

Dec. 2, 1941.

M. W. BAKER

2,265,054

REFRIGERATING APPARATUS

Filed May 26, 1939

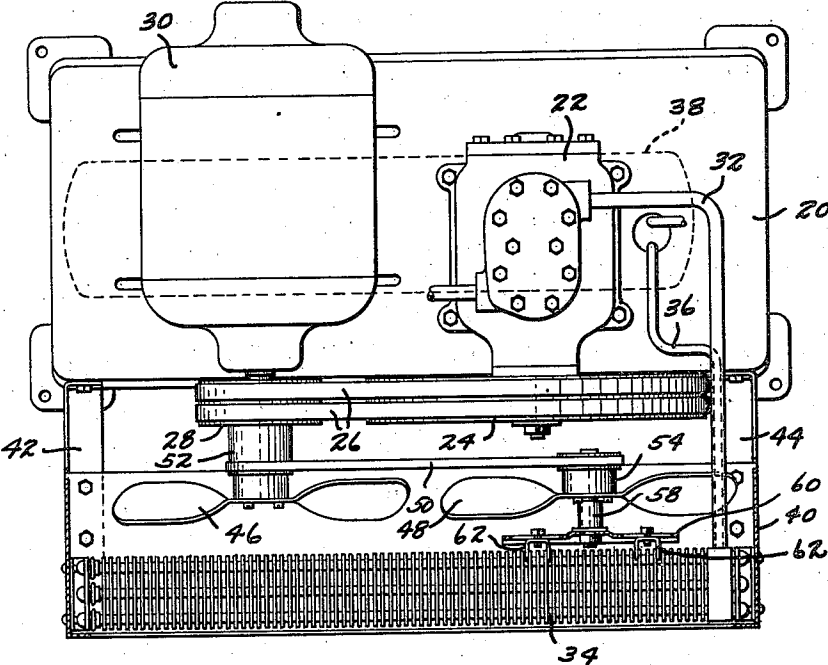


Fig. 1

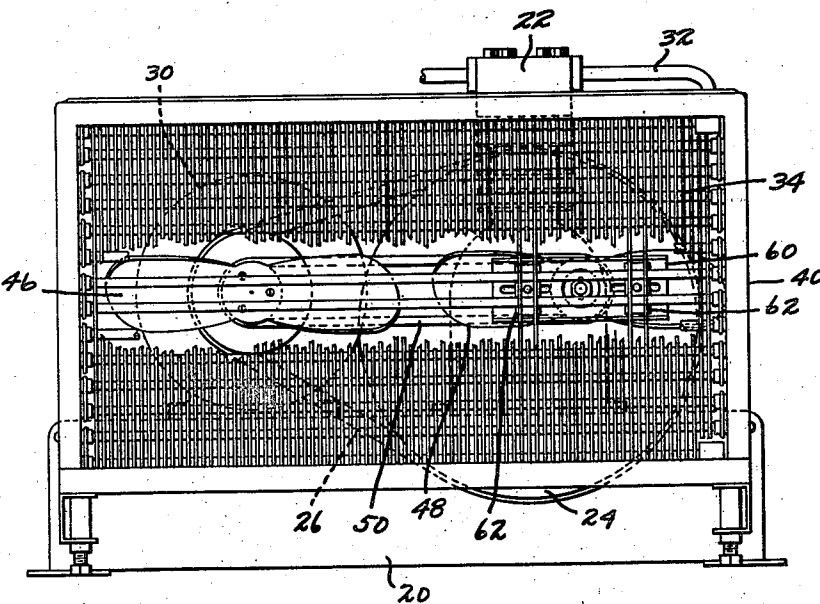


Fig. 2

INVENTOR.
BY *Marshall W. Baker*
Spencer Hardman & John Fehr
ATTORNEYS

UNITED STATES PATENT OFFICE

2,265,054

REFRIGERATING APPARATUS

Marshall W. Baker, Dayton, Ohio, assignor to
General Motors Corporation, Dayton, Ohio, a
corporation of Delaware

Application May 26, 1939, Serial No. 275,953

3 Claims. (CL 62—115)

This invention relates to refrigerating apparatus and more particularly to means for circulating air over the surfaces of the condenser of refrigerant condensing units.

