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(54) Paint spraying apparatus

(57) Paint spraying apparatus comprises a unit adapted to be carried as a backpack and includes one or more paint reservoirs (18, 20), which communicate with a spray nozzle and a compressed nitrogen reservoir (16) which communicates with the paint reservoir(s) via line (22, 26, 28) which includes a pressure reducing valve (24). The spray nozzle may form part of a spray gun which includes a first valve member which permits or prevents the flow of paint through the spray nozzle and a further adjustable valve member associated with each paint reservoir to permit the alteration of the paint colour to be sprayed.

Fig.1.

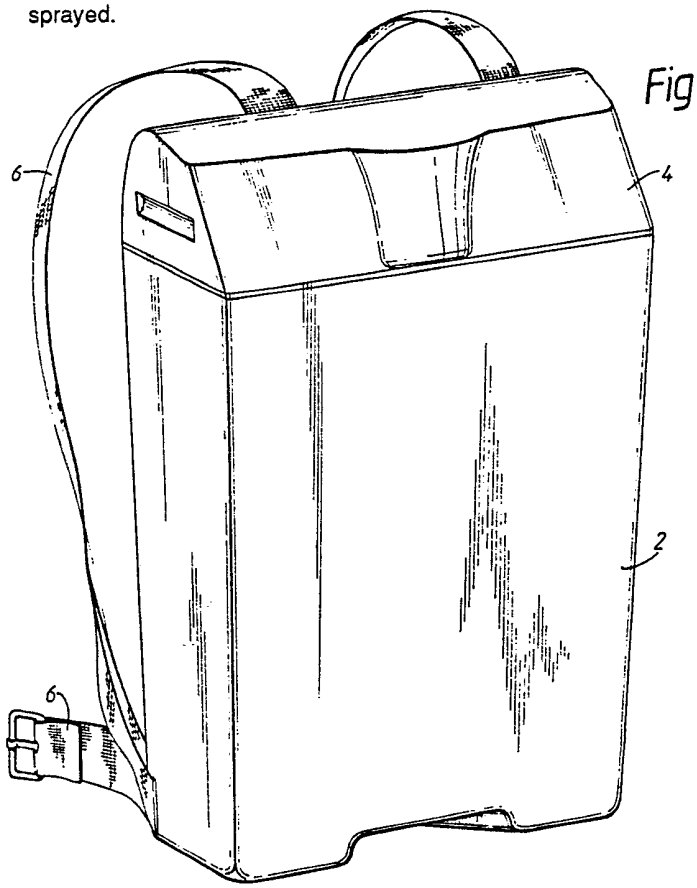
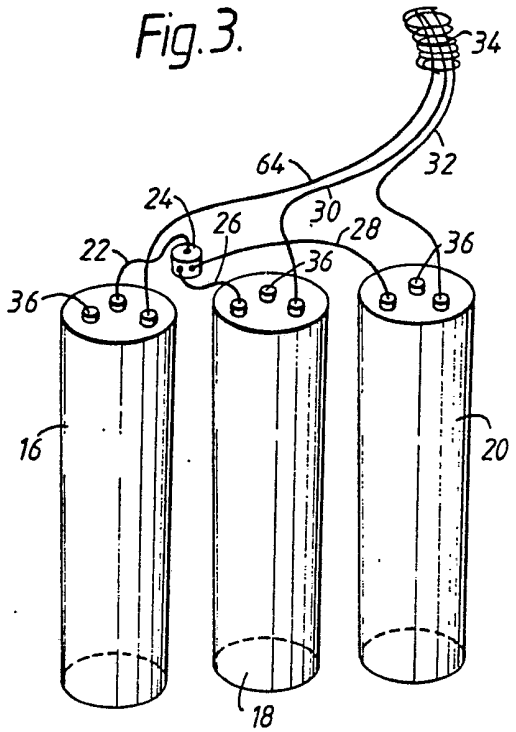


Fig.3.



