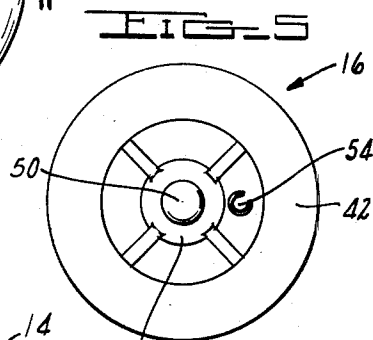
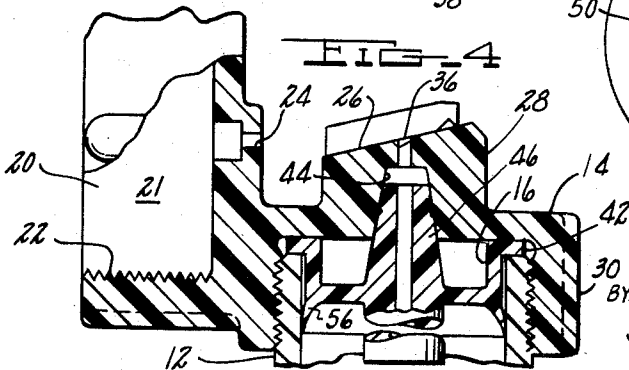
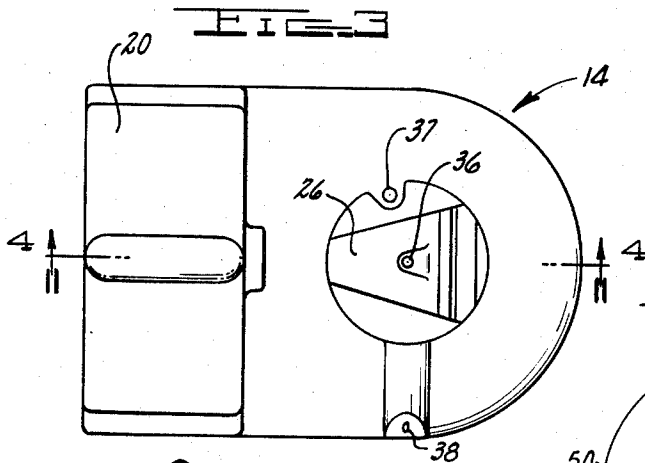
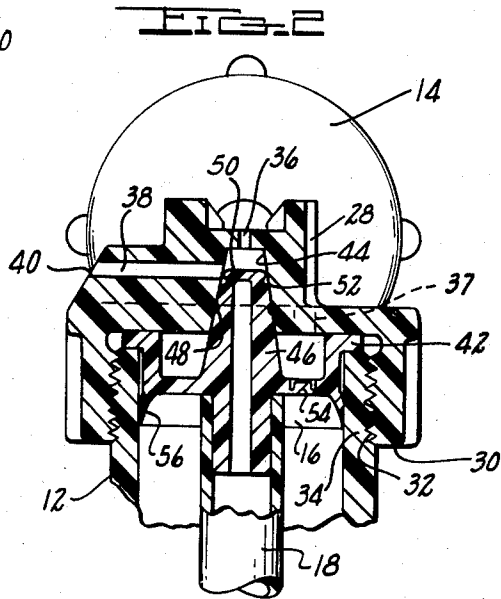
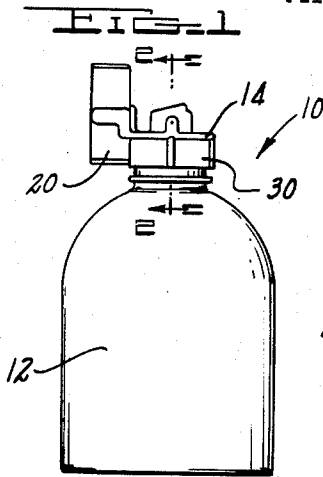


Sept. 6, 1960

C. A. PRICE ET AL
DISPOSABLE SPRAY HEAD

2,951,645

Filed Feb. 19, 1957



46 INVENTORS
CLARENCE A. PRICE
WILLIAM L. RUPP

BY SMITH, OLSEN, LEWIS & McRAE
ATTORNEYS

1

2,951,645

DISPOSABLE SPRAY HEAD

Clarence A. Price and William L. Rupp, Ann Arbor, Mich., assignors to Bradson Manufacturing Corporation, Saline, Mich., a corporation of Michigan

Filed Feb. 19, 1957, Ser. No. 641,106

8 Claims. (Cl. 239—318)

The present invention relates to devices for mixing and distributing liquids, and in particular to liquid mixing and spraying devices of the type that operate on the principle of aspiration. This invention constitutes improvements over prior art devices of the type disclosed in the patent to Budwig, No. 2,744,791.

