Dec. 8, 1953 W. M. HAESSLER 2,661,804

FIRE EXTINGUISHER DISCHARGE HEAD

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Fig. 1.

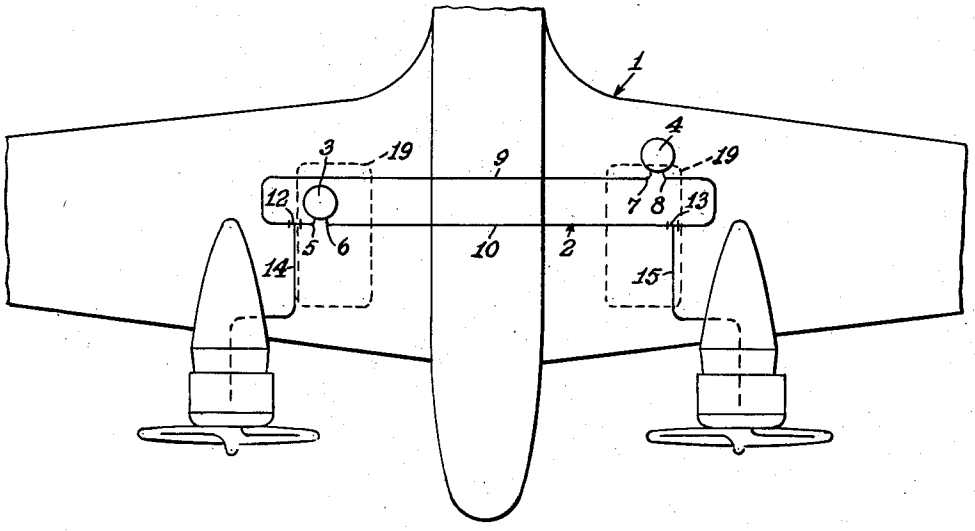
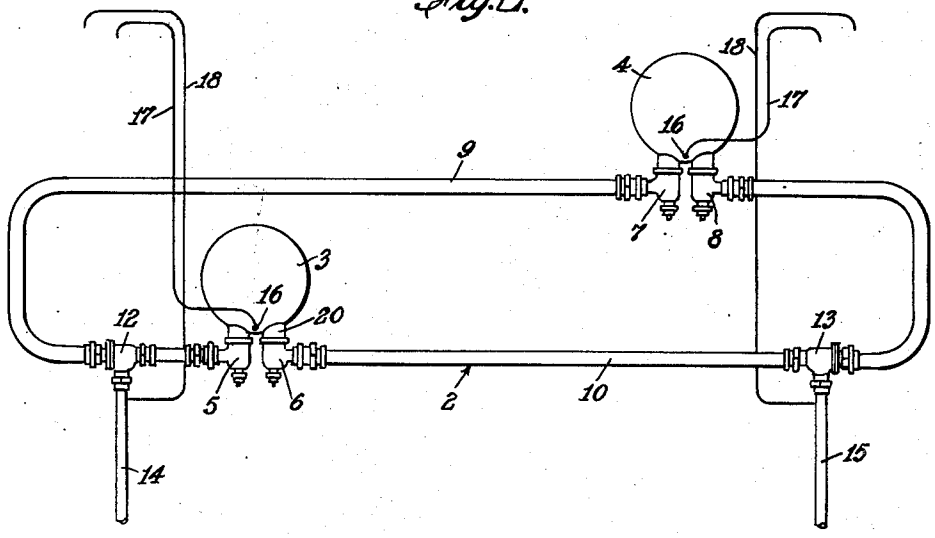


Fig. 2.



