

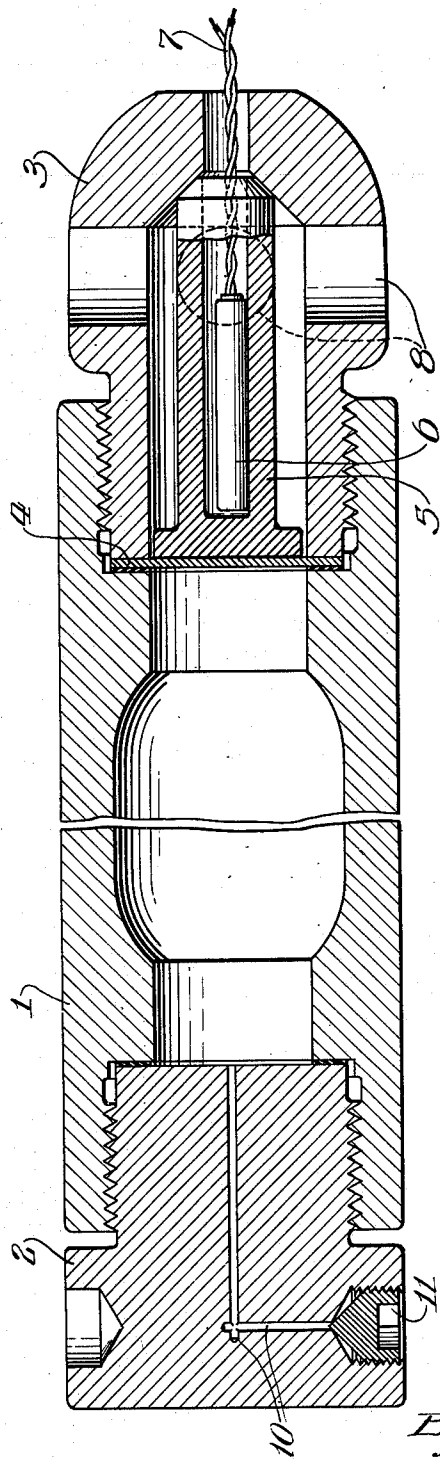
Dec. 1, 1936.

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2,062,912

BLASTING CARTRIDGE

Filed May 1, 1933



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UNITED STATES PATENT OFFICE

2,062,912

BLASTING CARTRIDGE

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Application May 1, 1933, Serial No. 668,869

20 Claims. (Cl. 102—7)

This invention relates to improved method and apparatus for the blasting of coal by means of compressed air or other gas.

The principal object of the invention is to improve the discharge mechanism of such a blasting device.

Referring to the drawing, the single figure is a view in longitudinal section through a complete cartridge of the type under consideration and embodying a preferred form of the present invention.

In the method of blasting under consideration, compressed air or other gases may be introduced into a reusable cartridge or container at what may be termed the working pressure. By this is meant pressures at which the charge of compressed air or other gas will be capable of performing useful work when liberated.

The particular construction shown consists of a tubular cartridge 1 having end caps 2 and 3 and a closure disc 4 designed to seal the discharge opening of the cartridge. Both the caps 2 and 3 have sealing engagement with the cartridge 1 so as to confine the charge of compressed air until such time as release thereof is desired. The charge of compressed air or other gas may be introduced into the cartridge by means of a valve 11 and charging ports 10 provided in the cap member 2.

The pressures contemplated for coal mining and work of a similar nature range from 6,000 to 10,000 pounds per square inch. The disc 4 is so designed as to be incapable of sustaining or supporting pressures of this magnitude, and it is therefore necessary to provide an auxiliary support for the disc to prevent rupturing thereof until discharge is desired. In the present instance this auxiliary support takes the form of a tubular post 5 which may be made of cast iron or any readily destructible or shatterable material having reasonably high compressive strength values. This post 5 seats at one end on the internal end wall of the discharge cap 3 and at its other end has a slightly broadened base for supporting engagement with the disc 4. Thus, it will be seen that by destroying the post 5 the reinforcement of disc 4 is removed and this disc will promptly fail under the influence of the high pressure charge contained within the cartridge, the discharge gases then passing outwardly through the several radial ports 8 of the discharge cap 3, and into the surrounding material to be broken down.

By way of illustrating one practical method of removing the reinforcement of the disc 4, there has been shown a detonator 6 positioned within a bore provided in post 5 with the usual current carrying wires 7 extending out through the end of the discharge cap 3 for connection to an ordinary firing cable. Upon the application of current to the wires 7 the detonator is discharged, result-

ing in a rather complete shattering of the post 5. This is immediately followed by rupture of the disc 4, thus liberating the normally confined charge of gas. It will be understood that the disc 4 may be made of metal, fibre or other suitable material.

Thus, there is provided an entirely practical and reliable means for suddenly liberating a confined charge of gas at working pressure. It should be understood, however, that the principles involved herein may be practiced by a variety of devices differing in physical form from that herein shown.

I claim:

1. A material breaking device comprising a reusable steel cartridge having a chamber designed to receive a quantity of gas at working pressure, a closure element associated with said cartridge for normally confining the charge of gas but being incapable in itself of withstanding the pressure of said charge, a shatterable member of less structural strength than said cartridge for normally providing support for said closure element, thereby enabling it to withstand said pressure, and means distinct from the pressure in said chamber for causing shattering of said member.

