Oct. 5, 1971 S. J. KAMINSKY 3,610,114

MECHANISM FOR HEATING CONTAINER SEALING SURFACES

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Fig. 5.

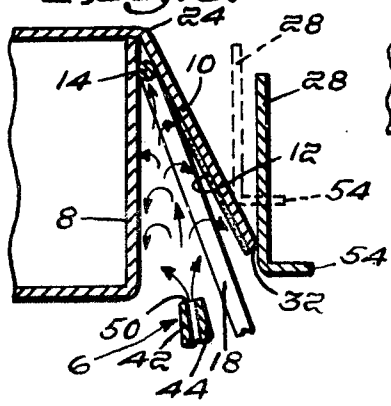


Fig. 1.

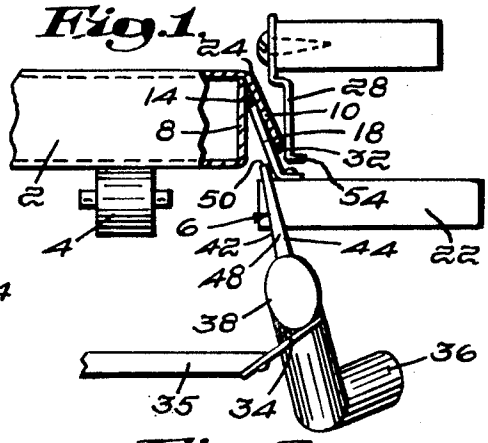


Fig. 2.

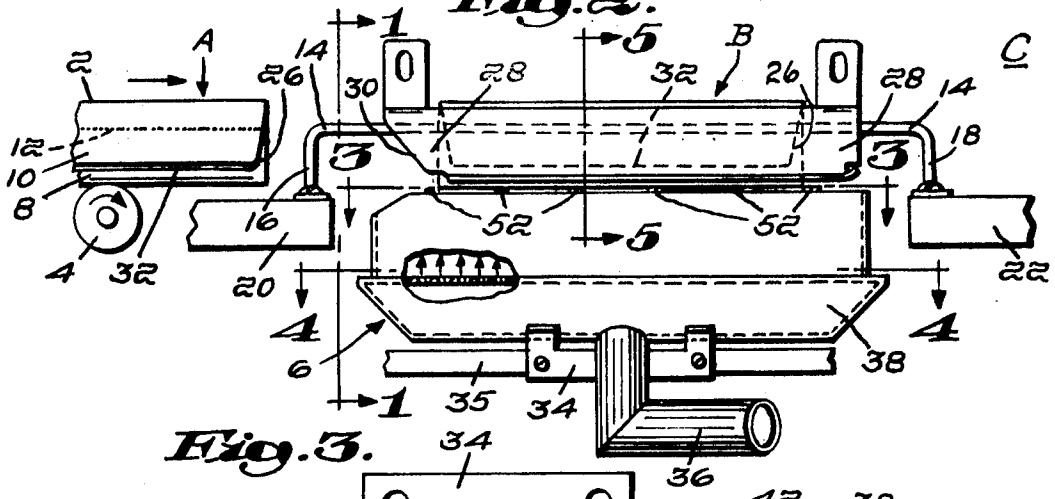


Fig. 3.

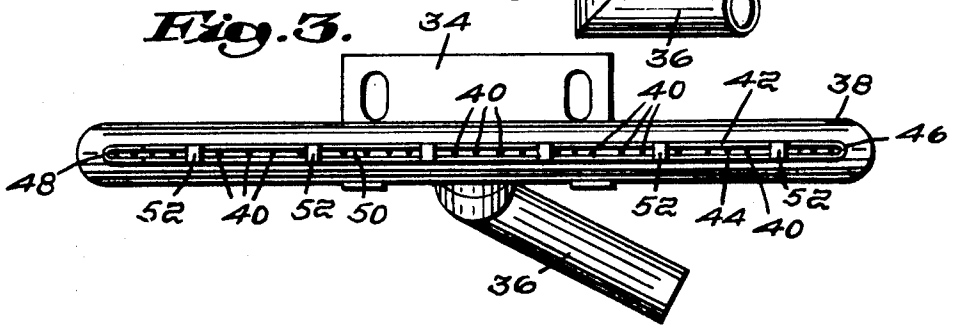
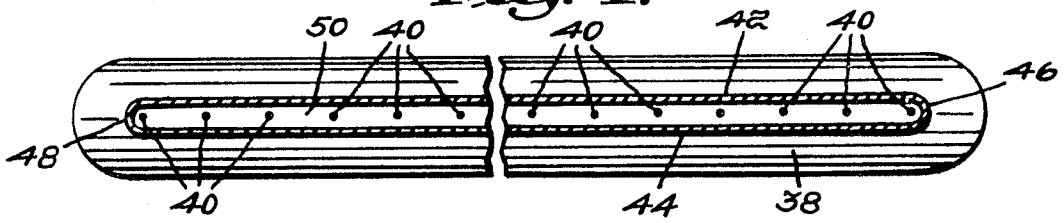


Fig. 4.



