Oct. 23, 1923. 1,471,820

E. C. BEAM

COMPRESSOR

Filed June 9, 1920

Fig. 1,

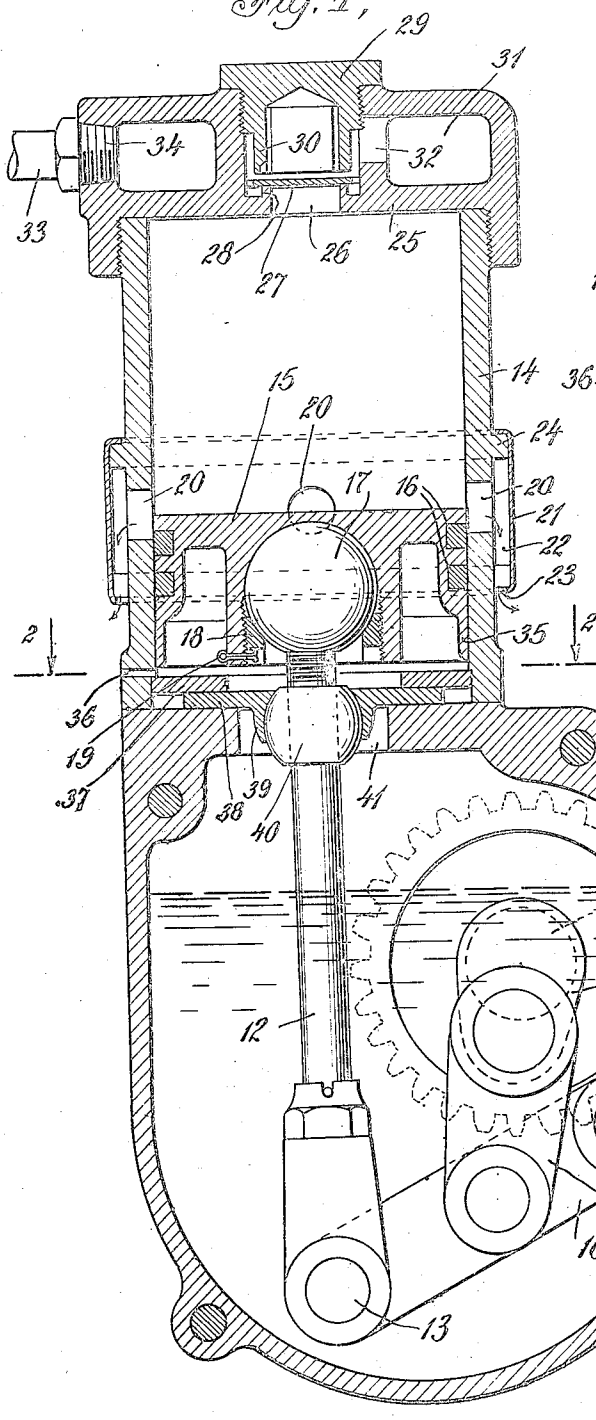
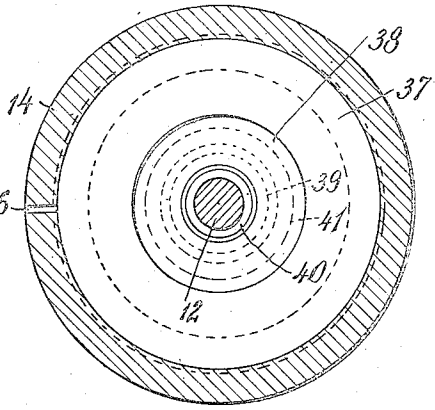


Fig. 2,



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UNITED STATES PATENT OFFICE.

EDWIN C. BEAM, OF NEWARK, NEW JERSEY, ASSIGNOR TO MOTOR STARTER & AIR PUMP COMPANY.

COMPRESSOR.

Application filed June 9, 1920. Serial No. 387,552.

