May 23, 1950 S. MOREL 2,508,766

DEVICE FOR INCREASING THE EFFICIENCY OF SANDBLAST GUN OPERATING BY MEANS OF COMPRESSED AIR

Filed Dec. 17, 1946

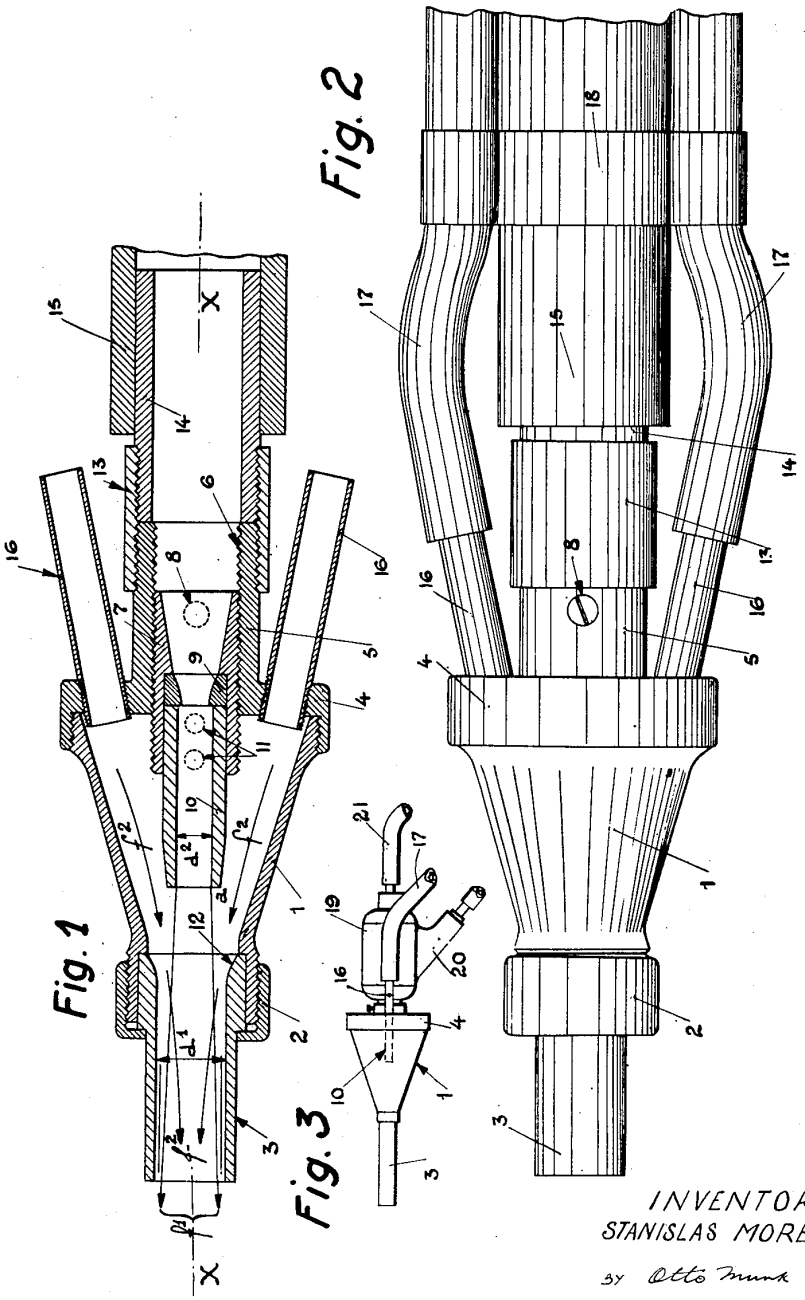

Fig. 1

Fig. 3

Fig. 2

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Patented May 23, 1950 2,508,766

UNITED STATES PATENT OFFICE

2,508,766

DEVICE FOR INCREASING THE EFFICIENCY OF SANDBLAST GUN OPERATING BY MEANS OF COMPRESSED AIR

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Application December 17, 1946, Serial No. 716,812
In France January 7, 1946

3 Claims. (Cl. 51—11)

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It is known that sand-blasting is effected with an abrasive substance which is projected, on to the place to be treated, by means of compressed air.

