Oct. 19, 1937. C. G. HAMILL 2,096,174

MUD CONDITIONING APPARATUS

Filed April 4, 1936 3 Sheets-Sheet 1

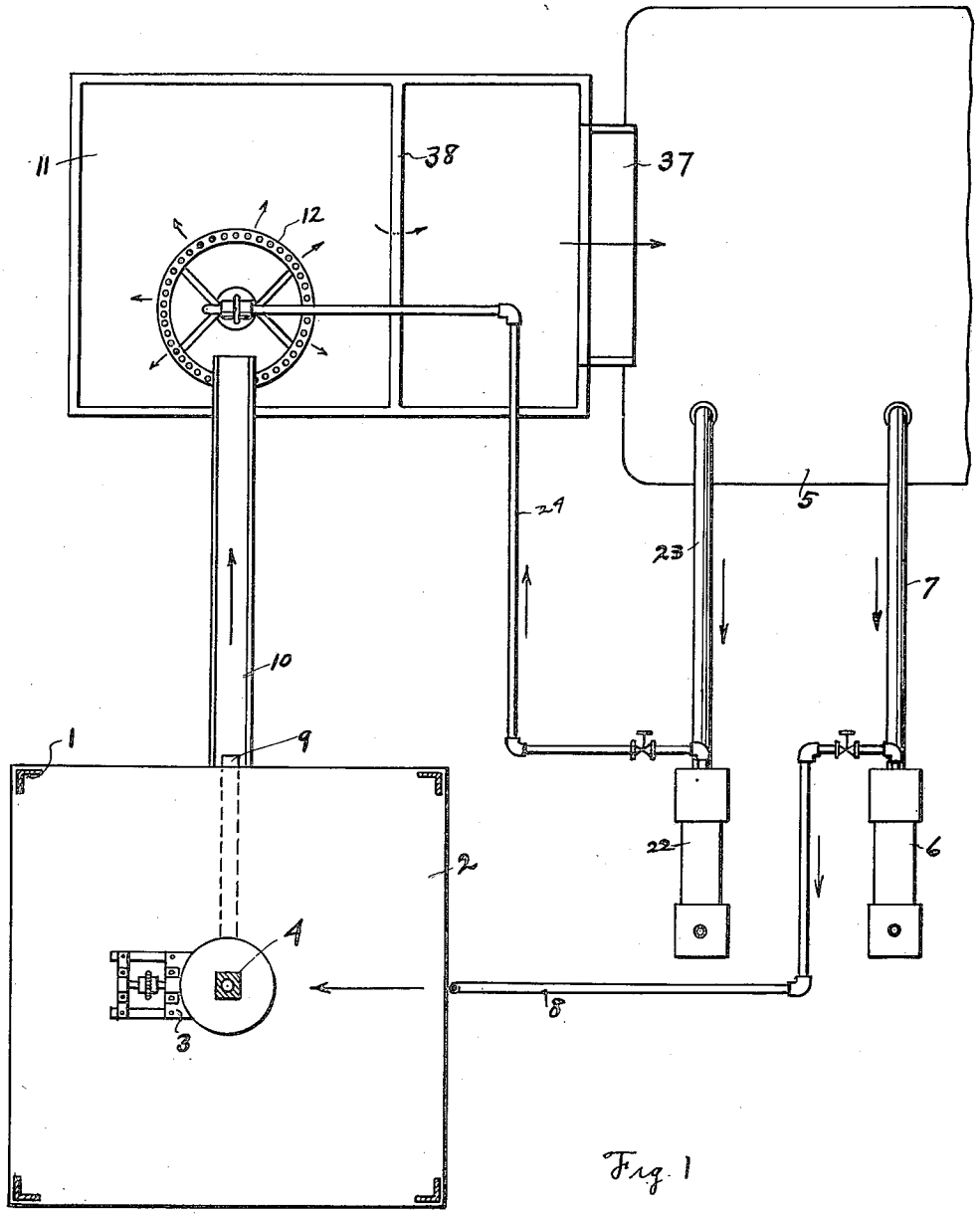

Fig. 1

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MUD