

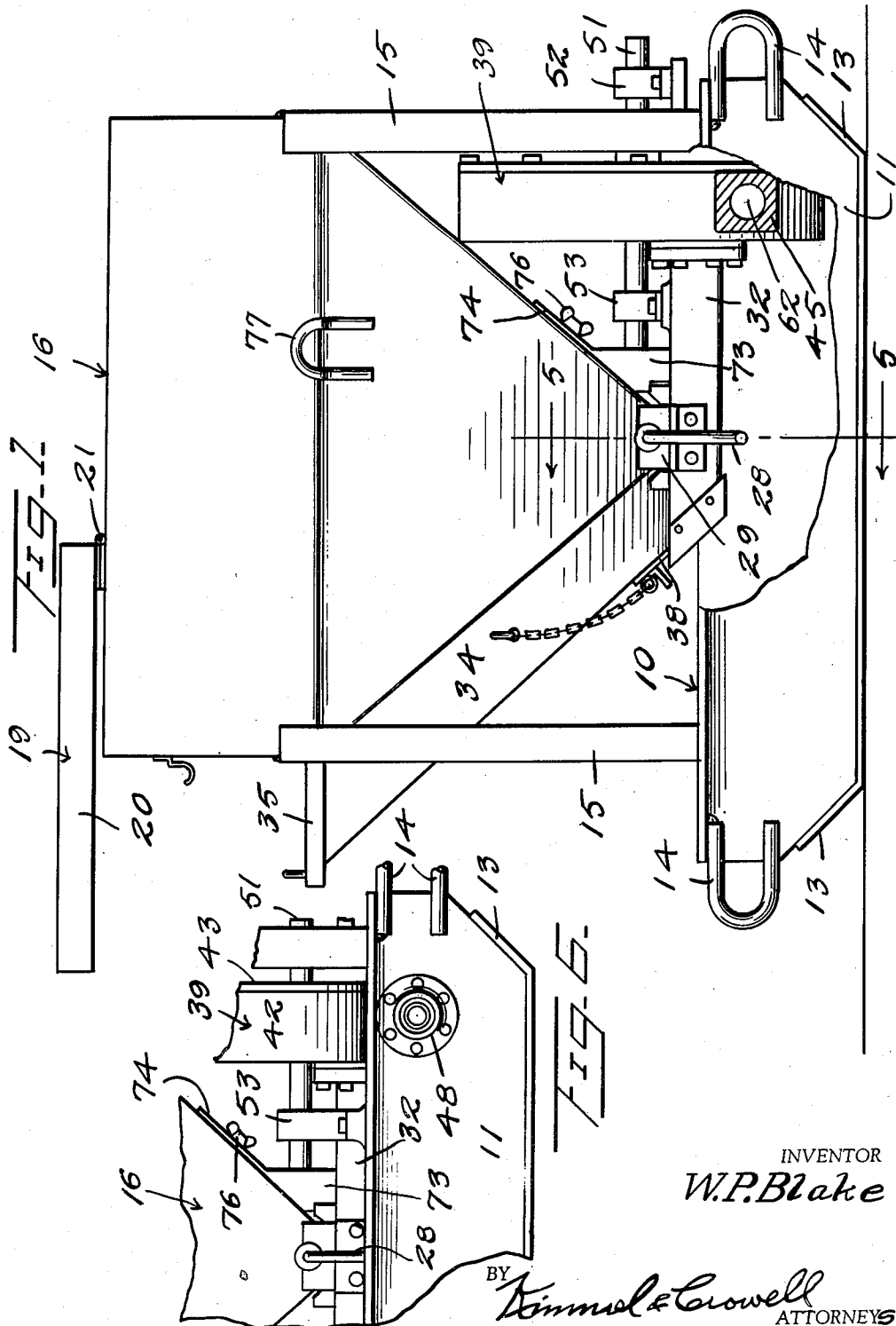
Oct. 2, 1951

W. P. BLAKE
MUD-MIXING MACHINE

2,569,439

Filed March 26, 1951

4 Sheets-Sheet 1



