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(54) Cylinder head for a pump

Zylinderkopf für eine Pumpe

Tête de cylindre pour pompe

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Description

FIELD OF THE INVENTION

[0001] The present invention relates to a cylinder head for a pump, such as a pressure washer pump.

BACKGROUND TO THE INVENTION

[0002] Cylinder heads generally include an inlet manifold for receiving a low pressure fluid and directing the low pressure fluid to the pump, an outlet manifold for receiving a pressurized fluid from the pump and directing the pressurized fluid to an outlet, and a pressure chamber between the inlet manifold and the outlet manifold. The pump includes pistons and cylinders for pressurizing the fluid and valves in line with the pistons and cylinders for selectively directing fluid from the inlet manifold to the cylinders. The inlet manifold and pressure chamber form passages in line with the cylinders for receiving the valves and are formed from a single piece of a single material, along with the outlet manifold.

[0003] US 4,572,056 relates to a plunger or floating piston pump which, according to the abstract of the document, is particularly adapted for use as a small-sized metering pump in performing chemical analyses. In a pump head casing there is disposed a plunger guide bushing made of a ceramic material in which a plunger made of sapphire is slidably guided permanently with extreme accuracy in relation to the bore in an annular seal, said annular seal itself cooperating with said plunger in such a way that there is no clearance between the plunger and said plunger guide bushing.

[0004] US 6,464,475 relates to a head for pumps, in particular of the membrane or piston- type, and the method for its manufacture. According to the abstract such pumps are used for watering and weeding. The head has an internal metal frame able to provide it with mechanical strength, integrated in a structure made of a material able to chemically withstand the pumped liquids.

[0005] US 4,808,092 relates to a precision reciprocating metering pump. According to the abstract of this document the pump is made of a transparent material. The pump head casing is designed such that a pump head liner is visually accessible. The pump includes cartridge-type check valve units which can be composed of transparent components and therefore be visually accessible. The opening and closing of a ball in a check valve unit can be monitored by an optical sensing system in order to obtain a feedback signal for governing a control circuitry, having the purpose of compensating the influence of the specific current pressability of the liquid being pumped, upon the pumping efficiency of the displacement system under conditions of high and highest working pressures.

[0006] US 4,573,886 relates to a valve assembly for a high pressure pump. According to the abstract of this document the pump has a valve housing formed with a central bore centered on a main longitudinal axis and a transverse bore extending radially from the central bore in opposite directions along a transverse axis and subdivided by the central bore into an intake transverse-bore part and an exhaust transverse-bore part. Respective intake in exhaust sleeves are provided in the intake and exhaust bore parts and are in turn provided with respective intake and exhaust valves. A flow-splitting sleeve is provided in the central bore and has a pair of lateral branches opening respectively in the intake and exhaust bore parts into the intake and exhaust sleeves. All three of these sleeves are received in the respective bores with radial play relative to the respective axes and form with the respective bores annular chambers that communicate with one another. The exhaust sleeve is formed with a through-going passage opening into the respective chamber so that all of the chambers are pressurized by the pump through this passage. Seals are provided to isolate the chambers from communication with the bores and the interiors of the sleeves except through this passage. In this manner the sleeves are externally hydrostatically braced in the housing.

[0007] US 4,116,364 relates to a dispensing system for low stability fluids. According to the abstract of this document the system comprises a pair of fluid operated pumps of very small volume alternately operable for drawing individually small quantities of catalyst from an unpressurised, sanitary source of supply, and for then pressuring and dispensing the catalyst in individually small increments. The two pumps operate alternately to provide a continuous pressurized discharge of catalyst despite the fact that only a small quantity is pressurized at any given time.

[0008] KR 20110047210 discloses background art which relates to the present invention.

[0009] US 3,036,525 discloses a chemical feed pump for accurately proportioning and delivering small quantities of fluid under pressure.

[0010] US 7,214,040 discloses a cylinder head arrangement for a piston compressor, particularly for a hermetically enclosed refrigerant compressor. According to the abstract of this document the compressor includes a valve plate, a suction gas channel, a discharge chamber and a retainer element for a discharge valve. The suction gas channel and the discharge chamber are arranged on different sides of the retainer element.

[0011] GB 2199620 relates to a compressor head and suction muffler for a hermetic compressor. According to the abstract of this document, hermetic reciprocating piston refrigeration compressor utilizes separate cylinder head members for the discharge and suction plenum chambers adjacent the discharge and suction valves. The two cylinder heads extend over substantially the entire area of the valve plate at the end of the cylinder carrying the valves. The discharge cylinder head is preferably formed of metal while the suction cylinder head is formed of a plastic material of low thermal conductivity to minimize heat transfer between the discharge and suc-

tion plenums. The suction cylinder head is also formed as a unitary member with a suction muffler and is secured in place by a single fastening member.

SUMMARY OF THE INVENTION

[0012] The invention is defined by the claims. Also disclosed herein is a cylinder head for a pump, the pump including a piston and a cylinder block at least partially defining a cylinder chamber receiving the piston, the cylinder chamber extending in a longitudinal direction, the cylinder head being couplable to the cylinder block, the cylinder head comprising:

an inlet manifold for receiving a low pressure fluid and for directing the low pressure fluid to the cylinder chamber, the inlet manifold being formed as a single piece;

an outlet manifold for receiving a pressurized fluid from the cylinder chamber and for directing the pressurized fluid to an outlet, the outlet manifold being formed as a single piece separate from the inlet manifold; and

a pressure chamber positioned fluidly between the inlet manifold and the outlet manifold for receiving the low pressure fluid from the inlet manifold and directing the low pressure fluid to the cylinder chamber, and for receiving the pressurized fluid from the cylinder chamber and directing the pressurized fluid to the outlet manifold, the pressure chamber being formed as a single piece separate from the inlet manifold and separate from the outlet manifold, the pressure chamber being formed of a first material;

wherein at least one of the inlet manifold and the outlet manifold is formed of a second material different than the first material.

[0013] Preferably the cylinder head further comprises an inlet valve positioned in the cylinder head for controlling flow of low pressure fluid from the inlet manifold to the pressure chamber, the inlet valve being oriented along an axis extending transverse to the longitudinal direction of the cylinder chamber such that the low pressure fluid flows through the inlet valve in a direction transverse to the longitudinal direction of the cylinder chamber.

[0014] Preferably the inlet valve is oriented along an axis extending substantially perpendicular to the longitudinal direction of the cylinder chamber such that the low pressure fluid flows through the inlet valve in a direction substantially perpendicular to the longitudinal direction of the cylinder chamber.

[0015] Preferably the cylinder head further comprises an outlet valve positioned in the cylinder head for controlling flow of pressurized fluid from the pressure chamber to the outlet, the outlet valve being oriented along an axis extending transverse to the longitudinal direction of the cylinder chamber such that the pressurized fluid flows through the outlet valve in a direction transverse to the longitudinal direction of the cylinder chamber.

[0016] Preferably the axis is a first axis, and wherein the cylinder head further comprises an inlet valve positioned in the cylinder head for controlling flow of low pressure fluid from the inlet manifold to the pressure chamber, the inlet valve being oriented along a second axis extending transverse to the longitudinal direction of the cylinder chamber such that the low pressure fluid flows through the inlet valve in a direction transverse to the longitudinal direction of the cylinder chamber.

[0017] Preferably the outlet valve is oriented along an axis extending substantially perpendicular to the longitudinal direction of the cylinder chamber such that the pressurized fluid flows through the outlet valve in a direction substantially perpendicular to the longitudinal direction of the cylinder chamber.

[0018] Preferably the axis is a first axis, wherein the cylinder head further comprises an inlet valve positioned in the cylinder head for controlling flow of low pressure fluid from the inlet manifold to the pressure chamber, the inlet valve being oriented along a second axis extending substantially perpendicular to the longitudinal direction of the cylinder chamber such that the low pressure fluid flows through the inlet valve in a direction substantially perpendicular to the longitudinal direction of the cylinder chamber.

[0019] Preferably the first material withstands higher pressures than the second material.

[0020] Preferably the first material includes brass.

