

No. 839,331.

PATENTED DEC. 25, 1906.

W. P. STEVENS.
AMMONIA GAS COMPRESSOR.
APPLICATION FILED APR. 4, 1904.

Fig. 1.

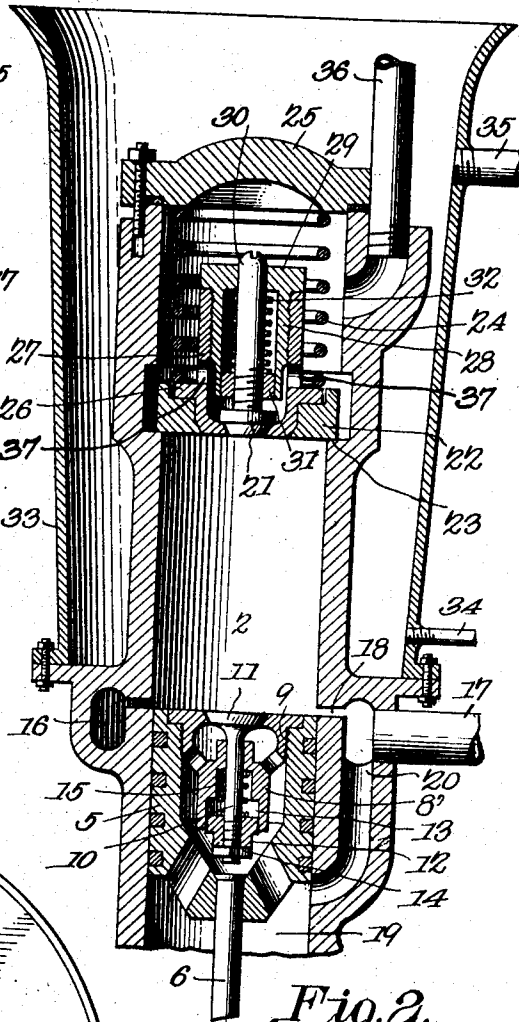
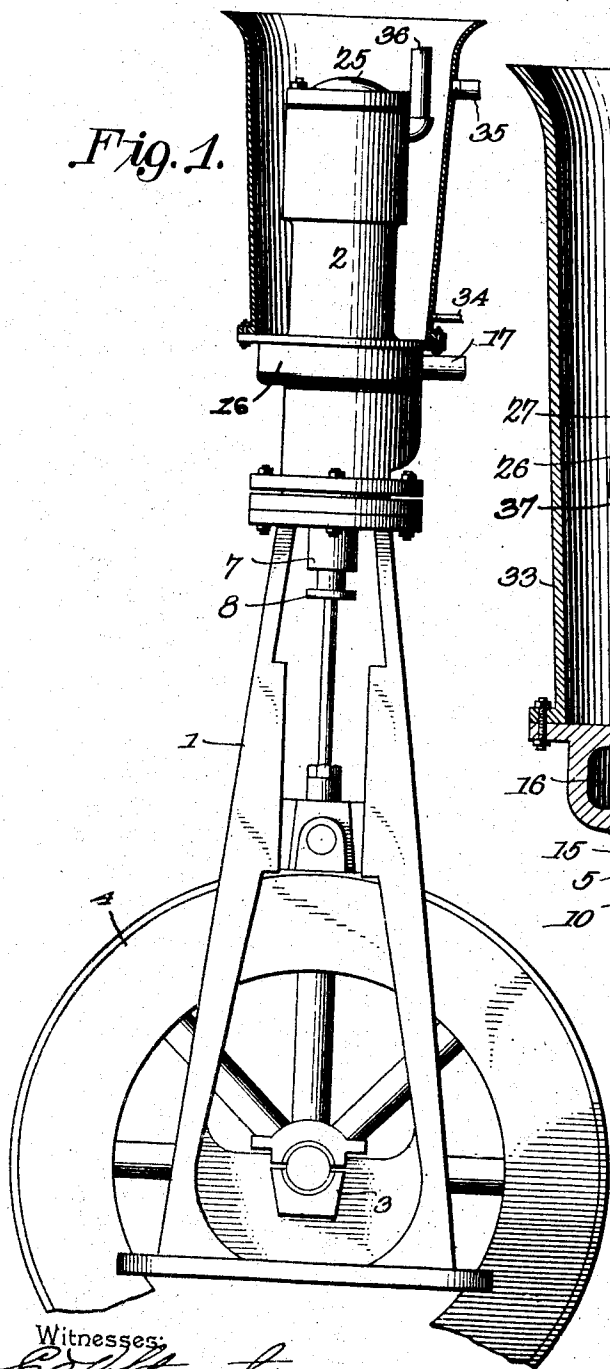


Fig. 2.

