Feb. 15, 1938. F. M. YOUNG 2,108,223

AIR COOLING DEVICE FOR COMPRESSORS

Filed Oct. 25, 1935 2 Sheets-Sheet 1

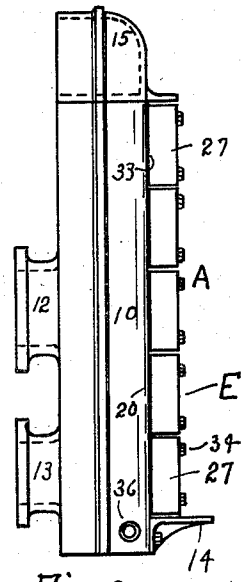


Fig.3.

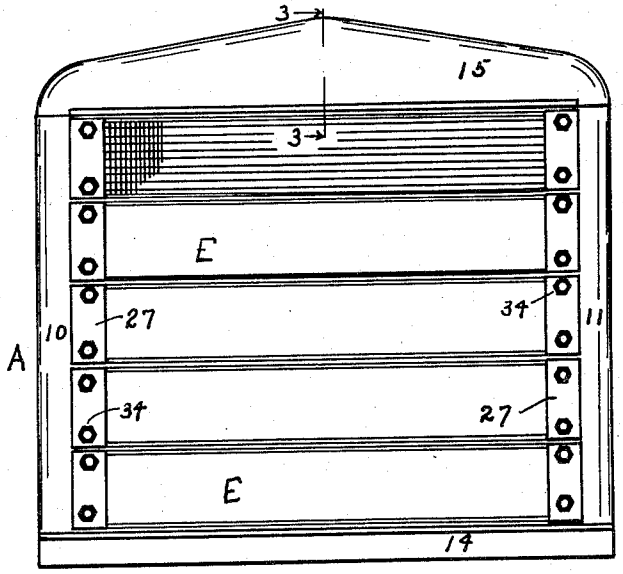


Fig.1.

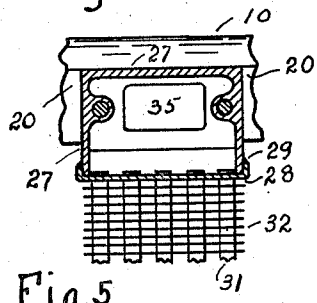


Fig.5.

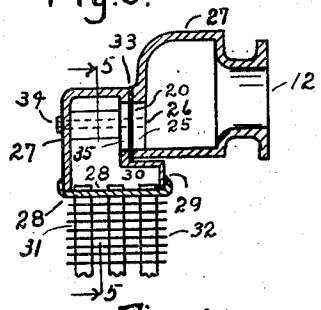


Fig.4.

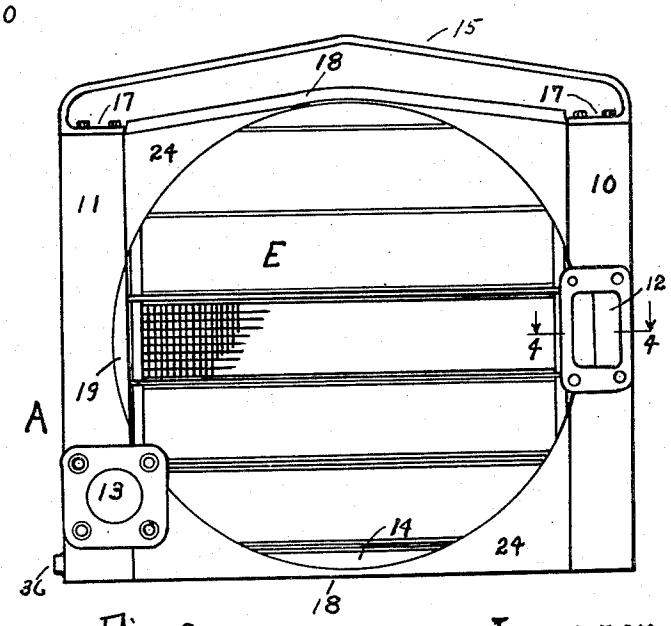


Fig.2.

