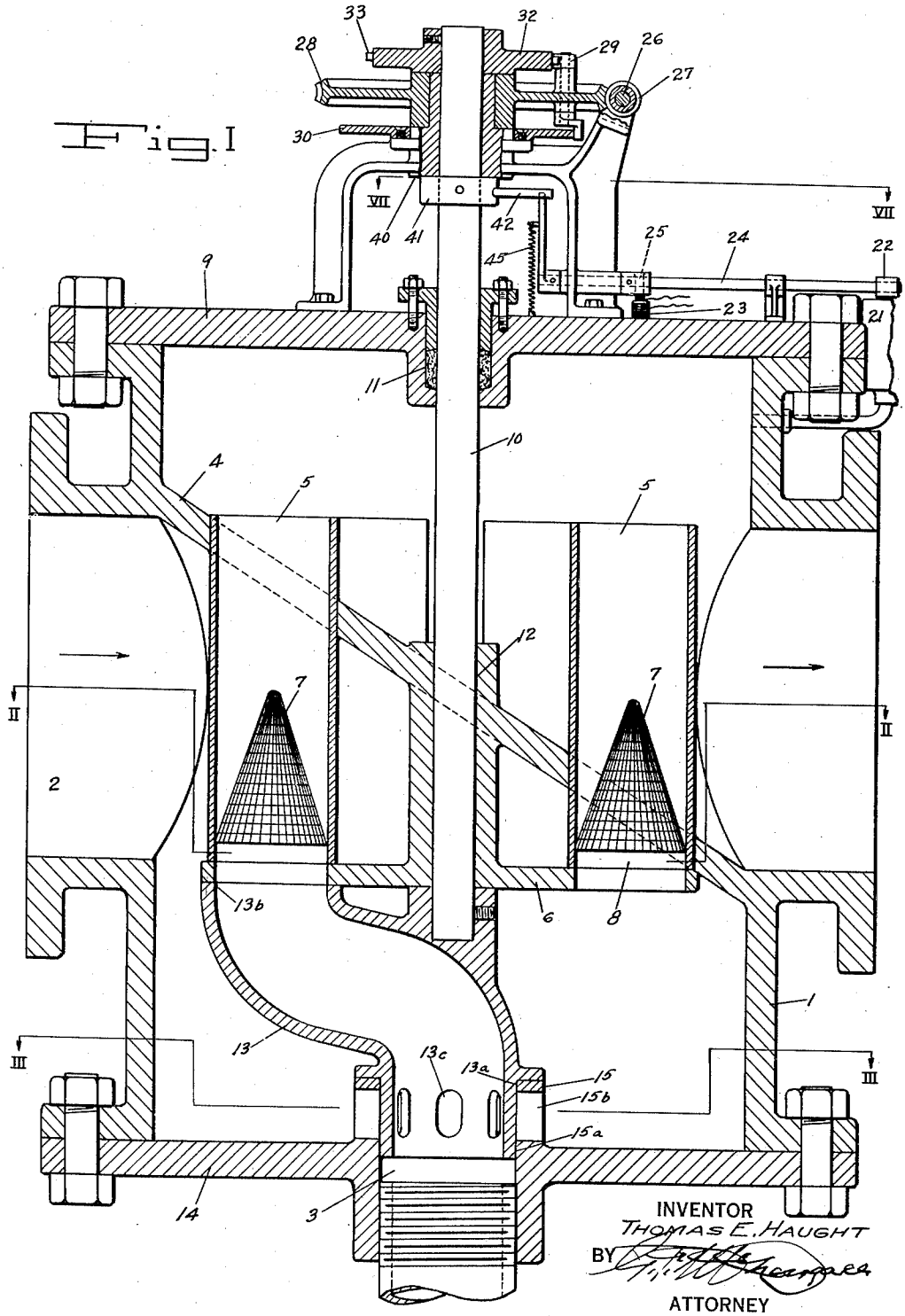
April 8, 1941. T. E. HAUGHT 2,237,964

SCREEN CLEANING MEANS

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Fig. 1



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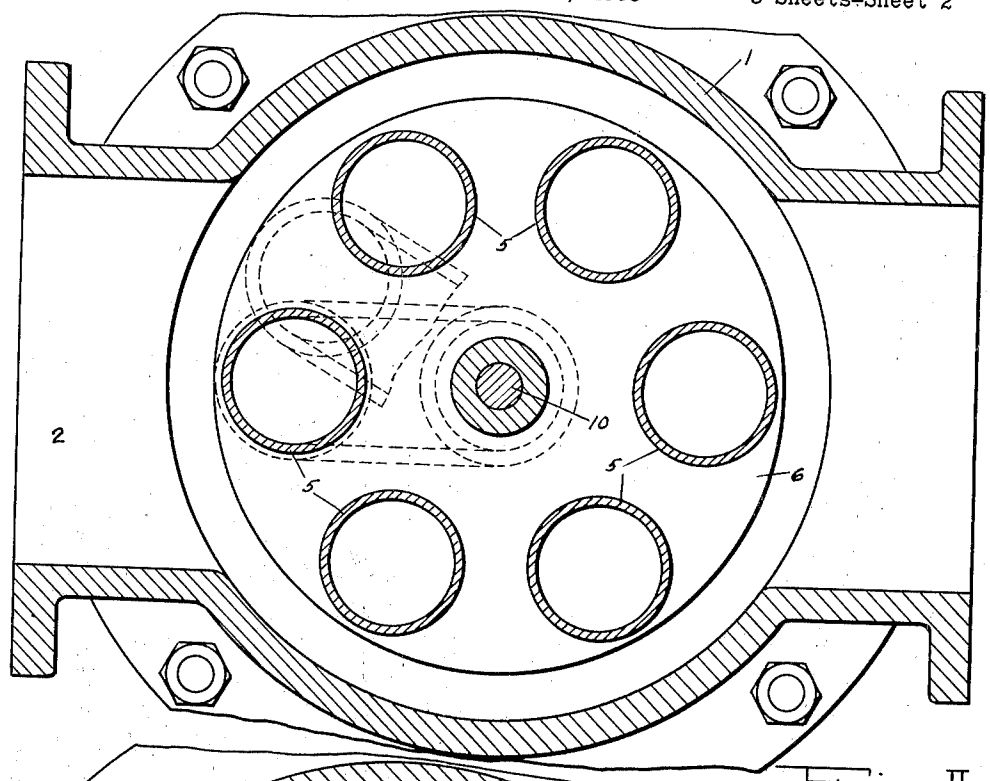