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At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

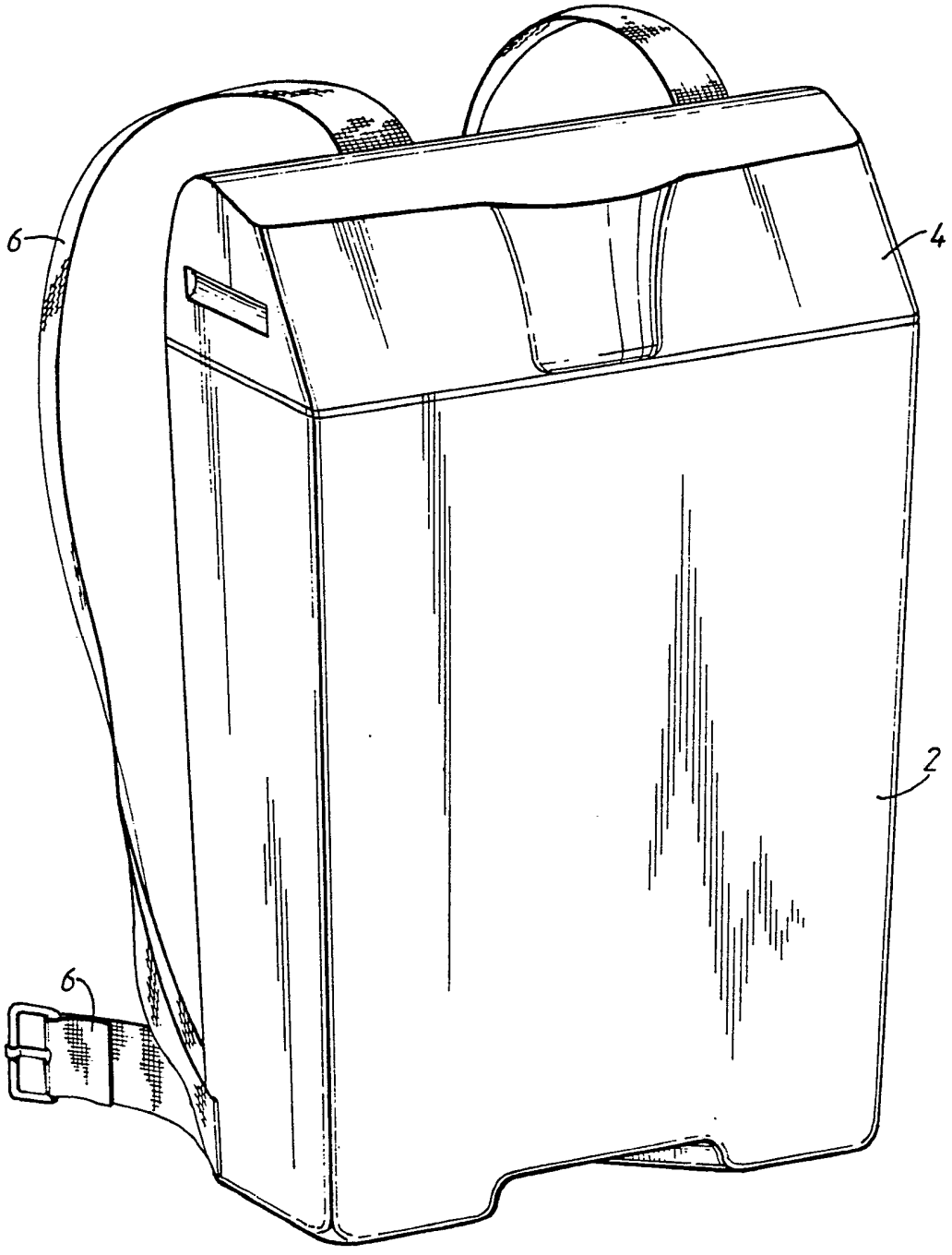

Fig.1.

