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(54) Mixing and dispersing apparatus.

(57) Mixing and dispersing apparatus for use for example in the manufacture of ink or paint has the mixing chamber connected to a source of supply of powder to be incorporated into a solvent with a connection opening through the base of the mixing chamber, the mixing chamber being sealed and a vacuum connection being provided at the top. This allows the solids to be "sucked in" below the liquid surface when they are wetted immediately which leads to very rapid incorporation and smooth dispersions.

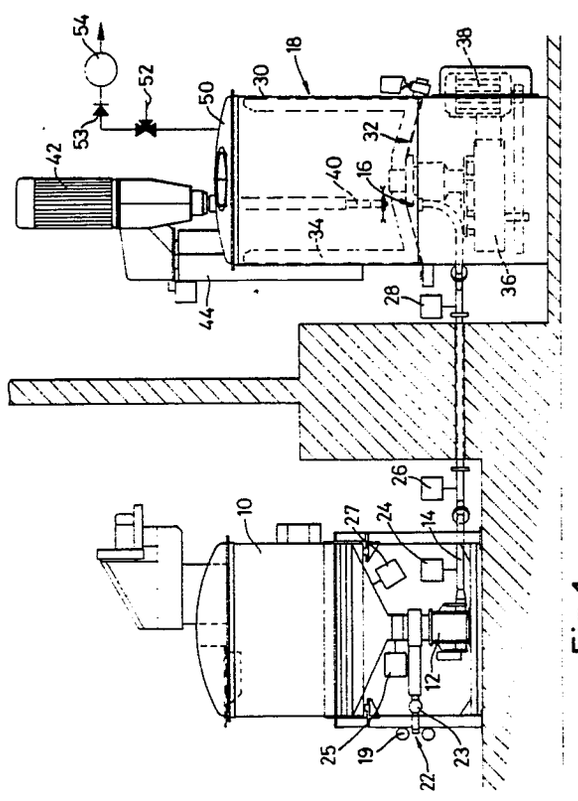

Fig.1

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MIXING AND DISPERSING APPARATUS

This invention relates to the incorporation of solids, that is powders and the like into liquids for example but not exclusively in the manufacture of paint or ink. In this case it is common to use a mixer or disperser which essentially comprises a tank for the liquid with one or more paddles rotating in the tank. Usually the tank has a lid and the powder is tipped or poured through one or more delivery ports in the lid. A high efficient apparatus of this kind is described in EP 000827B which uses a sensor to detect the noise made by the paddle churning the mixture and raises and lowers the paddle in the tank accordingly.

Particular difficulties are found with certain powders and particulate materials which are especially light and tend to float on the surface of the liquid in the tank. These materials are particularly difficult to incorporate and also to deliver to the tank and are the cause of environmental pollution. Even the efficient apparatus of the EP mentioned incorporates such materials into the liquid slowly and with difficulty. The objects of the invention are to solve these problems.

In accordance with the invention, mixing and dispersing apparatus comprises a tank provided with a lid and one or more paddles for rotation in the tank, and is characterised by the provision of a vacuum pump connected to the tank above the normal maximum liquid level therein, and a solids delivery passage connected to the tank below the normal minimum liquid level (in use) of the apparatus. Hence, solids can be "sucked in" below the liquid surface and wetted immediately; it is found experimentally that this leads to a very rapid incorporation and it is also surprisingly found that it leads to better (that is smoother) dispersion.

One presently preferred embodiment of the invention is now described with reference to Figure 1 of the accompanying drawings showing a hopper 10 connected by a control valve 12 to a feedline 14 communicating at 16 with the bottom of a mixing and dispersing apparatus generally indicated by the reference number 18.

The hopper may be vibrated by conventional means 19 to fluidise the powder contents and the valve may be a rotary sleeve valve. Air may be admitted at the point 22 through appropriate control valves 23 and further valves and sensors 25 26 27 28 are provided to monitor and control the process.

The mixing apparatus comprises, in this instance, a generally cylindrical tank 30 having a shallow conical base 32 and the sidewall and base are swept by an underdriven low speed disperser paddle 34 which conforms to the tank interior and is driven by a motor 38 via a gearbox 36. A high speed disperser paddle 40 is driven by motor 42 carried on telescopic column 44 at the side of the tank which enables the rotor to be lifted and lowered from time to time as the process proceeds, for example in accordance with the mentioned European Patent. Vacuum pump 54 is controlled by further suitable control valves 52-53.

It will be noted in Figure 1 that the bulk powder storage is located in a separate room or compartment from the mixing and dispersing unit, so that any environmental pollution caused when the hopper is filled is isolated from the dispersing side of the operation.

