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MAGNETIC SEAL FOR LEAKS IN OIL TANKS AND THE LIKE

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FIG. 1.

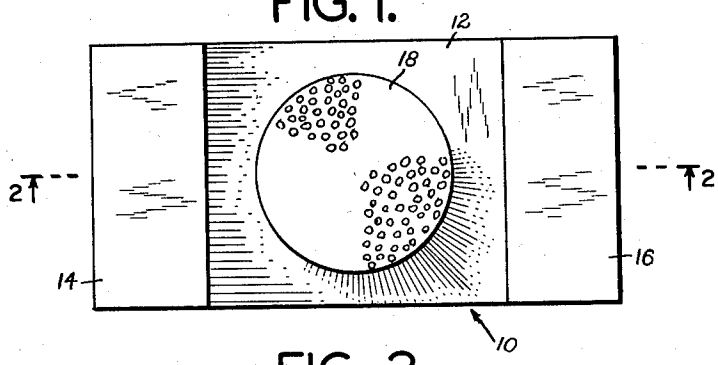
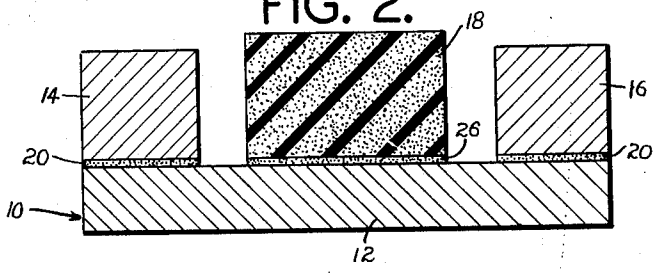


FIG. 2.



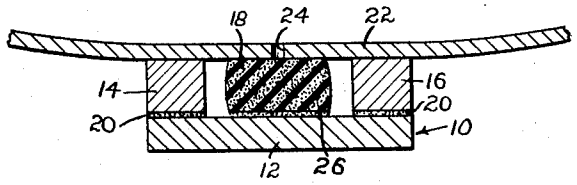


FIG. 3.

FIG. 5.

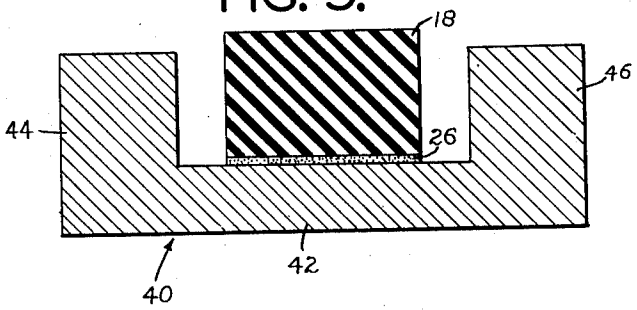
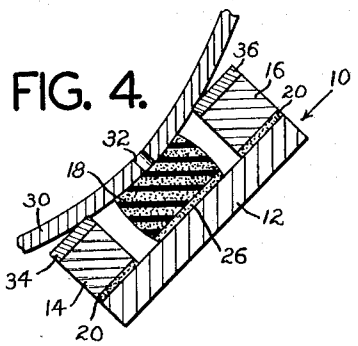


FIG. 4.



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MAGNETIC SEAL FOR LEAKS IN OIL TANKS AND THE LIKE

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3 Claims. (Cl. 220—24)

This invention relates to a magnetic seal for leaks in oil tanks and the like.

This invention relates primarily to low pressure oil tanks and other containers or conduits containing liquids or gases under relatively low pressure. For example, the invention would apply to a gas pipe containing illuminating gas under low pressure. For purposes of illustration, however, the invention will be described herein solely in terms of its application to fuel oil tanks installed in the home but it will clearly be understood that this is not intended to limit the scope and application of the invention in any way whatsoever.

In many fuel oil tanks which are installed for domestic use, leaks develop in the bottom wall. The sulfur in the oil combines with the water moisture which collects within the tank, below its oil contents, and chemical reactions set in which ultimately develop and result in the production of an acid which eats through the bottom wall of the tank. Reference is here made to tanks made of ferrous metal and particularly sheet steel, the metal being of relatively low grade and the gauge of the sheet being relatively thin. As a result of the action of the acid upon the steel, small holes, perhaps of pin-point dimensions, developed.

The usual practice in the repair of such tanks is to weld a new plate to the bottom of the tank. But this requires the employment of welding skill and equipment which many oil burner service men do not possess. When a leak develops in a fuel oil tank, it is usually the oil burner service man who is called to repair the leak. He, in turn, must call upon a welder to perform the actual work of welding a plate to the bottom of the tank. In the meantime, the oil continues to leak out of the tank. It is thus essential that a temporary seal be provided to stop the leak until the contents of the tank are consumed in the normal course of events or until the services of a welder can be had.

