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SPRAYING APPARATUS

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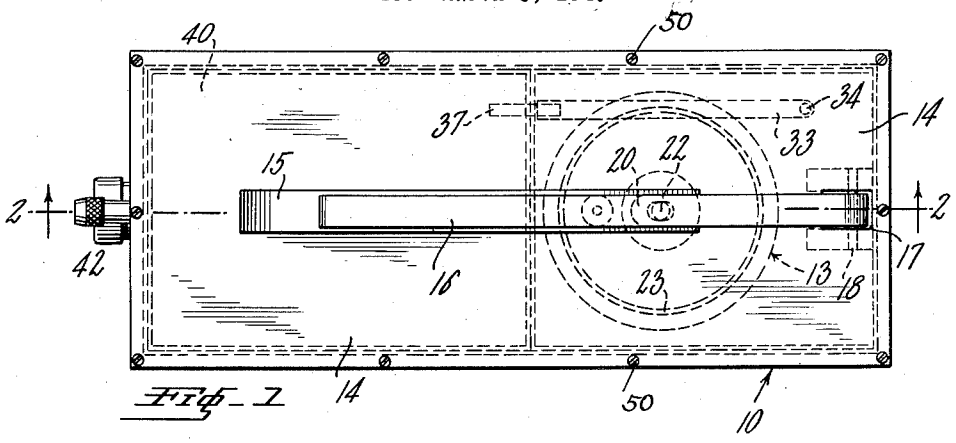


Fig. 1

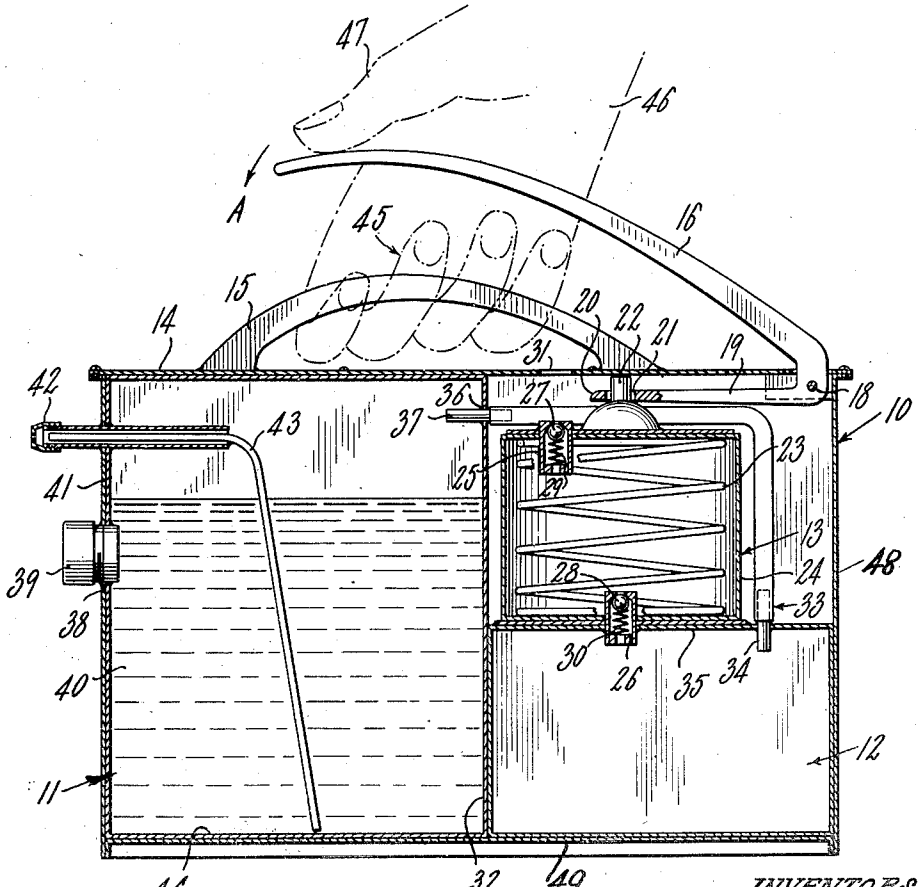


Fig. 2

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SPRAYING APPARATUS

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This invention relates to spraying apparatus for use in various fields of industry, in which fluids, liquids or liquid-like substances are employed in finely divided or atomized state.

It is one of the main objects of this invention to provide means rendering an apparatus of the above type very simple both in construction and operation, manipulatable by one hand only of the operator while carrying said apparatus, and highly satisfactory and efficient in performing its work.

It is another object of the invention to provide means facilitating the arrangement of an air compression chamber between the liquid or fluid dispenser and air pumping or pressure means.

