APPARATUS FOR ENTRAPPING SOLIDS IN A FLUID STREAM MOVING IN A WALLED CONDUCTOR

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My invention relates to an entrapping device comprising a perforated entrapping plate having a length dimension substantially greater than its width with said entrapping plate held in position at a small angle to the axis of a fluid flow in a walled conductor by means of a resilient holder. This small angle may be of any magnitude between 5° and 45°.

This invention provides a removable means of protecting pumps, blowers, fans and meters connected to any walled conductor handling a moving fluid stream from damage due to solids in said walled fluid conductors. The fluid stream might be for example liquid gas or air. The walled conductor might be for example a pipe tube duct.

Prior to my invention relatively large and expensive equipment such as basket traps were required to protect pumps, blowers, fans and meters connected to the walled conductor handling a moving fluid stream from damage due to solids such as bolts, screws, nuts, sticks, stones, and rocks.

The object of my invention is to provide a simple inexpensive removable means of entrapping such solids being carried in a moving fluid stream through a walled conductor. Present means of entrapping said solids requires excessive maintenance for installment, disassembly and cleaning. My invention provides a simple and inexpensive means for such entrapment. The design is such as to render its use in walled conductors for such industries as dairy and pharmaceutical advantageous due to ease of cleaning and sterilization.

My invention may be best described and its installation illustrated by reference to the accompanying drawing in which Fig. 1 is an elevational side view partially in section showing the preferred modification of my invention installed in a walled conductor. Fig. 2 shows a plan view of the preferred modification of my invention without the walled conductor like reference characters refer to corresponding parts throughout the drawing. It is understood that although the drawing shows my invention installed in a pipe line its use is not restricted thereto being equally adaptable to installation in other walled fluid conductors such as for example pipe tubing and ducts.

The preferred modification of my invention is shown as Fig. 1 and 2 on the drawing. Referring now to the drawing and particularly to Fig. 1 I show the preferred modification of the entrapping device installed in a wall fluid conductor 1 in this instance a pipe line conveying a fluid stream to a pump, blower, fan or meter. A perforated entrapping plate 2 is held in position at a small angle to the axis of fluid flow said flow direction being shown by arrows 4 by means of a resilient holder 5 secured to plate 2. The fluid stream carried by the walled conductor 1 passes through the perforations 6 of the perforated entrapping plate 2 whereas the solids to be entrapped 7 being larger than the perforations 6 are prevented from passing through the perforated entrapping plate 2.

The contour of the entrapping plate 2 shall be of such a shape as to conform closely to the inside walls of the walled fluid conductor 1. The perforations 6 in entrapping plate 2 shall be of such size as to allow passage of the fluid being conveyed in the stream to entrap the undesired solids 7. The number of perforations 6 shall be such as to give a net perforation area greater than the cross sectional area of the walled conductor 1. The length of the perforated entrapping plate 2 is determined by the number of perforations 6 required said length then determines magnitude of the angle 3 to axis of fluid flow.

The entrapping device is installed in the walled fluid conductor 1 by removing a closure 8 a pipe plug being shown in this illustration in the end of a T-shaped member 9 in the walled conductor 1 and inserting the entrapping device by slightly collapsing the resilient holder 5 by pressure of said holder against the inside wall of the walled fluid conductor said pressure being set up by the bearing points 10 of the resilient holder 5 contacting the inner walls of the walled fluid conductor. The pressure of the bearing points 10 of the resilient holder 5 against the inside walls of the walled fluid conductor holds the entrapping plate 2 in its correct angular position in said conductor as well as providing a holding means for the entrapping device. After installation of the entrapping device closure 8 is then reinstalled.

It is to be understood that the entrapping device could be installed in a straight length of walled fluid conductor without the necessity of the T-shaped member 9 or the closure 8 by installing unions or other disconnecting means such as flanges in the walled fluid conductor beyond each end of the entrapping device.

