Dec. 23, 1958 G. B. BONSPER 2,865,290

CARTRIDGE COUPLING DEVICE

Filed Feb. 7, 1955

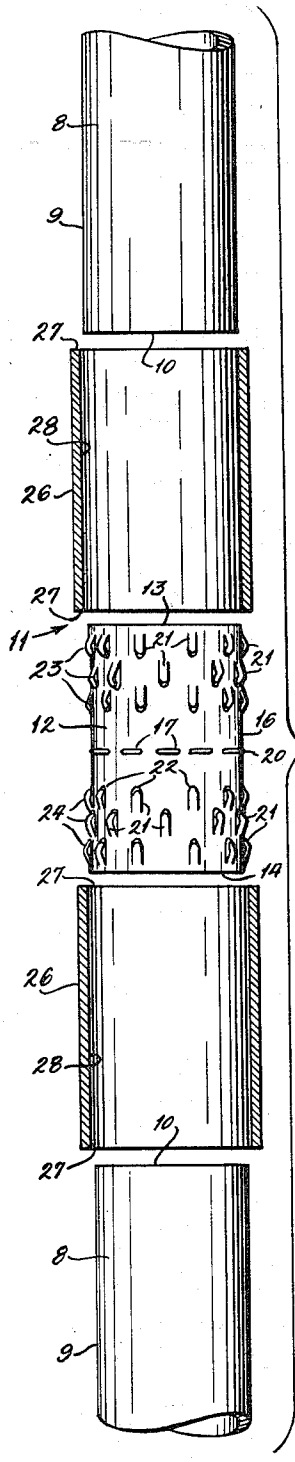


FIG. 1.

FIG. 2.

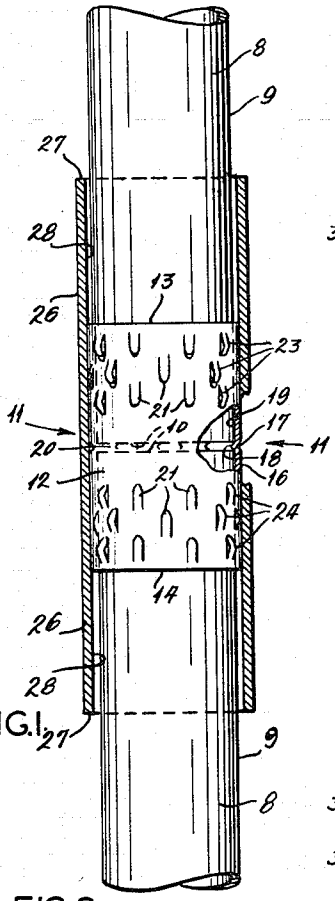


FIG. 3.

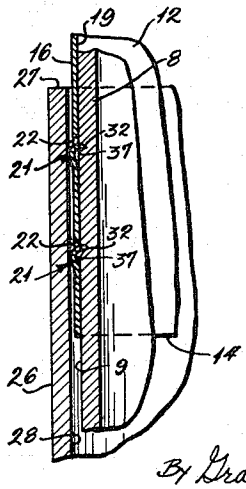


FIG. 4.

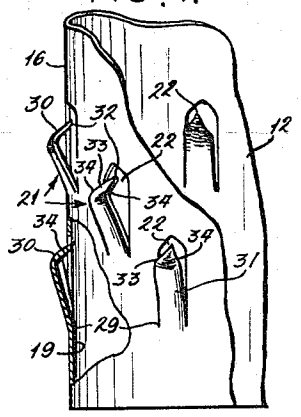
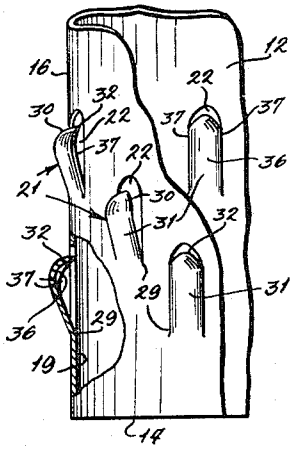


FIG. 5.



