March 24, 1970 L. F. KOHLBERG 3,502,220

PUMP INLET STRAINER

Filed Dec. 18, 1967

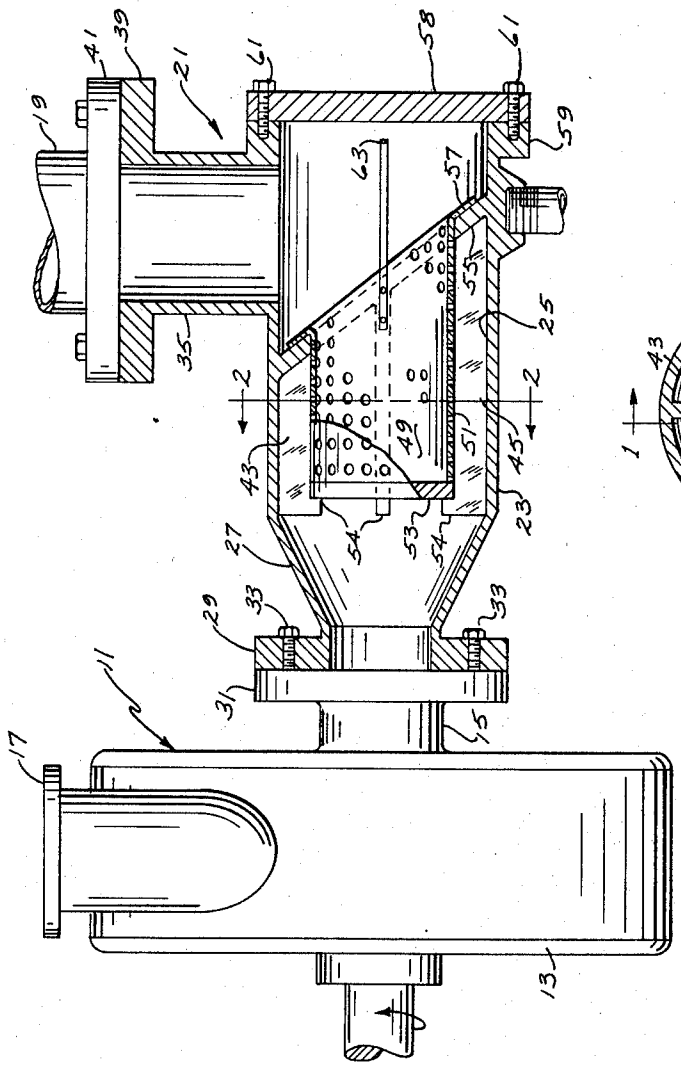


FIG. 1

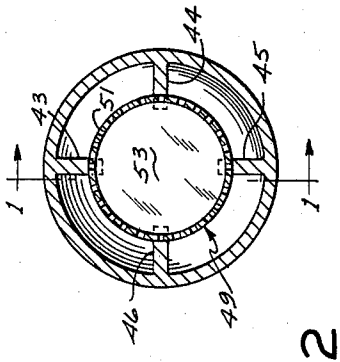


FIG. 2

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United States Patent Office 3,502,220
Patented Mar. 24, 1970

3,502,220

PUMP INLET STRAINER

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Filed Dec. 18, 1967, Ser. No. 691,504
Int. Cl. B01d 29/20
U.S. Cl. 210—416 4 Claims

ABSTRACT OF THE DISCLOSURE

A strainer is disclosed for use at the inlet of a pump to which liquid is provided through a supply pipe which extends transversely to the pump inlet. Liquid is admitted through the side of a substantially cylindrical chamber which is of larger diameter than the pump inlet. The liquid passes substantially radially outwardly through the peripheral straining surface of a substantially cylindrical strainer element and is then guided, by longitudinal fins extending inwardly into the chamber, to the outlet of the chamber. The outlet is funnel shaped and conducts the liquid into the pump without substantial turbulence.

BACKGROUND OF THE INVENTION

This invention relates to pump strainers and more particularly to such a strainer which may be used when liquid is provided to a pump through a supply pipe extending transversely to the pump inlet.

