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parts are subject to wear during the life of the machine, and provision must be made for their servicing.

During the construction of a complicated machine, such as dispensers of the above-mentioned type, various components are mounted within a framework to which an outer "skin" (oftentimes comprising sheet metal panels) is applied. Alternatively, the outer skin may be applied to the framework to form a cabinet within which the components are installed. As a machine is constructed, various components are accumulated and installed in a sequence which minimizes labor investment in the machine. Because of the nature of a commercial dispensing machine, many of the components of the machine comprise duplicates of the same part. For example, dispensing machines, especially those used in the coatings industry, dispense multiple materials, as many as sixteen different colorant materials, and oftentimes as many as nine or twelve different colorant materials. Each colorant material has its own "fluid circuit" typically originating with a canister in which fluid material is stored and terminating with the dispense head in which fluid material leaves the dispenser. Fluid circuits typically include, in addition to the aforementioned canisters, pumps, valves and intermediate fluid lines. Certain advantages can be attained if similar components are associated together in subassemblies which can be tested at one time.

SUMMARY OF THE INVENTION

[0006] The present invention aims to provide a dispensing machine in which components of like type are aggregated in functional subassemblies, which can be remotely tested prior to their installation in a dispensing machine.

[0007] Another aim of the present invention is to reduce the space required for components in a subassembly, employing the advantages of a "bench assembly" whenever possible.

[0008] A further aim is to provide dispensing apparatus having a reduced "footprint", thereby requiring a lesser amount of floor space, without sacrificing functionality of the machine.

[0009] According to principles of the present invention dispensing apparatus should have a construction which facilitates field servicing and adjustments, and which can readily accommodate store personnel who must manually position containers of substantial size and weight under a dispense head. For example, in the coatings industry, tinting materials are added to base coatings provided by the manufacture in container sizes around 25 litres (or 5-gallon). It is thus another aim of the present invention to provide a dispensing machine having a shelf arrangement which required minimum lifting of these and other containers which receive dispense materials.

[0010] In one aspect, the invention is defined in claim 1 below. In another aspect, the invention is defined in
metal construction. The cabinet 12 includes a lower portion 14 including side panels 16 and front panel 18, with access doors 20 formed in the side panel 16. As will be seen herein, the lower cabinet portion 14 encloses most of the storage canisters containing ingredients to be dispensed, pumps and pump drive systems which deliver the materials to a dispense head located in the lower part of upper cabinet portion 24.

Dispenser 10 has a significantly reduced size. In particular, the "footprint" or base of the cabinet 12 is substantially smaller than previous dispensers providing generally the same functionality. As will be seen herein, the space savings results from innovative assembly techniques which also provide substantial labor reduction for both installation and servicing of the dispenser.

Space reduction also results, in part, from the use of different sized canisters, and in particular, canisters of different lengths. A middle section 26 of cabinet 12 houses the upper parts of the taller canisters and also houses tubing coupling the dispense nozzle to pumps located in the lower cabinet portion 14. The middle cabinet portion 26 includes a hinged access door 30 which can be opened, as desired, to service the taller canisters. A lower shelf 32 also serves as a second access door for servicing the shorter canisters located therebelow. Shelf 32 provides a convenient support surface for larger sized containers, allowing the containers to be conveniently positioned underneath the dispense nozzle, located in the overhanging lower portion of the upper cabinet part 24. It has been found expedient, particularly when dispensing paint materials into smaller sized containers, that the small size containers be positioned as close to the dispense nozzle as possible. Accordingly, an upper shelf 34 extends from access door 30 to support the smaller sized containers above the lower shelf 32. When dispensing into larger containers, the upper shelf 34 is hinged to swing out of the way, against front surface 36.

The upper dispenser portion 24 encloses most of the control equipment generally indicated at 72 for the dispenser, including a digital controller, a keyboard for data input, a visual display and printer for data output, and memory units for program and formulation storage. As can be seen in FIGS. 2 and 3, the upper cabinet portion 24 also includes a dispense head assembly 44.

Referring to FIGS. 4 and 5, a pump assembly generally indicated at 50 is mounted on a base plate 52, which includes casters 54 for convenient movement of the dispenser. As mentioned, the pump assembly 50 is located in the lower cabinet portion 14 and, as can be seen in FIG. 4, is located at the bottommost portion of the dispenser. In the preferred embodiment, two pluralities of canisters, each having a respective uniform size, are employed. An array of shorter canisters 56 is located underneath lower shelf 32 while an array of taller canisters 58 is located underneath access door 30. As indicated in FIG. 4, the canisters and pump assembly are

Referring now to the drawings, and initially to FIGS. 1-3, a dispenser illustrating principles of the present invention is generally indicated at 10. The dispenser 10 has found immediate commercial acceptance in the field of retail and industrial coatings, particularly coatings which are blended on demand, using liquid components. As will be appreciated upon consideration of the following, the dispenser 10 and associated apparatus therein may also be readily adaptable for use with other flowable materials including relatively thick pastes (such as ink pastes), salves, balms, food products and food supplements, as well as lotions and creams for topical applications, for example.

