Aug. 12, 1958 R. STEFFEN 2,846,822

SAND BLAST MACHINE

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FIG. 1

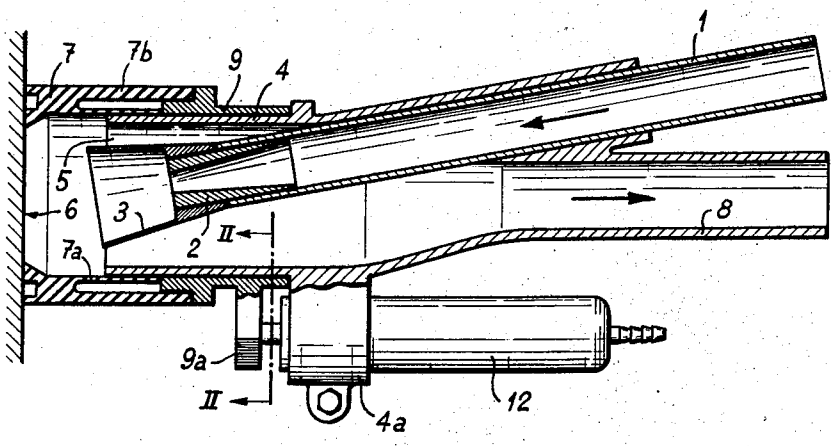
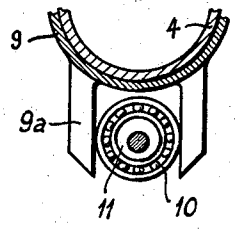


FIG. 2



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Fig. 3

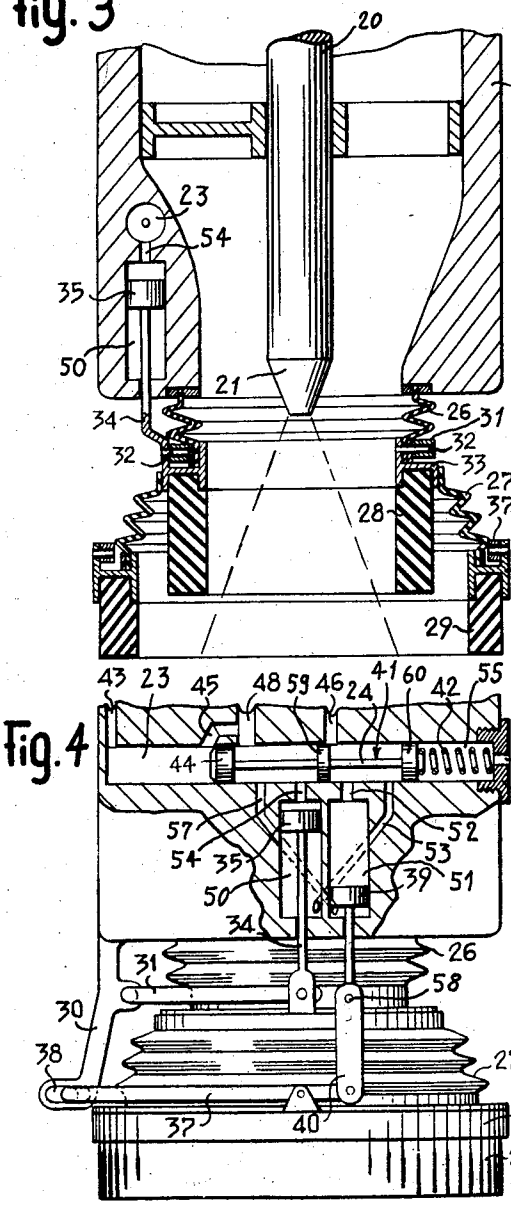


Fig. 4

Fig. 5

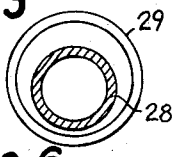


Fig. 6

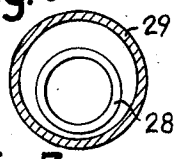


Fig. 7

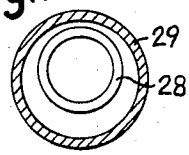
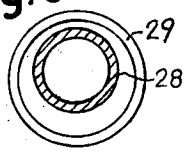


Fig. 8



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SAND BLAST MACHINE

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3 Claims. (Cl. 51—11)

The present invention relates to a sand blast machine comprising a tube intended to conduct a mixture of compressed air and sand to a sanding nozzle which is surrounded by a casing having an aperture allowing a jet of the sand to impinge on a work surface for sanding that surface.

