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THE THERMIT TYPE HEAT CARTRIDGE

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The thermit type heat cartridge consists of mixtures of iron, aluminum, zinc, manganese dioxide, and barium chromate, securely sealed in a cylindrical steel shell. It is capable of instant activation by the firing of an M-42 Hand Grenade Detonator that is crimped on its end. The ignition of this chemical mixture produces heat energy very quickly without the generation or releasing of any gases, as it is entirely self-contained, and, therefore, does not require outside oxygen for its combustion. It is non-flammable, non-explosive, and has a long shelf life. There is no evaporation or liberation of toxic chemical fumes either during storage or use. It is easily started by the impingement of a simple, spring-loaded firing mechanism upon the detonator unit.

The heat output of the cartridge ranges from 250 calories per gram to 550 calories per gram, depending on the mixture of the powders. The burning time of these mixtures will vary from ⅓ of a second per gram to one second per gram. To date, the accent has been put on the calorific output and not the time of burning, but time can be reckoned with in the event that it should be a prime factor in any requirement.

As of now, there is no known application where the cartridge is used by itself. Due to the amount of heat generated in the short burning time, the cartridge, when fired alone, will become red hot and local-

ization of this heat may cause a rupture of the steel container. Therefore, there must be a medium intimately attached or adjacent to the cartridge to use or carry off immediately the heat generated.

At the present time there are three standard size cartridges available that generate from 6 to 17 kilocalories in from 5 to 25 seconds. The outside diameter of two of these cartridges is ¾ inch — the third, ⅞ inch. The lengths vary from 1 15/16 inch to 2 15/16 inch.

In the past, there have been instances where this cartridge has been considered for Arctic usages: starting of motors, the warming of plasma or albumen for field transfusions, the warming of water in canteens, and the warming of battery fluid. But to date, for one reason or another, they have not materialized.

To illustrate the versatility of these cartridges I would like to describe several adaptions as used in existing items:

1. The first, which I think will be of immediate interest to the group, is the *Redi-Heat Block*, consisting of a 22 ounce block of magnesium, covered with flock. It has a receptacle in the center which accommodates one of the standard cartridges ¾ inch in diameter and 2 15/16 inch long. This cartridge produces 9½ kilocalories in approximately 10 seconds. In this instance, the heat is transmitted to the block and it, in turn, is used as a warming device. In the emergency treatment of shock this unit, when wrapped in a towel or blanket, will provide adequate heat for approximately one hour, as this charge raises the 22 ounce block of magnesium to a temperature of approximately 45°C above room temperature.

2. The *Quick-Shot Soldering Iron* — This is a conventional-type soldering iron that has a hollow body which will hold a cartridge ¾ inch in diameter and 1 15/16 in length. This cartridge produces 12½ kilocalories in approximately 5 seconds. The cartridge is activated by the spring-loaded mechanism in the handle and is capable of heating the soldering tip to a peak temperature of 862°F. within one minute. The soldering iron then contains enough heat to solder 40 - 60 rosin-core solder from 7 to 10 minutes. With its 250 wattage rating, it is used for emergency repairs requiring soldering where no other heating source is available and, also, has application in certain areas where open flames are not permissible.

3. *Baby Bottle Warmer* — This is aluminum extrusion with receptacles for both a baby bottle and a heat cartridge. The bottle is placed in its cavity and an intimate seal is made with the unit by the addition of a small amount of water. The cartridge, when fired, transmits its heat through the casting and the water seal, to the milk bottle. It utilizes a standard ¾ inch x 2 15/16 inch cartridge, which develops 12 kilocalories in approximately 15 seconds. It will raise 8 ounces of milk from room temperature to slightly above body temperature in from 2 to 3 minutes. It has proven invaluable when travelling with young children, and is particularly appreciated for the 2 a.m. feeding.