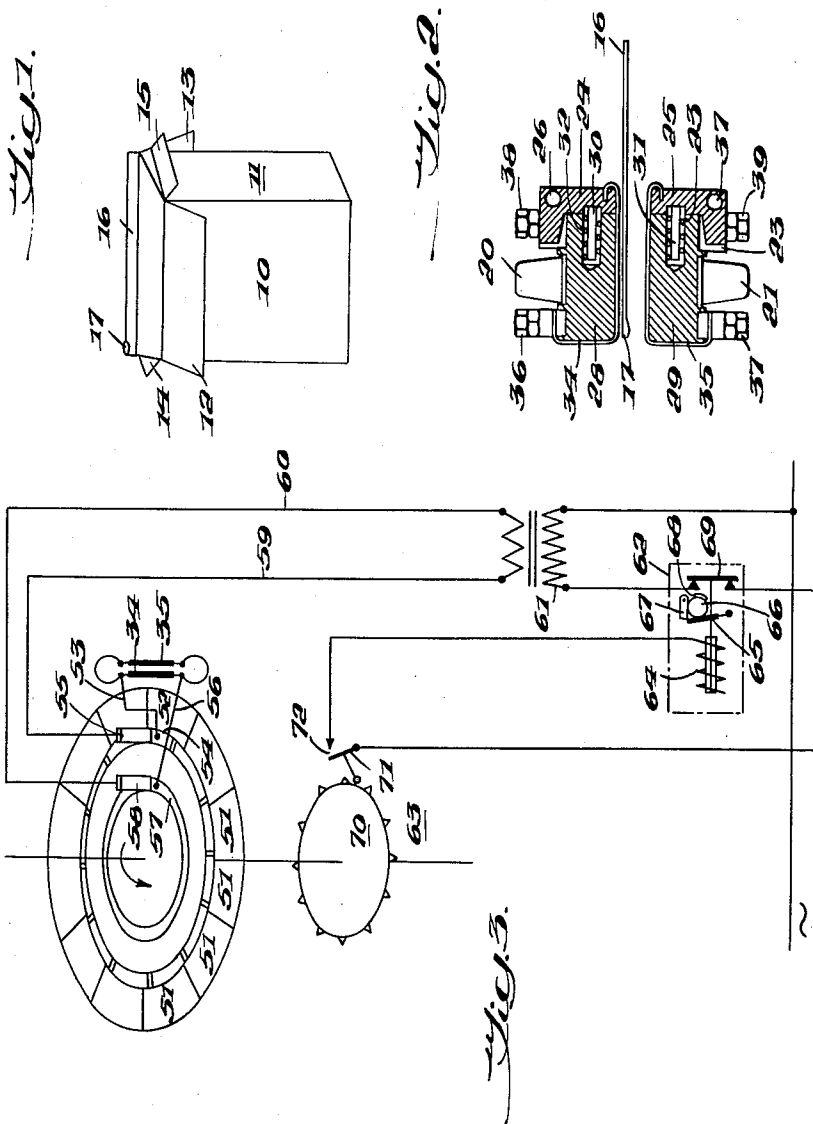


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ARRANGEMENT FOR ELECTRICAL HEAT SEALING OF
PACKAGES IN A SEALING MACHINE
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ARRANGEMENT FOR ELECTRICAL HEAT SEALING OF PACKAGES IN A SEALING MACHINE

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In the packing of different kinds of goods, especially food stuffs, vacuum packages have been used to an increasing extent, that is, packages of a plastic or similar flexible material which are evacuated and then sealed by heat sealing means. Heat sealing of packages has also been used in cases other than those where it has been found advantageous to evacuate the package, such as where the packed material is so finely divided that it may easily leak out, or when it contains liquid ingredients. Usually these packages are contained in an outer carton of cardboard or similar stiff material and an inner package of a soft plastic or similar material. It is the inner package that has been closed and sealed by heat sealing means which usually comprise electrically heated welding blocks which are pressed against the mouth of the inner package.

As the demand for high working capacity of the machines for heat sealing has increased, these machines have become larger and larger and the time for starting and stopping them has become longer and longer. During the starting and stopping time therefore, the machine will run with a speed which is lower than normal working speed and each operation of the machine will therefore take a longer time. With regard to the heat sealing, this means that the plastic material of the package is exposed to heat for a longer time than is normally necessary for proper sealing, and tests have been performed which prove that this causes leaky packages as the material tends to melt either fully or partially. In the more serious cases, the melting of the material of the inner package leaves a large hole. In less serious cases, the material which should be air tight becomes porous, so that the permanency of the package is also decreased, although there may not be any way of observing these imperfections.

