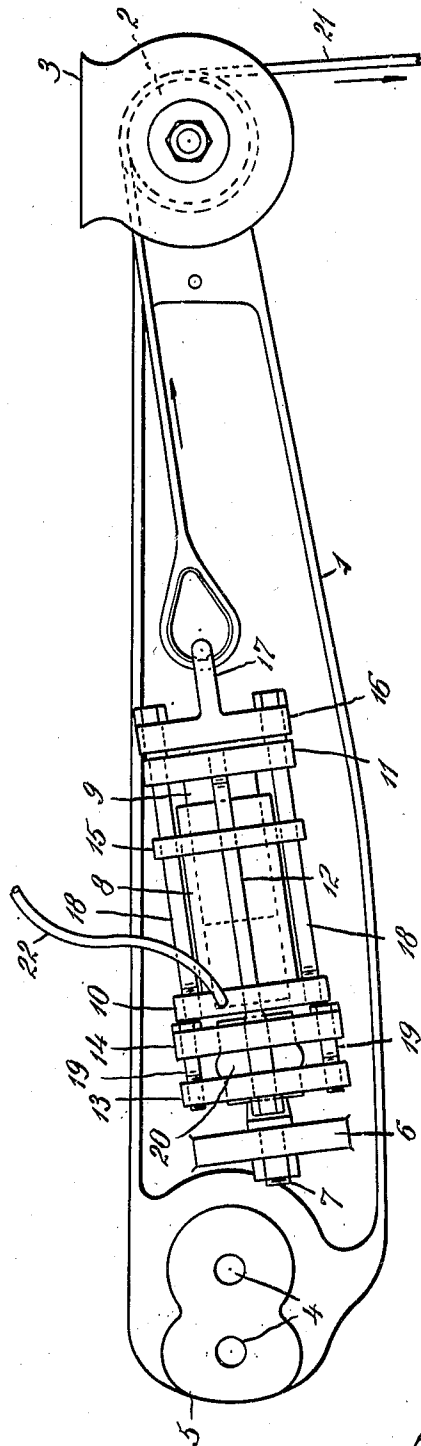


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TONG HANDLE TORQUE INDICATOR

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TONG HANDLE TORQUE INDICATOR

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2 Claims. (Cl. 265—1)

Our invention provides an improved tool for assembling screwed joints, between sections of drill pipe, casing, tubing and rods in the drilling and operation of wells for the production of petroleum for example. In particular, our invention provides an improved device for measuring the torque applied in assembling such screwed joints.

It has been recognized for some time that improved practical results could be secured if the joints, and particularly successive joints in a long string, of screwed pipe, casing, tubing or rods were assembled with a predetermined and controlled torque effort appropriate to the particular conditions of operation and the particular material and equipment. Various devices have been proposed for this purpose, intended particularly for use in wells drilled and operated for the production of petroleum, but up to this time none of these devices has come into general use notwithstanding recognition of the advantages to be secured in this manner. In general, these devices have been unsatisfactory in that their design failed to meet the service requirements of production work. In assembling a string of several thousand feet of casing or tubing in 30 to 40 foot lengths for example, the equipment involved must carry heavy loads and must consequently be of sturdy construction and, if the work is to be performed expeditiously, the tools used must be of extreme simplicity and of minimum number. The handling of unnecessary or complicated tools in such work imposes an intolerable burden. Our invention provides a tool for this purpose which meets the requirements of practical use.

Our improved tool comprises a tong handle carrying a sheave at the end to which force is applied, a cooperating cylinder and piston secured to and supported by the tong handle at a point adjacent the other end with the line of cylinder-piston travel substantially coincident with the line from the point of support tangent to the sheave, a coupling attached to the movable element of the cylinder-piston assembly, arranged between the support and the sheave, and a connection for transmitting pressure developed in the cylinder-piston assembly to a pressure measuring device. In use, the conventional tong-line is secured to this coupling and passed over the sheave at the end of the tong handle to the conventional cat-head. The end of the tong handle opposite the sheave is either secured to or formed as an appropriate gripping means for the casing, tubing or rods to be handled. The torque

effort used in assembling a joint is thus continuously indicated, and may be recorded, by the pressure measuring device connected to the cylinder-piston assembly.

