FIG. 10
Another object of the invention is to provide new smoke producing method and means wherein the fuel is siphoned from storage means and discharged onto means to convert the fuel to a smoke.

A still further object of the invention is to provide new and relatively inexpensive smoke-producing method and means.

A further object of the invention is to provide a relatively simple and light-weight portable smoke-producing apparatus for use on signs and the like.

Various other objects, advantages and features of the invention will become apparent to those skilled in the art from the following description taken in connection with the accompanying drawings, in which:

FIG. 1 is a longitudinal vertical cross section view of a preferred specific embodiment of the smoke generator means of the invention taken along the line 1—1 of FIG. 2.

FIG. 2 is a longitudinal cross section view taken through the embodiment of the invention shown in FIG. 1 and taken along the line 2—2 of FIG. 1.

FIG. 3 is a longitudinal cross section view through a preferred specific embodiment of a converter for use with the apparatus of FIGS. 1 and 2.

FIG. 4 is a transverse cross section view taken along the line 4—4 of FIGS. 1 and 2.

FIG. 5 is a partial longitudinal cross section view taken along the line 5—5 of FIG. 2.

FIG. 6 is a partial cross section view illustrating another preferred specific embodiment of the smoke generating means of the invention.

FIG. 7 is an enlarged partial cross section view illustrating the preferred mounting of the top of the housing for the smoke generator of the invention.

FIG. 8 is a top plan view illustrating another preferred specific embodiment of the converter for the apparatus of the invention.

FIG. 9 is an end view of the converter means of FIG. 8.

FIG. 10 is a schematic wiring diagram with legends showing connected the various electrical elements of the smoke generator of the drawings.

The following is a discussion and description of preferred specific embodiments of the new method and means for generating smoke of the invention, such being made with reference to the drawings wherein the same reference numerals are used to indicate the same or similar parts and/or structure. It is to be understood that such discussion and the description are not to unduly limit the scope of the invention.

Referring now to the drawings in detail and to FIGS. 1—5 and 7 in particular, a preferred specific embodiment of the portable smoke generator of the invention is shown generally at 10 and desirably includes an elongated cabinet having a bottom 12, two sides 14 and 16, two ends 18 and 20 and a top 22 removably mounted on the sides. Preferably the top 22 is mounted on side 14 of the cabinet by a piano hinge 24 in the manner illustrated in FIG. 7 of the drawings. For this purpose the top 22 can be provided with depending flanges 26, as shown in FIG. 1, which extend entirely around the top 22 and snugly engage the sides 14 and 16 and the ends 18 and 20 of the cabinet. The cabinet can be made of suitable metal, plastics, wood, etc. Bottom 12 is preferably made of wood or mounted on shock absorbing means to eliminate vibration of the cabinet.

In the preferred specific embodiment illustrated in the drawings the device is electrically operated and suitable electric inlet means, such as a socket 30, is connected to the end 15 of the cabinet and is connectible in any suitable manner to a source of electric current. A common timing switch 32 is mounted on the side 14 of the cabinet and is desirably positioned adjacent the end 18 thereof near
the electrical inlet means 30. A conduit 34 receives the electrical wiring (not shown) from the electrical inlet means 30 leading to the timing switch 32. Suitable fan or blower means are provided to move air through the cabinet. For this purpose a squirrel cage type blower fan 36 is preferably provided and mounted on the side 16 of the cabinet as shown in FIGS. 4 and 5. The blower fan 36 has an air inlet projection through side 16 of the housing to receive air from the atmosphere and an outlet 40 which is directed toward the end 20 of the cabinet. The blower fan 36 has an electric motor 42 which powers the blower. A blower fan switch 44 is mounted on the end 18 of the cabinet and preferably has a switch operator 46 which is operable to regulate the speed of operation of the blower fan at more than one speed. Movement of 50 to 200 cubic feet per minute of air through the blower has been found satisfactory. Electrical conductors 48 are connected in one end portion to the timing switch 32 and connected in the other end portion to a fuse or fusilstat 50. Electrical conductors 52 connect the fuse or fusilstat 50 to the blower switch 44 and conductors 54 connect the fuse or fusilstat 50 and blower switch 44 to the motor 42 of the blower fan 36.

A source of gas under pressure is provided, preferably electrically operated air compressor 60 which is mounted on the bottom 12 of the cabinet and desirably positioned adjacent the end 18 thereof as shown in FIGS. 2, 3, 4, and 5. Conductors 62 connect the fuse or fusilstat 50 to the fuel line of fusilstat 64 and conductors 66 connect the fuse 64 to a socket 68 mounted on the side 16 of the cabinet. The motor 70 of the compressor 60 is connected by a cord 72 to the socket 68 to thereby electrically connect the compressor to the switch 32. An air storage tank 74 is mounted on the bottom 12 of the cabinet and a compressor conduit 76 (FIG. 2) is operatively connected in the end portions to the outlet of the compressor 60 and to the tank 74 so that operation of compressor 60 supplies air under pressure to the tank 74. Preferably the conduit 76 (FIG. 1) is connected to one opening of a T-shaped coupling 78 which in turn is secured to the tank 74 and in fluid communication therewith through another opening of the conduit. An air gauge 80 is desirably mounted on the other opening of the coupling 78 to indicate air pressure therein as shown in FIG. 1.

