Nov. 28, 1961 J. S. KAMBORIAN 3,011,042

APPARATUS FOR MELTING ADHESIVE

Filed Nov. 10, 1958 2 Sheets-Sheet 1

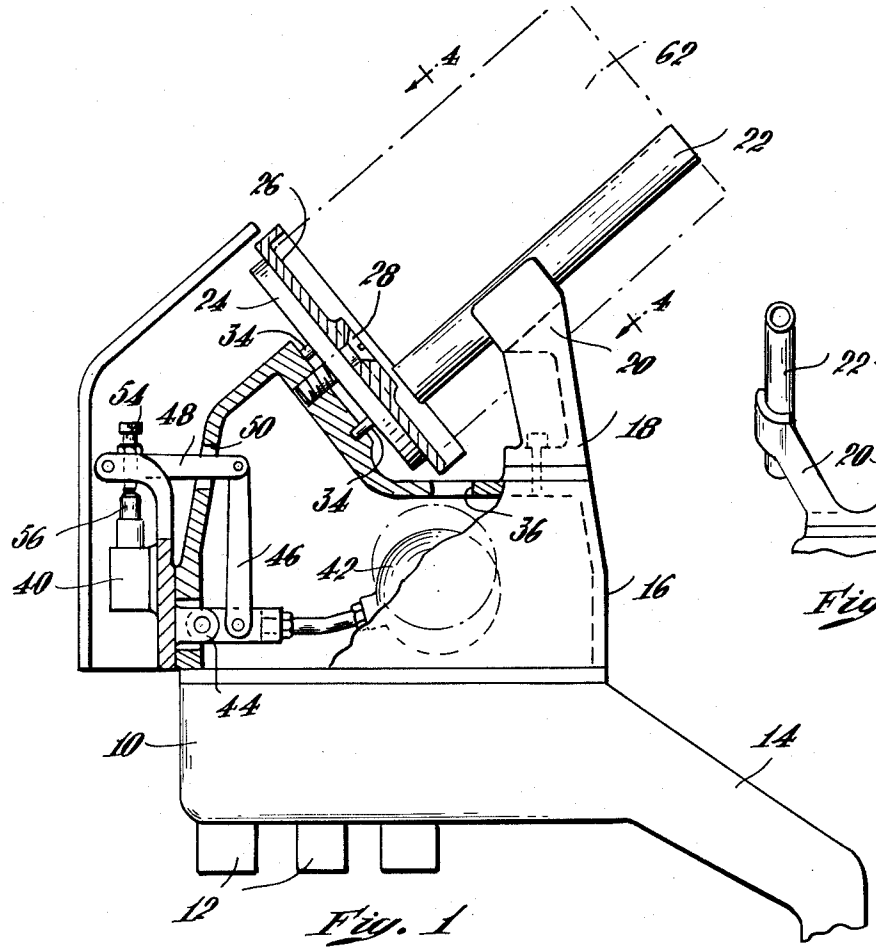


Fig. 1

Fig. 3

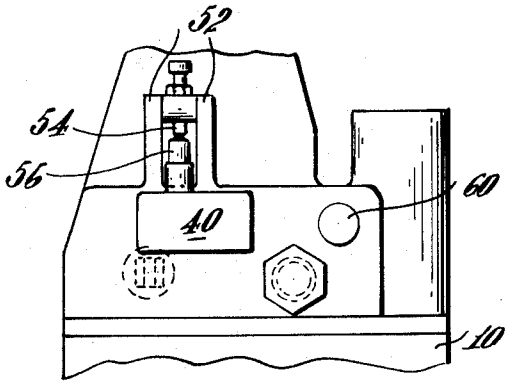


Fig. 2

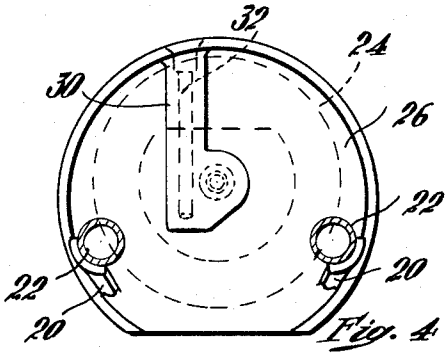


Fig. 4

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APPARATUS FOR MELTING ADHESIVE

