Sept. 27, 1932. J. JACZKO 1,879,685

COOLING AND HEATING SYSTEM

Filed Feb. 4, 1931

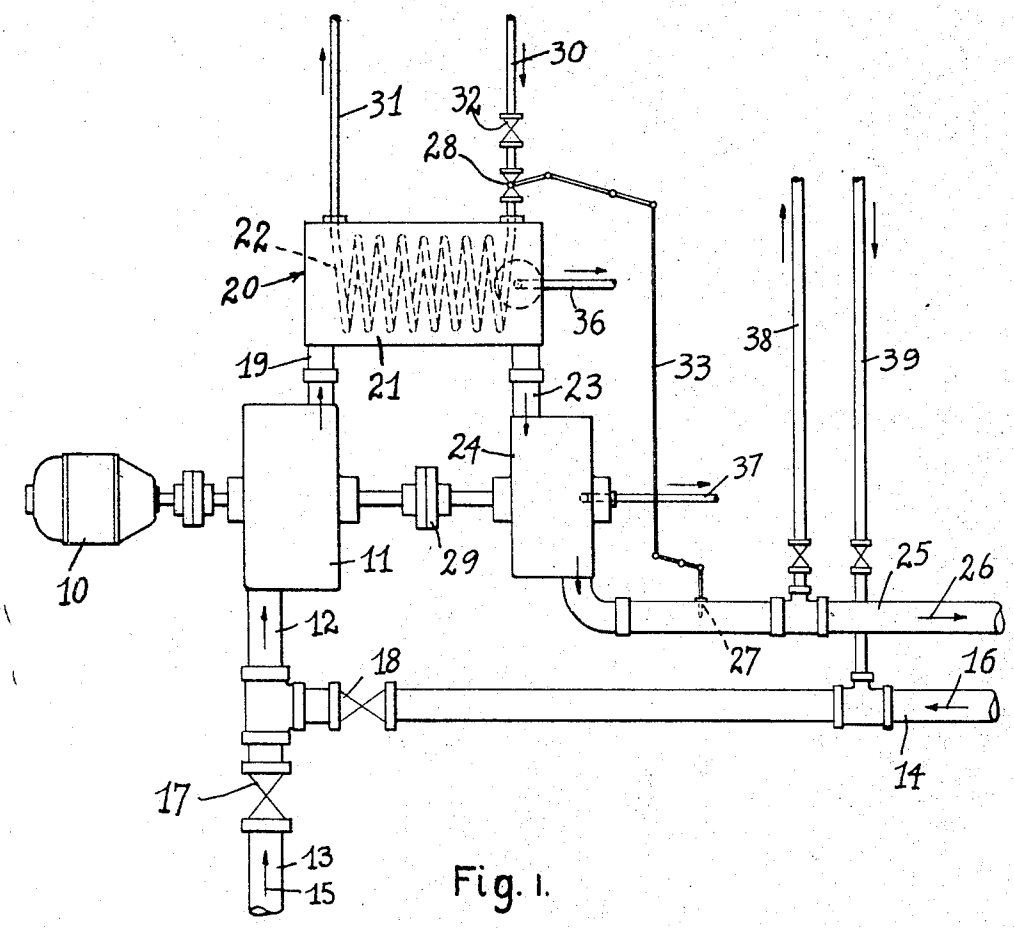


Fig. 1.

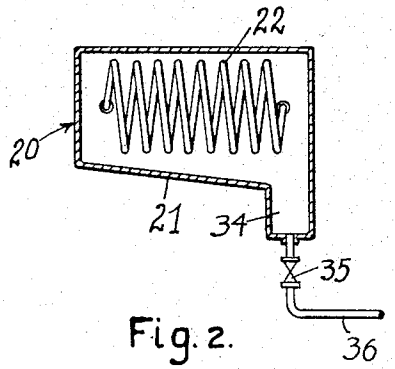


Fig. 2.

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UNITED STATES PATENT OFFICE

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COOLING AND HEATING SYSTEM

Application filed February 4, 1931. Serial No. 513,259.

This invention relates to a cooling system and means for the same for small buildings, homes, apartments and the like, and has for its main object to provide a system and machinery of the type mentioned which will be simple in construction, comparatively inexpensive to manufacture, install and operate and wherein only plain water is used as cooling medium.

Another object of this invention is to provide means as characterized hereinbefore in which the cooled air itself will aid in producing the necessary power.

Still another object of this invention is to provide an air cooling system and device of the type characterized in which the air will be directly cooled without the intermediacy of any other materials and the same air is used to cool and provide the premises in question with fresh air.

Still a further object of this invention is to provide a cooling system of the character mentioned which in case of need may also be used for heating the premises in which it is installed.

Still further objects of my invention will be apparent as the specification of the same proceeds.

In the drawing forming a part of this specification and attached thereto:

Fig. 1 is a diagrammatic plan view of an air cooling system according to my invention, while

Fig. 2 is a sectional elevation of the water cooler used therein.