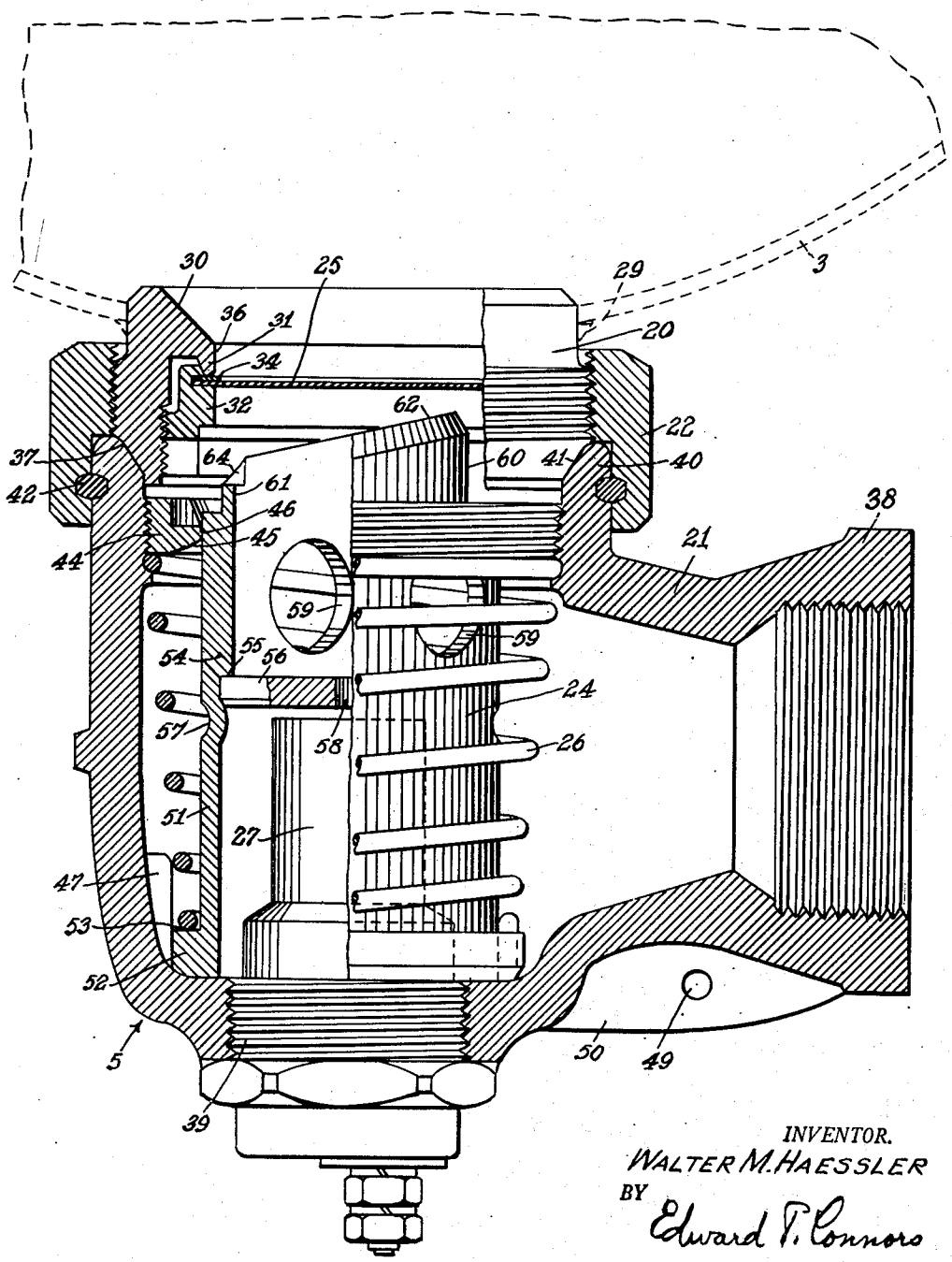
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Fig. 3.



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FIRE EXTINGUISHER DISCHARGE HEAD

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3 Claims. (Cl. 169—11)

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The present invention relates to fire extinguishing apparatus and particularly to a discharge head for a container storing a fluid under pressure releasable upon the cutting of a sealing disc in the discharge head.