Fig. II

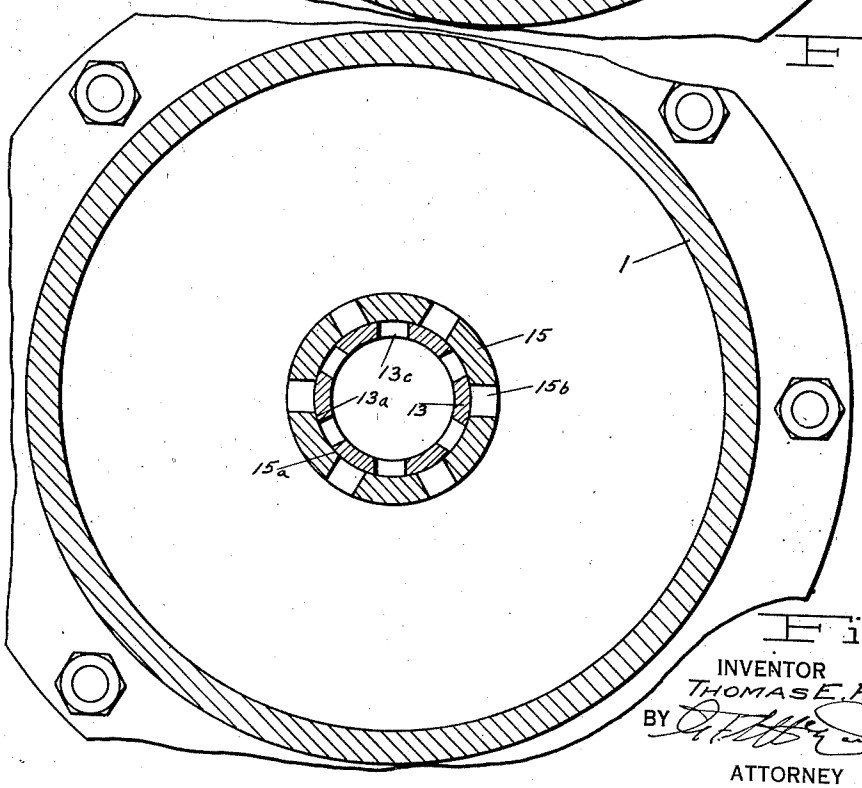


Fig. III

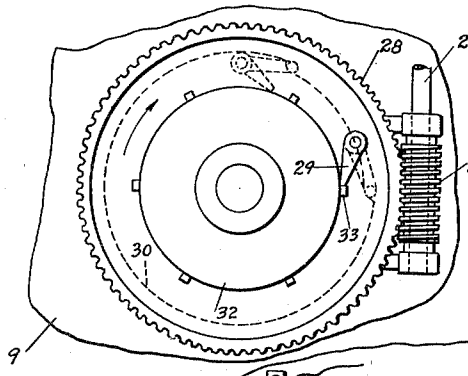
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Fig. IV



