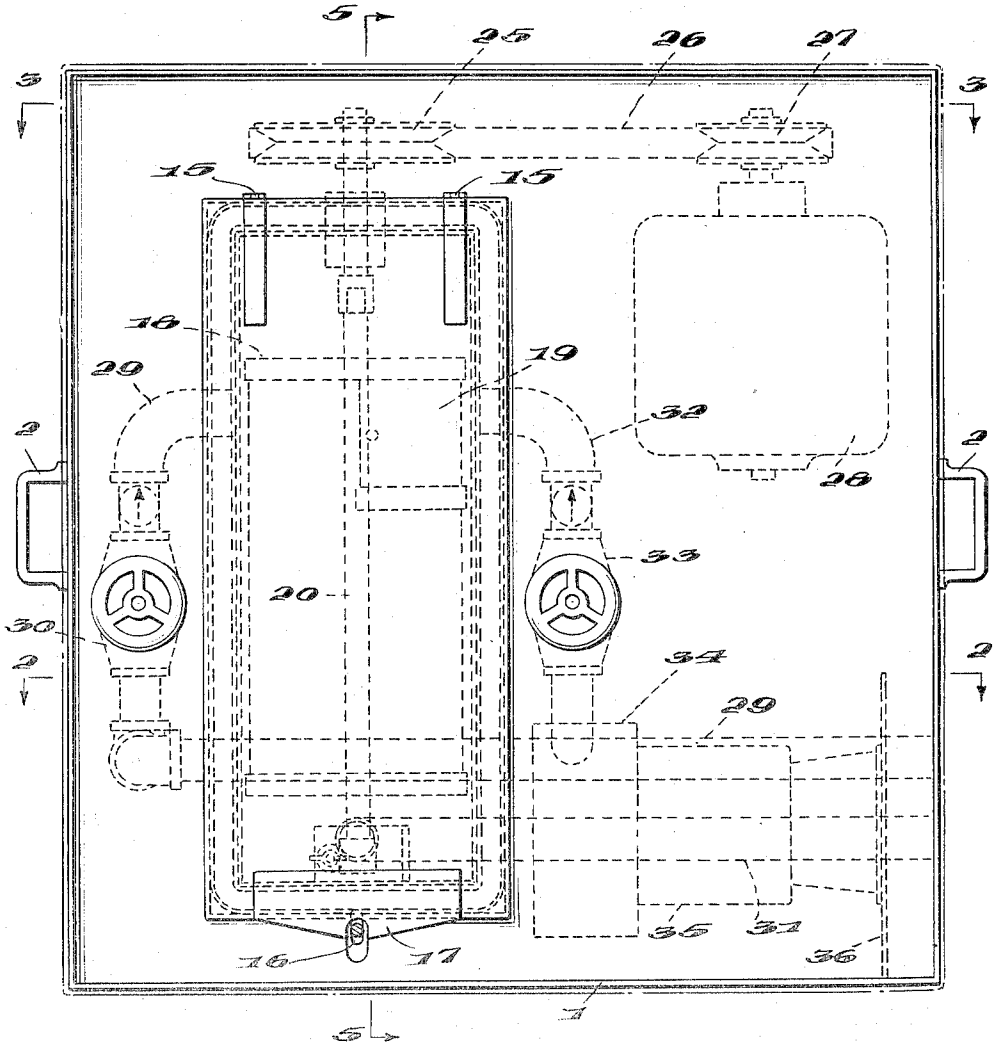
April 1, 1952 D. W. SMITH 2,591,209

WASHING AND DRYING MACHINE

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Fig. 1.



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WASHING AND DRYING MACHINE

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Fig. 2.

