

Dec. 6, 1966

J. T. SCHWIEGER
PROPORTIONING MACHINE AND METHOD

3,289,889

Filed Jan. 3, 1964

2 Sheets-Sheet 1

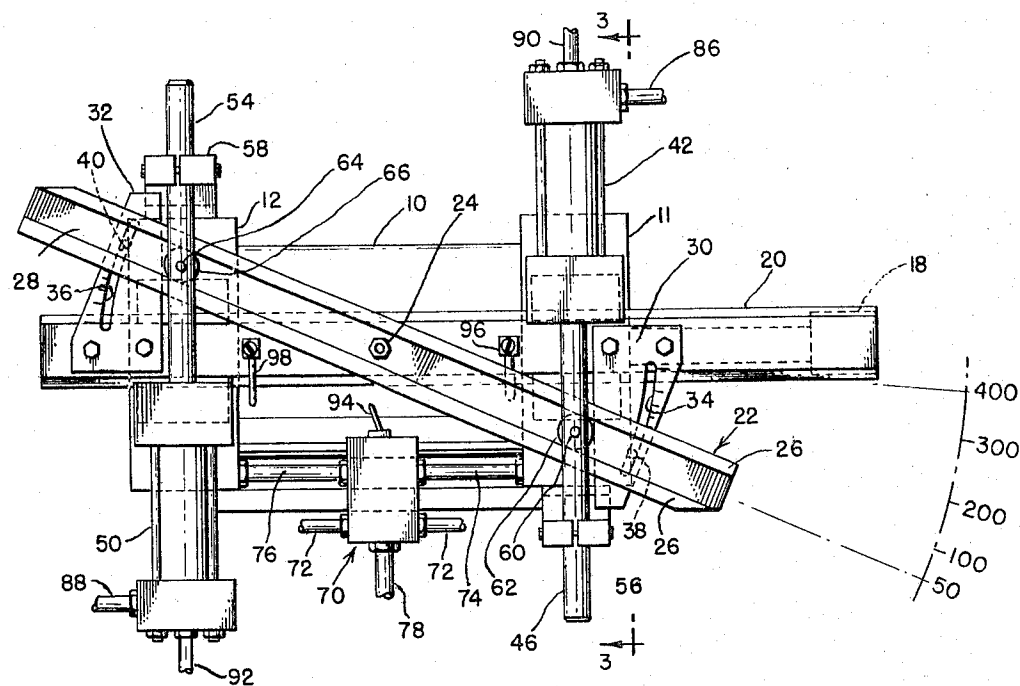


FIG. 1

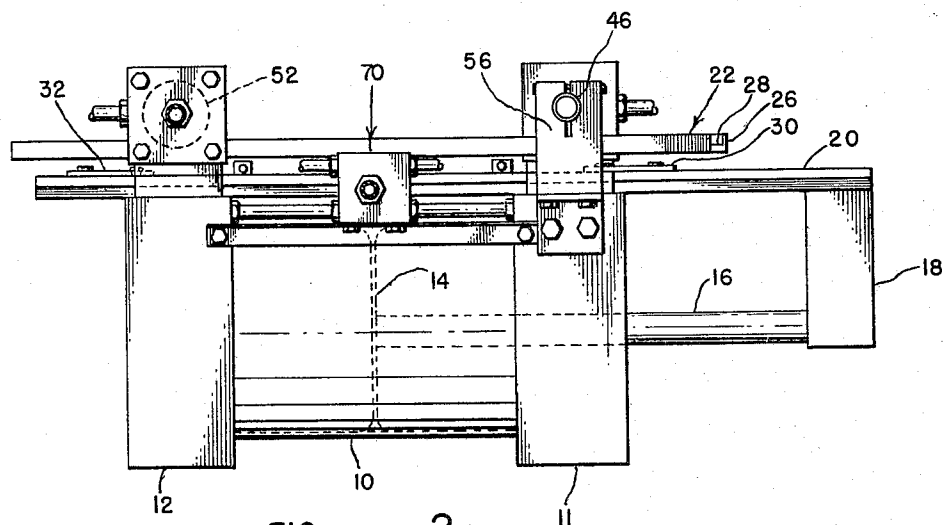


FIG. 2

JOHN T. SCHWIEGER
INVENTOR.

