No. 618,004. Patented Jan. 17, 1899.

J. J. FAULKNER.

GAS PUMP FOR ICE MACHINES.

(Application filed Dec. 29, 1897.)

(No Model.) 3 Sheets—Sheet 1.

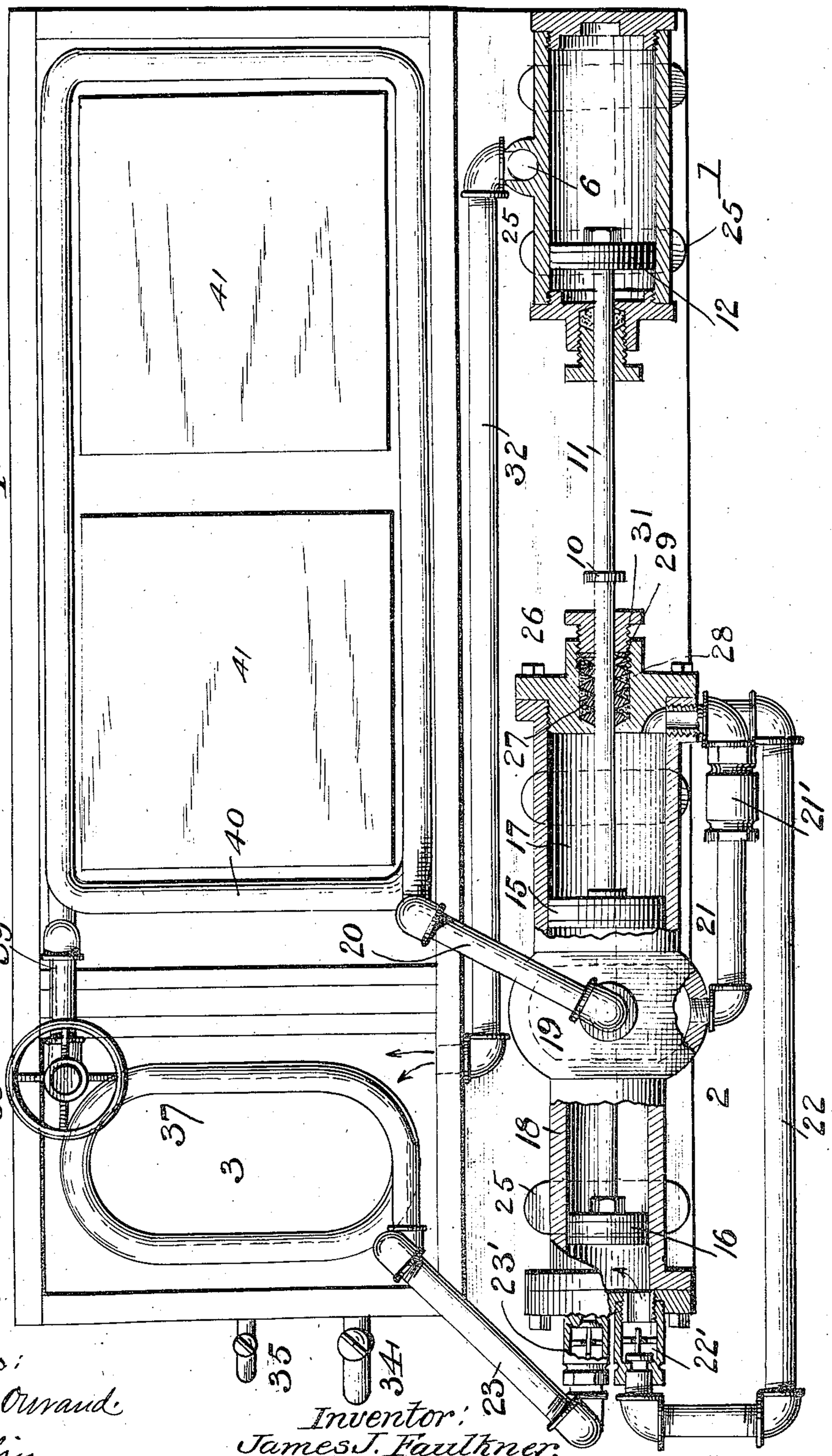

Fig. 1.

