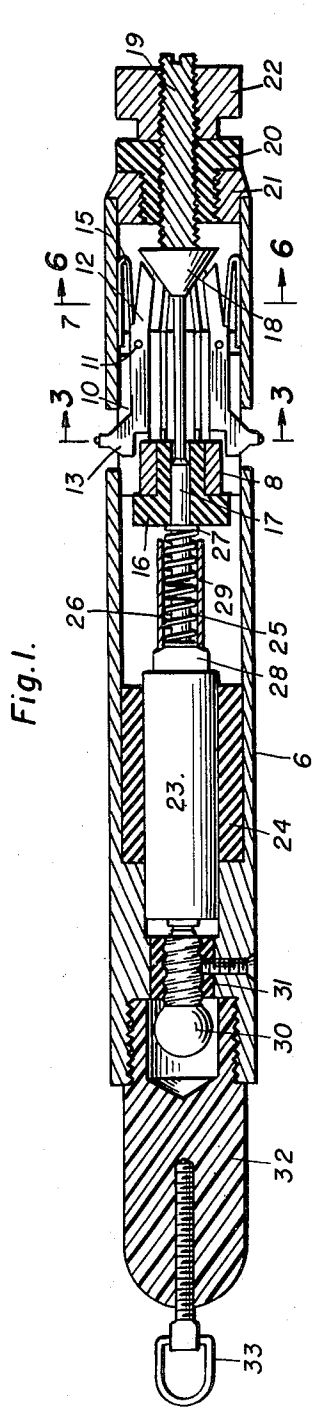
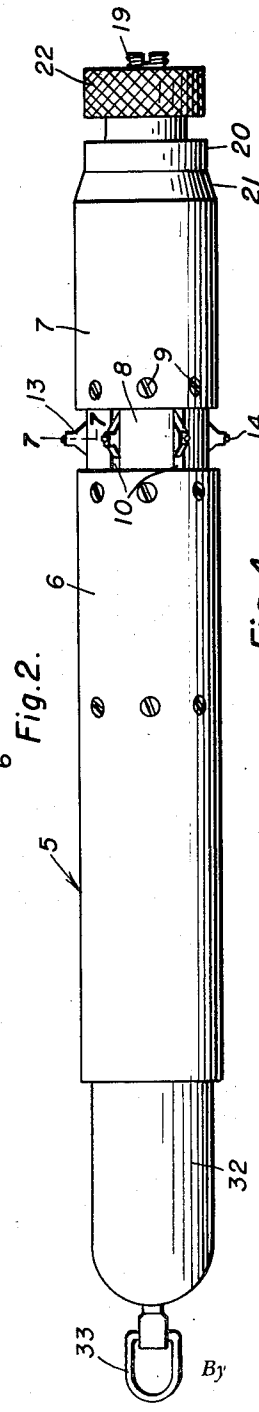
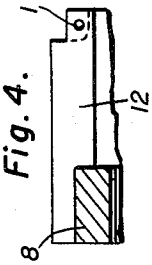
Aug. 7, 1951 A. L. DALE 2,563,216

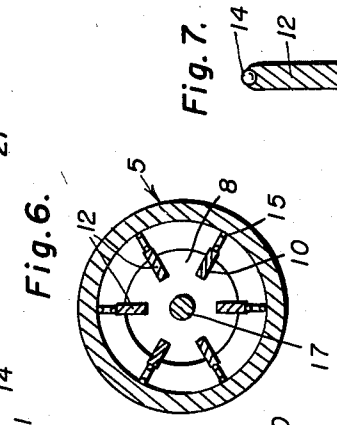
BOILER TUBE GAUGE

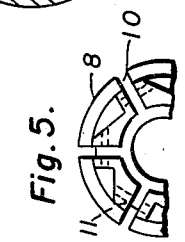
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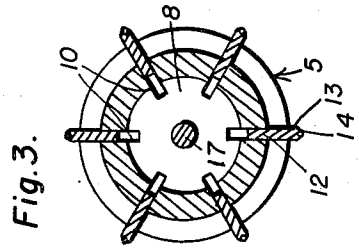












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BOILER TUBE GAUGE

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Application May 27, 1947, Serial No. 750,730

2 Claims. (Cl. 33—178)

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The present invention relates to new and useful improvements in boiler tube gages to check defects or weak spots in the tubes.

The invention is designed particularly for use with fire tube boilers of a catalytic cracking unit in refineries wherein the tubes are of considerable length and generally inaccessible for inspection. The high velocity, hot abrasive catalyst has a tendency to create a cyclone action in the tube which reduces the thickness of the walls of the tube in pockets and the invention has for an important object to locate such defects in the tube before a break therein occurs.

A further object is to provide a testing device or gage which may be drawn through a tube and embodying electric signalling means to indicate a spot in the tube where a defect therein has occurred.

Another object is to provide a tube testing device having self-contained electric signalling means therein.

Another object is to provide a device of this character of simple and practical construction, which is efficient and reliable in operation, relatively inexpensive to manufacture and otherwise well adapted for the purpose for which the same is intended.