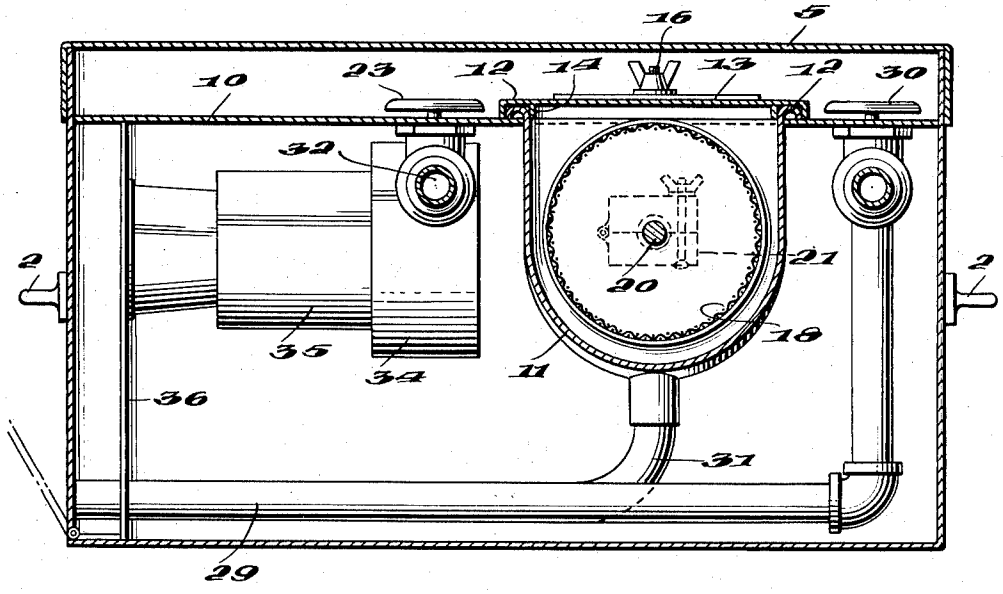
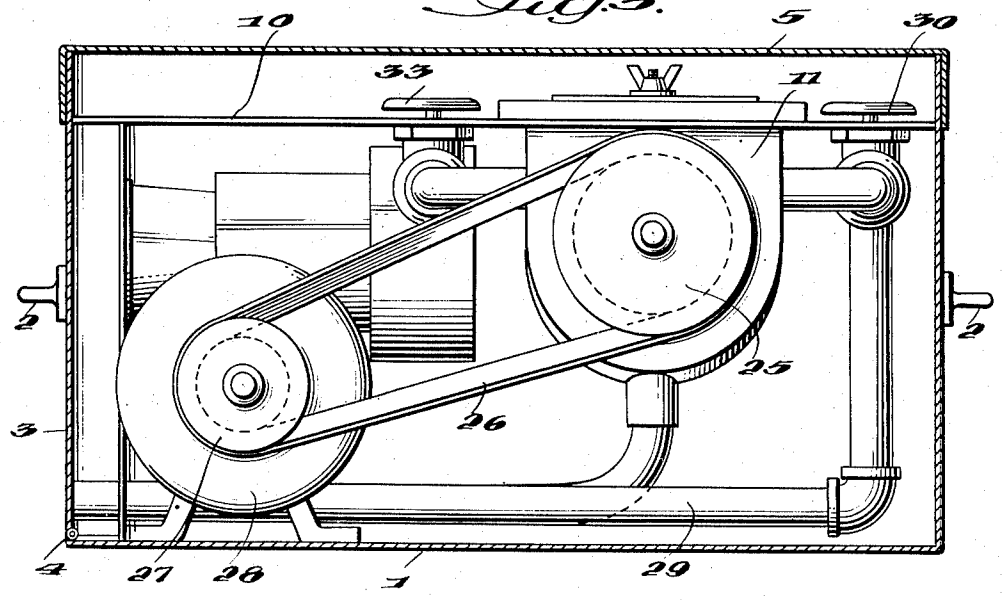


Fig. 3.



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Fig. 4.

