May 4, 1926. 1,583,156

C. E. JEFFERS

COMPRESSOR FOR REFRIGERATING PLANTS

Filed July 17, 1924 3 Sheets-Sheet 1

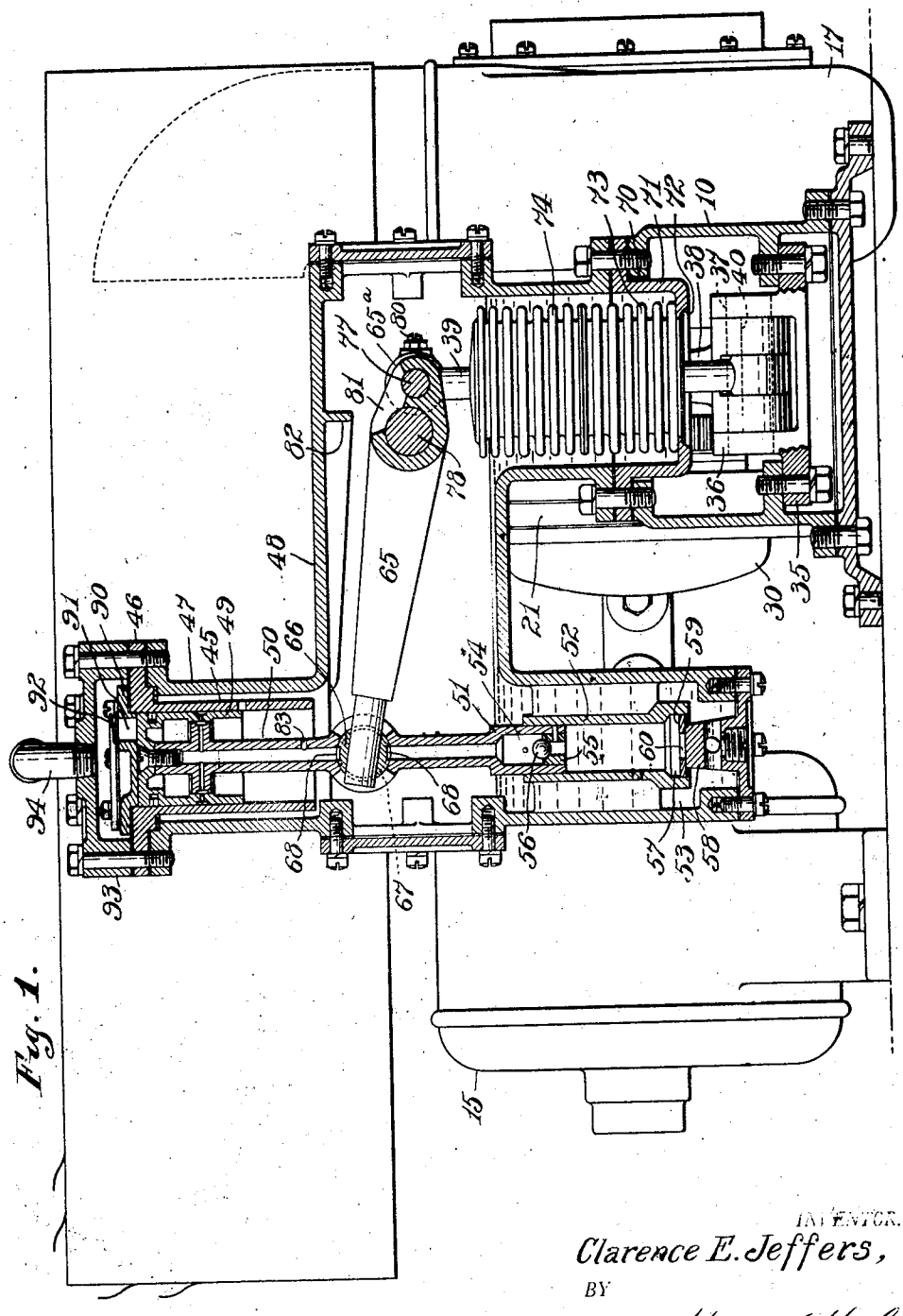


Fig. 1.

