Aug. 15, 1939 P. MANISCALCO 2,169,571

COMPRESSOR UNIT

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Fig. 1

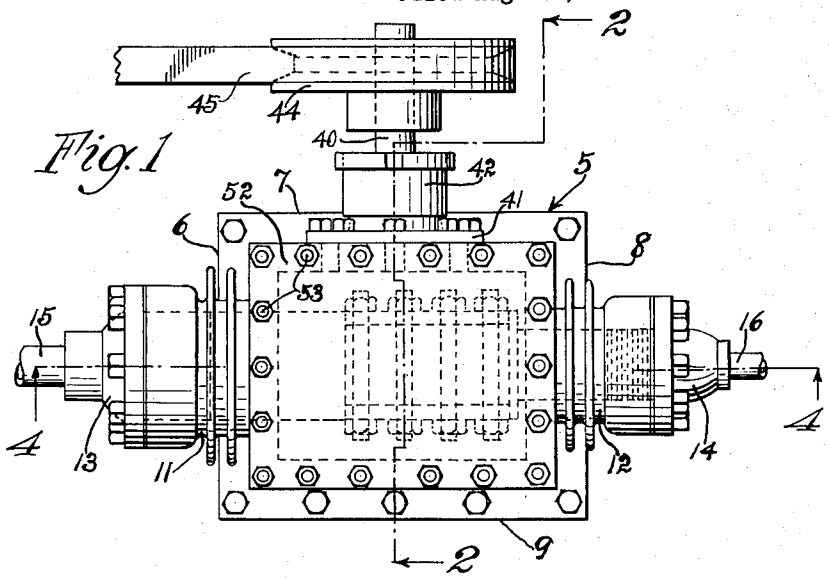


Fig. 2

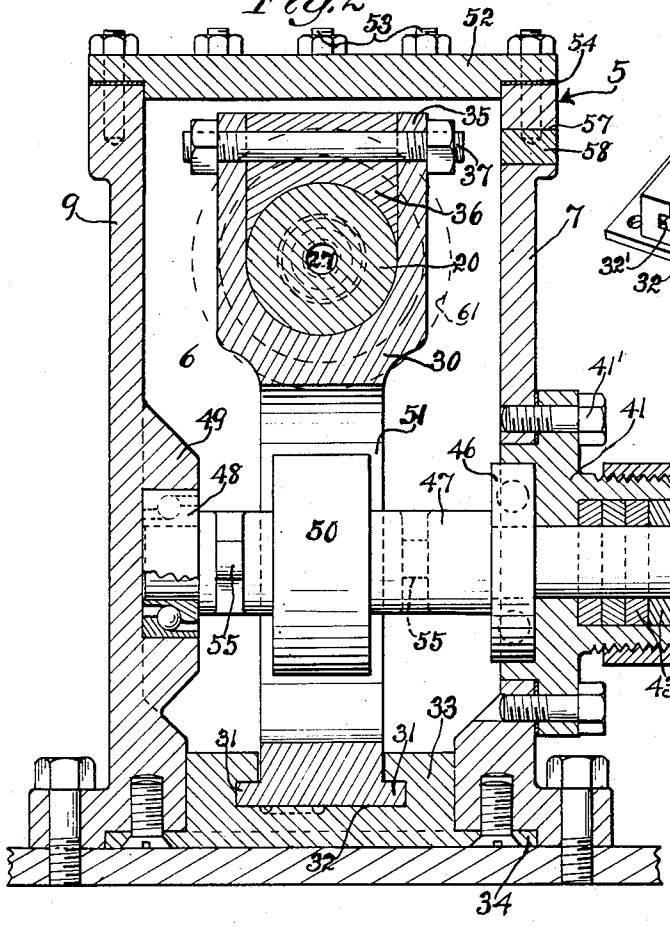
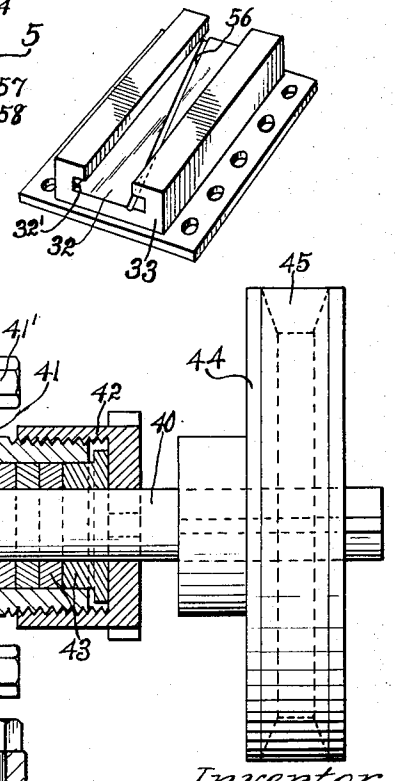