[0021] Preferably the second material includes aluminum.

[0022] Preferably the first material includes brass and the second material includes aluminum.

[0023] Preferably the pressure chamber cooperates with the cylinder head to define the cylinder chamber for receiving the piston.

[0024] Preferably both of the inlet manifold and the outlet manifold are formed of the second material different than the first material.

[0025] Also disclosed is a pump for pressurizing a fluid, the pump comprising:

a piston;

a cylinder block at least partially defining a cylinder chamber receiving the piston;

a cylinder head coupled to the cylinder block, the cylinder head including

an inlet manifold for receiving a low pressure fluid and directing the low pressure fluid to the cylinder chamber, the inlet manifold being formed as a single piece,

an outlet manifold for receiving a pressurized fluid from the cylinder chamber and directing the pressurized fluid to an outlet, the outlet manifold being formed as a single piece separate from the inlet manifold, and

a pressure chamber positioned fluidly between the

inlet manifold and the outlet manifold and in fluid communication with the cylinder chamber for receiving the low pressure fluid from the inlet manifold and directing the low pressure fluid to the cylinder chamber and for receiving the pressurized fluid from the cylinder chamber and directing the pressurized fluid to the outlet manifold, the pressure chamber being formed as a single piece separate from the inlet manifold and from the outlet manifold, the pressure chamber being formed from a first material,

wherein at least one of the inlet manifold and the outlet manifold is formed from a second material different from the first material.

[0026] Preferably the cylinder head further includes an inlet valve positioned in the cylinder head for controlling flow of low pressure fluid from the inlet manifold to the pressure chamber, the inlet valve being oriented along an axis extending transverse to the longitudinal direction of the cylinder chamber such that the low pressure fluid flows through the inlet valve in a direction transverse to the longitudinal direction of the cylinder chamber.

[0027] Preferably the inlet valve is oriented along an axis extending substantially perpendicular to the longitudinal direction of the cylinder chamber such that the low pressure fluid flows through the inlet valve in a direction substantially perpendicular to the longitudinal direction of the cylinder chamber.

[0028] Preferably the cylinder head further includes an outlet valve positioned in the cylinder head for controlling flow of pressurized fluid from the pressure chamber to the outlet, the outlet valve being oriented along an axis extending transverse to the longitudinal direction of the cylinder chamber such that the pressurized fluid flows through the outlet valve in a direction transverse to the longitudinal direction of the cylinder chamber.

[0029] Preferably the axis is a first axis, and wherein the cylinder head further includes an inlet valve positioned in the cylinder head for controlling flow of low pressure fluid from the inlet manifold to the pressure chamber, the inlet valve being oriented along a second axis extending transverse to the longitudinal direction of the cylinder chamber such that the low pressure fluid flows through the inlet valve in a direction transverse to the longitudinal direction of the cylinder chamber.

[0030] Preferably the outlet valve is oriented along an axis extending substantially perpendicular to the longitudinal direction of the cylinder chamber such that the pressurized fluid flows through the outlet valve in a direction substantially perpendicular to the longitudinal direction of the cylinder chamber.

[0031] Preferably the axis is a first axis, wherein the cylinder head further includes an inlet valve positioned in the cylinder head for controlling flow of low pressure fluid from the inlet manifold to the pressure chamber, the inlet valve being oriented along a second axis extending substantially perpendicular to the longitudinal direction of the cylinder chamber such that the low pressure fluid flows through the inlet valve in a direction substantially perpendicular to the longitudinal direction of the cylinder chamber.

[0032] Preferably the first material withstands higher pressures than the second material.

[0033] Preferably the first material includes brass.

[0034] Preferably the second material includes aluminum.

[0035] Preferably the first material includes brass and the second material includes aluminum.

[0036] Preferably the pressure chamber cooperates with the cylinder head to define the cylinder chamber for receiving the piston.

[0037] Preferably both of the inlet manifold and the outlet manifold are formed of the second material different than the first material.

[0038] Also disclosed is a pump for pressurizing a fluid, the pump comprising:

a piston;

a cylinder block at least partially defining a cylinder chamber receiving the piston, the cylinder chamber extending in a longitudinal direction;

a cylinder head coupled to the cylinder block, the cylinder head including

an inlet manifold for receiving a low pressure fluid and directing the low pressure fluid to the cylinder chamber, the inlet manifold being formed as a single piece,

an outlet manifold for receiving a pressurized fluid from the cylinder chamber and directing the pressurized fluid to an outlet, the outlet manifold being formed as a single piece separate from the inlet manifold,

a pressure chamber positioned fluidly between the inlet manifold and the outlet manifold and in fluid communication with the cylinder chamber for receiving the low pressure fluid from the inlet manifold and directing the low pressure fluid to the cylinder chamber and for receiving the pressurized fluid from the cylinder chamber and directing the pressurized fluid to the outlet manifold, the pressure chamber being formed as a single piece separate from the inlet manifold and from the outlet manifold, the pressure chamber being formed from a first material including brass,

an inlet valve positioned in the cylinder head for controlling flow of low pressure fluid from the inlet manifold to the pressure chamber, the inlet valve being oriented along an axis extending substantially perpendicular to the longitudinal direction of the cylinder chamber such that the low pressure fluid flows through the inlet valve in a direction substantially perpendicular to the longitudinal direction of the cylinder chamber, and

an outlet valve positioned in the cylinder head for controlling flow of pressurized fluid from the pressure chamber to the outlet, the outlet valve being oriented

along an axis extending substantially perpendicular to the longitudinal direction of the cylinder chamber such that the pressurized fluid flows through the outlet valve in a direction substantially perpendicular to the longitudinal direction of the cylinder chamber, wherein the inlet manifold and the outlet manifold is formed from a second material including aluminum.

BRIEF DESCRIPTION OF THE DRAWINGS

[0039]

FIG. 1 is a perspective view of a prior art pump having a cylinder head.

FIG. 2 is a top view of the prior art pump shown in FIG. 1.

FIG. 3 is a top view of a pump having a cylinder head according to one embodiment of the invention.

FIG. 4 is a cross section of the pump taken along line 4--4 of FIG. 3.

FIG. 5 is a left side view of the pump shown in FIG. 3.

FIG. 6 is a front view of the pump shown in FIG. 3.

FIG. 7 is rear view of the pump shown in FIG. 3.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0040] Before any independent embodiments of the invention are explained in detail, it is to be understood that the invention is not limited in its application to the details of construction and the arrangement of components set forth in the following description or illustrated in the following drawings. The invention is capable of other independent embodiments and of being practiced or of being carried out in various ways.

[0041] FIGS. 1-2 illustrate a prior art cylinder head 10 for a pressure washer pump 12. As best illustrated in FIG. 2, the cylinder head 10 includes an inlet manifold 14, an outlet manifold 16 and a pressure chamber 18. The inlet manifold 14, the outlet manifold 16 and the pressure chamber 18 are formed as a single piece from brass, which is represented by stippled shading. Brass is selected to handle the pressure of the water in the pressure chamber 18. The pressure chamber 18 houses pistons and corresponding valves, which are oriented and arranged substantially in line with each other along an axis A parallel to a direction in which the pistons reciprocate. The inlet manifold 14 is positioned substantially on top of, i.e., in line with, the pistons and valves along the axis A to direct inlet water to the valves and pistons.

[0042] FIGS. 3-7 illustrate a pump 20 having a cylinder head 22 according to one embodiment of the invention. The cylinder head 22 includes an inlet manifold 24, an outlet manifold 26 and a pressure chamber 28 between the inlet manifold 24 and the outlet manifold 26. The inlet manifold 24 and the outlet manifold 26 are formed from a first material and the pressure chamber 28 is formed from a second material, which is different from the first material. The second material is represented with stippled shading. In particular, the second material is stronger (i.e., designed to withstand higher pressures) than the material used to form the inlet manifold 24 and the outlet manifold 26. In the illustrated construction, the inlet manifold 24 and the outlet manifold 26 are formed of aluminum and the pressure chamber 28 is formed from brass. In other embodiments, other materials suitable for the pressure to which each part is subjected may be employed.

