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DISPENSING PUMP APPARATUS

2 Sheets-Sheet 1



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DISPENSING PUMP APPARATUS

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2 Sheets-Sheet 2

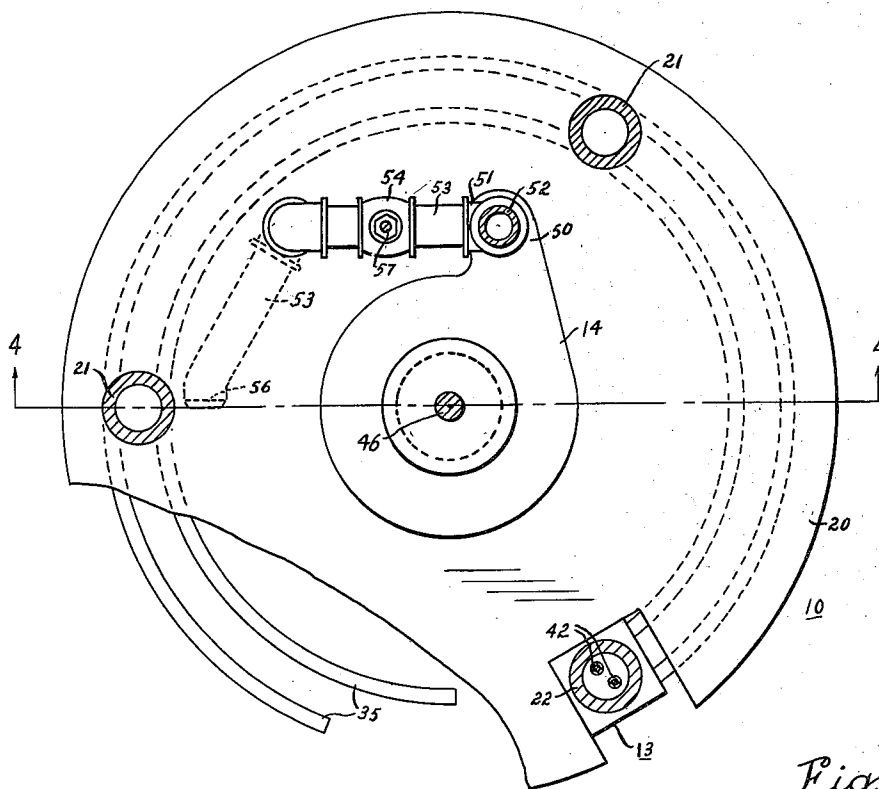


Fig. 3

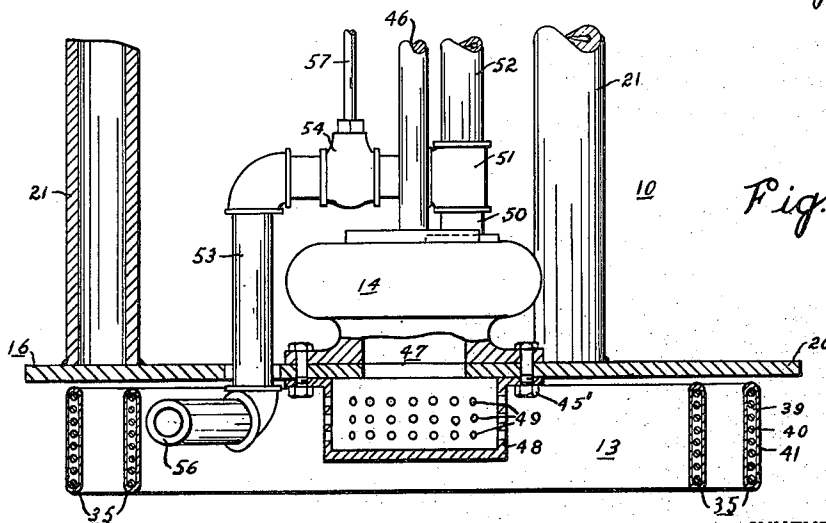


Fig. 4

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DISPENSING PUMP APPARATUS

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My invention relates to a device for removing low melting solid mass from containers.

It is an object of my invention to provide means for melting the low melting solid mass and means for pumping the molten mass from the container.

