Aug. 14, 1934. G. E. TUBBS ET AL 1,970,260

COMPRESSOR

Original Filed June 6, 1932 2 Sheets-Sheet 1

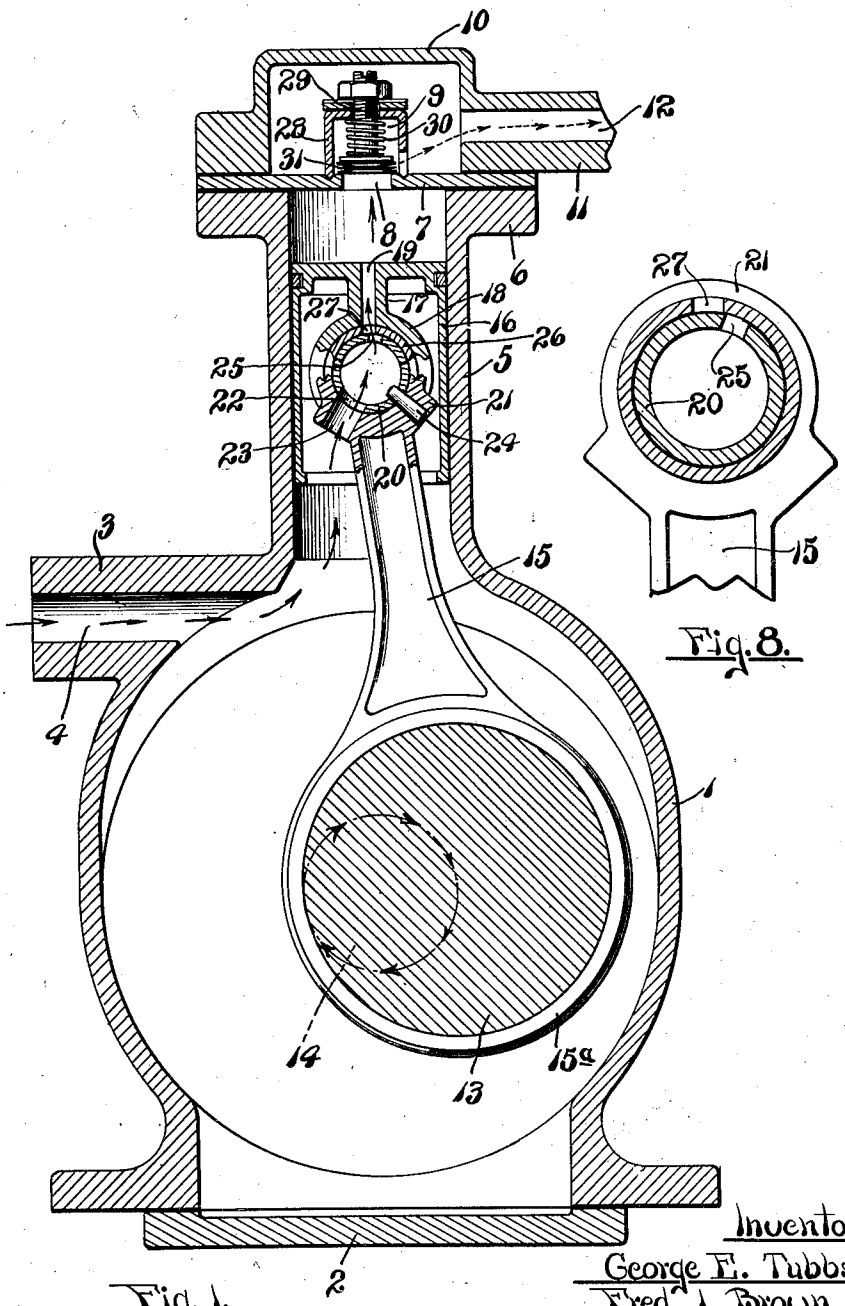


Fig. 1.

Fig. 8.

