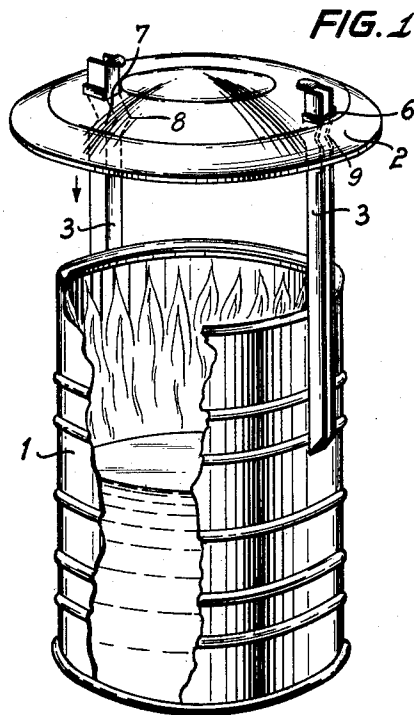
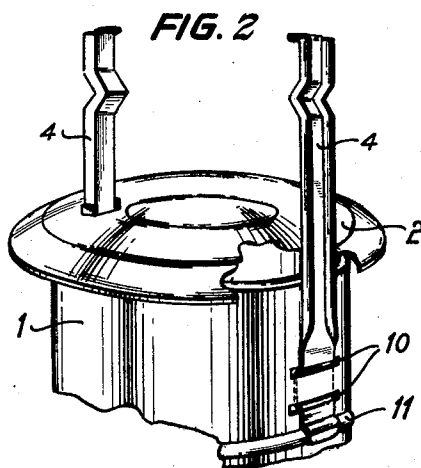


March 27, 1962

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OUTDOOR HEATING STOVE

3,026,931

Filed April 15, 1959



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OUTDOOR HEATING STOVE

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Filed Apr. 15, 1959, Ser. No. 806,563

Claims priority, application Germany Oct. 18, 1958

8 Claims. (Cl. 158—91)

The present invention relates to improvements in outdoor heating stoves for orchards, gardens, and the like for protecting plants from frost. More particularly, the invention relates to such a stove which is operated with a liquid fuel.

Prior to this invention, there have been different types of outdoor heating stoves which were operated with pressed coal or with oil. They usually consisted of conical pots with lateral vent holes. There has also been a prior disclosure of another stove of this kind which consisted of two conical parts in an inverted position to each other which also had special lateral vent holes. Because of their construction, these known outdoor stoves have a considerable weight and are therefore hard to transport so that they often require special means for carrying them, such as rings and the like.

It has also been found that the conical shape of these known stoves is very disadvantageous since the diameter of the liquid fuel surface determines the amount of heat radiation and this diameter obviously decreases as the fuel burns down to a lower level.

Possibly the most serious disadvantage of these prior stove designs, however, consisted in the provision of the lateral vent holes which permitted rain water coming down at an angle to enter into the stove and to mix with the oil therein. These vent holes also became frequently clogged or entirely closed by the smoke and soot forming during the combustion so that the amount of air admitted into the stove was no longer sufficient for attaining a proper combustion of the fuel. Finally, it was very difficult to extinguish the flame in these stoves since it was practically impossible to shut all of the vent holes.

It has also been previously proposed to provide a cover above the opening of the fuel container for liquid fuels in order to prevent the hot gases from being dissipated and the rain water from entering into the container. However, in the known stove designs, this cover was mounted at such a low level that the oxygen supply was no longer sufficient and the flame was forced back into the inside of the stove with the result that it no longer produced sufficient heat. Furthermore, the heat developed within these prior stoves had to penetrate through the material thereof, that is primarily, through the walls of the container. Consequently, the heating efficiency of these stoves was very low and the material of the walls was subjected to excessive stresses.

It is an object of the present invention to provide an outdoor heating stove which overcomes the above-mentioned disadvantages in a very simple, unobvious and effective manner.

The outdoor heating stove for liquid fuel according to the invention is provided at a point above the opening of the cylindrical fuel container with a concave cover plate, the opening of which faces in the downward direction. A particular feature of this stove according to the invention consists in the fact that the cover plate is removably secured to supporting arms at a point so high above the opening of the fuel container that the combustion of the liquid or vaporized fuel will occur at the upper edge of the fuel container.

