A vacuum sealer is disclosed which makes use of a flexible flap (24.2) secured along one of its edges to a base plate (12.2). The base plate (12.2) on which the bag (B) to be evacuated and sealed is placed has a vacuum port (16.2) in it so that air can be sucked out from between the base plate (12.2) and flap (24.2). A groove (36.2) is provided in the base plate (12.2). This assists in keeping the bag mouth from being sucked shut before evacuation is complete. An anvil (26.2) and a sealer bar (14.2) form a weld across the bag adjacent its open mouth after evacuation.
VACUUM SEALER FOR A BAG

BACKGROUND TO THE INVENTION

[0001] It is common practice to pack perishable goods in an evacuated bag of synthetic plastics material. There are two widely used procedures for evacuating and then sealing a bag. In the first procedure the packed but open bag is placed in a chamber with its open mouth lying on an anvil. The lid of the chamber is closed and this brings a heatable sealer bar into close proximity with the upper face of the bag. The chamber is evacuated and hence the bag flattens. Once the pressure in the chamber has fallen to a pre-set pressure, the sealer bar moves down towards the anvil. The bag is gripped between the anvil and the sealer bar and then current is supplied to a wire running along the sealer bar to weld the two walls of the bag together along a line adjacent the bag’s mouth. The sealer bar moves away from the bag and anvil, the pressure in the chamber is allowed to rise to atmospheric and the lid is opened so that the evacuated and sealed bag can be removed from the chamber.

[0002] This procedure is initiated by pressing a start button once the lid is closed and the procedure which follows is fully automatic.

[0003] A disadvantage of this type of vacuum sealer is that the entire volume of the chamber must be evacuated regardless of the volume of the bag.

[0004] The second common method employs a vacuum sealer which has an anvil of resilient material and a sealer bar which can be lowered to grip the mouth region of the bag between itself and the anvil. A vacuum pipe passes between the anvil and sealer bar and enters the bag. Pneumatic cylinders press the sealer bar against the anvil and the sealer bar itself presses the part of the pipe which is between the anvil and sealer bar into the resilient material of the anvil. The air in the bag is sucked out through the pipe. Thereafter the pipe is withdrawn from the bag and from between the anvil and the sealer bar. The space left by the pipe as it withdraws is immediately closed-up by the material of the anvil which expands resiliently to fill the space and maintain the mouth of the bag sealed.

[0005] Power is then applied to the resistance wire of the sealer bar to weld the two faces of the bag together and form the seal which closes the bag.

[0006] Unless care is taken to place the inlet end of the pipe close to the product being packed, the bag can be sucked onto the pipe inlet end. Once the pipe inlet end is obstructed the time taken to evacuate the bag increases and a poor vacuum is obtained, there usually being residual air left in the bag.

[0007] In another form an internally ribbed bag is used, the ribbing being intended to provide a series of channels which prevent the bag being sucked closed thereby inhibiting withdrawal of air from the bag. Such bags are expensive and the vacuum sealers that they operate with cannot be used on inexpensive bags comprising two juxtaposed films.

[0008] The present invention seeks to provide a vacuum sealer which does not have the disadvantages set out above.

BRIEF DESCRIPTION OF THE INVENTION

[0009] According to one aspect of the present invention there is provided a vacuum sealer which comprises a base plate onto which a bag of synthetic plastics material to be evacuated and sealed can be placed, a flexible flap which can be displaced from a position in which it lies on the base plate and a lifted position in which it is clear of the base plate, a heating element for forming a seal to close the bag, and a port through which a vacuum pump can be connected to the space between the base plate and the lowered flap.

[0010] According to a further aspect of the present invention there is provided a vacuum sealer which comprises a base plate onto which a bag to be evacuated and sealed can be placed, a port in said base plate for connection to a source of suction so that air can be drawn from above the base plate through said port, a flexible flap having a raised position in which it is clear of the base plate and a lowered position in which it lies on the base plate to confine a bag receiving space between itself and the base plate, elongate sealing means between the flap and the base plate for forming an elongate weld line across an evacuated bag to seal its mouth closed, and a groove in said base plate running transversely of said elongate means, said groove being in communication with said vacuum port. The base plate can have one or more grooves in it into which the lower film of a bag being evacuated is sucked thereby to leave one or more channels between said lower film and an upper film of the bag.

[0011] A separator in the form of a plate which is fixed along one edge can be provided, the separator being spaced from and overlying the base plate whereby a bag can be positioned with one film of the bag above the separator and below the flap, and the other film of the bag between the separator and the base plate and overlying the groove.

