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W. V. FISCHER
COMPRESSOR

2,452,232

Filed Aug. 24, 1944

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Fig. 1

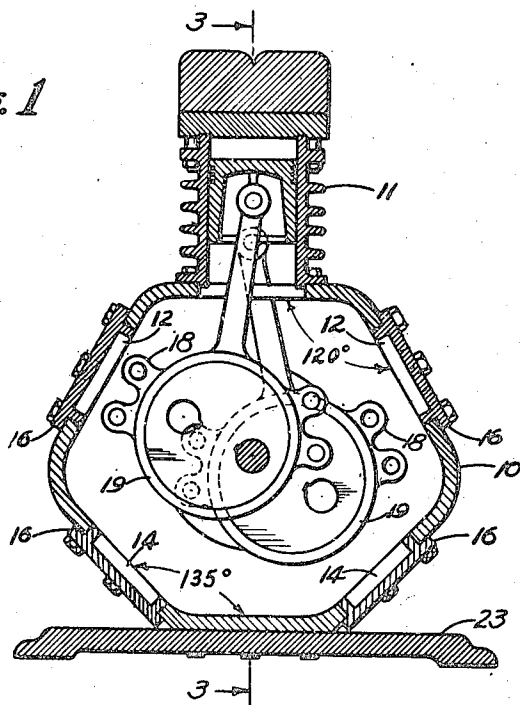
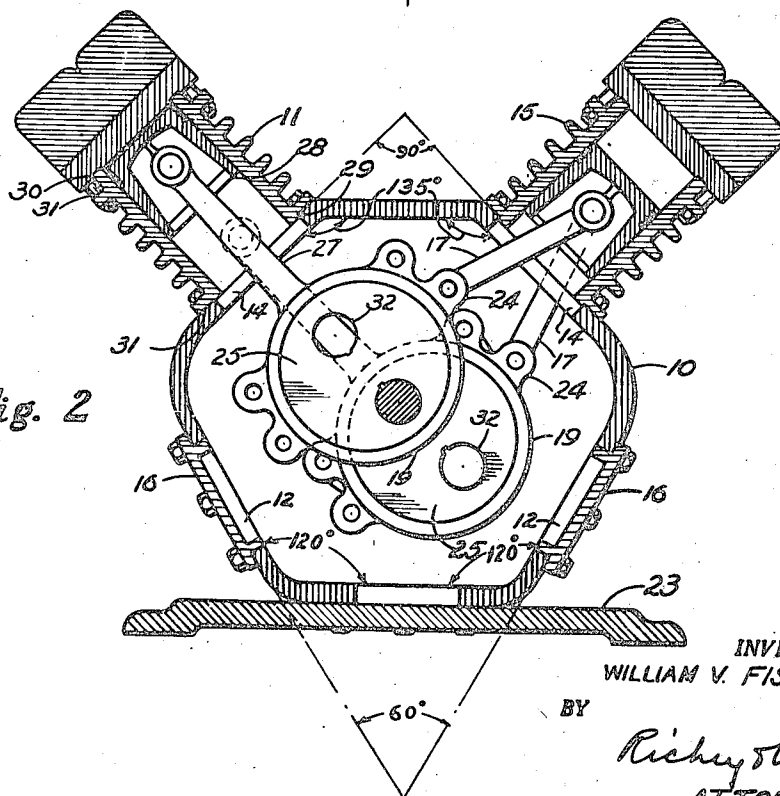