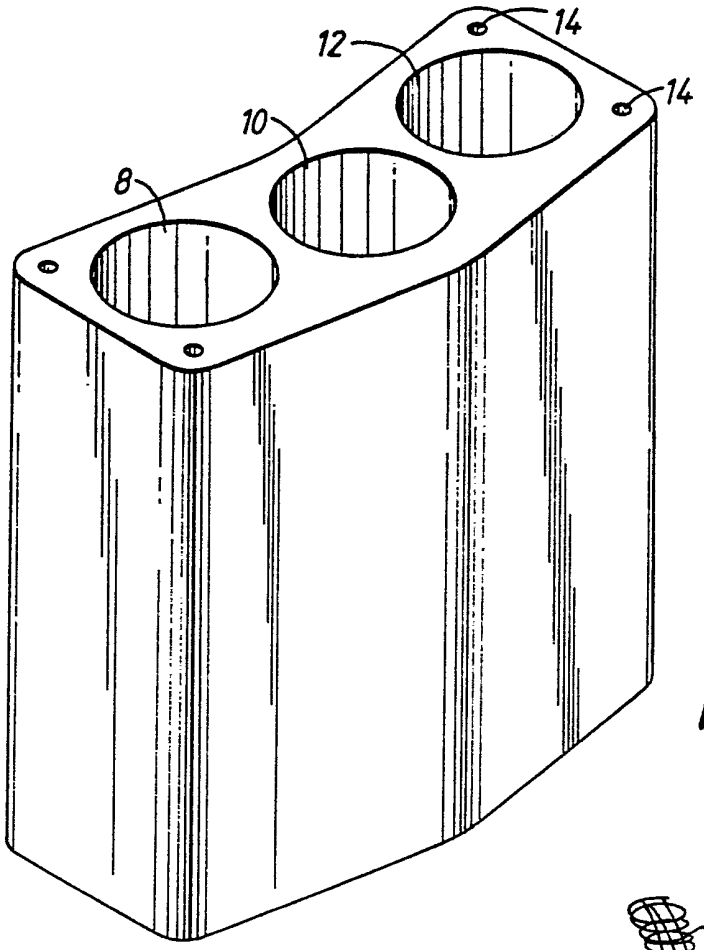

Fig. 2.

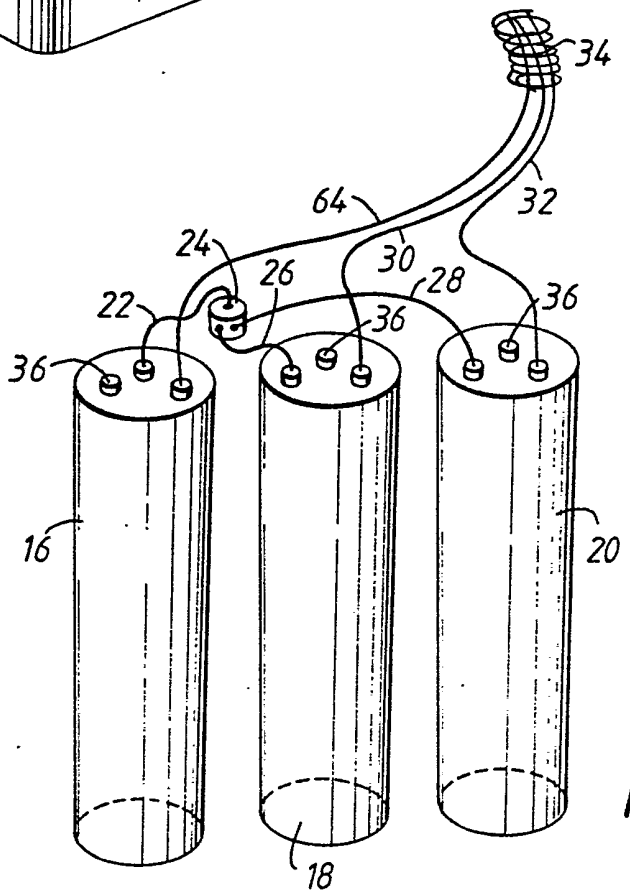

Fig. 3.

