

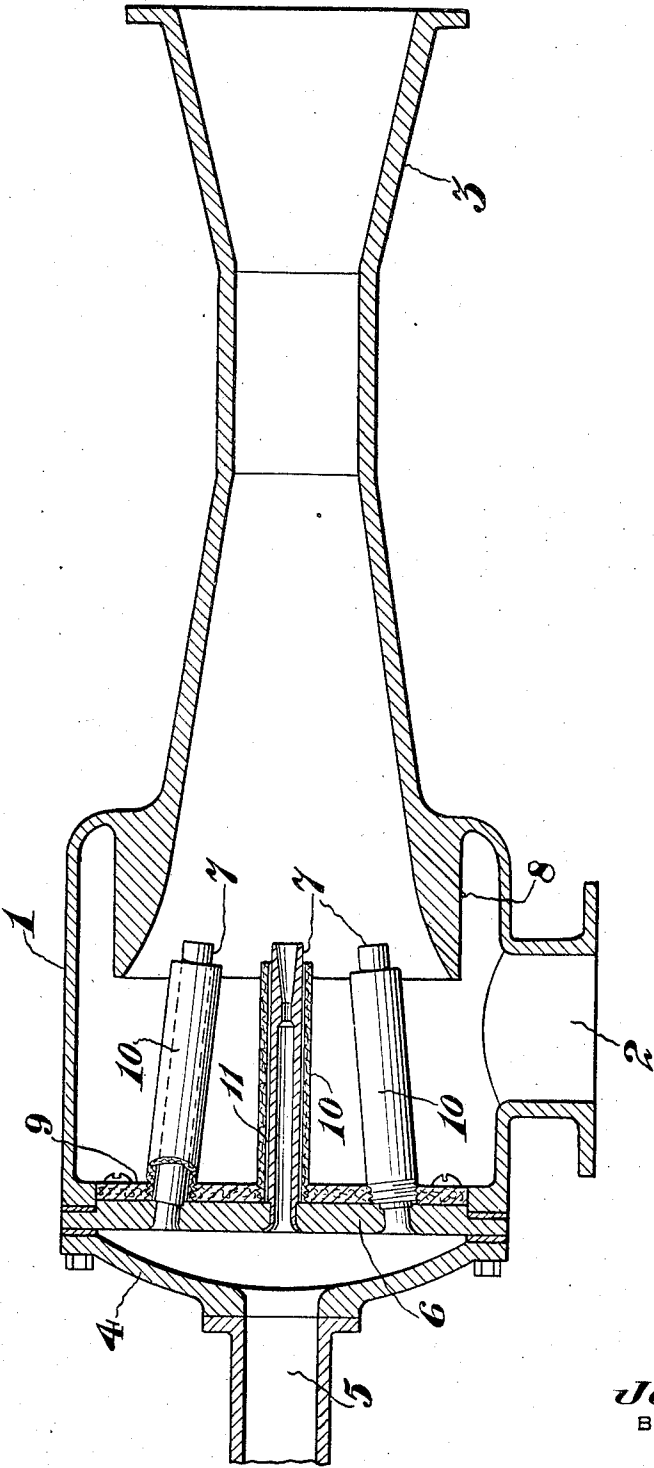
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THERMOCOMPRESSOR

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## UNITED STATES PATENT OFFICE

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## THERMOCOMPRESSOR

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3 Claims. (Cl. 230—95)

This invention pertains to thermo-compressors, and particularly to a thermo-compressor of the ejector type adapted to cause the displacement of fluid media, the temperatures of which are considerably lower than that of the energizing agent for the compressor.

An object of the invention is to increase the efficiency of the thermo-compressor by avoiding the extraction of heat from the energizing agent before the full kinetic effect thereof is attained. In the preferred embodiment of the invention this result is achieved by suitably insulating the nozzles from which the energizing agent is discharged, and thus preventing the cooling of the nozzles by contact with the fluid medium entering the casing of the compressor.

In systems of refrigeration where steam ejectors, for example, are utilized to remove vapor of a refrigerant which is being treated in a vacuum to lower the temperature thereof, the vapor enters the casing of the compressor at a much lower temperature than that of the energizing agent and tends to absorb heat from the parts of which the compressor is made. This vapor must flow past the nozzles of the ejector in close proximity thereto. Therefore the nozzles may be cooled to a material extent and the energizing agent may lose considerable of its power before it is discharged from the said nozzles to force the vapor through the delivery flue therefor. It is therefore important to prevent said agent from radiating any of its heat through the nozzles into the vapor surrounding them, and thus to save power and enable the energizing agent to act with undiminished energy when it mixes with the vapor and displaces same in the required direction. Also, if the cool vapor is permitted to come in contact with the heated nozzles, the formation of scale on these heated parts is highly probable. Hence, a further beneficial result derived by preventing such contact between the heated parts and the cool vapor is the elimination of scale and a prolongation of the life of these parts.

