

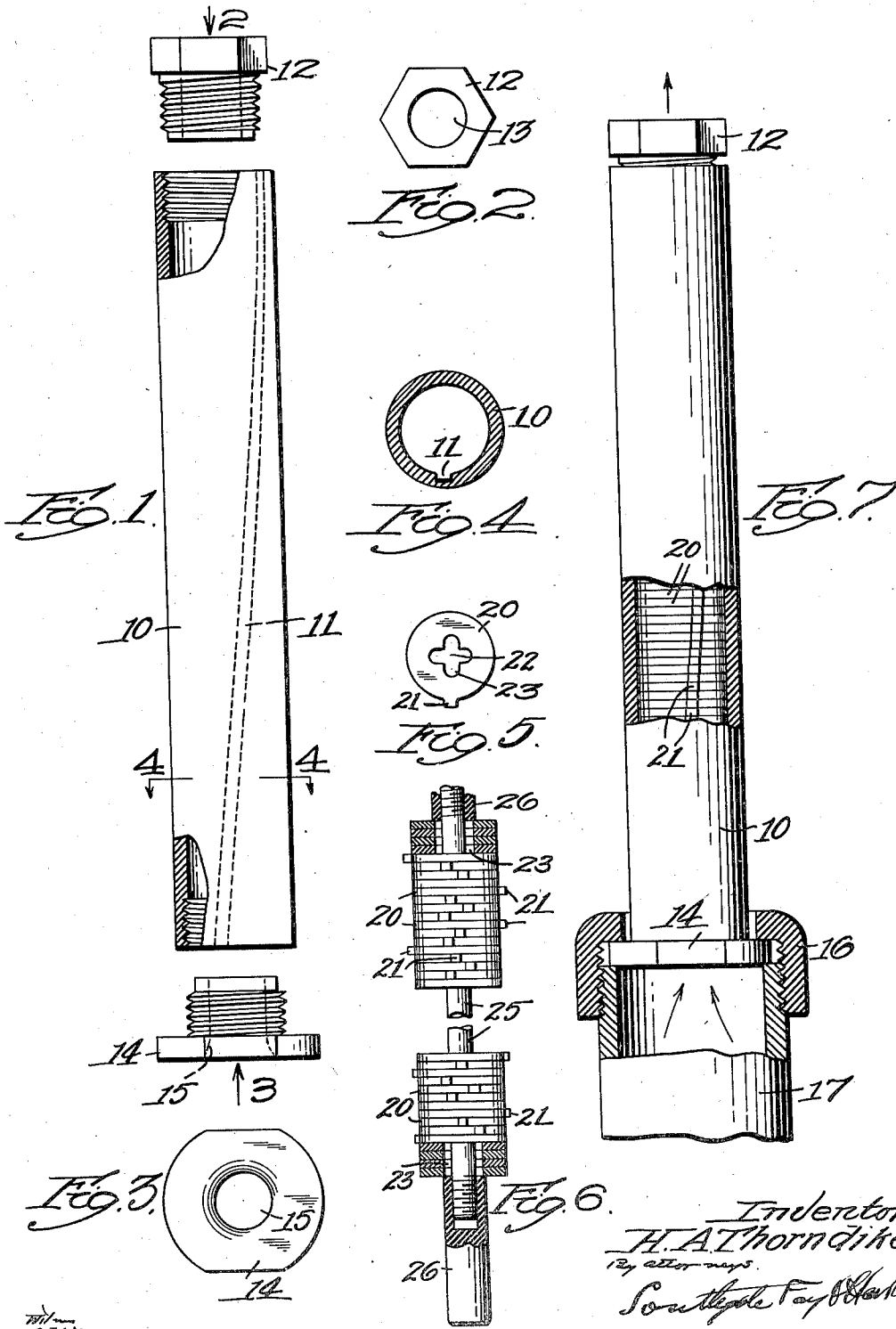
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SANDBLAST NOZZLE

