J. W. GARDNER.

AIR COMPRESSOR.

APPLICATION FILED JULY 19, 1909.

970,487.

Patented Sept. 20, 1910.

2 SHEETS—SHEET 1.

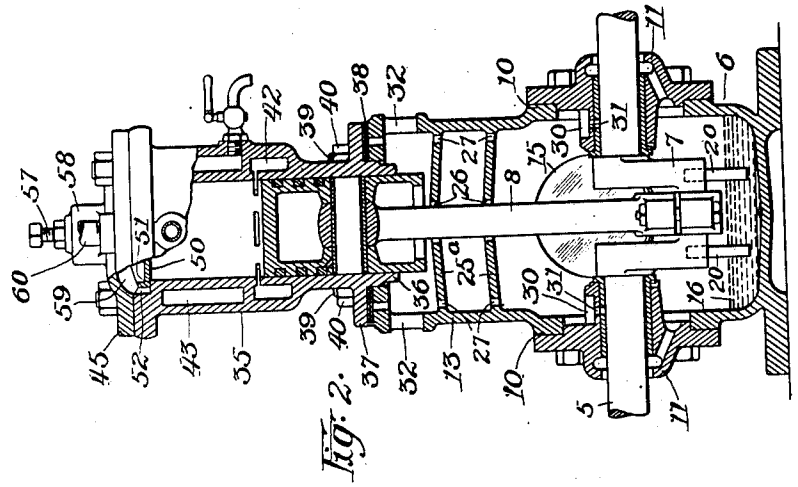

Fig. 2.

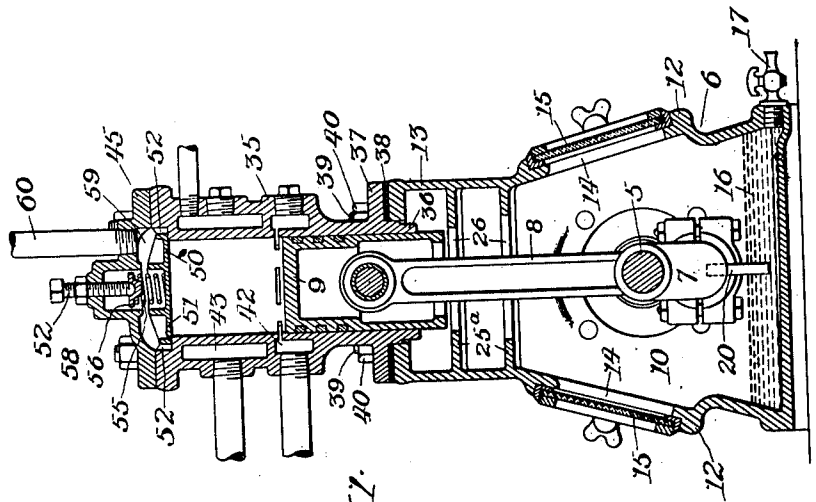

Fig. 1.

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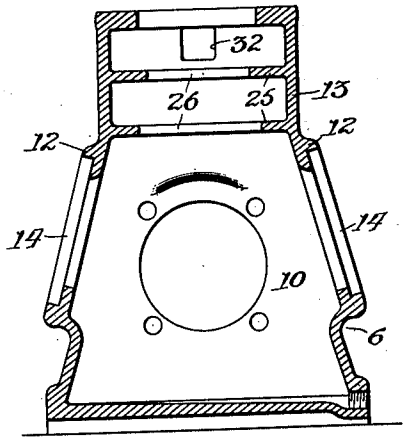

Fig. 3.

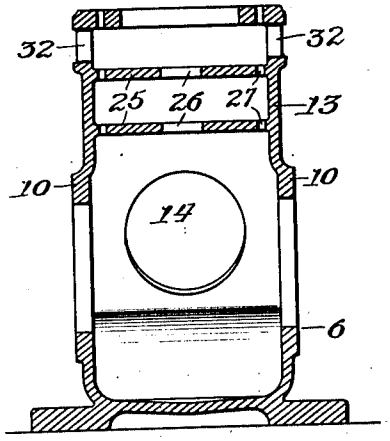

Fig. 4.

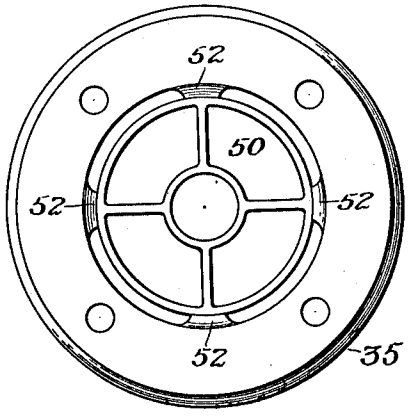

Fig. 5.