A wall 82 is preferably positioned within the cabinet and extends between and is secured to the sides 14 and 16 and extends from the top 22 when closed to the lower portion of the cabinet and desirably terminates in spaced relation to the bottom 12 of the cabinet. A plate 84 is preferably connected in spaced relation to the lower edge of the wall 82 and has the opposite edge positioned on the bottom 12 of the cabinet at the end 20 thereof and the plate 84 preferably extends across the cabinet from one side 14 to the other side 16 thereof. The wall 82 is positioned at an intermediate portion of the cabinet and defines with the end 20, the walls 14 and 16, top 22 and plate 84 a smoke accumulator compartment.

As shown in FIGS. 1 and 2, the wall 82 preferably has a centrally located opening 86 therethrough and a hood 88 is positioned within the accumulator compartment and has one end portion 89 thereof mounted on the center portion of the wall 82 in communication with the opening 86 therein. The other end portion 90 of the hood 88 desirably faces downwardly toward the plate 84 and is positioned in spaced relation thereto. The lower end portion 90 of the hood 88 is desirably relatively large in size in comparison with the end portion 89 to facilitate flow of smoke therethrough. Suitable support means, such as the angle iron 92, is provided and is secured in its end portions to the sides 14 and 16 of the cabinet and is desirably positioned adjacent the wall 82 and between the end 18 of the cabinet. Gun support means are provided and in the preferred embodiment illustrated in FIGS. 1 and 2 such is a piece of strap iron 94 having end portions bolted or otherwise suitably secured to the angle iron 92 at an intermediate portion thereof and having the center portion thereof projecting toward the end 18 of the cabinet. A common spray gun 96 is mounted on the gun support or strap iron 94 with the nozzle or spray end portion 98 of the spray gun pointed at the hood 88 through the opening 86 in the wall 82. The spray gun 96 is desirably a common type adapted to receive a gas such as air under pressure, in one portion thereof and pass same through the gun with fuel being received by another portion of the gun and supplied thereto as a result of passage of air therethrough. Spray guns of this type are known to the art and any suitable type or construction can be used.

An air hose 100, as illustrated in FIG. 2, is connected in its end portions to an air inlet in the handle of the spray gun 96 and to the air storage tank 74. Preferably a pressure relief valve 102 is located at the outlet of the tank 74 in the hose 100 and is operable to open at a preset pressure of air in the storage tank to provide compressed air therefrom to the spray gun at a substantially constant pressure. A pressure of approximately 20--25 pounds per square inch has been found satisfactory.

A fuel storage tank 104 is provided and is desirably positioned beneath the spray gun 96 and preferably is provided with removable cap 105 on the fuel inlet. An immersible electric heater element 106 is preferably provided and connected by cord 108 to a source of electric power, such as the electrical power mains. The heater 106 is desirably so connected to the fuel tank 104 to control the temperature of the fuel in tank 104 above the freezing temperature of the fuel. A hose or conduit 110 connects the fuel storage tank 104 to a forward portion of the spray gun 96 to transfer fuel 107 from the storage tank 104 to the spray gun 96.

A relatively short and preferably channel-shaped converter mounting bracket 112 is desirably provided and connected to the intermediate portion of the angle iron 92 in any suitable manner, such as by welding, and is desirably positioned adjacent the opening 86 in the wall 82.

Means are provided adjacent the outlet end 98 of the spray gun 96 to convert a smoke-producing fuel to smoke. For this purpose, a fuel converter 120 is, as shown in detail in FIG. 3, provided and preferably is cylindrical in shape and includes a tubular or cylindrical metallic outer housing 124 and a tubular inner metallic core 126, the core 126 preferably being longer than the outer housing 124 and projecting from both ends thereof as best illustrated in FIGS. 1 and 3. The core 126 is also substantially in spaced relation to the outer housing and substantially coaxial therewith. The fuel converter 120 includes a body portion 128 which is preferably cast in place and is positioned between and extends between the housings 124 and 126. Said body portion 128 is preferably made of aluminum or an aluminum compound due to the desirable heat properties of aluminum.

Heating means are operatively positioned relative to the core or fuel-receiving portion of the converter to heat same. Preferably two elongated, bar-shaped electrical heating elements 130 are provided and positioned in spaced relation within the body portion 128 of the converter 120 and desirably extend substantially the entire length thereof. The electrical heating elements or bars 130 are connected by electrical conductors 132 to a suitable source of current, e.g. socket 68, to heat the converter core to a relatively high temperature, preferably in excess of 400° F. Suitable plugs 134 can be provided to close the end portion of the housing at the ends of the heating elements 130.

