

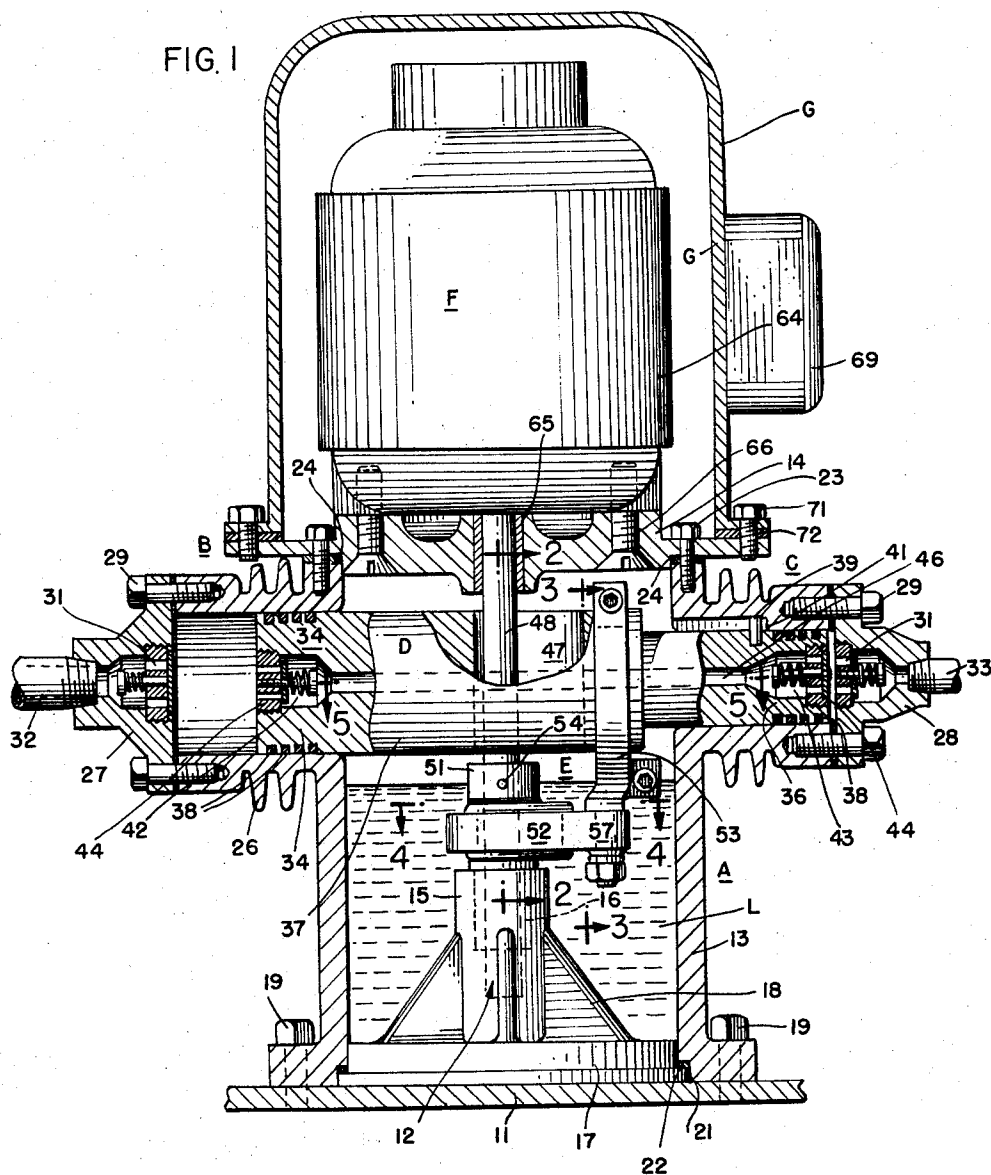
Sept. 23, 1958

P. MANISCALCO, SR
COMPRESSOR

2,853,226

Filed July 7, 1954

4 Sheets-Sheet 1



INVENTOR:
PIETRO MANISCALCO SR.

