May 24, 1938. T. C. GREEN 2,118,670

CONNECTER

Filed Sept. 14, 1936

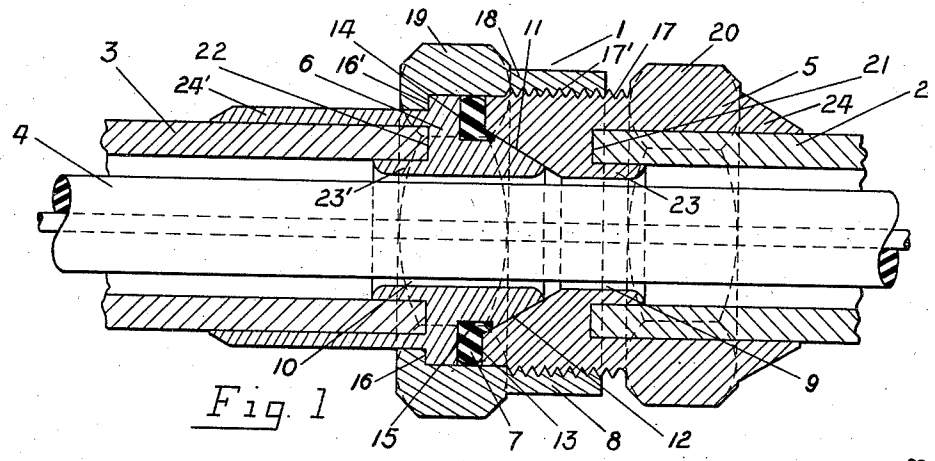

Fig. 1

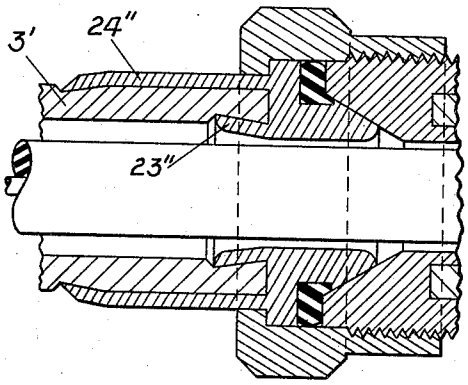

Fig. 2

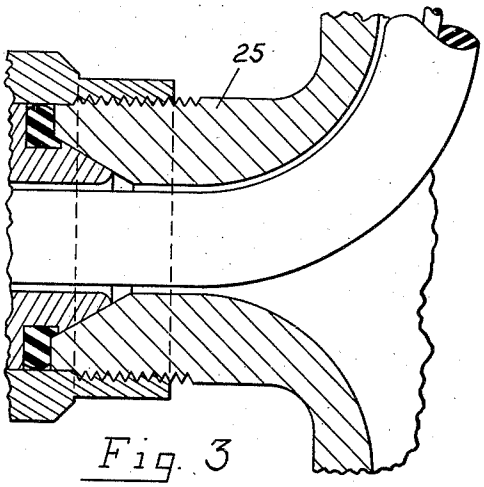

Fig. 3

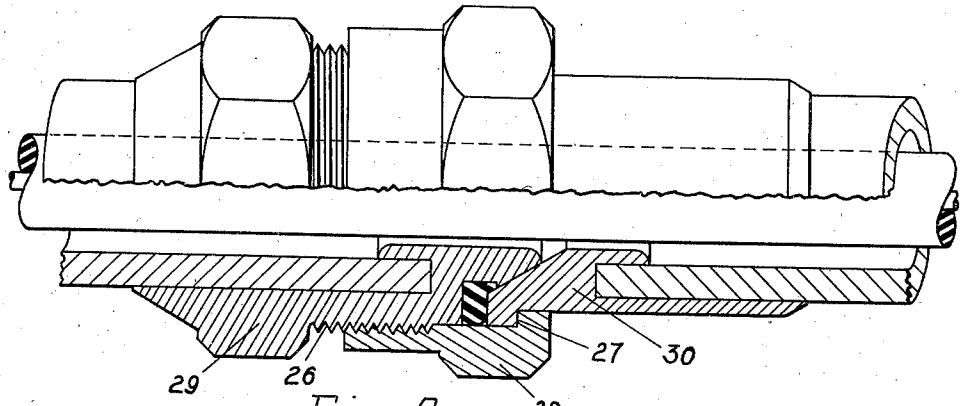

Fig. 4

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CONNECTER

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5 Claims. (Cl. 247—18)

(Granted under the act of March 3, 1883, as amended April 30, 1928; 370 O. G. 757)

My invention relates to a connecter or joint and more particularly to a connecter or joint for electrically conductive elements and for maintaining electrical continuity therebetween.

