THE JOINT EXAMINATION BOARD

PAPER P6

INFRINGEMENT AND VALIDITY OF UNITED KINGDOM PATENTS

27th APRIL, 1995

10.00 a.m. - 2.00 p.m.

Please read the following instructions carefully. This is a FOUR HOUR Paper.

1. Write on one side of the paper only using BLACK ink. You must write your examination number and the designation of the Paper in the top right hand corner of the sheet. You must not state your name anywhere in the answer.

2. NO printed matter or other written material may be taken into the examination room.

3. Answers MUST be legible. If the examiners cannot read a candidate's answer no marks will be awarded.

4. Candidates are reminded that marks are awarded more for the points selected for discussion and the reasoning displayed than conclusions reached.

Documents supplied:-

Client's letter
Client's GB Patent A
Company 'B's' GB Patent C
Extracts US Patent X

Letter from Client.

As you know, we have for many years manufactured packaging for the food industry and several years ago we also moved into the field of product testing. These days, for fear of being sued by the public, manufacturers are trying very hard both to keep their products fresh for long periods and to prevent odd bits of metal finding their way into packaged foods.

To solve the latter problem, we invented some time ago a monitoring method that is disclosed in our Patent 'A' and this method has become the Industry's standard. Patent 'A' is dated 1985 and is still in force.

To keep packaged products fresh for long periods of time, the packaging seal must be to a high standard and this is best done using laminated sheets which include a metallised or metal oxide layer. You may be familiar with packs of potato crisps wherein the inside of the pack is very clearly shiny and metallic.

However, use of these laminated sheets raised a problem with our monitoring method because the metallised or metal oxide layer screens the contents of the package from the electro-magnetic radiations upon which the monitoring method depends.

We have now managed to solve this problem. The solution in fact turned out to be simple, although we do not fully understand it. By providing lots of clear stripes or crinkles in the metallised or metal oxide layer, it is rendered sufficiently **transparent to** electro-magnetic radiation **to** enable metal objects within packages to be detected.

To our horror we have just discovered that Company `B' has a Patent C covering our solution. A copy of the specification for their Patent C is enclosed; it is dated 1992.

Your subsequent investigation of the Official Register shows it to be granted and in force, with no recorded licences.

We have now heard that Company ● B' used to buy from us reject laminated sheets that included a metallised or metal oxide layer and which we had considered to be unsuitable for packaging food for human consumption. Somebody in Company `B' obviously realised that the crinkles or faults in our reject sheets were sufficiently transparent to be used in our monitoring methods. We have approached Company `B' for a licence under their Patent C but they are asking us to pay very substantial royalties. Company 'B' are now selling laminated sheets for packaging which have discontinuities in a metallised or metal oxide layer.

Please can you advise us.

We also enclose extracts from one of our other Patents, United States Patent X, which predates our Patent A and Company ‘B's' Patent C. We have also determined that our rejected laminated sheets, incorporating a metallised or metal oxide layer, were sold to a pet food manufacturer, a subsidiary of Company ‘B', who used it as a packaging material for dog biscuits before the priority date of Patent C.

Please set out in note form the advice you would give your client together with any questions that you would ask.

Patent A

Product Monitoring

This invention relates to a method of and apparatus for monitoring a series of products.

The invention is particularly applicable to the monitoring of mass-produced food products, such a loaves of bread, sausages, frozen chickens and so on, but is also applicable to the monitoring of other articles. The invention is particularly useful fbr the detection of metallic foreign bodies in such articles, but is not limited to such uses.

In the invention food products are monitored by passing them through what is referred to as a metal detecting apparatus. The apparatus has a drive coil driven by an alternating signal which produces an oscillating magnetic field and a pair of detection coils positioned in a monitoring zone within the magnetic field and connected to a balance circuit. In the absence of a metallic objectwithinthe monitoring zone, the signal induced by the magnetic field in each coil will be the same and the balance circuit will have no output. If a metallic object is placed within the monitoring zone, different signals will be induced in each coil and the balance circuit will produce an output; i.e. a foreign body, such as a steel bolt, can be detected inside a loaf of bread.