The dispenser 10 includes a cabinet comprising an outer skin, preferably made of sheet metal components, affixed to a framework, preferably of tubular

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FIG. 1 is a perspective view of dispensing apparatus according to principles of the present invention; FIG. 2 is a front elevational view thereof; FIG. 3 is a side elevational view thereof; FIG. 4 is a side elevational view of selected components disposed within the outer cabinet; FIG. 5 is a rear elevational view of the dispenser apparatus; FIG. 6 is an exploded side elevational view of sub-assemblies of the dispensing apparatus; FIG. 7 is a top plan view of pump subassembly thereof; FIG. 8 is a side elevational view thereof; FIG. 9 is a side elevational view similar to that of FIG. 8, but prior to installation of the pumps; FIG. 10 is a front elevational view of the pump subassembly; FIG. 11 is a top plan view of one of the pumps; FIG. 12 is a side elevational view thereof; FIG. 13 is a rear elevational view thereof; FIG. 14 is a cross-sectional view taken along the line 14-14 of FIG. 11; FIG. 15 is a perspective view of the valve tray assembly thereof; FIG. 16 is a top plan view thereof; FIG. 17 is a front elevational view thereof; FIG. 18 is a side elevational view thereof; FIG. 19 is a rear elevational view thereof; FIG. 20 is a top plan view of a dispense head assembly thereof; FIG. 21 is a front elevational view thereof; and FIG. 22 is a bottom plan view thereof.

Detailed Description of the Preferred Embodiment.

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BRIEF DESCRIPTION OF THE DRAWINGS

[0011] FIG. 1 is a perspective view of dispensing apparatus according to principles of the present invention; FIG. 2 is a front elevational view thereof; FIG. 3 is a side elevational view thereof; FIG. 4 is a side elevational view of selected components disposed within the outer cabinet; FIG. 5 is a rear elevational view of the dispenser apparatus; FIG. 6 is an exploded side elevational view of sub-assemblies of the dispensing apparatus; FIG. 7 is a top plan view of pump subassembly thereof; FIG. 8 is a side elevational view thereof; FIG. 9 is a side elevational view similar to that of FIG. 8, but prior to installation of the pumps; FIG. 10 is a front elevational view of the pump subassembly; FIG. 11 is a top plan view of one of the pumps; FIG. 12 is a side elevational view thereof; FIG. 13 is a rear elevational view thereof; FIG. 14 is a cross-sectional view taken along the line 14-14 of FIG. 11; FIG. 15 is a perspective view of the valve tray assembly thereof; FIG. 16 is a top plan view thereof; FIG. 17 is a front elevational view thereof; FIG. 18 is a side elevational view thereof; FIG. 19 is a rear elevational view thereof; FIG. 20 is a top plan view of a dispense head assembly thereof; FIG. 21 is a front elevational view thereof; and FIG. 22 is a bottom plan view thereof.

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The dispenser 10 includes a cabinet comprising an outer skin, preferably made of sheet metal components, affixed to a framework, preferably of tubular
connected through tubing to a plurality of dispense valves 60, preferably located in the bottom part of upper cabinet portion 24. As will be seen herein, the dispense valves 60 and dispense head assembly 44 are mounted together in a modular valve assembly.

[0018] Referring again to FIG. 4, pump assembly 50 includes a plurality of pumps 66 coupled to an electric motor 68. The pumps 66 are preferably located in a common horizontal plane lying close to the horizontal centerline of motor 68, so as to provide a "flat" or "low profile" package. As can be seen in FIG. 4, the bottom ends of shorter canisters 56 and longer canisters 58 are generally coterminous, so as to lie generally in a common horizontal plane positioned immediately above the horizontal, low profile assembly 50. As can be seen in FIG. 4, the preferred embodiment of dispenser 10 includes three rows of canisters, two rows of shorter canisters and a row of longer canisters. In the preferred embodiment, each row is three canisters deep, with the dispenser having a total of nine canisters. If desired, each row of canisters could be made four canisters deep to provide a total of twelve canisters, with only a small size increase being required for the additional canisters.

