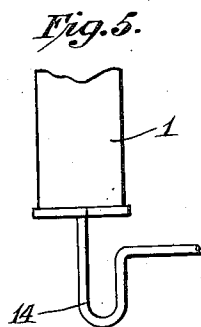
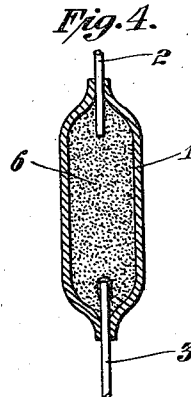
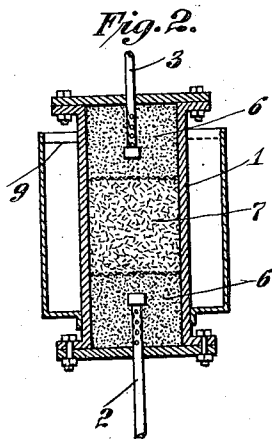
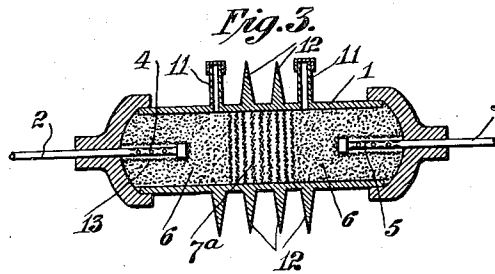
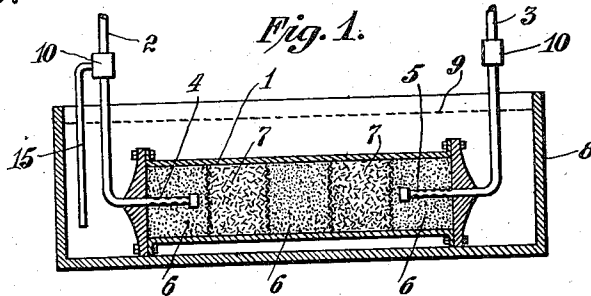


C. ELLIS.
EXPLOSION ARRESTER.
APPLICATION FILED SEPT. 22, 1913.

1,170,055.

Patented Feb. 1, 1916.



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CARLETON ELLIS, OF MONTCLAIR, NEW JERSEY.

EXPLOSION-ARRESTER.

1,170,055.

Specification of Letters Patent.

Patented Feb. 1, 1916.

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To all whom it may concern:

Be it known that I, CARLETON ELLIS, a citizen of the United States, and a resident of Montclair, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Explosion-Arresters, of which the following is a specification.

This invention relates to apparatus for preventing the flash back of explosive gaseous mixtures and the like including mixtures of illuminating gas and air, of hydrogen and oxygen, and of oil and air or oxygen and relates in particular to means which effectively arrest propagation of an explosion wave.

The handling of mixed gases such as mixtures of oxygen and coal gas, or of hydrogen and oxygen in connection with various forms of combustion and the production of hydrogen and oxygen electrolytically make it necessary at times to handle explosive mixtures of this character, or if such explosive mixtures are accidentally produced, to have present a means for checking any explosion wave which may occur.

Various safety arrangements of the valve type have been tried as well as wire gauze, but such expedients are of little value because of the combustion which may take place after an explosion at the surface of the wire gauze and the like, thereby raising the temperature to such an extent that inflammation is propagated past the means which is supposed to check it. Bundles of wire gauze are placed in pipe lines to stop explosions, but they are often without avail. When an explosion strikes back to one end of the gauze roll, combustion takes place at that surface of the gauze which is thus heated red hot transmitting ignition through the bundle. When an explosion takes place in a pipe line, especially when such an explosive mixture as oxygen and hydrogen is being handled, an explosive wave usually bursts the pipe connections around valves, elbows and other expanded portions and to guard against such a happening no expanded portions should be exposed in this manner unless very heavy metal or special reinforcing is employed.

My invention comprises a receptacle containing material adapted to check, hinder or stop the explosive wave and various forms thereof are shown in the appended illustrative and diagrammatic drawings, al-

though I do not limit myself to the precise structures shown herein, but may make various modifications thereof as will now be evident to those skilled in the art.

In the drawings Figure 1 shows in section a horizontal explosion arrester contained in a water-bath, Fig. 2 shows a vertical type of arrester in sectional view, Fig. 3 shows a horizontal form carrying air-cooling ribs, Fig. 4 shows in section a simple form of the apparatus and Fig. 5 shows in elevation a trap which may be used to resist the flow of gases.

Like reference parts are designated throughout by like characters.