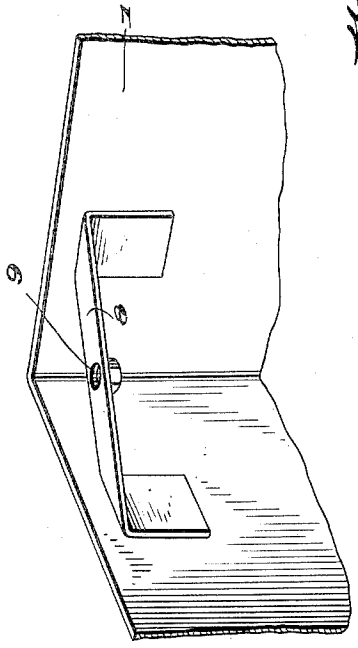
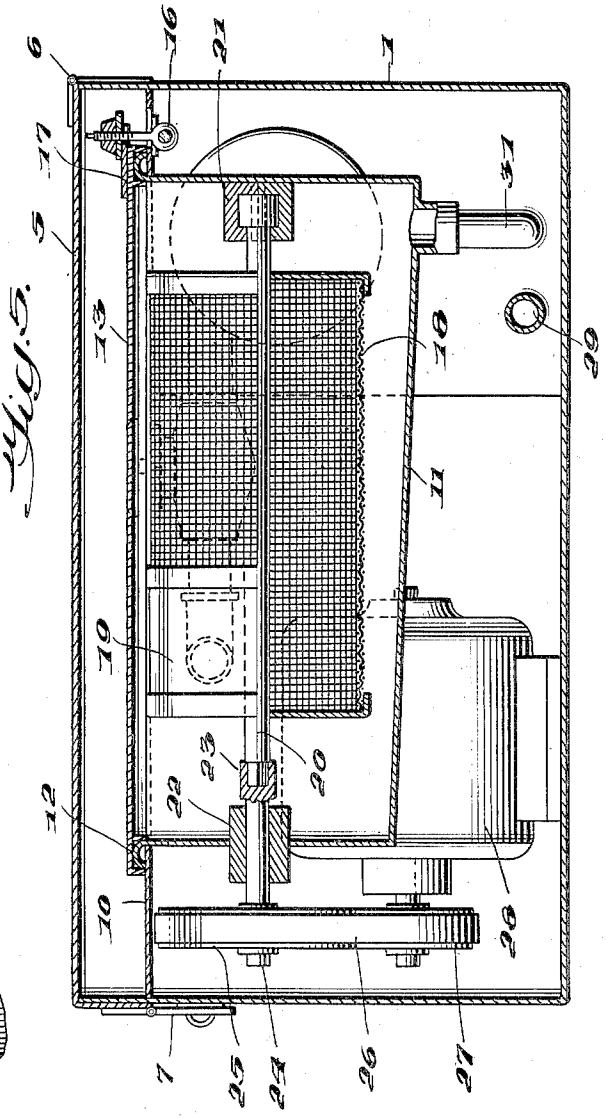


Fig. 5.



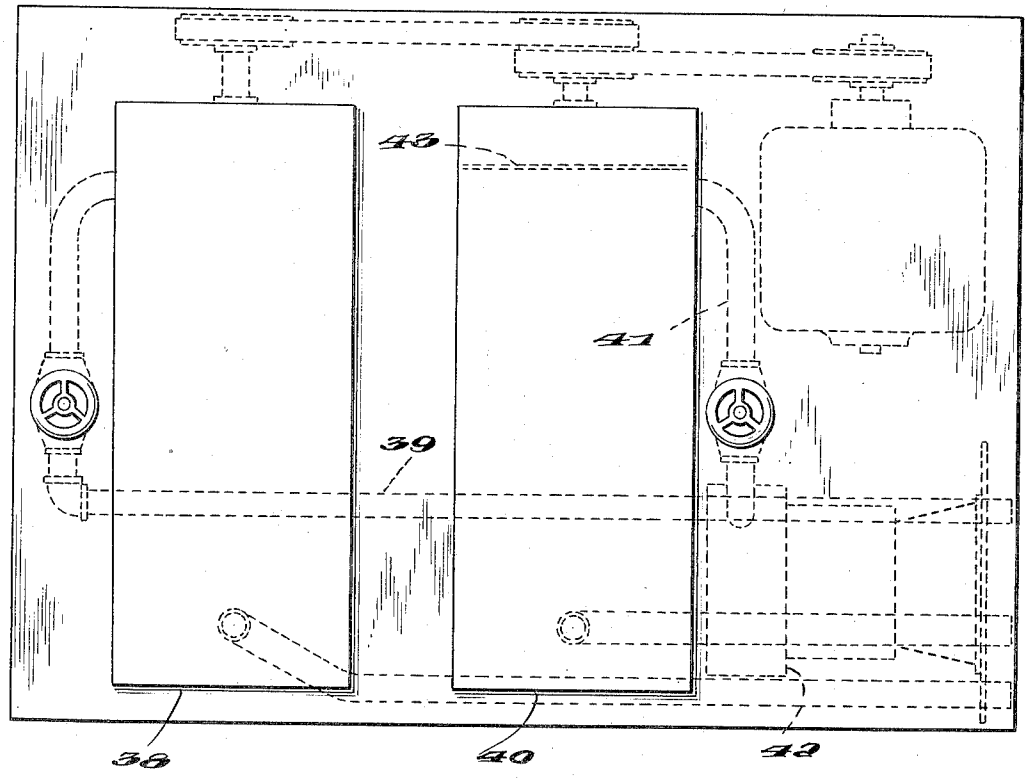
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Fig. 6.



