NFPA No.
10
File: 10 Series
Fire Extinguishing Appliances

Standard for the Installation,

Maintenance and Use of

PORTABLE FIRE EXTINGUISHERS

June

1959

Sixty Cents*

NATIONAL FIRE PROTECTION ASSOCIATION

International

60 Batterymarch Street, Boston 10, Mass.

3M-6-59-WP-RP *Discount for quantities Printed in U.S.A.

National Fire Protection Association

International

Executive Office: 60 Batterymarch St., Boston 10, Mass.

The National Fire Protection Association was organized in 1896 to promote the science and improve the methods of fire protection and prevention, to obtain and circulate information on these subjects and to secure the cooperation of its members in establishing proper safeguards against loss of life and property by fire. Its membership includes two hundred national and regional societies and associations (list on outside back cover) and seventeen thousand individuals, corporations, and organizations. Anyone interested may become a member; membership information is available on request.

This pamphlet is one of a large number of publications on fire safety issued by the Association including periodicals, books, posters and other publications; a complete list is available without charge on request. All NFPA standards adopted by the Association are published in six volumes of the **National Fire Codes** which are re-issued annually and which are available on an annual subscription basis. The standards, prepared by the technical committees of the National Fire Protection Association and adopted in the annual meetings of the Association, are intended to prescribe reasonable measures for minimizing losses of life and property by fire. All interests concerned have opportunity through the Association to participate in the development of the standards and to secure impartial consideration of matters affecting them.

NFPA standards are purely advisory as far as the Association is concerned, but are widely used by law enforcing authorities in addition to their general use as guides to fire safety.

Definitions

The official NFPA definitions of shall, should and approved are:

SHALL is intended to indicate requirements.

SHOULD is intended to indicate recommendations, or that which is advised but not required.

APPROVED refers to approval by the authority having jurisdiction.

Units of measurements used here are U. S. standard. 1 U. S. gallon = 0.83 Imperial gallons = 3.785 liters.

Approved Equipment

The National Fire Protection Association does not "approve" individual items of fire protection equipment, materials or services. The standards are prepared, as far as practicable, in terms of required performance, avoiding specifications of materials, devices or methods so phrased as to preclude obtaining the desired results by other means. The suitability of devices and materials for installation under these standards is indicated by the listings of nationally recognized testing laboratories, whose findings are customarily used as a guide to approval by agencies applying these standards. Underwriters' Laboratories, Inc., Underwriters' Laboratories of Canada and the Factory Mutual Laboratories test devices and materials for use in accordance with the appropriate standards, and publish lists which are available on request.

Portable Fire Extinguishers

NFPA No. 10 — June 1959

The 1959 edition of this standard supersedes all previous editions.

History

The 1959 changes, recommended by the Committee on Portable Fire Extinguishers were adopted by the National Fire Protection Association at its Annual Meeting on June 4, 1959.

In 1918 and 1919 the NFPA Committee on Field Practice (predecessor of the present committee) developed standards on First Aid Protection which were finally adopted by the Association in 1921. Subsequently the title was changed to First Aid Fire Appliances, and in 1957 to Portable Fire Extinguishers. Revised editions were adopted by the Association in 1926, 1928, 1929, 1930, 1931, 1932, 1936, 1938, 1942, 1945, 1950, 1953, 1955, 1956, 1957, 1958 and 1959.

Previous editions of this Standard have been published by the National Board of Fire Underwriters.. It has also been published by the Canadian Underwriters' Association.

Changes in 1959 Edition

Paragraph 313: Revised by the addition of a new last sentence stating that portable fire extinguishers having fractional ratings (e.g. ½-B) shall *not* be used in meeting the requirements of this Standard.

Paragraph 1543: Entire Paragraph revised to editorially clarify the intent.

Paragraphs 3124 and 3132: Revised to correct references to the various sizes of vaporizing liquid extinguishers.

Paragraphs 4149 and 4249: Revised to clarify and simplify hydrostatic testing recommendations on carbon dioxide extinguishers.

Section 44, Subhead: Revised to correct references to sizes of dry chemical extinguishers available.

Paragraph 7161: Revised to add note warning against stamping hydrostatic test dates on extinguisher shells with a hammer.

Appendix II, Conversion Table: Indicate by asterisks and a footnote that fractionally rated extinguishers are not to be considered as meeting the requirements of this standard (see change to Paragraph 313 given above).

Standard for the Installation, Maintenance and Use of PORTABLE FIRE EXTINGUISHERS

NFPA No. 10

Prompt notice of the existence of a fire is important and the use of containers holding fire extinguishing material in readily accessible locations is of value in extinguishing fires in their incipient state.

CONTENTS.

Principles of Fire Extinguishment.

Combustion is defined as "A chemical process accompanied by the evolution of heat."

Substances when heated to a certain temperature (known as the "temperature of combustion") form a union with the oxygen of the atmosphere, resulting in combustion

(fire or flame). Sufficient heat is usually liberated to raise the temperature of adjoining substances to the "temperature of combustion." Proper temperature and a supply of oxygen are necessary to cause a substance to burn.

Combustion can be suppressed by cooling (lowering the temperature of) the burning substance below the temperature of combustion, or excluding the oxygen of the atmosphere from contact with the substance or some combination of these.

Section 1.

GENERAL

101. **Purpose.** This Standard is prepared for the use and guidance of persons charged with the purchasing, installing, testing, inspecting, approving, listing, designing, operating and/or maintaining portable fire extinguishing equipment, in order that such equipment will function at all times as intended throughout its useful life.

102. **Scope.** The provisions of this Standard apply to the installation, maintenance, and use of all fire extinguishing equipment and devices that are portable in their entirety. They do not apply to permanently installed systems for fire extinguishment even though portions of such systems are portable (such as hose and nozzles attached to a fixed supply of extinguishing agent). Such systems are covered by the following NFPA standards:

(a). Foam Extinguishing Systems (No. 11).

(b). Carbon Dioxide Extinguishing Systems (No. 12).

(c). Installation of Sprinkler Systems (No. 13).

(d). Installation of Standpipe and Hose Systems (No. 14).

(e). Water Spray Systems for Fire Protection (No. 15).

(f). Dry Chemical Extinguishing Systems (No. 17).

103. Various types of fire extinguishers are described herein. Each type is of value, but all are not equally effective upon various kinds of fires. On this account consideration should be given to the class of fire which may occur on account of the nature of the processes in or contents of a building.

104. The requirements given herein are, in general, minimum and the authority having jurisdiction should be consulted in all cases. It should be understood that portable fire extinguishers are designed to cope with fires in their incipiency and are considered necessary even though the property is equipped with automatic sprinklers or standpipe and hose.

105. While the methods of operation of the various types of appliances are generally apparent from their very nature, and are indicated prominently on each extinguisher, it is important to give instructions to employees and to occupants of the property in order that, through familiarity, they may more intelligently and more confidently handle appliances during the excitement of a fire and thus accomplish the maximum of fire extinguishment in the minimum of time. These instructions should be supplemented by yearly or more frequent demonstrations.

106. It is extremely important that the instructions regarding maintenance be carefully followed so that the fire extinguishers will be always fully charged; in their designated places at all times; and in a condition which will permit efficient operation at any moment without delay.

107. In location where extinguishers are likely to be obscured by piles of stock, lumber, etc., or in large rooms, means should be provided to indicate conspicuously the location of the extinguishers.

108. In many industries temporary hazards occur from time to time. A good practice is to maintain a few portable stands or racks consisting of a horizontal bar on uprights with feet. Locate these stands as necessary and hang on them such fire extinguishers as are suited to the "Special Hazard" to be protected.

Section 2

CLASSIFICATION OF PORTABLE FIRE EXTINGUISHERS

211. In order to express the relative fire extinguishing potential of portable fire extinguishers, the following classification plan has been established.

Classification of Fires.

221. For all practical purposes, there are three general classes of fires:

(a). **Class "A" Fires,** defined as fires in ordinary combustible materials such as wood, cloth and paper where the "quenching-cooling" effect of quantities of water or solutions containing large percentages of water is most effective in reducing the temperature of the burning material below the ignition temperature and is, therefore, of first importance.

(b). **Class "B" Fires,** defined as fires in flammable petroleum products or other flammable liquids, greases, etc. where the "blanketing-smothering" effect of oxygen-excluding media is most effective.

(c). **Class "C" Fires,** defined as fires involving electrical equipment where the electrical nonconductivity of the extinguishing media is of first importance.

Classification of Fire Extinguishers.

231. Based upon the preceding classification of fires and also upon fire extinguishment potentials as determined by physical testing of fire extinguishers by Underwriters' Laboratories, Inc., classifications have been established for portable fire extinguishers.

232. This classification consists of a NUMERAL and a LETTER. It appears on the label affixed to the extinguishers labeled by Underwriters' Laboratories, Inc., and Underwriters' Laboratories of Canada. This NUMERAL and LETTER connote the following:

(a). In the case of Class "A" extinguishers, the NUMERAL is indicative of the approximate relative fire extinguishing potential of various size Class "A" fire extinguishers, i.e., a 4-A extinguisher can be expected to extinguish approximately twice as much fire as a 2-A extinguisher.

(b). In the case of Class "B" extinguishers, the NUMERAL is also indicative of the approximate relative fire extinguishing potential of various size Class "B" fire extinguishers, and in addition, the NUMERAL is an approximate indication of the square-foot area of deep-layer flammable liquid fire which an average operator can extinguish, i.e., a 10-B unit can be expected to extinguish 10 square feet of deep layer flammable liquid fire when used by an average operator.

(c). In the case of Class "C" extinguishers, no NUMERAL is used since Class "C" fires are essentially either Class "A" or "B" fires involving energized electrical wiring and equipment. The size of the Class "C" extinguishers installed should be commensurate with the size and extent of the area involving the electrical hazard or containing equipment being protected, considering that it must be covered or blanketed by the Class "C" extinguishing media for effective fire extinguishment.

(d). The LETTER refers to the class of fire (see Paragraph 221 preceding) on which the use of the particular extinguisher is approved for most effective fire extinguishment.

EXAMPLES:

Foam extinguisher, rated 2-A,4-B. This extinguisher should extinguish approximately twice as much Class "A" fire as a 1-A extinguisher, and four times as much Class "B" fire as a 1-B extinguisher. Also, the extinguisher should extinguish a fire in a deep-layer flammable liquid, such as a dip tank having a surface area of 4 square feet, when used by an average operator.

Dry chemical extinguisher, rated 6-B,C. This extinguisher should extinguish approximately six times as much Class "B" fire as a 1-B unit and should successfully extinguish a deep-layer flammable liquid fire of 6 square foot area when used by an average operator. It also is safe to use on fires involving electrical equipment.

Section 3

DISTRIBUTION OF UNITS

311. The required number of extinguishers may be obtained by providing devices of any of the types described in these Standards, or a combination of two or more types, selected in accordance with the character of the fires anticipated, and their suitability for the individual property protected.

312. The number of portable fire extinguishers to be installed shall be determined by the authority having jurisdiction in accordance with the severity of the incipient fire anticipated, i.e., rapidity with which a fire may spread, the intensity of the heat that may be developed and the accessibility of the fire. Where there are special hazards in addition to the ordinary hazards of the occupancy, additional and/or substitute units of suitable type shall be installed for the protection of such hazards (see Paragraphs 314 and 318).

313. The number and type of extinguishing units required shall be determined as specified in Paragraphs 314-320. The term unit refers to the numerical extinguishing capacity for any given fire classification as shown on the label affixed to the extinguisher, i.e., an extinguisher having a classification of 2-A,4-B, is regarded as possessing 2 units of extinguishing capacity for Class A fires and 4 units of extinguishing capacity for Class B fires. This can be translated into terms of actual extinguishers based on the classification and the numerical unit value of the extinguisher to be used. Portable fire extinguishers having fractional ratings (e.g. ½-B) shall *not* be used in meeting the requirements of this Standard.

For example, if 8 units are required for Class "A" protection and soda-acid extinguishers are to be provided having 2-A classification on the label, four extinguishers will be necessary.