[0043] The pump 20 also includes a cylinder block 30 to which the pressure chamber 28 is coupled by fasteners 32, such as bolts. In the illustrated embodiment, three fasteners 32 are employed (see the first and second fasteners 32 in FIG. 3 positioned near the outlet manifold 26 and the third fastener 32 in FIG. 4 positioned near the inlet manifold 24 and beneath a middle lateral outlet 38 of the inlet manifold 24). In other embodiments, other suitable fasteners may be employed, or the pressure chamber 28 and cylinder block 30 may be otherwise suitably coupled. The cylinder block 30 and pressure chamber 28 each at least partially define cylinders 34, which house respective pistons 36 (FIG. 4). In the illustrated embodiment, the pump 20 includes three pistons 36 and three respective cylinders 34. In other embodiments, one, two, four or more pistons and cylinders may be employed. Each piston 36 and cylinder 34 defines an axis B extending in a direction substantially parallel to a direction in which the pistons 36 reciprocate. The cylinder block 30 houses a piston actuator 48 for actuating the pistons 36.

[0044] The inlet manifold 24 includes a low pressure inlet 40 for receiving a low pressure fluid, such as water, and low pressure outlets 38 for directing the low pressure fluid to the respective cylinders 34. The number of low pressure outlets 38 is equal to the number of cylinders 34. At least one of the low pressure outlets 38 is oriented to define a central axis C substantially perpendicular to the axis B of the respective piston 36 and cylinder 34. In the illustrated embodiment, each of the low pressure outlets 38 is oriented substantially perpendicular to the respective cylinder 34.

[0045] As best illustrated in FIG. 4, the pressure chamber 28 includes inlet valves 42 (one shown in FIG. 4) positioned therein and positioned adjacent and in fluid communication with respective low pressure outlets 38 for receiving the low pressure fluid from the inlet manifold 24. In some embodiments, the pressure chamber 28 may partially define the low pressure outlets 38. There is one inlet valve 42 for each low pressure outlet 38. Therefore, in the illustrated embodiment, there are three inlet valves 42. The inlet valves 42 are each positioned fluidly be-

tween the inlet manifold 24 and the respective cylinder 34, downstream of the inlet manifold 24 and upstream of the respective cylinder 34. Each inlet valve 42 is oriented along the axis C, in line with and in fluid communication with the respective low pressure inlet 38 and substantially perpendicular to the respective cylinder 34 and axis B. In other words, fluid flows through each inlet valve 42 in a direction substantially parallel to the axis C.

[0046] The inlet valves 42 are one-way check valves that open to enable the pistons 36 to draw the low pressure fluid into the pressure chamber 28 and close to enable the pistons 36 to pressurize the low pressure fluid to a high pressure fluid. The pistons 36 then force the high pressure fluid to respective high pressure inlets 44 to the outlet manifold 26, which in turn deliver the high pressure fluid to a high pressure outlet 46. The high pressure inlets 44 are aligned along a central axis D substantially parallel to the axis C of the respective low pressure outlet 38 and substantially perpendicular to the axis B of the respective piston 36 and cylinder 34. Outlet valves 50 (one is illustrated in FIG. 5) are positioned in the outlet manifold 26 in fluid communication with each respective high pressure inlet 44. The outlet valves 50 are aligned with the axis D in a direction substantially parallel to the axis C of the respective low pressure outlet 38 and substantially perpendicular to the axis B of the respective piston 36 and cylinder 34. The outlet valves 50 are one-way check valves that open to enable the pistons 36 to force the high pressure fluid towards the outlet 46 and close to prevent backflow.

[0047] Because the inlet and outlet valves 42, 50 and respective low pressure outlet 38 and high pressure inlet 44 are positioned transverse to the pistons 36 and cylinders 34 (in other words, not in line with the pistons 36 and cylinders 34), the height of the pressure chamber 28 is reduced and thus the amount of brass, or other suitable pressure-rated material, is reduced. Also, because the valves 42, 50 and the inlet and outlet manifolds 24, 26 are adjacent the pistons 36 and cylinders 34 in a transverse direction to the axis B, the inlet and outlet manifolds 24, 26 can be formed from a different material than the pressure chamber 28, such as aluminum, further reducing the amount of brass, or other suitable pressure-rated material, needed to form the pressure chamber 28.

[0048] Thus, the invention provides, among other things, a low cost cylinder head having a novel arrangement of parts allowing a portion of the cylinder head to be formed of aluminum.

[0049] One or more independent features and independent advantages of the invention may be set forth in the following claims.

Claims

1. A cylinder head (22) for a pump (20), the cylinder head (22) comprising:
   a pressure chamber (28);
   an inlet manifold (24) for receiving a low pressure fluid and for directing the low pressure fluid to the pressure chamber (28), the inlet manifold (24) being formed as a single piece;
   an outlet manifold (26) for receiving a pressurized fluid from the pressure chamber (28) and for directing the pressurized fluid to an outlet (46), the outlet manifold (26) being formed as a single piece separate from the inlet manifold (24);
   the pressure chamber (28) positioned fluidly between the inlet manifold (24) and the outlet manifold (26) for receiving the low pressure fluid from the inlet manifold (24) and directing the low pressure fluid to a cylinder chamber at least partially defined by a cylinder block (30) of the pump (20), and for receiving the pressurized fluid from the cylinder chamber and directing the pressurized fluid to the outlet manifold (26), the pressure chamber (28) being formed as a single piece separate from the inlet manifold (24) and separate from the outlet manifold (26), the pressure chamber (28) being formed of a first material;
   characterised in that: at least one of the inlet manifold (24) and the outlet manifold (26) is formed of a second material different than the first material; the first material provides a mechanical strength which withstands higher pressures than the second material; and wherein the second material includes aluminium.

2. The cylinder head (22) of claim 1, wherein the cylinder head (22) further includes an inlet valve (42) positioned in the cylinder head (22) for controlling flow of low pressure fluid from the inlet manifold (24) to the pressure chamber (28), the inlet valve (42) being oriented along an axis extending transverse to a longitudinal direction of the cylinder chamber such that the low pressure fluid flows through the inlet valve (42) in a direction transverse to the longitudinal direction of the cylinder chamber.

3. The cylinder head (22) of claim 2, wherein the inlet valve (42) is oriented along an axis extending substantially perpendicular to the longitudinal direction of the cylinder chamber such that the low pressure fluid flows through the inlet valve (42) in a direction substantially perpendicular to the longitudinal direction of the cylinder chamber.

4. The cylinder head (22) of claim 1, wherein the cylinder head (22) further includes an outlet valve (50) positioned in the cylinder head (22) for controlling flow of pressurized fluid from the pressure chamber (28) to the outlet (46), the outlet valve (50) being oriented along an axis extending transverse to a longitudinal direction of the cylinder chamber such that

the pressurized fluid flows through the outlet valve (50) in a direction transverse to the longitudinal direction of the cylinder chamber.

5. The cylinder head (22) of claim 4, wherein the axis is a first axis, wherein the cylinder head (22) further includes an inlet valve (42) positioned in the cylinder head (22) for controlling flow of low pressure fluid from the inlet manifold (24) to the pressure chamber (28), the inlet valve (42) being oriented along a second axis extending transverse to the longitudinal direction of the cylinder chamber such that the low pressure fluid flows through the inlet valve (42) in a direction transverse to the longitudinal direction of the cylinder chamber.

6. The cylinder head (22) of claim 4, wherein the outlet valve (50) is oriented along an axis extending substantially perpendicular to the longitudinal direction of the cylinder chamber such that the pressurized fluid flows through the outlet valve (50) in a direction substantially perpendicular to the longitudinal direction of the cylinder chamber.

7. The cylinder head (22) of claim 6, wherein the axis is a first axis, wherein the cylinder head (22) further includes an inlet valve (42) positioned in the cylinder head (22) for controlling flow of low pressure fluid from the inlet manifold (24) to the pressure chamber (28), the inlet valve (42) being oriented along a second axis extending substantially perpendicular to the longitudinal direction of the cylinder chamber such that the low pressure fluid flows through the inlet valve (42) in a direction substantially perpendicular to the longitudinal direction of the cylinder chamber.