INVENTOR
W.P. Blake

BY
Kimmel & Crowell
ATTORNEYS

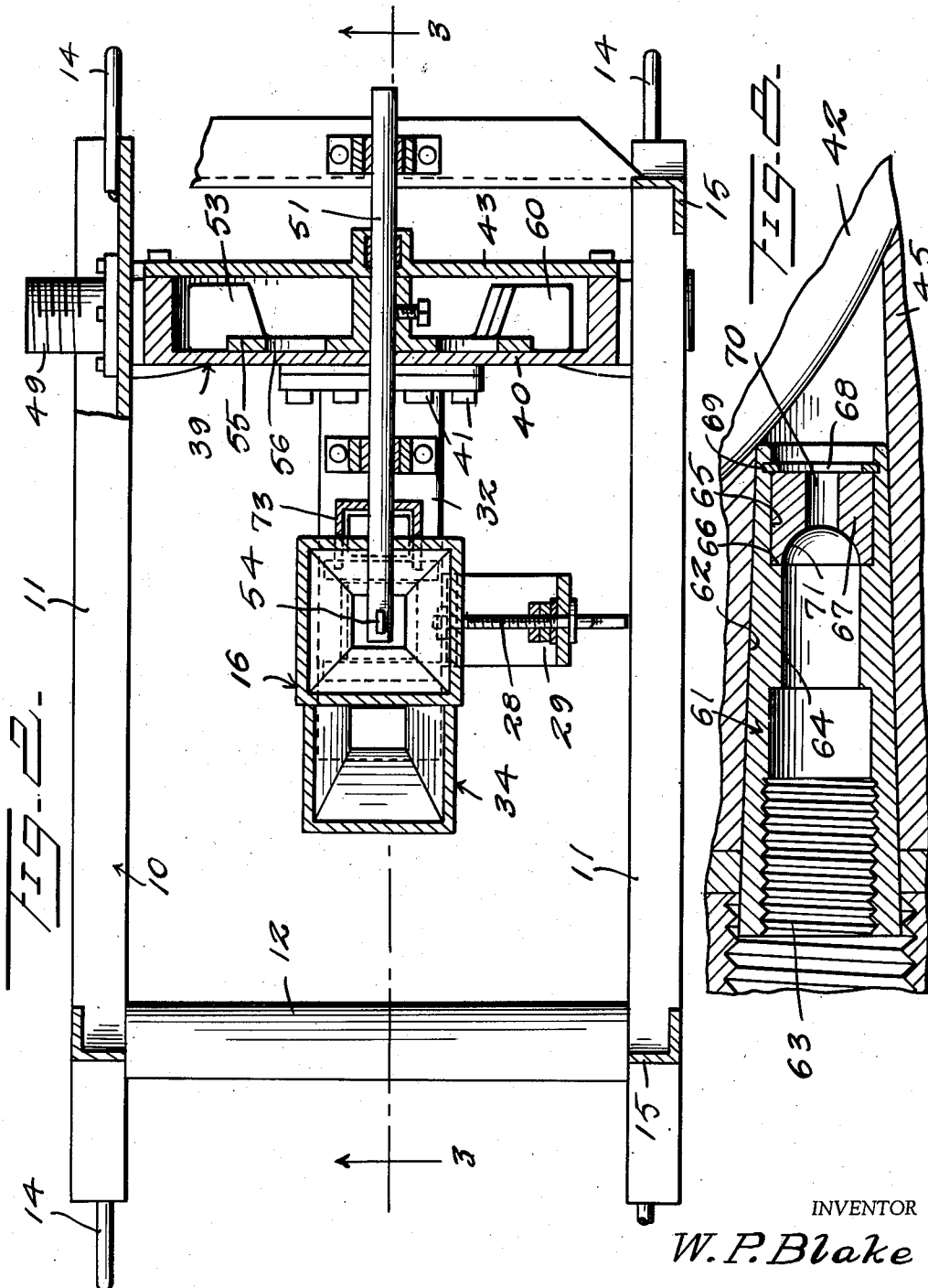
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BY