Similarly, if 8 units are required for Class "B" protection and dry chemical extinguishers are to be provided having 4-B classification, two extinguishers will be acceptable for area protection, but individual hazards shall be protected by single extinguishers.

314. **General Requirements.** The provisions of this paragraph are based primarily on the provisions of Class "A" extinguishers. Supplemental Class "B" and/or Class "C" extinguishers shall be provided where blanketing or nonconducting extinguishing agents are necessary.

(a). **Light Hazard Occupancies,** so classified by the authority having jurisdiction, where because of a relatively small amount of combustibles, incipient fires of minimum severity may be anticipated. Class "A" extinguishers shall be provided throughout, so located that a person will not have to travel more than 100 feet from any point to reach the nearest device, but at least one unit of extinguishing capacity shall be required for every 2500 square feet of floor area or greater fraction thereof on each floor.

NOTE: This class may include occupancies such as office buildings, schools (exclusive of trade schools and shops), public buildings, etc. Limited areas within such buildings containing ordinary hazard occupancies shall be protected as required under sub-paragraph (b).

(b). **Ordinary Hazard Occupancies,** where incipient fires of average severity in combustibles may be anticipated. Class "A" extinguishers shall be provided throughout, so located that a person will not have to travel more than 50 feet from any point to reach the nearest device, but at least one unit of extinguishing capacity shall be required for every 1250 square feet of floor area or greater fraction thereof on each floor.

NOTE: This class may include occupancies such as department stores, warehouses and manufacturing buildings of average hazard.

(c). **Extra Hazard Occupancies,** where because of the character or quantity of combustibles, extra severe incipient fires may be anticipated. At the discretion of the authority having jurisdiction, extinguishers suitable for the extra hazard shall be provided in addition to those specified for ordinary hazard occupancies.

NOTE: This class may include occupancies such as woodworking, spray painting, dipping, etc.

315. **Special Provisions Relating to Class "B" Extinguishers.**

(a). Exceptional cases may develop wherein the total area under consideration will present wholly Class "B" hazards in which case Class "B" extinguishers may be ac-

ceptable, protecting the entire area on a basis of one numerical extinguishing unit for every 625 square feet or greater fraction thereof of floor area. Travel distance shall not exceed 50 feet from any point to reach the nearest device.

(b). Class "B" extinguishers, except as noted in Paragraph 315 a., shall be required in addition to the Class "A" requirement where blanketing effect is essential; to be provided on the basis of one unit of extinguishing capacity for every 625 square feet or greater fraction thereof of such hazardous floor area to be protected. In establishing such area, consideration shall be given to providing protection for spill fires or surface fires involving flammable liquids.

(c). For deep-layer flammable-liquid fires, as in dip or quench tanks or similar individual hazards, at least one Class "B" type extinguisher shall be provided on the basis of one numerical unit of extinguishing potential per square foot of the largest individual hazard to be protected. Multiple smaller extinguishers shall not be employed in lieu of the larger extinguisher. When approved automatic protection is provided for deep-layer flammable-liquid hazard, this latter requirement may be waived.

316. Class "B" extinguishers are not acceptable in lieu of required Class "A" extinguishers unless the device selected also has a Class "A" rating. An extinguisher carrying both Class "A" and "B" designations may be accepted for area requirements under each individual letter classification and at the numerical rating for that class.

NOTE: One foam extinguisher (2-A, 4-B) may be acceptable for 2 times 1,250 square feet (2500 square feet) of ordinary combustible areas and also for 4 times 625 square feet (2500 square feet) of area requiring blanketing protection.

317. Where both Class "A" and Class "B" extinguishers are required in light hazard or ordinary hazard occupancies and the Class "B" extinguishers do not also have a Class "A" rating, the required number of Class "A" extinguishers may be reduced 50 per cent in the area which is protected by both Class "A" and Class "B" extinguishers, provided that the travel distances required in Paragraph 314 (a) and (b) are not exceeded. The areas protected by the Class "B" extinguishers shall be computed on the basis of one unit of extinguishing capacity for each 625 square feet.

318. Extinguishers with "C" classification shall be required where nonconducting extinguishing media agent is of first importance. Distribution shall be in accordance with applicable provisions of Class "B" extinguishers.

319. Travel distance should be given consideration with reference to special hazards and the extinguisher selected for such protection. Scattered or widely separated hazards should be individually protected if the above specified travel distance to the required type of extinguisher is exceeded. Likewise, extinguishers in the proximity of a hazard shall be carefully located so as to be accessible in the presence of a fire without undue danger to the operator.

320. FOR EXTINGUISHERS SHOWING CLASSIFICATION UNDER THE OLD METHOD, refer to the Conversion Table in Appendix II and use the current equivalents therein provided in determining the area of coverage applicable.

Section 11.

STANDARD FIRE PAILS; DRUMS WITH PAILS; BUCKET-TANKS

Limited water or anti-freezing-solution supplies using fire pails for distribution purposes are fire extinguishing appliances of limited value. The following combinations are considered as possessing two units of extinguishing potential (2-A) for Class A fires:

(a). 5 12-quart water-filled standard fire pails.

(b). 6 10-quart water-filled standard fire pails.

(c). Drum, cask or barrel of approximately 55-gallon capacity, with at least three standard fire pails attached.

(d). Bucket tanks of 25 to 55-gallon capacity, with standard fire pails (either (a) or (b) above) immersed therein.

Standard fire pails shall be made of galvanized iron or steel stock of at least No. 24 USS gage, with flat bottom welded in place or otherwise suitably reinforced, furnished with stamped ears welded in place and with strong wire bail and loose-fitting metal cover to exclude debris and retard evaporation.

Casks, drums or barrels should preferably be of metal of similar gage thickness or better and should have covers. Fire pails therewith may be hung on sides of the containers or immersed therein.

NOTE: Pails, casks, drums, or bucket tanks to be painted bright RED with the word "FIRE" stenciled in large letters on their outside with BLACK paint. If anti-freezing solution is used, inside of pails, drums or bucket tanks to be coated with red lead and oil followed by a coat of asphalt-base paint—casks to be heavily pitched. (See Paragraph 1146.)

Method of Operation.

1111. Pails are designed to be carried to the fire where the cover, if any, is removed and the contents thrown or poured over the entire surface of the burning material. While the liquid is most effective if used close to the fire, in case of necessity it can be directed from a distance of 10 feet horizontally.

Suitability.

1121. These appliances are effective on incipient fires in ordinary combustible materials (such as wood, paper, textiles, rubbish, etc.), i.e., on Class "A" fires, where the quenching and cooling effect of quantities of water or a solution containing a large percentage of water is of first importance.

1122. They are not effective on fires in flammable liquids, greases, etc., in vats, open vessels, etc., where the blanketing effect is essential, but are of value on incipient fires in floors soaked with oils, greases, etc., where the

quenching and cooling effect of the water (or anti-freeze solution) may be utilized.

1123. Their use in connection with fires in electrical equipment such as panelboards, switchboards, motors, and the like is not recommended.

NOTE: In some cases, fires in electrical equipment may be such that the quenching and cooling effect of large quantities of water or solutions containing large percentages of water is necessary. In such cases equipment should be made electrically dead before applying water or water solutions.

1124. Their use is limited to fires which may be readily reached by liquids thrown or poured from a pail. These appliances are readily used while being carried about.

1125. When located outdoors or in unheated sections of buildings containers must, when continued temperatures lower than 40° F. may be encountered, be protected against freezing as described in paragraph 1146.

Distribution.

1131. **Units.** Within structures or open sheds, the unit combinations cited above shall be located as required by Section 3 herein, "Distribution of Units," with the travel distance requirements determined by the relative combustibility of the materials being protected determining whether the occupancy is light hazard or ordinary hazard.

1132. **Arrangement.** Pail and water container units shall be conspicuously located where they will always be readily accessible and so distributed as to be immediately available in event of fire. Filled pails should be hung on hangers or set on brackets or shelves so that their upper rims will not be higher than 5 feet or less than 2 feet from the floor. Approved fire extinguishers shall also be provided for all power units and vehicles operating within or around structures.

NOTE: Casks or drums with pails, and bucket-tanks, shall be similarly arranged except that pails are enclosed inside of bucket-tanks and may be enclosed inside of tanks or drums.

Maintenance.

1141. Pails (and casks, drums or tanks) shall be kept full at all times and be refilled immediately after use.

1142. Pails (and casks, drums or tanks) shall be examined at regular intervals — several times a year — to make sure that they have not been tampered with or removed from their designated places; when anti-freeze solution is used, to determine (with a hydrometer) whether or not the specific gravity of the solution is such as to insure against its freezing at the lowest temperatures which may be encountered; to replace liquid which has become foul; and to see that the containers are kept full and to replace the liquid which may have evaporated. Covers shall be kept on containers.

1143. At least once yearly the containers shall be examined for deterioration or injuries due to misuse. Containers which are not in good condition shall be replaced.

1146. When located where continued temperatures below 40° F. may be encountered, containers shall be filled with an anti-freeze solution consisting of granulated or flake calcium chloride (free from magnesium chloride) dissolved in water. The following table shows approximately the temperature at which the resultant solution will freeze when granulated or flake calcium chloride (free from magnesium chloride) is added to water in the proportions shown:—

To Make 2½ Gallons Anti-freezing Solution

Approximate Freezing Temperature Degrees Fahrenheit	Water	Calcium Chloride	Specific Gravity	Baumé Degrees
10°	2 gals. 1 qt.	5 lbs.	1.139	17.7
zero	2 gals. 1 pt.	6 lbs. 4 oz.	1.175	21.6
10° below	2 gals.	7 lbs. 6 oz.	1.205	24.7
20° below	2 gals.	8 lbs. 6 oz.	1.228	26.9
30° below	2 gals.	9 lbs. 2 oz.	1.246	28.6
40° below	2 gals.	10 lbs.	1.263	30.2

NOTE: This table is based on granulated 75% Calcium Chloride.

Anti-freezing solutions shall be mixed thoroughly in exact accordance with proportions given above.

1147. On every property where anti-freezing solutions are employed, a quantity of granulated or flake calcium chloride (free from magnesium chloride) should be kept on hand in an airtight receptacle so that containers may be promptly refilled after use.

In an emergency common salt (not rock salt) may be used instead of calcium chloride when the solution is kept in wooden casks and where temperatures lower than zero Fahrenheit will not be encountered. Two and three-quarters pounds of salt per gallon of water produces a solution having a specific gravity of 1.205. Salt solution must never be kept in metal containers.

Section 12.

CHEMICAL SOLUTION (SODA-ACID) EXTINGUISHERS.
(1¼ to 1½ and 2½ Gallons)

Approved hand fire extinguishers made in two principal sizes: one having liquid capacity of 1¼-1½ gallons, the other 2½ gallons to filling mark. Chemicals used are a powdered chemical (usually bicarbonate of soda) designed to be dissolved in water for extinguisher shell, and a liquid chemical (sulphuric acid) for the bottle. While the discharge contains products of the chemical reaction, the extinguishing agent is principally water. (See paragraph 1245.)

Method of Operation.