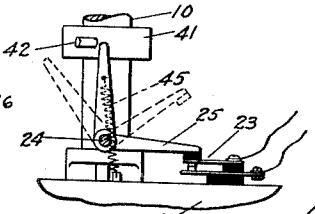


Fig. V

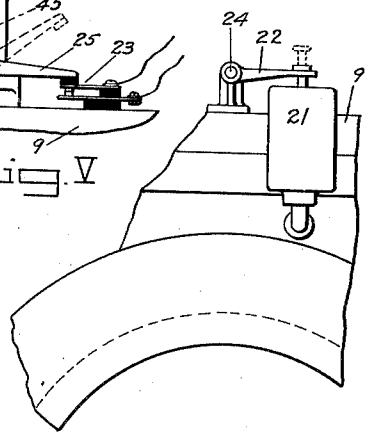


Fig. VI

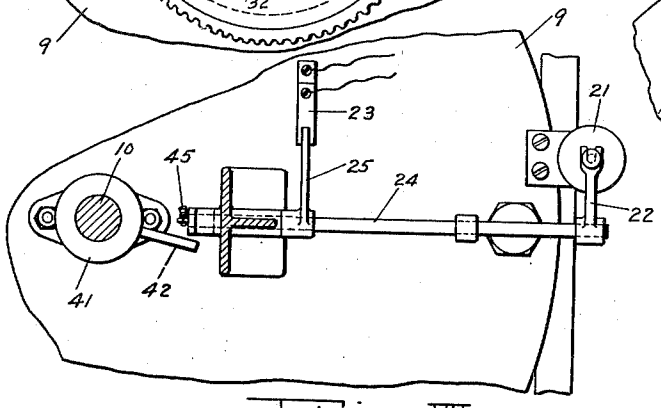


Fig. VII

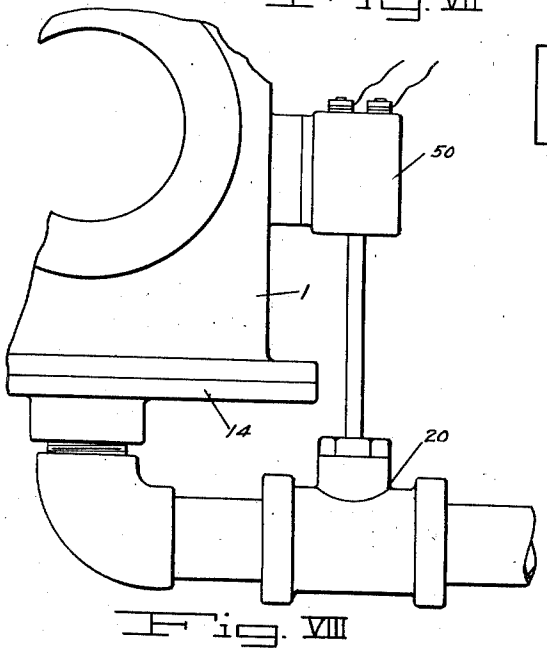


Fig. VIII

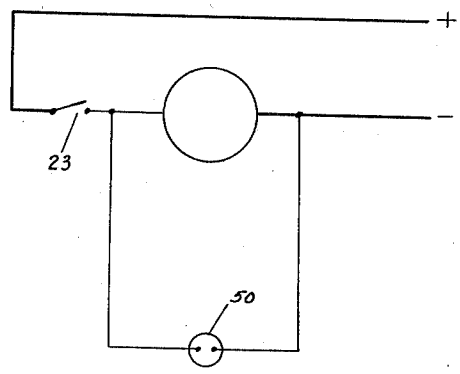


Fig. IX

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Patented Apr. 8, 1941 2,237,964

UNITED STATES PATENT OFFICE

2,237,964

SCREEN CLEANING MEANS

Thomas E. Haught, Boldman, Ky.

Application November 1, 1938, Serial No. 238,146

3 Claims. (Cl. 210—167)

This invention relates to screening devices for interposition in a pipe line carrying fluids, such as process water, that require screening.

I have found it expedient though not mandatory to employ the principle of intermittent operation disclosed in my patents numbered 2,084,955 and 2,119,433. It is also best to employ the principle of utilizing pressure drop occasioned by screen clogging, to start a cleaning cycle and a modified form of apparatus of that general type is shown as a part of this new invention to complete the disclosure but is not claimed herein.

An object of the present invention is screens set in rather deep pockets so that screened material will be held where it lodges, so that it can be discharged through a purge pipe without being scraped off, to again cause trouble, as the screen and purge are being brought into registration.

Another object is to so arrange the screens and purging apparatus therefor that the screens may be consecutively cleaned by reverse flow that persists for a substantial time to thoroughly clean them before the purge moves along to another screen.

Another object is the provision of a stationary screen assembly and a movable purge apparatus, so arranged that the chance of material lodging to block operation is reduced to a minimum.

Still another object is a valve means cooperative with the purge apparatus and operable thereby, that is effective to purge the space on the inlet side of the screening device during the time interval that the purge funnel is changing from one screen to another and is thus temporarily free for the latter function.