Fig. 3



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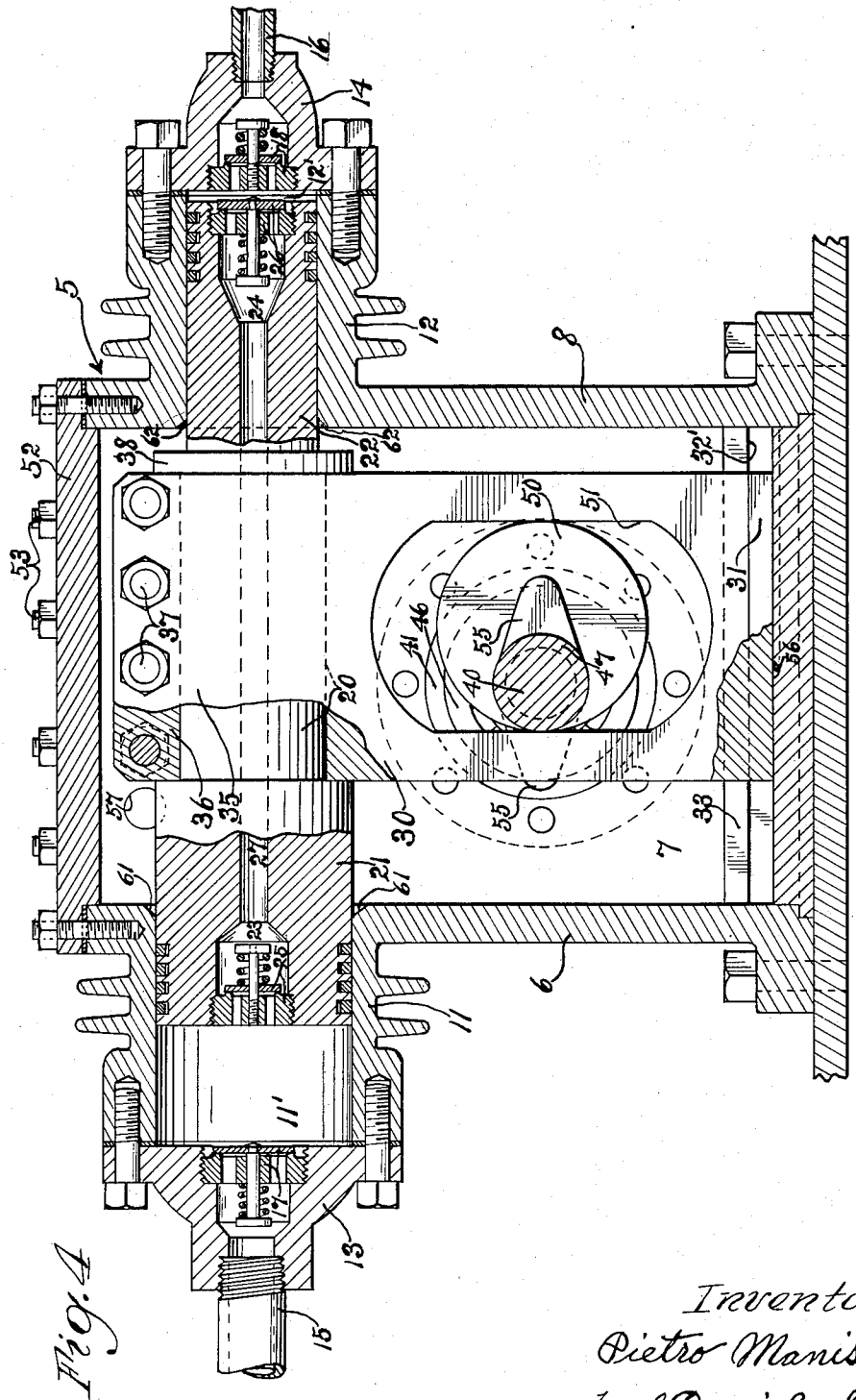


