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ELECTRICALLY ACTUATED CARTRIDGE

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Fig. 1

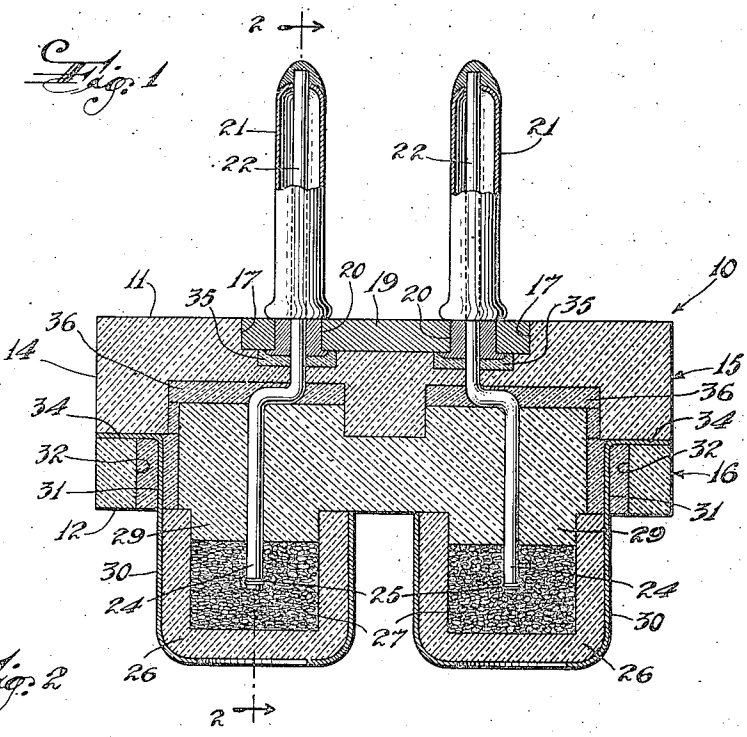
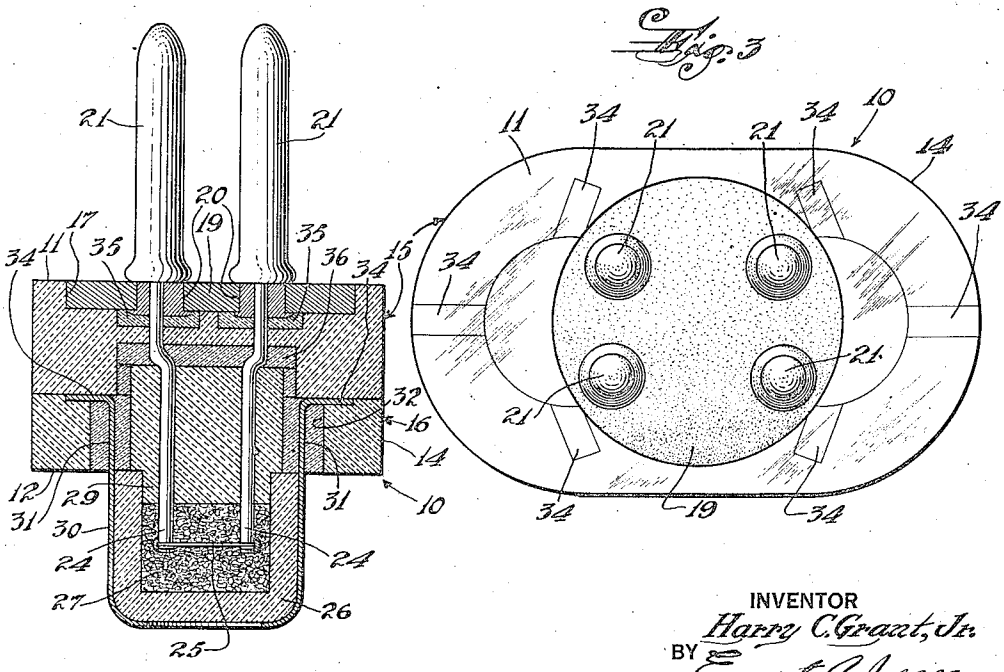


Fig. 2

Fig. 3



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ELECTRICALLY ACTUATED CARTRIDGE

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8 Claims. (Cl. 102—46)

The present invention relates to electrically actuated cartridges, such as cartridges for creating pressure, or blasting caps or cartridges for detonating an explosive, and more particularly to cartridges of the foregoing character having a plurality of independent charges adapted to be ignited simultaneously.