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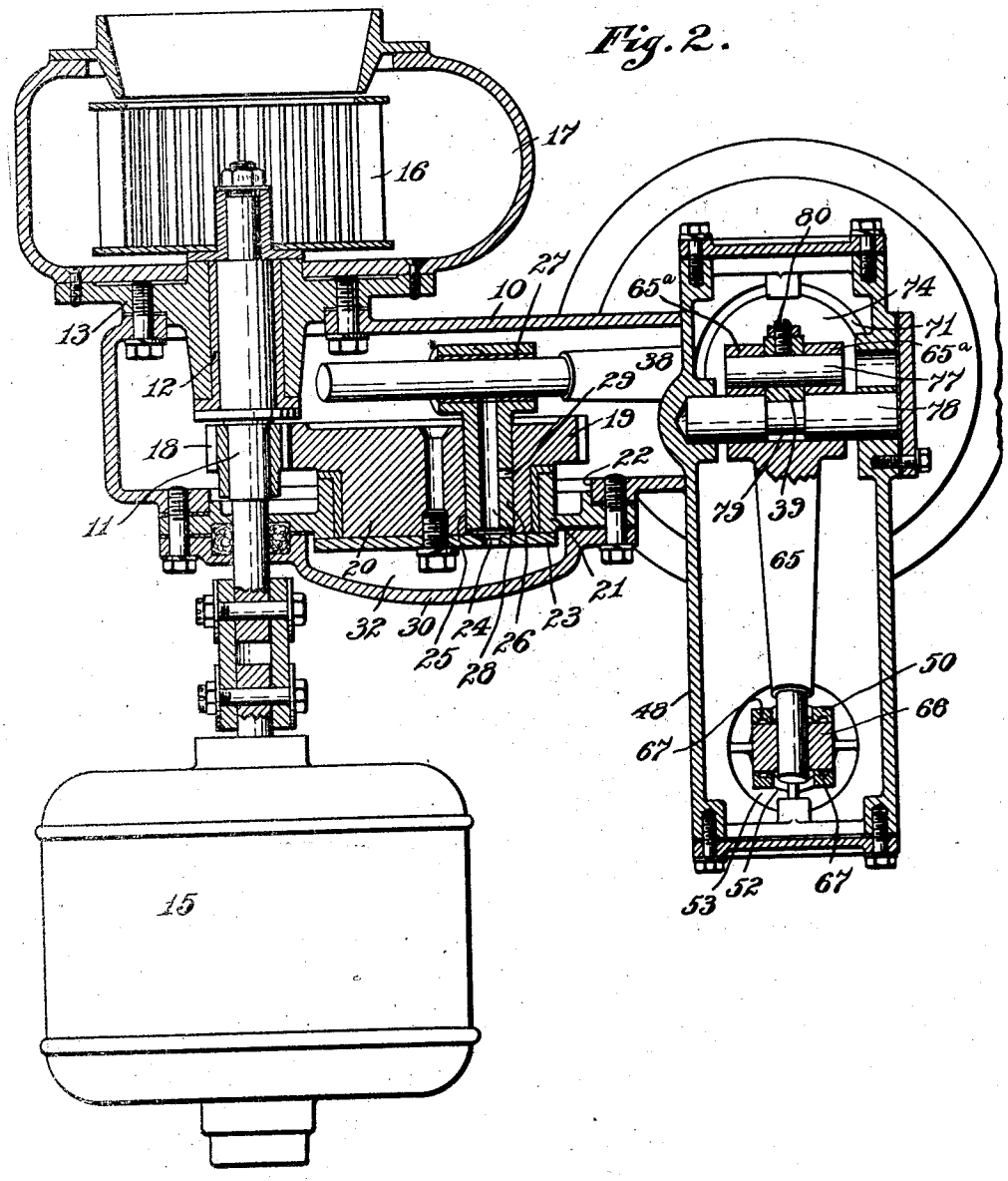
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Fig. 2.



