

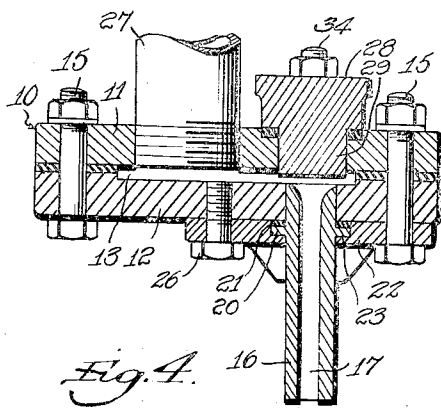
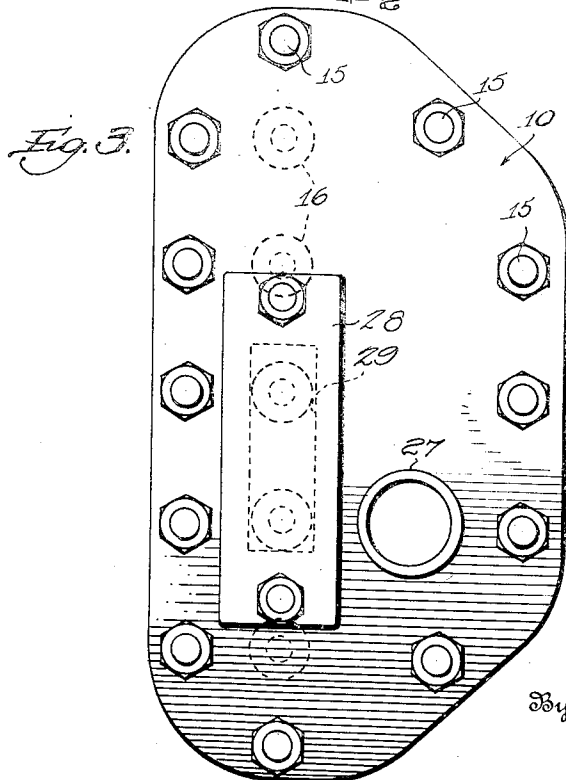
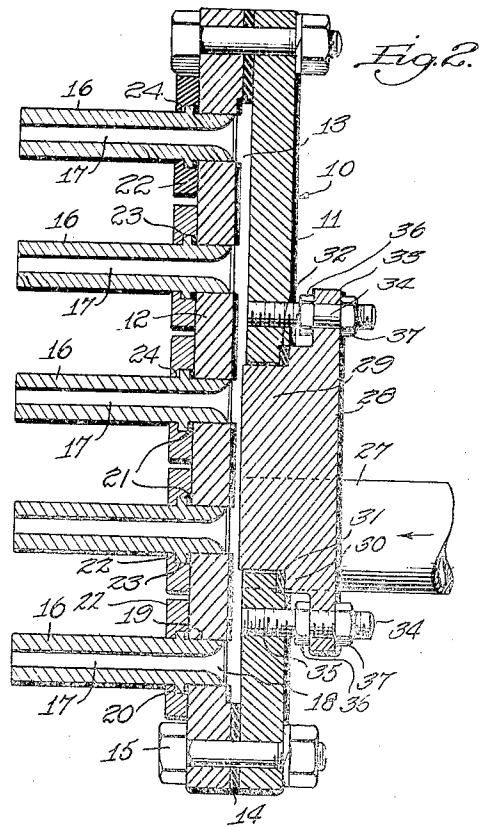
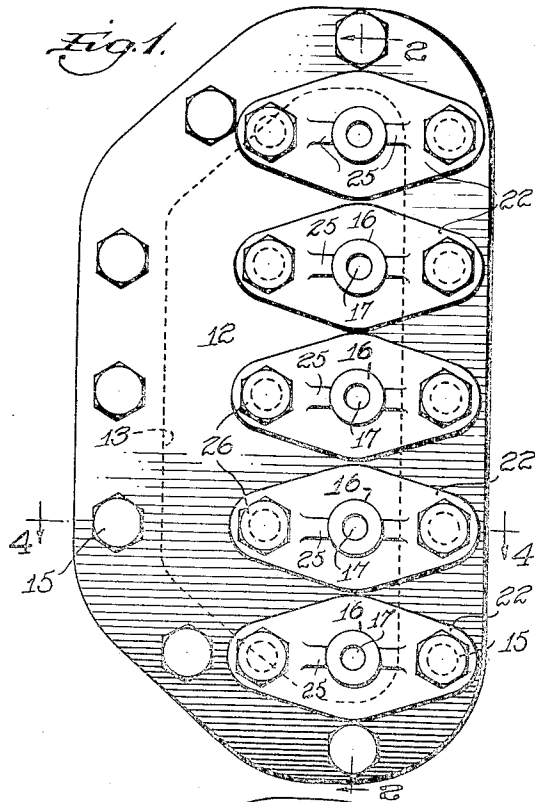
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ABRASIVE BLASTING NOZZLE

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ABRASIVE BLASTING NOZZLE

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9 Claims. (Cl. 51—11)

This invention relates to abrasive blasting nozzles, and more particularly to nozzles of this character adapted for use in connection with machines for removing scale and the like from
5 sheet metal.

