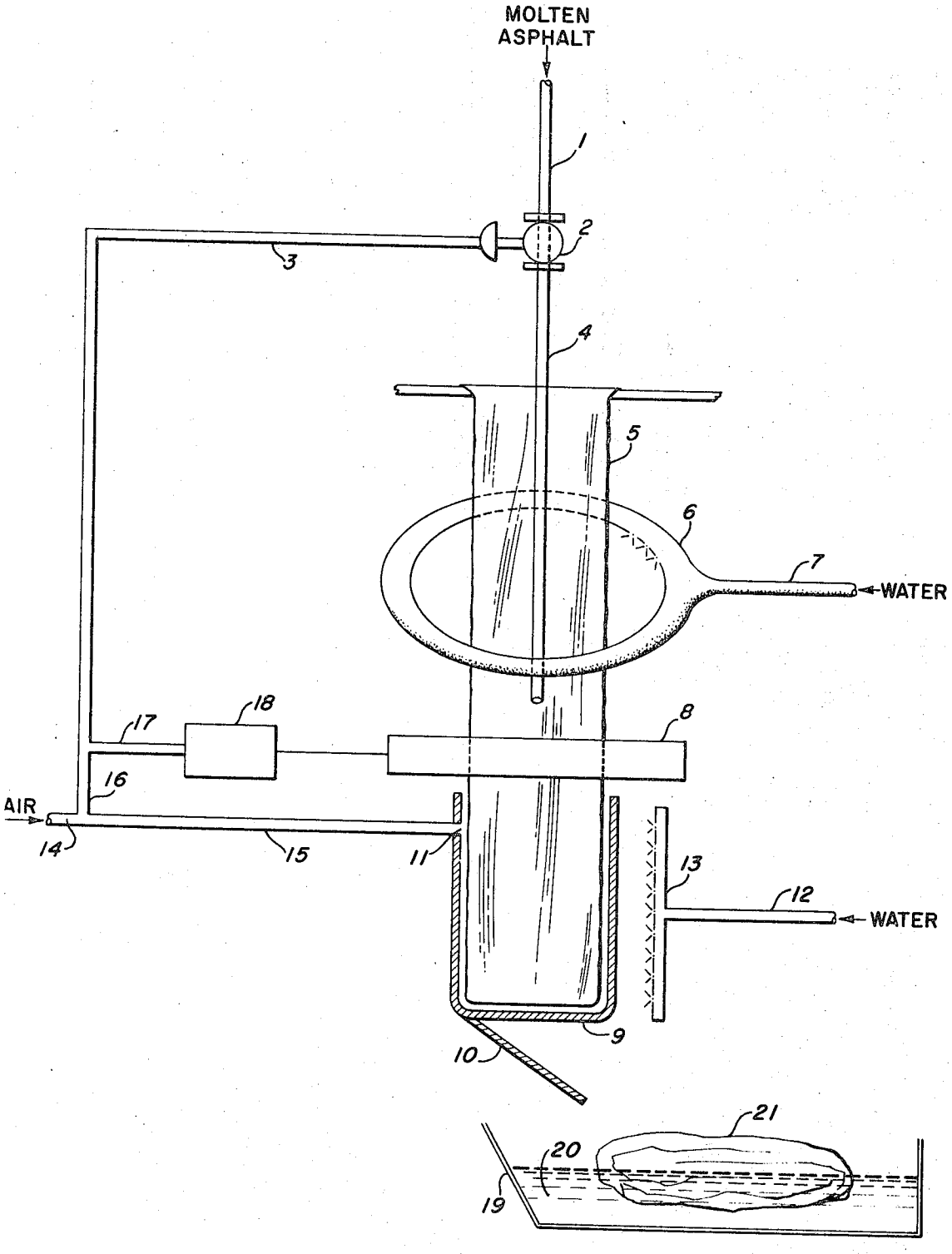
Feb. 23, 1971 G. E. KENT 3,564,808

LIQUEFIABLE MATERIAL PACKAGED IN FLEXIBLE PLASTIC CONTAINERS

Filed Nov. 8, 1968



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United States Patent Office 3,564,808
Patented Feb. 23, 1971

3,564,808

LIQUEFIABLE MATERIAL PACKAGED IN FLEXIBLE PLASTIC CONTAINERS

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Filed Nov. 8, 1968, Ser. No. 774,473
Int. Cl. B65b 63/08, 3/06, 57/14
U.S. Cl. 53—25 14 Claims

ABSTRACT OF THE DISCLOSURE

A normally solid or semi-solid material, such as asphalt, paraffin wax, sulfur, etc., is packaged in plastic bags by feeding the material in a molten state to a plastic tube sealed at its bottom end and disposed within a mold which serves to support, cool and shape the plastic tube during filling. After filling to a desired level, the tube contained within the mold is sealed at a position above the level of the material, severed thereat from the unfilled portion of the plastic tube and thereafter released from the mold and further cooled to provide a flexible container holding a solidified material.

