Jan. 20, 1931. E. H. WHITE 1,789,376

AIR COMPRESSOR

Filed Aug. 7, 1929 2 Sheets-Sheet 1

Fig. 1

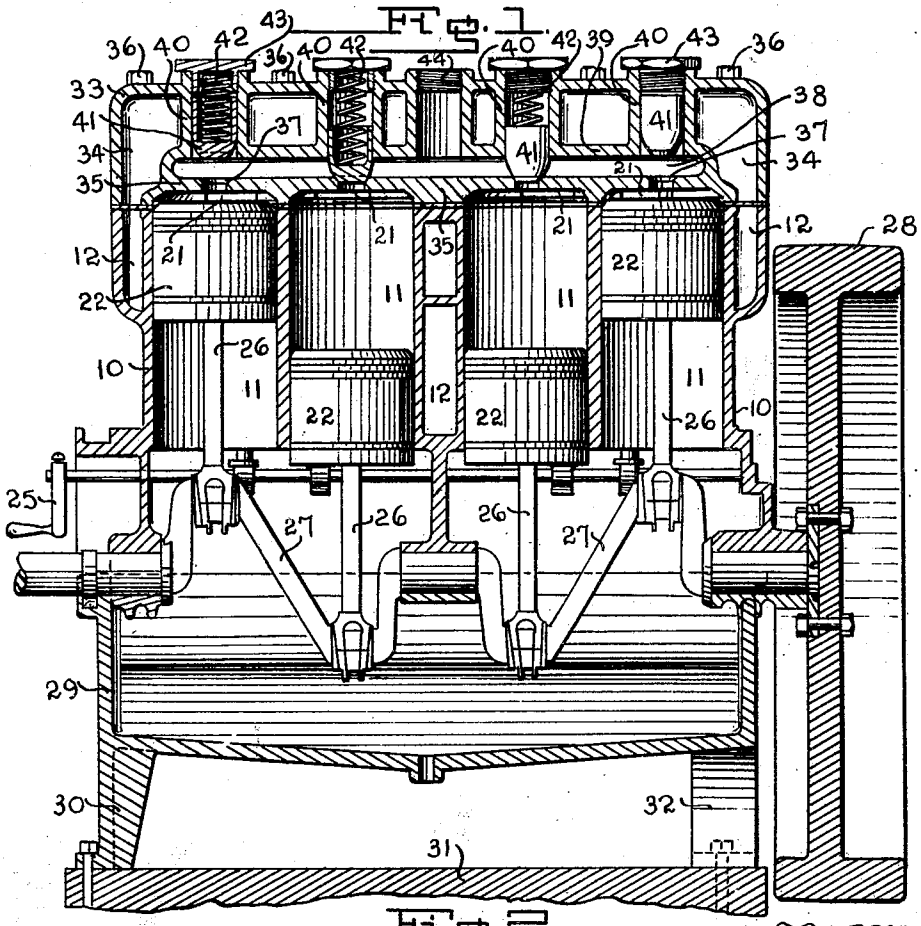
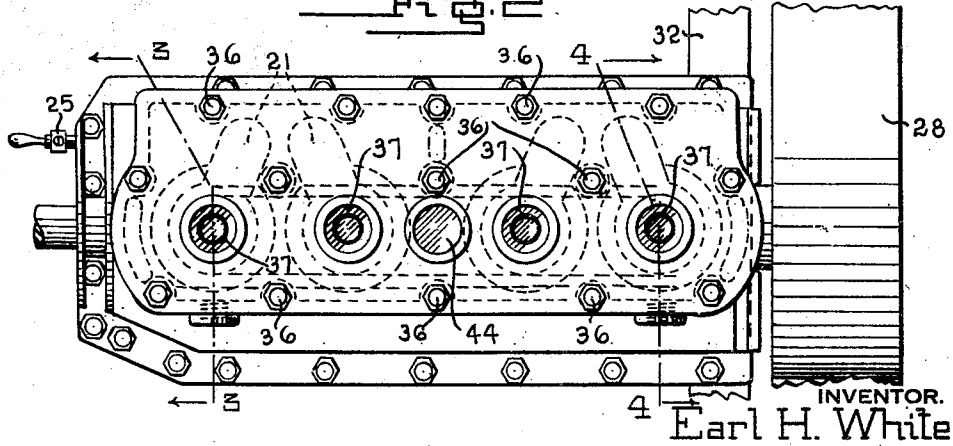


Fig. 2



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Fig. 3.

