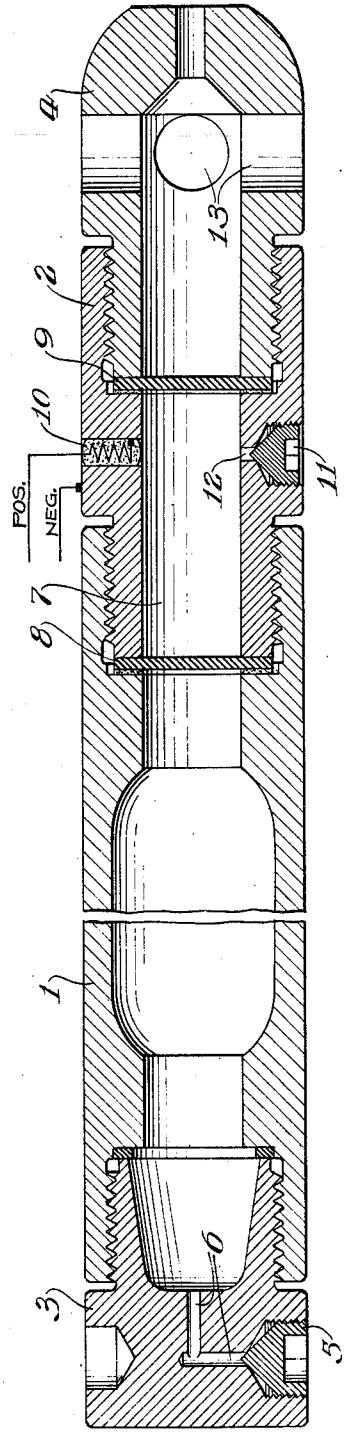
June 15, 1937. H. E. HAYWARD 2,083,709

BLASTING DEVICE

Filed July 22, 1933



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Patented June 15, 1937

2,083,709

UNITED STATES PATENT OFFICE

2,083,709

BLASTING DEVICE

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Application July 22, 1933, Serial No. 681,680

26 Claims. (Cl. 102—6)

This invention relates to an improved means for effecting the discharge of cartridges charged with high pressure air or other forms of potential energy at working pressures.

Referring to the drawing, the single figure is a view in longitudinal section illustrating a form of the invention.

The cartridge body proper is indicated at 1 and it will be observed that this body is internally threaded at its opposite ends for reception of an extension 2 and a terminal cap 3. The extension 2 is also internally threaded at one end for reception of a discharge cap 4. The terminal cap 3 is provided with a valve 5 and charging passages 6 whereby a charge of high pressure air or other gas may be introduced into the chamber formed in the main body 1 of the cartridge. Adjacent the end of the body 1 opposite the terminal cap there is formed a shoulder on which a disc 8 is designed to be sealed by means of a suitable gasket. Likewise, the extension 2 is provided with a shoulder adjacent to one of its ends on which a disc 9 is adapted to be sealed by means of a suitable gasket. Thus, the discs 8 and 9 form between them a chamber 7 separate and distinct from the main charge containing chamber formed in the body 1 of the cartridge. The extension 2 is also provided with a valve 11 and a charging passage 12 for the introduction of high pressure air or other medium. In the wall of the extension 2 there is provided a fusible plug 10 designed to be weakened or destroyed by the application of suitable electrical current thereto.

Assuming that it is desired to use in the cartridge described above a charge of compressed air at 10,000 pounds pressure, the first step in the charging of the cartridge would be to introduce into the chamber 7 through valve 11 and charging passage 12 a charge of compressed air at approximately 5,000 pounds pressure. The discs 8 and 9 should be of sufficient strength to withstand 5,000 pounds pressure but of insufficient strength to withstand a pressure of 10,000 pounds. After the chamber 7 has thus been charged, the main charge of 10,000 pounds air pressure may be introduced into the main chamber of the cartridge body 1 through valve 5 and charging passages 6. Thus, we have a condition under which the disc 8 is subjected to a pressure of 10,000 pounds per square inch on one side and to a pressure of 5,000 pounds per square inch on the opposite side. Disc 9, however, is subjected to 5,000 pounds pressure per square inch on one side and to atmospheric pressure on the opposite side. Under these conditions and bearing in mind that both discs 8 and 9 are calculated to withstand a pressure of 5,000 pounds per square inch, but to fail at a pressure of 10,000 pounds per square inch, it will be evident that if the pressure contained in chamber 7 is vented to the atmosphere the discs 8 and 9 will fail in rapid succession under the influence of the 10,000 pounds per square inch pressure in the main body of the cartridge. This result is achieved by passing current through the fusible plug 10, thereby causing it to blow out under the influence of the 5,000 pounds pressure in chamber 7.

It will be understood that the present disclosure relates primarily to the principles involved and that the details of construction, particularly as regards the fusible plug, may be widely varied.

