Feb. 27, 1973 E. D. POSEY 3,718,805

HEATED FLUID GUN

Original Filed Nov. 12, 1969 2 Sheets-Sheet 1

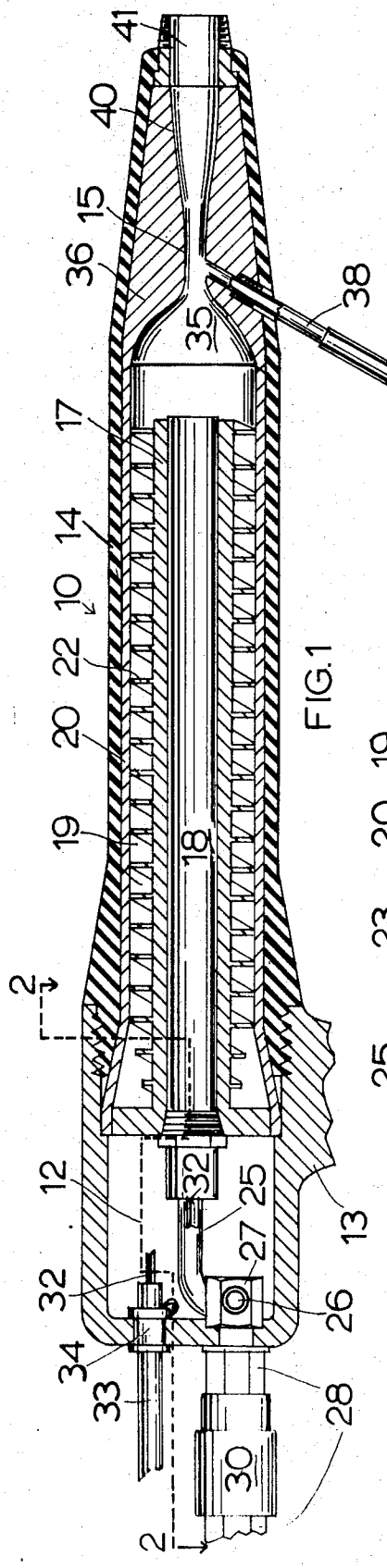

FIG. 1

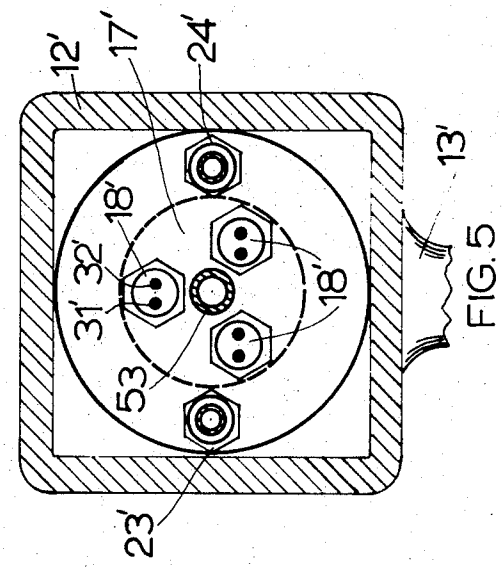

FIG. 5

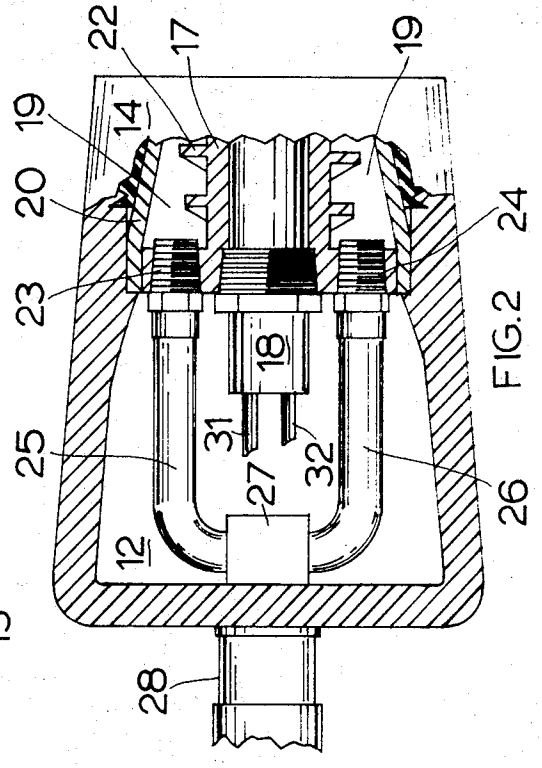

FIG. 2

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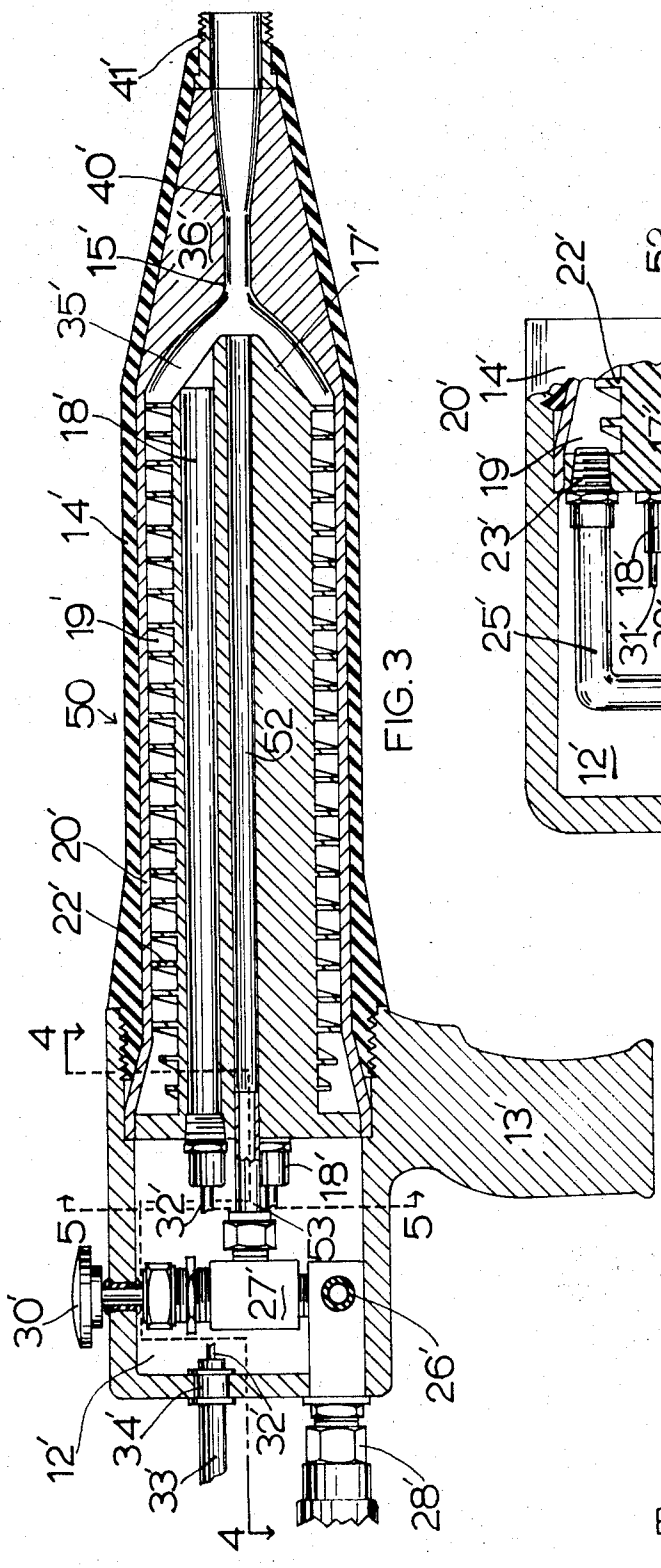

