

1

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SELF-SEALING FUNNEL

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1 Claim. (Cl. 226—32)

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2

The invention described herein may be manufactured and used by or for the Government of the United States of America for governmental purposes without the payment of any royalties thereon or therefor.

This invention relates to funnels and more particularly to funnels which automatically terminate fluid feed to a receiving tank when the fluid level of the tank rises beyond a predetermined height.

An object of this invention is to provide an improved funnel.

A further object is to provide an improved funnel adapted to terminate automatically the fluid feed to a receptacle through the funnel.

A further object is to provide a funnel whereby fluid may be transferred from one receptacle to another receptacle without spilling any of the fluid or causing it to overflow from the other receptacle.

A further object is to provide an improved funnel adapted to terminate automatically the fluid feed to a receptacle through the funnel in response to fluid level in the receptacle.

A further object is to provide a self-sealing funnel that does not become unsealed without a positive manual action.

A further object is to provide a self-sealing funnel provided with an indicator.

A further object is to provide a funnel that minimizes the spilling of expensive liquids and the spilling of inflammable liquids.

A further object is to provide a funnel that may be used in transferring measured quantities of liquids derived from a particular source to a selected receptacle at another location.

Other objects and many of the attendant advantages of this invention will be readily appreciated as the same becomes better understood by reference to the following detailed description when considered in connection with the accompanying drawings wherein:

Fig. 1 is a cross-sectional view of the funnel according to a preferred embodiment of this invention, and

Fig. 2 is a side view of the magnet used in the device of Fig. 1.

The funnel 10 comprises a tubular section 11, a conical section 12, and a conical section 13 which are integral with one another. A handle 14 is connected as shown to facilitate using the funnel. A support member 15 consisting of non-magnetic material is joined by any suitable means to diametrically opposite portions of the conical section 12 near the upper end thereof. A powerful bipolar permanent magnet 16 such as an Alnico magnet is mounted on the support 15 with the poles of the magnet straddling the support and directed toward the spout end 13 of the funnel 10.

A rod 17 of greater length than the funnel 10 is provided coaxially of the funnel and is arranged for reciprocal movement therein. The rod has terminal positions as indicated by the solid and dotted positions of members 18, 19 and 20. Member 18 fixed to the upper

end of the rod is a knob bearing indicator lettering for attracting attention when in raised position. The knob is adapted to be gripped manually. Member 19 is a float preferably of teardrop shape fixedly mounted on the rod at the end opposite the knob 18. Member 20 of magnetic material is fixedly mounted on rod 17 between the ends thereof. To facilitate adjusting the position of member 20, a set screw may be used to fix it to rod 17.

The rod 17 is guided by a bore through support 15 and magnet 16 and a pair of guide bearings 21 and 22. The bearing 21 is mounted in a strainer 23 located near the lower end of section 12 and the bearing 22 is mounted in support member 24 suitably joined to diametrically opposite portions of section 13. The rod 17 is able to reciprocate freely in the aligned guiding means.

A housing or shield member 25 is fixedly mounted on the support 15. The legs of the shield member straddle the magnet 16. The shield member has two adjacent upstanding leaves adapted to receive the knob 18 therebetween.

A washer or gasket 26 is mounted on the float 19 between the ends thereof. The washer 26 is resilient being made of a suitable material such as rubber, neoprene, etc., depending upon the fluid to be passed through the funnel. The magnetic member 20 and float 19 are arranged in properly spaced relationship so that washer 26 seals the spout 13 when the magnetic armature 20 is engaged with magnet 16.

When the rod 17 is moved into raised position the knob 18 and the lettering thereon comes into full view warning one using the funnel that the receptacle receiving the fluid is full. At the same time, magnetic member 20 is moved into engagement with magnet 16 and is retained in engagement with the magnet until positively released by manual pressure on knob 18. The float 19 at the lower end of the rod moves into engagement with the spout end of the funnel effectively sealing it so that flow of fluid therethrough ceases.

In operation the funnel 10 with its rod 17 in lowered position is inserted into the opening of a tank or any suitable receptacle. At first any fluid poured into the funnel passes freely through the funnel into the tank. When the level of the fluid in the tank rises to the level of the float and embraces the float the latter is buoyed up. As the fluid level continues to rise raising float 19 and consequently rod 17, the armature approaches the poles of the permanent magnet 16 till a point is reached where the magnet pulls the armature into positive engagement therewith. With the armature 20 in engagement with magnet 16 the spout is sealed permitting no further fluid flow therethrough. The knob when in raised position notifies the user of the funnel that the tank is full. The magnet 16 is sufficiently powerful to retain the rod in raised position as the funnel is removed from the tank with a substantial quantity of fluid therein. The funnel may then be inserted into the container from which the fluid was obtained, the knob forced down to lowered position whereby the fluid can flow back into the original container.

The funnel suitably calibrated may also be used to transfer a measured quantity of fluid from a supply tank to a receptacle. By this means the need for a measuring container is eliminated.

The material from which the funnel is made is selected to stand up in use with particular fluids.

Obviously many modifications and variations of the present invention are possible in the light of the above teachings. It is therefore to be understood that within the scope of the appended claim the invention may be practiced otherwise than as specifically described.

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3

In combination with a funnel having a cylindrical top part, a conical middle part and a conical spout, a handle connected to the top and middle parts of the funnel, a nonmagnetic support member joined to diametrically opposite portions of said conical middle part slightly below the junction of said top and middle parts, a bipolar permanent magnet mounted centrally on the support member, the poles of said magnet extending toward the funnel spout, said magnet having a central bore, a strainer mounted near the lower end of the conical middle part and having a bearing mounted centrally thereof, a second support member mounted in the spout and having a second bearing mounted centrally thereof, the said two bearings and the bore of the magnet being axially aligned, a rod of greater length than the funnel reciprocably mounted in said bearings and bore, a tear-shaped float mounted on the lower end of said rod extending beyond the spout, said float having a neoprene washer mounted centrally thereof and being of larger diameter than said spout, a manually engageable knob having indicating markings mounted on the upper end of said rod, a nonmagnetic shield means mounted on said first support and about said magnet, said nonmag-

4

netic shield means having two vertical leaves, the knob atop said rod adapted to assume a lowered position between said leaves in which position the knob is retracted from view, an adjustable magnetic armature fixedly mounted on said rod for cooperation with the permanent magnet, the rod being in its lowered position when the funnel is positioned in a tank opening for aiding in filling the tank, said rod adapted to rise when the tank liquid rises above the level of the float and continues to do so until the said armature comes into quick positive engagement with the magnet whereby the funnel spout is sealed by the neoprene washer and the indicator atop the rod rises into full view indicating a full tank.

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