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METHOD FOR PRODUCING STREAMS OF FIRE-EXTINGUISHING DRY CHEMICAL

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2,699,216

FIG. 1

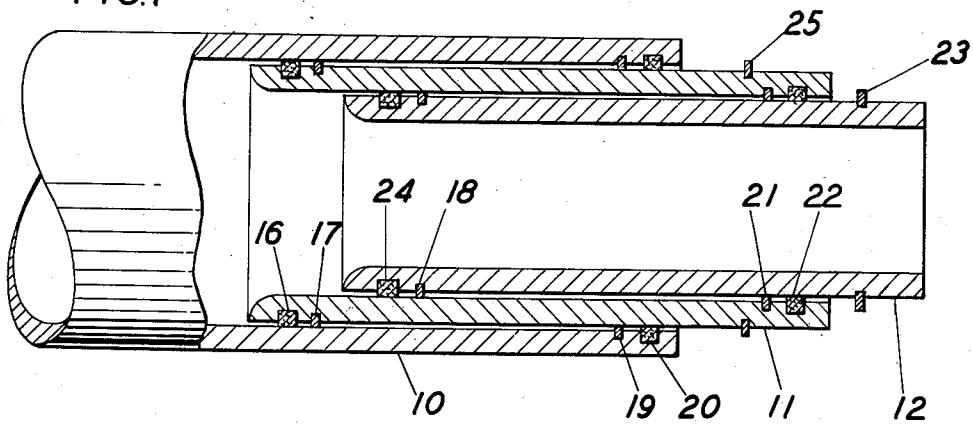


FIG. 2A

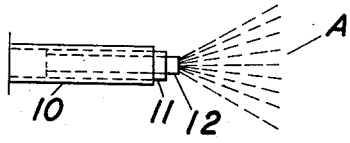


FIG. 2B

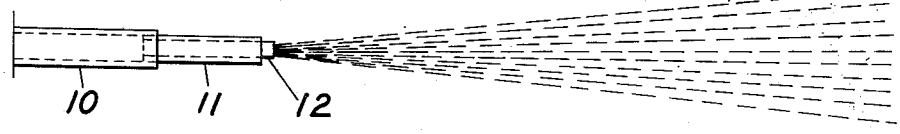
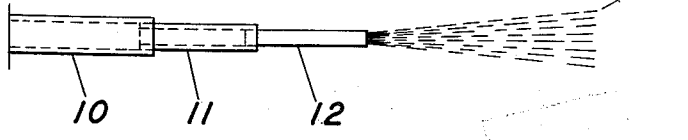


FIG. 2C



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METHOD FOR PRODUCING STREAMS OF FIRE-EXTINGUISHING DRY CHEMICAL

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2 Claims. (Cl. 169—1)

This invention relates to a method for producing streams of powdered fire-extinguishing dry chemical of predetermined velocity, shape, and range.

It is now generally recognized that flammable liquids and gases when afire can be effectively extinguished by means of finely powdered dry chemical composition containing sodium bicarbonate as the essential ingredient, as disclosed for example in Patent 1,793,420 February 17, 1931. Such dry chemical is usually fluidized in a storage container by means of an inert gas, such as nitrogen, supplied at a pressure of about 2000 lbs. per square inch. The fluidized dry chemical is then expelled from the container at a pressure of about 200 to 250 lbs. per square inch through suitable hose lines provided with nozzles for extinguishing the fire. The hose may be held and manipulated manually when extinguishing a fire or in some instances the nozzle may be supported on a turret mounted on a moving vehicle which is brought to the site of the fire or aboard ships and other structures. It has been found that it is often important to be able to continuously control the shape, velocity, and range of the expellant dry chemical stream in effectively extinguishing a fire depending upon the extent and character of the fire involved.

