United States Patent [19]

Dobbs

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[54] **METHOD AND APPARATUS FOR UNCLOGGING FLUID PUMP INTAKES**

[76] Inventor: **Louis R. Dobbs,** 2414 12th Ave., Canyon, Tex. 79015

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[52] **U.S. Cl.** ..... **259/2,** 134/104, 134/168 R, 259/95, 415/121 G

[51] **Int. Cl.** **B01f 5/12**

[58] **Field of Search** ..... 259/2, 95, 96, 97; 415/121 G; 134/104, 167 R, 168 R; 15/1.7, 21

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Primary Examiner—Robert W. Jenkins
Attorney, Agent, or Firm—Wilkinson, Mawhinney & Theibault

[57] **ABSTRACT**

The present disclosure is directed to a method and apparatus for handling flowable mixtures containing coagulants, solids and trash which clog or choke off pump intakes when pumping the mixtures and which is attained by activating whippers which are caused to flail about the intake of the pump to break up the coagulants and solids so that they may be pumped with the flowable material. The whippers are caused to flail by the passage therethrough of a portion of the fluid flow from the discharge side of the pump under varying pressure sufficient to cause a flailing action of the whippers to break up any coagulation of solids or accumulation of trash which will tend to choke off or clog the pump intake to render pumping of the flowable mixture and its solid contents.