Another object of my invention is the provision of an electrical heating element which floats on the low melting solid mass for melting the mass and also the provision of a pumping means for removing the molten mass from the container as it is melted by the electrical heating element.

My invention has for another object the provision of a mechanism which when floated on a low melting solid mass melts its way downwardly into the solid mass and also pumps the molten mass in the region of the heating element from the container.

Another object of my invention is the provision of a mechanism for melting a low melting solid mass and for circulating a portion of the molten mass about the heating element, and then removing the molten mass from the container.

Still a further object of my invention is the provision of a mechanism for removing low melting solid mass from a container in predetermined quantities by melting the portion of the mass to be removed and pumping the molten mass from the container without melting the entire solid mass.

Other objects and a fuller understanding of my invention may be had by referring to the following description and claims, taken in conjunction with the accompanying drawing, in which:

Figure 1 is a front elevational view of my invention showing my pumping mechanism in actual use;

Figure 2 is an enlarged view of my invention taken along the lines 2—2 of Figure 1;

Figure 3 is a still further enlarged view of my invention taken along the line 3—3 of Figure 1; and

Figure 4 is a side view of my invention, parts being shown in section, as taken along the line 4—4 of Figure 3.

It is one of the purposes of my invention to provide a fast, efficient and easy method of removing a solid mass having low melting temperature from its container. Attempts have been made to melt all the solid mass in the container and thus convert it to molten mass before pumping any of it from the container. A low wattage heating element was used in melting the contents of the entire container to prevent changing the composition of the solid mass by overheating that portion of the mass next adjacent the heat-

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ing element, thus resulting in a slow melting rate, which renders the method impractical. In my invention I have materially raised the wattage output of the heating element to produce rapid melting of the solid material and have added means to recirculate a portion of the molten mass about the heating element to increase the rate of dissipating the heat therefrom. This recirculation of a portion of the molten mass about the heating element prevents changing the composition of any of the mass by over heating. The pumping means has its intake in the region of the heating element thus enabling me to remove the molten mass from the container as it is being melted by the heating element. I have materially reduced the time required to remove the low melting solid mass from its container by using the higher output heating element and recirculating a portion of the mass. Still another advantage of my invention is that it permits removal of small quantities of the solid mass from the container without disturbing the remainder of the mass in the container.

With reference to my drawings and in particular to Figure 1, the reference character 10 represents the entire pumping and heating mechanism or unit which removes the low melting solid mass 11 from the container 12. The unit or mechanism 10 includes an electrical heating unit 13, a centrifugal pump 14, an electric motor 15 and a frame support 16 which supports the other parts of the mechanism 10. The frame support 16 has a base plate 20 with support members 21 and a conduit 22 fastened by welding or other suitable means thereto and extending upwardly therefrom. The conduit 22 is a part of the electrical heating unit 13. Above the base plate 20 is bracing plate 24 which is fastened by welding or other suitable means between the supporting members 21 and the conduit 22. The bracing plate 24 is in a plane parallel to the plane of the base plate 20 and at a distance from the base plate approximately equal to the depth of the container 12 from which the solid mass 11 is being removed. The supporting member 23 which extends upwardly from the bracing plate 24 and substantially parallel to the other supporting members 21 is fastened by welding or other suitable means to the bracing plate 24 and in the region of the conduit 22. A top spacer plate 25 is fastened to the ends of the supporting members 21 and the supporting member 23. The top spacer plate 25 is in a plane substantially parallel to the plane of the bracing plate 24, and at a distance from the bracing plate 24 greater than the length of the electric motor

15. A motor mounting plate 27 is fastened by welding or other suitable means to the supporting members 21 and between the bracing plate 24 and the top spacer plate 25. The electric motor 15 is fastened by bolts 45 as shown in Figures 1 and 2 or by other suitable means to the motor mounting plate 27 with the longitudinal axis of the rotor vertical. The heater switch box mounting plate 28, which supports the heating element switch box 37 is fastened between one of the supporting members 21 and the supporting member 23 located between the bracing plate 24 and the spacer plate 25. It is noted that the heating element switch box 37 and other controls of my mechanism 10 are remote from the heating elements 35 and the centrifugal pump 14 a distance which will permit lowering the entire mechanism 10 to the bottom of the container 12.