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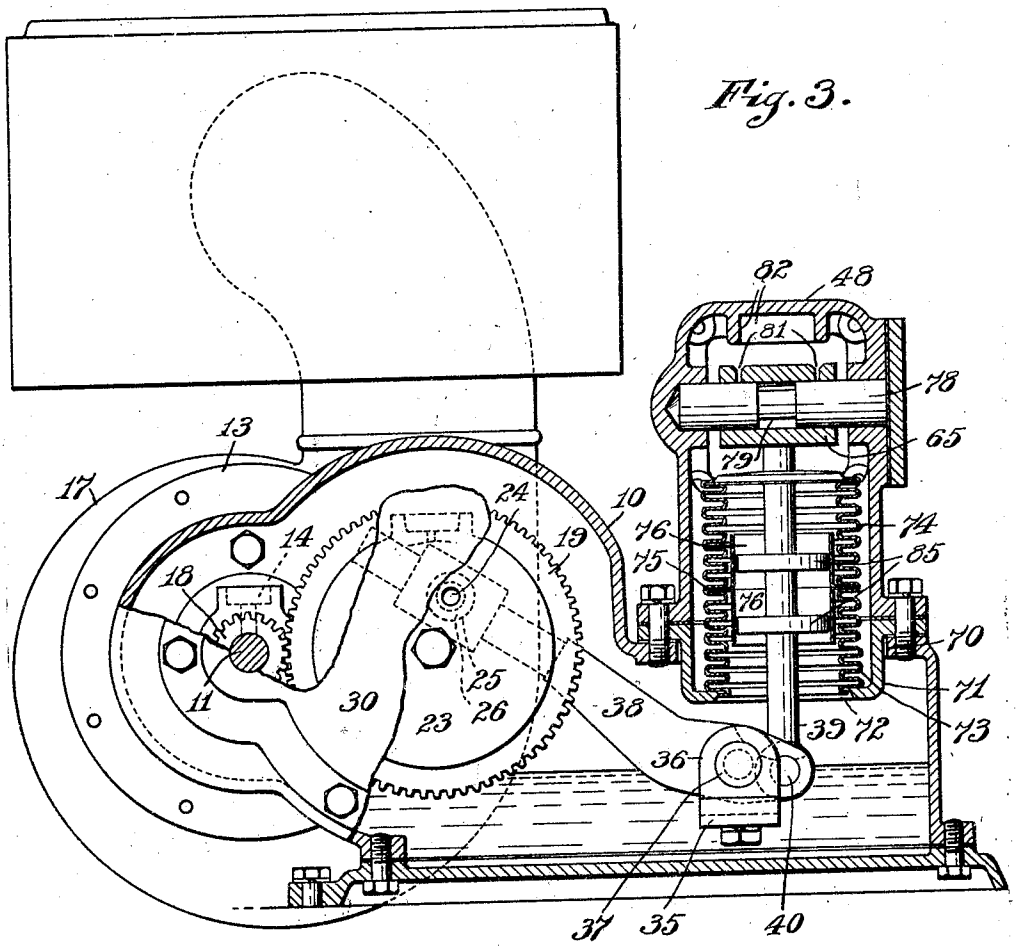
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Fig. 3.



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UNITED STATES PATENT OFFICE.

CLARENCE E. JEFFERS, OF INDIANAPOLIS, INDIANA, ASSIGNOR TO MERVIN V. ARNOLD, OF EVANSVILLE, INDIANA.

COMPRESSOR FOR REFRIGERATING PLANTS.

Application filed July 17, 1924. Serial No. 726,427.

To all whom it may concern:

Be it known that I, CLARENCE E. JEFFERS, a citizen of the United States, residing at Indianapolis, in the county of Marion and State of Indiana, have invented a new and useful Compressor for Refrigerating Plants, of which the following is a specification.

The object of my invention is to produce a neat, efficient and compact compressor for refrigerator units, more particularly of the type for use in household refrigeration.

The accompanying drawings illustrate my invention. Fig. 1 is a side elevation in partial vertical section of a machine embodying my invention; Fig. 2 is a horizontal section, on a distorted section plane, and Fig. 3 a vertical section in a plane at right angles to the plane of Fig. 1.

In the drawings 10 indicates a power train casing in which a main shaft 11 is journaled in a bearing 12 carried by a flanged plate 13 secured to casing 10, the hub in which said bearing is formed being provided with an oil cup 14 lying within casing 10.

Connected to one end of shaft 11 is a suitable motor 15, and attached to the opposite end is a centrifugal fan 16 arranged within a fan housing 17 attached to flange plate 13.