BY *Tuck & Cole*
ATTORNEYS

Dec. 6, 1966

J. T. SCHWIEGER

3,289,889

PROPORTIONING MACHINE AND METHOD

Filed Jan. 3, 1964

2 Sheets-Sheet 2

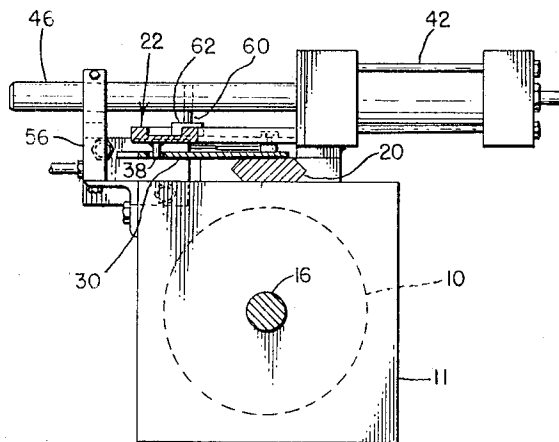


FIG. 3

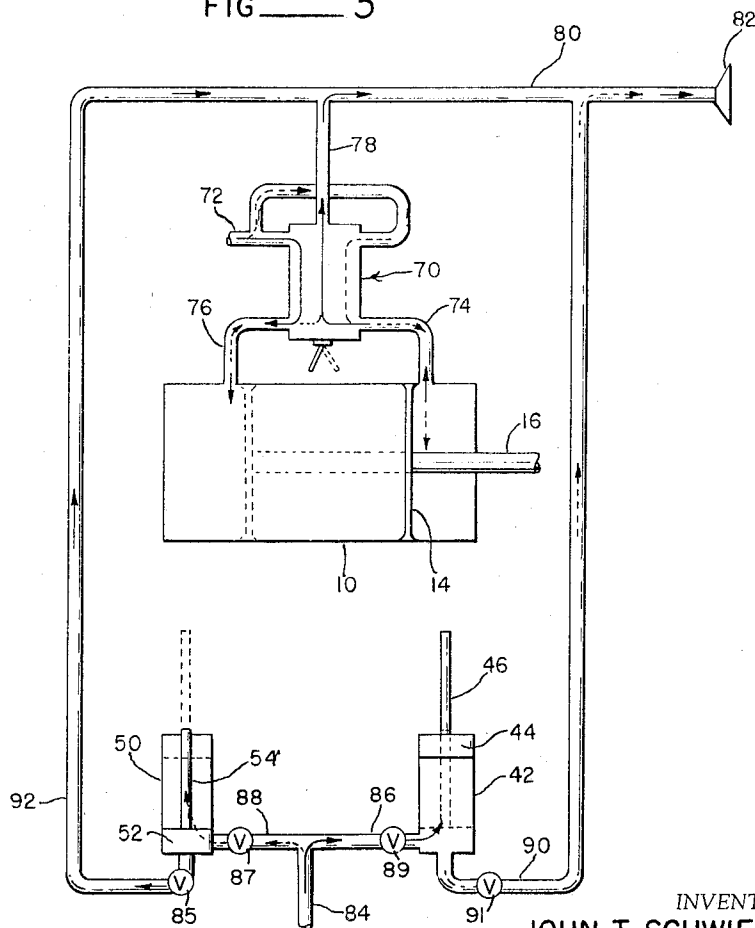


FIG. 4

INVENTOR.
JOHN T. SCHWIEGER

BY *Tuck & Cole*
ATTORNEYS

1

3,289,889

PROPORTIONING MACHINE AND METHOD

John T. Schwieger, 1605 8th NE., Auburn, Wash.