8. The cylinder head (22) of any preceding claim, wherein the first material includes brass.

9. The cylinder head (22) of any preceding claim, wherein the pressure chamber (28) cooperates with the cylinder head (22) to define the cylinder chamber for receiving a piston (36).

10. The cylinder head (22) of any preceding claim, wherein both of the inlet manifold (24) and the outlet manifold (26) are formed of the second material.

11. A pump (20) for pressurizing a fluid, the pump (20) comprising:

a piston (36);
a cylinder block (30) at least partially defining a cylinder chamber receiving the piston (36);
the cylinder head (22) of any preceding claim coupled to the cylinder block (30) such that the pressure chamber (28) is in fluid communication with the cylinder chamber.

Patentansprüche

1. Zylinderkopf (22) für eine Pumpe (20), wobei der Zylinderkopf (22) Folgendes umfasst:

eine Druckkammer (28);
einen Einlasskrümmer (24) zum Aufnehmen eines Niederdruckfluids und zum Leiten des Niederdruckfluids zu der Druckkammer (28), wobei der Einlasskrümmer (24) als Einzelteil ausgebildet ist;
einen Auslasskrümmer (26) zum Aufnehmen eines druckbeaufschlagten Fluids aus der Druckkammer (28) und zum Leiten des druckbeaufschlagten Fluids zu einem Auslass (46), wobei der Auslasskrümmer (26) als Einzelteil ausgebildet ist, das von dem Einlasskrümmer (24) separat ist;
wobei die Druckkammer (28) zum Aufnehmen des Niederdruckfluids aus dem Einlasskrümmer (24) und Leiten des Niederdruckfluids zu einer Zylinderkammer, die mindestens teilweise durch einen Zylinderblock (30) der Pumpe (20) definiert ist, und zum Aufnehmen des druckbeaufschlagten Fluids aus der Zylinderkammer und Leiten des druckbeaufschlagten Fluids zu dem Auslasskrümmer (26) fluidisch zwischen dem Einlasskrümmer (24) und dem Auslasskrümmer (26) positioniert ist, wobei die Druckkammer (28) als Einzelteil ausgebildet ist, das von dem Einlasskrümmer (24) separat ist und von dem Auslasskrümmer (26) separat ist, wobei die Druckkammer (28) aus einem ersten Material ausgebildet ist;
dadurch gekennzeichnet, dass: mindestens einer des Einlasskrümmers (24) und des Auslasskrümmers (26) aus einem zweiten Material ausgebildet ist, das sich von dem ersten Material unterscheidet; das erste Material eine mechanische Festigkeit bereitstellt, die höheren Drücken standhält als das zweite Material; und wobei das zweite Material Aluminium beinhaltet.

2. Zylinderkopf (22) nach Anspruch 1, wobei der Zylinderkopf (22) ferner ein Einlassventil (42) beinhaltet, das zum Steuern der Strömung von Niederdruckfluid von dem Einlasskrümmer (24) zu der Druckkammer (28) in dem Zylinderkopf (22) positioniert ist, wobei das Einlassventil (42) entlang einer Achse ausgerichtet ist, die sich quer zu einer Längsrichtung der Zylinderkammer erstreckt, sodass das Niederdruckfluid durch das Einlassventil (42) in eine Richtung quer zu der Längsrichtung der Zylinderkammer strömt.

3. Zylinderkopf (22) nach Anspruch 2, wobei das Einlassventil (42) entlang einer Achse ausgerichtet ist, die sich im Wesentlichen senkrecht zu der Längs-

richtung der Zylinderkammer erstreckt, sodass das Niederdruckfluid durch das Einlassventil (42) in eine Richtung im Wesentlichen senkrecht zu der Längsrichtung der Zylinderkammer strömt.

4. Zylinderkopf (22) nach Anspruch 1, wobei der Zylinderkopf (22) ferner ein Auslassventil (50) beinhaltet, das zum Steuern der Strömung von druckbeaufschlagtem Fluid von der Druckkammer (28) zu dem Auslass (46) in dem Zylinderkopf (22) positioniert ist, wobei das Auslassventil (50) entlang einer Achse ausgerichtet ist, die sich quer zu einer Längsrichtung der Zylinderkammer erstreckt, sodass das druckbeaufschlagte Fluid durch das Auslassventil (50) in eine Richtung quer zu der Längsrichtung der Zylinderkammer strömt.

5. Zylinderkopf (22) nach Anspruch 4, wobei die Achse eine erste Achse ist, wobei der Zylinderkopf (22) ferner ein Einlassventil (42) beinhaltet, das zum Steuern der Strömung von Niederdruckfluid von dem Einlasskrümmer (24) zu der Druckkammer (28) in dem Zylinderkopf (22) positioniert ist, wobei das Einlassventil (42) entlang einer zweiten Achse ausgerichtet ist, die sich quer zu der Längsrichtung der Zylinderkammer erstreckt, sodass das Niederdruckfluid durch das Einlassventil (42) in eine Richtung quer zu der Längsrichtung der Zylinderkammer strömt.

6. Zylinderkopf (22) nach Anspruch 4, wobei das Auslassventil (50) entlang einer Achse ausgerichtet ist, die sich im Wesentlichen senkrecht zu der Längsrichtung der Zylinderkammer erstreckt, sodass das druckbeaufschlagte Fluid durch das Auslassventil (50) in eine Richtung im Wesentlichen senkrecht zu der Längsrichtung der Zylinderkammer strömt.

7. Zylinderkopf (22) nach Anspruch 6, wobei die Achse eine erste Achse ist, wobei der Zylinderkopf (22) ferner ein Einlassventil (42) beinhaltet, das zum Steuern der Strömung von Niederdruckfluid von dem Einlasskrümmer (24) zu der Druckkammer (28) in dem Zylinderkopf (22) positioniert ist, wobei das Einlassventil (42) entlang einer zweiten Achse ausgerichtet ist, die sich im Wesentlichen senkrecht zu der Längsrichtung der Zylinderkammer erstreckt, sodass das Niederdruckfluid durch das Einlassventil (42) in eine Richtung im Wesentlichen senkrecht zu der Längsrichtung der Zylinderkammer strömt.

8. Zylinderkopf (22) nach einem der vorhergehenden Ansprüche, wobei das erste Material Messing beinhaltet.

9. Zylinderkopf (22) nach einem der vorhergehenden Ansprüche, wobei die Druckkammer (28) mit dem Zylinderkopf (22) zusammenwirkt, um die Zylinderkammer zum Aufnehmen eines Kolbens (36) zu definieren.

10. Zylinderkopf (22) nach einem der vorhergehenden Ansprüche, wobei der Einlasskrümmer (24) und der Auslasskrümmer (26) beide aus dem zweiten Material ausgebildet sind.

11. Pumpe (20) zum Beaufschlagen eines Fluids mit Druck, wobei die Pumpe (20) Folgendes umfasst:

einen Kolben (36);
einen Zylinderblock (30), der mindestens teilweise eine Zylinderkammer definiert, die den Kolben (36) aufnimmt;
den Zylinderkopf (22) nach einem der vorhergehenden Ansprüche, der an den Zylinderblock (30) gekoppelt ist, sodass die Druckkammer (28) in Fluidkommunikation mit der Zylinderkammer steht.

