

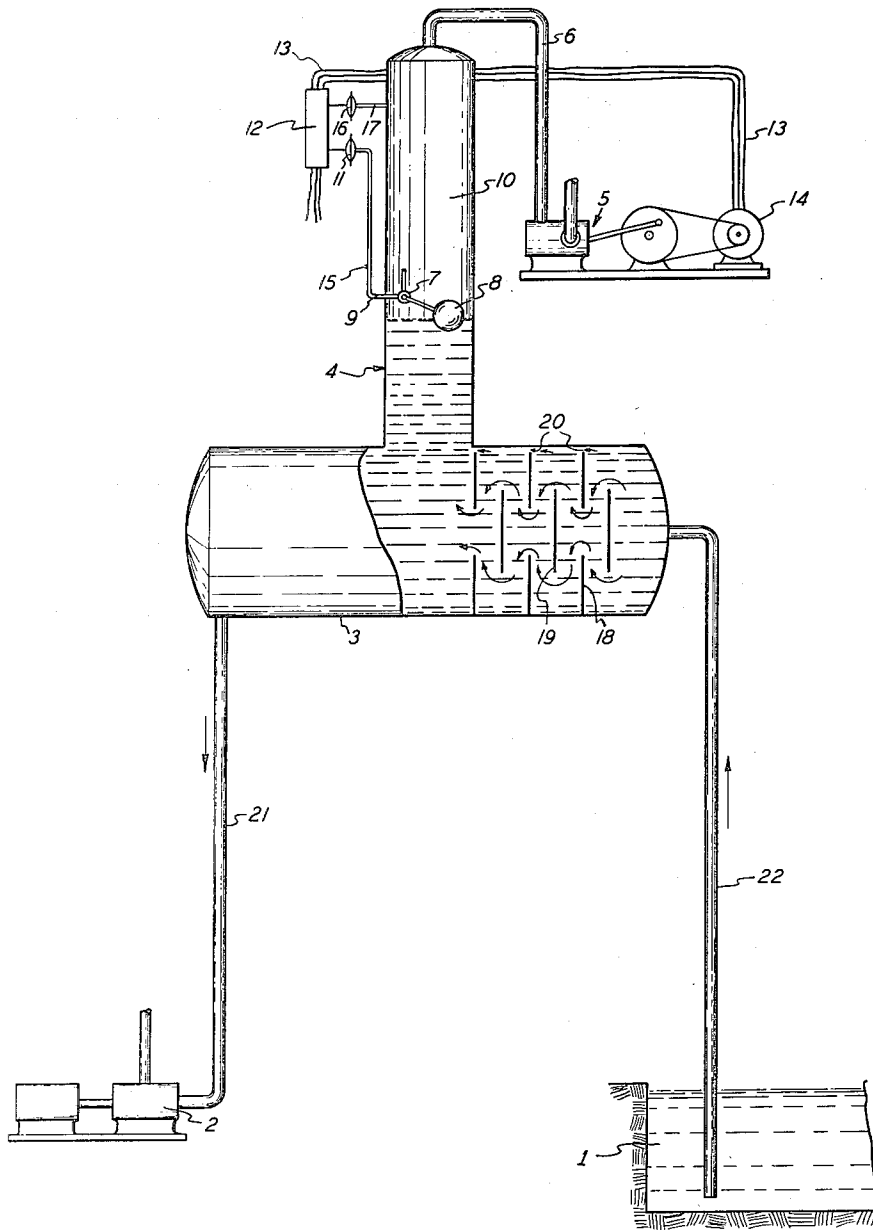
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APPARATUS FOR DEGASSING ROTARY MUDS

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APPARATUS FOR DEGASSING ROTARY
MUDS

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1 Claim. (Cl. 133—2.5)

It has often been observed that in the drilling of deep wells by the rotary method the circulating mud fluid often becomes "gas-cut" in passing through strata yielding natural gas under considerable pressure. By entraining great numbers of minute gas bubbles the mud is materially changed in physical characteristics, being reduced in weight and increased in viscosity.

In modern drilling practice it is desirable or necessary to control within narrow limits both the weight and the viscosity of the mud to meet variable conditions, such for example as rock pressure, hardness, and permeability, existing in the hole being drilled, and any spontaneous and uncontrolled variation from the preferred characteristics is highly undesirable and may even be disastrous if allowed to accumulate.

The object of the present invention is to obviate the evil effects of gas-cutting by continuously removing entrained gas from the circulating fluid prior to its return to the drilling operation.

To attain this object I pass the stream of mud through a zone of reduced pressure and cause it to flow in a circuitous path by which the gas bubbles, enlarged and reduced in weight by the reduced pressure, are brought to the upper side of the zone, in which they are collected and from which they are withdrawn.

The method may best be explained with reference to the attached drawing, showing in vertical section and partial elevation an apparatus adapted to the practice of the method.

Referring to the drawing: 1 is the conventional sump into which the circulating mud is discharged from the well and from which it is returned by the pump indicated at 2 after it has been conditioned. 3 is a tank adapted to resist external pressure, preferably of cylindrical form and with bumped heads as shown, this tank being provided with an upright tower 4. This tower is evacuated by a vacuum pump 5 through a pipe 6 connecting the suction of the pump with the top of the tower.

The tower is provided with two vacuum controls arranged to control respectively the maximum height to which mud can rise in the tower and the subatmospheric pressure which it is desired to maintain in the tower. For the first purpose I suggest a valve or cock 7 operated by a float 8 and arranged to open when the float rises above a predetermined level. The pipe 9 on which valve 7 is mounted may terminate in an

open end outside the tank and admit air to the space 10 above the mud level, but I prefer to connect it with a diaphragm regulator 11 operating a make and break switch not shown within a control box 12, this switch interrupting the flow of current through the leads 13 and thus cutting out pump drive motor 14 when the float rises. In order to allow the diaphragm to return and thus close the switch when the float again subsides, a small leakage orifice indicated at 15 is inserted in pipe 9.

The vacuum control may be a simple spring loaded valve arranged to admit air into the tower above the mud level, but I prefer to utilize a diaphragm regulator 16 connected with the tower by pipe 17 and arranged to open a switch in control box 12 when the vacuum exceeds a predetermined maximum. The two switches described should be connected in series in leads 13 so that the opening of either switch will interrupt the operation of motor 14 and vacuum pump 5.

Inside tank 3 it is desirable to provide a plurality of baffles 18—19 arranged to cause the mud to flow in a circuitous course as it passes through the tank. The upper baffles should be provided with gas ports 20 to allow the separated gas to flow along the upper side of the horizontal tank and into the tower.

Finally, the tank 3 should be so elevated above the suction of pump 2 and above the liquid level in sump 1 that the hydrostatic head in pipes 21 and 22 will balance the subatmospheric pressure which it is desired to maintain in tower space 10 and prevent any appreciable reduction below atmospheric pressure at the pump suction.

I claim as my invention:

Apparatus for conditioning gas-cut rotary mud, comprising: a substantially closed vessel in the form of a horizontally disposed cylinder provided with a vertical tower extending upwardly therefrom; pipe connections from said horizontal cylinder to a source of supply of said mud and to a pump arranged to withdraw conditioned mud from said vessel; a vacuum pump arranged to withdraw evolved gas from the upper portion of said vertical tower and to maintain subatmospheric pressure therein; means for limiting the mud level within said vessel to a desired maximum, said maximum mud level being located in said vertical tower; and means for limiting the degree of vacuum within said tower and above said mud level to a desired maximum.

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