Note: Within nine months of the publication of the mention of the grant of the European patent in the European Patent Bulletin, any person may give notice to the European Patent Office of opposition to that patent, in accordance with the Implementing Regulations. Notice of opposition shall not be deemed to have been filed until the opposition fee has been paid. (Art. 99(1) European Patent Convention).
Description

[0001] The present invention relates to a spray gun for use with an air pressure detector which will not interfere with the user in routine paint-spraying operation and maintenance of the spray gun and on which an air pressure can be read easily and readily when necessary to control the spraying air pressure.

BACKGROUND ART

[0002] The spray gun uses compressed air to atomize a paint for spraying to an object. The pressure of compressed air should always be monitored and controlled to assure a stable quality of painting with the spray gun. There are available some spray guns in which the user can check the spraying air pressure from a near position. There are many spray guns designed small for installation to a spray gun. Also, to assure a stable quality of coating and thus it is necessary that the spraying pressure can be monitored from a position near the spray gun. However, since the pressure gauge interferes with the user in the routine spray-coating work because of its weight and size, so it is rarely used in the actual coating.

[0003] The spraying air pressure is adjusted by a pressure reducing valve or the like before supplied to the spray gun via an air hose. Conventionally, the user of the spray gun rarely checks the spraying pressure in the course of a spray coating being made. As mentioned above, however, it is regarded as being very important to adjust the spraying pressure within a range set for assuring the stable quality of coating and thus it is necessary that the spraying pressure can be monitored from a position near the spray gun. Also, to assure a stable quality of the coating, it has been standardized to make a continuous spray coating under an air pressure adjusted to a predetermined range without reliance on the user’s skill and intuition. Thus, it is necessary to monitor the air pressure in the course of a spray coating.

[0004] Generally, a pressure gauge is installed directly to the spray gun in coating tests to acquire quantitative data. The pressure gauge used in such tests is a general-purpose one, and it is installed to a joint for the air hose of the spray gun. However, since the pressure gauge interferes with the user in the routine spray-coating work because of its weight and size, so it is rarely used in the actual coating.

[0005] However, there has been proposed to use a small pressure gauge installed directly to a spray gun and which has no influence on the operability of the spray gun and on which the air pressure can be checked at any time even while the spray gun is being used (cf. Japanese Published Examined Utility Model No. 22277 of 1993). This pressure gauge is an analog pressure gauge of the so-called bourdon tube type, and does not meet the precision and durability requirements because it has to be designed small for installation to a spray gun. The spray gun is normally cleaned with thinner or the like. However, a spray gun with such a pressure gauge should be cleaned with much care being exercised for the pressure gauge not to be applied with the thinner, and cannot be cleaned using any automatic cleaning machine.

[0006] Also, to solve the problem of the pressure gauge in the maintenance of the spray gun and accurately indicate a spraying pressure, there has been proposed in the Japanese Published Patent No. 506310 of 1993 a spray gun in which a pressure gauge unit using a pressure sensor is hermetically embedded to provide a digital indication of the air pressure under which a paint is being sprayed. In this example, the pressure gauge unit is battery-operated, and it is housed in an air-tight container. Therefore, the spray gun is expensive, and the battery is a consumable component and thus will be a waste after expiration of its service life. Namely, the spray gun of this type has many practical problems yet to solve.

EP-A-1375013 discloses a retrofittable pressure gauge attached to the body of a spray gun. US Patent 6585173 discloses a pressure gauge with its power supply and display, fitted into the grip of a spray gun. The invention provides a spray gun as defined in Claim 1. The present invention can overcome the above-mentioned drawbacks of the related art by providing a spray gun with which as spraying pressure can readily be checked when necessary and the coating work can be standardized.

The present invention can also provide a spray gun manufactured with a reduced cost and which needs no expensive associated facility and can be handled similarly to the conventional spray gun in the routine maintenance.

[0007] The present invention can also provide a spray gun designed to easily take the air pressure, thereby permitting to check pressure data and make a predetermined control of the pressure on the basis of the pressure data.

In the spray gun according to the present invention, the
pressure measuring device is normally separated from the spray gun, and they are joined to each other when it is necessary to measure the air pressure. Of course, the spray gun may be used with the pressure measuring device kept joined to the spray gun whenever necessary. The check valve may be embedded in a joint or the like at a grip end of the spray gun. The pressure detecting means may be removably connected to the pressure measuring device by abutting, screwing or fitting as long as a hermetic connection can be achieved between them.

