S. D. BLACK & A. G. DECKER.

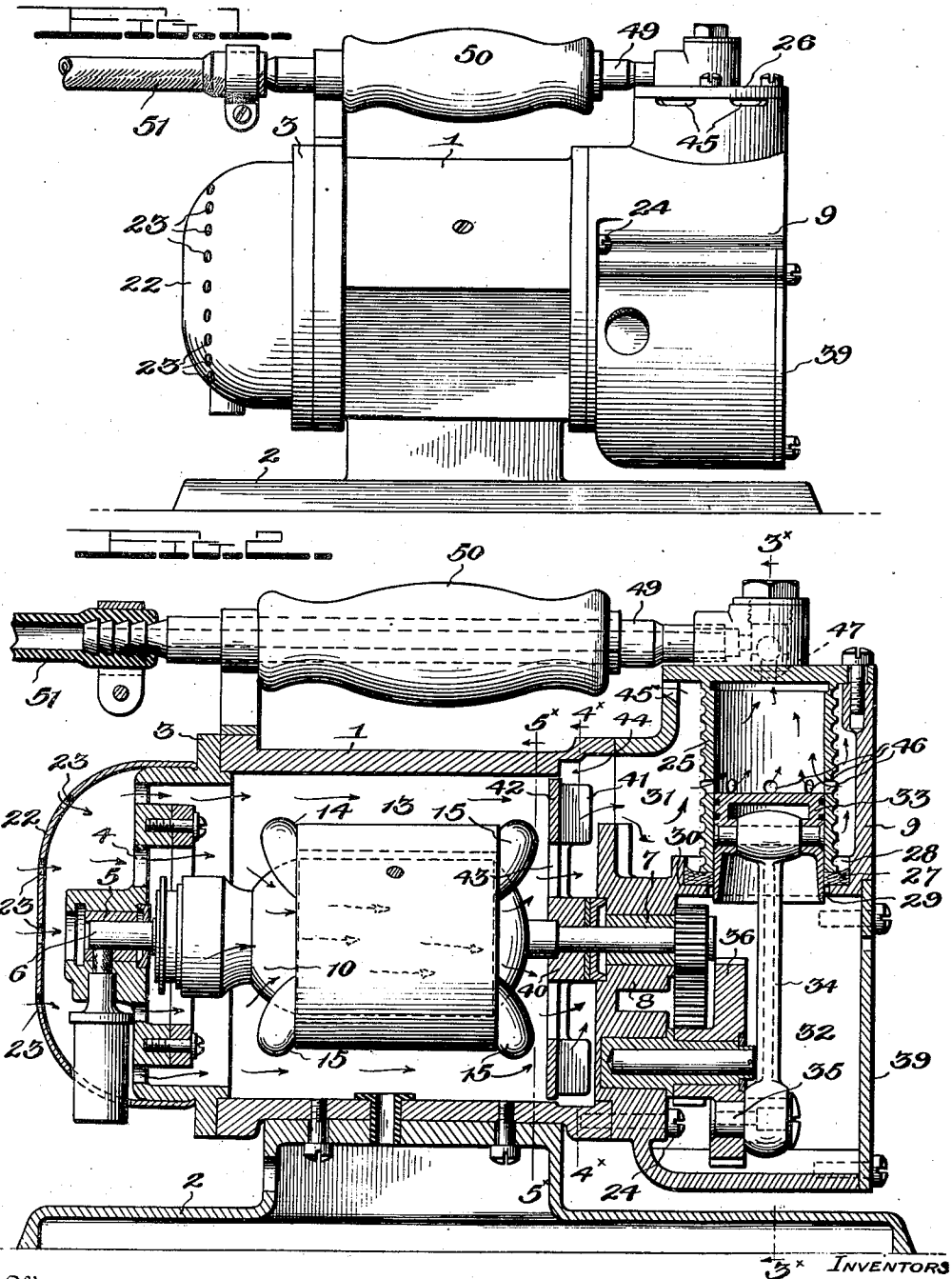
AIR COMPRESSOR.