Preferably one end portion of the core 126 of the converter 120 is positioned beneath the converter mounting bracket 112 and in closely spaced relation to the spray end 98 of the spray gun 96 to receive an air-fuel mixture...
therefrom. A U-bolt 136 is positioned around the core 126 of the converter 120 and has the end portions thereof projecting through the center portion of the converter mounting bracket 112 and receives nuts 138 to secure the converter in position. Preferably the end portion 89 of the hood 88 in the operational position is larger in size than the diameter of the converter and the converter is positioned substantially within the hood 88 with an end portion thereof projecting toward the spray gun as best illustrated in FIG. 1 of the drawings. Thus, an air passage is provided around the converter 120 between same and the hood 88 and by virtue of the end portion on the core 126 from the spray end 98 of the spray gun 96 an air passage is provided therethrough and another therearound and in use operation of the squirrel cage fan or blower 36 forces air through the core 126 and around the converter 120 and through the hood 88.

Desirably suitable means are provided to determine the temperature of the converter 120. For this purpose a common heat sensing element 140, FIG. 1, is mounted in the body portion 128 of the converter and is connected by a conductor 142 to a heat gauge 144 (FIGS. 2 and 5). The gauge 144 is preferably mounted on the wall 82 adjacent the side 16 of the cabinet to be readily visible when top 22 is open.

A common percentage input control mechanism 150 (FIGS. 1 and 2) is mounted on the side 14 of the cabinet adjacent the timer switch 32 and is electrically connected to the timing switch by a conduit 152 to receive electric current therefrom. Preferably the percentage input control mechanism 150 is adjustable to provide electric current to the converter 120 at various percentages from 1 to 100 percent of the operating cycle to provide a suitable average converter operating temperature. The input control mechanism 150 in use alternately completes and breaks the electrical circuit supplying power to the heater elements in converter 120 to produce a suitable average temperature. For example, if the percentage input control mechanism is set at 50 percent, electrical current will be supplied to the converter heater 50 percent of the time while the generator is in operation. The input time is broken up into suitable intervals. The mechanism 150 is connected by an electrical conductor in conduit 154 to a fuse box 156 which in turn is electrically connected to a socket 158 by conduit 160 and the wire 132 leading to the heating elements 130 and the converter 120 are connected to a wall plug which is inserted into the socket 158. Fuse box 156 and socket 158 can be mounted on side 14 of the cabinet.

Smoke produced by the converter 120 is discharged from the lower or right-hand end portion of the converter as shown in FIG. 1 into the hood 88 and is transferred by passage of air from blower fan 36 through the lower end 90 of the hood 88 into the smoke accumulator compartment. Means are provided to receive and transfer the smoke from the accumulator compartment to the desired location. For this purpose two smoke outlet pipes 170 and 172 (FIG. 2) are provided and mounted on end 20 of the cabinet and each have one end portion thereof in communication with an upper portion of the smoke accumulator compartment of the cabinet and the other end portions thereof are connectible to signs, etc. (not shown). If no combustion or burning of the fuel takes place within the converter or if such is incomplete a portion of the liquid fuel discharged into the converter by the spray gun 96 drains into the smoke accumulator compartment and onto the plate 84. Also, smoke condensation of fuel may take place within the wall 82 of the converter or smoke or the hood 88 and the resulting condensation is discharged onto the plate 84. In order to prevent accumulation of this smoke producing fuel in the smoke accumulator compartment a conduit 174 is connected in one end portion to the upper portion of the smoke storage tank 104 and in the other end portion to a drain 176 on plate 84 in the smoke accumulator compartment (FIG. 1) and the liquid or fuel received by the smoke accumulator compartment flows along the inclined surface of plate 84 to the drain 176 and through tube or conduit 174 back to the fuel storage tank 104 for further use.

Use of the apparatus described hereinbefore and when practicing the method of the invention, the converter 120 is preheated to a temperature sufficient to cause combustion or conversion of the smoke-producing fuel 107 and preferably the converter 120 is heated to a temperature of approximately 400° to 500° F. This temperature is sufficient to heat most smoke-producing fuels and preferably a fuel such as the Terra Oil Company and sold as No. 537 fuel is used, such having a relatively small residue product and being desirable for this purpose. Other suitable fuels can, of course, be used including fuel designed and constructed to produce colored smoke other than a black or gray color. The converter is preferably heated prior to starting the other apparatus. The timing switch 32 closes to provide current to conduits 48 a predetermined time interval after providing current to the converter heating elements such as five minutes. The air compressor 60 then commences operation and provides compression through the header 72 to the air storage tank 74. The valve 102 is preferably regulated to permit passage of air therefrom through hose 100 to the spray gun 96 at approximately 22 pounds per square inch pressure.

