

AMENDED SPECIFICATION.

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PATENT SPECIFICATION

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COMPLETE SPECIFICATION (AMENDED).

**An Improved Pump Adapted to be Driven by the Suction of an
Internal Combustion Engine.**



I, GEORGE CONSTANTINESCO, of "Carmen Sylva," Beechwood Avenue, Oatlands Park, Weybridge, in the County of Surrey, a subject of the King of Great Britain and Ireland, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

10 The present invention relates to pumps adapted for obtaining a supply of compressed air by utilising the suction of an internal combustion engine for driving the pump.

15 The object of the invention is to obtain a supply of compressed air which can be used, for example, for pumping up the tyres of motor cars or for other purposes.

20 In the type of pump to which the invention relates the suction of the engine acting through a connection directly leading to the induction pipe is caused to operate a large piston which is connected to a smaller piston moving in cylinders of smaller diameter in which the air is compressed.

30 The invention consists in a pump of the type described, the pump pistons being placed at the two ends of a rod carrying the motor piston, while the valves are carried by a hollow distributing rod which is actuated by the motor piston towards the end of its stroke.

35 The invention further consists in the special form of valve and the method of operating this valve to alternately place the two ends of the cylinder in communication with the vacuum and the
40 atmosphere.

[Price 1/-]

The invention also consists in the improved pump hereinafter described.

Referring to the accompanying drawings—

Fig. 1 is a part sectional view of the 45 complete pump,

Fig. 2 is an enlarged section through one of the valves of the pump cylinder,

Fig. 3 is a section on the line 3-3 50 Fig. 2.

In the form of the invention illustrated there is provided a central cylinder *a* and co-axial with the cylinder *a* there are provided two closed cylinders 55 *bb* of smaller diameter. The relative diameters will depend on the compression pressure which it is desired to obtain. For a pressure of about 70 lbs. per square inch the ratio of the diameters may be about $3\frac{1}{2}$ to 1. 60

Within the cylinders there are provided a piston *c* which acts as a motor piston and two pistons *d* which act as pump pistons, the three pistons being 65 mounted on a rod *e*. The mechanism by which the admission of air to the motor cylinder and connection of the motor cylinder to the vacuum are controlled comprises a hollow rod *f* which is capable 70 of movement axially and is given a slight movement by the piston *c* near each end of its stroke. The hollow rod *f* is placed in communication with the suction pipe of the engine between the throttle and the carburettor; a flexible pipe *g* being 75 provided to make the connection.

The details of the valves are shown at Fig. 2, the hollow rod *f* has on its upper end a flange *h* and carries a loose collar *k* formed in two halves which rests on a 80

flange *l*, a spring *m* is interposed between the flange *h* and the collar. The hollow rod also carries a valve *n* which when resting on its seat closes the entrance to the radial passages *p* and thus cuts off the vacuum in the pipe *g* and the hollow rod *f* from one end of the cylinder *a*. Below the valve *n* there is provided a flange *q* on the rod *f* and on this flange there rests a cap *r* formed in two halves. Between the cap *r* and the valve *n* there is interposed a spring *s*. Suitable leather or other washers *t* are provided on the two sides of the apertures in the ends of the cylinder through which the rod *f* passes. The outside washers form the valve seats for the air inlet valves, and the inner washers form the valve seats for the vacuum controlling valves. The apertures *w* in the valve *n* allow the air to pass into the ends of the cylinder with the valve in the position shown in Fig. 2. The rod *f* may be closed at its lower end, or this end also may be connected by a flexible tube with the suction pipe of the engine. The inlet valves by which air enters the pump cylinders are simply flap valves in the pistons and the compressed air passes out through non-return valves *u* formed in the ends of the cylinder. The pump except as regards the connection to the engine is symmetrical about a horizontal plane through its centre. If desired cooling pins may be provided on the pump cylinders.

The operation of the above described pump is as follows:—

With the parts in the position illustrated in Figs. 1 and 2 the piston *c* is supposed to be moving downwards, the lower end of the cylinder *a* being at a reduced pressure owing to the communication through the hollow rod *f* and tube *g* with the induction pipe of the engine. Air is being compressed in the lower pump cylinder and when a certain pressure is reached passes out through the valve *u* into a reservoir or to the tyres or other device in which it is required. The reservoir, if provided, may surround the pump but in such case means will have to be provided by which air can be led to the air inlets of the motor cylinder.