Inventors
George E. Tubbs
Fred L. Brown
By Liverance and
Van Antwerp
Attorneys

Aug. 14, 1934. G. E. TUBBS ET AL 1,970,260

COMPRESSOR

Original Filed June 6, 1932 2 Sheets-Sheet 2

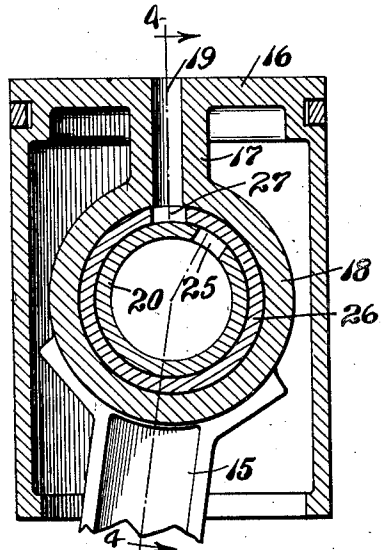


Fig. 2.

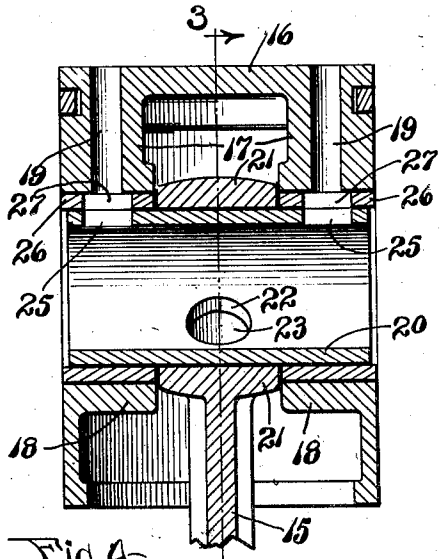


Fig. 4.

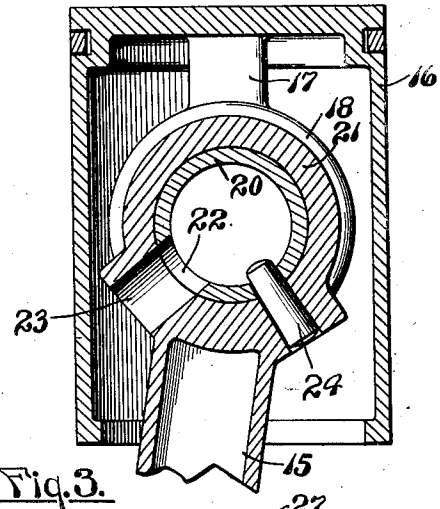


Fig. 3.

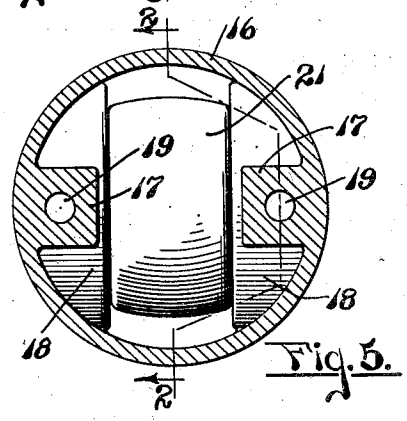


Fig. 5.

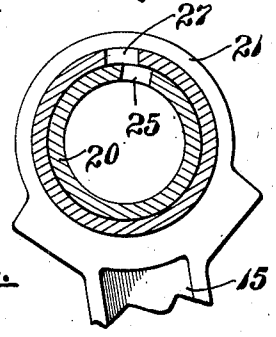


Fig. 6.

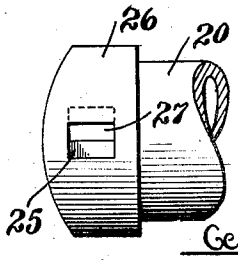


Fig. 7.

Inventors
George E. Tubbs
Fred I. Brown
By Livernance and Van Antwerp
Attorneys

Patented Aug. 14, 1934

1,970,260

UNITED STATES PATENT OFFICE

1,970,260

COMPRESSOR

George E. Tubbs and Fred I. Brown, Hillsdale, Mich.; said Brown assignor of one-sixth to said Tubbs

Application June 6, 1932, Serial No. 615,630
Renewed July 5, 1934

3 Claims. (Cl. 230—221)

This invention relates to compressors and in particularly concerned with a very durable and simply and economically constructed compressor, useful in refrigerating units.

