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Adjustable blender pump mount for hydraulic fracturing

Abstract

A blender system includes a skid and a blender assembly, the blender assembly including a blender tub and the blender tub including an outlet. The blender system also includes a discharge pump, the discharge pump coupled to the outlet and an adjustable mount, the adjustable mount supporting the discharge pump. The adjustable mount includes a bottom plate, the bottom plate including a plurality of rows of slots and two side gussets, the side gussets having tabs, the tabs inserted in the rows of slots of the bottom plate. In addition, the adjustable mount includes a top plate, the top plate positioned perpendicularly to the two side gussets and in parallel with the bottom plate. The top plate is affixed to the side gussets and to the discharge pump.

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References Cited

U.S. PATENT DOCUMENTS

Patent No.	Issued Date	Patentee Name	U.S. Cl.	CPC
2827121	12/1957	Nowak	166/295	C09K 8/5086
5425421	12/1994	Coleman	166/250.14	E21B 33/138
8774972	12/2013	Rusnak	700/282	F04D 15/0066
8789601	12/2013	Broussard	166/308.1	E21B 43/2607
9410410	12/2015	Broussard	N/A	H02P 23/00
9435175	12/2015	Chong	N/A	E21B 43/2405
9534473	12/2016	Morris	N/A	F01D 15/10
9534604	12/2016	Lopez	N/A	F04D 15/029
9650879	12/2016	Broussard	N/A	F04D 29/66
10227854	12/2018	Glass	N/A	F04B 47/02
10514301	12/2018	Luharuka	N/A	G05B 19/0425
2008/0209997	12/2007	Bailey	702/11	E21B 43/2607
2009/0151927	12/2008	Crawford	166/90.1	E21B 43/168
2010/0027371	12/2009	Lucas	366/134	B01F 23/59
2010/0282464	12/2009	Medvedev	166/280.1	G05D 7/0676
2011/0146980	12/2010	Crill	166/271	C09K 8/665
2012/0255734	12/2011	Coli	166/305.1	F04B 19/22
2013/0306322	12/2012	Sanborn	166/308.1	E21B 43/2607

2014/0174717	12/2013	Broussard	166/66.4	E21B 43/2607
2014/0238742	12/2013	Borek et al.	N/A	N/A
2014/0251623	12/2013	Lestz	166/308.2	E21B 43/26
2014/0277772	12/2013	Lopez et al.	N/A	N/A
2014/0290768	12/2013	Randle	137/565.11	E21B 43/2607
2015/0114652	12/2014	Lestz	166/308.1	E21B 43/267
2015/0129210	12/2014	Chong	166/57	F28D 21/00
2015/0252661	12/2014	Glass	166/308.1	E21B 43/2607
2016/0032703	12/2015	Broussard	166/250.01	E21B 43/2607
2016/0177678	12/2015	Morris	60/772	E21B 41/0085
2016/0208592	12/2015	Oehring	N/A	F04D 29/664
2017/0067689	12/2016	Surjaatmadja	N/A	F28D 1/024
2017/0226842	12/2016	Omont	N/A	E21B 43/255
2017/0241307	12/2016	Borek	N/A	F01M 1/16
2017/0322086	12/2016	Luharuka et al.	N/A	N/A

FOREIGN PATENT DOCUMENTS

Patent No.	Application Date	Country	CPC
102602322	12/2011	CN	N/A
103912259	12/2013	CN	N/A
204099301	12/2014	CN	N/A
104364465	12/2014	CN	E21B 43/2607
2267610	12/2005	RU	E21B 43/26
2379497	12/2009	RU	G05D 7/0676
WO-2007113528	12/2006	WO	E21B 43/2607

OTHER PUBLICATIONS

Decision to Grant issued in Russian App. No. 2017133921 dated Mar. 19, 2020; and English translation thereof (15 pages). cited by applicant
Office Action issued in Chinese App. No. 201680024244.0 dated Jul. 10, 2020; and English translation thereof (14 pages). cited by applicant

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Background/Summary

CROSS-REFERENCE TO RELATED APPLICATIONS (1) This application is a nonprovisional application which claims priority from U.S. provisional application No. 63/543,235, filed Oct. 9,

2023, which is incorporated by reference herein in its entirety.