A specific embodiment of the present invention will now be described by way of example, with reference to the accompanying drawings, in which:

Figure 1 is a block diagram illustrating a product monitoring apparatus; and

Figure 2 is a schematic perspective view of drive and search coils used in the apparatus of Figure 1

Referring to Figure 1, an apparatus according to the invention includes _a coil section 10 and driver and detection circuitry section 12,

Section 12 includes an oscillator 18 and associated circuitry 20 which supply an AC drive signal typically of 500 kHz and 25 volts to a drive coil 22 in the coil section 10. Spatially positioned to either side of, and co-axially with, the drive coil 22 are a pair of balanced, oppositely-wound series-connected search coils 24a, 24b. Typically, the drive and search coils are about 120 to 600 mm in diameter (or similar size but rectangular) and each has one or two turns. As shown in Figure 2, the coils are potted in epoxy resin 25, During product monitoring, the products are passed through the coils in the axial direction thereof. The search coils are connected via a transformer 26 to the input of an amplifier 28, the output of which is connected to a detector circuit 30, having an output 32.

As a product is passed through the coils, a non-zero detection signal will be output from the detector circuit 30. Using one drive coil and two search coils, as described above, the output signal will peak as each product is passed through the coil section. The peak signal level will be higher for a carbon steel article (ferro-magnetic) and an aluminium article (diamagnetic) than for products such as bread, meat, butter, cereals, which are generally transparent to electro-magnetic radiation.

The method of the present invention is also applicable to other products, especially food products, packed in electro-magnetically transparent containers.

Claims:

1. A method of monitoring a series of products contained in containers **transparent** to electro-magnetic radiation, comprising the steps of:-

(a) generating an alternating magnetic field in a monitoring zone;

(b) successively placing the products in the monitoring zone in a container substantially transparent to electro-magnetic radiation;

(c) detecting variations in the magnetic field in the monitoring zone caused by the successive products and utilising variations in the detected magnetic field to detect abnormalities in the field caused by metal bodies in the products.

