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BLASTING SHELL FOR SURFACE BLASTING

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Fig. 1.

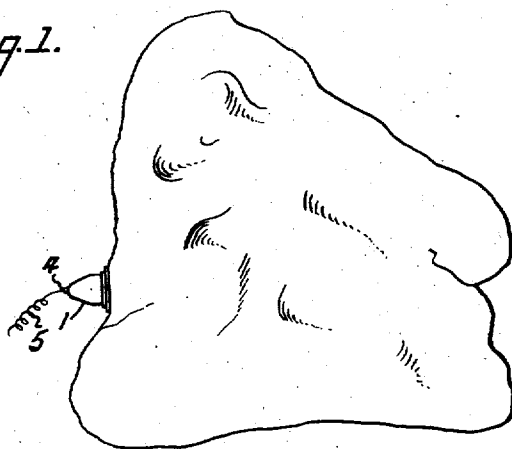


Fig. 2.

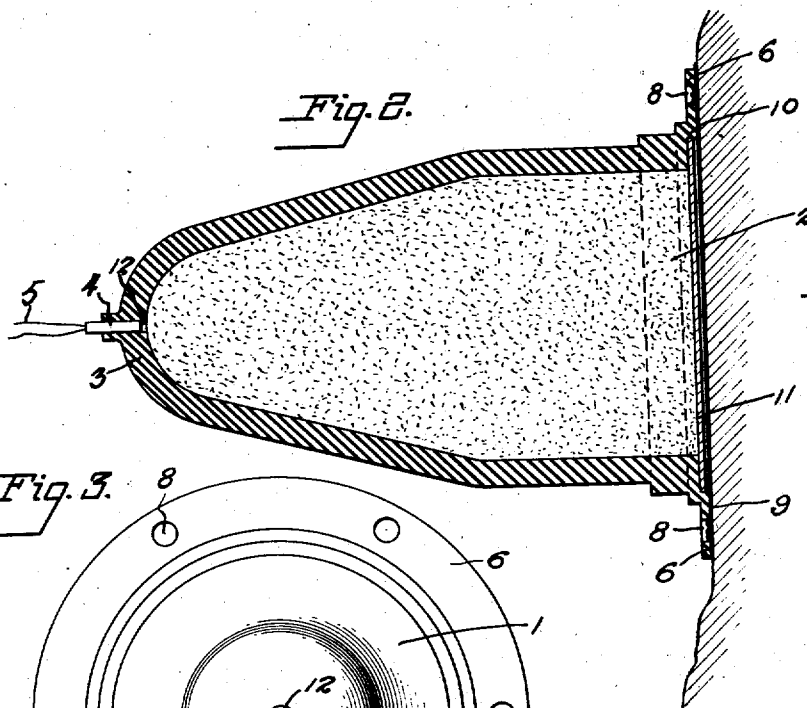


Fig. 4.

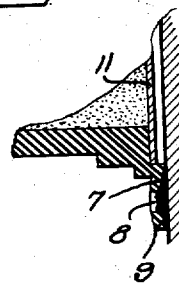
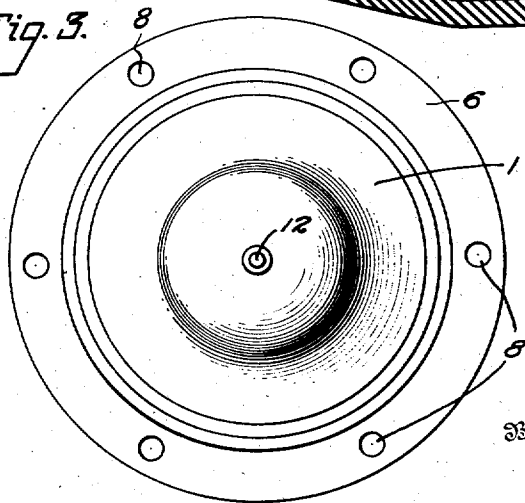


Fig. 3.



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BLASTING SHELL FOR SURFACE BLASTING

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5 Claims. (Cl. 102—5)

This invention relates to blasting shells for surface blasting. It has for its principal object the provision of a capsule adapted to be loaded with an explosive and to be stuck adhesively to the surface of the body to be blasted obviating the necessity for mud-capping or the employment of other expedients for holding the charge in place.

Another object of the invention is to provide a device of the character described in which the capsule is flexible and preferably of rubber or the like so that it yield to the impact of the explosion for a short moment before disintegrating, directing the major force of the explosion depthwise with respect to the body to be blasted, producing a deeper disruptive effect resulting in larger lumps and less shattering.

Other objects of the invention will appear as other and practical embodiments of the invention proceeds.

In the drawing throughout the several figures of which the same reference characters designate identical parts:

Figure 1 is a side elevation of a mass of coal for example showing the blasting shell of the present invention adhesively applied to a side surface thereof;

Figure 2 is a longitudinal section through the blasting shell; and

Figure 3 is a plan view.

Figure 4 is a detail view in section showing the flange, rabbet and appurtenant structure on a slightly enlarged scale.

Before proceeding with a description in detail of the device of the invention, it may be stated that in many mines, also in tunnels and construction jobs in general, it is frequently necessary or desirable to make use of high explosives in ways other than by inserting them in bore holes. For example, large lumps of coal or rock require breaking before they can be handled by loading and transportation systems. In such cases, the explosive charge is customarily confined by a quantity of mud placed over the explosive charge and detonated in the usual way. This procedure is commonly known as "mud-capping."