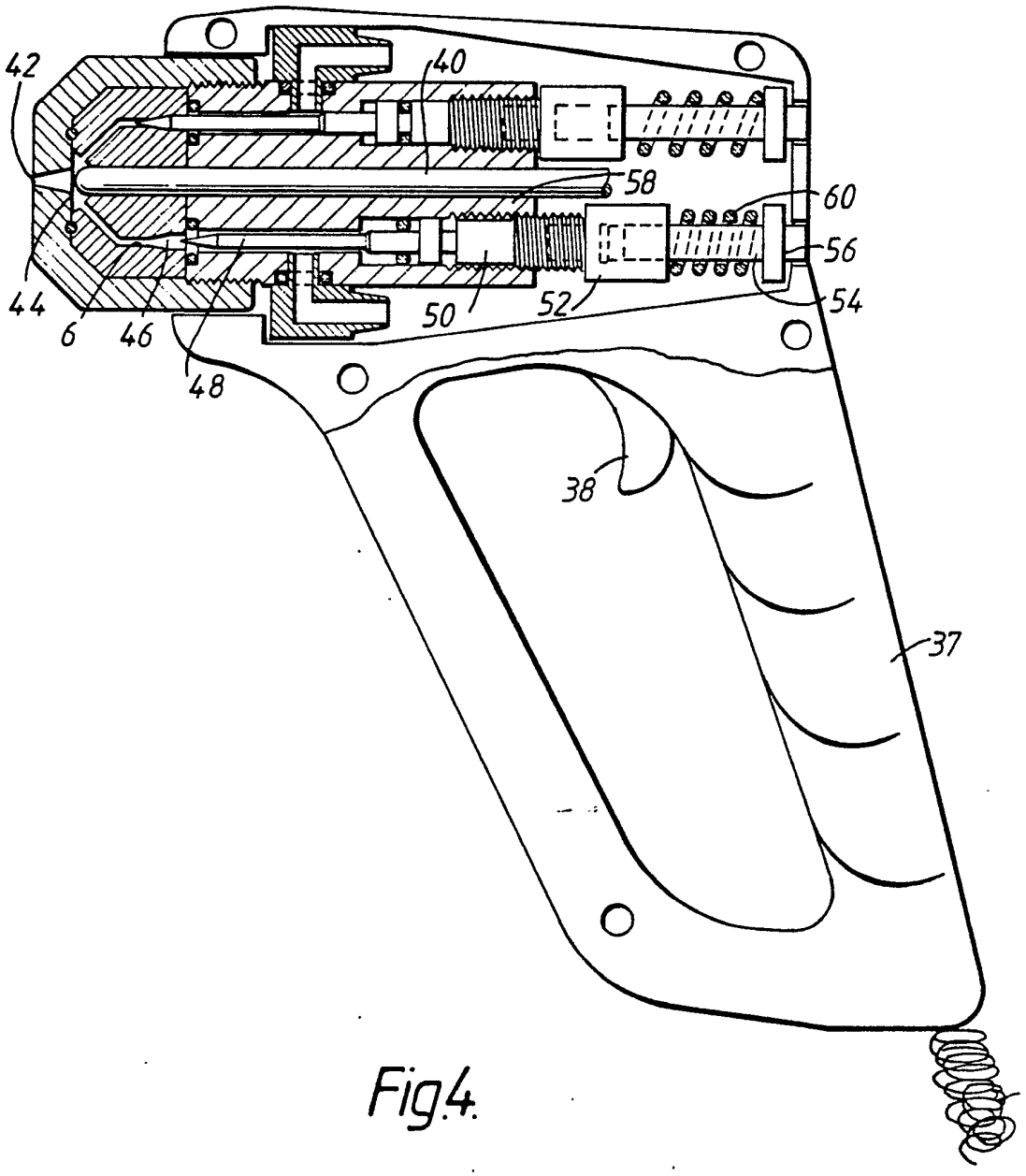

Fig.4.

PAINT SPRAYING APPARATUS

The present invention relates to paint spraying apparatus. Such apparatus includes a paint reservoir connected to a spray nozzle and to a source of pressurised gas which selectively propels the paint through the spray nozzle where it is broken into droplets or atomised and then blown against the surface to be painted.