The discharge head is particularly suitable for use in airplane fire extinguishing systems. It is important that the discharge head in a system of this type be positive in operation, light in weight, and rapid in operation. Difficulty has been had with prior devices in that the sealing means has been made of a shatterable disc in which, in some cases, the segments failed to break out, thus, restricting the discharge opening. Other devices have been provided utilizing a disc adapted to be cut to release the fluid. However, in some cases the cut-away disc is blown into the path of the flow acting to restrict same.

The present invention aims to overcome the difficulties and disadvantages of prior devices by providing a discharge head for a fire extinguishing system in which a piston cutter is used to cut a sealing disc upon the discharge of an explosive cartridge. The piston cutter member is normally held away from the sealing disc by a spring which provides guiding means to hold the piston cutter in position so that it is driven through the sealing disc in such a manner as to always have a flap on the side away from the outlet opening.

The discharge head is made in separable portions, one of which is permanently attached to the container with which it is to be used, the other portion of the discharge head being removable for inspection, cleaning or the like, a connection between the separable parts being provided for the swinging of the outlet of the discharge head into any desired position to facilitate connection with the piping of the extinguisher system.

Another object of the invention is to provide a discharge head which is simple and economical in manufacture, efficient in operation, and rugged in use.

Other objects and advantages of the invention will be apparent from the following description and from the following drawings which show, by way of example, an embodiment of the invention.

In the drawings:

Figure 1 is a partial plan view of an airplane incorporating a fire extinguishing system utilizing a plurality of discharge heads in accordance with the invention.

Figure 2 is a piping diagram of the fire extinguishing system utilizing the discharge heads.

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Figure 3 is a vertical sectional view of a single discharge head, a portion of the container with which it is used being shown in dotted lines.

Referring to the drawings, there is shown in Figure 1 an airplane 1 incorporating a fire extinguishing system 2 of the dual application two hazard type utilizing discharge heads in accordance with the invention. Fire extinguishing fluid is stored in a pair of spherical containers 3 and 4 respectively having dual discharge heads 5 and 6 on container 3 and dual discharge heads 7 and 8 on container 4. All of the discharge heads 5 through 8 are of the same construction.

Pipes 9 and 10 connect the discharge heads to two-way check valves 12 and 13, the outlets of which are connected by pipes 14 and 15 leading respectively to the spaces about the two motors of the airplane. At the ends of the pipes 14 and 15 are attached the usual discharge nozzles (not shown) for directing the fire extinguishing fluid in an efficient manner.

Safety outlets 16 are provided for the tanks 3 and 4 and are connected by discharge pipes 17 to suitable outboard discharge indicators (not shown). System discharge indication is provided by suitable outboard indicators (not shown) on the outer ends of pipes 18 leading from tap connections to the pipes 14 and 15. The tanks 3 and 4 may be mounted in any convenient location in the ariplane. In some installations it has been preferred to install the tanks 3 and 4 above or adjacent the wheel wells of the airplane, indicated in dotted lines 19 on Figure 1, in order that easy inspection access may be had while the airplane is on the ground.

The spherical tanks 3 and 4 are of the same construction. The tank 3 is adapted to be charged with a pressurized fire extinguishing agent, the fluid being releasable by the actuation of the electrical discharge plug 5 of the cutter type in which the force of the gas produced by the explosive discharge operates the piston cutter to cut a sealing disc allowing the pressurized fire extinguishing fluid to escape into the system.

The discharge head 5 in accordance with the invention includes an outlet member 20 and a main body member 21 secured together by a swivelling nut 22, the main body member 21 including a piston cutter 24 normally held away from a sealing disc 25 by a spring 26. The piston cutter 24 is actuated by the discharge of a suitable electric cartridge 27 which may be of the type shown and described in Frank B. Allen Patent No. 2,425,778, issued August 19, 1947.