Although resilient holder 5 normally holds the entrapping unit in position in the walled fluid conductor the entrapping unit should be installed ahead of a sharp change of direction in the said conductor such as illustrated by the elbow 11 in order to prevent the entrapping unit itself becoming an unwanted solid if resilient holder 5 should become bent relieving pressure of bearing points 10 against inner walls of the fluid conductor.

The entrapping plate 2 may be made of any material sufficiently rigid as to hold its shape and position and resilient holder 5 of any material sufficiently flexible as to set up a pressure at bearing points 10.

Fig. 2 shows a plan view of the entrapping device. The contour of the entrapping plate 2 as shown is as required for round or elliptical walled fluid conductors. The contour for square or rectangular walled fluid conductors would be in the form of a rectangle. It is to be understood that although the drawings show the perforations 6 as round holes any shaped perforations such as square, rectangular or elliptical would be equally effective.

It will be apparent from the foregoing description that while the conductor, which is in any case generally a conduit, may be of any cross sectional shape, the entrapping plate 2 will in every case be of a size and shape corresponding to the trace of the interior surface of the conduit at a plane traversing the conduit at an angle to its axis.

Thus, as shown in Fig. 1, the plate 2 will correspond to the plane and the periphery of that plate will correspond to the trace to which I have referred. Consequently the entire periphery of the plate will contact with the internal wall of the conduit throughout.

The resilient holder 5 may conveniently be formed as shown, of a spring rod anchored intermediate its ends in a boss located centrally of the plate with the opposite ends extending toward the opposite ends of the plate and thus adapted to bear against the opposite internal sides of the conduit. As the opposite ends of these rods bear against the opposite sides of the conduit as stated, they react upon the plate to tilt the plate about its shorter
mediated transverse axis which extends through the boss and autogenously cause the periphery of the plate to engage throughout with the internal surface of the conduit to frictionally hold the plate against movement longitudinally of the conduit.

The reference which I have hereinbefore made to the desirability of installing the entrapping unit ahead of a sharp change in direction in the conduit is intended merely as a safety measure, should the resilient rod 5 be inadvertently bent out of shape by an inexperienced workman when inserting the same in the conduit.

Having thus described my invention what I claim as new and desire to secure by Letters Patent of the United States is:

1. A device for entrapping solids conveyed in a stream of liquid moving through a walled conduit of predetermined shape and size comprising a perforated plate of a size and shape corresponding to the trace of the interior surface of the conduit at a plane transversing the conduit at an angle to the axis of the latter, and resilient means carried by said plate to simultaneously act against the opposite internal sides of the conduit and to react against the plate to tilt said plate about its shorter medial transverse axis and thereby autogenously maintain its periphery in contact with the wall of the conduit and frictionally hold the plate against movement longitudinally of said conduit.

2. A device according to claim 1, wherein the resilient means comprises resilient arms secured to the plate and extending at the opposite sides of the plate toward the opposite ends of said plate.

3. A device according to claim 1, wherein the resilient means comprises a resilient rod secured intermediate its ends substantially centrally of the plate with its opposite end portions extending toward the opposite ends of the plate and at the opposite sides of the latter.

4. A device according to claim 1, wherein the plate is provided with a centrally located hub, the resilient means comprising a rod, the central portion of which extends through said hub with the end portions of the rod at both sides of the hub bent in the directions of the opposite ends of the plate and forming resilient arms adapted to engage with the opposite internal sides of the conduit to force the peripheral edges of the corresponding ends of the plate into contact with the interior surfaces of the conduit.

5. A device for entrapping solids conveyed in a stream of liquid moving through a cylindrical conduit of predetermined diameter comprising a substantially elliptical perforated plate, and a spring rod passed centrally through the plate with its opposite ends extending in the directions to the opposite ends of the plate and adapted to engage with the opposite sides of the conduit to force the periphery of the plate into contact with the interior surface of the conduit.

6. A device according to claim 5, wherein the plate is provided with a centrally located hub through which the rod is passed.

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