FIG. 3

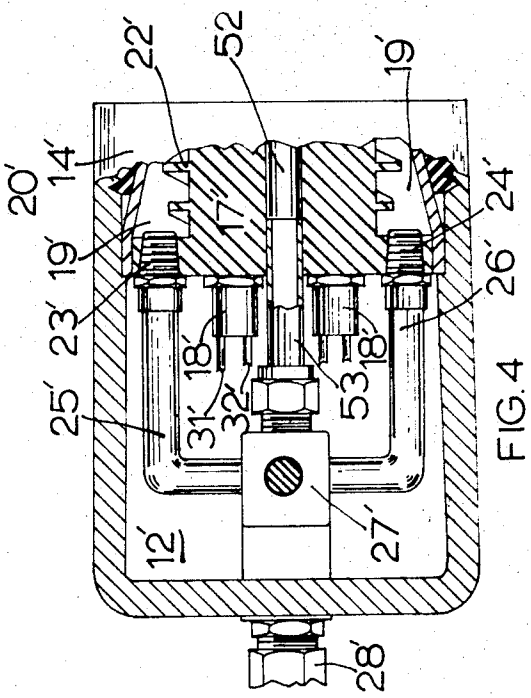

FIG. 4

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HEATED FLUID GUN

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Original application Nov. 12, 1969, Ser. No. 875,898. Divided and this application Jan. 13, 1971, Ser. No. 106,266