[0019] Referring now to FIG. 6, electronic control components generally indicated at 72 are installed in the upper part 24 of the dispenser cabinet. The electronic components include a microprocessor controller and associated circuitry for receiving commands from a keyboard 74 mounted in the front part of cabinet portion 24. The control circuitry is coupled to shaft encoders 102 on pumps 66 (see FIG. 7) to monitor the amounts of materials being dispensed during a controlled operation. In the preferred embodiment, the pumps are operated apart from the controlled dispense cycles so as to circulate materials between the pumps, the dispense valve 60 and the canisters 56, 58. The control circuitry is also coupled to dispense valve 60 to initiate and terminate a dispense operation, preferably by diverting circulating flow through the dispense valves to dispense head assembly 44. The control circuitry includes the necessary memory to store a variety of control operations. In the preferred embodiment, the formulations for a particular family of materials being dispensed is stored in a separate formula storage device 78, which also includes a visual display 80 for outputting data to an operator. Data is also outputted in hard copy form via a printer 82 mounted on the front of upper cabinet portion 24, alongside the formula storage device 78, and is also indicated by visual display 83.

[0020] In the preferred embodiment, the dispense valves 60 and dispense head assembly 44 are mounted on a common valve tray subassembly generally indicated at 90. As will be seen herein, the valve tray subassembly 90 can be fabricated externally, on a bench or assembly line environment. The electronics components 72 are likewise remotely fabricated, and brought to the machine assembly site, along with formula storage device 78, keyboard 74 and printer 82. The canisters are preferably arranged in two arrays, a first array for the six shorter canisters 56 and a second array for the three longer canisters 58.

[0021] Significant construction advantages have been attained by fabricating the pump assembly 50 separately, as a separate subassembly unit. The cabinet with the aforementioned components is preferably erected separately and is brought to the dispenser assembly site as a complete unit, where it is merged with the pump assembly 50 to form the dispenser 10 (see FIG. 6).

[0022] Substantial advantages can be attained with the modular constructions identified above. For example, a basic dispensing machine can be designed ahead of time, awaiting a particular customer order. Depending upon the materials to be dispensed by the customer, various components of the basic design may have to be substituted. For example, large volume dispensing operations may best be served by a dispense system having greater throughput rates. For example, if a larger capacity dispense head is required, a special valve tray assembly can be fabricated on a bench, and tested as a working unit prior to installation in the dispenser cabinet. Similarly, larger capacity pumps may be required and/or a larger capacity motor or a motor operating at a faster speed may be desired for a particular installation. It is a much simpler matter to substitute the desired components of the pump assembly on a test bench. If desired, several different versions of subassemblies can be stocked to meet most customer's requirements, and the lead time required for supplying custom built machines can be drastically reduced with the modular construction of the present invention. Additionally, the designers of the machine can arrange the elements of the pump assembly more densely than would otherwise be practically feasible.

[0023] Referring now to FIGS. 7-10, the pump assembly 50 will be described in greater detail. As mentioned above, motor 68 and pumps 66 are coupled together (i.e., either directly or indirectly connected) on a common base plate 52. If desired, a motor could be provided for each pump, for direct connection therewith. As can be seen in FIGS. 7 and 10, for example, the pumps 66 are indirectly connected to the motor through intervening elements, including a series of interengaging chain loops 96. The pumps are preferably arranged in two spaced-apart serial arrays, one on each side of motor 68. Except for the pumps located at the ends of the serial arrays, pumps 66 are connected to pairs of chain sprockets so as to form a drive system in each serial array, driven from a single point in the array (preferably at the drive shafts coupled to the end pumps shown at the bottom of FIG. 7). Connecting members 98 connect the sprocket drive shafts to a transmission member, preferably a gear box 100. A pulse encoder 102 informs the control circuitry of the rotation of the pumps 66.

[0024] Referring to FIG. 10, the pumps 66 are mounted by sleeves 106 to mounting walls 110 which are pref-
The pumps 66 are cantilevered from mounting walls 110. Referring additionally to FIGS. 11 and 12, the pumps 66 include an inlet port 112 and an outlet port 114. The pumps 66 have an outer housing 120 with a first end 122 remote from sleeves 106, and a second end 124 which includes a mounting hub 126 with an annular recess 128. The mounting hub 126 fits within a first end 130 of mounting sleeve 106 and is held in place by a set screw (not shown), the inner tip of which is received in recess 128. Sleeves 106 include a second end 134 which is stepped, having a large diameter outer surface portion 136, a smaller diameter externally threaded surface portion 138 and a stepped wall 140 therebetween. In the preferred embodiment, the stepped wall 140 comprises a reference surface for locating the pump sleeve on mounting walls 110.

The construction of pump 66, of the mounting sleeve 106 and of the arrangement of the weld nuts 144 and mounting channels 110, in registry with apertures 146 formed in the mounting wall. The pump sleeves are threadingly engaged with the mounting wall, as if they were a bolt. The pump mounting head is then installed in the open free end of the mounting sleeve and secured with the aforementioned set screw. As can be seen in FIGS. 11 and 12, the pump shaft 150 extends into the inner bore 152 of the mounting sleeve. Couplings 154 (see FIG. 10) join the pump shaft 150 with the drive shaft 150 of sprockets 160, thus completing connection to the drive motor. As can be seen in FIG. 11, for example, an inspection port 164 facilitates assembly of the coupling 154.

