

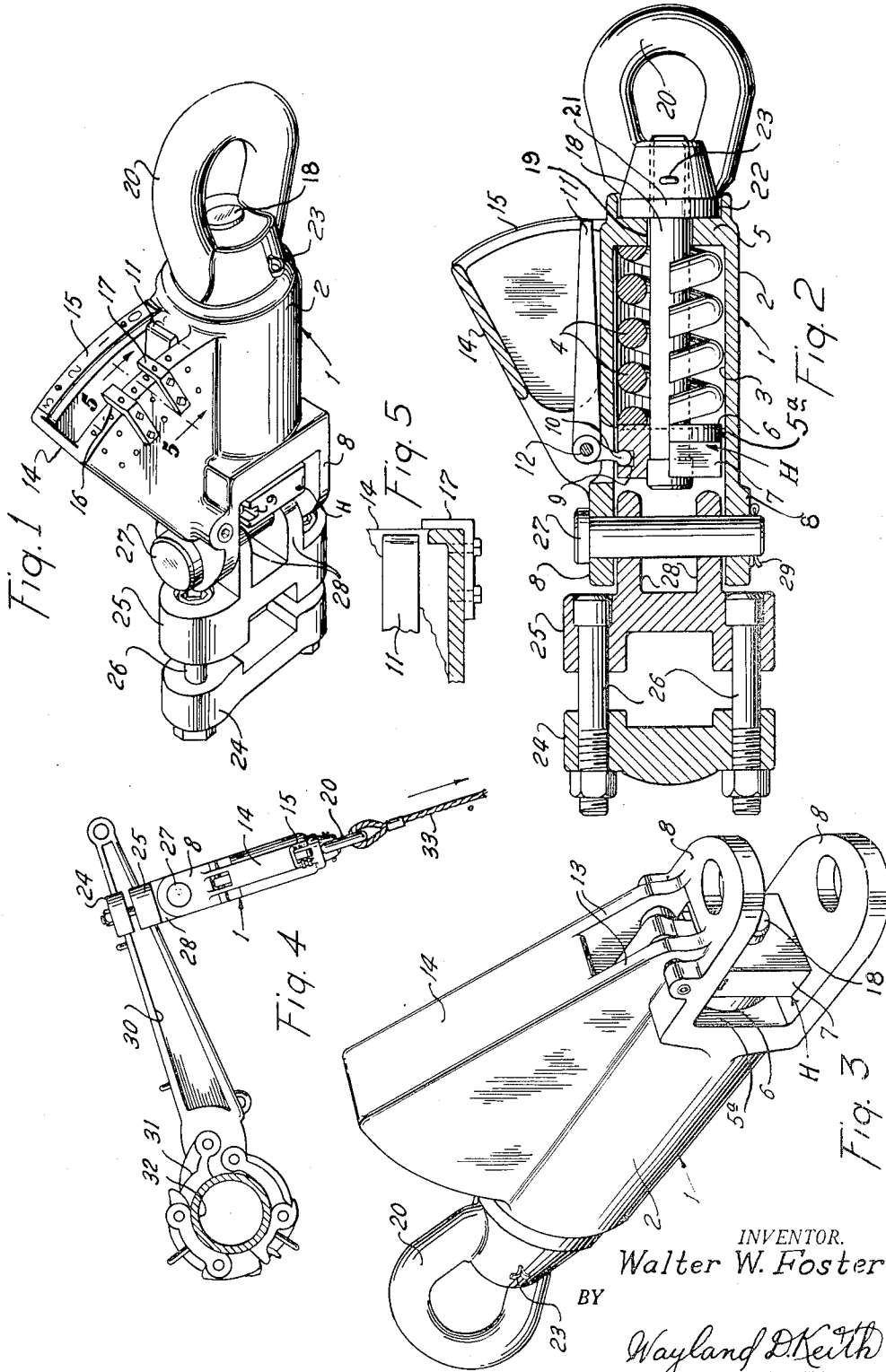
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TENSIOMETER

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TENSIO METER

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4 Claims. (Cl. 73—141)

This invention relates to improvements in tensiometers, and more particularly to tensiometers of the character wherein the pull of a cathead line may be measured in the "tonging up" of drill pipe, casing and the like.