Int. Cl. B05b 1/24; H05b 1/00

U.S. Cl. 219—305 3 Claims

ABSTRACT OF THE DISCLOSURE

A portable gun housing including an elongated heat-conductive core through which is formed a central elongated straight central fluid passage surrounded by a helical fluid passage and with both fluid passages communicating with a discharge orifice in the front of the housing. At least one elongated electrical heating element extends longitudinally through the core between the straight fluid passage and the helical fluid passage, and an electrical supply conduit is provided for energizing the heating element. A control valve located within the breech or rear chamber of the housing has an inlet connected to a fluid supply conduit and outlets connected to the fluid passages. The valve has a closed position wherein fluid is directed solely to the helical passage, a fully open position wherein the fluid is directed substantially solely through the straight passage and variable intermediate positions between the closed and open positions wherein fluid is directed simultaneously through both passages in proportionate amounts corresponding to the intermediate position.

CROSS-REFERENCE TO RELATED APPLICATION

This is a division of original application Ser. No. 875,898 filed Nov. 12, 1969, now abandoned.

BACKGROUND OF THE INVENTION

This invention relates to a fluid gun, and more particularly to a portable, heated fluid gun.

Steam guns are well known in the art. However, all of the steam guns known to the applicant employ a boiler or steam generator, usually large and bulky to which a steam spray gun is attached by a steam conduit or hose. Thus, the steam is generated in the boiler or generator and then supplied to the gun through the steam conduit, so that the sole function of the gun is to distribute, spray or discharge the steam at the desired location.

Steam guns have many uses, most of which are cleaning uses, such as cleaning an automobile, automobile engines, industrial equipment, plant areas, and the floors and walls of commercial establishments. Other uses would include defrosting of large refrigerated areas, such as refrigerated box cars and truck trailers. Steam guns are also used in the apparel industry for steaming garments preparatory to pressing the garment.

SUMMARY OF THE INVENTION

This heated fluid gun has been designed to overcome the above enumerated disadvantages, and specifically to provide a steam gun in which the heating apparatus or heating means is incorporated within the gun housing. Accordingly, this gun housing is rendered completely portable by eliminating large, separate steam generators and boilers and all of the valves, gauges and other accessories necessary to their operation.

This gun includes an elongated heat conductive core through which is formed a fluid passage for receiving and heating fluid, such as water, to be converted and discharged as steam.

Within the gun housing is the heating element, such as an electrical heating cartridge, which is secured within the heating core in order to heat the core and, therefore, the fluid in the passage extending through or surrounding the core.

The gun is provided with a pistol-grip handle. The entire gun, or at least that portion surrounding the core of the fluid passage, is insulated. The only connections to the gun are a fluid line, such as a water line extending through the housing and connected to the fluid passage or passages, and an electrical cable or conduit to supply electrical power for the electrical carriage or other heating element within the gun.

By providing a circuitous route or path for the fluid through the heated core, the power requirements for heating the core may be reduced.

Although this gun is primarily designed as a steam gun, nevertheless, it is capable of handling other types of fluids which are desired to be heated and discharged, such as air.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a fragmentary, sectional side elevation of one form of gun made in accordance with this invention;

FIG. 2 is a section taken along the line 2—2 of FIG. 1;

FIG. 3 is a sectional elevation of a modified form of the fluid gun made in accordance with this invention;

FIG. 4 is a fragmentary section taken along the line 4—4 of FIG. 3; and

FIG. 5 is a fragmentary section taken along the line 5—5 of FIG. 3.

DESCRIPTION OF THE PRFERRED EMBODIMENT

Referring now to the drawings in more detail, FIGS. 1 and 2 disclose a heated fluid gun **10** comprising an elongated housing, the rear portion of which constitutes a breech chamber **12** to which is fixed a pistol-grip handle **13**, and the forward portion of which comprises an elongated barrel **14** of heat insulating material. Formed within the front portion of the barrel **14** is a discharge orifice **15** of reduced cross-section.