BACKGROUND OF THE INVENTION

Field of the invention

This invention relates to a method and apparatus for the packaging of fusible material. More particularly, the invention is concerned with the packaging of a fusible material such as asphalt, wax, sulfur, etc., in flexible, thin-walled plastic bags.

Description of the prior art

Asphalt and similar materials which can be poured when hot and which solidify on cooling are conventionally packaged in wooden, metallic or other non-flexible containers. Ordinarily, the material to be packaged is fused and the molten material is poured into the container which, if necessary, is then immediately sealed. Rigid containers do not require external support during filling and can be easily transported while the material is still in the molten state.

The use of wooden and metal drums or similar rigid containers has, however, the drawback that the material contained therein can only be removed with difficulty since the material adheres to the inner wall of the containers. In order to obviate the drawback, it is already known to provide containers prepared from strong cardboard with an inner lining consisting of a metal foil and a film of cellulose acetate, the metal foil being glued to the inner side of the container, and the cellulose acetate film to the metal foil. The molten material, e.g., bitumen, which is poured into these containers when hot adheres to the cellulose acetate film while solidifying, so that in order to remove the packaging the cardboard with the metal foil must be stripped from the cellulose acetate film.

The containers provided with an inner lining are both inconvenient and expensive to use. British Pat. No. 935,357 attempts to overcome the deficiencies associated with the prior packaging methods by providing an asphalt bagging technique wherein molten asphalt is poured into a flexible plastic container while the container is progressively immersed in a water bath. After filling, the plastic container is sealed and allowed to remain in the water bath until the asphalt has solidified. Unfortunately, this prior art technique has the disadvantage that some facility must be employed to allow for gradual submersion in the water bath, e.g., the use of a counter weight system which would limit production.

SUMMARY OF THE INVENTION

In accordance with the invention, material to be packaged is liquefied by heating and fed in a molten state to a flexible plastic container positioned in a rigid mold exposed to cooling means. In a preferred embodiment, there is provided a process for packaging normally solid or semi-solid material which comprises liquifying said material by heating; downwardly advancing a continuous, flexible plastic tube into a mold forming a support and heat transfer surface therefor, said plastic tube being closed at its bottom end; feeding a predetermined amount of said liquefied material to the plastic tube disposed within the mold; cooling the mold to initiate solidification of said liquefied material and to prevent rupture of the plastic tube; closing and sealing said plastic tube at a position above the level of the material to form a package of material within the mold; severing the filled sealed bag from the continuous plastic tube; sealing the bottom edge of said continuous plastic tube; releasing the filled package from the mold; and repeating the above steps.

The invention is applicable to the packaging of normally solid, or semi-solid materials that are capable of being rendered fluid by heating such as, for example, asphalt, paraffin wax, plastics, sulfur, etc. The invention is particularly applicable to the packaging of cold-setting liquids, such as asphalts, having mechanical characteristics that prevent handling and packing of the package at normal storage temperature without considerable deformation.

The packaging material used herein should be substantially impervious to the water or other cooling liquid employed and should not melt at the temperature at which the molten material is packaged. Preferably, the packaging material is one that may be incorporated in use with the material to be packaged without detriment thereto so that the complete package may be used without removal of its contents. In general, suitable materials are plastics, such as polyethylene, polypropylene, polyvinyl chloride, polystyrene, cellophane and the like. When asphalt is packaged, the preferred packaging material is polyethylene.

The flexible plastic containers may be in the form of bags which may be suitably manufactured from tubular plastic foils by dividing the latter into short sections and sealing these sections at one end by welding or clamping means. The bags may be suspended by suitable devices below filling connections for supplying the material to be packaged. The tubular foils or flexible plastic tubes may be formed in various ways. For example, plastics may be fed from rolls and welded together at their edges. Alternately, a single sheet may be used and its two edges welded together. Instead of welding strips of plastics to form the tubular foil, plastic material may be formed into a tubular shape by direct extrusion blowing. In this case, the molten material injection line can pass through the center of the extrusion profile and injection can be performed at a distance from the extru-

sion outlet where the mechanical characteristics of the tubular foil are sufficient for filling in the mold.

It is convenient to supply materials by pumping and thus, in general, the most suitable materials for packaging according to the method of the invention are those with a softening point above, for example, about 50° C. Any filling temperature which will not cause melting of the flexible container under the conditions of filling may be used, but, in order to limit the cooling period in the mold, it is desirable to keep the temperature as low as possible.

BRIEF DESCRIPTION OF THE DRAWING

The invention is illustrated by the accompanying drawing showing a diagrammatic view of an asphalt bagging operation.