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United States Patent Office

2,865,290

Patented Dec. 23, 1958

2,865,290

CARTRIDGE COUPLING DEVICE

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Application February 7, 1955, Serial No. 486,535

2 Claims. (Cl. 102—22)

This invention relates to coupling devices, and particularly to explosive cartridge assemblies or columns of the kind used for geophysical prospecting, particularly seismograph prospecting for oil.

In preparing a column of explosive cartridges for seismograph prospecting, individual cartridges must be secured together to make up the desired amount of explosive, and it is well known that end abutment of adjacent cartridges produces the best explosive wave propagation, when the column is detonated. Safe and positive locking means for assuring the end abutment of adjacent cartridges and excluding the possibility of their separating during placement in a "shot hole" has not been shown by a coupling device not having other equally undesirable features.

It is, therefore, an object of the present invention to provide a coupling means especially adapted for connecting explosive cartridges to be used in seismic blasting operations.

Another object is to provide a coupling device which will assure a safe and reliable connection in order to prevent any relative endwise or rotational movement between the cartridges secured thereby.

Another object is to provide a coupling means for the interconnection of cartridges in a simple, economic and positive manner.

These and other objects and advantages will become apparent hereinafter.

The invention is embodied in a novel coupling device including a coupler sleeve to enclose the ends of adjacent cartridges, the coupler sleeve having a plurality of claw-like prongs adapted for engagement in the cartridge wall as other sleeves are moved over the coupler sleeve.

The invention also consists in the parts and in the combinations and arrangements of parts hereinafter described and claimed. In the accompanying drawings which form a part of this specification and wherein like numerals refer to like parts wherever they occur:

Fig. 1 is an exploded view of a cartridge coupling device,

Fig. 2 is a longitudinal elevational view partly in section showing the coupler applied to a pair of adjacent cartridges,

Fig. 3 is a fragmentary sectional view showing the gripping effect of the prongs in a cartridge,

Fig. 4 is a fragmentary view partly in section of one form of prongs employed in the coupler, and

Fig. 5 is a fragmentary view partly in section of another form of prongs employed in the coupler.

Referring to the drawings, Fig. 2 shows explosive cartridges 8 having outer surfaces or walls 9 and ends 10, the cartridges 8 being secured in end to end relationship by a novel cartridge coupling device 11 to form part of a column of explosives that is especially adapted for seismic exploration, although the principles of this invention are applicable to any type of cartridge.

As shown in Fig. 1, the cartridge coupling device 11 comprises a cylindrical coupler casing or sleeve 12 having

open ends 13 and 14. It is to be understood that the casing may be formed into other conventional shapes, a sleeve 12 having been shown as the preferred shape for the reason that explosive cartridges are generally cylindrical in order to withstand maximum pressures and for easier insertion in the "shot hole" without snagging. Furthermore, the sleeve 12 is preferably constructed from a metal that will retain its shape when bent, although it is within the scope of this invention to construct the sleeve 12 from other materials.

The coupler sleeve 12 has an outer surface 16, which may have a series of indentations 17 formed circumferentially therein to provide projecting surfaces or abutments 18 extending radially inwardly from the inner surface 19 of the sleeve 12. The indentations 17 are formed in the sleeve 12 substantially equidistant from each of the ends 13 and 14 to define the center 20 of the sleeve 12, Fig. 2. The diameter of the inner surface 19 of the sleeve 12 is larger than the diameter of the outer walls 9 of the cartridges 8 so that the cartridges may be easily inserted into the sleeve 12 from its opposite ends 13 and 14. However, the abutments 18 will restrict the insertion of the cartridges 8 to adjacent the center 20 of the sleeve 12 by the engagement of the cartridge ends 10 thereon.

