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(56) Documents cited
GB 2235393 A GB 2234268 A GB 2232443 A
GB 1456669 A US 4424125 A

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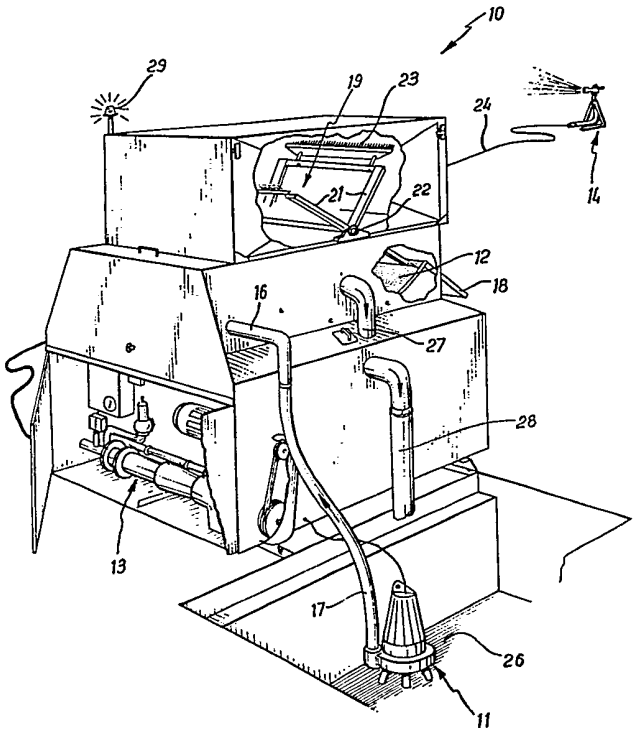
(54) Filtering apparatus

(57) Filtering apparatus for farm slurry comprises a submerged hydraulic feed pump 11 connected by hose 17 to an overflow tank at one end of a curved perforate filter screen 12, and a second pump 13 which receives the filtrate from beneath the screen and delivers it through hose 24 to an irrigation spinkler 14. Solids are swept from the screen by an array of rotating brushes 23 over chute 18. The brush drive motor and pump 11 may be controlled by a float switch in slurry pit 26. Light 29 indicates pump malfunctioning. Tanks upstream and downstream of screen 12 have overflows 27, 28.



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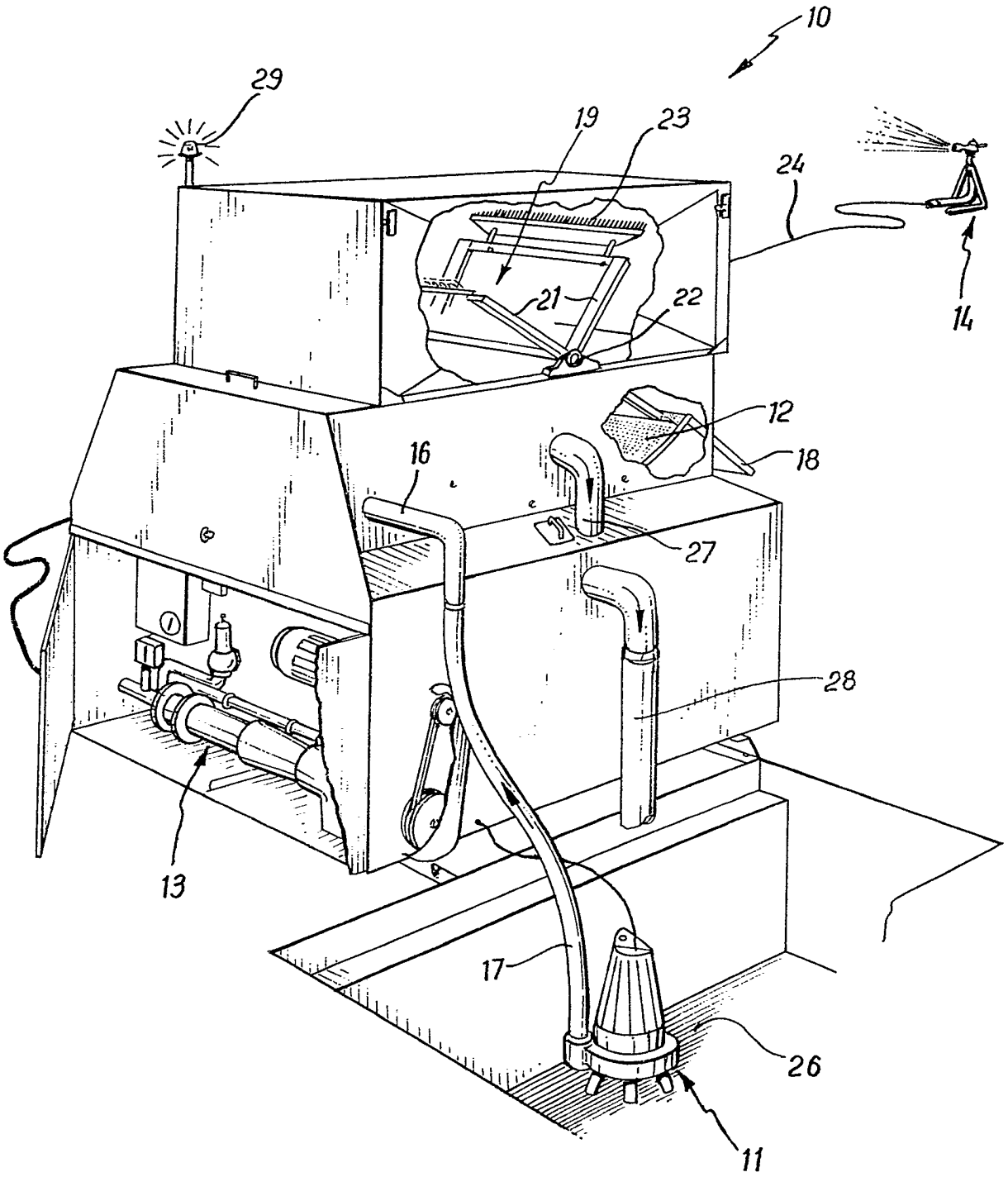
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FILTERING APPARATUS