In one common form of paint spraying apparatus the source of pressurised gas is merely a volume of compressed gas within the paint reservoir and this is the construction of conventional aerosol paint sprays. However, such aerosol paint sprays, which are hand held, suffer from the disadvantage that they inherently contain only a relatively small volume of paint, because they must be readily manipulable by one hand of the user, and also a relatively small amount of gas because the volume available for the gas is very small and it can not be compressed to any very substantial pressure, firstly because aerosol spray cans are too weak to withstand such a pressure and secondly because it is undesirable for the paint to be sprayed at substantial pressure. Aerosol spray cans are relatively expensive and can not be refilled and it is therefore prohibitively expensive to spray any significant volume of paint using such spray cans. Furthermore, the environmentally harmful effects of the propellants commonly in aerosol paint sprays have attracted increasing criticism over the past few years.

In a further known form of paint spraying apparatus,

the source of pressurised gas is an air compressor which is remote from the paint reservoir. Such apparatus is used for e.g. spraying cars. Whilst this apparatus does not suffer from certain of the disadvantages referred to above it is not readily portable in that it is rarely possible to move the compressor any significant distance, particularly if it is electrically powered, as is commonly the case. Furthermore, the use of compressed air introduces the further problem that the oxygen in it leads to gradual hardening of the paint within the system and thus when the apparatus is not in use the paint reservoir must be emptied and the paint supply line and spray nozzle must be purged or otherwise cleaned.

There is a significant demand for a portable paint spraying apparatus which can be used remote from a power source and can selectively dispense significant volumes of paint but is refillable and thus not expensive to operate. It is thus an object of the present invention to provide an apparatus which can fulfill this demand and in which the various disadvantages referred to above are not present.

Known paint spraying apparatus all dispense only a single colour paint but it is frequently desirable to be able to spray a selected one of a number of different paint colours or a selected mixture of colours from the same apparatus without having to alter its connections or to remove the one paint from the paint reservoir and replace it with a paint of a different colour.

For instance, in connection with forestry work it is common for trees to be marked with one of a number of colours to indicate the treatment to which they are to be subjected and for this purpose it is usual for the personnel to carry a number of aerosol paint sprays of differing colours. Such aerosol spray cans are expensive, as mentioned above, and it is troublesome to have to carry a number of them.

It is a further object of the present invention to provide paint spraying apparatus which can selectively spray any one of two or more different paints, and preferably any desired mixture of such paints, without having to alter its connections or remove one paint from the apparatus and replace it with another.

According to the present invention there is provided a paint spraying apparatus comprising a unit which is adapted to be carried or as a backpack and includes a paint reservoir, which communicates with a spray nozzle, and a compressed nitrogen reservoir, which communicates with the paint reservoir via a line which includes a pressure reducing valve.

The unit in accordance with the invention is thus a backpack unit which is carried in the manner of a rucksack and this readily enables considerably more paint to be carried than is possible with an aerosol spray can. The propellant gas used is nitrogen, though any non-oxygen containing gas would be satisfactory, and the paint is thus not subject to hardening in the paint reservoir or supply line and the unit may thus be left unused for a considerable period of time without

having to remove the paint from it. The compressed nitrogen is not stored within the paint reservoir but in its own tank which communicates with the paint reservoir via a pressure reducing valve. This means that the nitrogen may be stored at a pressure far higher than that which can be used for spraying which means in turn that a significantly greater amount of nitrogen may be stored. The pressure of the nitrogen may thus be as high as 50 bar or more but the spraying pressure may be only 10 bar or less.

It is preferred that the pressure reducing valve is adjustable to permit the spraying pressure to be altered as required or to permit a very high spraying pressure to be used initially to remove any clogging which may have occurred at the spray nozzle whereafter the spray pressure will be reduced again. In this connection it will be appreciated that it is only at the nozzle that any hardening of the paint can occur because it is only at this point that the paint comes into contact with oxygen.

The apparatus will of course require a selectively operable actuator or trigger to initiate or terminate spraying and whilst this may be provided on or adjacent the paint reservoir, it is preferred that this is provided at the end of a trailing paint output line adjacent or as part of the spray nozzle and is adapted to be operated by the user whilst the apparatus is in use.

