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DEVICE FOR GENERATING HIGH PRESSURE.

APPLICATION FILED JAN. 30, 1918.

1,419,844. Patented June 13, 1922.

Fig. 1.

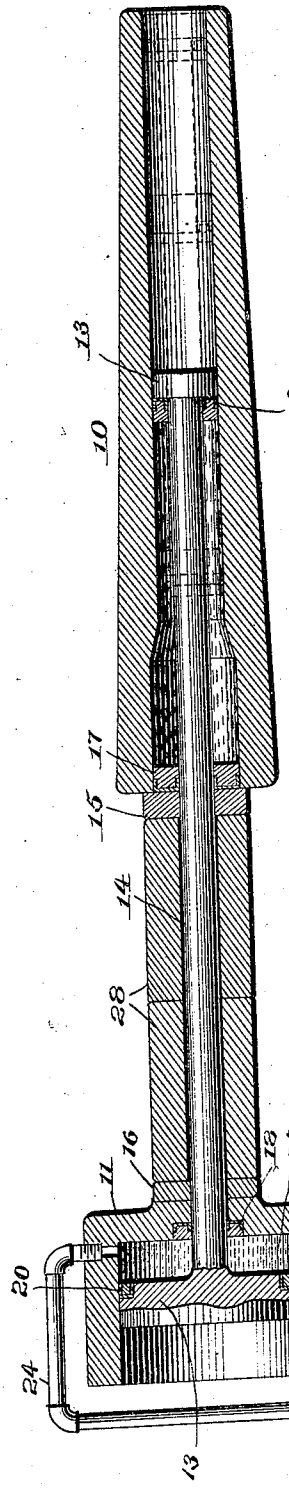
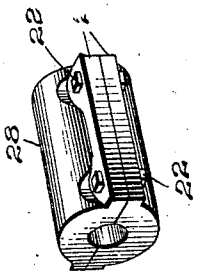


Fig. 2.



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DEVICE FOR GENERATING HIGH PRESSURE.

1,419,844. Specification of Letters Patent. Patented June 13, 1922.

Application filed January 30, 1918. Serial No. 274,134.

(FILED UNDER THE ACT OF MARCH 3, 1883, 22 STAT. L., 625.)

To all whom it may concern:

Be it known that I, ALBERT E. GUY, major, Ordnance Dept., U. S. A., a citizen of the United States, stationed at Washington, D. C., have invented an Improvement in Device for Generating High Pressure, of which the following is a specification.

The invention described herein may be used by the Government, or any of its officers or employees in prosecution of work for the Government, or by any other person in the United States, without payment of any royalty thereon.

This invention relates to a method of generating high pressure in tubes, involving the application of the laws of expansion of fluids or solids under change of temperature, and by suitable apparatus applying the result to generate high pressure within the tube.

The invention is useful in treating the inner walls of a tube to increase their resistance to internal pressure, and is particularly adapted for use in the treatment of gun tubes, which must withstand high internal pressure each time a shot is fired.

This method is useful in fitting linings in cylinders, tubes or the like, and especially for relining gun tubes, and is adapted for use in connection with the process of treating tubes by pressure described in my application S. N. 258,652, filed October 17, 1918.

This method is especially useful in the treatment of a gun tube, where pressure of different intensity is to be applied to different parts of the gun, to set up the required resistance to meet the various pressures throughout the gun, when fired.

The objects of the invention being to provide for rapid and easy operation, low cost and adaptability to a variety of conditions of manufacture and use and consists in the method and apparatus hereinafter described and claimed.

Similar numerals indicate corresponding parts of the drawings in which is shown a preferred means and mode of applying the invention to a gun tube.

Fig. 1 is a longitudinal section of a gun tube, wherein a liner is to be secured by an application of this method; and

Fig. 2 is a detail view of one of the spacers.

The gun forging is indicated at 10 and may be rough turned or forged to about its final dimensions on the exterior, the interior being left slightly smaller than the finished size.

In axial alinement with the gun tube 10 is a cylinder 11, preferably of considerably larger diameter than the tube, and spaced therefrom, as desired, in applying pressure at different parts of the tube.

A piston 12 is mounted for movement in the gun tube and a piston 13 is mounted in the cylinder 11. A piston rod 14 connects the pistons 12 and 13 and the space between the cylinder and the gun tube is filled in by more or less spacers as the application of the method is to be applied to one part or another of the gun tube.

Washers 15 and 16 are arranged at the end of the gun and cylinder respectively. A packing 17 seals the end of the gun tube and packing 18 seals the end of the cylinder through which the piston bar operates. Packing 19 is provided in piston 12 and packing 20 in the piston 13.

