History of fire extinguisher

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An early antecedent of what later became a fire extinguisher was patented in England in 1723 by Ambrose Godfrey, a famous chemist of his time. It was a firefighting barrel containing an extinguishing liquid that acted with the explosion of a tin chamber containing gunpowder. The dispersion and atomization of the liquid caused the fire to be extinguished. The English newspaper Bradley Messenger in its edition of November 7, 1729 speaks of its effectiveness in extinguishing a fire in London.

There were several attempts and patents over the years, marking a path with advances and setbacks, until reaching the current equipment.

The first fire extinguisher of which there is any record was patented in England in 1723 by Ambrose Godfrey, a celebrated chemist at that time. It consisted of a cask of fire-extinguishing liquid containing a pewter chamber of gunpowder. This was connected with a system of fuses which were ignited, exploding the gunpowder and scattering the solution. This device was probably used to a limited extent, as Bradley's Weekly Messenger for November 7, 1729, refers to its efficiency in stopping a fire in London.

A portable pressurised fire extinguisher, the 'Extincteur' was invented by British Captain George William Manby and demonstrated in 1816 to the 'Commissioners for the affairs of Barracks'; it consisted of a copper vessel of 3 gallons (13.6 liters) of pearl ash (potassium carbonate) solution contained within compressed air. When operated it expelled liquid onto the fire.[1][2]

Thomas J. Martin, an American inventor, was awarded a patent for an improvement in the Fire Extinguishers on March 26, 1872. His invention is listed in the U. S. Patent Office in Washington, DC under patent number 125,603.

The soda-acid extinguisher was first patented in 1866 by Francois Carlier of France, which mixed a solution of water and sodium bicarbonate with tartaric acid, producing the propellant carbon dioxide (CO_2) gas. A soda-acid extinguisher was patented in the U.S. in 1880 by Almon M. Granger. His extinguisher used the reaction between sodium bicarbonate solution and sulfuric acid to expel pressurized water onto a fire.[3] A vial of concentrated sulfuric acid was suspended in the cylinder. Depending on the type of extinguisher, the vial of acid could be broken in one of two ways. One used a plunger to break the acid vial, while the second released a lead stopple that held the vial closed. Once the acid was mixed with the bicarbonate solution, carbon dioxide gas was expelled and thereby pressurized the water. The pressurized water was forced from the canister through a nozzle or short length of hose.[4]

The cartridge-operated extinguisher was invented by Read & Campbell of England in 1881, which used water or water-based solutions. They later invented a carbon tetrachloride model called the "Petrolex" which was marketed toward automotive use.[5]

The chemical foam extinguisher was invented in 1904 by Aleksandr Loran in Russia, based on his previous invention of fire fighting foam. Loran first used it to extinguish a pan of burning naphtha.[6] It worked and looked similar to the soda-acid type, but the inner parts were slightly different. The main tank contained a solution of sodium bicarbonate in water, whilst the inner container (somewhat larger than the equivalent in a soda-acid unit) contained a solution of aluminium sulphate. When the solutions were mixed, usually by inverting the unit, the two liquids reacted to create a

frothy foam, and carbon dioxide gas. The gas expelled the foam in the form of a jet. Although liquorice-root extracts and similar compounds were used as additives (stabilizing the foam by reinforcing the bubble-walls), there was no "foam compound" in these units. The foam was a combination of the products of the chemical reactions: sodium and aluminium salt-gels inflated by the carbon dioxide. Because of this, the foam was discharged directly from the unit, with no need for an aspirating branchpipe (as in newer mechanical foam types). Special versions were made for rough service, and vehicle mounting, known as apparatus of fire department types. Key features were a screw-down stopper that kept the liquids from mixing until it was manually opened, carrying straps, a longer hose, and a shut-off nozzle. Fire department types were often private label versions of major brands, sold by apparatus manufacturers to match their vehicles. Examples are Pirsch, Ward LaFrance, Mack, Seagrave, etc. These types are some of the most collectable extinguishers as they cross into both the apparatus restoration and fire extinguisher areas of interest.