A feature of the invention resides in the fact that the edge of the casing next to the aperture is provided with a packing intended to ensure tightness between said casing and the surface being sanded, this packing being driven by a mechanism which imparts to it a vibratory movement intended to facilitate its displacements on the surface being sanded.

The annexed drawing shows, by way of example, respective embodiments of the invention, in which:

Figure 1 is an axial sectional view of a sand blast machine;

Figure 2 is a sectional view of a detail along line II—II of Figure 1;

Figure 3 is an axial sectional view of another sand blast machine;

Figure 4 is an elevational view with partial section of the machine represented in Figure 3; and

Figures 5 to 8 are explanatory diagrams.

The machine shown in Figures 1 and 2 comprises a tube 1 for conducting a mixture of compressed air and sand, the tube having a projecting nozzle 2 provided with a protecting cap 3. The nozzle and cap are surrounded by a tubular casing 4 having an aperture 5 which allows the sand to reach the surface 6 for sanding the latter. A packing 7 is interposed between the casing 4 and the surface 6 to prevent the sand from escaping laterally. This packing is made of a flexible and compressible material, such as rubber or a suitable synthetic material. A tube 8 for evacuating the sand and air after their utilization communicates with the casing 4. This tube is intended to be connected with a container, not shown, so that the sand is recovered after use.

Owing to the tightness ensured by the packing 7, the sand and the air rush into the tube 8 and accordingly evacuation is easily accomplished by simple feed back without any suction device being necessary.

In order to facilitate the displacements of the machine along the surface 6, the packing 7 is submitted to a vibratory movement produced by the following mechanism:

The packing 7 is sleeve shaped and includes at least along a part of its length a cylindrical double wall 7*a* and 7*b*. The inner wall 7*a* is forced on the extremity of the casing 4 and, consequently, remains stationary. On the other hand, the outer wall 7*b* is forced on the extremity of a sleeve 9 rotatably mounted on the casing 4. This sleeve is provided with a fork 9*a* between the two arms of which is arranged a ball-bearing 10 provided at its center with an excentric member 11 driven by a compressed air turbine 12. The turbine is secured to the casing 4 by means of a collar 4*a*. Rotation of the excentric member thus produces an oscillating or vibratory movement of the sleeve 9 which is transmitted to the packing 7 by the outer wall 7*b*. This facilitates displacement of the packing on the surface 6.

The invention of course is not limited to the embodiment disclosed and shown. The packing could for example be secured to the casing 4 on the one hand and to the sleeve 9 on the other hand by other means such as a tightening collar, projecting parts introduced into corresponding recesses, a bayonet-joint, et cetera. When the packing is made of synthetic material or the like, its outer wall illustratively is made of a different material than the inner wall, each material showing distinct properties, and their interconnection is achieved when the packing is molded. The shape of the front part of the packing may vary with respect to the shape of the surface to be sanded. The sand projecting nozzle can be coaxial with the casing 4 instead of oblique, as it is shown in the first embodiment.

In the second embodiment (Figures 3 to 8), the sand blast machine comprises a tube 20 ended by a nozzle 21 for jetting a mixture of compressed air and sand. This tube 20 is surrounded by a tubular casing 22, the rear part of which is connected with a pipe (not shown) intended to evacuate the air and sand after use. In this embodiment, the tube 20 is coaxial with the casing 22.

The casing 22 is connected, by means of joints 26 and 27, with sleeves 28 and 29, made for example of rubber. These two sleeves are intended to move in turn to and from the surface being sanded. The sleeve 29 moreover is able to displace itself laterally with respect to the sleeve 28 for facilitating the displacements of the machine on the surface being sanded. These several movements of the sleeves 28 and 29 are obtained by means disclosed hereafter.