It is one object of my invention to provide an electrically continuous connecter or joint having a minimum number of parts and which is susceptible of being easily and economically manufactured.

It is another object of my invention to provide a connecter or joint wherein the juncture between the connecter parts is sealed against the connecter exterior whereby electrical continuity through the connecter or joint is insured.

It is another and further object of my invention to provide an electrically continuous connecter or joint wherein the juncture between the connecter parts is maintained by direct and intimate metallic contact, the said juncture being sealed against the connecter exterior to thus preserve unaltered the resistance through the connecter or joint.

It is another and still further object of my invention to provide a connecter for a plurality of electrically conductive shielding casings wherein the juncture between the connecter parts is maintained by direct and intimate metallic contact, the said juncture being sealed against the connecter exterior to thus preserve unaltered the resistance through the connecter and thereby insure an optimum of shielding effect by the shielding casings.

Other objects and many of the attendant advantages of this invention will be readily appreciated as the same becomes better understood by reference to the following description when considered in connection with the accompanying drawing wherein:

Fig. 1 is an assembled view in section of my connecter as used for a plurality of shielding conduits;

Fig. 2 is a view in section of an assemblage similar to that of Fig. 1 and differing thereover only in the manner in which the shielding conduits are secured to the connecter parts;

Fig. 3 is an assembled view in section of my connecter as used in joining a shielding conduit to an ignition manifold ring, and wherein one of the connecter parts is integral with the ignition manifold ring and forms an outlet thereof; and

Fig. 4 is a view in partial section of another embodiment of my invention which is similar to that shown in Fig. 1 except that the male connecter part is threaded instead of the female connecter part.

In order to effectively shield extraneous apparatus against electro-magnetic and electrostatic disturbances caused by ignition circuits of internal combustion engines it is essential that the circuit be completely encased by a metallic surface; that the enveloping metallic surface be grounded at its ends and at suitable intervals therebetween; and that the enveloping metallic surface be electrically continuous throughout its length. Failure of the enveloping metallic surface to properly and effectively shield against the deleterious disturbances generated by the ignition circuits is caused principally by lack of electrical continuity along the enveloping metallic surface or an increase in resistance of the enveloping metallic surface over that at which optimum shielding is obtained. This lack of electrical continuity or increase of resistance takes place at the connecters or joints forming a part of the enveloping metallic surface. As long as the contacting surfaces of the connecters or joints are in intimate metallic contact and remain free from dirt, oil, gasoline, or other extraneous matter, the enveloping metallic metal surface will effectively shield. If, however, the contacting surfaces of the connecters or joints are not in intimate metallic contact or do not remain free from extraneous matter, there will be a lack of electrical continuity or an increase of resistance through the connecters or joints with attendant interruption or malfunctioning in the shielding properties of the enveloping metallic surface.

My invention seeks to provide a connecter which is not only electrically continuous but one whose resistance is preserved unaltered, this being accomplished by maintaining a direct and intimate metallic contact between the male and female connecter parts by causing a wedging action between their contacting surfaces through the medium of a suitable coupling and tensioning means, the contact or juncture between the connecter parts occurring within the confines of a compressible, fluid impervious means to thus effectively seal the juncture against the connecter exterior and hence against the introduction of any extraneous matter such as, for example, oil, gasoline, water or moisture, which would have a tendency to increase the resistance through the connecter or to destroy its electrical continuity.

The connecter or joint of my invention is intended primarily for use with the shielding of aircraft ignition circuits and is so described in its specific applications hereinafter. In this environment it may be used to connect electric shielding conduit both flexible and solid to the

manifold ring, spark plug shieldings, junction boxes, other shielding conduits and to electrical units of all kinds. It is to be emphasized, however, that the connecter or joint of my invention is not restricted to the aforementioned use but may be used wherever and whenever an electrically continuous joint or connecter is desired as well as one whose resistance is preserved unaltered. Thus as illustrative, but not restrictive, of the scope of its use my connecter or joint may advantageously be employed for connecting together a plurality of solid or tubular electrical conductors or a plurality of conduits which it is desired to maintain at ground potential throughout their combined length.