Inventor
Fred M. Young
By A.S. Krotz
Attorney

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AIR COOLING DEVICE FOR COMPRESSORS

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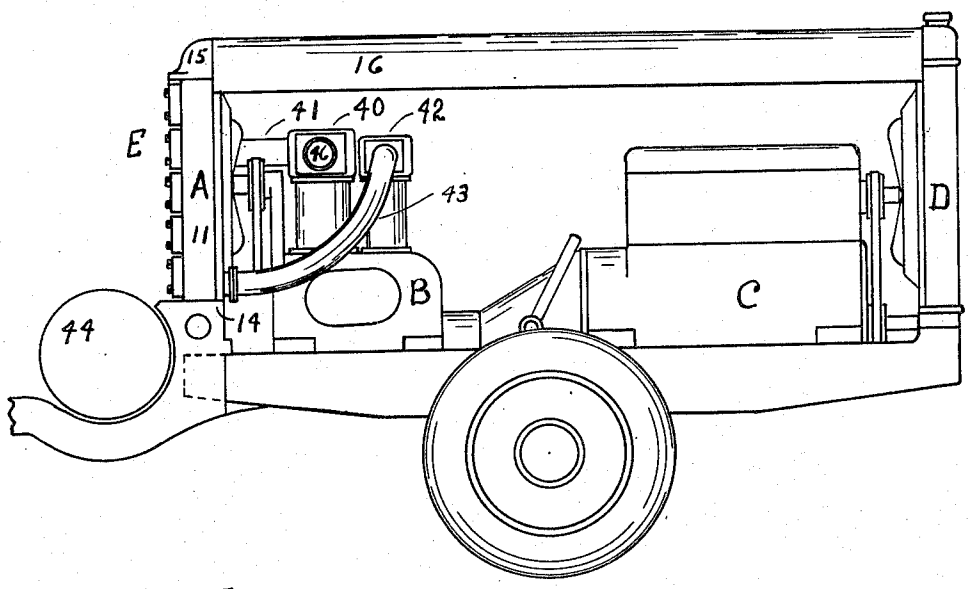


Fig. 6

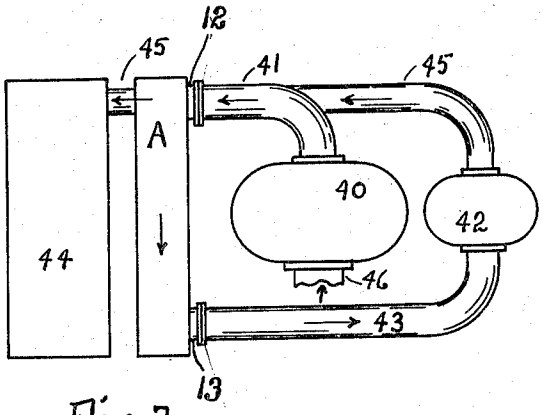


Fig. 7

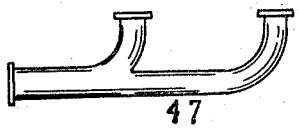


Fig. 8.

Inventor
Fred M. Young
By A.S. Krotz
attorney

Patented Feb. 15, 1938 2,108,223

UNITED STATES PATENT OFFICE

2,108,223

AIR COOLING DEVICE FOR COMPRESSORS

Fred M. Young, Racine, Wis.

Application October 25, 1935, Serial No. 46,683

1 Claim. (Cl. 257—125)

The object of my invention, generally stated, is to provide an air cooling device which is particularly suited for cooling compressed air as it passes from the first to the second stage cylinders and wherein the motive power and compressor may be horizontally mounted on a carrying frame, their radiators being mounted at the end of the frame thereby to provide a unit having a pleasing appearance.

The principal object of my invention is to provide a novel air cooling device which can be conveniently mounted adjacent the compressor and conveniently connected thereto; wherein the air, when desired, may be conducted outwardly and rearwardly from the first stage cylinder or cylinders or by a short right angle bend manifold and, when desired, to the second stage cylinder from the outlet header by means of a short manifold having a right angle bend.