2. A reusable blasting cartridge having a discharge opening in combination with a closure element for the discharge opening of said cartridge, which closure element is of insufficient strength in itself to withstand the pressure of the charge employed within the cartridge, an element destructible by a force less than that which would destroy said cartridge, designed to support said closure element and electrical means for causing destruction of said destructible element.

3. A blasting cartridge comprising a steel body having a gas chamber therein and a discharge opening leading to the exterior of said cartridge, a rupturable closure member for said discharge opening, means for supporting said closure member to prevent rupture thereof, and means in addition to the charge in said chamber for rupturing said supporting means to permit the closure member to rupture under the influence of the pressure of a charge of compressed gas contained within said cartridge.

4. A blasting cartridge having a discharge opening, a rupturable disc for normally closing said opening, a supporting member having engagement with said disc for normally preventing the rupture thereof and a detonator for destroying said supporting member.

5. A material blasting device comprising a container capable of holding a charge of compressed gas at work performing pressure and having a discharge opening, closure means for said opening capable of holding a charge of desired pressure against liberation through said opening, and means in addition to the pressure of the

charge in said container and having embodied therein a detonator for causing failure of said closure means to effect liberation of a charge.

6. A material blasting device comprising a container capable of holding a charge of compressed gas at work performing pressure and having a discharge opening, closure means for said opening capable of holding a charge of desired pressure against liberation through said opening, and electrically actuated means in addition to the pressure of the blasting charge and effective independently of such pressure and associated with said closure means for causing destruction of the entire closure means to effect liberation of a charge.

7. A material blasting device comprising a container capable of holding a charge of compressed gas at work performing pressure and having a discharge opening, closure means for said opening capable of holding a charge of desired pressure against liberation through said opening, and means housed within said closure means and operable at will for generating a force to cause failure of the latter to effect liberation of a charge.

8. A material blasting device comprising a container capable of holding a charge of compressed gas at work performing pressure and having a discharge opening, means for normally preventing liberation of a charge through said opening and including a destructible post, and means in addition to the pressure conditions in said container for destroying said post to effect liberation of a charge.

9. A material blasting device comprising a container capable of holding a charge of compressed gas at work performing pressure and having a discharge opening, means for normally preventing liberation of a charge through said opening and including a destructible element, and electrical means supplemental to the pressure of the charge in said container and effective independently of such pressure for destroying said element to effect liberation of a charge.

10. A material blasting device comprising a container capable of holding a charge of compressed gas at work performing pressure and having a discharge opening, means for normally preventing liberation of a charge through said opening and including a destructible element, and a detonator for creating a fracturing pressure supplemental to the pressure of the blasting charge but effective independently of such pressure for destroying said element to effect liberation of a charge.

11. A material blasting device comprising a container capable of holding a charge of compressed gas at work performing pressure and having a discharge opening, a rupturable disc for normally closing said opening, a supporting element having engagement with said disc for normally preventing rupture thereof, and electrically controlled means embodied in the cartridge and operative on current supply thereto for effecting removal of said element from supporting engagement with said disc to permit failure of the latter.

12. A material blasting device comprising a container capable of holding a charge of compressed gas at work performing pressure and having a discharge opening, a rupturable disc for closing said opening, a destructible post engaging

said disc for maintaining the latter against rupturing, and means in addition to the pressure in the container for destroying said post.

13. In a blasting cartridge, a container providing a chamber for receiving a blasting charge, release means for the blasting charge and including closure means of insufficient strength to withstand the pressure of the blasting charge within the container, destructible means designed to support said closure means, and electrical means wholly outside said chamber for causing destruction of said destructible means.

14. In a blasting cartridge, a container for receiving a blasting charge, rupturable release means for the blasting charge comprising a rupturable disc, rupturable supporting means having engagement with said disc for normally preventing the rupture thereof, and means embodied in the cartridge for creating an explosion for imparting a rupturing pressure, distinct from the pressure of the blasting charge, to the supporting means for rupturing the latter.

15. In a blasting cartridge, a container for receiving a blasting charge, release means for the blasting charge, means for maintaining said release means closed, and means embodied in said latter means for creating an explosion to render said maintaining means ineffective, thereby to release suddenly the blasting charge.

16. In a blasting cartridge, a container for receiving a blasting charge, release means for said blasting pressure, destructible means for maintaining said release means closed, and means embodied in said destructible means for causing an explosive effect to destroy said destructible means, thereby to release the blasting charge.

17. In a blasting cartridge, a container for receiving a blasting charge, release means for said blasting charge, a hollow destructible strut for maintaining said release means closed, and an explosive within said strut for destroying the latter, thereby suddenly to release the blasting charge.

18. In a blasting cartridge, a container for receiving a blasting charge, shatterable release means for said blasting charge, and self-contained means embodied wholly within the cartridge for imparting a shattering pressure, distinct from and acting independently of the pressure of the blasting charge in said container, to said release means to destroy the latter, thereby to release suddenly the blasting charge.

19. A material blasting device comprising a container providing a chamber capable of holding a charge of compressed gas at work performing pressure and having a discharge opening, means for normally preventing liberation of the charge through said opening including a destructible hollow post, and means positioned wholly within said post for destroying said post to effect liberation of the charge.

20. In a blasting cartridge, a container for receiving a blasting charge, release means for the blasting charge and including closure means of insufficient strength to withstand the pressure charge within the container, destructible means designed to support said closure means, and electrical means acting directly on said destructible means for causing destruction of the latter, to effect charge release.

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