Referring now to the drawing, by characters of reference, the numeral 10 designates an electric motor or any other suitable outside source of power which is adapted to drive an air compressor 11. Said air compressor draws the air through the intake pipe 12 either from the outside through pipe line 13 or from the rooms to be cooled through the pipe line 14 as indicated by the arrows 15 and 16, respectively, the proportion of the air from the two sources being adjustable through the use of the valves 17 and 18.

The air so drawn into the compressor 11 on a warm summer day has a comparatively high temperature (90° F.), and during compression it will reach a still higher temperature, but will be fed through the pipe line 19 into a cooler device, indicated generally by the numeral 20, and which is composed of a suitable container 21 through which the compressed air passes and which houses a cooling coil 22 circulating cold water as available in the locality, like usual running water of a materially lower temperature than the air, and in which the air will be cooled according to the temperature of the cooling water.

The cooled compressed air now passes through a pipe line 23 into an expansion air motor 24 wherein it expands, produces power, and will be further cooled, and the air so cooled will be led to the premises to be cooled by the pipe line 25 as indicated by arrow 26.

The warm summer air has a very high humidity, 70%—90%, and the vapor in the air will also be first compressed and overheated, but in the cooler the water content will be lowered according to the pressure of compression and the temperature of the cooling water, so that ultimately the greater portion of the compressed and cooled vapor will be condensed. The remaining vapor will expand in the air motor and will be further cooled thereby, but since the air will be cooled in the expanding motor to a greater degree than the vapor, the air will further cool said vapor and a good portion of said vapor will be again condensed.

My system has also incorporated therein a temperature regulator 27, in the outgoing air line and a regulating cooling water valve 28 in the intake line for the water cooler which may be regulated in such a manner that the air and vapor mixture will leave the air motor at a temperature of about 44° F., though other degrees of cooling may be produced therewith. I prefer a temperature of 44° F. for the cooled air and the vapor because at said temperature the air will contain such an amount of saturated vapor which upon the air warming to a preferable temperature of 70° F. in the premises wherein it will be used, it will have the most favorable humidity, that is about 40%.

The expansion motor 24 is connected by

a coupling and shafts 29 to the air compressor so that the power produced thereby will aid the motor 10 in driving said compressor. If the compressor is a rotating one then the expansion motor 24 should be an air turbine, while if the compressor is operating with a piston, the air motor will be of the same style and the two preferably would work on the same piston rod.

The air cooler 20 may simply consist of a metal container 21 having a coil 22 passing through the same and fed by the usual running water, the intake line being indicated by the numeral 30 and the outgoing line by character 31, the directions of the movements of the air and the water being the opposite to one another. The amount of the cooling water fed to the device may be regulated by a hand valve 32 and it also will be automatically regulated through the thermostat 27, and valve 28 mentioned hereinbefore, and connected by the link mechanism 33, as will be understood.

A condensed water trap 34 may also be provided in the air cooler 20 and the condensed water may be removed through a pipe line 36 by the use of the hand valve 35 or through an automatic air trap, as is well known in the art. The air motor also has a condensed water remover 37 but no air trap is needed there.

With my cooling installation I may also keep the usual kitchen refrigerator in a proper condition as to temperature and for this purpose I may branch off a cooling air line 38 to said refrigerator which may pass through the same in appropriate cooling coils and then return to the intake air line, as at 39.

I know that cooling devices based on similar principles as my herein invention have been used, usually on large scales for theatres, office buildings, etc., but the systems used there are too expensive and too complicated for small units, they usually employ expensive and possibly harmful outside materials and products and their operation also is expensive.

My system may also be used in a reversed manner for heating the premises in which it is installed, to raise the temperature in said premises in a moderate degree, as for instance from 32° F. to 70° F. The operation of my device in such a case is as follows: The compressor 11 will draw air from the outside only and the cooled air from the air motor 24 will be returned to the outside. In the former air cooler 20 the air will again be cooled, but the water in the coil 22 will be warmed up and its heat may be used in appropriate radiators in the premises. It can be proved that the amount of electricity used by the motor 10 in my installation when used as a heater will be only one-quarter or one-fifth of that amount of current which would be used if said premises were heated directly by electric current.

It is seen, that my air conditioning system is simplified to a single one-motor driven apparatus and requires no additional refrigerating fluids, as the air itself and its vapor content are subjected directly to the process of refrigeration and dehumidification.

It will be understood that changes and variations may be made in the parts and combinations of my invention and I hereby reserve all my rights to any and all such changes as are within the spirit of the invention and the scope of the appended claim.

What I claim as new, is:

In a device for cooling rooms and the like, means to compress air, means to cool the compressed air, means to expand such compressed and cooled air, said cooling means condensing the humidity of the air to a predetermined degree and being provided with means for removing the liquid so condensed, and means to convey said expanded air into the premises to be cooled, said compressed air being cooled by water travelling in a counter direction thereto, means to regulate the amount of said cooling water, said means being operated by a thermostat in the cooled air line.

Signed at Youngstown, in the county of Mahoning and State of Ohio this 2nd day of February, A. D. 1931.

JOSEPH JACZKO.