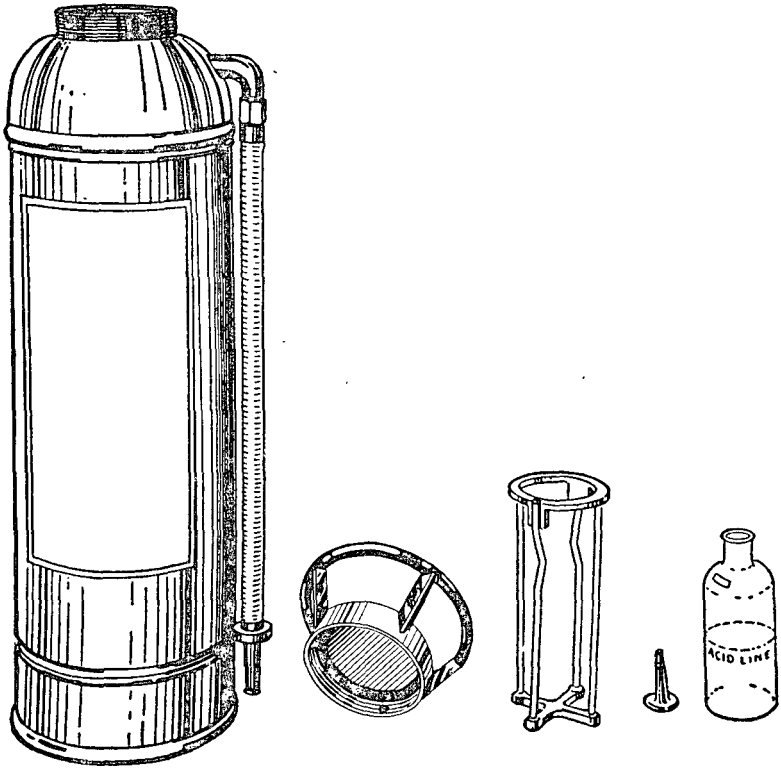
1211. Extinguishers are designed to be carried to the fire by means of the top handle and to be used must be inverted. When the chemicals mix as a result of the above operation, pressure is created within the container which expels a stream of reacted chemical solution through the hose. While the stream is usually most effective if used close to the fire, in case of necessity it can be directed effectively from a distance of 30 to 40 feet horizontally.

Suitability.

1221. These extinguishers are effective on incipient fires in ordinary combustible materials (such as wood, paper, textiles, rubbish, etc.), i.e., on Class "A" fires where the quenching and cooling effect of quantities of water or a solu-

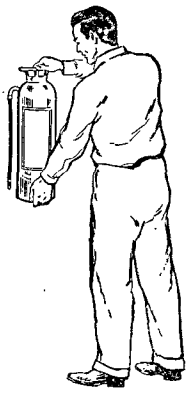
tion containing a large percentage of water is of first importance.

1222. They are not effective on fires in flammable liquids, greases, etc., in vats, open vessels, etc. (Class "B" fires), where the blanketing effect is essential but are of value on incipient fires in floors soaked with oils, greases, etc., where the quenching and cooling effect of the water solution may be utilized.



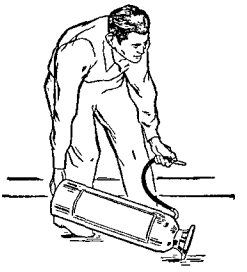
SODA-ACID TYPE EXTINGUISHER

The various parts of the conventional 2½-gallon loose-stopple type of soda-acid extinguisher: tank or shell; ring top or cap with gasket in place and pressure relief hole; cage for acid bottle; loose-fitting stopple for acid bottle; acid bottle showing acid line at the 4-ounce level.

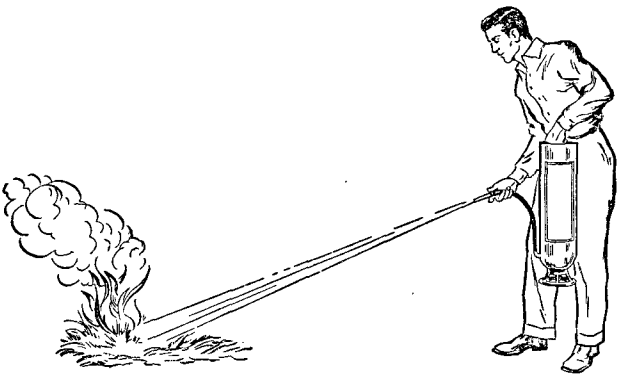


Lift extinguisher off hanger

Carry extinguisher to the fire



At fire, turn extinguisher over



Direct stream at base of flames

USING SODA-ACID TYPE EXTINGUISHERS

The method illustrated applies to most of the water solution types of "chemical" extinguishers. In the case of plain water, certain calcium chloride and loaded stream types operated by a carbon dioxide cartridge, there is another step: when extinguisher is turned over and held by the handle provided in the base as in lower picture, it is bumped on the floor. This releases gas from the cartridge and provides pressure for the stream.

1223. Their use in connection with fires in electrical equipment such as panelboards, switchboards, motors and the like (Class "C" fires) is not recommended.

NOTE: In some cases fires in electrical equipment may be such that the quenching and cooling effect of large quantities of water or solutions containing large percentages of water is necessary. In such cases equipment should be made electrically dead before applying water or water solutions.

1224. The force, range and duration of the stream are not dependent upon the operator. The 2½-gallon extinguisher discharges an effective stream of liquid for approximately one minute; the 1¼ to 1½-gallon device, a little over ½ minute. These appliances are readily operated while being carried about. The 1¼ to 1½-gallon extinguishers are readily handled by women.

1225. When located outdoors or in unheated sections of buildings extinguishers of this type must, when continued temperatures below 40°F. may be encountered, be protected against freezing as described in paragraph 1246.

Distribution.

1232. **Arrangement:**—Extinguishers shall be conspicuously located where they will always be readily accessible and so distributed as to be immediately available in event of fire. They shall be hung on hangers or set on brackets or shelves so that the top of the extinguisher is not more than 5 feet above the floor.

Maintenance.

1241. Extinguishers shall be kept full (to filling mark) at all times, and recharged annually as well as immediately after use. In recharging these extinguishers all parts shall be washed thoroughly with water and the water drained through the hose.

1242. Extinguishers shall be examined at regular intervals—several times a year—to make sure that they have not been tampered with nor removed from their designated places; to detect any injuries; also to see that they are not

empty; and to see that the orifice of the hoze nozzle is not clogged.

NOTE: If an extinguisher shows evidence of corrosion or mechanical injury, it may be unsafe for further use and should be either returned to the manufacturer for examination, or subjected to a hydrostatic pressure test in accordance with Section 71.

1243. At least once yearly, before emptying and recharging, the extinguishers and all their parts (including gasket and hose) shall be examined for deterioration or injuries due to misuse and the orifices of the hose nozzles examined to see that they are not clogged. Extinguishers or parts which are not in good condition shall be replaced, returned to the manufacturer for examination, or subjected to a hydrostatic pressure test in accordance with Section 71. It is important that acid bottles and their corresponding stopples when replaced should be exact duplicates of those originally provided with the extinguishers, as otherwise the discharge may be impaired or the extinguisher rendered inoperative. At these annual inspections, all extinguishers of this type shall be emptied and recharged. Recharging work shall be done under capable supervision and date of recharging and signature of the person who performed it put on the tag attached to each extinguisher. When extinguishers are to be recharged, each should, where practicable, be emptied by discharging it. At each annual inspection, one or more of the extinguishers should be discharged as if at a fire before an assembly of the occupants of the building. These exhibitions are valuable for the reasons outlined in paragraph 105.

1244. The powdered chemical shall be thoroughly stirred until dissolved in water in exact accordance with instructions on the extinguisher or charging unit.

1245. On every property where extinguishers of this type are employed, there should be kept on hand a quantity of chemical charges supplied by the extinguisher manufacturer for use in such appliances, so that the extinguishers may be promptly recharged after use.

1246. When located where continued temperatures lower than 40° F. may be encountered, extinguishers of this type shall be placed in suitable heated cabinets. See Appendix I. Extinguishers of this type should not be located where the ambient temperature will exceed 120°F.

1247. Ingredients such as common salt, calcium chloride, wetting agents, etc., must not be used in extinguishers of this type, as they may either reduce the effectiveness of the discharge (and chemical reaction) or change the nature of the discharge, or they may corrode extinguishers so as to make them dangerous for use.

1249. Every five years extinguishers which have been in service shall be subjected to a hydrostatic pressure test, in accordance with Section 71, to determine that they are still capable of safely withstanding the pressures which might be generated during operation.

Section 13.

WHEELED CHEMICAL SOLUTION (SODA-ACID) EXTINGUISHERS.
(17 and 33 Gallons)

Approved wheeled extinguishers made in two principal sizes: one having a liquid capacity of approximately 33 gallons (trade designation 40 gallons), and the other of 17 gallons (trade designation 20 gallons). Chemicals used are a powdered chemical (usually bicarbonate of soda) and a liquid chemical (sulphuric acid). While the discharge contains products of the chemical reaction, the extinguishing agent is principally water. (See paragraph 1345.)

Method of Operation.

1311. Extinguishers are designed to be wheeled to the fire, and, to be used, must be operated in accordance with instructions which are prominent on the extinguisher. When the chemicals mix as a result of the above operation, pressure is created within the container which expels the solution through the hose. While the stream is usually most effective if used close to the fire, in case of necessity it can be directed effectively from a distance of about 50 feet.

Suitability.

1320. The "warehouse" and "yard" types of wheeled extinguishers are suitable for use inside factory and warehouse buildings in which doorways are wide enough to per-

mit passage of extinguishers from one room or section to another, or in which the extinguisher will not be required to pass from one room to another. The "yard" type of wheeled extinguisher is suitable also for use in mill yards and similar places.

1321. These extinguishers are effective on fires in ordinary combustible materials (such as wood, paper, textiles, rubbish, etc.), i.e., on Class "A" fires where the quenching and cooling effect of quantities of water or a solution containing a large percentage of water is of first importance.

1322. They are not effective on fires in flammable liquids, greases, etc., in vats, open vessels, etc. (Class "B" fires), where the blanketing effect is essential but are of value on incipient fires in floors soaked with oils, greases, etc., where the quenching and cooling effect of the water solution may be utilized.

1323. Their use in connection with fires in electrical equipment such as panelboards, switchboards, motors and the like (Class "C" fires) is not recommended.

NOTE: In some cases fires in electrical equipment may be such that the quenching and cooling effect of large quantities of water or solutions containing large percentages of water is necessary. In such cases equipment should be made electrically dead before applying water or water solutions.

1324. The force, range and duration of the stream are not dependent upon the operator. They discharge an effective stream of liquid for approximately 3 minutes. They are not readily handled by women.

1325. When located where low temperatures may be encountered these extinguishers shall be protected against freezing, as described under "Maintenance."

Distribution.

1332. **Arrangement.** Extinguishers shall be conspicuously located where they will always be readily accessible and so distributed as to be immediately available in event of fire.

Maintenance.

1341. Extinguishers shall be kept full (to filling mark) at all times, and recharged annually as well as immediately after use. In recharging these extinguishers all parts must be washed thoroughly with water and the water drained through the hose.

1342. Extinguishers shall be examined frequently to make sure that they have not been tampered with or removed from their designated places, to detect any injuries, and to see that the hose nozzle is not clogged.

NOTE: If an extinguisher shows evidence of corrosion or mechanical injury, it may be unsafe for further use and should be either returned to the manufacturer for examination, or subjected to a hydrostatic pressure test in accordance with Section 71.

1343. At least once yearly, before emptying and recharging, the extinguishers and all their parts (including gasket and hose), shall be examined for deterioration or injuries due to misuse and the hose nozzles examined to see that they are not clogged. Extinguishers or parts which are not in good condition shall be replaced, returned to the manufacturer for examination, or subjected to a hydrostatic pressure test in accordance with Section 71. It is important that acid receptacles and lead or porcelain stopples when replaced should be exact duplicates of those originally provided with the extinguisher. At these annual inspections all extinguishers shall be emptied and recharged and date of recharging and signature of the persons who performed it written on the tag attached to each extinguisher. This work shall be done under capable supervision. On these occasions several extinguishers should be discharged as if at a fire and before an assembly of the occupants of the building. These exhibitions are valuable for the reasons outlined in paragraph 105. Each extinguisher should, where practical, be emptied by discharging it.

1344. The powdered chemical shall be thoroughly stirred until dissolved in water in exact accordance with instructions on the extinguisher or charging unit.

1345. On every property where extinguishers of this type are employed, there should be kept on hand a quantity

of chemical charges supplied by the manufacturer for use in such extinguishers, so that extinguishers may be promptly recharged after use.

1346. When located where continued temperatures lower than 40° F. may be encountered, extinguishers shall be kept in a heated enclosure conspicuously marked to show that it contains a fire extinguisher. Extinguishers of this type should not be located where the ambient temperature will exceed 120°F.

1347. Ingredients such as common salt, calcium chloride, wetting agents, glycerine, etc., shall not be used in extinguishers of this type, as they may either reduce the effectiveness of the discharge (and chemical reaction) or change the nature of the discharge, or they may corrode extinguishers so as to make them dangerous for use.