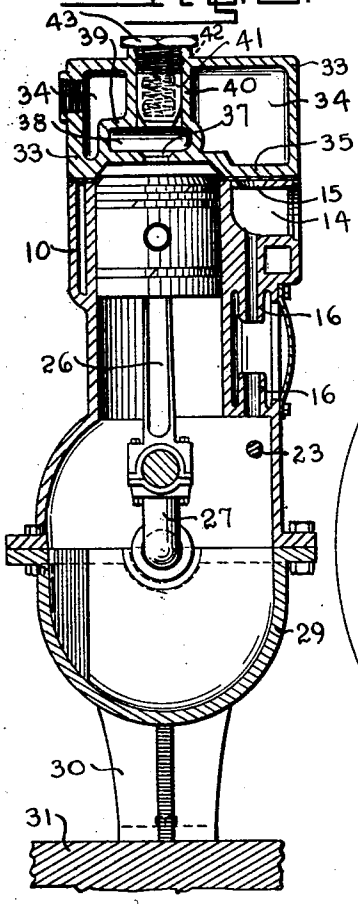


Fig. 4.

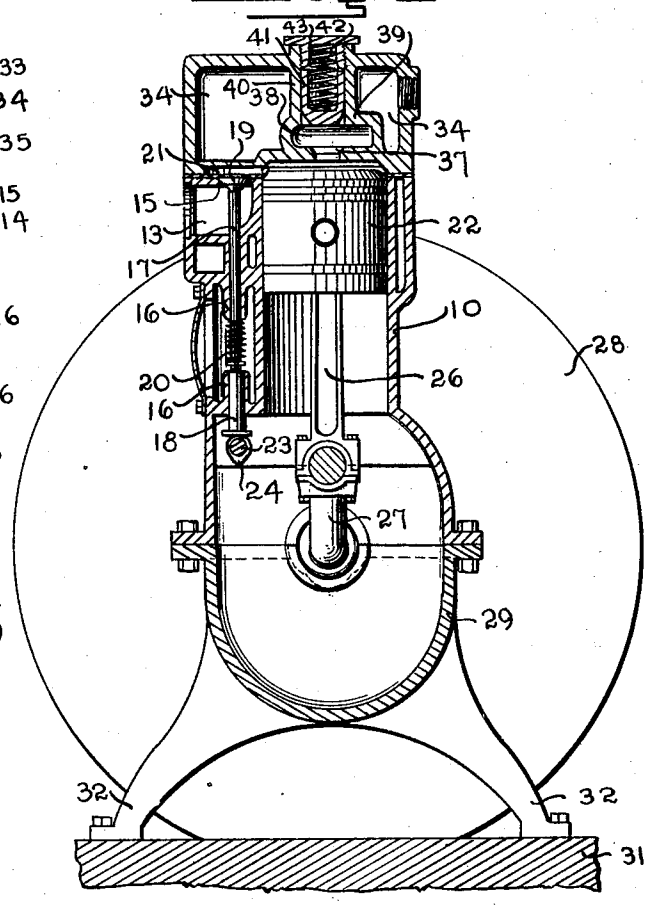
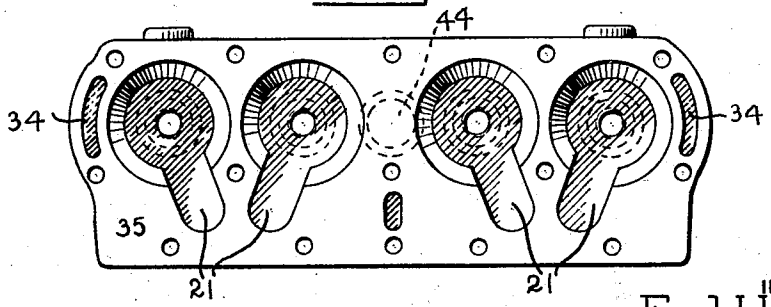


Fig. 5.