It is customary to apply a seal to the leaking area of a fuel oil tank in much the same manner as a tourniquet is applied to stop the flow of blood from a wound except that the seal is provided directly upon the leaking area whereas the tourniquet is generally applied above the wound, that is, between the wound and the heart. A seal or patch is placed against the leaking area and a band or strap is drawn around the tank and across said seal or patch to hold it in place. This method is awkward and difficult to follow particularly where the tank is situated in a somewhat inaccessible location or where one of its walls abuts a structural part of the house in which it is installed. Furthermore, it is very difficult for a serviceman, working alone, to throw the band around the tank and to clamp it in place while holding the seal or patch against the leaking area.

It is the principal object of this invention to provide a temporary seal for leaks of the character described, which may be applied by the simple expedient of placing the seal against the leaking area. The seal includes a magnetic element which anchors the seal to the wall of the tank. It also includes a patch or seal proper which is held against the leaking area by the magnetic force which said magnetic element exerts. A temporary seal is thus effected by simply placing the device herein claimed against the affected area.

The invention is illustrated in the accompanying drawing in which:

Fig. 1 is a face view of a magnetic seal made in accordance with one form of this invention.

Fig. 2 is a longitudinal section therethrough on the line 2—2 of Fig. 1.

Fig. 3 is a similar view showing how said magnetic seal is applied to a leaky wall of a fuel oil tank.

Fig. 4 is still another similar view showing the same magnetic seal applied with a pair of adapters to a curved section of the tank wall.

Fig. 5 is a sectional view through a magnetic seal made in accordance with another form of this invention.

It will be observed in Figs. 1 and 2 that a magnetic seal **10** made in accordance with the first form of this invention comprises a magnetic bar **12**, a pair of magnetic blocks **14** and **16** on said magnetic bar **12**, and a resilient block **18**, also on said magnetic bar **12** but between the two magnetic blocks **14** and **16**. Magnetic bar **12** is magnetic in the sense of comprising a bar magnet. Blocks **14** and **16** are magnetic in the sense that they are conductive in respect to the magnetic lines of force which emanate from the magnetic bar **12** although blocks **14** and **16** may also constitute a pair of magnets cooperating in polarity with bar magnet **12**. This, however, is not essential and what is preferred is simply a single bar magnet or magnetic bar **12** and a pair of blocks **14** and **16** which are magnetic in the passive sense above indicated, namely, as transmitters or conductors of the magnetic lines of force from said bar magnet **12**.

Bar magnet **12** should be made of such material as will enable it to exert a strong magnetic pull. Preferred is the type of material which is known as Alnico and made by the General Electric Company and also other manufacturers. Alnico is a line of permanent magnetic alloys supplied in the following typical compositions:

Designation	Average composition, percent essential elements other than iron
I	Ni, 21; Al, 12; Co, 5.
II	Ni, 17; Al, 10; Co, 13; Cu, 6.
III	Al, 12.5; Ni, 25; Cu, 3.00.
IV	Al, 12; Ni, 28; Co, 5.
V	Al, 8; Ni, 14; Co, 24; Cu, 3.
VI	Al, 8; Ni, 15; Co, 22; Cu, 3; Ti, 1.80.

Typical dimensions of magnetic bar **12** are the following: It may be a quarter of an inch thick, one inch wide and two inches long, forming a rectangle as Figs. 1 and 2 clearly show. It will be understood that these dimensions are purely illustrative. Blocks **14** and **16** should be as long as magnetic bar **12** is wide, as witness Fig. 1. Blocks **14** and **16** may be 7/16 of an inch wide and 7/16 of an inch thick or high. In short, blocks **14** and **16** may be square in cross section and long enough to extend from one side edge to the other of magnetic bar **12**. Again, these dimensions are purely illustrative.

The material of which blocks **14** and **16** may be made may simply be cold rolled steel. For more precise dimensions, ground stock may be used. Ground stock, 7/16 of an inch square, cut to one inch lengths, would provide a plurality of blocks **14** and **16** of precisely identical dimensions. Consequently, there would be no variation in height or thickness between blocks **14** and **16**.