To all whom it may concern:

Be it known that I, EDWIN C. BEAM, residing at 706 Summer Avenue, Newark, in the county of Essex, State of New Jersey, have invented certain new and useful Improvements in Compressors; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to compressors, particularly adapted to compress air for use in automobile tires and the like, although the compressor may be employed for other purposes.

Air compressors are employed at automobile service stations to fill tires or to maintain a supply of air under pressure in tanks, from which it is withdrawn as required. Such compressors are subjected to rough and continual usage under conditions which rapidly deteriorate compressors of the type heretofore commonly used. Such compressors are not well adapted to use at service stations, and are particularly inefficient in the smaller sizes which are operated by driving mechanism worked at a relatively high speed.

Owing to the high speed at which the compressor is operated, it is essential to provide proper lubrication of the moving parts, and this result is best accomplished by enclosing such parts in a suitable casing and by entirely or partially filling the casing with oil. Automobile tires are rapidly disintegrated by oil and it is necessary, therefore, to prevent the lubricating oil from entering the compression cylinder, from which it may be carried over by the compressed air into the tire. It is also desirable to secure the highest efficiency in the compressor and, at the same time to simplify the mechanism to a point which insures continuous and extended service without attention.

It is the object of the present invention to provide a compact and efficient compressor of simple construction, with the working parts enclosed and operating in a bath of oil and at the same time to prevent access of the oil to the compression cylinder.

It is a further object of the invention to provide an outlet for the compressed air, which insures rapid and complete delivery of the air from the cylinder, and to so arrange the parts that a minimum of clearance between the piston and the end of the cylinder is permitted at the end of the compression stroke.

Another object of the invention is to permit the ingress of air to the cylinder and to cushion the piston near the end of the return stroke without introducing sufficient resistan e to prevent proper operation.

These and other objects and advantages of the invention will be understood, upon reference to the following specification and to the accompanying drawings of which;

Fig. 1 is a vertical section through the compressor constructed in accordance with the invention; and

Fig. 2 is a section on line 2—2 of Fig. 1.

Referring to the drawing, 5 indicates a casing which may be of any suitable form and dimensions to enclose the operating mechanism of the compressor, which includes a shaft 6 driven through a gear 7 from a source of power and having a crank 8 which is connected by link 9 to a rocker 10, pivoted at 11 within the casing. A piston rod 12 is pivotally connected at 13 to the rocker 10. A cylinder 14 is supported on the casing 5 and a piston 15 is disposed therein and provided with suitable piston rings 16 to insure close fit between the piston and the cylinder. The piston 15 is provided with a recess to receive a ball 17 on the end of the piston rod 12. The connection between the piston rod 12 and piston 15 is maintained by an annulus 18, threadedly secured in the recess, which prevents the ball 17 from escaping therefrom. A cotter pin 19 secures the annulus in place.

The cylinder 14 is provided with ports 20 permitting entrance of air above the piston 15 when the latter is at its lowest position, and a shield 21 surrounding the cylinder in front of the ports 20, prevents the entrance of dust or other foreign matter to the cylinder. The shield 21 acts as a baffle and provides the air space 22 to which air is admitted through the annular opening 23 at its base. It is preferably supported on a flange 24 surrounding the cylinder. At

its upper end, the cylinder is provided with a head 25 having an outlet 26, which is closed during the return stroke of the piston by disk valve 27 resting upon a lip 28. A plug 29 threaded in the head 25 is provided with a lip 30, which limits upward movement of the valve 27. The head 25 has an annular space 31, surrounding the valve 27, to which compressed air passing the valve is admitted by a series of inlets 32, when the valve is lifted from the lip 28. This arrangement insures the free passage of compressed air from the cylinder upon the compression stroke and increases the efficiency and reduces the power consumption of the compressor. From the chamber 31, the air is permitted to escape through a pipe 33 which is threadedly connected to the head 25 at 34.