I accomplish the aforesaid objects by means of vertically positioned headers having, preferably, a number of removably attached horizontally positioned cores, and by means of a unitary supporting member connecting the lower ends of the headers and a novel decorative member connecting the upper ends of the headers, and further by providing novel air inlet and outlet connections in the headers whereby the side outlets on the compressor may be connected by short right angle single curve pipes or manifolds.

To these and other useful ends my invention consists of matter hereinafter set forth and claimed and shown in the accompanying drawings in which:

Figure 1 is a front elevation of one form of my improved air cooling device.

Figure 2 is a rear elevation of the device shown in Figure 1.

Figure 3 is a side elevation of the device shown in Figures 1 and 2.

Figure 4 is a fractional section taken on line 4—4 of Figure 2.

Figure 5 is a sectional view taken on line 5—5 of Figure 4.

Figure 6 is a diagrammatic drawing of a side elevation of a power compressor unit having an internal combustion engine and illustrating a two stage compressor and my improved air cooling device, all suitably mounted on a common frame.

Figure 7 is a diagrammatic drawing illustrating the manner of connecting the air cooling device to a two stage compressor; and

Figure 8 illustrates an inlet or outlet manifold suitable for a two unit, two stage compressor.

As thus illustrated my improved air cooler, in its entirety, is designated in the various figures by reference character A. The compressor and engine are similarly designated by reference characters B and C respectively, and the radiator for cooling the engine jacket water is, in its entirety, designated by reference character D.

Referring now specifically to Figures 1 to 5 inclusive; as will be seen the cooling radiator A is positioned at right angle to the usual custom. Numeral 10 designates the vertically positioned inlet header and 11 the outlet header. These headers have preferably rearwardly projecting flanged inlet and outlet openings 12 and 13 respectively.

Inlet 12 is preferably positioned about midway the center of header 10 or in whatever position is in horizontal alignment with the outlet from the first stage cylinder outlet. Outlet 13 may for various reasons be positioned below the center of header 11 so as to accommodate the manifold as shown in Figure 6. However for two unit, four cylinder compressors, I prefer to position this manifold on a horizontal line with the inlets of the second stage cylinders, using a manifold as illustrated in Figure 8.

Headers 10 and 11 are connected at their bottoms by means of, preferably, a unitary supporting bracket 14, and the upper ends are connected by means of a decorative member 15, thus forming a frame. Member 15 has, as indicated, a shape similar to the top header of a conventional automobile radiator and is therefore adapted to support a hood 16 (see Figure 6). Member 15 may be cast integral having supporting members 17—17 thereon, to which the upper ends of headers 10 and 11 are attached as illustrated in Figure 2. The ends of member 15 curve inwardly, as shown in Figures 1 and 2 and the front is curved rearwardly, as illustrated in Figure 3. The section of member 15, as at line 3, Figure 1, is indicated in Figure 3 by dotted lines. Each end member provides a surface to which the fractional fan shrouds 24—24 are attached as at 18—18, by means of screws or otherwise. These shrouds are also attached at their sides to headers 10 and 11.

The radiating cores are attached to the front of headers 10 and 11, thus there is provided an air space within the frame. Each manifold at its center is cut away as at 19, and the surface left will therefore answer for a short distance, as a part of the fan shroud, thus the rear edge of shrouds 24 may, if desired, be flush with the rear edge of the headers. The front surface of the

headers are, preferably, machine trued as at 20. This surface is provided with air passage openings 25 and threaded openings 26 on the opposite side of each opening 25.

The core, preferably, consists of a number of core units which in their entirety, are designated by reference character E. In Figures 1, 2 and 3 I illustrate five of these units.

The core units each comprise two headers 27—27, which are provided with a flanged tube plate 28, which is suitably brazed, bonded or welded to the header as shown in Figures 4 and 5 as at 29. The bottom of the header is considerably wider than the outer end, see Figure 4; thus a wide pocket 30 is supplied providing room for two, three or more rows of tubes 31. I provide a multiplicity of closely spaced flanged fins 32 through which the tubes extend.