In the aforesaid patent to Budwig, a bottle serves as a reservoir for concentrated liquid, and a die cast member is screwed to the top of the bottle and serves to direct a stream of diluent liquid over an apertured surface creating a vacuum for aspirating the concentrated liquid from the bottle. The diluent and concentrated liquids are mixed and sprayed by this operation upon external objects.

In the prior art devices of this character, the die cast member is generally formed from a metal suitable for die casting and the bottle is generally made from glass. The devices are sold empty, and the purchaser fills the bottle with the desired concentrated liquid, attaches a water hose, or the like, to the die cast member, and he is ready to start the spraying operation. When the concentrated liquid has been exhausted, a new supply is acquired and the bottle is refilled.

This procedure whereby the concentrated liquid is separately purchased and later introduced into the bottle of a spraying device fails in some instances to produce the best results. First, it causes inconvenience for the user. Second, a concentrated liquid which might be effectively mixed and sprayed with a diluent liquid when using one device of a prescribed size and design might not give the same satisfactory results when using a device of different size and design. Thus, the manufacturer of the concentrated liquid is dependent upon the purchaser of the concentrated liquid to use the proper mixing and spraying equipment if the intended results are to be obtained. Such proper selection is not always made for various reasons, and therefore the results expected from the sprayed mixture are not always realized. Obviously, the concentrated liquid and the mixing and spraying device could be sold as a single package, but this has not been practical heretofore because of the cost involved and because of the need to effectively seal the concentrated liquid during handling and storage.

With the foregoing premises in mind, it is a principal object of the present invention to provide an improved liquid mixing and spraying device which is constructed and arranged so that it can initially serve as a sealed container in which a concentrated liquid can be sold, and which can be readily adapted for use as a liquid mixing and spraying device, said device being characterized by its low cost making it economically practical to dispose of the same after the concentrated liquid has been exhausted.

It is another object of the present invention to provide an improved liquid mixing and spraying device of the foregoing character wherein a sealing member is provided for the top of the bottle, said sealing member being constructed and arranged to provide an effective seal irrespective of limited variations in the internal dimensions of the opening in the top of the bottle, thereby reducing the

2

cost of constructing the mixing and spraying device by allowing more liberal tolerances in manufacturing the bottle.

It is still another object of the present invention to provide an improved liquid mixing and spraying device of the foregoing character wherein the sealing member can be altered readily to allow passage of concentrated liquid therethrough during the aspirating operation, and which in other respects maintains an effective seal with the various associated parts to assure effective aspiration.

It is still another object of the present invention to provide an improved liquid mixing and spraying device of the foregoing character wherein the die cast member and the sealing member are made from suitable plastic materials.

Other objects of this invention will appear in the following description and appended claims, reference being had to the accompanying drawings forming a part of this specification wherein like reference characters designate corresponding parts in the several views.

In the drawing:

Figure 1 is a side elevational of an improved liquid mixing and spraying device embodying the present invention;

Figure 2 is an enlarged fragmentary section taken on the lines 2—2 of Fig. 1 showing a sealing member before it has been altered to allow aspiration of concentrated liquid from the bottle;

Figure 3 is an enlarged plan view of the fragmentary portion shown in Fig. 2;

Figure 4 is an enlarged fragmentary section taken on the line 4—4 of Fig. 3 after the sealing member has been cut to allow aspiration of the concentrated liquid; and

Figure 5 is an enlarged plan view of the sealing member as seen prior to being altered to permit aspiration of the concentrated liquid from the bottle.

