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METHOD AND MACHINE FOR TESTING SHELL CASES.

APPLICATION FILED JULY 5, 1918.

1,334,785. Patented Mar. 23, 1920.

Fig. 2.

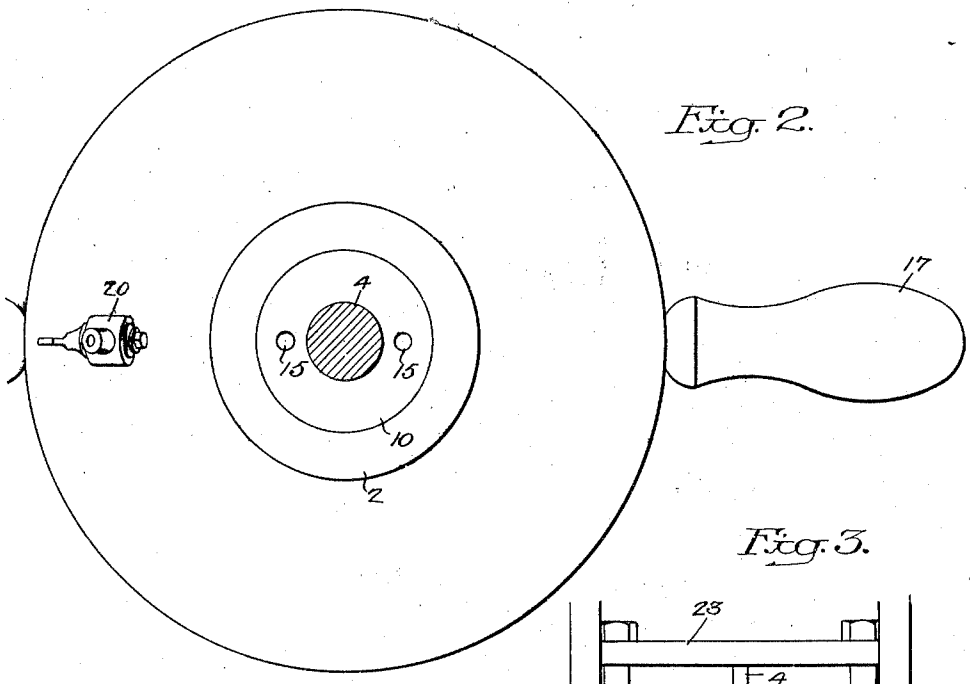


Fig. 3.

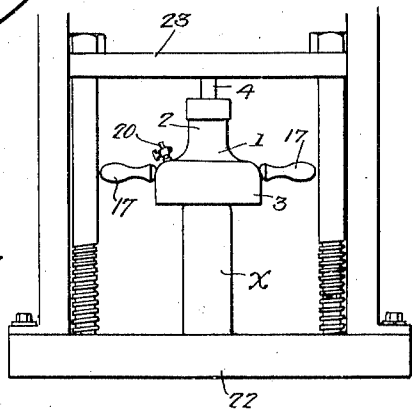


Fig. 1.

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METHOD AND MACHINE FOR TESTING SHELL-CASES.

1,334,785. Specification of Letters Patent. Patented Mar. 23, 1920.

Application filed July 5, 1918. Serial No. 243,439.

To all whom it may concern:

Be it known that I, THORSTEN Y. OLSEN, a citizen of the United States, residing in Philadelphia, Pennsylvania, have invented Methods and Machines for Testing Shell-Cases, of which the following is a specification.

One object of this invention is to provide a novel method of confining liquid in hollow structures such as shrapnel cases or shells while subjecting them to a predetermined hydraulic test pressure, whereby it shall be possible to quickly and conveniently apply such test without necessitating the use of heavy and costly apparatus.

It is further desired to provide a relatively simple device for applying a testing pressure to a shrapnel case or shell, which shall include novel means for sealing the latter so as to prevent leakage of the liquid therefrom under operating conditions.

Another object of the invention is to provide a self-contained, simple and conveniently applied device for retaining liquid under pressure in a shell while this is being tested;—the arrangement of parts being such as to permit of said device being quickly applied to and removed from the shell.

