Feb. 6, 1951

C. W. MURPHY

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MUD MIXER

Filed Jan. 11, 1949

Fig. 1.

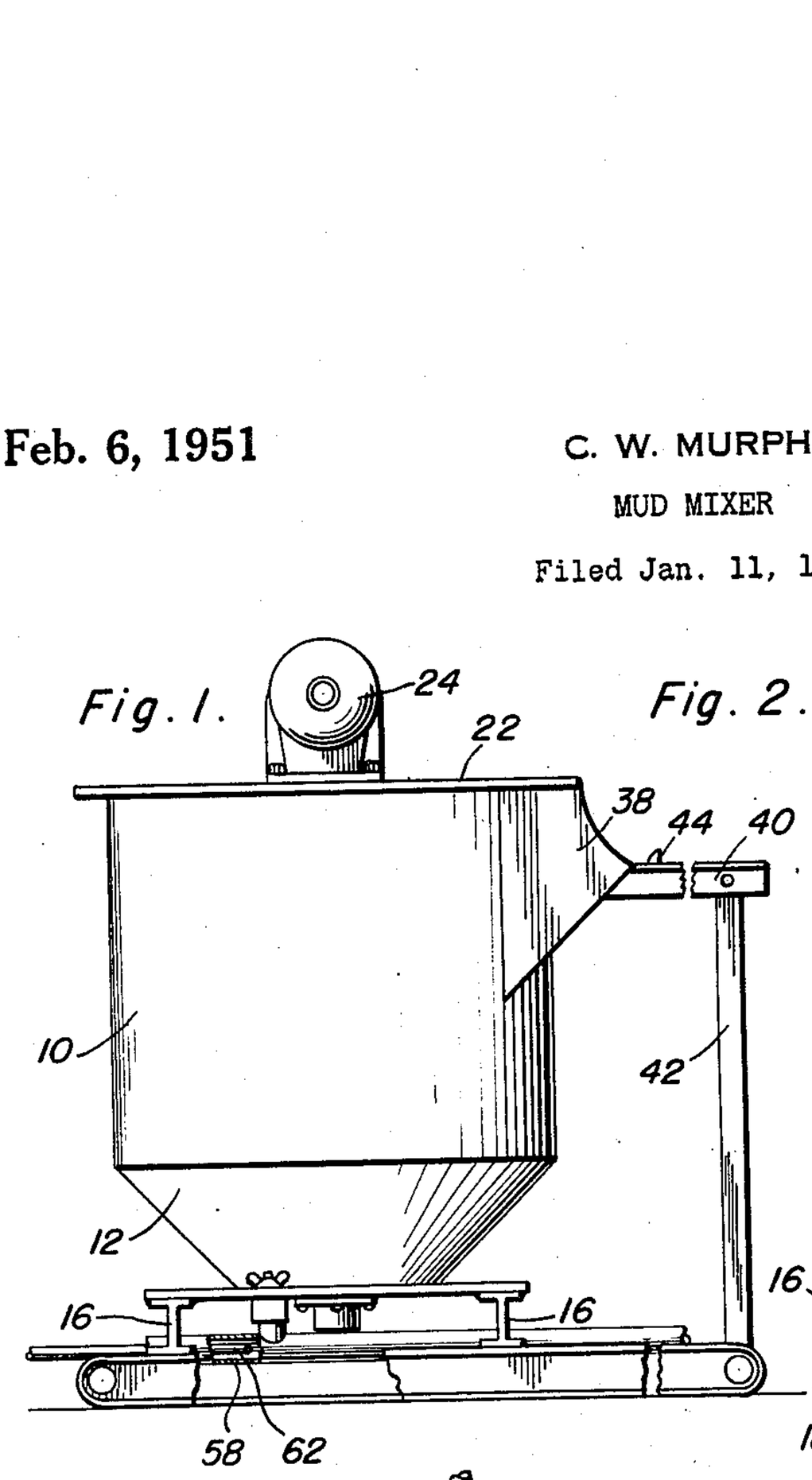


Fig. 2.