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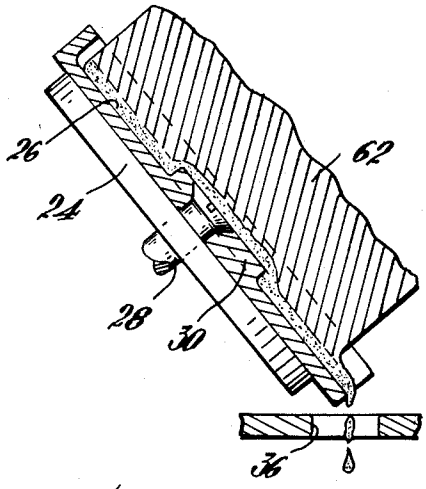


Fig. 5

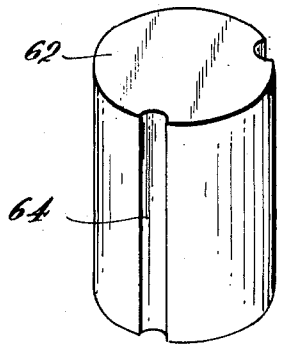


Fig. 6

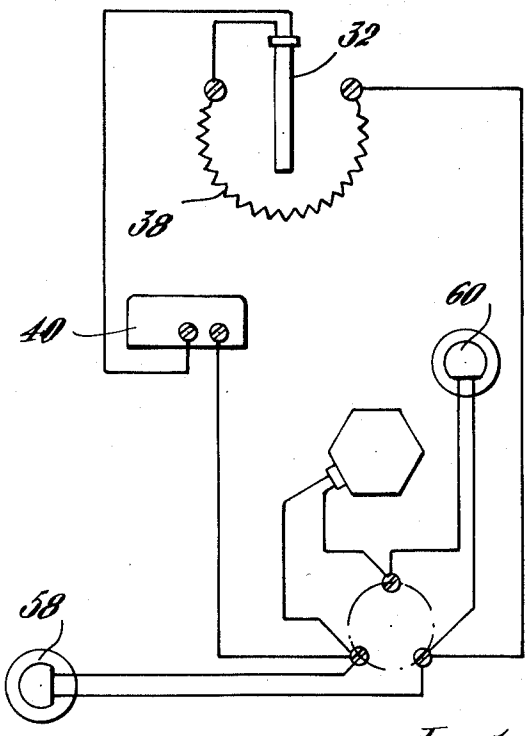


Fig. 7

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3,011,042

APPARATUS FOR MELTING ADHESIVE

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12 Claims. (Cl. 219—19)

This invention relates to apparatus for melting adhesive, more especially thermoplastic adhesive, and has for its principal objects to provide apparatus for melting adhesive, a little at a time, as the need for it is indicated, without softening the remainder of the adhesive and to effect the melting in such fashion that the fluid adhesive is protected to a great extent from exposure to the atmosphere prior to its use; to provide an apparatus in which after melting the fluid adhesive is stored within an enclosed heated chamber; to provide an apparatus which is so constructed as to make it difficult to introduce or use chunks of adhesive of a different kind except by melting in the manner intended; and to provide apparatus which is easy to keep clean.

As herein illustrated, the apparatus comprises means mounting a solid body of adhesive with its longitudinal axis inclined downwardly and with its lower end engaged with a downwardly inclined heating means so that the adhesive melted from the lower end of the body gravitates from the lower side of the heating means, accompanied by gravitation of the body of adhesive toward the heating means. Below the heating means, in the path of gravitation of the liquid adhesive, there is situated a hollow chamber containing an opening disposed in a position to permit the liquid adhesive to enter the chamber, the opening being small enough to prevent entrance of extraneous matter and/or solid pieces of adhesive. The mounting means for the adhesive is in the form of an inclined track arranged with its lower end adjacent, but spaced from the heating means, so that heat from the heating means is not transferred to the track. There is a switch for turning the heating means "on" and "off" and means in the hollow chamber operable by the level of the liquid therein to effect operation of the switch. A thermostat is arranged on the face of the heating element for contact with the lower end of the body of adhesive resting thereagainst to control the temperature of the heating element.

