April 21, 1931. O. M. SUMMERS 1,801,395

PUMP FOR REFRIGERATING APPARATUS

Filed April 30, 1928 2 Sheets-Sheet 1

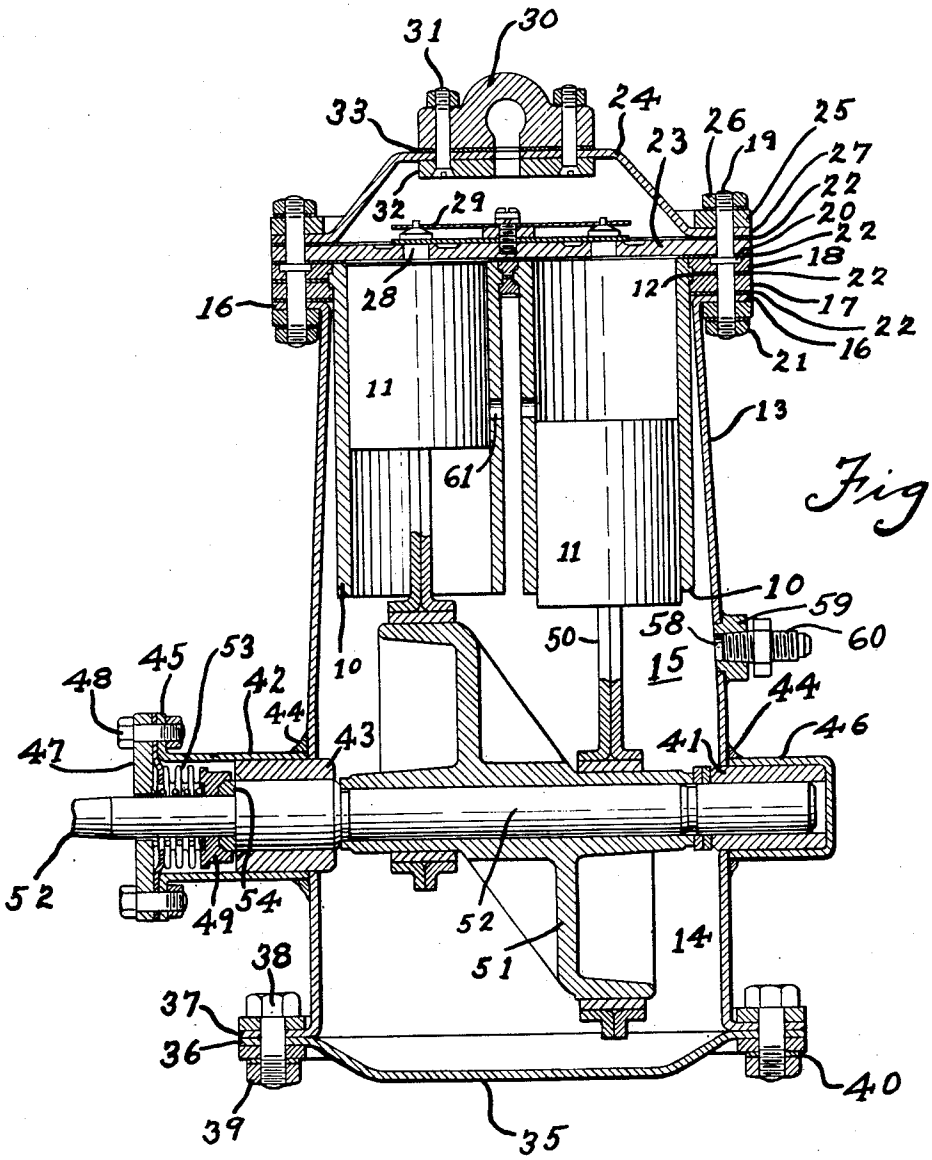


