

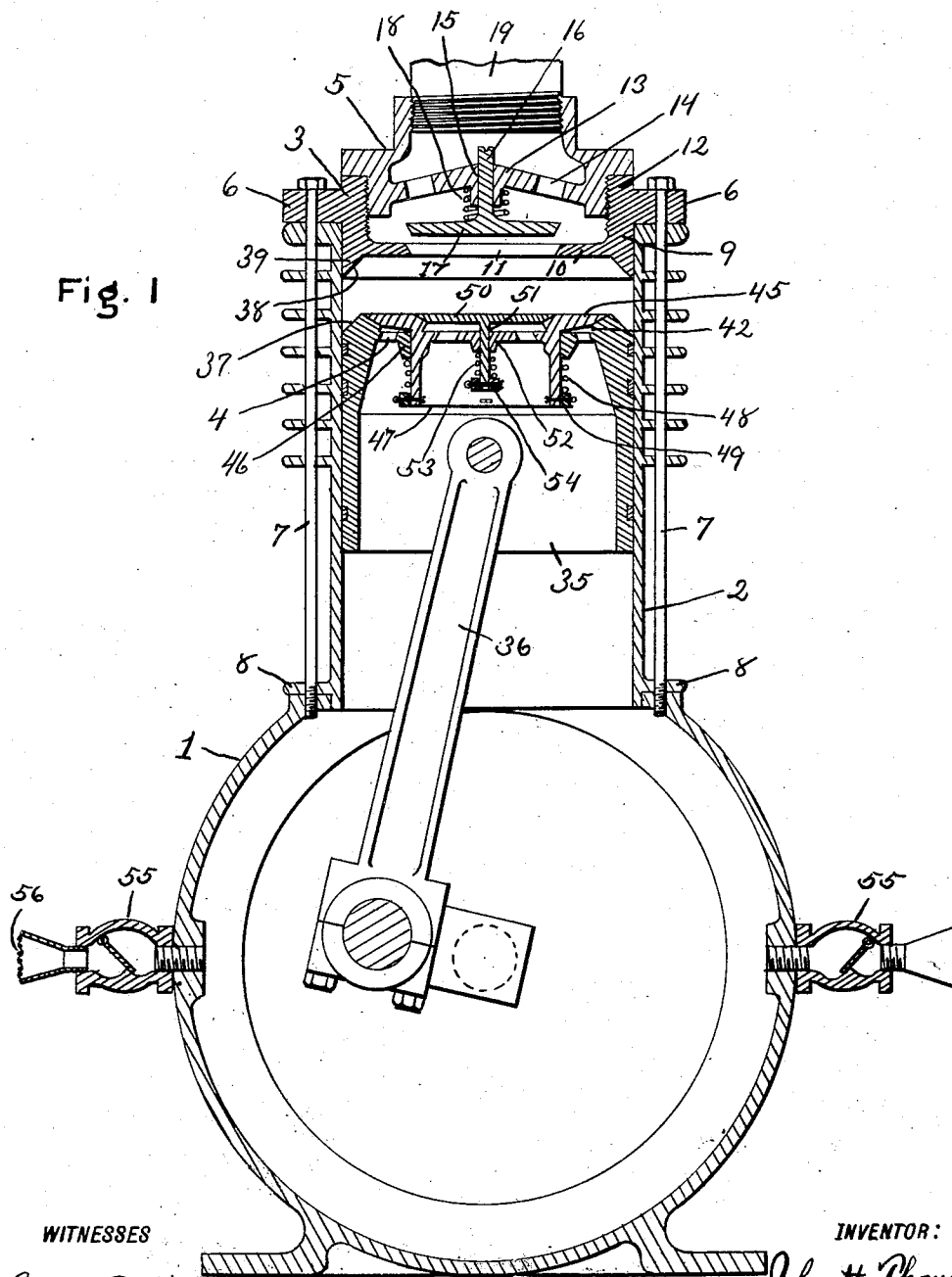
J. H. THOMAS.
AIR COMPRESSOR.
APPLICATION FILED APR. 11, 1913.

1,109,154.

Patented Sept. 1, 1914.