The pump assembly 50 is of a low profile design, with centerlines of the pumps and of the motor lying in closely spaced horizontal planes. The pump arrays are horizontally oriented, as is the drive shaft and outer body of motor 68.

The pumps 66 include a second sleeve bearing 200 adjacent the exposed free end of the pump shaft 150. Head 184 maintains fluid-tight enclosure of internal bore 170 at the first end of pump 66. In order to maintain a fluid-tight closure at the second end of the pump, a pair of seals are employed. FIG. 14 shows seals 204, 206 which have engaging mating faces. Typically, one seal rotates with drive shaft 150, while the other seal remains stationary, although other arrangements are also possible. For example, both seals could be allowed to rotate with drive shaft 150 with appropriate provision of rotational mounting for the seal located adjacent bearing 200. Seal 206 is mounted in a holder 210 which preferably engages the outer surface of the rotor shaft. A spring 212 is positioned between bushing 176 and holder 210, so as to bias the seals 204, 206 together, in mating engagement. A washer 214 is located between spring 212 and bushing 176 to reduce wear.

Initially, there is little or no "end play" in the drive shaft 150. However, with prolonged use, some end play may develop, and spring 212 presses the rotor head into engagement with the idler gear, and also presses the free ends of rotor teeth 180 into engagement with the mating face of head 122. In the preferred embodiment, the idler gear 182 and mounting pin 186 are of hardened construction, preferably hardened cast iron, and most preferably ceramic. The rotor and especially the teeth 180 are also of hardened construction, preferably hardened cast iron of greater hardness than the rotor, so as to provide continuous adjustments during prolonged pump use (with attendant wear on the rotor 178 and head 122), so as to maintain a constant pump output over the useful life of the pump.
of the three parts, that is, a lesser hardness than idler gear 182 but a greater hardness than the rotor 178. After prolonged use, the free ends of rotor 180 will wear, so as to have a reduced length in the axial direction. The idler gear 182 sees an increased pressure applied by rotor 178 and, being harder than the rotor, bores into the face 222 of the rotor, thereby effectively extending the length of rotor teeth 180 in the axial direction, as well as the slots between adjacent rotor teeth, thereby preserving the volume pumped for a given amount of rotation. Because the head member 122 is harder than the rotor, a compensating wear develops at the rotor face 222 rather than at the head member 122.

[0032] Referring now to FIGS. 15-22, the valve tray subassembly includes a mounting plate 230 in the form of a tray having a horizontal plate-like portion 232 and a downturned rear wall 234. The dispensing head assembly 44 is mounted at the forward end of the tray, and is coupled to the dispensing valves 60 by a plurality of tubing segments 240. Referring additionally to FIG. 21, the dispensing head assembly 44 includes a nozzle portion 244 downwardly depending from a body portion 246 which is preferably formed from a plastic block, machined to form flow channels, one for each conduit 240 extending to the nozzle 244.

[0033] In the preferred embodiment, three flow channels emerge from each sidewall and from the rear wall of the body portion 246. The tubing segments are arranged side-by-side and are trained to generally follow the horizontal plate portion 232 of tray 230. As can be seen in FIG. 16, the tubing segments "fan out" from the sidewalls and rear wall of the body member 246. The tubing segments are connected to dispense ports 250 of the valve 60. In the preferred embodiment, dispensing valves 60 are mounted directly to rear wall 234 of tray 230.

[0034] However, as indicated in FIG. 16, the dispensing valves 60 could be mounted to an intermediate plate 254 which is in turn mounted to rear wall 234. The mounting plate 254 has elongated mounting holes (not shown) to receive threaded fasteners (not shown) received in rear wall 234. Mounting plate 254 can be moved small amounts in a vertical direction, so as to control the amount of slope, if any, to the tubing segments 240. In the alternative embodiment shown in FIG. 16, the mounting plate 254 can be repositioned so as to introduce or alternatively eliminate a small downward slope in the tubing segments, as desired. The tubing segments should be of flexible construction to allow these adjustments.

[0035] Referring additionally to FIG. 4, the pump outputs are connected through conduits 260 to the inlet ports of dispense valves 60. Conduits 262 couple the outlet ports 264 to canisters 58, with conduits coupling the canisters to the pump inlet ports. In the preferred embodiment, material to be dispensed is stored in canisters 56, 58 and is pumped through conduits 260 to dispense valves 60. The dispense valves 60 are configured such that the material circulates through the dispensing valves, exiting through outlet ports 264 to return to canisters 56, 58 via conduit 262. When a dispensing cycle is initiated, control circuitry 72 initiates commands to dispense valves 60 through conduits 270, and flow is diverted through outlet ports 250, for passage through tubing segments 240 and dispense head 268 to dispense nozzle 244. The recirculation prevents settling in the various conduit lines, and also prevents settling in the canisters, augmenting the stirrers 280, driven by electric motor 282 (see FIG. 4).

