June 15, 1943. M. B. HEFTLER 2,322,131

FILTER

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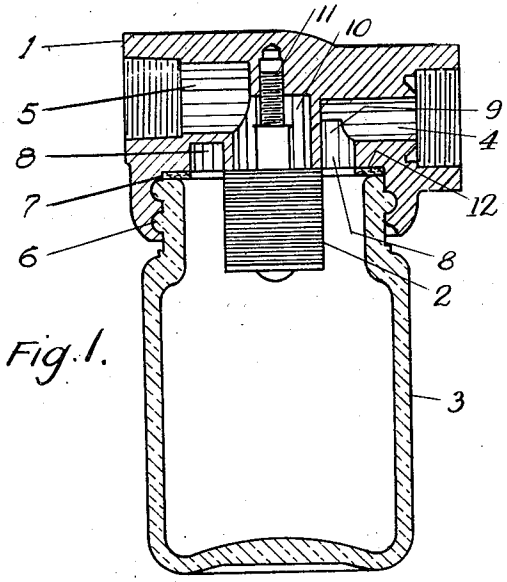


Fig. 1.

Fig. 5.

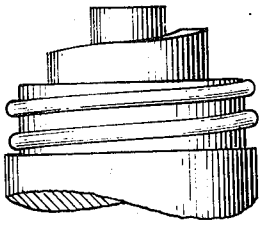
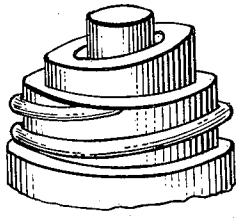


Fig. 3



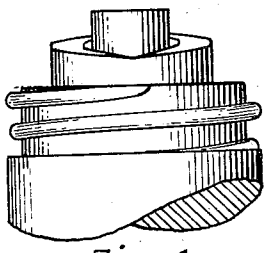


Fig. 4

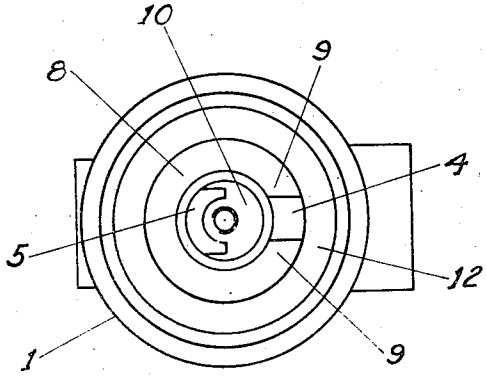


Fig. 2

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FILTER

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10 Claims. (Cl. 210—165)

This invention relates to filters or strainers adapted to remove solid particles from a stream of fluid conveyed in a pipe or tube, and particularly to a certain construction for such an article that is at once very substantial and durable, and very inexpensive to manufacture.

The principal reason for the economy of production made possible by this invention is the economy of material and the utilization of the die casting technique to reduce machine operations to a minimum. The object is to provide, by die casting, a head for a filter having inlet and outlet passages as nearly in line as possible so as to economize material and space, having a screw thread to hold the bowl of the filter, having a connection in the head near its center to the outlet passage, and having a connection further from its center from the inlet passage to the bowl and to core these connections and thread in such a way that the core can be removed and used for further castings, taking advantage of the necessity to unscrew the core in order to cast the thread to make the connections to inlet and outlet passages which are nearly in line but which terminate one more remote from the center of the piece than the other, the part of the core which forms the connection to the inlet passage receding as the core is unscrewed and thus avoiding breaking into the outlet passage.

A further reason for the economy of production made possible by this invention is the use of a glass bowl which can be screwed into place and retained by the thread cast in the head. Glass bottles are relatively inexpensive. Glass is light enough so that vibration will not shake it loose from the screw thread in the head of the filter. Using a single screw thread to join the bowl to the head eliminates the necessity for bails or clamps as now commonly used, and since the screw threads are obtained at practically no cost, the resulting economy is considerable. I find by experience that this construction is not loosened, even by the severe vibration of modern rubber mounted truck engines.

Figure 1 is a sectional view of the complete filter;

Figure 2 is a plan view of the bottom of the filter head, looking upward;

Figure 3 is an elevation of the central core used in casting the head taken from the same direction as Figure 1;

Figure 4 is an elevation of said central core taken at a right angle to Figure 3, looking from the outlet end.