Kimmel & Crowell

ATTORNEYS

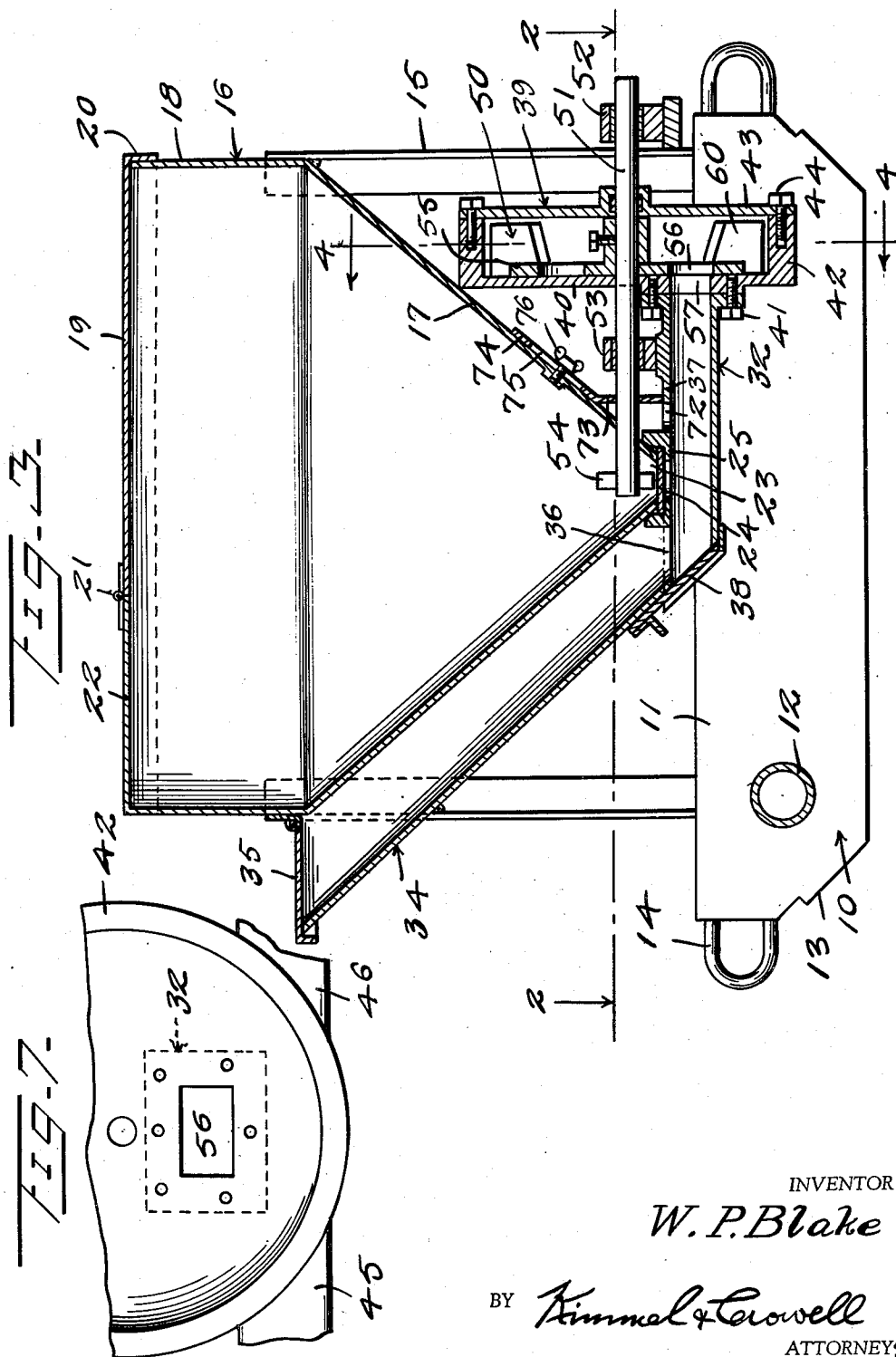
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INVENTOR

