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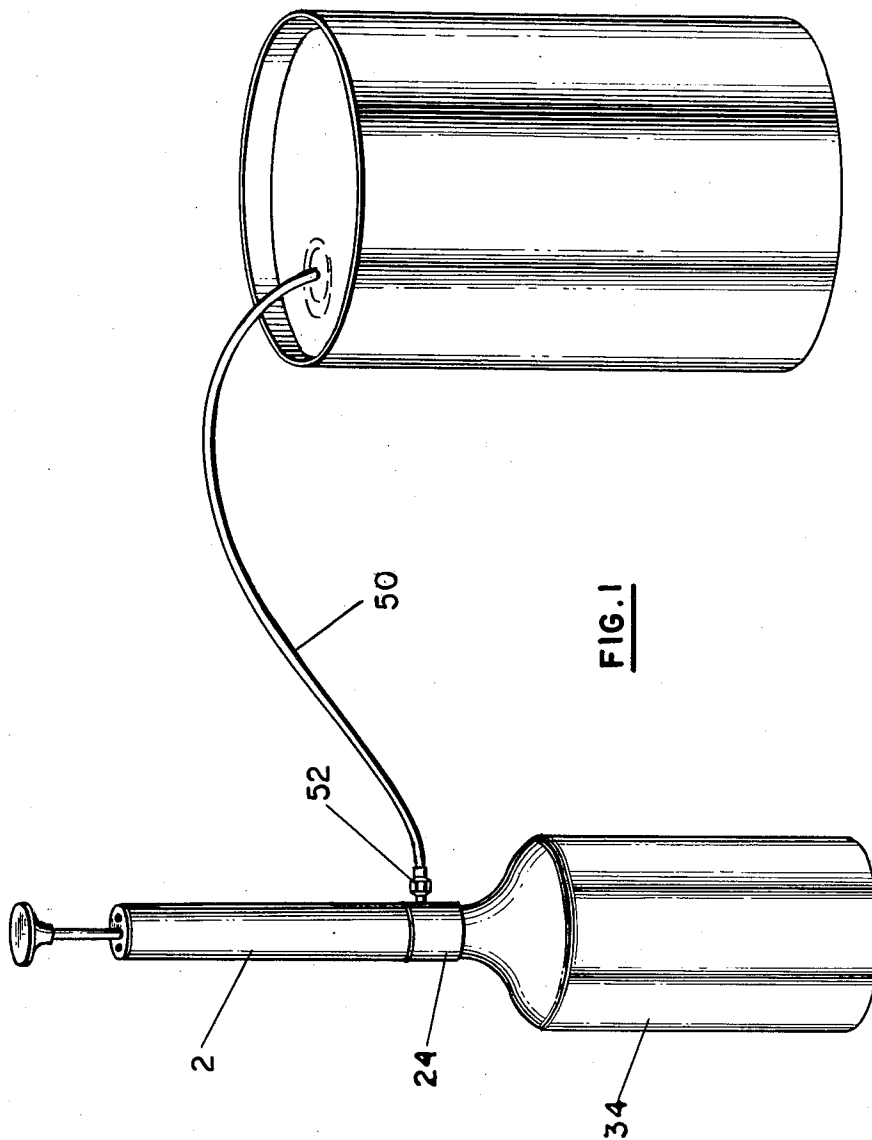
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3,062,056

