

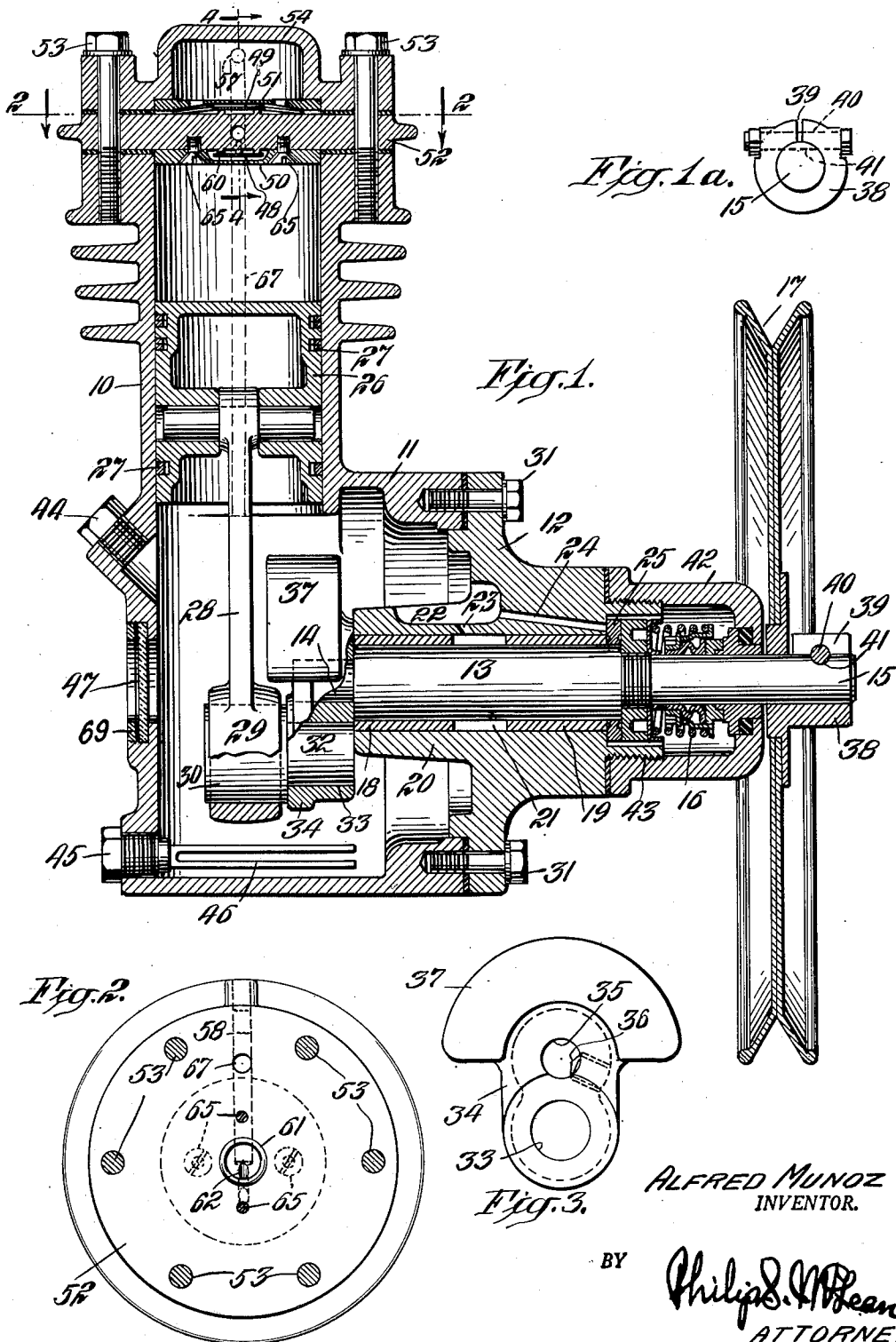
Dec. 23, 1952

A. MUNOZ
COMPRESSOR

2,622,942

Filed April 24, 1947

2 SHEETS—SHEET 1



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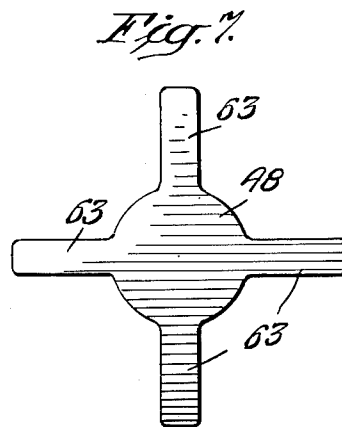
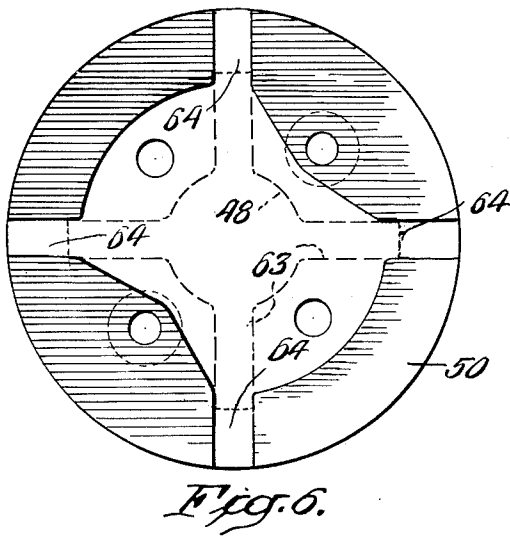
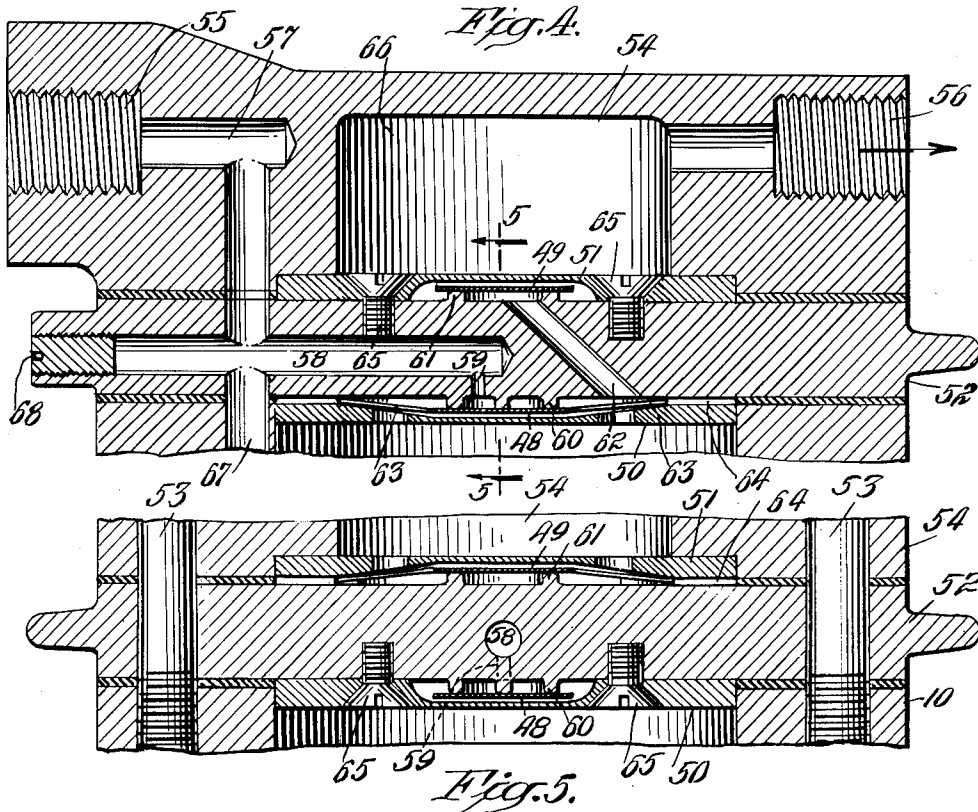
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2 SHEETS—SHEET 2



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2,622,942

COMPRESSOR

Alfred Munoz, Brooklyn, N. Y.

Application April 24, 1947, Serial No. 743,633

1 Claim. (Cl. 308—36.2)

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The invention herein disclosed relates to compressors, particularly those of the type employed for refrigeration.

Objects of the invention are to provide an efficient machine which in particular will be of simple, inexpensive construction, easily assembled and disassembled, and in which individual parts, if required, can be readily replaced at low cost.

Particularly it is a purpose of the invention to enable the machine being readily kept in proper operating condition and thus to avoid, as far as possible, any special servicing requirements.

Particular objects of the invention are to provide improved valve mechanism, to assure full and adequate lubrication of all working parts and otherwise assure continuous satisfactory operation of the machine.

Other important objects attained by the invention are set forth or will appear in the course of the following specification, in which the various features of the invention are described and broadly claimed.

Fig. 1 in the drawing is a vertical sectional view of one of the compressors;

Fig. 1a is an end view of the pulley clamping hub.

