July 25, 1961 R. T. CHEW 2,993,641

COMPRESSOR LUBRICATION SYSTEM

Filed July 25, 1958 3 Sheets-Sheet 1

FIG. 2

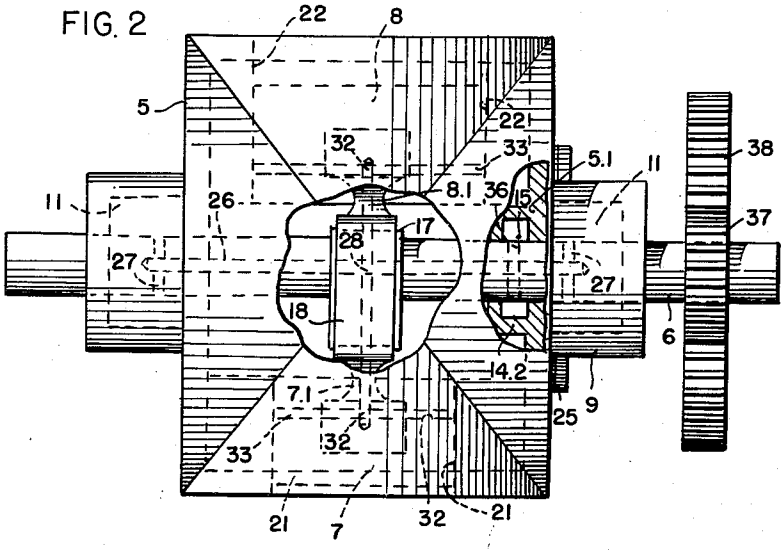
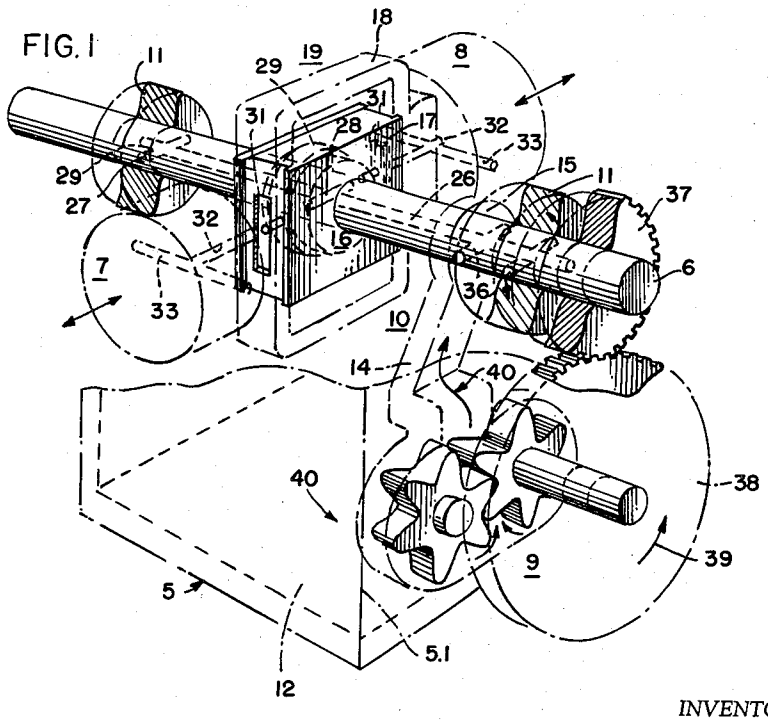