Before explaining the present invention in detail, it is to be understood that the invention is not limited in its application to the details of construction and arrangement of parts illustrated in the accompanying drawings, since the invention is capable of other embodiments and of being practiced or carried out in various ways. Also, it is to be understood that the phraseology or terminology employed herein is for the purpose of description and not of limitation.

Referring now to the drawing, a more detailed description of the invention will be given. The improved spray gun or liquid mixing and spraying device 10 has a bottle or reservoir 12 for holding a concentrated liquid of a type that may be diluted and sprayed to act as an insecticide, a weed killer, a fertilizer, or the like. Screwed to the neck of the bottle 12 is a mixing head or member 14 which in turn can be screwed to the outlet end of a water hose (not shown) for supplying a diluent liquid for use in aspirating the concentrated liquid from the bottle 12. A sealing member 16 fits over the open top of bottle 12, and a flexible tube 18 is attached at its upper end to the sealing member 16 so as to form a continuation thereof and the lower end of tube 18 extends to a position adjacent the bottom of bottle 12. These four parts constitute the main elements of the present invention.

As previously stated, the member 14 has an extension 20 with a socket 21 which is internally threaded at 22 for receiving the male end of a conventional garden hose coupling (not shown). The extension 20 is provided with a jet hole or nozzle 24, the bore of which communicates with the socket 21. The nozzle 24 is adapted to direct its jet onto a substantially flat distributing surface 26 at an oblique angle thereto so that after the jet has impinged upon the distributing surface 26 it spreads out into a water sheet over portions of said surface 26.

The distributing surface 26 is located on the upper

3

side of a platform 28 which projects upwards a suitable distance above the bottle cap portion 30 of the member 14. The bottle cap portion 30 is provided with a socket having internal threads 32 for screwing onto the externally threaded neck portion 34 of the bottle 12.

The member 14 is so proportioned and arranged that the jet from nozzle 24 impinges upon the distribution surface 26 just before reaching an aspiration or suction aperture 36 which aperture may provide communication with the bottom of the bottle 12 in a manner to be described. Impingement of the jet against the surface 26 before reaching the aperture 36 causes the sheet of water to pass at considerable velocity over the suction aperture 36 causing a vacuum to develop within the suction aperture 36, and when communication exists with the bottom of bottle 12 (in a manner to be described) the concentrated liquid therein will be drawn upwards through the suction aperture 36 to mix with and to be diluted by the jet of water. A duct 37 extends through the member 14 to allow air to enter the bottle 12 to maintain atmospheric pressure on the surface of the concentrated liquid during the aspirating operation.

In order to control starting and stopping of the aspirating operation a duct 38 provides communication between a region immediately below suction aperture 36 and the atmosphere. When it is desired to aspirate concentrated liquid from bottle 12 it is necessary that this duct 38 be closed, which can be accomplished merely by placing the finger of the user over the open end 40.

As stated above, in order to permit the concentrated liquid to be sold to the customer in the liquid mixing and spraying device 10, it is necessary that a low cost unit having an effective seal be provided. In the present invention such a seal is provided by the sealing member 16 which is made from a suitable plastic material such as flexible polyethylene. In its original form, as when initially being inserted in place after the bottle 12 has been filled with the concentrated liquid, there are no openings between its upper and lower sides. This can be seen in Figs. 2 and 5. Under these circumstances no liquid can flow or leak from bottle 12 so long as the cap 30 remains screwed tightly onto bottle 12 and the outer edge or outturned lip 42 of the sealing member 16 is clamped, between these screwed-together parts. The sealing member 16 is then in effect an imperforate membrane over the top of bottle 12.

However, the sealing member 16 is constructed and arranged so that it can be altered to allow aspiration of the concentrated liquid from the bottle 12. It will be observed that the member 14 has an enlarged outwardly flared bore 44 in communication with the suction aperture 36. The sealing member 16 has a conduit portion 46 which is originally closed at its upper end, as seen in Figs. 2 and 5. The outer, upper walls of the conduit portion 46 converge so as to fit in sealed relation with the inner walls of the flared bore 44. In order to assure a tight seal the bore 44 has a circular ridge 48 on its inner surface. The material of the sealing member 16 being flexible will be compressed inward at the ridge 48 forming a tight joint.