In order to make refrigerant condensing units as compact and neat as possible it has been found desirable to employ a relatively long condenser which is about the height of the compressor. This makes the condenser about twice as long as it is high. The condenser is normally placed in front of the motor and compressor. In order to draw air through the condenser it has been customary to provide a fan on the adjacent end of the motor shaft and sometimes to provide fan blades in the flywheel of the compressor. With this type of air circulation only the portion adjacent the motor fan obtained adequate air cooling because the flywheel fan was not driven at a sufficient speed nor located sufficiently close to the condenser to provide adequate air circulation.

It is an object of my invention to provide a simple inexpensive efficient means for providing better air circulation for the condenser of a refrigerant condensing unit.

It is another object of my invention to provide efficient air circulation over a greater condenser area.

It is another object of my invention to provide a second fan driven at an efficient speed for circulating air over a portion of the condenser of a refrigerant condensing unit.

It is still another object of my invention to provide a plurality of motor driven fans each driven at an efficient speed and located to obtain the greatest efficiency for circulating air over the greater portion of the surfaces of the condenser of a refrigerant condensing unit.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawing wherein a preferred form of the present invention is clearly shown.

In the drawing:

Fig. 1 is a plan view of a refrigerant condensing unit embodying my invention; and

Fig. 2 is a view in elevation of the refrigerant condensing unit shown in Fig. 1.

Briefly, I have shown a refrigerant condensing unit which is in general conventional excepting for the fact that the motor driven fan is provided with a pulley and a belt connecting to a second pulley which is provided on the hub of an auxiliary fan located adjacent the other por-

tion of the condenser of the condensing unit in front of the flywheel of the compressor.

Referring now to the drawing there is shown a motor compressor base 20 upon which is mounted a refrigerant compressor 22 provided with a large flywheel pulley 24 connected by a plurality of belts 26 to a motor pulley 28 provided upon the front end of the motor shaft of the electric motor 30. The electric motor 30 is fastened by an adjustable connection to the base 20 so that it may be located so as to keep the belts 26 in a sufficiently tight condition. The cylinder head of the compressor 22 is connected by a refrigerant conduit 32 to the upper portion of a fin and tube type condenser 34 which is made substantially as long as the base 20 and about as high as the compressor 22 in order to make the condenser unit compact and neat in appearance. The refrigerant is condensed within the fin and tube type condenser and the condensed refrigerant is conducted through a liquid conduit 36 to a receiver 38 located beneath the base 20. The condenser 34 is provided with a shield 40 in the form of a relatively deep flange which extends around its periphery and forms a sort of enclosing and supporting frame for the condenser 34. This shield 40 is connected to the base 20 by the angle brackets 42 and 44.

The front end of the motor pulley 28 is provided with an extension which carries a two-blade propeller type fan 46. This fan is located close to the condenser 34 within the confines of the shield 40, so that it efficiently draws air between the fin and tube surfaces of the condenser 34. The shield 40 serves as a guard for the fan 46 as well as prevents air from being drawn into the fan stream without passing through the condenser 34. It will be seen that this fan 46 can only efficiently draw air through about one-half the surfaces of the condenser 34. The remaining portion of the condenser which is located in front of the compressor receives little or no benefit from the fan 46. It will also be seen that if a fan were provided in the flywheel pulley of the compressor 24 that such fan blades would not be located sufficiently close to the condenser 34 to provide efficient circulation of the air through this portion of the condenser. The flywheel pulley 24 also rotates at a relatively slow speed so that it would not provide an efficient form of air circulation.

In order to provide efficient air circulation for the other portion of the condenser 34 I have provided a second two-blade propeller type fan 48 which is like the fan 46 and which is driven

by a V-belt 50 from a V-belt pulley groove 52 provided in the extended hub of the motor pulley 28. The hub 54 of the fan 48 is also with a V-belt type pulley groove for receiving the V-belt 50. Preferably the belt groove 52 and the belt groove in the hub 54 are of the same diameter so that the fans 46 and 48 operate at substantially the same or motor speed. The hub 54 of the auxiliary fan 48 is rotatably mounted upon ball bearings carried by a stationary shaft 58 which is fastened to a plate 60. This plate 60 in turn is fastened by cap screws to brackets 62 which are copper-hydrogen brazed to the adjacent fins of the condenser 34.