Fig. 2 is a horizontal sectional view as on line 2—2 of Fig. 1;

Fig. 3 is a face view of the combined crank and counterweight;

Fig. 4 is an enlarged and broken vertical cross sectional view as on substantially the plane of line 4—4 of Fig. 1;

Fig. 5 is a similar sectional view on the plane at right angles thereto, on a plane substantially corresponding to that appearing in Fig. 1;

Fig. 6 is a plan view looking at the under side of one of the valve guide discs;

Fig. 7 is a plan of one of the valve elements.

As shown in Fig. 1, the machine is preferably made up with a single casting providing an integral connected cylinder 10 and crank case 11, with a cover 12 closing the open end of the crank case and carrying a long bearing for the crank-shaft 13.

The latter is unusual in that it is of plain cylindrical construction, having a reduced cylindrical portion 14 at the inner end to carry the crank structure, and a reduced cylindrical extension 15 at the outer end to carry the rotary seal 16 and the drive pulley 17.

The bearing for the crank-shaft also is unusual in that it is made up of cylindrical bear-

ing bushings 18, 19, set into the opposite inner and outer ends of the elongated bearing housing 20 carried by the crank case cover 12, with annular space 21 left in said housing between the inner ends of the bushings to provide a distributing chamber for oil collecting in the pocket 22 in the top of the bearing housing. This collector 22 is shown as having drains 23 and 24, leading, respectively, to the chamber 21 surrounding the shaft and to the inner end member 25 of the rotary seal at the end of the outer bearing bushing.

This construction assures full and complete lubrication of the shaft without necessity for oil grooves or the like.

The piston 26 may be of conventional design but preferably it is constructed with quintuplicate bronze piston rings such as indicated at 27.

The connecting rod 28 may be of conventional design, except for the fact that it is made so that the large bearing 29 at the crank end will permit the crank-pin 30 to be slipped longitudinally out of the same. This enables the entire shaft and crank-pin assembly to be disconnected and removed as a unit by simply taking out the bolts 31 securing the crank case cover in place.

The crank-pin is shown as having a reduced mounting portion 32 set in a seat 33 in the crank-arm 34. The latter is shown as bored at 35 to fit the reduced inner end portion 14 of the shaft and on which it is fixedly secured by a setscrew 36 entered through the side of the arm.

The crank-throw is counter-balanced by a weight segment 37 at the opposite side of the center socket 35 from the crank-pin.

In securing the combination counterweight and crank assembly in position, the mounting portion 14 of the shaft may be drilled to receive the inner end of the positioning and securing setscrew 36.

The pulley is shown as having a hub portion 38 to fit the reduced end portion 15 of the shaft and split at 39 to be gripped on the shaft by a clamp bolt 40 traversing a cross groove 41 in the side of the shaft to act as a key. This forms a simple and rugged combination for firmly keying the pulley in place.

The rotary shaft seal 16 is shown as enclosed within a tubular cap 42 screwed on a hub portion 43 at the outer end of the bearing housing.

The outer end of this screw cap may be closely adjacent the pulley hub, substantially as shown, so that upon removal of the pulley securing bolt or screw 40 the cap may be unscrewed, and by

abutment with the pulley hub, be operated as a "wheel puller" to loosen or force the pulley off the shaft.

To similar effect, by leaving the pulley fast on the shaft and loosening the crank securing screw 36, the cap 42 may be unscrewed to pull the shaft out of the crank and counterweight member, the latter operation being easily performed after removal of the crank-case cover assembly.

The crank-case is shown as having a filling plug 44 and a drain plug 45 in the closed side of the same.

A special feature of the drain plug 45 is that it is located at the lowest level in the crank-case and that it is equipped with an elongated permanent magnet 46 extending inwardly across substantially the entire interior of the case to pick up any magnetic particles that may be present in the oil or result from wear in the machine.

A gage glass 47 is shown set in the end of the crank-case at approximately the crank-shaft level, for enabling inspection and ascertainment of quantity and character of oil in the crank-case. This sight glass is of special value in enabling conditions to be corrected, such as might be experienced from the oil getting low in the crank-case.

The valve mechanism is of special design, comprising thin spring sheet metal discs 48, 49, confined by guides 50, 51, to the under and upper sides of a plate 52 secured by bolts 53 between the end of the cylinder and cylinder head 54.

The cylinder head, as particularly shown in Fig. 4, has an inlet 55 at one side and an outlet 56 at the opposite side adapted to have the usual service valves and piping directly attached thereto.

