Dec. 26, 1922. 1,439,810.

K. GIRDWOOD.

COMPRESSING APPARATUS.

FILED AUG. 5, 1920. 2 SHEETS—SHEET 1.

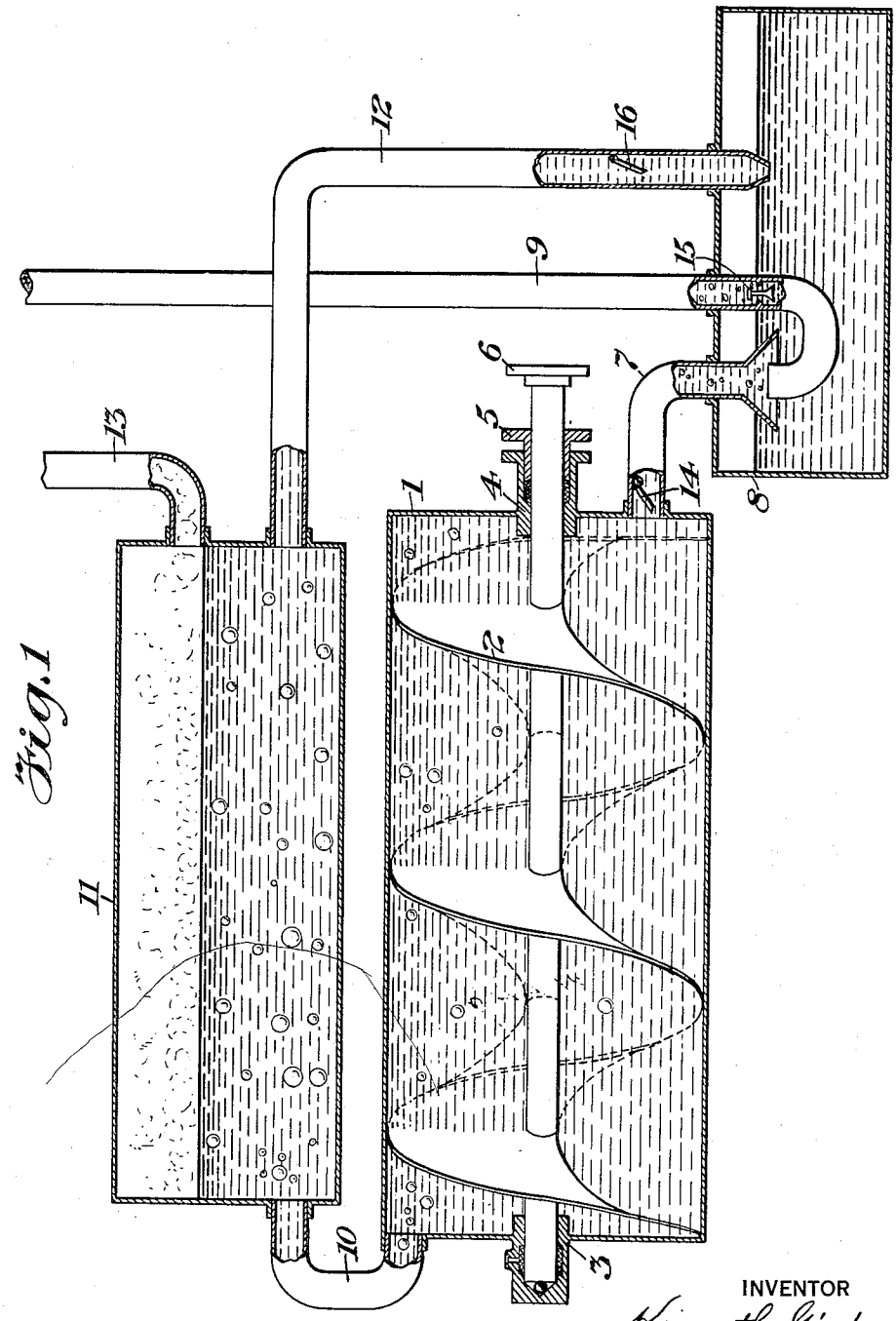


Fig. 1

INVENTOR

Kenneth Girdwood

BY

Kerr Page Cooper & Hayward

HIS ATTORNEYS

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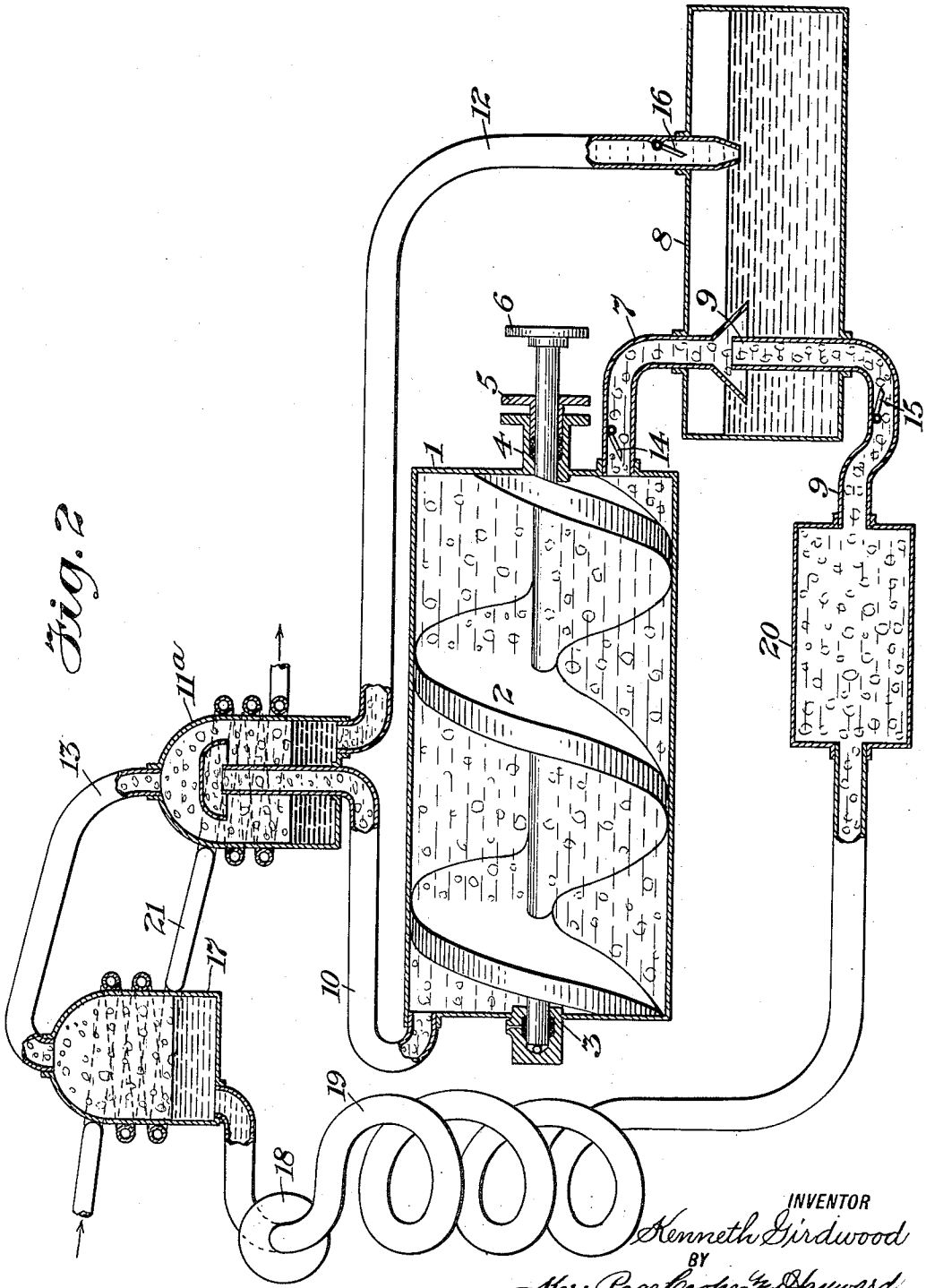


Fig. 2

INVENTOR
Kenneth Girdwood
BY
Sherr Page Cooper & Hayward
HIS ATTORNEYS

Patented Dec. 26, 1922. 1,439,810

UNITED STATES PATENT OFFICE.

KENNETH GIRDWOOD, OF HANCOCK POINT, MAINE.

COMPRESSING APPARATUS.

Application filed August 5, 1920. Serial No. 401,449.

To all whom it may concern:

Be it known that I, KENNETH GIRDWOOD, a citizen of the United States of America, residing at Hancock Point, Hancock County, and State of Maine, have invented certain new and useful Improvements in Compressing Apparatus, of which the following is a full, clear, and exact description.

My invention relates to pumping and compressing apparatus and has for its object to provide a pump and a compressor unit having a high efficiency and of simple construction, and one useful in the arts generally, and particularly in connection with household refrigerating systems of the types wherein a compressor is utilized.

I have discovered that by using a rotating Archimedean screw mounted in a suitable container, the periphery of the screw from end to end thereof being in close proximity to the wall of the container, and a circulating mobile material such as oil, for example, in the container and capable of serving as a seal at all points along the periphery of the screw, it is possible to entrain another mobile material, such as a gas, fluid, or liquid, in the circulating material and to utilize the device as a compressor for pressure work, or as a vacuum pump, if desired, as will be more fully pointed out hereinafter.

By the use of the above construction, a long seal effect is obtained between the ends of the device and when a gas or other suitable material is entrained in the oil at the input end of the device it is forced along with the oil by the rotation of the screw and passed through the output end of the device to a suitable separator and storage receptacle. By virtue of the long seal provided by the oil between the periphery of the screw and the container wall and between the ends of the container any desired pressure in the storage receptacle can be attained.

My invention is particularly useful in connection with refrigerating machines of the mechanical compressor type and serves to eliminate stuffing box leaks in said machines and thus conserves the refrigerant and further protects the householder from disagreeable escaping odors and fumes and possible harmful effects due to exposure to said odors and fumes.

