Sept. 19, 1933. W. B. OWENS 1,927,573

SAND BLAST NOZZLE

Filed July 6, 1932 2 Sheets-Sheet 1

FIG. 1.

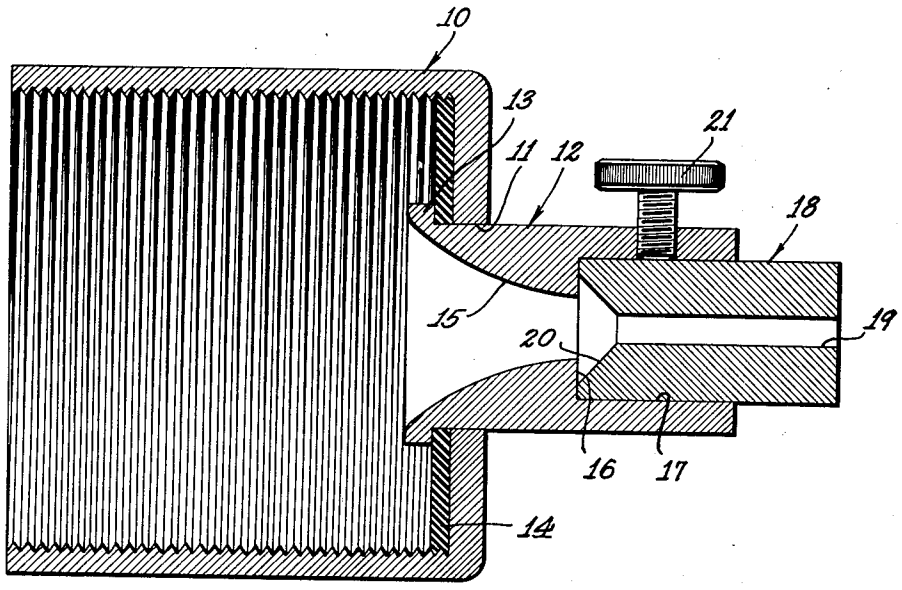


FIG. 2.

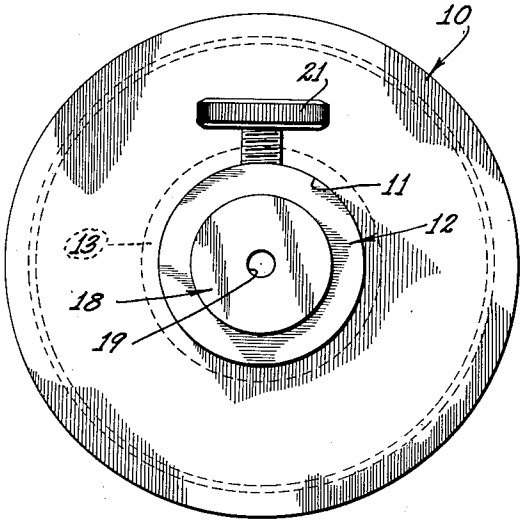
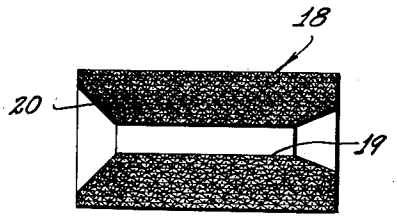


FIG. 3.



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Filed July 6, 1932 2 Sheets-Sheet 2

FIG. 4.