1348. Aisles, at least 1 foot wider than the extinguisher, shall be maintained at all times and floors of aisles shall be kept clear of anything which would interfere with the rapid movement of the extinguisher to a fire.

1349. Every five years extinguishers which have been in service shall be subjected to a hydrostatic pressure test, in accordance with Section 71, to determine that they are still capable of safely withstanding the pressures which might be generated during operation.

Section 15.

WATER TYPE EXTINGUISHERS; ANTI-FREEZE SOLUTION EXTINGUISHERS.

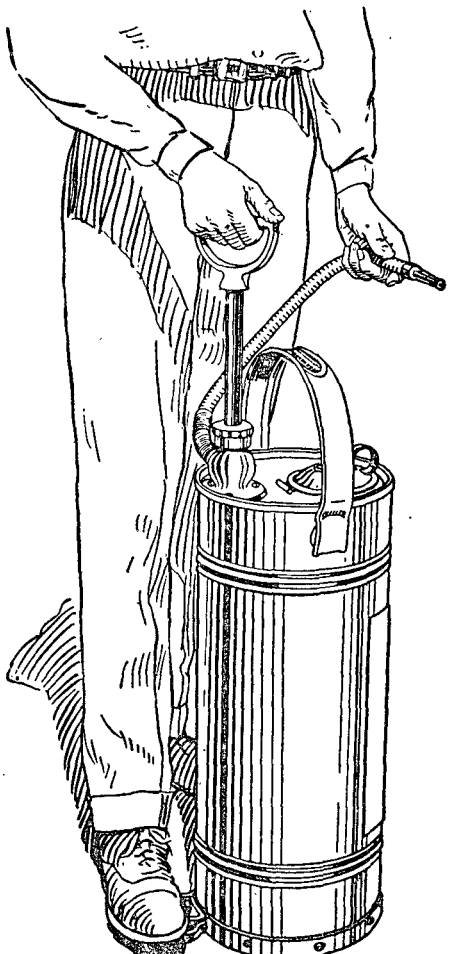
(1½ to 5 gallons)

Approved hand fire extinguishers made in a number of sizes having liquid capacity of approximately 1½ gallons to 5 gallons. Extinguishing agent used is plain water, or, when of anti-freeze type, a solution having a freezing point of 40° F. below zero—a calcium chloride base with important components for avoiding corrosion and/or deposits on operating parts.

Method of Operation.

1511. Extinguishers are designed to be carried to the fire by means of the top handle and to be used must be oper-

ated in accordance with instructions which are prominent on the extinguisher. This action expels a stream of extinguishing agent through the hose. While the stream is usually most effective if used close to the fire, in case of necessity it can be directed from a distance of 30 to 40 feet horizontally.



USING PUMP TANK EXTINGUISHER

Place foot on the foot rest at bottom of tank. The pump stroke need not be more than six or eight inches in length. Direct stream at base of flame. Follow flames and work around fire if possible.

Suitability.

1521. These extinguishers are effective on incipient fires in ordinary combustible materials (such as wood, paper, textiles, rubbish, etc.), i.e., Class "A" fires where the quenching and cooling effect of quantities of water or a solution containing a large percentage of water is of first importance.

1522. They are not effective on fires in flammable liquids, greases, etc., in vats, open vessels, etc. (Class "B" fires), where the blanketing effect is essential, but are of value on incipient fires in floors soaked with oils, greases, etc., where the quenching and cooling effect of quantities of water or a solution containing a large percentage of water is of first importance.

1523. Their use in connection with fires in electrical equipment such as panelboards, switchboards, motors, and the like (Class "C" fires) is not recommended.

NOTE: In some cases fires in electrical equipment may be such that the quenching and cooling effect of large quantities of water or a solution containing a large percentage of water is necessary. In such cases equipment should be made electrically dead before applying water or a water solution.

1524. Extinguishers which are pump-operated can be discharged intermittently, but the force, range and duration of the stream are dependent upon the operator. They cannot be operated while being carried about. The larger sizes are intended for use largely in industrial establishments where persons of ample strength, usually men, will employ them. The effective durations of discharge are as follows:

1½-gallon size	40 seconds
2½-gallon size	1 minute
5-gallon size	2 minutes

1525. When located outdoors or in unheated sections of buildings, unless charged with the anti-freeze solution mentioned in the introductory paragraph of this Section, extinguishers must, when continued temperatures below 40° F. may be encountered, be protected against freezing as described in paragraph 1546.

Distribution.

1532. **Arrangement.** Extinguishers shall be conspicuously located where they will always be readily accessible and so distributed as to be immediately available in event of fire. They shall be hung on hangers or set on brackets or shelves so that the top of the extinguisher is not more than five feet above the floor for sizes up to the 2½-gallons and three and one-half feet for the larger sizes.

Maintenance.

1541. Extinguishers shall be kept full (to filling mark) at all times and recharged immediately after use. Reweighing is the only method of determining whether or not the cartridge (of cartridge operated extinguishers) is fully charged. In recharging these extinguishers all parts shall be washed thoroughly with water and the water drained through the hose. It is essential, in the case of extinguishers containing the anti-freeze solution and located where freezing temperatures obtain, to remove all solution from the hose to prevent clogging by freezing.

1542. Extinguishers shall be examined at regular intervals—several times a year—to make sure they have not been tampered with nor removed from their designated places; to detect any injuries; to see that the orifice of the hoze nozzle is not clogged; also to see that they are full (to filling mark).

NOTE: If an extinguisher not of the pump type shows evidence of corrosion or mechanical injury, it may be unsafe for further use and should be either returned to the manufacturer for examination, or subjected to a hydrostatic pressure test in accordance with Section 71.

1543. Water type extinguishers shall be examined periodically in accordance with the provisions of this Section.

(a) At least once yearly the extinguishers and all their parts (including gasket and hose) shall be examined for deterioration or injuries due to misuse, and the orifices of the hose nozzles examined to see that they are not clogged. Extinguishers or parts which are not in good condition shall be replaced, or if of the cartridge-operated type, returned to the manufacturer for examination or subjected to a hydrostatic pressure test in accordance with Section 71. At these inspections all pumps (of pump-operated extinguish-

ers) shall be tested by operating them several strokes, discharging the solution back into the tank, then putting a drop of thin lubricating oil on the piston rod packing.

(b) At least semi-annually all cartridges (of cartridge-operated extinguishers) shall be removed and examined, and carbon dioxide cartridges shall be weighed on an accurate scale to detect loss of weight by leakage, a new cartridge being used to replace any which shows a loss of ½ ounce or more from the original weight stamped on it.

(c) At least semi-annually extinguishers of the stored-pressure type shall be examined to determine that the pressure as indicated on the extinguisher gauge is in the operable range.

(d) At these inspections and when extinguishers are recharged, date of inspection or recharging and signature of person who performed it are to be put on the tag attached to each extinguisher. This work shall be done under capable supervision. On these occasions several of the extinguishers should be discharged as if at a fire and before an assembly of the occupants of the building. These exhibitions are valuable for the reasons given in paragraph 105. When recharged, each extinguisher should, where practical, be emptied by discharging it.

1544. In recharging extinguishers with the anti-freeze solution the chemical shall be thoroughly dissolved in water outside the extinguisher in strict accordance with instructions on the extinguisher or charging unit. The water should preferably be cold and the solution should be put through a fine strainer while pouring it into the extinguisher.

1545. Property owners having cartridge-operated extinguishers shall keep on hand a quantity of the special cartridges supplied by the manufacturer for use in such extinguishers so that extinguishers may be promptly recharged after use. Property owners having extinguishers using the anti-freeze solution shall keep on hand a quantity of the special charges supplied by the manufacturer for use in such extinguishers.

1546. When not using the anti-freeze solution as an extinguishing agent and when located where continued tem-

peratures lower than 40°F. may be encountered, extinguishers shall be placed in suitable heated cabinets. See Appendix I. Both the water and anti-freeze solution extinguishers should not be located where the ambient temperature will exceed 120°F.

1547. Common salt must not be used in these extinguishers as it may corrode them so as to make them dangerous for use. Chemicals other than those specified in the introductory paragraph of this Section shall not be used in these extinguishers for any purpose. Cartridges other than those furnished by the manufacturer shall not be used in cartridge-operated extinguishers. Wetting agents shall not be used in these extinguishers without consulting the manufacturers of these extinguishers.

1549. Every five years extinguishers of the cartridge-operated and stored-pressure type which have been in service shall be subjected to a hydrostatic pressure test, in accordance with Section 71, to determine that they are still capable of safely withstanding the pressures which might be generated during operation.

Section 16.

WHEELED ANTI-FREEZE SOLUTION EXTINGUISHERS.

(17 and 33 gallons)

Approved wheeled extinguishers made in two principal sizes: one having a liquid capacity of approximately 17 gallons (trade designation 20 gallons) and the other 33 gallons (trade designation 40 gallons). The extinguishing agent used is a solution with a freezing point of 40° F. below zero, having a calcium chloride base with important components for avoiding corrosion and avoiding deposits on operating parts.

Method of Operation.

1611. The extinguishers should be wheeled to the fire, and, to be used, must be operated in accordance with the instructions which are prominent on the extinguisher. As a result of the above operation the gas escapes into the tank ejecting extinguishing liquid through the hose. While the stream is usually most effective if used close to the fire, in case of necessity it can be directed effectively from a distance of about 50 feet.

Suitability.

1620. These extinguishers are "warehouse" and "yard" type devices suitable for use inside factory and warehouse buildings in which doorways are wide enough to permit passage of extinguishers from one room or section to another, or in which the extinguisher will not be required to pass from one room to another, or in mill yards and similar places.

1621. These extinguishers are effective on incipient fires in ordinary combustible materials (such as wood, paper, textiles, rubbish, etc.), i.e., on Class "A" fires, where the quenching and cooling effect of quantities of water or solutions containing large percentages of water is of first importance.

1622. They are not effective on fires in flammable liquids, greases, etc., in vats, open vessels, etc. (Class "B" fires), where the blanketing effect is essential, but are of value on incipient fires in floors soaked with oils, greases, etc., where the quenching and cooling effect of water or a solution containing a large percentage of water is of first importance.

1623. Their use in connection with fires in electrical equipment such as panelboards, switchboards, motors and the like (Class "C" fires) is not recommended.

NOTE: In some cases fires in electrical equipment may be such that the quenching and cooling effect of large quantities of water or solutions containing large percentages of water is necessary. In such cases equipment should be made electrically dead before applying water or water solutions.

1624. The force, range and duration of the stream are not dependent on the operator. They discharge an effective stream for approximately 3 minutes. They are not readily handled by women.

1625. These extinguishers do not need to be protected against freezing as they employ an extinguishing liquid having a freezing point at 40° F. below zero.

Distribution.

1632. **Arrangement.** Extinguishers should be conspicuously located where they will always be readily accessible

and so distributed as to be immediately available in event of fire.

Maintenance.

1641. Extinguishers shall be kept full (to filling mark) at all times and recharged immediately after use. Reweighing is the only method of determining whether the cartridge is fully charged. In recharging these extinguishers, all parts shall be washed thoroughly with water and the water drained through the hose. It is essential to remove all water from the hose to prevent freezing and clogging the nozzle.

1642. Extinguishers shall be examined at regular intervals—several times a year—to make sure that they have not been tampered with or removed from their designated places; to detect any injuries; and to see that the hose nozzle is not clogged. It is impossible to indicate just how often examination should be made, but a careful inspection on the part of the plant inspector should be made at regular intervals.

NOTE: If an extinguisher shows evidence of corrosion or mechanical injury, it may be unsafe for further use and should be either returned to the manufacturer for examination, or subjected to a hydrostatic pressure test in accordance with Section 71.