These and other objects, features and advantages of the present invention will become more apparent from the ensuing detailed description of the preferred embodiments of the present invention when taken in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a schematic sectional view of the spray gun embodying the present invention; FIG. 2 is also a sectional view of an embodiment of the check valve; FIG. 3 is a sectional view of another embodiment of the check valve; FIG. 4 is an external view of the spray gun with the check valve means provided at the joint of the grip; and FIG. 5 is a sectional view, enlarged in scale, of a portion A in FIG. 4.

Referring now to FIG. 1, there is schematically illustrated in the form of a sectional view one embodiment of the spray gun according to the present invention. The spray gun, generally indicated with a reference 1, is a manual type one operated with a trigger 2. As shown, the spray gun 1 includes an atomizer formed primarily from an atomization air cap 3 and paint nozzle 4, a gun barrel 8 formed from a paint supply adjuster 5, a pattern adjuster 6 and an air valve 7, and a grip 9 extending backward and downward from the gun barrel 8. The grip 9 has formed at the bottom thereof a connecting joint 12 forming an air intake 10.

There is formed an air channel 13 in the gun barrel to connect the air intake 10 and atomizer to each other. There are disposed in a part of the air channel 13 the air valve 7 and a regulating valve 61 of the pattern adjuster 6. According to this embodiment, a check valve 20 is provided between and above the air valve 7 and regulating valve 61. The check valve 20 has a body 21 and a valve rod 26 which is determined in shape in relation to a portion, to provisionally fix the pressure gauge 30, there may be provided a lid to prevent intrusion of a paint or inadvertent opening while the spray gun is being used. Further, to provisionally fix the pressure gauge 30, there may be provided, for example, a removable means for screwing the pressure gauge 30 into the opening 25 in the valve rod 26.

In, the valve 23 is opened to take the pressure from inside the air channel 13.

The portions of the pressure gauge 30 and valve body 21, which are engaged on each other, have to be designed to open the valve 23 while moving in close contact with each other. If the contact portion of either the measurement opening 31 in the pressure gauge 30 or the opening 25 in the valve body 21 can have provided thereon a leakage-preventive means formed from any easily deformable material, the engagement portions of the pressure gauge 30 and valve body 21 are not limited to those shown in FIG. 2. FIG. 3 shows an example of such engagement portions in which the leakage-preventive means 34 is provided at the pressure detector 20.

The check valve may be provided in a location where it communicates with a part of the air channel 13 in the spray gun where the pressure has to be measured. Depending upon the location of the check valve 20, there may be provided a separate liaison channel which provides a connection between the check valve 20 and air channel 13, for example. Also, the opening 25 may be provided with a lid to prevent intrusion of a paint or inadvertent opening while the spray gun is being used. Further, to provisionally fix the pressure gauge 30, there may be provided, for example, a removable means for screwing the pressure gauge 30 into the opening 25 in the valve body 21.

As mentioned above, spray coating is effected by the spray gun provided with the pressure gauge 20 for pressure detection, and the air pressure can instantly be detected simply by pressing the pressure gauge 20 when it is necessary to measure and check the air pressure. As mentioned above, different from the conventional spray gun in which the air hose has to be disconnected for the purpose of installing the pressure gauge, it is not necessary in the spray gun according to the present invention to dismount the pressure gauge once installed for the reason that the latter will degrade the operability of the spray gun in spray coating. The spray gun according to the present invention can of course be used as an...
According to the present invention, a valve to determine the spraying pressure is provided at the joint of the air intake of the spray gun. The valve is connected to the pressure measuring device. As shown in FIG. 5, a pressure detector 41 is embedded in the connecting joint 12. The pressure detector 41 may have a similar check valve that is connected to the pressure measuring device. With the pressure detector 41 being embedded in a part of a fixture connecting to the air channel in the spray gun, the joint and the like of a conventional spray gun may be replaced. Therefore, the pressure detector 41 should desirably be easy to remove. With the pressure detector 41 being embedded in the joint, the joint and the like of a conventional spray gun may be replaced with the joint of the spray gun according to the present invention even with no modification of the spray gun body.

According to the present invention, a spray gun (1) including an atomizer (3, 4) to atomize paint with compressed air, an air intake (10) for compressed air from the atomizer, and an air channel (13) which provides a communication between the atomizer and air intake, is further provided a check valve (20) facing at one side thereof a part of the air channel and at the other side a part of the spray gun, the check valve being constructed so that the air pressure in the air channel acts on an external pressure measuring device (30) when the check valve is connected to the pressure measuring device, so that it is opened under pressure applied from outside, so that the spray gun can be used in common with a plurality of spray guns. Namely, many spray guns can be used at low costs.

