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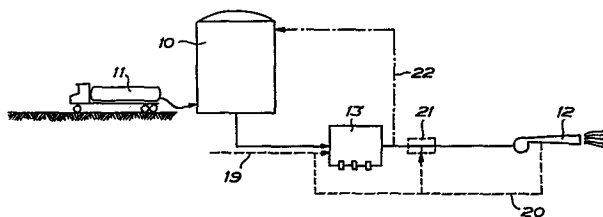
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⑤④ **Method for handling a coal-water suspension and stirring tank for working the method.**

⑤⑦ The invention relates to a method for handling a coal-water suspension to be stored in a tank (10) connected to a burner (12), and to be supplied to the burner for combustion therein. In order to avoid the necessity of storing the coal-water suspension in the tank under continuous stirring, said suspension is stored in a heavy condition in the tank. Then, a defined volume of the coal-water suspension is being stirred and after dilution with water is supplied in a more fluid, well suspended homogenized condition to the burner for combustion.

The invention also relates to a stirring tank (13) for receiving the defined volume while stirring said volume.



METHOD FOR HANDLING A COAL-WATER SUSPENSION AND
STIRRING TANK FOR WORKING THE METHOD

5 The present invention relates to a method for
handling a coal-water suspension to be kept stored
in a tank connected to a burner, and to be supplied
to the burner for combustion therein.

10 In order to obtain a satisfactory dispersion
of the coal powder in the suspension, which is a
prerequisite for a steady and stable combustion of the
coal-water suspension, a constant viscosity of the
coal-water suspension must be maintained while being
stored in the tank. However, the achievement thereof
15 may be uncertain due to occurring sedimentation in the
tank, change of the chemicals included in the coal-water
suspension, and evaporation of water from the coal-water
suspension while being stored. The larger the viscosity
of the coal-water suspension, the more stable is the
suspension, i.e. said problem in that case will be less
20 accentuated but on the other hand a heavy coal-water
suspension does not have the rheology required to make
possible combustion thereof in the burners available
today. Therefore, it is common practice at present to
store coal-water suspensions with a viscosity which
25 allows direct combustion in the burner, and to maintain
the viscosity constant during storing in the tank by
using stirrers. The method is not efficient, because
there may exist, notwithstanding the arrangement of
stirrers, different viscosities at different levels in
30 the tank, and because high investment and operational
costs are required for effecting the stirring in the
tank.

35 Facilitated handling of coal-water suspensions
at lower investment and operational costs while
obtaining a homogeneous suspension having the

desired viscosity and rheology for combustion in a burner will be achieved by the method of the invention which has obtained the characteristics appearing from claim 1. As a consequence thereof the coal-water
5 suspension can be supplied to the tank and be stored therein in a ~~condition~~ considerably heavier than that allowing combustion in the burner. In that connection it is not necessary that the heavy suspension is stored while being stirred continuously or inter-
10 mittently, due to the greater stability of such suspension. Before the suspension is supplied to the burner, the defined volume of the coal-water suspension is stirred, which can be effected in a smaller stirring tank, and the suspension is diluted to such rheology
15 that the combustion in the burner can take place without disturbances and by utilizing the burner constructions available at present.

The invention also relates to a stirring tank for working the method of the invention with the
20 characteristics appearing from claim 6.

In order to explain the invention in detail reference is made to the accompanying drawing in which
FIG. 1 shows diagrammatically a system for working the method of the invention while
25 FIG. 2 is a side view, partly a vertical sectional view, of a stirring tank included in the system of FIG. 1, and
FIG. 3 is a sectional view along line III - III in FIG. 2.

Referring first to FIG. 1, it may be assumed that
30 the system shown therein is arranged in a district heating plant in which a coal-water suspension is used for the combustion. For storing the coal-water suspension in association with the heating plant a storing tank 10
35 is provided to which the coal-water suspension is

supplied by means of a tank truck 11. The coal-water suspension stored can have a considerably higher viscosity, i.e. can be heavier, than that allowing combustion of the coal-water suspension in burners of available construction. The suspension may be so heavy that it has a high stability eliminating stirring in the storing tank 10. As a consequence thereof the tank will be of a simple construction and can be constructed in the same manner as conventional oil tanks.

However, the coal-water suspension in the storing tank 10 cannot be supplied directly to the burner 12 included in the system. Before this is done, the suspension must be homogenized by stirring and also dilution to a rheology suitable for combustion. This is effected in the stirring tank 13 which is shown in more detail in FIGS. 2 and 3.

As will be seen from FIGS. 2 and 3, the stirring tank has an inlet 14 and an outlet 15 which are connected to separate passages in a conduit 16 extending axially into the stirring tank 13 to be angled radially downwards and to have the openings of the passages adjacent the bottom of the stirring tank. The stirring tank is supported by a number of rotatably mounted rubber wheels 17, and one or several of these wheels can be driven for rotating the stirring tank 13. In order that coal powder of the coal-water suspension shall not adhere to the inside surface of the stirring tank 13, a number of segments 18 are arranged supported loosely by the stirring tank so as to slide against the inside surface of the cylindrical wall while scraping continuously against said wall.

