

Liquid Dispensing Apparatus

This invention relates to apparatus for dispensing a fine spray of liquid particles and more especially, but not exclusively, to liquid dispensers known as air brushes.

My British Patent No: 2245196B discloses apparatus for dispensing a fine spray of liquid particles which comprises a manually operated pump connected to supply air under pressure directly to a nozzle so positioned that air leaving the nozzle is directed onto and over a nib of a pen-like container releasably supported within a holder with the nib of the pen-like container in close proximity to the nozzle outlet to cause liquid from the pen to be dispensed as a fine particulate spray in air.

More especially, my British Patent discloses a foot

This Sheet Has Been Replaced



operated pump connected by a flexible hose to a hand held nozzle including a holder for supporting a felt-tipped pen.

This earlier dispenser was found to be cumbersome to use and relatively expensive to produce.

The present invention sets out to provide a simplified dispenser including a hand operated pump connected directly to a hand held nozzle without the need for a flexible hose. The present invention also provides a dispenser in which the hand operated pump is securely connected to the nozzle to prevent displacement thereof during use.

According to the present invention in one aspect, there is provided apparatus for dispensing a fine spray of liquid particles, the apparatus comprising a hand operated pump connected to supply air under pressure directly to a nozzle so positioned that air leaving the nozzle is directed onto and over the nib of a pen-like container (e.g. a felt-tipped pen) releasably supported within a holder with the nib of the pen-like container in close proximity to the nozzle outlet to cause liquid from the container to be dispensed as a fine particulate spray in air, the pump comprising a flexible bulb secured to the inlet end of the nozzle and including an internal inwardly extending rib which, on assembly of the bulb to the nozzle, seats behind an outwardly extending annular step formed on the external surface of the nozzle structure.

The nozzle preferably includes a locating surface

This Sheet Has Been Replaced



THIS SHEET HAS BEEN
REPLACED

against which a shoulder of the pen adjacent its nib abuts in use to ensure correct location of the nib with respect to the nozzle outlet.

The nozzle and the pen may, in use of the apparatus, be retained within discrete channels of a separable holder, the channels being mutually inclined so that compressed air leaving the nozzle flows directly onto and over the nib of the pen.

The channel for retaining the pen may be defined by a sleeve releasably secured to the holder. More than one such sleeve may be provided to enable pens having a variety of diameters and cross-sections to be retained by the holder.

Alternatively, for example, the channel for retaining the pen, which may be the sleeve releasably secured to the holder, may be provided with internal flanges or shoulders for example which may be of a flexible and/or resilient nature, and which may be so arranged and configured as to enable pens having a variety of diameters and cross section to be retained therein.

The bulb may be produced from a flexible material such as rubber which can be squeezed or otherwise deformed to expel air under pressure therefrom.

The liquid may be a colourant such as ink or an edible food colourant and the liquid source may comprise a conventional ink pen or a felt tipped marker. Alternatively, the liquid may comprise a scented medium, a disinfectant, a deodorant or an insecticide or pesticide



contained in a pen-like container.

The retaining means may comprise a suitably shaped bracket secured to or formed integral with the pump housing, the bracket being suitably inclined so that when a liquid source is retained therein, its tip lies adjacent to the pump nozzle.

According to the present invention in another aspect, there is provided apparatus for dispensing a fine spray of liquid particles, the apparatus comprising a dispenser adapted to be held in one hand and including a hand operated flexible bulb releasably connected to supply air under pressure directly to a nozzle of the dispenser, the nozzle being so positioned that air leaving the nozzle is directed onto and over the tip of a felt-tipped pen releasably supported within a holder of the dispenser with the felt tip of the pen in close proximity to the nozzle outlet to cause liquid particles from the felt tip of the pen to be dispensed as a fine particulate spray in air.

The invention will now be described by way of example only with reference to the accompanying diagrammatic drawings in which:-

Figure 1 is a perspective view of air brush apparatus in accordance with the invention;

Figure 2 is a front view of a part of the apparatus illustrated in Figure 1; and

Figure 3 is a section taken through an assembly of a hand pump and nozzle of the illustrated apparatus.

The air brush illustrated in Figures 1 and 2



comprises a hand pump 1 in the form of a flexible bulb of, for example, rubber connected to a nozzle 2 retained within a first channel 3 of a plastics holder 4. The holder 4 includes a second channel 5 within which is removably mounted a sleeve 6. The sleeve is retained in place by a suitable screw fixing 7. Positioned within the sleeve 6 is a felt-tipped pen 8.