Occupying most of the space within the barrel **14** behind the orifice **15** is a heat conductive core member **17**. Extending through substantially the entire length of the core member **17** is an elongated heating element or heating cartridge **18** of well-known manufacture. Surrounding the central portion of the core member **17**, which includes the heating cartridge **18**, is an annular fluid passage **19**. Although the exterior boundary of the fluid passage **19** is disclosed as a tubular heat-conductive sleeve **20**, nevertheless, the sleeve **20** is considered generally a part of the core member **17**.

As disclosed in the drawings, the fluid passage **19** occupies the entire space between the outer sleeve **20** and the central portion of the core member **17**, with the exception of the spiral baffle or wall **22**. Thus, the outer sleeve **20**, the central portion of the core member **17** and the spiral wall **22** define a continuous helical passage or path for the fluid for the entire length of the core member.

As best disclosed in FIG. 2, water is introduced into the fluid passage **19** through a pair of inlet spray nozzles **23** and **24**. The spray nozzles **23** and **24** are connected through inlet conduits **25** and **26**, respectively, to a common connector **27**, to which fluid, such as water, is supplied through a common supply pipe **28**. The amount of water and, therefore, the rate of flow is controlled by the adjustable flow control valve **30**.

The electrical heater cartridge **18** is connected by electrical leads **31** and **32** through cable **33** to any suitable

source of electric power. The cable **33** is held in the rear end of the cylinder **12** by means of a strain relief bushing **34**.

A fluid expansion chamber **35** is located within the barrel **14** between the front end of the core member **17** and the discharge orifice **15**. The front wall of the expansion chamber **35** is contoured to merge with the reduced orifice **15** in such a manner as to maintain the back-pressure of the hot fluid under control for the normal conditions under which the gun will operate. The front wall of the expansion chamber **35** as well as the discharge orifice **15** are integrally formed in the pressure control cap **36** which is in the forward portion of the barrel **14**.

Fitted within the pressure control cap **36** in such a manner as to intersect and open into the discharge orifice is a fluid additive supply conduit **38**. If, for example, it is desired to introduce a detergent into a stream of steam being discharged through the orifice **15**, then the detergent may be introduced through the conduit **38**, and drawn into the orifice **15** by the vacuum created within the orifice **15**.

In operating the gun **10**, the water inlet conduit **28** is coupled to a source of water, and the cable **33** is connected to a source of electricity. The pistol grip **13** is then grasped in the operator's hand and the gun **10** directed at the work or surface to which the steam is to be applied.

As soon as the cartridge **18** is energized, it rapidly generates heat, which is transmitted through the entire core member **17**, including not only the central portion surrounding the cartridge **18**, but also the spiral baffle or wall **22** and the heat conductive sleeve **20**. Thus, the entire fluid passage **19** is rapidly heated to a high degree of temperature.

The operator controls the flow of fluids through the gun by means of the adjustable control valve **30**. After a brief preheating period, the operator opens the valve **30** to permit the discharge of water from the supply line **28** through the connector **27**, inlet conduits **25** and **26** and inlet nozzles **23** and **24**. By providing inlet spray nozzles **23** and **24**, the water can be broken up into particles which will expose the maximum amount of water surface to the heated surfaces in the fluid passage **19**. As the water strikes the heated surfaces, it is rapidly heated and flashes into steam as it progresses through the passage **19**. As the steam proceeds down the helical path of the passage **19**, it is superheated and continues to expand and build up pressure. When the steam reaches the expansion chamber **35**, it is permitted to expand to relieve some of the back pressure in the fluid passage **19**. The steam is then forced through the discharge orifice **15** which is reduced in cross-section to increase the speed of the steam. The steam then expands through the flared nozzle opening **40**. A nozzle adapter **41** is provided to accommodate various designs and shapes of nozzles adapted for particular spraying jobs.

FIGS. 3, 4 and 5 disclose a slightly modified form of gun **50** in which all parts corresponding to the parts of the gun **10** have been indicated with the identical reference followed by a prime (′). One of the differences between the gun **50** and the gun **10** is that the core member **17′** is of larger cross-section to accommodate a cluster of heating elements, such as the three heating elements **18′**, disposed about the center of the core member **17′**. As best disclosed in FIG. 5, the three heating cartridges **18′** are equidistant from each other and radially spaced an equal distance from the center of the core member **17′**. The main purpose of this construction is to permit a single straight fluid conduit **52** to be formed coaxially through the center of the core member **17′**. The core member **17′** still incorporates the same type of fluid passage **19′** and helical baffle **22′** as incorporated in the gun **10**.

The purpose of forming a central fluid conduit **52** straight through the center of the core member **17′** is to provide specifically a means for rinsing with a cooler fluid medium after a surface is cleaned with the hot steam generated in the spiral passage **29′**.