APPLICATION FILED JUNE 4, 1915.

1,187,031.

Patented June 13, 1916.

3 SHEETS—SHEET 1.



INVENTORS

Witnesses

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Fig. 3.

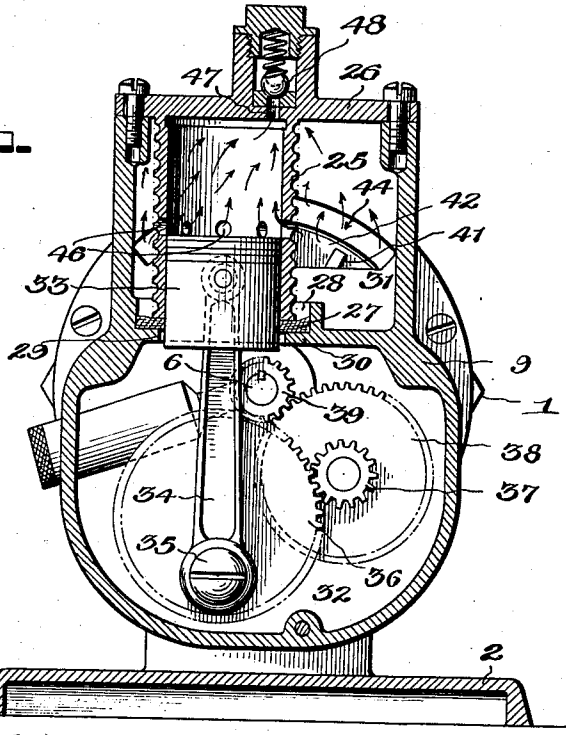


Fig. 4.

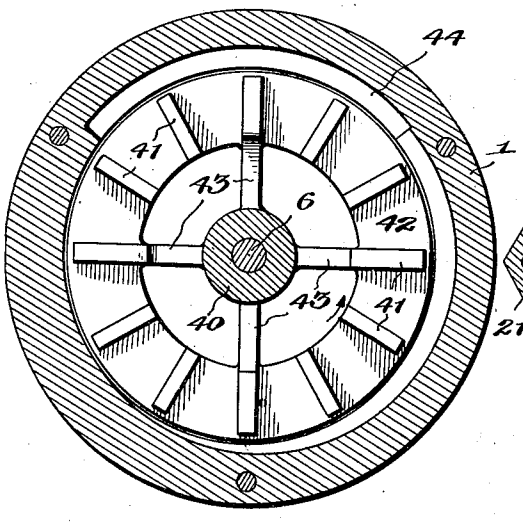
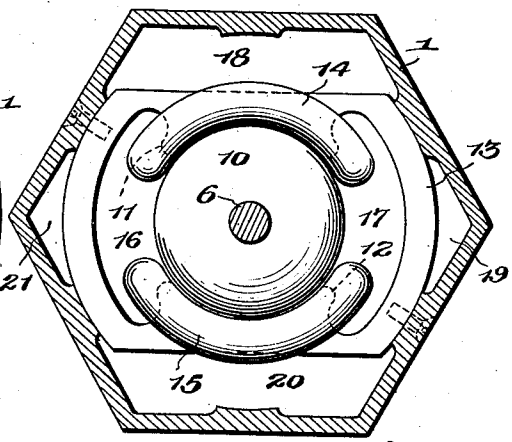


Fig. 5.