[0036] A lamp 290 is mounted to printed circuit board 292 which is secured to the upper surface of dispense head 246. The lamp 290 is received in a passageway 294 formed at the center of the dispense head 246 and the dispense nozzle 244, so that illumination from lamp 290 indicates the desired positioning of a container to receive dispense materials. Referring to FIG. 21, stainless steel nozzle extensions 298 are positioned at the bottom end of dispense nozzle 244, the nozzle extensions projecting small amounts beyond the bottom surface 300 of the dispense nozzle. The flow passageways in the dispense nozzle 244 and dispense head 246 are indicated in phantom in FIG. 21.

Claims

1. A dispensing apparatus, including:

- a plurality of pumps (66);
- a plurality of canisters (56, 58) for supply of material to be dispensed, coupled to the pump;
- a plurality of valves (60) coupled to respective ones of said pumps (66);
- a dispense head (44) coupled to the valves;

the apparatus being characterised by:

the pumps (66) each having a mounting hub (126) extending along an axis and a drive shaft (150) extending along the axis beyond the mounting hub;

a mounting wall (110) defining a mounting aperture;

a plurality of tubular sleeves (106) mounting the pump to the mounting wall, the sleeves having opposed first (122) and second (134) ends, the first ends receiving the mounting hubs and the drive shafts and the second ends having an outer surface (140) with a first surface portion of predetermined diameter, a second surface portion of reduced diameter and a radially extending step therebetween for engaging the wall so as to align the axes of the pumps at predefined angles to the mounting wall; and

securement means (8144) for securing the sleeve second end (134) to the wall (110).
2. The dispense apparatus according to claim 1 wherein the second ends (134) of the sleeve (106) are threaded, the securement means comprising nut fasteners (144) for mating engagement with the sleeve second ends to engage the mounting wall.

3. The dispense apparatus according to claim 2 wherein the nut fastener (144) is permanently secured to the wall, with the dispense apparatus further comprising a plurality of drive shafts (156) extending through the mounting wall and into the first ends of the sleeves, and coupling means (154) for coupling the drive shafts (156) to the pumps (66, 150).

4. The dispense apparatus according to claim 3 wherein the drive shaft is secured to a sprocket (160).

5. The dispense apparatus according to claim 4 further comprising a plurality of sprockets (160) and the coupling means comprising pairs of interengaging coupling members (154) within the sleeves for coupling the drive shafts (156) to the sprockets (160).

6. The dispense apparatus according to claim 5 further comprising:
   a frame (52) for supporting the mounting wall (110);
   a motor (68) mounted on the frame for preselected alignment with the mounting wall; and
   coupling means (96, 100) for coupling the motor to the pumps in driving engagement therewith, the sleeves (106) maintaining alignment between the coupling means and the pump drive shaft.

7. The dispense apparatus according to claim 1 further comprising a valve tray assembly (90) including a tray (230) having a forward end and a rearward end with the dispense head (44) mounted at the forward end of the tray.

8. The dispense apparatus according to claim 7 wherein the valves are arranged in a serial array and mounted at the rearward end of the tray (230), and the dispense apparatus further comprises a plurality of tubing segments (240) joining the dispense head to the valves, the tubing segments aligned side-by-side in a common generally horizontal plane extending generally parallel to the tray.

9. The dispense apparatus according to claim 1 wherein:
   the pumps (66) are arranged in two spaced serial arrays with the motor (68) disposed between the two spaced serial arrays and coupled to the pumps in driving engagement therewith; each serial array comprises at least one drive chain (96) coupling the pumps to the motor; and wherein the apparatus further comprising a pair of mounting walls (110), with the motor located between the mounting walls, and with mounting walls located between the motor and the pumps.

10. A pump assembly (50) for use in a fluid dispenser, comprising:
   a base plate (52);
   a plurality of mounting walls (110) upstanding from the base plate;
   a plurality of pumps (66) arranged in two spaced serial arrays, each array mounted to a respective mounting wall; and
   at least one electric motor (68) disposed between the two spaced serial arrays and coupled to the pumps in driving engagement therewith;
the pump assembly being characterised by:
   a plurality of attaching means having first ends secured to the mounting walls and second ends to receive the pumps;
   the attaching means comprising hollow sleeves (106) having first ends (134) extending through the mounting walls and second ends (130) engaging respective ones of said pumps;
   the first ends (134) of the sleeves being threaded; and
   the pump assembly further comprising nut fasteners (144) for matching engagement with the sleeve first ends to engage the mounting walls.