The heavy coal-water suspension supplied to the stirring tank 13 from the storing tank 10 thus will be stirred effectively in the stirring tank 13 in order to obtain a completely homogenized coal-water suspension.

In order to dilute the coal-water suspension to a suitable viscosity and rheology for the following combustion the homogenized coal-water suspension is mixed with water before it is supplied to the burner 12. This can be effected in different ways. E.g. diluting water can be supplied from a distribution net by a conduit 19 to the stirring tank 13 such that the dilution takes place in the stirring tank. However, burners have also been proposed recently wherein the coal-water suspension supplied to the burner is dehydrated just before combustion, and it is also conceivable to return the water recovered by the dehydration, to the stirring tank 13 as indicated by a conduit 20 in FIG. 1. Alternatively, dilution water from net or burner can be supplied to the homogenized coal-water suspension downstream of the stirring tank 13 in a dilution mixer 21 arranged for this purpose.

The amount of coal-water suspension supplied per time unit to the stirring tank 13 can be larger than the amount combusted per time unit in the burner 12, and in that case the excess amount can be allowed to return to the storing tank 10 as shown by means of a conduit 22 in FIG. 1. In this manner the coal-water suspension is continuously kept circulating through the stirring tank 13. Alternatively, the coal-water suspension supplied from the stirring tank 13, which is not used in the burner 12, may be allowed to return not to the storing tank 10 but to the stirring tank 13 such that there is obtained a circulation of the coal-water suspension through the stirring tank 13 only.

Within the scope of the invention the method of the invention can be applied by using another type of stirring than that described herein. However, the stirring tank shown herein is of a simple embodiment, but it is very effective and therefore advantageous

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considering the low investment and operational costs.

CLAIMS

1. Method for handling a coal-water suspension to be stored in a tank (10) connected to a burner (12), and to be supplied to the burner for combustion therein, c h a r a c t e r i z e d in that the
5 coal-water suspension is stored in the tank (10) in a heavy condition and that a defined volume (13) of the coal-water suspension is being stirred and after dilution with water is supplied in a more fluid, well
10 suspended homogenized condition to the burner (12) for combustion.
2. Method as claimed in claim 1, c h a r a c -
t e r i z e d in that part of the coal-water suspension, which has been treated in the defined volume (13) is
15 supplied to the tank (10) or the defined volume, the coal-water suspension or part thereof being continuously circulated.
3. Method as claimed in claim 1 or 2,
c h a r a c t e r i z e d in that water for diluting
20 the coal-water suspension is supplied to the defined volume (13) to be mixed therewith under stirring.
4. Method as claimed in claim 1 or 2,
c h a r a c t e r i z e d in that water for diluting
the coal-water suspension is added to be mixed therewith
25 while the coal-water suspension is being supplied to the burner.
5. Method as claimed in claim 3 or 4,
c h a r a c t e r i z e d in that the dilution water completely or partly consists of water which has been
30 separated from the coal-water suspension in the burner (12).
6. Stirring tank for working the method for handling a coal-water suspension according to any of claims 1 to 5, arranged to receive a defined volume of the
35 coal-water suspension under stirring, c h a r a c -

t e r i z e d in that the stirring tank having
cylindrical form, is supported for rotation and is
provided with conduits for supplying the coal-water
suspension to the rotating stirring tank and for
5 discharging said suspension therefrom, respectively.

7. Stirring tank as claimed in claim 6,
c h a r a c t e r i z e d in that the tank is
supported by support wheels (17) engaging the outside
surface of the cylindrical wall.

10 8. Stirring tank as claimed in claim 6 or 7,
c h a r a c t e r i z e d in that inside the
stirring tank loosely supported bodies (18) are
arranged to slide against the inner surface of the
cylindrical wall of the stirring tank during the
15 rotation thereof.

