

July 16, 1946.

P. MANISCALCO ET AL

2,404,079

COMPRESSOR

Filed May 30, 1942

4 Sheets-Sheet 1

Fig. 3

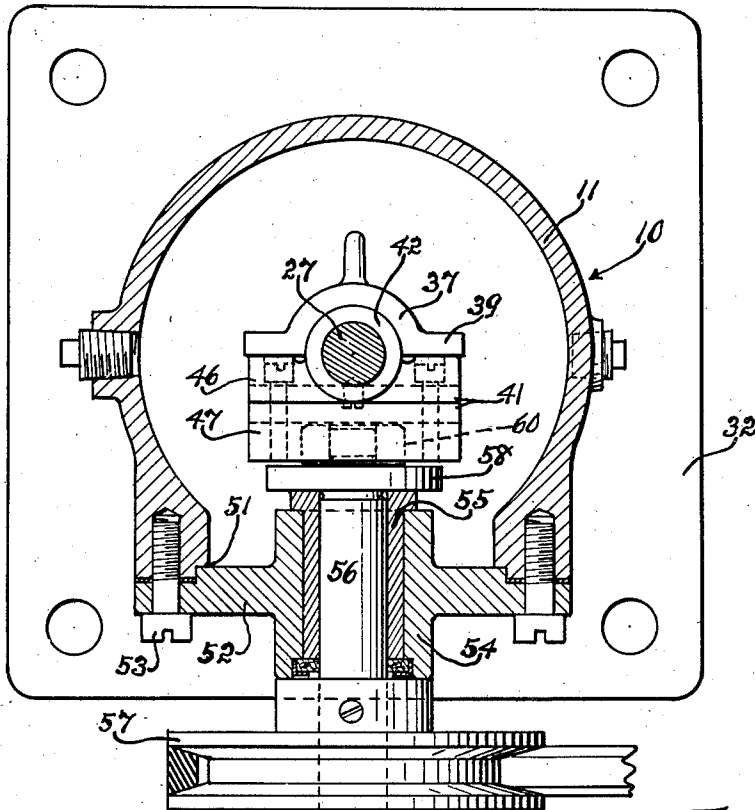


Fig. 1

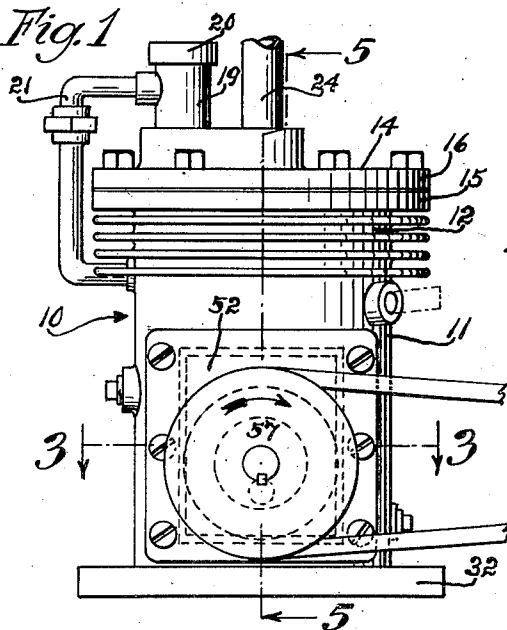
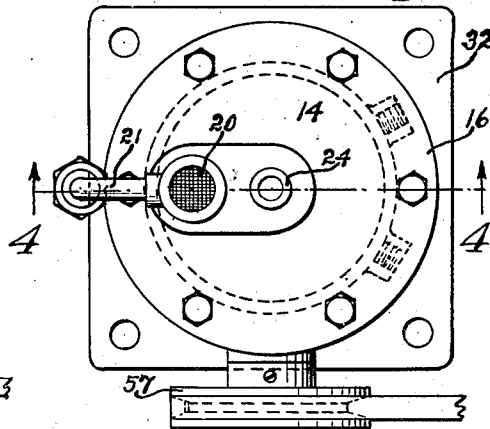


