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EXTERNALLY ADJUSTABLE TUBULAR FLUID FLOW RESTRICTOR FOR REFRIGERATION SYSTEMS

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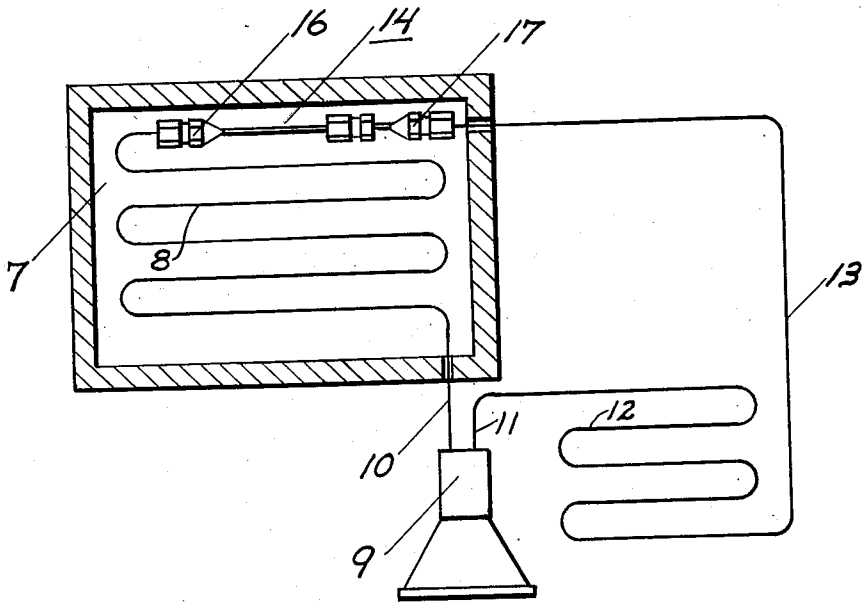

FIG 1

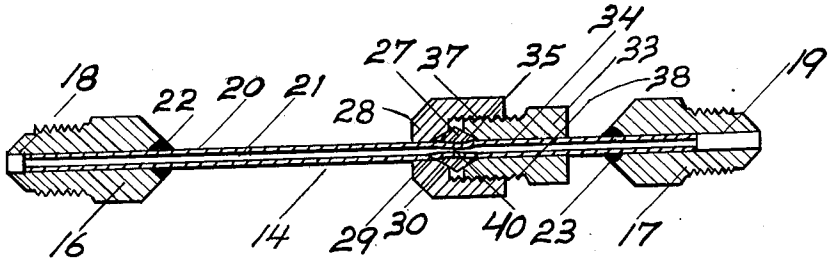

FIG 2

INVENTOR.

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2,532,452

EXTERNALLY ADJUSTABLE TUBULAR FLUID FLOW RESTRICTOR FOR REFRIGERATION SYSTEMS

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2 Claims. (Cl. 138—45)

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The present invention relates, in part, to a novel means of regulating refrigerant liquid flow from a condenser and to an evaporator.

At present, most domestic mechanical refrigerators employ either an automatic expansion valve or a capillary tube to maintain the necessary pressure differentials between the high pressure and low pressure sides of the system.

For my purpose, we can disregard the operation with the automatic expansion valve. One of the difficulties, of using a capillary tube for the purpose, is that it practically has to be a laboratory determined method and cannot be employed by an ordinary service man, in the field, except with a factory replacement for the particular unit.

Many systems would have the atuomatic expansion valve replaced with a capillary tube, if the service man would know exactly the correct capillary tube bore size and correct length of capillary tube for the particular job.

Since the presently employed capillary tubes depend upon a given length of uniform bore to produce the necessary flow restriction for the maintenance of the necessary pressure differentials, between the condenser and the evaporator, there is no means for adjustment and the correct capillary tube, as factory determined, must be used on any particular job.

Strictly speaking, my invention does not contemplate a capillary tube, although it employs tubing of relatively small size in the practice thereof. Taking a system, which would ordinarily have a standard capillary tube of say, .040'' bore and, say, 36'' length, I would have a tube of, say, .060'' bore and only about 6'' length. In order to get an equivalent restrictor effect, I propose a rather novel means of making the bore adjustable, at some certain point or points, without the use of valves or other expensive means generally equipped with stuffing boxes or equivalents.

An object, of the present invention is to provide a novel means of adjusting a tube bore in order to control a fluid flow rate therethrough.