A plurality of prongs or teeth 21 are formed from the sleeve 12 in any suitable manner to provide groups of prongs intermediate the center 20 and each of the ends 13 and 14, an opening 22 defining the area of the sleeve 12 from which each of the prongs 21 is formed. The prongs 21 intermediate the center 20 and the end 13 of the sleeve 12 may be arranged in a series of rows 23, and the prongs 21 intermediate the center 20 and the end 14 may be arranged in a series of rows 24. The rows 23 and 24 are positioned relatively nearer to the ends 13 and 14 than to the center 20 of the sleeve 12 so that when the cartridges 8 are positioned therein, the rows 23 will be disposed circumferentially about the outer wall 9 of the cartridge 8 in the end 13 and the rows 24 will be disposed circumferentially about the outer wall 9 of the cartridge 8 in the end 14. All of the prongs 21 in each series of rows 23 or 24 are adapted to be forced radially inwardly through the openings 22 into biting engagement with the outer wall 9 of one of the adjacent cartridges 8 thereby providing positive locking means for securing the cartridges in adjacent end to end relationship, as will be described more fully hereinafter.

The cartridge coupling device 11 also comprises a pair of slip tubes or sleeves 26 which are preferably constructed from fiberboard or the like. Each of the slip tubes 26 has a longitudinal length between its ends 27 that is greater than the distance between the center 20 and one of the ends 13 or 14 of the sleeve 12. Each of the slip tubes 26 also has an inner surface 28 slightly larger in diameter than the outer surface 16 of the sleeve 12. The slip tubes 26 have been provided as one means for moving the prongs 21 into locking engagement with the outer walls 9 of the cartridges 8.

Referring to Figs. 4 and 5, each of the prongs 21 has a base 29 integrally connected to the sleeve 12 and an unattached cartridge-engaging end 30 with a longitudinal body 31 therebetween. The unattached or free end 30 may be shaped into a curved claw having a piercing point or tip 32 formed at substantially right-angles to the longitudinal body 31 which is angularly positioned relative to the outer surface 16 of the sleeve 12 so that the point 32 on the free end 30 is disposed radially outwardly of the inner surface 19 of the sleeve 12. Therefore, the inner surface 19 is not obstructed and the cartridges 8 may be inserted into the sleeve 12 without engaging the points 32 on the prongs 21.

As seen hereinbefore, the prongs 21 are arranged to comprise a positive locking means for securing the car-

tridges 8 in end to end relationship thereby preventing relative endwise or rotational movement therebetween. The locking action is derived principally from the shape of the prongs 21 and their position relative to the cartridges 8, when engaged therein. Two preferred forms of the prongs 21 will now be described.

Referring to Fig. 4, the free end 30 of each of the prongs 21 is curved from the longitudinal body 31 inwardly to the point 32, and is provided with a transverse channel, depression or groove 33 defined by side flanges 34. The outer margins of the side flanges 34 converge to the piercing point 32 and form cutting edges for facilitating the engagement of the free end 30 in the walls 9 of the cartridges 8. The depressed portion 33 is concave relative to the center 20 of the sleeve coupler. When the prongs 21 are forced into the outer walls 9 of the cartridges 8, the depressed portion 33 forms a radial abutment surface which is engaged by a coacting surface of the cartridge wall 9 so that relative endwise movement between the sleeve 12 and the cartridges 8 is prevented. Any tendency of the cartridges to be withdrawn from the sleeve 12 would result in a tighter fit of the cartridge wall 9 with the prongs 21 inasmuch as the force exerted on the free ends 30 would be transmitted through the longitudinal body 31 of each of the prongs 21 to the sleeve 12. Furthermore, when the prongs 21 are positioned in the cartridge walls 9, the side flanges 34 provide curving inclined surfaces in spaced circumferential relationship with the cartridges 8 so that no cutting action by the outer margins of the flanges 34 will take place and relative rotational movement between the cartridges 8 and the sleeve is prevented.

