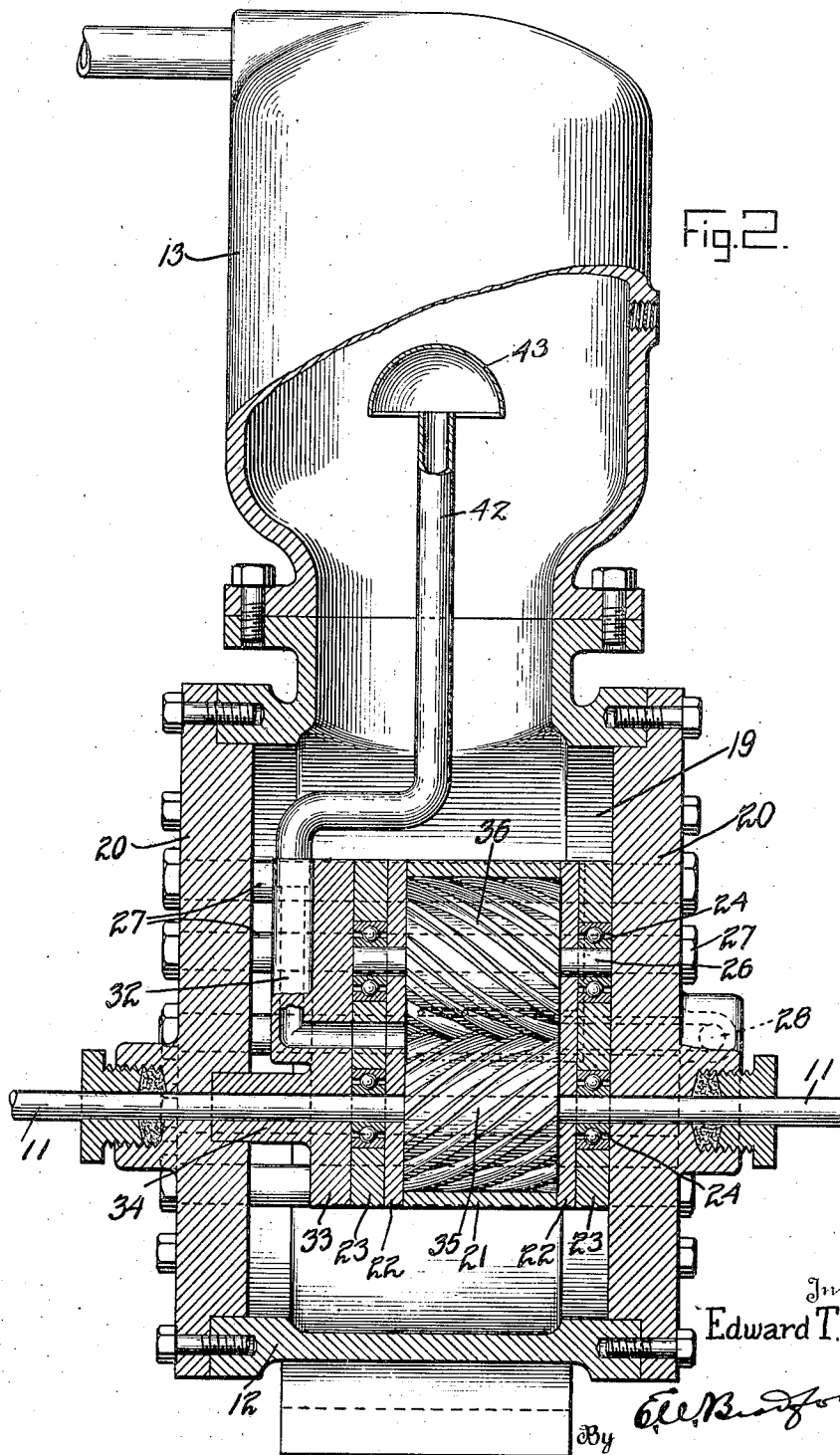


Dec. 19, 1922.

E. T. KIEN.
PUMP,
FILED JUNE 7, 1921.

1,439,628.

2 SHEETS—SHEET 2.



UNITED STATES PATENT OFFICE.

EDWARD THOMAS KIEN, OF ELMHURST, ILLINOIS, ASSIGNOR OF ONE-HALF TO
EMMETT S. NEWTON AND W. M. HARDWICK, BOTH OF CHATTANOOGA,
TENNESSEE.