11. The pump assembly according to claim 10 further comprising drive shafts (156) extending through the mounting walls (110) and into the first ends of the sleeves, and coupling means (154) for coupling the drive shafts (156) to respective pumps (66).

12. The dispense apparatus according to claim 11 wherein each serial array comprises at least one drive chain (96) coupling the pumps (66) to the motor.

13. The pump assembly according to claim 10, 11 or 12, further comprising pairs of bearing supports within the sleeves for rotationally supporting the drive shafts, the bearing supports located on opposite sides of the mounting walls.
Patentansprüche

1. Abgabevorrichtung, mit:

   einer Mehrzahl von Pumpen (66);

   einer Mehrzahl von Kanistern (56, 58) zur Zu-
   fuhr des abzugebenden Materials, die mit der
   Pumpe gekoppelt sind;

   einer Mehrzahl von Ventilen (60), die mit ent-
   sprechenden einzelnen der Pumpen (66) ge-
   koppelt sind;

   einem Abgabekopf (44), der mit den Ventilen
   gekoppelt ist;

wobei die Vorrichtung dadurch gekennzeichnet ist, daß

die Pumpen (66) eine Befestigungsnaabe (126)
besitzen, die sich entlang einer Achse er-
streckt, und eine Antriebswelle (150), die sich
entlang der Achse über die Befestigungsnaabe
hinaus erstreckt;

eine Befestigungswand (110) eine Befesti-
gungsoffnung begrenzt;

eine Mehrzahl von röhrenförmigen Hülsen
(106) die Pumpe an der Befestigungswand an-
bringen, wobei die Hülsen entgegengesetzte
erste (122) und zweite (134) Enden besitzen,
wobei die ersten Enden die Befestigungsnaaben
und die Antriebswellen aufnehmen und die
zweiten Enden eine äußere Oberfläche (140)
mit einem ersten Oberflächenbereich mit vor-
bestimmten Durchmesser, einen zweiten Ober-
flächenbereich mit verringertem Durchmesser
und einen sich in radialer Richtung erstrecken-
den Absatz zwischen diesen besitzen, um mit
der Wand so in Eingriff zu treten, um die Achseln
der Pumpen in vorbestimmten Winkeln zur Be-
festigungswand auszurichten; und

Befestigungseinrichtungen (144) das zweite
Ende (134) der Hülse an der Wand (110) befe-
stigen.

2. Abgabevorrichtung gemäß Anspruch 1, wobei die
   zweiten Enden (134) der Hülse (106) mit Gewinde
   versehen sind, und die Befestigungseinrichtungen
   Mutternbefestiger (144) dauerhaft mit der Wand
   verbunden ist, wobei die Abgabevorrichtung weiter-
hin eine Mehrzahl von Antriebswellen (156) umfaßt,
die sich durch die Befestigungswand und in die
ersten Enden der Hülsen erstrecken, und Kupplungs-
einrichtungen (154), um die Antriebswellen (156)
mit den Pumpen (166, 150) zu koppeln.

3. Abgabevorrichtung gemäß Anspruch 1, wobei die
   Antriebswelle mit einer Kettenscheibe (160) ver-
   bunden ist.

4. Abgabevorrichtung gemäß Anspruch 3, wobei die
   Antriebswelle mit einer Kettenscheibe (160) ver-
   bunden ist.

5. Abgabevorrichtung gemäß Anspruch 4, weiter um-
fassend eine Mehrzahl von Kettenscheiben (140)
und wobei die Kupplungseinrichtung Paare von mit-
einander in Eingriff befindlichen Kupplungselemen-
ten (154) innerhalb der Hülsen umfaßt, um die An-
triebswelle (156) mit den Kettenscheiben (160) zu
koppeln.

6. Abgabevorrichtung gemäß Anspruch 5, weiter um-
fassend:

   einen Rahmen (52), um die Befestigungswand
   (110) zu halten;

   einen Motor (68), der auf dem Rahmen montiert
   ist für eine vorgewählte Ausrichtung mit der Be-
festigungswand; und

   Kupplungseinrichtungen (96, 100), um den Mo-
tor in Antriebsverbindung mit den Pumpen zu
koppeln, wobei die Hülsen (106) auf der Ausrich-
tung zwischen den Kupplungseinrichtungen
und der Antriebswelle der Pumpe aufrecht er-
halten.

7. Abgabevorrichtung gemäß Anspruch 1, weiter um-
fassend einen Ventilbodenauflauf (90) mit einer
Platte (230) mit einem vorderen Ende und einem
hinteren Ende mit dem am vorderen Ende der Platte
montierten Abgabekopf (44).