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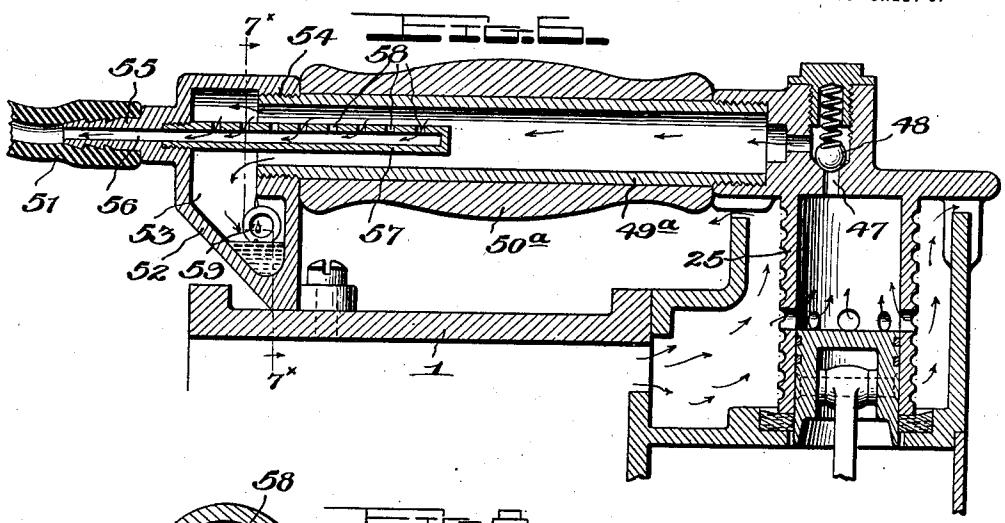
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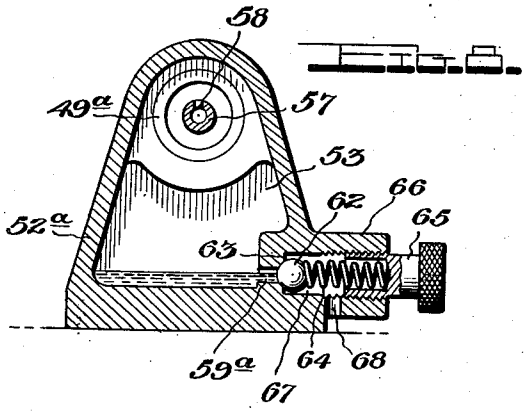
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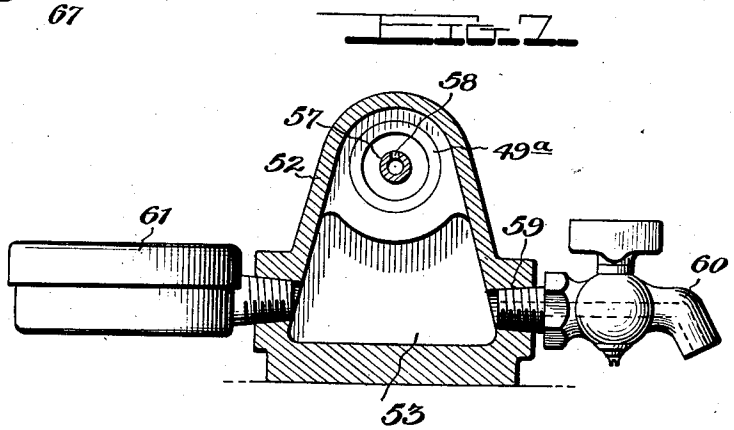
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3 SHEETS—SHEET 3.







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UNITED STATES PATENT OFFICE.

SAMUEL D. BLACK, OF BALTIMORE, AND ALONZO G. DECKER, OF ORANGEVILLE, MARYLAND.

AIR-COMPRESSOR.

1,187,031. Specification of Letters Patent. Patented June 13, 1916.

Application filed June 4, 1915. Serial No. 32,135.

To all whom it may concern:

Be it known that we, SAMUEL D. BLACK and ALONZO G. DECKER, citizens of the United States, residing, respectively, at Baltimore city and Orangeville, in the county of Baltimore and State of Maryland, have invented certain new and useful Improvements in Air-Compressors, of which the following is a specification.

This invention embodies improved means for cooling the air compressing chamber or cylinder of an air pump, cooling the motor which drives the compressor and increasing the efficiency of the compressor by a novel arrangement for supplying the air to the compression chamber.