This invention relates to filtering apparatus particularly for use in an agricultural environment.

In agricultural establishments such as farms for example, relatively large amounts of liquid effluent waste material is commonly produced.

It has been realised that if the solid waste material is removed from the effluent waste, then it would be possible to use the liquid constituent to satisfy the irrigation needs of the land. It is possible to use a three stage settlement tank arrangement to achieve the removal of the solid waste, however the problem with this arrangement is that a relatively large area is required to accommodate the tanks and furthermore the cost and time involved may well be prohibitive to some establishments.

It is an object of the present invention to provide filtering apparatus which is of a particularly simple construction and is relatively quick and inexpensive in operation.

According to the present invention therefore there is provided filtering apparatus for liquid effluent comprising means to cause conveyance of effluent to said apparatus, filtering means through which said effluent can be filtered and means operable to cause movement of said filtered effluent to a remote location.

With this arrangement it is possible to filter effluent in a simple, quick and inexpensive manner.

Preferably said means to cause conveyance of effluent comprises a pump which may be of the submersible type. Said pump may comprise a hydraulic pump of conventional form.

Said means may cause conveyance of effluent to said apparatus via intake means. Said intake means may comprise two interconnected parts, one part of which may be flexible and the other part of which may be rigid. Said flexible part may comprise rubber or plastics tubing and said rigid part may comprise a metallic pipe. Said rigid part may be fixed to or be formed integrally with the apparatus.

Said apparatus may further include effluent storage means adapted to receive said effluent therein and said effluent storage means may be connected directly or indirectly to said intake means whereby material is conveyed into said effluent storage means by said conveyance means.

Said effluent storage means may comprise a tank which may be rectangular in configuration.

Said effluent storage means may have at least one wall or at least a part thereof of reduced height relative to the remainder of said means. Said storage means may be disposed substantially adjacent said

filtering means and in particular said at least one wall of reduced height may be adjacent said filtering means.

Said filtering means may comprise a perforated sheet and furthermore may be of concave form.

Said apparatus may further include sweeping means which may be disposed above said filtering means and may be operable to sweep at least one surface of said filtering means. Said sweeping means may be rotatably mounted and may comprise multiple radially projecting arms, each arm having a brush mounted on an end thereof.

A filtration receiving means may be disposed below said filtering means and may comprise a tank.

Said means to cause movement of said filtered effluent may be connected to said filtrate receiving means and may comprise a pump. Said pump may be connected to said remote location by way of outlet means which may comprise plastics or rubber tubing.

Said remote location may comprise a remote sprinkler or similar.

The invention will now be described further by way of example only and with reference to the accompanying drawing, the single figure of which shows, partly in section, a perspective view of one form of apparatus according to the invention.

Referring now to the drawing there is shown an effluent filtering machine 10 which filters the solid

waste material from a liquid effluent to give a liquid suitable for irrigation purposes.