Fig. 2



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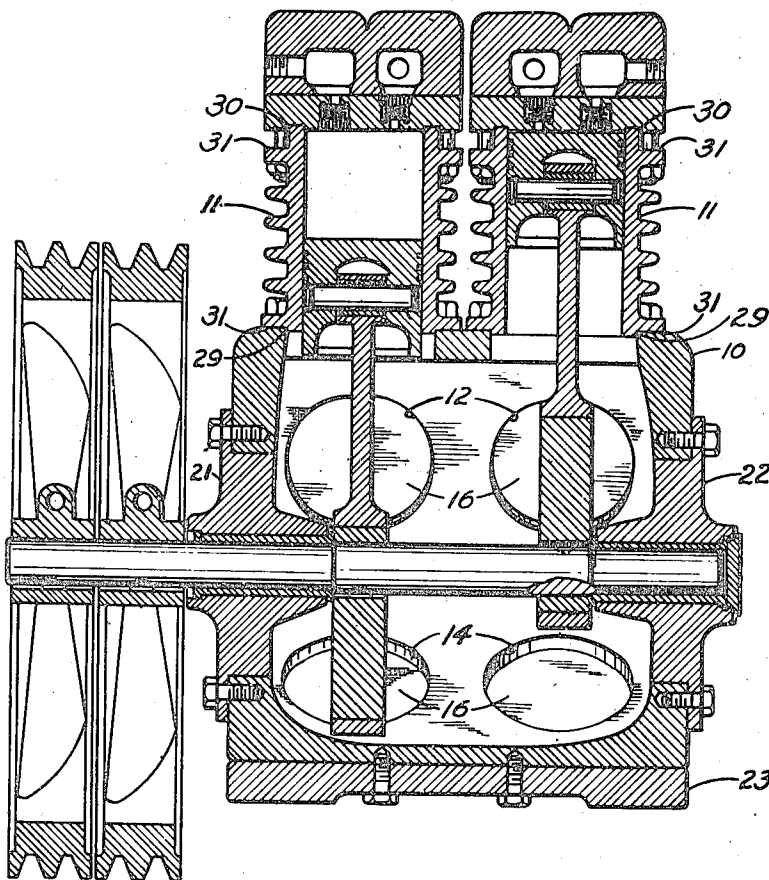
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Fig. 3



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COMPRESSOR

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7 Claims. (Cl. 230—187)

This invention relates broadly to air compressors and is directed more specifically to the construction of certain of the parts embodied therein which are designed for interchangeable assembly and orientation in compressors of different volumetric delivery.

With the ever increasing use of elastic fluids, in the many and diversified avenues of commerce, the manufacturers of compressors have from time to time been forced to enlarge their line of production until many of such manufacturers now catalogue well over a hundred models of different size, type or form. Due perhaps to the wide choice in size, all of these models have been built as unitary structures, i. e. machines of a fixed delivery rate, insusceptible of structural modification or alteration for substantial increased output; hence when a user of such equipment found it necessary to enlarge his facilities he has heretofore been compelled to either purchase a larger machine or install additional smaller units. In many instances such procedure was unsatisfactory both from the standpoint of economy and sacrifice in floor area.

The present invention contemplates an organization of standardized parts interchangeable with each other and with a base or housing formed for adjustment in alternate position to accommodate the production of either a two, four or six cylinder compressor, the object thereof residing in the economies realized by a purchaser using additive parts to his basic unit, the economies realized by the manufacturer in handling fewer parts, and the advantage inherent in the design of the parts of a balanced machine irrespective the modification thereof.

Other objects and advantages more or less ancillary to the foregoing and the manner in which all the various objects are realized will appear in the following description, which considered in connection with the accompanying drawings, sets forth the preferred embodiment of the invention.

Referring to the drawings:

Fig. 1 is a transverse section through the improved air compressor, certain parts thereof being arranged to form a two cylinder compressor;

Fig. 2 is a similar sectional view of the compressor, the crankcase thereof being inverted and the cylinders arranged to form a four cylinder compressor; and

Fig. 3 is a longitudinal section through the compressor illustrated in Fig. 1, the section being taken on a plane indicated by the line 3—3 therein.

