This invention relates to a prepared food article and a method of preparing the same, and more particularly to a novel method of preparing popcorn for consumption.

The method heretofore used in the preparation of popcorn for consumption involves first husking and then shelling (that is separating the kernels from the cob) an ear of popcorn, which is a type of Indian corn having the scientific name Zea mays Everta. The loose kernels are then sold or distributed as an article of commerce, the cob being discarded or otherwise disposed of separately from the kernels. The loose kernels may be stored for a considerable period of time, as much as a year or even longer, before they find their way to the ultimate consumer or to the person who pops them or prepares them for consumption. When it is desired to prepare the popcorn for consumption, a plurality of loose kernels are placed in a suitable heat-conducting but heat-resistant closed container, and the container and contents are exposed to dry heat emanating from a suitable source, such as an open gas flame. Heat is conducted through the container to the kernels, and after a heat exposure on the order of four to five minutes, the majority of the kernels are popped or everted (that is, turned inside out) by the explosion of the contained moisture, forming a white starchy mass many times the size of the original kernel. The entire mass in the container is then seasoned, as by salt and butter, and is ready for consumption.

There are several drawbacks which exist in the above-described procedure or process. In the first place, shelling the ear requires an additional operation and thus involves some additional expense, which would be done away with if this operation could be eliminated.

Also, due to the fact that the kernels are separated from the cob for such a long period of time before they are finally popped, they have a tendency to dry out, because when separated they can no longer absorb moisture from the cob itself. Again, due to this separation, the kernels tend to lose their original flavor.

In addition, the time required to pop the corn is rather great.

Also, in every mass or group of popcorn kernels prepared by this method there are an appreciable number of kernels which are not popped or everted, even though the rest of the kernels are popped. This result is probably due to the lack of sufficient contained moisture (in this appreciable number) to cause explosion and eversion of such kernels. These unpopped or everted kernels remain hard and inedible and, since they are intermixed with the everted kernels, interfere with the proper or complete edibility and enjoyment of the entire mass of prepared popcorn.

Furthermore, because of the many different handlings involved from ear to prepared popcorn, together with the fact that the loose kernels are ordinarily never stored in a sealed receptacle, the aforementioned drawbacks, the above-described method or process is rather unsatisfactory.

The object of the present invention is to obviate or eliminate the aforementioned drawbacks. This invention contemplates eliminating the shelling of the ear, leaving the kernels attached to the cob until they are everted or popped, popping the corn extremely rapidly, effectively preventing the intermixing of the unprepared kernels with the everted kernels, and providing a very sanitary method of preparing popcorn.

The manner in which these objects are effected or carried out will become more apparent as the description proceeds, said description being read in connection with the accompanying drawings, in which:

Fig. 1 is an illustration of a package of popcorn according to the invention, ready to be prepared for consumption;

Fig. 2 is a vertical section of a microwave oven utilized to prepare for consumption the popcorn of Fig. 1, showing a prepared package of popcorn therein;

Fig. 3 is a partial view of the package of prepared popcorn of Fig. 2, removed from the oven and broken open to expose the contents thereof;

and

Fig. 4 is a view of a popcorn cob after the kernels thereof have been popped according to the invention, said cob being in condition for discarding.

It has been found that, if the dry heat necessary to pop or evert the kernels of popcorn is provided by the impingement of radio-frequency energy on the corn to be popped while the same is positioned in an energy-filled metallic cavity or enclosure, the kernels can be popped or everted while they are still attached to the cob. In other words, a husked but unshelled ear of popcorn can be placed in a so-called microwave oven, and electromagnetic energy in the microwave region of the frequency spectrum, that is, wave energy whose wavelength is of the order of thirty centimeters or less, can be supplied to said oven to pop or evert the kernels of said ear, thus preparing them for consumption...
ample a magnetron, by means of a hollow waveguide 5 which is coupled to said interior by way of an aperture 6 in the rear wall of said cavity, said aperture being located somewhat above the horizontal midplane of the cavity. An access aperture 7 is provided in the front wall of oven 4, this aperture being of means of a hinged metal door 8. When door 8 is in its closed position, it will be seen that the oven 4 is entirely closed, except for the energy supply aperture 6 above described, through which radio-frequency energy in the microwave region of the frequency spectrum is supplied to the popcorn. For a more detailed description of a suitable microwave oven, reference is made to the corresponding Hall and Gross application, Serial No. 721,946, filed January 11, 1947.