The invention will now be described in greater detail with reference to the accompanying drawings wherein:

FIG. 1 is a side elevation of the apparatus partly in section;

FIG. 2 is a fragmentary elevation as seen from the left side of FIG. 1;

FIG. 3 is a fragmentary elevation as seen from the right side of FIG. 1;

FIG. 4 is a section taken on the line 4—4 of FIG. 1;

FIG. 5 is a fragmentary elevation to much larger scale of the heating element partly in section, showing engagement of the adhesive therewith and the flow of adhesive from its lower side through the opening into the chamber;

FIG. 6 is an isometric view of a block of solid adhesive shaped especially to be used with this apparatus; and

FIG. 7 is a diagrammatic view of the wiring controlling operation of the heating element.

The apparatus shown herein is especially designed for use with shoe making machinery where adhesive is required as part of the shoe making operation, however, it is to be understood that it can be used wherever there is a need for thermoplastic adhesive without departing from the spirit of the invention.

Referring to the drawings (FIG. 1), the apparatus has a hollow base **10**, from the lower side of which projects a plurality of bosses **12** for supporting it in a level position on the apparatus with which it is to be used. Extending laterally from one side of the base **10** there is an inclined spout **14**, through which the liquid adhesive delivered to the base **10** is free to flow to a conductor and nozzle, or the like. A hollow chamber **16** rests on the base **10** and there are suitable check valves in the bottom of the chamber **16** which communicate with the hollow base **10** to permit adhesive to flow from the chamber **16** into the base **10** when the level of the fluid in the base **10** is lowered by use of adhesive, in the manner shown in pending application Serial No. 693,352, filed October 30, 1957 now Patent No. 2,868,420. The chamber **16** has bolted to its upper side a bracket **18** (FIG. 3), the upper part of which is forked to provide spaced diverging arms **20—20**, to the upper extremities of which are fastened hollow tubular elements **22—22** with their longitudinal axes inclined downwardly from right to left, as shown in FIG. 1. Preferably the tubes are aluminum or some non-conductive material. An imperforate heating element **24** is also mounted on the upper side of the chamber **16** at the lower ends of the tubes **22—22**, with the plane of its upper surface **26** inclined downwardly at right angles to the axes of the tubes **22—22** and spaced therefrom. As shown more clearly in FIG. 5, the heating element is secured to the top of the chamber by a screw **28** at its center. A raised boss **30**, on the upper surface of the heating element, provides a reinforcement for the head of the screw and has a portion extending laterally therefrom toward one side of the heating element, as shown in FIG. 4, which is bored to receive a thermostat **32**. Levelling pins **34** (FIG. 1), are disposed in recess in the top of the chamber which bear against the bottom side of the heating element to hold the latter spaced from the chamber so that there is no transfer of heat from the chamber to the heating element.

The lower side of the heating element is situated close to the top of the chamber (FIG. 1) and there is a small opening **36**, through the top of the chamber, through which adhesive gravitating from the lower side of the heating element may flow into the chamber **16**. The opening **36** is made small enough so as to discourage any one using the apparatus from trying to place broken chunks of adhesive directly into the chamber **16** without first melting and also to minimize entrance of extraneous matter and the like, without interfering with free flow of the liquid adhesive into the chamber.

The heating element includes a resistance coil **38** in its base, shown diagrammatically in FIG. 7, and current is supplied thereto by way of a switch **40** (FIG. 1), fastened to the rear side of the chamber **16** to turn the heating element "on" and "off," the position of the switch being controlled by a float **42** in the chamber **16** the level of which depends upon the amount of adhesive in the chamber. The float is pivotally supported on a bracket **44** and its movement is imparted to the switch by way of links **46** and **48**, the latter projecting from the chamber through an opening **50** and being pivotally connected at its outer end between spaced bracket arms **52—52**, as shown in FIG. 2, the latter being fastened to the outer wall of the chamber **16**. A pin **54** is threaded vertically through the lever **48**, to the left of its pivot, so as to bear upon the operating button **56** of the switch **40** and is vertically adjustable so that the switch can be set to operate at a predetermined level of liquid in the chamber **16**.