Revendications

1. Culasse de cylindre (22) destinée à une pompe (20), la culasse du cylindre (22) comprenant :

une chambre de pression (28) ;
un collecteur d'entrée (24) permettant de recevoir un fluide basse pression et permettant de diriger le fluide basse pression vers la chambre de pression (28), le collecteur d'entrée (24) étant constitué d'une pièce unique ;
un collecteur de sortie (26) permettant de recevoir un fluide sous pression en provenance de la chambre de pression (28) et permettant de diriger le fluide sous pression vers une sortie (46), le collecteur de sortie (26) étant constitué d'une pièce unique séparée du collecteur d'entrée (24) ;
la chambre de pression (28) étant positionnée de manière fluidique entre le collecteur d'entrée (24) et le collecteur de sortie (26) afin de recevoir le fluide sous pression en provenance du collecteur d'entrée (24) et de diriger le fluide basse pression vers une chambre de cylindre au moins partiellement définie par un bloc de cylindre (30) de la pompe (20), et afin de recevoir le fluide sous pression en provenance de la chambre de cylindre et de diriger le fluide sous pression vers le collecteur de sortie (26), la chambre de pression (28) étant constituée d'une pièce unique séparée du collecteur d'entrée (24) et séparée du collecteur de sortie (26), la chambre de pression (28) étant constituée d'un premier matériau ;
caractérisée en ce qu'au moins un parmi le collecteur d'entrée (24) et le collecteur de sortie (26) est constitué d'un deuxième matériau dif-

férent du premier matériau ; le premier matériau fournit une résistance mécanique qui supporte des pressions supérieures à celles supportées par le deuxième matériau ; et dans laquelle le deuxième matériau comprend de l'aluminium.

2. Culasse de cylindre (22) selon la revendication 1, dans laquelle la culasse de cylindre (22) comprend en outre une vanne d'entrée (42) positionnée dans la culasse de cylindre (22) afin de commander une circulation de fluide basse pression allant du collecteur d'entrée (24) vers la chambre de pression (28), la vanne d'entrée (42) étant orientée le long d'un axe s'étendant de manière transversale par rapport à une direction longitudinale de la chambre de cylindre de sorte que le fluide basse pression circule à travers la vanne d'entrée (42) dans une direction transversale par rapport à la direction longitudinale de la chambre de cylindre.

3. Culasse de cylindre (22) selon la revendication 2, dans laquelle la vanne d'entrée (42) est orientée le long d'un axe s'étendant de manière essentiellement perpendiculaire à la direction longitudinale de la chambre de cylindre de sorte que le fluide basse pression circule à travers la vanne d'entrée (42) dans une direction essentiellement perpendiculaire à la direction longitudinale de la chambre de cylindre.

4. Culasse de cylindre (22) selon la revendication 1, dans laquelle la culasse de cylindre (22) comprend en outre une vanne de sortie (50) positionnée dans la culasse de cylindre (22) afin de commander une circulation de fluide sous pression allant de la chambre de pression (28) vers la sortie (46), la vanne de sortie (50) étant orientée le long d'un axe s'étendant de manière transversale par rapport à une direction longitudinale de la chambre de cylindre de sorte que le fluide sous pression circule à travers la vanne de sortie (50) dans une direction transversale par rapport à la direction longitudinale de la chambre de cylindre.

5. Culasse de cylindre (22) selon la revendication 4, dans laquelle l'axe est un premier axe, dans laquelle la culasse de cylindre (22) comprend en outre une vanne d'entrée (42) positionnée dans la culasse de cylindre (22) afin de commander une circulation de fluide basse pression allant du collecteur d'entrée (24) vers la chambre de pression (28), la vanne d'entrée (42) étant orientée le long d'un deuxième axe s'étendant de manière transversale par rapport à la direction longitudinale de la chambre de cylindre de sorte que le fluide basse pression circule à travers la vanne d'entrée (42) dans une direction transversale par rapport à la direction longitudinale de la chambre de cylindre.

6. Culasse de cylindre (22) selon la revendication 4, dans laquelle la vanne de sortie (50) est orientée le long d'un axe s'étendant de manière essentiellement perpendiculaire à la direction longitudinale de la chambre de cylindre de sorte que le fluide sous pression circule à travers la vanne de sortie (50) dans une direction essentiellement perpendiculaire à la direction longitudinale de la chambre de cylindre.

7. Culasse de cylindre (22) selon la revendication 6, dans laquelle l'axe est un premier axe, dans laquelle la culasse de cylindre (22) comprend en outre une vanne d'entrée (42) positionnée dans la culasse de cylindre (22) afin de commander une circulation de fluide basse pression allant du collecteur d'entrée (24) vers la chambre de pression (28), la vanne d'entrée (42) étant orientée le long d'un deuxième axe s'étendant de manière essentiellement perpendiculaire à la direction longitudinale de la chambre de cylindre de sorte que le fluide basse pression circule à travers la vanne d'entrée (42) dans une direction essentiellement perpendiculaire à la direction longitudinale de la chambre de cylindre.

8. Culasse de cylindre (22) selon l'une quelconque des revendications précédentes, dans laquelle le premier matériau comprend du laiton.

9. Culasse de cylindre (22) selon l'une quelconque des revendications précédentes, dans laquelle la chambre de pression (28) coopère avec la culasse de cylindre (22) afin de définir la chambre de cylindre de manière à ce qu'elle puisse recevoir un piston (36).

10. Culasse de cylindre (22) selon l'une quelconque des revendications précédentes, dans laquelle le collecteur d'entrée (24) et le collecteur de sortie (26) sont constitués du deuxième matériau.

11. Pompe (20) permettant de mettre un fluide sous pression, la pompe (20) comprenant :

un piston (36) ;
un bloc de cylindre (30) définissant au moins partiellement une chambre de cylindre recevant le piston (36) ;
la culasse de cylindre (22) selon l'une quelconque des revendications précédentes, couplée au bloc de cylindre (30) de sorte que la chambre de pression (28) est en communication fluidique avec la chambre de cylindre.