These objects and other advantageous ends I attain as hereinafter set forth, reference being had to the accompanying drawings, in which,

Figure 1 is a vertical longitudinal section of the apparatus constituting my invention;

Fig. 2 is a plan of the device shown in Fig. 1; and

Fig. 3 is an elevation showing my device under conditions of use.

In the above drawings 1 represents a head preferably made of a steel forging having a more or less elongated neck 2 and a laterally extended and usually circular base portion 3. Said neck has a central passage serving as a guideway for a pressure applying plunger 4 and the flat bottom face of the base 3 has a two-part annular recess concentric with said guideway. In the inner part of this recess is mounted a steel packing ring 5 preferably of approximately V-shaped section, designed to coact with a cup packing 6 of leather held in the cavity by an annular steel packing nut 7 threaded into its outer portion.

The steel packing ring 5 is at all times pressed toward the leather ring 6 by a suitable number of coil springs 8 mounted in recesses formed in the base structure 3, and the cup packing 6 and the packing nut 7 are internally curved to fit the curved point of the shell or shrapnel casing x which it is desired to test. The head structure is extended within the packing cavity of the base concentrically with the plunger 4 to provide an externally threaded boss 21 designed to screw into the open end of the shell x which is internally threaded to receive the fuse cap or timing mechanism.

The upper end of the neck 2 is provided with a packing to prevent leakage between the plunger 4 and the walls of the passage in which it operates, and for this purpose it is recessed concentrically with the guideway. In said recess there is threaded an annular packing nut 10 for retaining a cup packing 11 of leather and a packing ring 12 of approximately V-shaped section, for spreading its walls, there being a series of coil springs 13 operative on said packing ring to force it toward the leather packing.

The packing nuts 7 and 10 are provided with holes 14 and 15 in their outer faces respectively, for the reception of a spanner wrench whereby they may be set up or removed at will and the base portion 3 of the head has any desired or suitable number of radial recesses or holes 16 for the reception of handles 17 which are preferably permanently fixed therein.

The packing recess in the base portion 3 is deepest at its outermost portion and has leading from it to the external surface of the cap an upwardly extending passage 19 in whose outer end is mounted a valve or pet cock 20.

Under conditions of use the shell or shrapnel case to be tested is filled with water or other suitable liquid and the head is placed thereon, being then turned to cause its boss 21 to enter the correspondingly threaded open end of said shell. The rotation of the head is continued until the packing nut 7 engages the curved nose of the shell which is then closely engaged by the inner side of the cup leather 7 under the action of the springs 8 transmitted through the packing ring 5. The shell with the head is now placed upon the table 22 of any of the well known forms of compression testing machines and the head 23 of such machine, is caused to act upon the plunger 4 to move it downwardly

in the guideway of the head into the liquid in the shell. The pet cock 20 being opened, this movement of said plunger forces some of the water out of the shell case through a passage 25 in the boss 21 so that it enters the annular space above and around the packing ring 5, forcing the air therein out through said pet cock. When the air has been entirely displaced, as is shown by the escape of water from the pet cock, the latter is closed and the pressure on the plunger 4 is continued until it exerts the required pressure upon the liquid in the shell case and hence upon the walls of the latter as indicated by the well known weighing mechanism (not shown) associated with the movable head 23 of the machine.

As will be understood by those skilled in the art, there can be no leakage of the liquid either between the shell case x and the packing nut 7 or between the latter and the base portion of the head 1, since as the pressure in the space surrounding the packing ring 5 increases, the liquid acts on the sides of the leather packing 6, forcing these against the curved surface of the end of the shell case and against the interior wall of the packing recess respectively.

After the testing pressure has been maintained within the shell casing for the desired time, the head 23 of the testing machine is raised sufficiently to permit withdrawal of the head 1 and the shell case, after which said head is removed from the case by being unscrewed. Obviously while pressure is being exerted on the liquid in the shell casing, said liquid is prevented from escaping along the plunger through the neck 2 by the leather packing ring 11 which acts in the same manner as characterizes the ring 6.

It will be particularly noted that not only is the above described apparatus relatively simple, accurate and substantial in construction, but it is self-contained in that it acts automatically to seal the joint between itself and the shell casing without requiring the usual special and costly machinery hitherto employed to retain the liquid in the shell, and may be employed in connection with any form of testing machine capable of giving an indication of the pressure exerted upon the plunger 4.