Heretofore electrically actuated cartridges have been utilized to generate or create a pressure suitable for actuating devices associated with various control mechanisms. For example, such cartridges have been used in connection with devices for controlling the launching or inflation of collapsible life rafts from aircraft or the like, and have been used for actuating fire fighting equipment and other types of apparatus operated in emergencies.

One of the difficulties encountered is that in a number of cases the cartridges may fail to ignite or explode. This failure may be due to an inherent defect in the cartridge or may be due to moisture or other foreign substances getting into the cartridge and rendering the charge ineffective. Since a cartridge is destroyed once it is ignited or fired, the cartridges cannot be tested to determine whether or not they are free of defects which may result in failure upon actual use.

Even though the number of failures in a given number of cases is relatively small, a single failure in a great number of cases is very objectionable because the failure of a cartridge to function may result in the loss of life and property damage. Particularly, where the cartridges are used in connection with equipment of the armed forces, a failure may result in the destruction of vital apparatus or craft, prevent the safe escape of officers and men, and ultimately may result in important military information being divulged to the enemy.

In connection with electrically actuated blasting caps or cartridges, the failure of a cartridge to ignite or explode is also very objectionable. In the event a cartridge fails and does not detonate the charge of explosive associated therewith, the burden may be improperly broken up or objectionable humps or toes may remain which are costly to remove. Also, when a blasting cap fails to set off its explosive charge, the unexploded blasting charge is a serious hazard and must be removed. The removal of the explosive material is extremely dangerous because the explosive material may be difficult to locate in some instances and may blow up accidentally due to various causes while searching for it.

The present invention aims to provide an electrically actuated cartridge which overcomes the foregoing difficulties and disadvantages. More particularly, the present invention aims to provide a cartridge provided with two or more independent charges which are adapted to be ignited simultaneously from a common source of electrical energy, whereby the possibility of the cartridges to fail is eliminated or very greatly minimized.

An object of the present invention is to provide a simple inexpensive cartridge which is reliable in operation.

Another object is to provide a cartridge which eliminates or very greatly minimizes the number of failures heretofore encountered in connection with pressure creating cartridges, blasting caps or the like.

Another object is to provide a cartridge having two or more independent charges which are adapted to be ignited simultaneously.

Another object is to provide a cartridge or the like, of the foregoing type which may be conveniently manufactured and assembled.

A further object consists in the combination, construction, and arrangement of parts, whereby the foregoing objects may be accomplished.

Other and further objects of the invention will be obvious upon an understanding of the illustrative embodiment about to be described, or will be indicated in the appended claims, and various advantages not referred to herein will occur to one skilled in the art upon employment of the invention in practice.

A preferred embodiment of the invention has been chosen for purposes of illustration and description and is shown in the accompanying drawing, forming a part of the specification, wherein:

Figure 1 is an enlarged longitudinal sectional view of a cartridge, illustrating an embodiment of the invention.

Figure 2 is a sectional view taken substantially along the line 2—2 on Figure 1.

Figure 3 is an end view of the cartridge shown in Figures 1 and 2.

Referring more particularly to the drawing, a cartridge is shown which may be of the type adapted to generate pressure for actuating various control devices. Generally described, the cartridge comprises a body 10 having end walls 11 and 12 at opposite sides thereof and having a side wall 14 of a non-circular formation. The side wall may be oval, as illustrated in Figure 3, or may have any desired regular or irregular non-circular contour, to facilitate placing the cartridge, in a predetermined position, into a correspondingly shaped breech of a firing chamber or the like.

