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B. YOUNG

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PISTON AND PACKING RING STRUCTURE

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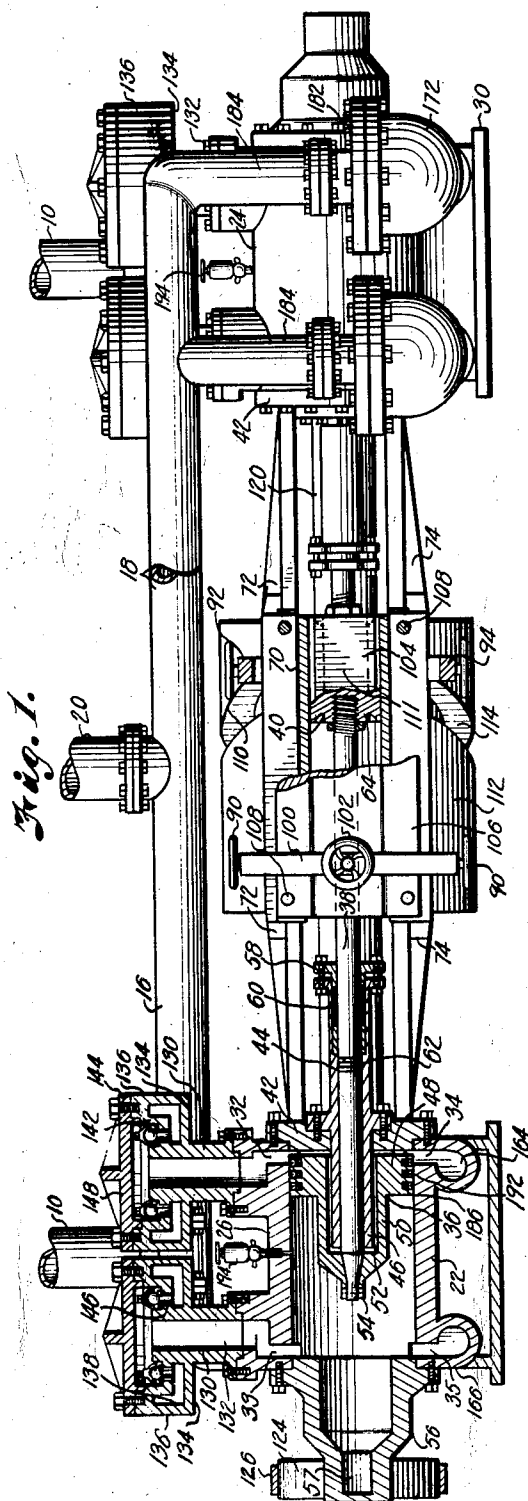


Fig. 4.

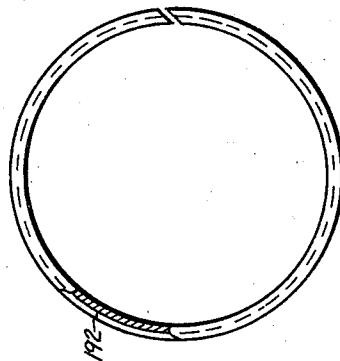


Fig. 5.

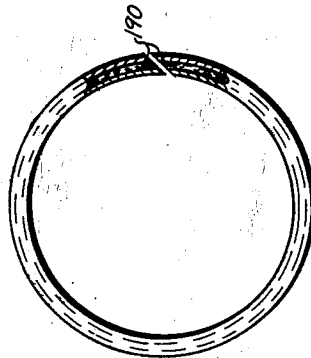
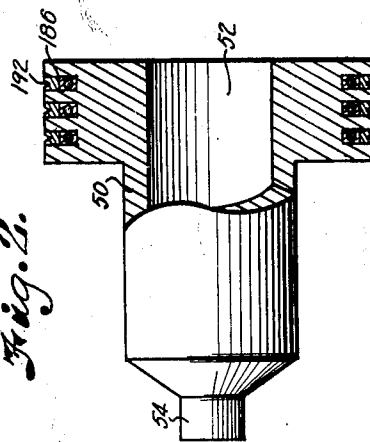


Fig. 2.



INVENTOR.
Bruce Young
BY *Wm. D. Brown*
ATTORNEY.

UNITED STATES PATENT OFFICE

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PISTON AND PACKING RING STRUCTURE

Bruce Young, Tulsa, Okla.

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2 Claims. (Cl. 309—43)

This invention relates to pumps, and more particularly to piston and packing rings of compressors used for transferring vapors and discharging the vapors under pressure.

5 The principal objects of the invention are to increase the velocity of vapors discharged by a compressor, and to provide a pump that will operate efficiently at high speeds for transferring vapors.

10 A particular object of the invention is to effect movement of hot oil vapors through a cracking zone at sufficiently high velocities and pressures to effect true vapor phase cracking of oil vapors.