Turning now to the drawing there is shown in Fig. 1 in assembled relation a connecter or joint identified in general by the numeral 1 for connecting together the shielding conduits 2 and 3 housing the ignition cable 4, the said connecter consisting of a female connecter part 5, a male connecter part 6, a deformable and compressible gasket which serves as a fluid impervious sealing means 7 interposed between the connecter parts and a conventional coupling 8 for maintaining a direct and intimate metallic contact between the connecter parts and for causing the connecter parts to compress the gasket 7 whereby to seal the surfaces of contact between the connecter parts against the connecter exterior.

The female and male connecter parts 5 and 6 are apertured at 9 and 10, respectively, to permit the passage of the ignition cable 4 from one shielding conduit to the other. In addition, the female connecter part 5 is provided with a conical recessed surface 11 with which a corresponding conical surface 12 of the male connecter part 6 is adapted to contact to thereby insure electrical continuity through the connecter. While the contacting surfaces of the male and female connecter parts are shown as conical in shape I do not desire to be restricted thereto since other inclined contact surfaces may be employed within the purview of my invention and will readily suggest themselves to those skilled in the art, hemispherical surfaces and pyramidal surfaces being illustrative but not restrictive of such other inclined surfaces.

The female and male connecter parts 5 and 6 are furthermore provided with bearing faces 13 and 14, respectively, extending outwardly of the connecter or joint from points adjacent the outermost edges of the conical or inclined surfaces 11 and 12, these bearing faces being adapted to abut against the sides of the deformable, fluid impervious gasket 7 interposed therebetween to compress the same and thereby seal the surfaces of contact 11 and 12 between the connecter parts or members 5 and 6 against the connecter exterior. The gasket 7 is preferably although not necessarily annular in shape and is placed about and supported by the cylindrical portion 15 of the male connecter part 6. The sealing means may be fabricated from synthetic rubber or any other suitable material so long as the material chosen is fluid impervious, will withstand the weather, and be reasonably resistant to fluids such as, for example, gasoline, oil and water.

In order to insure a direct and intimate metallic contact between the contacting surfaces 11 and 12 of the connecter parts and a compression of the gasket 7, the male and female connecter parts have been provided with a flange 16 and screw threads 17, respectively, which are adapted to engage a complemental flange 16' and internal screw threads 17' of a coupling sleeve or nut 18. Portions 19 and 20 of the coupling sleeve or nut and of the female connecter part are hexagonally or otherwise shaped to permit the use of a wrench for tightening purposes. The coupling sleeve or nut 18 in addition to holding the contact surfaces 11 and 12 of the connecter parts in intimate and direct metallic contact, and causing a compression of the gasket 7, serves also to furnish some protection to the fluid impervious sealing means 7 and to provide a secondary electrically conductive path between the male and female parts of the connecter.

The female and male connecter parts 5 and 6 are recessed or rabbeted at 21 and 22, respectively, to provide inner walls 23, 23' and outer walls 24, 24' between which the shielding conduits 2 and 3 are received. Since in this embodiment of my invention the male and female connecter parts 5, 6 and the coupling sleeve 18 are made of brass, bronze or other alloys or metals which can be readily soldered, the male and female connecter parts 5 and 6 are attached to their respective shielding conduits 2 and 3 of similar material by sweating the outer walls or sleeves 24 and 24' with solder to the outside of the conduits. The inner walls or sleeves 23 and 23' on the connecter parts 5 and 6 in this case serve to support the inside of their respective shielding conduits and to prevent their sharp edges from causing damage to the ignition cable 4.

Where, however, the connecter parts are made of an aluminum alloy or other alloy or metal which cannot conveniently be soldered to a shielding conduit of similar material, another method of securing the connecter parts and shielding conduits together must be employed. Such an alternate mode of connection is shown in Fig. 2 of the drawing wherein the outer sleeve 24'' is swaged inwardly around the shielding conduit 3' and the inner sleeve 23'' is swaged outwardly against the shielding conduit 3'. It is thus seen that the connecter parts are by means of this swaging operation pressed into a mechanically secure and electrically continuous engagement with the shield-conduits. With the exception of the mode of attaching the shielding conduits to the connecter parts, the disclosure in Fig. 2 of the drawing is otherwise identical with that shown in Fig. 1.

