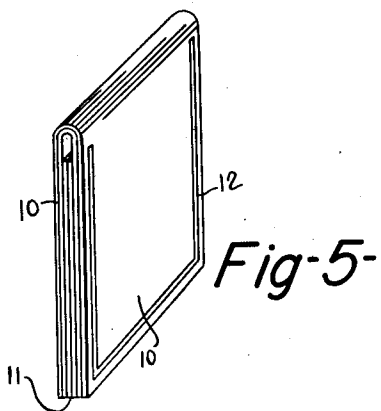
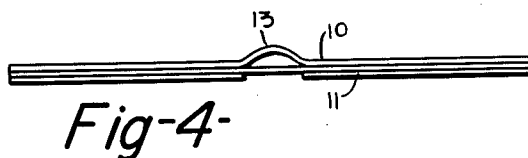
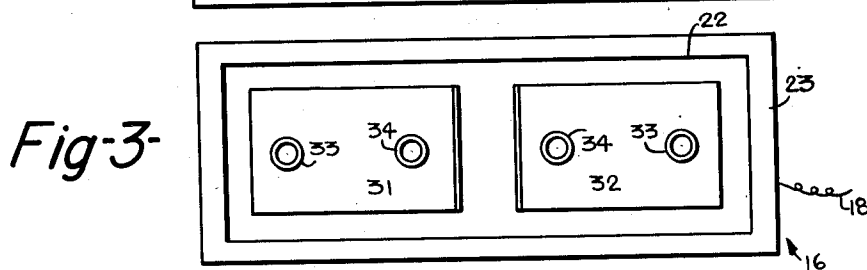
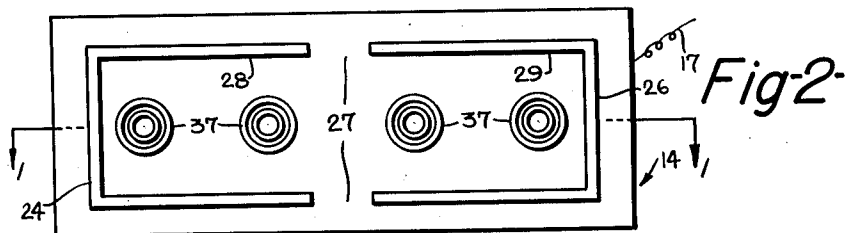
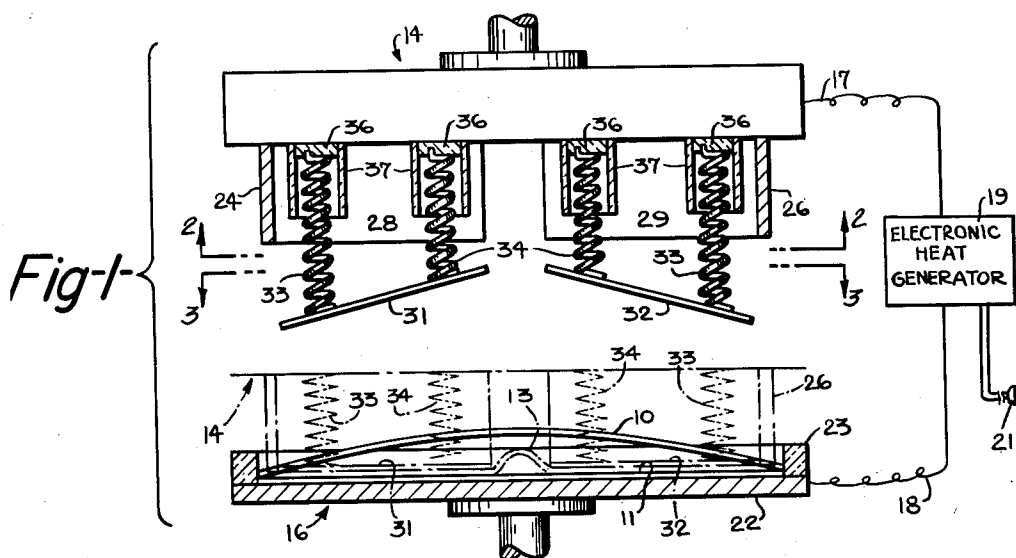


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HEAT-SEALING APPARATUS

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HEAT-SEALING APPARATUS

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1

The invention relates to apparatus for sealing and relates more particularly to machinery for electronic heat-sealing. Still more particularly, the invention relates to apparatus, for use in connection with an electronic heat generating circuit, to treat a heat-sealable object between two electrodes upon predetermined contact pressure.