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WASHING AND DRYING MACHINE

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Application February 14, 1947, Serial No. 728,593

8 Claims. (Cl. 210—199)

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This invention relates to improvements in sampling devices of the character adapted particularly for processing a sample of oil well cuttings, such as are removed in the course of drilling of a deep well in the earth.

In the drilling of a deep well, such as an oil well, by a rotary machine, it has been customary heretofore to circulate a liquid downward through the drill stem and out through the casing, washing out of the bottom of the well the particles of rock and shale and other cuttings that are loosened during the drilling operation. It has been customary to collect such solid particles and to test these for evidence of the presence of oil. This testing has been difficult, however, because the particles are embedded in relatively viscous mud, and it has not been an easy matter to wash them clean for testing purposes and to dry them effectively, so as to produce a sample capable of providing the desired test.

The object of this invention is to improve sampling devices for this purpose, by providing for the effective washing and drying of the samples as they are collected from the flow line, so as to produce clean dry samples, capable of ready analysis for test purposes, all in a single unit or machine, which is relatively simple and inexpensive to construct and use, and which is practical for the purpose.

In carrying out this object, the sampling machine preferably utilizes a rotary receptacle in which the sample may be placed and is operated at sufficient speed to discharge the liquid therefrom by centrifugal force, and at the same time the drying may be effected more readily by the circulation of warm air over the sample to facilitate the removal of moisture therefrom. In this way, substantially all of the moisture may be removed, leaving only the dry cuttings that are capable of ready analysis for the purposes desired. These parts may be enclosed within a box-like structure which serves as a mounting for the operating parts of the machine and enables the machine to be moved from place-to-place as desired.

The invention is illustrated in certain embodiments thereof, in the accompanying drawings, in which:

Fig. 1 is a top plan view of the machine with the cover removed;

Fig. 2 is a vertical cross section therethrough on the line 2—2 of Fig. 1;

Fig. 3 is a similar view on the line 3—3 of Fig. 1;

Fig. 4 is a detail perspective view of one of the top plate supports;

Fig. 5 is a longitudinal sectional view substantially on the line 5—5 of Fig. 1, with parts in elevation; and

Fig. 6 is a top plan view showing a modified form of the machine.

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The machine is shown as provided with an enlarged casing, generally designated by the numeral 1, for enclosing the operating parts thereof. This casing is provided with handles 2 at opposite ends thereof to facilitate the transporting of the machine from place-to-place as is often desired, when it may be used on different wells. The casing 1 is normally open at one side, which side is designated generally at 3 and may be closed as shown in Figs. 2 and 3, but is capable of being opened flat upon the ground or floor, being hinged to the body of the casing as at 4.