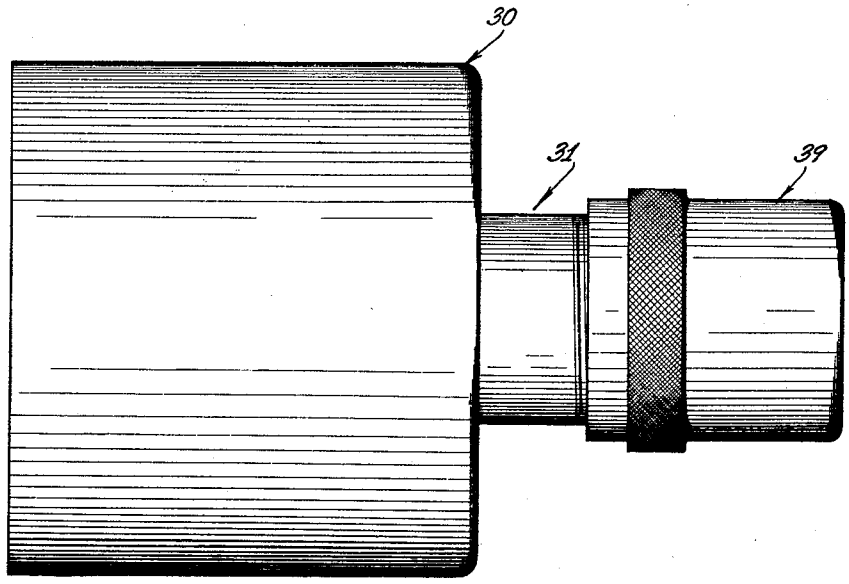


FIG. 5.

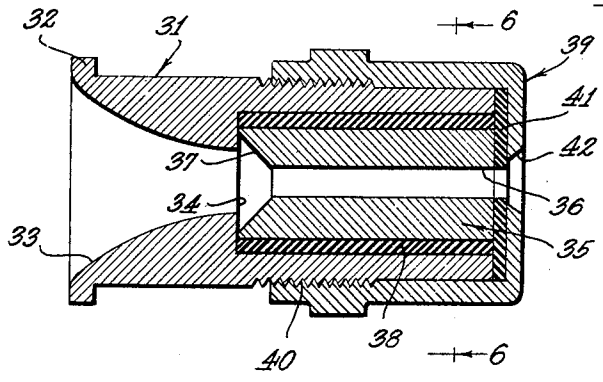
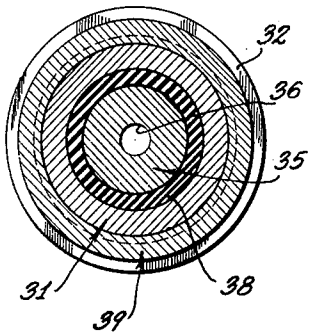


FIG. 6.



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Patented Sept. 19, 1933 1,927,573

UNITED STATES PATENT OFFICE

1,927,573

SAND BLAST NOZZLE

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7 Claims. (Cl. 51—11)

This invention relates to improvements in sand blast nozzles.

An object of the invention is to provide an improved sand blast nozzle having a renewable or replaceable tip. Heretofore in the construction of sand blast nozzles the customary practice has been to provide a cap attachable to the sand blast hose from which the nozzle proper projects. The nozzle proper is usually in the form of a single integral casting, flanged on its exterior for reception in the cap, and having a bore therethrough the rear end of which is enlarged in a tapering manner so that the nozzle receives the sand and causes it to issue through the smallest forward end of the bore. I find from experience that the wide end of the bore in the nozzle proper is not subjected to a severe cutting action by the sand but that the major portion of the cutting action takes place in the small or issuing end of the bore. When this small end becomes badly cut, the entire nozzle is usually junked and replaced. When these nozzles are made of relatively hard expensive material, this junking of the complete nozzle is a considerable item in sand blasting operations.

An object of the present invention is to provide a construction consisting of a two part nozzle, one part forming the body which presents the tapering throat of relatively large size and which is not subject to extreme wear. The other part provides the small bore which is subject to extreme wear but which can be easily replaced at a minimum expense. The arrangement and design of the construction is such that no shoulder is presented in the passage for the sand which would hinder or tend to obstruct the movement of sand through the nozzle. When the tip becomes badly worn it can be substituted for or replaced quite easily at a minimum expense.

With the foregoing and other objects in view, which will be made manifest in the following detailed description, and specifically pointed out in the appended claims, reference is had to the accompanying drawings for an illustrative embodiment of the invention, wherein:

Fig. 1 is a vertical section through the improved sand blast nozzle.