7 Claims, 4 Drawing Figures

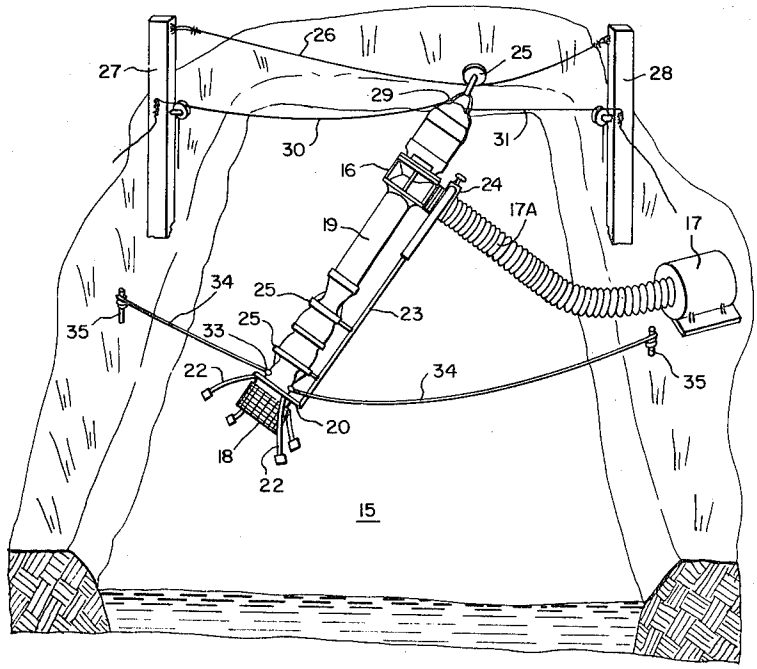


FIG. 1

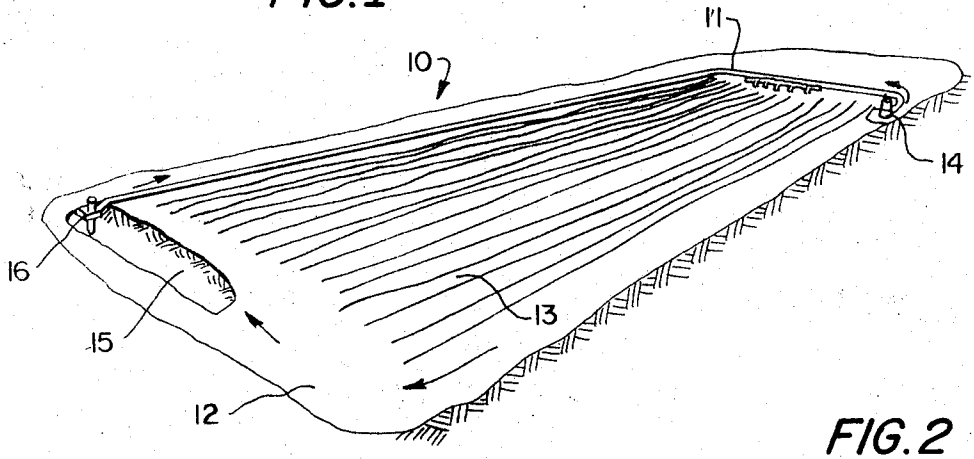

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FIG. 2

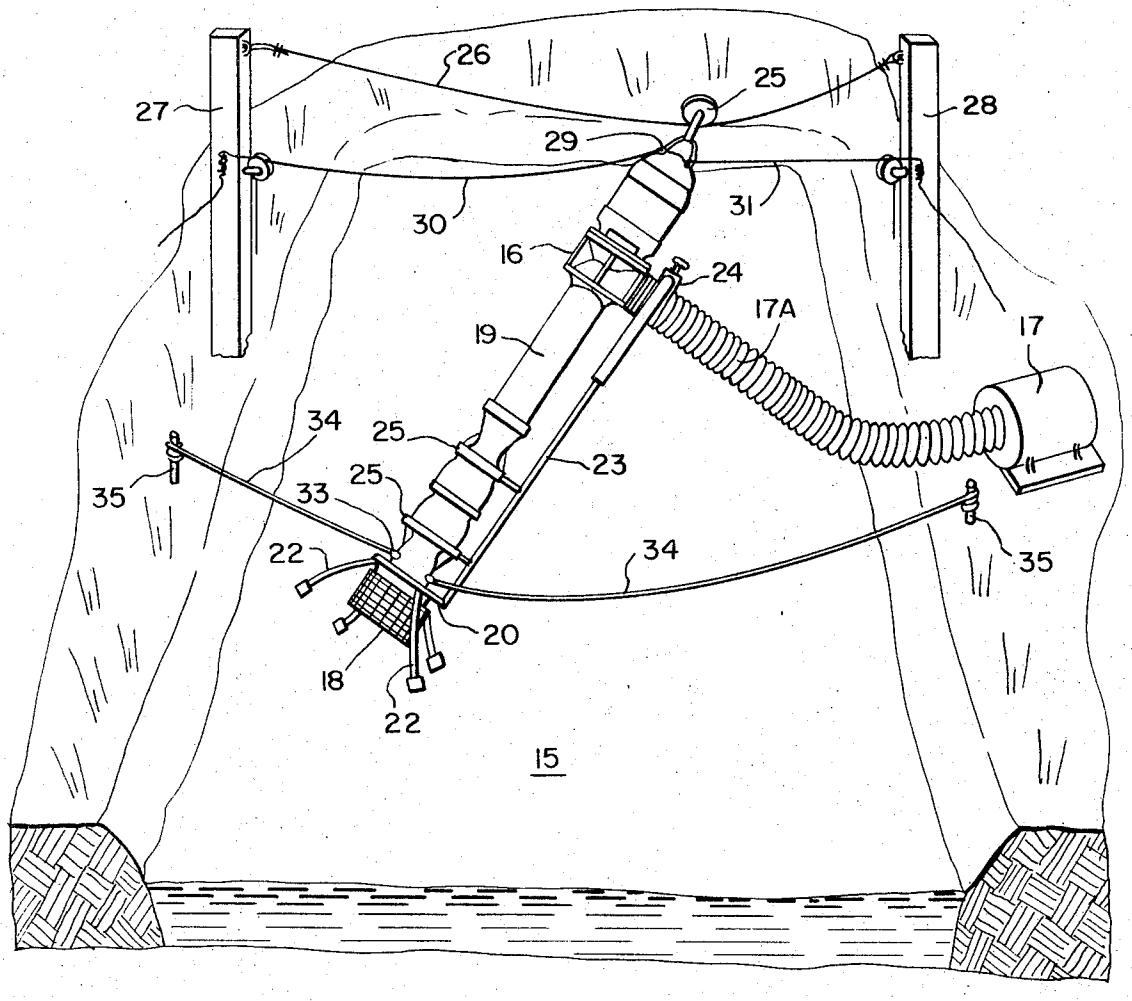

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FIG. 3

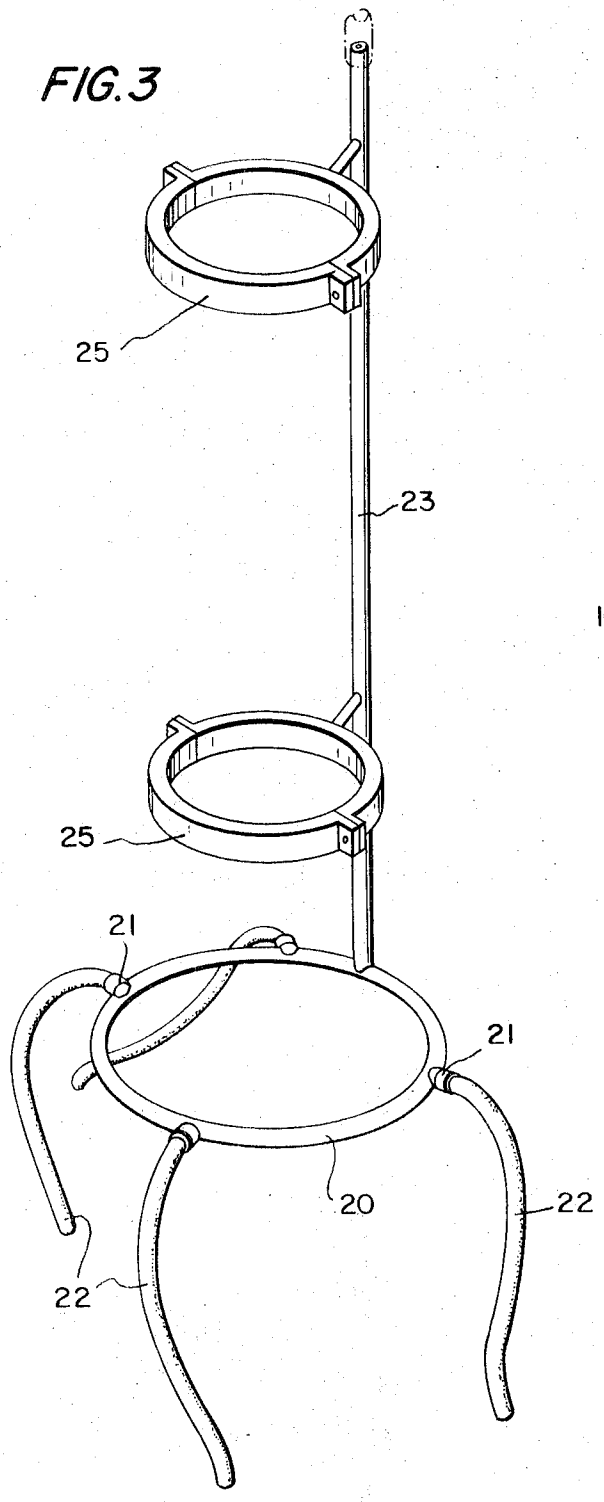
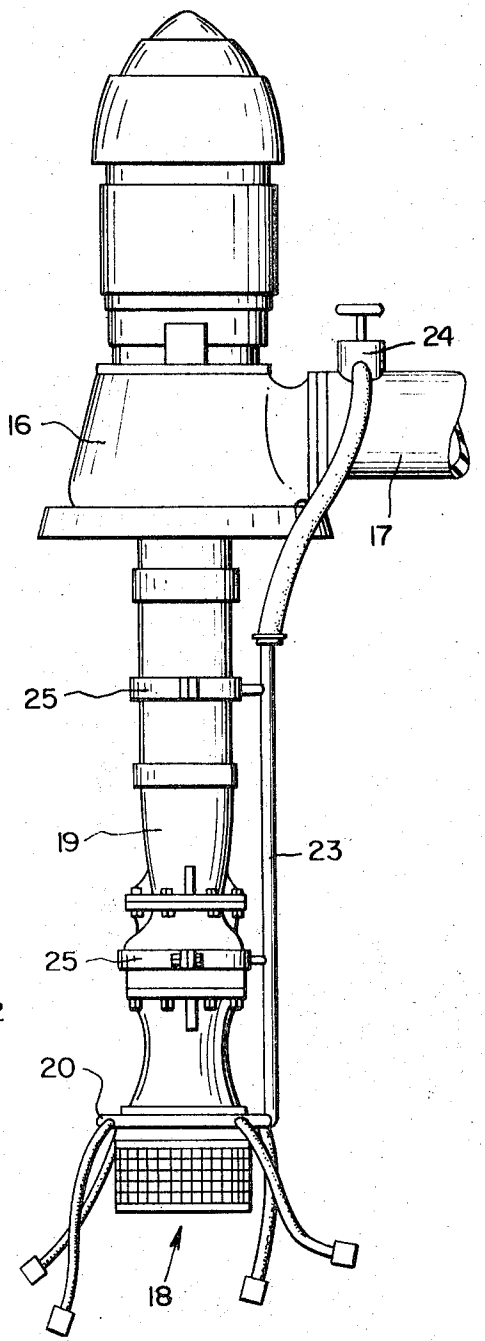


FIG. 4



METHOD AND APPARATUS FOR UNCLOGGING FLUID PUMP INTAKES

PROBLEM IN THE ART

In irrigation farming wells are dug and pumps raise the water to be distributed over main and lateral distribution lines which discharges the water to travel along crop containing furrows from a high level to a low level. At the low level lateral lines leads this tailwater to a tailwater sump where it is picked up by a tailwater pump which returns the tailwater to the high level where it is reintroduced to the field section being irrigated. Carried by the water along the furrows being irrigated is silt and trash which collects in the tailwater sump and coagulates or solidifies about the pump intake and chokes off the pump intake which breaks the return portion of the irrigation cycle.

