

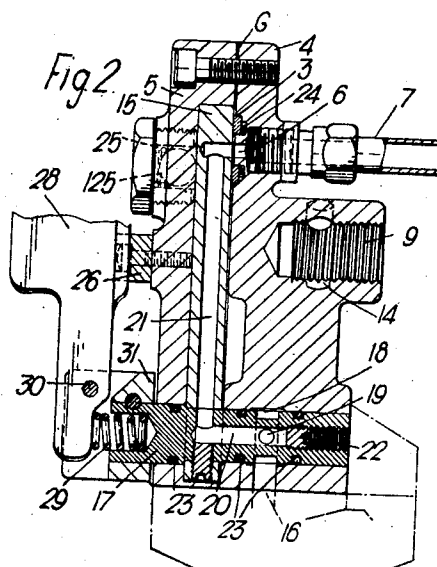
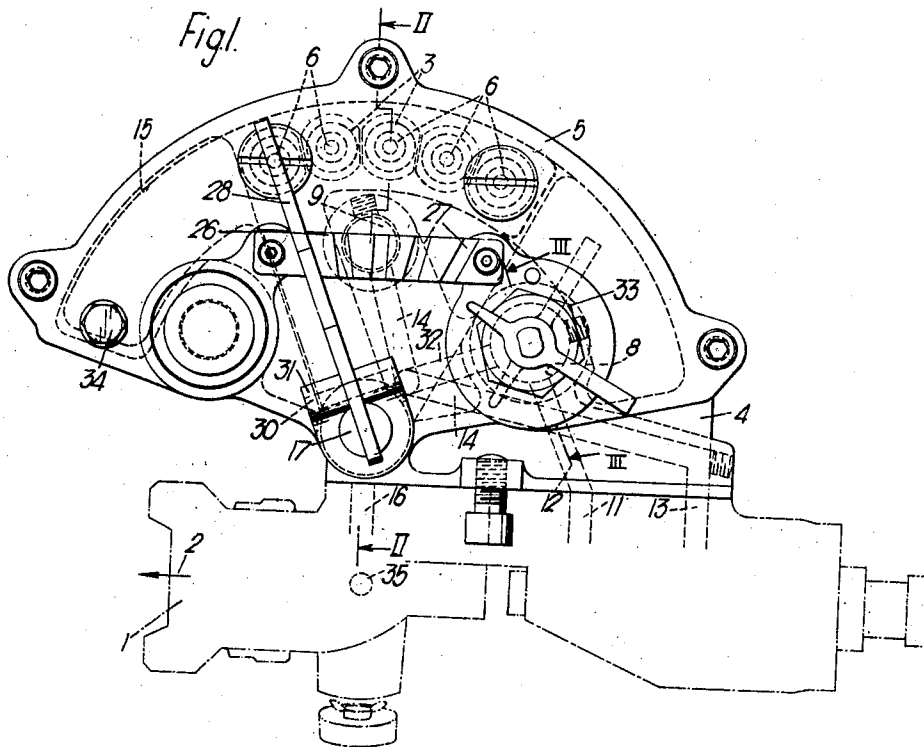
April 14, 1964

H. R. J. KNIGHT
LIQUID SPRAYING GUNS

3,128,787

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2 Sheets-Sheet 1



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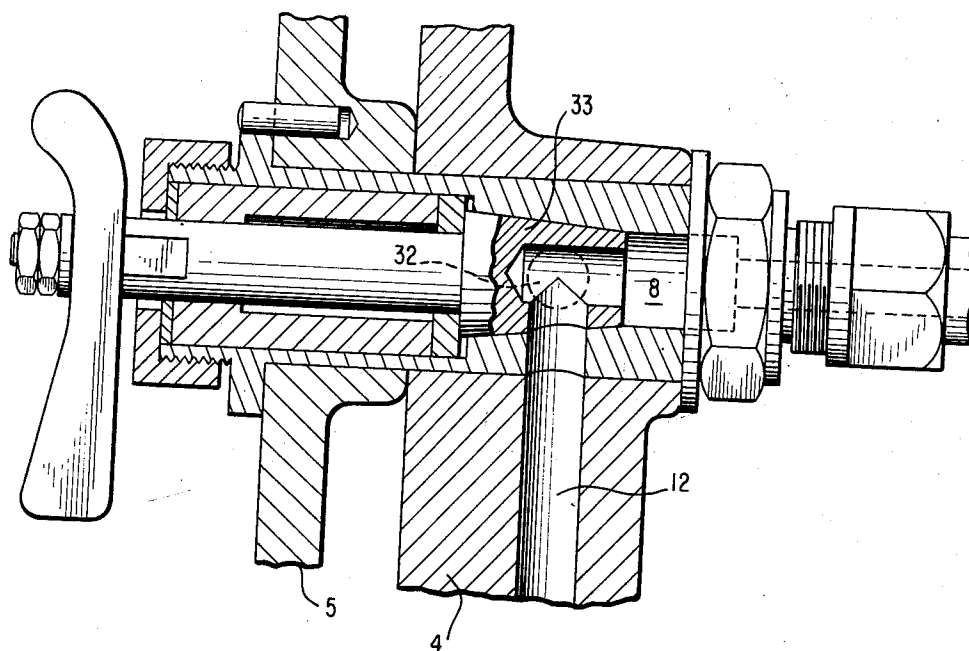


