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COMPRESSOR

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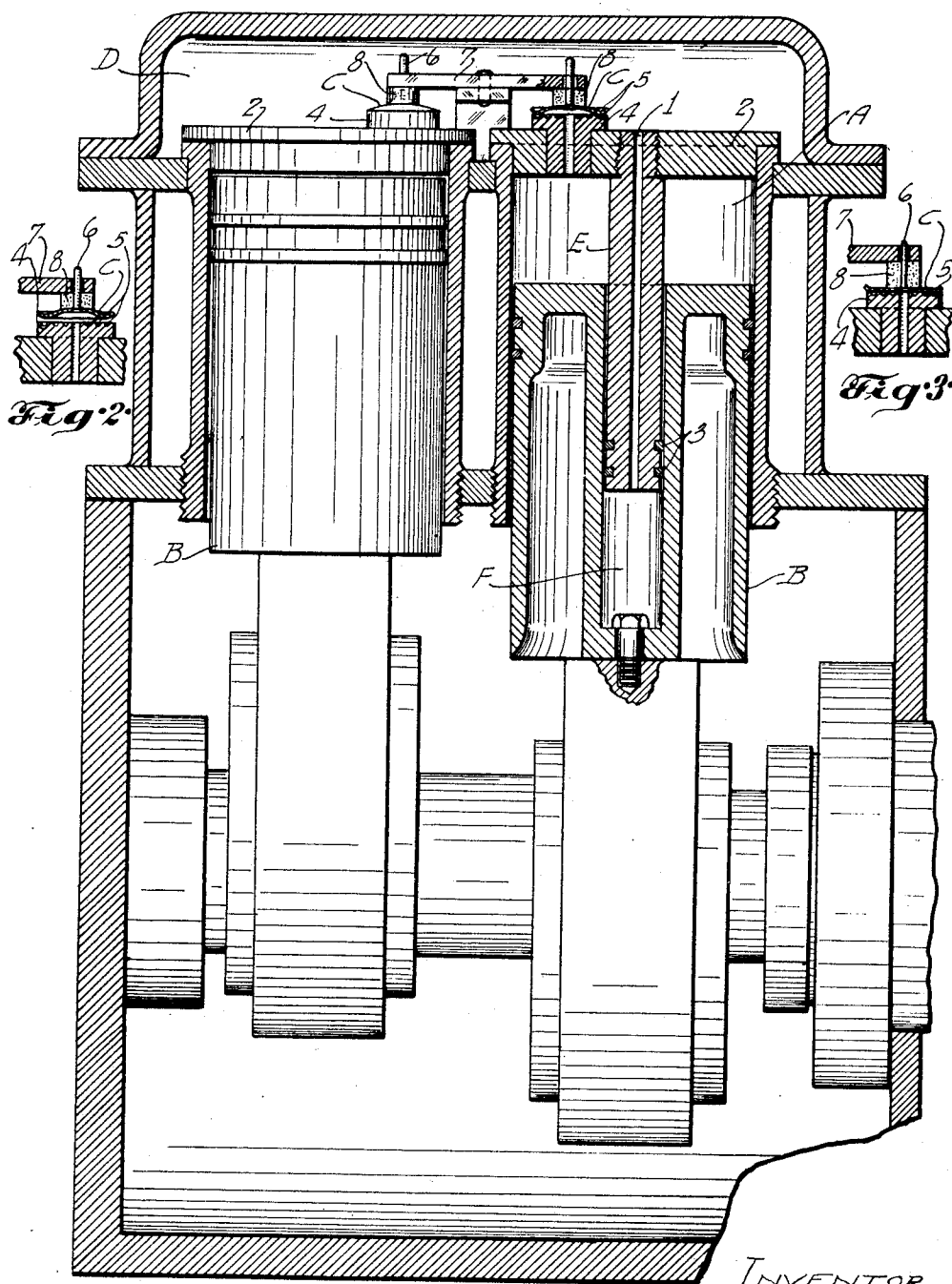


Fig. 1

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COMPRESSOR

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This invention relates to compressors, and has for its main object to provide a compressor which is equipped with a novel means for preventing a "knock" from developing during the intake stroke or suction stroke of the piston, in the event there is any play or lost motion in the bearings of the wrist pin, connecting rod, or crank shaft.

Figure 1 of the drawings is a vertical longitudinal sectional view of an air compressor constructed in accordance with my invention.

Figure 2 is a sectional view of the discharge valve, showing said valve unseated; and

Figure 3 is a sectional view of the discharge valve, showing it seated.

Referring to the drawings which illustrate a two cylinder air compressor embodying my invention, A designates the cylinders of the compressor, B designates the reciprocating pistons in said cylinders, C designates the discharge valves at the upper ends of said cylinders, and D designates the pressure chamber or space above the heads of the cylinders into which the compressed air escapes from the cylinders when the discharge valves open, said pressure chamber being connected by a pipe or conduit (not shown) with the reservoir in which the compressed air is stored and the cylinders being provided in their side walls with ports (not shown) through which air is admitted to the cylinders during the suction stroke of the pistons.

In the ordinary air compressor any play or lost motion in the main bearings or in the wrist pin or connecting rod bearings is apt to cause a "knock" during the suction stroke of the piston, due to the fact that the piston is not under pressure at such times.