An object of the present invention is to provide an apparatus which is operated by the water from the sump being pumped by the tailwater pump to cause a stirring or agitating action about the intake of the pump which will break up silt which coagulates or trash which accumulates and tends to choke off the pump intake. This is attained by employing whippers of flexible tubing connected at one end to a manifold proximate the tailwater pump intake and the other end of which is permitted to flail about the intake when the manifold is pressured with water taken from the discharge side of the tailwater pump.

Another object of the present invention is to provide an anti-choking device for the intakes of tailwater pumps whether the pump is of the turbine type or centrifugal type since each has an intake which can be clogged by silt and trash and silt must be pumped back from the sump end to the high end through either type pump.

A further object of the present invention is to provide an anti-choking device for tailwater pumps which can either be installed when the pump is built or a device which in kit form may be installed quickly and inexpensively on presently existing tailwater pumps of either the turbine or centrifugal type by field modification not requiring removing of presently installed tailwater pumps and transporting them to shops for modification.

A still further object of the present invention is the provision of a method which employs the tailwater being pumped to activate flexible hollow whippers which due to their being unrestrained at one end and being subject to having pressured water from the discharge side of the pump passed through their flexible hollow tubular bodies are caused to flail and agitate and break up silt masses or coagulants of nutrients and vaulable top soil that has been washed from the fields and which would clog the pump intake.

With the foregoing and other objects in view the invention will be more fully described hereinafter and more particularly pointed out in the appended claims.

In the drawing in which like parts are denoted by reference characters throughout the several views:

FIG. 1 is a perspective view of a section of land under irrigation showing the well and tailwater sump.

FIG. 2 is a perspective view of a tailwater sump pump installed in a sump pond.

FIG. 3 is a perspective view of the present invention ready for installation on an existing tailwater pump installation.

FIG. 4 is a side elevational view of a tailwater sump pump having the device of the present invention installed thereon.

Referring now to the drawings **10** designates a section of land under irrigation farming having a high end **11** and a low end **12.** The land has furrows **13** between which the crop under irrigation is grown. Situated at the high end is a well and pump **14** which supplies irrigation water across lateral distribution lines to the furrows. The water flows from the high end **11** to the low end **12** where it is collected in the tailwater sump **15** in the form of a pond where a tailwater pump **16** pumps the sump water through a return line **17** back to the high end of the land section for a rerun over the section being irrigated.

The problem to which the present invention is addressed exists in the tailwater sump pond **15** and is occassioned by the entrainment of silt, trash, valuable topsoil and nutrients with the water during its gravitational passage along the furrows from the high end of the section to its low end. The collection of the silt, trash etc. in the tailwater sump **15** presents an operating problem to the tailwater pump **16** in that the silt and topsoil coagulates and the trash with the silt chokes off the tailwater pump **16** at its intake **18.** This is true whether the pump is a turbine or a centrifugal type pump.

As shown by way of example in FIGS. **3** and **4** the tailwater pump **16** has an intake duct **19,** between the screened intake **18** and the motor driven pump **16.** The pump has a discharge to the return line **17.** A manifold **20** in the form of an annular tubular ring is secured to the intake duct **19** proximate the screened intake **18** and is provided with connectors **21** to which are secured by clamps one end of a whipper **22.** The whippers **22** are of flexible resilient hollow tubular construction and may vary from one-half inch in diameter to an inch in diameter and may be from three to five feet in length.

Connected to the manifold **20** is a line **23** which connects with a valve **24** in the discharge line of the pump **16** to the return line.

Suitable clamps **25** are positioned along the intake duct **19** to support the line **23** and manifold **20** such clamps being readily attachable or removable to permit field modification of existing tailwater pumps. An opening is made in the pump discharge line to which the variable opening valve **24** connects line **23** and manifold **20** with pressurized pump discharge water so that pressurized water passes through line **23,** manifold **20** and the plurality of whippers **22** which, due to their unrestrained free ends and the passage of the pressurized fluid through their hollow flexible bodies, will flail about the intake **18** of the tailwater pump **16** to agitate, break up and otherwise disburse coagulants and clumps of trash to keep the pump intake from being choked off and to at the same time permit the broken up silt to be pumped back through the return line **17** for redeposit on the land being irrigated.