1643. At least once yearly, the extinguishers and all their parts (including gasket and hose) shall be examined for deteriorations or injuries due to misuse and the hose nozzles examined to see that they are not clogged. Extinguishers or parts which are not in good condition shall be replaced, returned to the manufacturer for examination, or subjected to a hydrostatic pressure test in accordance with Section 71. At least semi-annually carbon dioxide cartridges shall be weighed on an accurate scale to detect loss of weight by leakage, a new cartridge being used to replace any which shows a loss of 1 ounce or more from the original weight stamped on it. This work shall be done under capable supervision. On these occasions several extinguishers should be discharged as if at a fire before an assembly of the occupants of the building. These exhibitions are valuable for the reasons outlined in paragraph 105. Each extinguisher should, where practical, be emptied by discharging it. The manufacturer's recharging instructions should be carefully followed.

1644. The chemical shall be thoroughly dissolved in water in exact accordance with instructions on the extinguisher. The water should be cold.

1645. On every property where extinguishers of this type are employed, there shall be kept on hand a quantity of the special charges supplied by the manufacturer for use in such extinguishers so that the appliances may be promptly recharged after use.

1646. Extinguishers of this type should not be located where the ambient temperature will exceed 120°F.

1647. Common salt must not be used in these extinguishers as it may corrode them so as to make them dangerous for use. Chemicals other than those specified in the introductory paragraph of this Section shall not be used in these extinguishers for any purpose. Cartridges other than those furnished by the manufacturer shall not be used in cartridge-operated extinguishers.

1648. Aisles, at least 1 foot wider than the extinguisher, shall be maintained at all times and floors of aisles shall be kept clear of anything which would interfere with the rapid movement of the extinguisher to a fire.

1649. Every five years extinguishers of the cartridge-operated type which have been in service shall be subjected to a hydrostatic pressure test, in accordance with Section 71, to determine that they are still capable of safely withstanding the pressures which might be generated during operation.

Section 18

WHEELED WETTING-AGENT EXTINGUISHERS

(10, 20, and 50 Gallons)

Approved wheeled extinguishers are made in three principal sizes; one having a liquid capacity of 10 gallons; one having a liquid capacity of 20 gallons; and one having a liquid capacity of 50 gallons. The extinguishing agent used is a surface-active substance added to water in proper quan-

tities to materially reduce the surface tension of the water and thus increase its penetrating and spreading characteristics, and emulsifying action.

Method of Operation.

1811. The extinguishers should be wheeled to the fire and, to be used, must be operated in accordance with the instructions which are prominent on the extinguisher. As a result of the above, the gas escapes into the tank ejecting extinguishing liquid through the hose. The stream may be discharged, if necessary, to a range of approximately 35 feet.

Suitability.

1820. These extinguishers are "warehouse" and "yard" type devices suitable for use inside factory and warehouse buildings in which doorways are wide enough to permit passage of extinguishers from one room or section to another, or in which the extinguisher will not be required to pass from one room to another, or in mill yards and similar places.

1821. These extinguishers are effective on incipient fires in ordinary combustible materials, (such as wood, paper, textiles, rubbish, etc.); i.e., on Class "A" fires, where the quenching and cooling effect of quantities of water or solutions containing large percentages of water is of first importance.

1822. Some degree of effectiveness on fires in flammable liquids of the high flash point type has been shown by these extinguishers. They are not intended for use in deep-layer flammable liquids, with low flash points, such as gasoline.

1823. Their use in connection with fires in electrical equipment, such as panelboards, switchboards, motors, and the like (Class "C" fires) is not recommended.

NOTE: In some cases, fires in electrical equipment may be such that the quenching and cooling effect of large quantities of water or solutions containing large percentages of water is necessary. In such cases, the equipment should be made electrically dead before applying water or water solutions.

1824. The force, range and duration of stream are not dependent upon the operator. They are not readily handled by women.

1825. When located where low temperatures may be encountered, these extinguishers shall be protected against freezing, as described under "Maintenance."

Distribution.

1832. **Arrangement.** Extinguishers should be conspicuously located where they will always be readily accessible and so distributed as to be immediately available in event of fire.

Maintenance.

1841. Extinguishers shall be kept full (to filling mark) at all times, and recharged immediately after use. Reweighing is the only method of determining whether the carbon dioxide cylinder, which is used as the expellant-gas container, is fully charged. In recharging these extinguishers, all parts shall be washed thoroughly with water and the water drained through the hose. It is essential to remove all water from the hose to prevent freezing and clogging the nozzle.

1842. Extinguishers shall be examined at regular intervals — several times a year — to make sure that they have not been tampered with or removed from their designated places; to detect any injuries; and to see that the hose nozzle is not clogged. It is impossible to indicate just how often examination should be made, but a careful inspection on the part of the plant inspector should be made at regular intervals.

NOTE: If an extinguisher shows evidence of corrosion or mechanical injury, it may be unsafe for further use, and should be either returned to the manufacturer for examination, or subjected to a hydrostatic pressure test in accordance with Section 71.

1843. At least once yearly, the extinguishers and all their parts (including gasket and hose) shall be examined for deteriorations or injuries due to misuse and the hose nozzles examined to see that they are not clogged. Extinguishers or parts which are not in good condition should be replaced, returned to the manufacturer for examination, or subjected to a hydrostatic pressure test in accordance with Section 71. At least semi-annually, carbon dioxide cylinders shall be weighed on an accurate scale to detect loss of weight, new cylinders being used to replace any which show a loss of 10 per cent from the original weight stamped on

them. This work shall be done under capable supervision. On these occasions, several extinguishers should be discharged as if at a fire before an assembly of the occupants of the building. These exhibitions are valuable for the reasons outlined in paragraph 105. Each extinguisher should, where practical, be emptied by discharging it. The manufacturer's recharging instructions should be carefully followed.

1844. The chemicals shall be thoroughly dissolved in water in exact accordance with instructions on the extinguisher. The water should be cold.

1845. On every property where extinguishers of this type are employed, there should be kept on hand a quantity of the special charges supplied by the manufacturer for use in such extinguishers so that the appliances may be promptly recharged after use.

1846. When located where continued temperatures lower than plus 40°F. may be encountered, extinguishers shall be kept in a heated enclosure conspicuously marked to show that it contains a fire extinguisher. Extinguishers of this type should not be located where the ambient temperature will exceed 120°F.

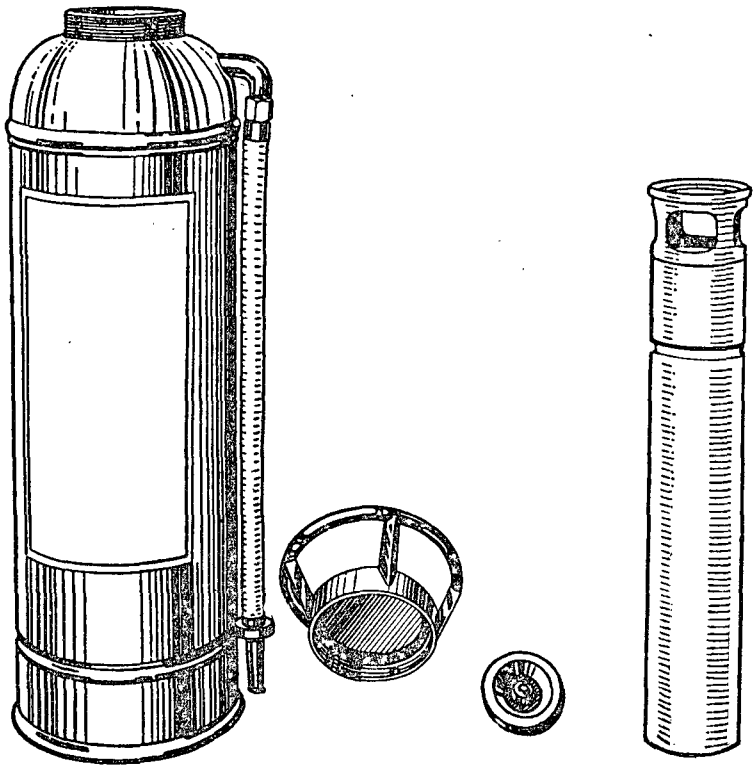
1847. Ingredients such as calcium chloride or common salt must not be used in these extinguishers as it may corrode them and make them dangerous for use. Chemicals other than those specified in the introductory paragraph of this section shall not be used in these extinguishers for any purpose. Cylinders other than those furnished by the manufacturer shall not be used in these extinguishers.

1848. Aisles, at least one foot wider than the extinguisher, shall be maintained at all times, and floors of aisles shall be kept clear of anything which would interfere with the rapid movement of the extinguisher to a fire.

1849. Every five years, extinguishers of this type which have been in service shall be subjected to a hydrostatic pressure test in accordance with Section 71 to determine that they are still capable of safely withstanding the pressures which might be generated during operation.

Section 22.
FOAM EXTINGUISHERS.
(1¼ to 5 Gallons)

Approved hand fire extinguishers made in 3 principal sizes, one having liquid capacity of 1¼ to 1½ gallons, and the others 2½ and 5 gallons. Chemicals used are bicarbonate of soda and a foam stabilizing agent dissolved in water for the outer compartment and aluminum sulphate dissolved in water for the inner cylinder. The extinguishing agent is a foam which results from the reaction of the two chemical solutions. (See paragraph 2245.)



FOAM EXTINGUISHER

The various parts of the conventional 2½-gallon foam extinguisher: tank or outer container; ring top or cap with gasket in place and pressure relief hole; head stopple; inner container.

Method of Operation.

2211. Extinguishers are designed to be carried to the fire by means of the top handle and, to be used, must be inverted. When the chemicals mix as a result of the above operation, foam is produced and pressure is created within the container which expels a stream of foam through the hose. While the stream is usually most effective when directed from a distance, it may be used close to the fire. In case of necessity it can be directed effectively from a distance as great as 30 to 40 feet horizontally.

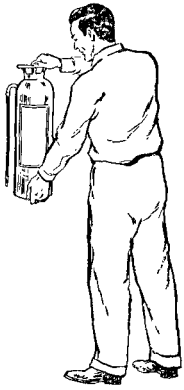
2212. On flammable liquid fires, best results are obtained when the discharge from the extinguisher is played against the inside of the wall of the vat or tank just above the burning surface, so as to permit the natural spread of the foam back over the burning liquid, or if this cannot be done, the operator should stand far enough away from the fire to allow the foam to fall lightly upon the burning surface —the stream should *not* be directed into the burning liquid. Where possible, the operator should walk around the container (fire) while directing the stream, so as to get maximum coverage during the discharge period.

2213. For fires in ordinary combustible materials the force of the stream may be used, or the foam may be used to coat the burning surface—according to conditions.

Suitability.

2221. These extinguishers are effective on fires in small quantities of flammable liquids, greases, etc., in vats or other open vessels or on floors, etc., i.e., on Class "B" fires, where the foam may be retained as a blanket on the burning material. Unless specifically noted on name plate, these extinguishers are not recommended for use on fires in alcohol type (polar) solvents.

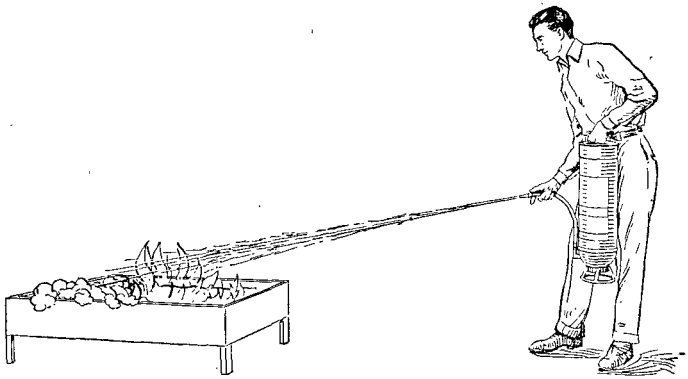
2222. While these extinguishers are primarily intended for use on Class "B" fires they are effective on incipient fires in ordinary combustible materials (such as wood, paper, textiles, rubbish, etc.), i.e., on Class "A" fires where the quenching and cooling effect of quantities of water or solutions containing large percentages of water is of first importance.