Fig. 2



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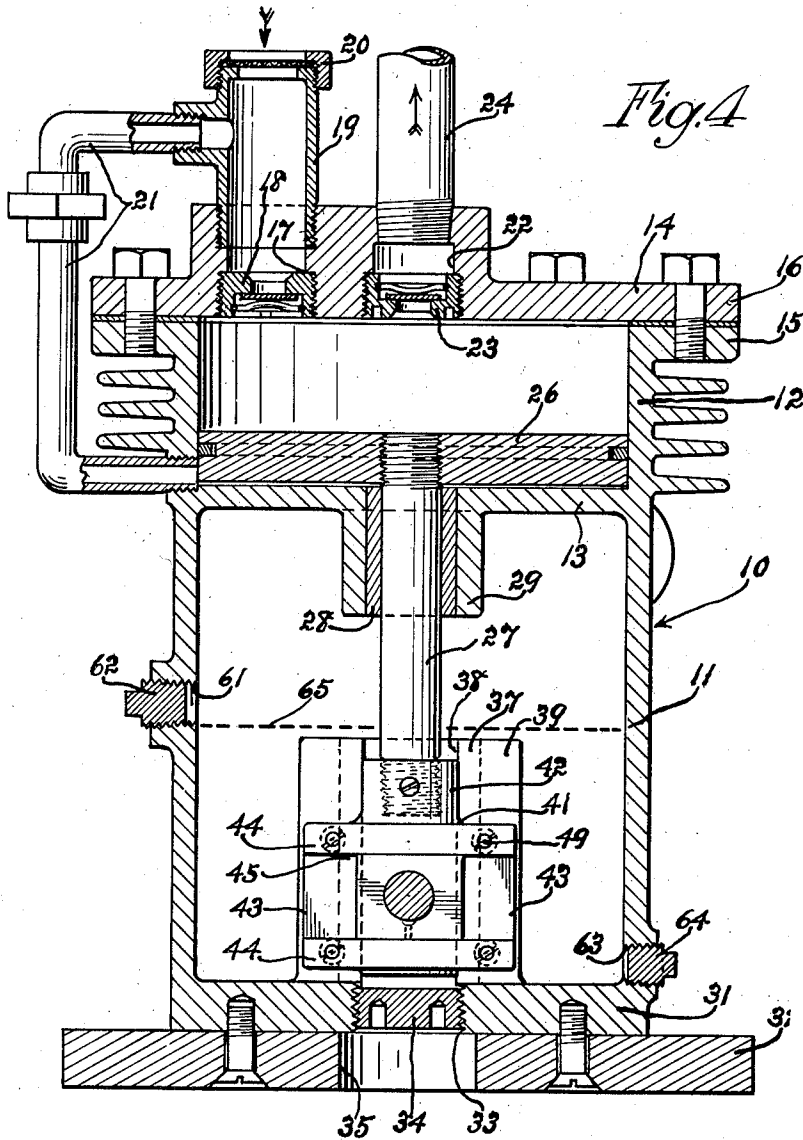
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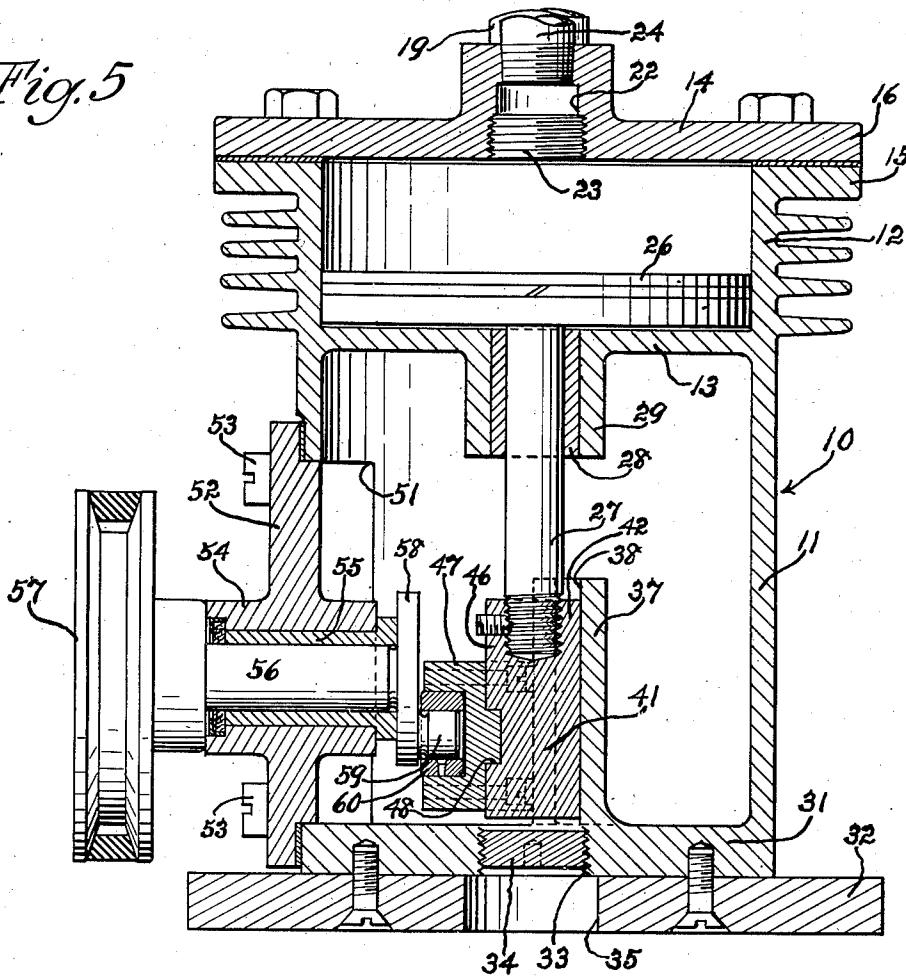
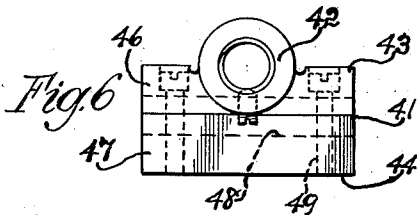
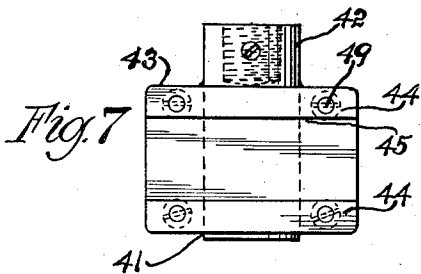
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Fig. 5