W. P. Blake

BY

Kimmel & Crowell

ATTORNEYS

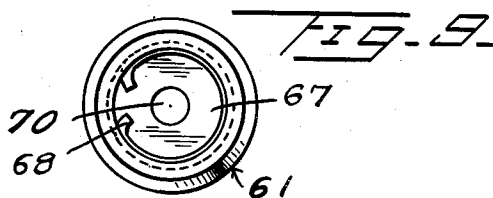
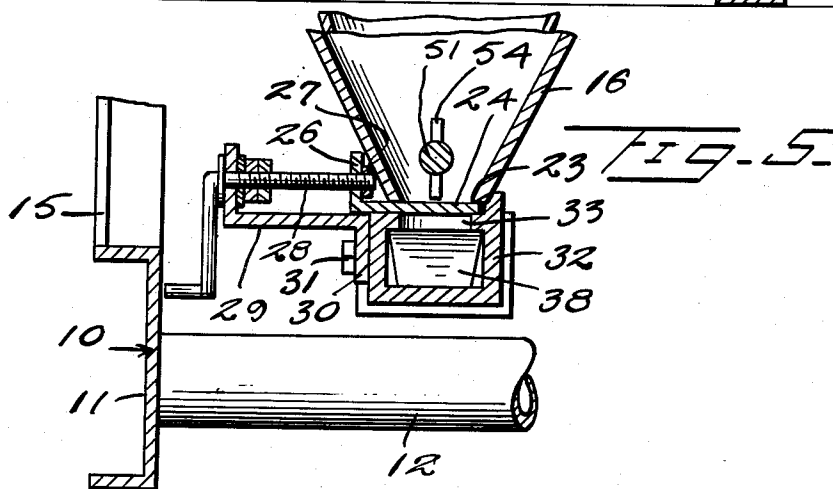
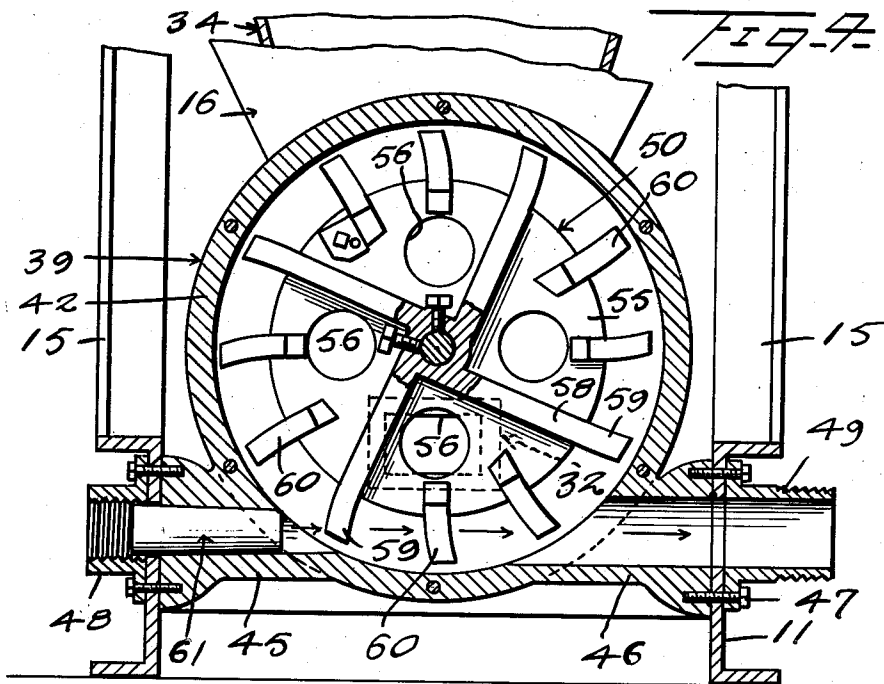
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INVENTOR
W. P. Blake

BY
Kimmel & Towell
ATTORNEYS

UNITED STATES PATENT OFFICE

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MUD MIXING MACHINE

William Pearle Blake, Fairmont, Okla., assignor
to K & B Manufacturing Company, Fairmont,
Okla.

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3 Claims. (Cl. 259—9)

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This invention relates to a mud mixing machine for use in well drilling operations.

In well drilling operations, particularly where rotary drills are used, it is customary to use mud in the drilling operation, and it is desirable for efficient operation to maintain a predetermined consistency of the mud. It is, therefore, an object of this invention to provide a means connected between the outlet or pressure side of the mud pump and the slush pit and operated from the mud pressure for continuously mixing dry mud material with the liquid mud and also maintaining a predetermined percentage of lost circulation material in the mud.

Another object of this invention is to provide a mud mixing machine which includes a main hopper for receiving dry mud, an auxiliary hopper for receiving lost circulation material, and a suction means whereby the dry mud and circulation material may be drawn from the hoppers and mixed together while at the same time the dry mud and circulation material are mixed with the liquid mud coming from the pump.

A further object of this invention is to provide a hopper construction wherein the lid for the hopper when swung to an open position may be used as a table for opening the bags containing dry mud.

A further object of this invention is to provide an improved impeller and jet nozzle wherein various types and sizes of nozzle tips may be used to produce the desired mixing of the materials.

A further object of this invention is to provide a multiple hopper structure with at least one valve in the discharge end of one of the hoppers so as to regulate the amount or proportion of materials which will be mixed together.

With the above and other objects in view, my invention consists in the arrangement, combination and details of construction disclosed in the drawings and specification, and then more particularly pointed out in the appended claims.