In many pump applications, such as in cooling towers, the liquid to be pumped is conducted to the pump through a supply pipe which extends transversely to or perpendicular to the pump inlet. The turbulence caused by the change in flow direction just prior to entering the pump has frequently required the use of a straight section of pipe aligned with the pump inlet to permit the turbulence to dissipate before the liquid reaches the pump thereby preventing cavitation in the pump. This solution, however, requires a substantial amount of space around the pump and is therefore undesirable in modern urban constructions where space is at a premium.

SUMMARY OF THE INVENTION

Among the objects of the present invention may be noted the provision of an inlet strainer which provides liquid to a pump inlet substantially without turbulence even though the liquid is supplied to the pump through a supply pipe which extends transversely to the pump inlet; the provision of such a strainer which is of compact construction; the provision of such a strainer which is efficient in removing foreign matter from the liquid; the provision of such a strainer which may easily be cleaned; and the provision of such a strainer which is relatively simple and inexpensive. Other objects and features will be in part apparent and in part pointed out hereinafter.

Briefly, an inlet strainer according to this invention is particularly useful with a pump to which liquid is provided through a supply pipe extending transversely to the pump inlet. Means are provided which define a substantially cylindrical strainer chamber having a diameter which is greater than that of the pump inlet. The chamber defining means is provided with a laterally facing inlet which opens into the chamber near one end thereof and which is adapted for connection to the supply pipe. The chamber defining means is also provided with a generally funnel-shaped outlet for coupling the other end of the chamber to the pump inlet, the pump inlet and the chamber being generally in axial alignment with each other. A plurality of longitudinal fins extend inwardly into the chamber from the chamber defining means and a

strainer member or element of generally circular cross section fits within the fins between the chamber inlet and the funnel-shaped outlet. The strainer member has a peripheral straining surface. Accordingly, liquid entering the chamber through the inlet passes substantially radially outwardly through the straining surface, is then guided by the fins to flow longitudinally along the outer portions of the chamber, and then passes through the funnel-shaped outlet into the pump inlet without substantial turbulence.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a side view, with parts partially broken away, showing an inlet strainer according to this invention installed between a pump and a supply pipe extending transversely to the pump inlet; and

FIG. 2 is a section on line 2—2 of FIG. 1.

Corresponding reference characters indicate corresponding parts throughout the several views of the drawings.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to FIG. 1 there is indicated at **11** a centrifugal pump of generally conventional construction having a generally disk-shaped housing **13**, an inlet **15** which opens substantially into the center of the housing **13**, and an outlet **17** which emerges from the housing **13** substantially tangentially thereto. A pipe **19**, through which liquid is supplied to the pump, extends generally parallel to the pump outlet, that is in a direction which is transverse or perpendicular to the pump inlet **15**. The supply pipe **19** is connected to the pump inlet **15** through an inlet strainer designated generally as **21**.

Strainer **21** includes a housing **23** which defines a substantially cylindrical strainer chamber **25**. Chamber **25** is of substantially larger diameter than the pump inlet **15**. The housing **23** also includes a substantially funnel-shaped outlet portion **27** by means of which the chamber **25** is connected with the pump inlet **15** in axial alignment therewith. The strainer outlet portion **27** and the pump inlet **15** are provided with mating flanges **29** and **31** which are fastened together by means of bolts **33**. Housing **23** also includes a laterally facing inlet portion **35** which is adapted for connection to the supply pipe **19** by means of mating flanges **39** and **41** on the inlet and the supply pipe respectively. The inlet opens into the strainer chamber **25** near the end thereof which is opposite the funnel-shaped outlet **27**.

A plurality of longitudinal fins **43–46** extend inwardly into the chamber **25** from the housing **23** between the inlet and the outlet. Within fins **43–46** fits a strainer element constituted by a strainer bucket **49** which is of generally cylindrical shape, that is, it is of circular cross section. The strainer bucket **49** comprises a cylindrical straining surface **51** constituted by a perforate or screenlike material which is suitable for removing foreign objects from a liquid stream passing therethrough. A solid end cap **53** blocks liquid flow at the end of the cylindrical straining surface. The area of the straining surface is preferably substantially larger than the cross-sectional area of either the pump inlet **15** or the supply pipe **19**.

