GELLED FUEL HEATING SYSTEM AND METHOD

Inventors: Erwin C. Fischer, Colorado City, AZ (US); Lorin Dee Fisher, legal representative, Colorado City, AZ (US); Leroy Fischer, Hildale, UT (US); Ron Darger, Colorado City, AZ (US); Lloyd L. Wall, Salt Lake City, UT (US)

Correspondence Address:
David R. McKinney
THORPE, NORTH & WESTERN, L.L.P.
P. O. Box 1219
Sandy, UT 84091-1219 (US)

Assignee: Alco-Brite, Inc.

ABSTRACT
A system and method for heating an elongate metal item to cause thermal expansion thereof. The system includes a tubular container having a nozzle and a moveable piston, with gelled fuel disposed between the piston and the nozzle. An advancing mechanism moves the piston toward the nozzle to force the gelled fuel to flow out of the nozzle onto the elongate metal item. The method includes the steps of applying the gelled fuel to a surface of the item, and igniting the gelled fuel.
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SPECIFICATION

BACKGROUND OF THE INVENTION

[0002] 1. Field of the Invention

[0003] The present invention relates generally to portable heat sources. More particularly, the present invention relates to a system and method for applying gelled fuel to metal items in order to heat and expand or thaw them.

[0004] 2. Related Art

[0005] There are many industrial applications where it is desirable to have a portable, sustained, concentrated heat source for heating items in place. For example, in the railroad industry, it is frequently desirable to heat rails in place to cause thermal expansion (i.e. elongation) for pull-apart repair, or to heat switch points or other track components for repair or thawing of frozen parts. Likewise, in many industries, it is desirable to have such a heat source for heating pipes, drums, pumps, structural steel components, and many other items.

[0006] In the past, heating of rails or other items in place has frequently been accomplished by wrapping the rail or other component with a rope soaked in diesel fuel or other flammable substance, then igniting the rope. Because diesel fuel burns relatively slowly, the effect is to gradually heat the rail. Unfortunately, this method presents several undesirable side effects. Among them, it pollutes the environment with large amounts of black diesel smoke, in addition to the ashes and residue from the combustion. Additionally, the typical method of manually preparing and/or attaching the rope to the rails or other components is cumbersome, time consuming, and may be objectionable to workers, possibly exposing them to chemicals and vapors which can be irritating or even toxic.

SUMMARY OF THE INVENTION

[0007] It has been recognized that it would be advantageous to develop a method for heating elongate items such as railroad rails, pipes, and the like, that is less polluting, less objectionable to workers, and easier to perform than the use of diesel-soaked ropes.

[0008] Advantageously, the invention provides a system and method for heating an elongate metal item to cause thermal expansion thereof. The method includes the steps of applying a gelled fuel to a surface of the item, and igniting the gelled fuel. The system can include a tubular container having a nozzle and a moveable piston, with gelled fuel disposed between the piston and the nozzle. An advancing mechanism moves the piston toward the nozzle to force the gelled fuel to flow out of the nozzle onto the elongate metal item. A means for igniting the gelled fuel is provided to allow ignition.

[0009] In accordance with a more detailed aspect of the present invention, the tubular container may be configured similar to a tube of caulk, and advancing mechanism may comprise a device similar to a caulking gun.

[0010] In accordance with another more detailed aspect of the present invention, the tubular container may comprise a refillable cylinder having a moveable piston therein for forcing gelled fuel out of a nozzle and onto the item.

[0011] In accordance with another more detailed aspect of the present invention, the system may further include a bucket pump system for pumping bulk gelled fuel from a bucket into the tubular container.

[0012] In accordance with another more detailed aspect of the present invention, the gelled fuel may be gelled ethanol comprising ethanol with a cellulose gelling agent, and an oxidizer. The fuel may also include carbon to increase its burn temperature, and metal powders to modify the color of its flame.

[0013] In accordance with another more detailed aspect of the present invention, the system comprises a tube-splitter for splitting an elongate tube of gelled fuel and spreading the fuel on a metal item. The tube-splitter includes a housing having an inside and a bottom, a feeder tube disposed inside the housing, with an aperture configured for receiving the elongate tube of gelled fuel, and a knife disposed within the housing adjacent to the feeder tube and pointing upward from the bottom of the housing, and a spreader ramp disposed adjacent to the knife. The knife is configured to slit the bottom of the elongate tube of gelled fuel, and the spreader ramp spreads open the split tube and presses the gelled fuel onto the metal item.

