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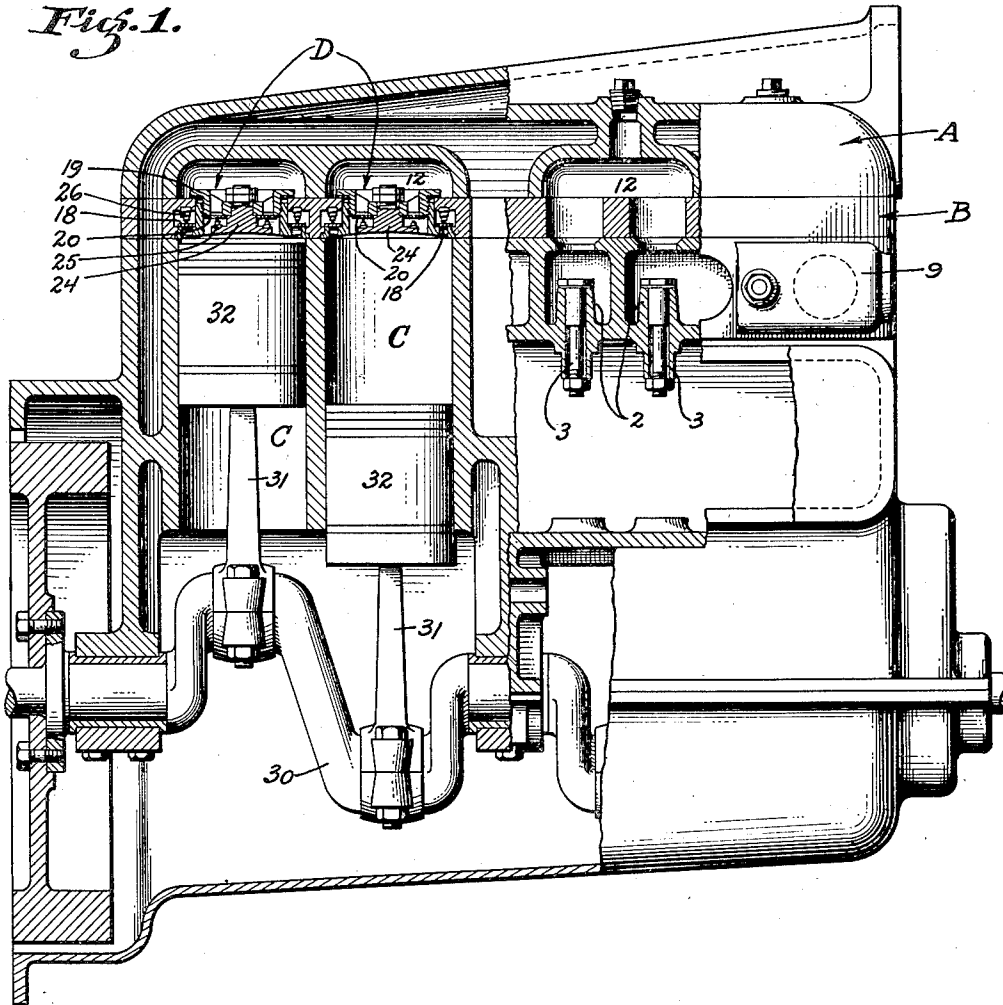
1,800,631

AIR COMPRESSOR

Filed Sept. 20, 1929

2 Sheets-Sheet 1

Fig. 1.



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Fig. 2.