CONDITIONING APPARATUS

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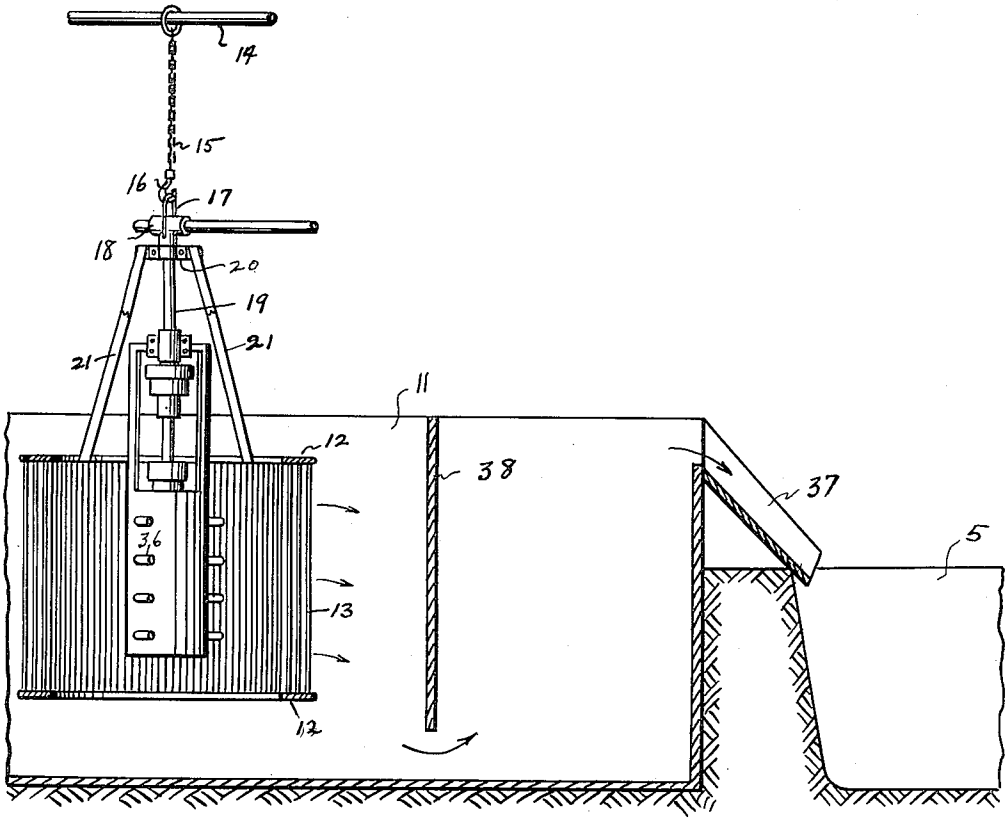

Fig. 2.

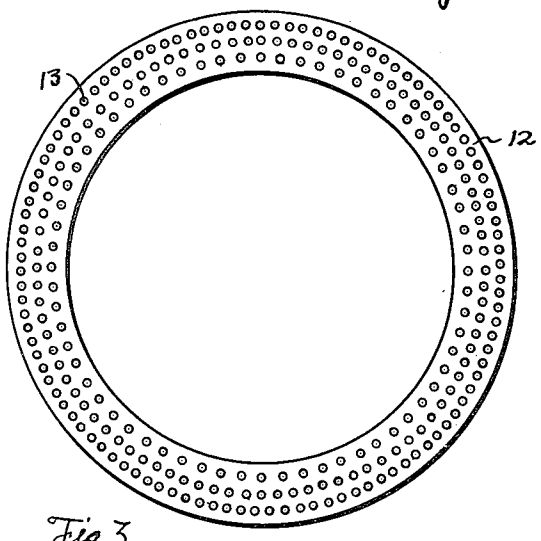

Fig. 3.