The drawing shows a longitudinal section of a thermo-compressor constructed in accordance with this invention.

The thermo-compressor has a casing 1 with an inlet opening in the bottom indicated at 2. The outlet or discharge flue is shown at 3 projecting away from the inlet end of the casing. The end of the casing, adjacent the inlet 2, is made so that it is open when the casing is finished and at said end is a steam chest 4 connected to a steam supply pipe 5. This end of the cas-

ing is closed by a removable mounting plate 6 covered by the steam chest 4 and mounted in this plate are a number of nozzles 7 in line with the outlet flue 3.

In practice the casing will be connected to a closed vessel or evaporator to which is admitted a liquid refrigerant to be cooled. The action of the steam issuing from the nozzles 7 is to create a vacuum in the evaporator. Because of the vacuum some of the liquid refrigerant is converted into vapor, absorbing heat from the remaining refrigerant and thus chilling it. The vapors are extracted through the opening 2 and propelled by the steam through the flue or conduit 3 into a condenser where the mixture of steam and vapor is liquefied. The vapor is always much cooler than the steam and as the nozzles 7 are directly in the line of flow of the vapor through the opening 2 into the flue 3 the vapor will always tend to extract heat from the nozzles, thus cooling the steam and reducing the capacity and efficiency of the compressor. The vapor also passes close to the heated plate 6 from which more heat from the steam may be radiated to the cool vapor. It is therefore desirable to prevent such cooling of the nozzles 7 and the plate 6 so that the power of the steam will be expended only in forcing the vapor through the discharge conduit into the condenser.

The conduit or flue 3 is of the usual shape, projecting at one end into the casing 1 as shown at 8 and contracting towards a portion of minimum diameter, beyond which it flares somewhat to the place where it is coupled to the condenser.

In order to insulate the nozzles 7 and the plate 6 a plate or facing of rigid heat-insulating material 9 is secured to the surface of the plate 6 on the side presented toward the flue 3 to prevent conduction of heat from the steam in the steam chest 4 through the plate 6. Each of the nozzles 7 is enveloped by a sleeve 10 also of rigid insulating material which may be fixed in the casing 1, and preferably to the plate 9, in any suitable manner. In this instance the plate 9 has openings larger than the nozzle 7 through which these nozzles project and these openings are threaded so that the ends of the sleeves 10, which are also threaded, can be screwed into the openings and made fast. The sleeves are axially aligned with the nozzles, and the threaded engagement acts to maintain this alignment. The sleeves 10 are preferably of such a diameter that a narrow space 11 will be formed between each sleeve and the nozzle surrounded thereby. Such a space provides a pocket of motionless vapor

which greatly aids in preventing the transmission of heat from the heated parts to the insulating material.

5 The nozzles of course are of the usual construction, but the covering sleeves 10 and the space 11 prevent radiation of heat from the steam in the nozzles and maintain the steam at the required operating temperature until it leaves the discharge ends of the nozzles to mix directly 10 with the vapor and impel it through the discharge conduit 3 to the condenser.

By this construction it will be seen that the steam is prevented from radiating any of its heat into the vapor before the vapor is forced into the outlet flue and the full power of the steam is reserved for the work of transmitting the vapor 15 from the evaporator to the condenser in which the steam and vapor are again reduced to a liquid state.

20 By this construction the entering vapor does not absorb heat from the nozzle surfaces or from the surface of the steam chest plate 6 and therefore the volume of the vapor does not increase. Without such nozzle and plate insulation the 25 vapor would be warmed and its volume would increase and this in turn would mean that the thermo-compressor could not handle as much vapor by weight as would be possible with the cooler vapor.

I claim:

1. In a thermo-compressor, a casing having an inlet and an outlet, one or more nozzles in line with the outlet, heat insulating covers of rigid material for the nozzles, and a plate of like material 5 mounted in the casing to shield a part thereof, said covers being fixed to the plate to hold them in fixed position.

2. In a thermo-compressor, a casing having an inlet and an outlet, one or more nozzles in line 10 with the outlet, and heat insulating sleeves surrounding the nozzles, and being fixedly mounted in the casing the sleeves being larger than the nozzles to leave a narrow space between each sleeve and the nozzle shielded thereby. 15

3. In a thermo-compressor, a casing having an inlet and an outlet, a mounting plate in said casing, one or more nozzles supported by said plate and extending toward the outlet, means for 20 supplying steam to said nozzles, a plate of rigid heat insulating material fixed to shield the inside surface of said mounting plate and having threaded openings surrounding the nozzles, and insulating sleeves of like rigid material axially 25 aligned with and surrounding the nozzles and having threaded engagement with the said plate to maintain said axial alignment.

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