BY *Pietro Maniscalco & Snow*
ATT'YS

Sept. 23, 1958

P. MANISCALCO, SR
COMPRESSOR

2,853,226

Filed July 7, 1954

4 Sheets-Sheet 2

FIG. 2

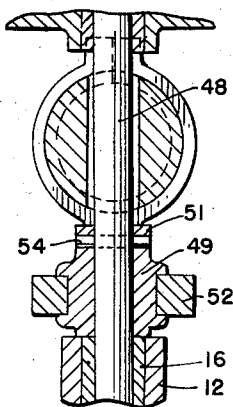


FIG. 3

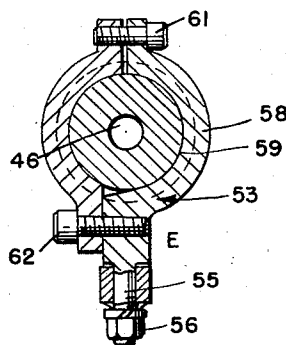


FIG. 4

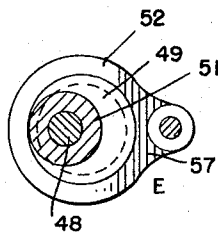
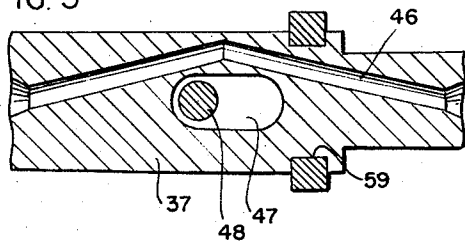


FIG. 5



INVENTOR:

PIETRO MANISCALCO SR.

BY *Pietro Maniscalco* *Att'ys*
ATT'YS

Sept. 23, 1958

P. MANISCALCO, SR
COMPRESSOR

2,853,226

Filed July 7, 1954

4 Sheets-Sheet 3

FIG. 6

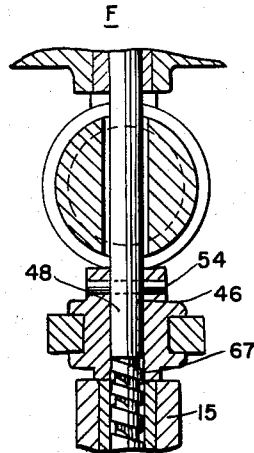


FIG. 7

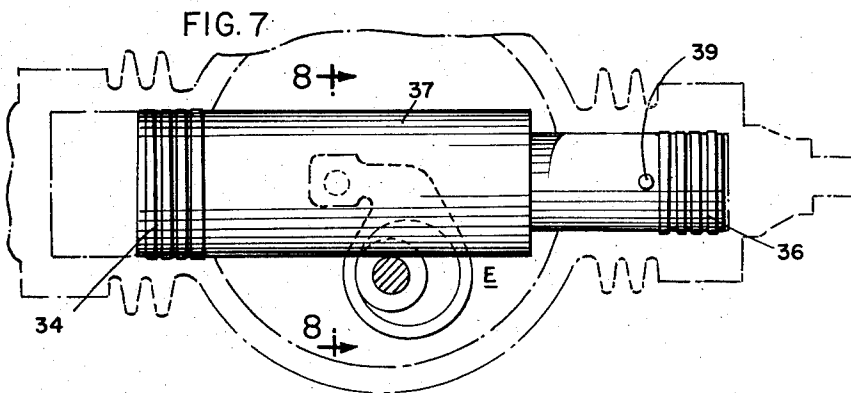
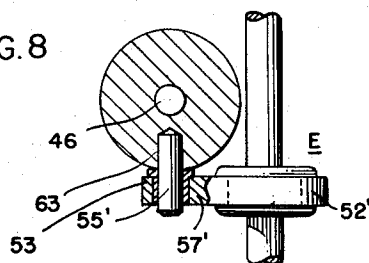


FIG. 8



INVENTOR:

