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BACK OFF SETTING DEVICE

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14 Claims. (Cl. 166—10)

My invention relates to a device for setting pipe in wells and has particular reference to setting tools whereby a strainer with liner and packer thereon may be lowered into the well and fixed in position.

In the operation of devices such as this the string of pipe which is employed to lower the strainer and packer assembly into fixed position at the bottom of the well is termed the setting string. This string of pipe usually has a detachable connection with the assembly which is lowered into the well and may after the setting operation has been performed be released and removed from the well. It has become somewhat common to use the setting string as a tubing to flow the fluid from the well.

A difficulty may arise, in connection with the use of the setting string as a flow line, that sand may pack in around the lower end of the string and within the strainer so that when it becomes necessary to remove or adjust the position of the tubing or setting string it will be found to be "fixed" or "frozen" in position due to the packed sand so that it can not be withdrawn.

My invention has as an object to provide a connection between the setting string and the liner above or within the liner which can be manipulated so as to be releasable by a right-hand turn in case the lower end thereof becomes sanded up and stuck in the well.

I desire to provide a back off connection which will be inoperative during the operation of lowering and setting the strainer but which will be rendered operative thereafter in the setting of the packer.

I desire to provide a locking engagement between the packer setting device and the lower end or wash pipe employed upon the setting string which will allow unscrewing of the said connection until the string has been properly manipulated in the well so as to release the locking means and allow the connection to be unscrewed.

The invention comprises a mandrel connected with the wash pipe and having thereon a locking sleeve which prevents unscrewing of the main portion of the setting string from the wash pipe until the locking means has been released by a relative upward movement of the locking sleeve on the mandrel.

The invention resides in the particular construction of the device and the details of which will be better understood from inspection of the drawings herewith, wherein:

Fig. 1 is a central longitudinal section through the lower end of the well showing my device therein, certain parts being broken away for clearness.

Fig. 2 is a view similar to that shown in Fig. 1 but showing the packer in set position and the locking connection released.

Fig. 3 is a similar longitudinal section showing the mandrel and upper portion of the setting string released from the wash pipe.

Fig. 4 is an enlarged detail of the packer setting device and the locking mechanism connected therewith,

Fig. 5 is a broken detail of the lower end of the latching sleeve.

Fig. 5*a* is a bottom plan view of said sleeve.

Fig. 6 is a transverse section on the plane 6—6 of Fig. 4.

Fig. 7 is a bottom plan view of the mandrel and locking sleeve removed from the wash pipe.

Fig. 8 is a side elevation of the device shown in Fig. 4 but with the locking means in released position.

Fig. 9 shows the parts disconnected from each other.

Fig. 10 is a side elevation of the latching slips employed with the packer setting mechanism; and

Fig. 11 is a sectional view of the lower end of the well showing the strainer and liner sanded up so as to prevent the removal of the wash pipe at the lower end of the setting string.

I contemplate employing my setting device in connection with any ordinary type of strainer and packer such as are now commonly used in oil field work. In the drawings, such an assembly is illustrated. Referring particularly to Figs. 1, 2 and 3, it will be noted that the strainer which is shown at 1 has at the lower end thereof a housing 2 for the back pressure valve and a lower guide shoe or bit 3 to guide the strainer into the lower end of the hole and not allow rotation thereof in setting the assembly upon the bottom. The strainer 1 may be of any ordinary type. I have shown a perforated pipe. Said pipe is secured by the coupling 4 to the lower end of the packer barrel 5. Said barrel has an upwardly extending portion 6, which has a ratchet surface on the outer side in the usual manner to cooperate with a latching sleeve 7 to which the upper end of the canvas packer 8 is connected. To the latching sleeve 7 is secured the setting barrel 9 at the upper end of which is secured a special collar 10 adapted to engage with the packer setting dogs. For this purpose there is an inner undercut portion having a lower

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LOAD SUPPORTING STRUCTURE

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This invention relates to load-supporting structures and more particularly to an openwork metallic structure adaptable for use either as a finished flooring or as a reinforce for a filled flooring and which is susceptible to manufacture for withstanding different loads and loading conditions. It has uses in the construction of floors and roadways for carrying heavy as well as light traffic of all kinds and may be used for any of the varied uses for which metallic gratings are suitable. Among the objects of the invention is to provide a load-supporting structure having a minimum amount of metal as compared with load-supporting structures of the same class designed for like load and span conditions.

Another object of the invention is to provide a unitary metallic load-supporting structure utilizing truss members or open-web joists as steel stringers, and a load-bearing structure comprising grating which is held in place upon the truss members by cross-bars which are themselves in rigid interlocking relationship with the truss members. The truss members are spaced from one another in parallel relationship and are laterally braced by the cross-bars which extend from one another through openings in the truss members. The cross-bars also provide vertical support to the upper and lower chords of the truss members intermediate the truss elements.