Secured to shaft 11, within casing 10, is a pinion 18 meshing with a wrist-pin gear 19 having a hub 20 journaled in a bearing ring 21 mounted in a perforation 22 in the side wall of casing 10, said perforation being of sufficient size to permit the withdrawal of gear 19. Gear 19 is held in ring 21 by a plate 23 which is perforated at 24 opposite the end of an eccentric bore 25, in gear 19, in which is journaled the wrist pin 26 provided in its outer end with a transverse bore 27, the shank of the wrist pin being axially bored at 28 to form an oil passage between perforation 24 and bore 27 and transversely perforated at 29 to provide an oil passage between bore 28 and bore 25. A plate 30, secured over ring 21 forms an oil-retaining chamber 32 communicating with perforation 24.

Detachably secured to casing 10 is a bar 35 (Fig. 1) having ears 36 projected into casing 10 and carrying a pin 37 upon which is mounted a walking-beam 38 one end of which is cylindrical and projected into bore 27 of the wrist pin 26. The other, shorter, end of walking-beam 38 is bifurcated to receive the lower end of reciprocating rod 39 pivoted thereto by pin 40.

The compressor cylinder 45 is carried by a flanged plate 46 secured to the open upper end of an upwardly extending cylindrical portion 47 of the pump casing 48, and mounted in cylinder 45 is a compressor piston 49 provided with a rigid, axially-bored piston rod 50 which is formed at its lower end into an oil piston 51 mounted in an open-ended cylinder 52, formed in an oil sump 53 in the lower part of casing 48, the lower end of the bore of rod 50 being enlarged to form a valve chamber 54 partially closed at its lower end by a seat ring 55 upon which is seated a ball valve 56.

The lower end of cylinder 52 is enlarged at 57 and projects downwardly adjacent the upper end of a seat post 58 upon which rests a valve ring 59 centrally perforated at 60, said ring having a close but sliding fit with the enlargement 57 and bore 60 being of less diameter than the top of post 58, the arrangement being such that ring 59 serves as a valve between the lower end of cylinder 52 and the oil sump.

Mounted in casing 48, at right angles to piston rod 50 and substantially parallel with the axis of pin 37, is a walking-beam 65, the longer arm of which is cylindrical at its end and projected through a trunnion pin 66 journaled in piston rod 50 at an intermediate point in its length. Pin 66 is provided near each end with an annular groove 67 (Fig. 1) lying within the width of the portions of rod 50 in which the pin is trunnioned and these annular grooves are connected by axial grooves 68, (top and bottom), thereby affording a communication between the upper and lower ends of the axial bore of rod 50 for the passage of lubricant.

For the purpose of forming a gas-tight connection between the interiors of casings 10 and 48, and at the same time affording a mechanical connection between the two walking-beams 38 and 65 offering a minimum resistance to movement, I provide the following construction:

Casing 10, immediately above the short arm of beam 38, is perforated at 70 and removably mounted in this perforation is a cup 71 having a central opening 72 over which is rigidly mounted, as by soldering or otherwise (as clearly shown in Fig. 3) the

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lower end of a metal bellows 73 to the upper end of which is secured the lower end of a second bellows 74 aligned therewith, the connection between these two bellows being preferably formed by brazing or soldering to and between them the outwardly turned flanges 75 of cylindrical guides 76 axially arranged within the bellows, for a purpose which will appear. The upper end of the upper bellows 74 is rigidly secured in a gas-tight manner, to the rod 39. The upper end of rod 39 lies between two ears 65^a, 65^a, forming a short arm of beam 65 and is pivoted thereto by means of pin 77.

Pin 65 is journaled on a pin 78 which is medially grooved at 79 so that the upper end of rod 39 will lie therein, (as clearly shown in Fig. 2) thereby being locked in place, pin 77 being held in place by a temper screw 80. Each of the ears 65^a is provided in its upper surface with a shallow groove 81 which gives oil access to the surfaces of pins 77 and 78, these grooves receiving an oil supply by drippage from a flange 82 formed on the under surface of the top of casing 48 and extending forwardly in two arms to a position to receive oil discharge through a perforation 83 in rod 50, the arrangement being such that on the down stroke of rod 50 a jet of oil is delivered through perforation 83 into the space between and upon rib 82.

