

United States Patent

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| [33] | | Japan |
| [31] | | 43/49796 |

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F04b 1/12, F04b 39/02
- [50] **Field of Search**..... 230/186,
206; 91/502, 499; 103/162P, 173, 173P

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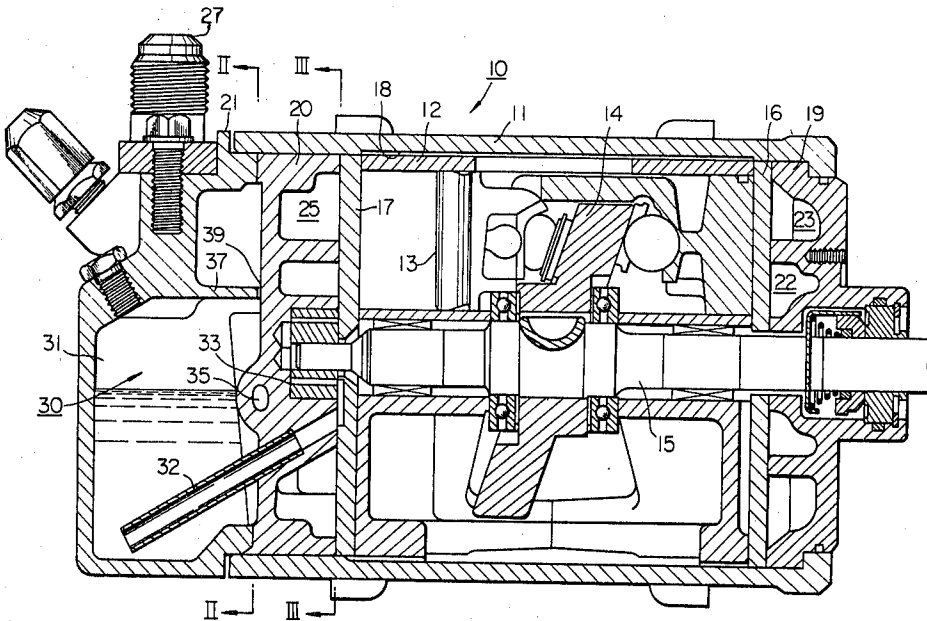
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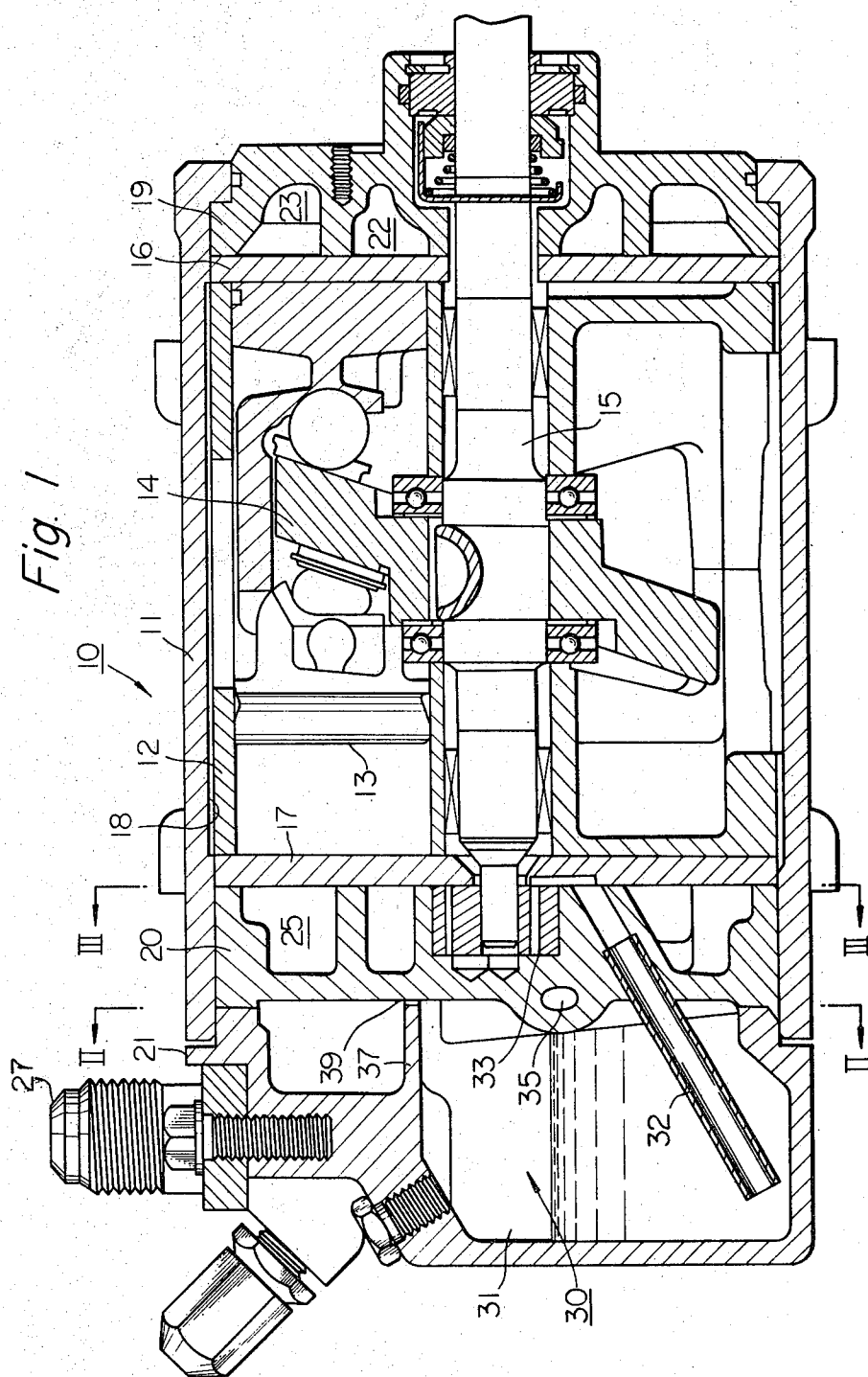
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- [54] CYLINDRICAL RECIPROCATING COMPRESSOR
OF HORIZONTAL TYPE FOR A CAR COOLER OF
AN AUTOMOBILE
6 Claims, 8 Drawing Figs.**

