May 18, 1965 L. BECK 3,184,124

MOTOR-DRIVEN GEARED PUMP

Filed Aug. 14, 1963 2 Sheets-Sheet 1

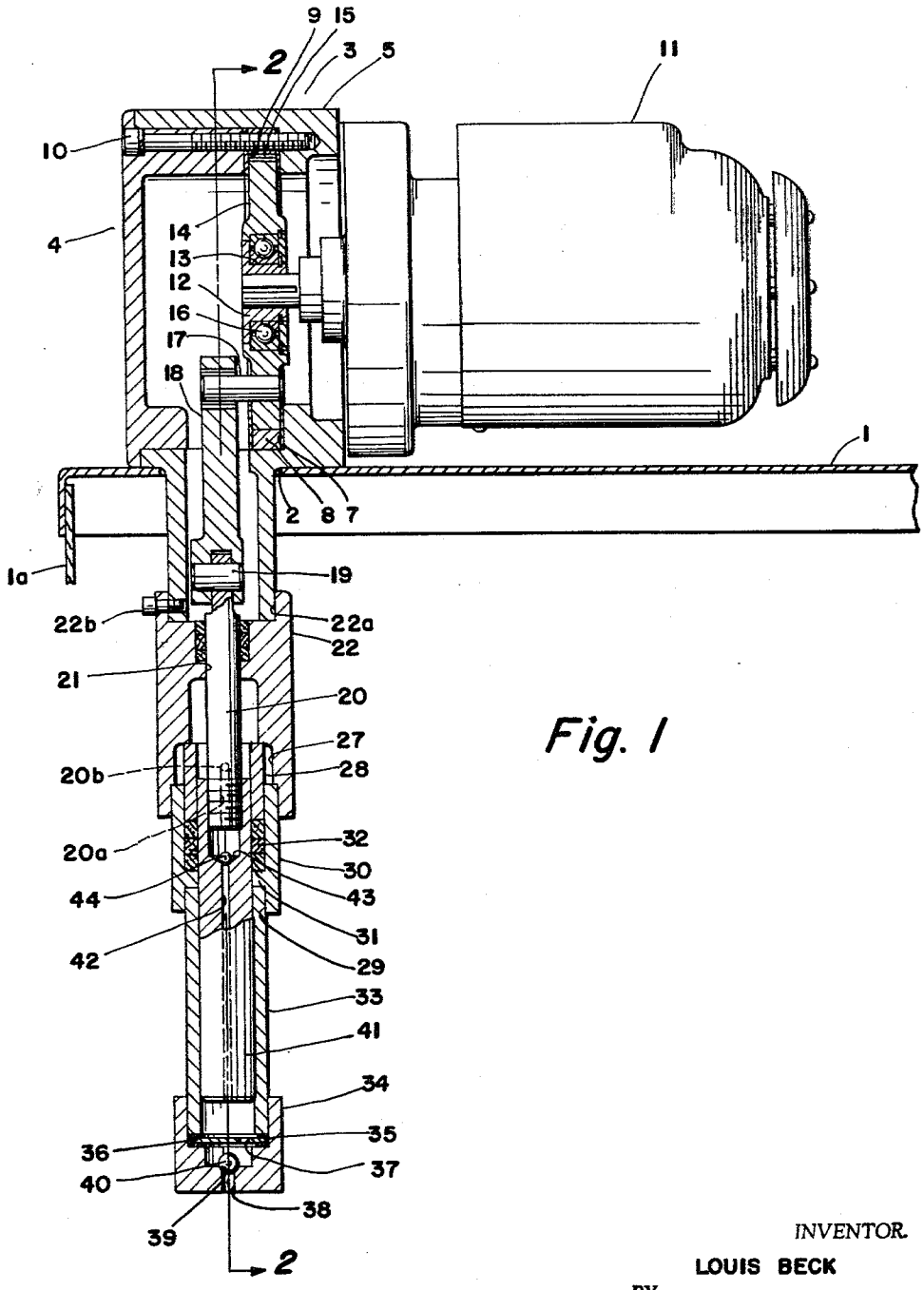


Fig. 1

INVENTOR.
LOUIS BECK
BY
Isler & Dunstein
ATTORNEYS

May 18, 1965 L. BECK 3,184,124

MOTOR-DRIVEN GEARED PUMP

Filed Aug. 14, 1963 2 Sheets-Sheet 2

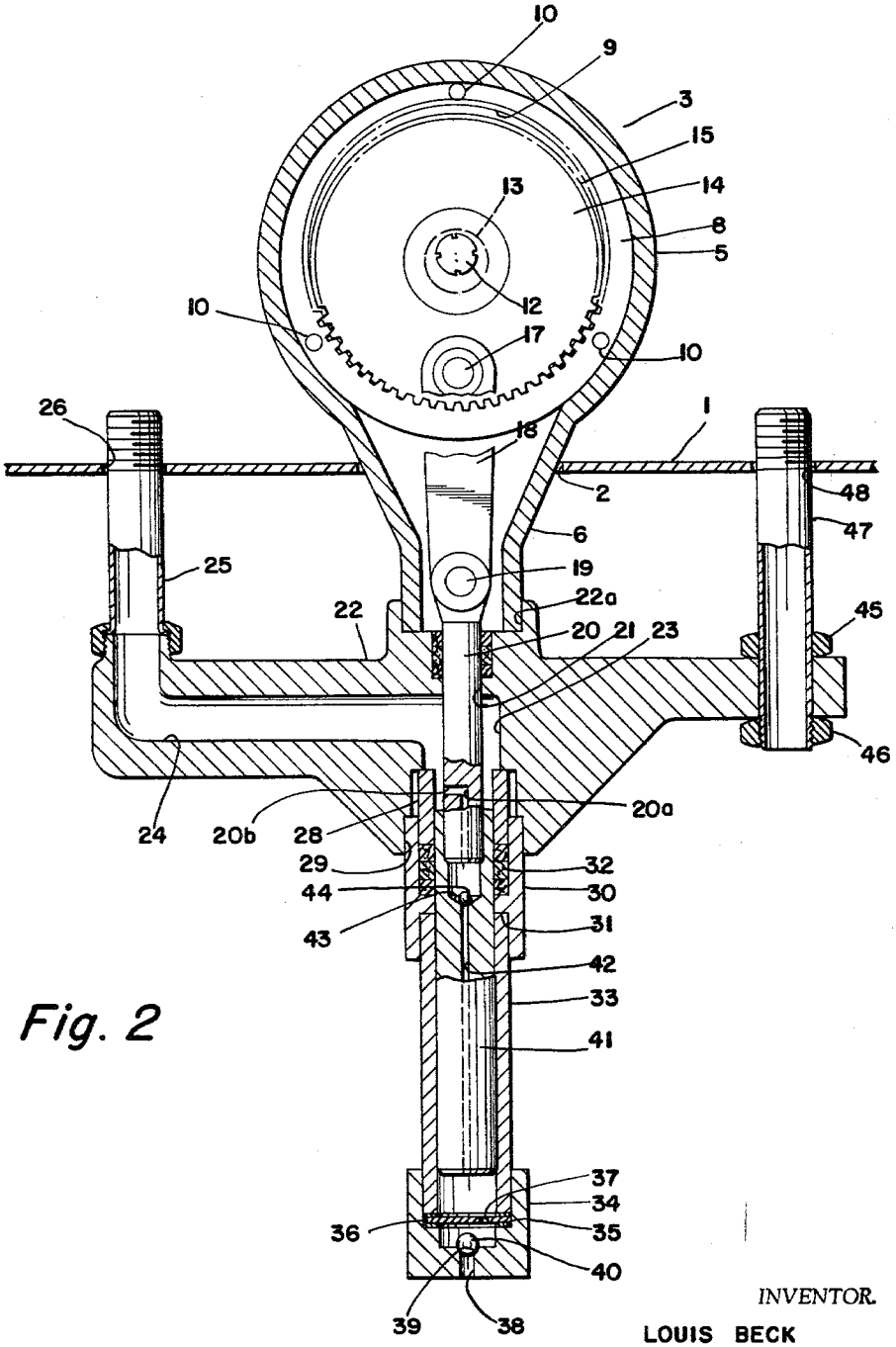


Fig. 2

INVENTOR.
LOUIS BECK
BY Isler & Ornstein
ATTORNEYS

United States Patent Office 3,184,124 Patented May 18, 1965

3,184,124

MOTOR-DRIVEN GEARED PUMP

Louis Beck, 6399 Crossview Road, Cleveland, Ohio

Filed Aug. 14, 1963, Ser. No. 302,109
3 Claims. (Cl. 222—333)

This invention relates generally to airless sprayers, but has reference more particularly to airless sprayers of the motor-driven type.

Sprayers of the type referred to, driven by high speed motor, are characterized by the use of an excessive number of gears and other parts which are necessary to reduce the high speed of the motor to a relatively low speed required for pumping fluids to a sprayer, such, for example as a paint sprayer. The use of an excessive number of gears and other parts creates objectionable noise and vibration, particularly after the gears become worn or teeth become broken.

The present invention has as its primary object the provision of a sprayer of the character or type described, in which the number of gears and other parts employed is reduced to a minimum, whereby excessive noise and vibration incident to operation or use of the sprayer are virtually eliminated.