Fig. 2 is a view in end elevation of the same.

Fig. 3 is a vertical section illustrating a modified form of tip which may be advantageously employed.

Fig. 4 is a view in side elevation illustrating a modified form embodying the invention.

Fig. 5 is a vertical section through the nozzle proper illustrated in Figure 4.

Fig. 6 is a sectional view taken upon the line 6—6 upon Figure 5.

Referring to the accompanying drawings, wherein similar reference characters designate similar parts throughout, the improved sand blast nozzle comprises a cap or bonnet 10 in the end of which at about the center there is formed an opening 11 for the reception of a body part 12 having a flange 13 positioned on the inside of the cap against a suitable gasket or washer 14 which prevents leakage. The body part 12 has a longitudinal opening extending therethrough, the rear end of which presents forwardly converging walls as indicated at 15. These walls are preferably smooth and curved as they taper forwardly forming a type of smooth throat ending at a shoulder 16. Forwardly of shoulder 16 the opening is enlarged and presents a cylindrical interior surface as at 17 for the reception of a tip 18 having a relatively small bore 19, the rear end of which is enlarged as at 20 with tapering walls or sides which meet the shoulder 16 outwardly of the tapering walls 15 on the interior of body part 12 so that the passage for the sand through the nozzle does not have any sharp shoulder which would hinder the flow of sand.

The tip 18 may be formed of any suitable material and may be formed of an extremely hard substance such as tool steel or a highly elastic substance such as relatively soft rubber. I find that soft live rubber has the faculty of resisting wear to a great extent in a device of this character. The tip 18 is held in place as by a thumb screw 21 and when it becomes badly worn the thumb screw can be loosened and the tip replaced. I find that by far the major portion of the wear takes place on the interior of the tip and that the walls 15 are subjected to very little wear. Consequently when the tip becomes worn it need only be replaced with a new tip which is relatively inexpensive. The old body part can remain in use until quite a number of tips have been worn out. Instead of a hard metal tip which can be either high speed steel, or tool steel, or a live rubber tip, the tip may be of the character as shown in Figure 3. In this construction the tip is made of a composition known as Redmanole which I find to have unusual wear resisting qualities. This tip as shown in Figure 3 is of a laminated structure and the bore therethrough is of the same shape as that shown at 19 on Figure 1 with the exception that if desired the forward end of the bore may be enlarged as shown.

In the form of construction disclosed in Figures 4, 5 and 6, there is likewise a bonnet 30 in which is positioned a flanged nozzle body part 31 having a flange 32. The body part 31 has a longitudinal opening therein, the rear end of which is smoothly rounded and tapered as indicated by the walls 33. These walls terminate in a shoulder 34 and forwardly of this shoulder the opening is enlarged cylindrically. The tip, which is replaceable, is indicated at 35, having a relatively small bore 36 therein the rear end of

which is coned out or tapered as at 37 with the tapering walls meeting the shoulder 34 outwardly of the forward ends of the walls 33. In this form of construction I prefer to use a tip of extremely hard material, such as for example tungsten carbide. A tungsten carbide tip is extremely hard and will resist the wearing action of the sand passing therethrough. Although this material is extremely hard, it is also somewhat fragile and can be broken. Consequently I find that in using a material of this character it is not desirable to use a thumb screw similar to thumb screw 21 because of the danger of breaking the tip when the thumb screw is tightened down. To this end I surround the tip with a suitable soft bushing such as a rubber bushing indicated at 38 and the tip is retained in the body part by means of a bonnet 39 provided with internal threads which will screw onto the threads 40 formed on the exterior of the body part 31. Within the bonnet there may be a rubber washer 41 which has an aperture therein in alignment with bore 36. The bonnet 39 also has an aperture 42 in alignment with the aperture in the washer 41 and in alignment with the bore 36. In this construction whenever the tip becomes worn the bonnet can be removed and a new tip substituted.