The packaged ear of popcorn shown in Fig. 1 is placed inside the oven 4, and may, for example, rest on the inner face of the bottom metallic wall of the oven. Therefore, radio-frequency energy in the microwave region is supplied to enclosure 4 for an interval of time which depends on the size and texture of the particular ear being treated; this interval may be in a range from 20 to 45 seconds. Such energy impinges on the packaged object lying on the bottom wall of oven 4 and, since bag 2 is transparent to such energy, impinges on the ear of corn inside said bag. This energy is converted to heat in the corn and kernels. The heat results in explosion of the moisture contained in the kernels, popping or evertion of each kernel to form a white mass many times the size of the original raw kernel 3. It is this increase of size which makes it necessary to use a bag 2 having an interior volume substantially larger than the volume of oven 4. In this figure, the bag is represented as being transparent, so that ear 1 is visible through said bag 2.

Bag 2 is made of a sheet material that is flexible and is transparent to electromagnetic energy, such as waxed paper or certain commercial synthetic plastics, but preferably the former. However, one suitable commercial synthetic material is produced in the form of transparent cellulose sheets, made by precipitating cellulose from an aqueous solution, extruding it into a coagulating bath, then moisture-proofing the same by lacquering on both sides. Another such synthetic material is a rubber hydrochloride made in the form of thin transparent sheets. Both of these latter materials are transparent to light, as well as to electromagnetic energy, so that the showing of Fig. 1 is justified.

In order to carry out the method of preparing popcorn according to this invention, a husked but unshelled ear 1 of raw popcorn is first provided, after which the ears 1 are seasoned, by applying butter and salt thereto, and thereafter ear 1 is sealed in a bag 2 of the type described above. The packaged ear of popcorn is then ready to be placed in a microwave oven, to effectuate explosion and evertion of the kernels.

Fig. 2 illustrates such a packaged ear of popcorn, in a microwave oven 4, after explosion and evertion of the kernels thereof. The hollow thin-walled metallic enclosure or cavity 4 preferably has the shape of a rectangular parallelopiped, this enclosure serving as the oven of a radio-frequency heating device. Radio-frequency energy is supplied to the interior of cavity 4 from any suitable source (not shown), for...
become intermixed with the edible everted kernels, but remain attached to the inedible cob and are effectively disposed of when the cob is discarded.

From referring to Fig. 3, this figure is a partial view of the package of prepared popcorn, removed from the oven of Fig. 2 and broken open to expose its contents. Bag 2 contains the ear 1, to the cob 9 of which are lightly attached or detachably secured a plurality of everted or popped kernels 3. A plurality of completely separated everted kernels 3' is contained in bag 2 surrounding ear 1; the few un,everted or hard raw kernels 3 remain firmly attached to cob 9.

Cob 9 may be removed from the bag 2, and if desired, the edible everted kernels 3' which are detachably secured thereto may be eaten directly off said cob, after which the cob may be discarded. Alternatively, the entire cob 9, along with its detachably secured everted kernels 3', may be discarded, leaving the completely separated kernels 3' for consumption.

As a further alternative, the everted kernels 3' which lightly cling to cob 9 may be brushed or shaken therefrom, leaving the cob shown in Fig. 4, to which are attached only the few un,everted or raw kernels 3; this cob may be then discarded.

No matter which of these three alternatives is followed, the few hard inedible un,everted kernels 3 do not become mixed with the soft edible everted kernels 3'. Since the kernels have been seasoned with butter and salt prior to the sealing of the ear 1 in the bag 2, the everted kernels are ready for consumption as soon as the package of popcorn is removed from oven 2. For all of the above, it will be seen that the objects of the invention have been accomplished. The sealing of the ear is eliminated along with the expense of this operation, since the un,everted ear is used directly for eversion of the kernels. The kernels remain on the cob until they are popped, thus retaining their original moisture and their original flavor; in fact, the prepared popcorn produced by the method of this invention has a flavor all its own which is more "corny" than that of the conventional prepared popcorn. The time required to pop the corn by this method is extremely short. Also, the hard inedible un,everted kernels are kept from becoming intermixed with the edible everted kernels, as explained above, thus entirely eliminating the possibility of interference by such hard kernels with the complete edibility and enjoyment of the popcorn. In addition, the bag 2 remains sealed from the time of husking the ear (assuming that the kernels are seasoned at the same time) until the popcorn is finally eaten, thus providing a very sanitary method of popcorn preparation.

Of course, it is to be understood that this invention is not limited to the particular details as described above, as many equivalents will suggest themselves to those skilled in the art. It is accordingly desired that the appended claims be given a broad interpretation commensurate with the spirit of this invention within the art.

What is claimed is:

1. A method of preparing popcorn for consumption, comprising exposing a husked but un,everted ear of popcorn to electromagnetic wave energy for a time sufficient to evert by explosion at least some of the kernels of said ear, thereby causing separation of at least some of the everted kernels from the cob of said ear while leaving the un,everted kernels attached to said cob.