PUMP.

Application filed June 7, 1921. Serial No. 475,668.

To all whom it may concern:

Be it known that I, EDWARD T. KIEN, a citizen of the United States, residing at Elmhurst, in the county of Du Page and State of Illinois, have invented certain new and useful Improvements in Pumps, of which the following is a specification.

My said invention relates to a pump for oil and gas, of the general type described in my Patent No. 1,355,231, filed October 12, 1920, and my Patent No. 1,409,868, March 14, 1922.

Referring to the accompanying drawings which are made a part hereof and on which similar reference characters indicate similar parts,

Figure 1 is an elevation of a refrigerator mechanism in which the pump may be used,

Figure 2, an elevation partly in section of the pump and associated devices, and

Figure 3 is a collective view of the pump casing and associated parts.

In the drawings 10 indicates a motor for driving through a shaft 11 the pump shown in Figure 1 which is enclosed in a casing 12 having an upper hollow portion 13 forming a separating chamber for oil and gas and also acting as a storage chamber for compressed gas. The gas forced into this chamber by the pump passes through a pipe 14 to a radiator 15 through which air is drawn by a fan 16 on shaft 11. Thence it passes through a pipe 17 to a coil in a domestic refrigerator or the like. After expansion in such a cooling coil it passes by another pipe 18 back to the pump to be again condensed. The casing 12 has a cylindrical chamber 19 with end plates or heads 20 and the shaft 11 passes through said end plates and the chamber. A pump casing 21 is mounted approximately midway between the end plates 20 and has at each side a disk 22, beyond each of which is a second disk 23 all of which parts are shown in Figure 3. Ball bearings 24 mounted in plates 23 provide anti-friction supports for the shaft 11 and the shaft 26 of the co-acting rotor of the pump. Bolts pass through aligned openings in the parts 21, 22 and 23 (see Fig. 3) and in one or both heads 20 and secure these parts together and in proper relation to said heads.

One of the heads 20 is provided with a

passage 28 by which the gas from the pipe 18 passes through openings 29 and 30 to a cut away portion 31 of casing 21. At the other end of the rotors and on the opposite side of a plane passing through their axes is a passage 32 through which the compressed gas passes to a similar channel in a disk 33 which has an extension 34 engaging the adjacent head 20 and spacing the disk therefrom thus providing room for an upwardly extending part of the channel 32. A pipe 42 extends upwardly from the disk and carries at its upper end a baffle 43 which assists in separating the oil from the gas. The oil falls back into the cylindrical chamber surrounding the pump casing and this chamber is normally filled nearly to the top. The oil in the chamber is kept cool by tubes 27 extending longitudinally therethrough in an annular series spaced about the casing 21 and associated parts, said tubes being held in place by nuts bearing against the heads 20 at their outer sides. The fan 16 forces air through said pipes to cool the pumping system.

The pump proper consists of a pair of rotors 35 and 36 having spiral gears as shown in Figure 1 which act by suction opposite the cut-away portion 31 of the casing to draw gas between them. As the gears revolve the gas is gradually compressed and forced out through the channel 32. The casing 21 and disks 22, 23 and 33 are held in proper relation to each other and to the end plates of the chamber by pins indicated at 37. To provide for feeding oil to the gears to seal the openings between the teeth I have indicated a vertical groove 38 in the left-hand disk 23, this groove leading to ports 39 in disk 22. Ports 39 open into a pair of horizontal passages 40 through the casing 21 and these passages are further subdivided, each into four branches 41 extending toward the gears whereby the oil may be admitted at different points to that portion of each gear having a compression action on the gas.

The first oil admission opening at the right in Figure 3 admits oil to the space between the respective gear teeth just prior to initial compression, oil being forced in due to the pressure in chamber 13 which greatly exceeds that on the suction side of

the gears. Compression then begins and as the teeth pass the successive ducts 41 additional oil is admitted the pressure in the chamber being still above that between the gear teeth. The oil so admitted is taken from the top of the chamber where it is hottest and least likely to contain an admixture of liquefied gas such as would interfere with proper working of the pump. It will be understood that the oil forms a foam between the rapidly rotating gears and so lubricates them and also acts as a liquid seal to prevent escape of gas between them. The compressed gas ejected at 34 sometimes falls to the bottom of the chamber with the cold oil in a liquid form and if admitted between the gears would thin the oil and tend to break the liquid seal. Admission of the oil is successive small increments helps to form the foam by breaking up the stream of oil.

