(No Model.) 3 Sheets—Sheet 1.

A. OSENBRÜCK.

COMPRESSING PUMP FOR AMMONIA GAS.

No. 304,446. Patented Sept. 2, 1884.

Fig: 1.

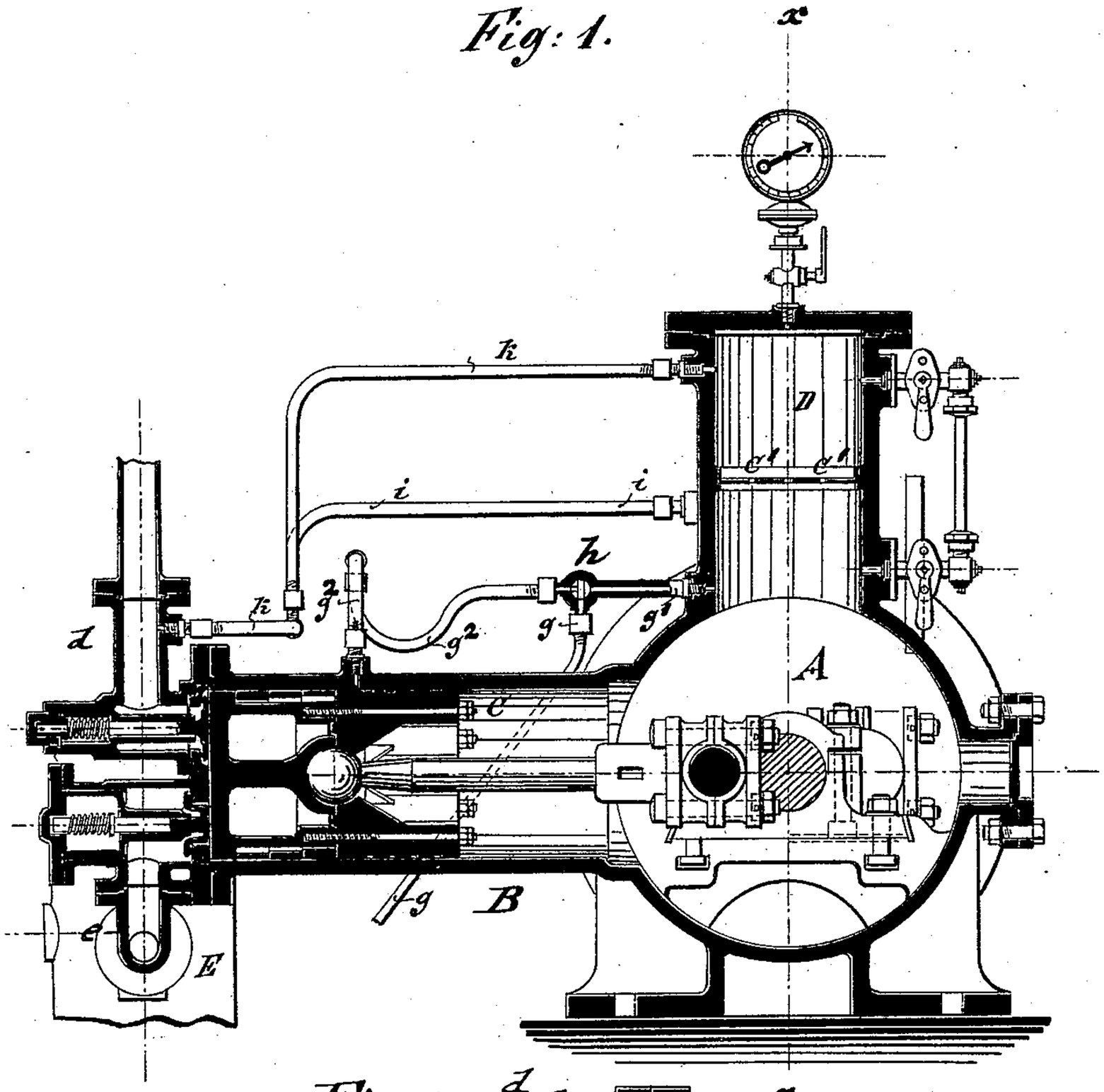