FIG. 1



INVENTOR:
ROY T. CHEW
BY Kenmuler & Snow
ATT'YS

July 25, 1961 R. T. CHEW 2,993,641

COMPRESSOR LUBRICATION SYSTEM

Filed July 25, 1958 3 Sheets-Sheet 2

FIG. 3

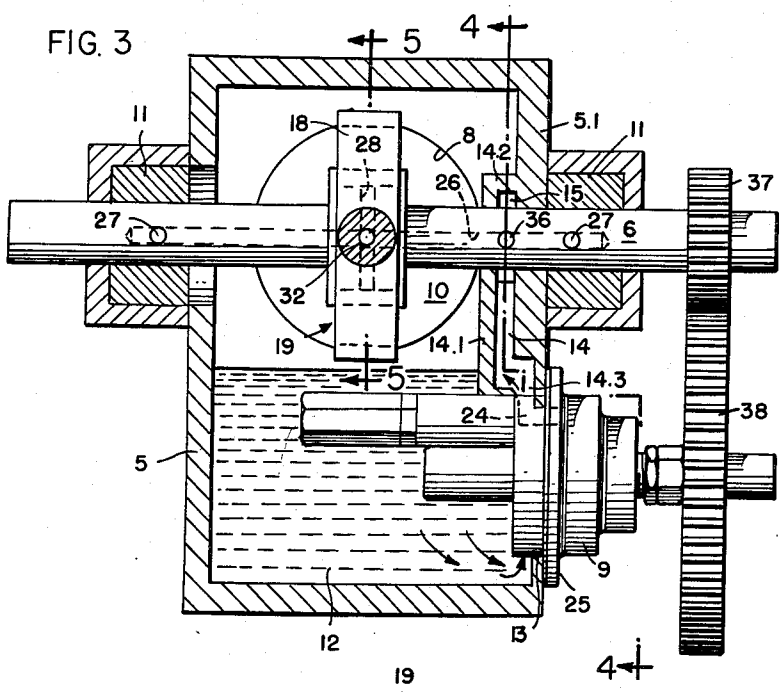
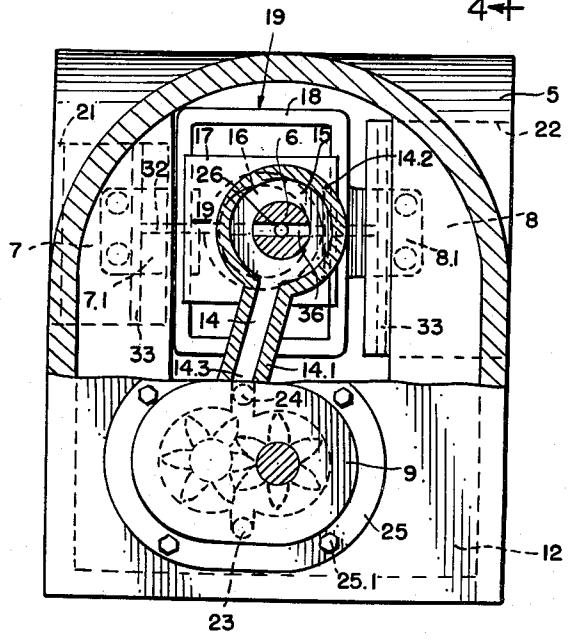


FIG. 4



INVENTOR:
ROY T. CHEW
BY Rummler & Lucow
ATT'YS

July 25, 1961 R. T. CHEW 2,993,641

COMPRESSOR LUBRICATION SYSTEM

Filed July 25, 1958 3 Sheets-Sheet 3

FIG. 5

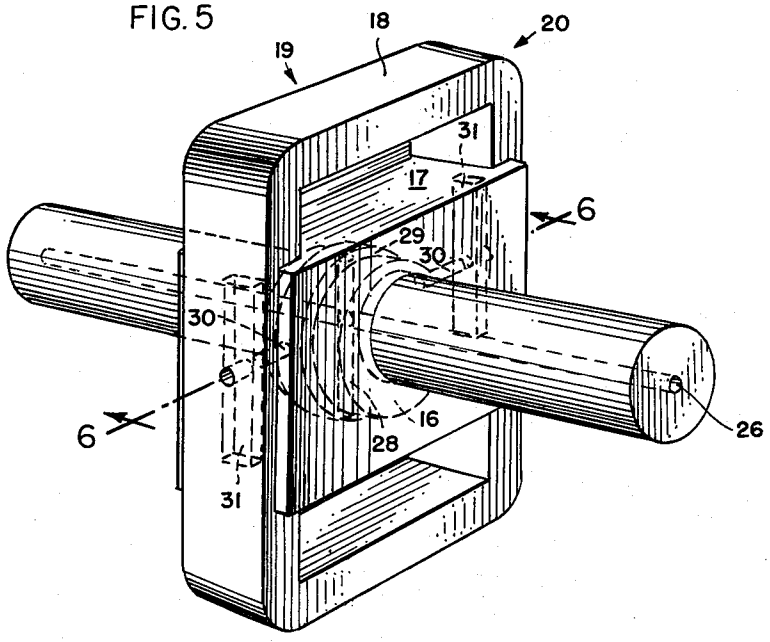
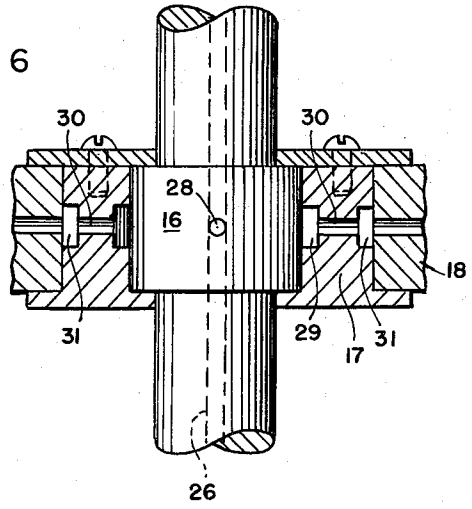