8. Abgabevorrichtung gemäß Anspruch 7, wobei die
   Ventile in einer Reihe angeordnet und am hinteren
   Ende der Platte (230) montiert sind, und die Abga-
   bevorr. weiterhin eine Mehrzahl von Verroh-
rungssegmenten (240) umfaßt, welche den Abga-
bekopf mit den Ventilen verbinden, wobei die Ver-
rohrungssegmente in einer gemeinsamen, im allge-
meinen horizontalen Ebene, die sich im allgemei-
nen parallel zur Platte erstreckt, Seite an Seite aus-
gerichtet sind.

9. Abgabevorrichtung gemäß Anspruch 1, wobei:

   die Pumpen (66) in zwei beabstandeten Reihen
   angeordnet sind, wobei der Motor (68) zwi-
schen den zwei beabstandeten Reihen angeordnet und mit den Pumpen in einer Antriebsverbindung mit diesen gekoppelt ist;

wobei jede Reihe zumindest eine Antriebskette (96) umfaßt, welche die Pumpen mit dem Motor koppelt; und wobei die Vorrichtung weiterhin ein Paar von Befestigungswänden (110) umfaßt und der Motor zwischen den Befestigungswänden angeordnet ist, und Befestigungswände zwischen dem Motor und den Pumpen angeordnet sind.

10. Pumpenaufbau (50) zur Verwendung in einer Flüssigkeitsabgabevorrichtung, umfassend:

- eine Grundplatte (52);
- ein Paar von Befestigungswänden (110), die von der Grundplatte hochstehen;
- eine Mehrzahl von Pumpen (66), die in zwei beabstandeten Reihen angeordnet sind, wobei jede Reihe an einer entsprechenden Befestigungswand angebracht ist; und
- zumindest ein Elektromotor (68), der zwischen den zwei beabstandeten Reihen angeordnet und mit den Pumpen in antreibendem Eingriff gekoppelt ist;

wobei der Pumpenaufbau gekennzeichnet ist durch:

- eine Mehrzahl von Befestigungseinrichtungen mit ersten Enden, die an den Befestigungswänden angebracht sind, und zweiten Enden zur Aufnahme der Pumpen;
- die Befestigungseinrichtungen holze Hülsen (106) mit ersten Enden (134), die sich durch die Befestigungswände erstrecken, und zweiten Enden (130), die mit entsprechenden Pumpen in Eingriff sind, umfassend:
  - erste Enden (134) der Hülsen, die mit Gewinde versehen sind; und
  - der Pumpenaufbau weiterhin Mutternbefesti-ger (144) umfaßt, für einen zusammenpassenden Eingriff mit den ersten Enden der Hülsen, um mit den Befestigungswänden in Eingriff zu treten.

11. Pumpenaufbau gemäß Anspruch 10, weiter umfassend Antriebswellen (156), die sich durch die Befestigungswände (110) und in die ersten Enden der Hülsen erstrecken, und Befestigungseinrichtungen (154), um die Antriebswellen (156) mit entsprechenden Pumpen (66) zu koppeln.


13. Pumpenaufbau gemäß Anspruch 10, 11 oder 12, weiter umfassend Paare von Stützlager innerhalb der Hülsen, um die Antriebswellen drehbar zu halten, wobei die Stützlager auf entgegengesetzten Seiten der Befestigungswände angeordnet sind.

Revendications

1. Appareil de distribution, comportant :

- une pluralité de pompes (66) ;
- une pluralité de réservoirs (56, 58) raccordés à la pompe pour l'apport de substances à distribuer ;
- une pluralité de vannes (60) raccordées à celles qui leur correspondent desdites pompes (66) ;
- une tête (44) de distribution raccordée aux vannes ;

l'appareil étant caractérisé par :

- le fait que les pompes (66) ont chacune un moyeu (126) de montage s'étendant le long d'un axe et un arbre d'entraînement (150) s'étendant le long de l'axe au-delà du moyeu de montage ;
- une paroi (110) de montage définissant une ouverture de montage ;
- une pluralité de manchons (106) tubulaires permettant le montage de la pompe sur la paroi de montage, les manchons ayant des première (122) et seconde (134) extrémités opposées, les premières extrémités recevant les moyeux de montage et les arbres d'entraînement et les secondes extrémités ayant une surface (140) extérieure avec une première partie de surface de diamètre prédéterminé, une seconde partie de surface de diamètre réduit et un échelon s'étendant radialement entre celles-ci pour l'engagement sur la paroi afin d'aligner les axes des pompes selon des angles prédéfinis sur la paroi de montage ; et
- des moyens (144) de fixation pour fixer la seconde extrémité (134) du manchon à la paroi (110).