The top of the casing is normally open but is provided with a cover 5 for closing the top thereof. The cover 5 is hinged at 6 to the upper edge of the casing 1 at one side thereof, as shown in Fig. 5. The cover 5 has a surrounding flange adapted to enclose the upper edges of the side walls of the casing. Suitable means may be provided for securing the cover in closed position, as by means of a hasp, generally designated at 7 in Fig. 5.

At the corners of the casing 1, and spaced downwardly from the upper edge thereof are brackets 8, each of which extends diagonally of a corner of the casing 1, as shown in Fig. 4. Each bracket 8 is provided with a tapped hole 9 therein, to receive a screw fastening for securing the top plate in place, or a bolt may be used for this purpose. The brackets 8 adjacent the side wall 3 are attached and supported only by the fixed sides of the casing 1.

A top plate is shown at 10 and preferably extends throughout the upper portion of the casing 1, seated at its corners upon the brackets 8 and supported thereby.

Supported by the top plate 10 is an elongated receptacle 11, which is preferably U-shaped in cross section, as shown in Fig. 2, and has out-turned upper edges, as indicated at 12, seated upon the top plate 10 for supporting the receptacle 11 thereon. A cover 13 extends over the top of the receptacle 11, and has a channel 14 on the under side thereof, at its periphery, to fit over the out-turned flanges 12 to close the top of the receptacle. This interfitting relation need not necessarily be air-tight, however, it should be reasonably water-tight having suitable sealing means, if necessary. This cover 13 is shown in Fig. 1, hinged at one end as indicated at 15 to the adjacent portion of the receptacle 11, while the opposite end thereof is secured by an eye-bolt, indicated generally at 16 engaging a latch plate 17 on the adjacent end of the cover 13. This eye bolt forms a hold-down device for securing the cover in place.

Operatively mounted within the receptacle 11 is a container or shell 18, which should have perforated or reticulated side walls, and ends if desired, and is shown as formed of screen material. The container 18 is closed at opposite

ends but is provided with a suitable door 19 in one side wall thereof for gaining access to the container to introduce or remove the cuttings therefrom.

The container 18 is mounted on a shaft 20 which extends lengthwise in the receptacle 11 and is journaled at its opposite ends in bearings 21 and 22. A detachable connection may be provided at 23 and at one end of the shaft 20 for connecting the shaft 20 with a stub shaft 24 on which a driving pulley 25 is mounted. The driving pulley 25 is adapted to be driven by a belt 26 from a pulley 27 mounted on the armature shaft of a motor 28, or other suitable source of power as desired.

When it is desired to wash the cuttings contained within the container 18, water may be admitted for this purpose through a water supply pipe 29, controlled by a valve 30. The pipe 29 extends into one side of the receptacle 11, as shown in Figs. 1 and 3, and will discharge water in the receptacle through a side of the container 18, for washing the cuttings therein. A drain pipe is shown at 31, leading from the opposite end of the receptacle 11, and the bottom of the receptacle preferably slopes downward toward the drain pipe, as shown in Fig. 5.

Provision is made also for drying the cuttings after they have been washed effectively. Accordingly, a second pipe 32 leads to the opposite side of the receptacle 11, from the water inlet pipe 29, as shown in Fig. 1, for supplying air to the containers 18. A control valve 33 regulates the flow of air through the pipe 32. A blower is shown at 34 connected with the pipe 32 and may be operated by an electric motor generally indicated at 35. The blower 34 may be of the type including electrical heating means for the purpose of supplying heated air to the container 18, to increase the drying effect of the air thereon.

The blower unit is supported within the casing 1, by an upstanding plate 36.

If desired, separate containers may be provided in the machine for washing and drying the samples, as shown in Fig. 6. The washing receptacle is designated generally at 38, having a water supply pipe 39 leading thereto. The drying receptacle is designated generally at 40, and has an air supply pipe at 41 leading thereto from a blower unit generally indicated at 42. In this form is shown also a baffle at 43, extending transversely of the receptacle externally of the cage therein to insure of passage of the air through the cage.

In this modified form, the cages or containers for the particles of earth formation may be operated simultaneously for the respective washing and drying actions, thus doubling the capacity of the machine over what has been possible heretofore.