2 SHEETS-SHEET 1.

Fig. 1



WITNESSES

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2 SHEETS—SHEET 2.

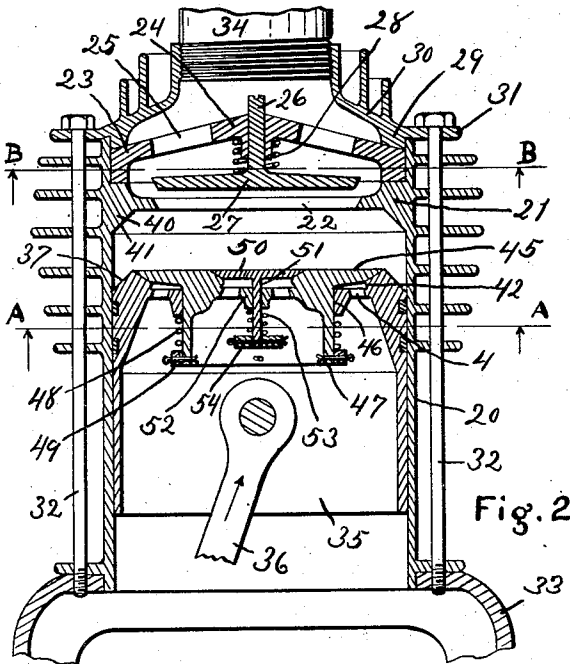


Fig. 2

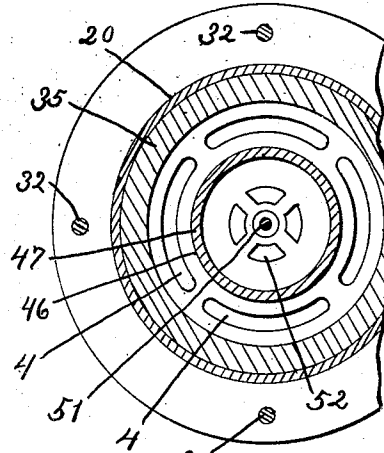


Fig. 4

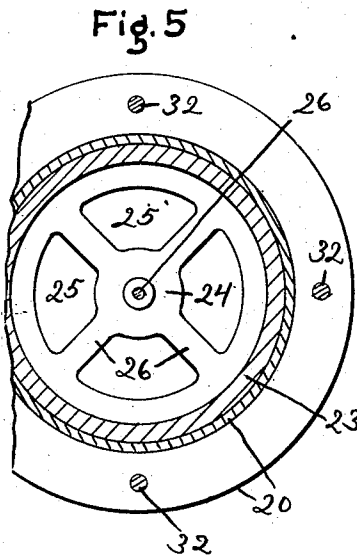


Fig. 5

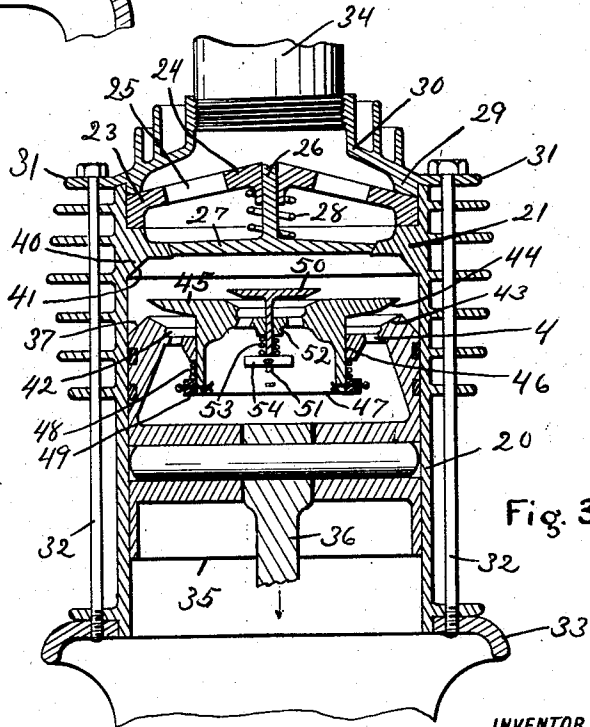


Fig. 3

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UNITED STATES PATENT OFFICE.

