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BLASTING PLUG

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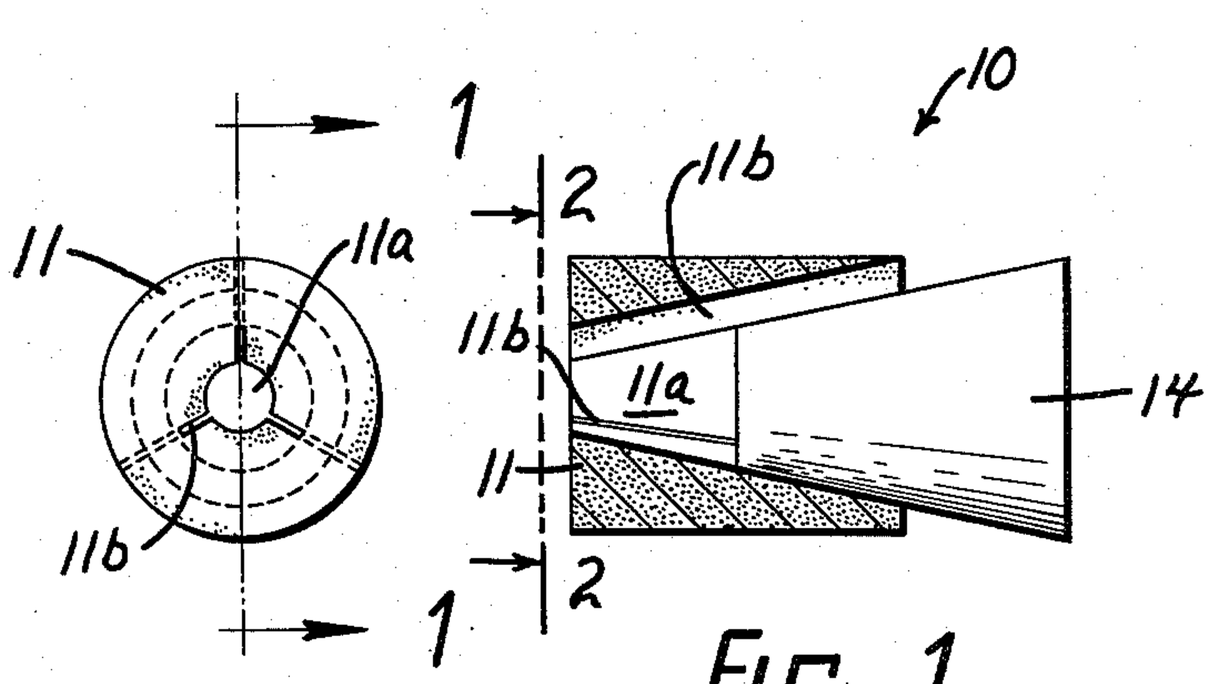