The outlet member or fitting 20 may be made

of any suitable material to provide the desired strength, preferably of the same material as the container 3, and is adapted to be secured in position in an outlet opening of the tank 3 by welding or brazing 29. The inner surface edge of the outlet member is beveled as indicated at 30 to facilitate the entrance of the fluid, the inner edge of the beveled surface 30 terminating in a valve seat 31 facing outwardly from the tank 3. The inner surface of the outlet fitting 20 is threaded to receive a sealing disc assembly including a ring member 32, a sealing gasket 34, and the sealing disc 35. The ring nut 32 is recessed to receive the sealing disc and gasket, outer edge 36 of the ring member 32 being turned inwardly to provide a unitary assembly. The lower edge of the outlet fitting 20 is bevelled as indicated at 37 to provide a contact and sealing surface with the main body member 21. The outer surface of the outlet fitting 20 is threaded to receive the swivelling nut 22.

The main body member 21 of the discharge head 5 is preferably cast of aluminum alloy for lightness in construction and is made in L-shape. Its outlet 38 is internally threaded to engage with the piping system. An opening 39 is made with a threaded surface to receive the electric discharge plug 27. Upper end 40 of the main body member 21 has its inner edge beveled as indicated at 41 to match the beveled surface 37 of the outlet fitting 20. A recess is made about the upper end 40 to receive a swivelling ring 42 engaged in a matching recess in the swivelling nut 22. The inner surface of end 40 is threaded to receive an annular guiding member 44 having its downward edge rounded upwardly as indicated at 45, the rounded edge terminating in a land 46 which is the guiding surface for the piston cutter 24. The main body member 21 is shaped to provide ample space around the piston member cutter 24. A plurality of inwardly directed guiding surfaces or fins 47 are spaced about the interior of the housing to receive the lower end of the piston cutter member 24 and to restrain it against sidewise vibration or shocks and to hold it in alignment with the land 46. A threaded hole 49 is made through a flanged portion 50 of the housing 4 to receive a grounding wire for the return electric circuit from the explosive plug 27.

The piston cutter 24 is preferably made with a cylindrical wall 51 having a thickened end 52 to provide a shoulder 53 to receive in abutting relationship therewith the lower end of the spring 26 and to fit the fins 47. Upper portion 54 of the wall 51 is made with a somewhat greater thickness to provide an inner shoulder 55 against which abuts a cylindrical piston member 56 secured in position against the shoulder 55 by inwardly depressing the wall 51 as indicated at 57. A vent opening 58 is made through the piston member 56, the vent serving the dual purpose of preventing excessive pressure buildup during the discharge of the plug 27 and also provides a vent for drainage of extinguishing fluid following a discharge. The upper portion 54 is made with a plurality of openings 59 spaced about the periphery of the wall 51 to provide an outlet for fluid, leaving, however, an unbroken portion of the wall away from the wall 38 and positioned diametrically opposite the longer wall of the cutting edge, as will later appear. The total area of the openings is at least equal the area cut in the sealing disc 35. The upper edge of the piston cutter 24 is shaped so as to provide a longer wall 60 on one side of the cutter member as compared to the length of the opposite wall 61. A cutting edge 62 is formed on the end of the cutter extending thereabout almost completely around the circumference thereof, leaving, however, a cut-away or recessed portion 64 which is not adapted to cut the disc 62 thereby providing for a flap attachment between the main body of the disc 35 and the cut portion so as to retain the sealing disc when ruptured. The unbroken portion of the wall above mentioned is to provide for contact by the cut flap. This is important in that if an opening were present, the cut portion of the disc would be embossed in the hole and the flap torn away from the secured edge by the downward movement of the cutter member out of the outlet member after the disc has been cut.

In the operation of a fire extinguishing system utilizing the discharge head 5, a conventional electric circuit is used to explode the electric cartridge 27, the discharge from which impinges against the under side of the piston 56 which is then driven away from the cartridge by the force of the expanding gases produced by the cartridge discharge. The cutting edge 62 is caused to cut the sealing disc 35. The fire extinguishing fluid then passes through the openings 59 of the piston cutter member and outwardly of the discharge head through its outlet 38. Any excess gases from the cartridge discharge are passed about the lower end of the piston cutter member 24. After the force of the explosion from the cartridge member 27 has dropped, the piston cutter member 24 is returned to its normal position by the spring 26 and by the force of the released extinguishing agent.