2. A method as claimed in Claim 1, further comprising the step of determining a peak in each detected magnetic field.

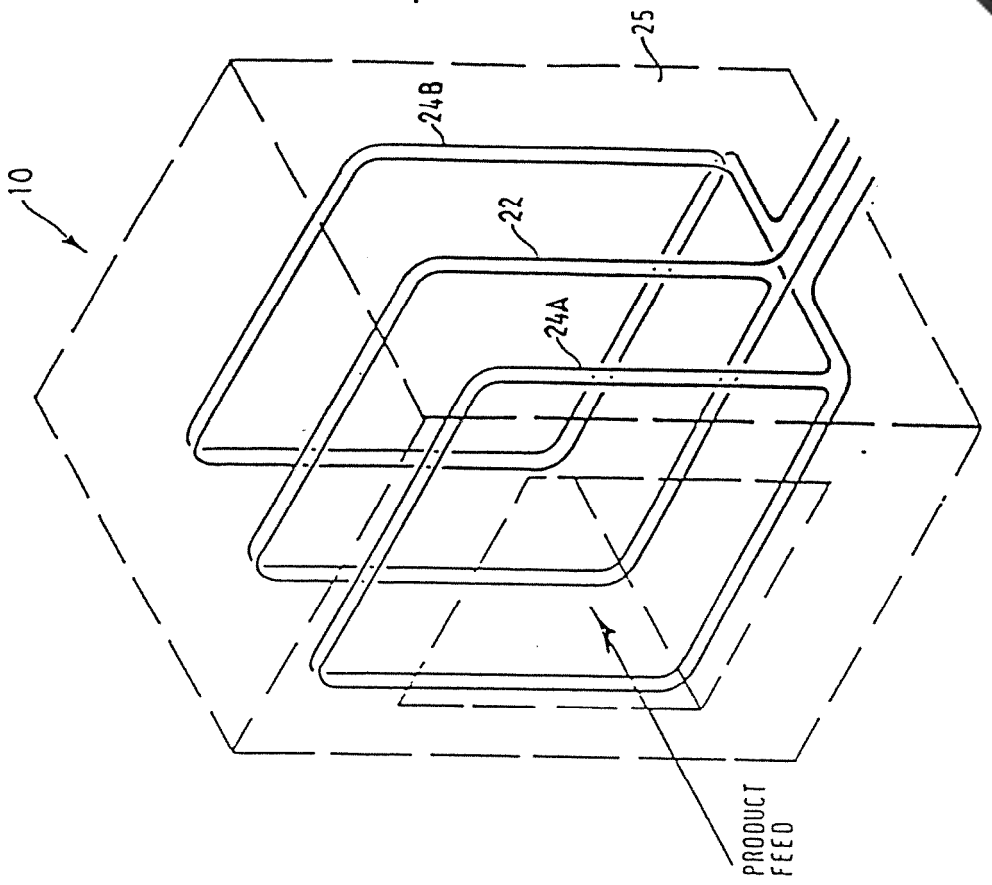


FIG.2

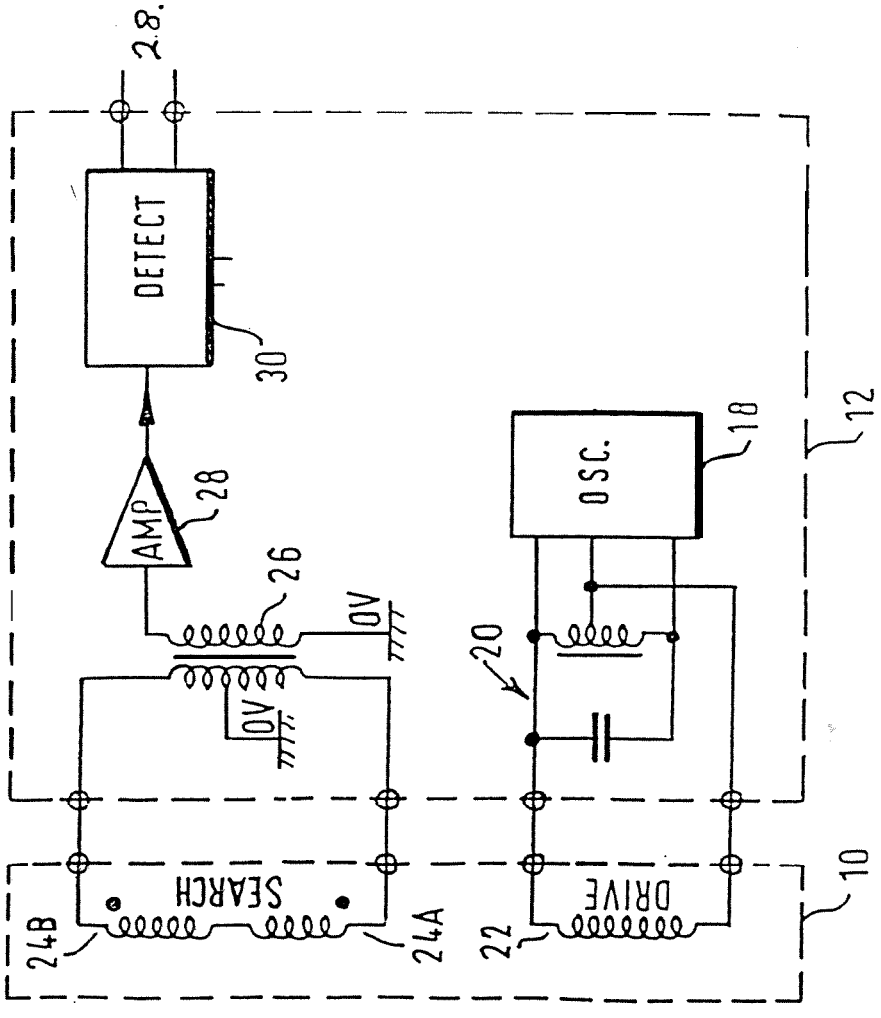


FIG 1

Patent C

Product Monitoring

This invention relates to a method and apparatus for monitoring a series of products and is related to the method and apparatus disclosed in GB Patent A. In that patent a method and apparatus isdisclosed by which mass-produced food products can be monitored in order to detect any metallic foreign bodies which may be contained in them.