Lift extinguisher off hanger

Carry extinguisher to the fire

At fire, turn extinguisher over



USING FOAM EXTINGUISHER

Extinguisher is carried to fire and set in operation by turning over. Stream should be directed against the inside of the opposite wall of the tank or pan so as not to splash the fire. If fire is in a spill of liquid on the floor, stand back and allow the foam to fall on the fire without much force. This technique prevents spreading the flames unnecessarily.

2223. Their use in connection with fires in electrical equipment such as panelboards, switchboards, motors, and the like (Class "C" fires) is not recommended.

NOTE: In some cases fires in electrical equipment may be such that the quenching and cooling effect of large quantities of water or solutions containing large percentages of water is necessary. In such cases equipment should be made electrically dead before applying water or water solutions.

2224. The force, range and duration of the stream are not dependent upon the operator. The 2½ and 5-gallon extinguishers discharge an effective stream of foam for approximately one minute; the 1¼ to 1½-gallon device approximately two-thirds of a minute. The 1¼ to 1½-gallon extinguisher is readily handled by women.

The 5-gallon foam extinguisher is intended for special use in commercial and industrial establishments where it may be desirable to have more foam delivered by one unit than can be delivered by a 2½-gallon foam extinguisher and where persons of ample strength, usually men and especially instructed in their use, will employ them.

2225. When located outdoors or in unheated sections of buildings, extinguishers of this type must, when continued temperatures below 40° F. may be encountered, be protected against freezing as described in paragraph 2246.

Distribution.

2232. **Arrangement.** Extinguishers shall be conspicuously located where they will always be readily accessible and so distributed as to be immediately available in event of fire. They shall be hung on hangers or set on brackets or shelves so that the top of the extinguisher is not more than 5 feet above the floor for 1¼ to 1½ and 2½-gallon devices, and 3½ feet for 5 gallon devices.

Maintenance.

2241. Extinguishers shall be recharged annually as well as immediately after use. In recharging these extinguishers all parts shall be washed thoroughly with water and the water drained through the hose.

2242. Extinguishers shall be examined at regular intervals—several times a year—to make sure that they have not been tampered with or removed from their designated places; to detect any injuries; also to see that they are not empty and to see that the orifice of the hose nozzle is not clogged.

NOTE: If an extinguisher shows evidence of corrosion or mechanical injury, it may be unsafe for further use and should be either returned to the manufacturer for examination, or subjected to a hydrostatic pressure test in accordance with Section 71.

2243. At least once yearly, before emptying and recharging, the extinguishers and all their parts (including gasket and hose) shall be examined for deterioration or injuries due to misuse and the orifices of the hose nozzles examined to see that they are not clogged. Extinguishers or parts which are not in good condition shall be replaced, returned to the manufacturer for examination, or subjected to a hydrostatic pressure test in accordance with Section 71. At these annual inspections, all extinguishers of this type shall be emptied and recharged. Recharging work shall be done under capable supervision and date of recharging and signature of the person who performed it put on the tag attached to each extinguisher. When extinguishers are to be recharged, each should, where practicable, be emptied by discharging it. At each annual inspection, one or more of the extinguishers should be discharged as if at a fire and before an assembly of the occupants of the building. These exhibitions are valuable for the reasons given in paragraph 105.

2244. The chemicals shall be thoroughly stirred until dissolved in water and in exact accordance with instructions on the extinguisher or charging unit.

2245. On every property where extinguishers of this type are employed, there should be kept on hand a quantity of chemical charges supplied by the manufacturer for use in such extinguishers so that extinguishers may be promptly recharged after use.

2246. When located where continued temperatures lower than 40° F. may be encountered, extinguishers of this type shall be placed in suitable heated cabinets. See Appendix I. Extinguishers of this type should not be located where the ambient temperature will exceed 120°F.

2247. Anti-freeze ingredients such as common salt, calcium chloride, etc., must not be used in extinguishers of this type, as they may either reduce the effectiveness of the discharge (and chemical reaction) or change the nature of the discharge, or they may corrode extinguishers so as to make them dangerous for use.

2249. Every five years extinguishers which have been in service shall be subjected to a hydrostatic pressure test, in accordance with Section 71, to determine that they are still capable of safely withstanding the pressures which might be generated during operation.

Section 23.

WHEELED FOAM EXTINGUISHERS.

(10 to 33 Gallons)

Approved wheeled fire extinguishers are made in three principal sizes, one having liquid capacity of 10 gallons, one approximately 17 gallons (trade designation 20 gallons), and the other 33 gallons (trade designation 40 gallons). Chemicals used are bicarbonate of soda and a foam stabilizing agent designed to be dissolved in water for the outer compartment and aluminum sulphate dissolved in water for the inner cylinder. (See paragraph 2345.)

Method of Operation.

2311. Extinguishers are designed to be wheeled to the fire, and to be used, must be operated in accordance with instructions which are prominent on the extinguisher. When the two chemicals mix as a result of the above operation, foam is produced and pressure is created within the container which expels the foam through the hose. While the stream is usually most effective when directed from a distance, it may be used close to the fire. In case of necessity it can be directed effectively from a distance of about 50 feet.

2312. On flammable liquid fires, best results are obtained when the discharge from the extinguisher is played against the inside of the wall of the vat or tank just above the burning surface, so as to permit the natural spread of the foam back over the burning liquid, or if this cannot be done, the operator should stand far enough away from the

fire to allow the foam to fall lightly upon the burning surface —the stream should *not* be directed into the burning liquid. Where possible, the operator should walk around the container (fire) while directing the stream, so as to get maximum coverage during the discharge period.

2313. For fires in ordinary combustible materials the force of the stream may be used, or the foam may be used to coat the burning surface—according to conditions.

Suitability.

2320. The "warehouse" and "yard" types of wheeled extinguishers are suitable for use inside factory and warehouse buildings in which doorways are wide enough to permit passage of extinguisher from one room or section to another. The "yard" type of wheeled extinguisher is suitable also for use in mill yards and similar places.

2321. These extinguishers are effective on fires in considerable quantities of flammable liquids, greases, etc., in vats or other open vessels, or on floors, etc., i.e., on Class "B" fires, where the foam may be retained as a blanket on the burning material. Unless specifically noted on name plate, these extinguishers are not recommended for use on fires in alcohol type (polar) solvents.

2322. While these extinguishers are primarily intended for use on Class "B" fires they are effective on fires in ordinary combustible materials (such as wood, paper, textiles, rubbish, etc.), i.e., on Class "A" fires, where the quenching and cooling effect of quantities of water or solutions containing large percentages of water is of first importance.

2323. Their use in connection with fires in electrical equipment such as panelboards, switchboards, motors, and the like (Class "C" fires) is not recommended.

NOTE: In some cases fires in electrical equipment may be such that the quenching and cooling effect of large quantities of water or solutions containing large percentages of water is necessary. In such cases equipment should be made electrically dead before applying water or water solutions.

2324. The force, range and duration of the stream are not dependent upon the operator. They discharge an effective stream of foam for approximately 3 minutes. They are not readily handled by women.

2325. When located where continued temperatures lower than 40° F. may be encountered these extinguishers shall be protected against freezing as described under "Maintenance."

Distribution.

2332. **Arrangement.** Extinguishers shall be conspicuously located where they will always be readily accessible and so distributed as to be immediately available in event of fire.

Maintenance.

2341. Extinguishers shall be recharged annually as well as immediately after use. In recharging these extinguishers all parts shall be washed thoroughly with water, and the water drained through the hose.

2342. Extinguishers shall be examined at regular intervals to make sure that they have not been tampered with or removed from their designated places; to detect any injuries; also to see that they are not empty and to see that the hose nozzle is not clogged.

NOTE: If an extinguisher shows evidence of corrosion or mechanical injury, it may be unsafe for further use and should be either returned to the manufacturer for examination or subjected to a hydrostatic pressure test in accordance with Section 71.

2343. At least once yearly, before emptying and recharging, the extinguishers and all their parts (including gasket and hose) shall be examined for deterioration or injuries due to misuse and the hose nozzles examined to see that they are not clogged. Extinguishers or parts which are not in good condition shall be replaced, returned to the manufacturer for examination, or subjected to a hydrostatic pressure test in accordance with Section 71. At these annual inspections, all extinguishers of this type shall be emptied and recharged. Recharging work shall be done under capable supervision and date of recharging and signature of

the person who performed it put on the tag attached to each extinguisher. When extinguishers are to be recharged, each should, where practicable, be emptied by discharging it. At each annual inspection, one or more of the extinguishers should be discharged as if at a fire and before an assembly of the occupants of the building. These exhibitions are valuable for the reasons given in paragraph 105.

2344. The chemical shall be thoroughly stirred until dissolved in water and in exact accordance with instructions on the extinguisher or charging unit.

2345. On every property where extinguishers of this type are used there should be kept on hand a quantity of chemical charges supplied by the manufacturer for use in such extinguishers so that extinguishers may be promptly recharged after use.

2346. When located where continued temperatures lower than 40° F. may be encountered, extinguishers shall be kept in a heated enclosure, conspicuously marked to show that it contains a fire extinguisher. Extinguishers of this type should not be located where the ambient temperature will exceed 120°F.

2347. Anti-freeze ingredients such as common salt, calcium chloride, etc., must not be used in extinguishers of this type as they may either reduce the effectiveness of the discharge (and chemical reaction) or change the nature of the discharge, or they may corrode extinguishers so as to make them dangerous to use.

2348. Aisles, at least 1 foot wider than the extinguisher, shall be maintained at all times and floors of aisles shall be kept clear of anything which would interfere with the rapid movement of the extinguisher to a fire.

2349. Every five years extinguishers which have been in service shall be subjected to a hydrostatic pressure test, in accordance with Section 71, to determine that they are still capable of safely withstanding the pressures which might be generated during operations.

Section 24.

LOADED STREAM EXTINGUISHERS.

(1 to 2½ Gallons)

Approved hand fire extinguishers made in three principal sizes, having liquid capacity of 1, 1¾ and 2½ gallons respectively.

The chemical used is a solution of an alkali-metal-salt, which solution has a freezing point of 40° F. below zero. (See paragraph 2445.)

Method of Operation.

2411. Extinguishers are designed to be carried to the scene of the fire by means of the top handle and, to be used, must be operated in accordance with instructions which are prominent on the extinguisher. This action expels a stream of the alkali-metal-salt solution through the hose. While the stream is effective if used close to the fire, in case of necessity it can be directed effectively from a distance of 30 to 40 feet horizontally.

2412. On all fires the stream should be directed at the base of the flames. On flammable liquid fires, best results are obtained when the discharge from the extinguisher is played against the inside of the wall of the container, just above the burning surface, so as to break up the stream near the burning surface—the stream should *not* be directed into the burning liquid. Where possible, the operator should walk around the container (fire) while directing the stream, so as to get maximum coverage during the discharge period.

Suitability.

2421. These extinguishers are effective on incipient fires in ordinary combustible materials (such as wood, paper, textiles, rubbish, etc.), i.e., on Class "A" fires where the quenching and cooling effect of quantities of water or a solution containing a large percentage of water is of first importance.

2422. The 1¾ and 2½-gallon sizes are effective on fires in small quantities of flammable liquids, greases, etc., in vats or other open vessels or on floors, etc., i.e., on Class "B" fires.

2423. Their use in connection with fires in electrical equipment such as panelboards, switchboards, motors, and the like (Class "C" fires) is not recommended.

NOTE: In some cases fires in electrical equipment may be such that the quenching and cooling effect of large quantities of water or solutions containing large percentages of water is necessary. In such cases equipment should be made electrically dead before applying water or water solutions.

2424. The force, range, and duration of the stream are not dependent upon the operator. These extinguishers are readily operated while being carried about. The 2½-gallon extinguisher discharges an effective stream of liquid for approximately one minute; the 1¾-gallon device for approximately three-quarters of a minute; the 1-gallon device approximately two-thirds of a minute. The 1-gallon extinguisher is readily handled by women.

2425. These extinguishers when charged with the solution specified in the introductory paragraph of this Section do not need to be protected against freezing.

Distribution.

2432. **Arrangement.** Extinguishers shall be conspicuously located where they will always be readily accessible and so distributed as to be immediately available in event of fire. They shall be hung on hangers or set on brackets or shelves so that the top of the extinguisher is not more than 5 feet above the floor.