Blocks **14** and **16** are secured to magnetic bar **12** by means of cement **20**. Any suitable metal-to-metal cement or adhesive may be used for this purpose. For example, Metlbond made by Narmco-Inc. under a for-

mula license from Consolidated Vultee Aircraft Corp. is suitable for this purpose. It is an adhesive resin made of a modified thermosetting synthetic rubber with a sheer strength of up to 4,000 pounds per square inch. Pliobond of the Goodyear Tire & Rubber Co. is also suitable. Unlike metal bonds, Pliobond is thermoplastic. Another suitable adhesive is Vinylseal made by Carbide and Carbon Chemicals Co. This adhesive is made from polyvinyl acetate and sometimes from modified polyvinyl acetate resins in various solvents. Among these solvents are acetone, methyl acetate and toluene.

The resilient block **18** may be made of any suitable material capable of sealing a leak and capable of resisting chemical reaction with the leaking liquid or gas. Synthetic rubber, such as neoprene may be used. This is a chloroprene rubber made by E. I. du Pont de Nemours et Co., Inc. in various grades or polymers. It is highly resistant to reaction with fuel oil and many chemicals. Other synthetic rubbers and even natural rubbers may be used for the purposes of this invention since contact with the leaking fuel oil is generally of short duration and it is not likely that noticeable chemical reaction would normally set in. It is important that block **18** be highly resilient and for that reason a cellular rubber, rather than a solid rubber, would be preferred. Cellular rubber is formed with a plurality of individual cells but unlike sponge or foam rubber, its cells are sealed off from each other.

Illustrative dimensions of resilient block **18** are as follows: It may be half an inch thick and three quarters of an inch in diameter. These figures are related to the dimensions of blocks **14** and **16** above given and especially their height or thickness. It appears from the foregoing that resilient block **18** is 1/16 of an inch thicker than blocks **14** and **16**. As Fig. 3 clearly shows, when the sealing device **10** herein claimed is placed against a flat wall **22** of a fuel oil tank, the magnetic attractive forces exerted by magnetic bar **12** will anchor said sealing device to the wall with its blocks **14** and **16** in abutment therewith, thereby causing the resilient block to compress and to provide a pressure seal against wall **22** to close off hole **24** formed therein.

It will be observed that resilient block **18** is secured to magnetic bar **12** by means of a cement or adhesive **26**. A suitable adhesive is Iron Bound cement made by Slomons Laboratories, Inc. Pliobond made by Goodyear Tire & Rubber Co. is also suitable for this purpose. These cements or adhesives are purely illustrative of the many rubber-to-metal cements or adhesives that may be used for this purpose.

Fig. 4 is an exaggerated view of a curved section **30** of a fuel oil tank and it shows how the sealing device **10** above described may be applied thereto to seal a hole **32** formed therein. A pair of adapter plates **34** and **36** are placed upon blocks **14** and **16** respectively to increase the height of said blocks relative to the height of the resilient block **18**. These adapters should be made of magnetic material such as cold rolled steel or ground stock in order to conduct the magnetic lines of force to the tank wall. The thickness of adapters **34** and **36** will depend upon the extent of curvature of the wall and a plurality of such adapters may be provided in different thicknesses to be used selectively and interchangeably in connection with the same sealing device **10** hereinabove described.

A sealing device **40** is shown in Fig. 5 which in principle corresponds to sealing device **10** but which is made somewhat differently. This device comprises a U-shaped magnet having a crossbar or yoke **42** and a pair of arms or legs **44** and **46** respectively molded integrally with said yoke or crossbar. A resilient block **18** is secured to the crossbar or yoke **42** by means of adhesive **26**. Arms or legs **44** and **46** correspond to blocks **14** and **16** of the sealing device **10** above described.

The foregoing is illustrative of preferred forms of this invention and it will be understood that these preferred forms may be modified and other preferred forms may be included within the broad spirit of the invention and the broad scope of the claims.

We claim.

1. A sealing device for sealing a hole in a fuel tank wall or the like, comprising a U-shaped magnet consisting of a yoke and a pair of arms joined thereto, and a resilient sealing member joined to said yoke between said arms, the free ends of said arms being disposed in a common plane and the free end of said resilient member projecting beyond said plane on the opposite side thereof from the yoke, said resilient member being compressible against a fuel tank wall when said sealing device is placed against said wall with the free ends of its arms in abutment therewith.

2. A sealing device in accordance with claim 1, wherein the yoke comprises a bar magnet and the arms comprise a pair of magnetic blocks which are joined to said bar magnet, said resilient sealing member comprising a cellular rubber block which is cemented to said bar magnet in spaced relation to said magnetic blocks.

3. A sealing device in accordance with claim 1, wherein a pair of magnetic plate adapters are placed against the free ends of the arms to increase their effective length, whereby said sealing device may be placed against a convex wall of a fuel tank with said adapters and said resilient member all in abutment therewith.

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