Oct. 9, 1956 W. A. STEWART 2,765,976

TWO STAGE COMPRESSOR

Filed March 14, 1952

FIG. 2

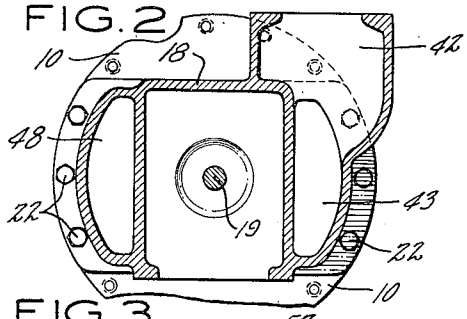


FIG. 3

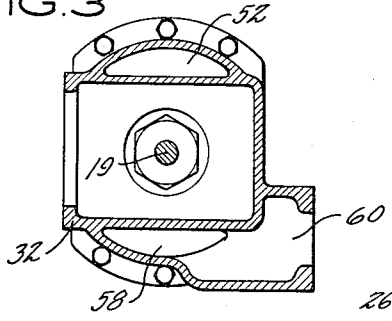


FIG. 1

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TWO STAGE COMPRESSOR

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4 Claims. (Cl. 230—182)

The invention relates to compressors and more particularly to an air or gas compressor of the two-stage or compound type in which the cylinders are placed at right angles to each other.

An object of prime importance in this invention is that between the cylinders and the frame or base supporting the main crank shaft, cross heads, etc. are intermediate members, one of these members having an intake connection and the other member having a discharge connection. The intermediate member having the intake connection is attached to one end of the low pressure cylinder and the intermediate member having the discharge connection is attached to one end of the low pressure cylinder. Adjustment of these members may be effected angularly about the frame or base to a limited extent so that the intake and discharge connections may be disposed at different desired angular positions within their plane of circular adjustment.

Another object of the invention is that the compressor may be adapted for different intake and discharge connections by substituting different intermediate members.

Another object of importance of the invention is that an intercooler is interposed within the fluid passages between the cylinders, these passages passing through the intermediate members in the different angular positions to which they are adjusted.

With the above and other objects in view, the invention may include the features of construction and operation set forth in the following specification and illustrated in the accompanying drawing.

In the accompanying drawing annexed hereto and forming a part of this specification, I have shown the invention embodied in a compact compound air compressor having double acting compressing cylinders, but it will be understood that the invention can be otherwise embodied and that the drawing is not to be construed as defining or limiting the scope of the invention, the claims appended to this specification being relied upon for that purpose.

In the drawings:

Fig. 1 is a central vertical sectional view through a complete compressor made in accordance with the present invention; and

Figs. 2 and 3 are cross sectional views taken on the planes of lines 2—2 and 3—3 in Fig. 1.

In the above mentioned drawings there has been shown but one embodiment of the invention which is now deemed preferable, but it is to be understood that changes and modifications may be made within the scope of the appended claims without departing from the spirit of the invention.

Briefly, and in its preferred aspect, the invention may include the following principal parts: First, a base or frame member within which is rotatably mounted on suitable bearings a main crank shaft and which also is provided with cross head slides; second, an intercooler enclosed within a part of the base; third, cylinder construc-

tions extending from spaced positions on the base at right angles to each other; fourth, intermediate members interposed between an end face on the base and an end face on said cylinder constructions; fifth, fastening means between said base and intermediate members and between the intermediate members and the cylinder end faces; and sixth, fluid connections in said intermediate members for admitting and discharging fluid to and from said cylinders and intercooler.

Referring more in detail to the figures of the drawing there is shown at 10 a base or frame member within which is mounted for rotation on a horizontal axis a main crank shaft 12 having two connecting rods 14 on its crank or cranks. Extending at right angles to each other within guideways formed in the base are cross head slides 16 on which are mounted cross heads 17 each head being attached pivotally to the extended ends respectively of the connecting rods 14.

Supported on a top circular flat surface of the base 10 forming a suitable seat therefor is an intermediate member 18 and on the opposite face of the intermediate member is a low pressure cylinder construction 20. Annular rows of fastening members 22 such as studs or bolts secure the intermediate member 18 to the end face of the base or frame member 10 and similar fastening means 24 secure the cylinder construction 20 to the outer surface of the intermediate member 18. By means of the annular rows of fastening devices 22 and 24 for securing the intermediate member 18 between the end face of the base 10 and the end face of the cylinder construction 20 the intermediate member 18 may be secured in limited adjusted angular or rotative positions respectively relative to the base 10 and cylinder construction 20.

At one side of the base 10 is an enlargement 26 preferably formed integrally with the base within which is mounted an intercooler 28 provided with a circulating system for a liquid coolant in any preferred manner and having passages presently to be described for the fluid being compressed.

On a vertical flat surface forming a seat at one side of the base 10 is a second or high pressure cylinder construction 30. This at one end is attached to an intermediate member 32 which member is in turn attached to the vertical flat surface on the base 10. The fastening means for the intermediate member 32 and for the cylinder construction 30 are in every way similar to fastening means 22 and 24 for the intermediate member 18 and cylinder construction 30 so that the intermediate member 32 may be angularly adjusted similarly to member 18.