The unit is in the form of a backpack or rucksack and may comprise a frame to which straps, padding and the

like are connected and which carries the various components of the unit. It is preferred that the frame includes or consists of a body of moulded plastics material, e.g. foamed plastics material, which affords recesses accommodating a respective reservoir.

Whilst the apparatus in accordance with the invention may include only a single paint reservoir it may include two or more such reservoirs. These may communicate with a common nitrogen reservoir, via either a respective or a common pressure reducing valve, or with respective nitrogen reservoirs.

The or each paint reservoir may be wholly separate from the or each nitrogen reservoir but it is preferred that the or each paint reservoir is integral with a nitrogen reservoir and thus effectively comprises a single tank divided into two portions which communicate via a pressure reducing valve. It is preferred that each reservoir is provided with a connection or filling opening by means of which it may be refilled.

If the apparatus includes two or more paint reservoirs, the paints therein may be dispensed through respective output lines and selectively operable spray orifices. It is however preferred that the apparatus includes only a single spray head which includes a single spray nozzle which communicates with each paint output line, each paint output line including a respective flow control valve and the spray head including a single actuating member connected to further valve means arranged to permit or prevent the flow of paint through the spray nozzle. The spray head thus includes a

single actuator or valve which controls all the paint lines and a respective further valve for each paint line whereby operation of the actuator results in that paint or mixture of paint being sprayed which is determined by the setting of the further valves.

Further features and details of the invention will be apparent from the following description of one specific embodiment which is given by way of example with reference to the accompanying drawings, in which:-

Figure 1 is a perspective view of a two-colour paint spraying apparatus in accordance with the present invention;
Figure 2 is a perspective view of the frame of the apparatus from which the cover and reservoirs have been removed;
Figure 3 is a diagrammatic perspective view of the reservoirs and their connecting lines; and
Figure 4 is a partly sectioned elevation of the paint spray head.

As best seen in Figure 1, the apparatus is of generally rucksack or backpack appearance and comprises a frame or support member 2 which is covered by a cover 4 and to which are attached carrying and securing straps 6 of the conventional type. Extending from the front of the frame 2 is a trailing hose (not visible in Figure 1) through which a number of lines pass and which terminates in a paint spray head or gun, as will be described below.

The frame 2 comprises a one-piece member of high

density resilient plastics material which directly engages the user's back and thus acts as a cushion. Within the plastics material are three cylindrical recesses 8,10,12 and four fastening holes 14 for securing the connecting lines or pipework, as seen in Figure 2. Received in the recesses are a compressed nitrogen cylinder 16 and two paint cylinders 18,20 which contain paint of different colours. The nitrogen cylinder 16 is connected by a line 22 to an adjustable pressure-reducing valve 24 which is in turn connected by lines 26,28 to respective paint cylinders 18,20. Within each paint cylinder is a respective tube (not shown) which is open adjacent the bottom of the cylinder and is connected to a respective paint output line 30,32. The paint output lines are surrounded by common sheathing to form the trailing delivery hose 34 which terminates in the spray gun. Each cylinder also has a pressure relief valve 36 and may be refilled with paint or nitrogen, as the case may be, through the relief valve opening.

The spray head is in the form of a gun with a handle 37 and a trigger 38 which is coupled to move a valve member 40 which is arranged to block or expose a spray nozzle or orifice 42. The orifice 42 communicates with a mixing chamber 44 which in turn communicates with two inlet passages 46. Each inlet passage 46 communicates with a respective paint output line 30,32 and accommodates a valve needle 48. The valve needle 48 is connected to an externally threaded body 50 whose screw thread is received in a threaded bore in a block 52. The block 52 is connected to be rotated by a peg 54 which terminates in an adjustment member 56 which is

accessible from the exterior of the gun and may be rotated manually or by means of a tool. The thread on the member 50 cooperates with an internal thread on a bored member 58 and a spring 60 extends around the peg 54 and is engaged by the block 52 and a shoulder adjacent or integral with the adjustment member 56.