Fig: 1a

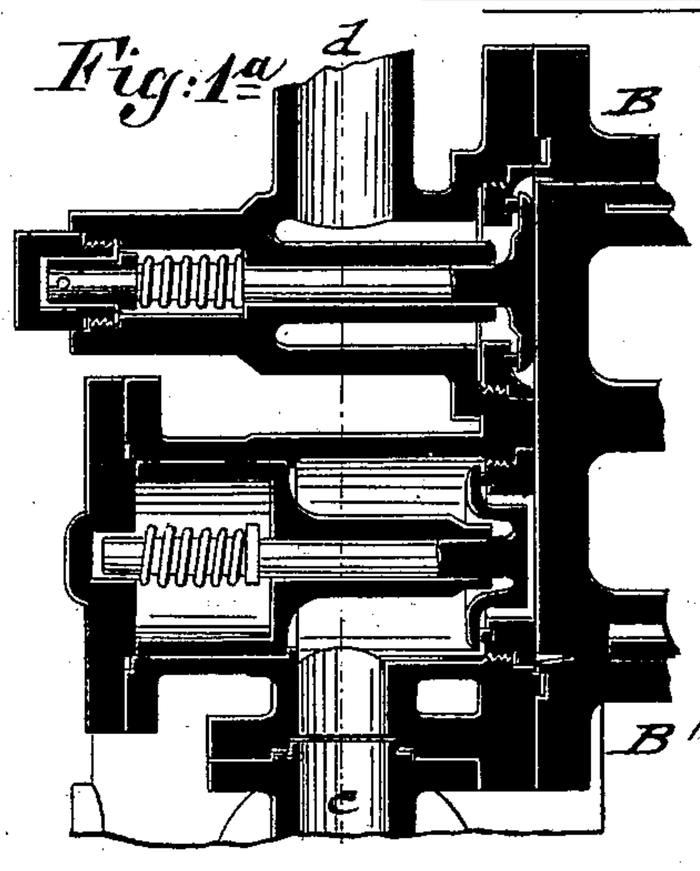

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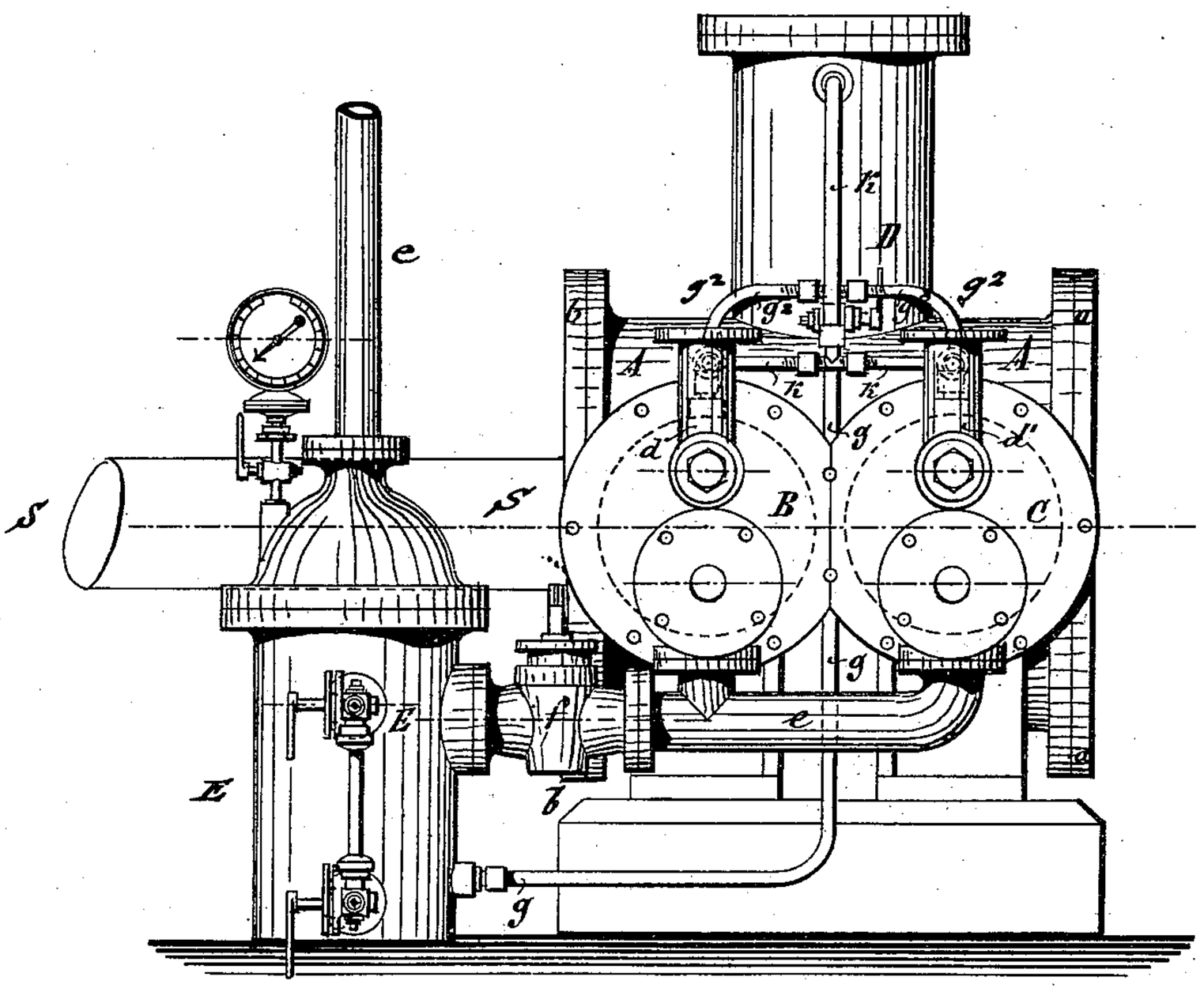
Fig: 2.