The channels 3,5 are mutually inclined so that the tip 9 of the pen 8 is positioned in close proximity to the nozzle outlet. When using a nozzle as illustrated in Figure 1, the pen shoulder 11 adjacent the tip 9 is positioned against a step 10 for location purposes.

The holder 4 is designed to be held a specified distance away from the article on which a fine spray of particles is to be applied. Operation of the hand pump 1 causes air under pressure to flow directly through the nozzle 2. As this compressed air passes over the tip 9 of the pen, a fine dispersion of particles is produced.

Turning now to Figure 3, it will be seen that the end 12 of the nozzle 2 over which the open end 14 of the bulb 1 seats includes, in sequence, an inclined section 15 terminating in an upstanding annular step 16, a second inclined section 17 terminating in an annular step 18, and an annular end step 19. The bulb 1 includes a neck 20 of a length substantially equal to the length of the nozzle end 12 and an inwardly extending annular rib 21 at the junction of the neck 20 and the main part of the bulb 1.

On assembly, the neck 20 is forced over the inclined

This Sheet Has Been Replaced



THIS SHEET HAS BEEN
REPLACED

sections 15,17 of the nozzle until the end of the neck seats adjacent the end stop 19. At this point, the annular step 16 is positioned just behind the annular rib 21 of the bulb and ensures that, despite a build up of pressure within the bulb or the nozzle, the bulb is retained securely on the nozzle. Without the rib 21 and step 16, it has been found that the nozzle can be ejected from the bulb if the bulb is squeezed too tightly or rapidly.

As mentioned previously, the pen 8 may comprise a felt-tipped pen. Alternatively, it may comprise a cartridge containing a technical drawing pen, the nib of a conventional pen or a pen-like cylindrical container including, for example, a dip tube through which a colourant such as ink can be withdrawn. Alternatively, edible food colourants, ink-based acrylic and emulsified paints may be dispensed by means of the apparatus. A selection of sleeves 6 may be provided to enable a variety of different liquid sources to be employed.

It will be appreciated that the foregoing is merely exemplary of one embodiment of dispensing apparatus in accordance with the invention and that modifications can readily be made thereto without departing from the true scope of the invention as set out in the claims appended hereto.

This Sheet Has Been Replaced



THIS SHEET HAS BEEN
REPLACED

CLAIMS

1. Apparatus for dispensing a fine spray of liquid particles, the apparatus comprising a hand operated pump connected to supply air under pressure directly to a nozzle so positioned that air leaving the nozzle is directed onto and over the nib of a pen-like container releasably supported within a holder with the nib of the pen-like container in close proximity to the nozzle outlet to cause liquid from the container to be dispensed as a fine particulate spray in air, the pump comprising a flexible bulb secured to the inlet end of the nozzle and including an internal inwardly extending rib which, on assembly of the bulb to the nozzle, seats behind an outwardly extending annular step formed on the external surface of the nozzle structure.
2. Apparatus as claimed in Claim 1 wherein the nozzle includes a locating surface against which a shoulder of the pen adjacent its nib abuts in use to ensure correct location of the nib with respect to the nozzle outlet.
3. Apparatus as claimed in Claim 1 or Claim 2 wherein the nozzle and the pen, in use of the apparatus, are retained within discrete channels of a separable holder, the channels being mutually inclined so that



THIS SHEET HAS BEEN
REPLACED



compressed air leaving the nozzle flows directly onto and over the nib of the pen.

4. Apparatus as claimed in Claim 3 wherein the channel for retaining the pen is defined by a sleeve releasably secured to the holder.
5. Apparatus as claimed in Claim 4 wherein more than one such sleeve is provided to enable pens having a variety of diameters and cross-sections to be retained by the holder.
6. Apparatus as claimed in Claim 3 wherein the channel for retaining the pen is provided with internal flanges or shoulders of a flexible and/or resilient nature.
7. Apparatus as claimed in any one of Claims 1 to 6 wherein the bulb is produced from a flexible material which can be squeezed or otherwise deformed to expel air under pressure therefrom.
8. Apparatus as claimed in any one of the Claims 1 to 7 wherein the liquid is a colourant and the liquid source comprises a felt tipped marker.
9. Apparatus as claimed in any one of the preceding Claims wherein the retaining means comprises a



THIS SHEET HAS BEEN
REPLACED

suitable shaped bracket secured to or formed integral with the pump housing, the bracket being suitably inclined so that when a liquid source is retained therein, its tip lies adjacent to the pump nozzle.