[0012] Said sealing means is preferably an anvil carried on the underside of said flap and an electrically conductive wire carried by said base.

[0013] In a specified form said wire is carried by a sealer bar which is reeled off a roll of said base plate, said roll being secured to a diaphragm which divides a chamber into two compartments, an upper compartment communicating with said groove through said slot and a lower compartment being connectable selectively to a source of vacuum or atmosphere.

[0014] In a preferred form the flap is fixed along one edge and has a stiffening frame along its other edges.

BRIEF DESCRIPTION OF THE DRAWINGS

[0015] For a better understanding of the present invention, and to show how the same may be carried into effect, reference will now be made, by way of example, to the accompanying drawings in which:

[0016] FIG. 1 is a diagrammatic top plan view of a vacuum sealer;

[0017] FIG. 2 is a side elevation of the vacuum sealer of FIG. 1

[0018] FIG. 3 is a cross section showing a detail of a modified form of a sealing structure;

[0019] FIG. 4 is a diagrammatic section taken at right angles to the section of FIG. 3;

[0020] FIG. 5 illustrates the way in which a bag and a groove co-operate;
FIG. 6 is a section similar to that of FIG. 2 and showing a further form of vacuum sealer;

FIG. 7 is a section illustrating a further form of vacuum sealer;

FIG. 8 is a diagrammatic section illustrating another form of vacuum sealer;

FIG. 9 is a diagrammatic top plan view of the base plate and separator of the sealer of FIG. 8;

FIGS. 10 and 11 show two ways in which the vacuum sealer of FIGS. 8 and 9 can be used; and

FIG. 12 shows a modified form of separator.

DETAILED DESCRIPTION OF THE DRAWINGS

The vacuum sealer 10 illustrated in FIGS. 1 and 2 comprises a base plate 12 which is rectangular in plan view and has a sealer bar 14 mounted on the top surface thereof. A port 16 is provided in the base plate 12, the port being connected to a vacuum pump (not shown) by a vacuum pipe (not shown). The power supply leads to the heating wire 18 of the sealer bar 14 pass through the base plate 12 from below and are diagrammatically shown at L.

Along the rear edge of the base plate 12 (the right hand edge in FIG. 2) there is a fastening strip 20 which is secured to the base plate by a row of fastening elements 22. One edge of a rectangular flexible flap 24 of, for example, Neoprene is secured by the strip 20 and studs 22 to the base plate 12.

The flap 24 is large enough to cover the entire area of the top surface of the base plate 12. An anvil 26 in the form of a "Teflon" strip is secured to the underside of the flap 24.

In use the flap 24 is lifted away from the base plate 12 to the position shown in dotted lines in FIG. 2 to enable a packed bag B to be placed on the base plate. The bag B is closed along three sides and has an open mouth at M. The bag is placed so that the sealer bar 14 runs across the bag B parallel to, and adjacent, the open mouth M.

The flap 24 is then pulled back to a position in which it overlies the base plate 12 and the bag B lying on it. Because the flap 24 is flexible it takes up a position in which it closely follows the contours of the bag and its contents and lies against the base plate around the bag. The mouth region of the bag is now trapped between the sealer bar 14 and strip 26.

The vacuum pump is then actuated and air is drawn out of the thin space between the top face of the base plate and the flap. Because the flap has been allowed to fall onto the base plate and the filled bag and takes up a closely conforming shape, the volume of air trapped between the flap and the base plate is small. Thus evacuation of what little air there is a quick procedure thereby speeding up the cycle time.

Once the bag has been evacuated the wire 18 has current supplied to heat it and form the seal. It will be understood that atmospheric pressure presses the strip 26 against the sealer bar and that the pneumatic cylinders conventionally used for this purpose are not required.

At the end of the pre-set period during which the wire 18 is supplied with current, the port 16 is opened to atmosphere to release the vacuum. The flap 24 can then be lifted to enable the evacuated and sealed bag to be removed and the next cycle started.

Experimental work has shown that it is possible in some circumstances for the mouth of the bag to be sucked closed at the beginning of air evacuation thereby trapping air in the bag and resulting in a poor vacuum. To avoid this a bar 28 can span across the base plate between the flap 24 and the base plate. The bar 30, in the upper position illustrated, prevents the flap pressing down on the mouth region of the bag and closing it prematurely. Just before the end of the evacuation portion of the sealing cycle the bar 28 moves to the lower position illustrated in dotted lines in FIG. 2 and the flap 24 is sucked down onto the bag.

