

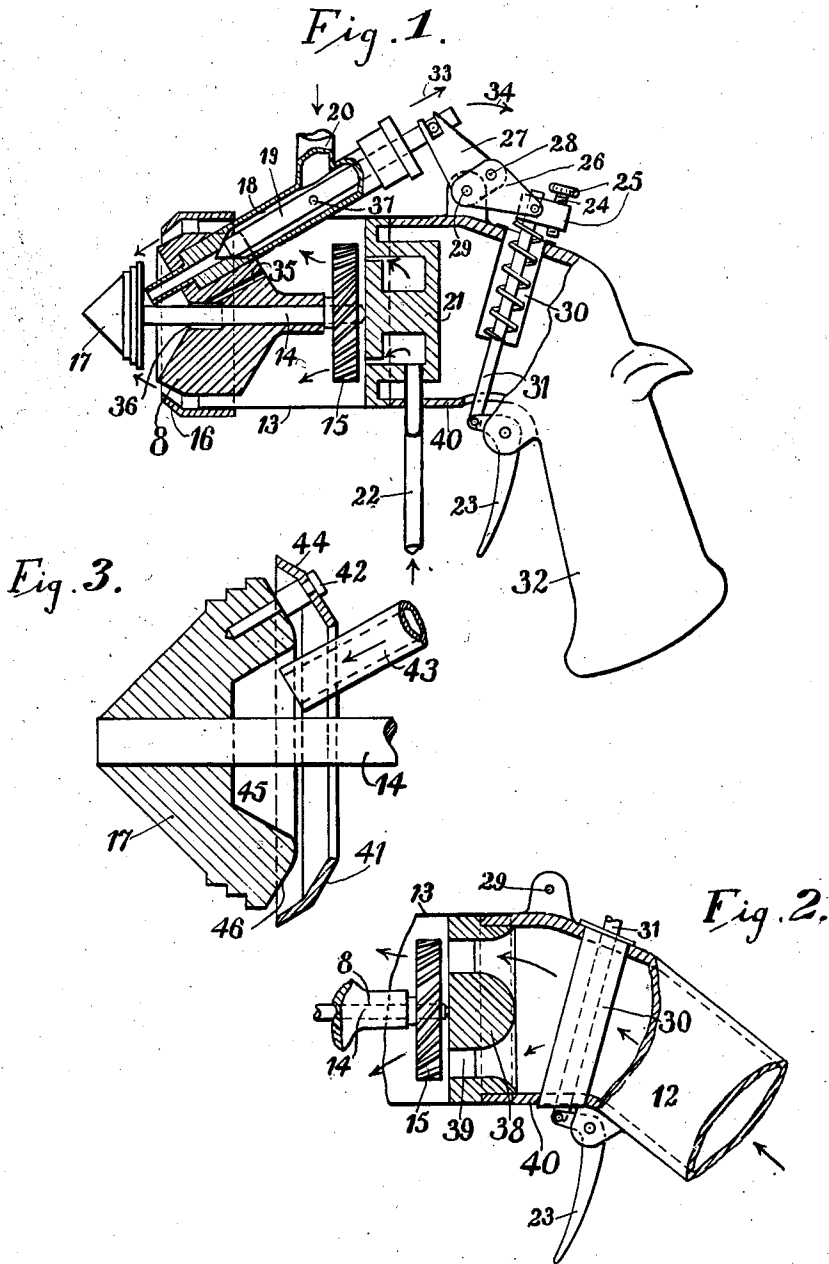
Nov. 18, 1930.

K. LUDWIG

1,782,309

LIQUID SPRAYING DEVICE

Original Filed Aug. 31, 1927



Inventor
Karl Ludwig
By *Spencer Middleton*, *Daniel Oscar Hall*
ATTORNEYS

UNITED STATES PATENT OFFICE

KARL LUDWIG, OF HAMBURG, GERMANY, ASSIGNOR TO "HUNDERTFEUER" GESELLSCHAFT FÜR MODERNE BAUTENTECHNIK MIT BESCHRÄNKTER HAFTUNG, OF HAMBURG, GERMANY

LIQUID-SPRAYING DEVICE

Original application filed August 31, 1927, Serial No. 216,637, and in Germany August 31, 1926. Divided and this application filed October 31, 1928. Serial No. 316,305.

This application is a division of my earlier application, Serial No. 216,637 filed in the U. S. Patent Office, Aug. 31, 1927.

The invention relates to a device adapted to spray liquids by means of a current of air and project them to the position of use. It is also adapted to extend the possibilities of application of dust suction devices.

Spraying devices are known which spray liquids with highly compressed air by the action of nozzles or by means of impellers driven by special machines, such as electric motors, for example, paint spraying pistols or centrifugal cement applying devices.

According to the invention, a mechanically operating atomizing device is mounted in front of the discharge opening and operated by a rotor driven by the current of air. The atomizing device may be a stepped centrifugal cone to which the liquid to be sprayed is supplied through a needle valve. The liquid mist formed is blown in a direction substantially axial by the discharge of the air current through a suitable nozzle.