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UNITED STATES PATENT OFFICE

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AIR COMPRESSOR

Application filed August 7, 1929. Serial No. 383,993.

The present invention relates to air compressors, and has for an object to provide a set of attachments of a novel construction which may be quickly and easily applied to automobile truck, tractor or the like motor blocks for utilizing the blocks from new or used engines as the body portions of air compressors.

It is well known that in the equipment of construction companies, garages and various industrial concerns, air compressors play a very important part, and also that in nearly all cases there is included in this equipment either new or used engine blocks.

It is also well known that it is easy to obtain motor blocks and assemblies of the Ford model T and Fordson type because of their widespread distribution, and it is therefore another object of this invention to provide attachments which are particularly adaptable to this type of motor block.

Further, an advantage of attachments of this nature is in the ease of obtaining repair parts for this type of block and on account of the special adaptation of machines and tools for making repairs upon the blocks.

A further object of the invention is to provide attachments which are relatively simple and economical in construction and few in number, and which may be easily and quickly applied to the block. The special equipment of this invention which is necessary is a novel construction of cylinder head, with novel arrangement of valves therein, and a special crank case which provides a support for the air compressor and a suitable oil reservoir to insure proper lubrication.

A still further object of the invention is to provide an air compressor of this general type which has considerable capacity at relatively low cost compared with compressors of like capacity which are built especially for compressing air.

With the foregoing and other objects in view, the invention will be more fully described hereinafter, and will be more particularly pointed out in the claims appended hereto.

In the drawings, wherein like symbols refer to like or corresponding parts throughout the several views.

Figure 1 is a longitudinal vertical section taken through an air compressor constructed according to the present invention.

Figure 2 is a fragmentary top plan view of the same, the springs and cap screws being removed from the top of the cylinder.

Figure 3 is a transverse section taken through one end of the compressor substantially on the line 3—3 of Figure 2.

Figure 4 is a similar view taken on the line 4—4 of Figure 2, and

Figure 5 is a bottom plan view of the improved head.

Referring now to the drawings, 10 designates a conventional form of cylinder block shown in the present instance as having four bores or cylinders 11 therein, and also provided with the usual water jacket 12. The cylinder block 10 is also provided at one side with the usual intake openings 13, exhaust openings 14 and the corresponding valve seats 15. At the same side of the block 10, and in line with the valve seats 15 are disposed the usual guides 16 for valve rods 17 and their tappets 18. In the present instance the exhaust valves with their parts are omitted, while, as shown in Figure 4, the intake valves 19 are retained so as to control the inflow of air to the cylinders 11.

Instead of the relatively heavy valve spring, a light valve spring 20 is mounted in the usual manner upon the valve stem 17 so as to lightly hold the valve 19 in closed position and admit of the lifting of the valve by suction in the cylinder 11. The intake valves 19 open in to ports or passages 21 which led into the upper ends of the cylinders 11 and serve, to admit air to the cylinders when the piston 22 moves downwardly therein.

For the purpose of priming the motor a cam shaft 23 may be mounted lengthwise along one side and at the bottom of the block 10, the crank shaft shown at 23 and having cams 24 thereon, one cam for each tappet 18.

The cam shaft 23 is provided upon one end and exteriorly of the block 10 with a crank handle 25 by means of which the shaft 23 may be turned to lift the intake valves 19 and ad-

mit the free passage of air to the cylinders so that the pump may be easily started.