The disclosure in Fig. 3 of the drawing is an assembled view in section of my connecter as used in connecting a shielding conduit to an ignition manifold ring 25, the female part of my connecter being formed at the outlet of the manifold ring. In other respects the disclosure in Fig. 3 is identical with that shown in Fig. 1 of the drawing.

Turning now to Fig. 4 of the drawing there is shown an alternative embodiment of my invention, the said embodiment differing over that shown in Fig. 1 in that the screw threads 26 and flange 27, with which the coupling sleeve or nut 28 is adapted to engage, are formed on the male and female connecter parts 29 and 30, respectively, instead of on the female and male connecting parts as shown in Fig. 1.

In use, the coupling sleeve or nut 18 (Fig. 1) is assembled over the male connecter part 6 and the fluid impervious means 7 is placed around the cylindrical portion 15 of the male connecter part. The female connecter part 5 is then brought into place and the parts secured together by tightening the nut or coupling sleeve 18. As the sleeve or nut 18 is tightened the conical projection on the male connecting part is wedged into

the corresponding conical recess of the female connecting part, thus providing direct electrical continuity through the connecter. Simultaneously with the tightening of the nut or sleeve 18 the sides of the fluid impervious sealing means 7 are compressed between the bearing faces 13 and 14 of the connecter parts, thus sealing within its confines the surfaces of contact 11 and 12 of the connecter parts against the connecter exterior and providing fluid tight integrity against the introduction of extraneous materials such as gasoline, oil and moisture.

According to the provisions of the patent statutes I have set forth the principle and mode of operation of my invention and have illustrated and described what I now consider to represent its best embodiments. However, I desire to have it understood that within the scope of the appended claims the invention may be practiced otherwise than as specifically illustrated and described.

This invention may be manufactured and used by or for the Government of the United States of America for governmental purposes without payment of royalties thereon or therefor.

I claim:

1. A shielding assembly comprising in combination a plurality of electrically conductive casing elements and a connecter for connecting said elements together and for insuring electrical continuity and continuity of passage therebetween, said connecter including an apertured, electrically conductive member in intimate electrical contact with a second apertured, electrically conductive member and said members being electrically continuous with their respective casing elements, means for sealing the area of contact between said first and second mentioned members against the introduction of any matter from the assembly exterior, and means for holding said first and second mentioned members in engagement.

2. An electrically continuous joint comprising in combination a first member provided with a bearing face and a surface, a second member provided with a bearing face and with a surface adapted to contact the surface of said first mentioned member, said surfaces of contact of the members being in intimate electrical engagement, deformable means interposed between bearing faces of said members and adapted to be engaged thereby for sealing the area of contact at the surfaces of said members against the joint exterior and means for holding said members in engagement at their surfaces of contact and for causing the bearing faces to abut against the deformable means interposed therebetween whereby to insure an intimate, electrically continuous and protected juncture of said members.

3. An electrically continuous joint comprising in combination a first member provided with an inclined surface, a second member provided with a surface which is in intimate electrical contact with the aforementioned inclined surface, means for sealing the area of contact between said first and second mentioned members against the joint exterior, and means for holding said members in wedging engagement at their surfaces of contact whereby to insure an intimate and electrically continuous juncture of said members.

4. An electrically continuous joint comprising in combination a first member provided with a bearing face and a surface, a second member provided with a bearing face and with a surface adapted to contact the surface of said first mentioned member, said surfaces of contact of the members being in intimate electrical engagement, deformable means interposed between the bearing faces of said members and adapted to be engaged thereby for sealing the area of contact at the surfaces of said members against the joint exterior, and means for holding said members in non-rotatable engagement at their surfaces of contact and for causing the bearing faces to abut against the deformable means interposed therebetween whereby to insure an intimate, electrically continuous and protected juncture of said members.

5. A connecter for joining a plurality of electrically conductive elements and for insuring electrical continuity therebetween, comprising in combination an electrically conductive member in intimate electrical contact with a second electrically conductive member, means for sealing the area of contact between the first and second mentioned members against the connecter exterior and means for holding said first and second mentioned members in engagement.

THOMAS C. GREEN.