I claim:

1. A blasting device comprising a substantially indestructible cartridge body having formed therein a chamber for the reception of high pressure air or other form of fluid possessing potential energy, a disc for sealing said chamber and normally confining the charge therein, means for uniformly subjecting the entire exposed outer surface of said disc to a fluid pressure sufficient to maintain it against shearing under the influence of the pressure exerted thereon from the main chamber of the cartridge, and means for releasing said fluid pressure acting on the outer surface of said disc.

2. A blasting cartridge consisting of a substantially indestructible body having formed therein a chamber adapted to receive a charge of material possessing potential energy, means for closing a discharge opening for said chamber, said means being normally incapable of withstanding the pressure exerted thereon at said opening by the charge of material possessing potential energy contained in said chamber, means for providing a counter-acting fluid pressure on said closure means and means for relieving said counter-acting fluid pressure.

3. A blasting cartridge comprising a substantially indestructible body having formed therein a chamber designed to receive a charge of material possessing potential energy at working pressure, a rupturable disc for closing said chamber, means associated with said body for forming an auxiliary chamber on the opposite side of said disc, means for introducing pressure into said auxiliary chamber and means for relieving said pressure.

4. A blasting device comprising a substantially indestructible cartridge having a chamber adapted to receive a charge of material possessing po-

tential energy at work performing pressure, controllable means for retaining said charge in said chamber including a body of fluid confined at a pressure greater than atmospheric pressure, and fusible means operable to effect a reduction in the pressure of said fluid to cause said retaining means to release said charge.

5. A blasting device comprising a substantially indestructible cartridge having a chamber adapted to receive a charge of material possessing potential energy at work performing pressure, charge confining fluid pressure controlled means for closing said chamber, said means held closed by a pressure distinct from the pressure in said chamber, and electrically operated means for relieving the holding pressure of said fluid pressure controlled means to bring about release of said charge.

6. A blasting device consisting of a substantially indestructible body having formed therein a chamber adapted to receive a charge of material possessing potential energy, means for closing said chamber, said means being normally incapable of withstanding the pressure exerted thereon by the charge of material possessing potential energy contained in said chamber, means associated with said body for forming an auxiliary chamber on the opposite side of said closure means, means for introducing pressure into said auxiliary chamber, and means for relieving the pressure in said auxiliary chamber.

7. A blasting device comprising a substantially indestructible container device having a chamber adapted to receive a work performing charge of material possessing potential energy, a pair of spaced rupturable discs carried by the container device for forming between the same a control chamber, means for introducing fluid under pressure into said auxiliary chamber to distribute the force of the charge of material possessing work performing potential energy between the two discs, and means for relieving the pressure from the auxiliary chamber to cause the charge of potential energy to rupture both of said discs.

8. In a blasting cartridge, a container for receiving a blasting charge, a member for confining the charge in said container, means for uniformly subjecting the entire exposed outer surface of said member to the action of fluid pressure sufficient to maintain said member against opening under the influence of the pressure of the blasting charge, and means for releasing said member from the action of said fluid pressure acting on the outer surface of said member to cause the pressure of the blasting charge to open said member.

9. A blasting cartridge, a container for receiving a blasting charge and having a discharge opening for the blast, means under the action of the blasting charge for closing said opening to confine the charge in said container, said means being normally incapable of withstanding the pressure exerted thereon by said charge at said opening, means for providing a sustaining fluid pressure on said closure means, and means for relieving said sustaining fluid pressure to cause the pressure of the blasting charge to open said closure means.

10. In a blasting cartridge, a container having a chamber for receiving a blasting charge, a valve for confining the blasting charge in said container, means associated with said container for providing an auxiliary chamber at the opposite side of said valve from said charge receiving chamber, means for introducing pressure into said auxiliary chamber, and means for relieving said pressure in said auxiliary chamber to cause the pressure of the blasting charge to open said valve.

11. In a blasting cartridge, a container for receiving a blasting charge, controllable means for confining said charge in said container including a body of fluid confined at a pressure greater than atmospheric pressure, and fusible means operable to effect a reduction in the pressure of said fluid body to cause said confining means to release said charge.

12. In a blasting cartridge, a container for receiving a blasting charge, fluid pressure controlled means for confining under the action of fluid pressure the blasting charge in said container, and electrically operated means for effecting actuation of said fluid pressure controlled means to effect release of the blasting charge.

13. In a blasting cartridge, a container for receiving a blasting charge, means for confining said charge in said container, said means being normally incapable of withstanding the pressure exerted thereon by the pressure of the blasting charge, means associated with said container for forming an auxiliary chamber on the opposite side of said confining means, means for introducing pressure into said auxiliary chamber, and means for relieving the pressure in said auxiliary chamber to cause the pressure of the blasting charge to open said confining means.

14. In a blasting cartridge, a container for receiving a blasting charge at blasting pressure, a head attached to the inner end of said container, a discharge cap attached to the inner end of said head, and means associated with said container, said head and said discharge cap for confining the charge in said container and for controllably releasing the blasting charge from said container including blasting pressure rupturable elements positioned respectively by said head and cap.