The amount of valve opening of valve **24** may be varied to either increase or decrease the water supply to the whippers **22** to either increase or decrease the flailing action necessary to break up the mass of silt or trash which tends to clog the pump intake **18.** This flow rate

is left to the judgment of the pump operator as dictated by his eyes and ears.

While the foregoing description of the present invention has been directed to the environment of the intake of a tailwater sump pump it will be appreciated by those skilled in the art that the present invention will have utility in any pumping art in which the pump intake is immersed in a flowable solution to be pumped and such flowable solution may contain foreign substances which may coagulate or accumulate to impede flow of the solution through the pump intake resulting in a choking or over loading of the pump which may be overcome by the flailing action of whippers **22** supplied with reactive fluid from manifold **20** supplied through line **23** from the pump discharge by regulation of valve **24.**

The number of whippers **22** connected to manifold **20** will depend upon application of the invention to a particular environment, some applications requiring more flailing action to break up masses of foreign matter which would choke the pump intake than other applications. As few as one whipper may be sufficient if the pressure of fluid flow through the whipper **22** is high enough to produce the flailing action necessary to break up the mass which would block the pump intake **18** from performing at its rated capacity.

As shown in FIG. **2** the tailwater pump **16** is installed in the pond **15** by suspension from a trolley pulley **25** supported by cable **26** anchored to poles **27** and **28** at each side of the pond. The top of the pump has attaching eyes **29** to which are secured teather lines **30,31** for moving the pump **16** along the cable **26** to the desired position. The teather lines are secured to davits **32** on the poles **27, 28** to locate the pump. At the base of the pump eyes **33** having raising lines **34** connected thereto so that the pump may have its intake **18** raised clear of the pond for cleaning. When the raising lines **34** are employed they are secured to stakes or pipes **35** driven into the ground. A flexible hose **17A** connects the pump discharge to the return line **17.**

What is claimed is:

1. For use with a tailwater pump in an irrigation system having main and lateral distribution lines, a tailwater sump and return line, said pump having an intake and discharge, a tailwater pump intake agitator comprising

a. an agitating water manifold adapted to be secured proximate the pump intake,

b. means adapted to be connected to the discharge side of said pump to supply water from said pump to said manifold,

c. and whipper means connected to said manifold to conduct water from said manifold through said whipper means to cause thewhipper means to flail about the intake of the tailwater pump to break up deposits of silt, trash and the like for movement through the pump for repassage through the return line from the sump to the main distribution lines for recycling through the system.

2. A tailwater pump intake agitator as claimed in claim **1** further comprising valve means connected between said pump discharge and said manifold to vary the water pressure supplied to the whipper means from the manifold to regulate the amount of flail to which the whipper means is subjected.

3. A tailwater pump intake agitator as claimed in claim **2** wherein said agitating water manifold is an annular hollow conduit having a plurality of discharge connectors spaced circumferentially about the pump intake.

4. A tailwater pump intake agitator as claimed in claim **3** wherein said whipper means are a plurality of lengths of flexible hollow surgical tubing connected to the discharge connectors on said manifold at one end and being free to whip and flail about their other end when subjected to the regulated pump discharge pressure.

5. For use with a pump the intake of which is immersed in a flowable mixture having ingredients which tend to coagulate, solidify or clog the pump intake, a pump intake agitator for breaking up coagulants, solids or trash proximate the pump intake comprising

a. an agitating manifold adapted to be secured proximate the pump intake,

b. means adapted to be connected to the discharge side of the pump to supply a portion of the flowable mixture being discharged from the pump to said manifold under variable pressure, and

c. a flexible hollow whipper means connected to said manifold to conduct flowable mixture from said manifold through said whipper means to cause the whipper means to flail about the intake of the pump to break up coagulants, solids and trash from clogging the pump intake and permitting the solids and coagulants to be pumped through the pump to the source originating the flowable mixture.

6. A pump intake agitator as claimed in claim **5** wherein said whipper means are flexible hollow tubular members from three to 5 feet in length.

7. The method of recirculating a flowable mixture containing coagulants, solids and foreign matter which tends to clog and choke off the intake of a pump which returns the flowable mixture from a low end of the system to a high end comprising

a. collecting the flowable mixture in a sump at the low end of the system,

b. pumping the collected flowable material to the high end of the system,

c. employing a portion of the flowable material being pumped from the low end to the high end to drive flails actuated by said portion of the flowable material to break up coagulants, solids and foreign matter which tend to clog or choke the pump intake.

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