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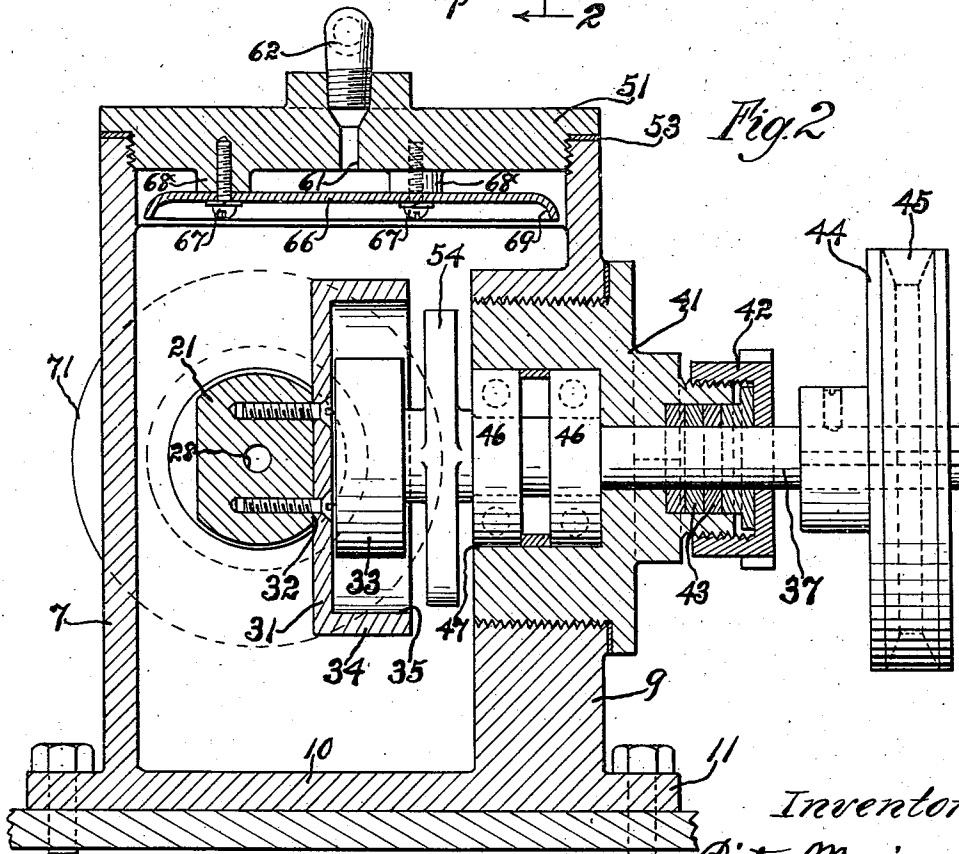
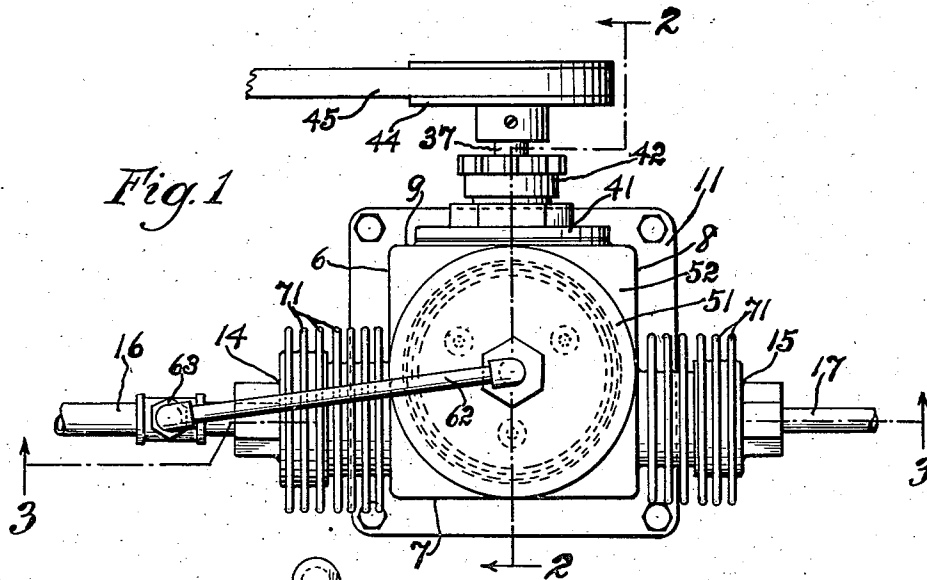
P. MANISCALCO