In my copending applications Serial Nos. 196,959, filed June 6th, 1927, 228,332, filed October 24th, 1927, and 240,310, filed December 15th, 1927, I have disclosed several forms of
10 apparatus adapted for use in a novel manner for impacting abrasive material against the sides of sheet metal to remove the scale and other foreign material therefrom to prepare the sheets for receiving surface coatings of various char-
15 acters.

It has been the practice for many years to remove surface scale and other foreign material from metal sheets by subjecting the sheets to the action of pickling baths, but such a method
20 presents a number of difficulties which have been outlined in my copending applications above referred to. The forms of apparatus disclosed in such copending applications are adapted to impact abrasive material against the
25 sheets in a uniform manner whereby the finished sheets will present a remarkably smooth uniform surface structure which will be clean and free from foreign material and will remain in
30 such condition for relatively long periods of time.

An important object of the present invention is to provide an improved form of nozzle construction adapted for use in connection with machines of the character shown in my
35 copending applications and wherein the scale removing operation is accomplished with a more uniform finished sheet and wherein the operation may be carried out in a shorter space of
40 time.

A further object is to provide a novel gang nozzle wherein a uniform distribution of abra-
45 sive material to the individual nozzles is accomplished.

A further object is to provide a nozzle of the character referred to including a manifold and a plurality of discharge nozzles and to provide
50 means for introducing abrasive material into the manifold in such a manner as to uniformly distribute the abrasive material to the separate discharge nozzles.

A further object is to provide a nozzle structure of the character referred to wherein the abrasive material is introduced into the mani-
55 fold directly against one wall thereof whereby the material spreads in a fan-like spray for

uniform distribution to the discharge nozzles.

A further object is to provide novel means for varying the supply of abrasive material to cer-
tain of the nozzles to render uniform the dis-
tribution of abrasive material.

A further object is to provide a spraying de-
vice of the character referred to including a manifold and a plurality of discharge nozzles communicating therewith, means being provided
60 for introducing abrasive material into the mani- fold against one wall thereof out of alinement
65 with the nozzles, and to provide means for varying the cross sectional area of the manifold between the point of supply of the abrasive ma-
70 terial and one or more of the nozzles to decrease the supply of abrasive material to the latter.

Other objects and advantages of the invention will become apparent during the course of the following description.

In the drawing I have shown one embodiment
75 of the invention. In this showing,

Figure 1 is a face view of the device,

Figure 2 is a section on line 2—2 of Figure 1,

Figure 3 is a view similar to Figure 1 showing
80 the opposite side of the device, and,

Figure 4 is a section on line 4—4 of Figure 1.

Referring to the drawing, the numeral 10 designates a manifold as a whole comprising a pair of plates 11 and 12 having their adjacent
85 faces inwardly of the edge portions thereof preferably parallel and slightly spaced to form a relatively flat chamber 13. A gasket 14 is interposed between the edge portions of the plates, and the latter are secured together by suitable
90 bolts 15.

A plurality of nozzles 16 is adapted to receive abrasive material from the chamber 13. These
95 nozzles are provided with passages 17 therethrough which are flared outwardly to increase in diameter at their inner ends as at 18 to facilitate the entrance of the abrasive material into the nozzles. The inner ends of the nozzles are snugly received in cylindrical openings 19
100 formed in the plate 12, and outwardly of this plate, each nozzle is provided with an annular flange 20 beneath which is arranged a gasket 21.

Any suitable means may be employed for retaining the nozzles in position, and in the drawing I have illustrated plates 22 having recesses
105 23 therein to receive the annular flanges 20 whereby the latter may be clamped tightly against the gaskets 21. Each plate 22 is provided with a central opening 24 through which the nozzles extend, and is further provided with
110 reinforcing ribs 25 which contact with the nozzles

to form bracing means for the nozzles and for the plates 22. The bolts 15 adjacent one edge of the manifold pass through the plates 22 to serve as securing means for one end of each of these plates, as shown in Figure 4. Screws 26 secure the opposite ends of the plates 22 in position.

Referring to Figures 2, 3 and 4, the numeral 27 designates a relatively large feed pipe for supplying air and abrasive material under pressure to the chamber 13. As shown in Figure 4, the feed pipe is offset from the nozzles 16 and feeds the abrasive material directly against the inner face of the plate 12. It will be obvious, however, that the pipe 27 may lead through the plate 12 and supply the abrasive material against the plate 11.

