Oct. 11, 1932. A. W. HELMHOLTZ ET AL 1,881,564

BLASTING APPARATUS

Filed July 16, 1931

Fig. 1.

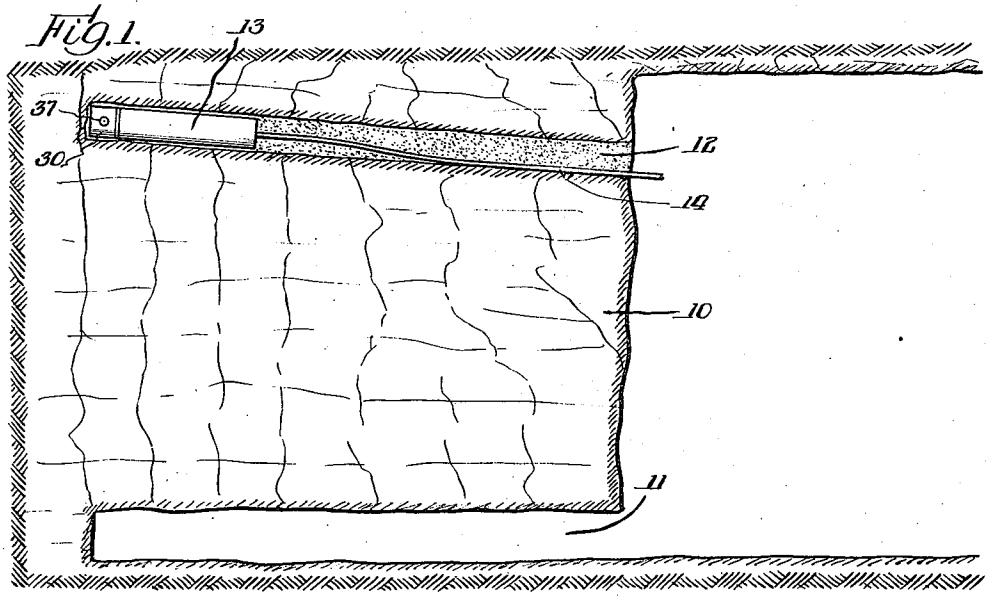


Fig. 2.

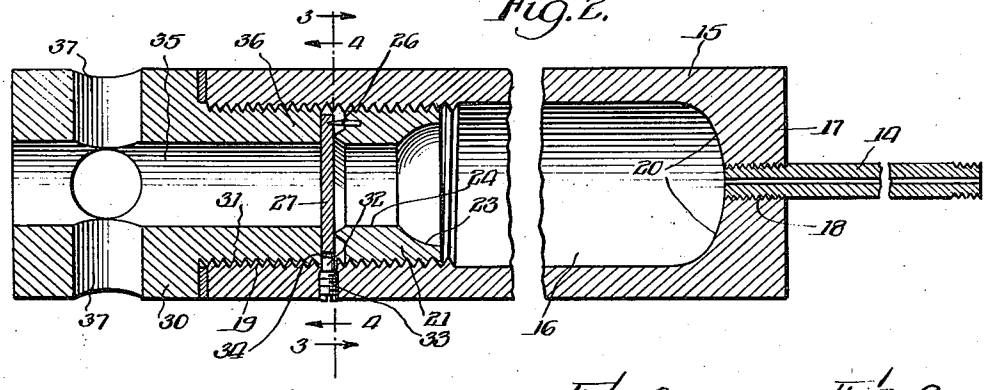


Fig. 5.

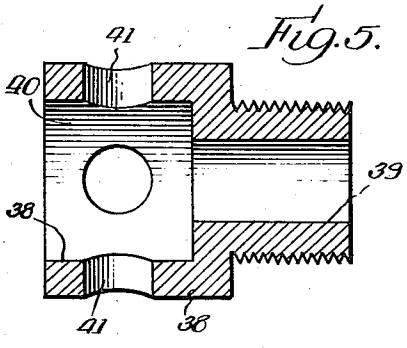


Fig. 3.

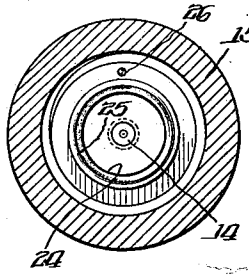
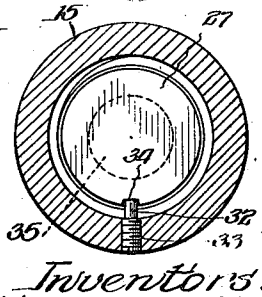


Fig. 4.



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UNITED STATES PATENT OFFICE

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BLASTING APPARATUS

Application filed July 16, 1931. Serial No. 551,084.

This invention relates to improvements in a blasting cartridge or shell adaptable to be used in the mechanical pressure blasting system disclosed in our previous Patent No. 1,569,226, January 12, 1926, and particularly relates to the improved construction of the cartridge or shell and the removability and replaceability of the rupturable venting disk whereby the present construction has many advantages not present in previously-used designs.

The present disclosed cartridge includes a rigid container of suitable metal designed to be several times stronger than the venting device. The discharge orifice is formed in an inserted shoulder which contains or holds the sealing device, whereby it is possible to confine the blasting medium, employed under any pressure less than the rupture strength of the venting disk without leakage for an indefinite period of time. We further show an improved construction for securing the venting disk against displacement with respect to the sealing device while the disk is being secured in position.