The present invention embodies also improved means for filtering the air whereby such oil, for example, as may get by the piston rings of the pump is separated from the air delivered from the compressor.

The present invention embodies also an improved arrangement whereby the carrying handle for the whole plant serves also as an outlet duct for the air.

The said invention embodies also other features which will more fully appear from the following description, and which will be particularly pointed out in the claims.

This invention in the specific forms here shown was designed particularly for use as an air pump or compressor for inflating pneumatic tires, for which purpose it has been found very efficient, but it may be used for a variety of other purposes.

In order to more particularly describe the said invention, reference will be had to the accompanying drawings wherein,

Figure 1, is a side elevation of one form of the complete device; Fig. 2, a central longitudinal section thereof on a slightly larger scale than Fig. 1; Fig. 3, a section on line 3^x—3^x, Fig. 2, looking to the left; Fig. 4, a section on line 4^x—4^x, Fig. 2, looking to the left; Fig. 5, a section on line 5^x—5^x, Fig. 2, looking to the left; Fig. 6, a fragmentary horizontal section to show the arrangement of the air filter, the air conducting handle associated therewith and an arrangement of valves controlling the outlet of air from the compression cylinder; Fig. 7, an enlarged detail section on line 7^x—7^x, Fig. 6, and Fig. 8, an enlarged detail sectional view of the filter with an automatic valve in the place of the pet-cock shown in Fig. 7.

Referring first to Figs. 1 to 5 of the accompanying drawings, 1 represents the casing which is made fast to and supported upon a suitable base 2. In one end of casing 1 fits an annulus 3 which carries a bracket or spider 4 having a bearing 5 in which is journaled one end of the armature shaft 6 of an electric motor. The other end of said armature shaft is journaled in a bearing 7 carried in a casing 8 which forms a portion of casing 9 to which reference will be had more particularly later. The armature 10 of said electric motor rotates between poles 11 and 12 (see Fig. 5) of a laminated field piece or magnet 13 secured to the interior of casing 1, the field coils 14 and 15 of which are arranged on the pole pieces as shown, leaving spaces 16 and 17 for the passage of air, as later described. The field magnet 13 of the motor and the casing 1 are so shaped, the latter being hexagonal in cross-section as shown, that air spaces 18, 19, 20 and 21 will be formed between said casing and the motor field magnet, such spaces extending longitudinally of the casing. Bracket or spider 4 is open so as to admit of free passage of air from the outside into casing 1, but is preferably provided with a protecting cap 22 having a number of perforations 23 for the passage of air therethrough. Casing 1 opens at its end opposite bracket 4 into the interior of casing 9, the two casings being removably connected together by screws 24. Within casing 9 is located an air compressing cylinder 25, the upper end or head of which is provided with an annular extension or flange 26 which rests upon and is removably secured to the upper side walls of casing 9. The lower end of the compression cylinder rests upon a packing 27 inserted in an annular recess 28, which surrounds an opening 29 formed in a web or partition 30 which divides the casing 9, or the interior thereof, into two compartments 31 and 32, the former of which constitutes an air chamber or jacket surrounding the cylinder 25. Cylinder 25 is provided with a reciprocating piston 33, preferably of the hollow type used in internal combustion engines, and, except in so far as it is closed by piston 33, cylinder 25 is open at its lower end. Piston 33 is connected through rod 34 to a crank pin 35 on a gear 36, which latter is connected through a train of gears 37, 38 and 39 to armature shaft 6. These gears are all within compartment or chamber 32, and prefer-

ably run in oil contained in said chamber. One of the walls of this chamber is formed by a removable plate 39 which affords ready access to the gears.