The inlet socket 55 in the head is shown as having a passage 57, Fig. 4, opening downwardly into a passage 58 in the valve plate 52, and the latter passage is shown as having openings 59 near the center of the plate into the space within an annular valve seat ridge 60. The inlet valve disc 49 is arranged to engage this annular seat, as shown in both Figs. 4 and 5.

Similarly, there is provided on the top of the valve plate an annular valve seat 61 engageable by the outlet valve 49.

An inclined passage 62 is shown extending from the under side of the valve mounting plate 52, inwardly and upwardly to within the space bounded by the annular valve seat ridge 61.

The spring valve discs 48, 49, may be alike and even duplicates, and they are shown as having each four radiating arms 63 to locate and guide them in correspondingly arranged slots 64 in the overstanding guide plates 50 and 51.

These valve guide plates 50, 51, likewise may be of duplicate construction, being so shown in Figs. 4 and 5, the bottom or inlet valve guide 50 being shown as secured by screws 65 to the under side of plate 52 and the upper guide 51 secured to the upper side of plate 52 by screws 66.

The radiating spring arms 63 of the valve discs may be bent somewhat, as indicated in Figs. 4 and 5, to normally tension the valves in the opening direction.

To avoid gumming or sticking action of the valve discs, the inlet passage 57 in the head may be continued on down through the valve plate 52 and down into the top of the crank-case, as indicated at 67, Fig. 4, this serving in substance as a drain to trap oil or the like out of the entering gas and pass it down into the crank-case.

The valves, being of light spring metal, respond

instantly to pressure pulsations and maintain continuous efficiency. They may be inspected and replaced readily by simply removing the cylinder head and the valve plate which it holds in place. If desired, a complete new plate with valves mounted may be substituted in place of a used assembly.

All parts are readily assembled or disassembled, inspected or replaced on removal of the crank-case bolts 31. The entire crank-shaft assembly may be withdrawn without disturbing the piston and connecting rod and without having to remove the cylinder head or other parts. The machine is protected from magnetic particles or cuttings in the lubricating oil by the magnetic plug 45 in the bottom of the crank-case, which may be removed at any time for inspection or cleaning purposes. The gage glass in the end of the crank-case enables inspection of internal parts and oil level and correction of conditions that otherwise might not be known to exist.

The various parts of the machine are of simple construction, easily produced, low cost and, where possible, interchangeable. The oil pocket in the top of the bearing housing automatically feeds a proper supply of lubricant to the shaft and insures that the shaft will have sufficient lubrication for starting after a long period of idleness. The bearing bushings can be easily replaced at low cost. The shaft, being of plain, cylindrical construction, also can be replaced at low cost. The plain form of the cylinder makes it possible to use liners therein and smaller size pistons for smaller capacity compressors. In using such liners smaller diameter valve retainers 50, 51, would be employed, of a size to go within the smaller diameter of the liners, instead of within the full diameter of the cylinder, as in Fig. 1.

Various other changes may be made, all within the true intent of the invention.

The ends of the passages in the valve plate, particularly at the discharge side, may be chamfered, beveled or rounded about the edges to avoid or reduce the vacuum effect usually created at the ends of straight-through passages of a single diameter.

The plug 68 closing the end of the passage 58 in the valve plate may be screw threaded in place, thus to be removable for connection with this passage of a low pressure control, gage or other device.

While particularly important as a compressor for refrigeration, it will be realized that the invention may be used as a compressor for air or gases for any purpose.

The gage glass 47 is shown in Fig. 1 as secured in place by a gland nut 69, but may be secured in other ways as by means of a spring "snap ring," the latter in some instances being preferred as being simpler and eliminating the need for tapping the opening in the crank-case to take the gland nut.

What is claimed is:

A compressor of the character disclosed having a crank-case with a removable end cover, said crank-case cover having a bearing housing projecting into the crankcase and provided with an oil pocket in the top of the same open to the crank-case, a shaft journaled in said bearing housing and an annular oil chamber about the intermediate portion of said shaft open to and receiving lubricant from said oil pocket, a rotary seal at the outer end of said bearing housing in communication with said oil pocket for lubrica-

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tion therefrom and an enclosure for said rotary seal having a screw mounting on the crank case cover, said crank-case cover having an annular, screw threaded hub projecting from the outer side of the same over the inner end of said rotary seal and said enclosure being a tubular cap having the inner end of the same screw threaded in adjustable, removable, sealing engagement over the screw threaded hub extension of the crank-case cover and extending from said hub in completely enclosing relation about the outer end of said rotary seal and said rotary seal having a sealing element rotating with the shaft and having a rotary sliding sealing connection with the outer end of said stationary tubular cap.

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