Another object, of the present invention, is to provide an inexpensive adjustable flow restrictor for use with refrigeration systems.

Further objects, of the present invention, will be disclosed within the following specification and claims.

In the drawings:

Fig. 1 is a view of a refrigerating system employing the invention.

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Fig. 2 is a cross-sectional view of the flow restrictor of Fig. 1.

Referring to the drawings:

In Fig. 1, a compartment 7 is cooled by means of a cooling coil 8 from which the compressor 9, driven by means not shown, evacuates refrigerant vapor by means of the suction conduit 10 connecting therebetween. The compressor 9 compresses the vapor into the discharge conduit 11 leading to a condenser 12 wherein the compressed vapor surrenders its heat and becomes liquefied prior to its entry into the liquid conduit 13 leading to the pressure restrictor 14, which discharges to the cooling coil 8.

In Fig. 2, the pressure restrictor 14 comprises two flared tube end fittings 16 and 17 between which, and in the bores 18 and 19, is placed a tube 20 of copper, in the present instance, and having a bore 21, which is generally, initially, of uniform diameter. The tube 20 is soldered to the end fittings 16 and 17, as indicated, at 22 and 23 respectively.

The tube bore adjusting means comprises a ferrule 27 having a diametral taper toward each end thereof and an initial bore which is a slip fit over the tube 20.

The compression member 28 has a bore 29, which is a slip fit over the tube 20, and a taper bore 30 somewhat similar to the diametral taper of the ferrule 27 engaging therewith.

The compression member 33 has a bore 34, which is a slip fit over the tube 20, and a taper bore 35 somewhat similar to the diametral taper of the ferrule 27 engaging therewith.

The compression member 28 has a threaded bore 37 engaging the male thread 38 of the compression member 33. Screwing up the compression members 28 and 33 results in the respective tapers 30 and 35 approaching each other and compressing the ferrule 27 therebetween. This reduces the initial bore, of the ferrule 27, and squeezes the outside diameter, of the tube 20, at that point, whereby I now have a reduced bore 40 which is of diametral form.

Whenever a tube is so compressed, the tube wall thickness, at the point of compression, is materially increased; therefore, the original tube strength is only slightly disturbed.

Since the reduced bore 40 is of diametral form, same as originally except reduced in size, it has the virtue of being able to pass foreign matter of many times the size which would clog up a needle valve, associated with a valve seat having a bore equivalent to the initial bore of the tube 20, adjusted to equivalent fluid flows.

Since the bore reduction is comparatively gradual, during the screwing up of the compression members, the proper size thereof is easily attained.

Instead of soldering the tube **20**, as at **23**, I might combine the male thread **38** and the taper **35** with the flared end fitting **17**, resulting in decreased expense.

In effect, what I have done is to provide an adjustment to regulate fluid flow through a tube without the use of valves, etc.

While the invention is definitely adaptable to refrigeration systems, it has a much wider field of utility and I do not wish to be confined thereto.

While the drawings show and the specification explains a particular embodiment of the invention, it is to be understood that various modifications may be employed without departing from the spirit and scope of the invention, which is to be limited only to the following claims:

I claim:

1. An externally adjustable tubular fluid flow restrictor assembly for passing a controlled volatile refrigerant fluid flow to a cooling unit, which comprises the combination of a fine bore compressible metal tube, of given length, hermetically sealed to an inlet fitting and to an outlet fitting, an outer short length ferrule on the tube intermediately of the inlet and outlet fittings, and two inter-engaged threaded compression members mounted on the tube at opposite ends of the ferrule and arranged to engage the same and capable of compressing both the ferrule and the tube wall during wrench-up, so that the tube bore may be contracted for controlling the flow rate of the volatile refrigerant fluid through the assembly.

2. For interposition in the liquid circuit of a refrigeration system having an evaporator, a pressure restrictor comprising a tube of compressible metal having a potential refrigerant liquid flow rate in excess of the vaporizing capacity of the evaporator, and compression means comprising a ferrule arranged on the tube between the ends thereof, said ferrule being oppositely tapered toward its ends, and two inter-engaged threaded compression members slidably mounted on the tube at opposite ends of the ferrule and having tapered portions arranged to engage the tapered portions of the ferrule and capable of relative adjustment to compress the ferrule radially to reduce the size of the opening in the ferrule and compress the tube inwardly and reduce the diameter of the bore and simultaneously increase the wall thickness of the reduced portion of the tube.

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