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(No Model.) 3 Sheets—Sheet 3.

A. OSENBRÜCK.

COMPRESSING PUMP FOR AMMONIA GAS.

No. 304,446. Patented Sept. 2, 1884.

Fig: 3.

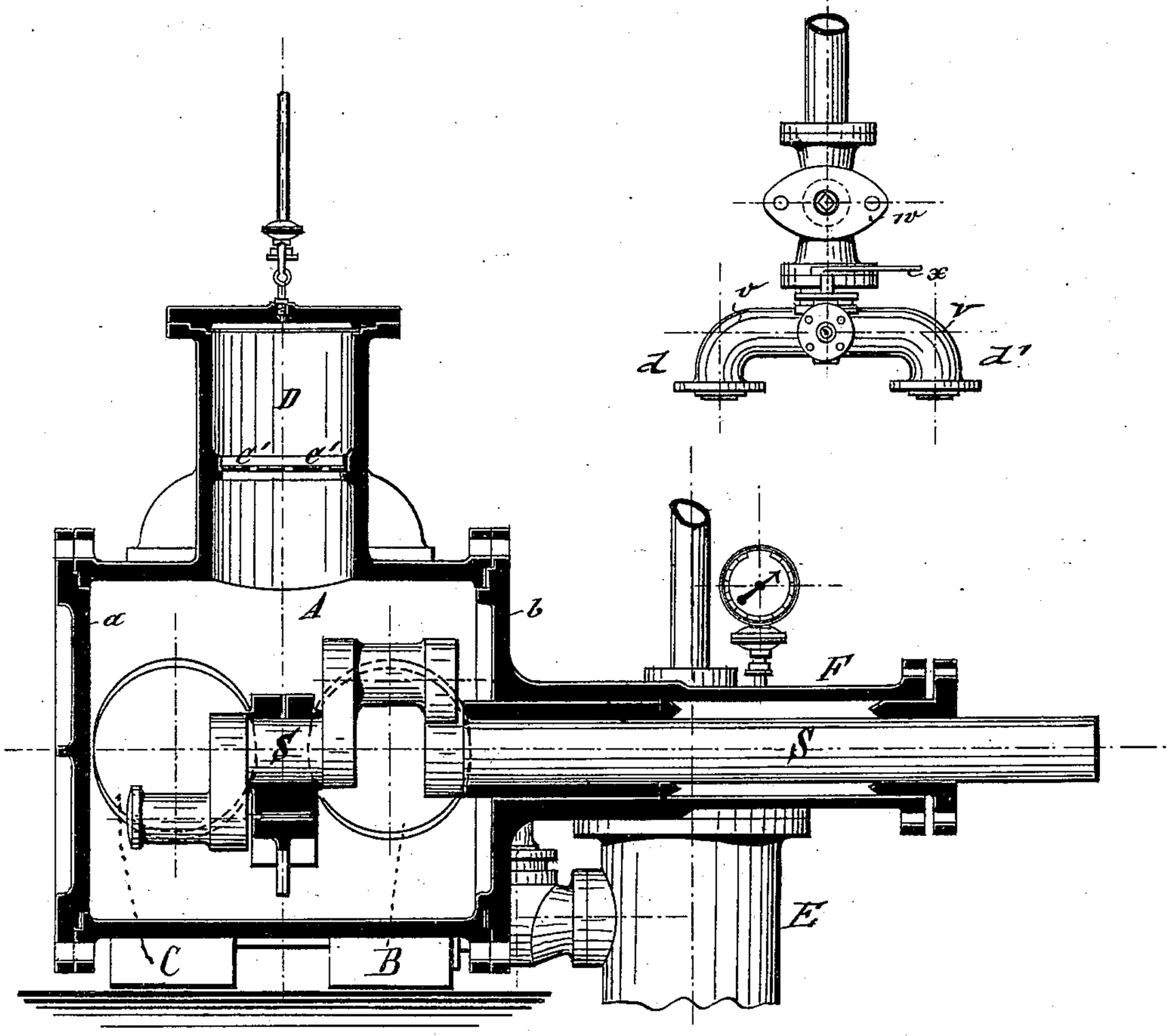

Fig: 4

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UNITED STATES PATENT OFFICE.

AUGUST OSENBRÜCK, OF HEMELINGEN, GERMANY.

COMPRESSING-PUMP FOR AMMONIA-GAS.

SPECIFICATION forming part of Letters Patent No. 304,446, dated September 2, 1884.

Application filed November 13, 1882. (No model.) Patented in England February 27, 1882, No. 952; in Germany March 22, 1882, No. 17,373; in France May 13, 1882, No. 147,683, and in Austria-Hungary May 25, 1882, No. 12,817 and No. 20,241.

To all whom it may concern:

Be it known that I, AUGUST OSENBRÜCK, of Hemelingen, in the Empire of Germany, have invented certain new and useful Improvements in Compression-Pumps for Refrigerating-Machines, (for which Letters Patent have been granted to me in Germany, numbered 17,373, dated March 22, 1882; England, numbered 952, dated February 27, 1882; France, numbered 147,683, dated May 13, 1882; Austria, No. 12,817, May 25, 1882, and Hungary, No. 20,241, May 25, 1882,) of which the following is a specification.

This invention relates to an improved compression-pump for ammonia refrigerating-machines in which the movable parts are inclosed in a casing or chamber filled with oil, so that the same are exposed to but little wear and require but little attention.

The invention consists of a compression-pump for refrigerating-machines in which the piston-actuating mechanisms are located in a cylindrical crank-chamber which is hermetically closed against the atmosphere and filled entirely with oil. A closed cylinder at the top of the crank-chamber is provided with a perforated partition-plate and connected with the suction-pipe of the pump, so that the crank-chamber is always exposed to the lowest pressure of the pump. A separate oil-reservoir is connected by pipes and a three-way cock with the pump-cylinders for the injection of oil back of the pistons, said three-way cock being also connected with the oil-cylinder on the crank-chamber, so as to regulate the level of the oil in the oil-reservoir and in the oil-cylinder of the crank-chamber.