JOHN H. THOMAS, OF BLOOMFIELD, NEW JERSEY, ASSIGNOR TO THOMAS MOTIVE POWER COMPANY, A CORPORATION OF NEW JERSEY.

AIR-COMPRESSOR.

1,109,154.

Specification of Letters Patent.

Patented Sept. 1, 1914.

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To all whom it may concern:

Be it known that I, JOHN H. THOMAS, a citizen of the United States, residing at Bloomfield, in the county of Essex and State of New Jersey, have invented certain Improvements in Air-Compressors, of which the following is a specification.

The objects of this invention are to provide an air compressor of great efficiency which shall be simple and inexpensive to manufacture; to secure free and ample intake of air to the cylinder upon the reverse stroke of the piston; to insure the entrance of such air to the cylinder with the least possible resistance; and at the same time enable the cylinder to be completely emptied on each instroke of the piston; to secure a simple construction not liable to break or get out of order; to enable the parts of the cylinder to be conveniently secured together and to the crank case, and to obtain other advantages and results as may be brought out in the following description.

Referring to the accompanying drawings, in which like numerals of reference indicate the same parts throughout the several figures, Figure 1 is a central longitudinal section of a compressor of my improved construction, showing the position of parts upon instroke of the piston; Fig. 2 is a similar sectional view illustrating a modified construction of cylinder head and an open bed or supporting base; Fig. 3 is a similar view showing the position of parts assumed upon reverse stroke of the piston, the detail structure being that shown in Fig. 2; Fig. 4 is a section on line A—A of Fig. 2, looking in the direction indicated by the arrows, to illustrate the piston valves, and Fig. 5 is a cross-section on line B—B Fig. 2.

In said drawings, and particularly Fig. 1, 1 indicates the closed crank case of an air-compressing pump of my improved construction, and 2 is a cylinder body mounted thereon with its head made up of a cap 3 providing an interior annular valve-seat 11, and a central valve guiding support 5 screwed into said cap. The said cap preferably has a peripheral flange 6, and bolts 7 extend through said flange 6, the base flange 8 of the cylinder body and screw into the crank-case 1, as shown, to bind all said parts together. Inside the said flange 6 the cap projects into the cylinder, as at 9, and provides a partition 10 disposed transversely of

the cylinder, which partition is centrally apertured and forms a valve seat 11. The valve support 5 screws into the interiorly threaded end 12 of the cap and provides interiorly of itself a central portion 13 supported by radial arms 14 and bored longitudinally of the cylinder to form a slideway 15 for the stem 16 of a valve 17. Said valve 17 is adapted to move between the valve support 5 and the valve seat 11, being suitably fitted to said valve seat to imperviously engage the same, and a spring 18 is arranged between the valve support 5 and the valve 17 to normally seat the same. A discharge pipe 19 leads from the end of the valve support 5, preferably screwed thereto as shown.

While I prefer the construction of cylinder head just described, I do not wish to be understood as limiting myself thereto, and indeed I have shown in Figs. 2 and 3 another construction of cylinder head which may sometimes be used. In this modified construction, an annular flange 21 is formed upon the inner wall of the cylinder 20 and this flange is centrally apertured to provide a valve seat 22. A valve support 23 fits within the cylinder and rests upon said flange 21, said support having a central portion 24 supported by arms 25 and providing a central slideway for the stem 26 of a valve 27 lying between the valve support and flange 21 and adapted to be normally seated by a spring 28. Said valve support 23 is held in place by an annular portion 29 of the cap 30, which annular portion projects into the cylinder for that purpose, while a flange 31 of the cap over-lies the end of the cylinder body and receives bolts 32, which clamp the cylinder parts all to the base or crank support 33 of the pump or compressor. A delivery pipe 34 screws into the cap 30 to conduct the discharge or compressed air from the pump.