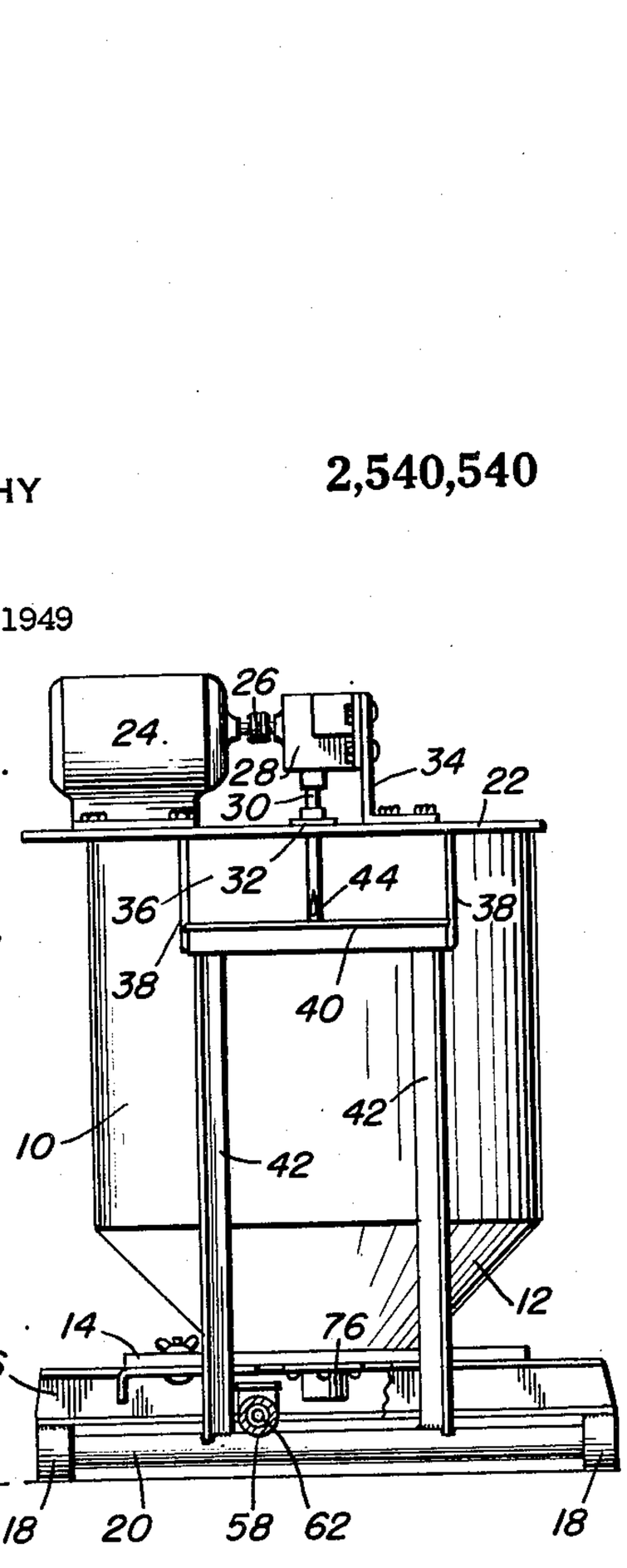
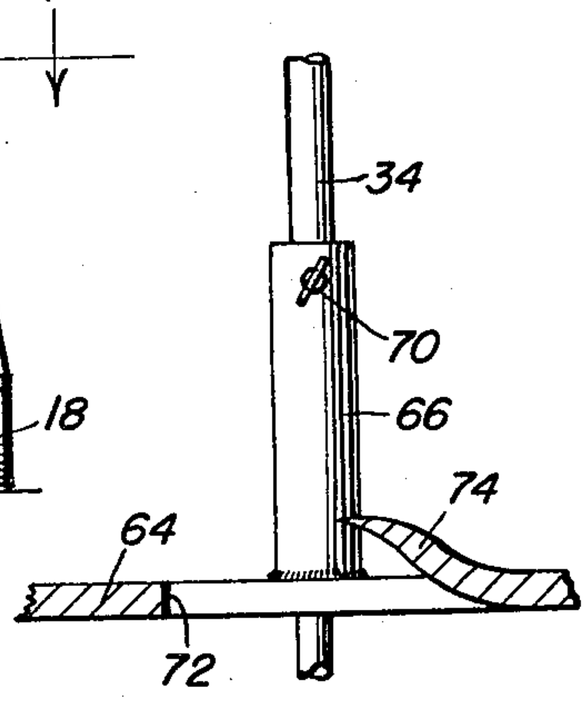


Fig. 3.