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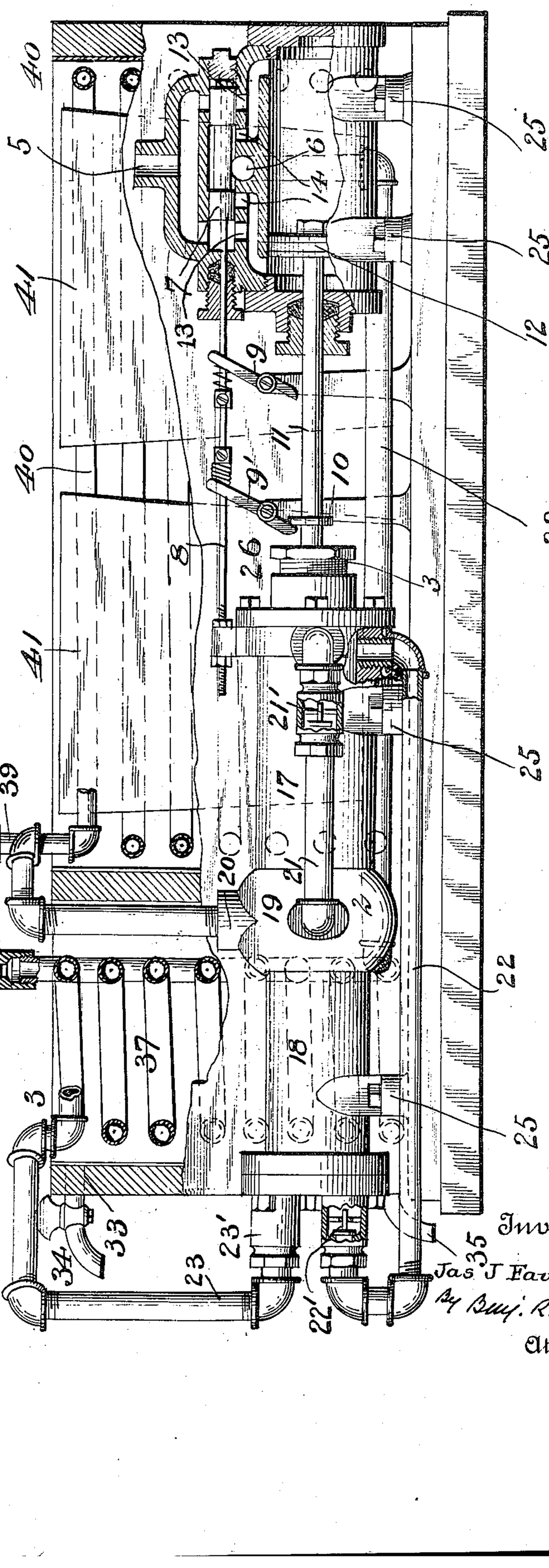

Fig. 2.