Each piston 22 has a connecting rod 26, and the latter are connected to the crank portion of a crank shaft 27 of conventional type and which is mounted in the lower end of the block 10. The crank shaft 27 is adapted to be turned by any suitable means, and in the present instance is shown as provided upon one end with a combined pulley and fly wheel 28 which may receive a belt thereover and which also is adapted to carry the crank shaft 27 over the dead load period in the cycle of the operation of the compressor.

The block 10 is provided with a novel construction of crank case 29 which is secured to the block 10 and is of suitable proportion for receiving the desired quantity of oil and maintain the same in such position that the crank portions may dip into the body of oil and provide a lubricating system of the splash type for supplying the cylinders, pistons, and other parts of the compressor with the proper amount of lubricant. The crank case 29 is provided with any suitable means of support, and in the present instance the crank case 29 is provided at one end with a flanged leg 30 which may be bolted or otherwise secured to the floor 31, and at its other end is provided with preferably a pair of diverging or downwardly arched legs 32 which may also be bolted or otherwise suitably secured to the floor 31.

It will be noted that the pair of legs 32 is provided upon the end of the crank case 29 at which is located the fly wheel 28 so as to resist the lateral vibration of the fly wheel.

The improved head of the air compressor comprises a casting or body portion 33 having a water jacket 34 and provided with a bottom wall 35 seated on top of the block 10 and extending over the block. The head is also provided with suitable apertures and cavities for intercommunication with the corresponding apertures and cavities in the block 10 for the free circulation of water or other cooling medium, and also to provide the various channels and chambers required.

The block 33 is secured by bolts 36 or the like to the block 10, and the lower wall 35 is provided at its under side with cavities which register with and form part of the cylinders 11, and the wall 35 has co-axially with each cylinder 11 an exhaust opening the upper side of which is provided with a valve seat 37 opening into a longitudinally extending chamber 38 disposed between the lower wall 35 and a horizontal partition wall 39 which is spaced above the wall 35. The head 33 is provided therein with valve casings 40, one for each cylinder 11, and preferably disposed co-axially therewith. Each valve casing 40 is provided with a plunger valve 41, the lower end of which tapers and is adapted to engage the seat 37.

Each valve 41 is cup shaped and opens upwardly, and seated at its lower end in the valve 41 is a spring 42 which is compressed by a cap screw 43 threaded into the upper end of each valve casing 40. The spring 42 maintains the valve 41 normally to the seats 37 so as to close off communication between the chamber 38 and the cylinders 11 when the air in the cylinders 11 are not under compression.

The head 33 is provided with a common outlet nipple 44 which communicates with the chamber 38 and is adapted to receive air therefrom under pressure, and the nipple 44 is preferably located intermediate the ends of the head 33 shown in Figure 1.

From Figure 3 it will be noted that the lower wall 35 of the cylinder head 33 is uninterrupted so as to provide a flat closure surface extending over the exhaust opening 14 of the cylinder block 10 because the exhaust opening 14 is not used when the cylinder block is converted into a compressor. The head 33 is also provided with a gasket 45 which not only seals the head 33 in position on the block, but also seals the exhaust opening 14.

In operation, the crank shaft 27 is turned either by means of the pulley 28, or any other suitable drive means. The cam shaft 23 is turned so as to raise the intake valves 19 into open position until the crank shaft 27 reaches a desired speed of rotation when the cam shaft 23 may then be turned to face the cams 24 downwardly away from the tappets 18.

The relatively light spring 20 now maintains the intake valve 19 in closed position, and the suction created in the tops of the cylinders 11 by the pistons 22 is sufficient for unseating the valves 19 and admitting of the intake of air to the tops of the cylinders 11. The downward movement of the piston 22 draws in a quantity of air through the intake opening 13, past the intake valve 19, and through the passage 21 into the top of the cylinder 22. When the pistons 22 move upwardly the intake valves 19 are closed and held closed by the springs 20 while the air is forced upwardly past the valve seats 38, unseating the adjacent valve 41 and admitting the air under compression to the chamber 38. From the chamber 38 the air is driven outwardly through the exhaust or outlet 44. It will be noted that the outlet bore or nipple 44 is threaded to receive a pipe or the like so that air under compression may be transmitted to a storage tank, or other suitable point for storage or use.