The filtering machine 10 comprises a first pump 11 to pump effluent to the machine 10, a feed tank (not shown) to receive the effluent, a filtration mesh 12, a holding tank (not shown) to receive the filtered effluent and a second pump 13 to pump the filtered liquid to a desired remote location 14.

The first pump 11 comprises a hydraulic pump of conventional form which is able to be submersed in the effluent in operation.

The feed tank (not shown) is disposed within a machine housing and is a generally rectangular stainless steel tank. An intake conduit 16 thereof is linked to the first pump 11 by way of an intake hose 17.

A perforated filtration mesh 12 is also mounted within the housing substantially adjacent the feed tank in such a position that effluent can flow over one side of the tank and onto the mesh 12. In order to achieve this, one wall of the tank can be of reduced height relative to the remaining walls. The mesh 12 is mounted in the housing so as to adopt a concave form and one end thereof is secured to a downwardly inclined discharge chute 18.

A rotor arrangement 19 is disposed above the mesh 12 within the housing. The arrangement is of generally

cross-shaped form having two projecting arms 21 mounted for rotation on a central shaft 22. The arms 21 are fixed substantially at 180° relative to each other and each arm 21 has a brush 23 secured to one end thereof. The rotor arrangement 19 is driven by an electric motor (not shown) which is operable to cause rotation of the central shaft 22, for a purpose to be described hereinafter.

A holding tank (not shown) is also disposed in the housing in a position directly below the filtration mesh 12 to receive the filtered effluent therein.

The second pump 13 is connected to the holding tank and is of conventional form. The second pump 13 links the holding tank and an outlet hose 24 and is operable to pump liquid from the holding tank, through the outlet hose 24 to a remote location 14.

In use the filtering machine 10 is located adjacent an effluent collection pit 26 or similar. The first pump 11 is positioned in the pit 26 submersed in the effluent. Actuation of the first pump 11 causes effluent to be pumped through the hose 17 and intake conduit 16 into the feed tank. Thus the feed tank fills up with effluent material until the level of material therein exceeds the height of the one wall of the tank. At this time the effluent will flow over the wall and will fall onto the filtration mesh 12. A float switch (not shown) is

provided in conjunction with the first pump 11 and which is operable to cause actuation of first pump 11 and the motor to drive the rotor arrangement 19 due to the presence of effluent in the collection pit 26. Alternatively the motor to drive the rotor arrangement can be actuated by actuation of the first pump.

When the effluent drops onto the filtration mesh 12 it will be appreciated that any solid or particulate matter of greater size than the perforations in the mesh 12 will be retained on an upper surface thereof, whilst the liquid constituent and smaller solid matter will pass through the mesh into the holding tank below.

The rotating rotor arrangement 19 is positioned such that on rotation thereof, each of the brushes 23 mounted on the ends of each respective arm 21 sweeps across the surface of the mesh 12 removing the solid matter thereon and causing the same to be discharged from the machine 10 down the discharge chute 18. It will be appreciated that the mesh 12 can be chosen to have any desired perforation size such that matter greater than such desired size will not pass therethrough and furthermore the speed of rotation of the rotor can be variable or fixed, as desired, a typical speed being 8 revs/min.

Once the filtered effluent has been collected in the holding tank, the second pump 13 can be actuated manually or automatically to pump the filtered effluent down

outlet hose 24 to a remote location, for example the sprinkler shown at 14 on the figure for irrigation or other purposes.

Both feed and holding tanks have respective overflow outlets 27, 28 associated therewith whereby if the level of effluent or filtered effluent rises to an unacceptable level then the material is discharged through the overflow outlets 27, 28 directly back into the effluent collection pit 26.

Furthermore, the machine 10 also incorporates a warning light 29 which is shown mounted on the top of the machine and which is connected via suitable circuitry to the or each pump 11, 13. The light 29 is caused to be actuated when a malfunction occurs in the or each pump 11, 13 to warn a user of this malfunction.

With this arrangement it is possible to filter effluent in a simple, convenient and inexpensive manner.

It is of course to be understood that the invention is not intended to be restricted to the details of the above embodiment which are described by way of example only.

CLAIMS

1. Filtering apparatus for liquid effluent comprising means to cause conveyance of effluent to said apparatus, filtering means through which said effluent can be filtered and means operable to cause movement of said filtered effluent to a remote location.

2. Apparatus according to claim 1 wherein said means to cause conveyance of effluent comprises a pump.

3. Apparatus according to claim 2 wherein said pump is of a submersible type.

4. Apparatus according to claim 2 or claim 3 wherein said pump is a hydraulic pump.

5. Apparatus according to any one of claims 1 to 4 wherein said conveyance means causes conveyance of effluent to said apparatus via intake means.