10. Apparatus for dispensing a fine spray of liquid particles, the apparatus comprising a dispenser adapted to be held in one hand and including a hand-operated flexible bulb releasably connected to supply air under pressure directly to a nozzle of the dispenser, the nozzle being so positioned that air leaving the nozzle is directed onto and over the tip of a felt-tipped pen releasably supported within a holder of the dispenser with the felt tip of the pen in close proximity to the nozzle outlet to cause liquid particles from the felt tip of the pen to be dispensed as a fine particulate spray in air.

This Sheet Has Been Replaced



THIS SHEET HAS BEEN
REPLACED



AMENDED CLAIMS

[received by the International Bureau on 28 March 1994 (28.03.94); original claims 1-10 replaced by amended claims 1-9; (3 pages)]

1. Apparatus for dispensing a fine spray of liquid particles, the apparatus comprising a hand operated flexible bulb (1) formed with an open-ended neck which locates over one end of a nozzle (2) positioned to direct air from the flexible bulb (1) onto and over the tip (9) of a pen (8) releasably supported within a holder (6) with the tip (9) of the pen in close proximity to the outlet of the nozzle (2), the apparatus being characterised in that the inner surface of the neck of the flexible bulb (1) includes an inwardly extending annular rib (21) which, on assembly of the bulb onto the nozzle, seats behind an annular step (16) of an inclined section (15) of the nozzle, the annular step (16) being located at or towards the said one end of the nozzle (2).
2. Apparatus as claimed in Claim 1 characterised in that the end of the nozzle over which the neck of the bulb seats is formed with a second inclined section (17) which terminates in an annular step (18).
3. Apparatus as claimed in Claim 1 or Claim 2 characterised in that the nozzle is formed with an outwardly protruding annular step (19) which, on assembly of the flexible bulb, locates against the rim of the open end of the bulb.





4. Apparatus as claimed in any one of Claims 1 to 3 characterised in that the nozzle (2) includes a locating surface (10) against which a shoulder of the pen adjacent its nib abuts in use to ensure correct location of the nib with respect to the nozzle outlet.
5. Apparatus as claimed in any one of the preceding claims characterised in that the nozzle and the pen, in use of the apparatus, are retained within discrete channels of a separable holder, the channels being mutually inclined so that compressed air leaving the nozzle flows directly onto and over the nib of the pen.
6. Apparatus as claimed in Claim 5 characterised in that the channel for retaining the pen is defined by a sleeve releasably secured to the holder.
7. Apparatus as claimed in Claim 6 characterised in that more than one such sleeve is provided to enable pens having a variety of diameters and cross-sections to be retained by the holder.
8. Apparatus as claimed in Claim 5 characterised in that the channel for retaining the pen is provided with internal flanges or shoulders of a flexible and/or resilient nature.



