Kerosene heater

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A **kerosene heater**, also known as a **paraffin heater**, is typically a portable, unvented, kerosene-fueled, space-heating device. In Japan and other countries, they are a primary source of home heat. In the United States they are a supplemental heat or a source of emergency heat during a power outage. Most kerosene heaters produce between 3.3 and 6.8 kW (11000 to 23000 BTU per hour).

A modern Japanese kerosene heater

Contents

Operation

A kerosene heater operates much like a large kerosene lamp. A circular wick made from fiberglass or cotton is integrated into a burner unit mounted above a font (tank) filled with 1-K kerosene. The wick draws kerosene from the tank

via capillary action. Once lit, the wick heats the Kerosene until it turns into a gas (gasification) and this gas is then burnt which heats air via convection or nearby objects via radiation. The burner is designed to properly oxygenate and distribute the flames. The flame height is controlled by raising or lowering the exposed wick height inside the burner unit via an adjusting mechanism. The kerosene heater is extinguished by fully retracting the wick into a cavity below the burner, which will snuff out the flame.

There has been a technological advance in kerosene heaters: some now use electricity to power a fan to force the heated air out, making it possible to heat up rooms faster. There is also thermostat controlled operation installed in modern kerosene heaters as well. However, most kerosene heaters require no electricity to operate. Most heaters contain a battery-operated or piezo-electric ignitor to light the heater without the need for matches. If the ignitor should fail the heater can still be started manually.

The Japanese non-vented "fan" heater burns Kerosene gas and is known as a gasification type heater. The liquid Kerosene fuel is pre-heated via an electric heating element to vaporize the fuel. The resulting gas is collected and forced into the burn chamber where it is ignited and burns with a blue flame, similar to Propane. The unit is fueled through a conventional side mount cartridge style tank just like other non-vented wick type radiant heaters.

The other type of Japanese Kerosene heaters are the vented type with intake and exhaust piped through a dual pipe "chimney" through a side wall of a house. These units burn roughly like the old 1950's "pot" burners, but with fuel injection and computer control.

Details of operation

A kerosene heater is an appliance in which kerosene is gasified by surface evaporation and burned. The amount of kerosene evaporated and heat generated can be increased in direct proportion to the area of the contact surface between the kerosene and air. The wick used in a kerosene heater

consists of many bundles of fine fibers and, in accordance with the principle behind it, it is designed to provide a large evaporation area. The kerosene is drawn up from the tank into the combustion area by these capillary tubes.

If the kerosene becomes viscous or dirt and dust find their way inside the heater, the capillary tubes will become clogged. This will cause a deterioration in the drawing of the kerosene and combustion will no longer be possible.[1]

Odors during operation

When filling a kerosene heater, there is an opportunity for the fuel to vaporize and create an odor in the air. This is why it is important to fill the heater in a garage or outdoors. When a kerosene heater is first ignited, it takes a few seconds to a few minutes for the fuel to mix with the air in the perfect ratio for complete combustion. During that time, the fuel to air mixture is quite rich. This results in a small amount of unburned kerosene, thus creating an odor. Once the heater is burning normally, no additional odor is created. An improperly adjusted wick also causes smoke and odor.[2] This is corrected by adjusting the wick-height. A wick with carbon build-up will also cause odor and should be replaced. Odor may also be apparent when the heater is extinguished. The wick holder remains quite warm, and as the wick continues to draw kerosene, it causes vaporization of the fuel which is detected as odor.

Maintenance

The wicks require routine maintenance. With fiberglass wicks, the kerosene heater is placed outdoors and allowed to operate until it runs out of fuel. Tar and other leftover deposits on the wick are burned off. This should be done at least once a week if operated 24hr a day. With cotton wicks, the heater must never be run dry to clean the wick. Cleaning is instead accomplished with a paper towel, wiping down the top of the wick to remove any residue. The wick will eventually deteriorate to the point where it will need to be replaced.

Safety hazards

Combustion gases

Because kerosene heaters are usually unvented, all combustion products are released into the indoor air. Among these are low levels of nitrogen dioxide and carbon monoxide. An improperly adjusted, fueled, or poorly maintained kerosene heater will release more pollutants, particularly through incomplete combustion. Use of a kerosene heater in an improperly ventilated home poses an extreme risk to life. If oxygen is burnt faster than the extraneous atmosphere can leak into the room to replenish the burnt oxygen, the proportion of carbon monoxide rapidly increases. Since the monoxide can not escape any person in the room will fatally succumb to the poisonous gas. Human senses only detect an excess of carbon dioxide, and death occurs before any occupants of the room sense there is something amiss. Most manufacturers recommend that a window or door be left cracked open. Kerosene heaters should not be left unattended, especially when sleeping. A kerosene heater, as any heater that uses organic fuel, can produce dangerously high amounts of soot and carbon monoxide when running out of oxygen. Failure to follow safety precautions could result in asphyxiation or carbon monoxide poisoning.

Fire hazard

Hot surfaces on the heater pose a fire and burn risk. The open flame poses an explosion risk in environments where flammable vapors may be present, such as in a garage. Use of improper or contaminated fuel could cause poor performance, a fire or an explosion. There are the usual risks involved with the storage of kerosene and when refilling the heater.

Incorrect fuel

Always use the fuel type indicated by the manufacturer (usually clear 1-K Kerosene). The pink "off road" Kerosene can be burned in the fiberglass wicked models as well as the Japanese vented heaters. The Japanese gasification type as well as all the cotton wicked heaters should use clear 1-K. Use of impure fuel can cause extra soot. A risk of explosion is present with even trace amounts of gasoline mixed in the fuel, which is why it is illegal in many jurisdictions to dispense gasoline into unauthorized containers such as kerosene jugs. Be sure to store in a container that has not been used with gasoline.

Moisture Problems

"For every gallon of kerosene burned in an unvented kerosene heater, 1.1 gallons of water is produced. In very tightly sealed homes, such as those that are well insulated, weather-stripped and have storm windows, use of an unvented kerosene space heater can at least double the amount of moisture vapor generated in a house each day." [3]

See also

- Gas heater

References

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2. http://www.rentequip.com/pub/KeroseneManual.pdf
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