Fig. 1

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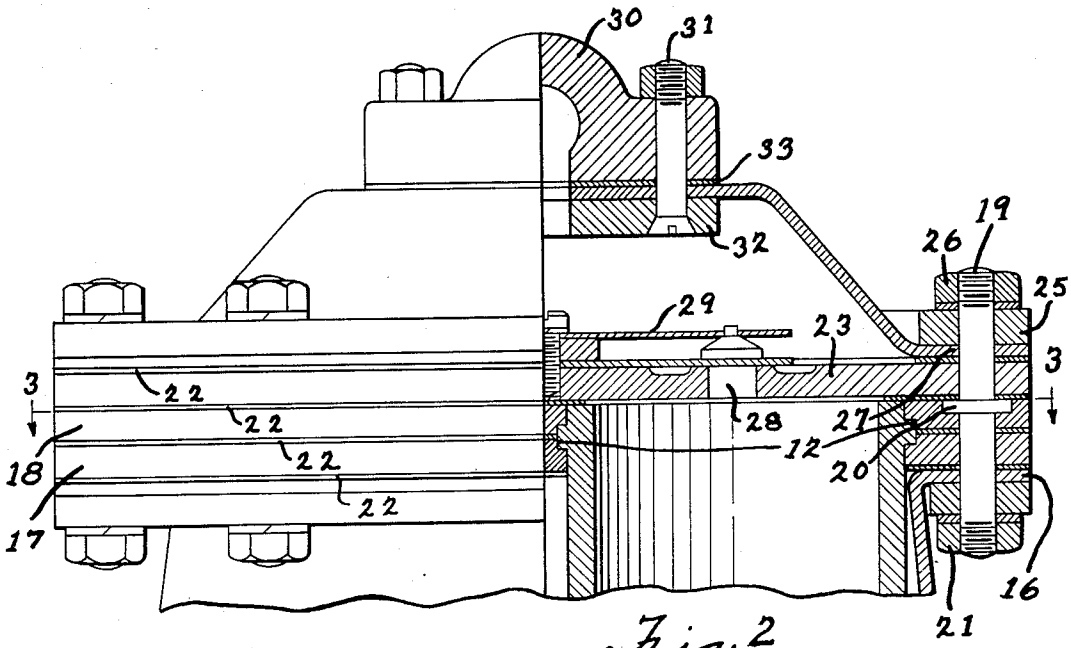


Fig. 2

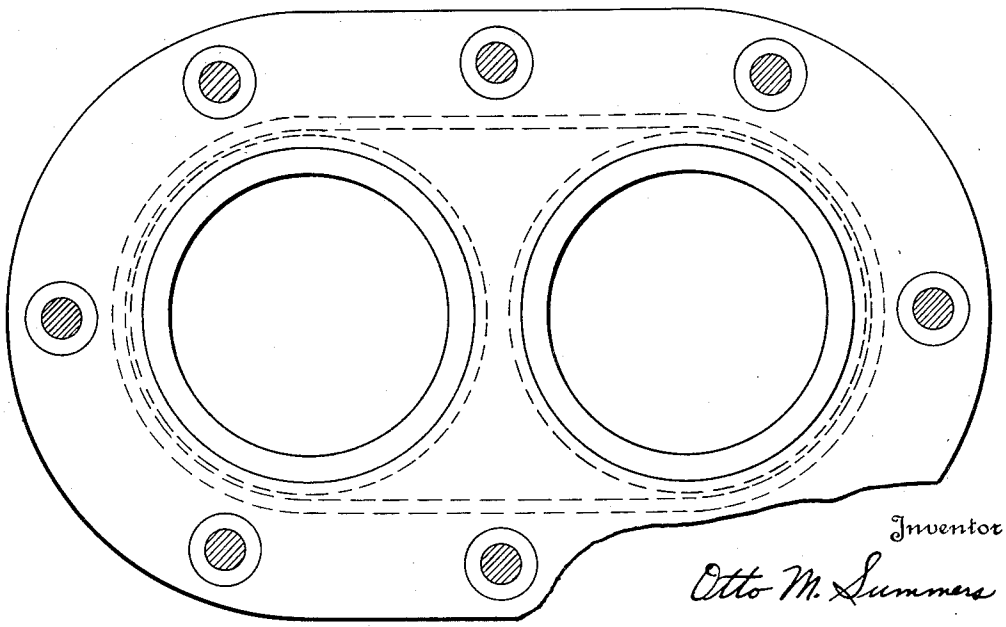


Fig. 3.