There are certain food products which are required to be kept in storage for significant periods of time, for example up to 1 year, without deterioration. In order to achieve this, it is known to wrap such products in a single or multi-layer plastics film incorporating a metallised or metal oxide coating or layer in order to protect the products from various aspects of the environment including air, gas and ultra-violet radiation. There can be as many as seven layers. The presence of such a metallised or metal oxide coating or layer can form a screen which prevents the effective operation of the method and apparatus of the above-mentioned patent. The present invention is concerned with overcoming this problem.

According to the present invention, a method of detecting metallic foreign bodies within products wrapped inside a film having a metallised or metal oxide coating or layer comprises the steps of:-

(i) generating an alternating magnetic field in a monitoring zone;

(ii) treating the said coating or layer to render it discontinuous and to some extent transparent to radiation:

(iii) placing the wrapped product successively in a monitoring zone; and

(iv) detecting variations in the magnetic field in the monitoring zone caused by the successive products and utilising variations in the detected magnetic field to detect abnormalities in the field caused by metallic foreign bodies within the products.

According to one aspect of the present invention the product wrap comprises a single or multi-layer plastics film incorporating a metallised or metal oxide coating or layer in which said coating or layer has a plurality of discontinuities, which render the coating or layer to some extent transparent to a detection signal, whilst at the same time provides substantially the same sealing effect as a film having a continuous coating or layer.

How the invention may be carried out will now be described, by way of example only, and with reference to the accompanying drawings in which:

Figure 1 shows a very enlarged fragmentary view of a metallised wrap of film constructed according to a first aspect of the present invention;

Figure 2 is a similar view to Figure 1 showing a metallised wrap of film constructed according to a second aspect of the present invention; and

Figure 3 is a very enlarged fragmentary cross-sectional view of a wrap of film constructed according to a third aspect of the present invention.

The general method and apparatus to which the present invention is applicable is disclosed in GB Patent 'A'. The details of this method and apparatus will therefore not be described in

this application.

The essence of that method and apparatus is **the use of a** magnetic field to detect a metallic foreign body within a package.

Figure 1 illustrates, on an extremely large scale, a very small portion of a film wrapper 1, having a substrate 2 and a metallic coating 3, the wrapping film 1 containing a food powder 4. The substrate 2 is made of a plastics material such as 'Mylar' (registered trade mark) and the metallic coating 3 is aluminium. The metallic coating 3 is relatively thin having a thickness of a few microns. The plastics substrate is typically 0.1mm thick.

The effect of corrugating the wrapping film 1, and thus the metallic coating 3, is to influence the above-mentioned magnetic field in such a way that the metallic coating in effect becomes transparent to some extent to electro-magnetic radiation, thus enabling a metallic body, indicated by 5 in Figure 1, to be detected. The exact mechanism is not known to the applicants but it is thought that the corrugation sufficiently affects the crystalline structure of the coating to render it "transparent" at these points.

Although a specific form of corrugation is shown in Figure 1, other forms of corrugation could be employed.

The term "corrugation" is intended to have a broad meaning to include information of irregularities or irregular pattern in the surface of the film and thus the metallic coating 3, the effect of which would be to enable the aforementioned field to effectively detect a magnetic foreign body contained within the product enclosed by the wrapping, i.e. to enable the field to as it were "see" through the wrapping.

Figure 2 illustrates a second embodiment of the invention which

is particular appropriate where the metallic coating 3 is substantially thicker than that indicated in connection with Figure 1 and where the arrangement of Figure 1 does not give a satisfactory result. In this second embodiment the same reference numerals have been used to illustrate the equivalent elements to those shown in Figure 1. However, the effective *'transparency" of the metallic coating 3 is achieved by providing it with a series of mutually parallel gaps or stripes 6 which are relatively narrow compared with the metallic material between adjacent stripes 6. For example, each stripe may be only 0.1 mm wide.

The distance between adjacent stripes is a compromise between the sealing and detection capabilities. Sealing capability is generally inversely proportional to the number of stripes.