The nozzles with single orifices which have been hitherto available for emitting streams of dry chemical usually can emit only a fixed type of stream and the fire fighter is therefore limited in his mode of extinguishing a given fire and may lose time in the early critical period of a fire in adjusting this technique, position, and distance relative to the fire in order to extinguish it in the shortest period of time with the fixed type of stream. The character of a fire may also change either in intensity or extent after a fire-extinguishing stream is directed on a fire so that it may become necessary for the fire fighter to readjust his fire-fighting technique or to change his position relative to the fire.

The present invention overcomes the difficulties previously mentioned by providing an adjustable nozzle for continuously producing streams of fire-extinguishing dry chemical of predetermined velocity, shape and range so that the fire fighter can have available instantly the type of dry chemical stream best suited for his need in extinguishing the fire he is coping with, depending upon its character from moment to moment until it is finally extinguished.

Further advantages and objects of the invention will be apparent from the following specification and drawings, wherein

Figure 1 is an enlarged longitudinal partial sectional view of an adjustable telescopic nozzle constructed in accordance with the present invention,

Figure 2A is a view of the telescopic nozzle shown in Figure 1 in fully collapsed position for producing a predetermined relatively low velocity stream of dry chemical which is relatively wide in cross-section and short in range,

Figure 2B is a view of the telescopic nozzle shown in Figure 1 in partially extended condition for producing a relatively high velocity dry chemical stream which has a long range and which is relatively narrow in cross-section, and

Figure 2C is a view of the nozzle shown in Figure 1 in its fully extended position to produce a dry chemical stream which is relatively narrow in cross-section, of short range, and low velocity.

Referring to the drawings, the telescopic nozzle comprises a plurality of telescoping nozzle tubes **10**, **11** and **12**, which can be fully collapsed to assume the position shown in Figure 2A or fully extended to assume the position shown in Figure 2C. An intermediate position of the nozzle tubes is shown in Figure 2B. The intake end of nozzle tube **10** is suitably connected to a conduit supplying fluidized dry chemical supplied under a constant expelling gas pressure, as for example 200 to 250 lbs. per square inch. The supply conduit should have a cross-sectional area equal to or greater than the cross-sectional intake end of nozzle tube **10**.

A second tube **11**, of smaller diameter than tube **10**, is slidably retained in tube **10** by retaining rings **17** and **19**. A suitable compressible sealing ring **16** serves to seal the end of tube **11**. A sealing ring **20** serves to seal the forward end of tube **10** in slidable relation to the inner surface of tube **11** and to support tube **11** for slidable support thereon.

Tube **12** is slidably retained in tube **11** in telescoped relation thereto by means of retaining rings **18**, **21** and **23**. A sealing and supporting ring **24** is provided adjacent the inner end of tube **12** for sealing the outer face of tube **12** in slidable engagement with tube **11**.

The nozzle tube sections **11** and **12** can be adjustably extended axially of tube **10** to any desired length by simply sliding tubes **11** and **12** to any suitable relative position. A nozzle of predetermined and suitable length and diameter can thus be readily provided by the fire fighter in order to continuously produce a stream of dry chemical having predetermined desired characteristics. For example, if it is desired to produce a dry chemical stream which is relatively wide in cross-section, of relatively short range, and relatively low velocity, the nozzle tubes **11** and **12** are fully retracted, as shown in Figure 2A. In this position nozzle tube **12** will be retracted until retaining ring **23** engages the outer face of tube **11**. The two nozzle tubes **11** and **12** are then retracted together until retaining ring **25** engages the face of tube **10** in its rearmost position. When a stream of dry chemical is fed to the nozzle of such length, the fluidizing and expellant gas of the dry chemical stream within the nozzle tube **12** has not fully expanded when it leaves the nozzle and enters the atmosphere. The expansion of the gas at the nozzle tip will cause the escaping stream A to spread out so that it attains a relatively wide cross-sectional shape, as shown in Figure 2A, and at the same time its forward velocity is reduced so that the stream has a relatively short range. It is thus apparent that the length of the fully collapsed nozzle is selected for a given supply of fluidized dry chemical and pressurized at a given pressure so as to produce a dry chemical stream of maximum width, short range, and low velocity.