The respective positions of sleeves 28 and 29 during the displacements of the machine are shown diagrammatically in Figures 5 to 8. Hatching is used to denote sleeve contact with the work surface being sanded, and hatching is omitted to denote lack of contact. Thus, in Figure 5, the inner sleeve 28 is in contact with the work surface to be sanded and the outer sleeve 29 is away from the work surface. Next (see Figure 6) the sleeve 29 is brought in contact with the surface and the sleeve 28 is away from it. Then the machine is displaced parallel to the surface being sanded and at that time is located in the position shown in Figure 7. Thereafter, sleeve 28 again comes in contact with the surface being sanded and the sleeve 29 moves away from it. The sleeve 29 then moves laterally with respect to the sleeve 28 returning to the Figure 5 position, and the cycle starts again.

Figure 4 shows the device which provides the movements of the sleeves. The lower part of the casing 22 has an extension 30 on which a stirrup piece 31 is hinged intermediate the length of the extension. Each extremity of the stirrup piece hinges on a pin 32 rigidly secured to a ring 33 (Figure 3) which carries the sleeve 28. Ring 33 is connected to a rod 34 carrying a piston 35. The sleeve 29 is secured to a ring 36 which is hingedly secured to the extremities of a stirrup-piece 37 in the same way as the ring 33. However, the stirrup-piece 37 is hinged at its middle part in an elongated hole 38 of the extension 30.

A piston 39 is connected, by a rod 40, with one of the extremities of the stirrup-piece 37 and controls the vertical movements of the sleeve 29. The displacements of the pistons 35 and 39 are controlled by a distributor 41 located in a cylinder 23 provided in the casing 22 above the pistons. This distributor comprises a rod 24 carrying three pistons 44, 59 and 60. The distributor is submitted on the one hand to the action of a coil-spring 42 acting on piston 60 and, on the other hand, to the action

of compressed air coming through a pipe 43 and acting on the piston 44. The cylinders 50 and 51, in which the pistons 35 and 39 are respectively located, are situated in the lower portion of the casing 22, and so is the cylinder 23.

This arrangement constitutes a pneumatic motor which drives the sleeves 28 and 29 and operates as follows:

The compressed air entering through pipe 43 pushes piston 44 to the right in Figure 4 until the piston lies in the position represented in that figure. Thus, the piston opens an outlet aperture 45, the transverse section of which is much larger than the corresponding section of pipe 43. The action of spring 42 brings the distributor back to the left in Figure 4 so that the outlet aperture 45 is once more closed and so that the compressed air entering through the pipe 43 can again push the piston 44 toward the right. In the extreme position indicated in Figure 4, the distributor allows compressed air entering through pipe 46 to act on the one hand on the upper face of the piston 39 through a passage 52 and, on the other hand, on the lower face of the piston 35 through a passage 53. When the distributor is moved far enough to the left of the Figure 4 position, the pistons 59 and 60 lie to the left side of a passage 54 and of the passage 53 respectively. The distributor then allows compressed air to enter the upper part of cylinder 50, through the passage 54, while the lower part of the cylinder 50 is brought in communication with the ambient atmosphere through passage 53, chamber 55 in which spring 42 is located and through a hole 47 provided in the closing plug 56. Piston 35 accordingly is pushed downwards so that the sleeve 28 comes into contact with the surface being sanded. The distributor 41 continues its movement toward the left in Figure 4 and comes into extreme left position in which the pistons 59 and 60 are located at the left side of passages 57 and 52 respectively. The upper part of cylinder 51 accordingly is put in communication with the ambient atmosphere through the passage 52, chamber 55 and hole 47, while the lower part of this cylinder 51 receives compressed air entering from pipe 46 through passage 57. The piston 39 is then pushed upwards, so that the sleeve 29 is brought away from the surface being sanded. A spring, not shown, acts on the stirrup-piece 37 to move it laterally with respect to the sleeve 28, for instance toward the right in Figure 4. The stirrup-piece 37 can effect this lateral displacement owing to the fact that the hole 38 is elongated and because rod 40 is provided with a joint 58. This lateral displacement takes place as soon as the sleeve 29 is out of contact with the surface being sanded.