It is an object of the invention to secure a form of cartridge or container which is relatively cheap to manufacture from suitable material and in which the machining or finishing cost is reduced to a minimum, since the container barrel may be formed in a hydraulic press from plate material or from seamless tubing made by piercing solid billets. The cap which is secured to the container barrel may be formed from seamless tubing or forged, if desired.

It is a feature of the invention that the cap member includes a hardened end which presses against the venting disk and forms a shoulder against which the venting disk shears when the proper pressure is obtained.

Additional and further objects of the present invention will be more readily apparent from the following description taken in connection with the attached drawing, in which

Figure 1 is an elevation showing the manner of using the cartridge;

Figure 2 is a longitudinal section of the cartridge;

Figures 3 and 4 are transverse sections looking in opposite directions taken on a common plane, as indicated in Figure 2, and

Figure 5 is a detail longitudinal section of a modified form of the cap member.

The cartridge is used in a manner similar to that described in our previous patent, above mentioned, and as shown in Figure 1, 10 is a wall of coal or other material to be blasted, which is undercut as at 11 and provided with a slightly upwardly directed drill hole 12 which extends substantially to a vertical plane from the end of the undercut. The blasting container or cartridge 13 is inserted in the drill hole and is connected through a pipe line 14 to a suitable source of supply. The pressure may be obtained by the chemical generation of gas, such as carbon dioxide, or by a pumping system, developing a high gas pressure. It is to be understood, however, that we desirably employ an expansible gas which is released from the cartridge at a high pressure, such as 5000 pounds per square inch of pressure. Upon release of the expansible gas the wall of coal is slowly broken down.

The blasting cartridge shown in detail in Figure 2 includes a tubular container 15 having an internal cylindrical cavity 16 open at one end of the container 15. The other end 17 of the container is closed except for the connection of the pipe line 14 which is made by screw threads 18. At its open end the barrel or container 15 is internally threaded, as at 19. The closed end of the container is formed with internally rounded corners as indicated at 20. Within the container 15 there is inserted a shoulder or throat piece 21 externally threaded as at 22 and thereby engaging the internal thread 19 of the container 15. Preferably the shoulder 21 is permanently secured in position by cementing the threaded connection. The shoulder or throat piece 21 has a discharge orifice 24 concentric with respect to the axis of the container 15 and having a rounded or enlarged entrance portion 23 at its inner end to reduce the resistance to flow of the blasting medium upon venting from the container. The shoulder 21 has formed on its outer end portion a circular hardened knife edge 25 and just out-

side of the knife edge 25 there is provided in the shoulder 21 a hardened pin 26 which projects slightly beyond the knife edge 25. The rupturable venting disk 27 is pressed into engagement with the pin 26 and the knife edge 25 by means of the cap member 29 having an external thread 31 engaging the internal thread of the container 15. The pin 26 is used to prevent rotation of the disk 27 as it is being forced into position since any rotation relative to the knife edge will prevent a tight metal to metal seal and there might be leakage of the gas.

As additional means for preventing rotation of the disk or as an alternative construction, we may employ a hardened pin 32 threaded into the wall of the container 15 as at 33 and engaging a slot 34 formed in the edge of the disk 27. The cap member at its outer end has an enlarged portion 30 corresponding in diameter with the diameter of the container 15. The cap 29 has a straight discharge passage 35 through which the blasting medium may pass and through which the portion of disk 27 which shears against the inner shoulder 36 of the cap member 29 when the desired blasting pressure is obtained may be discharged. Additional discharge orifices may be arranged transverse to the axial passage 35, as indicated at 37, and these transverse orifices 37 may also be of assistance to receive a tool for tightening the connection of the cap member to the container shell 15 when a new rupturable disk has been inserted.

As a modified construction, the cap member may take the form indicated 38 in Figure 5 in which the axial discharge orifice 39 for the escape of the blasting medium terminates in an enlarged open end of the chamber 40, which has lateral discharge orifices 41 similar to the orifices 37 in Figure 2. This construction eliminates any possibility that the portion of the disk 27 which is sheared off upon rupture might lodge and block the discharge orifices.

We claim:

1. In a blasting cartridge of the type adapted to receive an expansible gas under high pressure, a rigid substantially indestructible container having a chamber therein to receive the blasting medium, a rupturable venting disk member normally forming a sealing wall of said chamber, a circular knife edge rigid with respect to said container on the inner side of said disk member, a cap member having a discharge passage for the escape of the blasting medium and removably secured to said container in position to force said disk member into sealing engagement with said knife edge and a pin fixed with respect to said container adapted to engage said disk member before engagement of said knife edge with said disk member to prevent relative rotation between said disk member and said knife edge while said cap member is being secured in place.

2. In a blasting cartridge of the type adapted to receive an expansible gas under high pressure, a rigid substantially indestructible container having a chamber therein to receive the blasting medium, said container having a threaded opening at one end, a rupturable venting disk adapted to be received in said threaded opening, an annular knife edge rigid with respect to said container against which said disk is adapted to seat in sealing engagement to normally form a sealing wall of said chamber, a removable cap member having threaded engagement with said threaded opening of said container and adapted to engage said disk to force said disk into engagement with said knife edge, said cap member having a discharge passage for the escape of the blasting medium and a removable threaded pin mounted in the wall of said container adapted to engage said disk member to prevent relative rotation between said disk and said knife edge while said cap member is being threaded in place.

Signed at Harrisburg, Illinois, this 13 day of July, 1931.

ARTHUR W. HELMHOLTZ.
DENT FERRELL.