SAMPLE REMOVING APPARATUS

Filed Nov. 24, 1958

2 Sheets-Sheet 1



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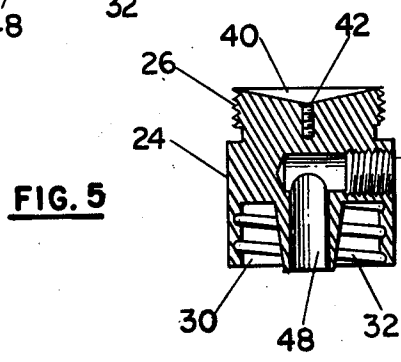
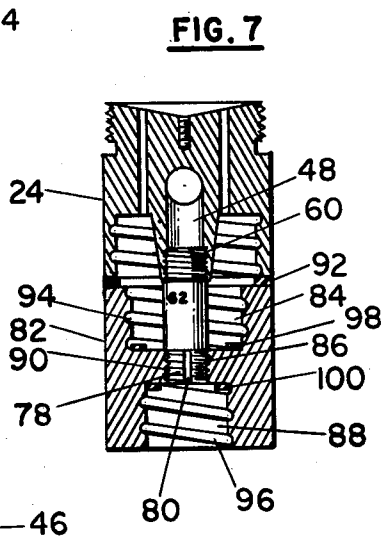
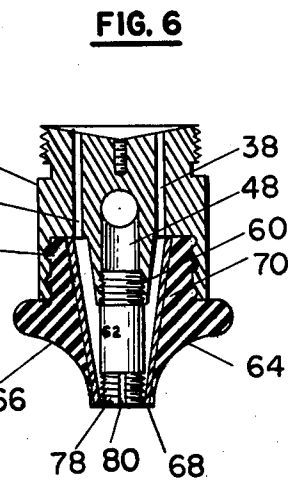
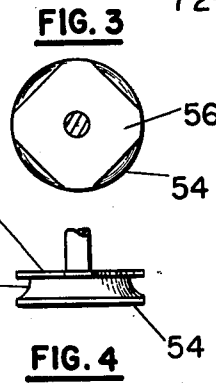
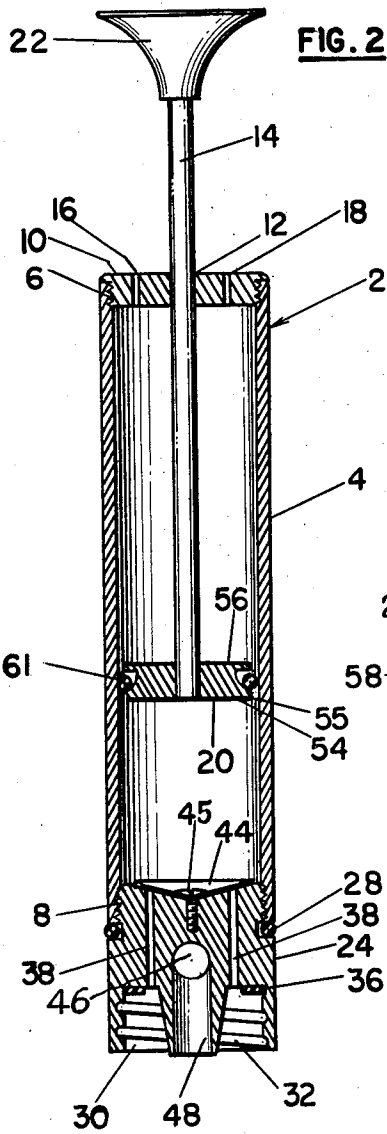
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SAMPLE REMOVING APPARATUS

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2 Sheets-Sheet 2



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SAMPLE REMOVING APPARATUS

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2 Claims. (Cl. 73-425.6)

This invention is directed to the problem of transferring flowable material from a reservoir container to a sample container. It resides, as indicated, in a pump apparatus and sample container and, more particularly, relates to a novel structure and combination of parts thereof.

Removal of parts of flowable materials from a reservoir to serve as representative samples thereof for analysis in determining the condition of the materials such as fluids or powders is a necessary procedure in testing such materials undergoing chemical and physical changes. Thus to name a few of many, samples are taken of a lubricating liquid in bearing reservoirs; samples are taken of a coolant in an electrical transformer to determine the dielectric quality of the coolant in the transformer; samples are taken of powders to determine the homogeneity of such materials in its larger bulk. In the broad field of chemistry, testing representative samples of compounds is a necessary procedure in manufacturing processes.

The present invention has as its object the provision of a pumping apparatus which easily and effectively removes a representative sample of flowable material directly from a reservoir container to a sample container.

Another object of this invention is to provide a pumping apparatus, the pumping element of which will not be contaminated by the material transferred.

Still another object is to provide a sample removing pump apparatus which is economical to manufacture and easily portable.

Accordingly, the preferred embodiment of this invention is illustrated in the accompanying drawings in which, FIGURE 1 is an elevation of this invention shown in perspective and in operative relationship,

FIGURE 2 is a side elevation of the pump apparatus of this invention sectioned along its longitudinal axis,

FIGURE 3 is a plan view of the piston head,

FIGURE 4 is a side view of the piston head,

FIGURE 5 is a side view of the transfer nozzle of this invention shown in section along its longitudinal axis and taken at right angles to the view shown in FIGURE 2,

FIGURE 6 is a side view of the transfer nozzle of this invention shown in section along its longitudinal axis and fitted with a connecting adaptor and

FIGURE 7 is a similar view showing the transfer nozzle fitted with another connecting adaptor.