Maintenance.

2441. Extinguishers shall be kept full (to the filling mark) at all times and recharged immediately after use. Reweighing is the only method of determining whether the cartridge (of cartridge operated extinguishers) is fully charged. In recharging these extinguishers all parts shall be washed thoroughly with water and the water drained through the hose. All water should be removed from the hose to prevent clogging of hose and nozzle due to freezing.

2442. At regular intervals—several times a year—extinguishers shall be examined to make sure that they have

not been tampered with nor removed from their designated places; to detect any injuries; also to see that they are not empty; and to see that the orifice of the hose nozzle is not clogged.

NOTE: If an extinguisher shows evidence of corrosion or mechanical injury, it may be unsafe for further use and should be either returned to the manufacturer for examination or subjected to a hydrostatic pressure test in accordance with Section 71.

2443. At least once yearly, the extinguishers and all their parts (including gasket and hose) shall be examined for deterioration or injuries due to misuse and the orifices of the hose nozzles examined to see that they are not clogged. Extinguishers or parts which are not in good condition shall be replaced, returned to the manufacturer for examination, or subjected to a hydrostatic pressure test in accordance with Section 71. At least semi-annually all extinguishers shall be examined as to condition of "generator" or cartridge and all cartridges shall be removed and weighed on an accurate scale to detect loss of weight by leakage—replacing with a new cartridge any which shows a loss of ½ ounce or more from the original weight stamped on it. Recharging work shall be done under capable supervision and the date of recharging and the signature of the person who performed it put on the tag attached to each extinguisher. At each annual inspection, one or more of the extinguishers should be discharged as if at a fire before an assembly of the occupants of the building. These exhibitions are valuable for the reasons outlined in paragraph 105.

2444. The chemical (if not procured in solution form) shall be thoroughly stirred until dissolved in water and in exact accordance with instructions on the extinguisher or charging unit.

2445. On every property where extinguishers of this type are employed, there should be kept on hand a quantity of the cartridges and special chemical charges supplied by the manufacturer for use in such extinguishers so that extinguishers may be promptly recharged after use.

2446. Extinguishers of this type should not be located where the ambient temperature will exceed 120°F.

2447. Chemicals or cartridges other than those furnished by the manufacturer shall not be used in these extinguishers, because they are liable to render the extinguishers inoperative or make them dangerous for use.

2449. Every five years extinguishers which have been in service shall be subjected to a hydrostatic pressure test, in accordance with Section 71, to determine if they are still capable of safely withstanding the pressures which might be generated during operation.

Section 25.

WHEELED LOADED STREAM TYPE EXTINGUISHERS.

(17 and 33 Gallons)

Approved wheeled fire extinguishers are made in two principal sizes, one having liquid capacity of approximately 17 gallons (trade designation 20 gallons), and the other 33 gallons (trade designation 40 gallons). The chemical used is a solution of an alkali-metal-salt, which solution has a freezing point of 40° F. below zero. (See paragraph 2545.)

Method of Operation.

2511. Extinguishers are designed to be wheeled to the fire, and to be used, must be operated in accordance with instructions which are prominent on the extinguisher. While the stream is usually most effective if used close to the fire, in case of necessity it can be directed effectively from a distance of about 50 feet.

2512. On all fires the stream should be directed at the base of the flames. On flammable liquid fires, best results are obtained when the discharge from the extinguisher is played against the inside of the wall of the container, just above the burning surface, so as to break up the stream near the burning surface—the stream should *not* be directed into the burning liquid. Where possible, the operator should walk around the container (fire) while directing the stream, so as to get maximum coverage during the discharge period.

Suitability.

2520. The "warehouse" and "yard" types of wheeled extinguishers are suitable for use inside factory and warehouse buildings in which doorways are wide enough to permit passage of extinguisher from one room or section to an-

other. The "yard" type of wheeled extinguisher is suitable also for use in mill yards and similar places.

2521. These extinguishers are effective on fires in ordinary combustible materials (such as wood, paper, textiles, rubbish, etc.), i.e., on Class "A" fires where the quenching and cooling effect of quantities of water or a solution containing a large percentage of water is of first importance.

2523. Their use in connection with fires in electrical equipment, such as panelboards, switchboards, motors and the like (Class "C" fires) is not recommended.

NOTE: In some cases fires in electrical equipment may be such that the quenching and cooling effect of large quantities of water or solutions containing large percentages of water is necessary. In such cases equipment should be made electrically dead before applying water or water solutions.

2524. The force, range, and duration of stream are not dependent upon the operator. They discharge a solid stream of liquid for approximately 3 minutes. They are not readily handled by women.

2525. These extinguishers do not need to be protected against freezing as they employ an extinguishing liquid having a freezing point of 40° F. below zero.

Distribution.

2532. **Arrangement.** Extinguishers should be conspicuously located where they will always be readily accessible and so distributed as to be immediately available in event of fire.

Maintenance.

2541. Extinguishers shall be kept full (to the filling mark) at all times and recharged immediately after use. Reweighing is the only method of determining whether the cartridge (of cartridge operated extinguishers) is fully charged. In recharging these extinguishers all parts shall be washed thoroughly with water and the water drained through the hose. All water should be removed from the hose to prevent clogging of the hose and nozzle due to freezing.

2542. At regular intervals—several times a year—extinguishers shall be examined to make sure that they have not been tampered with or removed from their designated places; to detect any injuries; also to see that they are not empty; and to see that the hose nozzle is not clogged.

NOTE: If an extinguisher shows evidence of corrosion or mechanical injury, it may be unsafe for further use and should be either returned to the manufacturer for examination or subjected to a hydrostatic pressure test in accordance with Section 71.

2543. At least once yearly, the extinguishers and all their parts (including gasket and hose) shall be examined for deterioration or injuries due to misuse and the hose nozzles examined to see that they are not clogged. Extinguishers or parts which are not in good condition shall be replaced, returned to the manufacturer for examination, or subjected to a hydrostatic pressure test in accordance with Section 71.

At least semi-annually all extinguishers shall be examined as to condition of the cartridge and all cartridges shall be removed and weighed on an accurate scale to detect loss of weight by leakage—replacing with a new cartridge any which shows a loss of 1 ounce or more from the original weight stamped on it. Recharging work shall be done under capable supervision and the date of recharging and the signature of the person who performed it put on the tag attached to each extinguisher. At each annual inspection, one or more of the extinguishers should be discharged as if at a fire before an assembly of the occupants of the building. These exhibitions are valuable for the reasons outlined in paragraph 105.

2544. The chemical (if not procured in solution form) shall be thoroughly stirred until dissolved in water and in exact accordance with instructions on the extinguisher or charging unit.

2545. On every property where extinguishers of this type are employed, there should be kept on hand a quantity of the cartridges and special chemical charges supplied by the manufacturer for use in such extinguishers so that extinguishers may be promptly recharged after use.

2546. Extinguishers of this type should not be located where the ambient temperature will exceed 120°F.

2547. Chemicals or cartridges other than those furnished by the manufacturer shall not be used in these ex-

tinguishers, because they are liable to render the extinguishers inoperative or make them dangerous for use.

2548. Aisles, at least 1 foot wider than the extinguisher, shall be maintained at all times and floors of aisles must be kept clear of anything which would interfere with the rapid movement of the extinguisher to a fire.

2549. Every five years extinguishers which have been in service shall be subjected to a hydrostatic pressure test, in accordance with Section 71, to determine if they are still capable of safely withstanding the pressures which might be generated during operation.

Section 31.

VAPORIZING LIQUID EXTINGUISHERS.

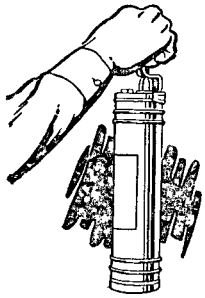
(1 Quart to 3½ Gallons)

Approved hand fire extinguishers made in many sizes having capacities from one quart to 3½ gallons. The extinguishing agent used is a specially treated nonconducting liquid having a freezing point of at least 50° F. below zero and a corrosion inhibitor ingredient. (See paragraph 3145.)

Method of Operation.

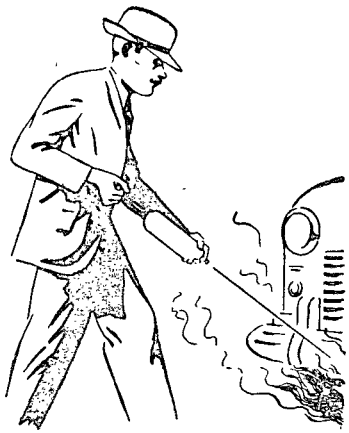
3111. Extinguishers are designed to be carried to the fire, and to be used, must be operated in accordance with instructions which are prominent on the extinguisher. This action expels a stream of liquid which is vaporized into a gas by the heat of the fire. While the stream is usually most effective if used close to the fire, in case of necessity it can be directed from a distance of approximately 20 to 30 feet horizontally (varying for different types and for different methods of operation).

3112. On all fires the stream should be directed at the base of the flames. On flammable liquid fires, best results are obtained when the discharge from the extinguishers is played against the inside of the wall of the container, just above the burning surface, so as to break up the stream near the burning surface — the stream should *not* be directed into the burning liquid. Where possible, the operator should walk around the container (fire) while directing the stream, so as to get maximum coverage during the discharge period.



Remove extinguisher from wall bracket by grasping handle and pulling outward

On way to fire, unlock handle by turning.



Direct stream at base of flames and work around fire. rapidly

USING VAPORIZING LIQUID EXTINGUISHER

The pictures illustrate use of the common one-quart hand-pumped type. Some other types use stored pressure to actuate discharge of the liquid.

Suitability.

3121. These extinguishers are effective on fires in small quantities of flammable liquids, greases, etc., in vats or other open vessels or on floors, etc., i.e., on Class "B" fires, where the gas formed by the vaporization of the extinguishing liquid may be retained as a blanket on the burning material.

3122. They are effective on incipient fires in electrical equipment, i.e., on Class "C" fires where a nonconducting extinguishing agent is of importance.

3123. They are not effective on deep-seated fires of ordinary combustible materials such as wood, paper, textiles, rubbish, etc. (Class "A" fires), which require the quenching and cooling effect of water for complete extinguishment, but they may be of value for surface fires in small quantities of such material where the smothering effects of the gas may be utilized.

3124. Extinguishers which are pump-operated can be discharged intermittently, but the force, length and duration of the stream are dependent upon the operator; and the 2 to 3½-gallon ones are not readily operated while being carried about. Under average usage the liquid will be completely discharged in three-quarters of a minute of continuous operation for the smaller sizes to 2½ minutes for the largest size. The 1 and 1¼-quart extinguishers are readily handled by women. The 1½ to 2½-quart extinguishers are intended for use largely in industrial establishments where persons of ample strength, usually men, will employ them.

The 1 to 3½-gallon extinguishers are intended for use largely in electrical power stations and the like and in industrial establishments where persons of ample strength, usually men, and especially instructed in their use, will employ them.

CAUTION — DO NOT USE EXTINGUISHERS OF THIS TYPE IN SMALL ROOMS, CLOSETS, OR OTHER CONFINED SPACE. Users should take precautions to avoid the effects which may be caused by breathing the vapors or gases liberated or produced. See The Hazards of Vaporizing Liquid Extinguishing Agents (NFPA No. 182-M).

3125. These extinguishers when charged with the liquid specified in the introductory paragraph of this Section do not need to be protected against freezing.

Distribution.

3132. **Arrangement.** Extinguishers shall be conspicuously located where they will always be readily accessible and so distributed as to be immediately available in event of fire. They shall be hung in the special brackets supplied with the extinguisher so that the top of the extinguisher is not more than 5 feet above the floor for the smaller devices, 3½ feet for 2 to 3½-gallon devices.

Maintenance.

3141. Extinguishers shall be kept full (to filling mark on stored pressure types) at all times and be refilled immediately after use.

CAUTION—DO NOT USE WATER FOR ANY PURPOSE IN EXTINGUISHERS OF THIS TYPE.