The subject of this invention is a filter consisting of four principal parts, and the preferred arrangement of these parts is shown in Figure 1. The filter head 1 has the filtering or straining material or filter element 2 fastened to it; it supports the bowl 3 of the filter; it includes the inlet connection 4 and the outlet connection 5. The bowl 3 is joined to the head 1 by coacting screw threads 6 on each part. The joint between the head 1 and the bowl 3 is made tight and leak proof by a resilient gasket 7 which is compressed between the flat surface 12 in the head 1 and the top of the bowl 3 as the coacting screw threads 6 on each part are screwed together.

The most important part of this device, to insure its success as a filter, is the quality of the filter element 2. The preferred construction for a filter element is disclosed in Patent Number 1,641,485, issued to Victor R. Heftler, September 6, 1927. The bowl 3 is made of glass with an external screw thread near the top, and is best described as a common pill bottle.

The filter head may be described as follows:

The head 1, preferably of die-cast metal, is made to receive the filter element 2 and the bowl 3. It is provided with an inlet passage 4 and an outlet passage 5. The head is formed with a flat topped recess provided with an internal thread 6. The bowl 3 is screwed into the recess, with the gasket 7 interposed between the top of the bottle and the top of the recess to provide a seal therebetween.

A second recess 8, coaxial with the screw thread, is formed in the casting and the top of this recess is not plane but presents a portion at 9 which is higher than the remainder. It is to that highest portion of the top of the second recess that the inlet passage connects.

There is a third recess 10, coaxial with the screw thread, which communicates with the outlet passage, the latter being located in a radial plane near the shallowest portion of the second recess. Into the inner one of those concentric recesses is attached the filter element 2 by means of the screw stem 11. This filter element is there placed in the path of the fluid entering at 4 and going out at 5, preventing the passage of foreign matter that may be entrained in the fluid.

If this second recess had a flat top, the outlet 5, which must not communicate with this second recess, would have to be located much higher; this would increase the bulk of the filter and increase the length of the stem 11 and, therefore, increase the cost of the filter.

In the actual making of the die casting, if it is desired to cast the rather coarse thread by which

the bottle is held, the core cannot be pulled out straight; it must be unscrewed from the casting.

It is plain that this core could have a flat end such as a plane perpendicular to the axis of the core, which is the axis of the screw. When unscrewing such a core, the end thereof would pull away from the metal that has been cast against it. It can also be seen that if the end of the core were machined with a helical surface having the same pitch as that of the thread of the core, that helical surface would slide against the surface of the metal cast against it. But if the pitch of the helical surface terminating the core were greater than the pitch of the screw, the core could not be withdrawn.

By making a substantial portion of the end of the core in the shape of a helix, having a pitch greater than zero but no greater than the pitch of the thread on the core, there is provided a high and low point at the bottom of this second recess, the high point being at 9 where the inlet passage enters the core and the low point being diametrically opposed, in this case, though not necessarily, in the plane where the outlet is located.

The pitch of the helical segment of the right side of the core, as shown in Figure 4, is of no greater pitch than the thread 6, so that this segment cannot stick as the core is unscrewed. The helical segment at the left side of the core, as shown in Figure 4, is of no greater pitch than the thread 6, but is of opposite hand. The high portion of this segment will be immediately retracted as the core is unscrewed. The longitudinal distance said high portion is retracted is the same as the longitudinal inclination of the thread for the first half-turn of the core, after which said high portion will be completely clear of the top of the intermediate recess in the head. Should the pitch of the helical segments be less than the pitch of the threads, the high portion of the left helical segment will be immediately drawn entirely clear of the top of the intermediate recess upon the initial unscrewing movement of the core, and therefore the core may be freely unscrewed.

In the preferred form of the filter, the end of the core is machined so as to form two helical surfaces of the same pitch, but of opposite hand. It is plain that the helical surface which is of the same hand as the thread on the core will slide against the casting while the other helical surface will pull away from the metal quite fast. This provides for this second recess a low and high point which are diametrically opposed.

While the embodiment of the present 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.

I claim:

1. In a filter, a head provided with a recess having an internally threaded portion with a plane bottom, a second portion of smaller size coaxial therewith and terminating in an end having a helical surface of a pitch no greater than said thread whereby said second portion varies in depth, an inlet passage opening into the deeper part of said second portion and disposed in a plane substantially radial to said portion, a third portion coaxial with the other portions, an outlet passage communicating with the third portion of the recess and disposed in a plane substantially radial to the common axis and above the shallower part of the second portion, a filter element, means to secure the filter element in registration with the third portion of the recess so as to form a foraminous closure therefor, and an externally threaded receptacle adapted to register with the first mentioned portion and form a tight closure with the bottom thereof.