Another object of the invention is to provide an airless sprayer of the character or type described, which consists of a minimum number of parts, which can be quickly and easily assembled and disassembled, whereby the cost of manufacture of the sprayer is reduced substantially.

Other objects and advantages of my invention will be apparent during the course of the following description.

In the accompanying drawings forming a part of this specification, and in which like numerals are employed to designate like parts throughout the same,

FIG. 1 is a vertical cross-sectional view of a sprayer embodying the invention, and

FIG. 2 is a cross-sectional view, taken on the line 2—2 of FIG. 1, but with the cover or cover plate of the gear housing omitted, to more clearly show the construction.

Referring more particularly to the drawings, there is disclosed a cover 1 of a container 1*a*, which contains paint or other coating fluid or any fluid which is to be sprayed, said cover being provided with an opening 2.

Mounted on the cover 1 is a gear housing consisting of a body portion generally designated by reference numeral 3 and a cover plate generally designated by reference numeral 4.

The body portion 3 of the gear housing consists of an annular upper portion 5, and a depending neck portion 6 which extends through the opening 2 and into the container to which reference has been made. The body portion 3 is further provided with an annular seat 7 against which a fixed internal gear 8 having teeth 9 is clamped by the cover plate 4, the cover plate 4 being secured to the body portion 5 of the gear housing by means of bolts 10 which pass through the gear 8.

Mounted on the gear housing is an electrically-driven high speed motor 11, which, for example, runs at a speed of 10,000 r.p.m., and has a shaft 12, which is rigidly connected to an eccentric 13. The eccentric 13 rotates within a pinion 14 provided with teeth 15, some of which are in mesh with the teeth 9 of the gear 8. To facilitate rotation of the eccentric 13 within the pinion 14, a ball-bearing 16 is interposed therebetween.

It will be noted that the pitch diameter of the pinion 14 is less than the pitch diameter of the gear 8, to the extent that the pinion 14 has, in this instance, 119 teeth, and the gear 8 has 120 teeth. As a result, the pinion 14, during rotation thereof, will be in mesh constantly with the gear 8, that is to say, the pinion 14 will roll on the gear 8, incrementally along the gear, but at a speed which is only a small fraction of the speed of the eccentric 13,

in this instance, at a speed of about 60 r.p.m., when the speed of the eccentric is 10,000 r.p.m.

The net effect of this is that a drive is obtained, which is virtually noiseless and trouble-proof, as compared with drives of conventional motor-driven airless sprayers of the reciprocating pump type, and a substantial reduction in the number of gears is effected, that is to say, the number of gears is reduced to two.

The rotary movement of the pinion is converted into linear motion for driving a reciprocating pump.

For this purpose, the pinion 14 is provided eccentrically thereof with a pin 17 to which a crank or crank arm 18 is pivoted.

The crank arm 18 is pivotally connected at its lower end as by a pivot pin 19, to a rod 20, which is mounted for vertical reciprocatory sliding movement in an opening 21 of a supporting yoke 22, which is disposed within the container from which the fluid is to be sprayed. The supporting yoke 22 is counterbored as at 22*a* for reception of the lower end of the neck portion 6 of the gear housing, the neck portion being connected to said yoke, as by screws 22*b*.

The supporting yoke 22 is provided with a central opening 23 from which a passageway 24 leads to a tube 25, the upper end of which passes through an opening 26 in the cover 1. The tube 25 is connected to a sprayer (not shown).

The opening 23 of the supporting yoke is counterbored, as at 27, for the reception of a tubular casing element 28, which forms a portion of the casing or cylinder for the reciprocating pump, and the counterbore 27 is further counterbored, as at 29, for the reception of a tubular casing member 30. The tubular casing member 30 is provided with an annular flange 31, between which and the lower end of tubular casing element 28 a seal or packing 32 is interposed.

The tubular casing member 30 has secured in its lower end, below the flange 31, a tubular casing element 33, which forms the balance of the casing or cylinder for the reciprocating pump.

Secured to the lower end of the tubular casing element 33 is a cap 34 having an annular seat 35, between which and the lower end of the element 33, a disc 36 is secured or clamped, this disc being provided with an opening 37.

The cap 34 is also provided with an inlet opening or passageway 38, the upper end of which is provided with a conical seat 39 for a ball 40.

The rod 20 has threadedly secured to its lower end a piston or plunger 41 which is slidable in the casing or cylinder provided by the tubular casing elements 28 and 33.

The piston or plunger 41 is provided with an axial bore or passageway 42, which is counterbored to provide a conical seat 43 for a ball 44. The rod 20 is also provided in its lower portion with an axial bore 20*a*, in axial alignment with the passageway 42 in the plunger 41, and which communicates, at its upper end, with a radially-extending passageway 20*b*.