15. In a blasting cartridge, a container for receiving a blasting charge, a pair of spaced valves carried by the container for forming between the same a control chamber, means for introducing fluid under pressure into said control chamber to distribute the force of the blasting charge between the two valves, and means for relieving the pressure from the control chamber to cause the pressure of the blasting charge to open both of said valves.

16. In a blasting cartridge, a container for receiving a blasting charge at different blasting pressures below a predetermined maximum pressure and having a discharge orifice, controllable means for said orifice and located at the discharge end of the cartridge for confining a blasting charge in said container including a body of fluid confined at a pressure greater than atmospheric pressure, and means operable to effect a reduction in the pressure of said fluid to cause said confining means to release the blasting charge regardless of the pressure in said container above a predetermined minimum pressure.

17. In a blasting cartridge, a container for receiving a blasting charge, a valve for confining the charge in said container and operable to release the charge by the pressure of the charge bearing directly thereagainst, means for directly subjecting said valve to the action of fluid pressure to counteract said blasting charge for maintaining said valve closed, and means for effecting a reduction in the pressure of the fluid to

cause the pressure of the blasting charge to open said valve.

18. A blasting device comprising a substantially indestructible cartridge having a chamber to receive a charge of material possessing potential energy at work performing pressure, closure means for said chamber for retaining said charge therein, fluid pressure controlled means acting on said closure means for maintaining the latter closed, and electrically operated means located exteriorly of said charge receiving chamber for rendering said fluid pressure controlled means ineffective to hold said closure means closed.

19. In a blasting cartridge, a container for receiving a blasting charge, a head attached to the inner end of said container, a discharge cap attached to the inner end of said head and having a discharge orifice through which the blasting charge is discharged from the container, and means associated with said container, said head and said discharge cap for confining the charge in said container and for controllably releasing the blasting charge from said container through said discharge cap orifice including blasting pressure release elements positioned respectively by said head and cap.

20. In a blasting cartridge, a container for receiving a blasting charge at different predetermined blasting pressures between a maximum blasting pressure and a minimum blasting pressure, fluid pressure controlled means at the discharge end of the cartridge for confining the blasting charge in said container and including a separate body of control fluid, and means under remote control and at the discharge end of the cartridge for effecting actuation of said fluid pressure controlled means by liberating said separate body of control fluid to effect release of the blasting charge regardless of the particular blasting pressure in the container between said predetermined maximum and minimum pressures.

21. A blasting device comprising a cartridge having a chamber adapted to receive a blasting charge at work performing pressure, differential fluid pressure operated discharge means for controllably releasing said charge from said chamber including operation initiating means fusible at a temperature less than the fusing temperature of the remainder of said discharge means, and means for effecting fusing of said fusible means.

22. A blasting device comprising a cartridge having a chamber adapted to receive a blasting charge at work performing pressure, means located entirely beyond one end of the chamber for normally confining said charge in and controllably releasing the charge from said chamber including an operation initiating element fusible at a temperature less than the fusing temperature of the remainder of said means, and means under remote control for effecting fusing of said fusible element.

23. In a blasting cartridge, a plurality of chambers to receive separate charges of a gaseous blasting medium at different high pressures, means for discharging the charge from one of said chambers, and means responsive to the discharging of the charge from said one chamber for effecting discharge of the charge from the remaining chamber to the material to be blasted through said one chamber.

24. In a blasting cartridge, a container for receiving a charge at blasting pressure, a control chamber for receiving a charge at a pressure less than that of said container charge but above atmospheric pressure, means for separately charging said container and said control chamber, means for effecting discharge of the charge from the control chamber, and means responsive to the drop in pressure in the control chamber for effecting discharge of the blasting charge from the container to the material to be blasted through the control chamber.

25. A blasting device comprising a re-usable indestructible cartridge having a chamber adapted to receive a charge of fluid possessing potential energy at work performing pressure, a tubular extension connected to one end of said cartridge, a discharge cap connected to the outer end of the extension, fluid pressure operated means for sealing the charge receiving chamber from the interior of the extension, fluid pressure operated means for sealing the interior of the extension from the interior of the discharge cap, both of said fluid pressure operating means cooperating to retain the potential energy charge in its chamber, and means associated with the extension for creating a fluid pressure condition therein which will effect operation of both of said fluid pressure operated means to release the potential energy charge through said discharge cap.

26. In a blasting cartridge, a container for receiving a charge at blasting pressure and having a discharge opening, a control chamber for receiving a separate charge at high pressure and connected to the container to communicate therewith through its discharge opening, said control chamber having a discharge opening at its outer end, a discharge cap connected to the control chamber to communicate therewith through its discharge opening, means for venting the charge from the control chamber and release means for controlling both of said discharge openings operable upon venting of the charge from the control chamber for releasing the blasting charge through the discharge cap.

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