The abrasive substance alone, falling by gravity on to the place to be treated, would be sufficient to produce, in time, a satisfactory grinding in many cases. The compressed air is added to the abrasive in order to increase the power of the impacts of said abrasive on the place to be treated and accelerate the grinding of the surface. The projection of the mixture of abrasive and compressed air is effected through a nozzle.

It is advantageous to project, in a given time, the largest possible quantity of abrasive with a small amount of compressed air, owing to the very high cost of compressing air. Unfortunately, in the known sand-blasting devices, it is impossible to exceed a certain percentage of abrasive relatively to the quantity of air since, if the abrasive is too dense in the pipe and in the nozzle, the speed of the air and sand mixture is slowed down which considerably impairs the efficiency.

As it is impossible to increase the rate of discharge of abrasive without increasing the consumption of compressed air, it is necessary, in order to increase the power of the sand-blast, to give a larger cross-section to the pipe and to the nozzle, but the efficacy is not increased thereby and the costs increase in proportion to the power of the sand-blast.

The present invention has for its object to provide a device which can be fitted to all sand-blasting installations operating by means of compressed air and which enables the efficacy to be increased by increasing the rate of discharge of abrasive without involving an additional consumption of compressed air, thereby very substantially lowering the cost of the sand-blasting operation.

The device may operate in several ways, according to whether the sand-blast installation operates by pressure or by suction.

In all cases, the mixture of compressed air and abrasive, which flows out of the nozzle of said gun installation into the rear end of the discharge nozzle fixed to the front of the body of frusto-conical or like shape, causes an additional quantity of abrasive to be sucked through the aforesaid tube or tubes and this abrasive enriches the mixture projected through said discharge nozzle on to the parts to be sand-blasted.

In the accompanying drawing, which is given solely by way of example:

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Fig. 1 is a longitudinal section of a device according to the invention, in the case of a sand-blast apparatus operating by pressure;

Fig. 2 is an elevational view thereof;

Fig. 3 is a view on a smaller scale in the case of a suction operated sand-blast gun.

According to the embodiment shown in Figs. 1 and 2, the device according to the invention comprises a frusto-conical body 1, on the small base of which is fixed, by means of a screwed nut 2, a tubulure or discharge nozzle 3 intended for the outlet of the final mixture of abrasive and compressed air. Preferably, this tubulure or nozzle is made of a very strong metal or alloy, for example of tungsten steel.

On the large base side opposite, the cone frustum 1 is closed by means of a screwed head 4. Said head is provided at its centre and on its rear face with a cylindrical boss 5 having therein like the head a tapped hole 6. In said hole 6 is screwed a nozzle-holder 7 fixed in position by means for example of a screw 8. In said nozzle-holder 7 is screwed the neck 9 of the usual nozzle 10 of an usual sand-blast apparatus. The neck 9 and the nozzle 10 are made of tungsten steel or other strong metal or alloy. The nozzle 10 is locked in position for example by means of one or a plurality of screws 11. Its normal length is such that its free front end a is adjacent the flared rear end 12 of the discharge nozzle 3, the diameter d^1 of which is larger than the diameter d^2 of the nozzle 10.

Towards the rear a sleeve 13 connects to the boss 5 a tube 14 on which is fixed a pipe 15 which is preferably flexible, made of rubber for example, and which is intended for the supply of a usual mixture of abrasive and compressed air.

On either side of the boss 5, the head 4 carries two tubes 16 which are preferably arranged obliquely with respect to the longitudinal axis XX of the device so as to converge towards the flared mouth 12 of the tubulure 3. To each of the tubes 16 is connected a pliable or flexible tube 17 for the supply of additional abrasive.

Preferably, one or more collars 18 secure said tubes 17 to the main tube 15.

Before explaining the operation of the device, it will be pointed out that this device, which comprises the body 1, the tubulure 3, the head 4 with its tubes 16, is merely added to a pressure sand-blast apparatus comprising the nozzle-holder 7, the nozzle neck 9 and the nozzle 10, which are supplied with a mixture of abrasive and pressure air through the pipe 15.

The device operates as follows:

The main mixture of compressed air and abrasive of a normal pressure sand-blast apparatus issues powerfully in the form of a jet f^1 from the nozzle 10 and flows out through the discharge nozzle 3 on to the place to be treated.

