

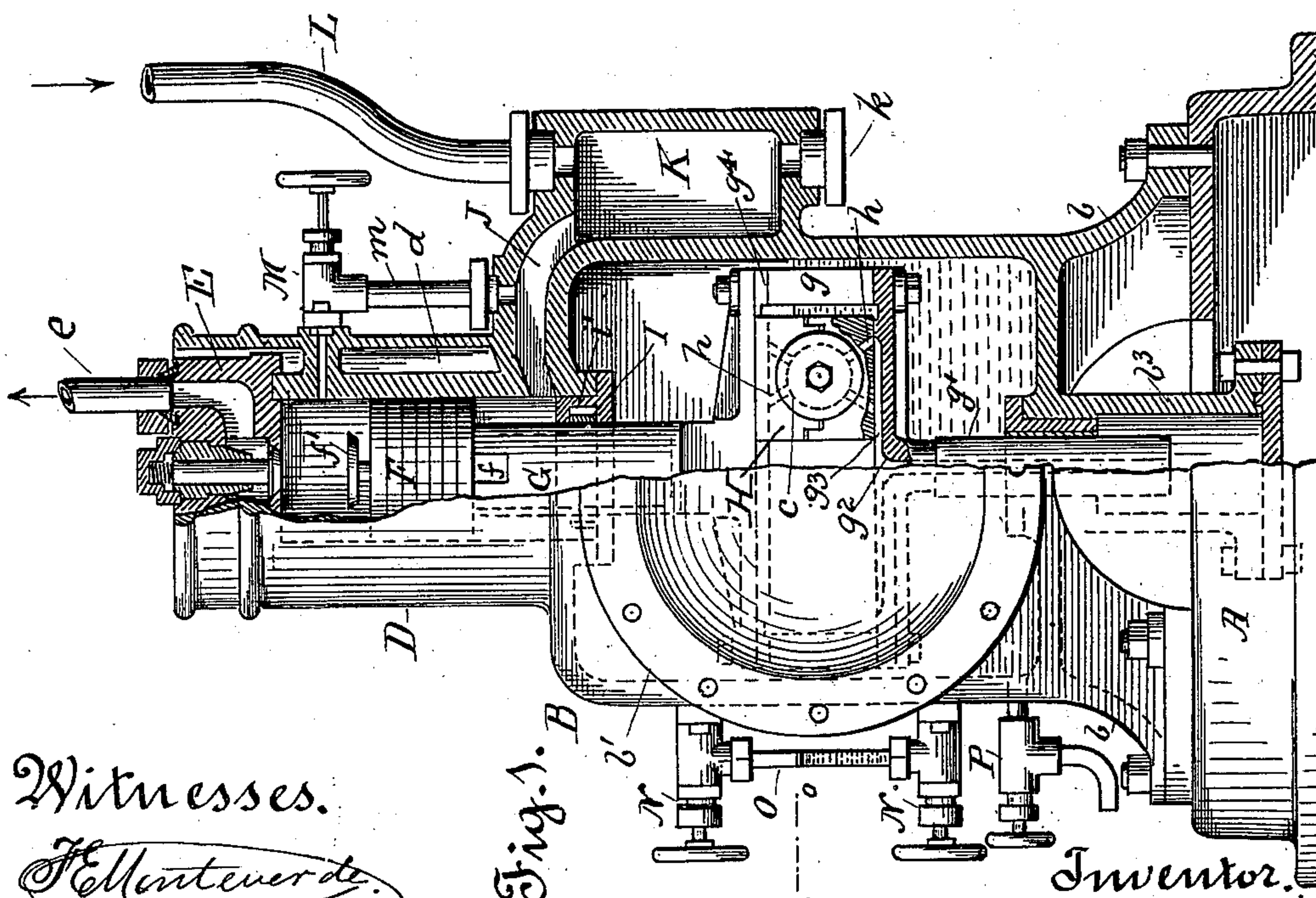
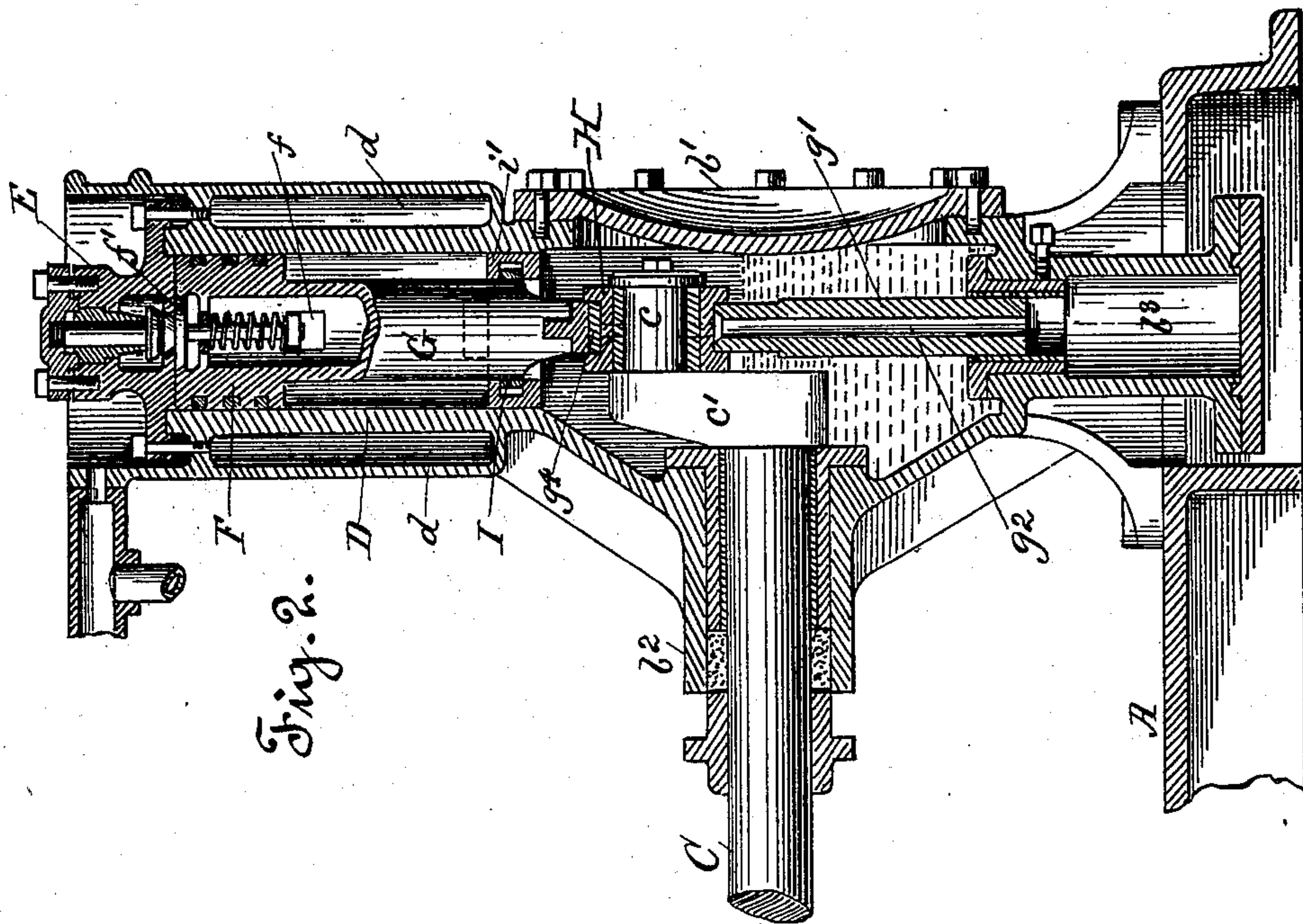
No. 661,184.