By thus designing the stove according to the invention, the same will be insured of a very ample and effective supply of oxygen so that the fuel will first be vaporized

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and the flames will then form at the upper edge of the fuel container rather than at the inside of the fuel container slightly above the liquid level therein, as in the former stoves of this type. This apparently simple arrangement which has previously been never considered has the effect that the hot gases and vapors which are generated by the flames are conducted by the cover plate directly toward and along the ground and then pass gradually upward along the plants which are to be protected. The heat transmission therefore occurs by convection, rather than primarily by conduction through the material of the wall of the fuel container as in the known stoves. Such new manner of heating has a degree of efficiency which has never been previously attained and it has the further important advantage that the material of the stove according to the invention is not subjected to such intense heating as previously and that the stove will therefore have a much longer working life.

The efficiency of the stove will be further improved by the fact that, since there is always an adequate supply of oxygen free of soot, the combustion of the heating oil will be almost complete and without smoke.

According to another feature of the invention, the cover plate is removably secured to the fuel container so that a number of these stoves can be easily stacked on each other and can thus be easily transported to and from the place where they will be used. They then form simple cylindrical drums which in transport can be placed upright on top of each other or laid side-by-side and upon each other, and which may then be easily carried or rolled to their place of use.

A further important feature of the invention for simplifying the construction and operation of the stove consists in providing the cover plate with one or more openings through which the supporting arms are passed, whereby the cover will be guided so as also to serve for extinguishing the flame. By this construction it will also be avoided that any parts of the stove have to be separately stored or transported, or might be misplaced or lost in the area to be heated.

These and other objects, features, and advantages of the present invention will become further apparent from the following detailed description thereof, particularly when read with reference to the accompanying drawings, in which—

FIGURE 1 shows a perspective view of an outdoor heating stove according to the invention in the operative position, but partly cut open to disclose the inside thereof;

FIGURE 2 shows a perspective view of the upper parts of the stove according to FIGURE 1 in the inoperative position.

Referring to the drawings, and first particularly to FIGURE 1, the outdoor heating stove according to the invention consists of a cylindrical fuel container or drum 1 and a cover plate 2 which is secured above the opening of the fuel drum 1 by means of supporting arms 3. Cover plate 2 has a pair of apertures 6 therein through which supporting arms 3 extend and is of a concave shape so that the heat will be deflected in the downward direction. It is mounted at such a distance from the upper end of the fuel drums 1 that the combustion of the liquid or vaporized fuel will occur at the upper edge of the fuel container.

FIGURE 1 shows the outdoor heating stove in the operative position. The cover plate 2 is raised to such a high level that an adequate supply of oxygen for a proper combustion of the fuel oil in drum 1 will be admitted into drum 1 through its upper opening. For extinguishing the flames it is merely necessary to press or hit upon the upper surface of cover plate 2 whereby the cover plate will slide downwardly along the slightly resilient supporting arms 3 to settle evenly on the upper edge of drum

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1, thereby shutting off any further supply of combustion air. The cover plate 2 therefore serves the double purpose of acting in the raised operative position as a protective shield against rain and as a heat deflector, and in the closing position for extinguishing the flames and for thereafter fully protecting the fuel oil in drum 1 from being contaminated by rain water, leaves, dust, or the like. By being guided by the resilient supporting arms 3, the cover plate 2 will be held firmly closed on the drum and cannot be shifted or lifted by the wind.

These last-mentioned features of the invention are of a considerable practical importance since outdoor heating stoves of this kind are usually distributed over the area to be protected and supplied with fuel oil some time before freezing temperatures occur so as to be immediately available for operation as soon as the temperature drops to a dangerous point. During this waiting period and particularly during the time shortly preceding a frost when wind and rain usually occur, the oil will not be contaminated by rain or dirt blown in by the wind, and the cover will be firmly held on the drum, although in such a manner that it can be instantly raised to the operative position.

Aside from merely relying upon the resilience of the supporting arms 3 to hold the cover plate 2 in the raised operative position, the arms 3 may also be provided with suitable wave-shaped bends 7 forming in each arm an inwardly directed projection 8 and a corresponding inwardly projecting recess 9. In other words, arms 3 may either resiliently grip inwardly or may spring outwardly. In the first instance, the inward edges of apertures 6 engage projections 8 and in the second instance the outer edges of apertures 6 engage recesses 9.