Figure 2 is a more schematic flow diagram of a complete plant for producing a coating for a continuous line of material and in this case the mixer unit 60 is generally similar to that in Figure 1 except that the tank wall is frusto-conical over its lower part so that a deep pool can be formed when the tank is operating at only a fraction of its maximum capacity. The tank of the dispersing apparatus 60 is to be connected to the so-called big bags of powder 64 66 via appropriate control valves 70 and the connection may be by a lance plunged through the wall of the big bag so that the contents can be sucked out minimising handling and avoiding the risk of atmospheric pollution by emptying bags into hoppers.

Figure 2 also shows provision for raw material insertion into the mixing apparatus through the lid via lines 67 in more conventional manner, which may be appropriate for initial supplies of solvents and liquids and possibly also of further solids which are not to be drawn in by the vacuum method.

Claims

1. Mixing and dispersing apparatus comprising a tank 30 provided with a lid 50 and one or more paddles 32 for rotation in the tank, characterised by the provision of a vacuum pump 54 connected to the tank above the normal maximum liquid level therein, and a solids delivery passage 14 connected to the tank at 16 below the normal minimum liquid level.

2. Apparatus as claimed in Claim 1 wherein the solids delivery passage 14 is connected to a solids storage hopper 10 arranged to be vibrated (22) and with valves for controlling flow of solids from the hopper to the delivery passage.

3. Apparatus as claimed in Claim 1 wherein the solids delivery passage is arranged to be connected to a big bag 64,66 by means of a lance inserted into the bag so as to draw solids directly from the bag without using a hopper.

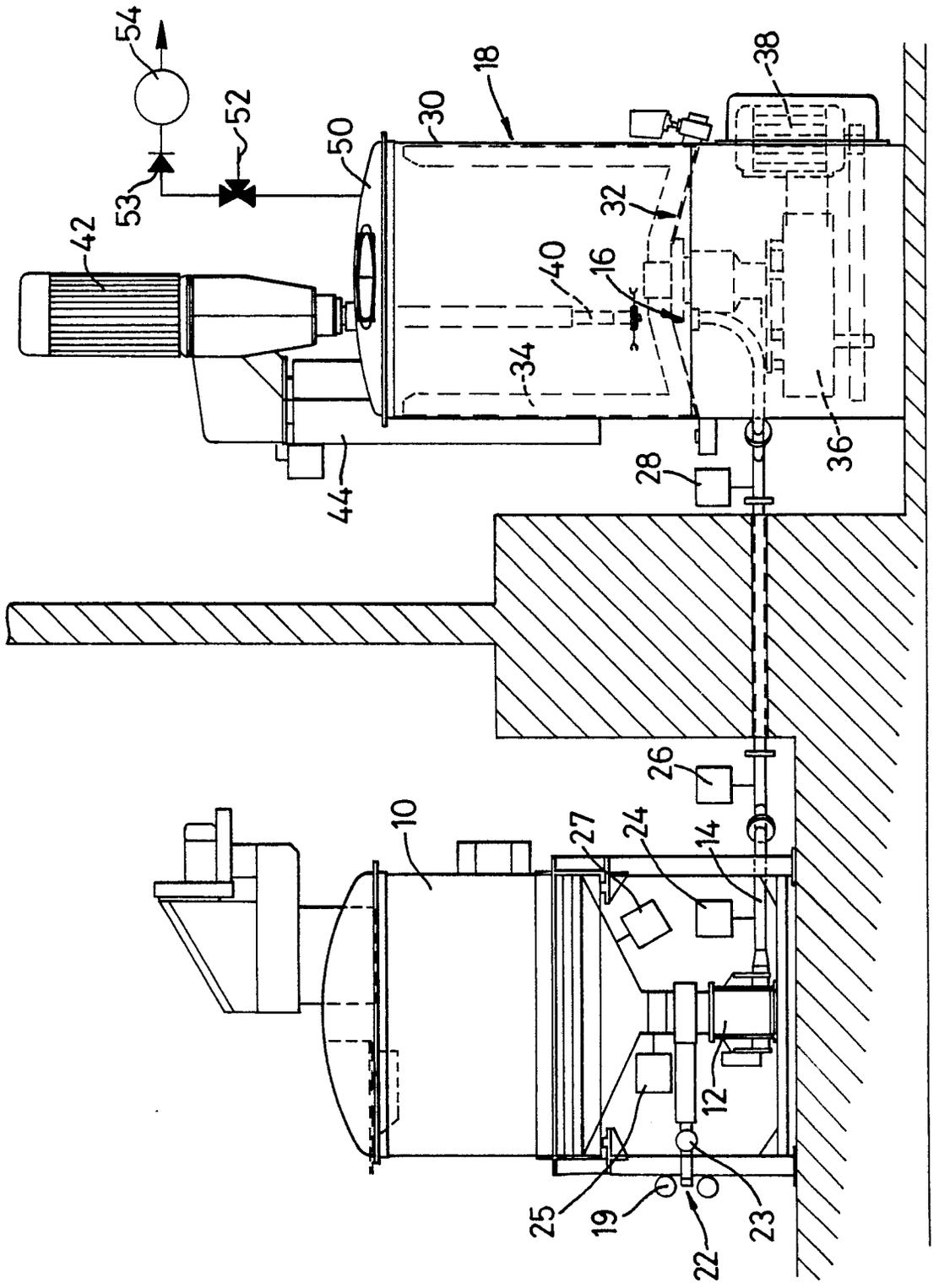
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Fig.1