Suitable connections may be made at the exterior of the casing, upon opening of the side wall 3 thereof, with the respective supply and discharge pipes for supplying and removing the fluids as used. With the cover 5 open or removed as desired, ready access may be obtained to the interior of the machine.

The side 3 may be opened, lying flat on the ground or floor, or removed, which will open one side of the casing for access to the pipes therein and to admit air to the intake of the blower 34. The air or water or both are discharged through the drain pipe 31, which should be sufficiently large for the purpose.

The cuttings as received in the usual sample bags from the discharge line of the well are

placed in the container or cage 18, or in the receptacle 38 in Fig. 6. This container or cage is operated by the electric motor provided, and the valve 30 opened to admit water thereto for effectively washing the samples.

Thereafter, the washing water is discontinued and the blower unit is operated to supply air to the cage for drying the samples. At the same time, the cage is rotated at an appreciably higher rate of speed to discharge the water or fluids therefrom by centrifugal force, which fluids will be drained off through the pipe 31. Where the blower unit includes electric heating means, the heat supplied thereby will increase the drying effect on the samples so that upon removal of the samples, these are in clean dried condition ready for analysis.

Where separate cages are used for the washing and drying action, as shown in Fig. 6, these may be operated simultaneously to accomplish the respective actions, the samples being transferred from one cage to another.

While the invention has been illustrated and described in certain embodiments thereof, it is recognized that variations and changes may be made in the invention without departing therefrom, except as specified in the claims.

I claim:

1. A washing and drying machine for samples of cuttings from a drilled well comprising a rotary closed container having means for admitting shale cuttings thereto and having a perforated side wall, an imperforate receptacle enclosing the container and having an open top, a cover for said open top of the receptacle, means for rotating said container at high speed for discharge of moisture therefrom by centrifugal force, a first pipe connected with one side of the receptacle for supplying water thereto in washing relation with the container, a second pipe connected with the opposite side of the receptacle in drying relation with the contents of the container, said pipes being in communication with the interior of said receptacle but terminating externally of said container, valve means for controlling the flow through said pipes, and a casing enclosing said receptacle, the means for rotating the container and pipes, said casing having a side thereof mounted thereon for movement to an open position, said water pipe extending substantially to said side for external connection upon opening movement of the side.

2. A washing and drying machine for samples of cuttings from a drilled well comprising a rotary closed container having means for admitting shale cuttings thereto and having a perforated side wall, an imperforate receptacle enclosing the container and having an open top, said receptacle having means to admit water thereinto and drain water therefrom, a cover for said open top of the receptacle, means mounting said container for rotation about an approximately horizontal axis, means for rotating said container at high speed for discharge of moisture therefrom by centrifugal force, a casing enclosing the receptacle and means for admitting water into the container and having upstanding sides, a supporting plate for the receptacle, brackets fixed to the sides of the casing and supporting the plate at a point spaced downwardly from the upper edges of the casing sides, a blower having means communicating with the interior of said container, said blower being enclosed in said casing, and a cover for the casing enclosing the top thereof.

3. A washing and drying machine for samples of cuttings from a drilled well comprising a rotary closed container having means for admitting shale cuttings thereto and having a perforated side wall, an imperforate receptacle enclosing the container and having an open top, a cover for said open top of the receptacle, means mounting said container for rotation about an approximately horizontal axis, means for rotating said container at high speed for discharge of moisture therefrom by centrifugal force, a casing enclosing the receptacle and means for admitting water into the container and having upstanding sides, means admitting water to said container through said receptacle, a supporting plate for the receptacle, brackets fixed to the sides of the casing and supporting the plate at a point spaced downwardly from the upper edges of the casing sides, a cover for the casing enclosing the top thereof, said supporting plate having an opening therein, the receptacle having out-turned flanges thereon seated on the plate around the opening with the receptacle extending downwardly through the opening, a blower having means communicating with the interior of said container, said blower being enclosed in said casing, and means connecting the cover with the receptacle.