Air under pressure passes through the spray gun 96 and the nozzle 98 and passes from the smoke accumulating fuel 107 thereof and passage of air through the spray gun siphons fuel from tank 104 through conduit or tube 110 to the spray gun 96 for mixing therein with the air under pressure and a mixture of air and fuel is discharged from the spray gun onto a heated surface of the converter, preferably the inner surface of the tube or core 126, and passage of the fuel therealong causes heating of the fuel and conversion of same into smoke. The blower fan 36 is started at the same time as the compressor and continuously provides from 80 to 160 cubic feet per minute of air from the atmosphere through the cabinet and through the converter and around same and in the passageway between the converter and the hood 88. This passage of air causes continuous transfer of smoke from the converter 120 into the hood 88 and from same into the smoke accumulator compartment and from the accumulator compartment through the conduit 170 and 172 to a sign or the like. If desired, suitable interrupting means (not shown) can be connected to the smoke outlet means 170 and 172 to provide surges of smoke therethrough for discharge of smoke at the outlet end thereof.

By siphoning fuel 107 from fuel storage tank 104 rather than providing same under pressure to the spray gun it has been found that proper conversion of the fuel to a smoke occurs instead of a flash ignition of the fuel which would result in imperfect production of smoke and inefficient utilization of the fuel. A slow burning or smolder effect is obtained as a result of the method and structure of the invention. The siphoning of the fuel can be referred to as reversed carburation.

Another preferred specific embodiment of the converter means of the invention is illustrated in FIGS. 8 and 9 of the drawings and this embodiment is quite desirable for production of large volumes of smoke with a minimum increase in equipment required. In this embodiment, the converter is shown generally at 200 and includes an elongated outer metallic housing 202 and a body portion 204 which preferably comprises a glass-like material. A plurality of cores or tubular members 206 are provided in the body portion 204 and are preferably of sufficient length to project from both end portions thereof as best illustrated in FIG. 8 of the drawings. Design of the uses of the cores 206 are substantially parallel to each other and the cores are in spaced relation as illustrated in FIG. 9. One end portion of the cores 206
is desirably located adjacent to and in spaced relation to a plurality of spray guns 208 and receive a spray of fuel and compressed air in the manner described herebefore in connection with the spray gun 96. A plurality of heating elements 210 are mounted in the body portion 204 of the converter 200 and are connected by electrical conductors 212 to a source of electric power thereby heat the converter and cause conversion of the fuel to smoke when received by the cores 206. The heating elements 210 are desirably positioned in spaced relation to each other and to cores 206.

In use the converter 200 is mounted in a hood or the like similar to that shown at 88 and receives a fuel-air mixture from the spray guns 208 and converts the fuel to smoke. Operation of a blower or the like similar to that shown at 36 transfers the generated smoke to the desired location.

Another preferred specific embodiment of the invention is illustrated in Fig. 6 of the drawings. In this embodiment the invention a smoke accumulator compartment is defined by a side wall 220, an end wall 222, an intermediate wall 224, a plate 226 mounted on the end 222 and the bottom 228 of the cabinet and another wall (not shown) opposite from the wall 220. The smoke accumulator compartment of Fig. 6 is the same or similar in construction to that of Figs. 1-5 of the drawings. In this embodiment a support, such as the angle iron 230 is mounted on the cabinet within the smoke accumulator compartment, such as by connecting same to the side wall 220 and the wall opposite therefrom. A gun support 232 is mounted on the angle iron 230 in any suitable manner, such as by bolts 234. Gun support 232 can be the same or similar in construction to that shown at 94 and described herebefore. The spray gun 236 is connected to the gun support 232 and supported thereby with the spray end or nozzle 238 thereof directed toward the end 222 of the housing.

A hose 240 connects the handle portion of the gun 236 to a source of air or gas under pressure and a hose or conduit 242 connects the gun 236 to a fuel storage means, such preferably being positioned beneath the gun 236 to be supplied thereto by passage of the compressed air or gas therethrough.

A converter mounting bracket 250 is preferably provided and desirably has a relatively flat portion 252 and inclined edge or leg portions 254 and 256 which are connected to the plate 236 and end 222, respectively, in any suitable manner, such as by welding, bolt means, etc. The center portion 252 of the converter support is preferably inclined relative to the end 222 and bottom 228 of the housing or cabinet.

A generally flat and generally plate-shaped converter 260 is provided and has the lower surface secured to the center portion 252 of the converter support 250 and can be mounted thereon by bolt means, welding, or other suitable means. The flat upper surface 262 of the converter 260 is positioned adjacent the spray end or nozzle 238 of the spray gun 236 to receive smoke producing fuel therefrom.

The converter 260 preferably has a plurality of rod or bar-type electrical heating elements 264 positioned therein in spaced relation and operatively connectable to a source of electric current and the like such as in the manner described herebefore. A condensation conduit 266 is desirably connected to a drain 267 on the plate 226 and to the fuel storage tank to return fuel condensed in the smoke accumulator compartment or not consumed on the converter surface 262 to the storage tank. In Fig. 6, as in Figs. 8 and 9, the means for compressing the air, moving air to the converter and through the smoke accumulator compartment, and for transferring the produced smoke to a sign or the like are the same or similar in construction to that illustrated in detail in Figs. 1, 2, 4 and 5 of the drawings and have not been shown in detail here. Also, the manner of operation is the same as that described herebefore for Figs. 1-5.