The supporting arms 3 may be secured in any suitable manner to the fuel drum 1, for example, by welding or riveting. They are preferably made of a U-shaped profile and may be stamped into their required shape by a single stamping operation. According to FIGURE 2, arms 4 may be secured to the fuel drum 1 by being provided at their lower end with a flat portion which is passed through a pair of slots 10 in the wall of drum 1 and the lower edge portion of which abuts against a corrugation 11 on the drum. This edge portion may also be slightly bent or curved so as to rest more fully on the corrugation 11. This manner of securing the supporting arms 4 has been found very appropriate as it will not be affected by the tensions and stresses caused by the heating of the wall of the drum and does not require any additional operations such as welding or riveting. The flat end portions of the supporting arms are preferably slightly bent or curved so as to be held under a resilient tension in the slots 10.

Although not shown particularly in the drawings, the cover plate 2 may in place of the apertures 6 also be provided at the outer edge of the plate with suitable cutouts in which the supporting arms 3 are guided. In the raised operative position of the cover plate, the supporting arms or the projections or grooves thereon will then resiliently engage with the inner edges of such cutouts.

All of the parts of the new outdoor heating stove according to the invention may be made of relatively thin sheet metal and be welded together. The entire stove will therefore be of a very light weight which can be easily rolled or carried even by women or children. It may also be manufactured at a low cost so that a farmer or planter may place a sufficient number of such stoves into the area to be protected without having to invest a great deal of money in these stoves.

Practical experience has shown that one of the stoves according to the invention will adequately heat an area of land of about 30 square feet for eight hours at a consumption of 1 gallon of a light fuel oil.

Although my invention has been illustrated and described with reference to the preferred embodiments there-

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of, I wish to have it understood that it is in no way limited to the details of such embodiments, but is capable of numerous modifications within the scope of the appended claims.

Having thus fully disclosed my invention, what I claim is:

1. An outdoor heating stove for liquid fuel comprising: a cylindrical fuel drum having an upper opening; a plurality of resilient supporting arms mounted on said drum and extending upwardly from the upper opening thereof; a downwardly concave cover plate having corresponding apertures therethrough carried by said arms, said arms passing through the apertures in said cover plate, at least one of said supporting arms including abutment means above the upper surface of said cover plate to limit the upward movement thereof, said cover plate being movable to an uppermost position substantially parallel to and at a distance above said drum opening sufficient to insure the combustion of the liquid and vaporized fuel to occur near the upper edge of said fuel drum, and a lowermost position adjacent the upper opening of said drum for extinguishing the flames to prevent contamination of the fuel carried by said drum.

2. An outdoor heating stove as defined in claim 1, wherein at least two of said supporting arms of a resilient material are mounted on said drum, each of said resilient arms having an upper end portion adapted to releasably grip the outer region of said cover plate.

3. An outdoor heating stove as defined in claim 1, wherein at least two of said supporting arms of a resilient material are secured at opposite positions to the outer wall of said drum, said cover having at least two apertures, said supporting arms extending through said apertures to permit said cover plate to be raised and lowered thereon, said supporting arms resiliently engaging with at least one wall of each of said apertures for arresting said cover plate in the raised position above said drum opening and in the closed position on said drum opening.

4. An outdoor heating stove as defined in claim 1, wherein each of said supporting arms has a projection thereon near its upper end adapted to engage with at least one wall of each of said apertures to maintain said cover plate in the raised position.

5. An outdoor heating stove as defined in claim 1, wherein each of said supporting arms has a recess therein near its upper end adapted to engage with at least one wall of the edge portion of each of said apertures to maintain said cover plate in the raised position.

6. An outdoor heating stove as defined in claim 1, wherein each of said supporting arms has a substantially flat lower end portion, said fuel drum having a pair of substantially parallel horizontal slots above each other, said flat portion being passed through said slots and engaging with its free end against an outwardly projecting corrugation on the wall of said drum.

7. An outdoor heating stove as defined in claim 6, wherein the free end of said flat portion is bent so as to engage around said corrugation.

8. An outdoor heating stove as defined in claim 6, wherein said substantially flat portion is slightly bent so as to engage at a resilient pressure with the walls of said slots.

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