FIG. 6



INVENTOR:

ROY T. CHEW

BY Fennemore & Snow

ATT'YS

United States Patent Office

2,993,641

Patented July 25, 1961

2,993,641

COMPRESSOR LUBRICATION SYSTEM

Roy T. Chew, 11322 S. Michigan, Ave., Chicago 28, Ill.

Filed July 25, 1958, Ser. No. 750,930
1 Claim. (Cl. 230—206)

This invention relates to oil-pressured lubrication systems for high speed reciprocating compressors of gaseous fluid.

The main objects of this invention are to provide an improved pump-pressured lubricating system for the various rotating and reciprocating parts of certain types of machine; to provide an improved lubricating system of this kind particularly adapted for use with high speed compressors; to provide a compressor lubricating system having an improved built-in arrangement of pressured oil distribution incorporated in the compressor housing structure and wherein the oil pump unit is a removable, externally accessible, component powered directly from the main compressor shaft; to provide such a compressor lubricating system wherein the oil pump unit may be removed and replaced without in any way disturbing the compressor assembly or installation; and to provide an improved pump-pressured lubricating system of this kind which is simple in construction, economical to manufacture, efficient in operation, and more easily maintained.

A specific embodiment of this invention is shown in the accompanying drawings in which:

FIGURE 1 is a schematic, partly phantom perspective view, partly broken away, of a particular type of compressor equipped with pump-pressured lubricating system constructed in accordance with this invention;

FIG. 2 is a top plan view of the same, a portion being broken away to more clearly illustrate interior arrangement thereof;

FIG. 3 is a vertical sectional view of the construction shown in FIGS. 1 and 2;

FIG. 4 is a vertical sectional view taken on the plane of the line 4—4 of FIG. 3;

FIG. 5 is a perspective view of the Scotch yoke drive for the compressor pistons as viewed from the plane of the line 5—5 of FIG. 3; and

FIG. 6 is a sectional view of the same as taken on the line 6—6 of FIG. 5.

The essential concept of this invention involves a gear-type oil pump mounted externally on the side wall of the oil-reservoir portion of a compressor housing in which housing is formed a conduit leading to the drive shaft and communicating therethrough with an arrangement of interconnecting channels extending to all relatively moving surfaces of the compressor assembly, the oil pump having direct communication internally of the compressor with both the reservoir portion thereof and the said conduit, whereby the pump unit, as an individual component, may be readily removed and replaced without dismantling the compressor structure.

A compressor lubricating system embodying the foregoing concept comprises a compressor housing **5**, a main drive shaft **6**, opposed reciprocating pistons **7** and **8**, and an oil pump **9** operated to feed lubricating oil to a system **10** of intercommunicating channels formed in the several moving parts of the compressor assembly. The several figures show these parts in a more or less diagrammatic form and relationship to indicate a conventional compressor and illustrate one manner of embodying this improved lubricating system in a machine involving a series of relatively-moving parts requiring constant lubrication. Therefore no attempt is made to show and describe a complete compressor unit, only the elements requiring pressure lubrication being referred to.