While the invention has been described and illustrated with reference to a specific embodiment thereof, it will be understood that other embodiments may be resorted to without departing from the invention. Therefore, the form of the invention set out above should be considered as illustrative and not as limiting the scope of the following claims.

I claim:

1. A discharge head for a container storing a fluid under pressure and releasable upon the rupture of a sealing disc, the discharge head comprising a sealing neck portion and a separable body member, the sealing neck portion adapted to be secured in the neck of the container and having a fluid passage therethrough, a seat about the passage, a sealing disc assembly threadedly engaged in the neck portion contacting the seat and closing the fluid passage, the exterior of the neck portion threaded and having a beveled lower edge, a body member having a beveled upper edge engaging the beveled lower edge of the neck portion, a swivel nut at the upper end of the body member engaging the threaded exterior surface of the neck portion, an explosive cartridge adapted to discharge within the body member, a reciprocable tubular piston cutter member having one end with a sharpened edge to facilitate the rupture of the disc, a partition across the tubular member intermediate the ends thereof forming a piston head, a plurality of openings through the wall of the piston cutter member located between the sharpened edge and the partition, a shoulder formed in the inner wall of the piston cutter member to receive the partition in abutting relationship, the inner wall of the piston cutter member deformed holding the partition in position, a shoulder formed about the sharpened edge of the piston cutter member

adapted to contact the sealing disc assembly to limit the travel of the piston cutter member, an annular shoulder about the end of the piston cutter member away from the sharpened edge, a spring yieldingly holding the cutter member away from the sealing disc, the body member spaced from the cutter member to provide an outlet for fluid released from the container, a plurality of guiding ribs inside the body member for the depending skirt, and a ring guiding member positioned at the upper end of the body member adjacent the neck portion, the spring abutting against the ring member and the annular shoulder of the depending skirt.

2. A discharge head comprising a body member, a sealing disc, an explosive cartridge adapted to discharge within the body member, a freely reciprocable cutter member within the body member and positioned to rupture the sealing disc, piston means carried by the cutter member and positioned to receive the discharge of the explosive cartridge, a spring yieldingly normally holding the cutter member away from the sealing disc, the body member spaced from the sides of the piston cutter member to provide an outlet for the fluid reelased from the container, a ring guiding member positioned about the cutter member, a depending skirt for the piston extending about the discharge end of the explosive cartridge, and a shoulder about the outer edge of the skirt, the spring abutting between the shoulder and the ring guiding member, the reciprocable cutter member normally held in position by contact with the guiding ring against lateral displacement and held against longitudinal displacement by the spring.

3. A discharge head for a container storing a fluid under pressure and releasable upon the

rupture of a sealing disc, the discharge head comprising a body member having a beveled upper edge, a swivel nut at the upper end of the body member, an explosive cartridge adapted to discharge within the body member, a reciprocable tubular piston cutter member having one end with a sharpened edge to facilitate the rupture of the disc, a partition across the tubular member intermediate the ends thereof forming a piston head, a plurality of openings through the wall of the piston cutter member located between the sharpened edge and the partition, a shoulder formed in the inner wall of the piston cutter member to receive the partition in abutting relationship, the inner wall of the piston cutter member deformed holding the partition in position, a shoulder formed about the sharpened edge of the piston cutter member adapted to contact the sealing disc assembly to limit the travel of the piston cutter member, an annular shoulder about the end of the piston cutter member away from the sharpened edge, a spring yieldingly holding the cutter member away from the sealing disc, the body member spaced from the cutter member to provide an outlet for fluid released from the container, a plurality of guiding ribs inside the body member for the depending skirt, and a ring guiding member positioned at the upper end of the body member adjacent the neck portion, the spring abutting against the ring member and the annular shoulder of the depending skirt.

WALTER M. HAESSLER.

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