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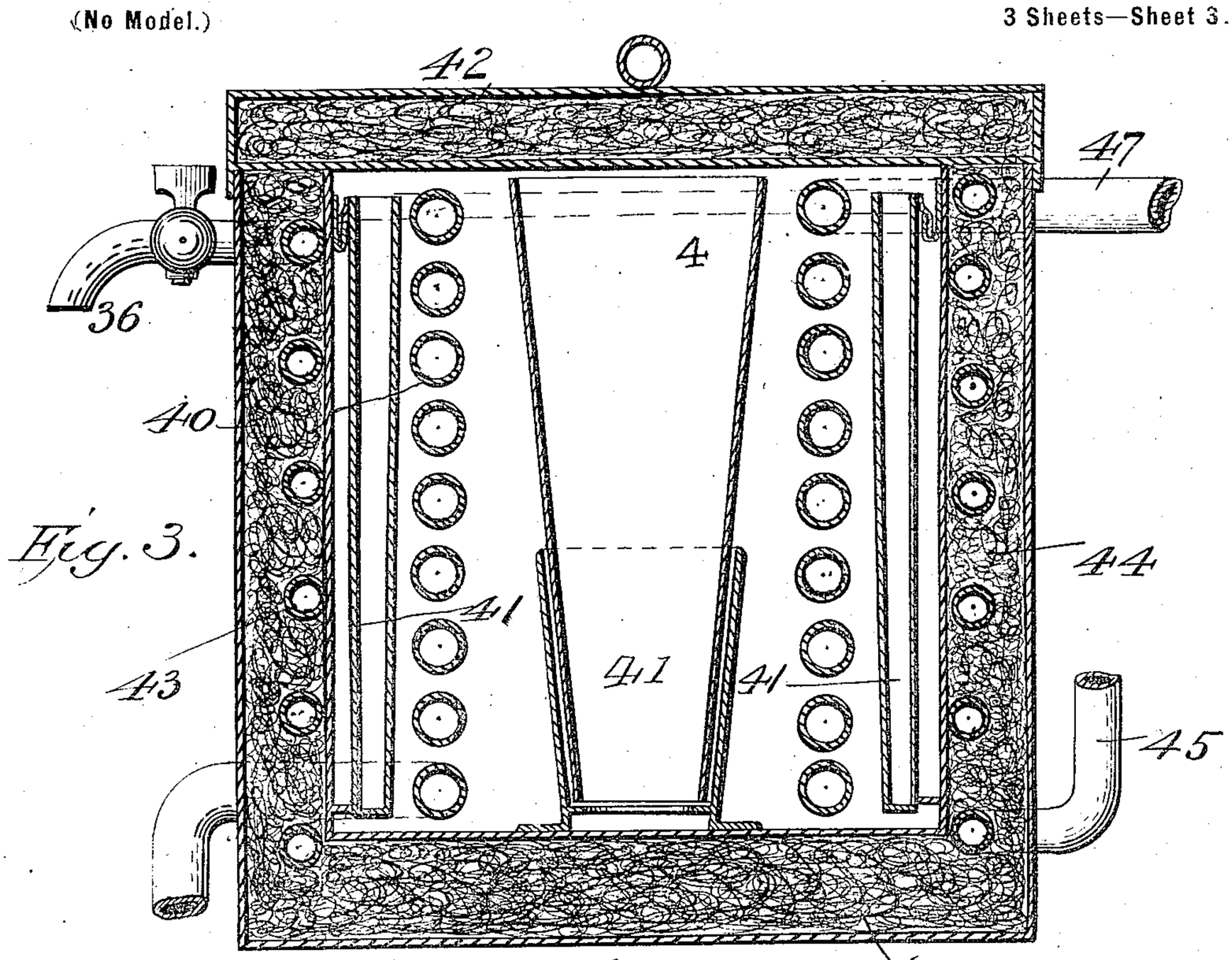

Fig. 3.

