

Jan. 9, 1923.

L. M. PERSONS

1,787,700

PATENT OFFICE

Filed Aug. 1, 1923.

2 Sheets-Sheet 1

Fig. 1.

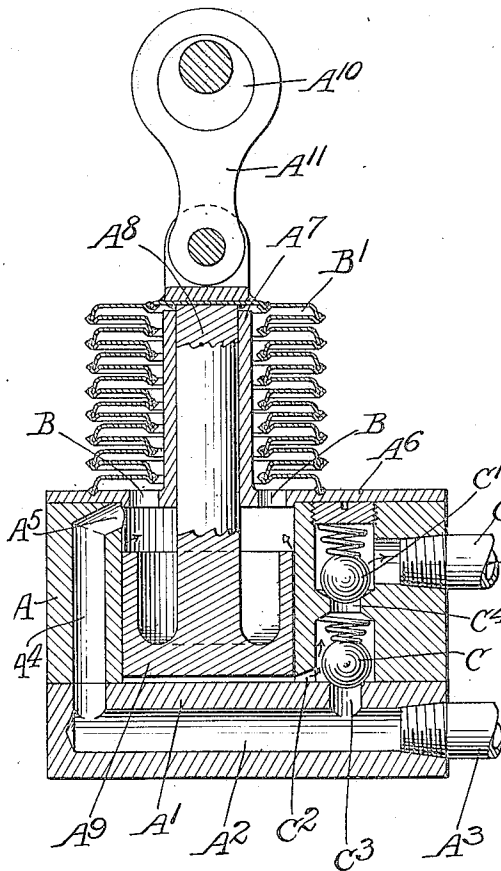
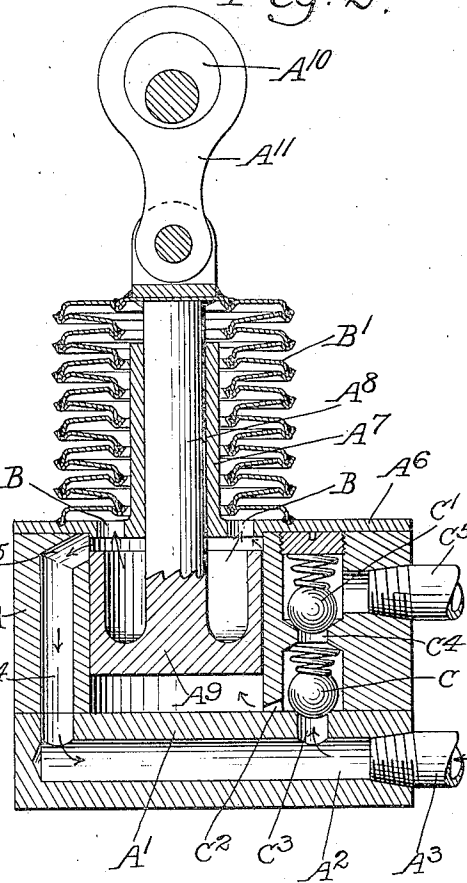


Fig. 2.



Inventor
Laurence M. Persons
by Parks & Curtis
Attorneys.

Jan. 6, 1931.

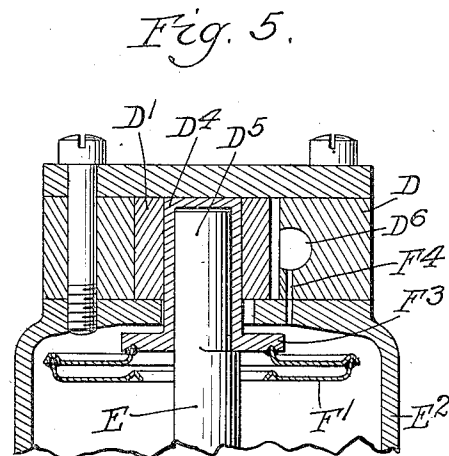
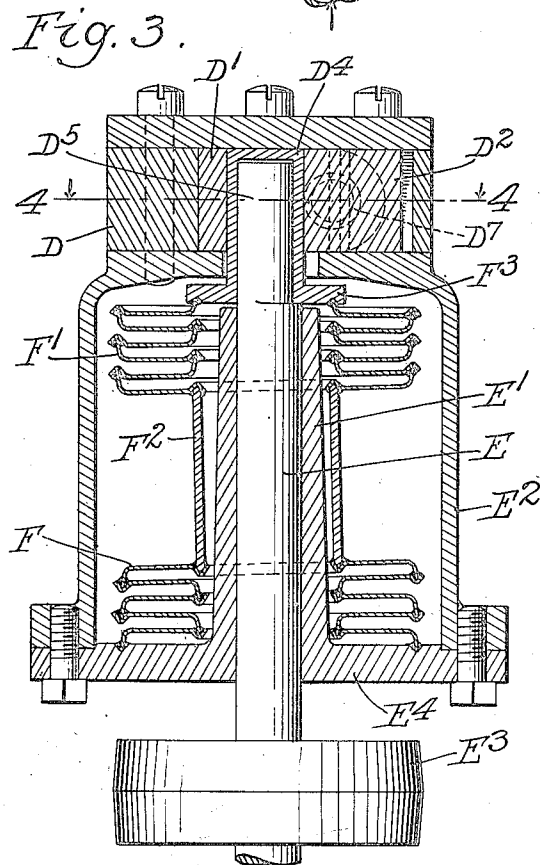
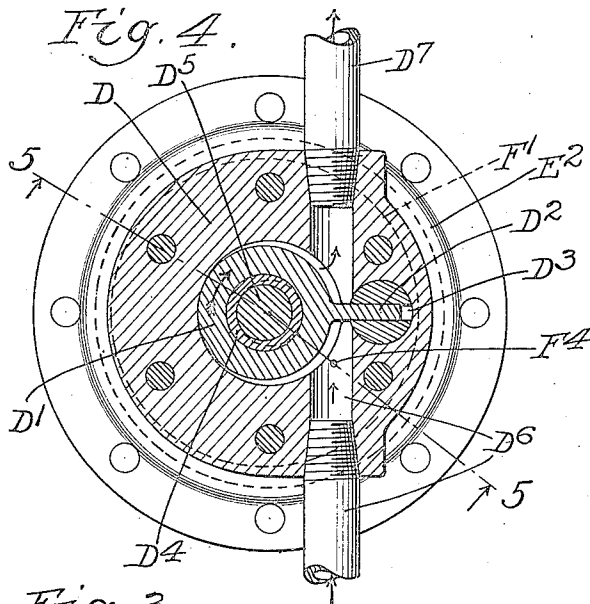
L. M. PERSONS