The invention, furthermore, will be described hereinbelow in connection with the manufacture of a billfold made of heat-sealable material, but this feature, also, is not intended to be construed in a limiting sense, since the use of the invention is not restricted to the described exemplification.

The heat generating circuit will be mentioned only briefly, since its principle is well understood by those skilled in this and related arts, and, per se, does not form part of the invention.

The invention has among its objects the provision of machinery for quickly and safely heat treating heat-sealable material under pressure, enabling the utilization of semi-skilled or unskilled operators, for operation at overall low cost.

Further objects and advantages of the invention will be set forth in part in the following specification and in part will be obvious therefrom without being specifically referred to, the same being realized and attained as pointed out in the claims hereof.

With the above and other objects of the invention in view, the invention consists in the novel construction, arrangement and combination of various devices, elements and parts, as set forth in the claims hereof, one embodiment of the same being illustrated in the accompanying drawings and described in the specification.

In the accompanying drawings,

Fig. 1 is a sectional view, partly in elevation, taken along line 1—1 of Fig. 2, illustrating two opposite die parts in registry, with the remaining portions of the machine broken away;

Fig. 2 is an elevational view of one of the dies, as seen in direction 2—2 of Fig. 1;

Fig. 3 is an elevational view of the other die part, as seen in direction 3—3 of Fig. 1;

Fig. 4 is an elevational view of a billfold, of the type manufactured by the apparatus shown in the preceding views, in unfolded position; and

Fig. 5 is a perspective view of the billfold shown in Fig. 4, but in folded position.

Before describing the apparatus in detail, a few explanations concerning the billfolds to be made with the apparatus may be appropriate.

Billfolds

As the name implies, billfolds, for instance of the type illustrated in Figs. 4 and 5, admit of folding and unfolding. The conventional bill-

2

fold, surrounding, between its outermost walls 10 and 11, a plurality of adjoining compartments, is made of several layers of material, either folded from a single blank or assembled from several pre-cut pieces of matching shapes. The billfold parts conventionally are stitched along the outer contour, or they may, for instance by use of the instant apparatus, be sealed near the outer edges at 12. In either case, the securing of the edges necessitates that the layers about the center bending line will be closely adjoining and parallel in folded position (Fig. 5) or in unfolded position (Fig. 4), but not in both.

It is desirable, however, to have the layers parallel in the folded position, in order to prevent damage to the contents, carried in the billfold compartments due to crumpling of the layers. Consequently, it is customary to provide the billfold at one side with an outermost layer having near the center a loop or bulge 13 in unfolded position (Fig. 4) which is not secured to the edges of the remaining layers; this is brought about by making the outermost layer (or layers) of one side of the billfold longer than at the other. Upon folding of the billfold, the loop will disappear and the billfold layers will be parallel, as shown in Fig. 5.

Apparatus

The apparatus for use in manufacturing such billfolds is shown in Figs. 1-3. It may be a press or similar machine which comprises an upper die part, generally indicated at 14, and a lower die part generally designated 16. The remainder of the press in which the apparatus parts are placed is not shown, since any conventional press may suitably be employed that has one or both die parts movable towards the other and is capable of applying a predetermined pressure.

Both die parts 14 and 16 are interconnected by leads 17 and 18 to an electronic heat generator 19 including a circuit (not shown in detail) that may be connected by means of a plug 21 to an electric network. The generator 19 may be of conventional make-up, well known in the art, and does not form part of the invention, per se. The remainder of the press may be insulated from the current conducting parts.

The lower die part 16 carries a conductive plate 22 that is secured thereto and to which, in turn, is secured an endless frame 23 that is preferably made of insulating material; the frame 23 surrounds the plate 22 and projects upwardly therefrom. The frame 23 encloses an area corresponding exactly to the shape of the flattened shorter layer 11 (Fig. 4) of the billfold, and such a layer is placed in the frame acting as a jig, before the machine is put through an operating run. The longer layer 10 (Fig. 4) is superposed thereon, but since its length exceeds the avail-

3

able space within the frame 23, it will, prior to operation, extend convexly upwardly from the plate 22, as best shown in full lines in Fig. 1.

The upper die part 14 carries a pair of electrodes 24 and 26 that are U-shaped and disposed oppositely providing therebetween a gap 27 for accommodation of the loop 13 of the billfold, as best shown, in broken lines, in the lower part of Fig. 1. The electrodes 24 and 26 project from the upper die 14 downwardly and have far side edges 28 and 29, respectively, and thus are profiled for abutment against the object to be sealed. The profiles of the electrodes are so dimensioned that they will make contact with predetermined lines 12 (Fig. 5) of the billfold for heat treatment thereof along said lines. Both electrodes are interconnected to the circuit of the heat generator 19.

