

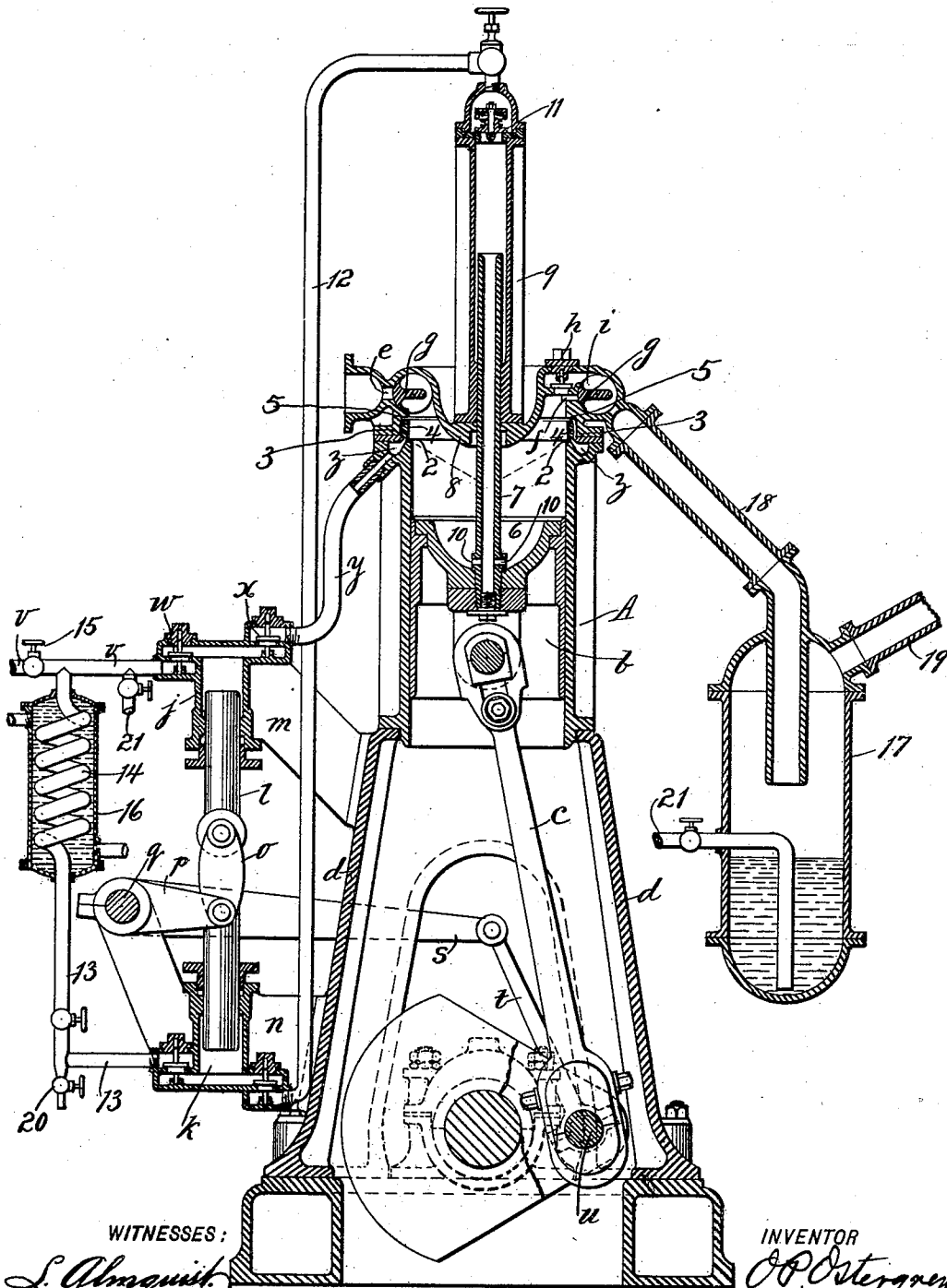
No. 694,299.

Patented Feb. 25, 1902.

O. P. OSTERGREN.
AIR COMPRESSOR AND COOLER.

(Application filed May 24, 1901.)

(No Model.)



WITNESSES:

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AIR COMPRESSOR AND COOLER.

SPECIFICATION forming part of Letters Patent No. 694,299, dated February 25, 1902.

Application filed May 24, 1901. Serial No. 61,773. (No model)

To all whom it may concern:

Be it known that I, OSCAR PATRIC OSTERGREN, a citizen of the United States of America, and a resident of New York city, county and State of New York, have invented certain new and useful Improvements in Air Compressors and Coolers, of which the following is a specification.

My invention consists of improvements in the construction of air compressing and cooling apparatus whereby both the compressing and cooling are more economically effected, as hereinafter described, reference being made to the accompanying drawings, which represent a vertical section of my improved apparatus.

A represents the cylinder, and *b* the piston, of an inverted upright compressing-engine, whereof the piston is connected by a rod *c* with the crank-shaft by which the power is applied, said cylinder being supported on suitable standards *d*. The air-induction port is represented at *e* and the eduction-port at *f*, with suitable controlling-valves *g*.

h is a relief-valve-opening escape through the port *i* in case there may accidentally happen to be an excess of water in the latter part of the stroke of the piston.