The housing **5** here shown is of hollow generally rectangular form mounting the drive shaft **6** on bearings **11** in the upper portion of the housing whereby the lower portion thereof constitutes an oil reservoir **12**. One side wall **5.1** of the housing **5** is formed with an opening **13** (FIG. 3) for the reception of the pump **9** and from one side of this opening **13** and oil conduit **14** leads upwardly to an annular pocket **15**, embracing the shaft **6**, to feed oil to the channel system **10**, as presently will be explained more fully.

As shown the conduit **14** is formed within a boss or rib **14.1** integrally on the inner surface of the wall **5.1**, which boss or rib extends from the opening **13** to an annular portion **14.2** through which the shaft **6** passes, the pocket **15** in the portion **14.2** opening to and surrounding the shaft periphery. At the lower end of the boss or rib **14.1** the conduit **14** opens to an inlet **14.3** which is located to meet and communicate with the discharge outlet **24** of the pump **9**. It will be understood, however, that the conduit **14** and pocket **15** may be contained within a separable member, suitably secured to the wall **5.1**, or formed as an open channel in the inner wall surface which is merely enclosed by a suitable cover plate. In any event the conduit **14** and pocket **15** are a part of the wall structure, however they may be enclosed, and are fixed and permanent internal elements of the compressor assembly providing constant communication between the pump outlet **24** and the drive shaft **6**.

The shaft **6**, medially of the bearings **11**, mounts an eccentric crank or drive member **16** journaled in a slide block **17** slidingly supported in a rectangular frame **18** and constituting a more or less conventional Scotch-yoke drive **19** for the reciprocating pistons **7** and **8**.

The pistons **7** and **8**, of conventionally different diameters, are opposedly supported in cylinders **21** and **22** at diametrically opposite sides of the shaft **6** and are connected rigidly to opposite sides of the yoke frame **18** in a conventional manner by brackets **7.1** and **8.1** integral on the yoke **18**.

The pump **9** here is shown as a conventional gear type. It is so mounted in the housing opening **13** that its inlet **23** (FIG. 4) is in direct communication with the oil in the reservoir **12** and its outlet **24** registers with the inlet end **14.3** of the housing conduit **14**. Preferably the body of the pump **9** is peripherally flanged, as at **25**, and is secured to the outside of the housing wall **5.1** by suitable removable fasteners **25.1** which pass through the flange. Thus the body of the pump, inwardly of the flange may be received in the opening **13** and the mounting sealed by means of a suitable gasket disposed beneath the flange. With such a mounting the pump may be readily removed for inspection, repair, or replacement at any time and the compressor, itself, need not be disturbed.

The system of channels **10** initiates with a primary axially extending channel **26** in the shaft **6**, oppositely terminating at intersecting radial branches **27** in the area of the bearings **11** and having an intermediate intersecting radial branch **28** in the plane of the eccentric or crank **16**. The branch **28** extends diametrically through the eccentric **16** and opens into an annular channel **29** formed in the surface of the bore of the slide block **17** in which the eccentric or crank **16** is journaled. The annular channel **29** has oppositely extending branches **30** which lead to the sides of the slide block which engage the inner walls of the yoke **18** and, as shown in FIGS. 5 and 6, the side surfaces of the slide block **17** are provided with elongate, vertically extending slots or pockets **31** into which the branches **30** open. These pockets or slots **31** are located medially of the slide block **17**, between its top and bottom ends, and extend a sufficient vertical distance so as to be in continuous open communication with passages **32** which extend axially of the pistons **7** and **8** from the inner wall of the yoke **18**, through the connecting arms or brackets **7.1** and **7.2** to the in-

terior of the pistons. Inside the pistons, and extending diametrically through the hub portion thereof which is not shown, are lateral branch passages **33** which open to the periphery of the pistons and the respective cylinder walls.

From the foregoing it will now be seen that the several oil passages are at all times in communication with the main supply passage **26** extending axially in the shaft **6**, and that the various passages lead to every surface which engages and moves relative to another surface, so that all friction areas are under a continuous supply of lubricant from the main shaft passage **26**.