In contrast, the detection effectiveness appears to be proportional to the square of the number of stripes employed. Thus, by doubling the number of stripes the detection effectiveness is increased by a factor of 4. It has also been found that for maximum detection effectiveness the stripes 6 should run parallel to the direction of travel of the product as it passes through the detection apparatus.

The total area of the stripes 6 in relation to total area of the metallic coating 3 would be typically only 1 to 2 percent. It has been found that although this enables effective monitoring of metallic bodies to be carried out, it is not sufficient to significantly affect the sealing effect of the wrapper 1 as a whole.

Although Figure 2 illustrates an arrangement of stripes 6 which consists of mutually parallel straight lines other arrangements and shapes of stripes 6 could be employed. Furthermore, other forms of discontinuity in the metallised coating, which achieve the object of adequately sealing the product whilst at the same time enabling effective monitoring of foreign bodies, could be

employed.

The embodiment of Figure 3 illustrates the application of a multi-layer wrapper of an arrangement similar to that shown in Figure 2. In this embodiment there are three layers of plastics film 2a, 2b and 2c, and two sets of metallic stripes 3a and 3b sandwiched between the plastics film layers.

The stripes on each set are staggered with respect to those in the other set and are insulated from one another by the plastics film layer 2b.

With this stagger the effective sealing function of the wrapper is maintained whilst at the same time creating the required discontinuity in the metallised areas to enable the effective detection of foreign bodies within the wrapped product to be carried out.

Claims:

1. A method of detecting metallic foreign bodies within products wrapped inside a film having a metallised or metal oxide coating or a layer comprising the steps of:-

(i) generating an alternating magnetic field in the monitoring zone;

(ii) treating the said coating or layer to render it discontinuous and to some extent transparent to radiation;

(iii) placing the wrapped product successively in the monitoring zone; and

(iv) detecting variations in the magnetic field in the mon'itoring zone caused by the successive products and utilising variations in the detected magnetic field to detect abnormalities in the field caused by metallic foreign bodies within the product.

2. A method as claimed in Claim 1 in which the discontinuity is achieved by providing the film with one or more areas which are uncoated; such areas being relatively small in relation to the total area of the film.

3. A method as claimed in either Claim 1 or Claim 2 in which the said discontinuities comprise a plurality of gaps or stripes so that the substrate is uncoated in those gaps or stripes.

4. A method as claimed in Claim 1 in which the discontinuity is obtained by corrugating a film,

5. A method as claimed in either Claim 2 or Claim 3 in which there are a plurality of layers of film between which are sandwiched a plurality of sets of discontinuous metallised or

metal oxide coatings.

6. A method as claimed in Claim 5 in which the discontinuous areas of sets of said coatings are staggered with respect to one another.

7. A method as substantially hereinbefore described with reference to or as shown by Figure 1 or Figure 2 or Figure 3 of the accompanying Drawings.

8. A laminated sheet for packaging foodstuffs, with a sheet including a layer which is either of a metal or a metal oxide and which has sufficient small striations, wrinkles or cracks in the layer to render the sheet substantially transparent to electro-magnetic radiation.

9. A laminated sheet for packaging foodstuffs substantially as hereinbefore described with reference to or as shown by Figure 1 or Figure 2 or Figure 3 of the accompanying Drawings.