Thus by this auxiliary fan the portion of the condenser 34 in front of the compressor 22 is provided with as great air circulation as the portion in front of the motor 30. The auxiliary fan 48 may be belted so that it can operate at the most efficient speed or it can be belted so as to operate at the same speed as the fan 46 so that a fan of the same size may be used in both positions. This arrangement is less expensive than the use of a flywheel fan and is also more efficient. This arrangement also makes it possible to use thinner, more efficient condensers of greater frontal area. It also makes it possible to use the more efficient quiet two-blade fans although three or more blade fans may also be used.

It is of course not necessary that the bearing support for the auxiliary fan be mounted directly upon the condenser 34, but this bearing support is mounted upon any desired available support. While I find the belt drive between the motor 40 and the auxiliary fan to be the most convenient arrangement other arrangements such as a belted or geared drive from the flywheel pulley might be used to drive the auxiliary fan. For other shapes and sizes of condensers more than two fans may be used to obtain better air circulation. Thus, by my invention I have provided more efficient air cooling for the condenser and thereby have provided means for increasing the efficiency of refrigerant condensing units with little or no expense.

While the form of embodiment of the invention as herein disclosed, constitutes a preferred form, it is to be understood that other forms might be adopted, all coming within the scope of the claims which follow.

What is claimed is as follows:

1. A refrigerant liquefying unit comprising, a compressor element and a motor element located at a side of the compressor element, the shafts of said elements being disposed in parallel relation to one another, a condenser confronting and extending substantially across said motor and compressor elements and being disposed substantially perpendicularly to the axis of said shafts, means associated with the shafts of said elements and forming a driving connection therebetween, said driving connection being located intermedi-

ate said elements and said condenser, a first fan adjacent one portion of said condenser mounted upon and rotatable with the shaft of said motor, another shaft rotatably carrying a second fan adjacent another portion of said condenser, means associated with said motor shaft and forming a driving connection for said second fan, means for mounting said second fan carrying shaft upon said unit, and said mounting means for said second fan carrying shaft being separate from said compressor and adjustable independent of said driving means between said elements.

2. A refrigerant liquefying unit comprising, a compressor element and a motor element located at a side of the compressor element, the shafts of said elements being disposed in parallel relation to one another, a condenser confronting and extending substantially across both of said motor and compressor elements and being disposed substantially perpendicularly to the axis of said shafts, means associated with the shafts of said elements and forming a connection therebetween for driving said compressor at a reduced speed of rotation with respect to the motor, said driving connection being located intermediate said elements and said condenser, a first fan adjacent one portion of said condenser mounted upon the shaft of said motor and rotatable therewith, another shaft rotatably carrying a second fan adjacent another portion of said condenser, means associated with said motor shaft and forming a connection with said second fan carrying shaft for driving said second fan at substantially the same speed of rotation as the rotation of said first fan and at a higher rotative speed than that of said compressor shaft, said fan driving connection being disposed between said fans and said driving connection of said elements, means for mounting said second fan carrying shaft upon said condenser, and said mounting means for said second fan carrying shaft being adjustable independent of said driving connection between said elements.

3. A refrigerant liquefying unit comprising, a compressor element, a motor element and a condenser, means associated with the shafts of said elements and forming a driving connection therebetween, a first fan adjacent one portion of said condenser mounted upon and rotatable with the shaft of one of said elements, another shaft rotatably carrying a second fan adjacent another portion of said condenser, means associated with the shaft of said one element and forming a driving connection for said second fan, means for mounting said second fan-carrying shaft upon said unit, and said mounting means for said second fan-carrying shaft being separate from said elements and movable relative thereto for adjusting the driving connection between said first and said second fans independently of the driving connection between said elements.

MARSHALL W. BAKER.