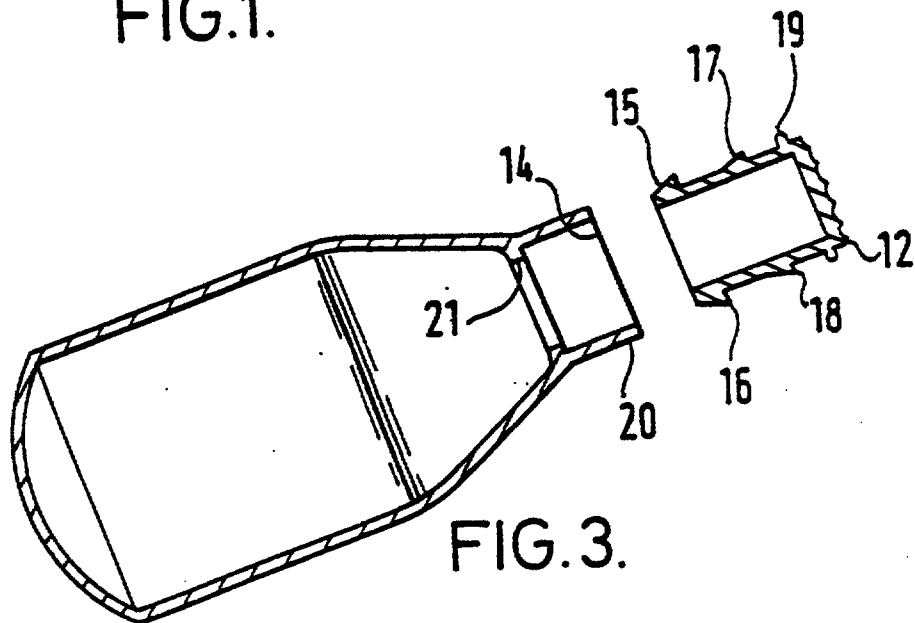
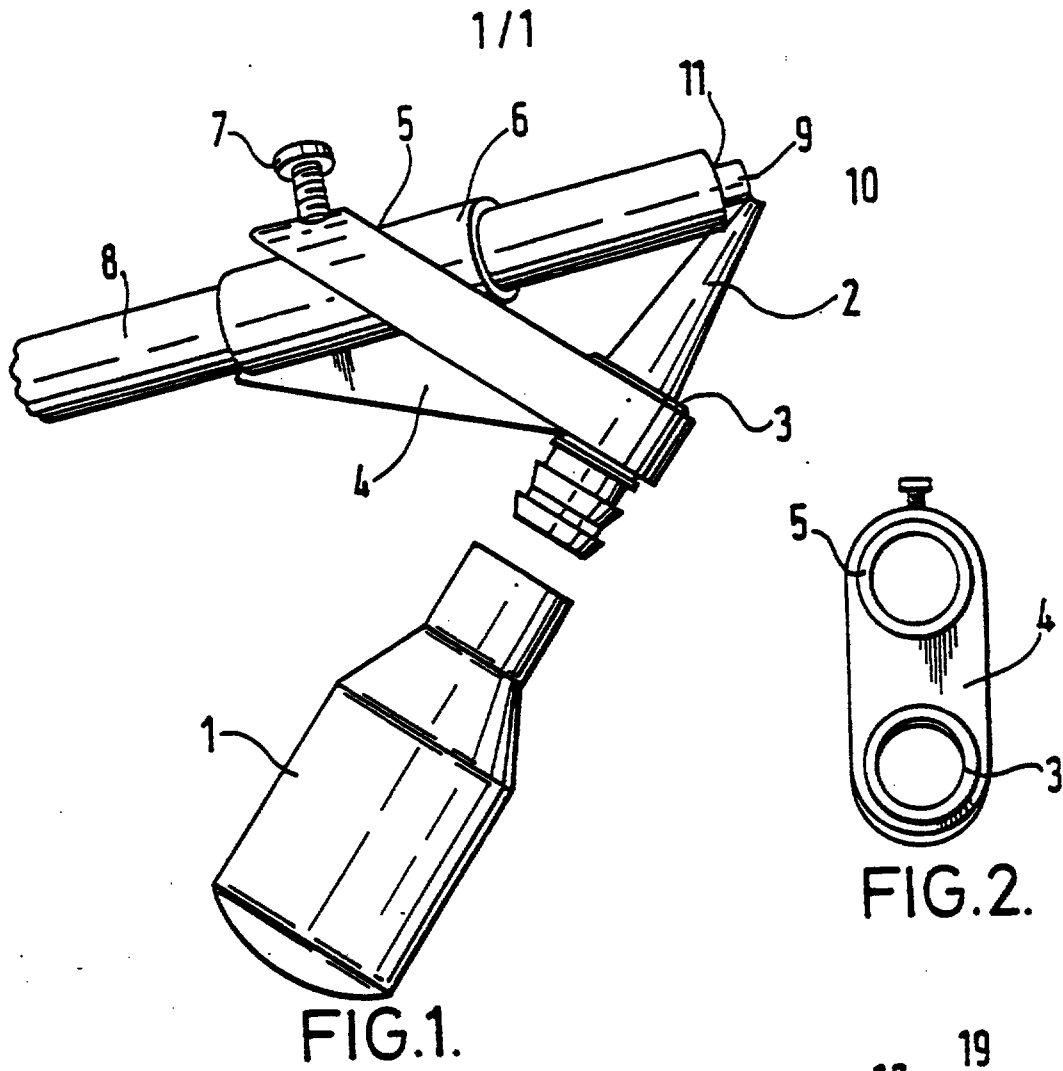
9. Apparatus as claimed in any one of the preceding Claims characterised in that the retaining means comprises a suitable shaped bracket secured to or formed integral with the pump housing, the bracket being suitably inclined so that when a liquid source is retained therein, its tip lies adjacent to the pump nozzle.