Fig. 4.

Fig. 5.



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Patented Feb. 6, 1951 2,540,540

UNITED STATES PATENT OFFICE

2,540,540

MUD MIXER

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Application January 11, 1949, Serial No. 70,245

5 Claims. (Cl. 259—43)

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This invention comprises novel and useful improvements in a mud mixer and more specifically pertains to a drilling rig mud mixing device.

The principal object of this invention is to provide an improved mud mixer for drilling rigs which shall be specifically constructed for portability, especially adapted for emptying sacks of drilling mud therein, for agitating and mixing the same and for controllably dispensing mud into a jet for delivery to the mud pit of the drilling rig.

Another important object of this invention is to provide an improved agitating and mixing disk for a mud mixer, together with improved control means cooperating with the disk for controllably delivering mixed mud at a predetermined rate to a mud nozzle.

These, together with various ancillary features and objects of the invention which will later become apparent as the following description proceeds, are attained by this device, a preferred embodiment of which has been illustrated by way of example only in the accompanying drawings, wherein:

Figure 1 is a side elevational view, parts being broken away, of the preferred embodiment of the invention;

Figure 2 is a transverse vertical sectional view of the device of Figure 1 showing the mixing hopper in end elevational view from the right;

Figure 3 is a fragmentary vertical transverse sectional detail view taken upon an enlarged scale through the lower portion of the mixing chamber, and showing the construction and journal of the agitator disk and its bearing means together with the arrangement of the mud nozzle and is taken substantially upon the plane of the section line 3—3 of Figure 4;

Figure 4 is a horizontal sectional view taken substantially upon the plane of the section line 4—4 of Figure 3; and,

Figure 5 is a fragmentary detail view, taken on vertical section substantially upon the plane of the section line 5—5 of Figure 4 and illustrating the arrangement of the agitating and mixing fins of the agitator disk.

Referring now more specifically to the accompanying drawings, wherein like numerals designate similar parts throughout the various views, it will be seen that the numeral 10 indicates generally a mixing chamber having cylindrical side walls whose lower portions as indicated at 12 are of a conical configuration and being open at the bottom, are welded or otherwise rigidly secured to a supporting platform 14. The latter is

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mounted by suitable cross braces 16 upon the upper surface of a pair of parallel spaced skids or runners 18 which are rigidly connected together as by cross rods 20, to thereby form a sled for rendering the device portable.

The upper end of the mixing chamber 10 is provided with a cover 22, upon which may be suitably mounted an electric motor 24 constituting a driving means for the mixer.

The armature of this motor is connected as by a detachable coupling 26 and its suitable reduction gearing indicated generally by the casing 28, to a vertically disposed agitator shaft 30 which is journalled as at 32 in the cover 22.

The gear casing 28 may be conveniently supported upon a bracket or the like 34 from the cover 22. An opening 36 is formed in the cylindrical casing 10 adjacent the upper end thereof as shown in Figure 2, and as will be seen from Figures 1 and 2, this opening is provided with laterally extending guiding flanges or side walls 38 between which extends a suitable table 40 supported as by pillars or columns 42. Upon this table and adjacent the opening 36, there is provided a rigid knife 44 extending upwardly therefrom, whereby bags of mixing mud may be placed upon the platform 40, and being drawn between the guides 38 and through the opening 36 into the mixing chamber 10, will be ripped by the knife whereby their contents may be readily discharged.

As above mentioned, the lower end of the conical portion 12 of the mixing chamber is open, and is welded or otherwise secured to the supporting platform 14. At a suitable location, this platform 14 within the confines of the conical section 12 is provided with a discharge opening which may be circular, as indicated in Figure 4, this opening being indicated at 46. The size of this opening is controlled by a shutter or slide valve, which preferably consists of an elongated plate 48, provided with a downturned flange 50 at its outer extremity forming a handle by means of which the plate may be actuated, this plate having an elongated slot indicated generally by the numeral 52 in Figure 3, while a clamping nut and bolt 54 extend through the slot and thereby secure the plate to the undersurface of the platform 14.