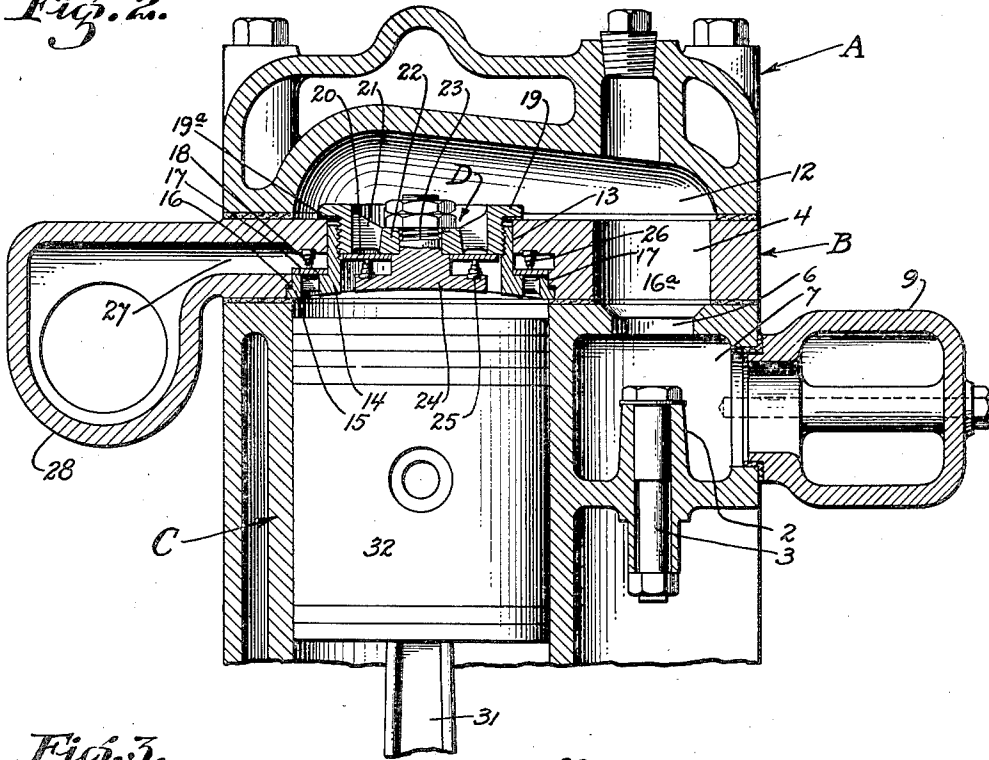
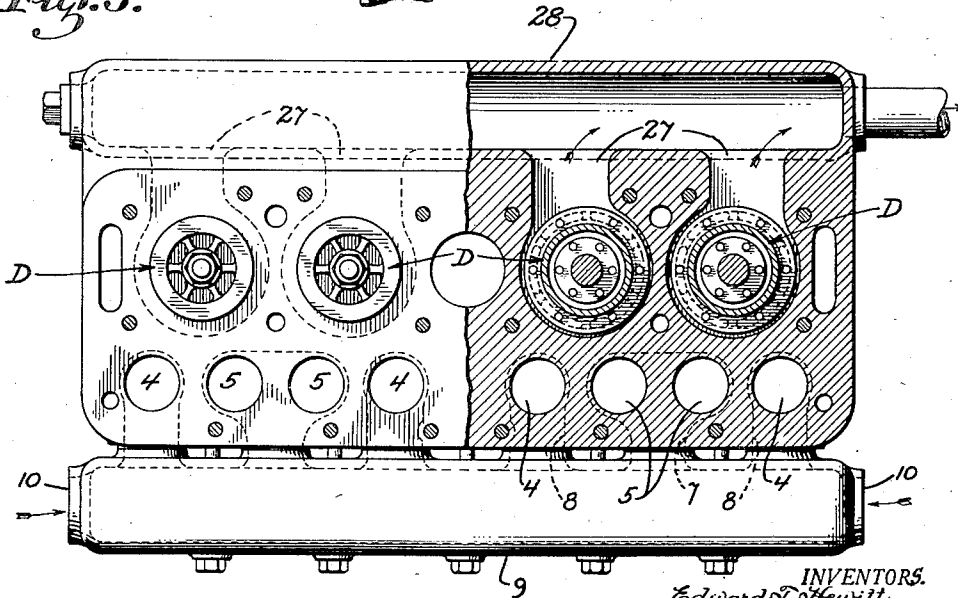


Fig. 3.



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AIR COMPRESSOR

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This invention relates to an air compressor or the like, and especially to a structure or attachment whereby an ordinary internal combustion engine or motor may be converted to operate as a compressor.

The object of the present invention is to provide a valve head which is adapted to be interposed between the cylinder and head of an ordinary gas engine, whether of the single or multiple type, and when so interposed causes conversion of a gas engine into an air compressor; to provide a valve head which permits the use of ring or disk valves; to provide a valve head in which the valves are adapted to be concentrically grouped in pairs, one pair for each cylinder, and further to provide a novel valve cage structure whereby the valves and cooperating springs may be quickly removed with relation to the valve head, for inspection, repair etc.

