

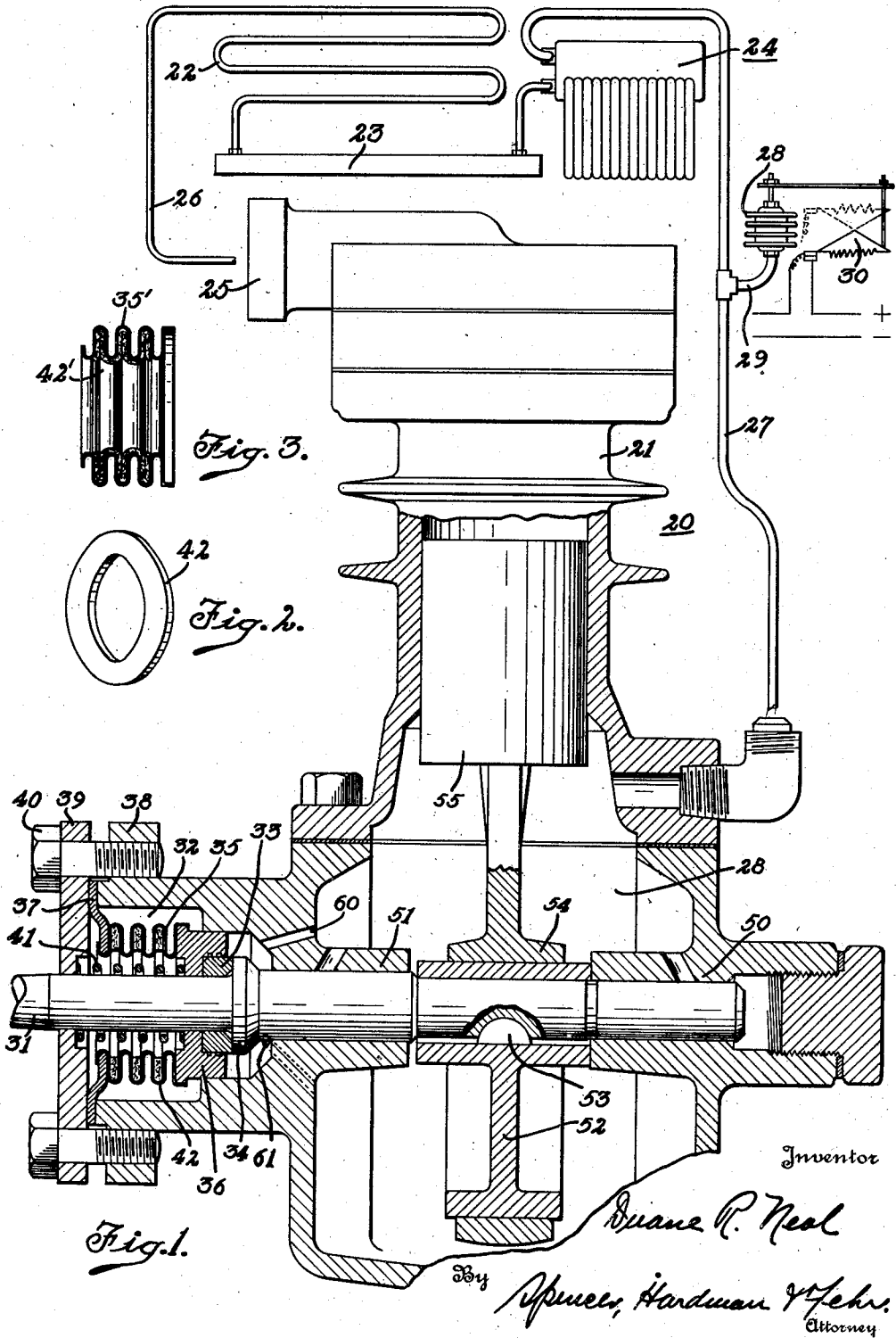
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REFRIGERATING APPARATUS

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REFRIGERATING APPARATUS

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This invention relates to refrigerating apparatus and more particularly to the sealing means for a shaft passing through a wall of the refrigerating apparatus such as the shaft of a compressor.

An object of this invention is to provide a seal for a shaft passing through a wall of the refrigerating apparatus which seal is provided with means for preventing squeaks.

Another object of this invention is to provide means for preventing audible vibrations in a flexible wall which provides a seal.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawings, wherein a preferred form of the present invention is clearly shown.

In the drawings:

Fig. 1 is a view partly in cross-section, partly in elevation and partly diagrammatic of the system embodying features of my invention;

Fig. 2 is a perspective view of a felt washer used within the seal, shown in Fig. 1; and

Fig. 3 is a cross-section of a modified form of seal.