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UNITED STATES PATENT OFFICE.

WILL P. STEVENS, OF LOS ANGELES, CALIFORNIA.

AMMONIA-GAS COMPRESSOR.

No. 839,331.

Specification of Letters Patent.

Patented Dec. 25, 1906.

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To all whom it may concern:

Be it known that I, WILL P. STEVENS, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles and State of California, have invented a new and useful Ammonia-Gas Compressor, of which the following is a specification.

This invention relates to ammonia-gas compressors for refrigerating plants.

The object of the invention is, in a ready, thoroughly feasible, practical, and positive manner, to insure at all times a full charge of gas to the pump-cylinder even though the suction-valve fails to work; to obviate liability of damage to the pump-cylinder in the event of failure of the discharge-valve to work, as from binding or sticking in its seat, or from any other cause which will render it non-yielding; to effect compression of the gas in a rapid and economical manner, and generally to improve and render more effective the operation of compressors of the class defined.

With the above and other objects in view, as will appear as the nature of the invention is better understood, the same consists in the novel construction and combination of parts of an ammonia-gas compressor, as will be hereinafter fully described and claimed.

In the accompanying drawings, forming a part of this specification, and in which like characters of reference indicate corresponding parts, there is illustrated one form of embodiment of the invention capable of carrying the same into practical operation, it being understood that the elements therein exhibited may be varied or changed as to shape, proportion, and exact manner of assemblage without departing from the spirit thereof.

In the drawings, Figure 1 is a view in side elevation of a compressor embodying the improvements of the present invention. Fig. 2 is a sectional detail view, on an enlarged scale, of the upper portion of the compressor.

Referring to the drawings, 1 designates a pedestal upon which is supported in the usual or any preferred manner a pump-cylinder 2, the lower part of the pedestal being provided with bearings 3 for supporting a drive-wheel 4 of the usual construction.

The pump-cylinder has arranged in it a hollow piston 5, with which connects the upper end of a piston-rod 6, the lower end of which is operatively connected with the crank of the drive-wheel, thereby to effect reciprocatory movements of the piston. The

piston-rod works in a stuffing-box 7, having an adjustable gland 8, by which to insure a gas-tight passage-way for the piston-rod.

Combined with the piston is a cage 8', which has a screw connection at 9 with the piston, and working in the bore in this cage is the stem 10 of the suction-valve 11, which engages a seat in the upper face of the cage, the lower end of the stem having combined with it a head 12, which works in a seat 13 in the cage, the head being held in operative relation with regard to the stem by a nut 14. The bore of the cage is enlarged intermediate of its ends to receive a coiled spring 15, which bears at its lower end against the head, and thus serves to hold the valve 11 yieldingly seated.

One of the essential features of the present invention is the provision of means to effect supply of a full charge of gas to the gas-compressing chamber or that portion of the pump-cylinder above the piston, thereby to prevent any interference with the operation of the compressor. This function is secured by providing the wall of the cylinder intermediate of its ends with a circumferential chamber 16, constituting an emergency gas-chamber, and with which communicates the suction-pipe 17, communication between the emergency-chamber and the gas-compressing chamber being established through the medium of a plurality of ports 18, which, as clearly shown, are in alinement with the upper face of the piston when the latter is at the limit of its downward stroke. The passage of the gas from the gas-receiving chamber 19, or that portion of the pump-cylinder below the piston to the emergency gas-chamber is secured to a by-pass 20.

It will be noted by referring particularly to Fig. 2 that the circumferential chamber 16 is of substantially the same cross-sectional area as the suction-pipe 17, so that little if any expansion of the gas will occur within said chamber prior to its discharge through the opening 18. It is also to be noted that this chamber 16 only surrounds the base of the cylinder and that that portion of the cylinder thereabove and in which the piston works is maintained at a uniform temperature throughout its extent, and there is therefore no danger of the cylinder being expanded or contracted unevenly, so as to be snifted out of true and interfere with the operation of the piston.