[0014] The system and method are particularly useful for heating railroad rails for pull-apart repair, and for thawing frozen railroad switch points, pipes, drains, pumps, and the like. Additional features and advantages of the invention will be apparent from the detailed description which follows, taken in conjunction with the accompanying drawings, which together illustrate, by way of example, features of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

[0015] FIG. 1 is a pictorial view of one embodiment of a gelled fuel applicator for use with the method of the present invention, wherein the applicator includes a refillable main chamber;

[0016] FIG. 2 is a longitudinal cross-sectional view of the main chamber of the gelled fuel applicator of FIG. 1;

[0017] FIG. 3 is a pictorial view of the gelled fuel applicator of FIG. 1 mated with a bucket pump configured for filling the main chamber of the applicator from a fuel supply container;

[0018] FIG. 4 is a pictorial view of an alternative gelled fuel applicator comprising a mechanism for squeezing gelled fuel from a prefilled rigid tube;

[0019] FIG. 5 is a pictorial view of an elongate prepackaged flexible tube of gelled fuel;

[0020] FIG. 6 is a pictorial view of a tube-splitter tool for placing and opening the elongate prepackaged flexible tube of gelled fuel of FIG. 5 and pressing the fuel onto a surface of a railroad rail;
FIG. 7 is a longitudinal cross-sectional view of the tube-splitter tool of FIG. 6.

FIG. 8 is a transverse cross-sectional view taken along line 8-8 through the rearward portion of the tube-splitter tool of FIG. 7, showing the dispersion ramp and tubespreader ridge;

FIG. 9 is a frontal elevation view of the knife-mounting yoke taken along line 9-9 in FIG. 7;

FIG. 10 is a transverse cross-sectional view taken along line 10-10 through the forward portion of the tube-splitter tool of FIG. 7, showing the feeder tube and aperture;

FIG. 11 is a cross-sectional view of one rail of a conventional railroad track with the tube-splitter tool disposed against one side of the rail web, and showing alternative locations for application of the gelled fuel.

DETAILED DESCRIPTION

For the purposes of promoting an understanding of the principles of the invention, reference will now be made to the exemplary embodiments illustrated in the drawings, and specific language will be used to describe the same. It will nevertheless be understood that no limitation of the scope of the invention is thereby intended. Any alterations and further modifications of the inventive features illustrated herein, and any additional applications of the principles of the invention as illustrated herein, which would occur to one skilled in the relevant art and having possession of this disclosure, are to be considered within the scope of the invention.

As illustrated in FIGS. 1-3, a system, indicated generally at 10, in accordance with the present invention is shown for applying gelled fuel to items such as railroad rails, pipes, etc. The gelled fuel applicator 10 generally comprises a substantially cylindrical main chamber 12 with an axially extending outlet tube 14 and applicator nozzle 16 extending from a first end of the main chamber. The main chamber may be any desirable size. The inventors have used such a device sized to hold about 2 gallons. The cylinder may include a handle 13 disposed on the outside for allowing easy handling and manipulation of the device. The nozzle 16 is removable, so that nozzles of different shapes may be selectively disposed at the end of the outlet tube for allowing the creation of differently shaped beads of expelled fuel, if desired, and also to accommodate refilling of the device, as described below.

At a second end of the main chamber 12 is a rotational connector 18 which is configured to allow connection of a central threaded rod 20 to a rotational drive means, such as a handheld drill 22. Alternatively, the rotational drive means may be a lever and ratchet mechanism, a hand crank, an electric motor, or other comparable devices for rotating a shaft. FIG. 2 presents a cross-sectional view of the main chamber 12. The threaded rod 20 extends axially through the center of the chamber, from end to end, being rotationally supported at each end, and includes screw threads 28 along its entire length. Slidably disposed upon the threaded rod and engaged with the screw threads 28 is a piston 30 which fits snugly within the interior of the main chamber, and is configured to travel from one end of the main chamber to the other as the rod 20 rotates. An air valve 32 is located toward the second end of the main chamber to allow air to enter or escape the chamber as the piston moves or as fuel is pumped into the chamber, as described below.