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MUD CONDITIONING APPARATUS

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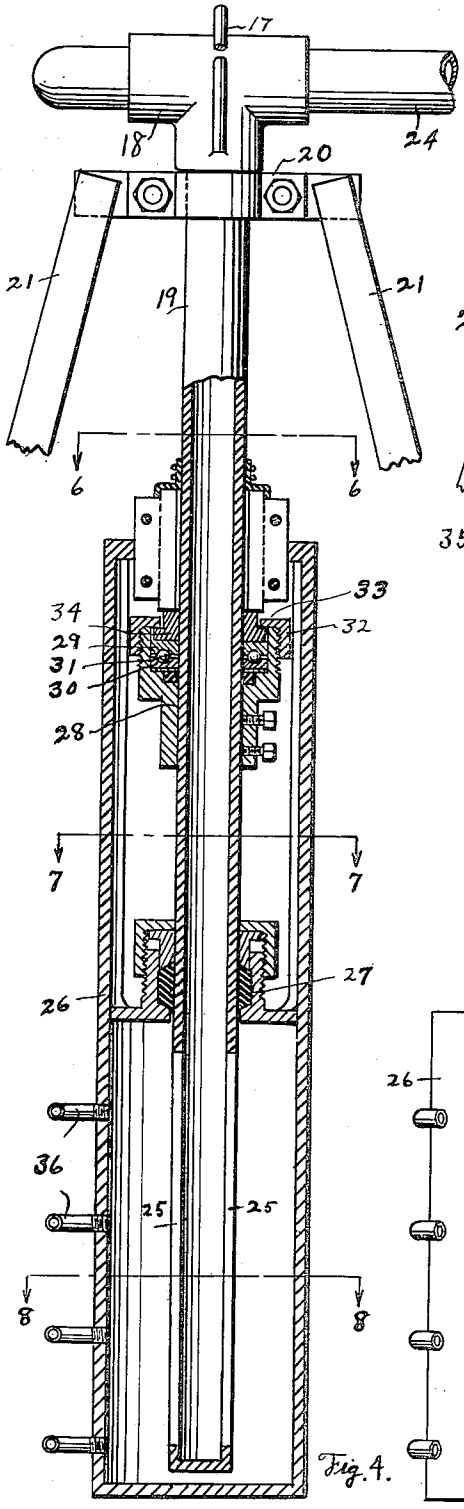

Fig. 4.

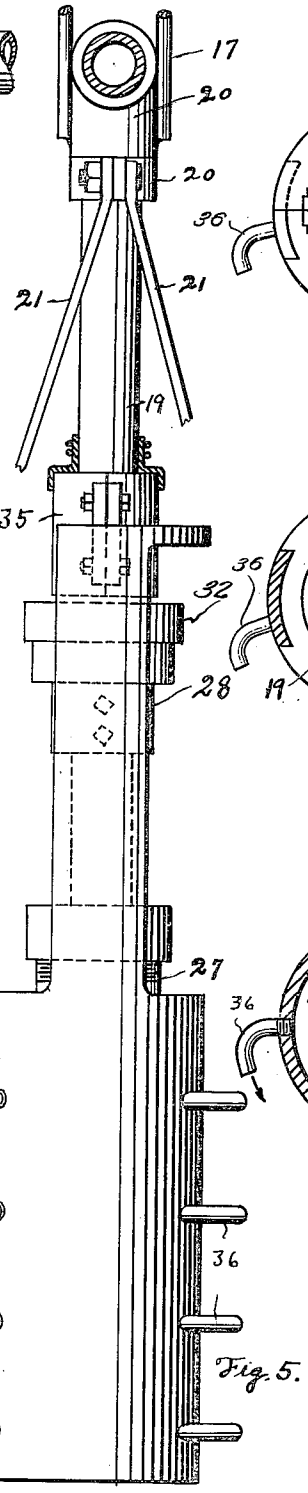

Fig. 5.