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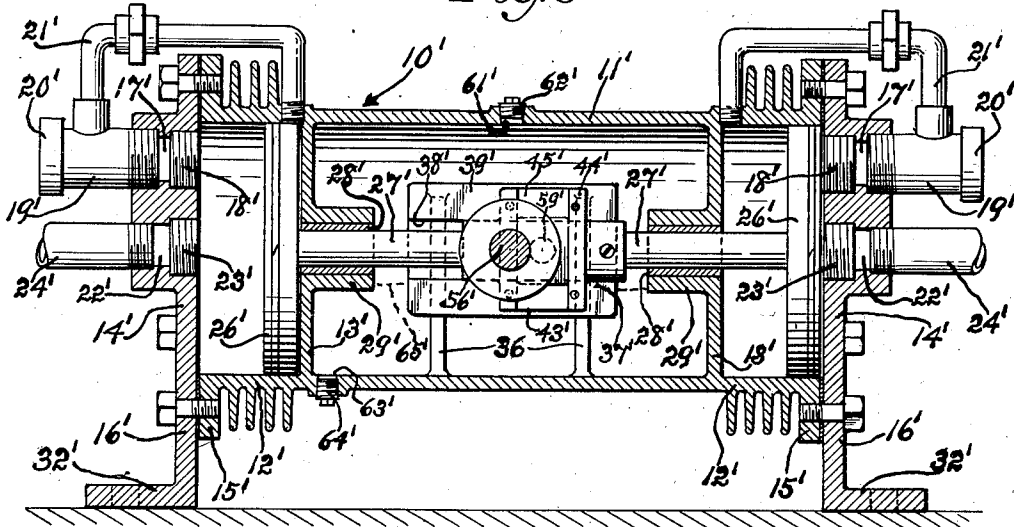
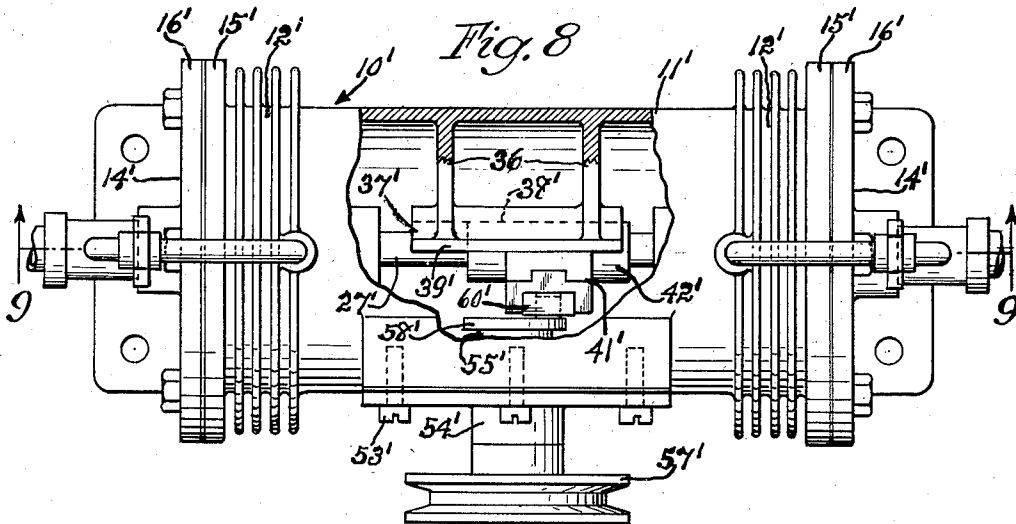
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Fig. 9