The cylinders 20 and 30 as shown in Fig. 1 are provided with inlet and exhaust valves 34 and 36 respectively of usual or standard form. Also within the cylinders operate pistons 38 and 40 connected to the cross heads 17 by the usual piston rods 19.

The fluid being compressed enters the intake connection 42 in the intermediate member 18 for the low pressure cylinder 20 and passes through the arcuate passage 43 in the intermediate member to the intake passages 44 of the cylinder and through the intake valves 34 to the compression cylinder. After compression in this cylinder the fluid passes the discharge valves 36 and enters the discharge passage 46. From this passage 46 the fluid passes through the arcuate passage 48 in the intermediate member 18 to a passage 50 in the base 10 leading to the intercooler 28. From the intercooler 28 the fluid then passes through the arcuate passage 52 in the intermediate member 32 for the high pressure cylinder 30. From this side of the intermediate member 32 the fluid then passes into the intake passage 54 through the intake valves 34 to the high pressure cylinder 30 and discharge valves 36 to the discharge passage 56. From this latter passage 56 the fluid enters the passage 58 in the intermediate member

32 for the high pressure cylinder 30 to the discharge connection 60.

I claim as my invention:

1. A two cylinder compressor comprising in combination, a base, a main crank shaft rotatably mounted in said base, said base having seats formed thereon at right angles to each other, intermediate members mounted on said seats, cylinder constructions secured to the outer surfaces of said intermediate members, each of said cylinder constructions having valved controlled intake and discharge ports, an intake connection formed in one of said intermediate members, a fluid passage in said one intermediate member connecting said intake connection to the valve controlled intake port of one of said cylinder constructions, a fluid passage in a second of said intermediate members connected to the valve controlled intake port of a second of said cylinder constructions, a second fluid passage in said one intermediate member and in said base connecting the fluid passage in the second of said intermediate members to the valved controlled discharge port in said one cylinder construction, a discharge connection in the second of said intermediate members, a second fluid passage in the second of said intermediate members connecting the valved controlled discharge port in the second of said intermediate members to said discharge connection, and pistons reciprocally mounted in said cylinder constructions and connected to said crank shaft for operation thereby.

2. A two cylinder compressor comprising in combination, a base, a main crank shaft rotatably mounted in said base, said base having seats formed thereon at right angles to each other, intermediate members mounted on said seats, cylinder constructions secured to the outer surfaces of said intermediate members, each of said cylinder constructions having valved controlled intake and discharge ports, an intake connection formed in one of said intermediate members, a fluid passage in said one intermediate member connecting said intake connection to the valve controlled intake port of one of said cylinder constructions, a fluid passage in a second of said intermediate members connected to the valve controlled intake port of a second of said cylinder constructions, a second fluid passage in said one intermediate member and in said base connecting the fluid passage in the second of said intermediate members to the valved controlled discharge port in said one cylinder construction, an intercooler disposed in said second fluid passage, a discharge connection in the second of said intermediate members, a second fluid passage in the second of said intermediate members connecting the valved controlled discharge port in the second of said intermediate members to said discharge connection, and pistons reciprocally mounted in said cylinder constructions and connected to said crank shaft for operation thereby.

3. A two-cylinder compressor comprising in combination, a base, a main crank shaft rotatably mounted in said base, said base having seats formed thereon at right angles to each other, intermediate members mounted on said seats, cylinder constructions secured to the outer surfaces of said intermediate members, each of said cylinder constructions having valved controlled intake and discharge ports, an intake connection formed in one of said intermediate members, a fluid passage in said one intermediate member connecting said intake connection to the valve controlled intake port of one of said cylinder constructions, a fluid passage in a second of said intermediate members connected to the valve controlled intake port of a second of said cylinder constructions, a second fluid passage in said one intermediate member and in said base connecting the fluid passage in the second of said intermediate members to the valved controlled discharge port in said one cylinder construction, an intercooler having intake and discharge passages in the portions of said second fluid passage within said base, a discharge connection in the second of said intermediate members, a second fluid passage in the second of said intermediate members connecting the valved controlled discharge port in the second of said intermediate members to said discharge connection and pistons reciprocally mounted in said cylinder constructions and connected to said crank shaft for operation thereby.

4. A two cylinder compressor comprising in combination, a base, a main crank shaft rotatably mounted in said base, said base having seats formed thereon at right angles to each other, intermediate members mounted on said seats, cylinder constructions secured to the outer surfaces of said intermediate members, each of said cylinder constructions having valved controlled intake and discharge ports, an intake connection formed in one of said intermediate members, a fluid passage in said one intermediate member connecting said intake connection to the valve controlled intake port of one of said cylinder constructions, a fluid passage in a second of said intermediate members connected to the valved controlled intake port of a second of said cylinder constructions, a second fluid passage in said one intermediate member and in said base connecting the fluid passage in the second of said intermediate members to the valved controlled discharge port in said one cylinder construction, an intercooler mounted within said base, intake and discharge passages therefor disposed in said second fluid passage, a discharge connection in the second of said intermediate members, a second fluid passage in the second of said intermediate members connecting the valved controlled discharge port in the second of said intermediate members to said discharge connection and pistons reciprocally mounted in said cylinder constructions and connected to said crank shaft for operation thereby.

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