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SANDBLAST NOZZLE

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The principal objects of this invention are to provide a construction of sand blast nozzle which will give a whirling motion to an abrasive stream of sand or other abrasive forced from a nozzle by compressed air; to provide means by which the motion of the sand or abrasive as it comes through the nozzle will tend to concentrate and condense the abrasive stream instead of spreading it, thereby greatly increasing the cutting effect of the abrasive so that it will produce a shearing cut on the surface it strikes; to provide a construction in which the stream of abrasive on account of the above described action, will not cause such a wide diversion of the abrasive when it rebounds from the surface it acts upon and therefore the operator can stand at a greater distance from the work than has been the case heretofore and can get a full view of the work without being so near it and his position will still be outside the dust area; to provide a construction in which the same nozzle can be used a greater length of time than has been possible heretofore on account of the increased cutting; also to provide a construction in which the inside of the nozzle can be taken out and replaced in several different ways so as to bring short surfaces of the interior of the nozzle to the outlet end where the wear occurs, thereby increasing the life of the nozzle; to provide a construction of nozzle which comprises a rifling of the passage through the nozzle; to provide a series of discs having non-circular passages therethrough to form the passage through the nozzle which can be rifled by placing them in the nozzle slightly offset from each other circumferentially; to provide the discs with projections located in a rifle groove in the casing; and to provide a convenient means for mounting the discs in the nozzle.

Other objects and advantages of the invention will appear hereinafter.

Reference is to be had to the accompanying drawing, in which

Fig. 1 is an elevation of the casing of a preferred form of sand blast nozzle constructed in accordance with this invention, broken away to show interior construction, and also showing the nuts used at the discharge and intake ends of the nozzle;

Fig. 2 is a plan of the outlet flange nut;

Fig. 3 is a plan of the opposite flange nut used for the connection of the hose;

Fig. 4 is a transverse sectional view on the line 4—4 of Fig. 1;

Fig. 5 is an elevation of one of the discs used to form the internal passage for the abrasive;

Fig. 6 is a side view of a plurality of these discs, shown mounted on a rod before insertion in the nozzle; and

Fig. 7 is a view similar to Fig. 1 of the complete nozzle with the discs in position and showing the connection of the flange nut at the intake end with a supply hose.

This invention constitutes an improvement over the best types of sand blast nozzles now in use. They generally consist of a casing having a smooth bored hole all the way through it for the delivery of the sand or other abrasive under the pressure of an air current. A stream of sand propelled through the nozzle produces detrimental results when it is in operation, and it is the main object of this invention to alleviate such results. The usual nozzles result in the spreading of the sand as it leaves the nozzle and the result of this is that much of the sand is projected at an angle against the surface being acted upon. This results in a cloud of dust arising from this blast while the work is going on and forces the operator to stand very close to the work. It is also detrimental to the health of the operators and prevents a clear view of the work.

These nozzles cannot concentrate the stream of abrasive on account of the feathering out of said stream immediately upon the stream leaving the muzzle of the nozzle. By this expansion of the stream and the consequent projecting of some of the sand in an angular direction the cut made cannot be perfectly sharp and the efficiency of the nozzle is reduced on this account. The present day smooth bore nozzles can produce only a "hammering" or "pecking" effect on the surface to be cleaned. This effect is thereby governed in actual accomplishment by the size, weight and condition of the sand and the pressure of delivery of the propelling air under pressure.

In accordance with this invention the smooth bore principle is eliminated and a rifled nozzle is provided which can be made in any length desired.

In its preferred form the nozzle consists of a cylindrical casing made of any desired material but preferably of steel. Throughout the entire length on the inside or inner surface and extending lengthwise, one or more curved grooves are cut or molded, one groove generally being sufficient. This groove has its ends offset from each other. Any desired amount of twist at a given length can be provided.

In the form shown this helical groove forms a part of a master rifling or guide for a series of

filling discs which are perforated all exactly alike and of non-circular shape so that when all of them are placed in the same relationship to the helical groove, the inside passage formed by the successive perforations in the disc will present a rifle surface for the nozzle.

The casing 10 is closed at the discharge end by a flange nut 12 which is screw threaded outside to screw into the end of the casing 10 and has a cylindrical opening 13 therethrough. Also at the other end of this tube is a similar nut 14 also perforated at 15. These nuts can be made of various materials, preferably steel. The nut 14 is shown herein as having a flange but that is not strictly necessary. It is formed of any design to provide the double function of closing the tube at the entrance end and at the same time forming with a cup connection 16 a means for securing the hose 17 through which the sand and air are introduced and holding these parts firmly in position.

A nozzle could be constructed in accordance with this invention merely with a plurality of grooves 11 on its inner surface and it would have the result of turning the sand as it passes through the nozzle and providing a whirling blast as it comes through the outlet in accordance with this invention. In that case the device would look like Fig. 1 in a general way.

The above described construction would wear out quickly and for the purpose of providing replaceable surfaces along which the sand travels and also necessitating only one groove 11, a series of discs 20 is employed. Each disc has a radial projection 21 which is adapted to enter the groove 11 for guiding it and holding it in its proper position and holding all the discs in such position that the inside of the effective passage for conducting the sand will be rifled. Each disc is provided with a perforation 22 which is non-circular and in the form shown is in the shape of a cross formed with four recesses 23 approximately of semi-circular shape. As all the discs are identical, each recess 23 will form part of a helical groove constituting rifling.