The closed upper end 50 of the sealing member 16 can be cut off at the groove 52 after the member 14 has been unscrewed from bottle 12. When the parts are reassembled direct communication will then be provided between the suction aperture 36 and the bottom of the bottle by means of the flexible tube 18 which is connected to the lower end of the conduit portion 46. At the time the various parts are disassembled for cutting away the closed end 50, the plug 54 will also be punched out so as to provide communication between the surface of the concentrated liquid and the duct 37. After reassembly the operator will be in position to control the aspirating operation merely by opening or closing the outlet end 40 of duct 38.

The sealing member 16 is provided with an outwardly

4

and downwardly turned lip or skirt 56 which will press against the sides of the bottle neck to aid in effecting a tight seal so that there will be no leakage past this lip. Since the present invention is intended to be a disposable unit, it is desired to use low cost bottles and in such products the tolerances on the inner diameter of the necks will vary. The lip 56, because of its resilient, flexible properties, will fit these various sizes and provide effective seals for all. Thus, a good seal is provided while using low cost disposable bottles.

In addition, the member 14 is made from rigid polyethylene which can be made in mass production quantities at relatively low cost so that member 14 also will be disposable with bottle 12. Thus, the concentrated liquid can be supplied to the consumer in a low cost, sealed spray gun which is designed to mix and spray the concentrated and diluent liquids in a manner to provide the best results. When the supply of concentrated liquid has been exhausted the spray gun can be thrown away and a new filled spray gun can be purchased which can be put into use merely by unscrewing the member 14, cutting off the closed end 50 and punching out the plug 54 of the sealing member 16, and screwing the member 14 back in place.

Having thus described our invention, we claim:

1. In combination: a container with an open top in which a first liquid can be stored; a device removably mounted on said container over the open top for mixing and distributing liquids comprising a mixing head having a distributing surface thereon, said head having a passageway terminating at one end in an aperture in said surface, the other end opening into said container, and means positioned adjacent said distributing surface and aligned for angularly directing a stream of a second liquid at a relatively high velocity onto said distributing surface to cause a sheet of said second liquid to pass over a portion of said surface and said aperture to create a reduced pressure in said passageway for aspirating said first liquid from said container; and a sealing member operably disposed between said container and said device to prevent aspiration or leakage of said first liquid from said container, said sealing member having a conduit with a removable closed end extending into said other end of said passageway and said conduit forming a sealing fit with said passageway when extending therinto, the other end of said conduit being adapted to be inserted into said first liquid so that on removal of said closed end aspiration of said first liquid from said container can be effected.

2. In combination: a container with an open top in which a first liquid can be stored; a device removably mounted on said container over the open top for mixing and distributing liquids comprising a mixing head having a distributing surface thereon, said head having a passageway terminating at one end in an aperture in said surface, the other end opening into said container, means positioned adjacent said distributing surface and aligned for angularly directing a stream of a second liquid at a relatively high velocity onto said distributing surface to cause a sheet of said second liquid to pass over a portion of said surface and said aperture to create a reduced pressure in said passageway for aspirating said first liquid from said container, said device having a duct formed therein with one end opening to the interior of said container and the other end opening to the atmosphere for maintaining atmospheric pressure on the surface of said first liquid in said container; and a sealing member operably disposed between said container and said device to prevent aspiration or leakage of said first liquid from said container, said sealing member having a conduit with a removable closed end extending into said other end of said passageway and said conduit forming a sealing fit with said passageway when extending therinto, the other end of said conduit being adapted to be inserted into said first liquid so that on removal of said closed end aspiration of said first liquid from said container

5

can be effected, and a plug adapted to be punched out to provide communication between said duct and the interior of said container.

3. In combination: a container with an open top in which a first liquid can be stored; an aspirating and liquid mixing device removably mounted on the open top of said container and having means on its upper external portion for aspirating said first liquid from said container through a passageway extending into the latter and thereafter for cooperating in mixing the aspirated liquid with a second liquid supplied from a separate source, said device having a downwardly diverging duct forming the upper portion of said passageway; said duct having a radially inwardly projecting rib around its inner surface; and a sealing member secured between the top of said device closing liquid communication between said container and said device, said sealing member having an upwardly projecting portion closed at one end and extending into said diverging duct to form an intermediate segment of said passageway, said portion being adapted when said device and container are disassembled to have its closed end removed so that on reassembling the parts liquid can flow through said passageway, said sealing member being formed from a resilient material relatively softer than the material forming said device so that when said upwardly projecting portion is pressed into said downwardly diverging duct the rib will deflect the side wall of the sealing member inwardly effecting a tight joint.

