

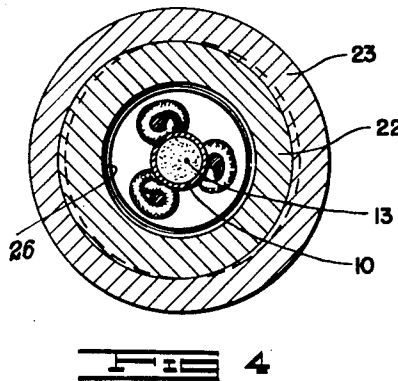
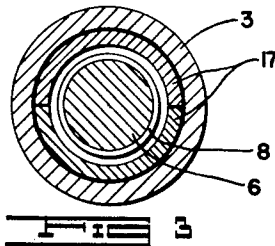
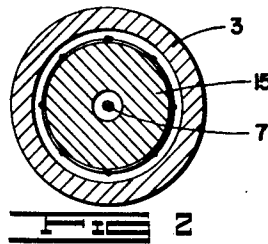
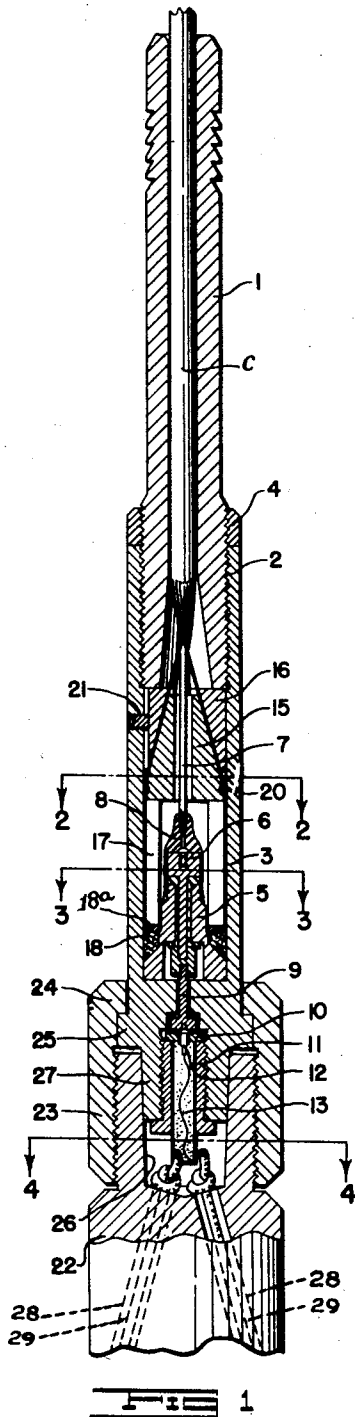
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CABLE CONNECTOR FOR GUN PERFORATORS

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CABLE CONNECTOR FOR GUN PERFORATORS

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My invention relates to a cable connector and firing head for gun perforators and included in the objects of my invention are:

First, to provide a device of this character which not only forms a mechanical connection between a suspension cable and a gun perforator but also incorporates an electrically initiated ignition cartridge for the purpose of firing the gun perforator.

Second, to provide a device of this character wherein the force required to pull the cable free may be predetermined so that should the need arise, such as may occur if the gun perforator should become stuck in the well bore, the cable may be pulled free upon exertion of a force below the safe maximum load of the cable.

Third, to provide a device of this character which is particularly easy to assemble and disassemble in the field.

With the foregoing and other objects in view, reference is directed to the accompanying drawings, in which:

Figure 1 is a longitudinal sectional view of my firing head and cable adaptor secured to a gun perforator shown fragmentarily.

Figure 2 is an enlarged transverse sectional view through 2-2 of Figure 1.

Figure 3 is another enlarged transverse sectional view thereof through 3-3 of Figure 1.

Figure 4 is another enlarged transverse sectional view through 4-4 of Figure 1.

My firing head and cable adaptor is intended to connect a conductor core cable designated C to a gun perforator for the dual purpose of supporting the gun perforator from the cable and to supply electrical energy to the gun perforator. A tubular cable sleeve 1 is adapted to receive the lower end of the conductor cable C and is threadedly connected at 2 within a recess or socket provided in the upper end of a body 3. The sleeve is locked in place by a lock nut 4.

Seated at the bottom end of the recess in the body 3 is a connector housing 5 through which extends an insulated conductor 6. The cable C is provided with a conductor core 7 which is electrically connected to the upper end of the connector 6. This juncture is made waterproof by a tape wrapping 8 or other waterproofing material.

The connector 6 is screw-threaded to a lower connector 9 which extends through and is insulated from the walls of an axial opening in the body 3. This opening communicates with a threaded socket extending upwardly from the lower end of the body 3 which receives an elec-

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trically fired detonator cartridge 10. The cartridge 10 is provided with a flange at its upper end and is held against the connector 9 by a threaded retainer bushing 11. The upper end of the cartridge is fitted with an insulated pin 12 which is attached to a filament 13 extending throughout the length of the cartridge and grounded into at its lower end. The cartridge is filled with a suitable explosive, preferably mixed with an initiator such as flashlight powder.