In the accompanying drawings, in which similar letters of reference indicate the same parts, Figure 1 represents a vertical longitudinal section through one of the pump-cylinders and through the crank-chamber of my improved compression-pump for refrigerating-machines. Fig. 1ª is an enlarged section of the head of one of the pump-cylinders, showing the suction and pressure valves. Fig. 2 is an end elevation of my improved compression-pump; Fig. 3, a vertical transverse section through the crank-chamber of the compression-pump on line *x x*, Fig. 1. Fig. 4 is a detail section showing the coupling for the suction-pipes of the cylinders.

A represents a cylindrical crank-chamber, which is supported in a horizontal position on a suitable bed-plate. The crank-chamber A is closed hermetically at both ends by the cylinder-heads *a* and *b*. The head *b* is provided with a stuffing-box, F, for the driving-crank shaft S of the pump. From one side of the crank-chamber A extend two pump-cylinders, B and C, while an oil-cylinder, D, is arranged at the upper part of the crank-chamber A. The oil-cylinder D communicates at its lower end with the crank-chamber, but is closed at the top and provided at the interior with a perforated horizontal partition-plate, C′, as shown in Figs. 1 and 3. The perforated plate C′ serves as a guard-plate to retain the oil and prevent it from being dashed about in the upper part of the cylinder D when agitated by the strokes of the pistons and the rotations of the cam-shaft. The vertical oil-cylinder D communicates with the suction-pipes *d d′* of the pump-cylinders by the pipe K, which branches into two parts, K′ K′, at its lower end, as shown in Fig. 2.

The crank-chamber A is preferably made in one casting with the pump-cylinders B and C and the top cylinder, D. In connection with the pressure-pipe *e* of the pump is arranged an oil-reservoir, E, which can be closed toward the pump-cylinders B and C by a stop-cock, *f*. The pressure-pipe *e* is connected to the oil-reservoir above the level of the oil in the same, so as to communicate with the space above the oil-level, it being continued at the top part of the reservoir E. The interior of the oil-reservoir E is consequently exposed to the maximum pressure of the pump, and serves for the injection of oil into the space back of the pump-pistons. The suction-pipes *d d′* of the pump-cylinders are connected by a coupling-pipe, *v*, (shown in detail in Fig. 4,) which is provided with a stop-cock, *w*, by which the compression-pump can be shut off from the suction-pipe. By means of a small stop-cock, *x*, liquid ammonia or any other refrigerating agent can be supplied to the pump.

The oil-reservoir E is connected by a pipe,

g, attached to its lower part with the three-way cock *h*, (shown clearly in Fig. 1,) which latter is connected by a pipe, *g'*, with the oil-cylinder D on the crank-chamber A, and by branch pipes g^2 with the pump-cylinders B and C. The openings of the branch pipes g^2 g^2 into the cylinders B and C are located in such a position that they are cleared at each end of the suction-stroke of the pistons, so that a certain quantity of oil is injected at the moment when the pistons clear the supply-openings of the pipes g^2 g^2. The size of the pump-pistons *c c* and the relative length of the pump-cylinders B and C are arranged in such a manner that the pistons are guided during the entire length of their stroke by the cylinders. The pistons *c c* are composed of two cylindrical sections, which are connected by longitudinal screw-bolts, and are connected to the piston-rods by ball-and-socket joints, as shown clearly in Fig. 1. The interior of the crank-chamber and the pump-cylinders B and C, adjoining thereto, are filled up to the partition-plate C' with a suitable oil, so that the actuating-cranks, piston-rods, and pistons move always in oil, by which wear is diminished and the escape of ammonia-vapors prevented. The oil-cylinder D and oil-reservoir E are provided with the usual accessories, such as pressure-gages, oil-gages, &c. The quantity of oil that is supplied at each stroke of the pistons *c c* to the cylinders B and C is regulated by the position of the three-way cock and the pressure of the pump. From the pump-cylinders the oil passes through the pressure-valves of the same back of the oil-reservoir E, from which it is supplied again to the cylinders, and so on.

