Jan 6, 1931. S. S. LANIER, JR 1,787,910

BLASTING SHELL

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Fig. 1

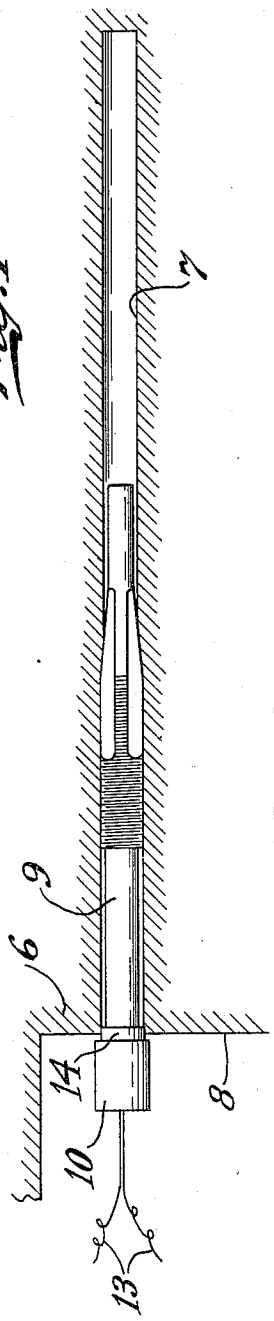


Fig. 2

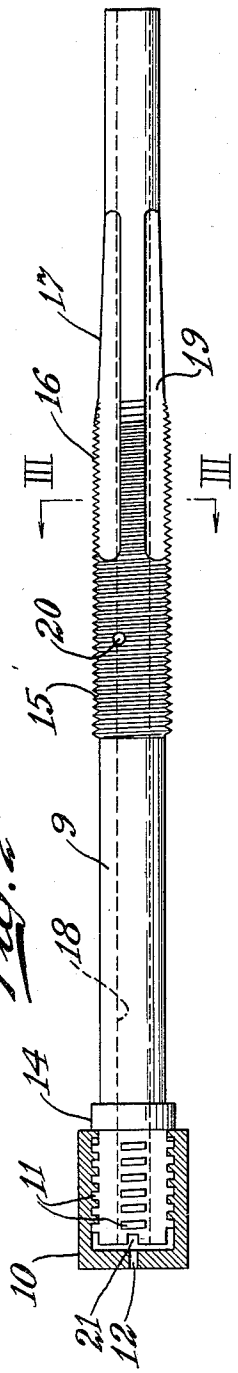


Fig. 4

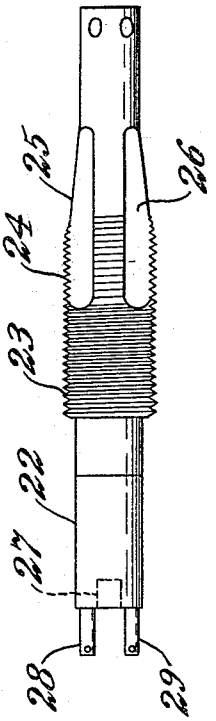
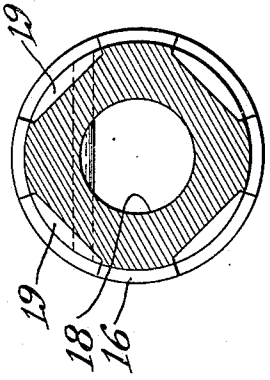