PIETRO MANISCALCO SR

BY *Sumner Snow*
ATT'YS

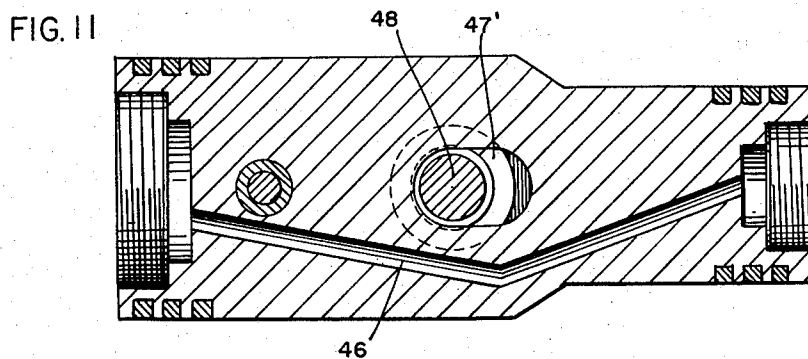
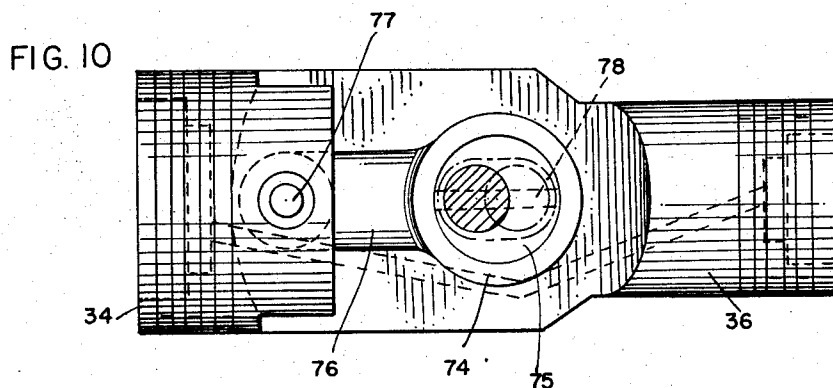
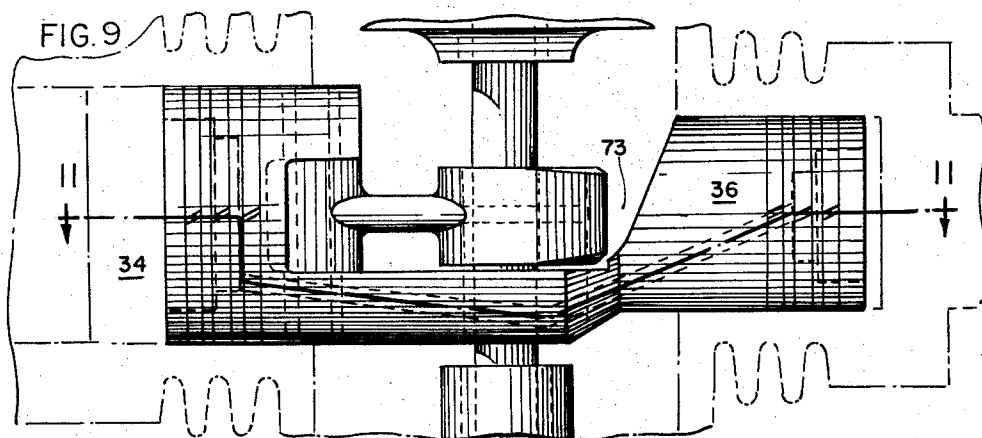
Sept. 23, 1958

P. MANISCALCO, SR
COMPRESSOR

2,853,226

Filed July 7, 1954

4 Sheets-Sheet 4



INVENTOR:
PIETRO MANISCALCO, SR.

BY *[Signature]*
ATT'YS

1

2,853,226

COMPRESSOR

Pietro Maniscalco, Sr., Chicago, Ill.

Application July 7, 1954, Serial No. 441,908

8 Claims. (Cl. 230—58)

This invention relates to compressors of the light running, multistage type, particularly suitable for use in compressing refrigerant fluids required for refrigerating and/or air conditioning equipment.

The main objects of this invention are to provide an improved form and arrangement of the piston-reciprocating mechanism driven by a vertically disposed semi-sealed motor mounted over the piston-cylinder compressing mechanism; to provide an improved arrangement and location of an eccentric drive for effecting the reciprocation of the piston unit and insuring an appropriate lubrication thereof; and to provide an improved motor-mounting and eccentric-driven piston unit of this kind which is simple in construction, compact in arrangement, light running in operation, and economical to manufacture.

