

1,273,728.

Witnesses
 Floyd N. Cornwall.
 L. L. Buckner.

George Burd,
Charles Burd,

A. Sattisen.

Attorney

UNITED STATES PATENT OFFICE.

GEORGE BURD AND CHARLES BURD, OF HAZELWOOD, PENNSYLVANIA.

AIR-COMPRESSOR PUMP.

1,273,728.

Specification of Letters Patent.

Patented July 23, 1918.

Application filed October 18, 1917. Serial No. 197,234.

To all whom it may concern:

Be it known that we, GEORGE BURD and CHARLES BURD, citizens of the United States, residing at Hazelwood, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Air-Compressor Pumps, of which the following is a specification, reference being had therein to the accompanying drawing.

This invention relates to improvements in air compressor pumps, and the improvement is adapted to be used either as a single or a double compressor.

Among the objects of my invention are:

1. Providing a hollow piston into which the air is drawn and compressed, whereby the hollow compression piston is subjected to the cooling effect of the air when withdrawn from the cylinder on its outstroke, which rapidly radiates its heat and prevents overheating.

2. Providing a structure in which a hollow open ended piston acts as an air-compressor in conjunction with an annular form of cylinder, the hollow piston telescoping the projecting head of the annular cylinder, thus compressing the air within the hollow piston, whereby a simple construction is provided and one that is capable of easy repair.

3. Providing an air compressor comprising an annular cylinder and a hollow piston cooperating with the inwardly projecting head of the cylinder for compressing the air, the wall of the cylinder having a thickness less than the width of the annular cylinder in which it enters, and the open end of the cylinder provided with a packing engaging the exterior of the hollow piston to make an air-tight fit, whereby friction occurs only at the point of the packing, thus reducing the tendency to heat up, and whereby the hollow piston is exposed to the air at each outstroke to be cooled.

4. Providing a compressor composed of oppositely extending hollow pistons adapted to enter annular cylinders alternately for compressing the air in first one hollow piston and then the other.

Other and more specific objects of the invention will appear from the following description.

The accompanying drawing is a horizontal sectional view of a compressor embodying my invention, the piping and re-

ceiving chamber being shown in top elevation.

We here show our improvement in the form of a double acting compressor, but our invention is adapted for use in a single acting compressor.

In the drawings, 1 represents two cylinders. Each of these cylinders comprises an outer annular wall 2, and an inner annular wall 3. The outer ends of the inner and outer walls are closed by an annular wall 4, and the inner end of the annular wall 3 is closed by a head or wall 5, the walls 2 and 3 constituting between them the annular piston receiving space 6.

Coöperating with this annular cylinder, thus constructed, is a hollow annular piston 7 having an outer open end 8. The wall of this hollow piston is made thinner than the annular space 6, whereby the hollow piston may move back and forth therein without engaging the walls of the annular cylinder. For the purpose of making an air-tight fit, between the outer surface of the hollow piston 7 and the open end of the annular cylinder, a suitable packing 9 is provided, which is annular or ring-like in shape and may be of any suitable form or construction. As here shown, this packing is of a fibrous character of some well-known suitable material, but it may be of any efficient metallic packing without departing from the spirit of my invention. This packing 9 is held in place by an annular ring 10 and suitable bolts 11.

The difference between the thickness of the wall of the hollow piston 7 and the width of the space between the walls 2 and 3 is here exaggerated since they can be nearer to corresponding size than here shown, without departing from the spirit of my invention, so long as there is no frictional engagement between the hollow piston and the inner and outer walls of the annular cylinder. The inwardly projecting head 5 of the inner wall 3 is provided with an air-inlet opening or pipe 12, having a suitable check valve 13, which will permit air to be drawn therefrom into the hollow piston when it is drawn outward, and will close when the piston moves inward for compressing the air therein. This head 5 is also provided with an air-outlet opening or pipe 14, which is provided with a suitable outlet check valve 15, which will permit the air to be forced out by the compression of the hollow piston,

but prevents air from passing therethrough into the hollow piston.

The pipe 14 is extended and connected up with a suitable air receiving chamber 16, from which the compressed air may be taken through any desired form of outlet opening or pipe 17. The hollow piston may be reciprocated in any suitable manner. The way here shown, however, consists in providing the head 18 of the hollow piston with oppositely extending pintles 19 to which one end of the pitman or links 20 are swiveled at 21. The other ends of these links 20 are swiveled at the points 22 to the crank arms 23, which are connected to a suitable crank shaft 24. This crank shaft 23 may be driven in any suitable manner, but, as here shown, it is provided with a gear wheel 25, geared to a wheel 26 carried by a suitable drive shaft 27. This drive shaft 27 may be driven by any form of power (not shown) such as a steam engine, an electric engine or explosion engine.

Thus far we have described only a single compressor embodying our invention, and that may be driven differently from the manner here shown without affecting the invention herein involved. However, our improvement involves providing the piston head with two hollow pistons which extend in opposite directions and preferably directly in a line with each other and cooperating with an annular cylinder the same as that heretofore described, and since the hollow pistons and the annular cylinders are exactly alike, it is unnecessary to repeat the description heretofore given of one compressor, and the same reference letters are applied to both pistons and both cylinders, the improvement in this respect being a single piston head with oppositely extending hollow pistons cooperating with cylinders spaced at opposite sides of the piston head and distances apart a little less than the length of the hollow portion of the two pistons.

Attention is directed to the fact that the hollow pistons are of such length and the cylinders placed a distance apart so that

when the ends of the links 20 are detached from the pintles 19, one piston may be moved within its cylinder sufficiently far to carry the hollow end of the other piston outside of the packing 9, whereby the packing can be removed by removing the annular ring 10, and a new packing substituted therefor.

Projecting from opposite sides of each annular cylinder are the flanges 28, by means of which the cylinders may be attached to any suitable support.

By this construction both the inner and outer walls 2 and 3 of the annular cylinder are subjected to the cooling effect of the surrounding air as well as the hollow pistons when they are withdrawn from their respective cylinders and thus materially assist in preventing the overheating of the compressor in operation.

Having thus described our invention what we claim and desire to secure by Letters Patent is:—

An air compressor comprising two separate annular cylinders in a line with each other and having facing open ends, the inner wall of each cylinder having an inwardly projecting head with inlet and outlet openings, two connected hollow pistons cooperating with the hollow cylinders, the walls of the pistons being thinner than the spaces between the walls of the annular cylinders, packings carried by the ends of the outer walls of the cylinders and engaging the outer surfaces of the pistons, the packings supporting the pistons out of contact with the walls of the cylinders and making a tight joint between the outer walls of the cylinders and outer surfaces of the pistons, and means for reciprocating the pistons.

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

GEORGE BURD.
CHARLES BURD.

Witnesses:

JAMES F. KEOUGH,
EDWARD A. FAUST.