It will also be noted that a conventional crank shaft 27 is employed wherein the pistons 22 move up and down in pairs in the cylinders 11. The crank portions of the crank shaft 27 may be disposed at 90 degree angles, or otherwise so as to effect the de-

sired operation in pairs or in sequence as may be found desirable.

The compressor thus constructed may utilize an old type of cylinder block with merely the head of the present invention and other slight changes or alterations above indicated to convert the block into a compressor so that the main part of the compressor may be merely a discarded cylinder block.

It is of course understood that various changes and modifications may be made in the details of construction and design of the above specifically described embodiment of this invention without departing from the spirit thereof and being restricted only by the scope of the following claims:—

What is claimed is:—

1. In an air compressor, the combination with a cylinder block, of a crank shaft, pistons in the cylinder of the block connected to the crank shaft, a crank casing for enclosing the crank shaft and supporting the cylinder block, means for turning the crank shaft, spring actuated intake valves mounted in the block, a head mounted on the block having an air receiving chamber communicating individually with the cylinders of the block, said head having means for closing the exhaust ports of the block, and individual valves mounted in the head for admitting air under compression from the cylinders into said chamber.

2. In an air compressor, the combination with a cylinder block having intake and exhaust ports therein, of pistons in the cylinders of the block and a crank shaft connected to the pistons, a crank case supporting the cylinder block and enclosing the crank shaft and provided with legs for supporting the compressor, means for turning the crank shaft, a head mounted on the block and having a bottom wall adapted to close the exhaust ports of the block, valves mounted in the block for controlling the intake ports, said head having an air receiving chamber therein with separate openings leading to the individual cylinders of the block, and spring pressed valves normally closing said openings and arranged to be individually opened by compression of air in the cylinders for admitting the air to said chamber, said head having an outlet nipple leading from said air receiving chamber.

3. In an air compressor, the combination with a cylinder block having cylinder bores therein and intake and exhaust ports leading to said bores, a crank shaft, and pistons mounted in the cylinder bores connected to said crank shaft, of a head mounted on said block and having a compressed air chamber therein with an outlet opening leading from said chamber, said head also having individual openings leading from said chamber to the cylinder bores in the block, and individual spring pressed valves mounted in the head for normally closing said openings and adapted to be individually opened by air under pressure in the cylinder bores for admitting said air to said chamber in the head.

4. In an air compressor, the combination with a cylinder block having cylinder bores therein and provided with intake and exhaust ports leading to the cylinder bores, of pistons in the cylinder bores, a crank shaft connected to the pistons, a crank shaft support arranged beneath the block and having an oil reservoir for supplying lubricant to the crank shaft, suction operated intake valves for said intake ports, a head mounted on the cylinder block and having a lower wall adapted to close said exhaust ports of the block, said head also having a compressed air chamber and an outlet opening therefor and provided with individual openings leading to the cylinder bores of the block, said head also having a valve casing in line with each cylinder bore, a spring pressed valve mounted in each valve casing and adapted to normally close the adjacent opening from the compressed air chamber to the adjacent cylinder bore, and means for manually opening the intake valves of the block for priming the compressor.

5. In an air compressor, the combination with a cylinder block having cylinder bores therein and provided with intake and exhaust ports leading to the cylinder bores, of pistons in the cylinder bores, a crank shaft connected to the pistons, suction operated intake valves for said intake ports, a head mounted on the cylinder block and having a lower wall adapted to close said exhaust ports of the block, said head also having a compressed air chamber and an outlet opening therefor and provided with individual openings leading to the cylinder bores of the block, said head also having a valve casing in line with each cylinder bore, a spring pressed valve mounted in each valve casing and adapted to normally close the adjacent opening from the compressed air chamber to the adjacent cylinder bore, and means for manually opening the intake valves of the block for priming the compressor.

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