Upon the compression stroke of the piston 15 the air, which has entered through the ports 20, is compressed and when the depending flange 35 on the piston 15 passes these ports, air is admitted through the openings at the rear of the piston to prevent drawing a partial vacuum behind the piston. Upon the return stroke a portion of this air is trapped behind the piston as the lower edge of the flange again passes the ports 20. and serves to cushion the return stroke of the piston. Unless provision is made to permit escape of this air, it will cause too much resistance to the operation of the compressor, and accordingly a vent 36 is provided near the base of the cylinder 14 to permit the escape of the air. The vent is so proportioned that the desired cushion effect is preserved, without interfering with the operation of the compressor.

As previously noted, the casing 5 is filled or partially filled with a lubricator, such as oil, and unless prevented the oil will escape into the cylinder and will eventually work its way past the piston, thereby permitting the compressed air to carry oil to the storage tank or tire. An annular washer 37 is therefore provided in the cylinder 14 above the casing 5 and a washer 38 is supported on the piston rod, between the washer 37 and the top of the casing 5. The washer 38 closes the opening 41 in the top of the casing 5 in which the piston rod travels and effectually prevents the escape of oil from the casing 5. Preferably the washer 38 is provided with a flange 39 having a spherical surface, which co-operates with a ball 40 having an opening through which the piston rod is adapted to slide, the flange and ball constituting a ball and socket connection between the washer and the piston rod. Thus the washer 38 travels in a plane between the top of the casing 5 and the washer 37 as the piston rod reciprocates and swings under the actuation of the rocker 10. It is impossible therefore for oil to pass the washer 38, in sufficient quantity to interfere with successful operation of the compressor.

From the foregoing, it will be understood that a simple and effective compressor is provided, which has obvious advantages over compressors of the usual type heretofore employed for purposes to which the present structure is adapted. The stroke of the piston is more than twice the diameter of the crank circle and the compressor may be operated at high speed. A free inlet and outlet for the air is provided, which insures that the cylinder is fully evacuated at the end of the compression stroke, and is again filled with air before the commencement of the succeeding compression stroke. The entire compressor is self-contained and self-lubricated. The parts are protected from dirt and foreign matter, which would otherwise cause rapid wearing of the contacting surfaces. The cushion effect of the air trapped behind the piston prevents jarring and consequent destruction of the mechanism. The cylinder is fully protected against the entrance of lubricating oil and consequently the compressor may be safely used for compressing air which is subsequently employed in filling automobile tires.

Various changes may be made in the form, arrangement, and construction of the parts and in the dimensions as shown, without departing from the invention or sacrificing any of its advantages.

I claim:

1. In a compressor, the combination of a cylinder, a piston in the cylinder, a piston rod connected to the piston, operating mechanism therefor, a casing for the mechanism, and adapted to contain a lubricant, and means for preventing escape of the lubricant including an annular washer at the base of the cylinder, and a washer having a ball and socket connection with the piston rod and disposed between the annular washer and the top of the casing and of a diameter less than that of the annular washer thereby to slide freely in every direction, said washers being adapted to close the opening in which the piston rod travels.

2. In a compressor, the combination of a cylinder, a piston in the cylinder, ports for admitting air to the cylinder, the ports being spaced away from the inner end of the cylinder, and the piston having an annular flange engaging the cylinder wall and of a length to cover and close the ports before the piston reaches the end of its down stroke, thereby to trap a relatively large body of air to form a cushion between the piston and the end of the cylinder, the cylinder having a restricted outlet for the trapped air.

3. In a compressor, the combination of a cylinder, a piston in the cylinder, a rod con-

nected to the piston, operating mechanism therefor, a casing for the mechanism and adapted to contain a lubricant, means for preventing escape of the lubricant including an annular washer at the base of the cylinder, and a washer through which the rod extends disposed between the annular washer and the top of the casing, and of a diameter less than that of the annular washer thereby to slide freely in either direction, said washer closing the opening in which the piston rod travels.

In testimony whereof I affix my signature.

EDWIN C. BEAM.