2,256,926

FLUID COMPRESSOR

Filed July 17, 1940

2 Sheets-Sheet 1



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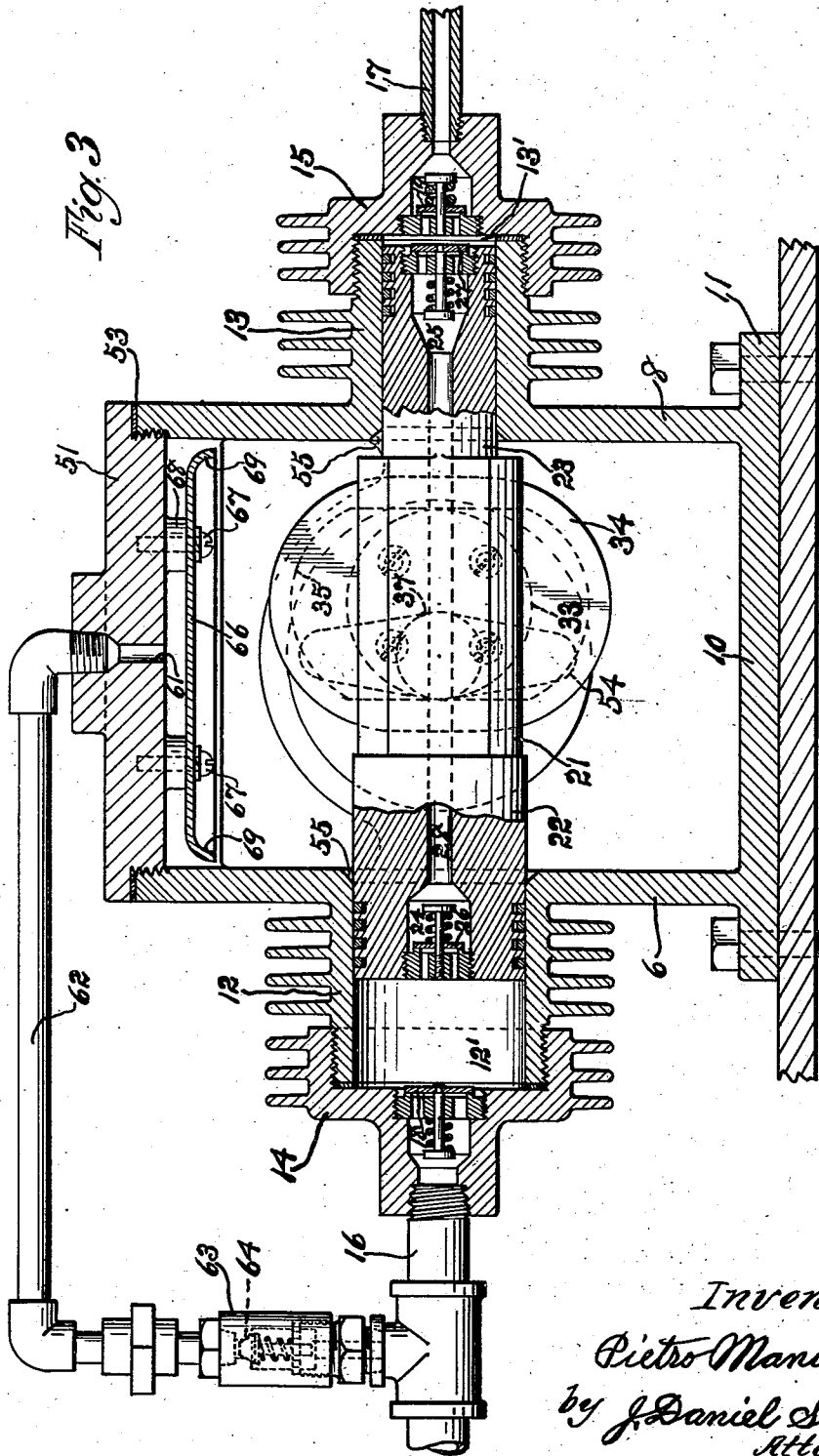
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UNITED STATES PATENT OFFICE

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FLUID COMPRESSOR

Pietro Maniscalco, Chicago, Ill.

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2 Claims. (Cl. 230—200)

This invention relates to an improved fluid compressor, and more especially to a compressor unit of the multistage type.

One of the objects of this invention is to provide a novel compact compressor of a simplified and economical construction, capable of speedily producing a high stage of compression, the same being preferably accomplished by producing a two-stage compression with each complete piston stroke, by the use of a primary and a secondary piston.

Another object of this invention is to provide a release or bypass for any back-pressure that may be produced in the casing during reciprocation of the pistons, due to the difference in the sizes of the primary and the secondary pistons.