The foregoing and other objects that will be apparent from the disclosure constitute the purposes of the present invention, the novel features of which are particularly pointed out in the appended claims.

Drawings showing a preferred form of the invention, accompany and form a part of the disclosure, in which—

Fig. I is a section of my preferred form of embodiment, the arrows showing the direction of principal flow therethrough;

Fig. II is a section at II—II, Fig. I;

Fig. III is a section at III—III, Fig. I;

Fig. IV is a plan of a portion of the top of Fig. I, drawn to show the devices and action thereof, to provide intermittent movement of the purge funnel, as hereinafter described;

Fig. V is a detail of the means for electric switch, being an orthographic projection of a portion of Fig. I as will be explained;

Fig. VI is a full view, in projection, of a part shown broken in Fig. I for lack of space to complete it;

Fig. VII is a partial top view of Fig. I on the line VII—VII, Fig. I;

Fig. VIII is a view at reduced scale showing an outside valve that controls the purge outlet of my screen device and is essentially the same thing as the element **46** in my Patent No. 2,119,433 except that I have preferred to show it electrically instead of mechanically operated; and

Fig. IX is a wiring diagram of the electrical connections required to operate the described embodiment of the device to complete the illustration of a completely operative instrumentality.

In the drawings, a body **1** is provided with an inlet **2**, a purge opening **3** and a divisional wall **4**.

The wall **4** is provided with a plurality of screened openings **5**, here shown to be six in number and since with the form of body shown it is convenient that the divisional wall be diagonal, a drum shaped body **6** is made rigid with the divisional wall **4** and forms a part thereof.