The present invention relates to an arrangement which overcomes the disadvantages of the previous known arrangement.

In the method according to the invention, the heated part used for heat sealing is of such small heat capacity that the amount of heat given off is almost exclusively limited by the electrical energy fed thereto, and a time limiting means is connected into the electrical circuit so that the amount of energy supplied for each separate operation is limited.

Further details of the invention will be evident from the description in connection with the attached drawing, in which

FIGURE 1 shows a perspective view of a package which is intended to be heat sealed after evacuation by the method of the invention,

FIGURE 2 shows a cross-section of the heat sealing means, and

FIGURE 3 shows in schematic form a circuit diagram.

In a preferred embodiment of the invention, the package comprises an outer package of cardboard, rectangular in crosssection and having a broad side 10 and a narrow side 11. On each broad side a closing flap 12 and 13, respectively, is hinged, and on each narrow side a closing flap 14 and 15, respectively, is hinged. The lining has been closed at the bottom in the package of FIGURE 1, and the closing flaps have been bent inwards and glued together. At this time, the package has been provided

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with the material to be packed, and the closing flaps are folded outwardly at the top so they will not interfere with the handling of the package in the evacuation and sealing machine. Furthermore, the ridge formed at the top by closing of the lining has been heat sealed along the major part 16 of its length, leaving a small unsealed portion 17 at one end. It is intended that the package will be evacuated through this unsealed opening.

The package is then placed into a machine for evacuation and sealing of the remaining opening 17 by squeezing this opening between a pair of blocks which are momentarily fed with heat. These blocks have a rather small heat capacity, so that no uncontrollable amount of heat is accumulated on the preceding heating which might cause the package to be subjected to a greater amount of heat at those times when the machine is running slowly, although only a normal quantity of electrical energy is fed to the sealing blocks.

The means by which the sealing blocks are brought into contact with the mouth of the package do not form part of the present invention. They may be of any suitable kind and do not require further description.

FIGURE 2 shows a section view through the two welding blocks in separated position. The blocks are mounted on a pair of arms 20 and 21, one arm preferably being fixed and the other arm moved into contact with the mouth of the package by any suitable means. On the arms 20 and 21 are mounted a pair of supporting means 22 and 23, said means being partially hidden in the figure by parts placed in front of them. The support means 22 and 23 carry, by means of resilient hinges, a pair of first means 24 and 25. The hinges consist of hinge pins 26 and 27 loaded by means of a spiral or screw spring surrounding them, said springs acting to keep the parts 24 and 25 in the positions shown in the drawing. The parts 24 and 25, in turn, carry further parts 28 and 29 which are connected to the parts 24 and 25 by means of hinges shaped in a similar manner. These are shown in section in FIGURE 2. The hinge pins 30 and 31 are surrounded by springs 32 and 33 which act to keep the parts 28 and 29 in the position in the figure. The parts 24, 28 and 25, 29 are surrounded by a resistance element in the form of a tape, this resistance element being of small heat capacity but capable of generating a large capacity of momentary heat when fed with an electric current. The resistance tape is indicated by 34 and 35, respectively. At one end, each tape is connected to terminals 36 and 37, which are attached to the parts 28 and 29, and at the other end they are connected to the parts 24 and 25, and at this end an electrical conductor, not visible in the drawing, connects the tapes to terminals 38 and 39.

The electrical coupling device is shown in FIGURE 3 which also shows the essential parts of the machine in schematic form. This machine is in the form of a turntable having a number of pockets into which the packages are inserted. The pockets are then closed and sealed and evacuated, thereby removing the air from the inner package to the opening 17. When the package has been sufficiently evacuated the welding blocks are brought together and heated by an electric current so that the opening 17 is sealed.

The turntable is shown schematically at 50 in FIGURE 3. In the embodiment illustrated it is divided into twelve pockets, each of which is intended to handle one package. The pockets are indicated at 51.