Water is to be injected into the compressing-cylinder for cooling by direct contact with the air, for which a pump of novel contrivance is used, said pump consisting of duplicate cylinders *j* and *k*, mounted one above another in vertical alinement, with their plunger-openings confronting each other, and a double-ender plunger *l*, coacting with the said cylinders, respectively. These cylinders are in this example mounted on brackets *m* and *n*, suitably attached to one of the compressing-cylinder supports *d*. The plunger *l* is connected between the cylinders by links *o* with arms *p* of a rock-shaft *q*, which has another and longer arm *s*, reaching to the vertical plane of the crank-shaft, where it is coupled by a rod *t* with the crank-pin *u*, to which the compressing-piston *b* is also connected, and thus motion for operating the plunger is obtained from the same crank that operates the compressing-piston. The water for injecting into the compressing-cylinder is primarily received through the pipe *v*, which communicates with the induction-valve *w* into the

pump-cylinder *j*. From said cylinder the water is ejected through eduction-valve *x* and pipe *y* into the annular channel *z* at the top of cylinder *A*, from which a narrow annular passage communicates with the upper end of the cylinder-space between the annular valve-seats 2 and 3, whereon an annular valve 4 is seated, said valve being limited as to its rising movement by the annular shoulder 5 above it and so fitted that besides admitting a thin annular sheet of water under the valve other portions of water may pass up behind the valve and over its top, so as to enter in another thin sheet for more effectively spraying and breaking up the water into misty condition best adapted for effective mixture of the atoms of air and water. The valve 4 is surrounded by equal pressure, or practically so, which favors such distribution of water above and below it.

The pump-piston *b* has a cup 6 in the upper surface, from the center of the bottom of which a tubular tail-rod 7 extends upward through the cover 8 of the cylinder and a suitable distance above in a stand-pipe 9, resting on said upper cover, said tail-rod having radial openings 10 from the exterior to the interior at the bottom of the cup. The cover 8 is of protruding form adapted to enter the cup containing water and displace it gradually and with less shock than if the parts were flat. Between the piston and the cover, the water having cooled, the air is forced upward through the tail-rod, stand-pipe, and a check-valve 11 at the top of the stand-pipe and thence through the pipe 12 to the suction side of the pump-cylinder *k*, by which it is ejected through pipe 13 and the cooling-coil 14 and part of supply-pipe *v* to be again supplied to the pump *b* for repeated use, the primary supply being shut off by the cock 15. The coil 14 is surrounded by a jacket 16 for circulation of cold water around the coil to cool the water for reuse, this being preferable to using new water direct, from which accumulations of foul matters result, while from the water used continuously there will be no accumulations over that contained in the original supply; but new water will have to be supplied from time to time to replenish the waste by absorption and escape in the air. Most of the water escaping with the air may, how-

ever, be received in a trap 17, into which the air from the compressor may be discharged through the downwardly-directed pipe 18 for depositing the water in the bottom of the trap, while air relieved of the water escapes through pipe 19.

It will be seen that when working in the closed system, by which is meant the system in which the cooling water is reused, the pump is balanced by equal pressures, or thereabout, on both ends of the duplex plunger, and thus power is economized. It will also be seen that the method of diffusing the water in the air in the compressing-cylinder is adapted for most effective intermixture and most rapid and effective interchange of temperatures, and it will also be seen that the compressor and the pump are geared for synchronous action, whereby water enters the compressor at the time compression takes place, and heat is generated under conditions whereby it takes the heat directly in the location where it is generated and at the moment of the same, thus more effectively cooling the air than when the action of the water is indirect.

What I claim as my invention is—

1. The combination with the air-compressor, of the water-injecting pump, the annular inlet to the compressing-cylinder and the annular valve controlling said inlet.

2. The combination with the air-compressor, of the water-injecting pump, the annular inlet to the compressing-cylinder, and the annular valve controlling said inlet, and arranged to distribute the inflowing jet partly under and partly over it.

3. The combination with the air-compressor and water-injecting pump, of the tubular tail-rod attached to the piston and having inlet-passages in close proximity to the piston, the tubular stand-pipe attached to the cylinder-cover and receiving the tail-rod and the check-valve in the top of the stand-pipe.

4. The combination with the air-compressor and water-injecting pump, of the piston having the cup in the upper side, the tubular tail-rod attached to the piston at the bottom of the cup and having the inlet-passages in close proximity to the bottom of the cup, the cylinder-cover having the protruding part acting with the cup, stand-pipe receiving the tail-rod and the check-valve in the top of the stand-pipe.

5. The combination with the air-compressor, of the duplex plunger-pump, one part of which is connected for injecting cooling-water into the compressor, and the other part is connected for receiving the water ejected from the compressor, and returning it to the injecting part, whereby the resistance on the pump is balanced.

6. The combination with the air-compressor, of the duplex plunger-pump, one part of which is connected for injecting cooling-water into the compressor, and the other part is connected for receiving the water ejected from the compressor and returning it to the injecting part, and a cooler intermediate of the two parts for the water passing from one to the other of said parts.

7. The combination of the compressor, duplex plunger water-injecting pump, rock-shaft coupled with the plunger intermediately of the pump-cylinders, and also coupled with the pin of the compressor driving-crank.

8. The combination with the air-compressor, of the water-injecting pump geared with the compressor for injecting the cooling-water into the compressing-chambers simultaneously with the act of compressing.

Signed at New York city this 17th day of May, 1901.

OSCAR PATRIC OSTERGREN.

Witnesses:

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J. M. HOWARD.