Referring to FIG. 3, in one method of filling the main chamber 12, the applicator 10 is mated with a fill tube 51 associated with a bucket pump 50. The bucket pump is similar to a device disclosed in U.S. Pat. No. 2,726,602 to H. E. Jones and incorporated herein by reference. The bucket pump system generally comprises a pump head 54 which is disposed atop a bucket 52, the bucket being a source of bulk gelled fuel, the pump head securely holding itself and the bucket to a base plate 53 by means of threaded tension rods 55.

To fill the main chamber 12, the nozzle 16 is removed, and the outlet tube 14 is mated with the fill tube 51. The piston 30 is retracted to the second end of the main chamber (shown at 30a in FIG. 2) and the air valve 32 is opened to allow air to escape from the main chamber. The pump head 54 includes a mechanism (not shown) for pressing a piston down into the bucket 52 to force the contents of the bucket through the fill tube 51, through the outlet tube 14, and thence into the main chamber 12. The pump head 54 may be activated by a hand crank 56, as shown, or may be activated by a power source such as a motor (not shown). As fuel is pumped into the main chamber, air is allowed to escape through the air valve 32.

With the main chamber 12 full of gelled fuel and the piston 30 retracted to the second end of the main chamber (shown at 30a in FIG. 2), the threaded rod 20 may be caused to rotate in a second direction by the rotational drive means 22, causing the piston to travel toward the first end of the main chamber (shown at 30b in FIG. 2), forcing the contents of the chamber into the outlet tube 14 and thence out of the nozzle 16. The device is thus used to apply a bead of fuel to the rail, such as on top of the rail, and the bead may then be ignited to heat the rail.

The gelled fuel applicator 10a shown in FIG. 3 is an alternative embodiment configured for pneumatic activation. The main chamber 12 of this embodiment is similar to that shown in FIG. 2 except that no central threaded rod is required. Rather, the piston 30 is configured to slide within the main chamber 12 in response to a pressure differential from one side of the piston to the other. As shown in FIG. 3, the handle 56 of the applicator has a supply line 57 which communicates between the handle and a compressed air source (not shown), and a trigger 58. The trigger 58 is configured to allow selective opening of a valve (not shown) which introduces compressed air through the supply line 57 to the side of the piston opposite the outlet tube 14 and nozzle 16, in a manner well known. Naturally, the air relief valve 32 must be closed for the pneumatic system to operate. When the main chamber is to be refilled, the air relief valve 32 is opened, and the piston 30 naturally retracts to its first position (30a in FIG. 2) under the force of the gelled fuel entering the main chamber.

As yet another alternative, the embodiment of FIG. 3 may be configured for hydraulic activation. In such an embodiment, the supply hose 57 may be configured for supplying hydraulic fluid from a hydraulic pumping source (not shown), and the interior of the main chamber 12 configured for pushing the piston 30 in response to the hydraulic pressure. The trigger 58 allows selective introduction of hydraulic fluid. It will be apparent that a hydraulic
return line (not shown) will be required to allow the release of hydraulic pressure for retraction of the piston 30.

[0034] As shown in FIGS. 1 and 3, the gelled fuel applicator 10 and 10a is thus a refillable device for progressively forcing a gelled fuel, such as gelled ethanol, from a chamber through an aperture using an advancing piston, wherein the mechanical means for supporting and advancing the piston is disposed within the chamber and does not move therewith. The device is used to both draw in and then expel gelled fuel from a main chamber.

[0035] In another embodiment of the invention, depicted in FIG. 4, an alternative gelled fuel applicator 60 is configured somewhat similar to a conventional caulking gun, having an elongate body 62 with a front bulkhead 63, which is configured for receiving a prepackaged tube 64 of gelled fuel. The applicator has a handle 66 and trigger 68 which allow activation of an internal ratchet mechanism (not shown), so as to advance a rod 70 having an end plate 72. The prepackaged tube 64 is a substantially rigid tube, and defines a central cavity 74 for containing the gelled fuel, and has an outlet tube 76 and nozzle 78 at one end, and a slidable piston 80 at the other, the piston substantially sealing the end of the tube 64.