Preferably, the body 10 is formed of upper and lower disc-like members 15 and 16 which facilitate the assembly and the arrangement of the parts of the cartridge. The upper and lower members have complimentary recesses and projections at their opposed surfaces and, preferably, are adhesively secured together, as will be indicated herein.

The upper member has a centrally located circular recess 17 in the end wall 11 thereof for receiving a disc 19 having apertures 20 for mounting electrical connecting members 21, such as plugs adapted to fit into a socket. The number of plugs provided depends upon the number of explosive charges which the cartridge has. A pair of plugs is provided for each charge, and the pairs of plugs are relatively closely grouped together so that they may be plugged into a socket adapted to connect both pairs of plugs to a common source of electrical energy.

Each plug has an electrical conductor 22 soldered or otherwise secured thereto, and these conductors extend through suitable apertures in the upper and lower body members 15 and 16 and project outwardly from the end wall 12 of the body. The projecting portions of the conductors provide leg wires 24, which are arranged in pairs, so that each pair extends into a charge containing chamber about to be described. Each pair of leg wires is provided with a bridge wire 25 (Figure 2) adapted to be heated electrically to ignite the charge.

Preferably, two independent charge containing chambers are provided, each comprising a substantially cup-shaped member or shell 26 having a cylindrical bore or space therein for receiving a charge of powder 27 or any other suitable explosive or inflammable pressure generating substance. The cup-shaped members are attached to the lower body member by inserting suitable cylindrical plugs or projections 29 formed on the end wall 12 into the bore of the cup-shaped members and adhesively securing the parts together.

Each of the cup-shaped members is reinforced to prevent shattering thereof when the charge is ignited. This may be accomplished by an annular band or sleeve 30 of metal extending about the side wall of the cup-shaped members and partly under the end wall of the cup-shaped members. The reinforcing bands are provided with one or more tab-like projections 31 suitably embedded in the body. For example, the projections 31 may be seated in apertures or recesses 32 in the lower body member which apertures may be filled with adhesive, and tabs 34 at the ends of the projections may be seated between the opposed surfaces of the upper and lower body members (Figures 1 and 2).

When the charges are ignited the reinforcing bands permit the cup-shaped members 26 to separate from the plugs 29 extending into the charge containing chamber or space, whereby the pressure generated is released from the members 26 without destruction of the body 10 and the members 26.

Preferably, the body members 15 and 16, and the cup-shaped members 26, illustrated herein, are formed of a plastic molding compound, such as cellulose acetate or other suitable well known molding compounds. Such compounds can be readily molded, whereby the parts can be manufactured economically by simple and rapid operations. Furthermore, such molding compounds have good insulating properties, which are desirable in connection with the electrical actuating means for the charges.

In cases where the foregoing referred to parts are made of cellulose acetate, the adhesive substance for securing them may be semi-liquid cellulose acetate, which upon setting is hardly visible due to its close resemblance to material of which the parts are formed. Suitable pockets, recesses or spaces 35 and 36 are provided in the body members for receiving liberal quantities of adhesive. Also, prior to attachment of the cup-shaped members 26 to the plugs 29, adhesive is applied to the surfaces in contact with each other when assembled.

In operation, the cartridge is placed into a suitable receptacle for receiving the pressure to be generated. When the pressure is required to operate a suitable mechanism or device, electrical current is simultaneously supplied to each pair of plugs 21 to simultaneously ignite each charge of the cartridge. If one charge fails to ignite or to develop its desired pressure, the other charge is capable of performing the intended function of the cartridge. The probability of both charges failing at the same time is exceedingly remote, because, for example, if one single charge out of every hundred cases fails, both charges should not fail at the same time more than once out of about every ten thousand cases.

From the foregoing description, it will be seen that the present invention provides an improved cartridge or the like which is less likely to fail than cartridges which have been utilized heretofore for similar purposes. By utilizing two or more independent charges adapted to be ignited simultaneously, failure of the mechanism to be operated in an emergency is eliminated or very greatly minimized. The cartridges are simple and inexpensive in construction and can be economically manufactured. The cartridges are rugged in construction, and protect the explosive charge against the entrance of moisture or other foreign matter which may render the charge ineffective.