In 1910, The Pyrene Manufacturing Company of Delaware filed a patent for using carbon tetrachloride (CTC, or CCl_4) to extinguish fires.[7] The liquid vaporized and extinguished the flames by inhibiting the chemical chain reaction of the combustion process (it was an early 20th-century presupposition that the fire suppression ability of carbon tetrachloride relied on oxygen removal). In 1911, they patented a small, portable extinguisher that used the chemical.[8] This consisted of a brass or chrome container with an integrated handpump, which was used to expel a jet of liquid towards the fire. It was usually of 1 imperial quart (1.1 L) or 1 imperial pint (0.57 L) capacity but was also available in up to 2 imperial gallons (9.1 L) size. As the container was unpressurized, it could be refilled after use through a filling plug with a fresh supply of CTC.[9]

Another type of carbon tetrachloride extinguisher was the fire grenade. This consisted of a glass sphere filled with CTC, that was intended to be hurled at the base of a fire (early ones used salt-water, but CTC was more effective). Carbon tetrachloride was suitable for liquid and electrical fires and the extinguishers were fitted to motor vehicles. Carbon tetrachloride extinguishers were withdrawn in the 1950s because of the chemical's toxicity – exposure to high concentrations damages the nervous system and internal organs. Additionally, when used on a fire, the heat can convert CTC to phosgene gas,[10] formerly used as a chemical weapon.

The carbon dioxide extinguisher was invented (at least in the US) by the Walter Kidde Company in 1924 in response to Bell Telephone's request for an electrically non-conductive chemical for extinguishing the previously difficult-to-extinguish fires in telephone switchboards. It consisted of a tall metal cylinder containing 7.5 pounds (3.4 kg) of CO_2 with a wheel valve and a woven brass, cotton-covered hose, with a composite funnel-like horn as a nozzle.[11] CO_2 is still popular today as it is an ozone-friendly clean agent and is used heavily in film and television production to extinguish burning stuntmen.[12] Carbon dioxide extinguishes fire mainly by displacing oxygen. It was once thought that it worked by cooling, although this effect on most fires is negligible. An anecdotal report of a carbon dioxide fire extinguisher was published in Scientific American in 1887 which describes the case of a basement fire at a Louisville, Kentucky pharmacy which melted a lead pipe charge with CO_2 (called carbonic acid gas at the time) intended for a soda fountain which immediately extinguished the flames thus saving the building.[13] Also in 1887, carbonic acid gas was described as a fire extinguisher for engine chemical fires at sea and ashore.[14]

In 1928, DuGas (later bought by ANSUL) came out with a cartridge-operated dry chemical extinguisher, which used sodium bicarbonate specially treated with chemicals to render it free-flowing and moisture-resistant.[15][16] It consisted of a copper cylinder with an internal CO_2 cartridge. The operator turned a wheel valve on top to puncture the cartridge and squeezed a lever on the valve at the end of the hose to discharge the chemical. This was the first agent available for large-scale three-dimensional liquid and pressurized gas fires, but remained largely a specialty type until the 1950s, when small dry chemical units were marketed for home use. ABC dry chemical came over from Europe in the 1950s, with Super-K being invented in the early 1960s and Purple-K being developed by the United States Navy in the late 1960s. Manually applied dry agents such as graphite for class D (metal) fires had existed since World War II, but it was not until 1949 that Ansul introduced a pressurized extinguisher using an external CO_2 cartridge to discharge the agent. Met-L-X (sodium chloride) was the first extinguisher developed in the US, with graphite, copper, and several other types being developed later.

In the 1940s, Germany invented the liquid chlorobromomethane (CBM) for use in aircraft. It was more effective and slightly less toxic than carbon tetrachloride and was used until 1969. Methyl bromide was discovered as an extinguishing agent in the 1920s and was used extensively in Europe. It is a low-pressure gas that works by inhibiting the chain reaction of the fire and is the most toxic of the vaporizing liquids, used until the 1960s. The vapor and combustion by-products of all vaporizing liquids were highly toxic and could cause death in confined spaces.

In the 1970s, Halon 1211 came over to the United States from Europe where it had been used since the late 1940s or early 1950s. Halon 1301 had been developed by DuPont and the United States Army in 1954. Both 1211 and 1301 work by inhibiting the chain reaction of the fire, and in the case of Halon 1211, cooling class A fuels as well. Halon is still in

use today but is falling out of favor for many uses due to its environmental impact. Europe and Australia have severely restricted its use, since the Montreal Protocol of 1987. Less severe restrictions have been implemented in the United States, the Middle East, and Asia.[17][18]