Filed Jan. 3, 1964, Ser. No. 335,523

3 Claims. (Cl. 222-57)

This invention relates to the general art of metering and proportioning dispensers for introducing admixtures fluids into water or other carrier fluids in controlled quantities. More specifically does this invention relate to a proportioning machine and method in which accurate ratios between a given amount of carrier vehicle and an admixture fluid can be established and maintained without loss of proper proportions during the dispensing period.

In the raising of fruits, vegetables, grain, poultry and livestock ranchers and farmers frequently find need for employing medicinal substances, sprays, insecticides, liquid fertilizers, and the like, which when applied or administered in controlled amounts have beneficial effects.

Previous attempts to introduce a closely controlled ratio of chemical, medicinal substances, insecticides, fertilizers, etc. into a quantity of water have proved generally unsuccessful for numerous reasons. The diluent or carrier fluid, which is usually water, must have its flow closely regulated with that of the admixture fluid so that the admixture fluid ratio is maintained within prescribed tolerance ranges. Prior art devices in this area have been complicated, costly, and generally undependable.

This device provides a means for accurately dispensing admixture fluids in a carrier vehicle such as water by the simple but novel utilization of a large main cylinder with a reciprocating piston mechanically rigidly connected to two smaller cylinders with reciprocating cylinders. In effect the larger main or carrier cylinder dispenses a given amount of carrier fluid with each stroke of the piston in such a way that the movement of the main piston is transferred to smaller admixture cylinders and their pistons for injecting or dispensing admixture fluid into the carrier fluid being discharged from this proportioning machine.

Accordingly, it is a feature of this invention to provide a proportioning machine in which water or other carrier fluid under pressure is the transporting medium for admixture fluids and in which the admixtures are accurately proportioned to the carrier.

Another feature of this invention is to supply a proportioning machine in which the ratio of admixture fluid to carrier fluid may be varied within a wide range by very simple and quick adjustments.

Still another feature of this invention is to furnish a proportioning machine, for introducing and dispensing admixture fluids into given quantities of water or carrier fluid, which is simple in design, durable, dependable, rugged in construction, and economical in cost.

Yet another feature of this invention is to provide a dispensing and proportioning machine for carrier and admixture fluids in which the ratios of the respective fluids may be controlled with close accuracy for maximum and most efficient utilization of the admixture fluid, thus eliminating waste or ineffectual use of the admixture.

Another feature of this invention is to furnish a proportioning machine which is readily adaptable to a wide range of admixture fluids, and which machine is compact, readily transportable, and convenient to operate.

These and other objects, advantages and features will become subsequently apparent in the details of construction and operation as more fully hereinafter described and claimed. Reference will be had to the accompanying drawings, forming a part of this disclosure, wherein like numerals refer to like parts throughout, and in which:

FIGURE 1 is a top plan view of a preferred arrange-

2

ment of the components of this proportioning machine; FIGURE 2 is a side elevational view of the preferred embodiment shown in FIG. 1;

FIGURE 3 is an end elevational view taken along the line 3-3 of FIG. 1 further showing details of the arrangement and location of the components of this invention; and

FIGURE 4 is a diagrammatic view of the fluid control system and flow as created and maintained by this invention.

Referring now to the drawings it will be seen, particularly by reference to FIGS. 1 to 3, that the device is comprised of a large main or carrier cylinder 10 having support structures 11 and 12 at each end to maintain the cylinder 10 in a stable position and also form the means by which other components of the invention are supported. Cylinder 10 has piston 14 and piston rod 16. Piston 16 is designed for reciprocating movement within cylinder 10, which movement is caused by the controlled infeed of pressurized carrier fluid by means which will be described more fully hereinafter. Piston rod 16 extends out of one end of the cylinder 10 for a distance sufficient to permit maximum movement of the piston 14 to the opposite end of the cylinder and yet leave rod 16 still protruding from the cylinder. A generally upstanding connector bracket 18 is secured to the outer end of piston rod 16. Bracket 18 as is apparent from FIG. 2 extends upwardly to about the height of the upper surface of main cylinder support frame members 11 and 12. Securely attached to the upper end of connector bracket 18 is reciprocating bar 20. As can be seen, bar 20 is substantially parallel to piston rod 16, and lies generally in the plane of the upper surface support frame members 11 and 12. Simple guide means may be provided to insure against undesirable side movement of bar 20.