TECHNICAL FIELD/FIELD OF THE DISCLOSURE

(1) The present disclosure relates generally to well service equipment and specifically to equipment used with well fluids.

BACKGROUND OF THE DISCLOSURE

(2) During drilling, completion, and production operations, fluids are circulated through a wellbore. Various chemicals are introduced into the fluids, referred to herein as the slurry, to produce slurry having desirable characteristics. In some cases, chemicals may be provided in dry form. Such chemicals and fluid may be mixed in a blender system.

SUMMARY

(3) A blender system is disclosed. The blender system includes a skid and a blender assembly, the blender assembly including a blender tub and the blender tub including an outlet. The blender system also includes a discharge pump, the discharge pump coupled to the outlet and an adjustable mount, the adjustable mount supporting the discharge pump. The adjustable mount includes a bottom plate, the bottom plate including a plurality of rows of slots and two side gussets, the side gussets having tabs, the tabs inserted in the rows of slots of the bottom plate. In addition, the adjustable mount includes a top plate, the top plate positioned perpendicularly to the two side gussets and in parallel with the bottom plate. The top plate is affixed to the side gussets and to the discharge pump.

(4) A method of mounting a discharge pump is disclosed. The method includes positioning a discharge pump and supplying an adjustable mount. The adjustable mount includes a bottom plate, the bottom plate including a plurality of rows of slots and two side gussets, the side gussets having tabs, the tabs inserted in the rows of slots of the bottom plate. The adjustable mount also includes a top plate, the top plate positioned perpendicularly to the two side gussets and in parallel with the bottom plate, the top plate affixed to the side gussets. The method also includes orienting the adjustable mount so as to support the discharge pump by adjusting the position of the two side gussets with respect to the bottom plate. The method also includes supporting the discharge pump with the adjustable mount.

(5) A method of mounting an air filter to a side support is disclosed. The method includes supplying a side support, the side support including tabs, and affixing an air filter adjustable mount. The air filter adjustable mount includes a back plate, the back plate including slots and a side plate, the side plate either affixed to or integral to the back plate, the side plate perpendicular to the back plate. The method also includes adjusting the tabs so that the tabs fit within the slots and positioning the air filter within the air filter adjustable mount.

Description

BRIEF DESCRIPTION OF THE DRAWINGS

(1) The present disclosure is best understood from the following detailed description when read with the accompanying figures. It is emphasized that, in accordance with the standard practice in the industry, various features are not drawn to scale. In fact, the dimensions of the various features may be arbitrarily increased or reduced for clarity of discussion.

(2) FIG. **1** depicts a side view of a blender system consistent with at least one embodiment of the present disclosure.

(3) FIG. **2** is an expanded side view of the blender system of FIG. **1** showing an adjustable mount consistent with at least one embodiment of the present disclosure.

(4) FIG. **3** depicts an adjustable mount consistent with certain embodiments of the present disclosure.

(5) FIG. **4** depicts a blender system with a side-mounted air filter with an air filter adjustable mount

consistent with certain embodiments of the present disclosure.
(6) FIG. **5***a* depicts a rear view of an air filter adjustable mount consistent with certain embodiments of the present disclosure.
(7) FIG. **5***b* depicts a side view of an air filter adjustable mount consistent with certain embodiments of the present disclosure.

