To all whom it may concern:

Be it known that I, IRVING HOCHSTADTER,
a citizen of the United States, residing at Far Rockaway, in the county of Queens and
State of New York, have invented a certain new and useful Process for Bleaching Foods,
which is my invention.

This invention relates to a process for bleaching foods, and more specifically to a
bleaching process wherein sulphur dioxide (SO₂) or sulphurous acid or a salt of sulphurous
acid is used, and the product then oxidized by hydrogen peroxide (H₂O₂) or other
peroxide or peroxides giving com-
pounds non-injuries to food.

Processes for bleaching with SO₂ (which expression is used herein throughout to in-
dicate SO₂ whether combined or uncom-
bined to produce other compounds such as
sulphurous acid, sulphites or bisulphites,
etc.) have been known for many years, but it
has been a troublesome matter to eliminate
the SO₂ remaining in the food after the
bleaching operation has been completed.

The federal and various State pure food
laws regulate and limit the SO₂ content in
foods, and it is therefore highly desirable
to make use of a process which can remove
entirely or decrease the amount of such SO₂
without damaging the food.

The invention has accordingly as an ob-
ject the provision of a process for removing
SO₂ from food without damage thereto, and
moreover with an improvement in its quali-
ties. It has as an object a process of bleach-
ing in which SO₂ is used in conjunction with
an agent which will assist in the bleaching
operation.

The invention accordingly relates to a
process which comprises treating a food with
SO₂ and then with H₂O₂. More specifically,
it relates to such a process wherein the H₂O₂
is added in amounts sufficient not only to
oxidize the SO₂, but also to itself bleach the
food.

The invention relates to the treatment of
foods of various kinds generally, but for the
sake of a specific description the following
embodiment is given:—

50 Gelatine which has been bleached with
SO₂ may be further treated by hydrogen
peroxide (H₂O₂) whereby not only additive
effects of both bleaching agents are obtained,
but also a combined effect which seems to
be due to the bleaching action of the per-
oxide on substances ordinarily not suscepti-
table to bleaching action by SO₂ or H₂O₂, but
which are conditioned by the treatment with
SO₂ so that they can be bleached by the sub-
sequent treatment with the peroxide. More-
ever, the mere additive effect of the SO₂
an H₂O₂ treatment secures a better bleach-
ing of the gelatine than by the action of
either agent alone since one is reducing and
the other oxidizing in its action. It is advis-
able to add from 2 to 4% of ammonium
hydroxide (NH₄OH) to aid and accelerate
the bleaching process with H₂O₂, and in case
there should be any acidity in the product
this can be neutralized with ammonium
hydroxide. The treatment with H₂O₂ is car-
ried out at a temperature of about 140° to
150° F. As a result of this treatment the
sulphur dioxide present is entirely elimi-
nated or reduced to the smallest possible
amount, which would not be more than a
trace.

As another embodiment of the invention,
the following is given:—

In the bleaching of cherries, SO₂ may be
added either uncombined as a gas or com-
bined as a solution of sulphurous acid or of a
sulphite such as sodium sulphite, which may
be used in the cold or with the application
of a little heat, and this treatment may be
continued from one to 24 hours, according to
circumstances. The SO₂ remaining is then
washed out with water as much as possible,
and there will be left an amount of SO₂
ranging from mere traces to five to six
thousand parts per million. The cherries
are then treated with H₂O₂ in the form of
a three to four per cent solution in an
amount sufficient to oxidize the SO₂ to
H₂SO₄ or compounds of the same and also
to further bleach the cherries. In this
bleaching operation the action is an oxidiz-
ing one as contrasted to the reducing
bleaching action of the SO₂. As a result, in
this embodiment of my invention, also, the
sulphur dioxide present is entirely removed
or reduced to the smallest possible amount
which would not be more than a trace.

The sulphuric acid H₂SO₄ and compounds
thereof formed in the above processes may
be then removed by washing or preferably
by treatment with an alkali to neutralize the
acid or both. The alkali used may be am-
onium carbonate, ammonium hydroxide,
sodium carbonate or sodium bicarbonate,
sodium hydroxide, calcium hydroxide, or
any other alkali which will not be injurious
to the food, a volatile alkali being particu-
larly suitable since it can evaporate and leave
no impurity in the food product. The alkali furthermore aids in the bleaching action since hydrogen peroxide is particularly active as a bleaching agent in alkaline media.