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UNITED STATES PATENT OFFICE

2,404,079

COMPRESSOR

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Application May 30, 1942, Serial No. 445,154

10 Claims. (Cl. 230—180)

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This invention relates to a new and useful compressor.

One of the essential objects of this invention is to provide a compressor which is compact and light running, and is of unitary construction comprising a chamber containing the driving means operating in lubricant therein and having the cylinder means formed integral with said chamber.

Another object of this invention is to provide a compressor construction in the shape of a cylindrical casing comprising an operating chamber therein, and having the cylinder means formed integral and in axial alinement therewith, which may be either one cylinder integral at one end of the chamber or a pair of cylinders integral on the two opposite ends thereof.

Another object of this invention is to arrange such compact compressor construction so that the cylindrical casing may be set-up and operated in an upright position, and may likewise be mounted and operated in a horizontal position.

A further object of this invention is to provide the compressor with novel driving mechanism, including means connected with the piston rod and slidably mounted in lubricant in the chamber, and operating means which slidably engages said slidable means and reciprocates it and the piston, to provide a smoothly running construction.

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 shown in some of its arrangements and forms, it being evident that other arrangements and forms of construction may be resorted to for carrying out the objects and purposes of this invention.

In the drawings:

Fig. 1 is an elevational view of a compressor embodying our invention, being shown in the preferred form of construction and having the casing placed in an upright position.

Fig. 2 is a plan view thereof.

Fig. 3 is an enlarged horizontal section taken on line 3—3 of Fig. 1.