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MECHANISM FOR HEATING CONTAINER SEALING SURFACES

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U.S. Cl. 93—52 6 Claims

ABSTRACT OF THE DISCLOSURE

Means for holding a box or container flap whose inner side is coated with a sealing material activated by hot air at a predetermined angle while the box is advancing on a conveyor and simultaneously directing a flow of sufficiently hot air at the area covered with the sealing material just prior to applying sealing pressure against the flap.

BACKGROUND OF THE INVENTION

The art of automatically filling paper boxes or containers with merchandise and then closing and sealing the end flaps to create an airtight package is old and well understood in the packaging field. See, for example, the U.S. patent to Hittenberger et al. No. 3,340,777. It is at present customary to seal the end flaps together by coating the inner surface of the outer flap with a thin layer of thermopalstic or other equivalent material which when heated becomes tacky and capable of adhering to the surface against which it may be pressed.

SUMMARY OF THE INVENTION

The invention disclosed and claimed is for a simplified inexpensive means for holding a thermoplastic coated end flap of a moving box at a suitable angle to the adjacent flap or other box portion to which the flap is to be sealed and, while the advancing lid is being held at this angle, directing by means of a specially designed and located nozzle, a sufficient continuous volume of very hot air to the entire thermoplastic covered flap surface. The flap is held at the desired angularity by the cooperating action of a longitudinally extending rod positioned under the flap and close to the flap hinge and a flap control bar that is parallel to the rod and engages the flap along or near its free edge with enough pressure to hold the flap against the rod. Preferably, both the rod and control bar are longer than the flap so that a uniform flap position prevails as the box passes the hot air nozzle.

The position and diameter of the rod and location of the control bar are such that as the box passes thereby a flap angle generally in the order of 30° to the box end will be maintained. While the angle is not critical, it should be small enough to minimize heat dissipation but still large enough to permit easy entrance and circulation of the hot air to all surfaces that must be heated.

The hot air nozzle is of novel construction and is located outside of the V-space formed by the flap. By having the nozzle of a length substantially coextensive with the rod and control bar, the nozzle will be able to direct the hot air to the flap interior surface in a manner to produce a uniformly softened tacky condition in the thermoplastic or equivalent film so that when the sealing pressure is immediately thereafter applied to the flap, ideal sealing conditions will be present.

Means for applying sealing pressure to the heated flap of a moving box is old and is not therefore illustrated herein. Suffice it to say that the pressure must be applied promptly after the box has left the hot air applying position while the thermoplastic film is still in hot sealing condition.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a vertical section taken on the line 1—1 of FIG. 2.

FIG. 2 is a side elevational view.

FIG. 3 is a plan view of the nozzle taken on the line 3—3 of FIG. 2.

FIG. 4 is an enlarged view of the nozzle taken on the line 4—4 of FIG. 2.

FIG. 5 is an enlarged vertical section taken on the line 5—5 of FIG. 2 showing the flap, rod, control bar and nozzle.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

FIGS. 1 and 2 show the general arrangement of the rod, control bar and nozzle all located in fixed relation to each other and at a fixed station in a box conveying and sealing machine.

The container **2**, first shown at position A in FIG. 2 and moving preferably continuously on a conventional conveyor as suggested by the supporting roller **4**, passes through position B where there is a hot air supplying nozzle generally referred to at **6**, enroute to an immediately subsequent position C. At position C, pressure will be applied by conventional means to cause the inner flap **8** to be sealed to outer flap **10**.

The inner face of flap **10** has previously been coated with a film of thermoplastic sealing material **12** as shown in FIG. 5 and indicated by the dotted line **12** on the flap **10** of the advancing box **2** at position A.

As the box **2** moves to the right from position A in FIG. 2 to position B, the partially open flap **10** is moved to straddle the rod **14**. Rod **14** is mounted on down turned ends **16** and **18** which are secured to convenient supports **20** and **22**. The diameter of rod **14** is such that when located as shown well up in the V formed by outer flap **10** and inner flap **8**, it will hold flap **10** outwardly at an angle which may be in the order of 30° more or less. This angle as previously mentioned is not critical. Rod **14** is located fairly close to the flap hinge **24** and is above the upper edge of the thermoplastic film **12** which is best illustrated in FIG. 5.

As the box moves from position A to position B, the leading edge **26** of flap **10** is compelled to assume a position behind a control bar **28** as shown in FIGS. 1, 2 and 5. The sloping edge **30** of bar **28** will direct flap **10** to this position from its somewhat wider angled condition at station A.