Embodiments of this invention are shown in the accompanying drawings in which:

Figure 1 is a sectional elevation of an improved compressor with one form of piston reciprocating mechanism constructed in accordance with this invention;

Fig. 2 is a vertical sectional detail of the motor-shaft piston drive taken on the plane of the line 2—2 of Fig. 1;

Fig. 3 is another vertical sectional detail taken on the plane of the line 3—3 of Fig. 2;

Fig. 4 is a horizontal sectional detail taken on the plane of the line 4—4 of Fig. 1;

Fig. 5 is a horizontal sectional detail of the piston unit taken on the plane of the line 5—5 of Fig. 1;

Fig. 6 is a view similar to Fig. 2 but showing a modification of the lower end of the motor-shaft;

Fig. 7 is a fragmentary detail of a modified arrangement of the motor-shaft piston drive;

Fig. 8 is a transverse sectional detail taken on the plane of the line 8—8 of Fig. 7.

Fig. 9 is a somewhat enlarged, side-elevation view of another adaptation of a motor-shaft piston-drive;

Fig. 10 is a plan view of the eccentric and piston unit; and

Fig. 11 is a sectional detail of the same taken on the plane of the line 11—11 of Fig. 9.

The essential concept of this invention involves a horizontally-reciprocating piston unit for a multistage compressor eccentric-driven from a semi-sealed, vertically disposed motor mounted directly over the cylinder-piston mechanism, the eccentric being so positioned as to splash lubricant onto the internal relatively moving parts.

An improved light running multistage compressor embodying the foregoing concept comprises a supporting base A mounting a pair of opposed axially aligned cylinders B and C wherein a dual piston unit D is reciprocated by an eccentric mechanism E driven by a motor F vertically disposed directly above the cylinders and semi-sealed within a hood G.

Three adaptations of this improved form of eccentric mechanism E are described and illustrated, one in Figs. 1 to 5, another in Figs. 7 and 8, and a third in Figs. 9—11.

The supporting base A, for any of these three adapta-

2

tions, includes a plate 11, whereon is arranged a motor-shaft bearing 12, a surrounding housing shell 13, whereon the cylinders B and C are integrally formed, and a combination top-closure and motor-mounting plate 14.

The plates 11 and 14 may be of any suitable form such as machined steel rollings or castings. The housing shell 13 generally would be a machined casting.

The motor-shaft bearing 12, with a sleeve 16, is formed with a hub 15 extending axially upward from a disk 17 and braced thereon by reinforcing webs 18. The housing shell 13 is bolted to the plate 11 by machine screws 19 with a rim 21 on the disk 17 interposed and fluid-sealed with a gasket 22. The housing shell 13 thus provides a chamber for containing a quantity of lubricant L, usually at a level such as to submerge a part of the eccentric means E for the first and second adaptations so that during the operation of the compressor the lubricant will be splashed up onto the piston unit D to insure its proper lubrication in the cylinders B and C. The closure plate 14 is secured to the top of the housing shell 13 by machine screws 23 with an interposed fluid-seal gasket 24.

The cylinders B and C here are shown cast integral with the housing shell 13 in opposed axially aligned relationship. These are more or less conventional constructions formed with heat-dissipating fins 26 and provided with the usual cylinder heads 27 and 28. These heads are secured in appropriately sealed position on the respective cylinders B and C by machine screws 29 and equipped with recessed check valves 31, the specific form and character of which is disclosed in copending application Serial No. 441,907 filed July 7, 1954. These heads 27 and 28 have connected thereto the respective inlet and outlet conduits 32 and 33 forming a part of the line through which the refrigerant or other fluid circulates.

The bores of the cylinders B and C, as is most clear from Fig. 1, are of different diameters, cylinder B serving as the initial and low-compression cylinder and cylinder C serving as the secondary and high-compression cylinder.

The piston unit D is a machined casting formed with heads 34 and 36 connected by an intervening body part 37, the heads being dimensioned to fit the bores of the cylinders B and C respectively. These heads 34 and 36 are equipped with the usual rings 38. A spring-pressed pin 39, extending into the slot 41 in the piston unit D, holds the piston unit against turning in the cylinders B and C.