The spacers 28 may be any length and of any preferred number to provide for the application of this method to the portion of the gun tube desired, said spacers must be so constructed as to enable their adjustment in place between the gun tube washer 15 and the cylinder washer 16 without disassembling the parts, and may be constructed as shown in sections provided with connecting ears 21 secured together by bolts 22.

The normal position of the piston 13 in cylinder 11 provides a space 23 between the piston and the end of the cylinder, said space is filled with any suitable substance having preferably a high coefficient of expansion.

The temperature changing means may be of any preferred form, but for purposes of illustration a circulating apparatus is shown consisting of tube 24 connected at its ends with the chamber; and provided with the coil 25 enclosed within the heater 26. The space 23 and tube 24 are filled with the substance above referred to and when heated, expands and increases the distance between the end of the cylinder and the piston and moves the piston rod 14 in the direction of the arrow.

The space between the piston 12 and the washer 17 is filled by a fluid which, when the distance between the piston and washer is diminished, exerts pressure on the interior of the tube.

If different portions of the tube 10 are

to be subjected to different internal pressures it will be clear by reference to Fig. 1 that the full line position of the parts, show them when pressure is to be applied to the breach portion of the gun tube or that portion nearest the cylinder. By inserting the spacers of the number and length shown the piston 12 will be located near the breach end of the tube, and the pressure will be applied only between the piston and the washer, or sealing member.

If a pressure of different intensity is to be applied to the central portion of the tube, one of the spacers 28 is removed, thus permitting the piston rod 14 to extend further into the gun tube and therefore place the piston 12 in the position shown in dots at 27, and when the space between it and the washer 15 is filled, and the substance in chamber 23 expanded, the pressure will under these conditions be applied to the tube between said dotted line position 27 and the seal.

By this method it will be clear that pressure of various intensities may be applied to the same or different portions of the interior of a tube by sealing the adjacent ends of the tube and cylinder, inserting the number of spacers between the tube and cylinder to bring the portion of the tube that it is desired to be treated between its piston and seal, filling the space between the piston and seal with a fluid, and expanding the contents of the cylinder.

It may be here noted that with the above construction, should there be any leakage in the seal or piston, of the gun tube, it will be compensated for by continuing the raising of the temperature in the cylinder.

Having thus fully described my invention what I claim as new and desire to secure by Letters Patent of the United States is:

1. A device for applying pressure to the interior of tubes consisting of a cylinder mounted in axial alinement with the tube, sealing walls in the adjacent ends of the tube and the cylinder, pistons mounted in the tube and cylinder, a connecting rod between the pistons, fluid fillers between the pistons and the sealed ends of the tube and cylinder, and means for changing the temperature of the contents of the cylinder.

2. A device for applying pressure to different portions of the interior of tubes consisting of a cylinder mounted in line with the tube, sealing walls in the adjacent ends of the tube and cylinder, spacers between the ends of the tube and the cylinder, pistons mounted in the tube and in the cylinder, a connecting rod between the pistons and the sealed ends of the tube and cylinder, and means for changing the temperature of the filler within the cylinder.

3. A device for applying pressure to the interior of a tube, including a cylinder mounted in axial alignment with the tube, sealing walls in the end of the tube and the adjacent end of the cylinder, pistons in the tube and the cylinder, a rigid connection between the pistons, spacers surrounding the rigid connection and separating the tube and the cylinder, a filler in the tube between the piston and the sealing wall, a filler in the cylinder between the piston and the sealing wall and circulating means for changing the temperature of the filler in the cylinder.

4. A device for applying variable pressures to the interior of tubes consisting of sealing walls mounted in the tube, one of said walls being adjustable, a fluid filler between the walls and variable pressure means for reducing the distance between the walls, after adjustment.

5. A device for applying variable pressures to different parts of the interior of tubes consisting of sealing walls mounted in the tube, one of said walls being adjustable, a fluid filler between the sealing walls and variable pressure means for forcing one of the sealing walls toward the other, after adjustment.

6. A device for applying pressure to the interior of tubes consisting of sealing walls mounted in the tube, one of said walls being adjustable, a fluid filler between the sealing walls, a cylinder in line with the tube, a piston in the cylinder, a connecting rod between the piston and the adjustable wall, a filler between the piston and the end of the cylinder and means for expanding the filler in the cylinder to actuate the piston and adjustable wall to compress the fluid in the tube.

7. A device for applying pressure to different portions of the interior of tubes consisting of sealing walls mounted in the tube, one of said walls being adjustable, a fluid filler between the sealing walls, a cylinder in line with the tube, a piston in the cylinder, a connecting rod between the piston and the adjustable sealing wall, a spacer between the cylinder and the tube, a filler between the piston and end of the cylinder and means for expanding the filler in the cylinder to actuate the piston and adjustable wall to compress the fluid in the tube.

ALBERT E. GUY.