Further, the pressure measuring device such as the digital pressure gauge can be removed from the spray gun which is used as an ordinary one. Therefore, the pressure measuring device may be provided therein a storage unit, control feature and the like to standardize and manage the spray-coating work.

In the foregoing, the present invention has been described in detail concerning certain preferred embodiments thereof as examples with reference to the accompanying drawings. However, it should be understood by those ordinarily skilled in the art that the present invention is not limited to the embodiments but can be modified in various manners, constructed alternatively or embodied in various other forms without departing from the scope thereof as set forth and defined in the appended claims.

### Claims

1. A spray gun (1) including an atomizer (3, 4) to atomize paint with compressed air, an air intake for compressed air from the atomizer, and an air channel (13) which provides a communication between the atomizer and air intake, characterized in that there is further provided a check valve (20) facing at one side thereof a part of the air channel and at the other side the outside of the spray gun, the check valve being constructed so that the air pressure in the air channel acts on an external pressure measuring device (30) when the check valve is connected to the pressure measuring device, so that it is opened under pressure applied from outside, so that the air channel is isolated from the outside when the check valve is disconnected from the pressure measuring device, and so that the check valve is closed as the pressure from the pressure measuring device is removed.

2. A spray gun according to Claim 1, wherein the check valve (41) is embedded in a joint (12) which is the air intake (10).

### Patentansprüche

1. Sprühpistole (1) umfassend einen Zerstäuber (3, 4), um Farbe mit Hilfe von Druckluft zu zerstäuben, e-
nen Lufteinlass für die vom Zerstäuber kommende Druckluft, und einen Luftkanal (13), der eine Verbindung zwischen dem Zerstäuber und dem Lufteinlass herstellt, **dadurch gekennzeichnet, dass** ferner ein Rückschlagventil (20) bereitgestellt wird, dessen eine Seite ein Teil des Luftkanals zugewandt ist und dessen anderer Seite das Äußere der Sprühpistole zugewandt ist, wobei das Rückschlagventil so aufgebaut ist, dass der Luftdruck im Luftkanal auf ein äußeres Druckmessgerät (30) einwirkt, wenn das Rückschlagventil mit dem Druckmessgerät verbunden ist, so dass es unter von Außen einwirkendem Druck geöffnet wird, so dass der Luftkanal von Außen isoliert wird, wenn das Rückschlagventil vom Druckmessgerät getrennt wird, und so dass das Rückschlagventil geschlossen wird, wenn der Druck vom Druckmessgerät entfernt wird.

2. Sprühpistole nach Anspruch 1, wobei das Rückschlagventil (41) in ein Verbindungsstück (12), das sich im Lufteinlass (10) befundet, eingelassen ist.

**Revendications**

1. Pistolet de pulvérisation (1) incluant un atomiseur (3, 4) pour atomiser de la peinture à l’aide d’air comprimé, une entrée d’air pour l’air comprimé provenant de l’atomiseur, et un canal d’air (13) fournissant une liaison entre l’atomiseur et l’entrée d’air, **caractérisé par** la fourniture supplémentaire d’un clapet anti-retour (20) faisant face, sur un de ses côtés, à une partie du canal d’air, et sur l’autre côté, à l’extérieur du pistolet de pulvérisation, le clapet anti-retour étant conçu de manière à ce que la pression d’air dans le canal d’air agisse sur un dispositif de mesure de pression extérieur (30) quand le clapet anti-retour est connecté au dispositif de mesure de la pression, de sorte qu’il s’ouvre sous la pression appliquée de l’extérieur, de sorte que le canal d’air est isolé de l’extérieur quand le clapet anti-retour est déconnecté du dispositif de mesure de pression, et de sorte que le clapet anti-retour est fermé lorsque la pression du dispositif de mesure de la pression est supprimée.

2. Pistolet de pulvérisation selon la revendication 1, dans lequel le clapet anti-retour (41) est encastré dans un joint (12) qui est l’entrée d’air (10).
Fig. 5
REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- JP 22277 A [0005]
- JP 1993 A [0005] [0006]
- JP 506310 A [0006]
- EP 1375013 A [0006]
- US 6585173 B [0006]