FIG. 3

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1

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LIQUID SPRAYING GUNS

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This invention relates to guns for spraying liquids and in particular to guns for spraying liquids, such as paint, which may be of differing colours.

When effecting painting with a spray gun it is often required to effect frequent changes of colour and this entails the provision of alternative sources of paint supply and the connection thereof to the gun, the turning off of atomising air during the changeover, and the operation of the gun to cause the paint of new colour to purge the gun of the previously used colour. In many instances, as for example when the gun is being employed for painting automobile bodies moved automatically in quick succession to the painting position, the change-over and purging must be effected quickly, possibly in an interval of less than ten seconds, and the change-over must be effected in a manner such as to avoid contamination of the already painted body either by splashes of the new paint, or atomised new paint, during purging of the gun or by dried paint particles or dust which may be dislodged while disconnecting one paint hose from the gun and connecting another to the gun.

Generally it has been possible for only one paint hose to be connected to the gun at any one time and this has rendered difficult the effecting of a quick change-over from one colour to another and also the avoidance of contamination as just mentioned. Further, when effecting purging of the gun it has been necessary to run to waste a relatively considerable amount of paint which is an expensive commodity.

It is a main object of the present invention to provide a spray gun which reduces to a minimum the time necessary for effecting a change-over from one colour to another and which reduces the possibility of contamination during change-over.

It is a further object of the invention to reduce to a minimum the quantity of paint which is run to waste during purging.

According to the invention there is provided in or for a liquid spraying gun a service unit including a plurality of liquid entry ports, an atomising air entry port, and a control air entry port, a valve member operable selectively to effect communication between any one of the liquid entry ports and a liquid inlet port in a gun-body, an atomising air passage to connect the atomising air entry port with an atomising air inlet port in the gun-body and a control air passage to connect the control air entry port with a control air inlet port in the gun-body.

In order that the invention may be clearly understood one embodiment thereof will now be described, by way of example, with reference to the accompanying drawings, in which:

FIGURE 1 is a side elevation of a service unit for a spray gun and,

FIGURE 2 is a section on line II—II, FIGURE 1 but with the valve member in the central position thereof, and

FIGURE 3 is an enlarged section taken on line III—III of FIGURE 1.

Referring to the drawings, a spray gun, illustrated diagrammatically in broken lines, comprises a gun-body 1 from which paint is sprayed in the direction of arrow 2, FIGURE 1. The spray gun and its mode of opera-

2

tion are well known in the art being of the kind manufactured by Binks Manufacturing Company of Chicago, Illinois, or by The DeVilbiss Company of Toledo, Ohio. The gun comprises a nozzle which is normally closed by a needle valve and is provided with an atomising air inlet port connectable with a source which continuously supplies air under pressure, with a liquid inlet port connectable with a source which continuously supplies paint under pressure, and with a control air inlet port connectable with a source of air under pressure. Control air is admitted to the control air inlet port only on demand from the painting machine. The needle valve normally obturates the flow of atomising air and of paint but when control air is admitted, as called for by the painting machine, through the control air inlet port the needle valve is withdrawn by the control air to permit paint and atomising air to flow to the nozzle.

The service unit according to the present invention is arranged to be fitted to this known kind of gun and, as will be described below, is provided with an atomising air entry port to co-operate with the atomising air inlet port of the gun, with liquid entry ports for selective co-operation with the liquid inlet port of the gun, and with a control air entry port for co-operation with the control air inlet port of the gun.