This construction lends itself admirably to making the screened openings **5** as short tubes within which may be removably placed screens **7**.

Placing the screens well up into the tubes **5**, provides a space **8** for the accumulation of debris screened from the flow and ordinarily a pressure drop will occur due to screen clogging, before the space **8** is full. If the material is rather coarse, such as twigs of wood, the screens may be placed higher and for leaves or the like they will be placed about as shown.

The body **1** is closed at the top by the flanged cap **9**, upon which is mounted part of the operating mechanism, to be described.

A shaft **10** is supported in the stuffing box **11**, axially of the cap **9** and is a running fit in a central bore of the drum **6**, indicated by the numeral **12**. The lower end of the shaft **10** is made rigid with the purge funnel **13**, an offset tubular structure that is formed with a radius similar to the central radius of the zone of the drum **6** in which the screened openings **5** are spaced.

The body **1** is also provided with a lower flanged closure member or cap **14** and a bored boss **15** is made to fit the turned lower portion **13***a* of the purge funnel **13**, the lower portion of the purge funnel **13***a*, the said boss **15** and the shaft **10** being coaxial. The purge outlet is also formed in the boss.

The upper surface of the purge funnel **13**, indicated by **13***b*, is made to have a running fit with the lowermost surface of the drum **6**, as

shown in Fig. I. It is designed to run in substantially fluid tight contact therewith under the influence of turning moment applied through the shaft 10. Where the surface 13a of the purge funnel 13 contacts with the bore 15a of the boss 15, a plurality of openings are provided in both parts, so spaced that when the purge funnel 13 is in registry with one of the screened openings 5 as shown at the left hand side of the drum 6 in Fig. I, the openings 15b in the boss 15 are not in registry with the openings such as 13c in the surface 13a but will be in registry during a part at least of the interval when the purge funnel 13 is being turned from one screened opening to another as shown in dotted outline in Fig. II.

Obviously, if the openings 13c and 15b were to register simultaneously with the occurrence of registry between the purge funnel and one of the screened openings 5, the capacity of the purge opening 3 would be satisfied and the purpose of the structure, to act as a purge or cleaning valve for the lowermost portion of the body 1, would be impaired. As shown in Fig. VIII, an outside valve 20 is provided for complete closure of the purge opening 3 when a cleaning cycle is not in progress.

The mode of operation of the structure is that when a cleaning cycle starts, the valve 20 opens, thus reversing the flow through the screened opening that is in registry with the purge funnel and this flow persists for an appreciable period of time because the shaft 10 and the attached purge funnel 13 do not begin to revolve immediately as will now be explained.

When pressure of the discharge side of the divisional wall 4 begins to fall, due to clogging of the screens in the openings 5, a spring loaded pressure sensitive device shown at 21 will move the lever 22 to close an electrical contact 23 which may be a main line switch or one that operates a relay, as preferred.

This closure is accomplished by a part revolution of the shaft 24 to which is attached the bell-crank lever 25 and moves it from the position shown in dotted outline in Fig. V to the position shown in the same figure in full lines. The contact between the pressure sensitive device 21 and the lever 22 is a one way contact, hence when the lever 25 is thrown to establish the electrical contact just described, restoration of pressure equilibrium will not open the switch 23, which must be done by other means, to be described.

A suitable motor will be presumed to be attached to the worm shaft 26, with which is made rigid the worm 27, meshing with the worm wheel 28, to revolve the latter in the direction of the arrow in Fig. IV.

Mounted on the web of the worm wheel 28 is a pawl 29, the movement of which is controlled by the cam 30, fixed below the worm wheel 28. As shown in full lines in Fig. IV, the pawl engages the disc 32 by contacting pins 33 spaced around its perimeter. In Fig. IV, the pawl 29 had been released by the cam 30 and come into contact with the disc 32 at the point shown in dotted outline, Fig. I, bringing the pin 33 to the position shown in full lines where it is about to leave it under the influence of the cam 30. On the next round of the worm wheel 28 it will engage the next pin, such as 33, and bring it to like position.