Patented Nov. 6, 1900.

J. T. LUDLOW.  
AMMONIA COMPRESSOR.

(Application filed Oct. 31, 1898.)

(No Model.)



Witnesses.

*J. Monteverde.*  
*Walter H. Kane.*

Fig. 1. B

Inventor.

James T. Ludlow  
by *Wm F. Booth*  
his Attorney.



# UNITED STATES PATENT OFFICE.

JAMES T. LUDLOW, OF SAN FRANCISCO, CALIFORNIA, ASSIGNOR TO THE  
VULCAN IRON WORKS, OF SAME PLACE.

## AMMONIA-COMPRESSOR.

SPECIFICATION forming part of Letters Patent No. 661,184, dated November 6, 1900.

Application filed October 31, 1898. Serial No. 695,097. (No model.)

*To all whom it may concern:*

Be it known that I, JAMES T. LUDLOW, a citizen of the United States, residing in the city and county of San Francisco and State of California, have invented certain new and useful Improvements in Ammonia-Compressors; and I do hereby declare the following to be a full, clear, and exact description of the same.

My invention relates to ammonia-compressors; and it consists in certain improvements therein hereinafter described and claimed, and which relate to the arrangement of the inlet for the gas into the compressor, the construction for confining the oil within the casing and separating it from the cylinder and from the entering gas, the proper lubrication of the crank-pin and sliding box, the compensation for wear in the yoke in which the sliding crank-pin box is seated, the construction and arrangement of the relief-valve, the construction of a dirt or scale trap or receiver, and other features, the object of all of which is generally to improve the compressor.

Special objects will be explained in connection with the several improvements.

Referring to the accompanying drawings, Figure 1 is a part elevation and part vertical section of my compressor. Fig. 2 is a vertical section at right angles to Fig. 1.