This Sheet Has Been Replaced



* C L M S *

THIS SHEET HAS BEEN
REPLACED

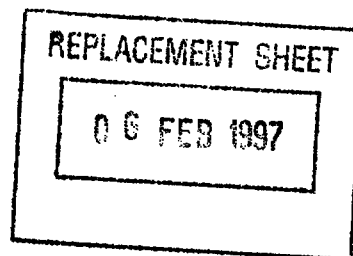


This Sheet Has Been Replaced



THIS SHEET HAS BEEN
REPLACED

1



Liquid Dispensing Apparatus

This invention relates to apparatus for dispensing a fine spray of liquid particles and more especially, but not exclusively, to liquid dispensers known as air brushes.

My British Patent No: 2245196B discloses apparatus for dispensing a fine spray of liquid particles which comprises a manually operated pump connected to supply air under pressure directly to a nozzle so positioned that air leaving the nozzle is directed onto and over a nib of a pen-like container releasably supported within a holder with the nib of the pen-like container in close proximity to the nozzle outlet to cause liquid from the pen to be dispensed as a fine particulate spray in air.

More especially, my British Patent discloses a foot

06 FEB 1997

operated pump connected by a flexible hose to a hand held nozzle including a holder for supporting a felt-tipped pen.

This earlier dispenser was found to be cumbersome to use and relatively expensive to produce.

The present invention sets out to provide a simplified dispenser including a hand operated pump connected directly to a hand held nozzle without the need for a flexible hose. The present invention also provides a dispenser in which the hand operated pump is securely connected to the nozzle to prevent displacement thereof during use.

According to the present invention in one aspect, there is provided apparatus for dispensing a fine spray of liquid particles, the apparatus comprising a hand operated pump connected to supply air under pressure directly to a nozzle so positioned that air leaving the nozzle is directed onto and over the nib of a pen-like container (e.g. a felt-tipped pen) releasably supported within a holder with the nib of the pen-like container in close proximity to the nozzle outlet to cause liquid from the container to be dispensed as a fine particulate spray in air, the pump comprising a flexible bulb secured to the inlet end of the nozzle and including an internal inwardly extending rib which, on assembly of the bulb to the nozzle, seats behind an outwardly extending annular step formed on the external surface of the nozzle structure.

The nozzle preferably includes a locating surface

06 FEB 1997

against which a shoulder of the pen adjacent its nib abuts in use to ensure correct location of the nib with respect to the nozzle outlet.

The nozzle and the pen may, in use of the apparatus, be retained within discrete channels of a separable holder, the channels being mutually inclined so that compressed air leaving the nozzle flows directly onto and over the nib of the pen.

The channel for retaining the pen may be defined by a sleeve releasably secured to the holder. More than one such sleeve may be provided to enable pens having a variety of diameters and cross-sections to be retained by the holder.

Alternatively, for example, the channel for retaining the pen, which may be the sleeve releasably secured to the holder, may be provided with internal flanges or shoulders for example which may be of a flexible and/or resilient nature, and which may be so arranged and configured as to enable pens having a variety of diameters and cross section to be retained therein.

The bulb may be produced from a flexible material such as rubber which can be squeezed or otherwise deformed to expel air under pressure therefrom.

The liquid may be a colourant such as ink or an edible food colourant and the liquid source may comprise a conventional ink pen or a felt tipped marker.

Alternatively, the liquid may comprise a scented medium, a disinfectant, a deodorant or an insecticide or pesticide

06 FEB 1997

contained in a pen-like container.

The retaining means may comprise a suitably shaped bracket secured to or formed integral with the pump housing, the bracket being suitably inclined so that when a liquid source is retained therein, its tip lies adjacent to the pump nozzle.

According to the present invention in another aspect, there is provided apparatus for dispensing a fine spray of liquid particles, the apparatus comprising a dispenser adapted to be held in one hand and including a hand operated flexible bulb releasably connected to supply air under pressure directly to a nozzle of the dispenser, the nozzle being so positioned that air leaving the nozzle is directed onto and over the tip of a felt-tipped pen releasably supported within a holder of the dispenser with the felt tip of the pen in close proximity to the nozzle outlet to cause liquid particles from the felt tip of the pen to be dispensed as a fine particulate spray in air.

The invention will now be described by way of example only with reference to the accompanying diagrammatic drawings in which:-

Figure 1 is a perspective view of air brush apparatus in accordance with the invention;

Figure 2 is a front view of a part of the apparatus illustrated in Figure 1; and

Figure 3 is a section taken through an assembly of a hand pump and nozzle of the illustrated apparatus.