The service unit is adapted to be secured to the gun-body, as by bolts, not shown, and comprises a housing formed by a frame member 4 and a cover plate 5 between which there is located a sealing gasket G, FIGURE 2. The frame member 4 is provided with a plurality, five as shown in FIGURE 1, of liquid entry ports 6 each of which receives, as shown in FIGURE 2, a connector by which a paint hose 7, FIGURE 2, for example a plastic hose, can be connected to the service unit. The frame member is also provided with an atomising air entry port 8, and a control air entry port 9, each of which is provided with a connector, not shown, similar to the connector for the port 6, which can be connected respectively with an atomising air hose and a control air hose, not shown. The atomising air entry port 8 is connectable with the atomising air inlet port 11 in the gun-body 1 by an atomising air passage 12 formed in the frame member 4, and the control air entry port 9 is connectable with the control air inlet port 13 in the gun-body by a control air passage 14.

A valve member 15 in the shape of a T-shaped quadrant is operable selectively to effect communication between any one of the liquid entry ports 6 and the liquid inlet port 16 formed in gun-body 1. The valve member includes a rockable hollow spindle 17 which is provided with an exterior annular groove 18, FIGURE 2, which is aligned with the liquid outlet port 16 and has a hole 19 effecting communication between the groove 18 and the interior 20 of the spindle. The valve member 15 is secured to the spindle in any suitable manner and a delivery passage 31 which extends therethrough is arranged to effect communication between the interior 20 of the spindle and a liquid entry port 6. One outer end of the spindle is closed by a plug 22, FIGURE 2, and O-sectioned sealing rings 23 effect a liquid-tight seal between the spindle, the cover 5, and the frame member 4. A liquid-tight seal between the valve member 15 and frame member 4 is effected by washers 3, O-sectioned rings 24, and by springs 25 and balls 125, FIGURE 2, which press the valve member 15 against the washers 3 which surround the liquid entry ports 6. The washers 3 are preferably self-lubricating and are made of polytetrafluoroethylene. With the arrangement of washers 3 and O-sectioned rings 24 as just described it is found that at any given instant two of the washers 3 are firmly engaged with the valve member 15 and that the remaining

washers 3 are pressed against the member 15 by the rings 24 which are engaged therewith. The valve member 15 thus "floats" between the washers 3 and the balls 125 which are aligned with the sealing washers 3.

Indexing means are provided to locate the delivery passage 21 relative to any one of the liquid entry ports 6 and, as illustrated in the drawings, comprises a fixed element 26 on the cover 5, which element is provided, as shown in FIGURE 1, with slots 27 which are aligned one each with the ports 6. An indexing finger 28 which is retainable in any one of the slots 27 by a spring 29, FIGURE 2, is pivoted at 30 to a nut 31 secured to the spindle 17. The finger 28 is thus rockable with the spindle 17 and is supported for rocking movement about pivot 30 in the general direction of the longitudinal axis of the spindle 17.

The control air passage 14 is connected with the atomising air passage 12 by an auxiliary air passage 32, FIGURE 1, and a cock 33 rotatable in the air entry port 8 is arranged to obturate the auxiliary passage 32 from the atomising air passage 12, as shown in FIG. 3, or to open the auxiliary passage to the atomising air passage.

As illustrated in FIGURE 1 the gun with the service unit fitted thereto is conditioned to receive paint from the extreme left-hand entry port 6. If now a change-over is to be effected to the centre port 6 the indexing finger 28 is rocked about pivot 30 counterclockwise, as viewed in FIGURE 2, thus releasing the finger from the slot 27 aligned with the extreme left-hand port 6, FIGURE 1, and the finger 28 is then rotated clockwise, as viewed in FIGURE 1, until it is aligned with slot 27 which is aligned with the center port 6, the finger then being released so that spring 29 causes it to enter and be retained in the slot 27 aligned with the center port 6. The rotation of finger 28 causes the spindle 17 and valve member 15 also to be rotated clockwise, as viewed in FIGURE 1, so that the delivery passage 21 is now aligned with the center port 6. It is now necessary to operate the gun in order to purge it and when this happens the atomising air is cut-off from port 11 to avoid the finely atomised paint of the new colour from spoiling the preceding work and by rotation of cock 33 is diverted through auxiliary passage 32 into port 13 to open the needle valve of the gun so that paint issues from the gun as a slow moving, unatomised, stream thus reducing to a minimum the possibility of the paint contaminating an already painted body. At this time there is no control air in passage 14. It will be understood that only the gun and the delivery passage 21 have to be purged of old paint and this can be quickly effected with a minimum of paint of the new colour. Because of the sealing arrangements described above very little paint collects in the passage for the valve member 15 but a drain plug 34, FIGURE 1, is provided to permit draining of the valve passage. When the paint of new colour is flowing freely from the nozzle the cock 33 is again operated to re-connect the atomising air to port 11 and the control air to port 13 and the gun is then conditioned to effect spraying operations with the paint of new colour.