4. A washing and drying machine for samples of cuttings from a drilled well comprising a closed casing, a plate mounted in said casing, an elongated receptacle mounted in said closed casing, means for suspending said elongated receptacle from said plate, bearings carried by said receptacle, a container adapted to receive cuttings from said well and having a perforate side wall, means rotatably mounting said container in said bearings, and means suspended from said plate for introducing fluid into said receptacle.

5. A washing and drying machine for samples of cuttings from a drilled well comprising a closed casing having side and bottom walls, a plate mounted in said casing, an elongated receptacle mounted in said closed casing, means for suspending said elongated receptacle from said plate, bearings carried by said receptacle, a container adapted to receive cuttings from said well having a perforate side wall, means rotatably mounting said container in said bearings, a blower suspended from said plate and in communication with said elongated receptacle, and means suspended from said plate for supplying liquid to said elongated receptacle, said elongated receptacle, blower and means for supplying liquid being entirely enclosed within the closed casing and spaced apart from the side and bottom walls of said casing.

6. A washing and drying machine for samples of cuttings from a drilled well comprising a closed casing, a plate having an opening therein mounted in said casing, a substantially U-shaped elongated receptacle having outturned edges extending along the sides thereof, said receptacle being inserted through the opening in said plate and being suspended therefrom at opposite sides with the outturned edges resting on said plate, a cover mounted on said edges closing said receptacle, bearings carried by said receptacle, a container adapted to receive cuttings from said well having a perforate side wall, means rotatably mounting said container in said bearings, and means for introducing fluid into said receptacle.

7. A washing and drying machine for samples of cuttings from a drilled well, comprising a casing, an imperforate container mounted in said casing, a perforate container mounted within said imperforate container and in spaced relation thereto, means mounting said perforate container for rotary motion in said imperforate container, means mounted in said casing for rotating said perforate container, a pipe connected to and in communication with the interior of said imperforate container for supplying water thereinto, a second pipe connected to and in communication with the interior of said imperforate container for removing water therefrom, said first and second mentioned pipes terminating exteriorly of the perforate container, a third pipe connected to and in communication with the interior of said imperforate container for supplying heated air thereto, a blower including heating means therein connected to said third pipe mounted in said casing, and detachable closure means attached to the imperforate container to permit access thereinto.

8. A washing and drying machine for samples of cuttings from a drilled well, comprising a casing, an imperforate container mounted in said casing, a perforate container mounted within said imperforate container and in spaced relation thereto, means mounting said perforate container for rotary motion in said imperforate container, means mounted in said casing for rotating said perforate container, a pipe connected to and in communication with the interior of said imperforate container for supplying water thereto, a second pipe connected to and in communication with the interior of said imperforate container for removing water therefrom, said first and second mentioned pipes terminating exteriorly of the perforate container, a third pipe connected to and in communication with the interior of said imperforate container for supplying heated air thereinto, a blower including heating means therein connected to said third pipe and mounted in said casing, detachable closure means attached to the imperforate container to permit access thereinto, and a removable side on said casing forming an opening closure therefor, said first and second mentioned pipes extending substantially to said opening in position in said casing so as to communicate with the opening in said casing.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
80,340	Dill	July 28, 1868
184,427	Riddle	Nov. 14, 1876
417,799	Waldbaur	Dec. 24, 1889
911,469	Boyd	Feb. 2, 1909
948,763	Hutchins	Feb. 8, 1910
1,003,827	Tolhurst	Sept. 19, 1911
1,219,796	Atkins	Mar. 20, 1917
1,799,649	Schenck	Apr. 7, 1931
1,979,693	Lindenberger	Nov. 6, 1934
2,121,431	Hamm	June 21, 1938
2,167,322	Cuno et al.	July 25, 1939
2,237,603	Kapp	Apr. 8, 1941
2,266,586	Branum	Dec. 16, 1941
2,295,437	Thompson	Sept. 8, 1942
2,302,996	Lilligren	Nov. 24, 1942
2,336,539	Gilbert	Dec. 14, 1943
2,416,499	Saxe	Feb. 25, 1947