The initiating shaft channel **26** is supplied by an intersecting radial branch **36** located in the plane of the annular pocket **15** in the enlarged portion **14.2** of the conduit boss **14.1**. This branch **36** is thus in constant communication with the oil supply conduit **14** leading from the pump **9**.

The shaft **6** is driven from a suitable source of power (not here shown) to operate the compressor and is connected by gears **37** and **38** to drive the pump **9**. Thus the speed of the pump will always be proportional to the speed of the compressor and the quantity and pressure of the lubricant supplied to the compressor will be in direct relation to the friction load.

In the operation of my improved compressor lubricating system the shaft **6**, through the gears **37** and **38**, drives the pump **9** in the direction of the arrow **39** (FIG. 1) and causes oil to be drawn from the reservoir **12** through the pump inlet **23** (FIG. 4) and be pressured in the direction of the arrow **40** up through the housing conduit **14**, to the pocket **15**, through the passage **36** and into the axial channel **26** in the shaft **6**. Flowing to opposite ends of the channel **26**, under constant pressure, oil emerges from the radial branches **27** to lubricate the bearings **11**, and from the medial radial branch **28** in the crank **16** to the slide block **17** and the pockets **31** in the outer side surfaces thereof.

The pockets **31** are of such length as to be somewhat longer than the stroke of the slide block, as it moves up and down in the yoke **18** under the influence of the eccentric or crank **16** on the shaft **6**, and since these pockets are centered on the axes of the pistons when the slide block is in a medial position the passages **32** leading into the pistons will be continuously supplied with lubricant for lubricating the cylinder walls.

The speed of the pump **9** will, of course, be determined by the compressor speed and the ratio of the gears **37** and **38**. Preferably the pump will be operated at a lesser speed than the compressor, particularly when the compressor is a component in an automotive air conditioning system and is driven by a power take-off from the vehicle motor. However in any case the pressure of the lubricant will be directly proportional to the lubrication requirements of the system. Also the pump, being an externally mounted component of the compressor unit can be readily removed and replaced whenever required and dismantling or disconnecting the compressor from the system in which it is incorporated is unnecessary in case of pump failure.

Although but one specific embodiment of this invention is herein shown and described it will be understood that numerous details of the construction shown may be altered or omitted without departing from the spirit of the invention as defined by the following claim.

I claim:

In a compressor comprising, a housing having an oil reservoir therein, a rotatable drive shaft extending into the housing through one wall thereof, bearings to journal the said shaft, a pair of opposed pistons and cylinders therefor within said housing, and eccentric means of circular configuration on said shaft operatively connected by a Scotch yoke to reciprocate the pistons in said cylinders; said Scotch yoke comprising a rectangular yoke element having parallel side members, each directly and rigidly connected to a respective one of said pistons, and a rectangular slide block mounted between said side members in sliding engagement therewith, said slide block having an annular central opening receiving and slidably fitting the periphery of said eccentric; a lubricating system comprising an axially extending passage in said drive shaft having a radial branch passage leading to the periphery of said eccentric, a continuous peripheral channel in the wall of said slide block opening in the plane of said branch passage, a pocket in each of the outer walls of said slide block which engage the side members of said yoke element, passages connecting said peripheral channel with each of said pockets, an axial passage in each of said pistons leading to the inner surface of the respective side member of said yoke element, said pistons each having radial passages leading from its axial passage to the outer piston wall, and means for supplying oil under pressure from said reservoir to the axial passage of said drive shaft adjacent one end of the shaft, each of said slide block pockets extending in the direction of slide block movement relative to said yoke element and being of such length and so disposed as to be in constant communication with the respective axial passage of said pistons.

References Cited in the file of this patent

UNITED STATES PATENTS

1,616,913	McCallum	Feb. 8, 1927
1,961,451	Phillips et al.	June 5, 1934
2,025,187	Werner et al.	Dec. 24, 1935
2,071,913	Bentley	Feb. 23, 1937
2,257,707	Sladky	Sept. 30, 1941
2,504,528	Hume	Apr. 18, 1950
2,751,145	Olcott	June 19, 1956