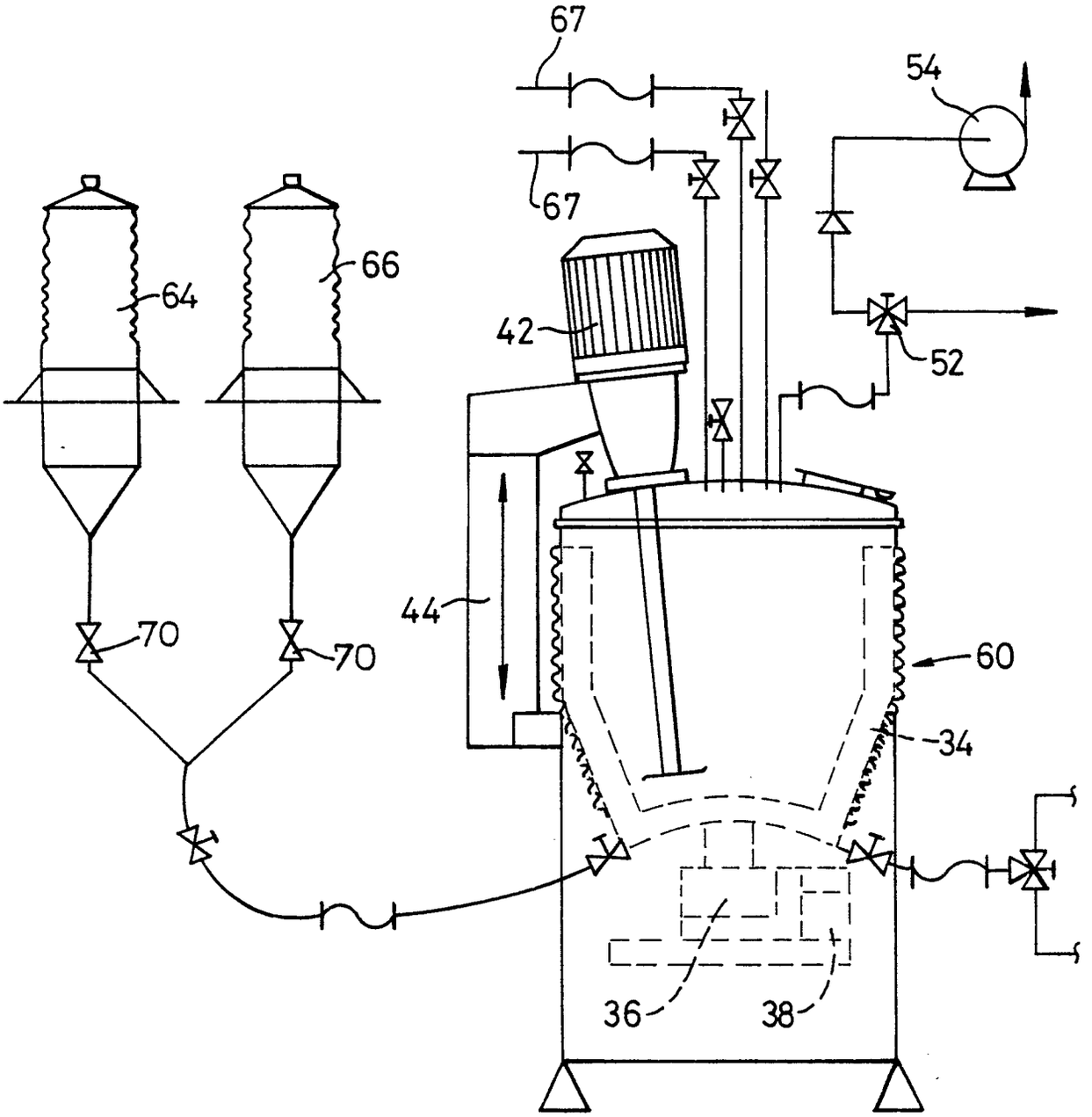

Fig. 2