FIG.1

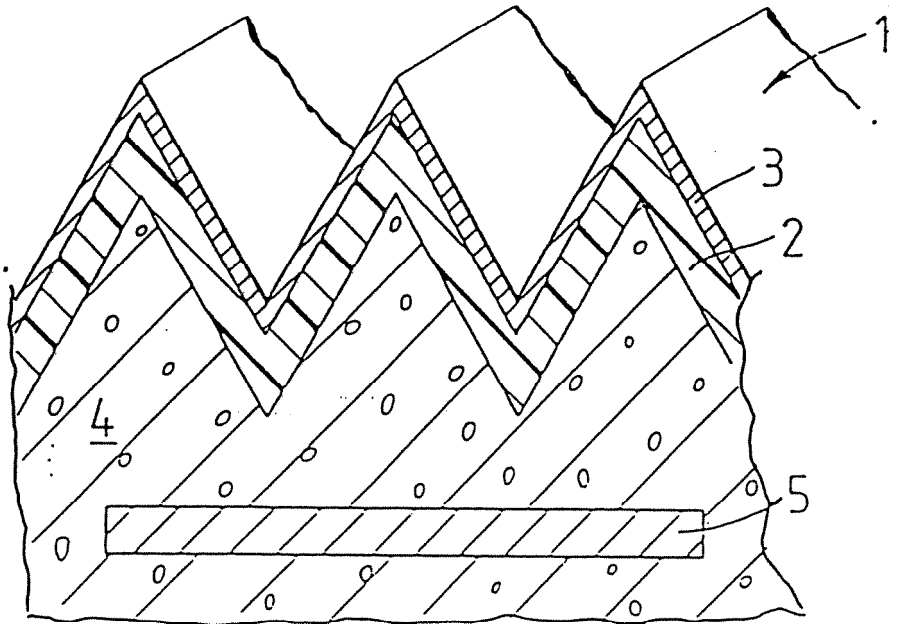


FIG. 2

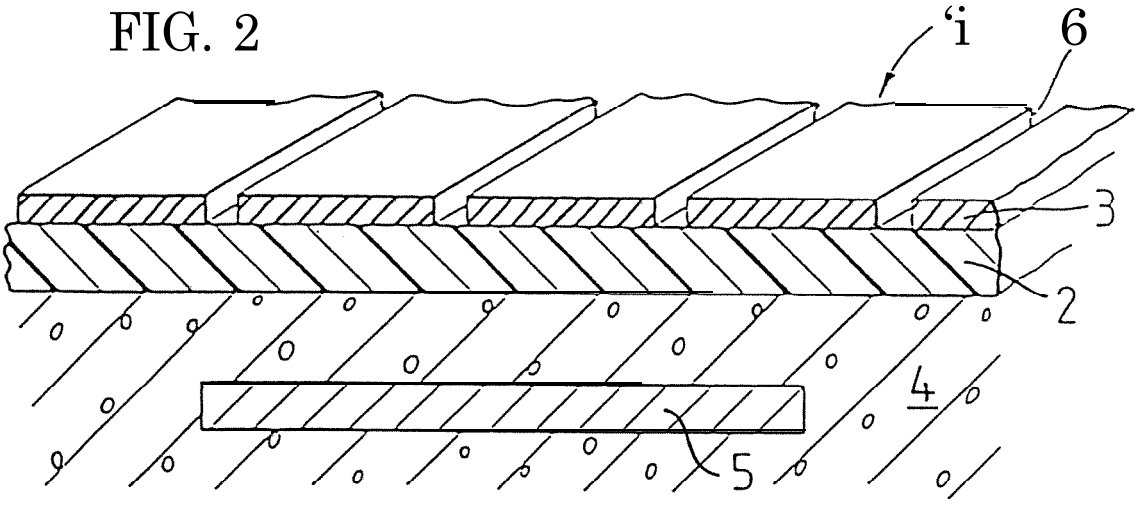
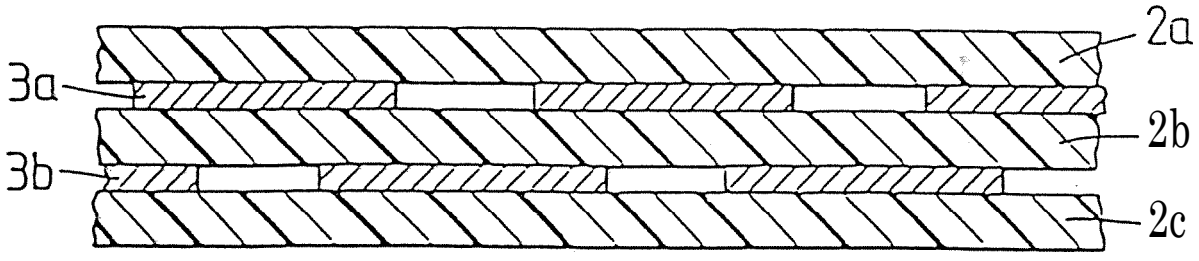


FIG.3



Extracts from United States **Patent X**

Formation of Laminates

The present invention relates to the formation of laminates, in particular for use in packages for microwave cooking.