Abrasive material, usually crushed steel, is supplied to the pipe 27 together with fluid under pressure. The abrasive and pressure fluid are thoroughly mixed and accordingly the particles of abrasive are held in substantially uniform suspension in the pressure fluid. The walls 11 and 12 are spaced relatively close together, as previously stated, and the slight spacing of these plates is important in order that there may be no drop in the pressure of the mixture supplied to the chamber 13 from the pipe 27. The mixture reaching the chamber 13 spreads out in a fan shaped spray, upon being impacted against the wall 12, and thus is distributed to the nozzles 16. Means is provided for preventing an excess supply of abrasive material to the nozzles nearest the supply pipe 27. Referring to Figures 2, 3 and 4, the numeral 28 designates an adjusting plate including a portion 29 preferably arranged with its inner face projecting slightly into the chamber 13 to reduce the cross sectional area thereof between the pipe 17 and one or more of the nozzles 16. The adjusting plate is provided with an enlarged portion 30 seating against a gasket 31 arranged in a recess 32 formed in the plate 11. The adjusting plate is provided with overhanging ends 33 receiving bolts 34 having their inner ends 35 threaded in the plate 11. Nuts 36 and 37 are threaded on the bolt 34 and contact with the inner and outer faces of the extensions 33 to fix the adjusting plate in position. Adjustment of this plate may be accomplished by employing gaskets 31 of varying thicknesses to vary the position of the inner face of the plate with respect to the chamber 13.

The operation of the apparatus is as follows: The gang nozzle described may be used in any desired manner and is adapted particularly for use in connection with the forms of abrasive apparatus disclosed in my copending applications previously referred to. When so employed, the impacting devices are employed in groups preferably arranged on opposite sides of the path of travel of a sheet to impact abrasive against both sides thereof and the nozzles are reciprocated across the path of travel of the sheet to evenly distribute the abrasive material thereagainst.

Abrasive material and air under pressure are fed into the chamber 13 through the pipe 27, and upon striking against the plate 12, the abrasive material spreads out in the form of a fan-shaped spray for distribution to the various nozzles 16. The arrangement of the nozzles, adjusting plate and pipe 27 may be varied if desired, but the arrangement shown in the drawing has been found particularly efficient for

certain purposes, as, for example, cleaning metal sheets, and in operation, a perfectly uniform distribution of abrasive materials to the nozzle may be accomplished. As viewed in Figure 3, only the nozzle furthest remote from the pipe 27 will be fed directly with abrasive material without interference to the latter. Owing to the distance of this nozzle from the supply pipe, however, it normally would receive less abrasive material than would be supplied to the remaining nozzles, and particularly those closest to the pipe 27. The two nozzles arranged opposite the inner portion of the adjusting plate (see Figures 2 and 3) normally would receive the greatest amount of abrasive, but the reduction of the cross sectional space defined by the walls of the chamber 13 and by the adjusting plate diminishes the amount of abrasive material supplied to the two nozzles in question. The projection of the corner portions of the adjusting plate partially into the path of abrasive traveling from the pipe 27 to the two nozzles arranged just beyond the adjusting plate causes a slight diminution of the abrasive material supplied to these nozzles. It has been found that with the use of a gasket 32 of proper thickness, the distribution of the abrasive material to the various nozzles will be remarkably uniform, and when the device is employed in connection with machines of the character shown in my copending applications referred to, the resultant cleaned sheets will possess surface structures of remarkable uniformity.

It will be apparent that the present invention contemplates the provision of means for supplying abrasive, uniformly suspended in a pressure fluid, from a single supply pipe to a plurality of nozzles by impacting the material against one wall of the chamber communicating with the nozzles, instead of directly supplying the mixture of abrasive and pressure fluid to the nozzles themselves. The creation of the fan-shaped spray caused by the flow of the mixture under pressure from the pipe 27 against the plate 12 has been found to be of great assistance in securing the even distribution of material to the several nozzles.

In this connection, it will be apparent that the maintenance in a substantially uniform suspension of the abrasive material in the pressure fluid is dependent upon the maintenance of a high velocity of movement of the mixture. If a drop in velocity in the mixture occurs at any place between the source of supply and the outer ends of the nozzles 16, there will be a tendency for the abrasive material to accumulate. For example, if the supply line has a number of turns, the distribution of abrasive material will not be wholly uniform, but the material nevertheless will be moving in the direction of the flow of the pressure fluid, and the operation of the device is such as to correct any slight unevenness in the suspension of the abrasive material.

