A feeding device for liquid raw materials includes a storage tank and a hydraulic cylinder. The storage tank includes an outer tube, an inner tube, a receiving space, a front cap and a rear cap. The inner tube is mounted coaxially in the outer tube. The receiving space is defined between the inner and outer tubes. The front cap is mounted on the inner and outer tubes and has a feeding inlet communicating with the inner tube and a front outlet communicating with the receiving space. The rear cap is mounted on the inner and outer tubes and has a rear inlet communicating with the receiving space. The hydraulic cylinder has a piston rod and a piston connected to the piston rod and mounted movably in the inner tube. Thus, the feeding device is simplified and quiet and can be used to transport materials of different viscosities.
FEEDING DEVICE FOR LIQUID MATERIALS

BACKGROUND OF THE INVENTION

0001 1. Field of Invention
0002 The present invention relates to a feeding device, and more particularly to a feeding device for liquid materials.
0003 2. Description of the Related Art
0004 A conventional feeding device may comprise a pump including a motor and a gear set or a diaphragm pump to feed liquid materials. However, the conventional mechanical or pneumatic pump may produce a great deal of noises and vibrations during operating. Thus, the conventional feeding device may cause unfavorable effects on field workers. Additionally, the mechanical pump includes many components like a rotor or bearings and has a complicated structure and a high manufacturing cost. Furthermore, the conventional mechanical and pneumatic pumps cannot feed different liquid materials in different viscosities and is limited in use.

0005 To overcome the shortcomings, the present invention provides a feeding device for liquid materials to mitigate or obviate the aforementioned problems.

SUMMARY OF THE INVENTION

0006 The primary objective of the present invention is to provide a feeding device for liquid materials that is driven by a hydraulic power and has a simplified structure and cheap manufacturing cost.
0007 A feeding device for liquid raw materials in accordance with the present invention comprises a storage tank and a hydraulic cylinder. The storage tank includes an outer tube, an inner tube, a receiving space, a front cap and a rear cap. The inner tube is mounted coaxially in the outer tube. The receiving space is defined between the inner and outer tubes. The front cap is mounted on the inner and outer tubes and has a feeding inlet communicating with the inner tube and a front outlet communicating with the receiving space. The rear cap is mounted on the inner and outer tubes and has a rear outlet communicating with the receiving space. The hydraulic cylinder has a piston rod and a piston connected to the piston rod and mounted movably in the inner tube. Thus, the feeding device is simple and quiet and can be used to transport materials of different viscosity.
0008 Other objectives, advantages and novel features of the invention will become more apparent from the following detailed description when taken in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

0009 FIG. 1 is a side view in partial section of a first embodiment of a feeding device for liquid materials in accordance with the present invention;
0010 FIG. 2 is a cross sectional rear view of the front cap of the first embodiment of the feeding device for liquid materials along line 2-2 in FIG. 1;
0011 FIG. 3 is a cross sectional rear view of the front cap of the first embodiment of the feeding device for liquid materials along line 3-3 in FIG. 1;
0012 FIG. 4 is an operational side view in partial section of the first embodiment of the feeding device for liquid materials in FIG. 1;
0013 FIG. 5 is a side view in partial section of a second embodiment of the feeding device for liquid materials in accordance with the present invention;
0014 FIG. 6 is an operational side view in partial section of the second embodiment of the feeding device for liquid materials in FIG. 5; and
0015 FIG. 7 is a schematic side view of a third embodiment of the feeding device for liquid materials in accordance with the present invention.