Similarly, it is possible to obtain a dry chemical stream having a maximum long range, minimum width in cross-section, and relatively high velocity by using a single nozzle tube of predetermined length and diameter or an extended telescopic nozzle of such length and diameter that when the stream of dry chemical leaves the nozzle the fluidizing and pressurizing gas in the stream will have expanded substantially to its maximum amount in the tube so that it substantially equals the prevailing atmospheric pressure. Under such conditions, the dry chemical will have attained its maximum velocity when it is ejected from the nozzle thereby producing a dry chemical stream of maximum long range and minimum width in cross-section. Such nozzle is shown in Figure 2B wherein nozzle tubes **11** and **12** are moved forwardly in relation to tube **10** so as to emit a stream B from the nozzle **12**.

It will be apparent that a dry chemical stream of any predetermined characteristics intermediate the maximum and minimum ranges and cross-section width can be obtained by either using a nozzle tube of suitable diameter and length or by continuously adjusting the telescopic nozzle tubes to the desired length. For example, when it is desired to produce a dry chemical stream of relatively narrow cross-section, low velocity, and short range, the nozzle tubes **11** and **12** are fully extended

to their maximum length relative to tube **10**, as shown in Figure 2C. In this condition the ffuidizing and pressurizing gas in the dry chemical stream will expand to substantially atmospheric pressure while still within the nozzle tube and thereafter will continue moving forwardly within the nozzle so that as a result of friction losses within the tube the forward velocity of the stream will be reduced to such extent that the stream C issuing from nozzle will be relatively narrow in cross-section and of short range.

The present invention thus provides a method and means of producing dry chemical streams having any desired predetermined characteristics by either selecting a nozzle tube of suitable diameter and length or by adjusting the length of the nozzle when using a telescopic type of nozzle, as previously described, so that the continuous stream produced will have the desired velocity, range and shape which may be required to extinguish any type of fire as the circumstances may occur. According to the present method it is possible to feed continuously a stream of fluidized dry chemical through a nozzle tube of predetermined cross-section and length to control expansion of the expellant gas within the tube to a predetermined value, then expelling the stream into the atmosphere to produce a stream of predetermined cross-section shape and range, depending upon the extent of the expansion of the expellant gas at the point where it enters the open atmosphere.

Modifications and changes may be made of the described details and procedures of this invention which are intended to be included within the scope of the appended claims.

I claim:

1. A method of producing a fire-extinguishing dry chemical stream having a predetermined cross-sectional shape, velocity and range which comprises continuously passing a fluidized stream of dry chemical under propellant gas pressure substantially greater than atmospheric pressure through a confined zone opening to the atmosphere of predetermined length and cross-sectional area to permit the propellant gas pressure to issue into the atmosphere at a pressure greater than atmospheric pressure at the point of entry of said stream into the atmosphere to permit secondary expansion of said stream outside of said confined zone to produce an emitted dry chemical stream relatively wide in cross-section and of reduced forward velocity and relatively short range, and adjusting the ratio of the cross-sectional area and the length of the said confined zone while the stream is flowing continuously to reduce secondary expansion of said stream outside of said confined zone and to produce an emitted dry chemical stream of maximum range and velocity and relatively narrow cross-section.

2. A method of producing a fire-extinguishing dry chemical stream having a predetermined cross-sectional shape, velocity and range which comprises continuously passing a fluidized stream of dry chemical under propellant gas pressure substantially greater than atmospheric pressure through a confined zone opening to the atmosphere of predetermined adjusted ratio of the cross-sectional area and length for controlling the expansion of the propellant gas pressure within said confined zone to a predetermined pressure prior to entry of said stream into the atmosphere to produce an emitted dry chemical stream of desired cross-section, velocity and range, and adjusting the ratio of the cross-sectional area and the length of the said confined zone while the stream is flowing continuously to suitably alter the cross-section, velocity and range of the emitted dry chemical stream.

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