Fig. 4

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UNITED STATES PATENT OFFICE

2,169,571

COMPRESSOR UNIT

Pietro Maniscalco, Toledo, Ohio

Application August 17, 1938, Serial No. 225,333

8 Claims. (Cl. 230—192)

This invention relates to an improved compressor unit.

One of the objects of this invention is to provide a compact sealed compressor unit of a simplified and economical arrangement and construction.

Another object of this invention is to provide a sturdy compressor of an improved construction whereby the installation and likewise the replacement of the compressor members within the casing is simplified, and yet the compressor remains durable and efficient.

Another object of this invention is to provide a compressor comprising improved lubricating means.

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 4 are enlarged vertical sectional views of this compressor, taken on lines 2—2 and 4—4, respectively.

Fig. 3 is a perspective view of the supporting guide plate.

This invention embodies a sealed and compact compressor unit, which is preferably of the multistage type, and which is illustrated in the drawings in the preferred form of construction. It comprises a casing or housing 5 including integral walls 6, 7, 8 and 9, and the opposite walls 6 and 8 thereof have integral sleeves 11 and 12 extending in opposite directions therefrom, providing cylinder chambers 11' and 12' therein. These cylinders have the longitudinal axes aligned, and the cylinder 11 is larger than the cylinder 12 and forms the primary compression cylinder, while the cylinder 12 forms the secondary compression cylinder. Closure members or heads 13 and 14 are removably mounted on the outer ends of cylinders 11 and 12, respectively, by suitable bolts or the like, while an inlet pipe 15 is connected to head 13, and an outlet pipe 16 is connected to head 14, and check valves 17 and 18 are mounted in suitable pockets provided in heads 13 and 14, to admit the passage of the fluid only from pipe 15 to pipe 16.

The piston unit 20 comprises at its opposite ends a larger primary piston 21 and a smaller secondary piston 22, which fit and operate in the cylinder chambers 11' and 12', and are provided with suitable piston rings. Said pistons 21 and 22 contain end pockets 23 and 24, respectively, having check valves 25 and 26 therein, while a bore 27 extends longitudinally thru the piston unit 20, from pocket 23 to pocket 24. This provides a larger compression chamber 11' to effect the primary compression, wherefrom the fluid flows thru the bore 27 into secondary chamber 12' where it is subjected to a higher stage of compression and is then delivered to outlet pipe 16.

The means provided for reciprocating or operating the piston unit has its essential operating members housed within the casing, the same comprising an operating member or post 30 having lower side flanges 31 thereon mounted in undercut portions 32' of a guide groove 32 provided in the upper part of a base plate 33 and being thereby retained slidably in place. Said plate has bottom flanges 34 set in a groove in the bottom of the casing, being secured in place by the use of screws or the like, thereby closing the lower end of the upstanding integral walls of the casing, said lower end being mounted on a suitable base, as indicated in the drawings.

The operating member 30 includes a pair of spaced upper side plates or walls 35 providing a trough or groove therebetween wherein the middle part of piston unit 20 fits closely. A saddle 36 bears tightly upon piston unit 20 between said side walls and is secured to the walls by bolts 37. A collar or flange 38 is provided on the piston unit, being preferably integral therewith, and is placed adjacent the smaller piston 22 to engage said walls 35 and retain them in place between said collar and the larger piston 21, so that said piston unit will travel with this operating member 30.