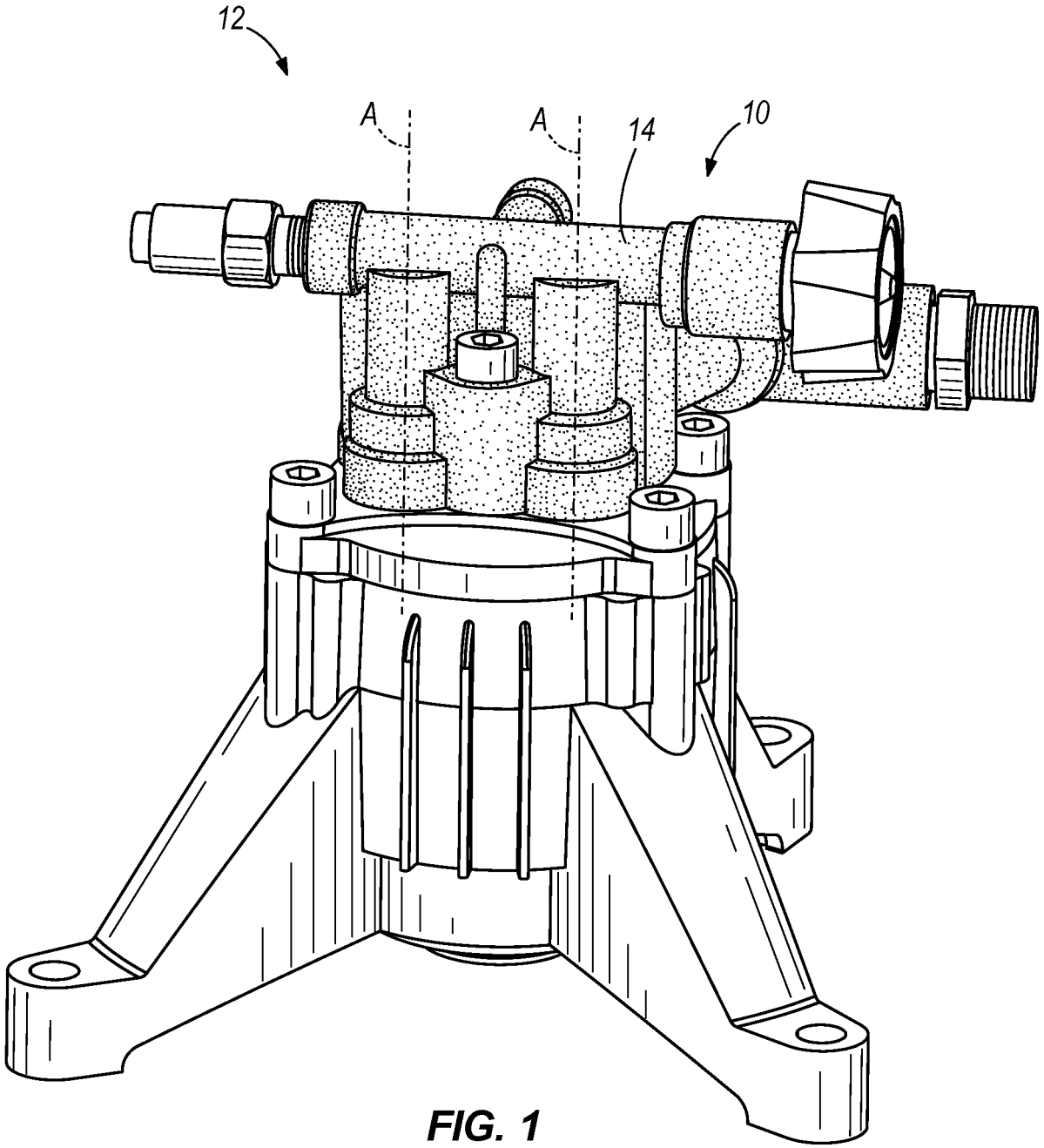

FIG. 1
PRIOR ART

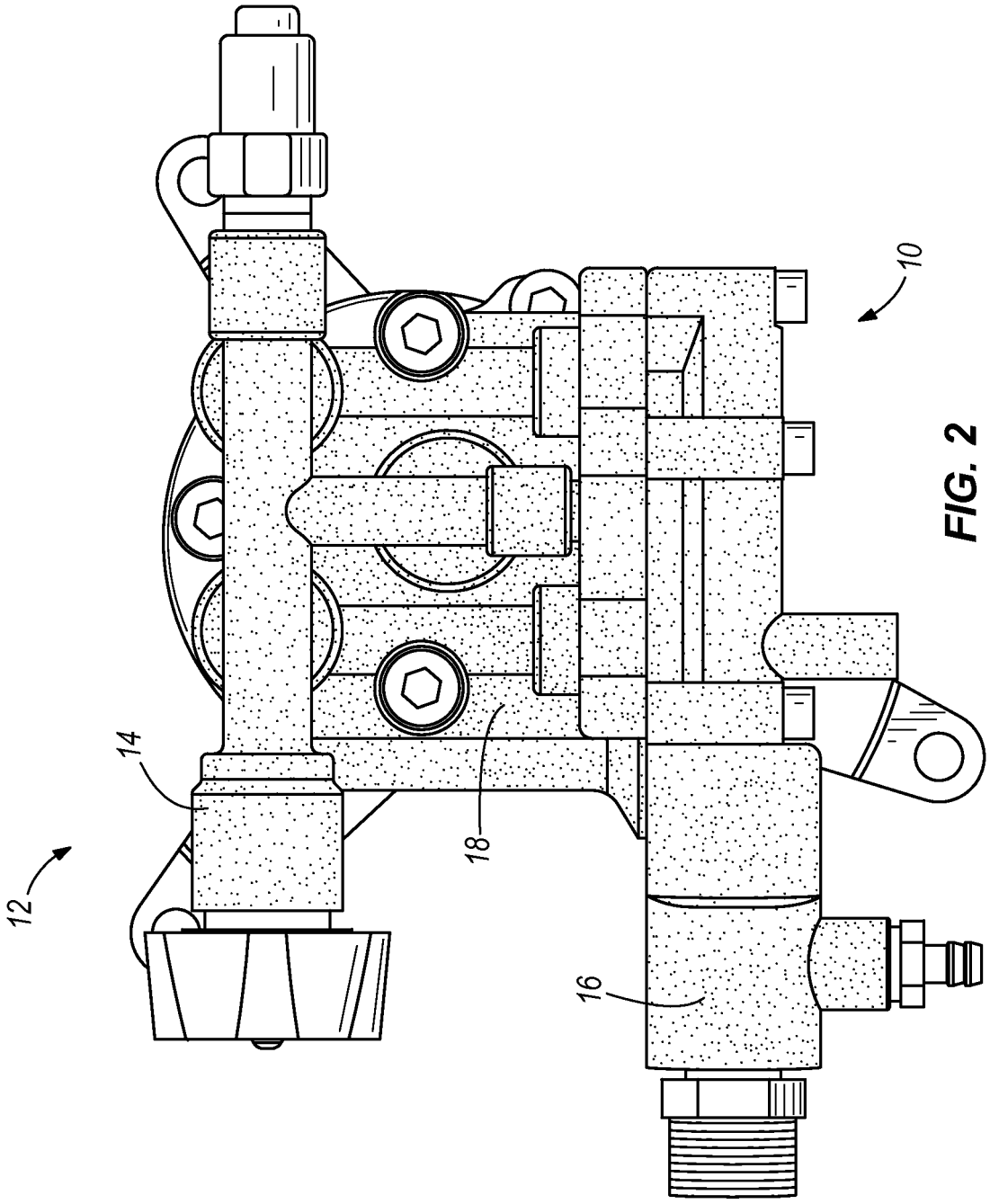

FIG. 2
PRIOR ART

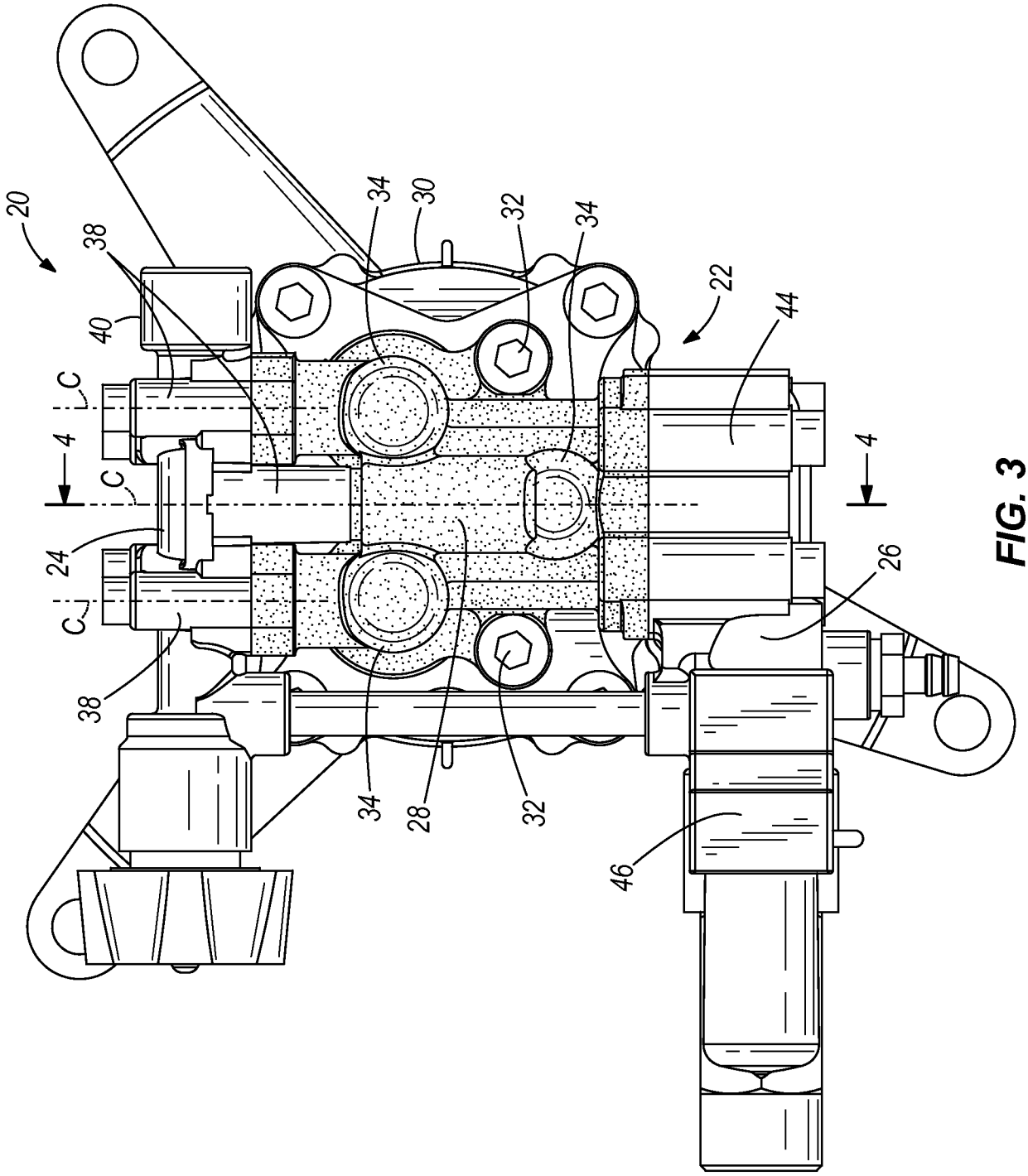