Fig. 4 is an enlarged vertical section taken on line 4—4 of Fig. 2.

Fig. 5 is an enlarged vertical section taken on line 5—5 of Fig. 1.

Figs. 6 and 7 are, respectively, top and side views of the piston-operating member that is slidable in channel means in the casing.

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Fig. 8 is a plan view, showing the cylindrical casing mounted in a horizontal position and having a cylinder formed integral on each of the two opposite ends of the operating chamber.

Fig. 9 is a vertical sectional view of this two-cylinder form of our invention, taken on line 9—9 of Fig. 8.

In the drawings our invention is illustrated in its preferred form of construction, and it is shown in two substantially alike arrangements. In either shape and arrangement this compressor comprises a compact unitary casing which is preferably cylindrical in shape and includes an operating chamber which is adapted to contain lubricant therein and wherein the driving means operates; and this casing further includes cylinder means which is formed integral with the chamber and is provided with valved head means thereon and piston means therein.

The arrangement of the compressor with its chamber and the integral cylinder means may consist of a cylindrical casing 10 comprising a chamber 11 having one cylinder 12 formed integral on one end thereof, as shown in Figs. 1 to 7, inclusive; and the arrangement may likewise consist of a casing 10' comprising a chamber 11' and a pair of cylinders 12' with one formed integral on each of its two opposite ends. An integral partition wall 13 is provided between the chamber 11 and the cylinder 12; and similar integral partition walls 13' are provided between the two ends of chamber 11' and the integral chambers 12' on its two opposite ends. An end member or head 14 is detachably mounted on the outer end of the cylinder 12, by the use of flange means 15 and 16, provided on the cylinder and on the head, respectively, and containing registering openings having securing bolts therein; and similar end members or heads 14' are likewise mounted on the two outer ends of the cylinders 12', by flanges 15' and 16' on these cylinders and heads and securing bolts fastened in registering openings therein, substantially as illustrated. Said heads are provided with valved fluid inlet means and valved fluid outlet means, in either form and arrangement.

Considering the form shown in Figs. 1 to 7, inclusive, the head 14 contains an inlet port 17 having an inlet valve 18 removably mounted therein, and also having a fluid inlet member or tube 19 mounted outward of said valve and provided with a detachable strainer member 20 thereon, while a bypass 21 is preferably extended from the tube 19 to the inner end of the cylinder 12, as indicated in the drawings, to prevent

back-pressure on the piston during its inward stroke. An outlet port 22 in the head is provided with an outlet valve 23 therein and a conduit 24 attached outward of said valve, for conducting the compressed fluid from the cylinder.

The cylinder 12 contains a piston 26 therein provided with a rod 27 thereon extending thru the partition wall 13 into the operating chamber 11, and slides or reciprocates in a bushing 28 mounted in a collar 29 provided centrally in said partition wall, said bushing being preferably made of bronze.

In this form, having one cylinder provided on chamber 11, as best shown in Figs. 4 and 5, the chamber comprises an end wall 31, opposite the partition wall 13; and said wall 31 is arranged or provided with means for supporting the compressor. When this compressor is to be mounted upright, as shown, then a base member or plate 32 is secured to said wall 31, by suitable bolts or the like, and the casing can thus be mounted upright on any suitable support.

The integral end wall 31 of chamber 11 is preferably provided with a central aperture 33 having a plug 34 removably mounted therein, as by threading the two and providing suitable notches or indentations for receiving the prongs of a wrench in the plug to turn it in the aperture; while an opening 35 is provided in plate 32, to facilitate applying and removing said plug. Said aperture 33 is utilized for extending suitable finishing means or tools therethru in finishing the interior of collar 29 for seating the bushing 28 therein, and for alining it with the interior of the guide member which extends from the end wall 31, and for finishing and alining the channel in said guide member. Said aperture may also be used for draining the used lubricant from the upright casing.