The smoke generating method and means of the invention have been found quite desirable in use for supplying relatively large quantities of smoke over a long period of time to signs and in other uses where smoke is required. By mounting the apparatus in a cabinet as indicated in the drawings, the apparatus is easily portable and need only be connected to a source of electric current and have the smoke outlet means 170 and 172 connected to the sign or other means to receive the smoke and the apparatus is ready for use. The apparatus can be used for portable installations such as for signs or similar trader signs or the like for moving signs, to lay down smoke screens, etc. The apparatus can also be used in applications other than for signs. For example, the device can be used to detect leaks in pipes or conduits, such as in sewer pipes, oil carrying conduits or pipes, etc.

While the invention has been described in connection with preferred specific embodiments thereof, it will be understood that such is intended to illustrate and not to limit the scope of the invention which is defined in the claims.

1. A portable smoke generator comprising, in combination, an elongated cabinet having a bottom, two sides, two ends and a hingedly mounted top secured to one of said sides, electrical inlet means connected to one end of said cabinet electrically connectable to said cabinet and connected to a source of electric current, a timing switch mounted on said one side of said cabinet adjacent said one end of said cabinet and electrically connected to said electrical inlet means, a blower fan positioned within said cabinet and mounted on the opposite side of said cabinet, a blower fan switch electrically connectable to said blower fan and said timing switch, said blower fan switch being operable to regulate the speed of operation of said blower fan, an electrically operated air compressor mounted on said bottom of said cabinet adjacent said one end thereof and electrically connected to said timing switch, an air storage tank mounted on said bottom of said cabinet adjacent said one end thereof, a compressor conduit connected at its end portions to said compressor and said air storage tank to supply air under pressure to said air storage tank, an air pressure gauge operatively connected to said air storage tank to indicate pressure of air therein, a wall in said cabinet extending between and secured to said sides thereof and extending from said top when closed to the lower portion of said cabinet and terminating in spaced relation to said bottom of said cabinet connected by a plate connectable in one edge to the lower edge of said wall and having the opposite edge positioned on said bottom of said cabinet at said other end of said cabinet and extending across said cabinet from said one side to said other side, said wall being positioned at the intermediate portion of said cabinet and defining with the other end thereof, said sides, said top and said plate, a smoke accumulator compartment, a centrally located opening in said wall, a hood mounted on the center portion of said wall with one end portion thereof in communication with said opening, said hood being positioned within said cabinet compartment and having its other end portion opening toward said plate, and in spaced relation thereto, an angle iron secured in its end portions to said sides of said cabinet and positioned adjacent said wall between said wall and said one end of said cabinet, a gun support connected to an intermediate portion of said angle iron and projecting therefrom toward said one end of said cabinet, a spray gun mounted on said gun support with the spray end thereof pointed at said hood through said opening in said wall, an air hose connected in its end portions to said spray gun and to said air storage tank to provide compressed air therefrom to said spray gun, a fuel storage tank positioned...
beneath said spray gun and below said accumulator compartment, an immersible electric heater in said fuel storage tank, a fuel conduit connected in one end portion to said spray gun and having the other end portion positioned in said fuel storage tank, a short channel-shaped conduit mounting bracket and 25 immersible electrical heating elements mounted therein in spaced relation to the radially disposed inner and outer surfaces of said body, said body being larger in size than said boiler and portion of said conduit to provide an air passage therearound, a heat sensing element positioned in said body portion of said conduit, a heater gauge mounted on said wall and operatively connected to said heat sensing element to indicate the temperature of said body portion of said converter, said converter having a tubular center core mounted in and coaxial with said body portion and projecting from the ends of said body portion, one end of said tubular core of said converter being positioned be-neath conduit mounting bracket and in closely spaced relation to said nozzle of said spray gun to receive fuel therefrom, a U-bolt removably connecting said one end portion of said core of said converter to said conduit mounting bracket, a percentage input control mounted on said one side of said cabinet within said cabinet walls and electrical means connected to and each of said heating elements in said converter and operable to supply electric current to said heating elements in said converter from one to one hundred percent of the operating cycle in suitable time intervals to provide a constant temperature in the converter, two smoke outlet pipes connected to the upper portion of said other end of said cabinet and communicating with the interior of said accumulator compartment of said cabinet, and a condensation conduit connected in its end portions to said accumulator compartment and to said fuel storage tank to return fuel conserved in said accumulator compartment to said fuel storage tank, said smoke generator being constructed and adapted so that operation of said compressor provides air under pressure to said air storage tank and to said spray gun with passage of air through said spray gun siphoning fuel from said fuel storage tank to said spray gun for discharge therefrom into said one end portion of said converter core for burning therein as a result of heating therein to result in discharge of smoke from the other end of said converter into said hood, said blower fan forcing air through said air passage around said converter and forcing smoke from said hood through said accumulator compartment into said smoke outlet pipes, said timing switch constructed and adapted to in operation initially operate to provide current from said source of electric current to said heating elements for burning said gas, by providing at a time interval current from said source to said compressor and blower fan, thereby providing for producing and delivering smoke.