A further object of the invention resides in the provision of means for removably attaching a liquid containing tank or the like to the spraying apparatus so as to maintain at all times authenticity and origin of the product or fluid used for spraying purposes.

Still another object of the present invention is to provide means for obtaining an apparatus that is compact and portable and which constitutes a well balanced unit which may be held in any desired angle toward the surface against which the spray liquid is to be directed.

Still a further object of the present invention is to provide means affording a substantially continuous flow or stream of spray liquid through the nozzle of the apparatus.

Yet, another object of the present invention is to provide means for maintaining a substantially uniform and equal pressure from the compression chamber to the liquid tank of the apparatus, so that the efficiency of the apparatus will not be influenced in an undesired manner and always be kept at the same rate or standard for which the apparatus is constructed, although the same is hand operated.

A still further object of the present invention is to provide means requiring only relatively small physical force and effort for manipulating and operating the apparatus made in accordance with this invention as compared with other known devices.

Yet, another feature of this invention is to provide means for obtaining a substantially leakproof and safe apparatus of the aforesaid type which possesses only a few movable parts, is very sturdy and is made entirely of non-breakable material, so that the cost for the maintenance of the apparatus is reduced to a minimum.

With the above and other objects in view which will appear as the description proceeds, the invention resides in the novel construction, combination and arrangement of parts substantially as hereinafter described, and more particularly defined by the appended claims, it being understood that such changes in the precise embodiment of the herein disclosed invention may be made as come within the scope of the claims.

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In the drawing:

Fig. 1 is a top plan view of an apparatus embodying features of this invention.

Fig. 2 is a cross sectional view taken along lines 2—2 of Fig. 1.

Referring now more particularly to the drawing, there is shown an apparatus 10 made in accordance with this invention.

The apparatus mainly comprises a liquid container or tank 11, a compression chamber 12 and a pressure exerting device in the form of a bellows 13 for sucking in air which is subsequently expelled into the air compression chamber 12.

The apparatus in this instance is of substantially rectangular shape, although the same may be differently shaped or streamlined.

On top wall 14 of the apparatus, there is affixed by any appropriate means a handle 15 for engagement with the fingers of the hand of an operator. Substantially in alignment with handle 15 and thereabove extends a lever 16 whose rearward end extends through an opening 17 of top wall or cover 14 and is pivoted therebelow at 18 on a suitable bracket fixed to the inner face of one of the walls of the apparatus.

Lever 16 is further provided with an arm 19 which is positioned below the cover 14 and extends from pivot 18. The end 20 of arm 19 is perforated at 21 through which protrudes a guide pin or stud 22 forming part of the bellows device 13 which stud abuts in expanded condition of the bellows 13 against the underface of top wall 14 of apparatus 10.

Bellows 13 substantially comprises a helical spring 23 positioned within the interior of housing 24 of the bellows device 13. Housing 24 is made from a compressible, liquid proof and air tight material, such as impregnated cloth, leather or the like.

The bellows device 13 is further equipped with two valves 25 and 26. Both valves are of the ball type, each having a ball 27 and 28, respectively, supported by suitable compression springs 29 and 30.

Top wall 14 is further provided with a slit or opening 31 through which air may enter.

The apparatus 10 has further a partition 32 separating the liquid tank 11 from the compres-

sion chamber 12 and bellows 13. Between the compression chamber 12 and the liquid container 11, there extends a tubing 33. One end 34 of tubing 33 is set in a partition or wall 35 of the compression chamber 12 and leads upwardly and above bellows device 13 through partition 32 at 36 to terminate into a reduced tube end 37 within the upper part of liquid container 11 and substantially at the level of the nozzle 42 of the apparatus and substantially in alignment with said nozzle.

Tank 11 is provided with an opening 38 which is closable by a cap 39. Through opening 38 liquid 40 may be filled into tank 11, and the opening 38 may then subsequently be closed by said cap or closure 39.

Preferably through front wall 41 of the apparatus 10, there passes the aforesaid nozzle device 42 from which tube 43 leads downwardly toward the bottom 44 of the tank 11. Any suitable known nozzle construction may be employed to bring about atomization and distribution of the liquid substance used in connection with this apparatus. It will be well understood that any suitable liquid or liquid-like substances, such as insecticide solutions, varnishes, air purifying liquids and similar fluids may be employed for the purpose of this invention.

