

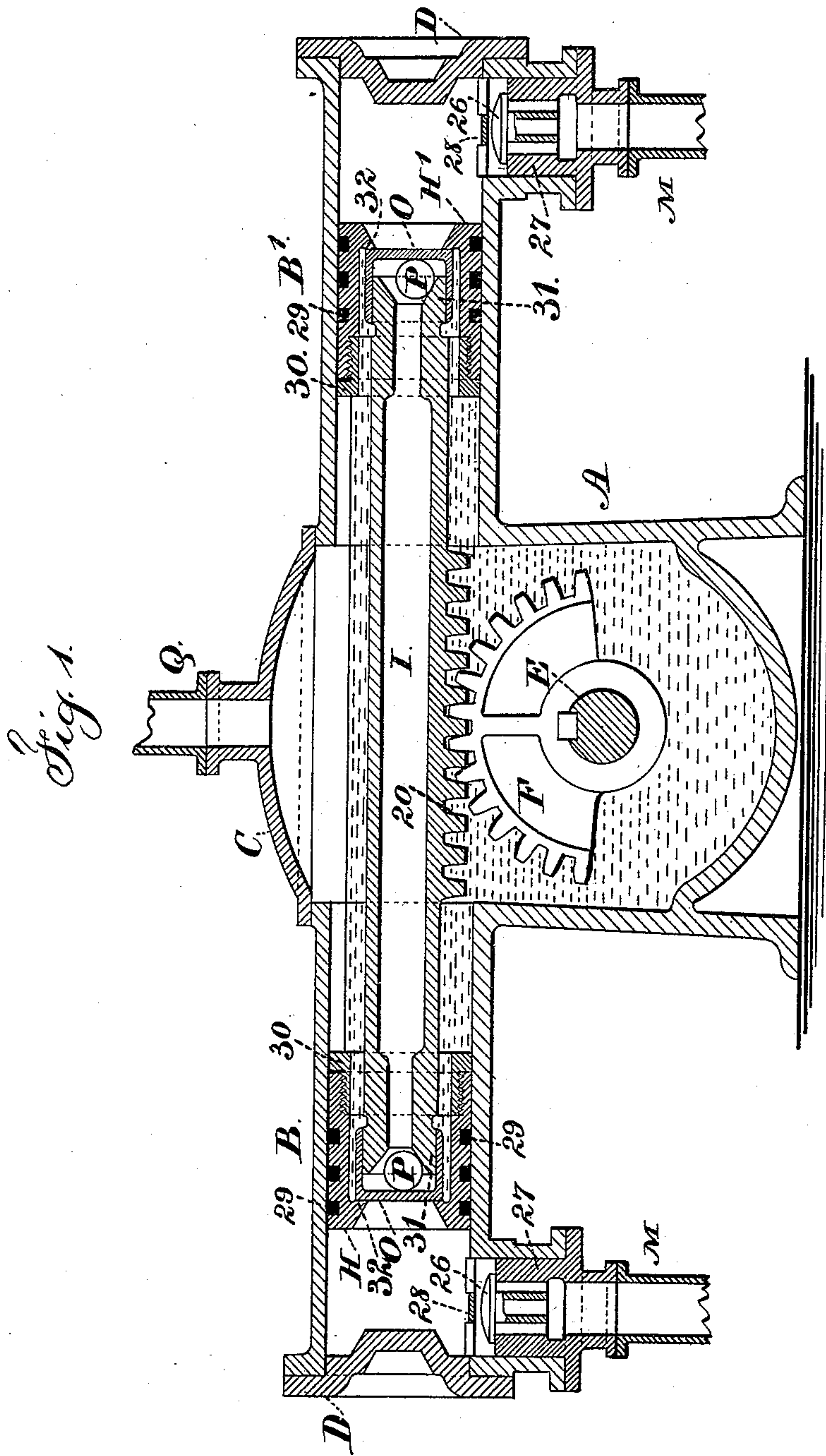
(No Model.)