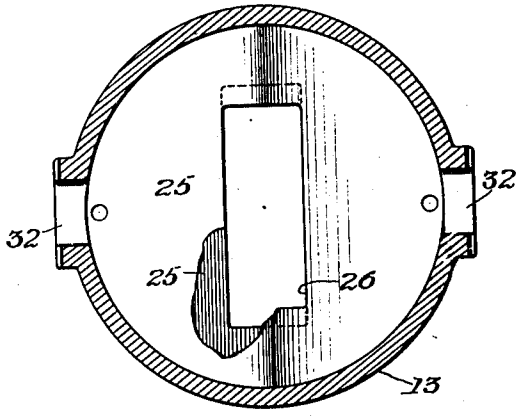

Fig. 6.

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UNITED STATES PATENT OFFICE.

JOHN WILLIS GARDNER, OF QUINCY, ILLINOIS.

AIR-COMPRESSOR.

970,487. Specification of Letters Patent. Patented Sept. 20, 1910.

Application filed July 19, 1909. Serial No. 508,427.

To all whom it may concern:

Be it known that I, JOHN WILLIS GARDNER, a citizen of the United States, and a resident of Quincy, in the county of Adams and State of Illinois, have invented certain new and useful Improvements in Air-Compressors; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the numerals of reference marked thereon, which form a part of this specification.

This invention relates to air compressors and more particularly to certain improvements in air compressors of a vertical type.

The objects of the invention are to provide novel means for economically and efficiently oiling the operating parts; for preventing the oil from being splashed or otherwise drawn up into the compression cylinder; to provide means for adjusting the clearance in the air cylinder as wear may occur between the connecting rod and the crank shaft; and to provide a novel means whereby the discharge valve may be ground upon its seat without the use of auxiliary guides.

In the drawings illustrating this invention: Figure 1 is a vertical cross-sectiontl view of an air compressor embodying my invention. Fig. 2 is a vertical cross-sectional view of the air compressor taken at right angles to the plane of the first section. Fig. 3 is a vertical detail sectional view of the crank casing. Fig. 4 is a vertical detail sectional view of the crank casing, taken at right angles to the plane of the section in Fig. 3. Fig. 5 is a plan view of the upper end of the piston head illustrating the discharge valve and seat therefor. Fig. 6 is a horizontal cross-section view of the cylindrical portion of the crank casing.

In the drawings, 5 designates the operating shaft of the compressor which is rotatively mounted in a crank casing 6 and is provided within the said casing with a crank arm 7. Journaled at its lower end upon the said crank arm 7 is a connecting rod 8 which is connected at its upper end with a compression piston 9 in a well known manner. The lower portion of the crank casing 6 is generally rectangular in shape, said lower portion being formed with two perpendicular walls 10, 10 to which are removably secured horizontally arranged journal bearings 11, 11 which extend into the said casing and are adapted to support the operating shaft 5. 12, 12 designate the other two walls of the lower portion of the crank casing which slope inwardly and upwardly and terminate in an upper cylindrical portion 13 of the said casing. The sloping walls 12, 12 of the crank casing are provided with openings 14, 14 which are covered by glass plates 15, 15 through which the interior of the said crank casing may be viewed. The said casing is closed at its bottom portion and is adapted to contain a quantity of oil or other lubricant 16. 17 designates a tap or faucet which opens into the lower portion of the crank casing and through which the oil or lubricant in the casing may be withdrawn.

Instead of lubricating the bearing within the crank casing by filling same up to a sufficient level with oil to permit the crank arm to be dipped therein during the rotation of the operating shaft, it is preferable to lower the level of the oil in the said casing and to provide two oiling pins or suitable projections 20, 20 which are firmly secured to the crank arm or connecting rod, and which are so arranged that the rotation of the crank causes them to dip into the oil and splash or throw the oil to the bearings. The pins or projections thus arranged, not only furnish a sufficient amount of oil to the bearing parts to maintain the said bearing parts at a sufficiently low running temperature, but they eliminate excessive splashing of the oil which must necessarily follow the passing therethrough of the larger metal parts, which splashing is found to be very detrimental to the air cylinder. In addition to reducing the splashing of oil in the crank casing, by reducing the parts which pass therethrough, additional precaution is taken for preventing oil from entering the air cylinder which consists in providing in the cylindrical portion 13 of the crank casing one or more baffle plates 25, 25. The said baffle plates are formed integrally with the said casing or attached thereto and each is provided in its central portion with a slot or opening 26 through which the connecting rod 8 moves, said slot or opening in each plate being of sufficient length to permit the connecting rod to oscillate freely in the casing. The said baffle plates 25, 25 may be arranged horizontally one above the other, as illustrated in Figs. 3 and 4, or may be arranged at an angle to the horizontal, as

indicated at 25ª, 25ª in Figs. 1 and 2. The latter is the preferred arrangement, as the slope of said plates causes them to more readily shed the oil. They are provided near their outer margins adjacent to the wall of the crank casing with drain holes or openings 27, 27 through which oil collected upon the tops of the said plates may be drained into the casing below.

Recesses 30, 30 are formed in the tops of the bearings 11, 11, below the drain holes 27, 27, in position to receive the oil shed from the baffle plates. Oil openings 31, at the bottom of said recesses direct the oil into the bearings of the shaft 5.