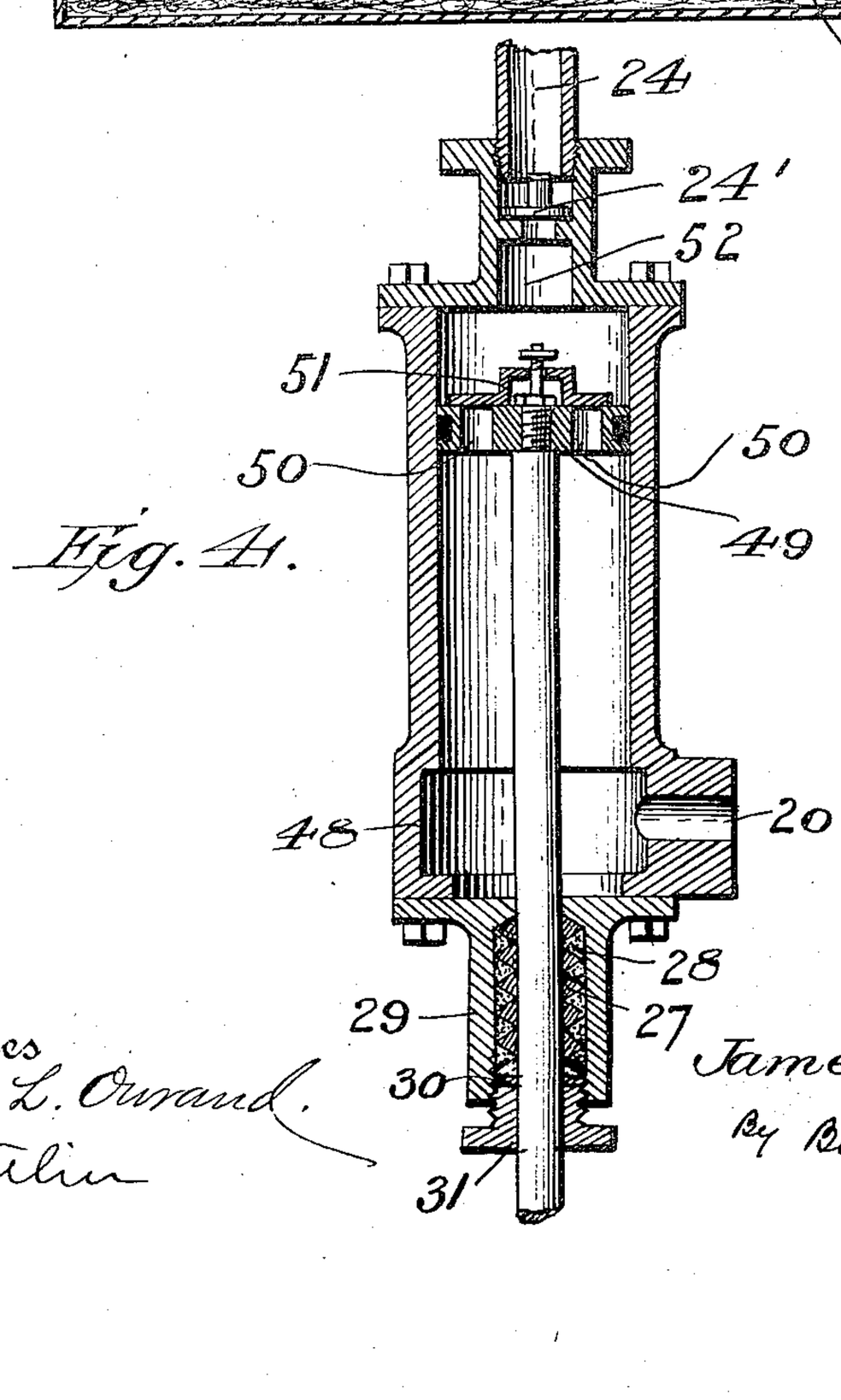

Fig. 4.

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UNITED STATES PATENT OFFICE.

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GAS-PUMP FOR ICE-MACHINES.

SPECIFICATION forming part of Letters Patent No. 618,004, dated January 17, 1899.

Application filed December 29, 1897. Serial No. 664,333. (No model.)

To all whom it may concern:

Be it known that I, JAMES J. FAULKNER, a resident of Memphis, in the county of Shelby and State of Tennessee, have invented certain new and useful Improvements in Ice-Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use the same.

The invention relates to "ice-machines," so called, and has for its object to increase their efficiency and economy.

The invention consists in the construction hereinafter described and pointed out.

In the accompanying drawings, Figure 1 is a plan of the improved apparatus, partly in section. Fig. 2 is a side elevation of the same. Fig. 3 is a section of a water-freezing chamber of modified form. Fig. 4 is a view of a modified compressor-cylinder.

The machine or apparatus comprises a motor 1, a multiple ammonia-compressor 2, a condenser 3, and a refrigerator 4.

The motor is operated (by water in the present instance) to compress ammonia-gas and drive it through a cooled coil, whereby it is condensed and from which it is expanded into a refrigerating-coil and absorbs heat from the water to convert it into ice.

The motor has an inlet 5 and an exhaust-port 6.

7 is a sliding valve having a rod 8 and spring-held tappets 9 and 9′, situated in the path of a ring or projection 10 on the piston-rod 11 of the piston 12.

As shown in Fig. 1, the piston has been driven to the extreme left. An inlet-valve port 13 at the right has thereby been closed by valve 7 and the left-hand port 13 opened to admit water behind the piston. The right-hand port 14 and exhaust-port 6 are open for the escape of water from the right of the piston, the left-hand port 14 being closed. The reversal of the valve is effected by the piston-rod through the medium of the projection 10 and valve-rod tappets 9 and 9′.

The piston-rod 11 passes through suitable stuffing-boxes into the compressor-cylinders and is therein provided with pistons 15 and 16. The compressor-cylinders are indicated by 17 and 18. They are of unequal diameter and are connected by a chamber 19.

20 denotes a gas-inlet, whereby ammonia is received from the refrigerator-coil.

21 is a pipe by which the chamber 19 and the adjacent parts of the cylinders 17 and 18 communicate with the remote end of the cylinder 17, and 21′ is a check-valve in said pipe. 22 is a pipe, whereby said cylinder communicates with the opposite end of cylinder 18 and with the pipe 23, leading to the condenser.

22′ is a check-valve in pipe 22, and 23′ is a check-valve in pipe 23.

25 indicates brackets for the attachment of the cylinders and motor to any suitable support.