Another object of my invention is to provide a load-supporting metallic structure which is capable of use either as an open flooring or as a solid flooring consisting of the metallic load-supporting structure filled with concrete or other filling material, with suitable allowance in strength of its members being made according to whether the flooring is to be open or filled.

Further and other objects of the present invention will be hereinafter set forth in the accompanying specification and claims and demonstrated by the drawing which shows by way of illustration a preferred embodiment and the principle of my invention, and what I now consider the best mode in which I contemplate applying that principle. Other embodiments of the invention employing the same principle may be used and structural changes made by persons skilled in the art within the spirit of the appended claims without departing from the invention. For example, while there are a variety of grating structures which are suitable for the load-bearing or road-surfacing structure, it is sufficient to illustrate one of such grating structures.

In the drawing, Fig. 1 shows the general appearance in plan of one arrangement of the openwork metallic load-supporting structure.

Fig. 2 is a view in perspective of the end of a panel of the load-supporting structure with part of the load-bearing grating omitted.

The load-supporting structure has utility either with or without a filling of concrete or other material, it being understood that when the floor or roadway for which the structure is to be used requires a filling, the various elements of the metallic skeleton or frame will be so proportioned as is usual in the design of slabs, allowance and reduction in weight of metal being made for the additional strength provided by concrete or other filling material. The skeleton or metallic frame may be completely fabricated in panels and transported to the place of installation where all that remains to be done is to place the panels in position upon the supporting beams or other substructure and to secure the panels to the substructure and adjacent panels to each other. If filling is to be done, trucks carrying the filling may be run over the metallic framework for that purpose. The panels may be made in any convenient lengths and widths. The end of a single panel with part of the load-bearing grating 10 omitted is illustrated in Fig. 2. In general the panels may be laid end to end and side to side as illustrated in Fig. 1, but owing to the adaptability of the structure to uniformity in appearance the panels may be staggered with reference to each other.

The principal load-carrying members are stringers 11 in the form of truss members having flanges 12, 13 at their upper and lower edges and webs 14 which are provided with openings 15, 16 and 17. The webs comprise diagonally extending truss elements 18, 19 which cross each other in pairs. While other forms of truss members may be provided, I prefer to use one-piece steel truss members or open-web joists of standard construction which are available in different weights and depths. The size of the truss members selected is dependent upon the load-carrying qualities which are specified for the particular floor or other structure for which the panels are to be used.

The truss members of a single panel are arranged parallel to one another and are interconnected by a number of cross-bars 20 which extend cross-wise of the panel and through aligned openings 17. The cross-bars are provided with notches 21, 22 in their upper and lower edges for engaging the upper and lower portions of the truss members.

Projections 23 are provided intermediate

10. A packer and strainer assembly including a packer expanding barrel, in combination with a setting device including a wash pipe, means to detachably engage said wash pipe at the lower end of said strainer, a nipple at the upper end of said wash pipe, a mandrel screwed within said nipple, a locking sleeve on said mandrel, locking means thereon engaging said nipple to prevent unscrewing of said mandrel, lugs on said mandrel engaging within slots in said sleeve, means on said sleeve to engage said packer expanding barrel and support said sleeve, whereby said mandrel may be moved relatively downward to release said locking means.

11. A packer and strainer setting device including a wash pipe, a mandrel, means releasably connecting said pipe and mandrel, a clutch on said mandrel and pipe normally preventing relative rotation, and means on said clutch to engage a support and hold said clutch from downward movement, whereby a relative downward movement of said mandrel will disengage said clutch to permit relative rotation of said mandrel and pipe.

12. A packer and strainer setting device including a wash pipe, a mandrel, means releasably connecting said pipe and mandrel, a clutch on said mandrel and pipe normally preventing relative rotation, and means on said clutch to engage a support and hold said clutch from downward movement, whereby a relative downward movement of said mandrel will disengage said clutch to permit relative rotation of said mandrel and pipe, and means to thereafter prevent re-engagement of said clutch.

13. In a setting string for strainers and the like, a threaded nipple, a mandrel on said string secured thereto, a sleeve upon said mandrel, interengaging clutch members on said sleeve and said nipple, frangible means to retain said sleeve in position with said clutch members engaged, dogs on said sleeve, and means to urge the lower ends of said dogs resiliently outwardly, whereby said dogs may be engaged upon a support and said frangible means broken to release said clutch.

14. A setting string, a mandrel thereon, a connecting nipple screwed upon the lower end of said mandrel, a clutch sleeve on said mandrel, interengaging teeth on said sleeve and said nipple, detachable means securing said sleeve to said mandrel, dogs on said sleeve adapted to be engaged upon a support to detach and move said sleeve to disengage said teeth and allow unscrewing of said mandrel from said nipple.

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