

July 21, 1936.

G. F. WEIHER

2,048,581

SEAL FOR REFRIGERATING APPARATUS

Filed June 30, 1934

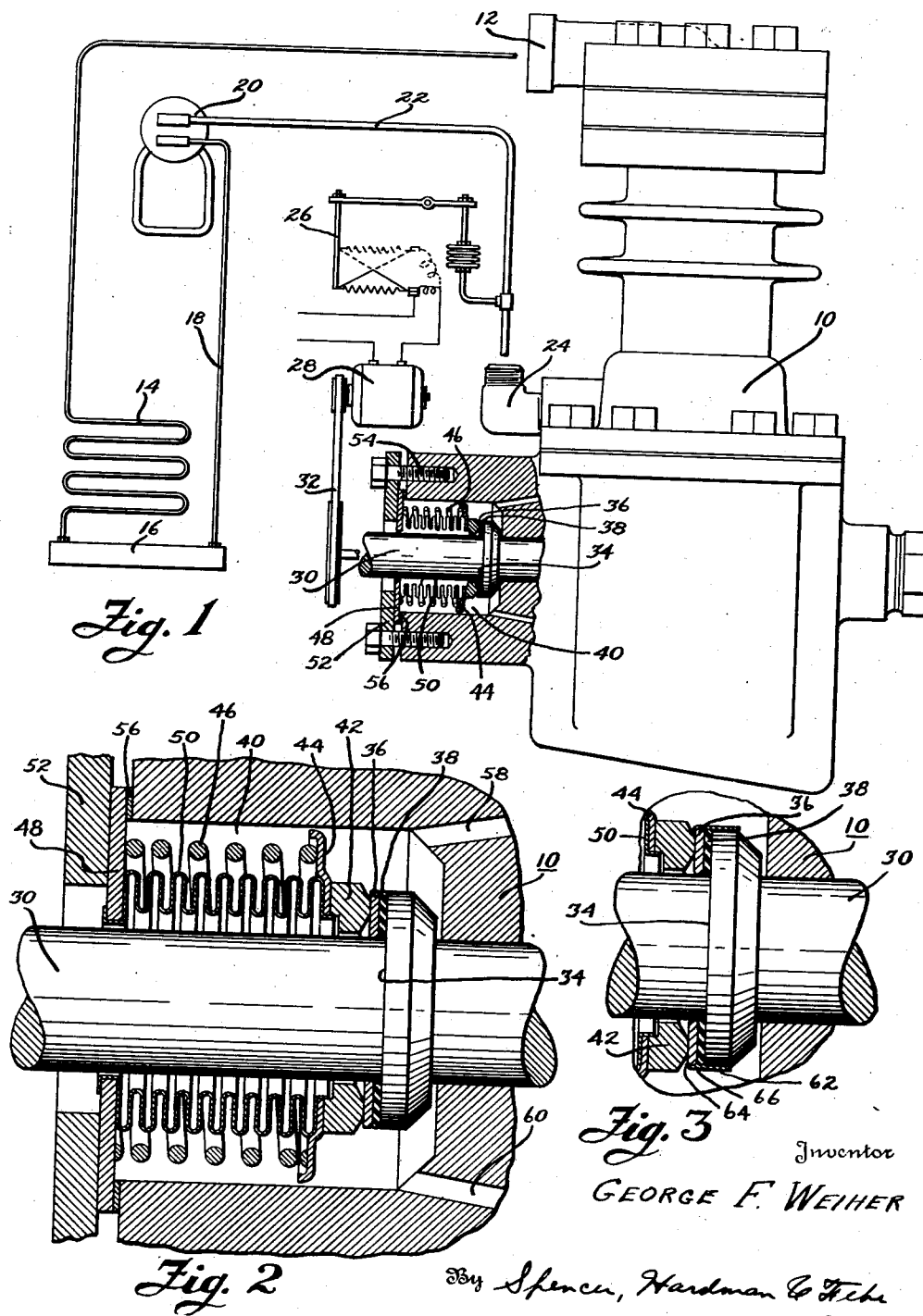


Fig. 3
Inventor
GEORGE F. WEIHER

By Spencer, Hardman & Fitch
Attorney

UNITED STATES PATENT OFFICE

2,048,581

SEAL FOR REFRIGERATING APPARATUS

George F. Welher, Dayton, Ohio, assignor to
General Motors Corporation, Dayton, Ohio, a
corporation of Delaware

Application June 30, 1934, Serial No. 733,289

2 Claims. (Cl. 286—11)

This invention relates to refrigerating apparatus and more particularly to rotary shaft seals for compressors for refrigerating systems.