FIG. 2

FIG. 1

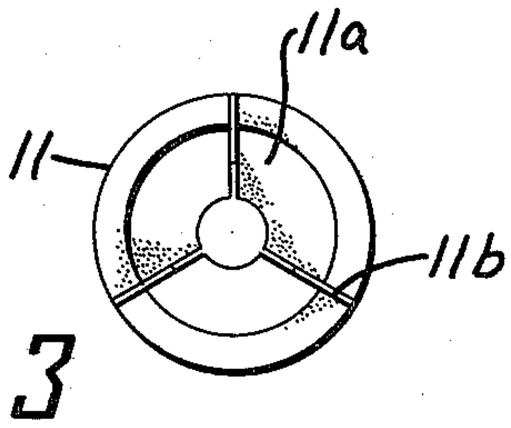

FIG. 3

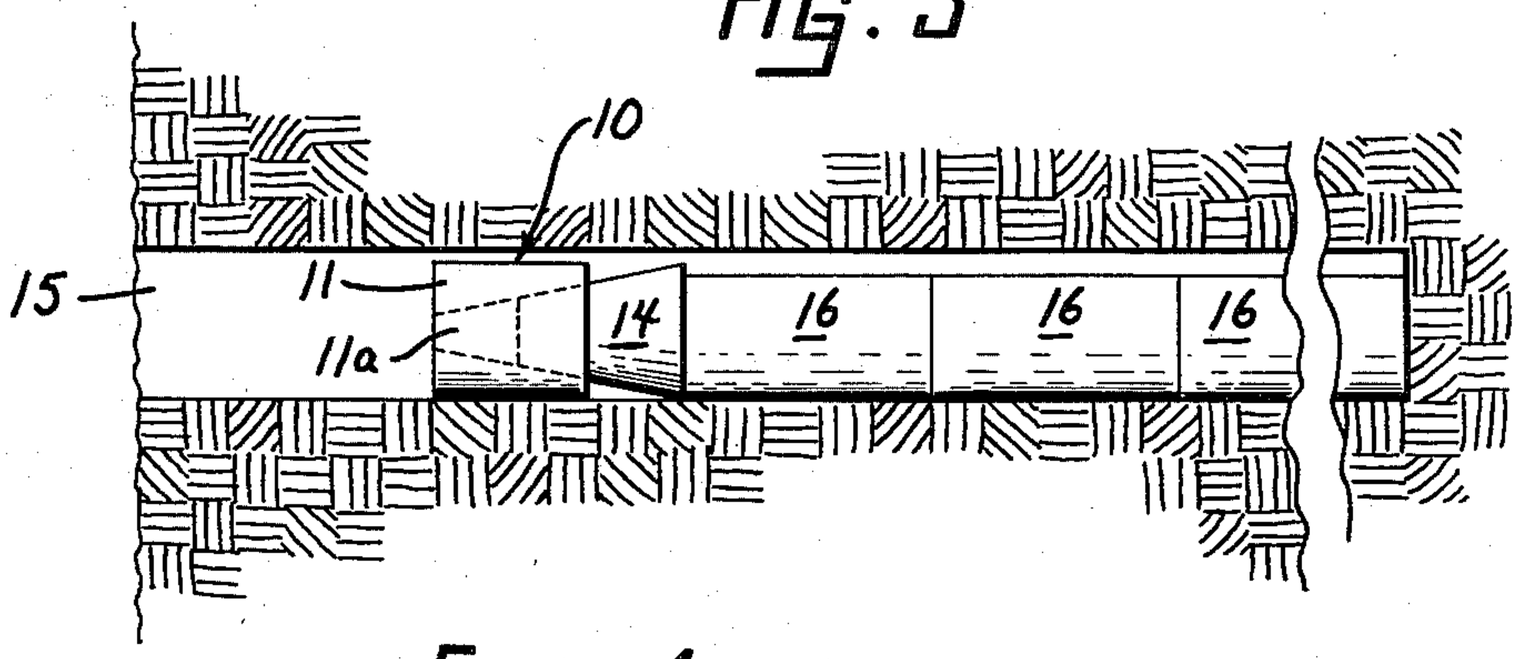

FIG. 4

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BLASTING PLUG

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The present invention relates to a blasting plug, and more particularly to a new and novel blasting plug which is light in weight and virtually impervious to water.

As is known, blasting plugs are commonly used in connection with the blasting operation in a mine or quarry. The blasting plug serves to direct the explosive forces into an area of maximum utility, and thus to prevent the surge of explosive force directly from the drill hole. The prior devices for the above-mentioned purpose have been generally objectionable for several reasons including, and most principally, the fact that they were susceptible to water damage, either in storage or while in use; the materials and/or weight thereof created manufacturing and/or shipping problems; and, the difficulty of positioning in the drill hole, where the blocking of the latter was oftentimes ineffective as a result of the required tamping action.