2. A method of preparing popcorn for consumption, comprising exposing a husked but un,everted ear of popcorn to electromagnetic wave energy for a time sufficient to evert by explosion the majority of the kernels of said ear, thereby causing separation of at least some of the everted kernels from the cob of said ear while leaving the un,everted kernels attached to said cob.

3. A method of preparing popcorn for consumption, comprising exposing a husked but un,everted ear of popcorn to electromagnetic wave energy for a time sufficient to evert by explosion at least some of the kernels of said ear, the force of the explosion and eversion of the everted kernels being sufficient to cause a substantial number of such kernels to become completely separated from the cob of said ear but being insufficient to cause the complete separation from the cob of an appreciable number of such everted kernels.

4. A method of preparing popcorn for consumption, comprising exposing a husked but un,everted ear of popcorn to electromagnetic wave energy for a time sufficient to evert by explosion the majority of the kernels of said ear, the force of the explosion and eversion of the everted kernels being sufficient to cause a substantial number of such kernels to become completely separated from the cob of said ear but being insufficient to cause the complete separation from the cob of an appreciable number of such kernels, the un,everted kernels remaining firmly attached to said cob.

5. A method of preparing popcorn for consumption, comprising sealing a husked but un,everted ear of popcorn in a bag that is transparent to radio-frequency energy, and exposing said bag and contents to radio-frequency energy for a time sufficient to evert by explosion at least some of the kernels of said ear.

6. A method of preparing popcorn for consumption, comprising sealing a husked but un,everted ear of popcorn in a bag that is transparent to radio-frequency energy, and exposing said bag and contents to radio-frequency energy for a time sufficient to evert by explosion the majority of the kernels of said ear, thereby causing separation of at least some of the everted kernels from the cob of said ear while leaving the un,everted kernels attached to said cob.

7. A method of preparing popcorn for consumption, comprising sealing a husked but un,everted ear of popcorn in a bag that is transparent to radio-frequency energy, and exposing said bag and contents to radio-frequency energy for a time sufficient to evert by explosion at least some of the kernels of said ear, the force of the explosion and eversion of the everted kernels being sufficient to cause a substantial number of such kernels to become completely separated from the cob of said ear but being insufficient to cause the complete separation from the cob of an appreciable number of such everted kernels, the complementarily separated kernels being caught and retained in said bag.

8. A method of preparing popcorn for consumption, comprising applying butter to the kernels of a husked but un,everted ear of popcorn, applying salt to said kernels, thereafter sealing said ear in a bag that is transparent to radio-frequency energy, and exposing said bag and contents to radio-frequency energy for a time sufficient to evert by explosion at least some of the kernels of said ear.

9. A method of preparing popcorn for consumption, comprising applying butter to the kernels of a husked but un,everted ear of popcorn, applying
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salt to said kernels, thereafter sealing said ear in a bag that is transparent to radio-frequency energy, and exposing said bag and contents to radio-frequency energy for a time sufficient to evert by explosion the majority of the kernels of said ear, thereby causing separation of at least some of the everted kernels from the cob of said ear while leaving the uneverted kernels attached to said cob, the separated kernels being caught and retained in said bag.

10. A method of preparing popcorn for consumption, comprising applying butter to the kernels of a husked but unshelled ear of popcorn, applying salt to said kernels, thereafter sealing said ear in a bag that is transparent to radio-frequency energy, and exposing said bag and contents to radio-frequency energy for a time sufficient to evert by explosion at least some of the kernels of said ear, the force of the explosion and eversion of the everted kernels being sufficient to cause a substantial number of such kernels to become completely separated from the cob of said ear but being insufficient to cause the complete separation from the cob of an appreciable number of such everted kernels, the completely separated kernels being caught and retained in said bag.

11. A prepared article of food comprising a natural popcorn ear having a plurality of the original kernels thereof, everted, and detachably secured to the cob thereof.

12. A packaged edible food product comprising a sealed package containing a natural popcorn ear having a plurality of the original kernels thereof, everted, and detachably secured to the cob thereof.

Percy L. Spencer.

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Certificate of Correction

Patent No. 2,480,679

PERCY L. SPENCER

August 30, 1949

It is hereby certified that errors appear in the printed specification of the above numbered patent requiring correction as follows:

Column 1, lines 9 and 10, for the name "Zea mays Evereta" read Zea Mays Everata; column 2, line 11, for the word "unsatisfactory" read unsanitary; line 53, after "can" insert then; column 3, line 4, after "oven" strike out the comma; column 6, lines 61 and 62, for "completely" read completely;

and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 3rd day of January, A. D. 1950.

[Seal]

THOMAS F. MURPHY,
Assistant Commissioner of Patents.