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UNITED STATES PATENT OFFICE

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PUMP FOR REFRIGERATING APPARATUS

Application filed April 30, 1928. Serial No. 274,086.

This invention relates to improvements in refrigerating machinery or apparatus and more particularly to the compressor used in the compressor-expander-condenser type of machinery.

It is an object of the invention to provide a compressor which is readily and cheaply manufactured and quickly assembled.

With this object in view, the invention contemplates providing a compressor whose structure is composed of individual elements which can be manufactured in quantities individually and assembled into a composite operating structure.

The invention contemplates providing a compressor which is composed of piston sections which are held in position by a retaining structure made of pressed metal or stampings.

It is a further object of the invention to provide a compressor in which other elements thereof are made of pressed metal.

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 drawings:

Fig. 1 illustrates a section through a complete compressor of the invention;

Fig. 2 is a view partly in elevation and partly in section of the top portion of the compressor showing the method of assembling the parts, and

Fig. 3 is a view taken on the line 3—3 of Fig. 2.

In the construction of compressors such as those used for the compression of gases generally and of media used in refrigerating systems specifically, it is customary to construct the compressor as a casting which is then bored out to constitute a cylinder portion adapted to receive a piston. Frequently two or more cylinders are cast in a block and the shape of the casting then requires expensive grinding and boring operations and to a greater extent than in the case of a single cylinder. In such cast compressors great care must be taken to align properly the cylinder boring with respect to the crankshaft bearings.

By means of the present invention means are provided for producing a structure having any desired number of cylinders, the integral parts of which may be fabricated individually and then assembled into an operating structure. This is effected by forming the cylinders as individual pipe-like members which may readily be produced in quantities and providing also a pressed steel or pressed metal uniting structure capable of holding such individual cast cylinders in uniting relation with the other portions of the compressor.

Referring in detail to the drawing, the compressor chosen for illustrating the preferred embodiment of the invention is composed of two cylinders 10 which are produced in any well-known manner, either as cast sections of pipe or drawn pipe sections. The interior of these cylinder members must be carefully ground and lapped so as to fit accurately with the pistons when the compressor is assembled. The pistons are indicated by 11, one being shown in its upper position and the other in its lower position. The cylinders 10 are provided with externally located bosses 12 which enable them to be held rigidly in position as hereinafter described.

One of the main features of the invention resides in the method of assembling these individually constituted cylinders 10. The method used comprises forming a sheet metal body portion 13 which is preferably pressed or formed out of steel of suitable thickness and so shaped as to form a crankcase portion 14 and an upper portion 15 substantially an integral cylindroid shape.

The individual cylinders are shown held

in position by being clamped between a flange 16 of the casing 13 and suitable retaining rings 17 and 18. These retaining rings which are preferably so shaped as to embrace the boss 12 are held in place against the flange 16 by means of a bolt 19 which has a shoulder 20 bearing against the uppermost retaining ring 18 and which is adapted to draw the rings 18 and 17 tightly against the flange 16 by means of a nut 21. Suitable gaskets indicated at 22 are interposed between the rings to insure a tight union or closure.

It is thus apparent that the cylinders 10 are retained in a rigid manner by the casing 13 through intermediary of the flange 16 and the rings 17 and 18. In order to provide for the attachment of a cylinder head which is indicated at 23, the bolt 19 extends upwardly as at 20 so that the cylinder head 23 may be placed thereover and engaged thereby, this cylinder head serving also as a valve plate or carrier. A cover 24 is placed over the valve plate 23 and a ring 25 serves by means of nut 26 operating on the uppermost threaded portion of bolt 19 to clamp the cover 24 tightly in place against the valve plate 23 through intermediary of the flange 27. A packing or gasket 22 is used to prevent leakage.