Moreover, it will be apparent that if the chamber 13 is too wide a drop in velocity will occur with the results above referred to. It will be apparent, however, that the chamber 13 is of restricted depth with respect to the cross-sectional area of the pipe 27, and accordingly no drop in velocity occurs. Thus the abrasive material is held in uniform suspension and is uniformly distributed to the various nozzles. It will be evident that with the pipe 27 arranged with its outlet perpendicular to the plate 12,

the abrasive material discharged from the pipe 27 and striking the inner surface of the plate 12 will be distributed by bouncing in random directions. That is to say, the abrasive material will tend to splash in all directions as in the case of a stream of water under pressure directed against a flat surface at right angles thereto. It is this action which prevents any accumulation of the abrasive material suspended in the air and tends to correct any lack of uniformity in suspension as the mixture flows into the chamber 13.

It will be apparent that the nozzles are preferably equidistantly spaced from each other to secure a uniform application of abrasive material to the surface being treated, but the arrangement of the nozzles with respect to each other in other respects will depend upon the nature of the surface being treated. It usually is wholly impossible to arrange the nozzles at points equidistantly spaced from the supply pipe 27 since they would have to be circularly arranged under such conditions and would thus fail to provide a uniform cleaning action. The present apparatus therefore is highly desirable for feeding abrasive material uniformly to a plurality of nozzles substantially uniformly spaced from each other and unequidistantly spaced from the source of supply.

Obviously, the impacting of the material against one wall of the chamber 13 causes wear thereof, but the plates 11 and 12 are simple and relatively cheap castings and thus can be replaced when necessary without material expense.

It is to be understood that the form of the invention herewith shown and described is to be taken as a preferred example of the same and that various changes in the shape, size and arrangement of parts may be resorted to without departing from the spirit of the invention or the scope of the subjoined claims.

I claim:

1. A device of the character described comprising a chamber, a plurality of nozzles communicating at one end with said chamber, means for supplying abrasive to said chamber against one wall thereof, and means for varying the cross sectional area of said chamber between said last named means and at least one of said nozzles.

2. A device of the character described comprising a relatively flat chamber having opposite side walls, a plurality of nozzles communicating at one end with said chamber through one wall thereof, a pipe for supplying abrasive to said chamber against one wall thereof, and means for varying the cross sectional area of said chamber between said pipe and at least one of said nozzles.

3. A device of the character described comprising a relatively flat chamber having opposite side walls, a plurality of nozzles communicating at one end with said chamber through one wall thereof, a pipe for supplying abrasive to said chamber through the opposite wall thereof against said first named wall substantially at right angles thereto, and means for varying the

cross sectional area of said chamber between said pipe and at least one of said nozzles.

4. A device of the character described comprising a chamber defined on opposite sides by relatively close parallel walls, a plurality of nozzles carried by one wall and communicating at one end with said chamber, means for supplying abrasive to said chamber against one wall thereof, and means for varying the cross sectional area of said chamber between said first named means and at least one of said nozzles.

5. A device of the character described comprising a chamber defined on opposite sides by relatively close parallel walls, a plurality of nozzles carried by one wall and communicating at one end with said chamber, a pipe for supplying abrasive through the other wall of said chamber directly against the first named wall thereof, and means for varying the cross sectional area of said chamber between said pipe and at least one of said nozzles.

6. A device of the character described comprising a chamber defined on opposite sides by relatively close parallel walls, a plurality of nozzles carried by one wall and communicating at one end with said chamber, means for supplying abrasive to said chamber against one wall thereof, and a member adjustable into said chamber to vary the cross sectional area between said means and at least one of said nozzles.

7. A device of the character described comprising a chamber defined on opposite sides by relatively close parallel walls, a plurality of nozzles carried by one wall and communicating at one end with said chamber, and a pipe for supplying abrasive through the other wall of said chamber directly against the first named wall thereof, one portion of one of said walls being adjustable into said chamber to vary the cross sectional area thereof between said pipe and at least one of said nozzles.

8. A device of the character described comprising a pair of plates secured at their edges to provide a leak-proof joint and having their inner portions forming spaced parallel walls defining a chamber, a plurality of nozzles carried by one wall and communicating with said chamber, a pipe extending through one wall and adapted to supply abrasive to said chamber against the other wall thereof, one of said walls being provided with an opening, and a plate mounted in said opening and having its inner face parallel to said walls and adjustable into said chamber to vary the cross sectional area thereof between said pipe and at least one of said nozzles.

9. A device of the character described comprising a chamber defined on opposite sides by relatively close parallel walls of material area, a plurality of nozzles carried by one wall and communicating at one end with said chamber, a pipe for supplying abrasive through one wall of said chamber directly against the other wall thereof, and single means associated with said chamber for varying the proportionate supply of material from said pipe to said nozzles.

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