2 Sheets—Sheet 1.

M. GRIMM.  
PUMP FOR REFRIGERATING APPARATUS.

No. 479,877.

Patented Aug. 2, 1892.



Witnesses

*Charles Smith*  
*J. Staib*

Inventor

*Max Grimm*

By his Attorney

*Lemuel W. Ferrell*

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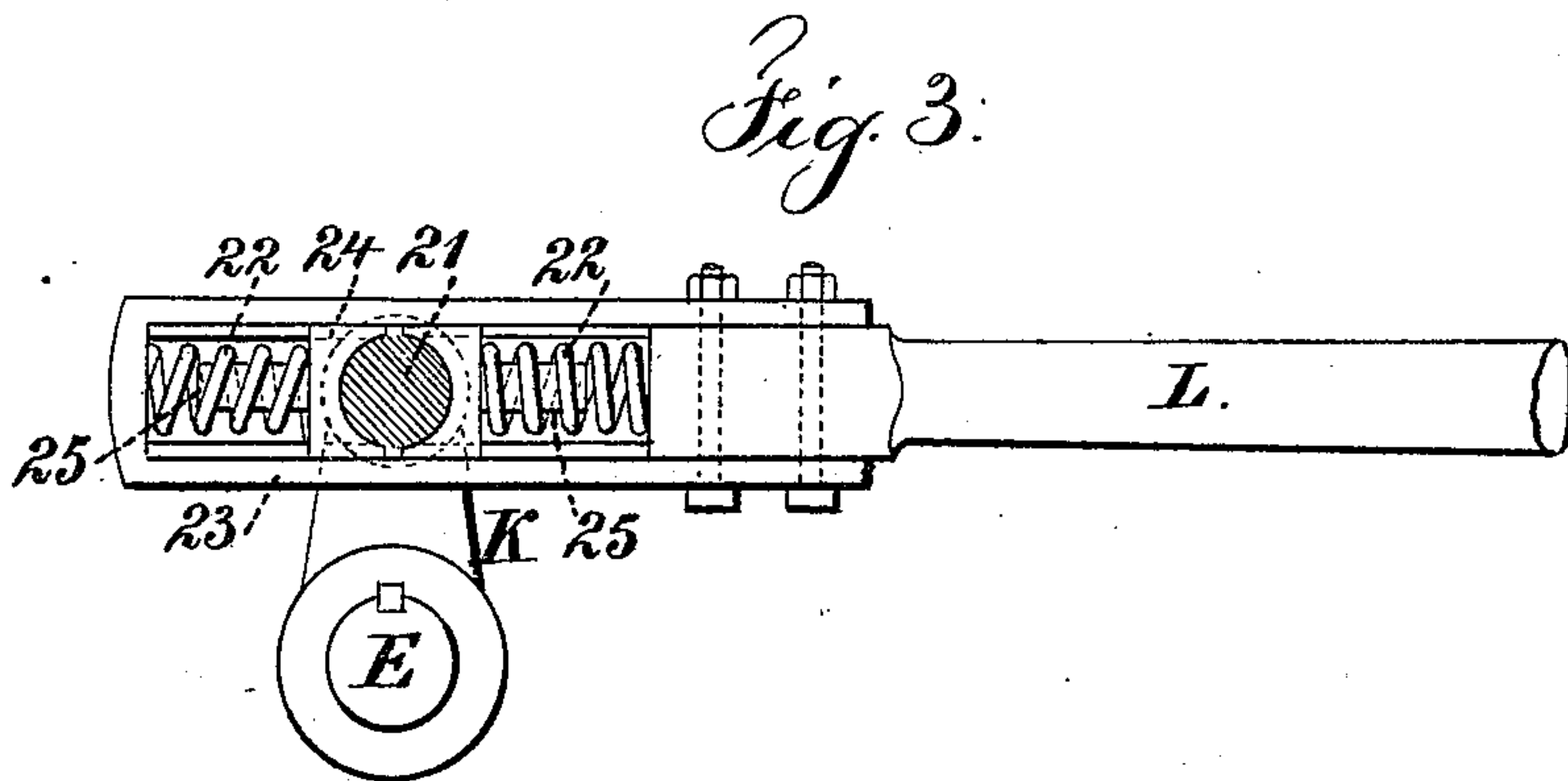
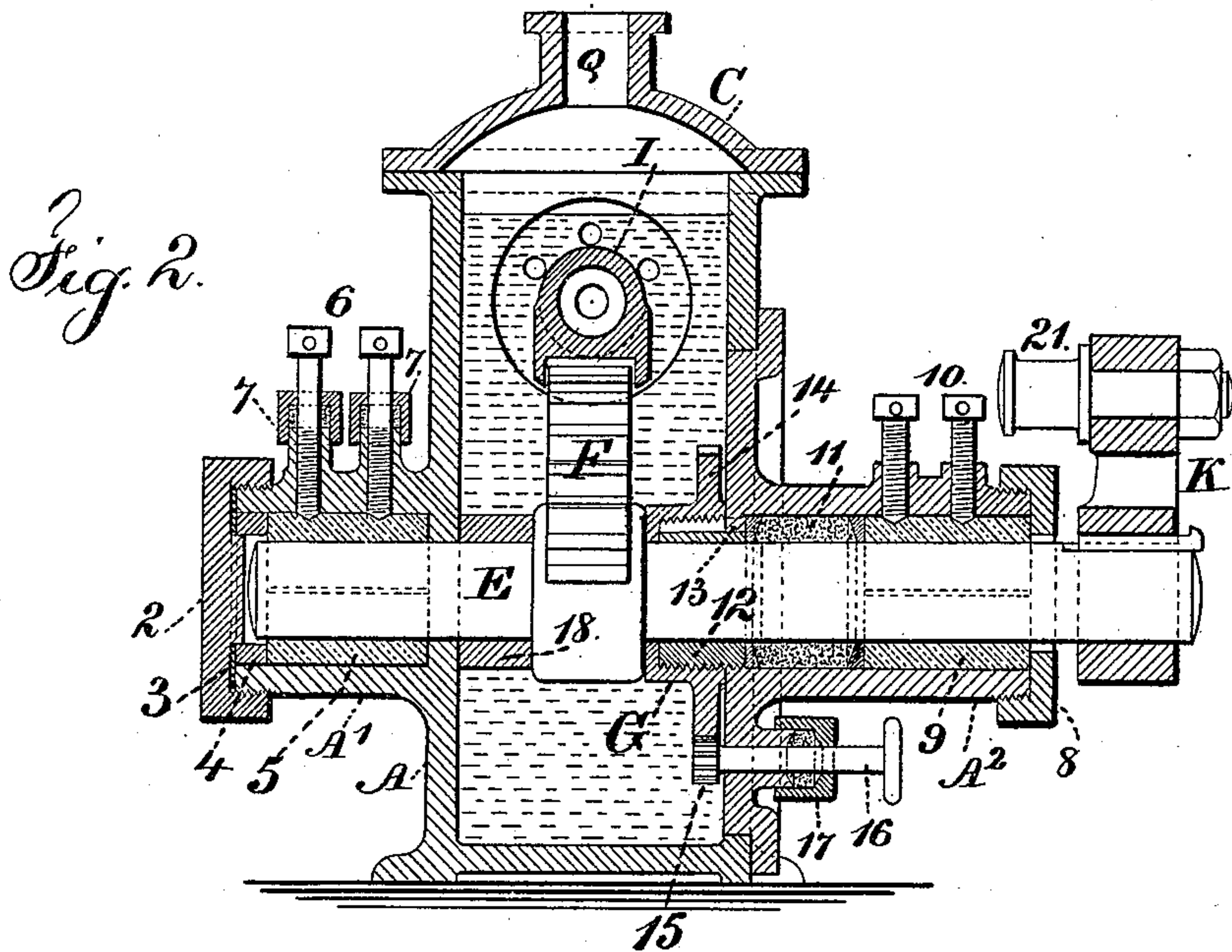
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Lemuel M. Terrell



# UNITED STATES PATENT OFFICE.

MAX GRIMM, OF WEST HOBOKEN, NEW JERSEY.