A series of discs of this kind sufficient to fill the entire nozzle is placed on a loading rod 25, the discs being in irregular position. This loading rod is screw threaded at each end and provided at each end with screw threads and with a handle and clamp 26. These discs with the loading rod are inserted in one end of the casing 10 and the projections 21 are turned to bring them into the groove 11. The structure is moved along in the tube 10 with the nut 12 in position and finally when the first disc comes up against the inner end of said nut the handle 26 at that end is unscrewed and removed and then the other handle is pulled to draw out the loading rod and the nut 14 turned into position to hold the discs.

This results, in the present form, in providing these discs in such a position that there will be four helical grooves in the walls of the central passage through the entire nozzle. These grooves furnish the rifling and result in the twisting of the blast as it is forced through the nozzle. The discs can be replaced by other discs having different sized or shaped perforations and recesses, but in any case there will be at least one line of recesses, as 23, which will be arranged in a helical path. The discs can be made of various materials, including metal, rubber, alloy or compositions but preferably they are made of steel.

The whirling motion of the blast tends to concentrate the abrasive stream, thus greatly increasing the cutting effect and enabling the operator to cut comparatively sharp edges. On account of the whirling of the blast there will be very much less tendency of the particles of sand to be whirled at an angle and they will be more nearly parallel with each other. This, of course, results in sharper work and also less wear on the discs nearest the outlet end of the nozzle. Another result of this is to prevent the rebounding of such a large amount of the abrasive on the surface of the work being worked upon and the reduction of the amount of dust around the work. Therefore, it enables the operator to stand at a comparatively great distance from the work and to have a full view of the work being done as he is outside the dust area.

The wear is greater on the discs near the outlet end and for that reason the life of these discs can be prolonged very much by simply taking out the discs and reversing them. This brings the wear on those at the other end. This can be done also by transposing the two nuts 12 and 14, thereby reversing the whole nozzle. This doubles the life of the nozzle. Furthermore, after the nozzle has been used to its full extent of wear on both ends the discs can be taken out and about one-third of them reversed. This can be accomplished at both ends and thus further increase the life of the nozzle. Of course, after it is too much worn out for use, the discs are simply taken out, thrown away and replaced by new ones. Actual test has shown increased cutting in favor of this rifle nozzle of about four to one over the smooth bore nozzles under the same conditions of air, volume and pressure and utilizing the same abrasive.

Having thus described my invention and the advantages thereof, I do not wish to be limited to the details herein disclosed, otherwise than as set forth in the claims, but what I claim is:—

1. In a sand blast nozzle, the combination of a casing and a series of identical discs located therein and filling the interior of the casing, each disc having a non-circular passage therethrough for the passage of sand and air, said casing and discs having cooperating means for locating the discs with their passages slightly offset from each other from end to end of the series.

2. In a sand blast nozzle, the combination of a casing having a groove extending throughout its length in a helical direction, and a series of discs, each having a projection extending into said groove so that each two adjacent discs will be set slightly out of registration with each other, said discs having perforations therein, the entire series of perforations constituting a passage through which the sand and air are blown, said perforations being provided with identical recesses constituting a groove along the entire length of the nozzle.

3. In a sand blast nozzle, the combination of a cylindrical casing provided with a groove therealong curved from one end to the other and having its two ends offset from each other circumferentially, and a series of discs arranged from one end to the other of the casing, each having a projection extending into said groove, each disc having a perforation provided with an outwardly extending recess, all in identical relation to its projection.

4. In a sand blast nozzle, the combination with a cylindrical casing having a curved groove in its inner wall extending from one end of the cas-

ing to the other, a series of discs filling the casing, each having a projection extending into the groove and each having a perforation therein comprising a plurality of radial recesses having their edges rounded, the discs all being exactly alike, whereby said recesses constitute rifling for the nozzle.

5 In a sand blast nozzle, the combination of a casing having a groove extending throughout its length in a curved direction, a series of discs, 10 each having a projection extending into said groove so that each two adjacent discs will be set

slightly out of registration with each other, said discs having perforations therein, the entire series of perforations constituting a passage through which the sand and air are blown, said passage being provided with identical recesses together constituting a groove along the entire length of the nozzle, a nut threaded to the casing at one end and having a discharge passage, a nut threaded at the other end having an inlet passage and means connected with the latter nut 10 for securing the nozzle to a hose.

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