If the pipes 17 are connected to distributors which are fixed to a hopper or dip in a receptacle containing abrasive, additional abrasive is drawn into said pipes and into the tubes 16 by the stream of atmospheric air which is produced owing to the rarefaction of the air produced in the nozzle 3 and the body 1 by the main jet f^1 of abrasive and compressed air issuing from the nozzle 10. In this case, the device according to the invention enables a substantial increase of efficiency to be obtained, since the additional abrasive thus drawn in without its being necessary to increase the quantity of compressed air flows in the direction of the arrows f^2 and mixes with the jet f^1, thereby considerably enriching it with abrasive.

If, on the other hand, the tubes 17 are connected to a reservoir with a head of abrasive (sand-blast machine), a stream of abrasive is driven into said tubes simultaneously by the pressure exerted in said reservoir and by the vacuum in the body 1. The additional abrasive is forced into the cone frustum 4, then flows into the tubulure 3 and issues therefrom mixed with the compressed air and the abrasive supplied by the nozzle 10 as in the previous case.

Fig. 3 shows the device in position on an ordinary suction operated sand-blast gun. In this case, the device is fixed by its head 4 on the nozzle 10 of the gun, which operates by means of a supply of compressed air through the pipe 21. This air sucks the abrasive, which is fed through a nipple 20, into the body 19. The mixture of abrasive and compressed air flows through the nozzle or injector tube 10 into the discharge nozzle 3 like the mixture of abrasive and compressed air of the previous example and the effect is the same. The efficiency of the sand-blast gun is likewise increased, but to a smaller extent than with a pressure operated sand-blast machine, owing to the fact that there is a substantial loss of pressure of the compressed air in the actual nozzle of the gun.

Naturally, the invention is in no way limited to the embodiments illustrated and described, which have only been chosen by way of example.

Having now described my invention, what I claim as new and desire to secure by Letters Patent is:

1. In combination with a sand-blast gun having an outlet nozzle connected with a source of compressed air and means for suspending abrasive particles in the stream of compressed air flowing through said nozzle, an attachment adapted to increase the abrasive power of said gun, said attachment comprising an injector casing generally of trapezoidal longitudinal section tapering toward a front outlet orifice, a cylindrical discharge nozzle fitted in said orifice in the longitudinal axis of said casing, the rear end of the inner wall of said discharge nozzle substantially merging with the inner wall of said casing, whereby the path of any abrasive particle moving in contact with the inner wall of said casing and of said nozzle from the rear of said casing to the discharge end of said nozzle is unobstructed, an injector tube, means for connecting the rear end of said injector tube with the outlet nozzle of said sand-blast gun, said injector tube being secured to the rear face of said casing and extending along the axis thereof close to the inlet end of said discharge nozzle, whereby a suction effect is produced in said casing and at least one abrasive material feeding pipe opening in said casing in a direction substantially parallel with the lateral inner wall of said casing and such that the rectilinear path of any abrasive particle discharged from said pipe under the sucking effect produced therein is unobstructed by said injector tube.

2. In combination with a sand-blast gun having an outlet nozzle connected with a source of compressed air and means for suspending abrasive particles in the stream of compressed air flowing through said nozzle, an attachment adapted to increase the abrasive power of said gun, said attachment comprising an injector casing generally of trapezoidal longitudinal section tapering toward a front outlet orifice, a cylindrical discharge nozzle fitted in said orifice in the longitudinal axis of said casing, the rear end of the inner wall of said discharge nozzle substantially merging with the inner wall of said casing, whereby the path of any abrasive particle moving in contact with the inner wall of said casing and of said nozzle from the rear of said casing to the discharge end of said nozzle is unobstructed, means for securing to the rear face of said casing the outlet nozzle of said sand-blast gun, said outlet nozzle extending along the axis of said casing close to the inlet end of said discharge nozzle, whereby a suction effect is produced in said casing and at least one abrasive material feeding pipe opening in said casing in a direction substantially parallel with the lateral inner wall of said casing and such that the rectilinear path of any abrasive particle discharged from said pipe under the sucking effect produced therein is unobstructed by said outlet nozzle of said sand-blast gun.

3. A sand blasting process comprising projecting a stream of compressed air having in suspension therein the maximum amount of abrasive particles compatible with the rate of flow of the stream into a chamber having a discharge opening, feeding additional abrasive particles into said chamber at a point immediately ahead of the discharge opening and discharging from the opening a stream of abrasive particles and air in which the amount of abrasive particles substantially exceeds the maximum amount compatible with the rate of flow of the compressed air stream discharged into the chamber.

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