In these processes the SO₂ and H₂O₂ bleach more permanently than SO₂ alone since the latter in its bleaching effect operates as a reducing agent whereas the SO₂ plus H₂O₂ operate with an oxidizing effect due to the action of the H₂O₂, also the SO₂ and H₂O₂ bleach more effectively than H₂O₂ alone. There will, therefore, be a combined bleaching operation beginning with a reducing bleaching action and ending with an oxidizing bleaching action so that any de-colorizing substance present in the food which will respond to an oxidizing or reducing action will be effectively attacked and bleached.

A large number of other foods may be similarly treated, such as fruit products, syrups, nuts, potatoes, apples, cereals, and in fact any kind of food susceptible to such treatment. The treatment of fruit products by this method is particularly desirable since a bleaching operation is generally necessary and must be thorough in order to make the goods marketable. For example, in the drying of apples the latter are cut into slices and then put into an evaporating chamber through which hot air at about 155° F. is passed in a careful manner to remove all but a small per cent of the water. During this operation the oxygen of the air is very likely to cause the apples to discolor, and it is necessary to bleach them to make them white. If the bleaching operation is not effective in retaining the white color, the apples cannot command as high a price on the market as pure white dried apples.

The same is true of dried sliced potatoes. By the treatment of this invention, the white color is made permanent and the SO₂ is at the same time removed.

Any H₂O₂ which remains in the foods does no harm since it breaks up to form water and oxygen gas very rapidly.

By the term SO₂ in the claims I mean either sulphurous acid, a salt thereof, or an SO₂ producing composition, and by the term H₂O₂ I mean hydrogen peroxide, a metallic or other peroxide, or a peroxide giving composition non-injurious to foods. As many apparently widely different embodiments of this invention may be made without departing from the spirit thereof, it is to be understood that I do not intend to limit myself to the specific embodiment thereof, except as indicated in the appended claims.

I claim:

1. The process which comprises treating a food with SO₂ and then with H₂O₂ unmixed with additional acids.

2. The process which comprises treating a food with SO₂ and then with H₂O₂ unmixed with additional acids in sufficient amount to oxidize the SO₂.

3. The process which comprises treating a food with SO₂ and then with H₂O₂, and neutralizing the acid oxidation product formed with an alkali.

4. The process which comprises treating a food with SO₂ and then with H₂O₂ in sufficient amount to oxidize the SO₂, and neutralizing the acid oxidation product formed with an alkali.

5. The process which comprises treating a food with SO₂, washing in water to remove some SO₂, and then treating with H₂O₂.

6. The process which comprises treating a food with SO₂, washing with water to remove some SO₂, then treating with H₂O₂ and neutralizing the acid oxidation product formed with an alkali.

7. The process of removing SO₂ from a food bleached thereby, comprising treating it with H₂O₂ in quantities sufficient to oxidize the SO₂ and then neutralizing the acid oxidation product formed with a volatile alkali.

8. The process of bleaching a food comprising treating it with SO₂ and then with H₂O₂ in amounts sufficient to oxidize the SO₂ and to further bleach the food.

9. The process of bleaching a food comprising treating it with SO₂, washing with water, and then treating with H₂O₂ in amounts sufficient to oxidize the SO₂ and to further bleach the food.

10. The process of bleaching a food comprising treating it with SO₂ and then with H₂O₂ in amounts sufficient to oxidize the SO₂ and to further bleach the food, and neutralizing the acid formed with an alkali.

11. The process of bleaching a food comprising treating it with SO₂ and then with H₂O₂ in amounts sufficient to oxidize the SO₂ and to further bleach the food, and then neutralizing the acid formed with a volatile alkali.

12. The process of bleaching a food comprising treating it with SO₂, washing with water, and then treating with H₂O₂ in amounts sufficient to oxidize the SO₂ and to further bleach the food, and neutralizing the acid formed with an alkali.

13. The process of bleaching gelatine comprising treating the gelatine with SO₂ and then with H₂O₂.

14. The process of bleaching gelatine comprising treating the gelatine with SO₂ and then with H₂O₂ in the presence of ammonium hydroxide.

In testimony that I claim the foregoing, I have hereunto set my hand this 21st day of March, 1921.

IRVING HOCHSTADTER.