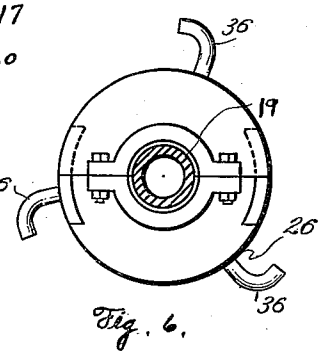

Fig. 6.

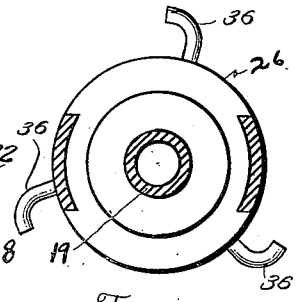

Fig. 7.

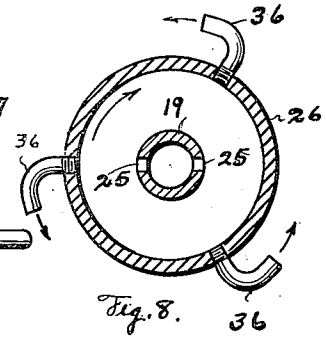

Fig. 8.

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UNITED STATES PATENT OFFICE

2,096,174

MUD CONDITIONING APPARATUS

Curtis G. Hamill, San Antonio, Tex.

Application April 4, 1936, Serial No. 72,830

2 Claims. (Cl. 183—2.5)

This invention relates to a mud conditioning apparatus and has particular relation to apparatus of the character described designed to recondition drilling fluid for the purpose of removing gas, air and foreign objects therefrom which may be collected therein as the fluid is used in carrying on drilling operations.

As is well known one of the chief component parts of drilling fluid is a commercial article designed to give weight to the fluid and which is of a slimy consistency so that it will readily flow. This material is rather expensive and it is desirable to recover the same as it is returned from the well during the drilling process. It is an object of this invention to provide apparatus whereby this fluid may be relieved of the gas which it accumulates in the well as well as of the drill cuttings, shale particles and other foreign matter.

It is another object of the invention to provide means whereby the drilling fluid as it is returned from the well may be subjected to agitation which will cause it to give up the accumulations of gas therein.

With the above and other objects in view the invention has particular relation to certain novel features of construction, operation and arrangement of parts, an example of which is given in this specification and illustrated in the accompanying drawings, wherein:

Figure 1 shows a plan view of the complete apparatus shown associated with a well drilling rig.

Figure 2 shows an enlarged fragmentary vertical sectional view.

Figure 3 shows an enlarged plan view of a cage employed.

Figure 4 shows a vertical sectional view of a distributing nozzle employed.

Figure 5 shows a side view thereof.

Figure 6 shows a cross sectional view taken on the line 6—6 of Figure 4.

Figure 7 shows a cross sectional view taken on the line 7—7 of Figure 4, and

Figure 8 shows a cross sectional view taken on the line 8—8 of Figure 4.

Referring now more particularly to the drawings wherein like numerals of reference designate similar parts in each of the figures, the numeral 1 designates a well drilling derrick on the floor 2 of which the rotary drilling machine 3 is mounted. This machine is used to drive the conventional drill stem 4. The numeral 5 designates the usual earth pit which contains the drilling fluid. The numeral 6 designates a slush pump having the suction pipe 7 leading from the pit and having a discharge line 8 which leads to the swivel (not shown) at the upper end of the drill stem and through which the drilling fluid is forced down through the drill stem. It passes out through channels in the drill and returns up through the bore about the drill stem and in the present instance is delivered through the pipe 9, under the derrick floor into the chute 10 which leads into a collecting tank 11.