The electrical heating unit 13 as carried by the frame support 16 has circular heating elements 35, and includes the heating element switch box 37, and the conduit 22. The heating elements 35 are fastened to the lower end of the conduit 22 by a heating element terminal head which may be welded or fastened by other suitable means on to the end of the conduit 22. This heater element terminal head has reference character 38. The heater elements may consist of resistor wires 40 wrapped in insulation 39 which are sealed in a metal housing 41. For purposes of clarity I have omitted sectioning of the insulation in the cross-sections of the heating elements 35 as shown in Figure 4. The metal housing 41 may be welded or otherwise fastened to the heater element terminal head 38 to support the heater elements 35 beneath the base plate 20 of my unit or mechanism 10. Thus, the heating elements 35 and the heater element terminal head 38 are entirely sealed to prevent possible damage to the resistor wires 40 and to the lead wires 42 by the molten mass 17. The only exposed portion of lead wires 42 is between the upper end of the conduit and the heating element switch box 37. The heating elements 35 extend perimetritically about the underneath side of the base plate 20.

The centrifugal pump 14 may be fastened by bolts 45' as shown in Figure 4 or by other suitable means to the base plate 20 of my unit or mechanism 10. The drive shaft 46 of the centrifugal pump extends upwardly from the pump through the bracing plate 24 and is connected to the rotor of the electric motor 15. The centrifugal pump 14 has an intake 47 through an opening in the base plate 20. The intake 47 of the centrifugal pump is located near the center of the heating elements 35. I have used an inlet cover plate 48 which may be fastened by the bolts 45' to the bottom side of the base plate 20 to prevent the solid mass 11 from entering the pump through the intake 47. This inlet cover plate 48 is substantially cup-shaped and has a plurality of holes 49 in the sides thereof. The holes 49 in the cover plate 48 will admit the molten mass 17 into the centrifugal pump 14 and exclude the solid mass from the pump.

I have installed a T 51 in the outlet 50 of the centrifugal pump 14 to divide the flow of the molten mass 17 therefrom. A discharge pipe 52 which extends upwardly through an opening in the bracing plate 24 of my housing mechanism 10 is fastened to one branch of the T 51. A recirculating pipe 53 which extends downwardly through an opening in the base plate 20 is fastened to the other outlet of the T 51. A valve 54

in the recirculating pipe 53 regulates the rate of flow of the molten mass from the recirculating pipe. The valve handle 55 is located above the bracing plate 24 and is fastened to the valve 54 by a valve stem 57 which extends through an opening in the bracing plate. A nozzle 56 on the end of the recirculating pipe and in the region of the heating elements 35, directs the flow of the molten mass 17 from the recirculating pipe 53 into the region of the heating elements 35. The recirculation of a portion of the molten mass 17 permits me to use the higher output heating elements 35 without damaging any of the solid mass by overheating. Although I have recirculated a portion of the molten mass 17 it is understood that other methods such as stirring may be used to circulate the molten mass in the region of the heater elements 35. The discharge pipe 52 after extending upwardly through an opening in the bracing plate 24 is turned and extends outwardly in a horizontal direction from the pumping mechanism 10. I have used a valve 60 in the discharge pipe 52 to regulate the flow therethrough. A hose 61 as shown in Figure 1 or other suitable tubing may be fastened to the end of the discharge pipe 52 to carry the molten mass from my unit or mechanism 10.