2. A portable smoke generator comprising, in combination, an elongated cabinet having a bottom, two sides, two ends and a hingedly mounted top secured to one of said sides, a blower fan positioned within said cabinet and mounted therein at one end portion thereof, switch means operatively connected to said blower fan and operable to vary the speed of same in operation, an air compressor mounted in said cabinet at said other end portion thereof, an air storage tank positioned in said cabinet adjacent said air compressor, conduit means connecting said air compressor to said air storage tank, a wall in said cabinet extending between said sides and positioned in an intermediate portion thereof and defining with the other side of said cabinet an accumulator compartment, said wall having an opening therein, hood means mounted on said wall and having one end portion thereof in fluid communication with said opening in said wall, said hood means being positioned within said accumulator compartment and having its other end portion thereof opening downwardly toward said bottom of said cabinet, spray gun support means operatively connected to said cabinet and positioned in said one end portion thereof, a spray gun mounted on said support means and having the spray end portion thereof positioned to direct a spray toward said hood through said opening in said wall, conduit means connecting said spray gun to said air storage tank, a fuel storage tank positioned beneath said spray gun and below said accumulator compartment, conduit means connecting said spray gun to said air storage tank with said blower fan being operable upon passage of compressed air therefrom to siphon fuel from said fuel storage tank and mix same with said air therein for discharge through said spray end thereof, a fuel converter operatively mounted in said cabinet and supported thereby and having the inlet end thereof positioned adjacent spray end of said spray gun to receive smoke-producing fuel therefrom, said fuel converter having heating means connected thereto to heat said fuel therein and convert same to smoke, the outlet end of said fuel converter being connected in the end portion of said charge smoke thereinto, said converter being positioned relative to said hood to provide a passage for air from said blower fan into said hood, and smoke outlet means in said accumulator compartment positioned to receive and discharge said smoke and means being constructed and adapted in operation to provide a smoke-producing fuel from said fuel storage tank to said spray gun for mixing therein with compressed air from said air storage tank and discharging therefrom into said fuel converter for production of smoke therein, the resulting smoke being discharged into said hood and moved by air from said blower fan through said smoke accumulator compartment to said smoke outlet means for delivery to a sign or the like, said switch means being connected to said compressor and to said heating means in said fuel converter and constructed and adapted to in operation initially operate said heating means followed by operating at a time interval said blower fan and compressor.

3. A portable smoke generator comprising, in combination, an elongated cabinet having a bottom, two sides, two ends and a hingedly mounted top secured to one of said sides, electrical inlet means connected to one end of said cabinet and electrically connectable to a source of electric current, a timing switch to selectively initiate or terminate operation of said generator mounted on said one side of said cabinet and electrical means being connectable to said electrical inlet means, a blower fan positioned within said cabinet and mounted on the other side thereof, a blower fan switch electrically connectable to said blower fan and said timing switch, said blower fan switch being operable to regulate the speed of operation of said blower fan, an electrically operated air compressor mounted on said bottom of said cabinet adjacent said one end thereof and electrically connected to said timer switch, an air storage tank mounted on said bottom of said cabinet adjacent said one end thereof, a compressor conduit connected in the end portions to said compressor and to said air storage tank to supply air under pressure to said air storage tank, an air pressure gauge operatively connected to said air storage tank to indicate pressure of air therein, a wall in said cabinet extending between and secured to said said there-
walls, said top when closed and said plate a smoke accumulator compartment, a centrally located opening in said wall, a hood mounted on the center portion of said wall with one end portion thereof in communication with said opening, said hood being positioned within said accumulator compartment and having the other end portion thereof facing toward said plate and spaced relation therefrom, an angle iron secured in its end portions to said sides of said cabinet and positioned adjacent said wall between said wall and said one end of said cabinet, a plurality of spray guns operatively connected to and supported by said angle iron with the spray gun portions thereof positioned direct a spray toward said hood through said opening in said wall, each of said spray guns being operatively connected to said air storage tank to receive air under pressure therefrom, fuel storage means positioned beneath said spray guns and accumulator compartment and operatively connected thereto to provide a smoke-producing fuel thereto, an elongated fuel converter operatively mounted in said cabinet, said fuel converter having an elongated metallic body portion positioned in said hood and having a plurality of tubular cores mounted thereto in spaced relation with said ends of said body portion, the axes of said cores being substantially parallel to each other and one end of said cores being positioned adjacent said spray gun portions of said spray guns to receive a fuel and air mixture from said spray guns, a plurality of heated elements mounted in said body portion of said converter in spaced relation to the outer surface thereof and to said cores to heat the fuel passing through said cores and convert same to smoke, the other end of each of said converter cores being positioned to deliver smoke to said hood, electrical input control means mounted in said cabinet and electrically connected to said timing switch and to said heating elements in said converter and operable to supply electric current to said heating elements, said converter being positioned relative to said hood to define therewith an air passage, two smoke outlet pipes connected to the upper portion of said other end of said cabinet and communicatin with the interior of said accumulator compartment of said cabinet, a condensation conduit connected in the end portions to said accumulator compartment and to said fuel storage means to return fuel condensed in said accumulator compartment to said fuel storage means, said smoke generator being constructed and adapted so that operation of said smoke generator provides air under pressure to said air storage tank and to said spray gun, the passage of air through heated fuel from said fuel storage means to said spray guns for discharge therefrom to said converter cores for production of smoke therein as a result of heating therein to result in discharge of smoke from said other end of said converter cores into said hood, said blower fan forcing air through said passage defined by said converter and said hood and forcing smoke from said hood through said accumulator compartment into said smoke outlet pipes, said timing switch constructed and adapted to in operation initially operate to provide current from said source of electric current to said heating elements followed by providing at a time interval thereafter current from said source to said compressor and blower fan, thereby providing for producing and delivering smoke.