The narrow portion of headers 27 are at their rear, machine trued so as to form a suitable surface for gasket 33. Bolts 34 extend through suitable sleeves or lugs in the ends of the headers and register with threaded openings 26 in the vertical headers, thus the core headers 27, which are the proper distance apart, may be removably bound and sealed to the headers 10 and 11. Openings 35 in the core headers 27, register with the openings 25 in the vertical headers and a registering opening is also made in the gasket 33. Thus air may pass from one vertical header to the other through the tubes of the cores.

Clearly any number of core units may be used in the device, or headers 27 may be made long enough to fill the space between the upper and lower frame members and a suitable number of tubes attached thereto to provide a single detachable core. I prefer, however, to use a number of core units as shown.

While in operation, a certain amount of condensate or water may pass to the bottom of outlet header 11. Outlet 13 will always be positioned above the bottom of the chamber in this header. I provide an outlet 36 which may be supplied with a valve whereby the trapped water may from time to time, be allowed to escape, thus preventing it from reaching the second stage cylinder.

Thus it will be seen that I have provided a novel, simple and efficient air cooler having a simple fan shroud, and suitable to be positioned close to the compressor as illustrated in Figures 6 and 7. A fan is provided which may be driven by the compressor similar to the manner in which the fan is driven by an automobile engine, thus the general appearance of the assembly may be similar to the engine, radiator and hood of an automobile, as illustrated in Figure 6.

In the design shown in Figure 6, two carrying wheels and a suitable hitch are provided for convenient transportation. Four carrying wheels may be provided having a hitch suitable therefor.

It will be noted that the complete unit presents a pleasing appearance particularly so in view of the position of members A and D. Members B and C are supported on the frame as indicated and make direct driving connection possible, thus to eliminate belts, gears, etc. The connection between the crank shafts being preferably, an automobile type clutch having an operating lever as shown.

In operation, air is forced through the cores of members A and D by suitable fans which are driven automobile like, as illustrated; thus the complete unit presents symmetry of design which is pleasing and simple. Clearly side aprons may be provided whereby members B and C will be protected against the weather, similar to an automobile engine and its accessories.

Thus clearly applicant's air cooling unit A is particularly suited to an assembly as illustrated in Figure 6. It will be noted by referring to Figure 7 that connections may be made to unit A by means of a single curve pipe. This is only possible with applicant's device. Inlet and outlet connections on compressors are generally at the sides. Connections to applicant's vertical headers are therefore, very simple, requiring very short pipes or manifolds and the air flow is therefore, short and direct, as indicated by arrows in Figure 7. In Figures 6 and 7 numeral 40 designates the head of the first stage compressor having a manifold connection 41 to the inlet 12 of unit A. The second stage compressor head is designated by numeral 42, its inlet having a manifold 43 leading from the outlet 13 of unit A.

The outlet of the second stage compressor is connected to tank 44 by means of pipe 45. Thus the air entering the first stage head as at 46, will move through the device and to the storage or supply tank 44, as indicated by arrows, the air being cooled by unit A as it passes therethrough. Thus it will be understood by those skilled in the art, that the efficiency and capacity of the device will be greatly increased by applicant's invention.

In Figure 8 I illustrate a manifold 47 which is suitable for two, two stage compressors. In this drawing the advantages of applicant's device are clearly manifest. This manifold, when used as an outlet from the first stage cylinder 40, will always be positioned horizontally, and when used to connect the outlet of unit A to the second stage cylinder 42, will preferably be positioned horizontally; however a suitable curve may be supplied whereby the outlet from header 11 may be as shown in Figure 6. Clearly applicant's vertically positioned headers and horizontal cores make these simple and direct connected manifolds possible. The manifolds are obviously simple, inexpensive and efficient.

Having thus shown and described my invention, I claim:

A heat transfer device, comprising two vertically positioned headers having means connecting their lower and upper ends forming a frame, an inlet connection on the rear of one header and an outlet connection near the bottom of and on the rear of the other header, a liquid drain connection at the bottom of said outlet header, a number of horizontally positioned core units occupying the space between said upper and lower frame members, said core units each comprising two headers, a number of operatively connected tubes therebetween and a multiplicity of closely spaced fins through which said tubes extend, said core headers having removable operating connections to said vertically positioned headers whereby air may pass from one vertical header to the other through the tubes of said cores.

FRED M. YOUNG.