4. The combination defined in claim 3 wherein said device is formed from a rigid polyethylene plastic and said sealing member is formed from a flexible polyethylene plastic.

5. In combination: a container with an open top in which a first liquid can be stored; an aspirating and liquid mixing device removably mounted on the open top of said container and having means on its upper external portion for aspirating said first liquid from said container for cooperating in mixing the aspirated liquid with a second liquid supplied from a separate source, said device having a vertical bore extending therethrough which can form the upper segment of an imperforate passage that extends to the first liquid; and a sealing member secured between the top of said container and said device closing liquid communication between said container and said device, said sealing member having a projection that extends into the bore of the device and forms a sealing fit therewith, said projection having a vertical bore therein closed at one end and which bore can form a segment of said passage, said sealing member having an imperforate tube extending from the bore therein to the first liquid, the bore in the sealing member being adapted when said device and container are disassembled to have its closed end removed so that on reassembling the parts a continuous passage is formed through which the first liquid can flow.

6. In combination: a container with an open top in which a first liquid can be stored; an aspirating and liquid mixing device removably mounted on the open top of said container and having means on its upper external portion for aspirating said first liquid from said container and for cooperating in mixing the aspirated liquid with a second liquid supplied from a separate source, said device having a vertical bore extending therethrough which can form the upper segment of an imperforate passage that extends to the first liquid; and a sealing member having

6

a peripheral edge secured between the top of said container and said device closing liquid communication between said container and said device, said sealing member having a projection that extends into the bore of said device and forms a sealing fit therewith, said projection having a vertical bore therein closed at one end and which bore can form a segment of said passage, said sealing member having an imperforate tube extending from the bore therein to the first liquid, the bore in the sealing member being adapted when said device and container are disassembled to have its closed end removed so that on reassembling the parts a continuous passage is formed through which the first liquid can flow, said sealing member also having a flared skirt contacting the inner walls which form the opening in said container for effecting an improved liquid seal irrespective of variations in dimension of said opening.

7. In combination: a container with an open top in which a first liquid can be stored; an aspirating and liquid mixing device removably mounted on the open top of said container and having means on its upper external portion for aspirating said first liquid from said container and for cooperating in mixing the aspirated liquid with a second liquid supplied from a separate source, said device having a vertical bore extending therethrough which can form the upper segment of an imperforate passage that extends to the first liquid and said device having a passageway providing communication between said bore and the atmosphere which must be closed to allow the aspirating operation to take place; and a sealing member secured between the top of said device closing communication between said container and said device, said sealing member having a projection that extends into the bore of the device and forms a sealing fit therewith, said projection having a vertical bore therein closed at one end and which bore can form a segment of said passage, said sealing member having an imperforate tube extending from the bore therein to the first liquid, the bore in the sealing member being adapted when said device and container are disassembled to have its closed end removed so that on reassembling the parts a continuous passage is formed through which the first liquid can flow, said sealing member also having a plug adapted to be punched out when the parts are disassembled so that on reassembly of the parts atmospheric pressure will be exerted on the surface of liquid in said container during aspirating operations.

8. The combination defined in claim 7 wherein said aspirating and liquid mixing device includes a duct providing fluid communication between the atmosphere and the interior of the container, and said sealing member has a plug which can be removed on disassembly of said parts so that on reassembly of such parts fluid communication is provided between said duct and the space within the container below said sealing member.

References Cited in the file of this patent

UNITED STATES PATENTS

1,714,874	Hothersall	May 28, 1929
2,030,853	Budwig	Feb. 18, 1936
2,544,539	Manders	Mar. 6, 1951
2,670,885	Allen	Mar. 2, 1954
2,723,881	Tupper	Nov. 15, 1955
2,737,413	Mitchison	Mar. 6, 1956
2,744,791	Budwig	May 8, 1956