4. A portable smoke generator comprising, in combination, a cabinet having a bottom, two sides, two ends and a hingedly mounted top secured to one of said sides, electrical inlet means connected to one end of said cabinet and electrically connectible to a source of electric current, a timing switch to selectively initiate or terminate operation of said generator mounted on said one side of said cabinet adjacent said one end of said cabinet and electrically connected to said electrical inlet means, a blower fan positioned within said cabinet and mounted on the other side thereof, a blower fan switch electrically connected to said blower fan and said timing switch, said blower fan switch being operable to regulate the speed of operation of said blower fan, an electrically operated air compressor mounted on said bottom of said cabinet adjacent said one end thereof and electrically connected to said timing switch, an air storage tank mounted on said bottom of said cabinet adjacent said one end thereof, a compressed air conduit connected to said air storage tank and to said air storage tank to supply air under pressure to said air storage tank, an air pressure gauge operatively connected to said air storage tank to indicate pressure therefrom, a wall in said cabinet extending between and secured to said sides thereof and extending from said cabinet closed to the bottom thereof, a plate connected in one portion to the lower edge of said wall and having the opposite edge thereof connected to said other end of said cabinet adjacent said bottom of said cabinet and extending across said cabinet from said one side to said other side thereof, said wall being positioned at the intermediate portion of said cabinet and defining with the other end thereof, said sides, said top when closed and said plate a smoke accumulator compartment, a centrally located opening in said wall, an angle iron secured in its end portions to said sides of said cabinet and positioned within said accumulator compartment projecting from said cabinet and operatively connected to an intermediate portion of said angle iron and projecting therefrom toward said wall, a spray gun mounted on said angle iron, an air hose connected in its end portions to said spray gun and to said air storage tank, a flat cabinet having the other end portion positioned in said fuel storage tank, a converter mounting bracket having a flat center portion and inclined edge portions, said edge portions being secured to said plate and said other end of said cabinet, a flat fuel converter having a plurality of electrical heating elements positioned therein in spaced relation to the upper and lower surfaces thereof, said fuel converter having the lower surface thereof connected to said converter mounting bracket and having the upper surface thereof positioned adjacent and in spaced relation to the spray end portion of said spray gun, electrical control means operatively connected to said electric heating elements in said converter and to said timing switch and operable to supply electric current to said said heating elements, said converter being positioned relative to said plate to define therewith an air passage, two smoke outlet pipes connected to the upper portion of said other end of said cabinet and communicating with the interior of said accumulator compartment of said cabinet, a condensation conduit connected in the end portions to said accumulator compartment and to said fuel storage means to return fuel condensed in said accumulator compartment to said fuel storage tank, said smoke generator being constructed and adapted so that operation of said smoke generator provides air under pressure to said air storage tank and to said spray gun with passage of air through said spray gun bypassing from said fuel storage tank to said spray gun for discharge therefrom to said converter cores for production of smoke as a result of heating of the fuel thereon, said blower fan forcing air through said opening in said wall into said accumulator compartment for mixing with smoke therein and discharging same through said smoke outlet means to a sign or the like, and a condensation conduit connected in the end portions to said accumulator compartment and to said fuel storage tank to return fuel condensed in said accumulator compartment to said fuel storage tank, said smoke generator being constructed and adapted so that operation of said smoke generator provides air under pressure to said air storage tank and to said spray gun with passage of air through said spray gun bypassing from said fuel storage tank to said spray gun for discharge therefrom to said upper surface of said converter for production of smoke as a result of heating of the fuel thereon, said blower fan forcing air through said opening in said wall into said accumulator compartment for mixing with smoke therein and discharging same through said smoke outlet means to a sign or the like, and said timing switch constructed and adapted to in operation initially operate to provide current from said source of electric current to said heating elements followed by providing at a time interval thereafter current from said source to said compressor and blower fan, thereby providing for producing and delivering smoke.

