Feb. 11, 1947. R. E. FOGG 2,415,422

BLASTING EXPLOSIVE ASSEMBLY

Filed Jan. 28, 1943 2 Sheets-Sheet 1

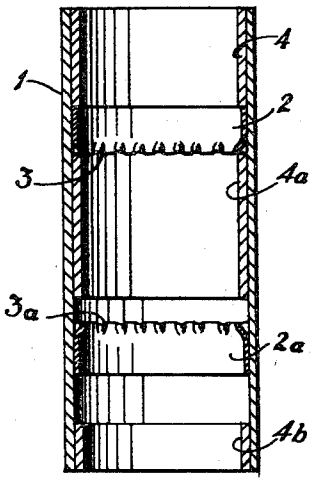


Fig. 1

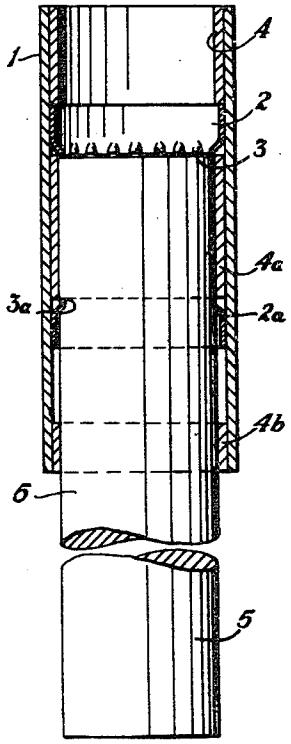


Fig. 2

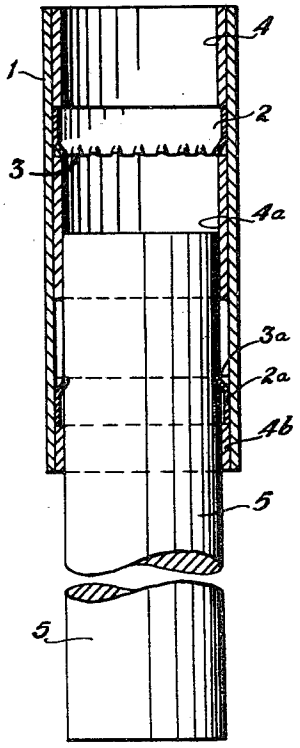


Fig. 3

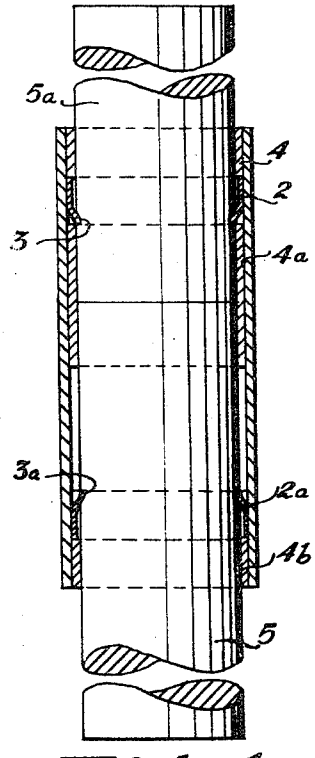


Fig. 4

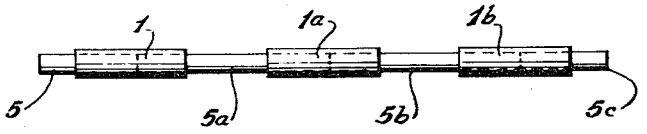


Fig. 5

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BLASTING EXPLOSIVE ASSEMBLY

Filed Jan. 28, 1943 2 Sheets-Sheet 2

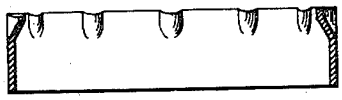


Fig. 6

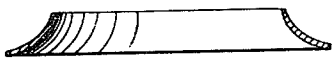


Fig. 10

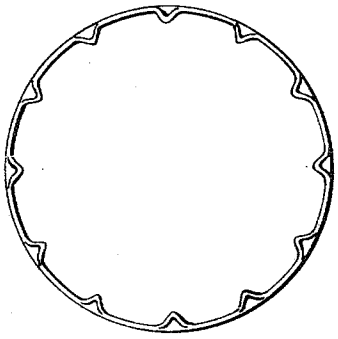


Fig. 7

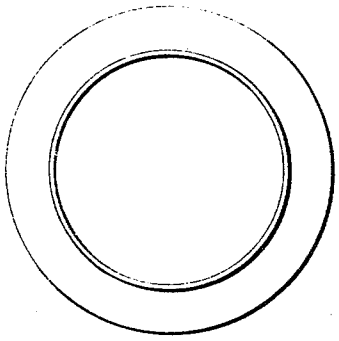


Fig. 11



Fig. 8

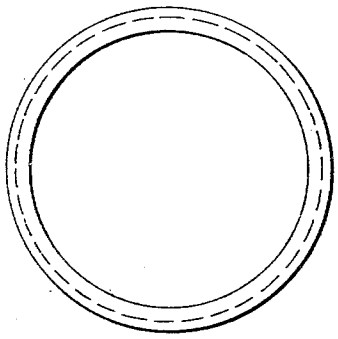


Fig. 9

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Patented Feb. 11, 1947 2,415,422

UNITED STATES PATENT OFFICE

2,415,422

BLASTING EXPLOSIVE ASSEMBLY

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Application January 28, 1943, Serial No. 473,807

1 Claim. (Cl. 102—22)

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The present invention relates to a new and improved explosive assembly, and more particularly to such an assembly whereby efficiency and safety in charging substantially vertical drill holes, especially in seismic prospecting, is assured.

In seismic blasting operations, the conditions encountered present problems which have not been adequately solved by the use of conventional explosive packages.

An object of this invention is a new and improved assembly, especially adapted to seismic blasting operations. A further object is a connecting device for joining explosive cartridges so as to form a column characterized by a strong, rigid structure adapted to be easily handled, and readily and safely loaded. It is also an object that the joint between the cartridges of the column shall be strong enough to prevent the accidental separation of cartridges from the column during the loading operation. Another object is such an assembly which can be quickly and easily joined together and which possesses strength and rigidity adequate to withstand the most severe conditions encountered in loading drill holes for seismic blasting operations. An additional object is such an assembly in the form of a column characterized by sufficient rigidity to permit forcing the same into a mucky drill hole without appreciable deviation from the axis of any unit of said column.

The foregoing objects are accomplished according to this invention by means of a coupler comprising a cylindrical tube with a plurality of grips spaced from each other therein. The grips are disposed in opposite directions so that with the insertion of an explosive cartridge in either end of the coupler tube, the cartridge will be held therein by at least one of the grips. It is greatly preferred that one of the grips be slidable within the coupler tube.