Referring first to Fig. 1, the compressor comprises a crankcase 10 of general hexagonal form in cross section bored for the reception of cylinders 11 and further provided with openings 12—12 for the reception of additional cylinders 13—13 indicated in dotted lines in Fig. 1 and openings 14—14 for the cylinders 15 and 11 illustrated in Fig. 2. The crankcase is provided with cover plates 16 adapted to seal the openings 12 or 14 when the parts of the compressor are assembled to form a two cylinder machine (Figs. 1 and 3) or the four cylinder compressor shown in Fig. 2. The crankcase as shown embodies six side walls, two of which are disposed in parallel relation with each other. The side walls connected with one of the parallel walls are disposed at included angles of 135° relative thereto or a 90° angle relative to each other, while the walls connected with the other parallel wall are disposed at included angles of 120° relative thereto or a 60° angle relative to each other.

When a substantial increase in delivery output is desired the plates 16 may be removed and additional cylinders 13 identical to the cylinder assemblies 11 may be inserted in the openings 12 to form a six cylinder machine. When the compressor is so converted connecting rods 17 are interlinked with the apertured bosses 18 in the eccentric sleeves 19 and the pistons 20 in the added cylinder assemblies. Access to the interior of the crankcase for such operation may be had through the removable bearing plates 21 and 22 in the end walls of the crankcase as illustrated in Fig. 3.

Should it be desired to convert the machine to a four cylinder compressor, the cylinders 11 may be dismantled from the crankcase 10, the base plate 23 removed and the crankcase revolved through an arc of 180° and remounted on the base 23, studs surrounding the opening for the cylinder 11 being employed to facilitate the securement thereof. With the crankcase thus positioned the cover plates 16 may be removed from the openings 14. Thereupon the cylinders 15 mounted therein, the connecting rods 17 coupled with the apertured bosses 24 on the eccentric sleeves 19 and the eccentric sleeves adjusted to accommodate the assembly of the arms 27 thereon with the pistons 28 in the original pair of cylinders 11.

The cams 25 are preferably formed with secondary driveshaft holes 32 disposed to reduce the stroke and the output of the compressor. In order to maintain the same compression ratio in the cylinders when using the alternate holes

32 and the shorter piston stroke, the cylinders are provided with pilot bearings 29 and 30 in the opposed ends thereof, adapted for engagement within the openings in the crankcase 10. The flanges 31 adjacent the pilots 29 and 30 are spaced at different lengths from the respective ends of the cylinders so that the volume of the compression chamber may be reduced to conform to the shorter stroke by turning the cylinders end for end when mounted in their assembled relation upon the crankcase. Should it be desired to convert the machine to a high-pressure, two-stage compressor, one cam may be operated with a short stroke and corresponding inverted cylinders of reduced capacity, the second cam being operated with a long stroke as first described above. Thus by interconnecting the output of the cylinders associated with said second cam and the intake of the cylinders of reduced capacity, a two-stage compression operation is effected.

From the foregoing it will be readily recognized that the manufacturer can limit his production to a crankcase of a single form which will accommodate the ready conversion of a two cylinder compressor to a four or six cylinder machine, that the cylinders are of uniform design and adapted for interchangeable assembly upon the crankcase and that the connecting rods and links are likewise of a standardized pattern which may be assembled interchangeably to provide a machine capable of a small, medium or large volume delivery. It is likewise obvious that the purchaser of a machine of this type having secured the basic units comprising the crankcase, connecting rods and cylinders may at any time alter the machine by rearranging the parts as indicated above or by adding new parts or subassemblies thus reaping the economy inherent in and afforded by the improved design.

Although the foregoing description is necessarily of a detailed character, in order that the invention may be completely set forth, it is to be understood that the specific terminology is not intended to be restrictive or confining, and that various rearrangements of parts and modifications of detail may be resorted to without departing from the scope or spirit of the invention as herein claimed.