The means for relieving the pump-cylin-

der from danger of injury in the event of the locking or binding of the discharge-valve 21 consists of a head 22, which is held against a seat 23, formed in the upper portion of the cylinder, by a spring 24, the upper end of which bears against the cylinder-head 25 and the lower end against the base-flange 26 of a cage 27. The inner upper portion of the cage is threaded to receive the threaded shank 28 of a guide 29, through which projects the upper end of the stem 30 of the valve 21, the lower portion of the stem being provided with a head 31 to work in the lower portion of the guide, a spring 32 interposed between the under face of the guide and the valve-head 31 serving to hold the valve yieldingly seated.

The gas-compressing chamber of the pump-cylinder is surrounded by a water-jacket 33, as usual, with the lower portion of which connects a water-inlet pipe 34 and with the upper portion a water-outlet pipe 35, the pump-cylinder being also provided with the usual discharge-pipe 36, which communicates with the cylinder above the head 23.

The operation of the compressor is as follows: On the upstroke of the piston gas is drawn in through the suction-pipe 17 and enters the gas-receiving chamber 19, and on the downstroke of the piston the gas passes through the piston and through the cage and lifts the suction-valve, and thus escapes to the gas-compressing chamber. When the gas rushes into the compression-chamber, it of course contacts with the hot walls thereof and is expanded. When, however, the piston reaches the limit of its downstroke and exposes the ports 18, an additional quantity of cold gas will rush therethrough into the compressing-chamber and will condense the expanded gas therein, and this will result in increasing the capacity of the machine. Should the valve 11 bind in its seat or from any other cause refuse to work, upon the downstroke of the piston the gas in the chamber 19 will be forced through the bypass 20 into the emergency gas-chamber 16 and thence through the ports 18 into the gas-compressing chamber, so that when the piston takes its upstroke it will have a charge of gas to propel. If upon the upstroke of the piston the discharge-valve 21 refuses to act from any cause, the gas-pressure will lift the head and permit the escape of gas through ports 37 into the upper part of the cylinder and thence to the discharge-pipe 36.

The improvements herein described are practically and thoroughly efficient for the purposes designed and may be adopted with compressors of standard makes without any extensive or objectionable change in their structural arrangement.

Having thus fully described my invention, what I claim is—

1. In a gas-compressor, a compressor-piston having an upwardly-opening valve, a gas-compressing chamber, a gas-receiving chamber, a suction-pipe, a circumferential compartment upon the gas-receiving compartment and of substantially the same transverse area as the suction-pipe, said compartment being disposed entirely below and communicating with the gas-compressing compartment, and a water-jacket entirely surrounding the compressing-chamber.

2. In a machine of the character described the combination with a cylinder having a gas-receiving chamber in the base thereof and a gas-compressing chamber; of a circumferential enlargement upon the base of the cylinder and around the gas-receiving compartment, said enlargement having a circumferential compartment communicating through the ports with the lower end of the gas-compressing chamber and, through a bypass with the gas-receiving chamber, a suction-pipe opening into the circumferential compartment adjacent one end of the bypass, a piston adapted to work in the gas-compressing chamber and to travel into the gas-receiving chamber a sufficient distance to uncover the ports, said piston having a passage therethrough, a spring for controlling the passage of gas through the piston, a spring-pressed valve disposed in one end of the cylinder, and a water-jacket completely surrounding the gas-compressing chamber.

3. In a machine of the character described a hollow piston open at one end and counter-sunk to form a seat, the other end of said piston being tapered and having apertures communicating with the interior thereof, said piston being threaded internally, a hollow cage threaded into the piston and having an annular flange upon the seat, said cage having apertures for establishing communication between the interiors of the piston and head, a reduced extension integral with the cage and disposed between the apertures therein, said extension being hollow, a valve normally closing one end of the cage, a stem projecting therefrom and slidably mounted within the reduced extension, a spring within said extension and around the stem for holding the valve seated, and means upon the stem and movably mounted within the extension for tensioning the spring, said means serving to center the stem within the extension.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

WILL P. STEVENS.

Witnesses:

JOHN PROPER,
JESSE M. ALDERMAN.