In shaft seals for refrigerator compressors which are provided with a spring pressed sealing ring working against the face of the shoulder on the compressor shaft, difficulties have been experienced after long periods of service with wear on the shoulder of the compressor shaft. When the surface becomes cut or scored, or for any other reason unsuitable for further service, it is necessary to completely disassemble the compressor mechanism in order to put in a new shaft. In many instances, the remaining parts of the compressor are in sufficiently good condition so that replacement is not necessary, and it is, therefore, uneconomical to have to completely tear down the compressor in order to replace a worn surface on the compressor shaft shoulder.

It is an object of this invention to provide a seal which may be readily replaced when worn without requiring a complete disassembly of the compressor.

It is also an object to provide a replacement sealing surface which may be applied to existing compressors having worn shaft shoulder surfaces without requiring disassembly of the compressor.

A further object is to provide a sealing ring which may be applied to a compressor shaft and which will be sealed thereto in a manner which is both gas tight and frictionally secure.

Another object is to provide a sealing ring which will be sealed to the shaft of a compressor by means of a sealing gasket formed of a synthetic rubber-like material which is resilient and which will not deteriorate under the action of oils and the common refrigerants encountered in refrigerating systems.

A further object is to provide a sealing ring for application to a shouldered shaft which will be retained in position solely by the action of the pressure of the coacting sealing ring upon the first ring.

Another object is to provide means in the present type of replaceable sealing ring for preventing displacement of the resilient rubber-like gasket.

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 drawing:

Fig. 1 is a view of a refrigerating system embodying the present invention, the compressor being shown on a larger scale and having the shaft seal portion thereof shown in cross section;

Fig. 2 is an enlarged view of the shaft seal shown in Fig. 1; and

Fig. 3 is a view of the modification of certain parts of the shaft seal.

Referring to Fig. 1, there is shown diagrammatically a refrigerating system comprising a compressor 10, having a discharge passage 12 communicating with the condenser 14, which in turn leads to a liquid refrigerant receiver 16 connected by a conduit 18 with an evaporator 20 which may contain the usual float valve for regulating the expansion of liquid refrigerant therein, and a low side conduit 22 leading from the evaporator to the intake 24 of the compressor. A low pressure control switch 26 is shown for controlling the motor 28 which in turn drives the shaft 30 of the compressor 10 by a belt drive 32.

The shaft seal construction is shown in detail in Fig. 2, wherein the compressor shaft 30 is provided with a shoulder 34. A sealing ring 36 is located on the shaft 30 adjacent the end face of the shoulder 34 and is sealed to the shaft 30 and shoulder 34 by a gasket 38 which is preferably formed of a resilient rubber-like material capable of withstanding the deteriorating effects of mineral and other oils and the common refrigerants. Such a material may, for example, be a polymer of chloro-2-butadiene-1,3 known in the trade as "Duprene". The main casing of the compressor is formed with a recess 40 adapted to receive the shaft seal mechanism. A sealing ring 42 coacts with the sealing ring 36 to form a running seal and is carried by a spring plate 44 which is urged to the right by a spring 46 abutting its opposite end against a fixed plate 48. The plate 48 has sealed thereto, as by soldering, a bellows 50 which at its opposite end is secured, as by soldering, to the spring plate 44 and sealing ring 42. The plate 48 and parts carried thereby are retained in position and sealed to the end wall of the compressor by a clamping plate 52 and bolts 54, a gasket 56 being interposed between plate 48 and the end wall of the compressor.