- [52] U.S. Cl..... 91/499,
417/269

ABSTRACT: A cylindrical reciprocating compressor of horizontal type for a car cooler of an automobile having an oil reservoir disposed at one end portion of the cylindrical casing for supplying lubricant to the hydraulic circuit of the compressor. This compressor is low enough to be disposed under the hood (bonnet) of the automobile.





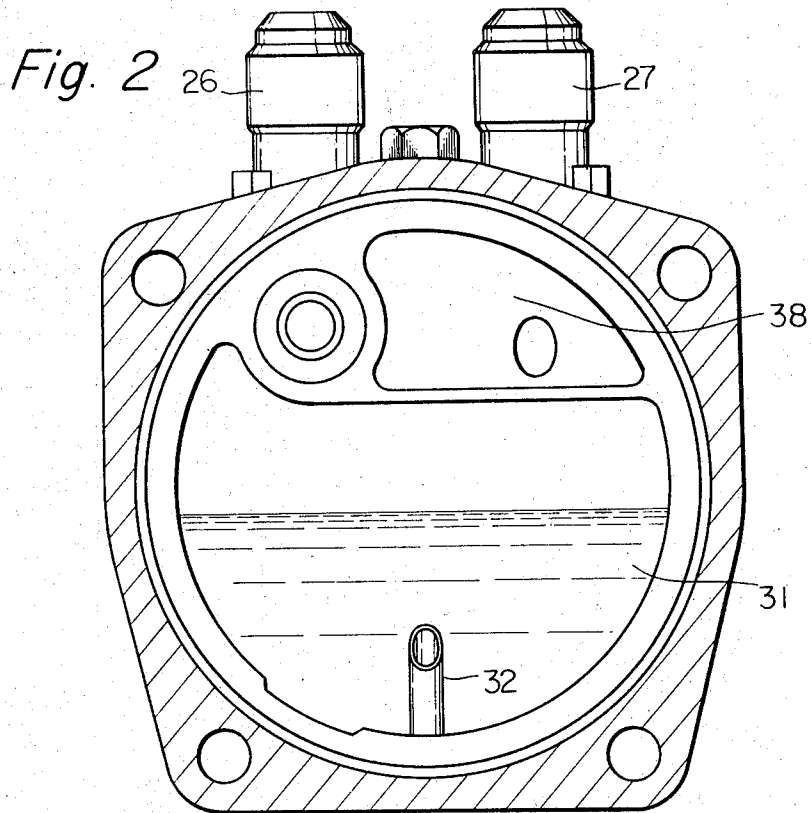
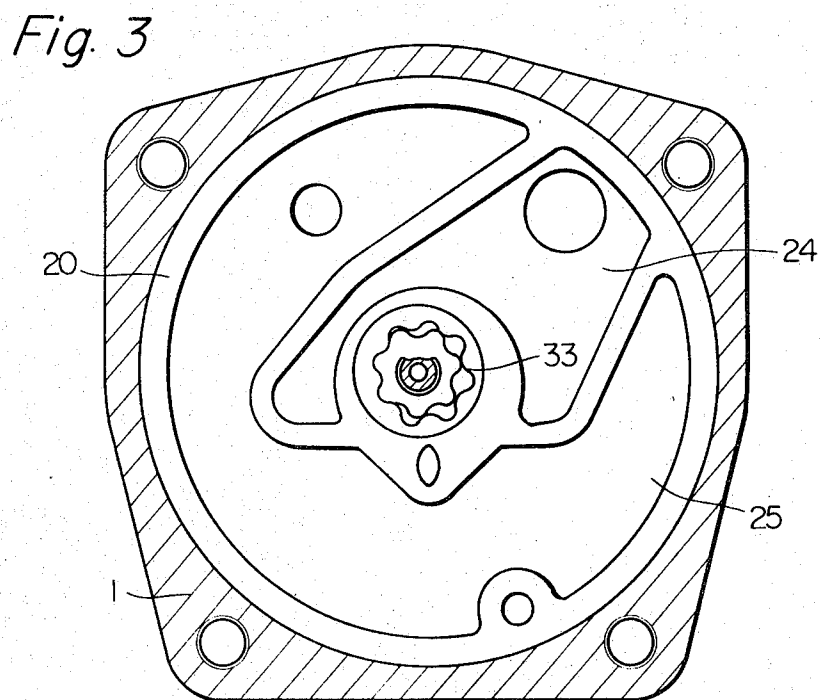