In case the pistons do not fit tightly, so that gas or oil should escape into the crank-chamber A, the escaping gas will pass through the oil and perforated plate C' to the upper part of the cylinder D, and from the same through the connecting-pipe K to the suction-pipe. The oil which passes into the crank-chamber causes a gradual rising of the oil-level in the oil-cylinder D, and consequently a corresponding lowering of the oil-level in the oil-reservoir E. Whenever this takes place, the three-way cock *h* is so adjusted that the oil is supplied to the pump-cylinders back of the pump-pistons from the oil-cylinders D. The oil is then returned through the pressure-valves to the oil-reservoir E, so that the level of the oil in the oil-cylinder D will fall, while that in the reservoir will rise. The three-way cock *h* is set again to its former position whenever the oil in the reservoir E has resumed its former level. As this requires, however, close supervision of the oil-gages by the attendant, who has to observe the rising and falling of the oil in the cylinder D, and the level of the oil-reservoir E, it is preferable to make the oil-supply to the pump-cylinders automatical and entirely independent of exterior manipulations. For this purpose a connecting-pipe, *i*, which leads directly from the oil-cylinder D to the lower end of the pipe K, and from the same through the branch pipes K' K' to the suction-pipe of the compression-pump, is provided. The connection of this pipe with the oil-cylinder D has to be, however, at a higher level than the connection of the same with the suction-pipes *d d'*. With this arrangement all the oil which passes between the pistons and pump-cylinders to the crank-chamber A is conducted to the suction-pipe, and from the latter, by the suction-valves of the pump-cylinders, into the space back of the pump-pistons, from which it is reconducted through the pressure-valves to the oil-reservoir E. The three-way cock *h* is in this case replaced by a common cock, as the injection of the oil into the space back of the pump-pistons is accomplished from the oil-reservoir E. The direct connection of the oil-cylinder D with the suction-pipes *d d'* keeps up automatically a constant oil-level in the oil-cylinder D and oil-reservoir E, and dispenses with the continual watching of the gages and setting of the three-way cock *h*. The ammonia-gases are compressed by the action of the pistons of the compression-pump in the well-known manner. The expanded gases are sucked back into the compression-pump and compressed again. The escape of ammonia-vapors from the pump is prevented by the oil-packing in the crank-chamber, and by the connection of the top part of the oil-cylinder D by the pipes K and K' K' with the suction-pipes *d d'*, whereby any vapors escaping from the cylinders B C to the crank-chamber and oil-cylinder are reconducted to the cylinders B C for compression. The crank-shaft S is supported in a bearing of the crank-chamber, provided with a stuffing-box of a reliable construction, whereby the escape of vapors at that point is prevented.

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

1. In a compression-pump for refrigerating-machines, the combination, with the pump-cylinders and pistons, of a crank-chamber having a vertical top cylinder, said crank-chamber and top cylinder being filled with oil, so that the actuating mechanisms of the pistons always move in oil, substantially as described.

2. In a compression-pump for refrigerating-machines, the combination of the pump-cylinders and pistons with a crank-chamber having an oil-cylinder on its top, and with a pipe connecting the oil-cylinder with the suction-pipe of the pump, whereby the crank-chamber is exposed to the minimum pressure of the pump, as described.

3. In a compression-pump for refrigerating-machines, the combination of the pump-cylinders B and C and their pistons, crank-chamber A, oil-cylinder D, pipes *g* g^2, three-way cock *h*, and oil-reservoir E, whereby oil is injected into the space back of the pump-pistons at each stroke, substantially as described.

4. In a compression-pump for refrigerating-machines, the combination of the pump-cylin-

ders B and C and their pistons, crank-chamber A, oil-cylinder D, three-way cock *h*, pipes *g g' g²*, and oil-reservoir E, whereby the oil is returned from the oil-cylinder to the oil-reservoir, substantially as set forth.

5. In a compression-pump for refrigerating-machines, the combination of the pump-cylinders B and C and their pistons, crank-chamber A, oil-cylinder D, and pipe *i*, which connects the oil-cylinder with the branch pipes K' K' and suction-pipes *d d'*, so as to automatically retain constant oil-levels in the oil-cylinder D and oil-reservoir E, substantially as described.

In testimony that I claim the foregoing as my invention I have signed my name in presence of two subscribing witnesses.

AUGUST OSENBRÜCK.

Witnesses:
WILH. OSENBRÜCK,
ADOLF OSENBRÜCK.