As shown, the disc 32 is made rigid with the shaft 10, which in turn is made rigid with the purge funnel 13, hence each step or partial revolution of the disc 32 is precisely reflected in a corresponding movement of the purge funnel 13 and the intermediate registration of the openings 13a and 15b which constitute the valve for purging the lowermost part of the body 1.

We immediately perceive that when the movements of the disc 32 are properly timed by proper shifting of the cam 30, which is adjustable as to position, a perfect registration of the screened openings with the purge funnel becomes a simple matter. We also see that the purge funnel will be left in such registration during almost a full revolution of the worm wheel 28 and that a relatively abrupt shift will then place it in registry with the next screened opening.

It may be noted that the design of contacting surfaces, first of the purge funnel with the drum containing the screens and second the style of the valve for purging the inlet side of the body, provides a very effective shear that will cut off anything likely to be introduced into the screen, such as twigs and sticks, because nothing that will not float can be expected to arrive inside the screen.

It is desirable that a cleaning cycle be completed whenever it is started; hence the one way contact of the pressure sensitive device as heretofore explained that will start the cycle but has no power to stop it.

Below the upper bearing 40 of the shaft 10 is a collar 41 adjustably mounted on the shaft 10 and having a projecting arm 42 that is arranged to contact with one arm of the bell-crank lever 25 to throw the switch to the out position. In this figure the levers are shown at the instant the pressure sensitive device has acted to close the switch 23. It will be noted that the upper member of the bell crank will clear the arm 42, from the dotted position to that shown. The bell-crank is shown to be equipped with the snap-over spring 45, hence when the shaft 10 has made a nearly complete revolution, it will contact this member and throw it back to the position shown in dotted outline, thus stopping the cleaning cycle, unless, and this is important, the cleaning cycle has not been effective to equalize the pressure. If the latter is the case, another cycle will start immediately.

I prefer to operate the valve 20 by a solenoid 50 that is controlled by the same switch that starts the motor, viz. 23, and a wiring diagram is shown in Fig. IX by which this may be accomplished without putting the solenoid in series with the motor. By applying the same numerals used in the other description, its mode of connection is at once apparent.

The foregoing description sets forth in detail the best form of my invention with which I am at present acquainted, but the detailed description and specification of parts is not to be considered as limiting the invention, the scope of which is to be ascertained by the following claims.

I claim:

1. A screening device for a pressure pipe line comprising in combination, a body, inlet and outlet means for connecting said body into a pipe line, a divisional wall in said body between said inlet and outlet means, a plurality of screens in a zone of said divisional wall, a purge outlet connection on the inlet side of said wall, an offset purge funnel revolubly mounted on the inlet side of said wall with its funnel end in close cooperative relationship with said wall and the opposite end connected with the purge outlet, means for

revolving the funnel into consecutive close registration with said screens and intermittently operative purge valve means for the inlet side of said body operable by said funnel revolving means only while the funnel is passing from one screen to the next.

2. A pressure pipe line screening device comprising a body, inlet and purge connections on one side thereof and an outlet connection on the other side, an interior divisional wall, a plurality of cylindrical tubular screen holders in a zone of said wall, conical screens inset in said tubular holders with their larger ends facing the inlet side of the body, an offset purge funnel revolubly mounted to connect the screens with the purge connection seriatim as the purge funnel is revolved, a mounting therefor and means comprising ports in the purge funnel and cooperating ports in its mounting, timed to register when the funnel is substantially out of registry with a screen, for purging the inlet side of the body.

3. A pipe line screen comprising a body member that is provided with inlet, outlet and purge pipe openings, a divisional wall in said body separating the inlet and purge openings from the outlet opening, a plurality of screen tubes in a zone in said wall with their inlet ends in the same plane as the inlet side of the wall, conoidal screens inset in said tubes, an offset funnel-like member revolubly mounted to closely register seriatim with the zonal tubes and continuously with the purge pipe, and purge valve means for the inlet side of the body, operable by said funnel upon movement thereof to intermittently connect the said inlet side of the body with the purge pipe, while the funnel is passing from one screen to the next.

THOMAS E. HAUGHT.