Suitably suspended within this last mentioned tank there is a cage preferably formed of upper and lower metal rings 12, 12 which are connected by series of rods 13, said rods being spaced apart to form an open work construction. The cage is suspended into the tank 11 as shown and the chute 10 has its discharge end arranged to deliver the returning drilling fluid down through the cage as indicated in Figure 1. The cage may be suspended in any suitable manner. As shown there is a supporting rod 14 from which there is suspended a chain 15 whose lower end has the hook 16 which engages the bail 17 of the T connection 18 and depending from this T-connection there is a pipe 19 having a clamp 20 from which the cage is suspended by means of the tie bars 21, 21.

There is also a slush pump 22 having the suction line 23 which leads from the pit 5 and whose discharge line 24 is connected into the T-connection 18 and thence into the pipe 19.

The lower end of the pipe 19 is closed, but adjacent said lower end it has the vertical side slits 25, 25. Mounted on said pipe 19 to rotate thereabout there is a housing 26. Above the upper ends of the slits 25 the housing has a stuffing box 27 forming a fluid tight joint with the pipe 19.

Above the stuffing box 27 there is a gland 28 which surrounds and is attached to the pipe 19 and this gland contains the upper and lower raceway rings 29, 30 and between them the ball bearings 31. Screwed onto the upper end of the gland 28 there is a flange nut 32 whose upper end has the inwardly extending flange 33 which engages over the corresponding outwardly extended flange 34 which depends from the clamp 35, which is secured on the pipe 19. The housing 26 thus is suspended from but is permitted to rotate independent of the pipe 19.

The housing 26 has the retracted discharge nozzles 36.

As the drilling fluid is returned from the well it will pass along the chute 10 and pour into the tank 11 through the cage. This drilling fluid will contain gas, drill cuttings, shale and other foreign matter. Clean drilling fluid will meantime be

taken by the pump 22 from the pit 5 and forced through the pipes 24 and 19 down into the housing 26 and out under considerable pressure through the retracted nozzles 36 in the direction indicated by the arrows in Figure 8, thus causing the housing to rotate in the opposite direction as indicated by the arrow in Figure 8. Streams of clean drilling fluid will thus be thrown out radially against the bars of the cage 12 and will intercept the fluid being poured in from the chute 10 and this fluid will also be broken up and thrown out against the rods 13, thus liberating the gas from the drilling fluid which has returned from the well and also breaking up the particles of shale by impacting them against the rods 13. The tank 11 has an overflow chute 37 and between said chute and the cage 12 has a transverse wier 38 underneath which the fluid passes after receiving the treatment above referred to. The objectionable material, drill cuttings and other foreign matter will settle at the bottom of the tank 11 and the accumulated gas will previously have been liberated from the fluid so that the fluid collecting in the compartment of the tank 11 adjacent the overflow chute 37 and flowing into the pit 5 will be substantially pure drilling fluid and capable of reuse.

The drilling fluid returning from the well and delivered into the tank 11 through the chute 10 will contain lumps of substantially solid material and the streams of fluid ejected from the nozzles 36 will throw these lumps of material out against the rods 13 and disintegrate them, thus liberating from them the commercial material which gives weight to the drilling fluid and this liberated material, as broken up, will pass on into the compartment of the tank adjacent the overflow chute 37 and will pass through said chute into the pit 5.

What I claim is:—

1. Apparatus for treating drilling fluid containing solid particles comprising a receiving tank, a cage therein, means for delivering the liquid to be treated, downwardly through the cage, and means for casting liquid under pressure out radially to intercept said liquid to be treated whereby said liquid will be caused to be impinged against the walls of the cage to break up the solid particles forcefully.

2. Apparatus of the character described comprising a tank for containing liquid, a cage like structure submerged in the liquid therein and having open work walls, means for discharging liquid, under pressure within said cage like structure in an outward direction against the walls of said structure, and means for delivering a liquid to be treated downwardly through said cage.

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