[0036] The gelled fuel applicator 60 is used in a manner similar to caulking guns. First, the rod 70 is retracted as far as possible toward the handle, and the tube 64 is placed in the elongate body 62 with the nozzle end of the tube disposed against the front bulkhead 63. The rod 70 is then pushed forward so that the end plate 72 is against the outside of the piston 80. Then, when the trigger 68 is pulled, the rod 70 is caused to advance by the ratchet mechanism, thus pushing the piston and forcing the contents of the central cavity 74 of the tube to be expelled from the nozzle 78. The caulking gun 60 may be powered manually, as shown, or alternatively by air, hydraulic, or electrical pushing devices. It will also be apparent that the mechanical ratchet-type mechanism depicted in FIG. 4 may be combined with the refillable embodiment of FIG. 1.

[0037] The method of applying the gelled fuel to the surface of an item generally involves the steps of (1) filling the main chamber with gelled fuel; (2) pumping the gelled fuel from the main chamber to form a bead of fuel which adheres to the surface of the item; and (3) igniting the fuel to heat the item. The configuration of the nozzle 16 or 78 will help determine the amount of fuel applied.

[0038] FIG. 11 is a cross-sectional view of a conventional railroad rail 150, showing several locations in which the gelled fuel may be placed. The rail includes a rail head 152, a vertical web 154, and base flange 156. In a conventional installation, the base flange 156 is supported on a steel tie plate 160, and both are affixed to a timber railroad tie 162 with spikes 158. To heat the rail for pull-apart repair, when the gelled fuel is mechanically applied, it is preferably applied to the side of the rail web, shown at 170. If the rail is cold, location 170 is preferred. As an alternative, the gelled fuel may be applied to the region, designated at 172, where the bottom of the rail web 154 and base flange 156 meet. Position 172 is preferred when the rail has previously been heated. In practice, when the gelled fuel is placed on the web at 170, it will naturally tend to flow downward toward position 172 as it burns. To cause a railroad rail to lengthen by about 2 inches, for example, heating of about 60 linear feet of the rail may be required. Heating usually takes about 12-15 minutes using the invention.

[0039] As yet another, though generally less desirable alternative, the gelled fuel may be applied to the rail head 152, as shown at 174. This latter method is frequently followed when applying gelled fuel to a rail by hand, but when applying the fuel mechanically as disclosed herein, this method may be needed where the rail 150 is affixed to a concrete railroad tie (not shown) upon a plastic plate (not shown), rather than a steel tie plate, disposed below the base flange 156. In such an installation, the heat of burning of the gelled fuel could damage the plastic plate, and placing the fuel atop the rail head prevents such damage. Another alternative when placing the fuel manually is placement below the lip of the rail head 152, at location 176, or at location 170. These latter locations are preferred for manual placement of the fuel. Manual placement means spreading the fuel on the item using spatulas, trowels, or other hand spreader devices.

[0040] The gelled fuel is a slow-burning gelled alcohol fuel. A suitable slow-burning gelled alcohol fuel is Fire-Gel®, which is commercially available from Alco-Brite® of Hilldale, Utah. Fire-Gel® generally comprises a blend of alcohols, a gelling agent, an oxidizer, and possibly also carbon additives for temperature control. In one embodiment, the alcohol is ethanol, the gelling agent is a hydrocarbon cellulose gelling agent, and the oxidizer is ammonium perchlorate. The oxidizer helps enhance the burn characteristics (temperature and burn rates). Powdered metals and other chemicals may also be added, or the base ingredients varied, to regulate the temperature range in which the gel burns. The gel viscosity can also be adjusted by varying the gelling agent, carbon content, and oxidizers.

[0041] Because alcohol flames are colorless, the fuel mixture may be modified with additives to produce various flame colors. For example, sodium chloride may be added to produce an orange flame, copper powder to produce a blue flame, magnesium powder to produce a white flame, and so forth. Those skilled in the art will recognize that many known substances may be added to produce a wide variety of desired flame colors.

[0042] Advantageously, the primary ingredients of the gelled alcohol fuel are available from renewable resources, and are non-toxic.