DETAILED DESCRIPTION OF THE INVENTION

0016 With reference to FIGS. 1, 2, 3 and 4, a feeding device for liquid materials in accordance with the present invention comprises a storage tank (10) and a hydraulic cylinder (20).
0017 The storage tank (10) comprises an outer tube (11), an inner tube (12), a receiving space, a front cap (13) and a rear cap (16). The outer tube (11) is thermal conductive and has a front end and a rear end. The inner tube (12) is thermal conductive, is mounted coaxially in and spaced from the outer tube (11) and has a front end and a rear end. The receiving space is defined between the inner and outer tubes (11, 12).
0018 The front cap (13) is mounted on the front ends of the inner and outer tubes (11, 12) and has a feeding inlet (14) and a front outlet (15). The feeding inlet (14) is defined in the front cap (13), communicates with the inner tube (12) and may be connected to a divider connected to a liquid material supply and a liquid material output through pipelines. The front outlet (15) is defined in the front cap (13), communicates with the receiving space and may be connected to a recycle device.
0019 The rear cap (16) is mounted on the rear ends of the inner and outer tubes (11, 12) and has a rear inlet (17) and a gas opening (18). The rear inlet (17) is defined in the rear cap (16), communicates with the receiving space between the inner and outer tubes (11, 12) and may be connected to a supply of hot and cold water through a pipeline. The gas opening (18) is defined through the rear cap (16) and communicates with the inner tube (12).
0020 The hydraulic cylinder (20) is connected to the storage tank (10) and has a piston rod (21) and a piston (22). The piston rod (21) is mounted through the rear cap (16), extends into the inner tube (12) and has a distal end. The piston (22) is connected to the distal end of the piston rod (21) and is mounted movably in the inner tube (12). When the hydraulic cylinder (20) is actuated, gas can flow in or out through the gas opening (18) of the rear cap (16).
0021 When the feeding device is in use, a liquid material (30) is fed into the inner tube (12) through the feeding inlet (14) of the front cap (13). The piston rod (21) of the hydraulic cylinder (20) drives the piston (22) to perform a reciprocating and linear movement and press against the liquid material (30) in the inner tube (21).
0022 Hot water can be introduced into the receiving space through the rear inlet (17) of the rear cap (16) to heat the liquid material (30) in the inner tube (12). Thus, the flow property of the liquid material (30) can be adjusted and the liquid material (30) can be fed at a suitable working temperature. Cold water can also be introduced into the receiving space through the rear inlet (17) of the rear cap (16) to cool the liquid material (30) in the inner tube (12). Thus, the liquid material (30) can be adjusted to a suitable temperature so as to facilitate the operation of the hydraulic cylinder (20). Hot and cold water can be delivered to the recycle device through the front outlet (15) of the front cap (13) and recycled to the supply of hot and cold water.
[0023] With reference to FIGS. 5 and 6, multiple storage tanks (10) can be connected coaxially in series and driven simultaneously by the hydraulic cylinder (20). The piston rod (21) of the hydraulic cylinder (20) extends through or into the inner tubes (12) of the storage tanks (10) and multiple pistons (22) are connected to the piston rod (21) and mounted respectively in the inner tubes (12) of the storage tanks (10). Thus, the piston rod (21) can drive the pistons (22) to pressing against the liquid material (30) in the inner tubes (12).

[0024] With reference to FIG. 7, multiple storage tanks (10) are arranged in parallel. Multiple hydraulic cylinders (20) are connected respectively to the storage tanks (10) and are connected to a hydraulic supply (40) through multiple pipelines. Thus, the hydraulic cylinders (20) can drive the storage tanks (10) with the same hydraulic supply (40).

[0025] The feeding device has a simplified structure and a low manufacturing cost and is easy to repair and maintain. Additionally, the feeding device is quiet because of the stability of the hydraulic cylinder (20). Furthermore, by means of the design of the inner (12) and outer tubes (11), the liquid material (30) in the inner tube (12) can be heated or cooled by introducing hot or cold water into the receiving space. The viscosity of the liquid material (30) can be adjusted and feeding liquid materials in different viscosities by the feeding device is easy and convenient.

[0026] Even though numerous characteristics and advantages of the present invention have been set forth in the foregoing description, together with details of the structure and function of the invention, the disclosure is illustrative only. Changes may be made in detail, especially in matters of shape, size and arrangement of parts within the principles of the invention to the full extent indicated by the broad general meaning of the terms in which the appended claims are expressed.

What is claimed is:

1. A feeding device for liquid materials comprising a storage tank comprising
   an outer tube having
   a front end; and
   a rear end;
   an inner tube being mounted coaxially in and being spaced from the outer tube and having
   a front end; and
   a rear end;
   a receiving space being defined between the inner and outer tubes;
   a front cap being mounted on the front ends of the inner and outer tubes and having
   a feeding inlet being defined in the front cap and communicating with the inner tube; and
   a front outlet being defined in the front cap and communicating with the receiving space; and
   a rear cap being mounted on the rear ends of the inner and outer tubes and having a rear inlet defined in the rear cap and communicating with the receiving space; and
   a hydraulic cylinder being connected to the storage tank and having
   a piston rod being mounted through the rear cap and extending into the inner tube; and
   a piston being connected to the piston rod and being mounted movably in the inner tube.

2. The feeding device for liquid materials as claimed in claim 1, wherein
   the feeding device comprises multiple storage tanks connected coaxially in series;
   the piston rod of the hydraulic cylinder extends into the inner tubes of the storage tanks; and
   multiple pistons are connected to the piston rod and are mounted respectively in the inner tubes of the storage tanks.

3. The feeding device for liquid materials as claimed in claim 2, wherein the rear cap of each storage tank further has a gas opening defined through the rear cap and communicating with the inner tube of the storage tank.

4. The feeding device for liquid raw materials as claimed in claim 1, wherein the rear cap further has a gas opening defined through the rear cap and communicating with the inner tube.

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