The thermostat **32** will, of course, maintain the heating element at a constant temperature and is disposed in the boss **30** so as to be in close contact with the liquid adhesive. The chamber **16** and the chamber **10** contain additional heating elements and thermostats to keep the liquid hot within these chambers, the latter being represented at **58** and **60** in FIG. 7.

In using this apparatus a block of adhesive in the form

of a cylinder 62 is supplied, as shown in FIG. 6, which has longitudinally of it a pair of spaced half-circular grooves 64-64, located so that when the block is placed on the upper side of the spaced parallel tubes 22—22 the grooves will engage the tubes and provide bearing surfaces for supporting the block in a downwardly inclined position as shown in FIG. 1, with its lower end resting against the imperforate upper surface 26 of the heating element. While all of the surface 26 is preferably imperforate, it is essential for the invention that only the portion of the surface 26 contacted by the lower end of the cylinder 62 be imperforate so that the melted adhesive will flow downwardly along said surface as described below. Preferably the blocks of the adhesive are cast so that their lengths are approximately the same length as the tubes 22—22. As thus positioned, when the heating element is energized by a call for adhesive determined by the level of the float 42 in the chamber 16, adhesive at the lower end of the block commences to melt, as shown in FIG. 5, and to flow downwardly along the surface of the heating element to the lower side and drip off through the opening 36 into the chamber 16. As the liquid adhesive flows downwardly into the chamber 16 the solid unmelted part of the block above gravitates downwardly on the supporting tubes 22—22, so that there is a constant progressive melting of the block from its lower end as long as the heating element is energized. As soon as the float indicates a sufficient amount of adhesive in the chamber 16 the heating element is shut off and melting terminates.

As can readily be seen by reference to FIG. 1, the block of adhesive is supported by the tubes 22—22, substantially, completely exposed to view, except for the end engaged with the heating element, thus it is always visibly apparent to the operator when the apparatus should be replenished by adding a new block of adhesive. Moreover, since the tubes 22—22 are of substantially the same length as the block, when a given block is partially used up, a new block may be placed on the supporting tubes in tandem relation to the partially used block in readiness for melting.

The use of apparatus of this kind for melting adhesive has a number of advantages, the principal ones of which are that the adhesive is melted only as fast as it is used up, only a small amount of adhesive is melted at any given time, and this is kept fairly well protected from exposure to the atmosphere so that there is not as much loss by reason of oxidation and that because only a small amount on adhesive is melted the bulk of it remains solid and is not exposed to deterioration. Other advantages are that the apparatus is self-feeding without requiring springs, pressure devices and other similar means for advancing it as it is melted or clamps for holding it in place, which devices are always the source of trouble, that the consumption of the adhesive is wholly visible to the operator so that the supply can be replenished by adding another block before the current block is completely used up, hence avoiding interruption in the supply available for use, and that it is difficult to contaminate the melted adhesive or dilute it with inferior adhesives.

It should be understood that the present disclosure is for the purpose of illustration only and that this invention includes all modifications and equivalents which fall within the scope of the appended claims.

I claim:

1. Apparatus for melting adhesive, comprising means mounting a solid body of adhesive with its longitudinal axis inclined downwardly and with its lower end engaged with an imperforate surface of a downwardly inclined heating means, so that as the adhesive melts from the lower end of the body the latter gravitates toward the heating means, and the liquid adhesive flows to the low side of the heating means and drips off, and a hollow container situated below the heating means, said container

being closed except for a small opening disposed to receive the drip of liquid adhesive.

2. Apparatus for melting adhesive, comprising means mounting a solid body of adhesive for downward movement along its axis, heating means situated at the lower end of said mounting means having an imperforate surface with which the body has contact, said heating means being inclined downwardly for continuously conducting adhesive melted from the lower end of the body, to permit the body to gravitate as it is melted toward the heating means, and a container closed except for a small opening subjacent the lower side of the heating means for receiving the liquid adhesive.