The supporting yoke 22 has secured thereto, as by nuts 45 and 46, a tube 47 which extends upwardly through an opening 48 in the cover 1, and serves as a filler tube for supplying fluid to the container, without the necessity of removing the cover 1 from the container. The tube 47 also functions to receive fluid that is pumped to the sprayer, but is not actually being sprayed, the pumping action being continuous.

The operation of the sprayer may be briefly described as follows:

In the position shown in the drawings, the piston or plunger 41 is in its lowermost position, and ready to pump fluid from the container, it being assumed that no fluid has, up to this point, been pumped from the container.

As the pinion 14 is rotated to a position 180 degrees from that shown in the drawing, the piston or plunger 41 rises to the upper limit of its movement, and in so doing, the vacuum created by the piston lifts the ball 40 from its seat 39, and causes fluid to be sucked from the container through the inlet opening 38 in the cap 34, and through the opening 37 of the disc 36 into the lower end of the tubular casing element 33. During this movement of the piston, the ball 44 remains seated.

On the downstroke of the piston, the fluid within the lower end of the tubular casing element 33 forces the ball 40 to become seated, and the fluid is displaced from the tubular casing element, and is forced upwardly through the passageway 42, causing the ball 44 to become unseated, the fluid then passing into the space above the ball 44, and thence through bore 20*a*, passageway 20*b*, opening 23, passageway 24, and tube 25 to the sprayer.

It is thus seen that I have provided an airless sprayer of the character described, in which excessive noise and vibration incident to the use of the sprayer are virtually eliminated, and the construction of which embodies a minimum number of parts, which can be quickly and easily assembled and disassembled, thereby greatly reducing the cost of manufacture.

It is to be understood that the form of my invention, herewith shown and described, is to be taken as a preferred example of the same, and that various changes may be made in the shape, size and arrangement of parts thereof, without departing from the spirit of the invention or the scope of the subjoined claims.

Having thus described my invention, I claim:

1. In a dispenser for a fluid material comprising a container, a cover for said container, a discharge assistant, a dispensing passageway, and a filling passageway, mounting means for said discharge assistant, said mounting means comprising:

(A) First and second vertically disposed, tubular elements, said elements

(*a*) extending downwardly through spaced openings in said cover,

(*b*) said first tubular element including a portion of said dispensing passageway,

(*c*) said second tubular element including said filling passageway in free communication with the interior of said container,

(B) a horizontal yoke attached to said tubular elements and spanning the space therebetween in downwardly spaced relationship to said cover, said yoke including:

(*a*) a centrally disposed vertical passageway,

(*b*) a vertical passageway in communication with the interior of said first tubular element, and

(*c*) a horizontally disposed passageway interconnecting said vertical passageways to complete a dispensing path through said yoke and said first tubular member,

(C) said discharge assistant comprising a pump, actuating means for said pump, driving means for said actuator, and transmission means interconnecting said driving means and said actuating means,

(*a*) said pump being suspended from said yoke beneath said centrally disposed passageway, and including a discharge path in fluid communication therewith,

(*b*) said transmission means including gears disposed in a gear housing, said gear housing

(1) mounted on said yoke above said centrally disposed passageway and

(2) including a neck portion in communication with said passageway,

(*c*) said actuating means extending through said centrally disposed passageway and said neck and operatively connecting said gears and said pump, sealing means surrounding said actuating means and disposed in said vertical passageway above its juncture with said interconnecting passageway and preventing fluid communication between said discharge path and said neck of said gear housing,

(*d*) said driving means mounted on said gear housing and comprising a motor operatively connected to said gears.

2. A dispenser for a fluid material as set forth in claim 1 wherein said pump and said actuating means are reciprocating.

3. A dispenser for a fluid material as set forth in claim 2 wherein said driving means is rotary, and said gears comprise means for converting the rotary motion of said driving means to reciprocating motion for said actuating means.

References Cited by the Examiner

UNITED STATES PATENTS

1,112,070	9/14	Kimman et al.	74—804
1,859,462	5/32	Perkins	310—83 X
2,166,975	7/39	Sologaistoa	74—52
2,169,514	8/39	Buzzard et al.	222—333
2,321,828	6/43	Lane	103—57 X
2,390,229	12/45	Thompson	74—804 X
2,591,951	4/52	Lowry	103—57 X
2,666,345	1/54	Amberg	74—804
2,782,646	2/57	Christian	74—52 X
2,884,815	5/59	Pittman	74—804
3,072,300	1/62	Thomas	222—333

LOUIS J. DEMBO, *Primary Examiner.*

ROBERT M. WALKER, *Examiner.*