

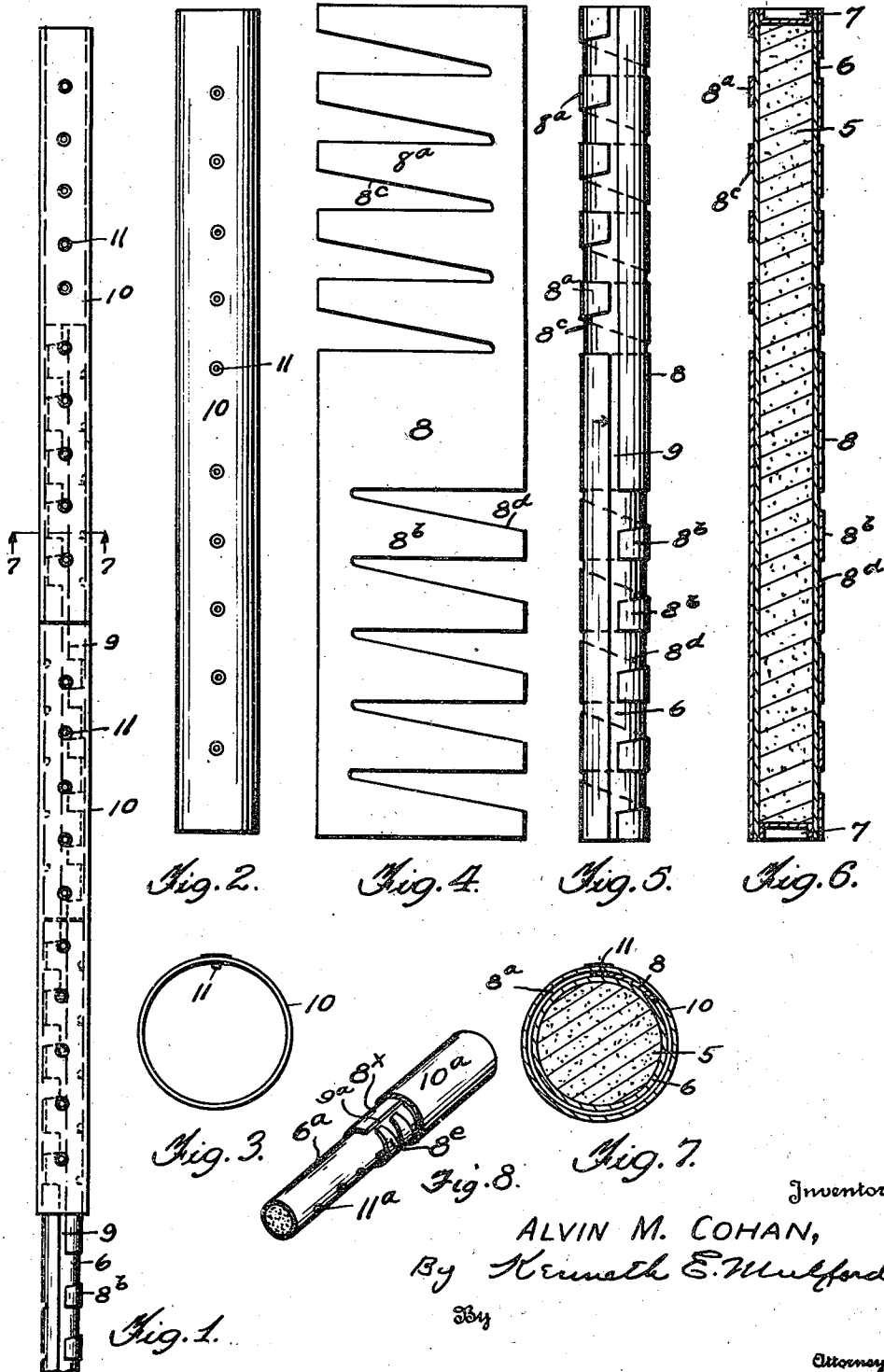
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BLASTING EXPLOSIVE

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BLASTING EXPLOSIVE

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The purpose of the present invention is to provide a simple, rapid and economical method of and means for connecting a plurality of explosive cartridges or shells, end to end, in such manner as to provide a strong and rigid assembly adapted to be placed in bore holes, to be there exploded.