1,767,700

PACKING FOR PUMPS

Filed Aug. 1, 1928

2 Sheets-Sheet 2



Inventor
Laurence M. Persons
by *Park & Carter*
Attorneys.

UNITED STATES PATENT OFFICE

LAURENCE M. PERSONS, OF CHICAGO, ILLINOIS

PACKING FOR PUMPS

Application filed August 1, 1928. Serial No. 296,811.

My invention relates to improvements in packings for pumps and the like, and has for one object to provide a new and improved form of packing particularly in connection with or rotary reciprocating positive displacement pumps for ice machines and the like, wherein a bellows is used as the packing medium. Another object is to provide a new and improved form of pump arrangement and pump and packing bellows arrangement. Other objects will appear from time to time in the specification and claims.

My invention is illustrated more or less diagrammatically in the accompanying drawings, wherein—

Figure 1 is a longitudinal section through a single acting pump, showing my device, with the pump piston at one end of its stroke;

Figure 2 is a similar view showing the piston at the other end of its stroke;

Figure 3 is a longitudinal section through a rotary positive displacement pump;

Figure 4 is a section along the line 4—4 of Figure 3;

Figure 5 is a section along the line 5—5 of Figure 4.

Like parts are indicated by like characters throughout the specification and drawings.

A is a pump cylinder closed at its bottom by a head A¹. A² is an intake passage in the head A¹ communicating with the intake pipe A³. A⁴ is a bleeder passage leading from the suction chamber A² along the axis of the pump, removed from the pump cylinder and communicating at A⁵ with the upper or low pressure side of the pump piston. A⁶ is a crank end head or cover for the piston and it carries a sleeve A⁷ to guide the piston rod A⁸. A⁹ is the piston carried by the piston rod and reciprocating in the cylinder. A¹⁰ is an eccentric which, when rotated, drives the pump, the eccentric rod A¹¹ riding on the eccentric and pivoted on the pump piston rod A⁸.

The cap A⁶ is perforated as at B about the periphery so as to provide a free and unobstructed passage from the low pressure side of the pump cylinder and piston into the space outside of the sleeve A⁷. This space is inclosed by a flexible bellows B¹. This bellows is anchored at one end on the cap A⁶ and at

the other end is carried by and reciprocates with the piston rod A⁸, there being a gas and water tight closure at each end of the bellows, the bellows elements themselves being tight to prevent leakage.

At one side of the cylinder barrel is a valve pocket. In it are two spring seated intake and exhaust valves C C¹, respectively. A port C² leads from the high pressure end of the cylinder into the valve chamber adjacent the intake valve C. This intake valve C closes the port C³ leading from the suction chamber A². The exhaust valve C¹ closes the port C⁴ and when unseated permits discharge of fluid by the pump through the valve chamber and through the discharge pipe C⁵.

Rotation of the eccentric, of course, causes reciprocation of the pump piston in the usual manner. When the pump piston is drawn up it sucks fluid in through the pipe A³, chamber A⁴, port C³, lifting the intake valve C. As the plunger starts down the pressure immediately seats the intake valve C but lifts the discharge valve C¹ and fluid flows out through the port C⁴ and pipe C⁵. Of course, on the suction stroke the valve C¹ is seated by its spring.