In order to guard against the creating of a vacuum in the crank casing which would have a tendency to draw the fine particles of oil up into the air cylinder there are provided in the upper part of the crank casing 10 and above the upper baffle plate 25 two oppositely located openings 32, 32 through which the air is drawn into and discharged from the crank casing during the operation of the parts therein.

35 designates, as a whole, an air cylinder of the usual form which is cast separately from the crank casing and is adapted to be secured thereto in any suitable manner. In the specific form shown, the said air cylinder is provided on its lower end with a reduced portion 36 which projects through an opening in the upper end of the crank casing and is further provided adjacent to its lower end with an external annular flange 37 which rests upon the upper portion of the said crank casing. Interposed between the lower face of the annular flange 37 and the adjacent face of the crank casing are metal washers or shims 38, 38 which are clamped tightly between the bearing surfaces by means of studs 39, 39 extending upwardly through the said shims and the annular flanges 37 and provided on their outer ends with clamping nuts 40, 40. The said shims not only form a tight joint between the air cylinder and crank casing but form means whereby correction may be made for the wear between the connecting rod and crank shaft. Surrounding the air cylinder 35 are two annular chambers 42 and 43 which constitute air and water supply chambers, respectively, the chamber 42 being the one through which air is supplied to the cylinder for the purpose of compression, and the chamber 43 being adapted for the circulation of water for cooling purposes. Removably secured to the upper end of the air cylinder 35 is a closing cap 45.

A discharge valve disk 50 of any ordinary type is located at the upper end of the air cylinder resting upon a valve seat 51 formed in the upper end of the said cylinder. Formed integrally with the said valve seat 51 are a plurality of radially arranged lugs 52, 52 which project inwardly toward the center of the cylinder and against which the margin of the valve disk 50 bears when said disk is resting upon its seat. The said lugs 52, 52 not only form a guide for the valve disk 50 in the ordinary operation of the same but form a guiding means whereby the said disk may be ground upon its seat without the use of a grinding jig or other auxiliary guiding means. The valve disk 50 is normally held upon its seat and returned to place thereon after operation by means of a coil actuating spring 55. The said spring, which rests at its lower end upon the upper face of the valve disk, engages at its upper end with a conical lug 56 which in turn is engaged by the lower end of an adjusting screw 57. Said adjusting screw is inserted through a screw-threaded aperture in a raised portion 58 formed upon the closing cap 45 and may be adjusted to vary the pressure of the spring 55.

In the operation of the compressor, the compressed air acts upon the lower face of the valve disk 50 to raise it from its seat and permit the air to pass upwardly into a chamber 59 formed between the upper end of the air cylinder and the closing cap 45 from whence it passes outwardly through a pipe 69 into a tank or other collecting means.

The advantages gained in constructing an air compressor in the manner hereinbefore described are manifest, it being readily apparent that the likelihood of oil being thrown or drawn up into the air cylinder is reduced to a minimum due to the small quantity of the lubricant which is gathered up by the pins 20, 20 during the revolution of the crank and also due to the interposing of the baffle plates between the part of the casing containing the crank and the air cylinder. Furthermore, the interposing of the shims between the crank casing and the air cylinder, which are originally cast separately, is of a decided advantage in that it forms a convenient means for correcting the clearance in the said air chamber due to the wear between the connecting rod and the crank shaft. Such a correction could not be made if the crank casing and air cylinder were formed in one casting. A further advantage is gained in the use of the guide lugs 52, 52 inasmuch as such lugs provide a suitable and convenient means for guiding the valve disk 50 when it is desired to regrind it upon its seat, thus eliminating the use of a jig and making it possible to regrind the valve by hand.

I claim as my invention:—

1. In an air compressor, in combination with the crank casing containing a quantity of oil, the crank shaft, the air cylinder and the connecting rod, one or more baffle plates located in said crank casing, each of said baffle plates being provided with an opening

through which the connecting rod freely passes, and with other openings at its outer margin through which oil collected upon the upper face of said plate may drain.

2. In a vertical air compressor, in combination with the crank casing which is adapted to contain a quantity of oil, the air cylinder, the crank shaft, the connecting rod, one or more baffle plates located in said crank casing between the crank shaft and the air cylinder, each of said plates being sloped from its central to its outer portion and provided through its center with an opening for the connecting rod and at its outer margin with drain holes.

3. In an air compressor, in combination with the crank casing containing a quantity of oil the crank shaft, the air cylinder and the connecting rod, one or more baffle plates located in said crank casing above the crank shaft, each of said baffle plates being provided through its central portion with an opening through which the connecting rod freely passes and at its margin with drain holes, and said crank casing being provided above said baffle plates with one or more openings.

In testimony, that I, claim the foregoing as my invention I affix my signature in the presence of two witnesses, this 7th day of July A. D. 1909.

JOHN WILLIS GARDNER.

Witnesses:
A. H. RAPP,
GEO. A. WALL.