DESCRIPTION OF A PREFERRED EMBODIMENT

Referring now more particularly to the drawing, molten asphalt which may be at a temperature, for example, of 225° F. is pumped through feed line **1** provided with quick closing valve **2** which operates in an open or closed position and which is actuated by air from line **3**. When valve **2** is in an open position, molten asphalt passes through line **4** and then into plastic tube **5** which is sealed at its bottom end and positioned within mold **9**, having trap door **10** and aperture **11**. Plastic tube **5** is conventionally formed (not shown) from plastic film (e.g., polyethylene of 6 mil thickness) and is cooled at a position above mold **9** by means of water spray **6** which is supplied with water via line **7**. Mold **9** is cooled by means of water supplied via line **12** to spray **13** which, when polyethylene is used as the packaging material, maintains mold **9** at a temperature within the range between about 60 and 150° F., e.g., 100° F. The mold may have movable sides which can be adjusted to form a bag of desired shape. Thus, mold **9** not only supports and cools the bag during filling but also shapes the filled container.

During the filling operation, air passes through line **14** into line **15** and then through aperture **11**. When the asphalt being supplied to plastic tube **5** reaches the level of aperture **11**, the passage of air therethrough is blocked by tube **5** so that the supply of air from line **14** is directed into lines **16** and **3** to thereby close valve **2** and into line **17** to thereby actuate control-timer **18** which signals means **8** to seal and cut plastic tube **5** at a position above the level of the asphalt after the closing of valve **2**. When the delivery of the asphalt ceases, the walls of plastic tube **5** are brought together, heat-sealed and cut by means **8** thereby packaging the asphalt within a thin plastic film. The filled bag is then permitted to drop through trap door **10** (shown open) into water filled trough **19** where additional heat is removed by water bath **20** prior to handling and storing of the filled packages **21**.

It will be understood that changes in detail may be resorted to without departing from the field and scope of the invention, and it is not intended to limit the invention to the exact details of structure and operation herein shown and described, as various modifications within the scope of the appended claims may occur to persons skilled in the art.

What is claimed is:

1. A process for packaging a liquefiable normally solid or semi-solid material on a continuous basis which includes the following steps:

(a) downwardly advancing a continuous plastic tube into a rigid mold having a wall closely conforming the wall of said tube, said tube being closed at its lower end to form a bag prior to entry into said mold;

(b) spraying a liquid cooling medium on the exterior wall of said mold;

(c) feeding a predetermined quantity of said material in liquefied form into said bag positioned within said mold;

(d) sealing said plastic tube above said material after said predetermined quantity thereof has entered said bag, thereby forming a filled closed container;

(e) severing said closed container from the continuous plastic tube above it;

(f) sealing the bottom of the severed plastic tube above the closed container, thereby forming a new bag;

(g) removing the severed closed container through the bottom of said mold;

(h) repeating steps (a) through (g).

2. The process of claim **1** including the step of cooling the plastic tube prior to its entry into the mold.

3. The process of claim **1** including the step of exposing the filled bag container removed from the mold to a bath of cooling fluid.

4. The process of claim **1** wherein said material is asphalt.

5. The process of claim **1** wherein said plastic is polyethylene.

6. The process of claim **1** which includes the step of conducting a stream of gas through an opening in an upper portion of the wall of the mold into the annulus between the wall of the tube and the wall of the mold, whereby completion of the filling of said bag can be signaled by a change in gas flow resulting from the closing of said annulus adjacent said wall opening.

7. The process of claim **6** which includes the step of utilizing said change in gas flow to actuate means for cutting off flow of liquefied material into said bag.

8. The process of claim **6** which includes the step of utilizing said gas flow change to actuate means for performing said sealing and severing steps.

9. An apparatus for packaging a liquefiable normally solid or semi-solid material in plastic film on a continuous basis which comprises, in combination:

(a) a support mold having a vertical side wall, an open top, and a supporting bottom movable between a closed position and an open position;

(b) means for downwardly advancing a continuous tube of plastic film into said mold in closely conforming relation with the side wall of said mold;

(c) means for introducing liquefied material within the portion of said tube positioned within said mold;

(d) means for spraying a cooling liquid on the exterior wall of said mold;

(e) means for sealing said tube in a region above material introduced into said tube within the said mold;

(f) means for severing said sealed portion of the tube from the continuous tube above it to thereby form a sealed package of material;

(g) means for sealing the bottom edge of the remaining continuous tube;

(h) means for moving said supporting bottom to the open position whereby to remove said sealed package.

10. An apparatus as defined by claim **9** including means for spraying cooling liquid on the exterior of said tube of plastic film above said mold.

11. An apparatus as defined by claim **9** including means for introducing a stream of gas through an upper portion of a vertical wall of the mold.

12. An apparatus as defined by claim **11** including means for detecting when the flow of said stream of gas into said mold has changed as a result of closing of the annulus between said wall and said tube of plastic film.

13. An apparatus as defined by claim **12** including means, associated with said detecting means, for actuating said severing means and said sealing means.

14. An apparatus as defined by claim **9** including means for introducing a stream of gas through an upper portion of a vertical wall of said mold into the annulus between said wall and the plastic tube positioned in said molds, and means, actuated by change in gas flow into said annulus, for cutting off flow of liquefied material into said plastic tube, whereby the closing of said annulus by the filling of

the tube with liquefied material to a predetermined level within the mold will automatically regulate the quantity of material fed into the package.

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U.S. Cl. X.R.

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