It will thus be seen that the plate may be slidably adjusted upon the under surface of the platform 14, whereby the end of the plate may be disposed in such a manner as to throttle or control the discharge opening 46. It is preferred to form the end of the plate with a V-shaped notch indi-

cated at 56 in dotted lines in Figure 4, which V-shaped notch is adapted to register with the opening 46 for throttling the same.

Suitably secured to and depending from the platform 14 and spaced beneath its under surface, is a pipe or housing 58 forming a mud jet nozzle, this housing having an opening 60 in its upper surface forming a mud inlet opening which is disposed beneath and in registry with the discharge opening 46.

Thus, as mud from the mixing chamber, preferably in dry form, is fed through the discharge opening 46 into the inlet opening 60 of the nozzle 58, in a manner set forth hereinafter, the same is picked up by a water injection nozzle 62, and delivered from the outer end of the jet nozzle 58 into the mud pit of the drilling rig. As will be understood, the water nozzle 62 will carry the mud deposited into the nozzle 58 and mix the same during its passage therethrough.

An improved means is provided for mixing, agitating and dispensing the mud from the mixing chamber into the discharge opening. For this purpose, a mixing or agitating disk 64 is provided, this disk being welded or otherwise rigidly connected with an axially and upwardly extending sleeve 66 provided with a socket 68 at its upper extremity for the reception of the end of the agitator shaft 34, a set screw 70 being provided for securing the sleeve and the agitator disk to the shaft.

Circumferentially disposed about the disk 64 are a plurality of ports 72, which are positioned for sequential and selective registry with the discharge opening 46 during rotation of the disk by the shaft 34. Preferably these ports 72 are formed by having a portion of the material of a disk struck or deflected upwardly to provide a fin or blade 74 which is positioned adjacent the rotationally advanced edge of the opening 72 to constitute a baffle or deflector therefor. Preferably this upwardly extending fin is smoothly curved backwardly and over the leading edge of the port 72 so that the material received in the mixing chamber will flow thereover and into the port 72 for discharge therefrom into the inlet opening 60 through the discharge port 46.

This fin thus serves to mix and agitate the dry mud powders received in the mixing chamber and feed the same into the port 72.

A guide and journalling means is provided for facilitating the operation and efficiency of the agitator disk. For this purpose, a cup-shaped bearing cage 76 is secured in any suitable manner to the undersurface of the platform 14, and receives therein a bearing block or member 78 provided with a central opening which rotatably and guidingly receives the end 80 of a spindle 82 whose upper end is detachably secured in a socket in the lower end of a sleeve 66 as by a set screw 84. This spindle is provided with a thrust bearing in the form of a collar 86 which rests upon the bearing block 78, and thereby transmits the weight of the disk 64 thereto.

It will thus be seen that the agitating disk 64 is supported and guided by a bearing assembly disposed beneath the supporting platform 14, while being rotated by the agitator shaft thereabove. If desired, a sealing member of any desired construction indicated at 88 may be provided for closing the upper end of the bearing cage 76 to prevent the entry of dirt thereinto.

From the foregoing, the operation of the device will now be readily understood. Drilling mud, preferably in the form of bags of powder are

dumped into the mixing chamber 10 as above set forth, and are agitated by the rotating agitator or mixer disk 64. During this rotation, the fins 74 serve to agitate the mud and uniformly feed the same through the successively registering ports 72 with the discharge opening 46, whereby measured quantities of the mud are delivered into the intake port 60 of the mud jet nozzle.

From thence the dry mud is mixed with water into any desired consistency and discharged into the mud pit where the same is utilized in drilling operations in a conventional manner.

From the foregoing, the construction and operation of the device will be readily understood and further explanation thereof is believed to be unnecessary. However, since numerous modifications and changes will readily occur to those skilled in the art after a consideration of the foregoing specification and accompanying drawings, it is not desired to limit the invention to the exact construction shown and described, but all suitable modifications and equivalents may be resorted to falling within the scope of the appended claims.