Normally the entire body of oil will be hot enough to cause the gas to separate therefrom immediately, but still be cooled enough by the ventilating pipes to prevent overheating of the pump and of the oil itself. The gas is more and more compressed as each tooth passes along the groove between two others and is finally forced with the oil out through passages 32 and 33. The oil falls back into chamber 19 and thus a continuous circulation takes place, clean oil being taken from the top of the body of oil and impurities falling to the bottom of the chamber 19 from which they may be removed at proper times in any convenient manner.

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

1. A pump comprising a pair of rotors having inter-engaging spiral teeth, a casing surrounding said rotors having an inlet passage for gas adjacent one end of said teeth and means providing an outlet passage adjacent the opposite end of said rotors and at the opposite side from the inlet, a pair of discs adjacent the casing, said inlet and outlet passages extending through the said discs, substantially as set forth.

2. A gas compressor comprising a housing open at opposite sides, end-closures therefor, a shaft extending through said end-closures, compressing means driven thereby, a casing enclosing the compressing means and forming with the housing a chamber containing oil said casing having passages for oil from the chamber to the compressing means, detachable end-closures on said casing, an inlet passage leading to said compressing means, an outlet through one of the end closures of the housing said end-closure being spaced from the end of the housing, a pipe extending upward in said space to the upper part of the chamber

and forming a continuation of the outlet, and means on the pipe to separate the oil from the gas, substantially as set forth.

3. In a compressing device for gas the combination of a housing, a cylindrical casing within the housing and spaced from the walls thereof, said parts providing between them a chamber containing oil, a rotary pump within the casing, inlet and outlet passages to said casing for admitting gas to the pump to be compressed, means providing circulation of oil through the pump in connection with the gas passing therethrough, a fan at one end of the housing and ventilating pipes extending through the chamber in co-acting relation to said fan, substantially as set forth.

4. A gas compressor comprising a housing, a pair of rotors in the housing having inter-engaging spiral teeth, a casing surrounding said rotors, a pair of disks engaging the ends of said casing and said rotors, a second pair of disks between the disks of said first pair and the housing, and inlet and exit passages in said disks for permitting circulation of gas to and from the pump, substantially as set forth.

5. A gas compressor comprising a housing, a pair of rotors in the housing having inter-engaging spiral teeth, a casing surrounding said rotors, a pair of disks engaging the ends of said casing and said rotors, a second pair of disks between the disks of said first pair and the housing, inlet and exit passages in said disks for permitting circulation of gas to and from the pump, and inlet passages in said disks and in the casing for admitting oil to the pump to form a liquid seal therefor, substantially as set forth.

6. A pump for air and gas compressors comprising a cylindrical chamber, heads at opposite ends of the chamber, a pair of rotors within the chamber having inter-engaging spiral teeth, a casing about said rotors, discs closing the ends of the casing and confining the rotors therein, said discs being secured between the rotors and the heads, an inlet passage through such discs for admitting gas to the rotors, an outlet passage through said discs, means for admitting oil to said rotors, and a pipe connected to said outlet passage extending upward from the rotors and having at its upper end a baffle to separate the oil from the gas, substantially as set forth.

7. A pump comprising a pair of rotors having inter-engaging spiral teeth, a casing surrounding said rotors having an inlet passage for gas adjacent one end of said teeth, means providing an outlet passage adjacent the opposite end of said rotors and at the opposite side from the inlet, and means for admitting oil to the pump comprising a chamber surrounding the pump, a passage

leading from the upper end of the chamber
and having branches adjacent the rotors,
one branch communicating with the space
about the rotors just prior to initial com-
5 pression position and the remaining
branches admitting oil in successive incre-
ments during compression, substantially as
set forth.

In witness whereof, I have hereunto set
my hand and seal at Atlanta, Georgia this 10
27th day of May, A. D., nineteen hundred
and twenty-one.

EDWARD THOMAS KIEN. [L. s.]

Witnesses:

R. W. STARKE,
W. W. STEVENS.