As previously explained, most of the wear in a sand blast nozzle takes place in the small bore and as this bore is provided by a replaceable member it can be substituted for and replaced quite easily whenever it becomes worn. The construction is such that there is no sharp shoulder which would tend to resist or hinder the flow of sand and air through the nozzle. If a sharp shoulder were presented in the stream of flow, the sand would tend to lodge and build up on this shoulder to plug the nozzle. The tapered surface at 37 on Figure 6 and at 20 on Figures 1 and 3 does not afford such a shoulder as would cause a plugging or stopping of the nozzle. The body part, while it is not subject to great wear, nevertheless becomes worn in the course of time, most of the wear taking place on the interior of the body immediately behind the shoulder. Consequently the interior of the body behing the shoulder will gradually enlarge but quite a large number of tips will be worn out before the body part becomes so badly worn as to expose a shoulder at the end of the tip. In other words the interior of the body may become considerably worn before it becomes flush with the extreme end of the tapered surfaces 37 on Figure 6, and 20 on Figures 1 and 3. Consequently replacement of tips on a worn body part does not cause a shoulder to be presented at the rear end of the tip.

From the above described construction it will be appreciated that a novel, simple sand blast nozzle is provided which enables replacement of the tip easily and quickly with a minimum expense whenever the tip becomes worn. Any other suitable construction for detachably fastening the tip in place may be used in place of the thumb screw 21.

Various changes may be made in the details of construction without departing from the spirit or scope of the invention as defined by the appended claims.

I claim:

1. A sand blast nozzle comprising a flanged body part having an opening therethrough, the rear end of the opening having forwardly converging walls, the forward end of the body part being enlarged to receive a tip, a tip in the forward end of the opening, said tip having a relatively small bore therethrough the rear end of which widens beyond the walls on the interior of the body part.

2. A sand blast nozzle comprising a flanged body part having an opening therethrough, the walls at the rear end of the opening converging forwardly to a shoulder, the opening forwardly of the shoulder being enlarged, a tip fitting in the forward end of the body part against the shoulder, said tip having a relatively small bore therethrough, the rear end of the bore being tapered from outwardly of the walls on the interior of the body part to the smallest size of the bore.

3. A sand blast nozzle comprising a flanged body part having an opening therethrough, the walls at the rear end of the opening converging forwardly to a shoulder, the opening forwardly of the shoulder being enlarged, a tip fitting in the forward end of the body part against the shoulder, said tip having a relatively small bore therethrough, the rear end of the small bore widening out against the shoulder outwardly of the walls on the interior of the body part adjacent the shoulder.

4. A sand blast nozzle having a flanged body with an opening therethrough, said body having the opening at its rear end presenting forwardly converging surfaces which terminate at a shoulder between the ends of the body, and a tip in the forward end of the body having an opening therethrough in alignment with the opening in the shoulder, the rear end of the opening in the tip being widened beyond the sides of the opening in the shoulder.

5. A sand blast nozzle having a flanged body with an opening therethrough, said body having the opening at its rear end presenting forwardly converging surfaces which terminate at a shoulder between the ends of the body, and a tip in the forward end of the body having an opening therethrough in alignment with the opening in the shoulder, said tip being positioned against the shoulder, the rear end of the opening in the tip being widened beyond the sides of the opening in the shoulder.

6. A sand blast nozzle having a body the rear end of which presents forwardly tapering interior surfaces terminating at a shoulder intermediate the ends of the body, and a tip in the forward end of the body positioned adjacent the shoulder having a passage therethrough the rear end of which widens beyond the forward ends of said forwardly tapering interior surfaces.

7. A sand blast nozzle having a body the rear end of which presents forwardly tapering interior surfaces terminating at a shoulder intermediate the ends of the body, and a tip in the forward end of the body positioned adjacent the shoulder having a passage therethrough the rear end of which widens beyond the forward ends of said forwardly tapering interior surfaces, and a bushing of relatively soft material between the exterior of the tip and the interior of the body.

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