The lower edge **32** of flap **10** as it enters position B makes line contact with control bar **28**. The position of the bar **28** in relation to the dimensions of the flap and position and diameter of rod **14** results in holding the flap **10** throughout its movement through position B firmly against both rod **14** and control bar **28**.

Preferably the pressure against edge **32** will be enough to arch flap **10** slightly without causing binding on rod **14**. As can be plainly seen in FIG. 5, rod **14** acts as a terminal barrier to prevent passage of hot air therebeyond.

The hot air supply operates as follows. The nozzle **6** mounted by bracket **34** on support **35** comprises an air supply pipe **36** connected with any suitable source of pressurized high temperature air which will be in the order of 900° F. Pipe **36** leads into a manifold **38** which along its top has a row of holes **40** designed to insure that the hot air leaves the manifold substantially uniformly over its length.

The holes **40** are encompassed by two closely spaced walls **42** and **44** connected at their ends at **46** and **48**. The walls terminate at parallel upper edges to form

a long narrow slot **50** through which the hot air is ejected.

The walls may be held at their upper edges in correct spaced condition by a number of small spacers indicated at **52** in FIGS. 2 and 3.

The effect of the nozzle construction just described is to cause the emission of a sheet of high velocity hot air from slot **50**. This slot as shown in FIGS. 1, 2 and 5 is aimed straight into the V space within flap **10**. The hot air blast becomes of a turbulent nature within the V and flows over all of the flap surface enroute to the adjacent atmosphere below and at the flap ends. The average time of exposure of the flaps to the hot air as the box moves into, through and beyond station B is sufficient to bring the thermoplastic material **12** to proper temperature for positive sealing when flap **10** is pressed against flap **8** or other end element at position C immediately after leaving the end of rod **14**.

It has been found generally advantageous to have the nozzle slot **50** outside of the confines of the V space between the flaps **10** and **8** in that a more uniform temperature is thereby applied to the flaps. Also, the position of the flaps as determined by rod **14** and bar **28** helps to control the final thermoplastic temperature. Obviously, the angle between the flaps may be varied by changing the diameter of rod **14** and the position of contact of flap edge **32** with control bar **28**.

As shown in dotted lines in FIG. 5, the lower edge **54** of control bar **28** might be above the lower edge **32** of flap **10** so as to engage the outer surface of flap **10** near its lower edge. This modification, however, would not affect the desired position of flap **10** during its passage through station B.

While the box is shown as moving in a horizontal direction, it will be understood that it may move in any direction in space so long as the relationship of the several elements is maintained.

In the light of the above explanation of the invention, other modifications within the scope of the claims will readily suggest themselves to those skilled in the art.

I claim:

1. Means for maintaining a box flap at a desired angularity as the box moves past a fixed station and means for continuously directing hot air into the moving V-space between said flap and the end of said box, said means comprising a rod parallel to the line of travel of said box and supported by at least one leg extending at an angle intermediate the said flap and the end of said box, said rod so located that when said box and flap pass therealong said rod will be within said V and parallel to and close to the hinge of said flap, and a control bar having a flap engaging edge generally parallel to said rod and positioned to slidingly engage the said flap at or near its free edge thereby to cause the interior of said flap and the box end to engage opposite sides of said rod, and a fixed hot air nozzle aimed to direct a continuous stream of hot air into the said V as said box moves thereby, said rod, control bar and nozzle being in alignment whereby said rod and control bar will together compel maintenance of a predetermined angularity of said flap while said hot air is being directed into the said V as the box moves past said nozzle.

2. The means set forth in claim **1** in which said nozzle is located beyond the confines of said V-space.

3. The means set forth in claim **1** in which said nozzle has its exit end in the form of a long narrow slot for emitting hot air in the form of a sheet.

4. The means set forth in claim **3** in which said slot is at least as long as said flap whereby at one point in the passage of said box past said fixed station, hot air will be directed into the full length of said V.

5. In a machine for conveying and sealing a succession of containers having flaps coated with sealing material activated by hot air, means located at a fixed station at which heat is applied to said unsealed flaps while the containers are moving thereby, said means comprising a fixed nozzle associated with a source of pressurized hot air, a fixed rod lying parallel and close to the hinge of the flap of the moving container and within the V-space formed by said unsealed flap and a box end, a control bar located to engage the unsealed flap near its free edge to hold said flap against said rod thereby to form a V-shaped space between said flap and the end of said container of constant angularity, said nozzle aimed into said V-shaped space to direct hot air flow toward said rod, said rod acting as means for limiting hot air flow within said V-shaped space toward said flap hinge.

6. The means set forth in claim **5**, said nozzle being long and narrow and able to direct hot air into the entire length of said V-space for a limited time as said container traverses said fixed station.

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53—375; 93—36 MM