The atomizing device may be so constructed that as great as possible a breaking up of the liquid is produced with the smallest expenditure of work. For this purpose a centrifugal cone preferably stepped is employed to which is secured a rear annular wall spaced from the cone by spacing bolts. The centrifugal cone is also provided with a recess in its rear surface to which the liquid is supplied. Preferably the base of the cone slopes back from its outer edge to the edge of the recess. The annular wall is preferably arranged parallel to the sloping base for part of its distance between inner and outer diameters and has its front part bent forward somewhat.

Fig. 1 is an elevation partly in longitudinal section showing the preferred form of construction for high pressure operation.

Fig. 2 is part view in section showing a modification in the construction of Fig. 1, suitable for low pressure operation.

Fig. 3 is a longitudinal section showing a preferred form of atomizing cone.

The spraying device is preferably shaped like a pistol and the needle valve may be oper-

ated by a trigger lever connected through a spring biased draw-rod and pivoted double lever with the needle valve. The double lever is preferably formed in two parts united by a pin, the removal of which enables the lever part connected to the needle valve to be turned back so that the needle valve can be taken out for cleaning purposes.

When the device is constructed for relatively high pressure operation the air is admitted into a nozzle chamber provided with an annular nozzle from which the air is ejected on to an impeller wheel driving the centrifugal cone. For relatively low pressure operation the air is preferably admitted through the piston butt formed as a pipe from whence it passes through guide vanes to the impeller wheel.

The shaft of the centrifugal cone is mounted in a bearing member having conical guide surface for the air current. In order to avoid the entrance of, for example, paint in the bearing, the bearing member is bored in front to form a cylindrical chamber round the shaft and a passage through the bearing member communicates with the rear end of this chamber. Thus any liquid which may tend to creep up the shaft is blown out by a current of air.

Referring now to Fig. 1, in a cylindrical casing 13 is arranged with the same axis a guiding and bearing member 8 with conical guide surfaces. This member forms the bearing for a rotating shaft 14 which is driven by an impeller wheel 15 acting as a rotor. The impeller wheel sets into rapid rotation a centrifugal conical plate 17 provided with steps.

The liquid to be sprayed, paint, colour and the like, is conducted to the atomizing device by means of a valve 18 employing a regulating needle 19 through an inflow pipe 20 and is thrown out on all sides by the atomizer in centrifugal direction. The impeller 15 is driven by compressed air which flows out of the annular gap of a nozzle member 21 and is admitted through a tube 22 which can be closed. This compressed air flows through the pistol in the direction of its axis

and is guided by means of a nozzle cap 16, which is adjustable in an axial direction so that the liquid mist centrifuged by the atomizing device is diverted and projected forward in the direction of the axis of the pistol, said nozzle cap having its front edge or end converging forwardly in the shape of a short truncated cone.

The needle 19 of the liquid valve 18 is operated by a trigger 23 chiefly by means of a double lever 26—27 in two parts and a draw-rod 31. The double lever 26—27 turns about a pivot 29 mounted on a projection on the casing and is united from the two single-armed levers 26 and 27 by a projecting pin 28 which can be removed. If the pin is drawn out the single-armed lever 27, which holds the valve needle 19 by pins with a forked slot, can be turned in the direction of the arrow 34 and the valve needle with all loose parts belonging to the liquid valve 18 can be removed in the direction of the arrow 33 for the purpose of cleaning. In order at the same time to keep together all parts which can be taken loose, such as stuffing box and follower nut, a short projecting pin 37 is passed through the valve needle.

The draw-rod 31 bears on its upper end a block or bracket 25 provided with bearing pins for the one-armed lever 26 and with an adjustable set screw 24 for regulating the stroke of the valve.

The force for closing the valve is provided by a compression spring in a guide sleeve 30. This sleeve is mounted on the casing 40 on which the hand grip or pistol butt 32 is secured. In order to prevent paint or other liquid from entering the bearings, the bearing member 8 is provided with a passage 35 which terminates in a cylindrical chamber 36, round the shaft 14 through which the air flows.

In Fig. 2 which shows a modification suitable for the low pressure, the compressed air flows into the pistol through a pistol grip 12 formed as a wide pipe. As rear pressure bearing for the shaft 14 of the impeller 15 there is provided a member 38 with distance and guide vane arms 39 which leads the flowing compressed air to the impeller. It is united with the casing 40.

Referring now to Fig. 3 the preferred construction of atomizing device is shown in longitudinal section. On the shaft 14 of the rotary spraying pistol, a stepped centrifugal cone 17 is secured, for example, screwed on the shaft. The base of the cone is hollowed out at 45 as shown. At some distance behind the conical body a funnel-shaped rear wall 41 is secured on the cone by means of spacing bolts 42. The liquid to be sprayed flows to the interior of the so formed atomizing device from the valve, not shown, through a small tube 43. When centrifugal force is applied, the liquid is rapidly whirled

in radial direction between the rear side of the cone and the rear wall 41 and so atomized. The base of the cone slopes backwards as at 46 from the outer edge to the edge of the recess. The fine particles of mist are diverted towards the front by the bent-over edge 44 of the rear wall and projected towards the surface of application. The particles of liquid reaching the front of the centrifugal cone are then engaged by the enveloping current of air from the nozzle and thus further atomized and projected forward.