3142. At regular intervals—several times a year—extinguishers shall be examined to make sure that they have not been tampered with, nor removed from the designated places; to detect any injuries; to see that they are full; and to see that the orifice of the nozzle is not clogged.

NOTE: If an extinguisher of the stored pressure type shows evidence of corrosion or mechanical injury, it may be unsafe for further use and should be returned to the manufacturer for examination.

3143. At least once yearly the extinguishers shall be examined as to condition of pump or pressure and for deterioration or injuries due to misuse. At these inspections all pumps shall be tested by discharging a portion of the liquid with the stream directed alternately upward and downward. Extinguishers which are not in good condition shall be replaced, or returned to the manufacturer for examination; others should be refilled by pouring in enough liquid to replace that which is discharged. Recharging work shall be done under capable supervision and date of recharging and signature of the person who performed it put on the tag attached to each extinguisher. At each annual inspec-

tion, one or more of the extinguishers should be discharged as if at a fire and before an assembly of the occupants of the building. These exhibitions are valuable for the reasons outlined in paragraph 105.

3145. On every property where extinguishers of this type are employed, there should be kept on hand a quantity of the special fire extinguishing liquid supplied by the manufacturer for use in such extinguishers, so that extinguishers may be promptly recharged after use.

3146. Extinguishers of this type should not be located where the ambient temperature will exceed 120°F.

3147. Liquid other than that furnished by extinguisher manufacturers should not be used in these extinguishers, because it is liable to render the extinguisher inoperative or make it dangerous for use.

Section 41.

CARBON DIOXIDE EXTINGUISHERS.

(2 to 25 Pounds)

Approved hand fire extinguishers made in many sizes having capacities from 2 to 25 pounds of carbon dioxide.

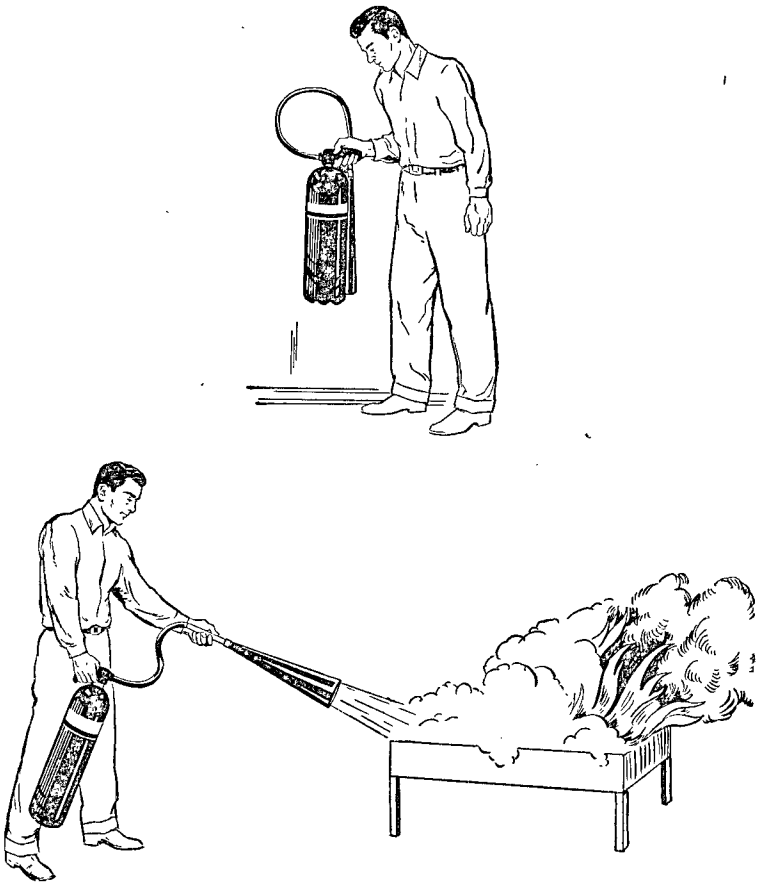
Method of Operation.

4111. Extinguishers are designed to be carried to the fire by the top handle, and to be used must be operated in accordance with instructions which are prominent on the extinguisher. This action expels a cloud of carbon dioxide gas with some "snow" through the horn. The discharge has an effective range of approximately 3 to 8 feet, depending on the size and design of the extinguisher.

4112. On all fires the discharge should be directed at the base of the flames. The discharge should be applied to the burned surface even after the flames are extinguished, to deposit carbon dioxide snow and thus tend to prevent possible reflash, by coating the hot surfaces and any glowing material present.

4113. On flammable liquid fires, best results are obtained when the discharge from the extinguisher is employed to sweep the flame off the burning surface, applying the dis-

charge first at the near edge of the fire and gradually progressing forward, moving the discharge cone very slowly from side to side.



USING CARBON DIOXIDE EXTINGUISHER

The extinguisher is lifted off its bracket by a handle. At fire, a trigger, lever, or other mechanism starts the discharge. Direct the discharge as close to the fire as possible applying it first at the edge and bottom of the fire and progressively moving it forward and upward, moving discharge horn from side to side. Continue discharge even after fire is out to cool the liquid and prevent possible reflash.

Suitability.

4121. These extinguishers are effective on fires in small quantities of flammable liquids, greases, etc., in open vessels, or on floors, etc., i.e., on Class "B" fires where the gas may be employed to separate the flames from the burning surface.

4122. They are effective on incipient fires in electrical equipment, i.e., Class "C" fires, where a nonconducting extinguishing agent is of importance.

4123. They are not effective on deep-seated fires of ordinary combustible materials such as wood, paper, textiles, rubbish, etc., which require the quenching and cooling effect of water for complete extinguishment, but they may be of value for surface fires in small quantities of such material where the smothering effects of the gas may be utilized.

4124. The force, range and duration of the discharge are independent of the operator when the valve is open. They are readily operated while being carried about. The effective periods of discharge are approximately ¼ of a minute for the smallest size to ½ minute for the largest size. The 2 to 6-pound sizes are readily handled by women. The 20 and 25-pound sizes are intended for use largely in electrical power stations and the like and in industrial establishments where persons of ample strength, usually men, and especially instructed in their use, will employ them.

In using extinguishers of this type in unventilated places such as small rooms, closets, or confined spaces, operators and others should take precautions to avoid the effects which may be caused by breathing the vapors or gases liberated or produced.

4125. These extinguishers do not need to be protected against freezing. The extinguishers are capable of complete uninterrupted discharge at temperatures down to minus 40°F. If the discharge of the extinguisher is interrupted during an attack on a fire by closing the valve one or more times when the temperature of the extinguisher contents is below 0°F, blockage of the discharge may occur thereby rendering the extinguisher useless for any further use on the fire being attacked. This condition corrects itself without any damage to the extinguisher after a period of

time dependent upon the ambient temperature. Therefore, sub-zero use of carbon dioxide extinguishers should not contemplate intermittent discharge.

Distribution.

4132. Arrangement. The extinguishers shall be conspicuously located where they will be readily accessible and so distributed as to be immediately available in the event of fire. They shall be hung on the hangers supplied with the extinguishers, so that the top of the extinguisher is not more than 5 feet above the floor for 10-pound or smaller appliances, 3½ feet for larger ones.

Maintenance.

4141. Extinguishers shall be kept full at all times. Reweighing is the only method of determining whether or not the extinguisher is fully charged. They shall be refilled immediately after use even though only partly discharged.

4142. At regular intervals—several times a year—extinguishers shall be examined to make sure that they have not been tampered with nor removed from their designated places; to see that they are not empty; and to detect any injuries.

4143. At least semi-annually the extinguishers shall be examined as to weight and for deterioration or injuries due to misuse. Extinguishers or parts which are not in good condition shall be replaced. At these inspections all extinguishers shall be weighed on an accurate scale to detect loss by leakage. Any extinguisher which shows a loss of 10% or more of the rated capacity stamped on it shall be recharged. Recharging work shall be done under capable supervision and date of recharging and signature of the person who performed it put on the tag attached to each extinguisher. At each annual inspection, one or more of the extinguishers should be discharged as if at a fire before an assembly of the occupants of the building. These exhibitions are valuable for the reasons outlined in paragraph 105.

4145. Extinguishers of this type must be sent to the manufacturer, his authorized agent, or a producer of carbon dioxide, for recharging, unless recharging facilities are available on the premises. In remote localities where recharging facilities of manufacturers or producers of carbon dioxide are not available within reasonable distance, recharging facilities should be maintained on the premises so that extinguishers may be promptly recharged after use.

4146. Extinguishers of this type should not be located where the ambient temperature will exceed 120° F., unless otherwise noted on the name plate of the extinguisher.

4149. Carbon dioxide extinguisher cylinders shall be hydrostatically retested at least once every twelve years to determine if they are satisfactory for continued use. Such hydrostatic tests shall be made in accordance with the requirements of the Interstate Commerce Commission.*

Section 42.

WHEELED CARBON DIOXIDE EXTINGUISHERS.

(25 to 100 Pounds)

Approved fire extinguishers made in several sizes having capacities from 25 to 100 pounds of carbon dioxide. The carbon dioxide is retained under its own pressure in liquid condition at normal temperature.

NOTE: Larger mobile extinguishers are available for special situations.

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*See Code of Federal Regulations, Title 49, Parts 71 to 90 available from the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. (Price: $6.25)

Method of Operation.

4211. Extinguishers are designed to be wheeled to the fire, and, to be used, must be operated in accordance with instructions which are prominent on the extinguisher. This action expels a cloud of carbon dioxide gas with some "snow." The discharge has an effective range of approximately 8 to 12 feet, depending upon the size and design of the extinguisher.

4212. On all fires the discharge should be directed at the base of the flames. The discharge should be applied to the burned surface even after the flames are extinguished, to deposit carbon dioxide snow and thus tend to prevent possible reflash, by coating the hot surfaces and any glowing material present.

4213. On flammable liquid fires, best results are obtained when the discharge from the extinguisher is employed to sweep the flame off the burning surface, applying the discharge first at the near edge of the fire and gradually progressing forward, moving the discharge cone very slowly from side to side.

Suitability.

4220. These extinguishers are suitable for use inside factory and warehouse buildings in which doorways are wide enough to permit passage of extinguishers from one room or section to another. They are also suitable for use in outdoor applications.

4221. They are effective on fires in quantities of flammable liquids, greases, etc., i.e., on Class "B" fires, where the gas may be employed to separate the flames from the burning surface.

4222. Extinguishers with insulated extension horns are effective on incipient fires in electrical equipment, i.e., Class "C" fires where a non-conducting extinguishing agent is of importance. Extinguishers with ordinary metallic discharge cones or horns are dangerous for use on live electrical equipment because of the conductivity of the discharge horns.

4223. They are not effective on deep-seated fires of ordinary combustible materials such as wood, paper, textiles,

rubbish, etc. (Class "A" fires), which require the quenching and cooling effect of water for complete extinguishment, but they may be of value for surface fires in small quantities of such material where the smothering effects of the gas may be utilized.

4224. With the nozzle open and the extinguisher in operation, the force, length, and duration of stream are not dependent upon the operator. The effective discharge period is from approximately 50 to 60 seconds, depending upon the size and design of the extinguisher.

In using extinguishers of this type, especially in unventilated places such as small rooms, closets, or confined spaces, operators and others shall take precautions to avoid the effects which may be caused by breathing the vapors or gases liberated or produced.

4225. These extinguishers do not need to be protected against freezing.

Distribution.

4232. **Arrangement.** Extinguishers shall be conspicuously located where they will always be readily accessible, and so distributed as to be immediately available in event of fire.

Maintenance.

4241. Extinguishers shall be kept full at all times. Reweighing is the only method of determining whether or not the extinguisher is fully charged. They shall be refilled immediately after use even though only partly discharged.

4242. At regular intervals—several times a year—extinguishers shall be examined to make sure that they have not been tampered with nor removed from their designated places; to see that they are not empty; and to detect any injuries.

4243. At least semi-annually the extinguishers shall be examined as to weight and for deterioration or injuries due to misuse. Extinguishers or parts which are not in good