FIG. 3

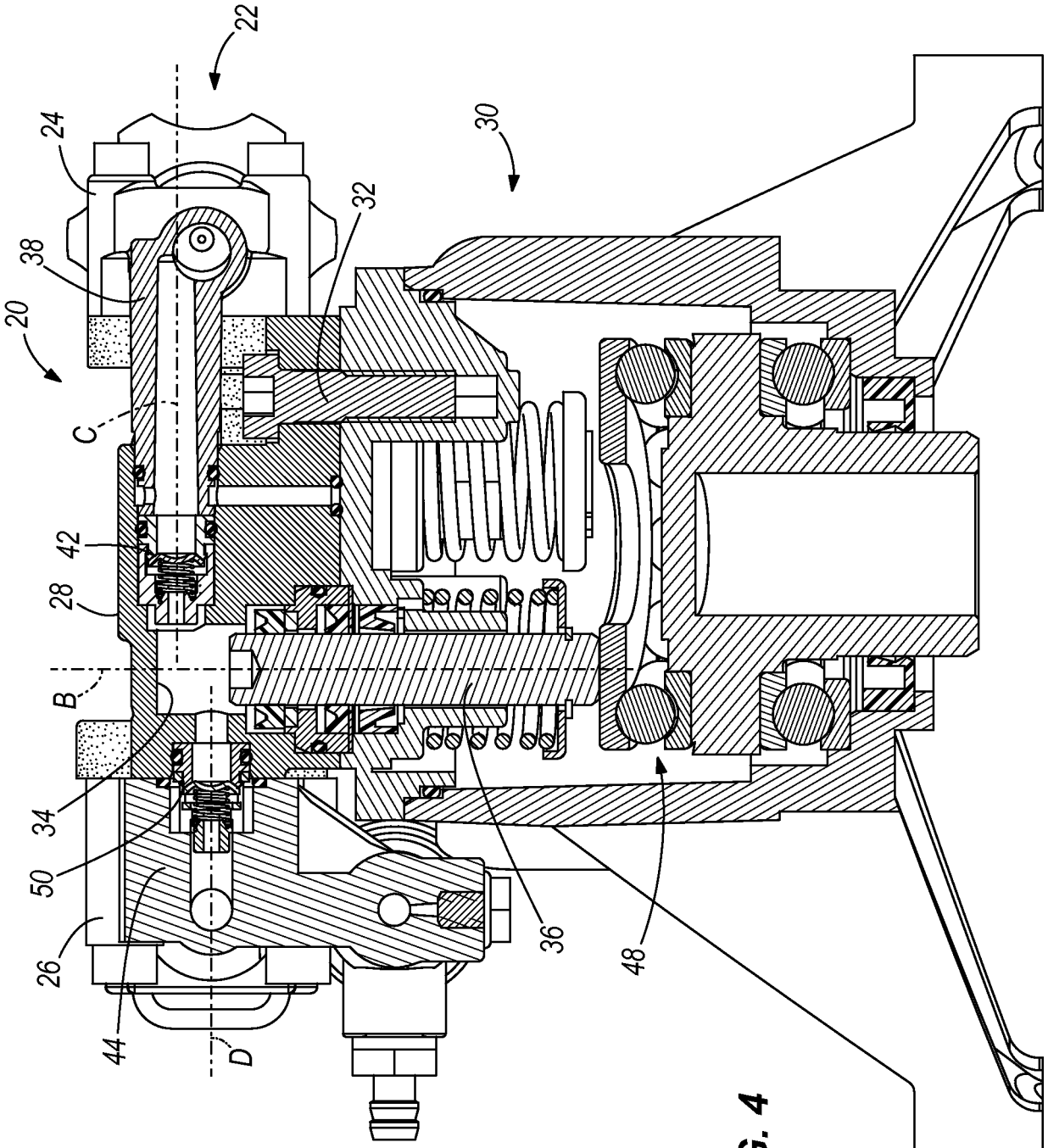

FIG. 4

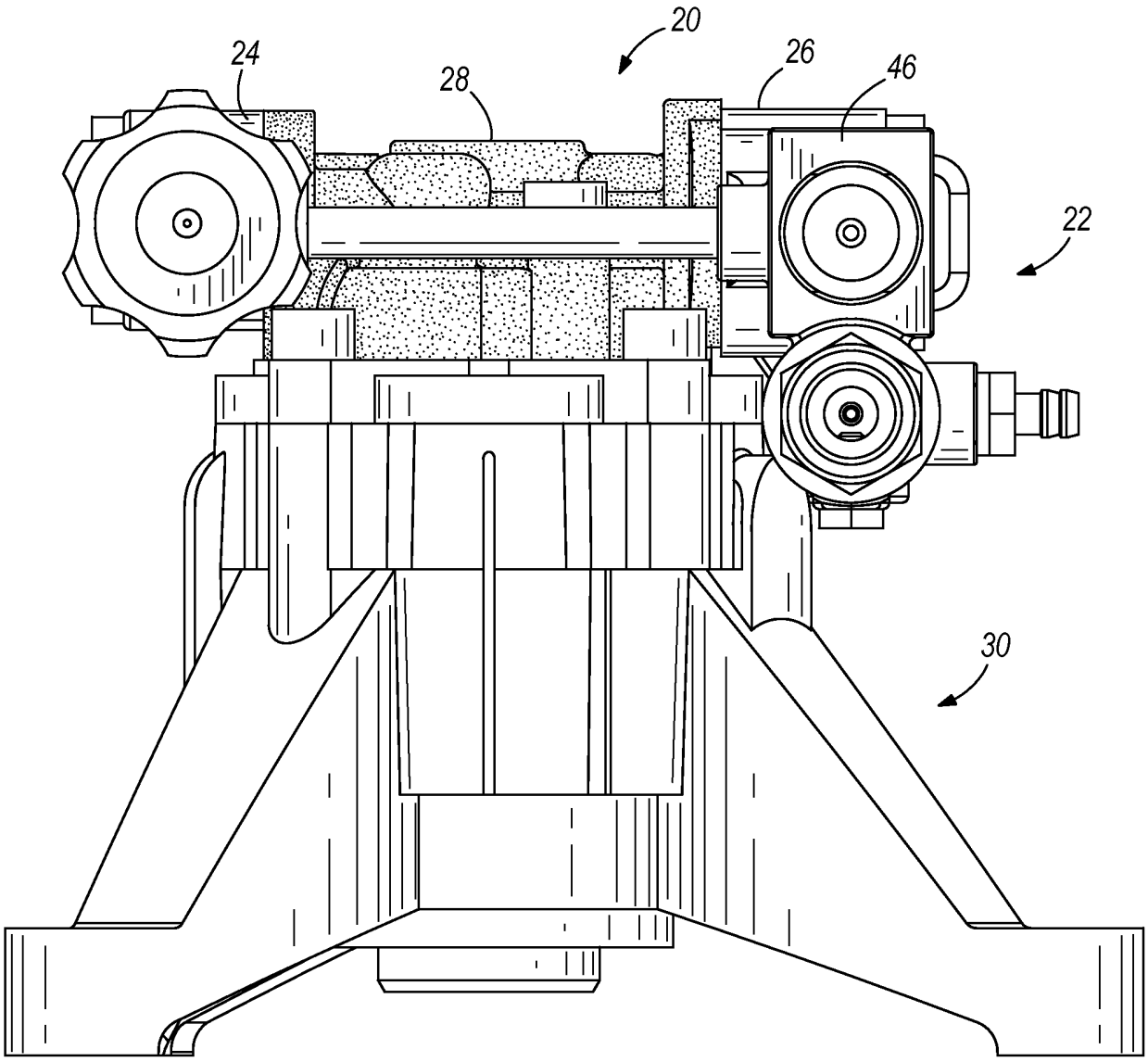

FIG. 5

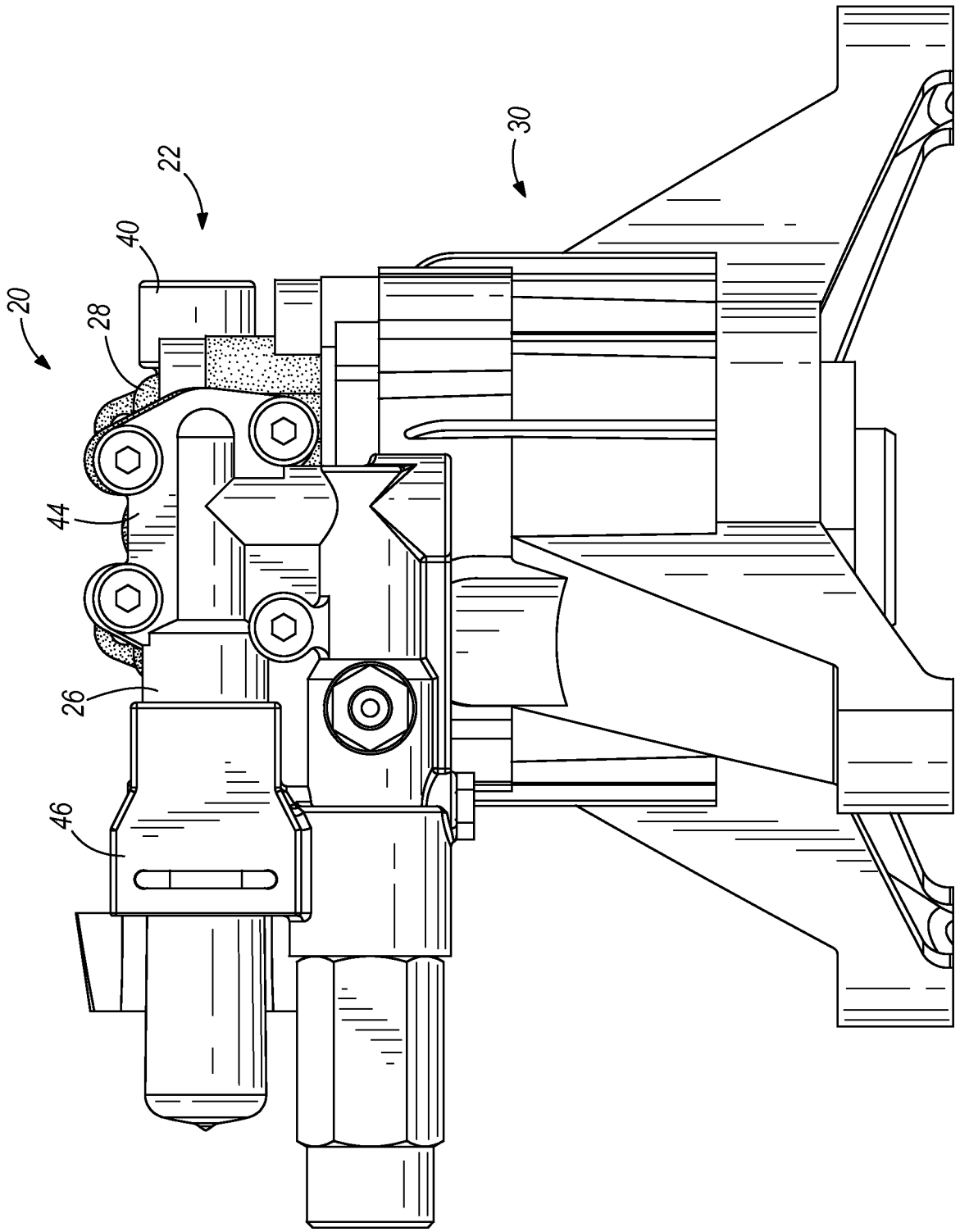