In the drawings 1 is a receptacle preferably in the shape of a long cylinder or tube with closed ends having an inlet pipe 2 for the admission of gases, and an outlet pipe 3. These inlet and outlet pipes preferably penetrate some distance from the ends of the cylinder as shown at 4 and 5, and the extreme ends of said pipes preferably are capped. The delivery ends preferably are perforated with fine holes sufficient in number to afford an area usually approximately equal to or greater than the cross sectional area of the pipe. If desired, these delivery ends may be wrapped with wire gauze as shown at 13 in Fig. 2. The cylinder or receptacle is partially charged with finely divided granular material of a refractory nature, preferably of poorly conducting material such as crushed fire-brick, clay, pumice, magnesia and the like, the fragments preferably being screened between 15 and 20 mesh or thereabout, so as to afford fairly uniform grains. These are placed in the cylinders in layers as shown at 6. Between the layers wire screens are placed to form spaces which are charged with copper or aluminium fragments, such as copper tacks or aluminium granules of say about 20 mesh forming the layers indicated by 7. The receptacle may be placed in a water tank as shown at 8, water being introduced to fill to the level marked 9. The inlet and outlet pipes preferably have explosion vents which may simply be openings in the pipes which are covered with thin sheet lead 10 or other material easily broken by the force of an explosion, or a water seal 15 may be provided at this point to relieve explosion pressure and possibly cause a self extinguishing effect by "blowing out." Where the inlet and outlet pipes 2 and 3 enter the receptacle

1, the fittings should be massive. When an explosion occurs which, for example, may be supposed to enter the apparatus by the pipe 2, the explosion impulse distributes through the perforations of the end 4 into the mass of refractory granular material so that the mechanical rupturing effect of the explosion is minimized at that point. In contact with this material and fed by an explosive mixture which, for example, may be entering the arrester by the pipe 3, combustion may take place in the layer of refractory material surrounding the pipe end 4 and eventually the combustion may recede toward the metallic layer 7 adjacent to the pipe end 4. This metallic layer is preferably made up of finely-divided metal fragments of good conductivity for heat forming a porous mass which readily allows gases to pass, but is still sufficiently conductive to heat so that contact of the outer layers with the water-cooled sides keeps the metal sufficiently cool and serves at that point to check or extinguish combustion. To render the apparatus safe under all conditions alternate layers of refractory material and chilling surface may be provided.

In Fig. 2, the receptacle is placed vertically and a water jacket surrounds the cylinder. Otherwise the arrangement may be substantially similar to that set forth in Fig. 1.

In Fig. 3 the metal layers may be in the form of a series of wire screens or perforated plates jacketed closely together. 11 is a charging inlet for the introduction of granular material. By having the charging inlets on the upper side the complete filling of the chamber beneath is assured. 12 represents air-cooling vanes.

In Fig. 4 the tube 1 contains inlet and outlet tubes 2 and 3 which project into the mass of granular refractory material 6.

In Fig. 5 the receptacle 1 contains a layer of shot which, if melted by the heat of combustion engendered by an explosion, flows into the trap 14 sealing same as the lead solidifies and preventing the further flow of gas.

If desired, and if the usage to which the gas is to be put will permit, the granular and metallic material may be kept moist by means of water or other fluid. When the granular material exerts sufficient capillarity to diffuse water throughout its mass, then a little water placed in the bottom of the explosion arrester will serve to keep the material moist. Or, water may be allowed

to drip slowly through the mass material, being introduced, for example, in Fig. 3 through the charging inlet 11 and withdrawn by a drip cock in the bottom of the apparatus, not shown in the drawing.

What I claim is:

1. An explosion arrester comprising a receptacle packed with alternate layers of granular refractory material and metallic heat-conducting material, said last mentioned material being in heat-conducting relation with cooling means.

2. An explosion arrester comprising a receptacle packed with alternate layers of granular refractory material and granular metallic heat-conducting material; said receptacle being water-cooled at a point surrounding said granular heat-conducting material, said receptacle having inlet and outlet pipes on opposite sides of the receptacle projecting into the receptacle a short distance from the side walls thereof and having perforations in that portion projecting through said side walls.

3. An explosion arrester comprising a liquid cooled receptacle having inlet and outlet pipes; said receptacle, having positioned between the inlet and outlet thereof, a quantity of porous heat-conducting material and heat non-conducting material.

4. An explosion arrester comprising a liquid cooled cylindrical receptacle closed at either end and having at one end an inlet pipe and at the opposite end an outlet pipe, and having throughout its length layers alternately of heat-conducting and heat-insulating porous beds, each comprising finely-divided material maintained at a temperature below the temperature of explosion propagation.

5. An explosion arrester comprising (1) a casing, (2) gas inlet and outlet connections thereto, (3) a separate liquid-introducing connection, (4) a plurality of spaced layers of refractory granular material therein, (5) a layer of metallic heat-conducting material interspaced between said spaced layers, and (6) cooling means disposed in heat-conducting relation to said heat-conducting means, substantially as described.

Signed at Montclair in the county of Essex and State of New Jersey, this 13th day of September A. D. 1913.

CARLETON ELLIS.

Witnesses:

B. M. ELLIS,
F. CARBUTT.