One embodiment of our improved tool is illustrated in the accompanying drawing and will serve further to exemplify our invention. The accompanying drawing is a conventional plan view (assuming the tool to be positioned as used on a vertical string of pipe, casing, tubing or rods) of a tool embodying our invention.

Referring to the drawing: The tong handle 1 carries a sheave 2, protected by a cover 3, at one end and at the other end is fitted to be secured to any appropriate conventional gripping device by means of the bolt holes 4 extending through the faced section 5. This tong handle may be a steel forging. Forged integrally with it is a flange 6 drilled to receive a stud 7 for securing the cylinder-piston assembly to the tong handle. The cylinder-piston assembly comprises a cylinder 8 and a cooperating piston 9 within a supporting cage. The cylinder 8 is secured to or formed as part of plate 10 and the piston 9 is secured to or formed as part of plate 11. The plate 11 is connected by means of a pair of rods 12 to plate 13, the rods 12 moving as a sliding fit through holes in plate 14 and guide ring 15. The plate 10 is connected to the stirrup 16 carrying coupling ring 17 by means of a pair of rods 18 moving as a sliding fit through holes in plate 11 and guide ring 15. The position of plate 14 relative to plate 13 is in part fixed by studs 19 which are screwed into the plate 13 and pass as a sliding fit through holes in plate 14. The axial position of plate 14 relative to plate 13 is controlled by stud 7 which is screwed into plate 14 and passes as a sliding fit through a hole in plate 13. Plates 13 and 14 are separated by a compressed resilient rubber block 20 which provides a resilient connection between the tong handle and cylinder-piston assembly and serves to absorb a major portion of the shock placed on the tool when cable 21 is jerked in making up screw joints. Torque effort is applied to the tong handle by means of a cable 21 passing over the sheave 2 and secured to the coupling ring 17. The space within the cylinder-piston assembly is filled with an appropriate hydraulic medium, and a connection 22 between this space and an appropriate pressure measuring device, indicating, recording or both, is provided through an opening in plate 10.

The cylinder-piston assembly in our improved tool is in effect, and for practical purposes, a

unitary part of the tong handle. The force-measuring device is thus made a unitary part of the tong handle, which must be used in any event, instead of being a separate piece of equipment to be inserted in the tong line or to be added to the equipment on the rig floor. From the standpoint of the operator, our tool does not require the use of any new or different technique but permits him to work with the tong handle and tong line technique to which he has long been accustomed, the torque measuring element of our tool becoming merely an advantageous reference rather than a separate and additional piece of equipment. It will be apparent that the cylinder-piston assembly may be arranged within the supporting cage so that either the cylinder or the piston is the movable element, and it is for this reason that we refer to the cylinder-piston assembly rather than saying that the piston is secured to and supported by the tong handle and the cylinder connected to the tong line as in the particular embodiment illustrated in the drawing.

We claim:

1. In a device for measuring the torque applied in assembling screwed joints the combination comprising a tong handle carrying a sheave at the end to which force is applied, a cooperating cylinder and piston assembly secured to and supported by the tong handle at a point adjacent

the other end with the line of cylinder-piston travel substantially coincident with the line from the point of support tangent to the sheave, a coupling attached to the movable element of the cylinder-piston assembly arranged between the point of support and the sheave, and a connection for transmitting pressure developed in the cylinder-piston assembly to a pressure measuring device.

2. In a device for measuring the torque applied in assembling screwed joints the combination comprising a tong handle carrying a sheave at the end to which force is applied, a cooperating cylinder and piston assembly secured to and resiliently supported by the tong handle at a point adjacent the other end with the line of cylinder-piston travel substantially coincident with the line from the point of support tangent to the sheave, a coupling attached to the movable element of the cylinder-piston assembly arranged between the point of support and the sheave, a flexible element connected to said coupling and passing partially around the sheave for applying force to the tong handle, and a connection for transmitting pressure developed in the cylinder-piston assembly to a pressure measuring device.

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