The piston heads 34 and 36, for each of the adaptations, are recessed at 42 and 43 to receive removable check valves 44 similar to the check valves 31. These recesses 42 and 43 are connected by a channel 46 extending longitudinally through the piston body part 37. In the adaptations shown in Figs. 1 and 5 and 9 to 11, the channel 46 extends around a slot 47 formed at the middle of the body part 37 of the piston unit D to accommodate the motor shaft 48. In the adaptation shown in Fig. 7, this channel 46 is indicated only in Fig. 8 and extends along the axis of the piston.

The eccentric means E, as shown in Figs. 1 to 5, is of a more or less conventional form, involving a grooved disk 49 with its hub 51, a collar 52, and a piston-unit connection 53. The disk 49 is keyed to the shaft 48 by a pin 54 (see Figs. 1 and 2) extending through the hub 51.

The connection 53, as shown in Figs. 1, 3 and 4, involves a pin 55 secured by a nut 56 to an arm 57 on the collar 52 and mounting a split yoke 58 (see Fig. 3) seated in a groove 59 (see Figs. 3 and 5) adjacent one end of the piston body part 37. The two parts of the yoke 58 are secured in embracing position on the piston unit D by machine screws 61 and 62 (see Fig. 3).

In the adaptation shown in Figs. 7 and 8, the pin 55', because the eccentric means E is offset at one side of the

piston unit D, has its free or upper end seated in a groove 63 in the body part 37 of the piston unit D.

In the adaptation shown in Figs. 9-11, the piston unit D, has its central portion recessed at 73 along the axis thereof between the piston heads 34 and 36 and formed with a slot 47. A collar 74, embracing a disk 75 is formed on the end of an arm 76 which is hinged on a wrist pin 77 in the adjacent end of the larger piston head 34. The eccentric disk 75 is secured to the motor shaft 48 by a key pin 78, and the swinging of the arm 76 in the recess 73 effects the reciprocation of the piston unit D as the collar 74 responds to the motor driven disk 75.

When the level of the lubricant L in the housing shell 13 is above the eccentric means E, as shown in Figs. 1 to 5 or 7 and 8, the eccentric means E not only is well lubricated but it splashes lubricant up onto the piston unit D and insures lubrication of the contacting and relatively moving surfaces of the piston heads 34 and 36 and the bores of the cylinders B and C. Where the lubricant L is not maintained at a level above the disk 49 and collar 52 of the eccentric means E, as shown in the first two adaptations, or where the lubricant level cannot be so maintained in the third adaptation, it is necessary to provide for a feeding of lubricant up to the eccentric means E and the piston unit D. This may be accomplished by the formation of spiral grooves 67 in the motor-shaft 48 (see Fig. 6).

The motor F is a standard type with a housing 64 of such external form, at least on one end, as to set squarely on the closure plate 14 and permit its being anchored thereto by machine screws 66 (see Fig. 1). An "Oilie" bearing 65 is arranged in the plate 14 for the motor-shaft 48 to insure its proper lubrication and prevent the lubricant from the shell 13 entering the motor housing 64. A conventional capacitor 69, normally mounted directly on the motor housing 64, is, in this case, mounted on the exterior of the hood G so that in the event of any gas leaks, from the housing well into the interior of the hood G, there could be no ignition of the gas and a possible explosion with resulting damage to the compressor unit and the mechanism wherewith it was operatively associated.

The hood G may be made of any suitable material and of a form to fit over the motor F. When bolted to the closure 14 by machine screws 71 with an interposed gasket 72, the hood G provides a removable seal for the motor.

The herein shown compressor, embodying this invention operates as follows:

The parts all being properly assembled and the motor F plugged into a source of power, the rotation of the shaft 48 causes the eccentric means E to effect a rapid recirculation of the piston unit D. The refrigerant, or other fluid, is drawn into the cylinder B through the inlet 32 during one stroke of the piston unit D, whereupon the reverse movement of the piston unit D compresses the refrigerant causing it to pass through the channel 46 into the cylinder C, so that the return stroke of the piston unit D further compresses the refrigerant and forces it out through the outlet 33 to the point of its intended use.