The present device is so constructed as to give a visual range of reading of the indicia, which is substantially in alignment with the pull of the line, thereby enabling the operator to watch, and thereby be able to control the amount of pull exerted on the line.

Tongs are used in the screwing together and unscrewing of pipe sections, and the present device is readily attachable, by means of a clamp, to tong handles and the like, or it may be attached to other objects, so that the mechanism of the tensiometer will readily swing into axial alignment with the pull of a cathead or winch line, to enable ready reading of the indicator thereon at all times.

An object of this invention is to provide a tensiometer that is rugged in construction, easy to attach to or detach from the tong handle or other tool with which it may be used.

Another object of the invention is to provide a tensiometer that is constructed with a minimum of parts, so as to obviate wear incident to the use thereof.

Another object of the invention is to provide a tensiometer that is hinged to swing in a horizontal plane so as to present a visible reading hand which will be in alignment with the line of pull at all times.

Still another object of the invention is to provide a tensiometer that has all the moving parts thereof substantially encased within a housing, to prevent damage thereto.

With these objects in mind, and others that will manifest themselves as the description proceeds, reference is to be had to the accompanying drawings, in which like reference characters designate like parts in the several views thereof, in which:

Fig. 1 is a perspective view of a device embodying the invention, and showing the front-end and a side thereof;

Fig. 2 is a longitudinal sectional view through the device, with parts shown in elevation to bring out the details of construction;

Fig. 3 is a perspective view taken from the rear and the opposite side from that shown in Fig. 1;

Fig. 4 is a top plan view of a pipe tong engaged upon a pipe, and showing the tensiometer attached to the handle of the pipe tong, and showing a fragmentary portion of a cable attached to the eye of the tensiometer; and

Fig. 5 is a fragmentary sectional view taken on the line 5—5 of Fig. 1, and showing a portion of the indicating hand and the attachable visual indicator markers.

With more detailed reference to the drawings, the numeral 1 generally designates the body of the tensiometer, which is cylindrical throughout the major portion of its length, as indicated at 2, and has a cylindrical bore 3 formed therein to receive a spring 4. The forward end of the body portion 1 is closed by a partition wall, as indicated at 5. The bore 3 is of such diameter as to snugly receive the cylindrical portion 6 of the head H. A squared

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portion 7 of the head H interfits between bifurcations 8 of the body 1 in such manner as to prevent rotation of the head H. One side of the head H has a transverse groove 9 formed therein, which groove is adapted to snugly receive the rounded end portion 10 of a bell-crank indicating hand 11.

The bell-crank hand 11 is pivoted on a transverse pin 12 that passes through a pair of lugs 13 formed on a side of the cylindrical portion 2 of the body of the tensiometer. The lugs 13 are formed integral with the housing 14 that encases the hand 11. The forward end of the housing 14 is arcuate in shape and carries indicia or graduations 15, usually graduated to indicate thousands of pounds, but other relative unit may be used as desired.

The indicia may be so made that it can be changed to make different indications for different types of work to be performed. This can be accomplished by changing the spring 4. However, in screwing casing together with tongs, and screwing drill stem together with tongs, these two operations fall within the same category, and the same indicia can be used on the device for both operations.

It is preferable to have visual marker elements 16 and 17 secured adjacent one of the arcuate faces of the housing, and which will extend outward thereover for alignment with indicator hand 11, so that the indication of pull on the tensiometer will be readily discernible, even when the tool is being worked with great rapidity. Since it may be desirable to screw casing together more tightly than is desirable in screwing drill stem together, marker indicator 16 may be bolted to the housing at the point to which it is desired that the hand 11 move, then as the tension on the pull line moves the hand 11 to a predetermined point relative to the indicia, the tension can then be immediately released, thereby insuring that all joints are tightened uniformly, and that they are sufficiently tight for the results desired, but that the threads will not be accidentally damaged or stripped by too much pull being applied to the joint.

The marker element 17 may be placed at the point opposite the point it is desired that the hand 11 indicate to show the pull that it is desired to be exerted on drill stem, so as to screw the drill stem together the required degrees of tightness without endangering the threads, and to give uniform joints. To further accentuate the visibility of the marker elements 16 and 17, these may be painted in colors to contrast from each other and from the housing.