Bar 20 has attached to its upper side an elongated track member, generally designated by; the number 22. Track member 22 is secured to slide bar 20 as by releasable nut and bolt arrangement 24 located essentially between the ends of main cylinder 10. Track member 22 has short upstanding wall sections 26 which define therebetween the channel or track 28. The slide bar 20 also has connected thereto in generally horizontally disposed positions the adjustment brackets 30 and 32. It will be noted that adjustment bracket 30 is located on the slide bar and extends to one side thereof, while adjustment bracket 32 is located to the opposite side of said slide bar. The adjustment bracket 30 has adjustment slot 34 while adjustment bracket 32 has slot 36. As can be seen the slots 34 and 36 are arcuate allowing for a pivot of the track member 22 from an angle of about 0° with relation to the slide bar to an angle of approximately 40° at the outer end of the slot. Obviously the extent of angular adjustment may be as variable according to the application of the machine. Guide pins 38 and 40 are attached to the underside of the track member 22 and extend down into slots 34 and 36. The adjustment on guide pins 38 and 40 may also have clamping means abutting the underside of the adjustment brackets in order to more firmly secure the track member with relation to the slide bar. Thus it will be seen that the track member and slide bar, because of clamping means associated with each of the brackets 30 and 32 and by virtue of the releasable center point 24, will move together at a predetermined angle and through the distance of the stroke of the cylinder 10 without disturbance of their angular relationship.

At the piston rod end of main cylinder 10 and located generally on the frame member 11 is an admixture fluid cylinder 42 having piston 44 and piston rod 46. It will be noted that cylinder 42 is smaller than main cylinder

10 and is located to the side of slide bar 20 opposite that on which the adjustment bracket 30 is positioned. Piston rod 46 being somewhat above the plane of track member 22 extends over the slide bar, the track, and beyond the side plane of cylinder 10. In like manner and located at the other end of the main cylinder on the opposite side of the slide bar and on support member 12 is a like-sized admixture fluid cylinder 50 having piston 52 and piston rod 54. This cylinder will be of the same size as cylinder 42. Cylinder 50 is mounted in the same way as cylinder 42 so that the piston rods 46 and 54 lie in approximately the same horizontal plane above slide bar 20. Appropriate guide and support structures 56 and 58 receive the outer ends of the piston rods 46 and 54 but allow for free reciprocation for said rods.

A short depending stub shaft 60 is mounted on and secured to piston rod 46 and has on the lower end thereof a roller 62, which roller is received in channel track 28. In a like manner a depending stub shaft 64 is secured to piston rod 54, which stub shaft 64 has on the lower end thereof the roller 66 to be received in track 28. Thus, movement of piston 14 in the main cylinder 10 will cause movement of the pistons in admixture cylinders 42 and 50. The amount of movement or stroke of the pistons in the smaller cylinders with respect to the main cylinder will depend upon the angle of set of track member 22. Actual ratios will depend upon both the angular rod of track member 22 and the relative sizes of the main and admixture cylinders.