Mounted fast on the motor armature shaft 6, and in the end of casing 1 adjacent casing 9 and therefore between the motor and the pump proper is a centrifugal fan 40, having a series of radial blades or vanes 41 extending from one side of an annulus or ring 42 cast on a series of spokes or webs 43. This fan in rotating creates a suction of air through casing 1, in the direction of the arrows indicated in Fig. 2, and delivers this air under pressure to the air jacket or chamber 31 through a passage 44 forming a communication between said jacket and the interior of casing 1. The air thus traversing the interior of casing 1 passes through the spaces 16, 17, 18, 19, 20 and 21, as well as between the armature and fields of the motor. A continuous flow of air is maintained through these spaces, from the outside, as long as the fan 40 continues to rotate, thus supplying a continuous flow of cooling air to the armature and fields of the motor. This air is continuously delivered to chamber 31 and passes out of the same through an outlet passage 45. The passage of air from chamber 31 being slower than the passage of air into the same, an air pressure will be created within said chamber.

Compression cylinder 25 takes in air through a series of openings or ports 46 located at such distance from the top of the cylinder that they will be just above the head of the piston on its extreme down stroke. These ports 46 open into chamber 31. Therefore, the air entering cylinder 25 for compression does so under pressure, whereby a very much more rapid and complete filling of the compression cylinder is effected than in the case where the vacuum created in the cylinder merely is relied upon to fill the same with air. In the present case, we not only have a vacuum created in the cylinder on the down stroke of the piston, but we also have the pressure of the air from the fan, both operating to fill the cylinder. With this arrangement the cylinder takes more air per stroke than it would otherwise do, and the efficiency of the pump is accordingly increased. The air leaves cylinder 25 through an outlet 47 controlled by a spring pressed ball valve 48. The air passes from outlet 47 into a pipe 49 which may be provided with a hand grip 50 which serves as a handle whereby the entire compressor, together with the motor, may be carried about. Flexible tubing 21, or the conducting means for the air, may be attached to pipe 49. An outfit of this kind may be made extremely small and therefore readily portable.

It will be observed that the fan 40 performs three functions; it cools the motor, supplies cooling air to the pump or compression cylinder, and creates air pressure within chamber 31 to fill the air compression cylinder. One of the greatest difficulties encountered in this class of devices is to keep down the heat, and the present invention very effectively overcomes this difficulty, as has been adequately proven in actual practice.

It is desirable that the air for inflating pneumatic tires be as free as possible from oily vapor which has a very deleterious effect on the rubber on the tire. It is one of the objects of the present invention therefore to provide means for filtering the air of such oil as may possibly leak into the compression chamber around the piston rings of the pump.

Our improved air filter comprises, among other parts, a hollow casting 52 in which is formed an expansion chamber 53. This casting is bolted or screwed to the top of casing 1, as shown in Fig. 6, and is provided with an opening 54 into which is screwed one end of pipe 49ª, corresponding to pipe 49, and provided, as in the case of pipe 49, with a hand grip 50ª. Opposite opening 54, the filter casing is provided with an extension or nozzle 55 through which passes an outlet orifice 56, and to which nozzle a flexible hose 51 may be connected. Orifice 56 is enlarged slightly at its end adjacent chamber 52, and there receives the open end of a pipe 57 closed at its other end and extending well into the bore of pipe 49ª. This pipe 57 is provided with a series of perforations or orifices 58 which are spaced along longitudinally of said pipe and extend through the upper side thereof. Chamber 53 is provided near its bottom with an outlet opening 59 into which is screwed a pet-cock 60 which may be employed for drawing the oil from chamber 53, and, if desired, a pressure gage 61 may be attached to the chamber 53, as shown in Fig. 7, to indicate the air pressure within said chamber, and therefore the air pressure within the receptacle being inflated.

If desired, there may be substituted for the pet-cock 60 an automatic valve, as shown in Fig. 8. This valve comprises, among other parts, a ball 62 adapted to rest upon a seat 63 surrounding the outlet opening 59ª, by a coil spring 64 carried within the hollow milled nut 65 screwed into an extension 66 of casting 52ª, provided with a chamber 67 for the ball valve and spring, and having an outlet 68 in communication with the outlet 59ª. This automatic valve serves the twofold purpose of an oil drain and an automatic blow-off or pressure release for the air, and renders the use of a gage unnecessary. By the proper adjust-

ment of nut 65, valve 62 may be set to open when the air pressure in chamber 53 reaches a predetermined amount, thereby rendering the over inflation of pneumatic tires, for example, impossible with this device. At the same time that the air blows off through the opening of valve 62, it will carry the oil which has accumulated in chamber 53 with it, thereby rendering the filter self cleansing or self emptying.