6. Apparatus according to claim 5 wherein said intake means comprises two interconnected parts.

7. Apparatus according to claim 6 wherein one part of said interconnected parts is flexible.

8. Apparatus according to claim 6 or claim 7 wherein another part of said interconnected parts is rigid.

9. Apparatus according to claim 7 wherein said flexible part comprises rubber or plastics tubing.

10. Apparatus according to claim or claim 9 wherein said rigid part comprises a metallic pipe.

11. Apparatus according to any one of claims 8 to 10

wherein said rigid part is fixed to the apparatus.

12. Apparatus according to any one of claims 8 to 10 wherein said rigid part is formed integrally with the apparatus.

13. Apparatus according to any one of claims 1 to 12 further including effluent storage means adapted to receive effluent therein.

14. Apparatus according to claim 13 wherein said effluent storage means is connected directly or indirectly to said intake means whereby material is conveyed into said effluent storage means by said conveyance means.

15. Apparatus according to claim 13 or claim 14 wherein said effluent storage means comprises a storage tank.

16. Apparatus according to any one of claims 13 to 15 wherein said effluent storage means has at least one wall, or at least a part thereof, of reduced height relative to the remainder of said means.

17. Apparatus according to any one of claims 13 to 16 wherein said storage means is disposed substantially adjacent said filtering means.

18. Apparatus according to claim 17 when dependent on claim 16 wherein said at least one wall of reduced height is adjacent said filtering means.

19. Apparatus according to any one of claims 1 to 18 wherein said filtering means comprises a perforated

sheet.

20. Apparatus according to any one of claims 1 to 19 wherein said filtering means is of concave form.

21. Apparatus according to any one of claims 1 to 20 wherein said apparatus further includes sweeping means operable to sweep at least one surface of said filtering means.

22. Apparatus according to claim 21 wherein said sweeping means is disposed above said filtering means.

23. Apparatus according to claim 21 or claim 22 wherein said sweeping means is rotatably mounted.

24. Apparatus according to claim 23 wherein said sweeping means comprises multiple radially projecting arms, each arm having a brush mounted on an end thereof.

25. Apparatus according to any one of claims 1 to 24 further including a filtration receiving means disposed below said filtering means.

26. Apparatus according to claim 25 wherein said receiving means comprises a tank.

27. Apparatus according to any one of claims 1 to 26 when dependent on claim 25 wherein said means to cause movement of said filtered effluent is connected to said filtration receiving means.

28. Apparatus according to any one of claims 1 to 27 wherein said means to cause movement of said filtered effluent comprises a pump.

29. Apparatus according to claim 28 wherein said pump is connected to said remote location by way of outlet-means.

30. Apparatus according to claim 29 wherein said outlet means comprises plastics or rubber tubing.

31. Apparatus according to any one of claims 1 to 30 wherein said remote location comprises a remote sprinkler.

32. Apparatus substantially as hereinbefore described with reference to and as illustrated in the accompanying drawing.

Patents Act 1977
Examiner's report to the Comptroller under Section 17 (The Search Report)

Application number 9114211.7

Relevant Technical fields

(i) UK Cl (Edition K) B1D (DNCD,DNPA,DNPB,DNRS, DPLC,DQAX)

(ii) Int Cl (Edition 5) B01D

Search Examiner

R T HAINES

Databases (see over)

(i) UK Patent Office

(ii)

Date of Search

31 JULY 1991

Documents considered relevant following a search in respect of claims

Category (see over)	Identity of document and relevant passages	Relevant to claim(s)
X,Y	GB 2235393 A (WU)	X:1-19, 25-28 Y:24
X,Y	GB 2234268 A (HITECH EQUIPMENT)	X:1,2, 4-15, 25-30 Y:24
X,Y	GB 2232443 A (HANFORD ENG) note page 3 lines 22-26	X:1-6,13 14,19,20 25-31 Y:24
Y	GB 1456669 A (LONGWOOD ENG)	24
X,Y	US 4424125 A (MARTIN)	X:1-29, 21-23, 25-29 Y:24

SF2(p)

GP2AAN

Category	Identity of document and relevant passages	Relevant to claim(s)

Categories of documents

X: Document indicating lack of novelty or of inventive step.

Y: Document indicating lack of inventive step if combined with one or more other documents of the same category.

A: Document indicating technological background and/or state of the art.

P: Document published on or after the declared priority date but before the filing date of the present application.

E: Patent document published on or after, but with priority date earlier than, the filing date of the present application.

&: Member of the same patent family, corresponding document.

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