Fig. 3



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Fig. 5

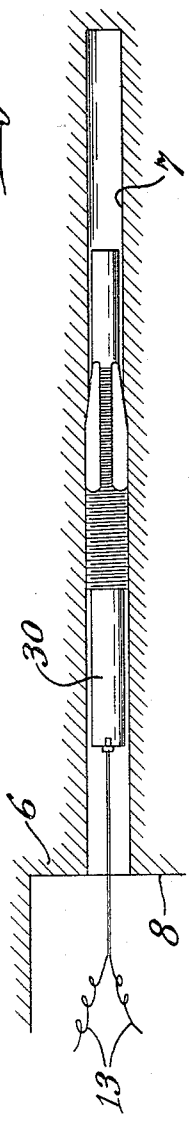
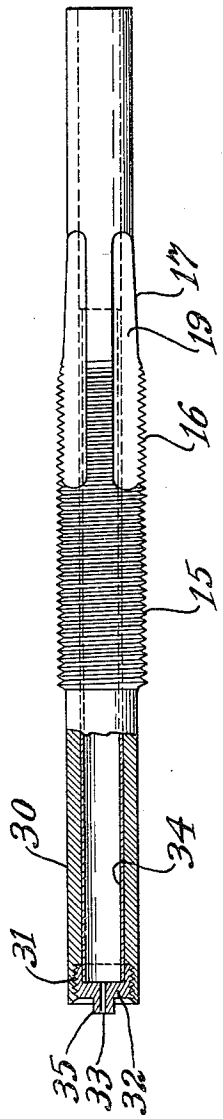


Fig. 6



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Patented Jan. 6, 1931

1,787,910

UNITED STATES PATENT OFFICE

STERLING S. LANIER, JR., OF HOPKINSVILLE, KENTUCKY

BLASTING SHELL

Application filed August 25, 1928. Serial No. 301,961.

My invention relates to a blasting shell, by which term I mean a metallic shell for containing any desirable explosive available for use in mining, which is designed to be both self tamping and self anchoring in the drill hole provided for it in the material being mined.

Heretofore, in this particular art, the practice has been to employ such as dynamite or other permissible explosives, which, after being introduced in the drill hole, must be very carefully tamped to prevent the occurrence of blow outs or windy shots, and, where the explosive has been in the form of a gas, it has been the practice to confine same in shells or suitable containers equipped with means by which the gas can be expanded and thus caused to fracture the shell and then break down the mineral being mined, but such gas shells also require in a still greater measure a tamping means both to hold them in position and to prevent the leakage of the more slowly expanding gases.

One object of my invention is to dispense with the provision of any tamping as a necessity incidental to breaking down minerals with any explosive, thereby greatly reducing the cost of operation as well as rendering it simpler and safer. To this end my invention contemplates the provision of the explosive container, whether for gas, dynamite, powder or permissible explosive, which is provided with an externally screw threaded portion, the threads being adapted to be screwed into the walls of the drill hole so as to have a threaded engagement therewith which not only acts as an effective tamping means, but likewise as an anchoring means.

A further object of my invention is to provide the shell with a reaming portion to open up the drill hole to the required diameter and with a tap portion adapted to cut the thread grooves in the drill hole, the tap portion of the shell having the customary dust grooves of taps which provide for the escape of the dust generated by the formation of the threads in the drill hole.

A further object of my invention contemplates adapting the shell to be screwed home into the drill hole by a rotary drive such as is customarily employed for operating the drill. A further object is to provide a breech loading shell adapted to permit the explosive to be inserted thereinto after the shell is in place in the drill hole if such is desired. This leaves the shell and its charge subject to inspection at all times before firing which makes possible for the shot firer to know just what explosive is being used.

A further object is to provide a short type of breech loading shell adapted to be screwed deeply into the drill hole and to receive a cartridge preferably attached to the screw plug used for closing the outer end of the bore of the shell. The advantage of this arrangement is that it permits relatively light shells to be used and inserted into the drill hole to the desired depth, after which they can receive the explosive charge, the latter being placed in the shell by the shot firer and thus be subject to his inspection.

A further object of my invention, particularly as applied to the use of permissible explosives, is to provide an elongated tubular shell into which the explosive can be introduced if desired after the shell is screwed into place in the drill hole, the shell carrying suitable means to position the explosive and to limit the charge.

My invention further comprises the novel details of construction and arrangements of parts, which in their preferred embodiments only are illustrated in the accompanying drawings to which reference is made in the accompanying specification.

In the drawings:—

Fig. 1 shows a vertical cross-section through a mineral body having a drill hole formed therein and having one type of my improved shell suitable for permissible explosives inserted in operating position.