By virtue of the instant invention, the applicants have provided a novel blasting plug for use in a drill hole in a mine or quarry which is virtually impervious to water, which is light in weight and, hence, readily transportable; and, which may be effectively positioned and readily broken apart for use prior to the blasting operation. The applicants' novel blasting plug presents a wide contact area for the tamping action required thereon prior to blasting, i.e. when the blasting plug is positioned in the drill hole adjacent the explosive material.

In carrying out the principles of the instant invention, the applicants employ a novel mixture of materials for forming the blasting plug including in various combinations and percentages, by volume, cement; perlite, kenlite, or other lightweight aggregate; mortar; and, water. The aforementioned materials are molded to produce the novel instant blasting plug which comprises a generally right cylindrical shell having a tapered or conical opening therethrough and a correspondingly shaped conical plug adapted to be received in the conical opening in the shell. The shell has a plurality of slits disposed on the surface of the conical opening to permit the ready breaking thereof during the positioning of the blasting plug in the drill hole.

Accordingly, the principal object of the present invention is to provide a new and novel blasting plug which is virtually impervious to water and yet which is light in weight.

Another object of the present invention is to provide a novel blasting plug which may be easily positioned for use in a drill hole, and which at the same time is capable of being readily broken during positioning to block or plug the drill hole.

A still further object of the present invention is to provide a novel blasting plug made from various combinations of material to effect a lightweight finished product.

A still further and more general object of the present invention is to provide a blasting plug which is readily transportable, and yet which is adapted to prolonged exposure to the elements.

Other objects and a better understanding of the invention will become more apparent from the following description, taken in conjunction with the accompanying drawing, wherein—

FIG. 1 is a view partly in vertical section and partly in side elevation, taken at line 1—1 of FIG. 2 and looking in the direction of the arrows, showing details of the instant invention;

FIG. 2 is a view in end elevation of the applicants' novel blasting plug of FIG. 1, taken at line 2—2 thereof and looking in the direction of the arrows, with the conical plug removed;

FIG. 3 is another end view of the blasting plug of FIG. 1, taken at the opposite end thereof from the view of FIG. 2, also with the conical plug removed; and,

FIG. 4 is a generally diagrammatic view showing the applicants' novel blasting plug in use in a drill hole in a mine or quarry.

For the purposes of promoting an understanding of the principles of the invention, reference will now be made to the embodiments illustrated in the drawing and specific language will be used to describe the same. It will nevertheless be understood that no limitation of the scope of the inventions is thereby intended, such alterations and further modifications in the illustrated device, and such further applications of the principles of the inventions as illustrated therein being contemplated as would normally occur to one skilled in the art to which the inventions relate.

Referring now to the figures, the applicants' novel blasting plug **10** comprises a generally right cylindrical shell **11** having a tapered or conically shaped opening **11***a* extending therethrough. In the preferred embodiment of the invention, the conically shaped opening **11***a* has a plurality of slits **11***b* disposed on the surface thereof, for reasons which will be apparent from the discussion herebelow. A conical plug **14**, which is complementary in shape to the conical opening **11***a* in the shell **11** completes the blasting plug **10** assembly. It should be noted from FIG. 1 that in a position of nonuse, the conical plug **14** extends only partly into the conical opening **11***a* in the shell **11**, again for reasons which will be discussed more fully herebelow.

The blasting plug **10** forming the instant invention is made from a novel combination of materials which provide, as a highly desired result, an end product which is virtually impervious to water and which at the same time is light in weight, features not present in the blasting plugs heretofore in use. The applicants make their novel blasting plug **10** from material including, in various combinations, mixtures of cement; mortar; perlite, kenlite, or other lightweight aggregate; and, water, proportioned by volume.. For example, a typical mixture may include approximately two parts of cement, four parts of perlite and one part of water, which mixture is received in forms which shape the finished product. Other effective combinations of material include cement, kenlite, and water; mortar, kenlite, and water; and, mortar, perlite, and water, all in a particular quantity relationship to achieve a stable yet readily breakable end product.