The operation of the apparatus is briefly as follows:

The apparatus is held by the fingers 45 of a hand 46, as indicated in Fig. 2, and the thumb 47 of the hand is employed to bring about movement of lever 16 in downward direction (arrow A). During this operation arm 19 actuates against the compressible bellows device 13 and permits air contained within the interior of said bellows device to be compressed and then to escape through ball valve 26 into air compression chamber 12. Upward movement of arm 19 is caused by spring 23, while lever 16 and thumb 47 move back into the starting or uppermost position, as indicated in Fig. 2.

During this upward movement of arm 19 air enters through opening 31 and further through valve 25 of bellows 13 into the interior of the same. On account of the repeated strokes by means of lever 16, it can be easily realized that air is first precompressed in chamber 12 and then allowed either directly or by any valve means (not shown) to escape through tube 33 into liquid container 11 at end piece 37. This compressed air exerts pressure on the column of the liquid contained in tank 11 and forces said liquid to pass through tube 43 and then to be atomized and ejected at nozzle 42 to which air from end piece 37 is simultaneously supplied under pressure.

In the present instance, this compressed air is also guided lengthwise of the upper portion of tube 43 which extends with clearance into the nozzle 42 as may be easily realized from Fig. 2. This upper tube portion provides due to the clearance a passageway for said air which extends between the outer diameter of said tube portion and the inner diameter of the extension of nozzle 42, which houses said upper tube portion and projects into said tank from therewithout.

The assembling of the apparatus may be effected in a very simple manner. Tank 11 and compression chamber 12 may be placed on the bottom 49 of the housing 48, whereas all the other parts are then connected, respectively, with the compression chamber and tank. Cover 14 is then subsequently affixed by screws 50 on the top of the housing 48.

It will thus be seen that in accordance with this invention there has been provided a spraying apparatus comprising a housing having a top wall, a vertically extending partition within said housing, a tank for containing liquid, a wall of said tank forming said partition, a compression chamber, air compressing means positioned above said chamber, said compression chamber and said air compressing means being juxtapositioned with respect to said tank wall, a handle fixed on said top wall, a movable handle lever substantially in alignment with and above said fixed handle and operatively connected with said air compressing means, means interconnecting said compression chamber with said tank, and nozzle means connected to said tank, whereby upon operation of said movable handle lever relatively to said fixed handle said air compressing means will be actuated to the effect to press air into said compression chamber so as to force air out of the latter into said tank, to thereby provide an uninterrupted flow of compressed air into said tank and for continuously discharging liquid, when contained in said tank, out of said nozzle means.

While there have been shown and described and pointed out the fundamental novel features of the invention as applied to a preferred embodiment, it will be understood that various substitutions and changes in the form and details of the device illustrated and its operation may be made by those skilled in the art without departing from the spirit of the invention.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent, is:

1. A spraying apparatus comprising a tank adapted to contain liquid and having a bottom, an air compression chamber including valve means, air compression means positioned substantially in alignment with said chamber and adapted to communicate through said valve means with the latter, nozzle means having an extension and projecting from without said tank therewithin, a handle lever operatively connected with said air compression means, tubular conduit means providing communication between said chamber and said tank, a tube extending from adjacent said bottom of said tank into said nozzle extension and forming between the latter and said tube a passageway, one end of said tubular conduit means being positioned substantially at the level of said passageway and being substantially aligned with the latter, whereby upon operation of said handle lever said air compression means will be actuated to force compressed air through said valve means into said chamber for precompression therein and thence through said one end of said tubular conduit means into said tank and nozzle means to thereby provide a substantially uninterrupted flow of liquid through said tube and of compressed air out of said nozzle means, and a housing having a top wall, said chamber and said compressing means being positioned in side by side relation to said tank and within said housing, said handle lever being arranged for movement on said top wall and extending through an opening thereof to said air compressing means for operating the same, said air compressing means forming a bellows.

2. A spraying apparatus according to claim 1, wherein a guide pin is provided at one end of

said air compressing means, said handle lever engaging said guide pin which, in one extreme position of said air compressing means abuts against said top wall of said housing.

3. A portable spraying apparatus comprising a housing having a top wall, a tank for containing liquid accommodated within said housing, an air compression chamber, a bellows positioned above and connected to said chamber, said chamber and said bellows being juxtapositioned to said tank within said housing, a handle lever arranged for movement on said top wall and extending through an opening of the latter for operation with said bellows, a conduit extending within said housing about said bellows and interconnecting said chamber with said tank, nozzle means extending from within said tank therewithout, one end of said conduit being disposed substantially at the level of said nozzle means and in communication with the latter, and a tube leading from within said nozzle means toward the bottom of said tank, whereby upon movement of said handle lever said bellows will be actuated to compress air in said compression chamber and thence through said conduit into said tank and said nozzle means to thereby provide at the latter a liquid spray in finely divided state.

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