Fig. 2 is an enlarged detail view of the shell shown in Fig. 1, the outer removable cap being shown in cross-section, and a part of the threaded portion being broken away to illustrate one form of stop or limit means for the explosive charge.

Fig. 3 is a cross-sectional view on the line III—III of Fig. 2.

Fig. 4 shows my invention applied to a

shell containing gas adapted to be expanded and to fracture the shell and break down the mineral.

Fig. 5 is a view corresponding to Fig. 1 showing the short type of breech loading screw shell screwed home in the drill hole.

Fig. 6 is an enlarged view of the shell shown in Fig. 5 broken away at its breech end to show the screw plug and the cartridge carried thereby.

Similar reference numerals refer to similar parts throughout the drawings.

In the embodiment of my invention illustrated in Figs. 1 to 3, I show a body of mineral 6 having a drill hole 7 formed therein by any suitable mechanism opening through the face 8 of the mineral body to be shot down.

I illustrate in Fig. 2 more clearly the preferred type of shell for use with dynamite or permissible explosives, which shell comprises a tubular body portion 9 having its outer end closed by a cap 10 which interlocks with the shell body by the conventional breech block lock elements 11 and which has a small opening 12 through which the fuse or electric wires 13 pass for controlling the means for firing the explosive. The breech block elements 11 are preferably formed on the shouldered end 14 of the shell. At a suitable distance from this end 14 the shell is provided with a full threaded portion 15, a tap portion 16 and a reaming portion 17. The diameter of the threads 15 is sufficiently greater than the diameter of the reamed drill hole to cause such threads to be fully embedded in the walls of the drill hole. Preferably the reaming portion 17 is gradually reduced in diameter towards the inner end of the shell so that it will act gradually to open the hole to proper size for the thread grooves to be cut in the drill hole by the tap 16. The tap has the desired number of grooves 19 for the escape of dust, formed by the cutting of the threaded grooves. The tap is designed to provide sharp cutting edges in the manner well understood in the art.

The bore 18 in the shell extends from its outer end of uniform diameter through its inner end. The bore may be intersected by a pin 20. This pin forms a stop for loose explosive which is adapted to be inserted through the open end of the shell either before or after it is screwed into place in the drill hole. The grooves 19 do not extend through the threaded portion 15. The inner end of the bore 18 through the shell is preferably left open.

In practice, after the drill hole 7 is provided, the explosive shell is started into the drill hole into which its inner end fits fairly snugly. As it is forced in, the reamer 17 and then the tap 16 gradually take hold and form threads in the outer portion of the drill hole into which the shell can be screwed by hand, or by connecting a rotary drive in the tool socket 21 formed in the outer end of the shell. After the shell's full threaded portion 15 has been screwed home, as shown in Fig. 1, the charge of black powder or permissible explosive, if not previously introduced, is then inserted in the shell with its detonator or cap and the wires or fuse leading to the latter are inserted through the head 10, after which the latter is coupled to the shell. The apparatus is then ready for firing and when the explosion occurs the gases will escape through the open inner end of the shell and into the drill hole where their further expansion will break down the mineral. The screw threaded engagement of the shell with the walls of the drill hole constitutes a tamping means and an anchoring means for the shell and the shell itself is preferably made of suitable material having sufficient strength to withstand the explosive strains and stresses so that it can be continuously utilized.

The pin 20 passing tangentially across the bore 18 will project thereinto sufficiently to stop the explosive at the desired point and yet to leave ample opening towards the inner end of the shell for the escape of the gases. This is of important advantage in that it limits the amount of explosive that can be inserted in the shell and indicates to the shot firer on inspection when an improper amount has been placed in the shell.

The explosive can be inserted in loose form, or in a metal or other cartridge and may be fired by any acceptable means.