The invention may be more readily understood by referring to the accompanying drawings in which like numerals are employed to designate corresponding parts throughout the several views. However, it is understood that these views represent preferred embodiments and are not intended to limit the scope of the invention.

Figure 1 is a view in cross section of the coupler unit before the insertion of the cartridges therein. Figure 2 is a similar view of said coupler with a cartridge held therein by the slidable grip, in position for shipment. Figure 3 is a similar view of the same assembly in an extended state preparatory to loading. Figure 4 is a view of two cartridges joined by said coupler. Figure 5 is a

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view of a continuous column of explosive built up by means of the couplers of the invention. Figures 6 and 7 are side and end views of the ferrule grip. Figures 8 and 9 are similar views of a rubber grip. Figures 10 and 11 are similar views of a plastic grip.

Referring in greater detail to the various figures, numeral 1 of Figure 1 designates a thick walled paper tube. Disposed therein are the metal ferrule grips 2 and 2*a* with corrugated edges 3 and 3*a* respectively. Each corrugated edge faces away from the end of the tube which is to receive the cartridge to be gripped thereby. One of the grips is stationary and the other slidable within the tube. The stationary grip 2 is retained in place within the tube, between cylindrical paper stops 4 and 4*a* concentric with the tube and glued to the inner wall of the same. The slidable grip 2*a* is free to move between the stops 4*a* and 4*b* which are spaced sufficiently far apart within the tube that a substantial freedom of movement is permitted with respect to the sliding grip.

In Figure 2 the cartridge 5 has been inserted into the coupler tube 1 and is retained therein by a frictional contact with the slidable grip 2*a* effected by the corrugated edges 3*a* which resist force applied to withdraw the cartridge from said grip by biting into the cartridge wrapper, said cartridge occupying most of the tube. In this telescopic position, the assembly is especially adapted to be shipped with conservation of space.

Upon arrival at the place of use, the assembly is extended as shown in Figure 3 by forcing the cartridge partly out of the tube so that the slidable grip 2*a* rests against the stop 4*b*.

A second cartridge may now be inserted into the other end of the coupler, to be held in place against the first cartridge by the stationary grip 2, as shown in Figure 4. A column of any suitable length may be built up in this way as shown in Figure 5.