Frequently, however the surface to be broken is inaccessible or unavailable for the mud-capping method. The lumps of material may be beyond the reach of the blaster or in such position as to preclude the placing of the cap against the surface. Sometimes the necessary mud may not be at hand. In such instances, resort is commonly had to the inefficient and wasteful expe-

dient of placing one or more sticks of powder of standard size in the most accessible open space without much reference to the effectiveness of the shot. An explosion of this character produces a minimum of effective work and a maximum of concussion.

There are also places where it would be desirable to use explosives if a satisfactory method of placing them were available. For example, many mines are constantly required to remove loose "top" or "roof" in tunnels and elsewhere, the prevailing method of doing this being the very unsafe one of wedging down the loosened slices of material with a steel bar. The man performing this operation is sometimes unable to judge the extent of the weakness of the rock or coal and is in danger of being killed by falls of the material. It is probable that this method is responsible for much "bad top" remaining and becoming the cause of practically one-half of all mine accidents.

The device of the present invention makes it possible to attach a dynamite charge on the surface of rock, coal or other material to be blasted irrespective of the position or nature of the surface. Thus the charge may be placed on the roof or the side of a tunnel, chamber or room, or against a timber to be removed, and in many other places which are impracticable for mud-capping.

Referring now in detail to the drawing, the shell consists of a capsule 1. This may be of any suitable shape, but preferably as shown. It has a wide open end 2 adapted to be placed against the surface to be blasted. The capsule at any suitable point such as the outer end 3 may be provided with a hole 12 to receive the detonating cap 4 fired in any suitable manner as by the electric conductor 5. It is not essential however that all the capsules be furnished with detonating caps for if one is positively fired others placed in proximity thereto will readily explode by impact.

The capsule 1 is preferably made of a flexible elastic material such as rubber, the advantages of which are:

First, that the explosive gases will be held within the capsule during the initial moment of their expansion which is long enough to direct the disruptive force of the explosion depthwise into the body of material to which the capsule is attached.

Second, a flexible capsule tends to conform to the irregularities of the surface to be shot.

Third, flexibility and elasticity minimize the

danger that a jar from any extraneous source may dislodge the capsule.

The capsule 1 at its bottom or open end 2 is preferably formed with a peripheral flange which may be either flat as shown at 6 in Figure 2 or slightly cupped as at 7 in Figure 4. The flange may also be formed with perforations 8 of any suitable size or shape. The flat or cupped surface of the flange is designed to receive a coating or layer 9 of adhesive which keys into the perforations forming a firm bond between the adhesive and the capsule. Any available adhesive is within the contemplation of the invention.

It has been found that a very practical and cheap adhesive may comprise molasses, one part by weight mixed with about three parts of finely divided clay or Portland cement. The sticky mass thus produced and applied to the flat flange 6 in Figure 2 or the cupped flange 7 in Figure 4, when pressed against the surface to be blasted conforms to the irregularities of the surface, closes the interstices presented by said irregularities and causes the loaded capsule to stick in place instantly.

In use, the capsule is filled with explosive. This is preferably a gelatin powder which will not spill out of the open end of the capsule. However, whether the explosive be in plastic form or granular, it is preferred to have the capsule formed with an internal circumferential rabbet 10 in which is seated or forced a disk 11 made of paper, cardboard or any suitable material. This holds the explosive in place. The detonating cap 4 is customarily for safety's sake not inserted until the capsule has been stuck in place.

Extensive experiments with this device have shown that it provides an explosive charge which is at least 75% more effective than a charge of loose powder and at least twice as effective as a cartridge containing an equal weight of explosive and laid flat against the surface to be blasted. Its effectiveness in relation to mud-capping depends of course upon the weight and character of the material used in the cap. It is fully as efficient as an equal charge with a very large mud-cap.

The device of the present invention is particularly adaptable for breaking up large lumps of coal in that the force of the shot is concentrated depthwise, in a direction perpendicular to the surface of the lump. This produces an unusual high proportion of large lumps and a corresponding minimum of dust, through shattering.

While I have in the above description disclosed what I believe to be a preferred and practical

embodiment of the invention, it will be understood to those skilled in the art that the details of construction as shown and described are by way of illustration and not to be construed as limiting the scope of the invention which is defined in the appended claims.

What I claim is:

1. Shell for surface blasting, comprising a capsule having a broad flange encompassing the base, an explosive charge confined within said capsule, said base flange being coated with a sticky layer of adhesive whereby the base of said capsule is adapted to be adhesively applied to the surface of the mass which is to be blasted.

2. Shell for surface blasting, comprising a capsule having a broad flange encompassing the base, an explosive charge confined within said capsule, said base flange being coated with a sticky layer of adhesive, said flange having perforations through which the adhesive extends, forming a key between said flange and said layer of adhesive.

3. Shell for surface blasting, comprising a capsule having a broad flange encompassing the base, an explosive charge confined within said capsule, said base flange being coated with a sticky layer of adhesive whereby the base of said capsule is adapted to be adhesively applied to the surface of the mass which is to be blasted, the adhesive coated side of said base flange being channel shaped and the adhesive layer filling the channel.

4. Shell for surface blasting comprising an explosive charge containing capsule having a base flange with a flexible tenacious margin adapted to be pressed adherently and sealingly against an irregular surface in interdigitating relation to the irregularities thereof, said capsule by virtue of said flexible tenacious margin constituting a chamber yieldingly confining the explosion gases for a brief moment at the instant of explosion, thereby cushioning the impact of the explosion.

5. Method of producing a cushioned explosion against an irregular surface so positioned as to afford inadequate support against gravitational displacement of the explosive charge, comprising confining the charge in a capsule having a flexible tenacious base margin, adhesively pressing said capsule into sealing interdigitating relation to the irregularities of said surface, and firing the charge, whereby by virtue of said flexible tenacious margin the explosion gases are yieldingly confined for a brief moment at the instant of explosion thereby cushioning the impact of the explosion.

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