In the drawings:

Figure 1 is a detailed side elevation partly broken away and in section of a mud mixing machine constructed according to an embodiment of this invention.

Figure 2 is a sectional view taken on the line 2—2 of Figure 3.

Figure 3 is a sectional view taken on the line 3—3 of Figure 2.

Figure 4 is a fragmentary sectional view taken on the line 4—4 of Figure 3.

Figure 5 is a fragmentary sectional view taken on the line 5—5 of Figure 1.

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Figure 6 is a fragmentary side elevation of the forward portion of the machine.

Figure 7 is a fragmentary end elevation of the impeller housing.

Figure 8 is a fragmentary longitudinal section through the fluid pressure nozzle.

Figure 9 is a front elevational view of the nozzle tip.

Referring to the drawings the numeral 10 designates generally a base structure which is formed of a pair of channel members 11 connected together by means of a tubular connecting member 12.

The opposite ends of the channel members 11 are disposed in upwardly divergent relation as indicated at 13 so that the base 10 may be dragged over the ground. The channel members 11 have secured to the opposite ends thereof loops 14 by means of which drawbar means may be connected with the base 10 and shifting the latter as may be desired.

The base 10 has secured to each channel member 11 upright angle members 15 and a main hopper generally designated as 16 is fixed to the upper end portions of the upright supporting bars 15. The hopper 16 is formed with downwardly convergent walls 17 and with vertically disposed walls 18 extending upwardly from the convergent walls 17.

A closure member 19 having marginal flanges 20 is hingedly secured to the top of the hopper 16 as indicated at 21, and when the closure 19 is disposed in open position as shown in Figure 1, the closure 19 substantially rests on top wall 22 of the hopper.

The closure 19 when in open position constitutes a table or horizontal support on which filled bags may be positioned for facilitating the opening of these bags and the discharge of the contents thereof into the hopper 16.

The hopper 16 is provided with a centrally disposed discharge opening 23, and a laterally adjustable valve plate 24 is slidably carried in guides 25 and is adapted to regulate the degree of opening of the discharge port 23. The valve member 24 is provided at its outer end with an upstanding extension 26 and a nut 27 is fixed to the extension 26.

A valve adjusting threaded shaft 28 is threaded into the nut 27 and is rotatably carried by a substantially L-shaped bracket arm 29 having a depending flange 30 at its inner end which is secured by fastening means 31 through the adjacent wall of a housing 32.

The housing 32 is disposed below the hopper 16

being horizontally disposed and communicating with the discharge opening 23 through an intake opening 33. An auxiliary hopper generally designated as 34 is fixed to the main hopper 16 being disposed on an angle to the vertical and is provided at its upper or rear end with a hinged closure 35.

The hopper 34 communicates at its lower end with the housing 32 through a rear opening 36 formed in the top wall 37 of the housing 32. A closure plate 38 is slidably carried by the rear end of the housing 32 being disposed on an angle to the vertical and provides a means whereby the interior of the housing 32 may be cleaned or the housing may be examined. An impeller housing generally designated as 39 is disposed between the base members 11 and includes an inner wall 40 secured by fastening means 41 to the forward end of the housing 32.

The housing 39 also includes a circular wall 42 formed integral with the inner wall 40 and a removable outer wall 43 is secured to the circular wall 42 by fastening members 44. The housing 39 also includes a pair of oppositely disposed bosses 45 and 46 extending substantially tangentially of the circular wall 42 and fixed between the base members 11 by fastening members 47 which also secure threaded bushings 48 and 49 to the outer sides of the base members 11.

The bushing 48 is an intake bushing, whereas, the bushing 49 is an outlet bushing.

An impeller wheel generally designated as 50 is rotatably disposed within the housing 39 being secured to a shaft 51 which is journaled in bearings 52 and 53. The shaft 51 projects into the lower portion of the hopper 16 and has secured thereto within the hopper 16 a pair of agitating members 54.

The impeller wheel 50 comprises a disc shaped member 55 which is fixed to the shaft 51 and the disc member 55 is provided with a plurality of circumferentially spaced apart openings 56. The openings 56 are adapted to move across the intake opening 57 formed in the inner wall 40 so that the mud in dry form will be drawn into the impeller housing 39 as the impeller wheel 50 rotates.