In operation, the spring 46 urges the spring plate 44 and the sealing ring 42 into close contact with the sealing ring 36. The bellows 50 maintains an impervious and yet end-wise expansible seal between the sealing ring 42 and the

wall of the compressor. The pressure of the
 spring 46 is transmitted to the sealing ring 36
 by the sealing ring 42, which pressure in turn
 compresses the gasket 38 causing it to form a gas
 tight seal between the ring 36 and the shoulder
 34 and also maintaining the ring 36 frictionally
 fixed to the shoulder 34 and shaft 30. As the
 shaft rotates, the running joint between the
 ring 36 and the ring 42 is maintained closed by
 the spring 46 and with a supply of lubricant,
 which is introduced from the compressor crank
 case through the passage 58, maintains a gas
 tight running seal. Passage 60 is provided for
 returning excess lubricant to the crank case.
 In compressors which are provided with a
 sealing ring 36 and a gasket 38 when first con-
 structed, the only work necessary to be done
 when the face of the ring 36 becomes unsuit-
 able for maintaining a seal due to wear, is to re-
 move the bolts 54 and plate 52 together with the
 expandable seal assembly comprising the parts
 numbered from 42 to 50 inclusive. The ring 36
 and gasket 38 may be then pried off with a
 suitable tool and a new ring and gasket replaced
 and the seal then reassembled. Thus, the present
 invention makes it unnecessary to completely
 disassemble the compressor and provide a
 complete new compressor shaft when the
 wearing surface corresponding to that on the
 shaft shoulder in the conventional type of seal
 becomes unsuitable for further service. Like-
 wise, it will be seen that in compressors original-
 ly constructed without the replaceable ring 36
 and gasket 38 that when the surface of the
 shoulder 34 becomes worn, the seal assembly
 may be removed and a ring 36 and gasket 38
 be placed on the shaft to thus provide a new
 running surface for the shaft seal in the man-
 ner described above.
 In the modification shown in Fig. 3, the cor-
 responding parts bear corresponding reference
 numerals. The ring 36, however, is provided
 with a collar member 62 of a ductile metal which
 is retained on the ring 36 by being spun thereon
 as at 64 and 66. The action of the seal shown
 in this modification is identical to that shown
 in Fig. 2 with the additional advantage that the
 collar 62 retains the gasket 38 against any tend-

ency to expand radially under endwise pressure
 transmitted from the spring 46 through the seal-
 ing ring 42. The collar 62 may also be made of
 such size that it will be retained frictionally on
 the shoulder 34, thus assisting in maintaining the
 ring 36 securely fastened to the shaft 30 and
 shoulder 34.

While the form of embodiment of the inven-
 tion 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. A replacement sealing ring for a shaft seal
 which includes a shaft having a shoulder thereon
 formed with a sealing face which may become
 unserviceable from wear, comprising the com-
 bination of a hardened metallic ring having a
 polished hard sealing surface and a thin flex-
 ible gasket formed of a material having the
 characteristics of flexibility, resilience and re-
 sistance to deterioration from contact with oil
 and the common refrigerants, said ring and
 gasket being adapted to overlie the worn face of
 the shaft shoulder and to be retained with the
 ring sealed to the shoulder of the gasket, and
 means including a member of softer metal sur-
 rounding the periphery of said ring and gasket
 for preventing radial expansion of the same
 under axial pressure, said member overlying and
 being in frictional engagement with the should-
 er upon the shaft.
2. A replacement sealing ring for a shaft seal
 which includes a shaft having a shoulder there-
 on formed with a sealing face which may be-
 come unserviceable from wear, comprising the
 combination of a hardened metallic ring having
 a polished hard sealing surface and a thin flex-
 ible gasket formed of a polymer of chloro-2-
 butadiene-1,3, said ring and gasket being
 adapted to overlie the worn face of the shaft
 shoulder and to be retained with the ring sealed
 to the shoulder of the gasket, and means in-
 cluding a member of softer metal surrounding
 said ring and gasket for preventing radial ex-
 pansion of the same under axial pressure.

GEORGE F. WEIHER.