There must always be a certain amount of leakage between the pump and the cylinder—that is, leakage from the high pressure to the low pressure side of the piston. Such leakage, when refrigerants such as ammonia and the like are used, is fatal and a positive closure must be provided to prevent the escape of any material leaking past the plunger into the atmosphere. This is provided by the bellows. Any material which may leak past the piston will be segregated on the low pressure side thereof and in the space inclosed within the bellows, and will be drawn off by the bleeder pipe A communicating with the suction side of the pump. The presence of this bleeder passage A⁴ insures that the pressure on the low pressure side of the plunger can never exceed suction line pressures, and therefore there is no possibility of the bellows packing being compelled to stand high pump pressures. The opening and closing of the bellows in response to the reciprocation of the plunger may

merely slightly change the volumetric capacity of the low pressure chamber. It is possible that the bellows may even act as a pump under some conditions and suck in fluid from the low pressure side as it goes up, and blow it back into the low pressure side as it goes down. More likely, however, the leakage will merely churn around in the space included in the low pressure side of the cylinder and the bellows, but in no event will any material be able to escape because the bellows provides a positive, tight closure and in no case will the bellows be subjected to any pressure which would cause it unduly short life.

In the modified form shown in Figures 3, 4 and 5, there is shown a different type of pump. D is a pump cylinder. In it gyrates a propeller head D¹. This propeller head does not rotate, being held against rotation by the web or lug D², which is mounted to reciprocate along radial lines in a slot D³ in the cylinder. D⁴ is a sleeve upon which the head D is loosely mounted. D⁵ is an eccentric carrying the sleeve D⁴, so that when the eccentric is rotated the sleeve and the pump head D¹ will be gyrated in the cylinder, the arrangement of the parts being such that the head always engages the inside of the cylinder along a line parallel with its axis of rotation. As this head gyrates this line constantly travels around the periphery of the cylinder but the head itself does not rotate. Rotation of the eccentric and gyration of the head in the direction of the arrow shown in Figure 4 causes the pipe D⁶ to be the intake, the pipe D⁷ to be the exhaust, and causes fluid to pass around the peripheral wall of the housing from the intake to the exhaust pipe, since it cannot get straight across owing to the presence of the web D².

The eccentric D⁵ is mounted on the end of a shaft E, which shaft rotates in a bearing sleeve E¹ in the housing E², being driven by a belt or any suitable means applied to the pulley E³. The sleeve E¹ is provided with a flange E⁴ which is bolted to the housing E² so as to provide a tight chamber. To prevent leakage of pump material through or along the bearing of the eccentric shaft, and to make it unnecessary to have tight packings to prevent leakage, a bellows packing is provided. This bellows takes the form of two separate bellows elements F, F¹, both surrounding the sleeve E¹ and the shaft E, the bellows F being closed at one end by the web or flange E⁴, at its other end carrying a filler sleeve F² which engages and makes a closed chamber with the bellows F¹, and the opposed end of the bellows F¹ is anchored on the flange F³ of the sleeve D⁴. Any leakage of material being pumped will come along the outside of the sleeve D⁴ into the chamber on the outside of the bellows, on the outside of the filler sleeve, on the inside of the housing E², and no leakage will be able

to reach any of the driving or working parts, and no leakage will therefore be able to escape. In order to protect the bellows against undue pressures, a bleeder pipe F⁴ leads from the inlet D⁶ to the space immediately outside the bellows, so that that space is always under a pressure limited by the inlet pressure, and therefore the bellows will not be overloaded.

This limiting of the pressure supported by the bellows is of the utmost importance, because experience shows that reversal of pressures and excess pressures greatly decrease the effective life of the bellows. If the pressures can be maintained substantially constant, and if little violent reversal of pressures prevail, the bellows will stand a static load, even when vibrated as indicated, for surprisingly long periods of time.

It will be noted that the bellows in the form shown in Figure 3 might be continuous, but it is cheaper and more satisfactory to provide two separate bellows elements joined by a tube, as the major bending resultant upon the gyration of the plug hat shaped sleeve which carries the eccentric takes place at the two ends and the long tube, giving a fairly long radius, reduces to the minimum the burden upon the bellows.

I claim:

1. In a pump, a housing, a reciprocating piston, a piston rod therefor, a bellows one end of which is rigidly fixed on and closed by the housing, surrounding the piston rod, the other end of which is rigidly mounted on and closed by the piston rod, passages leading from the low pressure side of the plunger to the interior of the bellows and means for limiting the pressures developed within the bellows, said means comprising a bleeder conduit leading from the bellows to the intake side of the pump.

2. A pump comprising a housing, a single action piston reciprocating therein, intake and discharge valves associated with the working side of the piston, a sleeve projecting from the housing, a piston rod slidable in and guided by the sleeve, a bleeder passage leading from the inactive side of the piston to the suction line, a bellows anchored on and closed by the housing on one end, anchored on and closed by the piston rod at the other and enclosing the piston rod and sleeve, there being bleeder ports through the wall of the housing between the interior of the bellows and the inactive side of the piston.

Signed at Chicago, county of Cook and State of Illinois, this 28th day of July, 1928.

LAURENCE M. PERSONS.