Each valve needle 48 may thus be so moved by rotation of the associated adjustment member 56 from the position shown for the uppermost valve needle in Figure 4, in which it engages a seat 62 and thus blocks the passage 46, to the position shown for the lowermost needle valve in Figure 4 in which the passage 46 is open and paint can flow through it to the mixing chamber 44. When the valve member 40 is moved by actuation of the trigger 38, the paint or mixture of paints which is sprayed through the orifice 42 is thus determined by the position of the valve needles 48.

In use, the unit is worn on the back in the manner of a rucksack and the spray gun is held in the hand. The desired paint colour or mixture of colours is set by adjustment of the adjustment member 56 and sprayed by actuation of the trigger 38 under the action of the pressure in the cylinder 16 which forces paint out of the requisite cylinder(s) 18 through the paint output lines into the spray gun. Due to the relatively large size of the nitrogen and paint cylinders, spraying may be continued for extended periods of time and the colour which is sprayed may be altered at any time without having to remove the unit from the user's back or to flush the paint lines. If the nitrogen or paint cylinders should become exhausted, they may be readily

refilled. If there is a substantial interruption to spraying, the paint cylinders do not need to be emptied and the paint lines do not need to be cleaned since the paint is only in contact with nitrogen and thus does not harden. A small volume of paint in the nozzle 42 is exposed to the atmosphere and will thus harden but this can readily be cleared when restarting spraying by temporarily adjusting the pressure reducing valve 24 to increase the spraying pressure. Alternatively, as shown in Figure 3, a gas line 64 may pass direct from the nitrogen cylinder 16 to the spray gun where it communicates with the mixing chamber 44, and is associated with its own valve (not shown) which may be fixed or of adjustable type similar to the individual paint valves. In this event, the paint lines are closed and the nitrogen line opened and the nozzle may be cleared by a brief application of high pressure nitrogen whereafter spraying may be conducted in the usual manner.

It will be appreciated that numerous modifications may be effected to the construction described above. Thus whilst the individual valves associated with each paint output line have been described as variable throttling valves they may be of simpler on/off valve type. The nitrogen line described above for cleaning the spray nozzle in the event of its being blocked by dried paint may be used to deliver a stream of nitrogen at all times when spraying paint to providing a dispersing or atomising gas flow for the paint. Whilst the use of only two different paint colours has been described, the apparatus may be modified to spray any one or a mixture of almost any desired number of paint colours.

The spraying pressure may be readily altered to suit the requirements by adjustment of the pressure reducing valve 24 and/or of the valve in the spray gun which is associated with the nitrogen line 64.

CLAIMS

1. Paint spraying apparatus comprising a unit which is adapted to be carried or as a backpack and includes a paint reservoir, which communicates with a spray nozzle, and a compressed nitrogen reservoir, which communicates with the paint reservoir via a line which includes a pressure reducing valve.

2. Apparatus as claimed in claim 1 in which the pressure reducing valve is adjustable.

3. Apparatus as claimed in claim 1 or claim 2 including a spray actuating member which together with the spray nozzle forms a spray unit connected at the end of a trailing paint output line.

4. Apparatus as claimed in any one of the preceding claims including a frame to which carrying straps are attached and which includes or consists of a body of moulded plastics material which affords recesses accommodating a respective reservoir.

5. Apparatus as claimed in any one of the preceding claims including two or more paint reservoirs, each of which communicates with a respective paint output line and with a compressed nitrogen reservoir via a pressure reducing valve.

6. Apparatus as claimed in any one of the preceding claims in which the or each paint reservoir is integral with a nitrogen reservoir.

7. Apparatus as claimed in claim 5 or claims 5 and 6 including a single spray head which includes a single spray nozzle which communicates with each paint output line, each paint output line including a respective flow control valve and the spray head including a single actuating member connected to further valve means arranged to permit or prevent the flow of paint through the spray nozzle.

8. Apparatus as claimed in claim 7 including a line extending from the nitrogen reservoir to the spray head through which nitrogen is delivered when paint is sprayed.

9. Paint spraying apparatus substantially or specifically as herein described with reference to the accompanying drawings.

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