Other objects and advantages reside in the details of construction and operation as more fully hereinafter described and claimed, reference being had to the accompanying drawings forming part hereof, wherein like numerals refer to like parts throughout, and in which:

Figure 1 is a longitudinal sectional view;

Figure 2 is a side elevational view;

Figure 3 is an enlarged transverse sectional view taken on a line 3—3 of Figure 1;

Figure 4 is a fragmentary longitudinal sectional view of the connector of the upper and lower ends of the barrel;

Figure 5 is a fragmentary end elevational view thereof;

Figure 6 is an enlarged transverse sectional view taken on a line 6—6 of Figure 1; and

Figure 7 is an enlarged fragmentary sectional view of one of the pivoted gage arms showing the anti-friction ball carried thereby.

Referring now to the drawing in detail, wherein, for the purpose of illustration, I have disclosed a preferred embodiment of my invention, the numeral 5 designates a barrel composed of upper and lower sections 6 and 7, respectively, connected to each other in longitudinally spaced relation by a cylindrical connector 8 having its ends inserted in the adjacent ends of the sections of the barrel and secured thereto by screws 9.

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The connector 8 is formed with a plurality of longitudinally extending slots 10 provided with transverse pins 11 and on which arms 12 are pivoted, the arms extending longitudinally in the barrel and provided with a laterally projecting head 13 positioned between the adjacent ends of the barrel sections and working radially of the barrel.

The outer edge of the head 13 has a ball 14 peened for free rotation therein to provide anti-friction contact with the interior of a tube when the barrel is drawn therethrough. A wire spring 15 is positioned in the lower section 7 of the barrel against the lower end of the arm to project the head 13 outwardly against the wall of the tube.

A flanged bushing 16 of insulation material is inserted in the upper end of the connector 8 in which a lower conductor rod 17 is slidably adjusted, the lower end of the rod having a conical head 18 in position for contact by the lower ends of the arms 12. The rod 17 and head 18 are adjusted longitudinally in the barrel by a set screw 19 threaded longitudinally in a lower plug 20 secured in the lower end of the barrel section 7 by an insulation sleeve 21. A lock nut 22 secures the screw 19 in adjusted position.

A conventional flashlight battery 23 is supported in the upper section 6 of the barrel by an insulation sleeve 24 and the base of the battery is engaged by an upper conductor rod 25 under spring tension by a coil spring 26 surrounding the adjacent ends of rods 17 and 25 between a flange 27 on the lower rod and a head 28 on the upper rod and enclosed in a guide sleeve 29 to hold the rods rigidly alined longitudinally.

The upper end of the battery contacts the base of a lamp 30 mounted in a socket 31 in the upper barrel section and the lamp is enclosed in the lower end of a Lucite cap 32 secured in the upper end of the barrel. A ring or bail 33 is attached to the cap 32 and to which a steel measuring tape (not shown) may be attached for raising or lowering the barrel in a boiler tube to be tested.

In the operation of the device, the heads 13 of arms 12 are projected radially outwardly of the barrel by the springs so that the anti-friction balls ride against the inside of a boiler tube. The conical head is adjusted to normally maintain the inner lower ends of the arms 12 spaced from the head whereby the circuit for the lamp remains open when the barrel passes through a tube of uniform predetermined internal diameter. When the balls encounter internal depressions or pockets in the tube caused by wear in

the walls thereof, the outward radial movement of the heads of the arms 12, when entering such depressions, will permit springs to move the lower ends of the arms into contact with the conical head and thus close the circuit to energize the lamp to indicate a defect in the tube.

The use of a measuring tape in raising or lowering the barrel in the tube will indicate the position of the defect.

In view of the foregoing description taken in conjunction with the accompanying drawings, it is believed that a clear understanding of the device will be quite apparent to those skilled in this art. A more detailed description is accordingly deemed unnecessary.

It is to be understood, however, that even though there is herein shown and described a preferred embodiment of the invention, the same is susceptible to certain changes fully comprehended by the spirit of the invention as herein described and within the scope of the appended claims.

Having described the invention, what is claimed as new is:

1. A boiler tube testing device comprising a barrel, a plurality of spring-biased gage arms pivoted in the barrel and having one end projecting radially outwardly of the barrel for travelling along the bore of a tube, a self-contained electric signal in the barrel, and switch means for said signal of which said arms are a part for closing a circuit with said signal upon a predetermined outward movement of said arms, said switch means including a cone-shaped contact slidably mounted in the barrel, and adjusting means carried at an adjacent end of the barrel for moving the cone-shaped contact relative to the inner ends of the arms to regulate the closing movement of the switch.

2. A boiler tube testing device comprising a barrel, a lamp in one end of the barrel, a battery in the barrel having one end contacting the base of the lamp, a spring-biased extensible conductor contacting the other end of the battery and having a conical head, a plurality of spring-biased gage arms pivoted in the barrel with one end projecting radially outwardly of the barrel to travel along the bore of a tube, the inner ends of said arms having circuit closing engagement with said head upon a predetermined outward movement of said arms, and adjusting means for said conductor to regulate the circuit closing movement of the arms with the head.

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