

Sept. 4, 1923.

S. H. TODD

1,466,974

COMPRESSOR

Filed March 18, 1921

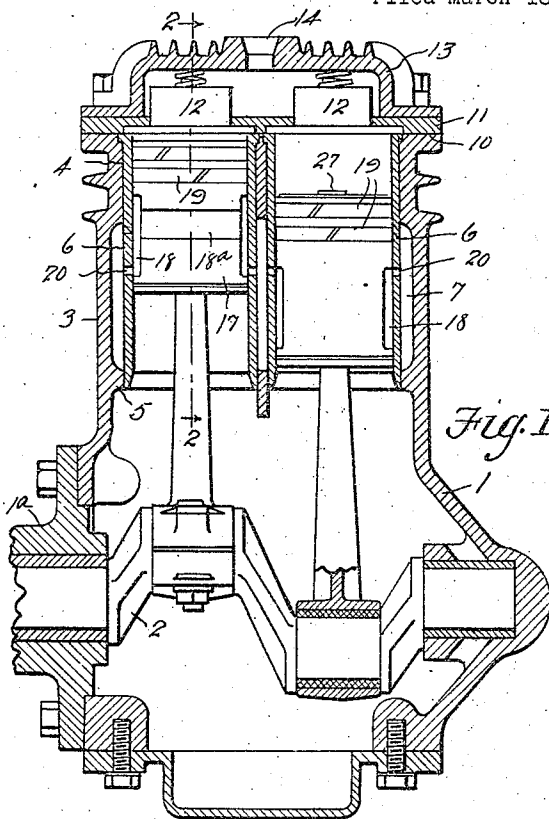


Fig. 1.

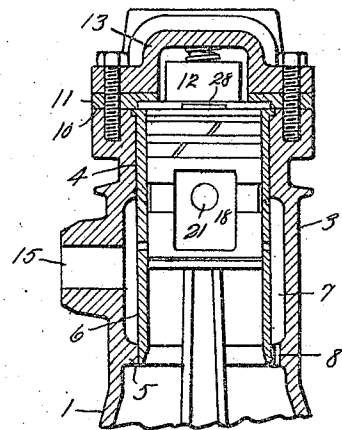


Fig. 2

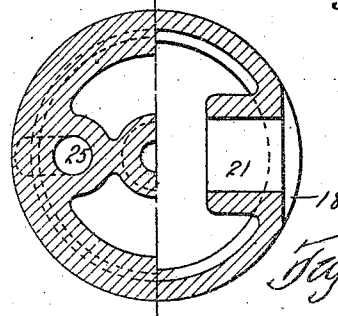


Fig. 5

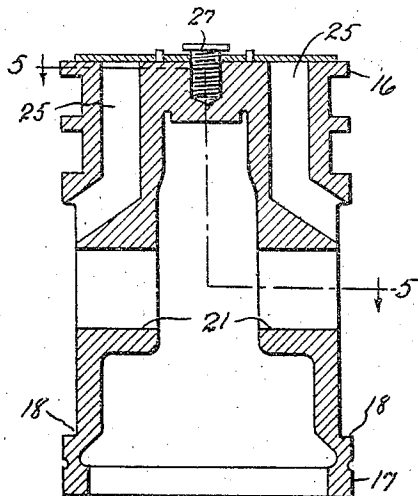


Fig. 3

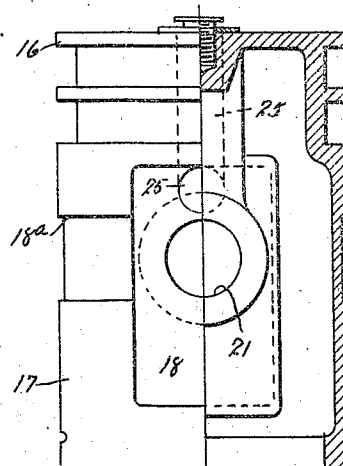


Fig. 4

Inventor

By *Samuel H. Todd*

Att. Sec.

UNITED STATES PATENT OFFICE.

SAMUEL H. TODD, OF DETROIT, MICHIGAN.

COMPRESSOR.

Application filed March 18, 1921. Serial No. 433,485.

To all whom it may concern:

Be it known that I, SAMUEL H. TODD, a citizen of the United States, residing at Detroit, in the county of Wayne and State of Michigan, have invented certain new and useful Improvements in Compressors, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings.

This invention relates to compressors for expansible gases and especially to those employed for inflating tires, for condensing gases, and in the art of mechanical refrigeration. The objects of the invention are the provision of a compressor of great simplicity and cheapness which will have a very high volumetric efficiency, which will start easily under load, and in which lubrication of the moving parts can be effected without danger of the lubricant becoming entrained in the gas; while further objects and advantages of the invention will become apparent as the description proceeds.