5. Portable smoke generator means comprising, in combination, a cabinet, a timing switch to selectively initiate or terminate operation of said generator mounted in said cabinet and operatively connected to a source of electric
3,250,723

power, a blower fan positioned in said cabinet to drive air therein, and electrically connected to said timing switch, a compressor mounted in said cabinet and electrically connected to said timing switch, an air storage tank positioned within said cabinet and operatively connected to said compressor to receive compressed air therefrom, spray gun support means connected to said cabinet, spray gun means mounted on said gun support means, fuel storage means positioned beneath said spray gun means, conduit means connecting said fuel storage means and said air storage tank to said spray gun means to supply air under pressure and fuel to said spray means, converter means mounted in said cabinet and positioned adjacent said spray gun means to receive an air-fuel mixture from said spray gun means, said converter having heating means therewith operable to heat said converter to cause conversion of said fuel to smoke upon contact with said converter means, said cabinet having smoke outlet means therewith operable to receive and pass smoke from said cabinet, said smoke generator means being constructed and adapted so that operation of said compressor provides air under pressure to said air storage tank and to said spray gun with passage of air through said spray gun means siphoning fuel from said fuel storage means to said spray gun means for discharge therefrom to said converter to result in the production of smoke, said blower fan forcing air through said cabinet into said smoke outlet means, said timing switch constructed and adapted to in operation initially operate to provide current from said source of electric current to said heating means of said converter followed by providing at a time interval thereafter from said source to said compressor and blower fan, thereby providing for delivering smoke.

6. Means for generating smoke comprising, in combination, spray means, means operatively connected to said spray means to provide a gas under pressure thereto, fuel storage means operatively connected to said spray means to provide a smoke-producing fuel thereto, converter means positioned at the outlet of said spray means to receive a fuel and gas mixture therefrom, said converter means having heating means operatively positioned relative thereto and operable to burn said fuel and produce smoke, smoke accumulator means positioned to receive smoke from said converter means, said accumulator means having outlet means to discharge smoke therethrough, and blower means mounted and operable to force smoke from said converter means through said accumulator means and into said outlet means.

7. The method of producing smoke comprising, the steps of, preheating a smoke converter to a temperature of approximately 400° F., subsequently commencing operation of an air compressor and transferring compressed air from the compressor to an air storage tank, passing air at approximately 22 pounds per square inch pressure from the air storage tank to a spray gun, operatively connecting the spray gun to a supply of smoke-producing fuel and passing the air under pressure through the spray gun and discharging same from a spray nozzle so that passage of air through the gun causes siphoning of fuel from the fuel storage tank to the spray gun, mixing the fuel and air under pressure in the spray gun and discharging a spray mixture of air and fuel from the spray gun, directing the fuel-air mixture from the spray gun onto a heated surface of the converter to cause heating of the fuel and conversion of same into smoke, continuously passing approximately 85 cubic feet per minute of air around the converter to cause movement of smoke therefrom and mixing of the smoke with the air, and transferring the smoke generated in the converter to a sign or the like.

8. A method of producing smoke comprising the steps of, preheating a converter to a temperature sufficient to convert a fuel to smoke, starting an air compressor after heating of said converter and operating the compressor continuously to provide a continuous supply of air under pressure to an air storage tank, transferring a portion of the air under pressure from the air storage tank to a spray gun and passing same therethrough, siphoning fuel from a fuel storage tank to the spray gun, mixing the fuel and air in the spray gun and directing the fuel-air mixture therefrom to the converter, heating the fuel-air mixture at the converter to cause conversion of the fuel to smoke and discharging the resulting smoke from the converter, continuously passing a stream of air past the converter to the smoke from the converter and mix same with the stream of air, and transferring the resulting smoke and air mixture through a restricted opening to a sign or the like.

9. A method of producing smoke comprising the steps of, compressing a supply of air, transferring a portion of the compressed air to a spray gun means, passing the compressed air through the spray gun to result in siphoning of a smoke-producing fuel from a fuel tank, mixing the fuel with the air in the spray gun and discharging same therefrom in a spray to a fuel converter, heating the converter, placing the fuel in contact with the converter to heat the fuel to thereby produce smoke, passing a stream of air around the converter to move the smoke therefrom and mix the smoke with the air, and transferring the smoke and air mixture to a sign or the like.

10. A method of producing smoke comprising the steps of, siphoning fuel from storage means into spray means, mixing said fuel therein with a compressed gas and forcing the resulting mixture from said spray means to converter means, heating the converter and thus the resulting mixture of fuel and gas to produce smoke and forcing same from the converter, blowing the resulting smoke into discharge means for delivery to a sign or the like.

11. A method of producing smoke comprising the steps of, heating a converter element to a temperature sufficient to cause a fuel to produce smoke, spraying a smoke-producing fuel onto the converter, directing a stream of air by the converter to cause movement of the smoke from the converter and delivery of same to the desired location.

References Cited by the Examiner

UNITED STATES PATENTS

2,422,024 6/1947 Levey et al. ……………252—359.1
2,686,944 8/1954 Gubelin ……………239—70 X
2,736,987 3/1956 Tomassovich ……………219—273
2,742,562 4/1956 Frantz et al. ……………219—38
2,882,420 4/1959 Charwat ……………252—359.1
2,926,855 3/1960 Durr et al. ……………252—359.1
3,044,276 7/1962 Kauten ……………239—70 X
3,081,313 5/1963 Wohl ……………219—38

NORMAN YUDKOFF, Primary Examiner.

GEORGE D. MITCHELL, Examiner.