The upper part 14, furthermore, carries two pressure elements 31 and 32, which are connected to that part by means of springs and are, in rest position (shown in solid lines in Fig. 1), inclined inwardly and upwardly relative to the part 14 and oppositely relative to each other. Long pressure springs 33 connect the outer side of the pressure elements to the part 14, and short pressure springs 34 at the inner side. All the springs are sufficiently long to permit the pressure elements in their entirety to project vertically downwardly beyond the confines of the electrodes 24 and 26. The pressure elements, however, are disposed and movable vertically in a space within the orbit of the electrodes, so that upon compression of the springs 33 and 34, each pressure element will be surrounded on three sides by an electrode. The springs 33 and 34 are insulated electrically from the part 14, for instance by insulating members 36. The pressure elements 33 and 34 are furthermore guided for up-and-down movement relative to the part 14, by guiding means, for example by insulated sleeves 37 surrounding the individual springs for a portion of their normal lengths.

When one die part is moved towards the other, each of the pressure elements 31 and 32 will make contact with the object held by the frame 23, namely with the outermost layer of the exemplified billfold extending upwardly first with its outer ends and subsequently with its entire surface including the inner ends. In the example of the billfold, the outer contour thereof, save the loop middle portion, will thus be pressed first outwardly and then throughout the major portion of its area, flat against the plate 22, in position within the frame 23. The middle area will be forced by this contact, owing to its length exceeding that of the frame 23, to form a loop 13 (as best shown in broken lines in Fig. 1).

Continued movement of one die part towards the other will then bring the electrodes 24 and 26 simultaneously in contact with the uppermost surface of the billfold. During subsequent moving apart of the die parts, the pressure elements 31 and 32 under pressure from the springs 33 and 34 will separate the electrodes from the billfold so that the latter can easily be lifted off the plate 22.

Operation

The operation of the apparatus described is as follows:

When the die parts 14 and 16 are apart, the operator places an object or objects, for instance an unassembled billfold in proper sequence of parts, with the outermost layer upwardly, in the frame 23 on the plate 22. Subsequently, the

4

operator actuates the apparatus to bring the die parts together (the actuation and moving mechanisms are not shown in the drawings). The pressure elements will first make contact with the outer convexly extending billfold layer to press it entirely into predetermined position in the frame, and subsequently the electrodes will make contact with the billfold; the latter, in that instant is positioned between upper electrodes (31 and 32) and a lower electrode, namely the plate 22, and all these electrodes are interconnected to the electronic heat generator 19.

The heat generator 19 is so arranged that it will be actuated in that instant, upon contact of the electrodes 31 and 32 with the billfold at predetermined pressure, and will remain actuated for a pre-set period of time, for instance a fraction of one minute. The electrodes, during actuation of the heat generator will make heat-impressions on the object worked upon; for instance, in the example of the billfold, the various layers thereof will be heat-sealed together along the lines 12 corresponding to the electrode profiles 28 and 29.

Thereafter, the die parts will be separated, and the operator will remove the heat-treated object off the frame 23, in which the object has remained due to the action of the pressure elements during die-part-separation.

It will be apparent to those skilled in the art that the novel principles of the invention disclosed herein in connection with specific exemplifications thereof will suggest various other modifications and applications of the same. It is accordingly desired that in construing the breadth of the appended claims they shall not be limited to the specific exemplifications of the invention described herein.

Having thus described the invention, what we claim as new and desire to be secured by Letters Patent, is as follows:

1. In an electronic heat-sealing apparatus, two die parts in registry and operable for relative displacement between opposite positions of proximity and separation, respectively, and an electronic heat generating circuit connected to a source of current, in combination with, circuit interconnected conductive means on one part including a plate for supporting an object, insulated pressure means movably mounted on said second part and spring tensioned to project in a direction towards said first part for positioning said object against said supporting means during movement of one part towards the other, a rigid circuit interconnected electrode on said second part and projecting in said direction for a distance smaller than said pressure means for making heat-sealing contact with said object following positioning thereof, and an element mounted on said plate having two abutment members spaced from each other for a distance corresponding to the length of said object following heat sealing thereof and smaller than the rectified length of said object prior to heat sealing, whereby said object will have its major portion out of contact with said plate prior to the engagement by said pressure means, and subsequently be pressed thereby into position for major part contact with said plate, and said element cooperating with said pressure means for positioning said object in predetermined place.