FIG. 6

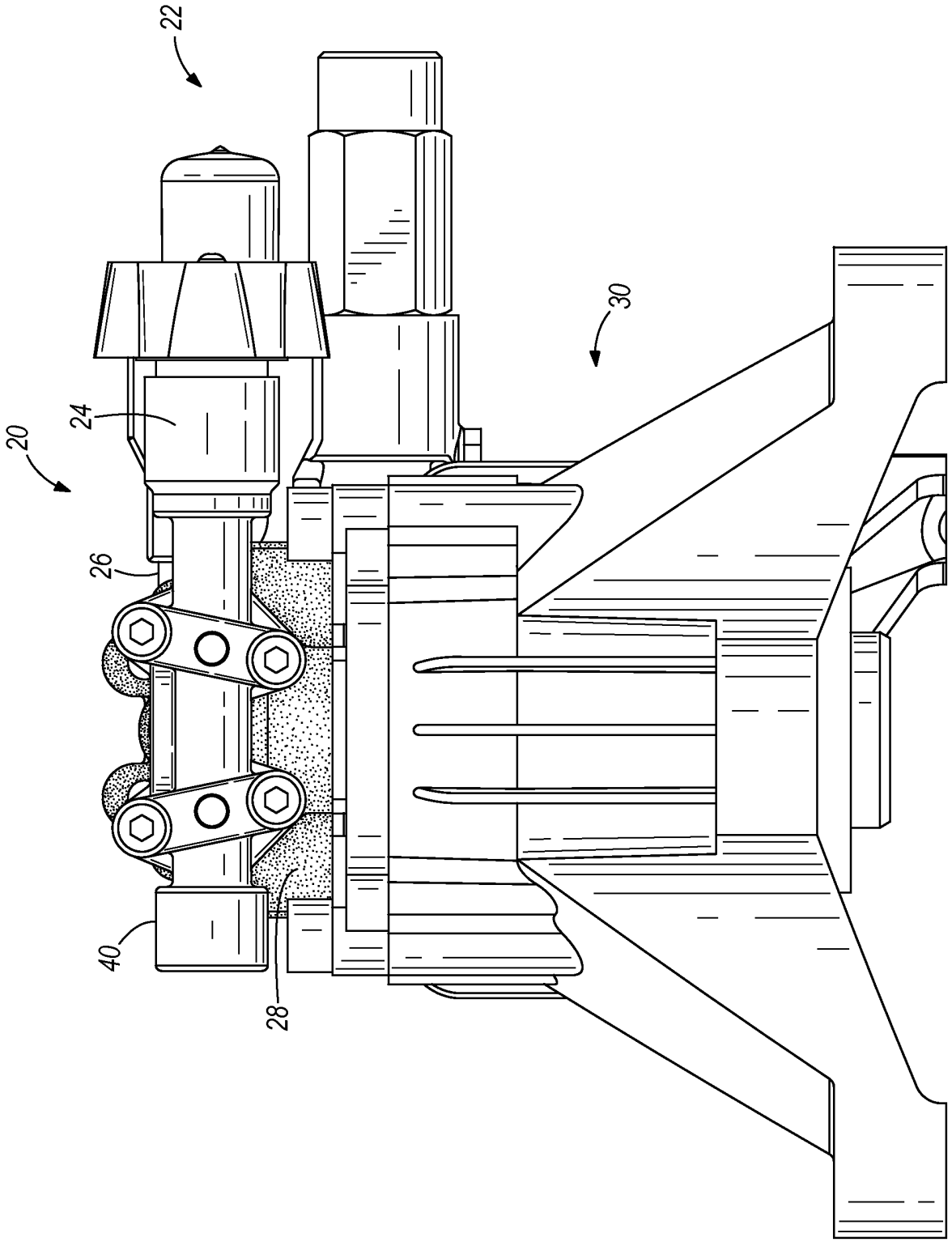

FIG. 7

REFERENCES CITED IN THE DESCRIPTION

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