After having reached its extreme left position, the distributor 41 moves again to the right in Figure 4, under the action of the compressed air acting on the piston 44, as previously stated. The first part of this movement puts the upper part of cylinder 51 in communication with the pipe 46, through the passage 52, while the lower part of this cylinder is brought in communication with the ambient atmosphere through the passage 57 and pipe 48 extending to the outside. It is to be noted that the outlet aperture 45 also communicates with pipe 48. This has for consequence that the piston 39 is moved downwards, applying the sleeve 29 against the surface being sanded. On continuing its displacement to the right in Figure 4, the distributor 41 conducts the air arriving from the pipe 46 into the lower part of cylinder 50, through the passage 53, while the upper part of this cylinder is put into communication with the pipe 48, through the passage 54. This pushes the piston 35 upward and both pistons again occupy the position represented in Figure 4. In this position, the machine can be displaced laterally with respect to the surface being sanded, against the action of the spring (not shown) which urges the stirrup-piece 37 laterally to the right in Figure 4. The force which is needed for carrying out this displacement can be small since the spring can be light, its function being to push the sleeve 29 to the right in Figure 4 at the moment the sleeve is no longer in contact with the surface being sanded.

The frequency of the successive displacements of the sleeves 28 and 29 can be regulated by a suitable choice of spring 42 and of the mass of the distributor 41. Experience has shown that the movement of these sleeves may be repeated at least several times a second if desired.

The movement of the sleeves may be obtained through other means than the pneumatic means described and shown, such as through cams or electro-magnets.

As many possible embodiments may be made of the invention and as many possible changes may be made in the embodiments set forth, it will be distinctly understood that all matter described herein is to be interpreted as illustrative and not as a limitation.

What I claim is:

1. In a sand blast machine, comprising a tube intended to conduct a mixture of compressed air and sand, a sanding nozzle ending this tube, a casing surrounding said tube and said nozzle, said casing being provided with an aperture allowing the sand jet going out of the nozzle to reach the surface which is to be sanded, and a tube opening in said casing for evacuating the sand and the air after their utilization in said machine, at least one sleeve shaped flexible and compressible packing provided at the edge of said aperture and intended to ensure the tightness between said casing and the surface to be sanded, said packing having an inner and an outer wall along at least a part of its length, a connection between said inner wall and the extremity of said casing, a sleeve rotatably mounted on said casing, a mechanism acting on said sleeve for imparting to it an oscillatory movement, and a connection between said outer wall and said oscillating sleeve whereby a part of said packing is submitted to an oscillatory movement intended to facilitate the displacements of the machine on the surface to be sanded.

2. In a sand blast machine, comprising a tube intended to conduct a mixture of compressed air and sand, a sanding nozzle ending this tube, a casing surrounding said tube and said nozzle, said casing being provided with an aperture allowing the sand jet going out of the nozzle to reach the surface which is to be sanded, and a tube opening in said casing for evacuating the sand and the air after their utilization in said machine, at least one sleeve shaped flexible and compressible packing provided at the edge of said aperture and intended to ensure the tightness between said casing and the surface to be sanded, said packing having an inner and an outer wall along at least a part of its length, a connection between said inner wall and the extremity of said casing, a sleeve rotatably mounted on said casing, a pneumatic turbine, an excentric member driven by said turbine and operatively connected with said sleeve for imparting to it an oscillatory movement, and a connection between said outer wall and said oscillating sleeve whereby a part of said packing is submitted to an oscillatory movement intended to facilitate the displacements of the machine on the surface to be sanded.

3. In a sand blast machine, comprising a tube intended to conduct a mixture of compressed air and sand, a sanding nozzle ending this tube, a casing surrounding said tube and said nozzle, said casing being provided with an aperture allowing the sand jet going out of the nozzle to reach the surface which is to be sanded, and a tube opening in said casing for evacuating the sand and the air after their utilization in said machine, at least one sleeve shaped flexible and compressible packing provided at the edge of this aperture and intended to ensure the tightness between said casing and the surface to be sanded, said packing having an inner and an outer wall along at least a part of its length, a connection between said inner wall and the extremity of said casing, a sleeve rotatably mounted on said casing, a fork having spaced arms rigid with said sleeve, a pneumatic turbine, an excentric member driven by said turbine and located

between the arms of said fork for imparting to said sleeve an oscillatory movement, and a connection between said outer wall and said oscillating sleeve whereby a part of said packing is submitted to an oscillatory movement intended to facilitate the displacements of the machine on the surface to be sanded.

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