The air brush illustrated in Figures 1 and 2

06 FEB 1997

5

comprises a hand pump 1 in the form of a flexible bulb of, for example, rubber connected to a nozzle 2 retained within a first channel 3 of a plastics holder 4. The holder 4 includes a second channel 5 within which is removably mounted a sleeve 6. The sleeve is retained in place by a suitable screw fixing 7. Positioned within the sleeve 6 is a felt-tipped pen 8.

The channels 3,5 are mutually inclined so that the tip 9 of the pen 8 is positioned in close proximity to the nozzle outlet. When using a nozzle as illustrated in Figure 1, the pen shoulder 11 adjacent the tip 9 is positioned against a step 10 for location purposes.

The holder 4 is designed to be held a specified distance away from the article on which a fine spray of particles is to be applied. Operation of the hand pump 1 causes air under pressure to flow directly through the nozzle 2. As this compressed air passes over the tip 9 of the pen, a fine dispersion of particles is produced.

Turning now to Figure 3, it will be seen that the end 12 of the nozzle 2 over which the open end 14 of the bulb 1 seats includes, in sequence, an inclined section 15 terminating in an upstanding annular step 16, a second inclined section 17 terminating in an annular step 18, and an annular end step 19. The bulb 1 includes a neck 20 of a length substantially equal to the length of the nozzle end 12 and an inwardly extending annular rib 21 at the junction of the neck 20 and the main part of the bulb 1.

On assembly, the neck 20 is forced over the inclined

06 FEB 1997

sections 15,17 of the nozzle until the end of the neck seats adjacent the end stop 19. At this point, the annular step 16 is positioned just behind the annular rib 21 of the bulb and ensures that, despite a build up of pressure within the bulb or the nozzle, the bulb is retained securely on the nozzle. Without the rib 21 and step 16, it has been found that the nozzle can be ejected from the bulb if the bulb is squeezed too tightly or rapidly.

As mentioned previously, the pen 8 may comprise a felt-tipped pen. Alternatively, it may comprise a cartridge containing a technical drawing pen, the nib of a conventional pen or a pen-like cylindrical container including, for example, a dip tube through which a colourant such as ink can be withdrawn. Alternatively, edible food colourants, ink-based acrylic and emulsified paints may be dispensed by means of the apparatus. A selection of sleeves 6 may be provided to enable a variety of different liquid sources to be employed.

It will be appreciated that the foregoing is merely exemplary of one embodiment of dispensing apparatus in accordance with the invention and that modifications can readily be made thereto without departing from the true scope of the invention as set out in the claims appended hereto.

06 FEB 1997

CLAIMS

1. Apparatus for dispensing a fine spray of liquid particles, the apparatus comprising a hand operated pump connected to supply air under pressure directly to a nozzle so positioned that air leaving the nozzle is directed onto and over the nib of a pen-like container releasably supported within a holder with the nib of the pen-like container in close proximity to the nozzle outlet to cause liquid from the container to be dispensed as a fine particulate spray in air, the pump comprising a flexible bulb secured to the inlet end of the nozzle and including an internal inwardly extending rib which, on assembly of the bulb to the nozzle, seats behind an outwardly extending annular step formed on the external surface of the nozzle structure.
2. Apparatus as claimed in Claim 1 wherein the nozzle includes a locating surface against which a shoulder of the pen adjacent its nib abuts in use to ensure correct location of the nib with respect to the nozzle outlet.
3. Apparatus as claimed in Claim 1 or Claim 2 wherein the nozzle and the pen, in use of the apparatus, are retained within discrete channels of a separable holder, the channels being mutually inclined so that



06 FEB 1997

compressed air leaving the nozzle flows directly onto and over the nib of the pen.

4. Apparatus as claimed in Claim 3 wherein the channel for retaining the pen is defined by a sleeve releasably secured to the holder.
5. Apparatus as claimed in Claim 4 wherein more than one such sleeve is provided to enable pens having a variety of diameters and cross-sections to be retained by the holder.
6. Apparatus as claimed in Claim 3 wherein the channel for retaining the pen is provided with internal flanges or shoulders of a flexible and/or resilient nature.
7. Apparatus as claimed in any one of Claims 1 to 6 wherein the bulb is produced from a flexible material which can be squeezed or otherwise deformed to expel air under pressure therefrom.
8. Apparatus as claimed in any one of the Claims 1 to 7 wherein the liquid is a colourant and the liquid source comprises a felt tipped marker.
9. Apparatus as claimed in any one of the preceding Claims wherein the retaining means comprises a



06 FEB 1997

suitable shaped bracket secured to or formed integral with the pump housing, the bracket being suitably inclined so that when a liquid source is retained therein, its tip lies adjacent to the pump nozzle.