When the piston *c* reaches a point near the bottom of its stroke it comes in contact with the cap *r* and its further movement compresses the spring *s*. At a certain point the pressure of the spring

overcomes the resistance with the result that the rod *f* carrying the valve suddenly moves downwards cutting off the vacuum by means of the valve *n* and allowing air to enter the lower end of the cylinder through the aperture in the bottom of the cylinder and the corresponding passages *w*. The downward movement of the rod *f* closes the air inlet valve *k* at the top of the cylinder and allows the vacuum to be applied to the space above the motor piston *c* through the passages *p* and hollow rod *f*. The motion of the motor piston is then reversed and air is compressed in the upper pump cylinder and drawn in to the lower pump cylinder. The operation is exactly similar at the two ends of the stroke.

A pump of the type described may be used for obtaining pressure up to 70 lbs. per square inch or more. In the case of large pumps, pistons and piston rings may be employed instead of leather packing of the type illustrated. It will readily be seen that the relative diameters of the motor and pump cylinders may be varied according to the pressure at which it is desired to obtain a supply of compressed air.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

1. A pump of the type in which engine suction is caused to operate a large piston connected to a smaller compressor piston for compressing air; the suction required to operate the pump being obtained directly from the induction pipe of the engine, the pump pistons being placed at the two ends of a rod carrying the motor piston, while the valves are carried by a hollow distributing rod which is actuated by the motor piston towards the end of its stroke, substantially as described.

2. In a pump as claimed in Claim 1 distributing valves arranged so that they are operated suddenly by means of a spring compressed by the movement of the motor piston, substantially as described.

Dated the 12th day of September, 1921.

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[This Drawing is a reproduction of the Original on a reduced scale.]

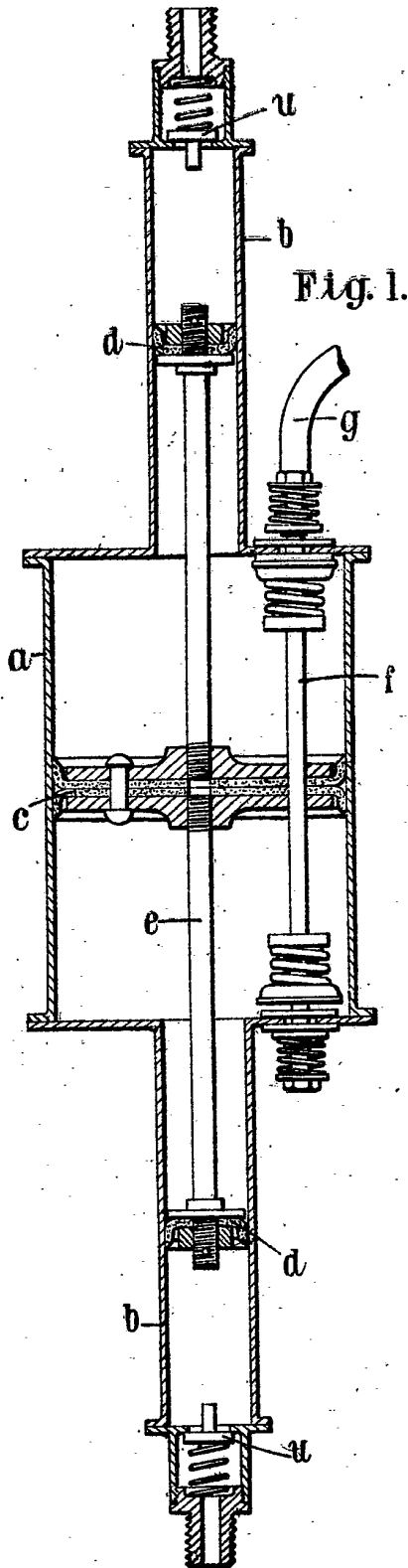


Fig. 1.

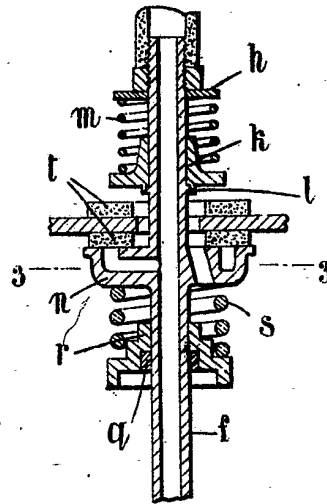


Fig. 2.

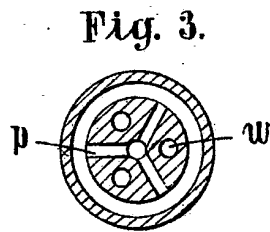


Fig. 3.