[0043] Primary combustion products include water, oxygen and a minute amount of carbon dioxide with a minimal carbon residue remaining. Additionally, with the Fire-Gel® product, there is minimal separation of the flammable substance and the gelling agents. Accordingly, safety hazards associated with fuel separation or toxicity to workers or contamination to the environment are reduced or eliminated.

[0044] The gelled alcohol fuel is non-compressible, and therefore is easily pumped and dispersed through hoses, pipes, and nozzles. The gelled alcohol fuel can also be impregnated or injected into fibrous material such as rope in which the gelled alcohol fuel is suspended or absorbed into or around the fibrous material. This “rope” can be laid along the rail or wrapped around the pump housing, structural steel, or pipe to allow concentration of heat to allow for thermal expansion or thawing.

[0045] As depicted in FIG. 5, in another embodiment the gelled alcohol fuel can be provided in the form of
continuous gel tube 90. In this embodiment, the fuel 94 is injected into a prepackaged continuous tube or casing 92, forming a product resembling a sausage, that can be laid along a rail, pipe, structural steel member, etc. In this embodiment, the casing 92 may be combustible, and in use the gel tube 90 may simply be placed along the item, and the casing ignited to cause ignition of the gelled alcohol fuel within the casing/tube. The casing 92 may be either flexible or semi-rigid, and may be formed of cellulose, polyethylene, nylon, or other combustible materials that will be consumed in the burning process. Gel tubes as shown in FIG. 5 containing Fire-Gel® are commercially available from Alco-Brite® of Hildale, Utah. The tubes are typically in 20 foot lengths, and are about 1¼” in diameter. When the fuel is burned within the casing, it is typically placed at location 172 as shown in FIG. 11.

[0046] To promote faster ignition and burning, the casing 92 can be cut open to expose the gelled fuel 94. This may be done by hand, using a knife or other easily and rapidly apply the gel tube 90 to an item such as a railroad rail, the inventors have devised a tube-splitter tool 100, depicted in FIGS. 6-10. The tube-splitter tool 100 generally comprises a housing 102, a feeder tube 104, and a spreader ramp 120, connected to a handle 114 by an angularly adjustable handle yoke 116. The feed tube 104 has an aperture 106 at the forward end for receiving the gel tube 90, and leads to a knife 124, which is disposed on a knife mounting yoke 108. The knife mounting yoke includes a knife mount assembly 112 and a quick-release knife blade lock assembly 126 that allows for a quick, no tool, change out of the knife blade.

[0047] The knife mounting yoke 108 is removably disposable within the housing 102 by means of locking tabs 110 which mate with slots 103 formed in the side of the housing. At the rearward end of the feed tube 104, the tube is constricted and flattened on the bottom so as to provide a good surface for penetration of the knife blade. The flattened bottom surface 128 of the rearward end of the feed tube is more apparent in the cross-sectional view of FIG. 8. As the tube 90 passes over the blade 124, its bottom side is split open, and the tube is then flattened and pressed against the surface 132 of the item by the spreader ramp 120 and tubespreader ridge 122, with the gelled fuel in contact with the surface of the item. When the 1½” tube 90 is cut and spread, it typically creates a bead of fuel about 2½” to 3” wide. The split tube method is typically performed to place the fuel at location 170, as shown in FIG. 11.

[0048] Returning to FIGS. 6-10, to begin use, the knife mounting yoke 108 is first removed from the housing 102. The tubular container 90 is then fed into the feed tube 104 by inserting it into the flared aperture 106 manually, in the direction of arrow 130. The gel tube 90 is then fed over the flattened bottom surface 128 of the feed tube and through the location where the knife mounting yoke will be placed, and past the spreader ramp 120 until enough of the gel tube is fed through the device to secure it on the surface to be heated. The knife mounting yoke 108 is then pushed into its cutting position in the housing.

[0049] Using the handle 114, a user can push or pull the tube-splitter tool 100 against the surface of the elongate item along the entire length of the gel tube 90, splitting open one side of the tubular container and pressing the gelled fuel against the surface 132. The spreader ramp 120 spreads the material in the tubular container to a desired thickness as the tube-splitter tool is pulled or pushed along the tubular container. The tube spreader ridge 122 opens up the tubular container 90 to allow the contents of the tube 92 to flow therefrom and spread on the surface of the item.