The assembly of the present invention is of particular utility in connection with seismograph operations. However, the principles, as well as the structure, shown and described, are capable of use in any relation where it is desired to connect a plurality of explosive packages, end to end, and wherein the connection must be of such nature as to support the weight of the packages containing the explosive material. In many cases the explosives used in deep well blasting, as well as in seismograph operations, are contained in paper wrappers. Certain other explosives used in bore holes of wells are placed in metal containers and these containers are provided with connecting means upon their ends, by means of which a number of such containers may be connected end to end. In the case of metal containers it has been possible to make the connections upon the ends of the containers of such strength as to support the weight of the desired number of containers. In the case of paper wrappers, however, it has been difficult to provide a type of connector which will be strong enough to support the weight of a plurality of explosive cartridges without undue complexity of structure and resulting expense.

The following description, in conjunction with the accompanying drawing, will show that I have produced a structure wherein the cartridges or shells do not rely on end connections, but are supported substantially throughout their entire length. This results in providing a strong assembly capable of supporting a number of explosive cartridges. It will also be noted that these elongated connecting surfaces are of the bayonet joint type so that very quick connection of the cartridges can be effected; all as will be hereinafter set forth.

In the accompanying drawing, wherein like numerals designate corresponding parts throughout the several figures:

Fig. 1 is a side elevation, showing two of the connecting sleeves and the associated explosive packages;

Fig. 2 is a side elevation of one of the connecting sleeves;

Fig. 3 is an enlarged end elevation of the sleeve of Fig. 2;

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Fig. 4 is a plan view of a blank of a heavy paper, cut as shown;

Fig. 5 is a side elevation of a paper wrapper explosive package or cartridge, having the structure of Fig. 4 wrapped thereon;

Fig. 6 is a longitudinal, vertical sectional view of the structure of Fig. 5;

Fig. 7 is a transverse sectional view, upon line 7—7 of Fig. 1, and

Fig. 8 is a sectional perspective view, illustrating a modified form of the invention.

In the drawing 5 designates a body of explosive material that is contained in a cardboard or paper wrapper 6. The ends of this wrapper are closed by caps or plugs 7, of paper cardboard or any other suitable material.

A sheet of heavy paper or other suitable material 8 is cut to the shape illustrated in Fig. 4 and such paper is then wrapped about and glued, or otherwise secured, to the outer face of cartridge or shell 6. By referring to Fig. 5 it will be seen that the sheet 8 is of such amplitude that it does not extend all the way around the cartridge 6, but, upon the contrary, its edges fall enough short of meeting to leave a channel or keyway 9 extending from end to end of the shell or wrapper 6.

The cutting of the sheet of Fig. 4 as illustrated provides the two groups of fingers 8^a, 8^b, having the inclined surfaces 8^c, 8^d, respectively, which provide a series of cylindrical cams extending only part way around the cartridge or shell. Connecting sleeves 10 (Fig. 2) are provided with a row of spaced studs 11, the inner ends of which extend inwardly beyond the inner faces of the sleeves, for engagement with the cams. These studs are spaced to coincide with the notches by which the fingers are formed. The sleeves 10 may be of paper, fibre or any other suitable material and may be convolutely or otherwise wound or formed. The studs may be metal buttons or rivets fastened through the paper, or they may be knots of string or made of other suitable material or fastened onto the sleeve by other convenient means, as, for example, a tape pasted on the sleeve, etc.