DETAILED DESCRIPTION

(8) It is to be understood that the following disclosure provides many different embodiments, or examples, for implementing different features of various embodiments. Specific examples of components and arrangements are described below to simplify the present disclosure. These are, of course, merely examples and are not intended to be limiting. In addition, the present disclosure may repeat reference numerals and/or letters in the various examples. This repetition is for the purpose of simplicity and clarity and does not in itself dictate a relationship between the various embodiments and/or configurations discussed.
(9) FIG. **1** depicts blender system **100**. Blender system **100** may be used to prepare fluids for use in wellbore operations including stimulation operations such as hydraulic fracturing operation. For the purposes of this disclosure and without any intent to limit the scope of this disclosure, the fluids prepared by blender system **100** are referred to herein as a slurry made up of ingredients, chemicals, products, and base fluids as understood in the art such as, for example and without limitation, friction reducer, high viscosity friction reducer, guar or synthetic gel, inhibitors, PH buffers, and biocides.
(10) In some embodiments, blender system **100** may include skid **101**. Skid **101** may support components of blender system **100** and may provide for transportation of blender system **100** while allowing all components thereof to remain operatively coupled. In some embodiments, skid **101** may be positioned on or may be part of trailer **103** that includes one or more wheels **105** positioned to allow blender system **100** to be transported by towing. In some such embodiments, trailer **103** may be a rockover trailer. In certain embodiments, skid **101** may be mounted on a truck chassis.
(11) Blender system **100** may include blender assembly **109**. Blender assembly **109** may be adapted to mix one or more ingredients, chemicals, and products with a base fluid to generate a slurry used, for example and without limitation, in a wellbore stimulation operation such as a hydraulic fracturing operation. Blender assembly **109** may include blender tub **111**.
(12) In some embodiments, blender tub **111** may include outlet **199** positioned at the base of blender tub **111**. Outlet **199** may be fluidly coupled to discharge pump **201** by outlet pipe **203**. In certain embodiments, such as the one shown in FIGS. **1** and **2**, discharge pump **201** may be a centrifugal pump, although any suitable pump may be used. Discharge pump **201** may be driven by discharge pump motor **204**. In some embodiments, discharge pump motor **204** may be an electric motor.
(13) Discharge pump **201** may be supported, at least in part, by adjustable mount **300**. Adjustable mount **300** may adjust to accommodate a variety of discharge pump **201** designs. Thus, discharge pump **201** may be removed without also removing adjustable mount **300**. FIG. **2** shows adjustable mount **300** in place with discharge pump **201**.
(14) FIG. **3** depicts adjustable mount **300** consistent with certain embodiments of the present disclosure. Adjustable mount **300** includes bottom plate **302**. Bottom plate **302** includes slots **303** for mounting side gussets **304**. Slots **303** may be positioned in rows along sides **306***a*, **306***b* of bottom plate **302**, in certain embodiments. Side gussets **304** include tabs **305** for insertion into slots **303** to hold side gussets **304** in place with respect to bottom plate **302**, but allow for limited movement inside side gusset **304** placement along bottom plate **302**. For example, in certain embodiments, slots may be between ¼″ and ¾″ wide, or, for example, ½″ wide, to allow for misalignment between discharge pump **201** and skid **101**. In certain embodiments, side gussets **304** may be positioned perpendicularly or approximately perpendicularly, i.e., at an angle between 75 degrees and 105 degrees, to bottom plate **302**.