Fig. 4

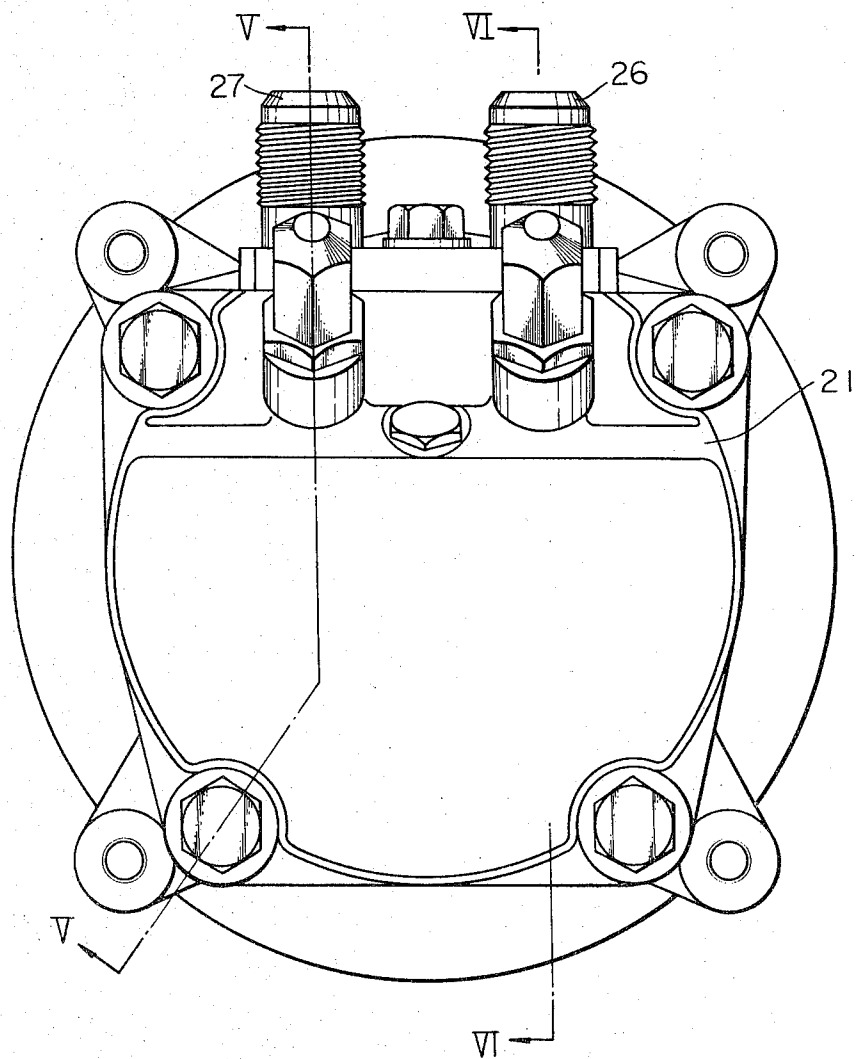


Fig. 5

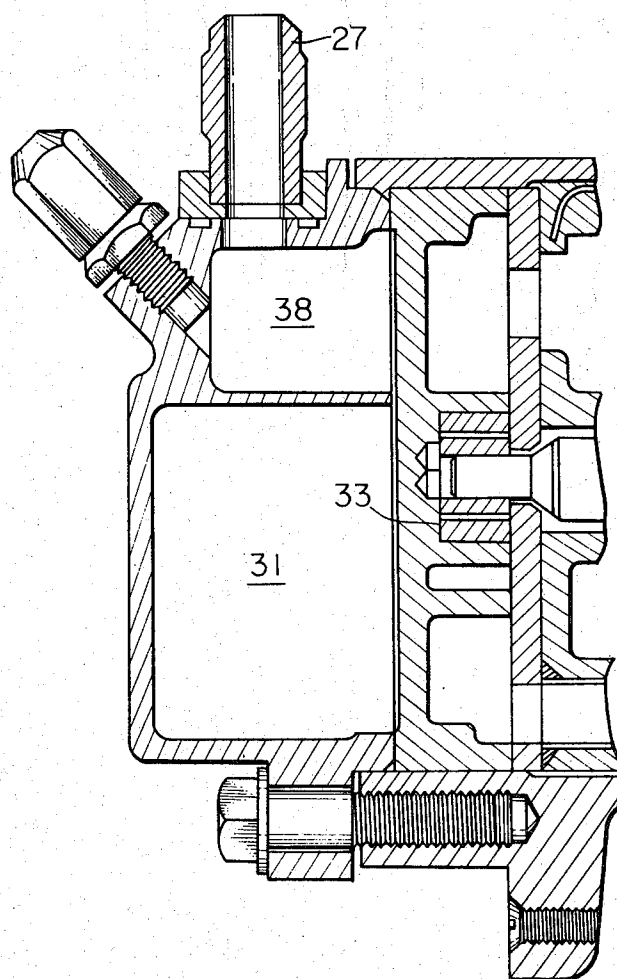


Fig. 6

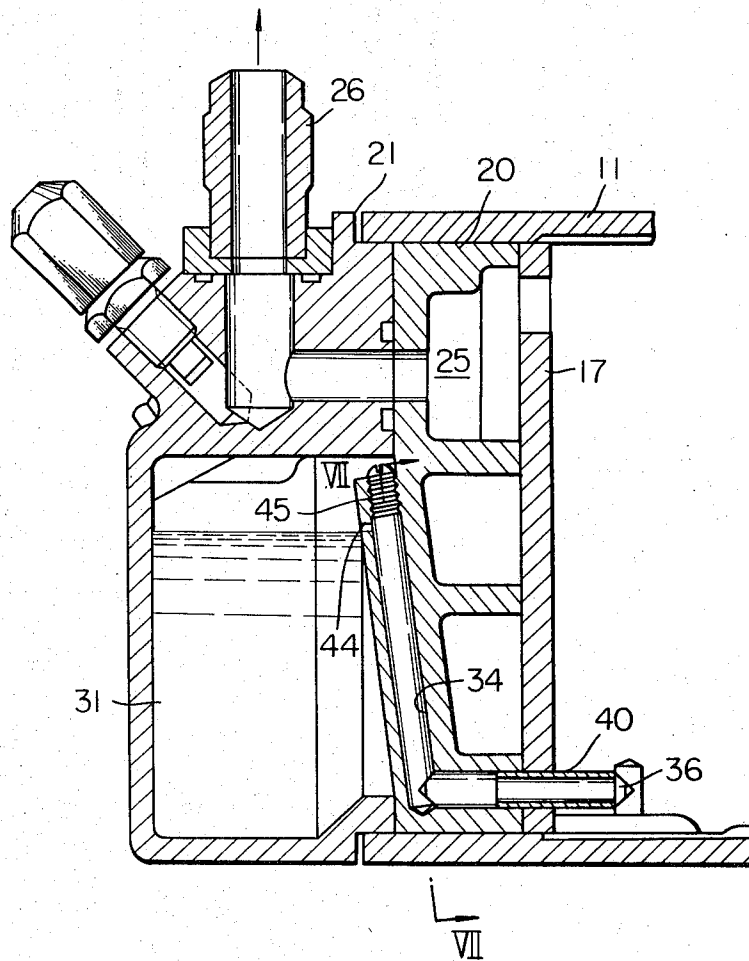


Fig. 7

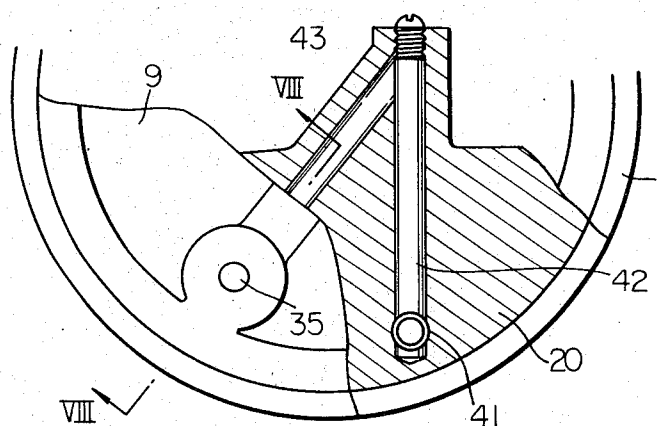
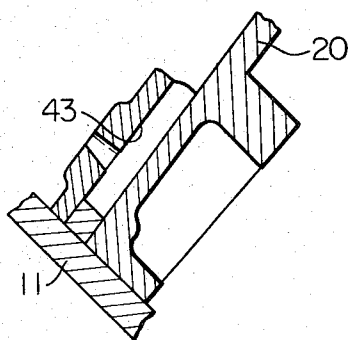


Fig. 8



CYLINDRICAL RECIPROCATING COMPRESSOR OF HORIZONTAL TYPE FOR A CAR COOLER OF AN AUTOMOBILE

This invention relates to a cylindrical reciprocating compressor of horizontal type having a swashplate for a car cooler of an automobile.