I have illustrated my invention in the accompanying drawings, in which Figure 1 is a sectional elevation of my new device; and Figure 2 is a diagrammatic sectional elevation of a household refrigerating apparatus in which the device of Figure 1 is utilized as a compressor for the refrigerant.

Referring to the drawings, 1 is a container in which is mounted an Archimedean screw, 2, the bearings therefor being shown at 3 and 4. A stuffing box, 5, cooperates with the bearing 4. A coupling, 6, is provided on the shaft of the screw 2 for connection to a suitable source of power, such as an electric motor (not shown). The rotation of the screw 2 draws oil, or other mobile material, into the container 1 at the input end thereof through a pipe, 7, from a tank, 8, and gas to be pumped is entrained from a pipe, 9, connected to a suitable gas supply (not shown), and opening in the mouth of the pipe 7. The oil and entrained material is forced along progressively by the screw 2 in a manner now well understood through container 1 and into a pipe, 10, at the output end of said container 1, and thence into a tank or separator, 11, where the circulating and entrained materials are separated from each other, by gravity, for instance, the circulating material returning to the well or tank 8, through a pipe, 12, and the entrained material passing through a pipe, 13, discharging into the air or into a suitable reservoir therefor and compressed therein, due to the fact that the circulating material serves to prevent a reverse movement of the entrained material in the container, 1.

Suitable check valves permitting flow only in the desired direction are located in the pipes 7, 9, and 12 and shown at 14, 15, and 16, respectively.

Referring to Figure 2, the entrained material is a refrigerant, such as sulphur dioxide, which is forced from the separator 11^a through pipe 13 to a storage receptacle, 17, where the refrigerant is compressed to the desired degree and condensed to liquid form and thence passed in that form through an expansion valve, conventionally indicated at 18, into an expansion coil or tube therefor, shown at 19, wherein the liquid refrigerant expands into vapor or gas, causing a refrigerating effect at this point in the apparatus, the gas passing into a tank, 20, and being drawn therefrom into the pipe 9 for reentrainment in the circulating liquid passing through the container, 1.

The usual control devices, such as the

cooling pipes, 21, for the condenser 17, the separator 11 and 11a, and the pump 1, as well as the pressure, thermostatic and electrical devices for controlling the operation of the above described apparatus either for continuous or intermittent operation thereof, are included in my new device, as exemplified in the well known Isko system of commerce.

While I have shown in the drawings an Archimedean screw of a few turns between ends, it is to be understood that the number of turns may be increased to any desired number; and, likewise, one or more vanes will be mounted on the screw shaft, depending on whether, two, or three, or more, intake suctions are desired for each revolution of the screw shaft, as is found needful for any particular service; or that the periphery of the vane or vanes may be provided with a sealing strip mounted in a groove in the periphery and functioning to give a closer fit with the container wall and generally similar to the well known piston ring of commerce.

It is to be understood that the invention is not limited to the specific procedure and apparatus herein illustrated and described, but may be practised in other ways without departure from its spirit.

I claim as my invention:

1. In a compressing apparatus, the combination with a liquid circulating screw pump, means for introducing a fluid material into the circulating liquid, and means for separating said fluid from said liquid.

2. In compressing apparatus, the combination with a liquid circulating screw pump, means for introducing a fluid material into the circulating liquid, means for separating said fluid from said liquid, and means for expanding and returning said fluid to said liquid.

3. In a compressing apparatus, the combination with a liquid circulating pump, means for introducing a fluid material into the circulating liquid, means in the pump for propelling the liquid and gas from the input end to the output end of the pump in a direction substantially parallel to the axis of rotation of the pump propeller, the circulating liquid serving as a seal preventing reverse movement of the said fluid.

4. In a compressing apparatus, the combination of a casing, a liquid in said casing, a propeller mounted in said casing and progressively forcing said liquid through said casing in a direction substantially parallel to the axis of rotation of the propeller, and means for entraining a compressible fluid in said liquid.

5. In a compressing apparatus, the combination of a casing, a liquid in said casing, a propeller mounted in said casing and progressively forcing said liquid through said casing in a direction substantially parallel to the axis of rotation of the propeller, means for entraining a compressible fluid in said liquid, the said liquid serving as a seal between the periphery of the propeller and the casing wall and preventing movement of the compressible material in a reverse direction.

6. In a compressing apparatus, the combination of a casing, a liquid in said casing, a propeller mounted in said casing and progressively forcing said liquid through said casing in a direction substantially parallel to the axis of rotaton of the propeller, means for entraining a compressible fluid in said liquid, means for separating the fluid from the liquid, means for expanding the compressed fluid and returning it to the point of entrainment in the liquid.

7. A pumping apparatus comprising a casing, a circulating fluid supply connected to the said casing, an inlet for fluid to be pumped, a screw propeller in said casing, progressively forcing said liquid through said casing, and an outlet for the entrained fluid.

8. A compressing apparatus comprising a casing, a circulating fluid supply connected to the said casing, an inlet for fluid to be pumped, a screw propeller in said casing progressively forcing said liquid through said casing, a separator in the circulating supply and an outlet for the entrained fluid.

In testimony whereof I hereto affix my signature.

KENNETH GIRDWOOD.