[0050] The tube-splitter tool 100 is shown in FIG. 11 in position for use in placing a bead of gelled fuel on the side of an railroad rail web 154. The tube-splitter device could also be used in other applications. For example, it could be used for dispensing and spreading of glues along trusses, beams, or similar supporting structures when flooring or paneling is installed.

[0051] The system and method of the present invention can be used in any application where a sustained concentrated heat source is required for heating of any non-combustible material such as steel, concrete, etc. Such applications include repair of railroad pull apart (cold retraction induced broken railroad rails), heating of slurry pumps, pipelines, broken pump or processing equipment, metal structural members, spot thawing of frozen pipes, drains, railroad switch points, etc. The system and method may also be used for thawing of frozen or gelled substances in closed containers such as pipes, pump housings, etc., and may provide a heat source for manufacturing, testing, assembly of metal items on site and at remote locations. It may also be used to provide heat to accelerate the setting of adhesives or similar applications involving chemical reactions that require heated surfaces or materials to augment the reaction. It can also provide a heat source for clean up at construction sites, or to burn out contaminated joints etc. It can also be useful for flares to mark out messages or other non-electronic signals, to ignite back fires for fighting of forest fires, or to assist in utility maintenance and clean up.

[0052] It is to be understood that the above-described arrangements are only illustrative of the application of the principles of the present invention. Numerous modifications and alternative arrangements may be devised by those skilled in the art with the inventors in the drawings and fully described above with particularity and detail in which is presently deemed to be the most practical and preferred embodiment(s) of the invention, it will be apparent to those of ordinary skill in the art that numerous modifications, including, but not limited to, variations in size, materials, shape, form, function and manner of operation, assembly and use may be made, without departing from the principles and concepts of the invention as set forth in the claims.

What is claimed is:

1. A method for heating an elongate metal item to cause thermal expansion thereof, comprising the steps of:
   a) applying gelled fuel directly to a surface of the metal item; and
   b) igniting the gelled fuel.

2. A method in accordance with claim 1, wherein the step of applying the gelled fuel comprises:
   c) placing a nozzle of a tubular container adjacent to the surface of the elongate item, the tubular container having a moveable piston disposed opposite the nozzle,
and gelled fuel disposed within the container between the piston and the nozzle; and
d) moving the piston toward the nozzle, so as to cause the gelled fuel to flow out of the nozzle onto the elongate metal item.

3. A method in accordance with claim 2, wherein the tubular container comprises a substantially rigid prepackaged tube, and the step of moving the piston toward the nozzle comprises manipulating a ratchet mechanism so as to advance a rod against the piston to force the gelled fuel out of the cavity through the nozzle.

4. A method in accordance with claim 2, wherein the tubular container comprises a refillable cylinder having a main chamber for containing the gelled fuel, and the step of moving the piston toward the nozzle comprises moving the piston linearly along a rod centrally disposed within the cavity.

5. A method in accordance with claim 4, wherein the rod is a threaded rod, and the step of moving the piston toward the nozzle comprises rotating the threaded rod to cause linear movement of the piston.

6. A method in accordance with claim 5, wherein the step of rotating the threaded rod comprises a step selected from the group consisting of moving a lever and ratchet mechanism, turning a hand crank, and activating an electric motor.

7. A method in accordance with claim 6, wherein the step of activating an electric motor comprises activating a power drill.

8. A method in accordance with claim 2, wherein the step of moving the piston toward the nozzle comprises applying compressed air against a side of the piston opposite the gelled fuel.

9. A method in accordance with claim 1, wherein the step of applying the gelled fuel further comprises the steps of:
c) placing an elongate prepackaged flexible casing of gelled fuel adjacent to the metal item;
d) slitting open the flexible casing to expose the gelled fuel; and
e) pressing the gelled fuel against the surface of the metal item.

10. A method in accordance with claim 9, wherein the steps of slitting open the flexible casing further comprises the steps of:
f) placing a cutting device against the metal item, the cutting device having an aperture and a cutting blade, the flexible casing extending through the aperture and contacting the cutting blade;
g) simultaneously (i) moving the cutting device linearly along the surface of the metal item and (ii) drawing the flexible casing through the aperture and against the cutting blade, whereby the flexible casing is cut along its length by the blade, and the gelled fuel is pressed against and adheres to the surface of the metal item.