Each of the fins **43–46** includes a small inwardly projecting portion **54** adjacent the funnel-shaped outlet **27** and these projecting portions **54** abut the end cap **53** of strainer bucket **49** to prevent movement of the strainer bucket toward the pump inlet **15**.

A collar or flange **55** extends inwardly from housing **23** into the chamber **25** and fits closely around the peripheral straining surface **51** of strainer bucket **49**. The strainer bucket in turn includes a lip **57** which rests against the collar or flange **55**. The collar or flange **55** and

the lip **57** are disposed at an oblique angle to the axis of the chamber **25** with the portion of the flange **55** which is nearest the outlet **27** being on the side of the chamber which is nearest the inlet **35**. Thus, liquid entering strainer **21** through the supply pipe **19** is directed naturally into the interior of the strainer bucket **49** and is blocked from passing between the strainer and the housing wall by the flange **55** and the lip **57**.

The end of chamber **25** opposite its outlet **27** is closed by a removable cap **58** which is secured to a mating flange **59** on housing **23** by bolts **61**. The strainer bucket **49** is provided with a handle loop **63** which facilitates removal of the strainer bucket through that end of the chamber for cleaning.

The operation of the pump inlet strainer **21** is substantially as follows: Liquid entering the strainer through supply pipe **19** passes first into the interior of the strainer bucket **49**. The turbulence created by the change in flow direction just prior to entering the strainer bucket is largely broken up by being strained through the peripheral wall **51** of the strainer bucket, this surface being of relatively large area as compared with the cross section of either the pump inlet **15** or the supply pipe **19** so that the flow velocity at the straining surface is relatively low. After passing substantially radially outwardly through the peripheral straining surface **51**, the fluid flow is guided longitudinally of the chamber **25** through the longitudinal passages defined by the fins **43–46** on the outside of the strainer bucket into the funnel-shaped outlet **27**. There the flow is converged into the pump inlet **15** without substantial turbulence and, accordingly, the pump can operate properly without cavitation. It can thus be seen that the inlet strainer **21** both changes the direction of fluid flow in a very compact space and also strains the liquid so as to remove foreign objects without introducing such turbulence as would disturb the operation of the pump **11**.

In view of the above, it will be seen that the several objects of the invention are achieved and other advantageous results attained.

As various changes could be made in the above constructions without departing from the scope of the invention, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

What is claimed is:

1. A strainer for connection to the inlet of a pump, for straining liquid supplied to the pump via a supply pipe extending transversely to said pump inlet, said strainer comprising

a housing defining a substantially cylindrical strainer chamber of larger diameter than the pump inlet, said housing having a funnel-shaped outlet at one end thereof constituting its inner end for connection to the pump inlet and having a removable closure at its outer end,

a flange extending inwardly from the housing into said chamber intermediate the ends of the housing, said housing having a lateral inlet between its said outer end and said flange for connection of said supply pipe,

a plurality of fins extending inwardly from the housing into the chamber and extending longitudinally of the housing from said flange toward the inner end of the housing, there being at least three such fins,

a cylindrical strainer element fitted in said flange and said fins and extending longitudinally in said chamber from said flange toward the outlet end of said housing, said element being centered in said housing by said fins, and said fins defining longitudinal passages on the outside of said strainer element,

said strainer element being closed at its end toward the inner end of the housing and open at its other end, whereby liquid entering the housing through the lateral inlet of the housing flows through the cylindrical strainer element past the flange and then radially outward through the strainer element to the said longitudinally extending passages on the outside of the strainer element and thence longitudinally through said passages to said funnel-shaped outlet.

2. A strainer as set forth in claim **1** wherein each fin has an inwardly projecting portion adjacent the inner end of said strainer chamber engageable by the closed end of said strainer element.

3. A strainer as set forth in claim **2** wherein the strainer element has a lip at its outer end engageable with the flange.

4. A strainer as set forth in claim **3** wherein the flange and said lip are in a plane at an oblique angle to the axis of said chamber, the portion of the flange nearest the inner end of the housing being on the side of said chamber nearest the lateral inlet of the housing.

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U.S. Cl. X.R.

210—452