A drive shaft 40 is rotatably mounted in a bearing collar 41 which is removably mounted on wall 7 and contains thereon a stuffing nut 42 provided with sealing rings 43 therein, said shaft 40 extending beyond the nut and having a driving member thereon, for example, a pulley 44 driven by a belt 45. Said shaft has antifriction bearing means 46 mounted thereon, at the inward side of collar 41, placed against an enlarged part 47 of the drive shaft, while at its inner end the shaft is mounted by antifriction bearing means 48 in a boss 49 which is integral with and extends inwardly of the casing wall 9.

A circular driving member 50 is eccentrically

positioned on the enlarged part 47 of the drive shaft and operates rotatively in a vertically elongated channel or opening 51 in operating post 30, whereby to reciprocate the pistons in the cylinders.

A top plate or cover 52 is removably mounted on the upper end of the casing walls, as by means of bolts 53, and by the use of suitable sealing means or rings 54. Other sealing means is likewise provided wherever required.

The casing is adapted to have lubricating oil or similar lubricating means placed therein for lubricating the movable parts; and an improved mechanism for distributing the lubricant is also provided which comprises splash fingers 55 extending radially from the enlarged part 47 of the shaft, adapted to lift and splash the lubricant upward to the pistons, and also upon the eccentric and the bearings, when the lubricant is no longer standing above the bearings. A lubricant groove 56 is provided at a slant and substantially diagonally across the upper face of plate 33, to aid in distributing the lubricant across the slidable lower face of the operating member 30.

Openings 57 are provided in one of the walls, preferably in wall 7, to facilitate passing bolts 37 therethru for inserting the same into side walls 35 and saddle 36 of the operating member 30, and a plug 58 is secured therein in each opening to close the same.

Chamfers of bevels 61 and 62 are provided in the casing, respectively, on the joining edge portions between the casing wall 6 and its cylinder chamber 11', and between the casing wall 8 and its cylinder chamber 12', as shown in Fig. 4. These chamfers are to drain off excessive lubrication on the piston and allow it to flow back into the bottom of the casing 5; and it aids in preventing oil from getting into the outlet pipe 16. This also serves to keep the lubrication on the piston at a proper minimum amount.

This construction provides a compact and sealed casing for the operating members of the compressor, and also provides an improved lubricating mechanism therefor, in view of the splash fingers 55 and the groove 56 and the chamfers 61 and 62, and the lubricant can also be maintained herein above the operating shaft and its bearings.

The construction furthermore is simple and durable and facilitates convenient and easy installing and replacing of the mechanism in the casing. In this procedure, the piston unit 20 is inserted thru the larger cylinder 11; and operating member 30 has its lower flanged part 31 slid into groove 32 of base plate 33 and is therewith inserted from the bottom into the casing, whereby the intermediate piston portion, which extends from the larger piston to the collar 38, is placed between the walls 35 of said member 30, and said plate 33 is then secured to the casing to close its lower end. The saddle 36 is added and the bolts 37 entered thru holes 57, and the nuts placed on the bolts for securing saddle 36 with walls 35 upon the intermediate portion of piston 20. The drive shaft with its bearings and the eccentric 50 are entered thru the side opening in wall 7, and the bearing collar 41 with its stuffing nut 42 are then secured around the shaft and to the side of the housing, by the bolts 41', and the drive member 44 is next attached to the shaft. The desired quantity of lubricant is then placed in the casing, and the cover plate 52 is secured thereon, thereby closing the casing and substantially sealing the same with its lubricant and its operating members enclosed therein.

I claim:

1. A compressor comprising a casing which is substantially sealed and has cylinder means extending integral from its wall means and opening into the casing, cap means with fluid conduit means on the outer ends of the cylinder means to close the same, piston means reciprocable in the cylinder means and in the casing, a bottom member on the casing having a guide channel therein provided with an oil groove slanting across its face, an operating post in the casing engaging and actuating said piston means and having a foot portion slidable in said guide channel, driving means entering the casing for driving said operating member, and splash fingers on said driving means in the casing adapted to splash and elevate lubricant positioned in the casing.