## PUMP FOR REFRIGERATING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 479,877, dated August 2, 1892.

Application filed December 30, 1891. Serial No. 416,517. (No model.)

*To all whom it may concern:*

Be it known that I, MAX GRIMM, a citizen of the United States, residing at West Hoboken, in the county of Hudson and State of New Jersey, have invented an Improvement in Pumps for Refrigerating Apparatus, of which the following is a specification.

Pumps for refrigerating apparatus have heretofore been made with a rock-shaft passing into a case to which the pumps are connected, and these pumps have been used in apparatus in which the ammonia is kept under pressure or is worked by withdrawing such ammonia from the refrigerating-vessel.

My present improvement is for the purpose of insuring the proper closing of the valves within the pistons of the horizontally-reciprocating pumps, and I arrange the parts in such a manner that the pumps and chamber with which they are connected can be kept full, or nearly so, of oil, so that leakage of the ammonia-gases is prevented and a full action of the pumps is insured.

In the drawings, Figure 1 is a longitudinal vertical section. Fig. 2 is a cross-section through the case at the rock-shaft, such rock-shaft and segmental gear being in elevation; and Fig. 3 is an elevation of the connecting-rod and crank giving motion to the rock-shaft.

The case A and the pump-cylinders B B' are preferably one casting with the removable cap C to the case and the removable heads D to the pump-cylinders, and the rock-shaft E passes transversely through the case A and through the tubular bearings A' A<sup>2</sup>, one of which is cast upon the case A, and the other is removably bolted to the side of the case by a flange that is sufficiently large to cover the opening in the case that is necessary for the introduction of the segmental gear F upon the rock-shaft E.

The tubular bearing A' is covered by a screw-cap 2, between which and the end of the bearing a washer 3, of lead or similar material, is introduced to make the joint tight, and a rubber gasket or ring 4 intervenes between the screw-cap 2 and the two-part journal-box 5. This journal-box is sufficiently long to furnish the requisite wearing-surface, and screws 6 are employed to tighten up this box as it may wear, and around these screws

6 there are caps 7, with packings to make the plain portions of the screws perfectly tight.

In the tubular bearing A<sup>2</sup> there is a screw-ring 8 at the end around the rock-shaft E and a two-part tubular journal-box 9 within the tubular bearing and set-screws 10 for setting up the journal-box, and next to the journal-box 9 a packing at 11 is introduced, and there is a tubular follower 12 for the packing, such tubular follower being around the rock-shaft E and guided by a feather 13 in a slot, so that the packing can be compressed by the end movement of the tubular follower, and to give this end movement a screw-socket G is provided around the tubular follower, having a gear-wheel 14 around its exterior surface, that is acted upon by a pinion 15 upon a stud or shaft 16, passing through the case and surrounded by a packing and screw-gland 17, so that by rotating this pinion 15 the gear 14 and screw-socket G will be revolved and act upon the tubular follower 12 to press the packing 11 more or less and render the same tight, so that the rock-shaft E can be moved and there will be no leakage around the same.

The screw-socket G acts at its back end against the side of the segmental gear F in pressing the tubular follower 12 upon the packing. It is advantageous to employ a collar 18 around the rock-shaft E, between the segmental gear and the interior of the case A.