Fig. 5 shows that each of the prongs 21 may be provided with a claw-shaped free end 30 which, with the longitudinal body 31, is formed into a channel, depression or scoop 36 defined by channel walls 37 on the sides and the piercing point 32 at the end. The piercing point 32 has cutting edges extending rearwardly toward the adjacent end of the sleeve, the cutting edges being the outer margins of the inclined side flanges or channel walls 37. Obviously, the prongs 21 shown in Fig. 5 differ only from the prongs 21 shown in Fig. 4 in that the channels 36 are formed on the inner surfaces of the prongs whereas the channels 33 are formed in the outer surfaces of the prongs. When engaged in the cartridges 8, the channel walls 37 extend radially inwardly into the cartridge walls 9 and provide flat surface abutments in spaced circumferential relation preventing rotational movement of the cartridges 8 relative to the sleeve 12. The scooped free end surfaces 30 coact with the cartridge walls 9 in a similar manner to the depressed portions 33 to prevent endwise movement of the cartridges 8 relative to the sleeve 12, Fig. 3.

When a series of cartridges 8 are to be joined together to form a column of explosives for seismograph prospecting, the coupling device 11 is employed to secure the adjacent ends 10 of the cartridges 8 in fixed abutting relationship. As seen above, when the sleeve 12 is formed, the longitudinal body 31 of each of the prongs 21 is angularly positioned relative thereto so that the points 32 will be disposed radially outwardly of the inner surface 19 of the sleeve 12, the longitudinal bodies 31 projecting outwardly a predetermined distance relative to the outer surface 16 of the sleeve 12 for engagement by the slip tubes 26. A pair of the cartridges 8 may be inserted into the sleeve 12 at the ends 13 and 14 until their ends 10 are engaged on the abutment 18 at the center 20 of the sleeve thereby spacing the cartridge ends a minimum distance apart. If desired, the abutment 18 may be eliminated in which case the ends 10 of the cartridges will be in abutting relationship.

When each of the cartridges 8 has been positioned in the sleeve 12 so that its end 10 is adjacent to the center 20 thereof, one of the slip tubes 26 is slipped onto the other end of each of the cartridges and moved axially over the sleeve 12 toward its center 20. As the slip tubes 26 are being moved toward the center 20 from the opposite ends 13 and 14 of the sleeve 12, the inner ends 27 of the slip tubes 26 will engage the longitudinal bodies 31 of the prongs 21 in the series of rows 23 and 24, respectively, thereby depressing the prongs 21 until the longitudinal bodies are enclosed by the inner surface 28 of the slip tubes 26. The points 32 on the free ends 30 of the prongs 21 are thus forced radially inwardly through the openings 22 into biting engagement with the outer walls 9 of each of the cartridges 8, Fig. 3.

When the column of explosive cartridges has been formed by securing the adjacent ends 10 of the cartridges 8 by the coupling means 11, a conventional blasting cap (not shown) may be inserted in the column in any suitable manner and the column positioned in a shot hole for detonation.

This invention is intended to cover all changes and modifications of the example of the invention herein chosen for the purposes of the disclosure, which do not constitute departures from the spirit and scope of the invention.

What I claim is:

1. A coupling device for securing explosive cartridges in endwise abutting relationship comprising a sleeve having a plurality of prongs formed therefrom, each of said prongs including a longitudinal body with a base integral with said sleeves and an unattached end, said unattached end being formed into a cartridge-engaging point, the unattached end curving through two planes to form axial and anti-rotational abutment surfaces when engaged in a cartridge, no portion of said prongs extending within the inner diameter of said sleeve in unassembled position, and slip tubes adapted to slide over said sleeve into engagement with said longitudinal bodies thereby moving said prongs radially inwardly relative to said sleeve to engage said prongs in the cartridges.

2. A coupling device for securing explosive cartridges in endwise abutting relationship comprising a sleeve having a plurality of prongs formed therefrom, each of said prongs having a longitudinal body positioned angularly outwardly of said sleeve, one end of said longitudinal body being formed integral with said sleeve and the other end of said longitudinal body being unattached, said unattached end having a depressed portion for preventing relative axial movement between said sleeve and a cartridge secured thereto, said unattached end also having side flanges curving from said depressed portion into spaced circumferential relationship, said unattached end being formed into a cartridge engaging point positioned outwardly of the inner diameter of said sleeve, and slip tubes adapted to slide over said sleeve into engagement with said longitudinal bodies thereby moving said prongs radially inwardly relative to said sleeve to engage the prongs in the cartridges.

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