The conventional reciprocating compressor for the car cooler of an automobile has an oil pan or reservoir provided at the bottom of the compressor in a projecting portion projected from the cylindrical body of the compressor. This projected portion increases the height of the compressor, with the result that it is difficult to place the compressor in the small space under the hood (bonnet) of the automobile, particularly in the case of a compact car. The modern automobile designs tend to prefer low heights, and as low as possible, so that the conventional compressor has become more difficult to be fitted in such a small space.

This invention eliminates above and other disadvantages of the conventional compressor used in the car cooler and the object of the present invention is to provide a cylindrical reciprocating compressor of horizontal type which is low enough to be disposed under the hood (bonnet) of an automobile.

Such an object of the present invention is accomplished by providing the oil reservoir in the head cover of the compressor so as to make the compressor body regularly cylindrical in shape in order to readily fit the compressor under the hood of the automobile.

This invention further contemplates to provide a cylindrical compressor of horizontal type having a high cooling capability by separating positively and easily the lubricant contained in the blowby gas in the compressor and further by separating the lubricant from the refrigerant gas contained in the circuit in a suction chamber and causing the oil to return to the oil reservoir.

The features and advantages of the present invention will become apparent from the following description taken in conjunction with the accompanying drawings, in which:

FIG. 1 is a longitudinal view in section of an example of a cylindrical reciprocating compressor of horizontal type for a car cooler in accordance with the present invention;

FIG. 2 is a view of the compressor taken and seen by the line II-II and arrows shown in FIG. 1;

FIG. 3 is a view similar to FIG. 2 but taken and seen by the line III-III and arrows shown in FIG. 1;

FIG. 4 is an end view of the compressor shown in FIG. 1;

FIG. 5 is a sectional view of the suction part of the compressor taken and seen by the lines V-V and arrows shown in FIG. 4;

FIG. 6 is a sectional view of part of the compressor taken along the line VI-VI shown in FIG. 4;

FIG. 7 is a longitudinal sectional view of part of the compressor along the line VII-VII shown in FIG. 6; and

FIG. 8 is a longitudinal sectional view of part of the compressor along the line VIII-VIII shown in FIG. 7.

Referring now to FIGS. 1 through 5, which show one example of a cylindrical reciprocating compressor of horizontal type for a car cooler according to the present invention, in the compressor 10 having a casing 11, a cylinder block 12, a double-acting piston 13, a swashplate 14, a drive shaft 15, front and rear valve plates 16 and 17 for closing the bores 18 provided in the cylinder block 12 at both ends, respectively to be driven by a valve mechanism (not shown) for actuating to intake or discharge a gas from or into the bore 18 in response to the movement of said piston 13, a front cylinder head 19 disposed at the front end of the cylinder block 12 sealingly in contact with the front valve plate 16 and inserted into the front end of the casing 11, a rear cylinder head 20 disposed at the rear end of the cylinder block 12 sealingly in contact with the rear valve plate 17 and inserted into the rear end of the casing 11, a rear head cover 21 sealingly in contact with the rear cylinder head 20, said front cylinder head 19 being formed with a suction chamber 22 and a discharge chamber

23, said rear cylinder head 20 being formed with a suction chamber 24 and a discharge chamber 25, said rear head cover 21 being formed with a feed port 26 connected with the refrigerating cycle and a return port 27 connected with the returning system of the refrigerating cycle, a lubricating system 30 of said compressor comprises an oil reservoir 31 formed in the lower portion of the rear head cover 21, an oil suction conduit 32 mounted on the rear head cover 21 and immersed into the oil in the oil reservoir 31 below the standard surface of the lubricant oil, an oil pump 33 driven by the drive shaft 15 for taking the oil in the oil reservoir 31 through the conduit 32 for supplying the lubricant oil into the drive shaft 15 itself and to the surface of the swashplate 14 for driving the piston 13, an oil passage 34 vertically formed in the cylinder head 20 and including an outlet 35 communicated with the oil reservoir 31 and an inlet 36 communicated with the lower portion of the casing 11 wherein the lubricant is fed by means of the pressure difference between the casing 11 and the oil reservoir 31 due to the blowby gas pressure whereby the oil reservoir is formed in the lower portion of the rear head cover 21 thereby the casing formed cylindrical.

