged sectional diagrammatical view showing the operation of the apparatus of Fig. 1, and Fig. 3 is a view similar to Fig. 2, but showing the abrasive laden air conducted in through the pipe and the discharge taking place through the annular space between the outside of the pipe and the walls of the bore.

Reference numeral 10 designates the tubular body, such as a drill rod, and 11 the sand core which is to be removed from the bore 12. The hollow head 13 is supported in any suitable manner, and the tube 10 is removably clamped therein by suitable means, such as the cam 14. The pipe 15 extends into head 13 through a packing device as indicated at 16, in line with the bore 12; and the pipe 15 is introduced into bore 12 and advanced therein as the core material is removed. Various means may be used for advancing the pipe 15.

Air under pressure is admitted to head 13, as by pipe 17, provided with means such as flap valve 18 to prevent sand from getting into the air pipe. Two sources of air, one at higher pressure than the other are preferably provided, as, for example, pipe 19, controlled by valve 20 may carry compressed air at suitable pressure for sand blast work, and pipe 21, also connected to pipe 17, and controlled by valve 22 may serve to supply compressed air at a higher pressure. Instead of air other suitable gaseous fluids may be used.

Means are provided for supplying abrasive particles, as for example, fine sand, to the chamber 23 in head 13. In the form shown, a relatively tall and narrow canister 24 is provided communicating with chamber 23 by passage 24, controlled by valve 25. The canister is preferably made tall to carry a sufficient quantity of abrasive, and narrow to avoid undue pressure on the head 26, which is preferably bolted in place, and provided with a plug 27 having a handle 28 for convenience in filling with sand from time to time. The pressures are preferably balanced on opposite sides of valve 25, as by the by-pass pipe 29, controlled by valve 29′. A pipe 30, controlled by valve 31 is preferably led to about the top of canister 24, and serves when desired, to connect same to the source of high pressure, and such connection may be used separately when desired, as, for example, if passage 24′ or valve 25 should get clogged up and require freeing by admitting high pressure momentarily behind the sand.

At such times pipe 17 is protected from entry of sand, if the low pressure connection should be open, by flap valve 18, and valve 29′ may be closed.

When the air laden with abrasive material 32 is conducted into tube 10 around the outside of pipe 15, as shown by the arrows in Fig. 1, it is confined so as to exert its primary attack against the sand core in a narrow annular region adjacent to the bore walls, as indicated at 33, Figs. 1 and 2. Due to the presence of the abrasive particles the initial attack on the sand core in this region is highly effective, and the core material being loosened in such annular region and freed from the bore walls is rapidly broken up and discharged through the bore 34 of pipe 15.

As the sand or other abrasive material 32 may be quite finely divided, no difficulty is encountered in delivering same through the narrow annular passage 35 between pipe 15 and the walls 36 of bore 12, and the pipe 15, may be of comparatively large diameter, leaving the bore 34 thereof sufficiently large for discharge of particles of comparatively large size, which may result from the effective breaking up of core 11 by the sand blast.

In the alternative apparatus of Fig. 3, the sand blast enters through the bore 37 of pipe 38, is discharged centrally against the face of the core 11, as at 39, and the débris of the core, together with the sand and air of the sand blast, are discharged through the annular passage 40 about pipe 38.

The preferred mode of applying the sand-blast, however, is as shown in Figs. 1 and 2, since the alternative mode of Fig. 3, while usable, requires a smaller pipe 38 in order to leave sufficient room for discharge of core particles of even moderate size, and in the case of making hollow drill rod having a completed bore of only about ⅜ of an inch diameter, it is desirable to be able to use a pipe of maximum size and ruggedness, also the walls of the drill rod bore are likely to be more or less irregular and rough, which also interferes with free outward passage of comparatively large particles around the pipe 38, whereas with the form of Figs. 1 and 2 the particles have a free outward passage through the smooth bore 34 of the relatively large diameter. Also the form of Figs. 1 and 2 is better adapted for removal of hollow center cores, which break down rapidly when attacked by sand blast close up to the bore walls.

To make use of the apparatus the rod or tube containing the core to be removed is secured in place and the air turned on, preferably the low pressure air, by means of valve 20, the sand valve 25 being opened sufficiently to admit the requisite amount of sand to chamber 23, and the removal of the core is effected as has been described, the pipe being advanced as needed to keep the sand blast up to its work on the receding face of the core. If the sand passage 24 or valve 25 should be clogged, valve 31 can be opened and valve 29′ closed for a short interval, which will usually be all that is necessary to free the sand passage. If the discharge from the tube 10 should become clogged it may be freed by admitting the high pressure air by valve 22, valve 20 being preferably closed at such times. The discharge can be connected with a source of suction, if desired, though ordinarily this is unnecessary.

It is to be understood that the apparatus shown is only for illustration and for affording an understanding of the invention, and that changes and modifications may be resorted to within the scope of my claims.

I claim:

1. Apparatus for removing a sand core from the bore of a tubular body, comprising a member containing a mixing chamber, means for supplying sand to said chamber, means for supplying gaseous fluid to said chamber under pressure, an outlet passage from said chamber being provided in a wall thereof, means for holding the cored tubular body with the cored part in register with said passage, and an outlet pipe for core material discharged from the said tubular body, said pipe extending through said chamber and passage and adapted to project into the bore of the tubular body.

2. In apparatus for removing hardened cores from tubular bodies, such as hollow drill rod and the like, a member having a mixing chamber provided therein, and said chamber having an outlet adapted to be brought into communication with the end of the hollow drill rod, outlet means for core material discharged from the tubular body, means for supplying air under pressure to the mixing chamber, check valve means for preventing backward flow of air from the mixing chamber, a sand reservoir above said chamber and having valved communication therewith, a by-pass pipe communicating with the air supply pipe for said chamber and with the space over the sand in the reservoir for balancing the pressure upon opposite sides of the sand, and high pressure air supplying means for communicating with the mixing chamber or with the sand reservoir above the sand therein, whereby any clogged sand may be blown out and the obstruction removed.

In testimony that I claim the foregoing I hereto set my hand, this 26th day of October, 1920.

PERCY A. E. ARMSTRONG.