The compressor is provided with a guide member which is fixed in the chamber and which is preferably made integral with the casing wall; and in the form shown in Fig. 5 the guide member 37 is extended integral from the end wall 31 into the chamber 11 and is provided with a trough or channel 38 therein which is substantially semi-circular and is alined with and close to the axis of the casing. A pair of guide flanges 39 are provided on the sides of said member 37.

A sliding member or shoe 41 is detachably connected to the piston rod 27, being preferably threaded thereto and secured thereon by a set screw, as shown. This shoe includes a rounded portion or runner 42 which fits exactly and is slidable in the cylindrical channel 38, on the longitudinal axis of the casing; while side flanges 43 on said shoe move slidably on and are guided by said guide flanges 39. The shoe is also provided with spaced ribs 44 on the side opposite the runner 42, which extend transversely of the channel 38 and which provide a transverse slideway 45. Said shoe may be made in two parts 46 and 47 having groove-and-tongue connection 48 and being secured together by screws 49, or the shoe may be made integral if desired.

The chamber 11 is provided with a doorway or opening 51 in its cylindrical wall, which has a door or closure member 52 openably mounted therein, being shown as detachably secured in place by means of bolts 53 and sealed by the use of gasket means. Said door includes an integral sleeve 54 which contains therein a bushing 55 wherein a drive shaft 56 is journaled, and the shaft is driven by suitable means on its outer end,

as a pulley wheel 57 secured on said end. On its inner end the shaft has fixed a disk or member 58 which carries a rounded stud or boss 59 thereon located eccentrically of the axis of this shaft 56, and this boss has bearing in a circular aperture provided in a block or slidable bearing member 60 which fits smoothly in said slideway 45, adapted to slide therein transversely of the shoe 41.

The door 52 can thus be opened or detached, and it will carry with it said parts 54 to 60, whereby the block 60 has simply been lifted out of its slideway 45. Access is thereby provided to the removed parts, and to the chamber with the shoe 41 and the other parts therein.

A lubricant inlet 61 with a removable plug or closure element 62, and a lubricant outlet 63 with a removable plug or closure element 64 are also provided on the chamber 11; and, as indicated in the drawings, they are so placed on the chamber as to be in proper position for service whether this compressor is mounted upright, as shown in Figs. 1 to 7, or it is placed horizontally, as shown in Figs. 8 and 9. The oil or lubricant is supplied in the chamber until its level or top stands substantially to the line 65, indicated in Fig. 4, and likewise to the line 65', indicated in Fig. 9; and the shoe during its reciprocation will thus slide in the lubricant and will act as splash means for moving the lubricant onto the associated parts including the piston rod, and some lubricant will thereby move along into the bushing 28 for lubricating the same.

Figs. 8 and 9 illustrate a slightly modified form of this invention, which comprises two cylinders 12' on the two ends of the chamber 11', each having a head 14' detachably mounted thereon. Each head contains an inlet port 17' having an inlet valve 18' removably mounted therein and having a fluid inlet tube 19' mounted outward of the valve and carrying a detachable strainer 20' thereon, while a bypass 21' is extended from the tube to the inner end of cylinder 12', as in the preceding form. An outlet port 22' in the head has an outlet valve 23' therein and a conduit 24' mounted outward of said valve, to conduct the compressed fluid from the cylinder.

Each of the cylinders 12' contains therein a piston 26' having a rod 27' extending thru the partition wall 13' into chamber 11', and the rod slides in a bushing 28' mounted in a collar 29' provided on said wall, like in the above described form.

In this form of our invention the compressor is preferably mounted to have its longitudinal axis extending horizontally, as shown; and the heads 14' are then provided with supporting means, as by providing laterally extending flanges or feet 32' on the flanges 16' on the heads, adapted for supporting this compressor on a suitable floor or the like.