2. Appareil de distribution selon la revendication 1, dans lequel les secondes extrémités (134) du manchon (106) sont filetées, les moyens de fixation...
comprenant des dispositifs (144) de fixation à écrous pour un engagement par emboîtement avec les secondes extrémités du manchon pour un engagement sur la paroi de montage.

3. Appareil de distribution selon la revendication 2, dans lequel l'élément de fixation (144) à écrou est fixé de façon permanente à la paroi, l'appareil de distribution comprenant en outre une pluralité d'arbres (156) d'entraînement s'étendant à travers la paroi de montage et dans les premières extrémités des manchons et des moyens (154) de raccordement pour raccorder les arbres d'entraînement (156) aux pompes (66, 150).

4. Appareil de distribution selon la revendication 3, dans lequel l'arbre d'entraînement est fixé à un pignon (160).

5. Appareil de distribution selon la revendication 4, comprenant en outre une pluralité de pignons (160) et les moyens de raccordement comprenant des paires d'éléments (154) de raccordement s'engageant mutuellement à l'intérieur des manchons pour un raccordement des arbres (156) d'entraînement aux pignons (160).

6. Appareil de distribution selon la revendication 5, comprenant en outre :
un châssis (52) pour supporter la paroi (110) de montage ;
un moteur (68) monté sur le châssis pour un alignement présélectionné avec la paroi de montage ; et
des moyens (96, 100) de raccordement pour raccorder le moteur aux pompes de façon à présenter un engagement d'entraînement avec celui-ci, les manchons (106) maintenant l'alignement entre les moyens de raccordement et l'arbre d'entraînement de pompe.

7. Appareil de distribution selon la revendication 1, comprenant en outre un ensemble (90) à plateaux de vannes comportant un plateau (230) ayant une extrémité avant et une extrémité arrière, la tête (44) de distribution étant montée à l'extrémité avant du plateau.

8. Appareil de distribution selon la revendication 7, dans lequel les vannes sont agencées selon un groupement en série et sont montées à l'extrémité arrière du plateau (230), et l'appareil de distribution comprend en outre une pluralité de segments (240) de tubulure joignant la tête de distribution aux vannes, les segments de tubulure étant alignés côté à côté dans un plan commun globalement horizontal s'étendant globalement parallèlement au plateau.

9. Appareil de distribution selon la revendication 1, dans lequel :
les pompes (66) sont agencées selon deux groupements en série mutuellement espacées, le moteur (68) étant disposé entre les deux groupements en série mutuellement espacés et étant raccordé aux pompes selon un engagement d'entraînement avec celles-ci ; chaque groupement en série comprend au moins une chaîne (96) d'entraînement reliant les pompes au moteur, et dans lequel l'appareil comprend en outre une paire de parois (110) de montage, le moteur étant situé entre les parois de montage, et les parois de montage étant situées entre le moteur et les pompes.

10. Ensemble (50) à pompes destiné à une utilisation dans un distributeur de fluide, comprenant :
one plaque (52) de base ;
one paire de parois (110) de montage érigées sur la plaque de base ;
one pluralité de pompes (66) agencées selon deux groupements en série mutuellement espacés, chaque groupement étant monté sur une paroi de montage respective ; et
au moins un moteur (68) électrique disposé entre les deux groupements en série mutuellement espacés et relié aux pompes selon un engagement d'entraînement avec celles-ci ;

l'ensemble à pompes étant caractérisé par :
one pluralité de moyens de fixation ayant des premières extrémités fixées aux parois de montage et des secondes extrémités destinées à recevoir les pompes ;
les moyens de fixation comprenant des manchons (106) creux ayant des premières extrémités (134) s'étendant à travers les parois de montage et des secondes extrémités (130) s'engageant dans celles qui leur correspondent desdites pompes ;
les premières extrémités (134) des manchons étant filetées ; et
l'ensemble à pompes comprenant en outre des éléments (144) de fixation à écrous pour un engagement par emboîtement avec les premières extrémités de manchons pour un engagement sur les parois de montage.

11. Ensemble à pompes selon la revendication 10, comprenant en outre des arbres (156) d'entraînement s'étendant à travers les parois (110) de montage et à l'intérieur des premières extrémités des manchons, et des moyens (154) de raccordement destinés à raccorder les arbres (156) d'entraînement...
ment aux pompes (66) respectives.

12. Appareil de distribution selon la revendication 11, dans lequel chaque groupement en série comprend au moins une chaîne (96) d'entraînement reliant les pompes (66) au moteur.

13. Ensemble à pompes selon la revendication 10, 11 ou 12, comprenant en outre des paires de supports à roulements à l'intérieur des manchons pour supporter de façon rotative les arbres d'entraînement, les supports à roulements étant situés sur des côtés opposés des parois de montage.