The valve plate 23 is provided in the well-known manner with outlet valve apertures 28 which are controlled by an outlet valve structure diagrammatically shown as 29, while the cylinders 10 are each provided with an inlet opening 61 in the side walls thereof.

Suitable valve connections may be attached to the cover 24, a suitable method consisting in attaching the body of the valve 30 to the cover by means of bolts 31, plate 32 and gasket 33.

The lower portion of the compressor is shown as formed to permit access to the crankshaft as by providing a removable bottom 35 held in place on the body 13 of the casing by the interengaging flanges 36 and 37, bolt 38, nut 39 and lockwasher 40, a suitable gasket being used if desired to prevent leakage.

Provisions are made for suitably mounting the bearings of the crankshaft. In this specific embodiment, these provisions comprise a capsule 46 welded or brazed on the casing 13 and containing a bearing bushing 41 for one end of shaft 52 and a similar capsule 42 brazed or welded to the opposite wall of the compressor body and also containing a bushing 43 to support the front bearing of the crankshaft. Both capsules may be attached in any well known manner as by welding indicated at 44.

The front bearing capsule 42 also acts as the housing for the stuffing box or sealing system generally used in compressors of this type. For this purpose the shell of the capsule is bent so as to form flange 45 against which a suitable sealing member such as a metal bellows 53 may be clamped through clamping plates 47 and screw 48. This metal bellows 53 carries a sealing ring 49 which bears against shoulder 54 on a portion of the crankshaft. The piston is operatively connected to the crankshaft and caused to reciprocate within the cylinders by means of piston rods 50 which likewise may be made of sheet metal halves welded or riveted together. These engage suitable eccentrics such as 51 which are keyed to the shaft 52.

The crankcase is provided with an inlet opening 58 having a surrounding boss 59 to which is secured the nipple 60. In operation, the fluid to be compressed enters the crankcase through the opening 58 and passes into the cylinders through openings 61. After compression, the compressed fluid is forced outwardly through the outlet apertures 28.

It is to be observed that the cylinders do not contact along their entire exterior body with the interior of the compressor but that they are retained rigidly in sealing relation with the body of the casing at the uppermost portion thereof as shown in Fig. 1 and as hereinbefore described.

By means of the structure shown and described above it is possible to construct a compressor either for air compression or for use in mechanical refrigerators which may be produced very economically and with great precision since the parts are all adapted to be individually manufactured separately from each other and are adapted to be united readily into a composite working structure. Likewise the structure is equally capable of being dismantled for repair and replacement purposes, thus reducing up-keep to a minimum. It is appreciated that if one piston or cylinder should become scored or damaged, it is not necessary to discard the entire block including the good cylinders but that it is merely necessary to remove the defective one, insert a replacement and continue operating as before.

Furthermore since the body is made of pressed sheet metal the amount of defective compressors produced is reduced since there is no danger of blowholes or flaws in the metal, which is a difficulty encountered in the construction of cast compressors.

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. In a compressor for refrigerants, in combination, a sheet metal housing adapted to form a crank case portion and a cylinder supporting portion, a cast metal cylinder secured to said last mentioned portion, a shaft projecting into said crank case portion, bear-

ings for said shaft secured to said sheet metal housing and a piston in said cylinder, said piston being operatively connected to said shaft.

2. For compressors for refrigerants, a sheet metal housing having a substantially integral cylindroid shape forming a cylinder supporting portion and a crank case portion therein, and a flange at both ends of said housing and removable sheet metal closure members supported on said flanges.

In testimony whereof I hereto affix my signature.

OTTO M. SUMMERS.