Another object of this invention is to produce a compressor which comprises a compact sealed casing provided with improved lubricating means for constantly and efficiently lubricating the members operating therein, and including means to prevent any lubricant leaking into the fluid which is being compressed.

A further object of this invention is to provide an efficient compressor of this kind which is especially adapted for use with refrigeration and air conditioning devices.

These and various other objects and advantages are attained with this invention, as will become apparent from the following description, taken in connection with the accompanying drawings wherein the invention is illustrated in its preferred form, it being apparent that various other arrangements and forms of construction may be adopted for carrying out the objects and purposes of this invention.

In the drawings:

Fig. 1 is a plan view of a compressor embodying the present invention in its preferred form of construction.

Figs. 2 and 3 are enlarged vertical sectional views of the improved compressor, taken on lines 2—2 and 3—3, respectively.

The form of this invention disclosed herein embodies a compact sealed compressor unit, which is shown as being of the multistage type. It comprises a casing or housing including up-standing walls 6, 7, 8 and 9 which are integral with each other and are integral with the base 10 wherefrom they arise, flanges or other suitable means 11 being provided on the base for mounting the compressor on a suitable support.

The two opposite walls 6 and 8 have integral sleeves 12 and 13 extending in opposite directions therefrom, providing cylinder chambers 12', 13'

therein. These cylinders have their longitudinal axes aligned, and the cylinder 12 is larger than the cylinder 13 and forms the primary compression cylinder, while the cylinder 13 forms the secondary compression cylinder.

Closure members or cylinder heads 14 and 15 are removably mounted on the outer ends of cylinders 12 and 13, respectively, being preferably threaded thereon and supplied with a sealing gasket, to provide a tight closure. An inlet pipe 16 is connected to head 14, and an outlet pipe 17 is connected to head 15, check valves 18 and 19 being mounted in suitable pockets provided in heads 14 and 15 to admit the passage of fluid in only one direction, from pipe 16 to pipe 17.

The piston means herein is provided in the form of a piston unit 21 which comprises at its opposite ends a larger primary piston 22 and a smaller secondary piston 23, fitting snugly and operating in the cylinder chambers 12' and 13', respectively, and they are provided with suitable piston rings. Said pistons 22 and 23 contain in their ends pockets 24 and 25, respectively, having check valves 26 and 27 therein. A bore 28 extends thru the piston unit 21, from pocket 24 to pocket 25, preferably extending straight along the longitudinal axis of said unit.

This arrangement of the cylinders and pistons provides a larger compression chamber 12', to effect the primary compression, and from which the fluid is forced thru the bore 28 into the secondary chamber 13', where it is then subjected to a higher stage of compression, and is therefrom delivered to outlet pipe 17 for use. This construction thus produces a two-stage compression with each complete piston stroke.

The means provided for driving or reciprocating the piston unit 21 is of a compact form and has its essential operating means or movable members housed within the casing, the same comprising a reciprocating member 31 which is substantially cup-shaped and is secured to a flattened side portion 32 of the intermediate part or body of piston unit 21, by the use of screws or the like, as best shown in Fig. 2 of the drawings; while a companion rotary member 33 engages member 31 for reciprocating the same. Said member 31 includes a laterally extending peripheral flange 34 which provides a continuous inner bearing surface or guide surface 35 therein, and over it travels the rotary member 33 which is secured eccentrically on the inner end of a drive shaft 37.

The drive shaft 37 is rotatably mounted in a bearing collar 41 which is removably mounted

in wall 9 of the casing, preferably by threading it in a threaded opening provided in wall 9, said wall being for that purpose made of considerable thickness. A stuffing nut 42 is threaded on the outer end of said collar and contains sealing rings 43 therein. The shaft extends beyond the nut and has a member thereon for driving it, for example, a pulley 44 driven by a belt 45. Said shaft has anti-friction bearing means 46 supplied thereon which are positioned in a pocket 47 provided at the inward part of collar 41.

A closure member or cover 51 is removably mounted on the top portion 52 of the casing walls. Said cover is preferably circular and is threaded in a circular opening provided in said top portion, having a sealing ring 53 therebetween to provide a tight closure; and the cover is thus readily installed and also detached. Other sealing means is likewise included whenever needed in order to provide a fluid tight casing.

The casing is adapted to have lubricating oil or similar lubricating means placed to a substantial height therein, for lubricating the contained operating parts or movable members of the compressor; while improved means for distributing the lubricant may furthermore be provided, which preferably comprises one or more splash fingers 54 extending radially from the shaft within the casing, so as to lift and splash the lubricant upwardly over the operating members 33 and 34 and the bearings 46, and also over the pistons, especially when the lubricant is no longer standing of sufficient height to reach the bearings.