The movement of the eccentric means E, shown in Figs. 1 to 5 and 7 and 8, in addition to causing the reciprocation of the piston unit D, also splashes lubricant up onto the piston unit D from where it tends to flow out along the piston unit to lubricate the contacting surfaces of the piston heads 34 and 36 and respective cylinders B and C.

It is to be understood that numerous details may be altered or omitted without departing from the spirit of this invention as defined by the following claims.

I claim:

1. A compressor comprising, a vertically-disposed supporting base forming a lubricating well, a motor-shaft bearing fixed on the base internally thereof, transversely-disposed axially-spaced and -aligned cylinders integrated with the base and connected at their respective outer ends

with conduits forming a part of a refrigerant flow line, a reciprocable piston unit having piston heads fitting the respective cylinders for effecting compression therein, the piston unit having an internal channel extending longitudinally thereof and affording communication between the respective cylinders, check-valve means in the piston-unit channel for controlling the refrigerant flow therethrough, a motor mounted on a vertically-disposed axis above the cylinders and having the motor-shaft extending below the cylinders with its lower end journaled in the base bearing, and a single eccentric journaled on the shaft and operatively connected to the piston unit to cause the opposite reciprocation thereof and thereby effect a direct flow of refrigerant from one cylinder to the other through the piston-unit channel.

2. A compressor comprising, a vertically-disposed supporting base forming a lubricating well, a motor-shaft bearing fixed on the base internally thereof, transversely-disposed axially-spaced and -aligned cylinders integrated with the base and extending exteriorly of the base, the cylinders being connected at their respective outer ends with conduits forming a part of a refrigerant flow line, a reciprocable piston unit having piston heads fitting the respective cylinders for effecting compression therein, the piston unit having an internal channel extending longitudinally thereof and affording communication between the respective cylinders, check-valve means in the piston-unit channel for controlling the refrigerant flow therethrough, a motor mounted on a vertically-disposed axis above the cylinders and having the motor-shaft extending below the cylinders with its lower end journaled in the base bearing, and a single eccentric journaled on the shaft and operatively connected to the piston unit to cause the opposite reciprocation thereof and thereby effect a direct flow of refrigerant from one cylinder to the other through the piston-unit channel.

3. A compressor comprising, a vertically-disposed supporting base forming a lubricating well, a motor-shaft bearing fixed on the base internally thereof, transversely-disposed axially-spaced and -aligned cylinders integrated with the base and extending exteriorly of the base and having external radially-disposed heat-dissipating fins formed thereon, the cylinders being connected at their respective outer ends with conduits forming a part of a refrigerant flow line, a reciprocable piston unit having piston heads fitting the respective cylinders for effecting compression therein, the piston unit having an internal channel extending longitudinally thereof and affording communication between the respective cylinders, check-valve means in the piston-cylinder channel for controlling the refrigerant flow therethrough, a motor mounted on a vertically-disposed axis above the cylinders and having the motor-shaft extending below the cylinders with its lower end journaled in the base bearing, and a single eccentric journaled on the shaft and operatively connected to the piston unit to cause the opposite reciprocation thereof and thereby effect a direct flow of refrigerant from one cylinder to the other through the piston-unit channel.

4. A compressor comprising, a vertically-disposed supporting base forming a lubricating well, a motor-shaft bearing fixed on the base internally thereof, transversely-disposed axially-spaced and -aligned cylinders integrated with the base and connected at their respective outer ends with conduits forming a part of a refrigerant flow line, a reciprocable piston unit having piston heads fitting the respective cylinders for effecting compression therein, the piston unit having an internal channel extending longitudinally thereof and affording communication between the respective cylinders, check-valve means in the piston-cylinder channel for controlling the refrigerant flow therethrough, a motor mounted on a vertically-disposed axis above the cylinders and having the motor-shaft extending below the cylinders with its lower end journaled in the base bearing, and a single eccentric jour-

5

naled on the shaft below the cylinder-piston-unit mechanism within the lubricating well and operatively-connected to the piston unit to cause the opposite reciprocation thereof and thereby effect a direct flow of refrigerant from one cylinder to the other through the piston-unit channel.