15 In accomplishing these and other objects of the invention, I have provided improved details of structure, the preferred form of which is illustrated in the accompanying drawing, wherein:

20 Fig. 1 is a front elevation of vapor pumping apparatus with parts broken away to disclose a piston and rings embodying my invention and shown in central section.

Fig. 2 is an elevation partly in vertical section of a piston showing novel piston rings.

25 Fig. 3 is a plan view of a hollow piston ring, the wall thereof being broken away to show plugs retaining mercury in the ring.

Fig. 4 is a plan view of a metal sealing ring having a peripheral groove.

Referring more in detail to the drawing:

30 The pumping apparatus to which the present application is directed preferably includes sets or pairs of opposed spaced piston cylinders 22—24 and 26—28 arranged horizontally and supported by bases 30, as best observed by comparing Figs. 1, 2 and 3. The cylinders have pairs of inlet and outlet passages 32—33 and 34—35 communicating respectively and separately with the inlet and outlet conduit branches and are fitted with pistons 36 having rods 38 connected with driving heads 40, all constructed and supported as later described in detail, for transferring hot oil vapors.

40 Fixed to the facing open ends of each pair of opposed cylinders are plates 42 having center openings. Sleeves 44 including portions 46 projecting substantial distances into the cylinders are fixed to the plates to form liners or guides in which the rods operate to prevent whipping of rods when the same reciprocate at high speeds.

45 The pistons include cylindrical body portions 48 and tubular portions 50 forming recesses 52 for the sleeve portions 46 and permit the piston bodies to approach closely to the end plates. The ends of the rods are fixed in reduced end portions 54 of the piston projections, which move into and out of recesses formed by caps 56 clos-

ing the opposite ends of the cylinders and having reduced axial pockets 57 for the reduced ends of the piston projections.

The sleeves are extended outwardly from the cylinder plates 42 and support glands 58 and packing 60 engaging the rods to seal the sleeves. Rings 62 are also located in grooves in the rods to engage the inner peripheries of the sleeves adjacent the glands for supplementing the sealing action of the glands.

10 Referring again to the pistons, attention is called to the fact that the body portion of each piston moves transversely across the elongated inlet and outlet passages, and is permitted to approach the end closures of each cylinder closely 15 because of the telescoping relation of the piston rod sleeve, and the entrance of the reduced end portion of the piston into the hollow cap.

Each piston body is provided with a plurality of annular peripheral grooves 186 formed in the 20 body of the piston, preferably three in number, as best shown in Figs. 1 and 2, and a plurality of overlapping rings are mounted in each groove.

The inner ring of each group of rings comprises a liquid containing member preferably 25 consisting of an expansible tube having beveled ends adapted to cause the ends to abut snugly when the tube is arranged in the circle and tend to lock the tube in circular form.

A quantity of liquid, preferably mercury, is enclosed in the tube and retained by closing the 30 apertures through which the mercury was introduced, in any suitable manner, for example by inserting plugs 190 in the ends of a tube whereby expansion of the mercury due to increase of 35 temperature of the piston will cause the ring to expand and press the outer ring against the inner periphery of the cylinder.

The outer rings are preferably formed of metal steel and have peripheral V-shaped grooves 192 40 formed on inclines of 60° and forming rim-like edges to engage the cylinder surface, thus reducing friction and increasing the number of sliding surfaces of a ring that engage the cylinder. The grooves further form reservoirs or 45 channels in which mercury may be collected and retained for lubricating the sliding surfaces of the piston and cylinder.

The outer metal rings thus form jackets which protect the expansible inner rings and provide 50 the friction surfaces which are held with increasing tightness against the cylinders upon increase of temperature so that an effective seal is produced even at high temperatures.

55 Sight feed lubricators 194 containing mercury

have downwardly directed nipples mounted on the cylinder walls in channels having restricted outlet ports as shown in Fig. 2. Valves 196 control flow of mercury to the cylinders to be picked up by the grooved rings and pistons with the reciprocating motion of the pump. The lubricators are adapted to stand the temperatures and pressures to which they are subjected.

Attention is particularly called to the use of mercury as a sealing agent and also to the service of the mercury as a lubricant for the sliding surfaces of the piston and cylinder, the mercury in the hollow inner rings in the piston grooves, when heated, causing expansion of the outer rings against the inner surface of the cylinder to enhance the sealing service of the outer rings.

What I claim and desire to secure by Letters Patent is:

1. A split ring having an interior channel extending circularly within the ring and closed at the split ends of the ring, and a heat expansive fluid in said channel for effecting uniform expansion of said ring throughout its circumference.

2. In an apparatus of the character described including a piston having a peripheral ring groove, sealing means for the piston including an expanding ring mounted in said groove, a second ring mounted in the groove and supporting the expanding ring and having an interior channel extending circularly within said ring, and a heat expansive fluid confined in said channel for effecting uniform expansion of said expanding ring throughout its circumference.

BRUCE YOUNG.