The microwave cooking of foods provided in bag-like enclosures is known. It is sometimes desirable to provide a metallised region adjacent the food to increase the concentration of energy and provide a more rapid cooking cycle. These currently lack any convenient manner of readily providing such structure.

In accordance with the present invention, there is provided a laminate suitable for formation into packages, comprising at least one layer of metallised flexible polymeric material which has been demetallisedto provide at least one discrete metallised area on one surface thereof with the remainder of the surface demetallised, and at least one layer of other material.

The discrete metallised area is located on the polymeric material sheet so as to be positioned in the localised region of the foodstuff, when the laminate is formed into an enclosure housing the same, but not elsewhere, for the purpose of cooking by the application of microwave energy.

The present invention also provides a method of cooking by the application of microwave energy, which comprises enclosing a microwavable foodstuff in a package which is constructed at least in part of a flexible polymeric film have a discrete metallised region adjacent the foodstuff, and applying microwave energy to the package and the foodstuff therein while the metallised region is located on the opposite side of the foodstuff from the source of microwave energy.

One convenient foodstuff which may be formed by the present invention is popcorn. Popping corn and butter are positioned in

the package which is folded generally flat but which has sufficient volume to accommodate the corn when **popped.**

In the present invention there is employed a polymeric material film which has discrete metallised regions on one surface. This film may be formed by selective demetallisation of a metallised polymeric film,

The laminate is shaped into the packaging structure so that the metallised region usually provides part or all of one surface of the package on which the foodstuff is to rest for cooking. Microwave energy is then applied to an opposite surface of the package, so that the microwave energy, in addition to heating the foodstuff in conventional manner, also heats the foodstuff by reason of concentration of the microwave energy in the metal layer, thereby heating up the metal layer, and heating of foodstuff by conduction from the heated metal layer.

The package structure provided in accordance with the invention is useful for a wide variety of food products, especially where conduction heat is desirable. As mentioned above, one application is in the formation of popcorn by microwave heating of popping corn located in the package. Other applications are in the reconstruction and/or cooking of frozen food products where a crisping or browning effect is desirable, for example, in the re-constitution of frozen French fries and frozen pizzas.

The amount of microwave energy which is converted into conduction heat by the utilisation of a discrete metallised region or regions on the polymeric film may be varied by varying the area of the metallised region through variation of the demetallisation procedure.

The invention is described, by way of illustration, with reference to the accompanying Drawings, in which:

Figure 1 is a perspective view of a web of polymeric material

illustrating the presence of discrete metallised regions;

Figure 2 is a perspective view, with parts cut away for clarity, of a package structure containing a foodstuff provided in accordance with one embodiment of the invention; and

Figures 3a and 3b are detailed sectional views taken at lines A-A and B-B respectively.

As may be seen in Figure 1, a pattern of rectangular metallised regions 20 may be provided with intervening areas 22 free for metallisation. Any desired patent consistent with the desired end use and dimensions of the web 19 may be employed.

Selective demetallising of the web 19 may be effected in any convenient manner to form the desired pattern of metallised 20 and demetallised 22 regions on the web.

In Figures 2 and 3, there is illustrated a typical package construction provided in this invention. As seen therein, a package structure 50 is formed from a laminate of outer layers 52 and 54 and a polymeric material layer 56 which has a discrete metallised region 58 providing the bottom wall 60 of the package.

The package structure 50 encloses a foodstuff 62 for heating by microwave energy 64 applied through the top wall 66 of the package 50, the microwave energy 64 passes through the top wall 66 since there is no metallised region, as a result of demetallising of the polymeric film 56. The microwave energy64 heats the foodstuff 62 by the usual mechanism but also the presence of the metallised region 58 causes the foodstuff to be heated also by convection therefrom.