In FIG. 2 the flap 24 is shown as deforming to a curving shape when it is in the lifted position (shown in dotted lines). This simple form can be used if the flap and base are relatively large compared with the dimensions of the bag. Even though the bag underneath the flap deforms it in the edges of the flap still fall flat on the base plate. However, if the bag is relatively large compared with the flap and base plate, then the distortions caused by the bag can reach the edge of the flap as ridges. The gap below the ridges prevent sealing taking place. To prevent this a frame 30 can be provided. This extends along the three sides of the flap 24 which are not connected to the strip 20. The part of the frame 30 which is parallel to the strip 20 is shown on the left hand side of FIG. 2.

In the sealing structure of FIGS. 3 and 4 the sealer bar 14 is secured to one side of a diaphragm 32. The diaphragm 32 divides a chamber 34 into two compartments 35.1 and 35.2. The compartment 35.1 communicates with the space under the flap 24 and the compartment 35.2 is connected to the suction side of the pump. The heating wire 18 runs along the bar 14. The shape of the diaphragm is such that it adopts the illustrated position in which the sealer bar 14 is lowered when the pressures in the compartments 35.1, 35.2 are the same.

The base plate 12 is formed with at least one groove 36 which extends the full width of the base plate from the port 16 to a position close to that edge of the base plate which is remote from strip 20. There can be a number of parallel grooves 36.

In FIGS. 1 and 2 the anvil 26 is on the underside of the flap 24. In FIGS. 3 and 4 the anvil 26.1 in the form of a strip is mounted on two columns 38 (see FIG. 4), the columns 38 being in sockets 40 of the base plate. Springs 42 push the columns 38 and anvil 26 upwardly.

The base plate 12 has a thicker edge zone which provides a raised platform 44. The bar 14 is in a slot 46 which opens through the top surface of the platform 44. The compartment 35.1 communicates with the groove through the slot 46.

When the vacuum cycle starts, both compartments 34.1 and 34.2 are evacuated. The diaphragm 32 holds the sealer bar 14 in the retracted position shown. At the end of the evacuation cycle the compartment 34.2 is connected to atmosphere so that the sealer bar 14 is pushed up against the
underside of the bag. Sealing then takes place by feeding current to the wire 18 to heat it. The vacuum under the flap 24 is then released.

[0042] If reference is made to FIG. 5 this diagrammatically illustrates the groove 36, a film F1 constituting the lower wall of the bag, and a film F2 constituting the upper wall of the bag. Experimental work has shown that the lower film F1 is sucked into the groove 36 as diagrammatically illustrated. The film F1 stretches somewhat and shifts somewhat with respect to film F2. Because the flap 24 presses on film F2, the film F2 has less freedom of movement than film F1. Hence it tends not to follow film F1 into the groove(s) and thus one or more channels C remain which run to the bottom of the bag. Thus the bag films F1 and F2 do not suck into such close proximity as to close-off the bag leaving air trapped inside.

[0043] To enable bags of greater volume to be handled, the part of the base plate which is to the right of the platform 44 can be in the form of a resiliently flexible sheet. A filled bag placed on it creates a depression in the sheet in which the bag lies. Thus only a part of the bag protrudes above the level of the flexible sheet, and this reduces the size of the hump that must be created in the flap 24 when it is lowered onto the bag.

[0044] Turning now to FIG. 6, the vacuum sealer illustrated comprises many features which are also found in the seaters of FIGS. 1 to 5. Where applicable the same reference numerals have been used with the addition of the suffix "0.1."

[0045] In this form there is a hinge 48 one leaf of which is mounted on the strip 20.1 and the other leaf of which is mounted on a plate 50. The sealing wire 18.1 is mounted on the underside of the plate 50.

[0046] The flap 24.1 in this form does not overlie the entire bag but only extends a short way beyond the free edge of the plate 50. The advantage of this form is that the contents of the bag can be seen, and collapse of the bag as it evacuates can be watched. The flap 24.1 extends the full width of the plate 12.1, or across sufficient of the width of the plate to cover the entire bag. If a visible bag is not a required feature then the flap 24.1 can extend over the whole area of the base plate.

[0047] The groove 26.1 ensures that a passageway into the bag is maintained open during evacuation there to ensure that the bag is totally evacuated. The sequence of operations is as described above in relation to FIGS. 1 and 2.

[0048] A gripping handle, shown diagrammatically at 52, can be provided for lifting the plate 50 and hence the flap 24.1.

[0049] As the flap 24.1 does not extend over the filled part of the bag, it does not require a frame around three of its edges.