I claim:

1. An air compressor embodying a crankcase, a plurality of similar cylinders having pistons therein and mechanism for reciprocating said pistons, said crankcase comprising a housing of six-sided cross section embodying cylinder receiving faces disposed with some of the faces in different angular relation with each other, two of said faces being parallel and either of said parallel faces constituting a base, five of said faces including one only of said parallel faces having cylinder openings therein for the reception of said cylinders, whereby a greater number of openings are available for the reception of cylinders when the crankcase is arranged for operation on one of the base faces than when arranged for operation on the other base face.

2. A compressor crankcase comprising a plurality of side walls, certain of said walls having cylinder openings therein, two of the side walls being disposed in parallel relation with each other, either of said parallel walls constituting a base, the remaining walls of the crankcase being non-parallel and so disposed that the three uppermost walls of the crankcase are in different angular relation with each other when the crank-

case is mounted on one of said base walls than when mounted on the other of said base walls.

3. In an air compressor, a crankcase formed with a plurality of flat side walls disposed in non-uniform angular relation, including a pair of parallel opposed walls, certain of said side walls having openings therein for the reception of cylinders, cylinders in said openings, pistons in said cylinders, a drive shaft in said crankcase and means in said crankcase for operatively connecting a greater number of cylinders and pistons with said drive shaft when the crankcase is mounted on one of said parallel side walls than when mounted on the other parallel side wall.

4. An air compressor embodying cylinders, pistons and a housing having a pair of parallel side walls, a second pair of side walls contiguous one of said parallel walls disposed at a 90° included angle, and a third pair of side walls contiguous the other of said parallel walls disposed at a 60° included angle, said walls having openings therein for the reception of cylinders, a drive shaft mounted in said housing, an eccentric keyed thereto, an eccentric strap thereon, an arm integral with said strap for reciprocating one of said pistons, a pair of apertured bosses on said strap disposed in 90° relation with said arm, linkage engaged with said bosses for operatively reciprocating the pistons in cylinders mounted on said walls disposed at a 90° included angle, a second pair of apertured bosses on said strap disposed in 60° relation with said arm, and linkage engaged with said bosses for operatively reciprocating the pistons in cylinders mounted on said walls disposed at a 60° included angle.

5. An air compressor embodying a crankcase of six-sided cross section, a plurality of cylinders thereon, pistons therein, a drive shaft in said crankcase, said crankcase being formed with one pair of walls in parallel relation, one of the said walls being a cylinder receiving wall, a second pair of cylinder receiving walls contiguous the cylinder receiving one of the parallel walls and disposed at angles of 120° relative thereto, a third pair of cylinder receiving walls contiguous the other of the parallel walls and disposed at angles of 135° relative thereto, means keyed on said drive shaft for reciprocating said pistons in the cylinders mounted on the cylinder receiving one of said parallel walls and on the two walls disposed in 120° angular relation therewith, and a second means on said first named means for reciprocating pistons in the cylinders mounted on the pair of walls disposed in 135° angular relation with the other of said parallel walls.

6. A compressor crankcase of asymmetrical polygonal cross section formed with one pair of walls in parallel relation, one of the said walls being a cylinder receiving wall, a second pair of cylinder receiving walls contiguous the cylinder receiving one of the parallel walls and disposed at angles of approximately 120 degrees relative thereto, and a third pair of cylinder receiving walls contiguous the other of the parallel walls and disposed at angles of approximately 135 degrees relative thereto.

7. A compressor crankcase of asymmetrical polygonal cross section comprising two parallel side walls and at least four additional side walls completing the enclosure of the crankcase, one of the parallel side walls and four of the additional side walls being provided with means for the mounting of cylinders thereon, the side walls adjacent one of the parallel walls being disposed at a different angle to that wall than the angle of the

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side walls adjacent to the other of the parallel walls to that other wall, whereby, by selecting one or the other of the parallel walls as a bottom wall, the crankcase is adapted to the mounting of different numbers of cylinders, in different angular relations, on the upper part of the crankcase.

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