2. A compact compressor unit comprising a closed and sealed casing including integral upright walls, two opposite walls being provided with a pair of integral outwardly extending cylinders which are in alignment, a pair of valved closure caps on the outer ends of the cylinders, one having an inlet conduit and the other having an outlet conduit thereon, a piston unit with a pair of pistons on its ends operating in said cylinders, an operating member in the casing engaging said unit for reciprocating it and including a lower supporting foot, a bottom wall removably mounted on and closing the bottom of said upright walls and having a guide channel slidably receiving said foot, a bearing collar detachably mounted in an opening provided in one of said walls, a drive shaft extending thru said collar and having means thereon engaging said operating member for reciprocating it and the piston unit, and a top member tightly but removably mounted on the top of said upright walls, whereby the casing is closed fluid tight and the members contained therein are readily removed and installed.

3. The subject matter set forth in claim 2, wherein the bottom wall is provided with an oil groove for lubricating the foot, and splash fingers are provided on the driving shaft to agitate lubricant placed in said closed casing.

4. A compact multistage compressor unit comprising a closed and sealed casing including integral upright walls, two opposite walls being provided with a pair of integral outwardly extending cylinders which are in alignment, a pair of valve closure caps on the outer ends of the cylinders, one having an inlet conduit and the other having an outlet conduit thereon, a piston unit with a pair of pistons on its ends operating in said cylinders, there being a valved channel thru the piston unit providing a one-way passage between the cylinders, an operating member in the casing connected with said unit for reciprocating it and including a lower supporting foot, a bottom wall removably mounted on and closing the bottom of said upright walls and having a guide channel slidably receiving said foot, a bearing collar detachably mounted in an opening provided in one of said walls, a drive shaft extending thru said collar and having means thereon functioning in said operating member for reciprocating it and the piston unit, and a top member tightly but removably mounted on the top of said upright walls, whereby the casing is closed fluid tight and the members

contained therein are readily removed and installed.

5. A compressor comprising a casing having a detachable bottom and a pair of cylinders extending in opposite directions from the casing walls and in alignment, valved means on the outer ends of the cylinders, a piston unit in the casing including an intermediate body part with integral oppositely extending pistons reciprocable in said cylinders, an operating member in the casing provided with upper forks and saddle means thereon embracing the intermediate part of the piston unit and also provided with means at its lower end to support and guide it on the bottom of the casing, said member being withdrawable thru the bottom opening, and driving means provided with means engaging said member in the casing for reciprocating it and the piston unit.

6. A compressor comprising a casing having cylinder means extending from the casing wall means, a piston unit in the casing including piston means reciprocable in the cylinder means, a grooved guide plate providing the detachable bottom wall of the casing, an operating member in the casing detachably connected to and depending from the piston unit for reciprocating it and including an integral foot provided with flanged means at its lower end to support and hold it slidably and guide it by the grooved guide plate, said member being removable with the plate from the casing, and driving means provided with means engaging said member in the casing for reciprocating it and the piston unit.

7. A compressor comprising a closed casing containing integral upright walls with a detachable closure plate thereon and including two opposite walls provided with integral cylinders extending in opposite directions therefrom and in alignment, a piston unit in the casing including oppositely extending pistons reciprocable in the cylinders, a guide plate detachably mounted on and closing the bottom of the casing and containing a guide channel, an operating member in the casing connected to the intermediate part of the piston unit and provided with lower flanged means supported in and guided by said guide channel, and a drive shaft entering said casing and provided with an eccentric rotatable in a slot in said operating member for reciprocating it and the piston unit, whereby the casing is closed tight and the members therein are readily removed and installed.

8. A compressor comprising a closed casing containing integral cylinder means on its walls opening into the casing, piston means in said cylinder means and casing, a guide plate at the bottom of the casing having a guide channel with a diagonally extending lubricant groove and with undercut side groove means, an operating member in the casing for actuating the piston means and having a foot portion slidable in the channel and provided with side flange means engaging in the undercut means to retain it in position, driving means entering the casing for actuating said operating member, and means in the casing on said driving means adapted to agitate lubricant housed in the casing.

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