An axial bolt 18 is fitted within head H and extends through spring 4, and out through an axial opening 19 which is formed within the end partition wall 5 of the housing. An eye 20 is threadably attached to the bolt 18, and the inner end of the eye has a cylindrical portion 21 that interfits within the cylindrical bore 22 of the cylindrical portion of the body 2, so as to guide the movement of the eye 20 relative to the cylindrical portion of the body. The eye 20 is held in locked position by means of a cotter key 23 which passes therethrough and through the bolt 18.

A clamp, comprising bars 24 and 25 and bolts 26, is secured to the bifurcations 8 by means of a pin 27 interengaging the bifurcated portions 8 at the rear end of the cylindrical body 2, and a pair of lugs 28 that interfit therebetween. The pin may be readily removed by the removal of cotter key 29, thereby leaving the clamp portions, comprising bars 24 and 25 and bolts 26, on the tong handle 30.

The tongs 31 that surround the pipe 32 may be of any conventional type, as the present device is adapted to be used with all types of tongs, or on any other device where an instant visual indication of the pull being exerted on a line is required, which indication is in alignment with

the line of pull of the tensiometer, and thus is readily available to the operator.

Operation

In the operation of the device as described above, the clamp bars 24 and 25 are bolted in place by bolts 26 on the handle 30 of tong 31, which tong 31 is of the general character that tightens upon the pipe 32 upon pulling the handle 30. A pin 27 provides a quick and effective means of coupling the body of the tensiometer unit, generally designated by the numeral 1, with the clamp member on the tong handle, and at the same time the pin 27 serves as a vertical axis to permit the horizontal swinging movement of the tensiometer, so when a cable 33 is attached to the eye 20, and pulled, the tensiometer 1 will immediately align with the pull of the cable, regardless of the angularity of the handle 30 of the tong. The indicator hand 11 will swing around in such manner that the end of the hand will be readily visible to the operator of the pull line 33, to enable him to appraise the amount of pull being exerted on the line, so that the pull may be instantly released when it has reached a predetermined value, thereby obviating the necessity of an assistant to the operator for the purpose of watching an indicator, and passing such information to the operator. Such delay in relaying information, coupled with possibility of misinterpretation of the reading, a hazard could be created both to the workmen and to the pipe being operated upon. Furthermore, when the hand 11 is in alignment with the line of pull, the operator can closely observe the position of the tongs, the indicator, and the workmen, so that workmen may be warned from walking within the path of the tongs, and also observe the pull exerted on the line until the hand 11 is in alignment with the correct marker, either 16 or 17, whereupon the pull may be instantly released.

By having the portion 6 of the head H cylindrical and interfitting within cylindrical bore 3, and having a squared portion 7 of the head H abutting with the end portion 5 thereof, when the maximum pull is reached or exceeded, no undue strain beyond its elastic limit is transmitted to the spring 4, thereby preventing damage to the spring and to the indicator mechanism, regardless of the amount of pull exerted on the line 33.

The longitudinal movement of head H will cause the rounded portion of arm 10 to move forward, and due to the difference of ratios of length of the arm 10 and lever 11, the lever 11, which is the indicating hand, will be moved a greater distance so that the pull on the line 33 is readily translated into the proper indicia, such as thousands of pounds pull, or into such other units of calibration as might be desired.

While the invention has been illustrated and described in a preferred embodiment thereof, it is to be understood that changes may be made in the minor details of construction, without departing from the spirit of the invention as set forth in the appended claims.

Having thus described the invention, what is claimed is:

1. In a tensiometer for use with a pull line, a body having a cylindrical bore formed therein, a pair of ears secured to an end of said body, a complementary member having an ear thereon, said ears each having a transverse aperture formed therein, a pin fitted within said apertures of said ears for hingeably connecting said body and said complementary member, means for connecting said complementary member to the handle of a wrench, an apertured abutment at the other end of said body, a resilient member fitted within said cylindrical bore of said body and having one end thereof abutting with said apertured abutment, a bar having a head, which head has a cylindrical portion thereon adapted to complementarily fit within said cylindrical bore in said body in sliding relation therewith, said bar being telescoped through said resilient member and through said aperture in said abutment and projecting outward from said abutment, said

head having an enlarged portion adapted to abut with said body at an end of said cylindrical bore when in one position to limit the longitudinal movement of said bar, the inner side of said cylindrical portion of said head on said bar abutting with the end of said resilient member opposite said abutment, attachment means on said projecting end of said bar for attachment of a pull line thereto, and lever indicator means fitted within a notch formed in the head of said bar to indicate a relative unit of pull on the handle of said wrench by said pull line.