Referring now particularly to FIG. 4, a typical use of the novel blasting plug **10** is shown in connection with a drill hole **15** typically found in a mine or quarry. After drilling the drill hole **15** to the desired depth, and, of course, in the desired direction, a series of explosive charges **16** are disposed therein, which explosive charges **16** are, for example, dynamite. The blasting plug **10** is then disposed in the drill hole **15** in the generally assembled relationship shown by FIG. 4, so that the conical plug **14** thereof engages and abuts one of the explosive charges **16**. Tamping action then takes place by use of a tamping member (not shown) which is generally of such diameter as to almost completely fill the drilling hole **15** at one end thereof and fully engage the end surface of the blasting plug **10**.

As the tamping member is pushed against the blasting plug **10**, in a left to right direction as shown in FIG. 4, the shell **11** rides upon the conical plug **14**, whereupon

the shell 11 readily breaks or fractures due to the longitudinal slits 11*b* therein. When the blasting plug 10 is broken apart as described hereabove, it completely fills the drill hole 15, and thereby effectively plugs or serves as a barrier between the explosive charges 16 and the outside mine shaft or other working area.

It should be particularly noted that the instant blasting plug 10 is particularly effective in that as the conical plug 14 and the conically shaped opening 11*a* in the shell 11 are each complementary in outward configuration, a highly effective bearing area is provided which urges the breaking of the shell 11 in a generally equal force relationship. The latter is in contrast to the former type blasting plugs where, in one instance, a conical plug engaged a right cylindrical opening in a cylindrical shell, such structure permitting only a line type of force engagement.

It should be particularly emphasized that as the blasting plug 10 forming the instant invention is made from one of the novel mixtures of materials indicated hereabove, the finished product is light in weight and virtually impervious to water. The latter feature is particularly important in that oftentimes it is desired to leave the blasting plug in the mine where it is damp, or perhaps in an area near the mine exposed to weather. Moreover, it should be readily apparent that transporting the instant blasting plug is simplified because of the water impervious feature thereof which, together with the lightweight feature, combine to present a highly desirable type of product readily adaptable for long distance shipment.

Thus, it should be understood from the above that the applicants have provided a new and improved blasting plug 10 made from a novel combination of materials which is light in weight and yet which is imperious to water. The blasting plug promotes ready positioning in view of the particular configuration of the components thereof, and yet highly effective fracturing in the drill hole when used. In addition, and as fully disclosed hereabove, the blasting plug is readily transportable and available for use as desired, irrespective of its duration or place of storage.

The instant blasting plug is susceptible to various changes within the spirit of the invention. For example, more or less than the three longitudinal slits may be disposed on the surface of the conical opening in the shell of the blasting plug depending, for example, upon the overall size of the plug with reference to the drill hole.

Thus, the above description should be considered illustrative and not as limiting the scope of the following claims.

We claim:

1. A blasting plug assembly for a bore hole comprising, in combination, a one-piece shell member having a tapered opening therein, and a plug member complementary in shape to said tapered opening in said one-piece shell member and disposed in direct contact therewith, said one-piece shell member having rupturable weakened sections and said plug member also being rupturable, where said weakened sections of said one-piece shell member and said plug member rupture to define a unitary blocking mass when placed in said bore hole prior to blasting, and where said one-piece shell member and said plug member are each made from material consisting of approximately two parts of cement, four parts of lightweight aggregate and one part of water.

2. A blasting plug assembly for a bore hole comprising, in combination, a one-piece shell member having a tapered opening therein, and a plug member complementary in shape to said tapered opening in said one-piece shell member and disposed in direct contact therewith, said one-piece shell member having rupturable weakened sections and said plug member also being rupturable, where said weakened sections of said one-piece shell member and said plug member rupture to define a unitary blocking mass when placed in said bore hole prior to blasting, and where said one-piece shell member and said plug member are each made from material consisting of approximately two parts of mortar, four parts of lightweight aggregate and one part of water.

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