Within the cylinder of my improved pump or compressor, is a piston 35 and which piston is shown of the same construction in the various figures of the drawings, so that the following description of the piston reads onto them all. Said piston 35 is arranged upon a piston rod 36, and preferably has the edge of its front end beveled or conically tapered, as at 37, the cylinder head having a corresponding bevel or taper so that the inner end of the piston exactly fits the

inner end of the cylinder, as shown. In the construction of Fig. 1, this bevel 38 on the cylinder head is formed by an integral flange 39 on the entering part 12 of the cap, 5 contiguous to the side wall of the cylinder and projecting from the partition 10 toward the piston. In Figs. 2 and 3, where the valve seat member 21 is integral with the cylinder, an integral fillet 40 in the angle 10 between the side wall of the cylinder and said member affords the desired bevel 41. Obviously, it could be secured in other ways.

The piston 35 is preferably hollow, as 15 shown, and the face of its front end is recessed, as at 42, to receive a main valve 45, which forms the end surface of the piston exclusive of its marginal bevel or taper 37 just described. At the edge of said recess 20 42, its wall slopes conically inward to form a seat 43 for the correspondingly shaped margin 44 of the valve 45, and at the center of the recess is an aperture 46 in which the stem 47 of said valve fits slidably. A spring 25 48 on said stem, between a collar 49 at the end of the stem and the end wall of the piston, normally seats the valve 45, and around the slideway for the valve stem in the bottom of the recess 42 are openings 4 30 through the piston end for the passage of air when the valve is opened.

Preferably, the stem 47 of the valve 45 is hollow, with its passage continued 35 through said valve and provided with a second valve 50 similar to the main valve itself. This second valve has a stem 51 extending slidably through a spider 52 in the passage of the main valve, and provided 40 beyond said spider with a spring 53 pressing against an end stop 54 of the stem to seat the valve. Obviously, as the piston 45 Fig. 3, and thus there is a free and ample intake with minimum resistance and in the shortest possible time. It will be noted that the beveled edge 37 also assists the entrance 50 of air in that it enables the inrushing draft to expand in both directions, that is, toward the center of the cylinder as well as toward its walls. The space formed by said beveled or recessed edge 37 becomes filled with air against which the later inrushing air impinges with less friction and creation of 55 heat than would be caused by its contact with metal.

As shown in Fig. 1, I prefer to employ a 60 closed crank case 1, the same being provided with one or more inwardly opening check valves 55 screened as at 56, and through which check valve atmospheric air enters the crank case upon instroke of the piston.

When the piston makes its reverse stroke, the check valves 55 close and air from the crank 65 case is positively forced through the valves 45, 50 of the piston into the cylinder. Many benefits and advantages of my improved invention may be secured, however, without using a closed crank case, and in Figs. 2 and 70 3 I have shown a supporting base 33 which does not provide a closed crank case.

An important advantage of my invention is that the pump or compressor can be 75 made very small and run at high speed, and still there will be a full and free intake of air from the atmosphere. Indeed, this can be carried to such an extent that the inrush of air upon intake and its sudden stoppage upon the piston reaching the end of its 80 stroke will fill the cylinder with air at a pressure slightly above atmospheric pressure, upon well-known principles. In this way, the instroke of the piston produces maximum results, and since I provide for 85 the end of the piston to fit closely against the cylinder head at the inner end of each stroke, so that complete expulsion is obtained, I secure a pump or compressor of maximum efficiency. 90

Having thus described the invention, what I claim is,—

1. The combination with a cylinder having a valved discharge in its head, of a piston in said cylinder, an inwardly opening 95 valve having a stem slidably seated in the end of said piston, said valve having a central longitudinal passage through its said stem, and a second inwardly opening valve in said passage. 100

2. The combination with a cylinder body and a piston therefor, of a cap for said cylinder having a flange seated upon the end of the cylinder and a portion projecting 105 into said cylinder and providing a transverse partition with a valve seat therein, a valve carrier mounted centrally in said cap and adapted to receive a discharge pipe, a valve in said valve carrier normally engaging 110 said valve seat and adapted to open outwardly, and means for securing said cap to the cylinder independent of said valve carrier.

3. The combination with a cylinder and a closed crank-case having an inwardly opening 115 check valve in its wall, of a piston in said cylinder, an inwardly opening valve having a stem slidably seated in the end of said piston, said valve having a central longitudinal passage through its said stem, 120 and a second inwardly opening valve in said passage.

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Witnesses:

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• MILTON A. SMITH.