As best disclosed in FIGS. 3 and 4, the fluid passage **19′** is supplied with fluid through the spray nozzles **23′** and **24′** and the conduits **25′** and **26′** from the control valve **27′**, which in turn is supplied with fluid from the supply conduit **28′**. In this respect, the gun **50** is similar to the gun **10**. However, fluid is also supplied from the supply conduit **28′** through the valve **27′** by inlet conduit **53** to central conduit **52**.

The control valve **27′** is so constructed, that when it is turned to its closed position, by the handle **30′** water is directed through the spray nozzles **23′** and **24′** only, and no water is supplied through the central inlet conduit **53**. Accordingly, when the control valve **27′** is in closed position, the gun **50** operates to produce steam only, for the cleaning operation. However, when the control valve **27′** is partially opened, water is introduced through the central inlet **53** into the central conduit **52**, and also continues to be introduced into the fluid passage **19′** through the spray nozzles **23′** and **24′**. The result will be a steam or hot water discharge of lower temperature than that of pure steam supplied by the gun **50**. When the control valve **27′** is fully opened, practically all of the water is discharged through the central conduit **52**, which is the path of least resistance through the core member **17′**. Although there may be some heating of the water passing through the passage **52**, nevertheless because of the straight course and the speed of the water, this temperature rise will be minimal and will not impede its effectiveness as a rinsing medium.

Not only does the control valve **27′** and the central passage **52** permit alternate cleansing and rinsing operations, but also the temperature of the discharge fluid from the discharge end of the gun **50** may be of any desired value between that of a mild or lukewarm stream of water to a very hot, superheated steam. Thus, the uses of such as gun as **50** are greatly multiplied by this great versatility in the values of the steam temperature.

Another function of the central fluid line **52** is to provide a cooling medium for cooling the heating elements **18′** after the electrical power supply has been disconnected, to assist in prolonging the life of the heating elements.

It will be understood that the gun **10** could also be used to house other fluid medium, such as air, when desired. Also, either the gun **10** or **50** may be employed for other uses than cleaning. For example, the gun may be used for sterilizing, and as previously mentioned, for pressing garments in the apparel industry.

Other minor changes may be made in the construction of this gun to accommodate it to various uses, such as changes in the wattage and the length of the high-watt density cartridges **18** and **18′**, changing the length of the core **17** or **17′**, variations in the design and size of the expansion chamber **35** or **35′**, changing the size of the cross-section of the discharge orifice **15** or **15′**, and the size and shape of the nozzle opening **40** or **40′**. Moreover, the characteristics of the water supply may be varied by selection of different spray nozzles **23**, **24**, **23′** and **24′** by varying the water pressure in the supply line **28** or **28′**, or the amount of water forced through the supply line.

What is claimed is:

1. A heated fluid gun comprising:

(a) a gun housing having a rear breech chamber, an intermediate elongated heating chamber, and a front discharge orifice,

(b) an elongated, heat conductive core within, and extending the length of, said heating chamber,

(c) a straight fluid passage having an inlet in said breech chamber and extending longitudinally through the center of said core, and communicating with said discharge orifice,

(d) a helical fluid passage having an inlet in said breech chamber and extending through said core coaxially of, and spaced radially outward from, said straight fluid passage, and communicating with said discharge orifice,

(e) at least one elongated electrical heating element within, and extending substantially the length of, said core between said straight fluid passage and said helical fluid passage,

(f) an electrical supply conduit extending through said breech chamber and connected to said heating element,

(g) a single fluid supply line connected to said breech chamber,

(h) a fluid control valve within said breech chamber having an inlet in fluid communication with said supply line, a first outlet in fluid communication with the inlet to said straight fluid passage, and a second outlet in fluid communication with the inlet to said helical fluid passage,

(i) said control valve having a closed position directing fluid from said supply line solely into said helical passage, a fully open position directing fluid from said supply line substantially solely through said straight passage, and variable positions between said closed and open positions directing fluid from said supply line to both said passages simultaneously in proportionate amounts corresponding to said variable position,

(j) means on said housing for varying the positions of said control valve, and

(k) a handle fixed to said housing.

2. The invention according to claim 1 in which the inlet to said helical fluid passage comprises a spray nozzle.

3. The invention according to claim 1 in which said handle comprises a pistol-grip handle, and means insulating said handle from said heating chamber.

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ANTHONY BARTIS, Primary Examiner

U.S. Cl. X.R.

219—273, 275, 302, 373; 222—146 HE; 239—133, 137