The pump of my invention, designated generally by the numeral 2 is comprised of an elongated cylindrical chamber 4 having internally threaded ends 6 and 8. Top end 6 is screw fitted with a cap 10 which has a central bore 12 therethrough and serves to guide the piston rod 14 in its reciprocating movement. Additional bores 16 and 18 may be provided in cap 10 to serve as vents. Piston rod 14 is fitted with a piston head 20 hereinafter described and handle 22. The other end of cylindrical chamber 4 is provided with a closure 24 having fluid transfer passages, which for purposes of this description, will be referred to as transfer nozzle 24. Transfer nozzle 24 is provided with external threads 26 at one end so that it may be threadedly fitted to the bottom end 8 of cylinder chamber 4 and made airtight at said connection with seal 28. The other end of the transfer nozzle 24 is formed with an annular recess 30 having screw engaging grooves or threads 32 in the infacing wall thereof to threadedly receive the neck of the sample container 34. A seal 36 is fitted at the seat of the annular recess 30 so that when the neck of the sample container 34 is tightened against seal

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36, an airtight connection is made. Exhaust passages 38 extending through transfer nozzle 24 allows removal of air from the sampler container 34 to the cylinder chamber 4. The end of the transfer nozzle 24 which is threadedly fitted to the cylinder chamber 4 is shaped with a slight conical depression 40 and is provided with a threaded screw hole 42 at the center thereof. A matching shaped conical leaf valve 44 is positioned in conical depression 40 and secured therein by means of a screw 45 screwed in hole 42. Leaf valve 44 covers exhaust passages 39 and serves to regulate the flow of air there-through. A threaded bore 46 is formed in the peripheral side wall of the transfer nozzle 24 and extends to the center thereof. A central vertical bore 48 in nozzle 24 communicating with the threaded bore 46 forms a passage from the side of nozzle 24 to the end of said nozzle which extends into the neck of the sample container 34. Threaded bore 46 is fitted with hose 50 by means of coupling 52.

Though any air evacuating piston head may be employed, I prefer a piston head 20 having a bottom side 54 circular in plan and dimensioned to allow a flow clearance 55 between the periphery thereof and the cylinder chamber 4. The top side 56 is non-circular in plan; I have shown it substantially square in shape. The peripheral wall 58 of the piston is shaped with a sloped contour. Piston ring 61 is formed of a flexible material such as rubber or a plastic material and is positioned on the sloped peripheral wall 58 of the piston 20. Piston ring 61 is axially movable between the circular bottom side 54 of the piston and the non-circular top side 56 and functions as a seal between the cylinder and piston when the piston is moving in one direction and as a non-seal when the piston is moving in the opposite direction.

FIGURES 6 and 7 illustrate modified means of connecting the pump apparatus 2 and sample container 34. It will be noted that for these adaptors I provide threads 60 in the central vertical bore 48 in which is threaded a short nipple 62. The adaptor 64 as illustrated in FIGURE 6 is comprised of a grommet 66 formed from rubber or other like suitable material fitted on a metallic tube 68. Said tube 68 and grommet 66 are formed in the general shape of a conical frustum. The shank 70 of grommet 66 is provided with external threads 72 which engage internal threads 32 of the transfer nozzle 24 with a seal fit. The body portion of the grommet 66 flares radially outward with a smooth contour so that upon being held against the mouth of a sample container a seal fit may be effected.

The base of tube 68, when the adaptor 64 is screw fitted into the transfer nozzle 24 as above described, encompasses exhaust passages 38. The other end of said tube slidably fits over threads 78 of nipple 62. Threads 78 do not function as such with this adaptor but serves as a brace for the flexible grommet 66 and the convolution of the threads provide a passage for the air which is exhausted from the sample container. To provide a freer passage for said air, I prefer to slit the threads at several equally spaced points as at 80.

The principal advantage of this adaptor is that the pump apparatus 2 may be used in a non-threaded engagement with sample containers of varied size mouth openings.

Another means of connecting the pump apparatus 2 to the sample container 34 is illustrated in FIGURE 7. This adaptor, designated by the numeral 82, is comprised as an internally threaded coupling formed with internally stepped bores 84, 86 and 88. Bore 86 has screw threads 90 and engages the threads 78 of nipple 62. With this adaptor, threads 78 of nipple 62 serve to tighten the adaptor 82 to the transfer nozzle 24 and therefore venting means should be provided such as slits 80 described above

to provide passages for the air exhausted from the sample container. A seal 92 is provided between adaptor 82 and transfer nozzle 24 so that when the adaptor is tightened on nipple 62, an air tight connection is made thereat. Stepped bores 84 and 88 are provided with threads 94 and 96 respectively, and are formed to engage the threads of the sample container neck. Seals 98 and 100 are fitted at the bases of the respective bores 84 and 88 to provide a seal fit between the sample container and the adaptor 82. It will be noted that the bores 84 and 88 have different diameters, therefore, the adaptor 82 may be connected to the transfer nozzle 24 so that either bore 84 or 88 may receive the sample container neck. Several such adaptors having varied size bores may be provided to connect to most sample containers having different size necks.