In operation a sleeve (Fig. 2) is slid over a shell or cartridge (Fig. 5) with the stud ends passing along channel 9, until half of the shell is encased; that is, until the end of the sleeve reaches the point indicated by the arrow in Fig. 5. By turning the sleeve on the shell a half turn or so the stud ends enter the spaces and engage the fingers or inclined cam surfaces to prevent the shell from pulling out. Another shell placed

in the open end of the sleeve in the same manner will butt tightly against the first shell. To connect more than two shells, another coupling sleeve is placed over one of the exposed ends of the above described assembly and another shell is placed in it. The turning of the sleeves with respect to the shells or the turning of the shells with respect to the sleeves, in the proper direction not only draws shell to shell, but it also draws sleeve to sleeve, with the ultimate result of producing an assembly that is strong and rigid, despite the fact that in many cases it is made principally of paper, or other non-metallic substances. It will usually be found desirable in order to conserve shipping space to pack each shell with a sleeve slid over it. In this connection it should be noted that my stud and channel arrangement provides a simple and rapid means for longitudinally sliding sleeves onto and off of shells when packing the cartridges for shipment and also when using them in the field. I wish to make it clear that metallic containers are not excluded from the scope of my invention because the basic principle of locating the bayonet type connections along the longitudinal faces of the containers rather than wholly at the ends, is novel with me as far as I am informed and it may be incorporated in containers of any material. However, the construction described is of particular utility in connection with paper wrapped explosives because it never requires complete rotation of the explosive cartridges with respect to the sleeves, and it requires no rotation of these parts, at all, until the cartridges are almost in abutting position. It is highly desirable to use paper in the manufacture of the article, for the reason that paper is cheap and non-sparking. However, paper has a high coefficient of friction and a construction such as that herein disclosed, which imposes upon the user no necessity of turning the parts with respect to each other until they have nearly reached final seating, is highly useful. The fingers or cams 8^a, 8^b, may be increased in number, at will, to provide additional engaging and weight carrying surfaces. Also they may be made with curved or otherwise modified surfaces so as to provide a greater locking action with a reduced amount of turning effort.

Further, I may cause the studs to be carried by the shells and the cam surfaces to be carried by the sleeves. Such a reversal of parts is illustrated in Fig. 8 where the shell 6^a carries studs 11^a corresponding in function to the studs 11 of Fig. 2. A heavy sheet of paper or other suitable material 8^x, cut to form fingers 8^c corresponding to fingers such as those previously indicated as 8^a, 8^b, 8^c, 8^d, is glued or otherwise secured to the inner face of a sleeve 10^a which corresponds in function to sleeve 10. The edge of the fingers provide cam surfaces which coast with the studs 11^a. The width of the sheet 8^x is such, with respect to the diameter of the sleeve, that a channel 9^a is left through which the outwardly protruding ends of the studs may pass as the sleeve and shell are slipped freely endwise with respect to each other in the initial positioning of the parts. After two shells have reached substantially abutting positions turning movement of the shells and sleeve with respect to each other will cause the shells to be forced tightly against each other and will also cause an interlocking of the shells and sleeve in such manner that they will not separate under endwise strain, pull or the action of gravity.

I wish it to be understood that the accompany-

ing illustration and description are merely explanatory of one form of the invention, and that it includes within its purview whatever changes fairly come within either the terms or the spirit of the appended claims.

Having described my invention, what I claim is:

1. In an explosive assembly, a plurality of paper wrappers containing explosive material and constituting explosive shells, a secondary wrapper of relatively thick paper upon the outer face of each of said shells, said secondary wrapper being cut on opposite edges to form two groups of oppositely facing fingers spaced to provide lateral openings between them, the lower edges of one group of fingers and the upper edges of the other group of fingers being inclined to constitute cams, and each of said secondary wrappings extending less than the full distance around its shell to leave a free channel extending the full length of the shell, a plurality of sleeves each substantially coextensive in length with one of said shells, studs along the interiors of said sleeves spaced to enter said openings and engage said cams, whereby said shells and said sleeves may be assembled by passing said studs through said channel and said studs and said cams inter-engaged upon relative turning movement of the shells and sleeves to thereby exert an endwise thrust to force shell against shell and sleeve against sleeve throughout the length of the assembly.