The lubricating system 30 further comprises a partition 37 formed in the head cover 21 for providing an oil separating chamber 38 and the oil reservoir 31, a gap 39 provided between the head cover 21 and the cylinder head 20.

It is understood that the lubricating system 30 may comprise a hole (not shown) formed in the partition 37 instead of the gap 39.

The outlet 35 of the oil passage 34 is vertically disposed substantially at the standard level of the lubricant in the oil reservoir 31.

The compressor 10 further comprises a hollow pin 40 for positioning the cylinder block 12, valve plate 17 and rear cylinder head 20 and being at one end connected with the bottom portion of the casing 11 through a hole 41 and at the other opened directly to the oil reservoir 31 through a vertical hole 42 bored in the cylinder head 20 or connected with the oil reservoir 31 through a hole 43 (FIG. 7) connected with the vertical hole 42 for constituting a lubricant oil circulating system for feeding the lubricant oil by means of the pressure difference between the casing 11 and the oil reservoir 31 because of the blowby gas pressure, as shown in FIGS. 6 through 8. FIGS.

The oil passage 34 may be formed in the cylinder head 20 and may pass through a point disposed substantially above the standard level of the lubricant and may include a hole 44 formed at the point and communicated with the oil reservoir 31 as shown in FIGS. 6 through 8.

In such a system as mentioned the hole 44 is provided for preventing the lubricant oil from counterflowing due to an accidental conversion of the pressure difference therebetween in order to avoid a syphone action between the holes. This compressor also comprises a blind plug 45.

I claim:

1. In a cylindrical reciprocating compressor of horizontal type for a car cooler of an automobile having a casing, a cylinder block, a single-acting piston, a swashplate, a drive shaft, a valve plate for closing a bore divided in the cylinder block at one end to be operated by a valve mechanism for actuating the intake or discharge of a gas from or into the bore in response to the movement of said piston, a cylinderhead disposed at one end of the cylinder block sealingly in contact with the valve plate and inserted into the end of the casing and including a suction chamber and a discharge chamber, a head cover provided sealingly in contact with the cylinderhead and including a feed port connected with the refrigerating cycle, and a return port connected with the returning system of the refrigerating cycle, a lubricant system of said compressor comprising:

an oil reservoir formed in the lower portion of the head cover;

an oil reservoir formed in the lower portion of the head cover;

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an oil suction conduit mounted on the head cover and immersed into the oil in the oil reservoir below the standard surface of the oil;

an oil pump driven by the drive shaft for intaking the oil in the oil reservoir through said conduit for supplying the lubricant oil into the drive shaft itself and to the surface of the swashplate for driving said piston;

an oil passage vertically formed in the cylinderhead and including an outlet communicated with the oil reservoir and an inlet communicated with the lower portion of the casing wherein the lubricant is fed by means of the pressure difference between said casing and oil reservoir due to the blowby gas pressure; and

said oil reservoir being formed in the lower portion of said head cover thereby said casing formed cylindrical.

2. A lubricant system as set forth in claim 1 further comprising:

a partition formed in said head cover for providing an oil

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separating chamber and oil reservoir; and means for passing between the oil separating chamber and the oil reservoir.

3. A lubricant system as set forth in claim 2, wherein said means is a gap provided between said head cover and said cylinderhead.

4. A lubricant system as set forth in claim 2, wherein said means is a hole formed in said partition.

5. A lubricant system as set forth in claim 1, wherein the outlet of said oil passage is vertically disposed substantially at the standard level of the lubricant in the oil reservoir.

6. A lubricant system as set forth in claim 1, wherein said oil passage formed in said cylinderhead and passing through a point disposed substantially above the standard level of the lubricant and including a hole formed at the point and communicated with the oil reservoir.

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