The sealing means are schematically shown for only one of the pockets, that is pocket 52, where the above described resistance tapes are indicated by 34 and 35, respectively, as in FIGURE 2. The two resistance tapes 34 and 35 are connected in parallel to a commutator for distribution of the electrical current pulse at the right

moment. Thus, the conductor 53 runs to a commutator lamina 54 in contact with a brush 55, and the conductor 56 runs from the other end of the resistance tape to a commutator rail 57 in contact with a brush 58. The brushes 55 and 58 are connected to the secondary winding of a transformer 61 by means of conductors 59 and 60. The primary winding of the transformer is fed from an available power main of for instance 220 volts. The voltage transfer in the transformer should suitably be such that a secondary voltage of about 2 volts is created when the electrical resistance of the resistance tapes is about $\frac{1}{325}$ ohm. This will induce a current of 650 amps, or 1300 watts, which causes a sufficiently rapid heating of the resistance bands. The tapes, however, should be fed with current only for a time of approximately $\frac{1}{10}$ of a second, causing a total energy of about 15 watt-seconds which corresponds to the most advantageous heating of the opening 17.

If the turntable rotates at a rate of 500 turns a minute, then obviously the current supply to the resistance tapes would automatically be limited to this period of time because of the action of the commutator. However, during the periods when the turntable is stopped or started and consequently rotates at a much lower speed, the sealing joints would be subjected to a greater amount of heat and would either be porous or the material burned away leaving a hole. The packages which are damaged in this manner, and in many cases the contents of the packages, would thus be lost.

To avoid this difficulty a time limiting device 62 is connected in the primary circuit of the transformer 61. The time limiting device is controlled by a pulse contact generator 63 driven by the turntable.

Time limiting devices of this type are well known and should require no further description. However, it may be assumed that in its simplest form the arrangement consists of a magnet 64 which, when magnetized, attracts a stop 65 allowing a shaft 66 driven by a clock-work to start rotating. At the same time, a hook 67 is let down in front of stop 65 so that the stop cannot return to its normal position until the rotation of the shaft causes a pin 68 to displace the hook 67 out of the path of stop 65. The stop 65 is combined with a contact spring 69 which is connected into the primary circuit of the transformer 61 so that current is fed through the primary from the time the electromagnet is energized until the stop has been freed by the pin 68. Obviously, this time can be controlled with a high degree of accuracy, either by a setting of the rotational speed of the clock-work or by setting of the position of the pin 68 on the shaft.

The winding of the electromagnet 64 is connected into a circuit which also contains the pulse mechanism 63. This is combined with the turntable 50 so that a pulse

is obtained each time a heat sealing operation is to be started. The pulse mechanism has, in the drawing, been shown as consisting of a pulse disc having teeth 70 which are adapted to activate a level 71 and close the contact 72.

The operation of the arrangement is as follows. After a package has been introduced into the turntable in order to be evacuated, the turntable has rotated a sufficient distance for the evacuation to be completed, the package is then sealed. At this time the pulse contact 72 is closed, and the commutator 54 in cooperation with the brush 55 determines to which pocket this pulse is guided. The pulse, however, causes immediate starting of the time limiting mechanism 62, which, during a given time, will feed primary current to the transformer 61 by means of the contact 69. At the same time the transformer is feeding secondary current over the conductors 59 and 60 to the commutator 54—57 for distribution to the heat sealing means 34 and 35 of the selected pocket. These heat sealing means will therefore receive an amount of electrical energy which is dependent upon the voltage of the transformer, the resistance of the resistance tapes, and the time setting of the time limiting device 62. The amount of electrical energy delivered is therefore independent of the speed with which the turntable rotates.

What is claimed is:

1. Apparatus for heat sealing of packages comprising a turntable having a plurality of pockets each adapted to receive a package, means for rotating said turntable, a pair of opposed sealing means disposed within each of said pockets, means for bringing said sealing means into contact with the opening in a package disposed in said pocket, said sealing means including a resistance element adapted to be heated by an electric current, a source of electrical energy, commutator means for distributing electrical energy to said sealing means in a preselected one of said pockets, and means for limiting the amount of electrical energy delivered to each of said sealing means.

2. Apparatus according to claim 1 wherein said limiting means includes a transformer and a device for limiting the time during which electrical energy is fed through said transformer.

3. Apparatus according to claim 2 including means actuated by rotation of said turntable for controlling said time limiting device.

4. Apparatus according to claim 3 wherein said control means includes a toothed disc rotating on the same shaft as said turntable.

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