This form is also provided with segmental ribs 36 for supporting the guide member 37' in chamber 11'; and, for economy in construction, these ribs 36 are preferably formed integral with the chamber wall and with this guide member, as indicated in the drawings. Said member 37' contains a semi-cylindrical channel or trough 38' which extends in parallel relation to the longitudinal axis of the cylindrical casing, and a pair of guide flanges 39' are provided on the sides of said member 37'.

The shoe or sliding member 41' herein has the two piston rods 27' detachably connected thereto,

as by a threaded connection and a securing screw. The shoe includes a rounded runner 42' which is slidable in the channel 33', while side flanges 43' on the shoe are slidable on the guide flanges 39' of member 37'; and this shoe is also provided with spaced ribs 44' forming a slideway 45' therebetween which extends transversely of said runner 42', like in the preceding form.

This chamber 11' also comprises a door 52' detachably mounted in a doorway provided in the chamber wall, being secured in place by means of bolts 53'. The door includes an integral sleeve 54' containing a bushing 55' having a drive shaft 56' journaled therein and driven by a pulley 57' fixed on its outer end; and this shaft has on its inner end a disk 58' carrying a boss 59' placed eccentrically of the axis of the shaft. The boss bears rotatably in an aperture provided in a block 60' which is slidable in said slideway 45' transversely of the shoe 41'.

The door can thus be opened to provide access to the parts in the chamber, and the door and shoe and operating parts are substantially identical with those of the preceding form described above.

The lubricant inlet 61' with its plug 62' and the lubricant outlet 63' with its plug 64' are also provided on chamber 11', and they are properly positioned so as to function right whether the compressor is placed horizontally or upright, as has been explained above.

These drive blocks 60 and 60' are preferably of bronze, and as they are removable from the associated slideway 45, 45', and boss 59, 59', each of them will act and serve as a removable bushing that can be readily replaced.

The cylinders are preferably also provided with radially extending cooling fins thereon, as indicated, as a cooling aid.

This invention, in either of its forms disclosed herein, provides a compact and unitary compressor construction which is light running and is also economical; and it can be mounted to be operated either in an upright position or in a horizontal position, as the involved conditions may require.

We claim:

1. In a compressor of the character disclosed and which has a crank chamber with a cylinder at an end thereof, a cylinder wall between them, and a piston in said cylinder with a piston rod slidable through said wall and having its end extending into said chamber; a guide means comprising a guide member fixed to and extending into said chamber from a wall thereof and having a guide channel coaxial with the axis of the piston and the piston rod, a shoe secured to the piston rod and having a runner slidable along said guide channel for maintaining the piston and piston rod in axial position during their reciprocations, and a drive shaft in said chamber and having operative connection with said shoe for reciprocating said shoe and said runner along said guide channel.

2. In a compressor of the character disclosed and which has a crank chamber with a cylinder at an end thereof, a cylinder wall between them, and a piston in said cylinder with a piston rod slidable through said wall and having its end extending into said chamber; a guide means comprising a guide member fixed to and extending into said chamber from a wall thereof and having a guide channel coaxial with the axis of the piston and the piston rod, a shoe secured to the piston rod and having a runner slidable along

said guide channel for maintaining the piston and piston rod in axial position during their reciprocations, a drive shaft in said chamber and having operative connection with said shoe for reciprocating said shoe and said runner along said guide channel, said shoe having a transverse slideway, and a block slidable in said slideway and provided with a bearing socket, said drive shaft having a crank with a crank pin fitting in said socket.

3. In a compressor of the character disclosed and which has a crank chamber with a cylinder at an end thereof, a cylinder wall between them, and a piston in said cylinder with a piston rod slidable through said wall and having its end extending into said chamber; a guide means comprising a guide member fixed to and extending into said chamber from a wall thereof and having a guide channel coaxial with the axis of the piston and the piston rod, a shoe secured to the piston rod and having a runner slidable along said guide channel for maintaining the piston and piston rod in axial position during their reciprocations, a drive shaft in said chamber and having operative connection with said shoe for reciprocating said shoe and said runner along said guide channel, a shoe part secured to a side of said shoe and having a transverse slideway, and a bearing block slidable in said slideway and having a bearing socket, said drive shaft having an eccentrically located pin extending into said bearing socket.