It will be further noted that the device is of such a nature as to be quickly applied to and removed from a shell case, and by reason of the construction employed, is relatively light and easily handled.

I claim:

1. A device for testing shell cases consisting of a structure threaded to screw into the open end of a shell case; and a member operative through said structure for applying pressure to liquid in said case.

2. A device for testing shell cases consisting of a structure threaded to screw into the open end of a shell case; and means carried by said structure for applying pressure to liquid in said case; with packing actuated by fluid under pressure from within the case and positioned to form a liquid tight joint between the latter and said threaded structure.

3. A device for testing shell cases consisting of a structure threaded to screw into the open end of a shell case; and a plunger slidable in the structure for applying pressure to the liquid in the shell case.

4. A device for testing shell cases consisting of a structure threaded to screw into the open end of a shell case; and a plunger slidable in the structure for applying pressure to the liquid in the shell case; with two sets of packing carried by the threaded structure for making liquid tight joints between it, the plunger and the shell case respectively.

5. The combination of a head having a recess for the reception of the open end of a shell case and including a threaded boss formed to screw into said end, said boss having a passage opening into the recess; means for exerting a testing pressure on a body of liquid in the shell case and in said recess; and packing mounted in the recess in position to be forced by the liquid therein into liquid tight engagement with the shell case.

6. The combination of a head having a recess for the reception of the open end of a shell case and including a threaded boss formed to screw into said end; a plunger movable through said boss into the shell case screwed thereon; and packing in the recess mounted to be acted on by liquid under pressure from the shell case to form a liquid tight joint between the head and said shell case.

7. The combination of a head having a plunger slidably guided therein and including a structure for holding it in a shell case; with packing mounted in a recess of said head in position to be acted on by liquid under pressure from the shell case to make a liquid tight joint between the head and the shell case.

8. The combination of a head including base and neck portions of which the former is provided with a recess for the reception of the end of a shell case to be tested and includes a threaded boss having a passage communicating with said recess; a plunger slidable through the neck and the threaded boss of the head; and packing in the recess placed to be acted on by liquid from the shell case delivered through the passage in the boss, to form a liquid-tight joint between the head and said shell case.

9. The combination of a head having a recess and a threaded boss for the reception of the end of a shell case, the latter being in

communication with said recess; an annular body of cup packing in said recess; a nut formed to hold said packing in place; a spring actuated ring for pressing apart the sides of the cup packing; with a plunger slidably mounted in the head for exerting pressure on a body of liquid in the shell case and in the recess.

10. The combination of a head having a recess and including means whereby it is held to a shell case against the action of liquid under pressure therein; a body of cup packing in the recess exposed to the action of the liquid under pressure in the shell case; and a plunger positioned to enter the open end of the shell case engaged by said packing for exerting a testing pressure on a body of liquid in said case.

11. The combination of a head having a passage therethrough and formed with a threaded boss and a recess at one end of said passage; a plunger slidable in said passage; a body of packing at one end of the head for preventing leakage between the plunger and said head; with a second body of packing in the recess exposed to liquid under pressure in a shell case threaded onto said boss and positioned to prevent leakage of said liquid between the head and the shell case.

12. The combination of a head having a passage therethrough and formed with a threaded boss and a recess at one end of said passage; a plunger slidable in said passage; a body of packing at one end of the head for preventing leakage between the plunger and said head; a second body of packing in the recess exposed to liquid under pressure in a shell case threaded onto said boss and positioned to prevent leakage of said liquid between the head and the shell case; and an air relief valve communicating with said recess.

13. The combination of a head; including means engaging and holding it to the pointed end of a shell case under test; means for exerting pressure on a body of liquid in the shell case; with a body of packing actuated by pressure of the testing liquid, for maintaining a liquid tight joint between the shell case and the head.

14. The combination of a head having a boss threaded to screw into the open end of a shell to be tested and formed with a recess around said boss; a handle for turning said head; a body for packing in the recess placed to engage the external curved end of a shell screwed onto the boss and exposed to the action of liquid under pressure in the shell case; with means for exerting a testing pressure on a body of liquid in the shell case and in said recess.

In witness whereof I affix my signature.

THORSTEN Y. OLSEN.