It is a primary object of the present invention to provide an exceedingly economical, durable and practical compressor and one which is particularly useful in compressing gases in a refrigerating system or unit such as is used in relatively small refrigerators as in households, dispensing with the use of ice as a refrigerant.

The construction embodying our invention may be understood from the following description, taken in connection with the accompanying drawings, in which,

Fig. 1 is a central vertical section through the compressor of our invention.

Fig. 2 is a vertical section through the compressor piston, substantially on the plane of the broken line 2—2 of Fig. 5.

Fig. 3 is a vertical section on the plane of line 3—3 of Fig. 4.

Fig. 4 is a vertical section substantially on the plane of line 4—4 of Fig. 2.

Fig. 5 is a horizontal section through the upper portion of the piston.

Fig. 6 is a section of the piston rod and the sleeves associated therewith in connecting it operatively with the piston, the section being on the same plane as in Fig. 2 but showing the piston rod in a different position with relation to the piston.

Fig. 7 is a fragmentary plan view of the sleeves interposed between the piston rod and the piston, and

Fig. 8 is a view, similar to Figs. 2 and 6, showing the position of the parts when the piston rod is at a dead center at either the upper or lower position of the piston.

Like reference characters refer to like parts in the different figures of the drawings.

In the construction of the compressor a casing 1 is provided, closed at its lower end by a base plate 2, and having an inlet 3 with a passage 4 at the upper portion of the casing 1. A cylinder 5 integral with said casing 1 extends vertically therefrom terminating at its upper end in an annular outwardly extending flange 6. A flat plate 7 covers the upper end of the cylinder, extends over the flange 6 and has a central opening 8 therein over which is a valve, generally indicated at 9, which normally closes the opening 8. A housing 10 is located over the plate 7 and the valve 9 and has an outlet 11 with an outlet passage 12 therethrough all as shown in Fig. 1.

In the casing an eccentric 13, mounted on a shaft 14, indicated in dotted lines, is located, and a piston rod 15 at its lower end has a ring section 15a over the eccentric 13 whereby on rotation of the shaft 14 the piston rod is reciprocated and the piston 16 connected therewith is moved up and down in the cylinder 5.

The piston 16 at opposite sides and at its inner portion has integral vertical bosses 17 terminating at their lower ends in cylindrical bosses 18 similar to and having the same purpose as wrist pin bosses. Each of the bosses 17 has a vertical passage 19 therein extending to and communicating with the horizontal openings through the bosses 18.

A tubular member 20 extends transversely through the upper end 21 of the piston rod 15, which upper end is bored and machined for the passage of the member 20. An opening 22 through a side of the tubular member 20, substantially midway between its ends, is in conjunction with an entrance opening 23 in the upper part 21 of the piston rod. The tubular member 20 is held fixed with relation to the piston rod by a pin 24 connecting the same as shown in Fig. 3. The tubular member 20 adjacent each end is provided with further openings 25, as shown.

Around each end of the tubular member 20 is a tubular sleeve 26 secured in the boss 18 and extending therethrough, the inner ends of the sleeves 26 coming to the ends of the upper portion 21 of the piston rod, while the outer ends of the sleeves are shaped in conformity to the outer surface of the piston and to the inner walls of the cylinder 5 in which the piston is located. The sleeves 26 have openings 27 in conjunction with the passages 19 shown in Figs. 2 and 4.

The valve 9 within the casing or valve chamber 10 in structure includes an inverted U-shaped housing 28, with an opening at one side as shown, a threaded rod or bolt 29 within said casing and extending at its upper end through the upper side thereof, a compression spring 30 between the head of the bolt at its lower end and the upper side of the casing and disc member 31 of thin sheet metal, three in number, the lower of which is of convex form looking at its upper side, the intermediate one of plane form and the upper of concave form viewed from its upper side. The specific structure of this valve is not concerned in the present invention as it is to be the subject matter specifically of a further application for patent.