Having described the invention, what is claimed as new is:

1. A drilling rig mud mixer comprising a supporting platform, a mixing chamber downwardly and inwardly tapered being open at its lower end and mounted on said platform, a vertical shaft journaled for rotation axially of said chamber, an agitator disk on said shaft at the lower end of said chamber forming a rotatable bottom therefor disposed closely adjacent but above said platform, a discharge opening in said platform and ports in said disk for communication with said opening, fins on said disk rotationally in advance of said ports and forming an obtuse angle with the disk, and means for rotating said shaft, said disk having a sleeve secured thereto and extending axially thereabove, means for securing said sleeve to said shaft, a bearing mounted beneath said platform and means journaled in said bearing and engaging the sleeve to support the latter.

2. A drilling rig mud mixer comprising a supporting platform, a mixing chamber downwardly and inwardly tapered being open at its lower end and mounted on said platform, a vertical shaft journaled for rotation axially of said chamber, an agitator disk on said shaft at the lower end of said chamber forming a rotatable bottom therefor disposed closely adjacent but above said platform, a discharge opening in said platform and ports in said disk for communication with said opening, a shutter beneath said platform for controlling said discharge opening, fins on said disk rotationally in advance of said ports, and means for rotating said shaft, a nozzle spaced beneath said platform and having an upper mud inlet beneath said discharge opening and a water inlet at one end for receiving and spraying mud dropped into said mud inlet.

3. A drilling rig mud mixer comprising a supporting platform, a mixing chamber downwardly and inwardly tapered being open at its lower end and mounted on said platform, a vertical shaft journaled for rotation axially of said chamber, an agitator disk on said shaft at the lower end of said chamber forming a rotatable bottom therefor disposed closely adjacent but above said platform, a discharge opening in said platform and ports in said disk for communication with said opening, fins on and integral with said disk rotationally in advance of said ports and forming an obtuse angle with the disk, and means for ro-

tating said shaft, said disk having a sleeve secured thereto and extending axially thereabove, means for securing said sleeve to said shaft, a bearing mounted beneath said platform, said bearing comprising a cup-shaped cage supported on the undersurface of said platform, a bearing in said cage, a vertical spindle journaled for rotation in said bearing having a thrust collar resting on said bearing, said spindle being retained in the lower end of said sleeve.

4. A drilling rig mud mixer comprising a supporting platform, a mixing chamber downwardly and inwardly tapered being open at its lower end and mounted on said platform, a vertical shaft journaled for rotation axially of said chamber, an agitator disk on said shaft at the lower end of said chamber forming a rotatable bottom therefor disposed closely adjacent but above said platform, a discharge opening in said platform and ports in said disk for communication with said opening, fins on said disk rotationally in advance of said ports and forming an obtuse angle with the disk, and means for rotating said shaft, a shutter beneath said platform for controlling said discharge opening and means for slidably adjusting said shutter to regulate said discharge opening, said discharge opening being circular, said shutter comprising a plate slidingly secured beneath said platform and a V-shaped notch in said plate adapted to register with said discharge opening.

5. A drilling rig mud mixer comprising a supporting platform, a mixing chamber downwardly and inwardly tapered being open at its lower end and mounted on said platform, a vertical shaft journaled for rotation axially of said chamber, an agitator on said shaft at the lower end of said chamber disposed closely adjacent but above said platform, a discharge opening in said

platform, said agitator comprising a central, plate-like body, circumferentially spaced blades integral with and disposed radially outward of the central body, said blades being rotatable immediately above the discharge opening for communication of the spaces therebetween with the discharge opening, each of said blades including an upwardly inclined trailing portion that forms an obtuse angle with the plane of the central, plate-like body, means for rotating said shaft, said central body having a sleeve secured thereto and extending axially thereabove, means for securing said sleeve to said shaft, a bearing mounted beneath said platform, said bearing comprising a cup-shaped cage supported on the under surface of said platform, a bearing in said cage, a vertical spindle journaled for rotation in said bearing having a thrust collar resting on said bearing, said spindle being retained in the lower end of said sleeve.

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