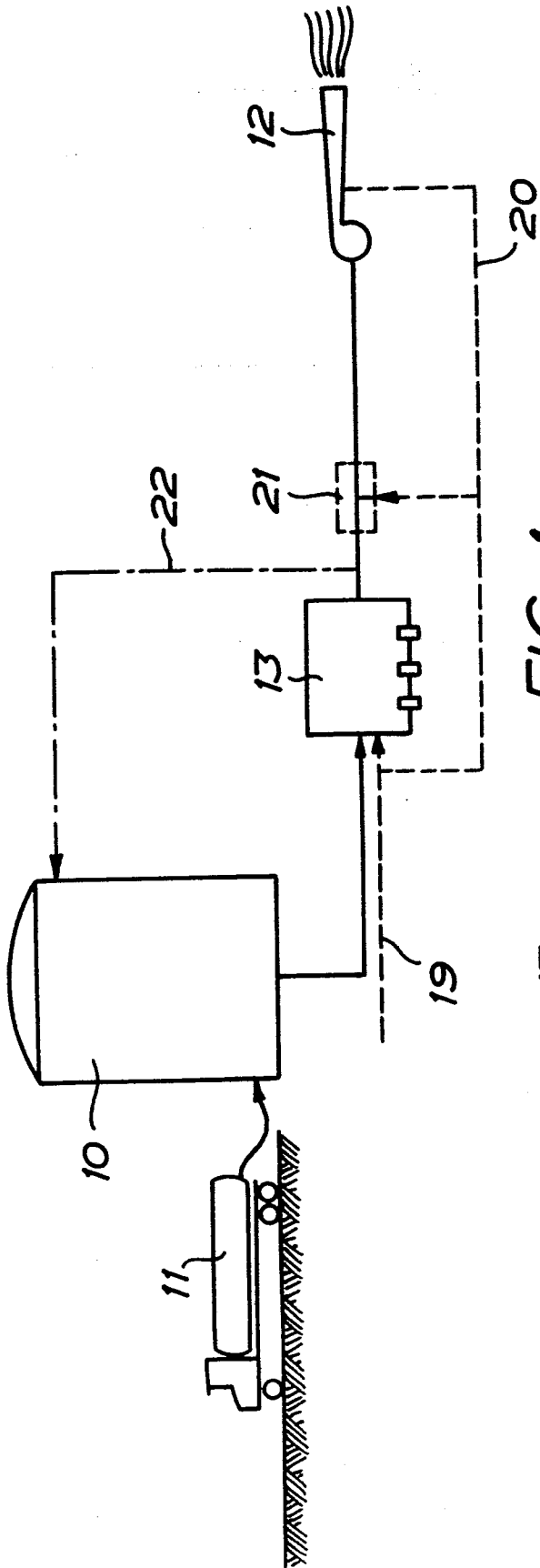


FIG. 1

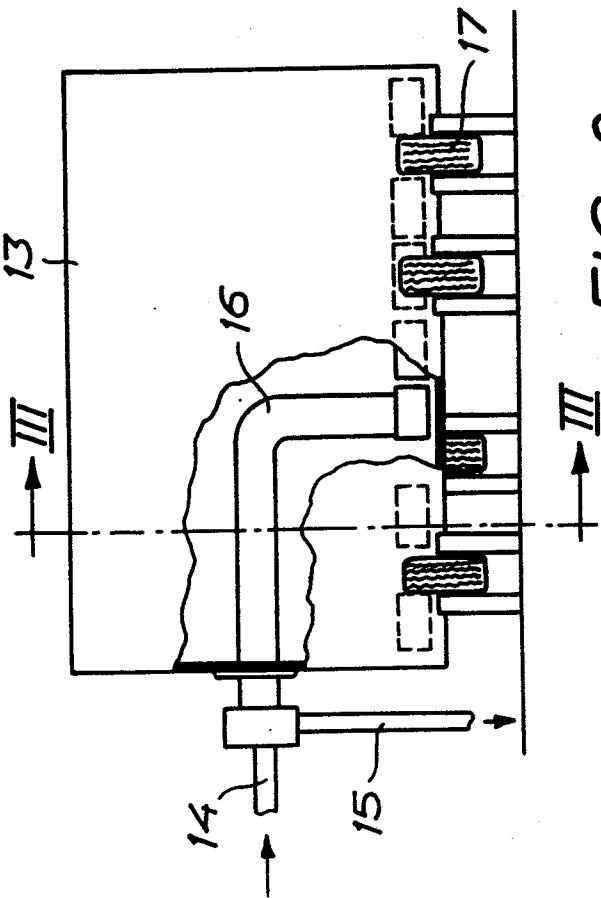


FIG. 2

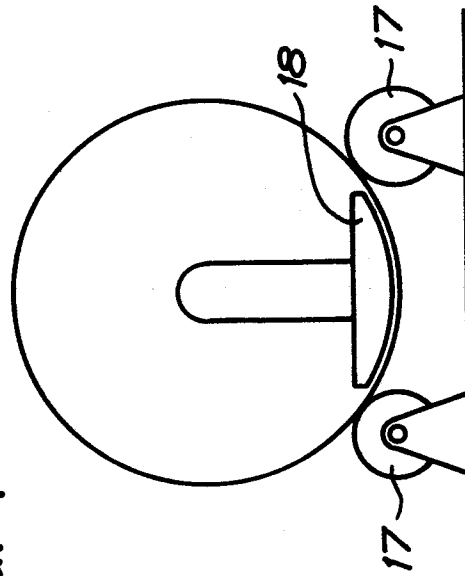


FIG. 3