In the drawings accompanying and forming a part of this application I have shown one embodiment of my invention although it will be understood that this drawing is intended merely for illustrative purposes and does not restrict me to any of the constructions therein shown. Fig. 1 is a vertical, longitudinal, sectional view showing my improvements as applied to a two-cylinder compressor; Fig. 2 is a vertical sectional view corresponding to the line 2—2 of Fig. 1 and looking in the direction of the arrows; Fig. 3 is a vertical longitudinal sectional view of one of the pistons drawn to enlarged detail; Fig. 4 is a view of the same piston taken at right angles to Fig. 3 and showing the same half in section and half in elevation; and Fig. 5 is a sectional view corresponding to the broken line 5—5 of Fig. 3.

Describing the parts by reference characters, 1 represents the shell or body of my improved compressor having at its lower end a crank case 1 having therein the usual crank shaft 2 and having at its upper end a hollow cylinder block 3 formed at its upper and lower ends with internal flanges 4 and 5. These flanges are formed with circular seats snugly receiving the sleeves 6—6 which constitute the cylinders. I have shown a two-cylinder compressor since this is the simplest balanced form, but I do not restrict myself thereto. The sleeves are spaced from

the walls of the cylinder block so as to form, in conjunction with the flanges 4, 5, an annular chamber surrounding each cylinder. The crank case is completely closed excepting for the removable plate 1^a which is hermetically secured thereto, and for one or more restricted openings 8 which lead to the chamber 7.

The upper end of the cylinder block is faced as at 10 for the reception of a closure plate 11 in which are mounted the outlet valves 12—12 which may be of any suitable or desired construction, the whole being surrounded by a hollow cap 13 in which is formed the compressor outlet 14. The side of the cylinder block is formed with the compressor inlet 15, which, in the case of refrigerating apparatus is connected with the expansion coil (not shown).

The pistons consist of hollow cylindrical bodies having bearing surfaces 16, 17 at their ends and one or more longitudinal recesses 18, 18 between such bearing portions. The portion 16 is grooved for the reception of rings 19 and the length of the recess is at least as great as and preferably somewhat greater than the length of the stroke. The sleeve 6 is formed with a port 20 registering with each recess and so located as always to register and communicate therewith, whatever be the position of the piston. In the present embodiment these recesses are longer on those sides of the piston through which are formed the apertures 21 for the wrist-pins, and throughout the remainder of the piston are of reduced extent as shown at 18^a in order that the bearing surface of the piston may be as great as possible, although this is primarily a matter of design. Communicating with the upper end of each of the recesses 18 is a longitudinal passage-way 25, formed one at each side of the piston axis, and carried by the piston head is a leaf-spring 26 which overlaps both of said passage-ways in such wise as to form a flap valve. In the present embodiment this spring is held in place by a screw 27 located at the center of the piston head, and the lower face of the cylinder head-closure, 12 is channeled as shown at 28 for the reception of said spring.

As a consequence of my improved construction, the inlet ports or passage-ways 25 of the piston are always in communication with the ports 20 of the cylinder so that no vacuum exists in the cylinder at any

time but gas movement and piston movement occur together. Also the proximity of the chamber 7 and ports 20 causes the immediate presence of an ample supply of gas to fill the cylinder. I prefer to have the recesses 18 as long as the stroke plus the width of the port 20 although it is permissible to cover a portion of such port at each end of the stroke, thus slightly decreasing the length of the recess. It is important, however, that no portion of the piston rings be dragged across such ports by reason of the wearing effect produced thereby, and it is also of importance to keep the ports 20 always in communication with the passages 25 in order that the inlet of the gas (or air) to the cylinder may commence immediately upon the beginning of the down stroke without the production of any pronounced vacuum.

For lubricating the crank and pitmans the splash system is preferably employed, and the arrangement here shown provides for the complete and successful lubrication of the parts without danger of the admission of oil to the compressed gas. This is particularly useful in connection with refrigerating apparatus for the following reason. During the existence of any extended idle period the lubricant in the crank is liable to become considerably saturated with condensed refrigerant, and upon starting the apparatus the sudden local decrease of pres-

sure causes a pronounced frothing of the lubricant. The narrowness of communication between the crank case and the rest of the compressor prevents the entrance of any large quantity of this froth into the chamber, while the formation of such chamber prevents entirely the admission into the cylinder ports of any oil which may thus enter the lower end thereof.

Experience shows that this compressor can be operated more cheaply and efficiently than any other heretofore known, but I do not limit myself to any specific details of construction except as recited in the claims annexed since many changes can be made without departure from my invention.

Having thus described my invention, what I claim is:

In a compressor, the combination with a cylinder having an inlet space in the wall thereof and a port from said space into the interior of the cylinder, of a piston in the cylinder, said piston having an external annular recess around the same registering at all times with said port, passages extending upwardly and inwardly from the upper end of said recess and opening thru the top of the piston, and a flap valve fastened to the top of the piston and controlling said openings.

In testimony whereof, I hereunto affix my signature.

SAMUEL H. TODD.