2. In an electronic heat-sealing apparatus, two die parts in registry and operable for relative displacement between opposite positions of proximity and separation, respectively, and an electronic heat generating circuit connected to a

5

source of current and to said die parts, in combination with, circuit interconnected conductive means on one part for supporting sheet material layers and having a contour sufficiently smaller than that of at least one of said layers to force the same to bulge outwardly thereof, insulated movable pressure means connected to said second part and projecting from said second part in a direction towards said first part, resilient means operable to urge said pressure means into rest position, whereby said one layer will be flattened with its major portion against said support means upon contact with said pressure means during die part approach to restrict the bulging to a medial portion of said layer.

3. In an electronic heat-sealing apparatus, two die parts in registry and operable for relative displacement between opposite positions of proximity and separation, respectively, and an electronic heat generating circuit connected to a source of current, in combination with, circuit interconnected conductive means on one part for supporting an object, insulated pressure means movably connected to said second part and spring tensioned normally to be spaced for a certain distance from the surface thereof to project into the space between the open die parts, and a circuit interconnected electrode secured to said second part and having an edge spaced from the surface of said second part for a distance and arranged to abut against said object on said supporting means, said pressure means being operable to make contact first with a predetermined portion of the surface of said object and subsequently to cover succeeding portions thereof during die part approach and to remain in contact during subsequent abutment and heat-seal engagement of said object by said electrode, and finally to release subsequent portions during die part separation, the released portion sequence being inverse relative to that during approach.

4. In an electronic heat-sealing apparatus, two die parts in registry and operable for relative displacement between opposite positions of proximity and separation, respectively, and an electronic heat generating circuit connected to a source of current, in combination with, a conductive plate mounted on one of said parts and interconnected to said circuit and arranged to support an object, a profiled electrode mounted on the second part and interconnected to said circuit and projecting from said second part in a direction towards said first part and arranged to make contact, near said proximity position, along its profile lines with said object to press and heat-seal the same at said lines, and a plurality of flat elements movably connected to said second part and yieldingly projecting therefrom in opposite inclined position in the space between said parts to extend throughout beyond the confines of said profile lines of said electrode and being shielded from electric contact and being turnable from the inclined position to a position parallel with said plate and being arranged, when a die part moves towards the other, to press at least the major portion of said object flat against said plate for positioning thereon in predetermined place preparatory for subsequent contact with, and ensuing heat-sealing by, said electrode.

5. In an electronic heat-sealing apparatus, two die parts in registry and operable for relative displacement between opposite positions of proximity

6

ty and separation, respectively, and an electronic heat generating circuit connected to a source of current, in combination with, a conductive plate mounted on one of said parts and interconnected to said circuit and arranged to support an object, a profiled electrode mounted on the second part and interconnected to said circuit and projecting from said second part in a direction towards said first part and arranged to make contact, near said proximity position, along its profile lines with said object to press and heat-seal the same at said lines, and a plurality of elements movably connected to said second part and yieldingly projecting therefrom in opposite inclined position in the space between said parts to extend throughout beyond the confines of said profile lines of said electrode and arranged to make contact with said object first with its outermost portions progressing towards contact with all portions whereby said object will be pressure positioned from the outside of its contour inwardly, said elements being shielded from electric contact and arranged, when a die part moves towards the other, to press said object preparatory for subsequent contact with, and ensuing heat-sealing by, said electrode.

6. In an electronic heat-sealing apparatus, two die parts in registry and operable for relative displacement between opposite positions of proximity and separation, respectively, and an electronic heat generating circuit connected to a source of current, in combination with, a conductive plate mounted on one of said parts and interconnected to said circuit and arranged to support an object, a profiled electrode mounted on the second part and interconnected to said circuit and projecting from said second part in a direction towards and first part and arranged to make contact, near said proximity position, along its profile lines with said object to press and heat-seal the same at said lines, and a plurality of elements movably connected to said second part and yieldingly biased and projecting therefrom in opposite inclined position in the space between said parts to extend throughout beyond the confines of said profile lines of said electrode though disposed entirely within the orbit of said profile and movable without obstruction by any electrode part, and being shielded from electric contact and being turnable from the inclined position to a position parallel with said plate upon contact with said object and being arranged, when a die part moves towards the other, to make contact with and to press said object preparatory for subsequent engagement and ensuing heat-sealing by, said electrode.

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