A refrigerating system embodying features of my invention is generally designated as 20. It may comprise a compressor 21, discharging compressed refrigerant into a condenser generally designated as 22, which discharges liquefied refrigerant into a receiver 23, which in turn delivers liquefied refrigerant to an evaporator 24, from which the evaporator refrigerant returns to the compressor 20. In the embodiment shown, the compressor discharges through an outlet 25 into the pipe 26, which delivers the refrigerant to the condenser 22. The evaporator 24, which may be of the float controlled type, returns the refrigerant through the pipe 27 preferably to the crank case 28 of the compressor 21.

A motor control means may be provided for instance in the low pressure line 27 of the system, and may comprise a collapsible bellows 28 connected to the line 27 through the pipe 29. The collapsible bellows may operate a snap switch 30 which starts and stops an

electric motor which drives the compressor 21 by means of the shaft 31.

The crankcase 28 contains refrigerant under varying pressure. For instance, should the system, which is of the household refrigeration type, be disconnected from the source of electricity for a long period of time, such as during transportation or during absence of the occupants of the house, the pressure in the system may become relatively great. Again, at times, during the operation of the system, the refrigerant in the casing 28 may be at sub-atmospheric pressure. Thus it is seen that the pressures within the crankcase 28 may vary greatly.

The shaft 31, in order to be connected with the motor, must pass through a wall of the system, and, in this particular embodiment, it passes through a wall of the crankcase 28. At this point, means must be provided which prevents the passage of refrigerant outwardly from or which prevents the passage of air inwardly into the system. A means for providing this seal is shown generally at 32. It may comprise a sleeve 33 made of relatively self-lubricating material such as described in the patent to Williams et al., 1,642,347. This sleeve abuts against a shoulder 34 on the shaft 31. The sleeve 33 is hermetically connected with a resilient or flexible wall 35 which may be of the metal type illustrated. For connecting the flexible or resilient wall 35 with the sleeve 33 a ring 36 may be hermetically connected with the wall 35 and the collar 33 may be hermetically connected, as by litharge, with the ring 36. The wall 35 may abut against a gasket-like member 37 clamped between the flange 38 of the case 28 and the end plate 39 by means of bolts 40. A spring 41 is interposed between the end plate member 39 and the ring 36 in order to exert a pressure against the sleeve 33 for maintaining a hermetic seal between the sleeve 33 and the shoulder 34.

Merely to present some figures as examples, in a system using SO_2 , the sleeve 33 may have an external diameter about one inch and an internal diameter of the contacting surface may be $\frac{3}{4}$ inch. The spring 41 may exert about 70 lbs. pressure on this sleeve 33.

The end of the shaft 31 may have a belt drive connection over pulleys with the electric motor.

A seal of the type hereinbefore described is liable to set up squeaking noises which are very disagreeable in refrigerating machinery of the household type. In order to dampen out these squeaking noises which may be due to vibrations, in the sealing means, within the audible range, I may provide solid material damping means to be in contact with the flexible wall 35. As an example, I may provide felt rings 42 interposed between the folds of the flexible wall 35. These discs are preferably placed on the inside of the flexible wall 35. In the modification shown in Fig. 3 the felt may be a continuous cylindrical member which follows the corrugations of the bellows, thus the felt 42' is a continuous piece within the bellows 35'. The words "solid material" are used herein to designate a material which does not tend to flow readily, and which therefore may be confined unhermetically in place against the flexible wall.

A purpose of the felt damping means is to change the vibration periods of the seal. It is possible that the felt means does not prevent vibrations entirely, but it does change their periods so that they are no longer in the range ordinarily audible to human beings.

The shaft 31 is placed in bearings 50 and 51 formed in the walls of the crankcase 28 and an eccentric member 52 may be keyed by a key 53 to the shaft 31. The collar 54 around the eccentric 52 reciprocates the piston 55 for circulating the refrigerant within the system 20. Suitable valve means are provided in the piston 55 and other parts of the compressor for causing the circulation of the refrigerant.

Oil passages 60 and 61 may connect the crankcase 28 and the space surrounding the shoulder 34.

Merely as a theory, the truth of which is not necessary to the completeness of this disclosure, the audible vibrations in the seal may be either torsional in character, or they may be of an axial character, or possibly a combination of the two, due to irregular slippage between the ring 33 and the shoulder 34.

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 refrigerating system wherein refrigerant is circulated, a casing for containing said refrigerant, a rotary shaft passing through said casing, a hermetic seal between said shaft and casing comprising a flexible wall, and felt against said wall for preventing audible vibrations in said seal.

2. In a refrigerating system, a compressor

provided with a shaft passing from a space connected with the atmosphere to a refrigeration space, a seal on said shaft for preventing leakage of gas comprising a flexible wall and members having sliding contact tending to set up vibrations within the audible range, and means for preventing said vibrations comprising damping solid material against said wall.

3. In a refrigerating system, a seal comprising a corrugated metal bellows, and felt rings between corrugations on said bellows.

4. In a refrigerating system, a seal comprising a corrugated metal bellows, and squeak damping means confined unhermetically between the corrugations.

In testimony whereof I hereto affix my signature.

DUANE R. NEAL.