FIG.1

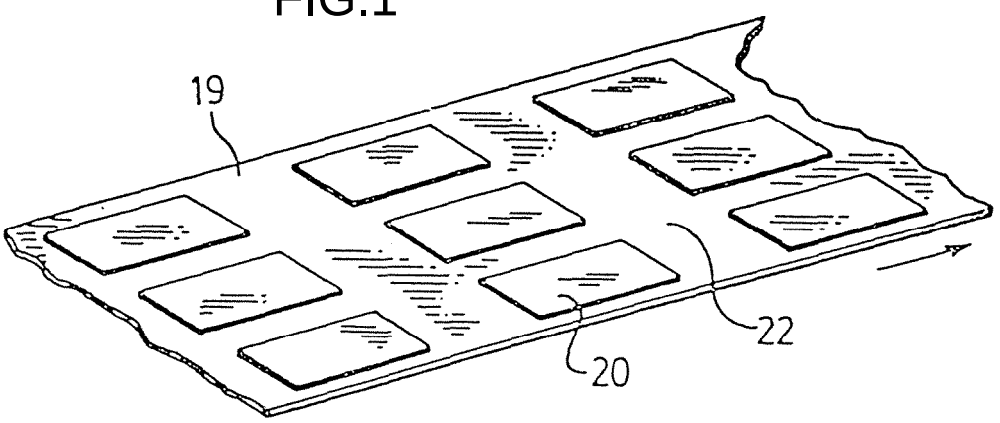
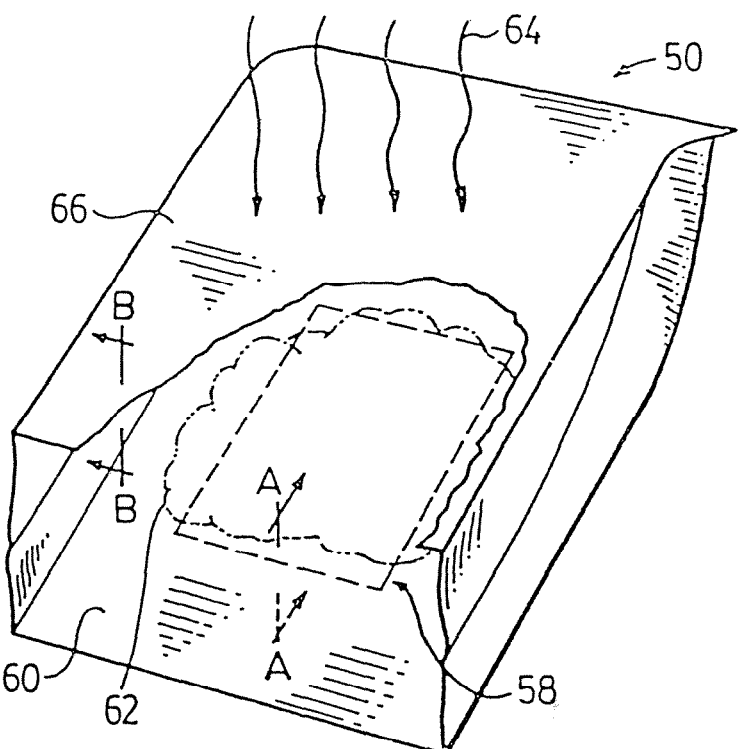


FIG.2



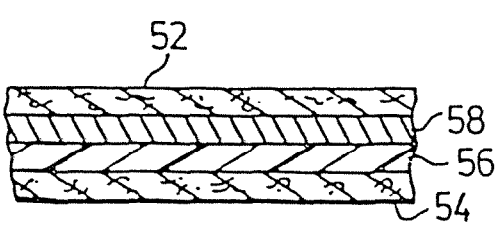


FIG. 3A

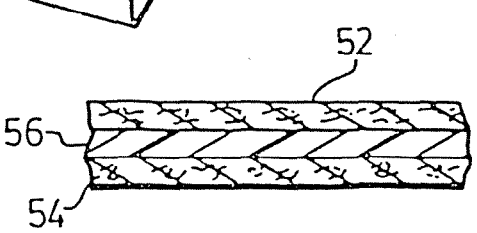


FIG.3 B