The disc shaped member 55 has fixed thereto oppositely extending pairs of ribs 58 terminating at their outer ends in blades 59, and the disc member 55 has disposed between the blades 59 pairs of intermediate blades 60. A pressure nozzle 61 is disposed in a tapered opening 62 formed in the boss 45 and the nozzle 61 is formed at its outer end with internal threads 63. The threads 63 provide a means whereby a nozzle puller may be coupled with a nozzle so as to remove the nozzle from the socket or tapered opening 62.

The nozzle 61 includes a reduced diameter intermediate bore 64 which forms with a forward larger diameter bore 65 a shoulder 66. A nozzle tip 67 is disposed within the bore 65 and abuts against the shoulder 66. The nozzle tip 67 is removably held in the bore or socket 65 by means of a split locking ring 68 engaging in an annular groove 69 formed in the bore or socket 65.

The nozzle tip 67 is formed with a central jet opening or bore 70, and the tip member 67 at its inner end is provided with a concave recess 71 which forms a concave or tapered guide for guiding the fluid forwardly to the jet opening 70.

In the use and operation of this device the main hopper 16 is adapted to have discharged thereinto dry mud and the auxiliary hopper 34 is adapted to have discharged thereinto cottonseed hulls or

other material which is used as lost circulation material.

The intake bushing 48 is connected to the pressure side of a mud pump, and the outlet bushing 49 is connected to the slush pit or other receiver. When the fluid passes under pressure through the nozzle 61 and impinges against the blades 59 and 60, impeller 50 will be rotated at a speed proportionate to the pressure and the velocity of the fluid discharged from the nozzle 61.

The rotation of impeller 50 will cause a suction to be generated in housing 32 so that the dry mud and circulation material will be drawn into the impeller housing 39 and will be mixed in housing 39 with the fluid discharged from nozzle 61 and passing horizontally through bushing 46 into bushing 49.

The amount of mud mixed with the lost circulating material which is discharged from hopper 34 into housing 32 may be regulated by adjustment of the valve member 24. The housing 32 has an opening 72 in the top wall 37 thereof which preferably is an inspection opening in addition to providing a means whereby any dry mud which leaks out of hopper 16 through the opening in hopper 16 within which shaft 51 engages may be drawn into housing 32.

A vertically disposed U-shaped cover 73 normally is disposed between an adjacent inclined wall 17 of hopper 16, and the top wall 37 and closure 73 has extending therefrom an elongated plate 74 which is formed with an elongated opening 75.

A wing bolt 76 engages through the opening 75 and provides a means whereby the closure 73 may be loosened and moved outwardly so that an inspection may be had of the interior of housing 32 through opening 72.

The side walls of the hopper 16 have secured thereto bails 77 so that the hopper may be lifted by means of a crane with hooks engaging in the bails 77.

What is claimed is:

1. A mud mixing machine comprising a frame, a hopper carried by said frame, a receiver connected with the lower end of said hopper, and a suction means connected with said receiver, said suction means comprising a housing having an intake opening communicating with said receiver, opposed inlet and outlet bosses carried by said housing, said inlet boss having a tapered bore, a jet nozzle in said tapered bore, and a combined suction and impeller member rotatably disposed in said housing.

2. A mud mixing machine comprising a frame, a hopper carried by said frame, a receiver connected with the lower end of said hopper, a housing secured to one end of said receiver, said housing having a cylindrical side wall, inner and outer end walls, said inner wall having an intake opening communicating with said receiver, a combined impeller and suction member rotatably disposed in said housing, said combined impeller and suction member being formed of a disk having openings movable across said intake opening, suction blades carried by one face of said disk, impeller blades extending from the periphery of said disk, opposed inlet and outlet bosses carried by said housing, and a jet nozzle carried by said inlet boss.

3. A mud mixing machine comprising a frame, a hopper carried by said frame, a receiver connected with the lower end of said hopper, a housing secured to one end of said receiver, said hous-

ing having a cylindrical side wall and inner and outer end walls, said inner wall having an intake opening communicating with said receiver, a shaft extending through said housing and terminating at one end in said hopper, agitating members carried by said one end of said shaft, a combined impeller and suction member fixed to said shaft in said housing, said last named member comprising a disc having a plurality of openings movable across said intake opening, 10 suction blades carried by one face of said disc adjacent said openings, impeller blades extending from the periphery of said disc, opposed inlet and outlet bosses carried by said housing extending in a direction transverse to the plane of 15

said disc adjacent said impeller blades, and a jet nozzle carried by said inlet boss.

WILLIAM PEARLE BLAKE.

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