While the invention has been described in connection with a pressure generating cartridge, by way of example, it will be understood that the principles involved herein and features of construction may be advantageously utilized in connection with other types of electrically actuated cartridges such as blasting caps and the like.

As various changes may be made in the form, construction and arrangement of the parts herein, without departing from the spirit and scope of the invention and without sacrificing any of its advantages, it is to be understood that all matter herein is to be interpreted as illustrative and not in any limiting sense.

It is also to be understood that the following claims are intended to cover all the generic and specific features of the invention herein described, and all statements of the scope of the invention which, as a matter of language, might be said to fall therebetween.

I claim:

1. A cartridge comprising a body having a pair of end walls and a non-circular side wall, a pair of cup-shaped members secured to one of the end walls of said body, each of said members having a chamber for containing an explosive charge, electrical charge igniting means for each of said chambers, and a pair of plugs for each of said charge igniting means for connecting said means to a common source of electrical energy.

said plugs extending from the other end wall of said body.

2. A cartridge comprising a body having a pair of end walls and a non-circular side wall, a pair of cup-shaped members secured to one of the end walls of said body, each of said members having a chamber for containing an explosive charge, a substantially annular reinforcing band for each of said members and extending about said members, said bands having a projection embedded in said body, electrical charge igniting means for each of said chambers, and a pair of electrical connecting plugs for each of said charge igniting means, said plugs extending from the other end wall of said body, and being grouped together to facilitate connection to a common source of electrical energy.

3. A cartridge comprising a body having a pair of end walls, a pair of cup-shaped members secured to one of the end walls of said body, each of said members having a chamber for containing an explosive charge, a substantially annular reinforcing band for each of said members and extending about said members, said bands having a projection embedded in said body, electrical charge igniting means for each of said chambers, and a pair of electrical connecting plugs for each of said charge igniting means, said plugs extending from the other end wall of said body, and being grouped together to facilitate connection to a common source of electrical energy.

4. A cartridge comprising a body having a pair of end walls and a non-circular side wall, a pair of cup-shaped members secured to one of the end walls of said body, each of said members having a chamber for containing an explosive charge, electrical charge igniting means for each of said chambers, and plug means for connecting said charge igniting means to a common source of electrical energy, said plug means extending from the other end wall of said body.

5. A cartridge of the class described comprising a body having non-circular side walls, a pair of cup-shaped members secured to said body and extending therefrom and each having a chamber for containing an explosive charge, a substantially cylindrical reinforcing band for each of said members and extending about said cup-shaped members, said bands having an outwardly extending portion at one end thereof secured to said body, and electrical charge igniting means in each of said chambers.

6. A cartridge of the class described comprising a body having non-circular side walls and adapted to be placed in a firing chamber, a pair of cup-shaped members secured to said body and extending therefrom and each having a chamber for containing an explosive charge, a substantially cylindrical reinforcing band for each of said members and extending about said members, said bands having an outwardly extending projection at one end thereof embedded in said body, electrical charge igniting means in each of said chambers, and means for connecting said charge igniting means to a common source of electrical energy.

7. A cartridge comprising a pair of superimposed body members secured to each other, a cup-shaped charge containing member projecting from one side of one of said body members, a reinforcing sleeve extending about said charge containing member and having an outwardly extending portion at one end thereof embedded between said body members for securing said charge containing member to said body members, and electrical charge igniting means in said charge containing member.

8. A cartridge comprising a pair of superimposed body members secured to each other, a pair of cup-shaped charge containing members projecting from one side of one of said body members, a reinforcing sleeve extending about each of said charge containing members and having an outwardly extending portion at one end thereof embedded between said body members for securing said charge containing members to said body members, and electrical charge igniting means in said charge containing members.

HARRY C. GRANT, Jr.