In Fig. 4 I show a shell 22 containing expansible gases and I provide the body portion of this shell with full threads 23 preceded by a tap portion 24 and a reamer portion 25 which are intersected by longitudinal dust grooves 26. This shell at its outer end is provided with a tool socket 27 by which it is adapted to be screwed into position in the drill hole. The electric wires lead to the heating elements in the shell and are connected to the posts 28 and 29 or equivalent devices so as to cause the gas to expand until it fractures, and escapes from, the shell and then to further expand in the drill hole to break down the mineral.

In Figs. 5 and 6 the shell is provided with whole threads, a tap and a reamer similar to and correspondingly numbered with the parts already described in connection with Fig. 1. The unthreaded outer end 30 of the shell is much shorter than is the case of the shell shown in Fig. 1, which latter is intended to project to or without the drill hole. In this arrangement the breech is internally threaded at 31 to receive a screw plug 32 having a central opening 33 for the wires or

fuse and recessed on its inner side to receive a cartridge 34 of metal or other suitable material which receives the charge of explosive and which is adapted to be inserted in the outer end of the shell.

The block is provided with a tool grip 35 by which it can be guided into the drill hole so as to place the cartridge in the shell and by which it can be screwed home into the shell preparatory to firing.

It is understood that my invention is available for use in shooting various minerals and that the material employed in, and the design of, the shell will be such as to perform the duty incidental to being screwed home into, and reaming, and tapping, the drill hole and also to withstand the explosive strains and stresses.

I claim special advantage in providing the shell with an open outer end through which the charge of explosive therein can be inspected and I also attach great importance to the provision of some stop means or its equivalent in the shell, by means of which the amount of the explosive used can be determined and definitely limited. Where the shell is long enough for its open breech end to project to or without the open end of the drill hole, it will have the added advantage of permitting the shot firer to inspect the explosive in the shell so as to be advised just what he is firing and to know whether or not the proper amount of explosive is in the shell. These lend large factors in safety in connection with the employment of my invention.

It is of course preferable, for simplicity in manufacture, that the screw threaded portion be integral with the shell but it is contemplated that it may be on any portion integral, connected to or corelated with the shell proper.

I do not confine myself to the design of the shells shown as they may be variously modified according to the conditions of use and the mining operations contemplated.

Without, therefore, limiting myself to the immaterial details of construction which may be widely varied within the scope of my invention, what I claim as new and desire to secure by Letters Patent, is:—

1. An explosive shell for mineral mining adapted to be introduced in a drill hole formed in the mineral body to be shot, the shell having formed thereon intermediate its ends a threaded element adapted to be interlocked by threaded engagement with the walls of the drill hole to hold the shell in place and disposed to act as a tampering means for holding the explosive gases to their work at the inner end of the drill hole, and a reamer formed on the inner end of the shell.

2. A shell of the character described in claim 1, in combination with a reamer preceding the threaded element.

3. A shell according to claim 1, in combination with a tap adapted to form thread grooves to receive the threads on said element.

4. A shell according to claim 1, having its threaded element comprising full threads, in combination with a tap portion preceding the full threads, and a reamer preceding the tap.

5. A shell of the character described having an open end for the introduction of the explosive and having a stop means fixedly connected within the shell to arrest the explosive and to limit the amount that can be introduced in the shell.

6. An explosive shell for mineral having an elongated metallic body provided at an intermediate point with threads adapted to have a screw threaded engagement with the walls of the drill hole, the shell having a bore opening through both ends, an intermediate stop fixedly connected to the shell for arresting the explosive charge, and a closure for its open outer end.

7. In a shell of the character described, a cylindrical body having a central longitudinal bore for explosives and adapted to be inserted bodily into a drill hole, a threaded outer portion intermediate the ends of the body adapted to engage the walls of the drill hole. and a tap portion formed on the body ahead of the threaded outer portion.

8. In a shell of the character described, a cylindrical body having a central longitudinal bore for explosives and adapted to be inserted bodily into a drill hole, a threaded outer portion intermediate the ends of the body adapted to engage the walls of the drill hole, a tap portion formed on the body ahead of the threaded outer portion, and a stop pin extending transversely of the body and traversing the bore.

In testimony whereof I affix my signature.

STERLING S. LANIER, JR.