In operation I fasten wire ropes 64 as shown symbolically in Figure 1 to the top of my unit or mechanism 10. The wire ropes 64 extend over pulleys 65 and are fastened to a counter-balance 66 thus providing means for reducing the difficulties of handling of the unit or mechanism 10. These pulleys, also shown symbolically in Figure 1, may be fastened by suitable means above the mechanism 10 and the containers 12. The operator lowers the unit or mechanism 10 on to the surface of the low melting solid mass 11 in the container 12. He then closes the heating element switch 37 to energize the heating element 35 for melting the low melting solid mass 11. At the same time the electric motor 15 is turned on to operate the centrifugal pump 14. As the low melting solid mass 11 is melted it becomes a molten mass 17 which is drawn into the intake 47 of the centrifugal pump 14 and is discharged therefrom through the outlet 50. A portion of the molten mass discharged from the pump is recirculated back through the region of the heater elements 35 and the remainder is removed from the container through the discharge pipe 62. The valves in the discharge and the recirculating pipes regulate the rate of flow of molten mass through the pipes. This process of melting the low melting solid mass, recirculating a portion of the molten mass through the heating elements, and removing the molten mass from the container through the discharge pipe is a continuous process until the unit or mechanism 10 has worked its way downwardly through the low melting solid mass 11 to the bottom of the container 12. It is noted here that small quantities of the solid mass 11 may be removed from the container without preheating all of the mass in the container.

Although I have described my invention with a certain degree of particularity, it is understood that the present disclosure has been made only by way of example and that numerous changes in the details of construction and the combination and arrangement of parts may be resorted to without departing from the spirit and the scope of the invention as hereinafter claimed.

I claim as my invention;

1. A pumping mechanism for removing a low

melting solid mass from a container comprising an electrical heating element for raising the temperature of solid mass above its melting point thus changing the solid mass in the region of the heating element to a molten material, plate means for floatingly supporting the electrical heating element on the solid mass, guide means for holding the said plate means and the said electrical heating element in a substantially horizontal plane, pumping means having a first and a second outlet and being mounted on the said plate means for removing the molten material from the container, the said plate means and the said electrical heating element resting on the solid mass and melting their way downwardly in the mass and carrying the pumping means therewith, the said pumping means having valve means for regulating the rate of flow of the molten material from the said first and second outlets, the molten material from the said first outlet being recirculated into the region of the electrical heating element, and the molten material from the said second outlet being forced from the container.

2. A device for removing a low melting solid mass from a container, said device comprising, electrical heating means floatingly supported on the low melting solid mass for melting the low melting solid mass, and pumping means having an inlet in the region of the heating means for removing the molten portion of the low melting solid mass from the container as it is being melted by the electrical heating means and for forcibly circulating at least a part of the molten mass in the region of the heating means.

3. A device for removing a solid mass from a container, the said solid mass having low melting temperature, said device comprising, an electrical heating element floatingly supported on the solid mass for raising the temperature of the solid mass next adjacent the electrical heating element above the melting temperature thus forming a molten material, and pumping means having an inlet in the region of the heating element for removing the molten material from the container as it is being formed by the said electrical heating element and for forcibly circulating at least a part of the molten mass in the region of the heating element.

4. A pumping mechanism for removing a low melting solid mass from a container, said pumping mechanism comprising, a heating element for raising the temperature of the solid mass above its melting temperature, support means for supporting the heating element, pumping means mounted on the support means for removing the molten material from the container, the said support means and the said heating element resting on the solid mass and melting their way downwardly in the mass and carrying the pump

therewith, and means for recirculating a portion of the molten material from the pump and into the region of the heating element.

5. A device for removing a solid mass from a container comprising, support means having an upper end with hook means and having a lower end with plate means, an electrical heating element fastened beneath the said plate means for melting the solid mass, pumping means having an inlet and a first and a second outlet mounted on the plate means, valve means for regulating the flow of molten material through the first and the second outlet, the molten material from the said first outlet being recirculated into the region of the said heating element, the molten material from the said second outlet being forced from the container.

6. A device for removing a low melting solid mass from a container comprising, support means, electrical heating means fastened to the said support means for melting the solid mass, said support means supporting the heating element in the container pumping means having an inlet in the region of said heating means and having a first and a second outlet, said first outlet constituting means for forcibly recirculating a portion of the molten mass in the region of the heating means and the said second outlet constituting means for removing the molten mass from the container.

7. A device for removing low melting solid mass from a container, said device comprising, an electrical heating element adapted to be floatingly supported by said mass, said electrical heating element supplying heat for melting said solid mass thus forming molten mass in the region of said heating element, pump means for forcibly recirculating a portion of the said molten mass in the region of the said heating element thus distributing the heat from the said heating element and into the surrounding mass, said heating element thus melting its way into the said solid mass, said pump means removing said molten mass from the container as it is being melted.

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