The air from the pump traverses pipe 49ª as indicated by the arrows, Fig. 6, entering pipe 57 through perforations 58. The oil being heavier than the air will gravitate to the bottom of pipe 49ª and pass into the filter chamber 53. Also oil will gravitate directly in said chamber from such oil carrying air as is contained therein.

Further changes and modifications of the specific construction here shown and described may be made within the scope of what we claim as our invention.

What we claim is:

1. Air compressing mechanism, comprising a pump having a compression cylinder, a motor operatively connected to said pump to drive the same, a fan located between said motor and pump and connected to said motor to be driven thereby, a casing inclosing said motor, fan and cylinder and arranged to act as an air confining means whereby said fan creates a draft of air passing over parts of said motor and said cylinder to cool the same.

2. Air compressing mechanism, comprising a pump having a compression cylinder, a casing around said cylinder with a space between the inner walls thereof and the exterior of said cylinder constituting an air chamber or jacket, an electric motor operatively connected to said pump to drive the same, a casing for said motor, connected to the casing around said cylinder, with an opening for the passage of air from the interior of said motor casing into the chamber surrounding said cylinder, and a fan located between said motor and air chamber and arranged to draw air over the motor elements within the motor casing and deliver air to said chamber surrounding said cylinder.

3. Air compressing mechanism, comprising a pump having a compression cylinder, a casing around said cylinder with a space between the inner walls thereof and the exterior of said cylinder constituting an air chamber or jacket, an electric motor operatively connected to said pump to drive the same, a casing surrounding the fields and armature of said motor and an opening for the passage of air into the chamber surrounding said cylinder, there being passages for the flow of air through said motor longitudinally of the axis of rotation of its armature between the fields of said motor and said casing as well as between the motor armature and fields, the casing for said cylinder being detachably secured to one end of said motor casing, and a fan located between said motor and the air chamber surrounding said compression cylinder and arranged to draw air through said air spaces within the motor casing and deliver air to said chamber surrounding said cylinder.

4. Air compressing mechanism, comprising a pump having a compression cylinder, a casing around said cylinder with a space between the inner walls thereof and the exterior of said cylinder constituting an air chamber or jacket, said cylinder being provided with air intake ports opening into said chamber, and said chamber being provided with an outlet for air contained therein, an electric motor operatively connected to said pump to drive the same, a casing surrounding the electro-magnetic elements of said motor and an opening for the passage of air into the chamber surrounding said cylinder, and a fan located between said motor and said air chamber and arranged to draw air through said motor casing over the said motor elements and deliver air under pressure to said chamber surrounding said cylinder.

5. Air compressing mechanism, comprising a pump and a casing therefor, a motor and a casing therefor, driving connection between said pump and motor, the pump casing extending above the motor casing and connected thereto, an air outlet from said pump, a substantially horizontal pipe above said motor casing and connected to the pump casing above the motor casing and communicating with said air outlet to convey the pumped air from said pump, and a support for the end of said pipe opposite its pump connection secured to said motor casing, said pipe forming a handle for lifting said motor and pump together.

6. Air compressing mechanism, comprising a pump, a motor connected to drive said pump, a casing for the motor and a casing for the pump, connected together, an air filter mounted on said motor casing, a handle connected to said filter and to the pump casing and having a duct forming a communication from the air outlet of said pump to said filter.

In testimony whereof we affix our signatures in presence of two witnesses.

SAMUEL D. BLACK.
ALONZO G. DECKER.

Witnesses:
JERE J. SANTRY,
THEODORE E. STRAUS.