4. In a compressor of the character disclosed and which has a crank chamber with a cylinder at an end thereof, a cylinder wall between them, and a piston in said cylinder with a piston rod slidable through said wall and having its end extending into said chamber; a guide means comprising a guide member fixed to and extending into said chamber from a wall thereof and having a guide channel coaxial with the axis of the piston and the piston rod, a shoe secured to the piston rod and having a runner slidable along said guide channel for maintaining the piston and piston rod in axial position during their reciprocations, and a drive shaft in said chamber and having operative connection with said shoe for reciprocating said shoe and said runner along said guide channel, said guide member also having guide flanges adjacent said guide channel, said shoe also having guide flanges to slide along said guide flanges of said guide member.

5. In a compressor of the character disclosed and which has a crank chamber with a cylinder at an end thereof, a cylinder wall between them, and a piston in said cylinder with a piston rod slidable through said wall and having its end extending into said chamber; a guide means comprising a guide member fixed to and extending into said chamber from a wall thereof and having a guide channel coaxial with the axis of the piston and the piston rod, a shoe secured to the piston rod and having a runner slidable along said guide channel for maintaining the piston and piston rod in axial position during their reciprocations, a drive shaft in said chamber and having operative connection with said shoe for reciprocating said shoe and said runner along said guide channel, said guide member also having guide flanges adjacent said guide channel, said shoe also having guide flanges to slide along said guide flanges of said guide member, said shoe having a transverse slideway, and a block slidable in said slideway and provided with a

bearing socket, said drive shaft having a crank with a crank pin fitting in said socket.

6. In a compressor of the character disclosed and which has a crank chamber with a cylinder at an end thereof, a cylinder wall between them, and a piston in said cylinder with a piston rod slidable through said wall and having its end extending into said chamber; a guide means comprising a guide member fixed to and extending into said chamber from a wall thereof and having a guide channel coaxial with the axis of the piston and the piston rod, a shoe secured to the piston rod and having a runner slidable along said guide channel for maintaining the piston and piston rod in axial position during their reciprocations, a drive shaft in said chamber and having operative connection with said shoe for reciprocating said shoe and said runner along said guide channel, said guide member also having guide flanges adjacent said guide channel, said shoe also having guide flanges to slide along said guide flanges of said guide member, a shoe part secured to a side of said shoe and having a transverse slideway, and a bearing block slidable in said slideway and having a bearing socket, said drive shaft having an eccentrically located pin extending into said bearing socket.

7. In a compressor of the character disclosed and which has a cylinder with a piston operative therein, a crank chamber with a piston rod operative therein, and an intervening partition wall with an opening for the passage of the piston rod; the combination therewith of a runner se-

cured to said piston rod in said crank chamber, a guide member in fixed position in said crank chamber and having a guide channel for said runner, a guide shoe secured to said runner and having a transverse slideway, and a drive means operable in said transverse slideway for reciprocating said piston and piston rod.

8. In a compressor as set forth in claim 7 and in which the guide shoe comprises a primary shoe part secured to said runner and a secondary shoe part secured to said primary shoe part and which secondary shoe part has said transverse slideway therein.

9. In a compressor as set forth in claim 7 and in which the guide shoe comprises a pair of shoe parts having tongue and groove connection therebetween for maintaining said parts together in an axial direction of said piston and piston rod, one of said shoe parts having said transverse slideway therein and the other of said shoe parts being fixed to said runner.

10. In a compressor as set forth in claim 7 and in which the guide shoe comprises a pair of shoe parts having connections therebetween for maintaining said parts together in an axial direction of said piston and piston rod, said shoe parts having means for securing said shoe parts together in a transverse direction to the axis of said piston and piston rod, one of said shoe parts having said transverse slideway therein and the other of said shoe parts being fixed to said runner.

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