2. In an explosive assembly a plurality of explosive filled cylindrical shells, a paper wrapping about each of said shells, each of said wrappings comprising two sets of oppositely facing fingers, one set at each of its opposite ends, those edges of the wrapping behind each set of fingers presenting a straight line longitudinally of its said shell and the said fingers being of such length as to fall short of extending entirely around the shell, thereby leaving a longitudinal channel lengthwise of the shell into which the spaces between said fingers open and all of the walls of which channel are defined by paper surfaces, a plurality of tubular sleeves dimensioned to slip over said shells and carrying rows of inwardly projecting elements disposed in a straight line lengthwise of the sleeves to adapt them to pass through said channels of the shells and to enter the spaces between said fingers when the shells are turned with respect to the sleeves, the edges of each set of fingers facing the center of said wrapper being shaped to constitute cams, the spacing of the cams and the inwardly projecting elements being such as to act to draw the confronting ends of the explosive filled shells into the sleeves and into contact with each other, to facilitate the propagation of the explosive wave through an assembled column of said shells and sleeves.

3. In an explosive assembly, a plurality of paper wrappers containing explosive material and constituting explosive shells, a plurality of sleeves substantially coextensive in length with one of said shells and dimensioned to fit over said shells, a secondary wrapper of relatively thick paper on one confronting surface between each of said shells and said sleeves, said secondary wrapper being cut on opposite edges to form two groups of oppositely facing fingers spaced to provide lateral openings between them, the lower edges of one group of fingers and the upper edges of the other group of fingers being inclined to constitute cams and each of said secondary wrappers extending less than the full distance around the surface on which it lies to leave a free channel

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extending the full length of the shell, and studs along the other confronting surface between each of said shells and said sleeves spaced to enter said openings and engage said cams, whereby said shells and said sleeves may be assembled by passing said studs through said channel and said studs and said cams engaged upon relative turning movement of the shells and sleeves to thereby exert an endwise thrust to force shell against shell and sleeve against sleeve throughout the length of the assembly.

4. In an explosive assembly, a plurality of paper wrappers containing explosive material and constituting explosive shells, a plurality of sleeves each substantially coextensive in length with one of said shells, a secondary wrapper of relatively thick paper upon the inner face of each of said sleeves, said secondary wrapper being cut to form two groups of oppositely facing fingers spaced to provide lateral openings between them, the lower edges of one group of fingers and the upper edges of the other group of fingers being inclined to constitute cams and each of said secondary wrappings extending less than the full distance around its sleeve to leave a free channel extending the full length of the sleeve and a longitudinal row of studs along the exterior of each of said shells spaced to enter said openings and engage said cams whereby said shells and said sleeves may be assembled by passing said studs through said channels and said studs and said cams interengaged upon relative turning movement of the shells and sleeves to thereby exert an endwise

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thrust to force shell against shell and sleeve against sleeve throughout the length of the assembly.

5. In an explosive assembly a plurality of explosive filled cylindrical shells, a plurality of tubular sleeves dimensioned to slip over said shell, a paper wrapping upon the inner face of each of said sleeves, each of said wrappings comprising two sets of oppositely facing fingers, one set at each of its opposite ends, those edges of the wrapping behind each set of fingers presenting a straight line longitudinally of its said sleeve and the said fingers being of such length as to fall short of extending entirely around the sleeve, thereby leaving a longitudinal channel lengthwise of the sleeve into which the spaces between said fingers open and all of the walls of which channel are defined by paper surfaces and rows of outwardly projecting elements disposed in a straight line upon the exterior of the shells to adapt them to pass through said channels of the paper wrapping, and to enter the spaces between said fingers when the shells are turned with respect to the sleeves, the edges of each set of fingers facing the center of said wrapper being shaped to constitute cams, the spacing of the cams and the outwardly projecting elements being such as to act to draw the confronting ends of the explosive filled shells into the sleeves and into contact with each other, to facilitate the propagation of the explosive wave through an assembled column of said shells and sleeves.

ALVIN M. COHAN.

Certificate of Correction

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ALVIN M. COHAN

It is hereby certified that errors appear in the printed specification of the above numbered patent requiring correction as follows: Column 3, line 59, for "edge" read *edges*; column 5, line 26, claim 4, for "length or" read *length of*; and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 11th day of March, A. D. 1947.

[SEAL]

LESLIE FRAZER,
First Assistant Commissioner of Patents.