2. A die-cast head for a filter having a recess adapted to be formed with a single core, said recess including a large diameter cylindrical portion having an internal cored thread, an intermediate diameter portion having a cylindrical wall coaxial with the large-diameter portion and having a substantial part of its upper end helical whereby said intermediate portion varies in depth, the pitch of the helical end of said intermediate portion being no greater than the pitch of the thread of said large diameter portion, and a small diameter portion having a cylindrical wall coaxial with the threaded portion, said head having inwardly extending passages from the exterior thereof, one of said passages opening into the deep part of the intermediate portion and the other passage opening into the small portion above the shallow part of said intermediate portion.

3. In a filter, a die-cast filter head having a recess adapted to be formed by a single core, said recess including a plurality of coaxial cylindrically walled portions including one portion of large diameter having an internal thread, one of intermediate diameter, and one of small diameter, the intermediate portion having a substantial part of its interior end helical whereby said portion varies in depth, the pitch of said helical part being greater than zero but no greater than the pitch of the thread, and said filter head having passages extending inwardly from the exterior thereof with one of said passages communicating with the intermediate portion at substantially its deepest part and the other passage communicating with the small portion above substantially the shallowest part of said intermediate portion, a threaded receptacle screwed into the large portion, and a filter interposed between the passages for straining out sediment entrained in fluid flowing from one of said passages to the other.

4. A die-casting having a recess adapted to be formed with a single core, said recess comprising a large-diameter portion having an internal thread, and a smaller diameter portion coaxial therewith, a substantial part of the interior end of the small portion being helical, and the pitch of said helical part being no greater than the pitch of the thread.

5. A die-cast filter head having a recess adapted to be formed with a single core and comprising a large-diameter cylindrical portion formed with an internal cored thread, and a smaller-diameter portion having a cylindrical wall coaxial with the large-diameter portion and having its inner end inclined relative to the common axis, the pitch of the inclined end being less than the pitch of said thread.

6. A die-casting having a recess adapted to be formed with a single core, said recess including a plurality of coaxial portions, one of said portions being of large diameter and having an internal cored thread, another of said portions being of intermediate diameter and having a part of its inner end inclined relative to the axis thereof, the pitch of the inclined part of said inner end being no greater than the pitch of the thread, and still another of said portions being of small diameter.

7. A die-cast filter head having a recess adapt-

ed to be formed with a single core, said recess including an internally threaded portion, a second portion of less diameter than the first mentioned portion and disposed thereabove, said second portion being of varying depth and terminating at its inner end in a plurality of helical segments of opposite hand but of a pitch no greater than the pitch of said thread, and a third portion, said portions being coaxial, and an inlet passage and an outlet passage in said filter head, one of said passages opening into the second portion adjacent the deepest part thereof and the other passage opening into the third portion.

8. A die-casting having a recess adapted to be formed with a single core and comprising a plurality of coaxial cylindrical portions, one of said portions being of large diameter and having an internal cored thread, another of said portions being of intermediate diameter and having a part of its inner end inclined relative to the common axis, the pitch of the inclined part of said inner end being no greater than the pitch of the thread, and still another of said portions being of small diameter, said casting having a plurality of passages from the exterior thereof, one of said passages communicating with the intermediate portion and another of said passages communicating with the small recess.

9. A die-cast filter head having a recess adapted to be formed with a single core, the internal formation including a large-diameter cylindrical portion having an internal cored thread, an intermediate annular portion above said large diameter portion and coaxial therewith, the interior end of said intermediate portion having at least a part thereof inclined at a pitch no greater than that of the internal thread of the large portion, and a small diameter portion located within the intermediate annular portion and having a cylindrical wall coaxial with the large and intermediate portions.

10. A die-cast filter head having its interior configuration adapted to be formed with a single core, said interior configuration including a large diameter recess having an internal cored thread and a plane bottom, said bottom having therein a small diameter recess coaxial with the large diameter recess and an annular recess concentric with the small diameter recess, the bottom of the annular recess being inclined relative to the common axis at a pitch no greater than the pitch of the thread of the large recess, and the bottom of said large recess and the tops of the small and annular recesses being in a common plane transverse to the common axis of said recesses.

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