A is a base, to which are secured the legs *b* of the shell or casing B, which on one side is fitted with a removable head *b'* to afford access to the interior and on the other is provided with a bearing *b<sup>2</sup>* for the shaft C. The shell or casing B has below a depending guide-chamber *b<sup>3</sup>* and above a cylinder D, having a water-jacket *d* and having its top fitted with the valve-controlled cap E, forming the discharge into the pipe system, of which pipe *e* represents the beginning. Within cylinder D is the piston F, having the ports *f* and controlling-valve *f'*. The rod G of said piston passes down into the shell or casing B and is provided with a yoke *g* and a downwardly-extending guide-rod *g'*, which plays into the guide-chamber *b<sup>3</sup>*. Within the yoke *g* is mounted a sliding box H, in which is journaled the crank-pin *c* of the crank *c'* of shaft C, whereby the piston is reciprocated. Within the shell or casing B is a body of oil, of which the level may be represented by the line *o o*.

In compressors of this general type it has been customary to introduce the gas from the suction-pipe to the casing or shell directly above and in contact with the body of oil. This is objectionable in several particulars. The cold ammonia causes the oil to foam up, rendering it hard to control. When the ammonia is below zero, it freezes the oil, and generally it interferes with the proper lubrication of parts. To remedy these difficulties, I place within the cylinder D, at or near its lower end, an annular packing-ring I, which is fitted to an annular seat *i'* and embraces the rod G of piston F. The packing-ring I is preferably a split one, divided, say, into three parts, with a flat spring to each part, this construction being for the sake of readily fitting it to its seat. Its effect in this position is to separate the cylinder from the casing B, and as I introduce the ammonia to the cylinder through the passage J at a point above the packing-ring the gas is kept from contact with the oil; but a further and important advantage of the packing-ring lies in the fact that it keeps the oil from being raised and passing over into the pipe system. A small quantity, capable of being regulated to a certain extent by the tightness of the packing, can be allowed to force itself over for lubricating purposes.

In many compressors the ammonia is taken in without having passed through any dirt or scale trap or receiver. The ammonia, through its cleansing action upon the pipes of the system through which it circulates or is expanded, causes the dirt or scale, and this when admitted to the cylinder wears and pits the valves and dirties the oil. In some cases a dirt trap or receiver is let into the suction-pipe separate and apart from the compressor. In my construction I form the dirt or scale trap or receiver K as part of the same casting as the shell or casing B. On one side thereof, near its upper portion and still as the same casting, I form the inlet-passage J from the receiver into the cylinder. The suction-pipe L is let into the top of the scale trap or receiver, and the latter is fitted with a controllable bottom opening *k* to draw off the sediment. This construction simplifies the manufacture of the compressor, making of the



general frame a single casting, as shown. It also places the dirt or scale trap conveniently and enables the connecting-passage J to be well located and to enter the cylinder at the proper place above the annular packing-ring I. It also makes the compressor more complete in itself, rendering it independent to that extent of the pipe system.

In order to lubricate the crank-pin *c* and the yoke in which the box H slides, I make a hole  $g^2$  lengthwise through the depending guide-rod  $g'$ . This hole communicates at its upper end with a groove  $g^3$  in the base of yoke *g*, and in the box H is made a hole *h*, which passes up to the crank-pin. A certain amount of oil will pass down by the guide-rod  $g'$  into the guide-chamber  $b^3$ , and as the rod descends the oil will be forced up through the hole  $g^2$  and enter the groove  $g^3$ , thereby keeping the yoke lubricated for the sliding box. The oil will also pass up through hole *h* in the box and lubricate the crank-pin.

As the pressure upon the sliding box is very great, the wear upon the yoke is excessive. To compensate for this, I introduce upon the under side of the top piece of the yoke a separate wearing-piece  $g^4$  to receive this wear. The yoke is made of a top and bottom and end pieces bolted together, so that the loose or separate wearing-piece may be readily introduced and easily removed when worn for the substitution of another.

M is the relief-valve. Instead of connecting the passage it controls with the pipe system, as is usual, I have so arranged it that its connection *m* is with the passage J. This affords convenience in construction and renders the compressor more compact and complete in itself without dependence upon the

pipe system, just as in the case of the dirt or scale trap or receiver being cast with or formed as a part of the shell or casing, as I have already mentioned.

N N are gage-cocks, and O is an oil-glass.

P is the valve for drawing off oil or letting it in.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In an ammonia-compressor, the combination of a casing, an adjacent cylinder, a piston therein, a guide-chamber opposite said cylinder, a piston-rod for said piston carrying a guide-rod working in said guide-chamber, said rod having an oil-duct adapted to receive oil from said chamber and carry it to the drive connection, and power connections for driving said piston-rod, in said casing, substantially as described.

2. In an ammonia-compressor having a shell or casing to contain oil, and an adjacent cylinder with piston and rod, said rod having a yoke with depending guide-rod, a crank-pin seated in a sliding box in said yoke, whereby the piston is operated, a guide-chamber in which the guide-rod works, said chamber communicating with the shell or casing containing the oil, a hole in said guide-rod, to permit the oil to pass therethrough from the guide-chamber, and suitable communications from the top of said hole, to permit the oil to reach the crank-pin and box.

In witness whereof I have hereunto set my hand.

JAMES T. LUDLOW.

Witnesses:

D. B. RICHARDS,  
WALTER F. VANE.