It will be also understood that the change-over can be almost instantaneously effected and that because it is not necessary to disconnect and connect hoses contamination of an already painted body by dried paint particles or dust is reduced to a minimum.

A gun as described herein can, as mentioned above, be used in an automatic painting machine, in which event it is pivoted at 35, FIGURE 1, to the painting apparatus in known manner, or the gun may be a hand-operated gun.

When the gun is used for automatic painting the paint hoses 7, together with the atomising air hose and the control air hose are so disposed relative one to the other as to avoid chafing as the gun pivots through its operating

angle, thus avoiding the possible precipitation of dirt on the painted surfaces.

I claim:

1. A service unit for a spray gun, said unit comprising a housing having a plurality of liquid entry ports and a liquid outlet passage, a valve member located in said housing and including a passage selectively connectable between said liquid outlet passage and any one of the liquid entry ports, said housing including an atomizing air entry port communicating with an atomizing air passage by which atomizing air is passed to a gun, a control air entry port communicating with a control air passage by which control air is delivered to a gun, an auxiliary passage in said housing connecting the atomizing air entry port and control air passage, and a cock operable to obturate the auxiliary passage from the atomizing air entry port and to connect said port to the atomizing air passage or to open the auxiliary passage to the atomizing air entry port and close the atomizing air passage whereby atomizing air may be diverted to the control air passage.

2. A service unit according to claim 1 wherein said valve member includes a rockable hollow spindle provided with an annular groove which communicates with the interior of said spindle and said liquid outlet passage, said annular groove and interior of the spindle forming part of said selectively connectable passage.

3. A service unit according to claim 2 including indexing means co-operating with the valve member to locate the selectively connectable passage relative to any one of said liquid entry ports.

4. A service unit according to claim 3 in which the indexing means comprises a fixed element on said housing, slots in said fixed element aligned one with each of the liquid entry ports, an indexing finger pivotally mounted on said hollow spindle for rocking movement therewith and for rocking movement relative thereto in the general direction of the longitudinal axis of the spindle, and a spring cooperating with said finger and tending to retain the finger in one of said slots.

5. A service unit for a spray gun comprising a housing having a plurality of liquid entry ports and a liquid outlet passage, a valve member located in said housing and including a passage selectively connectable between said liquid outlet passage and any one of the liquid entry ports, a sealing washer surrounding each of said liquid entry ports and having one face thereof engaging one face of the valve member, an O-section sealing ring engaging the opposite face of the sealing washer, pressure members engaging the opposite face of the valve member, and springs urging each said pressure member into engagement with said opposite face of the valve member, said housing including an atomizing air entry port communicating with an atomizing air passage by which atomizing air is passed to a gun, and a control air entry port communicating with a control air passage through which control air is delivered to a gun, an auxiliary passage in said housing connecting the atomizing air entry port and control air passage, and a cock operable to obturate the auxiliary passage from the atomizing air entry port and to connect said port to the atomizing air passage or to open the auxiliary passage to the atomizing air entry port and close the atomizing air passage whereby atomizing air may be diverted to the control air passage.

6. A service unit according to claim 5 in which the valve member includes a rockable hollow spindle provided with an annular groove which communicates with the interior of said spindle and said liquid outlet passage, said annular groove and interior of the spindle forming part of said selectively connectable passage.

7. A service unit according to claim 6 including indexing means co-operating with the valve member to locate the selectively connectable passage relative to any one of said liquid entry ports.

8. A service unit according to claim 7 in which the

indexing means comprises a fixed element on said housing and defining slots aligned one with each of the liquid entry ports, an indexing finger pivotally mounted on said hollow spindle for rocking movement therewith and for rocking movement relative thereto in the general direction of the longitudinal axis of the spindle, and a spring co-operating with said finger and tending to retain the finger in one of said slots.

5

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