26 denotes a stuffing-box in cylinder 17. To prevent the escape of ammonia, this is made of a succession of metal rings or washers 27 of wedge form in cross-section. 28 denotes flexible packing interposed between the rings. 29 and 30 indicate washers made, respectively, of metal and flexible packing. These parts are packed together by a follower 31. The packing-rings are made transversely wedge shape and the broadest part of the metal portions situated contiguous the piston-rod. These rings, together with the follower, constitute an efficient support and guide for the piston-rod, which also passes through a stuffing-box in the motor-cylinder and carries the several pistons, as elsewhere described. The construction and arrangement are very efficient and economical of space and power.

The condenser 3 is connected by pipe 32 with the exhaust-port of the motor, and 33 denotes an overflow, which may be provided with a cock 34. Draw-off cocks or faucets for the condenser-chamber and for the refrigerating-coil 43 are respectively denoted by 35 and 36.

37 denotes a condensing-coil, which receives ammonia from the pipe 23, communicating with the compressor.

38 is a spring-held regulating-valve, whereby the flow of ammonia from the condenser may be regulated.

39 is a pipe leading to a refrigerating-coil 40, situated in the refrigerating-chamber 4.

41 denotes cans to hold water to be frozen, and 42 is a removable cover for the refrigerator.

43 denotes a coil situated in the non-conducting cover 44 of the refrigerator. Said coil has an inlet-pipe 45 and a faucet 36.

47 is a return-pipe, which conducts the ammonia from the refrigerator-coil to chamber 19 of the compressor. The ammonia will have a temperature below the normal and will prevent too great a rise of temperature in the cylinders between the proximate sides of the pistons. The chamber 19 will act as a reservoir and hold a considerable body of ammonia in communication with the cylinders. It will receive any ammonia leaking by the pistons, and it coöperates with the adjacent parts of the cylinders in holding a sufficient quantity of fluid to insure a regular and even supply to the outlet-pipe. The advantages of the combination would be considerable were the enlargement of the contiguous ends of the cylinder to provide a chamber having a transverse diameter greater than that of the cylinders omitted; but the enlargement is preferred. In the form illustrated in Fig. 1 it not only serves as a reservoir, but it connects the two cylinders having unequal diameters in a manner to avoid an abrupt shoulder and an abrupt contraction of the open end of the larger cylinder. Further, some of the advantages of the enlargement of a compressor-cylinder could be secured in a single cylinder, such as shown in Fig. 4, in which 48 denotes such enlargement and 20 a gas-inlet pipe.

49 denotes a piston having ports 50. A gravity-valve is denoted by 51, and a pocket in the cylinder-head to receive the valve-guiding end of the piston-rod is denoted by 52.

24 is a pipe leading to a condenser, (not shown,) and 24′ is a check-valve. Beveled washers or packing-rings are denoted by 28 and 29, and 31 is a follower.

The chamber 49 holds a reserve of ammonia. It also receives leakage and increases the cooling effect of the returning refrigerant and contributes to the regularity of the discharge from the compressor.

It is obvious that a cold-storage box or compartment might be either substituted for the refrigerator or connected therewith. Further, though ammonia has been named as the refrigerating agent, other gases may be used, and the gas or gases may be used, if desired, with other refrigerants placed in the refrigerator as elsewhere.

The apparatus is suitable for household use, and in many cases the motor, if a water-motor is used, can be connected directly to a street-main. Other motors, however, are not excluded nor any mere mechanical changes that do not materially affect the principles of construction and operation.

Having described my invention, what I claim is—

1. In a refrigerating apparatus the combination of two gas-compressing cylinders having each a piston on the same rod, a gas-inlet and a gas-outlet communicating with a chamber between the pistons, said outlet communicating directly with one of the cylinders and indirectly through said cylinder with the other, and suitable check-valves, all substantially as described.

2. In a refrigerating apparatus, the combination of two gas-compressing cylinders of unequal sizes having each a piston on the same rod, a gas-inlet and a gas-outlet communicating with a chamber between the pistons, said outlet communicating directly with the larger cylinder and indirectly through said cylinder with the other, and suitable check-valves, substantially as described.

3. In a refrigerating apparatus, a double cylinder having unequal parts joined by the walls of an intermediate chamber, means of communication whereby gas is conveyed from said chamber to the larger cylinder, and thence to the other cylinder, pistons to compress gas in said larger cylinder and then to further compress the same in the smaller, and suitable check-valves, substantially as described.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

JAMES J. FAULKNER.

Witnesses:
J. T. RODGERS,
J. F. HUDSPETH.