10. Apparatus for dispensing a fine spray of liquid particles, the apparatus comprising a dispenser adapted to be held in one hand and including a hand-operated flexible bulb releasably connected to supply air under pressure directly to a nozzle of the dispenser, the nozzle being so positioned that air leaving the nozzle is directed onto and over the tip of a felt-tipped pen releasably supported within a holder of the dispenser with the felt tip of the pen in close proximity to the nozzle outlet to cause liquid particles from the felt tip of the pen to be dispensed as a fine particulate spray in air.



06 FEB 1997

AMENDED CLAIMS

[received by the International Bureau on 28 March 1994 (28.03.94);
original claims 1-10 replaced by amended claims 1-9; (3 pages)]

1. Apparatus for dispensing a fine spray of liquid particles, the apparatus comprising a hand operated flexible bulb (1) formed with an open-ended neck which locates over one end of a nozzle (2) positioned to direct air from the flexible bulb (1) onto and over the tip (9) of a pen (8) releasably supported within a holder (6) with the tip (9) of the pen in close proximity to the outlet of the nozzle (2), the apparatus being characterised in that the inner surface of the neck of the flexible bulb (1) includes an inwardly extending annular rib (21) which, on assembly of the bulb onto the nozzle, seats behind an annular step (16) of an inclined section (15) of the nozzle, the annular step (16) being located at or towards the said one end of the nozzle (2).
2. Apparatus as claimed in Claim 1 characterised in that the end of the nozzle over which the neck of the bulb seats is formed with a second inclined section (17) which terminates in an annular step (18).
3. Apparatus as claimed in Claim 1 or Claim 2 characterised in that the nozzle is formed with an outwardly protruding annular step (19) which, on assembly of the flexible bulb, locates against the rim of the open end of the bulb.



06 FEB 1987

4. Apparatus as claimed in any one of Claims 1 to 3 characterised in that the nozzle (2) includes a locating surface (10) against which a shoulder of the pen adjacent its nib abuts in use to ensure correct location of the nib with respect to the nozzle outlet.
5. Apparatus as claimed in any one of the preceding claims characterised in that the nozzle and the pen; in use of the apparatus, are retained within discrete channels of a separable holder, the channels being mutually inclined so that compressed air leaving the nozzle flows directly onto and over the nib of the pen.
6. Apparatus as claimed in Claim 5 characterised in that the channel for retaining the pen is defined by a sleeve releasably secured to the holder.
7. Apparatus as claimed in Claim 6 characterised in that more than one such sleeve is provided to enable pens having a variety of diameters and cross-sections to be retained by the holder.
8. Apparatus as claimed in Claim 5 characterised in that the channel for retaining the pen is provided with internal flanges or shoulders of a flexible and/or resilient nature.



REPLACEMENT SHEET

06 FEB 1997

12

9. Apparatus as claimed in any one of the preceding Claims characterised in that the retaining means comprises a suitable shaped bracket secured to or formed integral with the pump housing, the bracket being suitably inclined so that when a liquid source is retained therein, its tip lies adjacent to the pump nozzle.



P 6 FEB 1997

LIQUID DISPENSING APPARATUSABSTRACT

Apparatus for dispensing a fine spray of liquid particles comprises a hand operated pump (1) directed to supply air under pressure directly to a nozzle (2) so positioned that air leaving the nozzle (2) is directed onto and over the nib (9) of a pen-like container (8) releasably supported within a holder with the nib (9) of the pen-like container (8) in close proximity to the nozzle outlet to cause liquid from the container (8) to be dispensed as a fine particulate spray in air. The pump (1) comprises a flexible bulb secured to the inlet end (12) of a nozzle (2) and includes an internal inwardly extending rib (21) which on assembly of the bulb to the nozzle (2) seats behind an outwardly extending annular step (16) formed on the external surface of the nozzle structure.

FIGURE 1.