11. A method in accordance with claim 1, wherein the step of applying the gelled fuel further comprises the steps of:
c) disposing an elongate prepackaged flexible casing of gelled fuel on the metal item;
d) igniting the flexible casing.

12. A system for heating an elongate metal item to cause thermal expansion thereof, comprising:
a) a tubular container having a nozzle disposed at a first end, a moveable piston disposed in the container, and gelled fuel disposed within the container between the piston and the nozzle;
an advancing mechanism configured to move the piston toward the nozzle, to cause the gelled fuel to flow out of the nozzle onto the elongate metal item; and
means for igniting the gelled fuel.

13. A system in accordance with claim 12, wherein the tubular container comprises a substantially rigid prepackaged tube, said tube defining a cavity containing the gelled fuel, the piston substantially sealing an end of the cavity opposite the nozzle; and

14. A system in accordance with claim 13, wherein the tubular container comprises:
a) a cylinder defining a refillable main chamber for containing the gelled fuel, the cylinder having a first end with a nozzle in fluid communication with the main chamber, and a moveable piston disposed within and substantially sealing the main chamber opposite the nozzle; and
means for moving the piston linearly within the cavity, whereby movement of the piston toward the nozzle forces fuel out of the main chamber through the nozzle.

15. A system in accordance with claim 14, wherein the means for moving the piston within the cavity comprises:
a) a threaded rod centrally disposed within the main chamber, said moveable piston being mounted on the threaded rod; and
rotational drive means connected to the threaded rod, whereby the piston moves linearly when the threaded rod is rotationally driven.

16. A system in accordance with claim 15, wherein the rotational drive means is selected from the group consisting of a lever and ratchet mechanism, a hand crank, and an electric motor.

17. A system in accordance with claim 16, wherein the rotational drive means is selected from the group consisting of a lever and ratchet mechanism, a hand crank, and an electric motor.

18. A system in accordance with claim 17, wherein the electric motor comprises a power drill.

19. A system in accordance with claim 13, wherein the advancing mechanism for moving the piston comprises a compressed air source configured to supply compressed air into the cylinder and urge the piston toward the nozzle.

20. A system in accordance with claim 13, wherein the gelled fuel comprises gelled ethanol.

21. A system in accordance with claim 20, wherein the gelled ethanol comprises a mixture of ethanol, a cellulose gelling agent, and an oxidizer.
22. A system in accordance with claim 20, wherein the gelled ethanol comprises carbon additives for increasing its burn temperature.

23. A system in accordance with claim 13, wherein the elongate metal item is selected from the group consisting of a railroad rail, a railroad turnout component, a pipe, a drain, a pump, and mating structural steel components.

24. A system in accordance with claim 22:

wherein the elongate metal item is a railroad rail; and

wherein the gelled fuel is applied to a portion of the rail selected from the group comprising: the rail head, the web of the rail, and the base flange of the rail.

25. A method of heating a railroad track component to cause thermal expansion thereof, comprising the steps of:

a) applying gelled fuel to a surface of the railroad track component, such that the gelled fuel adheres to said surface; and

b) igniting the gelled fuel.

26. A method in accordance with claim 25 wherein the railroad track component is selected from the group consisting of a railroad rail and a movable turnout component.

27. A method in accordance with claim 26, wherein the railroad track component is a railroad rail, and the surface is selected from the group consisting of the rail web, the rail head, the rail base flange, the intersection of the rail web and the base flange, and the intersection of the rail head and the rail web.

28. A tube-splitter for splitting an elongate tube of gelled fuel and spreading the fuel on a metal item, comprising:

a housing having an inside and a bottom;

a feeder tube disposed inside the housing, and having an aperture configured for receiving an elongate tube of gelled fuel;

a knife disposed within the housing adjacent to the feeder tube and pointing upward from the bottom of the housing, and configured to slit the bottom of the elongate tube of gelled fuel;

a spreader ramp, disposed adjacent to the knife, and configured for spreading open the split tube and pressing the gelled fuel onto the metal item.

29. A tube-splitter according to claim 28, further comprising a handle configured for allowing a user to move the tube-splitter along the item.

30. A tube-splitter according to claim 28, wherein the knife is removable.