I claim:

1. A liquid spraying device of the air brush type comprising a closed hollow body, having an air exit at its front end, means for admitting air under pressure to said body, a rotary mechanical atomizer at the front end of said body adjacent said air exit, means for projecting material to be sprayed onto said rotary atomizer, and a rotor within said body and driven by the compressed air therein and having driving connection to said rotary atomizer.

2. A liquid spraying device of the class described comprising a substantially cylindrical closed body having an annular air exit in its front end adapted to supply a jet of air in the shape of a closed cone, a mechanical atomizer mounted at the front end of said body on a rotatable shaft arranged longitudinally of said body, an impact rotor located within said body and operatively connected by means of said shaft to said mechanical atomizer, means for admitting air under pressure to said body in rear of said impeller, and means for feeding the liquid to be sprayed to said mechanical atomizer.

3. A liquid spraying device of the class described comprising a substantially cylindrical body, a bearing member mounted in the front end thereof, there being an annular air exit past said bearing member, a spindle rotatably mounted in said bearing member, a mechanical atomizer carried by the front end of said spindle of less diameter than said annular air exit, an impact rotor located within said cylindrical body carried by the rear end of said spindle, means for admitting air to said body in rear of said impeller, and means for feeding liquid to be sprayed into juxtaposition to said atomizer.

4. A liquid spraying device of the class described comprising a substantially cylindrical body, a bearing member mounted in the front end thereof, there being an annular air exit past said bearing member, a spindle rotatably mounted in said bearing member, a mechanical atomizer carried by the front end of said spindle of less diameter than said annular air exit, an impact rotor located within said annular body and carried by the rear end of said spindle, a member within said body having an annular air passage, means

for supplying air under pressure to said member, and means for feeding the liquid to be sprayed to said atomizer.

5. A liquid spraying device of the class described comprising a substantially cylindrical body, a sleeve member adjustable on the front end of said body and having a forwardly converging front end, a bearing member within the front end of said body spaced therefrom, said bearing member having an inclined wall opposed to the inclined portion of the sleeve and forming therewith air exit means converging towards a prolongation of the axis of the cylinder, a cone shaped mechanical atomizer rotatably carried by said bearing member, means for feeding liquid to the base of said cone, means for admitting air under pressure to said body, and means operated by said air for rotating said atomizer.

6. Apparatus according to claim 5 in which the atomizer is in the form of a stepped cone.

7. A liquid spraying device of the class described comprising a casing having a bearing block in its front end and an annular air exit in said end, said block having an axial bore with an annular enlargement towards the front, a spindle rotatably mounted in said bore, an air passage leading from the interior of the casing through said block to the annular space formed by said enlargement, a rotary mechanical atomizer mounted on said spindle within the space defined by a prolongation of the annular air exit, a rotor adapted to be operated by compressed air carried by the rear end of said spindle, means for admitting air under pressure to said casing, and means for feeding liquid to be sprayed to said atomizer.

8. A liquid spraying device of the class described comprising a hollow body having an air exit at the front end, a rotary mechanical atomizer at said end, means for admitting air under pressure to said body, a rotor in said body operated by said air and operatively connected to said atomizer, a feed tube for supplying liquid to said atomizer, a removable needle valve for controlling the feed through said tube and means for operating said needle valve including two levers fulcrumed to pivot about a common axis and having overlapping parts provided with transverse openings, and a connecting pin removably located in said openings.

9. A liquid spraying device of the class described comprising a substantially cylindrical casing having a pistol shape handle a rotary mechanical atomizer at the front end of said casing, said casing having an air exit adjacent said atomizer, means for admitting air under pressure to said casing, a rotor in said casing operatively connected to said atomizer and adapted to be driven by said air, a liquid feed tube having a delivery

exit adjacent said atomizer, a needle valve controlling the liquid feed, a pair of levers fulcrumed upon a common fixed pivot and having overlapping parts, means for detachably locking said levers together, means for detachably connecting one of said levers to the needle valve, and a trigger associated with said pistol handle and operatively connected to the other lever.

10. A liquid spraying device of the air brush type comprising a closed hollow body having an annular forwardly converging air exit at its front end, means for admitting air under pressure to said body, a circular rotary mechanical atomizer at the front end of said body having a substantially uninterrupted periphery adjacent said annular air exit, means for feeding material to be sprayed to the rear face of said rotary atomizer within the peripheral edge thereof, and a rotor within said body and driven by the compressed air therein and having driving connection with said rotary atomizer.

In testimony whereof I have hereunto affixed my signature.

KARL LUDWIG.