In using my invention as a sample removing apparatus, I submerge the free end of hose 50 into the material or liquid of which a sample is desired. By manually operating the pump in the conventional manner, I support the entire apparatus while evacuating the sample container 34 of air thereby producing a relative vacuum therein. I do this effectively because as I move the piston 20 upwardly, the piston ring 61 which has friction contact with the cylinder chamber 4 seals the flow clearance 55 between said cylinder and the circular bottom side 54 of the piston 20. During this stroke, the sloping peripheral wall 58 of the piston 20 constantly urges the piston ring 61 against the cylinder wall thereby providing an excellent seal. The upwardly moving piston 20 withdraws the air from the sample container 34 through exhaust passages 38 of the transfer nozzle 24. The flexible leaf valve 44 is lifted at its periphery allowing the free flow of air therearound. When the piston 20 is pushed downwardly in the cylinder chamber 4, the piston seal 61 rides downwardly against the non-circular top side 56 of piston 20. The piston 20 will, in its downward travel, increase the pressure of the air in the cylinder before said piston. This increase in pressure will cause the leaf valve 44 to close against the exhaust passages 38 and prevent any air from returning into the sample container. The air before the piston 20 will escape through the flow clearance 55 between the bottom side 54 of piston 20 and the cylinder chamber 4 and take the path between the slope peripheral wall 58 and piston ring 61 and through the openings between the circular piston ring 61 and the non-circular top side 56 of piston 20 and evacuate the cylinder chamber 4 through vent holes 16 and 18 provided in cap 10.

The pumping action above described is continued until a substantial vacuum is produced in the sample container 34, the bores 46 and 48, and the hose 50 all of which communicate with the interior of said sample container. With this pressure condition existing in the system, the atmospheric pressure will cause the material or liquid to flow through the tube 50, through the bores 46 and 48 of the transfer nozzle 24 and into the sample container 34.

It will be apparent from the foregoing that my improved sample removing apparatus will quickly and effectively remove a sample of any flowable material from a reservoir to the sample container without coming in contact with the moving elements of this apparatus.

Although I have disclosed herein the preferred embodiment of my invention, I intend to cover as well any change or modification therein which may be made without departing from the spirit and scope of this invention.

I claim:

1. An apparatus for removing a sample of flowable material from a reservoir to a container comprising the combination of;

- a pump comprising a cylinder and a piston reciprocable therein adapted to produce a vacuum in said cylinder;
- a nozzle having a peripheral side wall and opposed ends, one of said ends being adapted for connection

tion to said cylinder, said peripheral side wall forming a continuation of said cylinder, the other of said ends formed with an annular recess therein, said other end having an infacing wall and a core provided by said annular recess, said nozzle having a passageway therethrough communicating said one end thereof and said annular recess, a leaf valve means over said passageway at said one end to allow atmospheric evacuation from said annular recess to said cylinder, a second passageway in said core, a third passageway in said peripheral side wall opening in said second passageway in said nozzle; a tubular extension having one end thereof releasably connecting said core in said second passageway and a terminal end; and

a hollow grommet having a shank end, a terminal end, and a seal contact surface therebetween, said shank end releasably connecting said infacing wall in said annular recess, said terminal end of said grommet being coterminous with said terminal end of said tubular extension and being laterally braced thereby, and venting means therebetween to allow atmospheric evacuation from said container to said annular recess.

2. An apparatus for removing a sample of flowable material from a reservoir to a container having a necked opening comprising the combination of;

- a pump comprising a cylinder and a piston reciprocable therein adapted to produce a vacuum in said cylinder;
- a nozzle having a peripheral side wall and opposed ends, one of said ends being adapted for connection to said cylinder, said peripheral side wall forming a continuation of said cylinder, the other of said ends formed with an annular recess therein, said other end having an infacing wall and a core provided by said annular recess, said nozzle having a passageway therethrough communicating said one end thereof and said annular recess, a leaf valve means over said passageway at said one end to allow atmospheric evacuation from said annular recess to said cylinder, a second passageway in said core, a third passageway in said peripheral side wall opening in said second passageway in said nozzle; a tubular extension having one end thereof releasably connecting said core in said second passageway and a threaded terminal end; and
- a connecting member having end bores adapted for reversible application to the necked opening of said container, a threaded intermediate bore for connecting engagement with said terminal end of said tubular extension, and vent passages for by-passing said connecting engagement to allow atmospheric evacuation from said container to said annular recess.

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