The cable C is secured in the upper socket of the body 1 by clamping the separated lower ends of the strands which comprise the cable. It is desirable that the force required to pull the cable free be less than the strength of the cable. Consequently, a predetermined number of the strands comprising the cable is selected to anchor the cable. By varying the number of strands so selected the "pull out" strength of the connection may be varied as desired. The selected strands are clamped between a conical wedge body 15 and a complementary circular solid wedge 16. A split spacer sleeve 17 and packing ring 18 and steel ring 18a are interposed between the wedge body 15 and the base of the connector housing 5. It will be observed that the base is enlarged to form a shoulder for this purpose.

To assemble the parts thus far described, the sleeve 1 is slipped over the end of the cable C and the conductor 7 is inserted through the opening in the wedge body 15 and in the wedge 13 and connected to the connector 6. The split spacer sleeve 17 is placed about the connector housing, and the cable strands are positioned on the wedge body 15 and initially held in place by a snap ring 20 or wire retainer. The circular wedge 16 is placed on the wedge body 15 and the assembly is then inserted into the recess in the body 3. As the threaded connection 2 between the socket 1 and the body 3 is made up, the packing 18 is compressed and the wedge 16 is forced downwardly to tightly secure the cable strands. A set screw 21 engages a slot in the wedge to prevent the wedge from being turned by the frictional drag of the sleeve member as the latter is turned. The lock nut 4 is then made up.

The head assembly is secured to the upper end of a gun body 22 by a coupling and adapter member 23 which threadedly engages the gun body and has a flange 24 engaging a flange 25 on the body 3. A downwardly tapered socket 26 is formed in the upper end of the gun body to tightly receive a similarly tapered extension 27 on the body 3. The coupling member 23 is also referred to as an adapter member because it is interchangeable

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able with other similar rings having internally threaded sockets of varying sizes to fit different sized gun bodies.

The gun body 22 is shown formed with bores 23 terminating at their upper extremities within the lower portion of the socket 26. Disposed within these bores 28 are lengths of a suitable fuse or detonator cord 29, the extremities of said cords being knotted. The cords 29 will be detonated upon explosion of the cartridge 10 and their lower positions are in communication with one or more loaded and primed gun bores (not shown), the charges of which will be fired upon detonation of the cords. It will be apparent that other detonation responsive devices might be fired by the said cords.

An advantage of the foregoing construction is that it permits assembly without twisting the cable or rotating the entire gun body. While making up the joint 2 between the sleeve 1 and the body 3, the sleeve may be held stationary and the body rotated. When connecting the body 3 to a gun body, only the coupling member 23 need be rotated.

This construction also facilitates dismantling and reassembly of the cable head assembly for inspection after completing a job. When the gun is submerged, well fluid will have access to the socket in the body 3 by means of the annular space existing between the cable C and the inner periphery of the sleeve 1. The insulation material 8 protects the electrical circuit from the well fluid. Therefore, it is customary to dismantle the assembly after completing a job, to inspect the internal parts.

Many other embodiments of the invention may be resorted to without departing from the spirit of the invention.

I claim:

1. In a firing head structure adapted to join a conductor cable to a gun perforator having an ignition chamber in one end, the combination of: a body member defining an ignition cartridge socket in one end and a cable socket in the opposite end; means for securing said body member to said gun perforator with said ignition cartridge socket confronting said ignition chamber; an electrically responsive ignition cartridge in said socket; a cable sleeve adapted to screw thread into the cable socket of said body member; complementary wedge elements adapted to clamp selected strands of a cable end protruding from

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said sleeve into said socket; an electrical connector housing at the inner end of said socket having a flange forming a packing abutment; a spacer means and packing element interposed between said flange and one of said wedge elements whereby upon screwing said cable sleeve into said socket, said strands are clamped and said packing element is expanded to seal said socket; and means extending through said housing for effecting electrical connection between the conductor of said cable and said cartridge.

2. In a firing head structure adapted to join a conductor cable to a gun perforator having an ignition chamber in one end, the combination of: a body member including means for connection to a gun perforator, and a socket adapted to receive the end of a cable; an electrically fired cartridge exposed to the upper end of said gun perforator; a cable sleeve adapted to screwthread into the cable socket of said body member; complementary wedge elements adapted to clamp selected strands of a cable end protruding from said sleeve into said socket; an electrical connector housing at the inner end of said socket having a flange forming a packing abutment; a spacer means and packing element interposed between said flange and one of said wedge elements, whereby upon screwing said cable sleeve into said socket, said strands are clamped and said packing element is expanded to seal said socket; and means extending through said housing for effecting electrical connection between the conductor of said cable and said cartridge.

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