The pistons H and H' are within the pump-cylinders B B', and they are permanently connected together by the piston-rod I, which for convenience and lightness is represented as hollow, and it is provided with rack-teeth 20 upon its under side, which rack-teeth gear with the segmental gear F, so that the pistons are reciprocated by the action of the rock-shaft E, segmental gear, rack, and piston-rod, and to give motion to this rock-shaft E, I make use of a crank-arm K upon such rock-shaft, the pin 21 of which is acted upon by a connecting-rod L to any suitable motor, and it is advantageous to make use of springs 22 within the strap 23 of the connecting-rod and at each side of the crank-pin box 24, so that such springs may yield in case of any obstruction, and it is desirable that the pistons H and H' shall at the ends of the respective strokes come into contact with the



heads of the respective pump-cylinders, and these springs 22 yield, when necessary, to prevent breakage and to accommodate any inaccuracy in the workmanship or adjustment, and it is preferable that both springs 22 should be under considerable compression, and there are projecting studs 25 upon the respective crank-pin boxes 24, which studs are within the respective springs for holding them in their proper positions.

The induction-pipes M lead to the outer ends of the respective pump-cylinders, and they are bolted on in any usual or convenient manner, and the valves 26 are of ordinary construction; but they are preferably guided by wings within the removable valve-seats 27, and such valves 26 close downwardly, and the cross-bars 28, which are made as portions of the pump-cylinders, prevent the valves from jumping out of place.

Each piston H H' is made hollow and with suitable peripheral packings 29, and the tubular portion of each piston is screwed upon the follower 30, that is made part of or connected with the piston-rod I, there being holes or openings through the followers into the tubular portions of the pistons, and each piston is provided with a valve O, which is cylindrical and slides freely over the cylindrical projecting end 31 of the piston-rod I, and this cylindrical projecting end of the piston-rod is recessed conically for the reception of the valve-closing ball P, the weight of which ball as it lies upon the inclined bottom of the cylindrical recess tends to press the valve O against its seat 32, and it will be observed that the end of the piston corresponds to the interior shape of the cylinder-head.

It is preferable to fill the interior of the case A with a liquid—such as oil—to lubricate the parts and to form a filling and non-compressible material that insures the proper action of the pump, and by the reciprocation of the piston-rod and pistons, as aforesaid, any gas that passes into the pump-cylinder by the induction-pipe M and valve 26 is retained by such valve, and as the piston moves in the opposite direction such confined gases are compelled to pass through the piston, and in so doing the valve O opens and its ball

rolls up the incline of the conical recess and the piston comes up closely against its head D, so that any gases or liquid is forced to pass through the piston, and the weight of the ball P in rolling down the incline causes the valve to close tightly upon its seat before the piston commences its return movement and the gases or materials under pressure pass off by the eduction-pipe Q.

By the use of the valve-closing balls I am enabled to dispense with springs in my pump and there is no risk of the parts becoming inoperative by breakage or otherwise.

I claim as my invention—

1. The circular valve-seat, in combination with a valve fitting such seat and having a cylindrical rear projection, a cylinder fitting within the cylindrical projection of the valve and having a conical recess, and a ball within such recess acting to press the valve toward its seat, substantially as specified.

2. The combination, with the case and the pump-cylinders and the heads and caps, of a rock-shaft across the case, tubular bearings for such rock-shaft and packings for the same, a segmental gear on the rock-shaft, pistons within the pump-cylinders, a piston-rod connecting such pistons and provided with a rack engaging the segmental gear, and a crank upon the rock-shaft, a connecting-rod, crank-pin boxes, and springs at each side of the crank-pin boxes, substantially as set forth.

3. The combination, with the pump-cylinder, of a tubular piston having a valve-seat within one end thereof, a valve adapted to sit upon the valve-seat and made with a cylindrical rear projection, a cylindrical connection to the piston within the cylinder of the valve and formed with a conical recess at the end adjacent to the valve, and a valve-closing ball within the recess and acting against the inner side of the valve, substantially as set forth.

Signed by me this 24th day of December, 1891.

MAX GRIMM.

Witnesses:

GEO. T. PINCKNEY,  
WILLIAM G. MOTT.