2. In a tensiometer for use with a pull line, a body having a cylindrical bore formed therein, a pair of parallel ears spaced apart and secured to an end of said body, a member having an ear thereon which ear is adapted to interfit with said pair of parallel ears, said ears each having a transverse aperture formed therein, a pin fitted within said apertures of said ears for hingeably connecting said body and said member, clamp means for connecting said member to the handle of a wrench, an apertured abutment at the other end of said body, a compressive spring member fitted within said cylindrical bore of said body and having one end thereof abutting with said apertured abutment, a bar having a head, which head has a cylindrical portion thereon, which cylindrical portion is adapted to complementarily fit within said cylindrical bore of said body in sliding relation therewith, a squared portion on said head which squared portion interfits in sliding relation between said parallel ears, a groove formed in a side of said squared head portion, said bar being telescoped through said resilient member and through said aperture in said abutment and projecting outward from said abutment with the head of said bar abutting with the end of said spring opposite said abutment, attachment means on said projecting end of said bar for attachment of a pull line thereto, and lever indicator means having an end portion thereof interfitting within said groove in said squared head portion so as to actuate said lever to indicate a relative unit of pull on the handle of said wrench by said pull line.

3. In a tensiometer for use with the pull line of a pipe tong, a body having a cylindrical bore formed therein and an open-ended hollow pocket formed on a side thereof, a pair of ears secured to an end of said body, a complementary member having a pair of ears thereon, said ears each having a transverse aperture formed therein, a pin fitted within said apertures of said ears for hingeably connecting said body and said complementary member, clamp means for connecting said complementary member to the handle of a pipe tong, an apertured abutment at the other end of said body, a resilient member fitted within said cylindrical bore of said body and having one end thereof abutting with said apertured abutment, a bar having a head, which head has a cylindrical portion thereon adapted to complementarily fit within said cylindrical bore in said body in sliding relation therewith, said bar being telescoped through said resilient member and through said aperture in said abutment and projecting outward from said abutment, said head having an enlarged portion adapted to abut with said body at an end of said cylindrical bore when in one position to limit the longitudinal movement of said bar, the inner side of said cylindrical portion of said head on said head abutting with the end of said resilient member opposite said abutment, attachment means on said projecting end of said bar for attachment of a pull line thereto, lever indicator means fitted within a notch formed in the head of said bar and protruding into said open end of said hollow pocket to indicate a relative unit of pull on the handle of said pipe tong, and attachable indicia means on said body at a side of said open-ended pocket to present visual reading in alignment with the line of pull of said pull line.

4. In a tensiometer for use with the pull line of a pipe tong, a body having a cylindrical bore formed therein and an open-ended hollow pocket formed on a side thereof, a pair of ears secured to an end of said body, a comple-

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mentary member having a pair of ears thereon, said ears each having a transverse aperture formed therein, a pin fitted within said apertures of said ears for hingeably connecting said body and said complementary member, clamp means for connecting said complementary member to the handle of a pipe tong, an apertured abutment at the other end of said body, a resilient member fitted within said cylindrical bore of said body and having one end thereof abutting with said apertured abutment, a bar having a head, which head has a cylindrical portion thereon adapted to complementarily fit within said cylindrical bore in said body in sliding relation therewith, said bar being telescoped through said resilient member and through said aperture in said abutment and projecting outward from said abutment, said head having an enlarged portion adapted to abut said body at an end of said cylindrical bore when in one position to limit the longitudinal movement of said bar, the inner side of said cylindrical portion of said head on said bar abutting with the end of said resilient member opposite said

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abutment, attachment means on said projecting end of said bar for attachment of a pull line thereto, lever indicator means fitted within a notch formed in the head of said bar and protruding into said open end of said hollow pocket to indicate a relative unit of pull on the handle of said pipe tong, the open end of said hollow pocket facing in the general direction of the line of pull, and indicia means adjacent said open end whereby the indicator means can be read in the line of pull of said pull line.

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