[0050] The vacuum sealer of FIG. 7 differs from that of FIG. 6 in that the flap, designated 24.2, covers the entire area of the base plate, designated 12.2, and is carried by a rectangular frame 54. In this form the plate 50.2 is fixed to the strip 20.2 and not connected to it-by-a-hinge. The frame 12.2 is mounted so that it can pivot, as shown by the arrows A, to lift the flap 24.2 away from the base plate 12.2. The frame 54 can be fixed to the underside of a dome-like cover 56 which is provided purely for aesthetic purposes. It will be understood that only the space under the flap 24.2 is evacuated and not the space, under the cover 56. The frame 54 ensures that all three unattached edges of the flap 24.2 lie flat on the base plate 12.2.

[0051] In FIGS. 8 and 9 parts which are also found in earlier Figures have been designated with like reference numerals with the addition of the suffix "0.3."

[0052] In this form a separator 58 in the form of a thin plate having a castellated edge (FIG. 9) to provide fingers 60 is mounted on a strip 62 which is close to the strip 20.3. Once the flap 24.3 has been lifted, the separator 58 is inserted into the bag by sliding the bag to the left as shown in FIG. 8. This separates the bottom film F1 from the top film F2 and holds the mouth of the bag open. When vacuum is applied to the space under the flap 24.3 via the port 16.3, the film F1 is sucked into the groove 28.3.

[0053] As will be seen from FIG. 9, there are vacuum ports 62 in addition to the port 16.3. Vacuum applied via these ports sucks the lower film F2 against the base plate 12.3 and prevents inadvertent movement of the bag.

[0054] As shown in FIGS. 8 and 9, the separator 58 is intended to be inserted into the bag to separate the films F1 and F2. However, experimental work has shown that even if both films F1, F2 of the bag are inserted below the separator (see FIG. 11) satisfactory evacuation and sealing occurs.

[0055] The flap 24.3 in FIGS. 8 and 9 does not require a frame as it does not cover the filled part of the bag.

[0056] In the form of FIG. 12 there is a protrusion 64 running from front to rear on the separator 58. This protrusion 64 presses the film F2, or both films F1 and F2, into the groove 28.3. The dimensions of the protrusion 64 are insufficient to hold the films F1, F2 in face-to-face contact and close off the passageway leading into the bag.

1. A vacuum sealer which comprises a base plate onto which a bag of synthetic plastic material to be evacuated and sealed can be placed, a flexible flap which can be displaced between a lowered position in which it lies on the base plate and a lifted position in which it is clear of the base plate, a heating element for forming a seal to close the bag, and a port through which a source of suction can be connected to the space between the base plate and the lowered flap.

2. A vacuum sealer according to claim 1, wherein the base plate has one or more grooves in it into which the lower film of a bag being evacuated is sucked thereby to leave one or more channels between said lower film and an upper film of the bag.

3. A vacuum sealer which comprises a base plate onto which a bag to be evacuated and sealed can be placed, a port in said base plate for connection to a source of suction so that air can be drawn from above the base plate through said port, a flexible flap having a raised position in which it is clear of the base plate and a lowered position in which it lies on the base plate to confine a bag receiving space between itself and the base plate, elongate sealing means between the flap and the base plate for forming an elongate weld line across an evacuated bag to seal its mouth closed, and a groove in said base plate running transversely of said elongate means, said groove being in communication with said vacuum port.
4. A vacuum sealer as claimed in claim 3, and including a plurality spaced apart parallel grooves in said base plate.

5. A vacuum sealer as claimed in claim 3 or 4 and including a separator in the form of a plate which is fixed along one edge, the separator being spaced from and overlying the base plate whereby a bag can be positioned with one film of the bag above the separator and below the flap, and the other film of the bag between the separator and the base plate and overlying the groove.

6. A vacuum sealer as claimed in claim 3, wherein said sealing means comprises an anvil carried on the underside of said flap and an electrically conductive wire carried by said base.

7. A vacuum sealer as claimed in claim 6, wherein said wire is carried by a sealer bar which is in slot of said base plate, said bar being secured to a diaphragm which divides a chamber into two compartments, an upper compartment communicating with said groove through said slot and a lower compartment being connectable selectively to a source of vacuum or to atmosphere.

8. A vacuum sealer as claimed in claim 1, wherein the flap is fixed along one of its edges and has a stiffening frame along its other edges.

9. A vacuum sealer as claimed in claim 3, wherein the flap is fixed along one of its edges and has a stiffening frame along its other edges.

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