The manner of introducing the separate fluids to the various cylinders and subsequently admixing the fluids in their proper proportions is best illustrated in the diagrammatic representation of FIG. 4. Carrier fluid, e.g. water, is introduced to main cylinder 10 through a valve mechanism, generally designated by the number 70. A pressure source (not shown) introduces water into the valve at pressures ranging from about 20 to about 500 p.s.i. through an input line 72. Depending upon which way the valve is opened carrier fluid will flow through the valve and then through either line 74 or line 76. Lines 74 and 76 lead into cylinder 10 each on an opposite side of piston 14. As fluid under pressure is introduced to one side of the piston, the piston is moved forcing fluid on the other side in a reverse direction through the cylinder infeed line 74 or 76. The fluid is then redirected back through valve 70 and out by way of line 78 and thence into the main discharge line 80. From main discharge 80 the fluid is ejected under pressure through a nozzle or spray device 82 which will have means connected thereto for turning the nozzle on and off, hence controlling the entire system. As piston 14 moves in cylinder 10 the pistons 44 and 52 in the admixture cylinders 42 and 50 are correspondingly actuated. The admixture fluid is fed from a source (not shown) through a line 84 and into infeed line 86 for cylinder 42 or infeed line 88 for cylinder 50. The admixture fluid obviously flows into one cylinder upon the back stroke of its respective piston while the other cylinder is expelling admixture fluid. As main piston 14 moves in the appropriate direction a smaller piston forces the admixture fluid out of the admixture cylinder through discharge line 90 for cylinder 42, or through a discharge line 92 for cylinder 50. Hence the admixture fluid is injected directly into the discharge line 80 through either of the lines 90 or 92.

Admixture cylinder 42 has check valve 89 in line 86 which permits passage of fluid into the cylinder on its intake stroke. At the same time a check valve 91 in line 90 closes when valve 89 is open. On expulsion of fluid from cylinder 42 check valve 91 opens and valve 89 closes. Similarly admixture cylinder 54 is provided with intake check valve 87 in line 88 and expulsion check valve 85 in line 92. Thus, flow of fluid into and out of the admixture cylinders may be regulated to the end desired.

Reciprocation of the main cylinder piston is accomplished by conventional control mechanisms attached to

the valve 70. Normally the main cylinder will express a given quantity of carrier fluid upon each stroke of its piston, as for example one gallon of carrier fluid for each stroke. Upon movement the piston 14 and rod 16, and thus the slide bar 20, the valve will be triggered to introduce carrier fluid to the other side of the piston at the same time permitting the fluid from the opposite side to be expressed back through the valve and out of line 78. The valve may have attached thereto a triggering control 94 which is actuated by fixed levers 96 and 98 attached to the slide bar. Note that the actuating levers are spaced apart so that at the end of a stroke of the main piston one of the actuating levers will strike the valve trigger 94 to reverse and redirect flow of carrier fluid therein. Those skilled in the art will readily recognize that any type of control mechanism in the valve for insuring rapid change-over of the valve will be acceptable. The most desirable aspect of the valve however, is that it be capable of quick reversal or fast change-over. The proportions to which this machine may be adjusted are shown to range from 50 to 400 parts of carrier fluid to 1 part of admixture fluid. These proportions may be altered to lower and higher ratios by angular adjustment of the track and by varying the capacities of the cylinders involved.

It is to be emphasized that the success of this method and machine lies in the direct proportional relationship of the carrier cylinder piston to the admixture cylinder pistons. With direct mechanical connection or linkage any movement of the carrier piston will result in a predetermined proportional movement of the admixture pistons. This proportional movement cannot be disturbed. It is in this invulnerability to loss of proportioning and metering that great value resides because of the damage that can be done if some toxic admixture fluid ratios are suddenly and accidentally increased. The nozzle or discharge member 82 regulates the entire system so that no fluid flows or mechanical parts move unless member 82 is opened. Thus, when member 82 is closed the system ceases operation but there is no disturbance of proportions either in mechanical parts or in fluid ratios.

The foregoing is considered as illustrative only of the principles of this invention. Numerous modifications and changes will readily occur to those skilled in the art, and hence it is not desired to limit the invention to the exact construction and operation shown and described. Accordingly all suitable modifications and equivalents may be resorted to, following within the scope of the invention.

