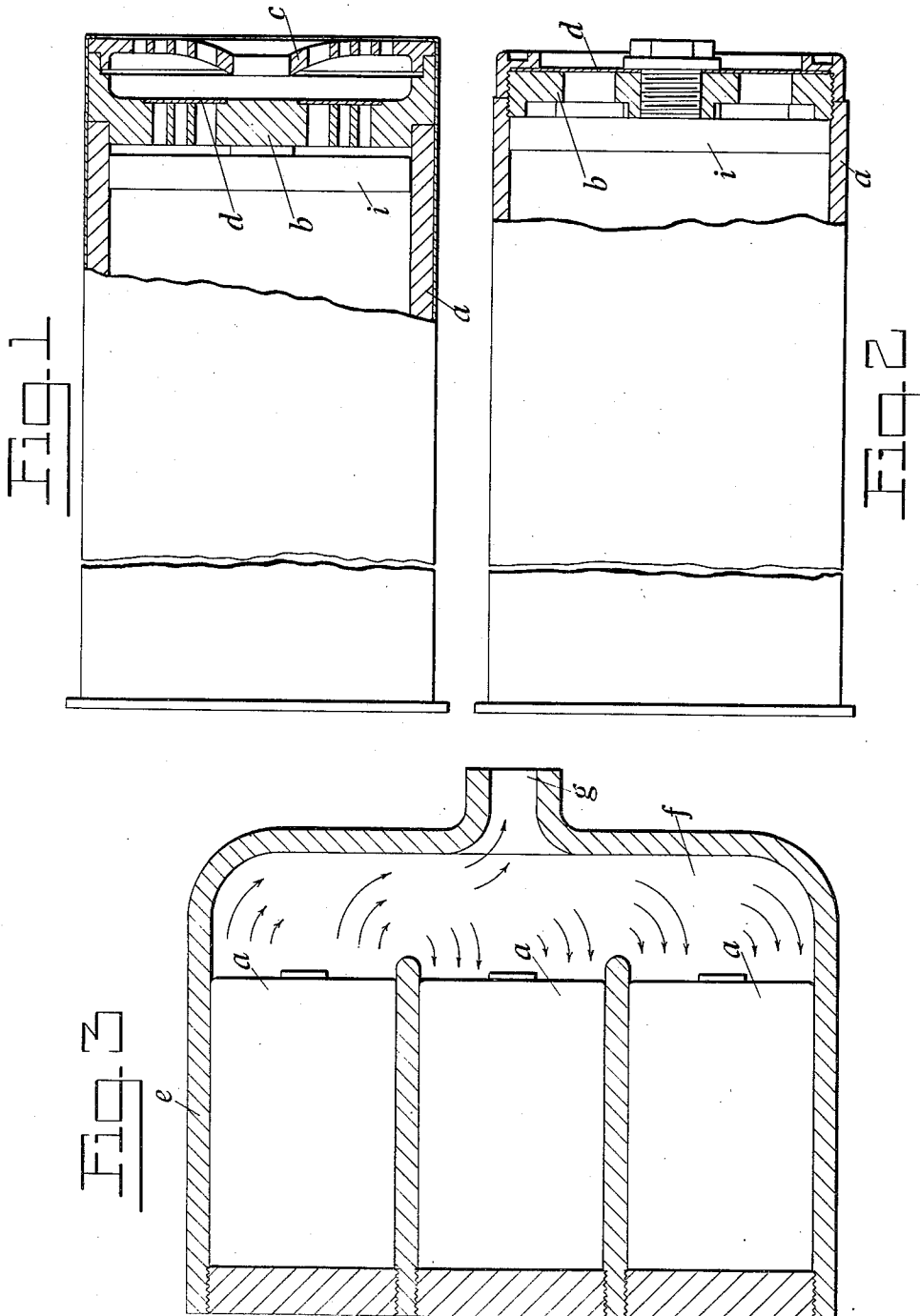


Aug. 5, 1952

T. W. MILLNS ET AL
ENGINE STARTING APPARATUS

2,605,705

Filed Nov. 28, 1949



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UNITED STATES PATENT OFFICE

2,605,705

ENGINE STARTING APPARATUS

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Application November 28, 1949, Serial No. 129,714
In Great Britain December 9, 1948

2 Claims. (Cl. 102—39)

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This invention relates to an engine starting apparatus of the type comprising a turbine adapted to be operated by gases produced by the firing of an explosive cartridge. In some forms of such apparatus a plurality of cartridges are employed, these being mounted in separate housings and adapted to be fired successively, the gases resulting from the firing of the cartridges being discharged into a common duct in the turbine casing. In such an apparatus it is necessary to protect the unfired cartridges against the action of the gases produced by a fired cartridge, and the primary object of the present invention is to enable this requirement to be met in a simple and convenient manner.

The invention comprises a cartridge having combined therewith at least one perforated plate, and a sealing means on the forward face of the plate.

In the accompanying drawings:

Figure 1 is a part sectional side elevation of a cartridge embodying the invention.

Figure 2 is a similar view to Figure 1 illustrating an alternative embodiment of the invention.

Figure 3 is a diagrammatic sectional view illustrating a housing containing a plurality of the cartridges.

Referring to Figure 1, there is secured in the forward end of the cartridge shell *a*, a pair of perforated plates *b*, *c*, these being spaced at any convenient (though usually small) distance apart. On the forward face of the rear plate *b* is placed a thin sheet metal sealing disc *d* of plain or annular form, the disc being secured at its peripheral edge or edges to the plate by welding, brazing, or in any other convenient manner. The perforations in the rear plate are such that the disc is adequately supported by the plate against the pressure of gases derived from a fired cartridge.

In the alternative construction shown in Figure 2, a single perforated plate *b* is provided at the discharge end of the cartridge shell *a*, and on the outer face of this plate is secured a thin disc *d*.

All the cartridges are fitted with either of the protective means above described. The mode of action of the said means is illustrated by the diagram at Figure 3. In this example three cartridges are accommodated in separate chambers in a housing *e*. At one end the chambers are open to a duct *f* from which the gases produced by the firing of a cartridge can pass to the turbine through an exit *g*. Assuming that the upper cartridge has been fired, the other two are protected by the means above described, the

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pressure of the gases in the duct *f* serving to press the discs *d* tightly against their supporting plates *b*. With the firing of any cartridge the associated disc *d* is blown off its supporting plate *b* and destroyed by the escaping gases. When the disc is such that it is completely destroyed by the gases, the construction shown in Figure 2 is convenient, but if it is desired to minimise any risk of fragments of the disc being carried forward to the turbine the construction shown in Figure 1 is preferred. In either case a destructible layer of heat insulating material *i* is preferably provided at the inner face of the disc *b*.

The invention is not, however, restricted to the examples above described, as subordinate details of construction or arrangement may be varied to suit different requirements. Further, cartridges made in accordance with the invention may be advantageously employed in so called single-shot engine starting apparatus.

By this invention, the required protection of the unfired cartridges is ensured in a simple and convenient manner.

Having thus described our invention what we claim as new and desire to secure by Letters Patent is:

1. An engine starting cartridge having in combination a shell, a perforated plate secured to and forming a wall at one end of the shell, and a sealing disc secured to the outer side of the plate and covering the perforations therein, so that the sealing disc can be blown off the plate by firing of the cartridge.

2. An engine starting cartridge as claimed in claim 1, and having a second perforated plate arranged at the outer side of the first mentioned plate in spaced relationship with the sealing disc, the two plates being secured together at their peripheries.

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