Fire extinguishers in a museum storeroom, cut to display their inner workings

A glass grenade-style extinguisher, to be thrown into a fire

A US copper building type soda-acid extinguisher

A US building-type chemical foam extinguisher with contents

Pyrene apparatus type chemical foam, 1960s

A Pyrene, brass, carbon tetrachloride extinguisher

Pyrene 1 qt. pump-type chlorobromomethane (CB or CBM), 1960s, UK

National Methyl Bromide extinguishers, UK, 1930s–1940s

Bell Telephone CO_2 extinguisher made by Walter Kidde, 1928

Du Gas cartridge-operated dry chemical extinguisher, 1945

Ansul Met-L-X cartridge-operated dry powder fire extinguisher for class D fires, 1950s

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This complicated apparatus was replaced by a new patent from 1813, which is considered to be the first fire extinguisher in history. After observing the inability of a group of Edinburgh firefighters to reach the upper floors of a burning building, Captain William George Manby came up with the idea of creating an instrument that would put out the fire more effectively. Thus, after some time of development, he managed to invent a firefighting pump loaded with a solution of lime and potash.

Manby was an English inventor and publicist, who was born in Denver (Norfolk) and died in Yarmouth (1765-1854). He embraced a military career, and after having been promoted to captain was appointed in 1803 as director of the Yarmouth barracks. The fire extinguisher was his most important and well-known invention, although he also invented other devices. One of them was also related to the fires. He invented a mechanism to catch, without hurting, people jumping from burning buildings.

George William Manby became passionate about safety devices after witnessing a storm in Yarmouth in 1807 in which dozens of men, women and children drowned just about 50 meters from the coast without him being able to do anything to prevent it. This fact had a profound impact on him and shortly afterwards he showed another of his inventions. It was the "Manby Morter". This was a mortar-shaped device that, when a ship was detected sinking near the coast, launched a projectile with a rope that the crew could hold on to to reach the coast.

A short time later, in 1808, it would be Manby himself who would test his own invention to rescue soldiers whose ship was sinking 140 meters off the coast of Yarmouth. Since then, dozens of Manby Mortars have been placed along the coast and have been frequently used in ship rescues. Not all of his inventions were successful, such as the fire extinguisher. He also invented a method to get people who had fallen into the lake through the ice and a boat that could not sink from which, by the way, he had to be rescued since it did sink.

Returning to the subject of fire extinguishers, it must be said that the first extinguisher was a device with four metal cylinders of which three of them were half filled with water and in the fourth it introduced pressurized air. At the top of the cylinder was a small hose and valve. When the valve was activated, the pressurized air came out of the metal cylinder dragging the water with it and thus extinguishing the fire.

In 1866 the Frenchman Francois Charlie patented a fire extinguisher that consisted of a solution of water with baking soda that reacted with tartaric acid, producing CO2 which was the propellant gas

The first authentic portable fire extinguishers appeared at the end of the first decade of the nineteenth century. They contained glass bottles with acid that, when broken, discharged the acid with a solution of soda, generating a mixture with enough gas pressure to expel the solution.

Water extinguishers, activated by cartridges (type of inversion), were introduced in the late 1920s. The first foam fire extinguisher appeared in 1917 and its appearance and operation closely resembles acid and soda extinguishers. Its use spread progressively over the years, until in the 50s powder extinguishers reached wide acceptance.

In 1959 pressurized water extinguishers appeared, which in 10 years gradually replaced cartridge models. In 1969, the United States discontinued the manufacture of all investment extinguishers, which are no longer certified or approved by testing laboratories.

One variety of the extinguishers was the anti-fire grenade. It consisted of a glass bottle filled at first with salt water and later with carbon tetrachloride, and was intended to extinguish electric fires and flammable liquids. Carbon tetrachloride was used until the end of 1959 when it was withdrawn due to its toxicity. Exposure to high concentrations caused damage to the nervous system and internal organs. Later, liquid chlorobromomethane, which was less toxic, and methyl bromide, which was discovered around 1920, were used. It is a low-pressure bottled gas that extinguishes fire by breaking the chain reaction. It was used until 1960 and was withdrawn due to the toxicity of the by-products in the extinction reaction, which could cause death in confined spaces.

From 1950 onwards, halon began to be used as an extinguishing agent. This product had been developed by the Dupont company in conjunction with the US Army. Both Halon 1211 and 1301 were extinguished by the rupture of the chain reaction.

We currently have a varied series of fire extinguishers, with different extinguishing agents and capacities, which allow us to attend to all the variants of habitats in which it is possible to start a fire.