Chamfers or bevels 55 are provided in the casing, on the joining edge portions between the casing wall 6 and its cylinder chamber 12', and between the casing wall 8 and its cylinder chamber 13', as shown in Fig. 3. These chamfers are effective in draining off excessive lubrication on the pistons and to allow the same to flow back into the lower part of the casing. They serve to keep the lubrication on the pistons at a proper minimum amount, and they also aid in preventing lubricant from getting into the outlet pipe 17.

Provision is moreover made herein to take care of any compressed air that may leak from the cylinder chambers past the pistons into the casing, and to provide a release for any back-pressure produced in the casing during reciprocation of the two different sized pistons. For this purpose a bypass is provided to receive any such compressed air that may be present in the casing and to convey it from the casing to the inlet conduit or the inlet head, and this bypass preferably comprises an escape channel 61 provided thru the cover 51, and a pipe or conduit 62 connected at one end to channel 61, and at the other end to inlet pipe 16 adjacent head 14, having a sleeve member 63 with a one-way valve 64 mounted in said pipe 62, so that any back-pressure in the casing will be relieved and any such compressed air therein will be conducted back into the inlet end of the compressor.

A deflecting member 66, which is substantially in the form of a baffle plate, is furthermore provided underneath cover 51. It is shown detachably secured thereto by suitable elements 67, but it may also be cast integral therewith. Said plate is spaced from the cover by spacers 68, and it has its marginal portion 69 curved downward and spaced from the casing walls, in order to provide a deflecting marginal part for directing oil sprays downward into the casing, and at the same time

allowing the air under pressure to pass freely upwardly around and over said marginal part 69 up into channel 61.

Cooling fins 71 are preferably also provided to extend radially from the cylinders 12 and 13 and from the heads 14 and 15, to facilitate the ready dissemination of heat away from this compressor.

The construction is simple and durable and facilitates convenient installing and replacing of the mechanism in the casing. The piston unit 21 is inserted thru the larger cylinder 13 and the reciprocating member 31 is introduced thru the open top and is secured to the part 32 of the piston unit. The bearing collar 41 with its shaft 37 mounted therein and carrying the reciprocating member 33 and splash fingers 54 is then secured in the wall 9 bringing member 33 in operative position in flange means 34; and the cover 51 with its deflecting member 66 is secured on the top of the casing, thus sealing the casing air-tight and fluid-tight, while the bypass means is secured on the device as indicated above.

This construction provides a compact compressor including a sealed casing for retaining lubricating means wherein the operating members of the compressor function, and for continuously lubricating the contained movable parts. Furthermore, in case any compressed air leaks past either piston into the casing, or any back-pressure results in the casing due to the different sizes of the two pistons operating therein, then, as soon as such pressure is greater than atmospheric or than that in inlet pipe 16, then the bypass will conduct such air from the casing to the inlet pipe; and the spring of the spring-held valve 64 is also made of the proper tension to permit said valve to open when the air pressure in the casing is slightly higher than atmospheric or is at the particular pressure intended.

I claim:

1. A compressor comprising a closed casing containing integral upright walls with an integral bottom thereon and an openable cover, two opposite walls being provided with two oppositely extending cylinders, a piston unit in the casing including a pair of oppositely extending pistons reciprocable in said cylinders, valved closure means on the ends of the cylinders, operating means including a member detachably connected to the piston unit and a drive shaft having a member thereon which engages the last said member for reciprocating it and the piston unit, a bearing collar detachably mounted in an opening provided in one of said walls and having the shaft journaled therein, said collar with the drive shaft and the member thereon being readily removable and insertable thru said wall opening, fluid conducting means to conduct compressed fluid out of the casing that may occur therein, and lubricant deflecting means mounted in the casing to prevent lubricant from getting into said fluid conducting means.

2. A compact multistage compressor which comprises a closed casing including integral upright walls and integral bottom thereon and an openable cover, two opposite walls being provided with a pair of integral outwardly extending cylinders, one being larger than the other, a closure head with an inlet valve on the larger cylinder and a closure head with an outlet valve on the smaller cylinder, a piston unit in the casing including a body having a larger and a smaller piston extending in opposite directions therefrom and being reciprocable in said cylinders, a valved channel centrally thru the piston unit providing

a passage from the larger to the smaller cylinder, operating means including a reciprocating member having a continuous bearing flange and being detachably secured to said body, a rotary member engaging said member and provided with a drive shaft extending from the casing, for reciprocating the piston unit, bypass means extending from the cover to conduct compressed fluid from the

5 casing and into communication with the inlet head on the larger cylinder, lubricant raising means provided on the shaft, and lubricant deflecting means between said raising means and said cover to prevent lubricant from entering the bypass.

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