The shaft 14 is rotated from any suitable source of power whereby there is caused a reciprocation of the piston 16. With the piston rod 15 changing position by reason of the movement of the eccentric 13, the tubular member 20 secured to the piston rod is rocked back and forth so that at certain times the openings 25 and 27 are in conjunction, and at other times out of conjunction with each other. At the upper and at the lower positions of the piston the openings 25 and 27 are not in conjunction but are as shown in Fig. 8. On the down-stroke of the piston openings 25 and 27, being closed to each other for a short period, a high vacuum will be induced in the cylinder 5 above the piston so that when said openings 25 and 27 either partly or wholly come into conjunction the gaseous refrigerant enters through the passages 19 to the chamber above the piston. Then on the up-stroke when the openings 25 and 27 are again closed to each other such gases above the piston are heavily compressed and lift the valve so as to pass through the opening 8 and thence outwardly through the outlet passage at 12.

This construction of compressor is of a very simple and economically manufactured form. It is silent in operation at high speeds, wear is reduced to a minimum with maintenance cost reduced to its lowest point, whereby the compressor is very durable and dependable and positive at all speeds both high and low. The valve at 9 is positively sealed, there is no chance for deposit on the valve seat or face and there is assurance of continuous operation under most severe and exact operation conditions. The tubular member 20 which serves the purpose of a wrist pin is of ample size to provide a large bearing surface, this enhancing the durability of the compressor. The materials used are suitable alloys that resist chemical action, it being understood that the refrigerating fluid, such as sulphur dioxide or other suitable refrigerant must be taken into account in the design of the compressor. The construction is very easily manufactured, the parts being readily and easily machined, quickly and easily assembled and there are no parts to get out of order. The test and trial of the compressor has shown the same to be exceptionally satisfactory, particularly durable and exceedingly economical both in manufacturing cost and operation.

The invention is defined in the appended claims and is to be considered comprehensive of all forms of structure coming within their scope.

We claim:

1. In a compressor comprising, an enclosed casing having an inlet thereinto, a cylinder extending from the casing and in communication therewith, a piston in the cylinder, said cylinder having an opening in its outer end, a valve normally closing said opening, the combination of means for reciprocating the piston, including a piston rod and connections between said piston rod and piston, said connections comprising, a tubular piston pin having communication with said casing and an outlet opening therein, and said piston having a passage leading from said tubular piston pin to the upper end of the piston, there being connections between the piston rod and piston pin for rocking the piston pin on reciprocation of the piston to periodically open and close communication between said passage in the piston and the outlet opening in the tubular piston pin.

2. In combination, a piston having a closed upper end and a depending skirt, and having inwardly extending wrist pin bosses and also having vertical bosses extending downwardly from the upper end of the piston to wrist pin bosses, there being vertical passages from the upper end of the piston to and through a side of said wrist pin bosses, a tubular piston pin located in and extending between said wrist pin bosses having openings adjacent its ends and at one side, a sleeve around each end of the tubular piston pin secured in each of said wrist pin bosses and having openings in communication with said passages, and a piston rod secured to said tubular piston pin between the ends of said sleeves, said tubular piston pin and adjacent portion of the piston rod having alined openings therethrough, for the purposes specified.

3. In combination, a piston located in a cylinder having downwardly extending diametrically opposed bosses at its inner sides terminating in cylindrical wrist pin bosses, said bosses having longitudinal passages therethrough, a tubular piston pin extending through said wrist pin bosses, a piston rod having an upper end portion in the form of a sleeve, means securing the piston rod and the tubular piston pin together, said piston pin and sleeve having alined openings therethrough, and said tubular piston pin having openings in a side thereof adjacent each end adapted to be brought into conjunction with the passages through said bosses, and sleeves one around each end of the tubular piston pin secured in the wrist pin bosses and having openings in conjunction with the passages in the piston bosses.

GEORGE E. TUBBS.
FRED I. BROWN.