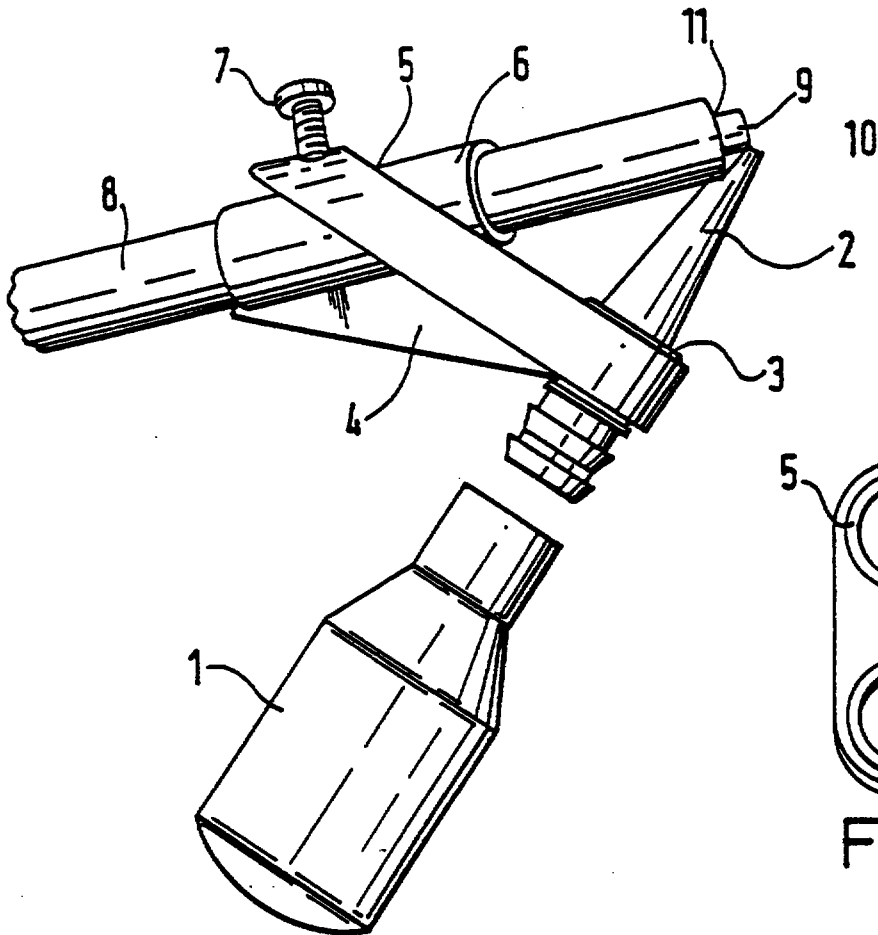


FIG.1.

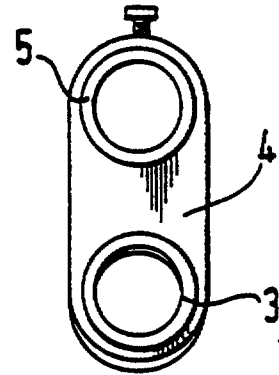


FIG.2.

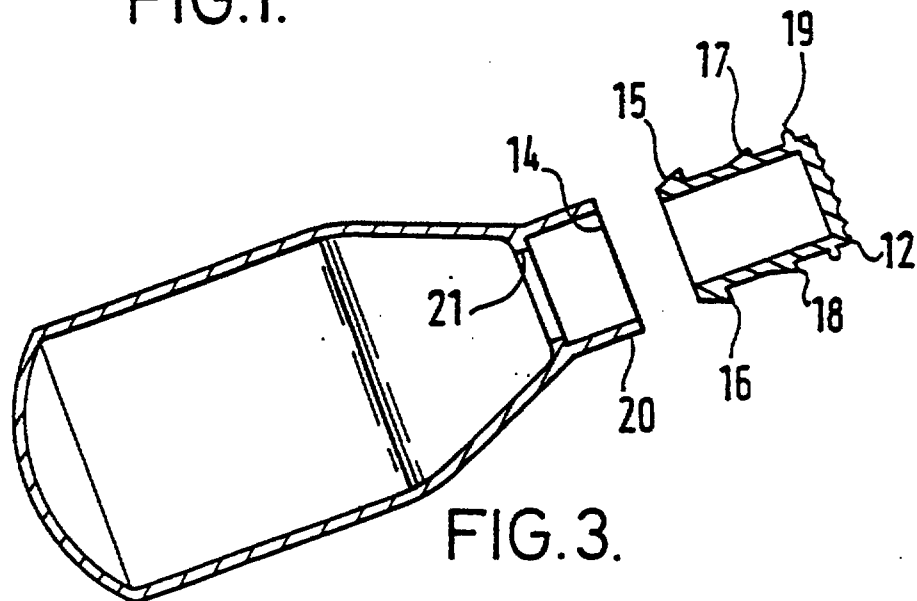


FIG.3.