(15) In some embodiments, bottom plate **302** may include cutouts **308** to reduce the weight of adjustable mount **300**. In addition, support cross plates **310** may be connected to bottom plate **302** to provide structural support for adjustable mount **300**. Support cross plates **310** may be placed perpendicular or approximately perpendicular to bottom plate **302** and side gussets **304**. Support cross plates **310** may extend across bottom plate **302** from side **306***c* to **306***d*.
(16) Side gussets **304** may support top plate **312**. Top plate **312** may be positioned perpendicularly or approximately perpendicularly to side gussets **304** and parallel or approximately parallel to bottom plate **302**. As shown in FIGS. **1** and **2**, top plate **312** may mount to discharge pump **201**, thereby providing support to discharge pump **201**. Mounting top plate **312** to discharge pump **201** may be accomplished through the use of mounting holes **314** in top plate **312**.
(17) As described above, adjustable mount **300** may accommodate a number of different types of discharge pumps **201**. Before adjustable mount **300** is set in place, adjustable mount **300** may be adjusted by moving side gussets **304** along the rows of slots **303** in bottom plate **302** and within slots **303** within tabs **305**. In certain embodiments, once adjustments have been made, adjustable mount **300** may be set in place. In other embodiments, once adjustments have been made, bottom plate **302**, side gussets **304** and top plate **312** may be affixed together, such as by welding, and then set in place.
(18) As shown in FIG. **4**, side support **122** may be affixed to air filter adjustable mount **126**, which may hold air filter **124**. Side support **122** may be affixed to skid **101**.
(19) FIGS. **5***a* and **5***b* depict a rear view and side view of air filter adjustable mount **126**. FIG. **5***a* shows back plate **402** of air filter adjustable mount **126**. Back plate **402** includes a plurality of mounting holes **404** for mounting air filter **124**, such as by fasteners **128**. Fasteners **128** may be screws, bolts or other fastening devices. Back plate **402** further includes a plurality of slots **406** for mounting air filter adjustable mount **126** to side support **122**. Slots **406** may be, for instance, between ¼″ and 1″ long so that tabs **130** (shown in FIG. **5***b*) of side support **122** may be adjustable within the length of slots **406**.
(20) FIG. **5***b* depicts back plate **402** and bottom plate **410**. In certain embodiments, back plate **402** and bottom plate **410** may be integral, i.e., a single piece. In other embodiments, back plate **402** and bottom plate **410** may be separate pieces that have been welded or otherwise affixed. Back plate **402** and bottom plate **410** may be perpendicular or approximately perpendicular to one another. Air filter **124** may sit within air filter adjustable mount **126**.
(21) The foregoing outlines features of several embodiments so that a person of ordinary skill in the art may better understand the aspects of the present disclosure. Such features may be replaced by any one of numerous equivalent alternatives, only some of which are disclosed herein. One of ordinary skill in the art should appreciate that they may readily use the present disclosure as a basis for designing or modifying other processes and structures for carrying out the same purposes and/or achieving the same advantages of the embodiments introduced herein. One of ordinary skill in the art should also realize that such equivalent constructions do not depart from the spirit and scope of the present disclosure and that they may make various changes, substitutions, and alterations herein without departing from the spirit and scope of the present disclosure.

Claims

1. A method of mounting a discharge pump comprising: positioning the discharge pump; supplying an adjustable mount, the adjustable mount including: a bottom plate, the bottom plate including a plurality of rows of slots; two side gussets, the side gussets having tabs, the tabs inserted in the rows of slots of the bottom plate; a top plate, the top plate positioned perpendicularly to the two side gussets and in parallel with the bottom plate, the top plate affixed to the side gussets; orienting the adjustable mount so as to support the discharge pump by adjusting the position of the two side gussets with respect to the bottom plate; and supporting the discharge pump with the adjustable

mount.
2. The method of claim 1, wherein the step of adjusting the position of the two side gussets includes moving the tabs within the slots.
3. The method of claim 1 further comprising prior to supporting the discharge pump with the adjustable mount: welding the bottom plate to the side gussets; and welding the side gussets to the top plate.
4. The method of claim 1, wherein the adjustable mount further includes cutouts.
5. The method of claim 1, wherein the adjustable mount further includes a support cross plate, the support cross plate connected to the bottom plate and perpendicular to the two side gussets and the bottom plate.
6. The method of claim 1, wherein the top plate has mounting holes.
7. The method of claim 1, wherein the slots are between ¼″ and ¾″ wide.
8. The method of claim 1, wherein the slots are ½″ wide.
9. The method of claim 1, wherein the discharge pump is a centrifugal pump.