One form which the invention may assume is shown by way of illustration in the accompanying drawings, in which:

Fig. 1 is a side elevation of the compressor, partially broken away and partially in section.

Fig. 2 is a vertical cross section of the upper portion of the compressor,

Fig. 3 is a plan view of the compressor, partly broken and partially shown in section.

When constructing a compressor such as we are illustrating practically any type of gas engine or motor having a removable head may be employed. In the present instance we have illustrated a Fordson tractor motor, as this has proven very suitable for conversion to a compressor. When converting a motor of this type, the cam shaft, together with the inlet and exhaust valves, pusher rods, springs etc., are removed and the valve stem guides 2 are plugged or closed by any suitable means, such as the bolts shown at 3. The head of the motor, generally indicated at A, is raised and a valve head B is interposed between the cylinders C and the head A.

The valve head B forms a cover or closure for the upper ends of the cylinders C, and it is held in position by stud bolts or the like,

passing through the head A. The valve head conforms to the shape of the upper end of the cylinders, and air inlet ports are formed therein, as indicated at 4 and 5, to register with the inlet and exhaust valve ports 6, formed in the cylinder proper. That is, the cylinders on a Fordson motor are cast as one unit, and pockets 7 and 8 are formed on one side thereof, the pockets 8 serving as an outlet for the exhaust gases and the pockets 7 for the admission of the explosive mixture. All the pockets terminate in valve seats, such as indicated at 6, see Fig. 2, and they are thus opened and closed at pre-determined time intervals by means of the inlet and exhaust valves. In the present instance, however, the inlet and exhaust valves, together with their actuating mechanism is entirely removed and all of the pockets indicated at 7 and 8 may serve as inlet passages for air or other fluid medium to be compressed.

As it is usually desirable to filter the air before admitting it to a compressor, a manifold such as indicated at 9 is employed. This communicates with the several pockets 7 and 8, and it is provided with one or more inlet openings, such as shown at 10 so as to permit the insertion of an air filter if desired.

Formed in the valve head B, in alignment with the pockets or ports 7 and 8, are ports such as indicated at 11. These communicate with the pockets 7 and 8 at the lower end and at their upper ends with recesses, such as shown at 12, which are formed in the head A. These recesses are ordinarily known as the combustion space. The valve head B is otherwise provided with openings 13, for the reception of valve cages generally indicated at D, there being one valve cage centrally disposed above each cylinder.

The valve cage is best illustrated in Fig. 2. It consists of an annular ring shaped member 14, the bottom portion of which is flanged as at 15 to engage an annular seat 16, in the lower face of the valve head, and to form a horizontal annular shoulder 17, for the reception of a ring or disk shaped valve 18. This valve will hereinafter be referred to as the exhaust valve.

The inner and upper end of the valve cage

is threaded to receive a lock nut 19. This lock nut has a valve seat formed on its lower face, and supports an inlet valve 20, which is also ring or disk shaped. A plurality of
 5 radially disposed arms are formed on the lock nut 19, as at 21, and these support a central hub member 22, which supports a bolt 23, the lower end of which is enlarged to form a head member 24, which carries a
 10 number of springs 25. These springs serve to normally hold the inlet valve 21 on its seat, and similar springs 26 serve the function of holding the exhaust valve 18 on its seat. Communication with the central openings 13
 15 in which the valve cage and valve mechanism are disposed are outwardly extending exhaust ports 27, and these communicate with an exhaust manifold 28, which may be formed integral with the valve head B, or secured
 20 thereto as desired.

In actual operation it will be understood that the crank shaft 30 of the motor, together with the connecting rods 31, and pistons 32 are left intact. It is accordingly only necessary to drive the crank shaft in any manner
 25 desired. During the revolution of the crank shaft, pistons 32 will reciprocate. During their downward strokes, air will be drawn through the manifold 9, the valve pockets 7 and 8, and the ports 6 and 11, into the recesses formed in the lower face of the head A. From here the air passes downwardly between the radial arms of the lock nut 19, and pass the valve 21 into the cylinder. During
 30 the up-stroke of the piston the spring 25 closes the inlet valves 21 and as the pressure builds up, the exhaust valves 18 are lifted from their seats and the compressed air or fluid is forced through the passages 27 into the discharge manifolds 28, from where it may be conveyed into storage tanks, or whatever the case may be.

