

FEED ARRANGEMENT FOR SPRAY PAINTING

BACKGROUND OF THE INVENTION

As stated, the invention relates to a spray painting apparatus having a diaphragm pump as the pressurizing device. The paint which is to be sprayed is pumped from a reservoir, through connecting lines, to one or more filters of a spray gun.

It is known that when a diaphragm pump is put into operation, it is necessary to expunge any gas-and-air mixture usually present in the pump chamber and the feed lines as fast as possible. Without such removal, the spray device does not deliver a smooth flow but results in a sputtering output. This is due to the gas present in the pump chamber being compressed in such a way that the valves open only imperfectly, so that a constant paint-feeding flow, as required for good spraying action, is available only after the apparatus has been in operation for some time.

Therefore, in spray painting units, a conventional procedure consists in starting the pump operation some time before the start of the spraying, in order to expel the enclosed air by means of the spraying material, or to remove the air by special devices from the pump chamber of the diaphragm pump. This is not only very expensive and time-consuming on account of the length of the feed lines, but also results at every start in the loss of a substantial amount of spraying material.

The invention therefore aims at a spray painting apparatus of the initially mentioned type in which the disadvantages of known comparable structures are avoided by simple means and without great expenditure, so that immediately after the starting of the operation faultless functioning is assured.

BRIEF SUMMARY OF THE INVENTION

According to the invention an immediate smooth flow of the spraying material is achieved by providing the diaphragm pump with a preferably manually adjustable air vent valve, connected to the feed line of the pump.

In this structure it is advantageous, in order to return the paint to the paint reservoir, to connect the air vent valve, via a line connected with the air vent aperture of said valve, with the paint reservoir. The said line ends in the reservoir, preferably in the area of the suction filter.

Furthermore it is preferable to insert in the feed line, in the direction of conveyance, behind the branch-off point of the air vent valve, one or more filters. Additionally, a check valve is positioned in the feed line between the branch-off point of the air vent valve and the diaphragm pump.

The air vent valve consists of a stationary diaphragm and a movable valve element engaging it, in which structure the valve element, in the area of the element that engages the diaphragm aperture, is shaped as a cone and preferably as a needle.

For moving the valve element, a lever is provided rotatable in the direction of the valve element and equipped with a cam that cooperates with a stationary countersurface. As an alternative, the valve element is provided with a switch with which the valve element is connected, directly or via intermediate elements consisting of a piston inserted in a casing supporting the diaphragm and impinged upon by the pressure agent. Besides, the valve member or the piston connected therewith may rest, via one or more springs, on a stationary structural element or an intermediate element inserted therein.

It is particularly advantageous to combine in a single structural unit the diaphragm pump, the reservoir, the air vent valve and the filter inserted in the paint-feeding line, in a common casing.

A spray painting apparatus constructed according to the invention excels not only by the simplicity of structure but particularly by high operating safety and readiness for use. This results from the fact that the diaphragm pump is provided with an air vent valve which makes it possible to ventilate at any time, but especially when the spray painting apparatus is being put into operation, the pump chamber as well as the feed lines, so that compression of the enclosed air is largely avoided and

a reliable suction of the pump is assured. The pump is, therefore, immediately after the air vent is reclosed, ready for operation and its delivery of spraying agent is constant.

Furthermore, the paint in the reservoir is churned by the returning paint and the gas mixture when the air vent valve opens, since the return line thereof ends in the paint reservoir. Thus clod formation, especially when the apparatus has been out of operation for some time, is obviated so that the suction is further improved. It is also possible to flush, by sudden opening of the suitably constructed air vent valve the filter inserted in the feed line since the latter can be abruptly emptied via the valve and the drained-off feeding flow of the pump acts also as an ejector. The spray painting apparatus constructed according to the invention is thus very simple in structure, and by the insertion of the pump, of the reservoir, of the air vent valve and of the filters in a common casing a compact unit is produced which is extremely safe in operation and nevertheless, especially at the start, assures immediately an unobjectionable operation.

DETAILED DESCRIPTION OF THE INVENTION

Further details of the spray painting apparatus of the invention are illustrated in the embodiment shown in the drawing.

In FIG. 1, the apparatus, consisting of a diaphragm pump, a paint reservoir, a spray gun, and several valves and filters; and

In FIG. 2, the air vent valve with which the diaphragm pump is provided, in cross section.

The spray painting apparatus shown in FIG. 1 and indicated by reference numeral 1 consists essentially of a paint-feeding pump, constructed as a diaphragm pump 2, a reservoir 3 for the paint to be sprayed, and a spray gun 4. Diaphragm pump 2 aspirates the paint through a line 5 provided with a filter 6, from reservoir 3 and conveys it, via pressure line 7 in which a check valve 8 is inserted, to another filter 9, wherefrom the paint is fed through a flexible line 10, adjustable to prevailing needs, to spray gun 4.

In order to ventilate feed lines 7 and 10 at the start of spray painting apparatus 1, pump 2 is provided with a manually controllable air vent valve 12 which through a branch line 11 can be connected with a feed line 7. A return line 13 of air vent valve 12 ends in reservoir 3 so that, when valve 12 is open, the conveyed paint is directly returned and therefore the paint in reservoir 3 is churned.

Diaphragm pump 2 whose diaphragm 18 is clamped in a casing 25 is driven by an eccentric disc 15 mounted on the driving shaft 14 of a driving motor not shown, which eccentric disc acts upon a displaceable piston 16. At each rotation of shaft 14, piston 16 is therefore moved in a strokelike manner, so that diaphragm 18 is bent via the oil present in a pressure chamber 17 and paint is aspirated through valve 19, which opens at the suction stroke, from reservoir 3 and pressed, through valve 8, into paint feeding line 7.

For guiding diaphragm 18 two holding plates 20 and 21 are used between which diaphragm 18 is inserted and which are rigidly connected with a bolt 27. Bolt 27 in turn rests, via a spring 26 provided for its return, on a disc 28 inserted rigidly in casing 25. Pressure chamber 17 is connected via a line 23 and an aperture 24, covered or freed at a stroke of cylinder 16, with an oil tank 22, in order to compensate for possible leakage losses.

Air vent valve 12, shown in FIG. 2 in cross section, is inserted in a separate casing 31 between branch-off line 11 and a return line 13 and consists essentially of a diaphragm 34 provided with an aperture 35 and an axially movable valve element 36, a section 37 of which is cone-shaped like a needle and engages diaphragm aperture 35. Diaphragm 34 is fastened in a casing 32 screwed in turn in casing 31 by means of a thread 33.

For moving valve element 36 axially a rotatable switch 47 is used which is rigidly connected by a pin 46 with the rod 45 of a piston 38 impinged upon by the paint, in which piston valve element 36 is inserted. Switch 47 is provided with a cam 48