One object of my invention is to prevent this and to this end I propose to equip each cylinder of the compressor with a means for causing the air that has been compressed in the cylinder to exert pressure on the piston during the suction stroke or intake stroke of the piston. Preferably, said means is composed of a guide or stationary piston E arranged in a cylinder F formed in the piston B and provided with a duct or passageway 1 that establishes communication between the

pressure chamber D and the cylinder F in the piston B. In a compressor of the construction above described any play or lost motion in the piston B or in the operating mechanism for same will not cause a "knock" during the suction stroke of the piston, because the pressure that exists in the pressure chamber D is exerted on the piston in a direction tending to move the piston downwardly. The perforated, stationary piston E is preferably connected to the head 2 of the cylinder A, and it is provided with one or more piston rings or other suitable devices 3 that produce a tight joint between the exterior of same and the exterior of the cylinder F in the movable piston B. In addition to acting as a means that establishes communication between the pressure chamber D and the interior of the cylinder F in the movable piston, said stationary piston E also acts as a center guide for the movable piston B that overcomes any tendency of said movable piston to slap against the side wall of the cylinder A in which it reciprocates.

The discharge valve C of the compressor consists of a disk-shaped piece of thin sheet metal that has sufficient resiliency to permit said valve to flex upwardly and downwardly within its peripheral edge. Said valve is arranged horizontally above a valve seat member 4 on the head of the cylinder that is provided with a flat valve seat equipped with a plurality of annular grooves 5 that are adapted to be filled with grease or some other suitable material of a viscous nature. The valve is provided with a stem 6 that projects upwardly through a stationary guide 7, and a buffer or stop 8, formed preferably of a non-metallic substance that has some resiliency, is arranged above the valve so as to limit the upward movement of the valve away from its seat, the stop or buffer 8 being so arranged in actual practice that it permits the valve to move upwardly off its seat only a few thousandths of an inch. On the suction stroke of the piston B of each cylinder the discharge valve C will be held tightly against its seat, as shown in Figure 3, by the suction in the cylinder and by the pressure in the chamber D. At a certain point in the upward stroke

or compression stroke of the piston the central portion of the discharge valve C flexes upwardly against the stop 8, as shown in Figure 1, thereby causing the valve to start to unseat, but without becoming completely unseated, and when a certain pressure in the cylinder is reached, the peripheral portion of the valve will move upwardly off its seat, as shown in Figure 2, and thus permit the pressure to escape from the cylinder into the pressure chamber D. In the conventional air compressor the entire area of the discharge valve is held tightly against the valve seat until a certain pressure in the cylinder is reached, and then the valve will be moved upwardly off its seat and thrown with such force against the valve stop that a very objectionable noise is made. In my improved compressor no perceptible noise or objectionable noise is made when the discharge valve unseats, due to the fact that said valve is constructed in such a manner that it unseats progressively, and in the first portion of the unseating operation, comes in contact with the stop 8 at a time when the peripheral portion of the valve is engaged with its seat, thereby preventing the valve from making a noise when it opens and permits the pressure to escape from the cylinder. In other words, in a compressor of the construction above described the upward flexing of the intermediate portion of the discharge valve causes said valve to be engaged by the stop or buffer which limits the movement of said valve away from its seat, and the final unseating of the valve is effected at a time when the intermediate portion of the valve is in direct engagement with the valve stop 8, thereby preventing the valve from being thrown suddenly and with considerable force against the stop that limits the upward movement of same, as in conventional air compressors.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

1. A compressor, comprising a cylinder, a piston in said cylinder, a pressure chamber into which said cylinder discharges, and means for causing the pressure existing in said pressure chamber to be exerted on the piston during the suction stroke of same.

2. A compressor, comprising a cylinder, a reciprocating piston in said cylinder, a pressure chamber for receiving the medium compressed in said cylinder, and a cylinder in said piston that is in communication with said pressure chamber during the suction stroke of the piston.

3. A compressor, comprising a cylinder, a reciprocating piston in said cylinder, a pressure chamber, a discharge valve for governing the passage of the compressed medium from said cylinder into said pressure chamber and means for causing the pressure in said

pressure chamber to be exerted on said piston when said discharge valve is closed.

4. A compressor, comprising a cylinder, a reciprocating piston in said cylinder, a cylinder in the piston, a pressure chamber for receiving the medium compressed, a stationary piston projecting into the cylinder in said reciprocating piston, and means for establishing communication between said pressure chamber and the cylinder in said piston.

5. A compressor, comprising a cylinder, a reciprocating piston in said cylinder, a pressure chamber for receiving the medium compressed in said cylinder, a stationary piston arranged at the center of said cylinder, a cylinder in said reciprocating piston for receiving said stationary piston, and a duct in said stationary piston that establishes communication between said pressure chamber and the cylinder in said piston.

6. A compressor, comprising a cylinder, a reciprocating piston in said cylinder, a pressure chamber for receiving the medium compressed in said cylinder, a discharge valve for governing the escape of the compressed medium from said cylinder into said pressure chamber, a cylinder in said reciprocating piston, a stationary guide arranged in the cylinder in said piston, and a duct in said guide for establishing communication between the pressure chamber and the cylinder in said piston.

7. A compressor, comprising a cylinder, a piston in said cylinder, means for confining and trapping off from said cylinder the medium that is compressed in said cylinder during the power stroke of the piston, and means for utilizing the pressure of said compressed medium to take up play or lost motion in the actuating mechanism of the piston during the return stroke of the piston.

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