5. A compressor comprising, a vertically-disposed supporting base forming a lubricating well, a motor-shaft bearing fixed on the base internally thereof, transversely-disposed axially-spaced and -aligned cylinders integrated with the base and connected at their respective outer ends with conduits forming a part of the refrigerant flow line, a reciprocable piston unit having piston heads fitting the respective cylinders for effecting compression therein, the piston unit being formed with a motor-shaft opening medially thereof and having an internal channel extending longitudinally of the piston unit and affording communication between the respective cylinders, check-valve means in the piston-unit channel for controlling the refrigerant flow therethrough, a motor mounted on a vertically-disposed axis above the cylinders and having the motor-shaft extending through the piston unit opening and below the cylinders with its lower end journaled in the base bearing, and a single eccentric journaled on the shaft and operatively connected to the piston unit to cause the opposite reciprocation thereof and thereby effect a direct flow of refrigerant from one cylinder to the other through the piston-unit channel.

6. A compressor comprising, a vertically-disposed supporting base forming a lubricating well, a motor-shaft bearing fixed on the base internally thereof, transversely-disposed axially-spaced and -aligned cylinders integrated with the base and connected at their respective outer ends with conduits forming a part of a refrigerant flow line, a reciprocable piston unit having piston heads fitting the respective cylinders for effecting compression therein, the piston unit being formed with a motor-shaft opening medially thereof and having an internal channel extending longitudinally of the piston unit and affording communication between the respective cylinders, check-valve means in the piston-unit channel for controlling the refrigerant flow therethrough, a motor mounted on a vertically-disposed axis above the cylinders and having the motor-shaft extending through the piston unit opening and below the cylinders with its lower end journaled in the base bearing, a single eccentric journaled on the shaft, and a yoke embracing the piston-unit and having a swivel connection to the eccentric to cause the opposite reciprocation of the piston-unit and thereby effect a direct flow of refrigerant from one cylinder to the other through the piston-unit channel.

7. A compressor comprising, a vertically-disposed supporting base forming a lubricating well, a motor-shaft

6

bearing fixed on the base internally thereof, transversely-disposed axially-spaced and -aligned cylinders integrated with the base and connected at their respective outer ends with conduits forming a part of a refrigerant flow line, a reciprocable piston-unit having piston heads fitting the respective cylinders for effecting compression therein, the piston-unit having an internal channel extending longitudinally thereof and affording communication between the respective cylinders, check-valve means in the piston-unit channel for controlling the refrigerant flow therethrough, a motor mounted on a vertically-disposed axis above the cylinders and having the motor-shaft extending below the cylinders with its lower end journaled in the base bearing, the piston unit having a longitudinal slot formed medially in the face thereof, a single eccentric journaled on the shaft at one side of the piston-unit, and a pin on the eccentric extending into the piston-unit slot to cause the opposite reciprocation of the piston-unit and thereby effect a direct flow of refrigerant from one cylinder to the other through the piston-unit channel.

8. A compressor comprising, a vertically-disposed supporting base forming a lubricating well, a motor-shaft bearing fixed on the base internally thereof, transversely-disposed axially-spaced and -aligned cylinders integrated with the base and connected at their respective outer ends with conduits forming a part of a refrigerant flow line, a reciprocable piston unit having piston heads fitting the respective cylinders for effecting compression therein, the piston unit being centrally recessed and slotted medially along its axis and having an internal channel extending longitudinally of the piston-unit and affording communication between the respective cylinders, check-valve means in the piston-unit channel for controlling the refrigerant flow therethrough, a motor mounted on a vertically-disposed axis above the cylinders and having the motor shaft extending through the piston-unit slot below the piston-unit and journaled in the base bearing, a rocket arm hinged to the piston-unit within the piston-unit recess, and an eccentric journaled on the motor shaft and connected to the rocker arm to cause the opposite reciprocation of the piston-unit and thereby effect a direct flow of refrigerant from one cylinder to the other through the piston-unit channel.

References Cited in the file of this patent

UNITED STATES PATENTS

1,738,104	Hall	Dec. 3, 1929
1,780,784	Gunn	Nov. 4, 1930
1,974,421	Haunz	Sept. 25, 1934
2,138,093	Feldbush et al.	Nov. 29, 1938
2,169,571	Maniscalco	Aug. 15, 1939
2,618,430	Smith	Nov. 18, 1952