Reciprocation of rod 39 results in alternate axial compression and expansion of the bellows 73—74 and, as this bellows is of considerable length and a comparatively small diameter, it is capable of withstanding any high pressure exerted externally thereon and an indefinite number of flexings. Lateral buckling is prevented by the co-action between the cylindrical guides 76 and collars 85 carried by rod 39 at proper intermediate points, as shown in Fig. 3.

The upper end of cylinder 45 is closed by head 90 having an exhaust passage 91 controlled by a suitably guarded valve tongue 92 and head 90 is in turn covered by cover plate 93 to which the delivery pipe 94 for the liquefied refrigerant is connected.

I claim as my invention:

1. A refrigerant compressor comprising a casing forming a gas chamber, a compression cylinder and piston communicating with said chamber, a walking beam in said chamber connected to said piston, a motor, a driving train between said motor and walking beam including a reciprocating rod, and a bellows associated with said rod and casing to close the chamber gas-tight and be expansible and contractible axially with said rod.

2. A refrigerant compressor comprising a casing forming a gas chamber, a compression cylinder and piston communcating with said chamber, a walking beam in said chamber connected to said piston, a motor, a driving train between said motor and walking beam including a reciprocating rod, and a bellows encompassing said rod and connected at one end to the rod and at the other end to the casing to form a gas-tight closure for the casing.

3. A refrigerant compressor comprising a casing forming a gas chamber, a compression cylinder and piston communicating with said chamber, a motor, a driving train between said motor and piston including a reciprocating rod, and a bellows encompassing said rod and connected at one end to the rod and at the other end to the casing to form a gas-tight closure for the casing, and a sliding connection between the rod and bellows intermediate the length of the bellows.

4. A refrigerant compressor comprising a casing forming a gas chamber, a compression cylinder and piston communicating with said chamber, a walking-beam mounted in said chamber and connected to said piston, a motor, a second walking-beam connected to said motor, a rod connecting the two walking-beams, and a gas-tight closure between said rod and casing, comprising a bellows arranged lengthwise of said rod and connected at its ends to said rod and casing respectively, and a sliding connection between said rod and bellows intermediate the ends of the bellows.

5. A refrigerant compressor comprising a casing forming a gas chamber, a compression cylinder and piston communicating with said chamber, a walking-beam mounted in said chamber and connected to said piston, a motor, a second walking-beam connected to said motor, a rod connecting the two walking-beams, a gas-tight closure between said rod and casing, and a sliding connection between said rod and bellows intermediate the ends of the bellows.

6. A refrigerant compressor comprising a casing forming a gas chamber, a compression cylinder and piston communicating with said chamber, a walking-beam mounted in said chamber and connected to said piston, a motor, a second walking-beam connected to said motor, a rod connecting the two walking-beams, and a gas tight closure between said rod and casing.

7. A refrigerant compressor comprising a casing forming a gas chamber, a compression cylinder communicating therewith, a tubular piston rod connected at one end to said piston, a second piston connected to the other end of said rod, an oil sump and cylinder in which said second piston is arranged, a valve seat in the lower end of said oil cylinder, an annular valve normally resting upon said seat, movable upwardly therefrom, and normally closing communication between the oil cylinder and sump.

8. A refrigerant compressor comprising a casing forming a gas chamber, a compression

cylinder communicating therewith, a tubular piston rod connected at one end to said piston, a second piston connected to the other end of said rod, an oil sump and cylinder in which said second piston is arranged, means for causing oil flow through said piston rod, a walking-beam for driving said rod, and an oil guide carried by the casing in position to receive oil from the piston rod and guide it to the walking-beam bearings.

9. In a refrigerant compressor, a casing having a perforated side wall, a perforated plate closing said perforation, a gear having a hub journalled in said plate, a retaining-plate attached to said hub and engaging the first mentioned plate, a cover secured to said first mentioned plate and forming a lubricant chamber over the plate end of the gear, and a wrist pin journalled eccentrically in the gear and channelled to communicate with said lubricant chamber.

In witness whereof, I have hereunto set my hand at Indianapolis, Indiana, this 3rd day of July, A. D. one thousand nine hundred and twenty-four.

CLARENCE E. JEFFERS.