It is well known that the efficiency of a compressor, particularly where fairly high pressures are required, is largely dependent upon the clearance space formed between the top of the piston when it reaches the upper end of its stroke and the valve mechanism.

By constructing a valve such as here shown, and placing the valves in the cage as here
 50 illustrated, the clearance space may be reduced to a minimum and high pressure volumetric efficiency may be obtained.

Volumetric efficiency is further increased by the unrestricted flow of air into the inlet valves, this being due to the fact that both the exhaust and inlet ports formerly employed may, in this instance, be utilized for the admission of air. In other words, the
 60 enclosed air has a free and unrestricted flow direct to the inlet valve and drawings and attenuation of the air is prevented.

Leakage losses around the valve cage are also prevented as a packing gasket such as
 65 indicated at 16a may be interposed between

the valve cage and the valve head proper, and a similar gasket may be interposed at the point indicated at 19a. That is, below the lock nut. These are the only two points where leakage could possibly take place and the interposition of gaskets at these points positively prevents leakage.

The valve cages are secured by the lock nuts 19, and by no other means, and it is thus possible, when the head A is removed, to quickly and readily remove any or all of the valve cages as the case may be—this being important when inspection and repair are considered.

The mechanism as a whole is accordingly simple. In fact, the only mechanism involved is the valve head B, with the valve cages mounted therein. This is merely interposed between the cylinders and the head of the motor, and when secured by the stud bolts in the usual manner, is ready for operation, it being understood that the exhaust and inlet valves of the engine, together with their actuating mechanism has been removed.

The free circulation of inlet air around the valve head is also important, as it tends to maintain the temperature fairly low. The head A and the cylinders proper are however, water jacketed, and before circulation of water is maintained, practically any temperature desired may result.

While the present invention is described and illustrated in conjunction with a Fordson tractor motor, it is obvious that an ordinary Ford automobile motor, and in fact practically any motor may be converted by the use of a valve head such as here shown. The only change in the valve head would be a different arrangement of the ports 7 and 8 to conform with the inlet and exhaust ports of the motor, and while other features of the invention are more or less specifically described, we wish it understood that various changes may be resorted to within the scope of the appended claims. Similarly, that the materials and finishes of the several parts employed may be such as the manufacturer may decide, or varying conditions or uses may demand.

Having thus described our invention, what we claim and desire to secure by Letters Patent is:—

1. A device of the character described comprising a cylinder, an inlet port formed in the cylinder, a valve head forming a closure for the cylinder and having a port formed therein in communication with the inlet port of the cylinder, a valve cage carried by the valve head, exhaust and inlet valves carried by the cage, a head member covering the valve head, said head having a recess formed therein in communication with the inlet valve and with the inlet ports, and said valve head having a port formed therein in communication with the exhaust valve.

2. A device of the character described comprising a block having a plurality of cylinders formed therein, a plurality of inlet ports formed in one side of the cylinder, a valve head forming a closure for the upper end of the cylinder, said valve head having ports formed therein in communication with the cylinder inlet ports, a plurality of valve cages mounted in the valve head, each cage aligning with a cylinder, exhaust and inlet valves carried by each cage, a head member forming a cover for the valve head, said valve head having a plurality of recesses formed therein, which communicate with the inlet ports and the inlet valves, and said valve head having a plurality of discharge ports formed therein communicating with the respective exhaust valves.

3. In a device of the character described a valve head, a plurality of aligned interspaced circular openings formed in the head and extending through the same, said head also having a pair of inlet ports formed therein for each of said openings, and said head also having a plurality of exhaust ports formed therein one for each of said openings, and in communication therewith, a valve cage disposed in each opening and an exhaust and inlet valve in each cage.

4. In a device of the character described a valve head, said head having a plurality of aligned interspaced circular openings formed therein and extending therethrough, said head also having a plurality of exhaust ports formed therein, one port for each opening and communicating therewith, a valve cage disposed in each opening, an exhaust and an inlet valve in each cage, said exhaust valves communicating with the exhaust ports only.

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