In Figures 6 and 7 the ferrule grip is shown in detail being enlarged to depict more clearly the corrugated edge 3 on one end of the grip.

Figures 8 and 9 show suitable structure for grips formed from rubber.

Figures 10 and 11 show a plastic grip which can be held in place within a coupler tube merely by friction or by resting it in a shallow groove in the inner wall of the tube with or without the use of built-in stops. Additional complementary grooves may be formed on the wall of the cartridge to be gripped to supplement the frictional gripping effect.

Although we greatly prefer that one of the grips within the coupler tube shall be slidable therein, it is conceivable that some loading problems may require that the grips be entirely stationary within the tube. Indeed, another embodiment can be employed wherein the slidable grip itself has the corrugated edge flared both inwardly and outwardly to bite into the inner wall of the tube as well as the outer wall of the cartridge. Such an arrangement prevents further movement of the cartridge within the tube after its insertion and renders the slidable grip stationary after the assembly has been extended in the field.

The blasting assembly according to this invention offers outstanding advantages to the art of seismic prospecting. Although the several advantages of my invention are made more readily understandable by noting the disadvantages attendant on various conventional devices used to fasten cartridges of a seismic charge into a column hereinbefore pointed out, some of the advantages of the present invention are hereinbelow enumerated. A remarkable feature of this container is that it renders possible joining cartridges together quickly and easily to form a column of explosive characterized by strength and rigidity sufficient to withstand the most severe conditions encountered in loading ill-defined seismic drill holes. Furthermore, by means of the unit containers of my invention, a rigid column of explosive is easily and quickly formed of any desired length and weight at the drill hole. Moreover the rigidity imparted to a column of explosive by my unit containers assures the axis of said column into a cavernous drill hole, or one blocked with mud or other objectioable matter, without any column breaks and waste of time and materials. A further advantage of my containers is that they enable the forming of a column characterized by close contact of the cartridges constituting said column, so that propagation of the explosion is enhanced. An additional aspect of the unit container according to the present invention lies in the fact that, in loading a charge into a hole which is free from obstruction, said charge can be lowered to position in one operation as a continuous column with complete assurance that none of the cartridges will drop from the column into a cavity or stick in the drill hole and prevent proper loading thereof. A further advantage lies in the cap protection provided by the tube. Also the top of the tube, in loading into the hole, serves as a cup to receive the loading pole and direct the energy applied. With these features in mind, the importance of my invention to the art of seismic prospecting will be appreciated.

Preferably I form tubes of heavy paperboard material. However, I may construct tubes of other materials which will allow the carrying out of my invention. I may use for example tubes of various plastic materials, hard rubber, various metals and, in fact, any material possessing the essential rigidity and capable of being shaped in such manner as to permit the butting together of adjacent cartridges. In bonding the inserted tube to the outer tube any suitable

adhesive may be used, but I find it advantageous to employ glue which has been made water resistant by treatment with formaldehyde, in accordance with the procedure disclosed in the copending application of Johnson, Serial No. 462,329, filed October 17, 1942.

Although I prefer to employ a plurality of separate grips within the tube, it should be understood that any suitable variation from this arrangement may be employed. For instance, I may employ a plurality of gripping edges on a particular gripping unit, either facing in the same direction to give added strength to the grip, or facing in different directions for special conditions. Alternatively, I may join the single spaced gripping units into one continuous unit so that a single insert will contain the two or more spaced grips in place of employing separately trapped single gripping units within the tube.

Whereas the invention has been described particularly with reference to seismic blasting operations, it should be understood to be applicable for any blasting use, including demolition uses involving not only commercial explosives but also military explosives such as trinitrotoluene and the like.

The present invention has been described in detail in the foregoing but it will be understood that many variations may be made in the form of couplers, annular holding devices or rings, and in the type of materials used for said couplers and rings. That is, any rigid, rubber-like or resilient material may be used for said rings, for example, any rigid and substantially nonmalleable metal, alloy, plastic or other material may be used. Thus steel, brass, tin, aluminum, glass, and thermosetting or thermoplastic resins and the like are applicable. Therefore, it will be understood that the details and examples given hereinbefore are illustrative only and in no way limiting on this invention as broadly described hereinabove and in the appended claim.

I claim:

An explosive coupler unit for a blasting column assembly, comprising a tube with a plurality of grips separated from each other therein said grips being in the form of ferrules, one of said ferrules being attached to the inner wall of said tube and another of said ferrules being slidable within said tube.

ROBERT E. FOGG.

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