3. Apparatus for melting adhesive, comprising a pair of spaced parallel rods inclined downwardly for supporting between them a solid body of adhesive, heating means adjacent the lower ends of the rods, but spaced therefrom, for melting the end of the body of adhesive resting on the rods with its lower end bearing against the heating means, said heating means being downwardly inclined for continuously conducting liquid adhesive melted thereby laterally from between the body and the heating means to the lower side of the heating means, and a heated container closed except for a small opening situated subjacent the lower side of the heating means for receiving the adhesive.

4. Apparatus for melting adhesive, comprising means mounting a pair of spaced parallel, hollow tubes and a heating element with the lower end of the tube spaced from the heating element, said tubes and heating element being adapted collectively to support a solid body of adhesive in an inclined position with its lower end engaged with the heating element for melting of the adhesive next to the heating element, and continuous drip of the latter from the lower side of the heating element, said mounting means containing a chamber and a small port situated directly below the lower side of the heating element to receive the drip of the adhesive from the lower side of the heating element through which the liquid adhesive has access to the chamber.

5. Apparatus according to claim 1, wherein there is a switch for turning the heating element "on" and "off" and means in the container operable by the level of the liquid therein to effect operation of the switch.

6. Apparatus according to claim 1, wherein there is a switch for turning the heating element "on" and "off" and a float in the container operable by the level of the adhesive therein to effect operation of the switch.

7. Apparatus according to claim 1, wherein there is a thermostat situated in the face of the heating element for contact with the adhesive resting against the heating element for controlling the temperature of the heating element, a switch for turning the heating element "on" and "off," and a float in the container for effecting operation of the switch.

8. Apparatus for supplying adhesive to an applicator comprising a heated reservior for receiving melted adhesive in such quantity as to meet the demand during any one application, a nozzle connected to the reservoir to which adhesive is delivered and from which adhesive is delivered by application of pressure to the reservoir, means for supporting a solid stick of adhesive externally of the reservoir for melting of adhesive from an end thereof, a receptacle positioned to receive and store the melted adhesive and from which the melted adhesive may flow to the reservoir, said receptacle having an opening through which adhesive is adapted to flow as it is melted from the stick, and means for melting the adhesive from the stick at a rate controlled by the level of the adhesive in the receptacle.

9. Apparatus for supplying adhesive through a nozzle for application of work comprising a container having fill and discharge chambers, for holding a body of melted adhesive with sufficient quantity to meet the demand for any

one application, said fill chamber having an opening through which adhesive is supplied to the chamber, and other openings through which adhesive flows therefrom into the discharge chamber to keep the latter filled, a nozzle connected to the discharge chamber to which adhesive is adapted to be delivered by pressure applied to the adhesive in the discharge chamber, means for supporting a solid stick of adhesive for melting of adhesive from an end so that it flows into the opening in the fill chamber, and means for melting the adhesive from the end of the stick, said means being controlled by the level of the adhesive in the fill chamber.

10. Apparatus for supplying adhesive to an applicator comprising a hollow base for holding a body of melted adhesive in sufficient quantity to meet the demand for any one application, a nozzle connected to the base to which adhesive is adapted to be delivered from the base by the application of pressure to the adhesive in the base, a chamber connected to the base for storing melted adhesive, at least one passageway interconnecting the chamber and the base to allow adhesive to flow from the chamber to the base, heating means positioned above the chamber for progressively melting a stick of adhesive from its end with the melted adhesive flowing from the heating means to the chamber as it melts, and means controlled by the level of adhesive in the chamber for operating said heating means.

11. Apparatus for melting adhesive comprising a downwardly inclined, imperforate, substantially planar surface, means for heating said surface, and a pair of downwardly inclined rods adapted to support a solid body of adhesive therebetween with its end face bearing against said surface, said rods having axes substantially at right angles to said surface, whereby the adhesive as it is melted by said heating means gravitates freely toward said surface and the melted adhesive drips down said surface.

12. The apparatus of claim 11 wherein a container is positioned below the heating plate and the rods to receive the melted adhesive as it drips from said surface.

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