What is claimed is:

1. A proportioning and dispensing machine, comprising: (a) an actuating main carrier cylinder having a reciprocating first piston therein and a first piston rod means connected to said piston extending out of one end of said carrier cylinder, (b) an elongated reciprocating slide bar means rigidly attached by connector means at one end to the outer end of said first piston rod and being disposed generally horizontally above and parallel to said piston rod on the outside of said cylinder for movement with said piston and piston rod, (c) a pair of smaller admixture fluid cylinder means fixed to supporting structure on said carrier cylinder, said admixture cylinders having reciprocating second pistons and second piston rods connected to said pistons which extend out of said admixture cylinders generally at right angles to and above said slide bar, (d) track means releasably pivotally mounted on said slide bar generally between said admixture cylinders, said slide bar having adjustment slot and clamping means thereon for adjustment of the angular relationship between said slide bar and track means, (e) guide means secured to each of said second piston rod means and slidably engaging said track means so that movement of said first piston transfers movement thereof proportionally to each of said second piston means, and (f)

5

means for selectively introducing and dispensing pressurized carrier fluid into and from said carrier cylinder into a discharge line, and including means for selectively introducing and dispensing admixture fluid into and from each of said admixture cylinders into said discharge line.

2. A proportioning and dispensing machine, comprising: (a) an actuating main carrier cylinder having a reciprocating first piston therein and a first piston rod means connected to said piston extending out of one end of said carrier cylinder, (b) an elongated reciprocating slide bar means rigidly attached by connector means at one end to the outer end of said first piston rod and being disposed generally horizontally above and parallel to said piston rod on the outside of said cylinder for movement with said first piston and piston rod (c) a pair of smaller admixture fluid cylinders fixed to supporting structure on said carrier cylinder, said admixture cylinders being located at opposite ends of said cylinder and on opposite sides of said slide bar, said admixture cylinders having reciprocating second pistons and second piston rods connected to said pistons which extend out of said admixture cylinders generally at right angles to and above said slide bar (d) an elongated track means releasably pivotally mounted near its center point to said slide bar between said admixture cylinders, said slide bar having adjustment slot and clamping means thereon for adjusting the angular relationship between said slide bar and track means, (e) guide means secured to each of said second piston rod means and slidably engaging said track means so that movement of said first piston transfers movement thereof proportionally to each of said second piston means, and (f) means for selectively introducing and dispensing pressurized carrier fluid into and from said carrier cylinder into a discharge line, and including means for selectively introducing and dispensing admixture fluid into and from each of said admixture cylinders into said discharge line.

3. A proportioning and dispensing machine, comprising: (a) an actuating main carrier cylinder having a reciprocating first piston therein and a first piston rod

6

means connected to said piston extending out of one end of said carrier cylinder, the outer end of said piston rod having a generally upstanding connector bracket secured thereto, (b) an elongated reciprocating slide bar means rigidly attached by one end to said connector bracket and being disposed generally horizontally above and parallel to said piston rod on the outside of said cylinder for movement with said piston and piston rod, (c) a pair of smaller admixture fluid cylinder means fixed to supporting structure on said carrier cylinder, said admixture cylinders being located at opposite ends of said cylinder and on opposite sides of said slide bar, said admixture cylinders having reciprocating second pistons and second piston rods connected to said pistons which extend out of said admixture cylinders generally at right angles to and above said slide bar, (d) an elongated track means releasably pivotally mounted near its center point to said slide bar between said admixture cylinders, said slide bar having adjustment slot and clamping means thereon for adjusting the angular relationship between said slide bar and track means, (e) guide means secured to each of said second piston rod means and slidably engaging said track means so that movement of said first piston transfers movement thereof proportionally to each of said second piston means, and (f) means for selectively introducing and dispensing pressurized carrier fluid into and from said carrier cylinder into a discharge line, and including means for selectively introducing and dispensing admixture fluid into and from each of said admixture cylinders into said discharge line.

References Cited by the Examiner

UNITED STATES PATENTS

35 2,980,292 4/1961 Taylor ----- 222—250 X

ROBERT B. REEVES, *Primary Examiner.*

RAPHAEL M. LUPO, M. HENSON WOOD, JR.,
Examiners.

40 F. R. HANDREN, *Assistant Examiner.*