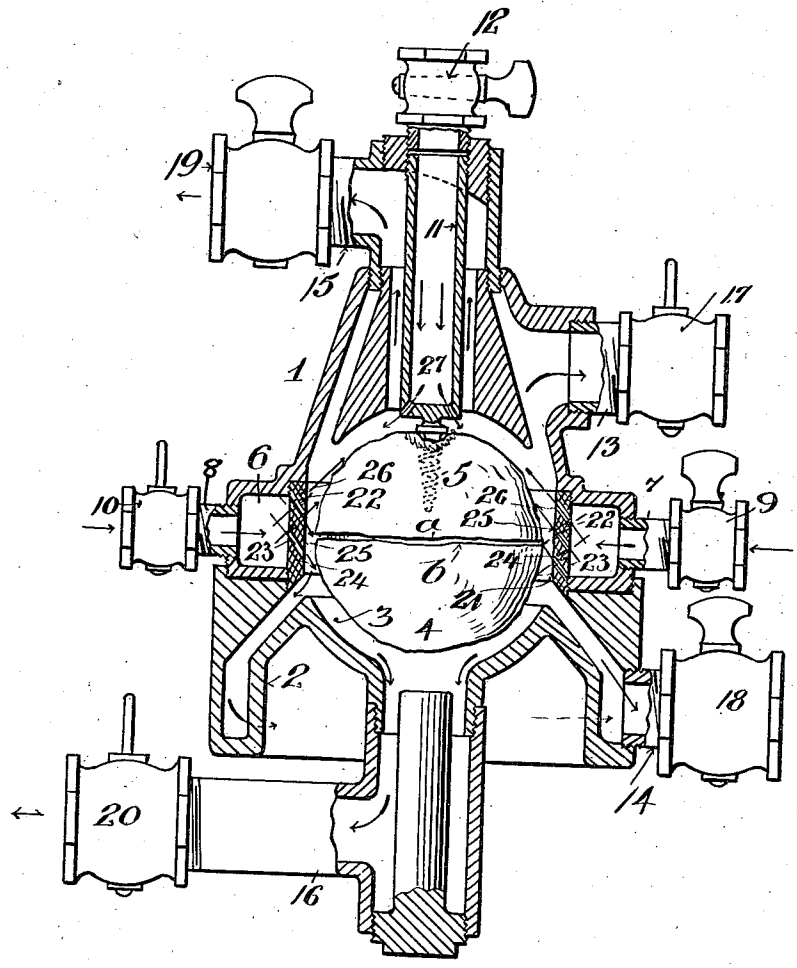
W. B. FENN.

PROCESS FOR REMOVING THE SKINS FROM FRUITS AND VEGETABLES.

APPLICATION FILED MAR. 13, 1917.

1,243,724. Patented Oct. 23, 1917.



Inventor.
William B. Fenn
By his atty Samuel P. Darby

UNITED STATES PATENT OFFICE.

WILLIAM B. FENN, OF NEW YORK, N. Y.

PROCESS FOR REMOVING THE SKINS FROM FRUITS AND VEGETABLES.

1,243,724. Specification of Letters Patent. Patented Oct. 23, 1917.

Continuation in part of abandoned applications Serial No. 95,323, filed May 4, 1916, and Serial No. 109,904, filed July 18, 1916. This application filed March 13, 1917. Serial No. 154,434.

To all whom it may concern:

Be it known that I, WILLIAM B. FENN, a citizen of the United States, residing at New York, in the county and State of New York, have made a certain new and useful Invention in Processes for Removing the Skins from Fruits and Vegetables, of which the following is a specification.

This invention relates to a process for removing the skins from fruit or vegetables.

The object of the invention is to provide a process for removing the skins from fruit or vegetables which is practical, expeditious and effective and which does not injure the meat or body of the article during the operation.

Other objects of the invention will appear more fully hereinafter.

The invention consists substantially in the mode of operation as will be more fully hereinafter set forth, as illustrated in the accompanying drawing, and finally pointed out in the appended claims.

I will describe my invention in connection with the removal of the skin from tomatoes but it is to be understood that I do not limit myself to such use of my invention as I have found that the skins of other fruits and vegetables may be removed by employing the process of my invention. In this connection I may mention that my process has been successfully applied in the removal of the skins from peaches, beets, apples, and the like.

The process of removing the skins from tomatoes as heretofore most commonly practised has proven to be not only slow and expensive but ineffective to thoroughly remove all particles of the skin from the tomato. Moreover, a large part of the meat or body of the tomato is frequently removed along with the skin. This adds to the cost and is unsatisfactory, particularly in canning and preserving establishments where the articles to be treated are required to be handled in large quantities.

In accordance with my invention I propose to effect the practical, economical, successful, complete, and expeditious removal of the skin from the articles treated without removal of or injury to the meat or body of such article.

In carrying out my invention I subject the article to be treated to the action of heat and pressure and then reduce the pressure, thereby effecting a rupture and removal of the skin from the article without injury to such article and without removal of the meat or body thereof.

In practice I have found it preferable to apply the heat and pressure only momentarily to the article to be treated and then to effect the reduction of pressure quickly. To this end I have found it best to supply the heat and pressure to an inclosed space within which the article to be treated is placed, and then to suddenly or quickly open such space to exhaust. I have found that steam under suitable pressure and at a suitable temperature is an effective agent for supplying the heat and pressure to the article under treatment, and, in order to secure the best results I prefer to deliver the steam within the inclosed space in fine jets or sprays, and to direct such jets or sprays against the tomato, for example, in such manner as to cause the skin thereof to rupture and to be stripped or peeled off therefrom and removed, when the reduction of pressure is effected by suddenly opening the inclosed space to quick exhaust.

It is to be understood that when I refer to jets in describing the process of my invention I do not desire to be limited or restricted to any technical definition of such term, but I mean thereby to include also sprays, streams or analogous conditions.

I have found that when an article, as for example a tomato, is subjected to heat and pressure within a closed chamber, apparently the moisture or water content of the juice immediately inside the skin of the tomato vaporizes or expands thereby developing a force inside the skin which, while not penetrating appreciably into the meat of the tomato, depending more or less upon the degree of heat and pressure and the time of exposure of the tomato to the action thereof, tends to effect a rupture of the tomato skin. As long as the application of the heating and pressure medium continues this expansive force inside the skin seems to be more or less restrained from bursting through or rupturing the tomato skin. If however, the closed chamber is suddenly opened to full exhaust what appears to be an explosive action takes place. The previously repressed or restrained expansive

force inside the skin of the tomato seems thereby to be released or to burst through and rupture the skin of the tomato and the force of the exhaust, aided perhaps by the continued supply of heating medium under pressure, effects the stripping of the ruptured skin from the tomato and its discharge from the chamber through the exhaust opening. By suitably and properly adjusting the time of exposure of the tomato to the heating and pressure medium, as well as the degree of heat and pressure of such medium and the relative areas of supply and exhaust, the process may be varied to suit different kinds of fruit or vegetables and different conditions of ripeness thereof.

While I do not desire to be limited or restricted thereto in the broadest scope of my invention as defined in the claims I have found, in practice that the best results are attained when the heating and pressure medium is directed in fine jets against the tomato, or other article, along a circumferential line approximately at its middle. This being the line of greatest diameter of the tomato, the expansive action which takes place, inside the skin of the article is greatest and the most rapid along this line. To take advantage of my invention to the fullest extent thereof, therefore, the jets should be concentrated upon this medial circumferential line and preferably in opposing directions inclined to the central longitudinal axial line of the tomato. Other series of jets are also preferably employed and arranged to deliver in inclined directions at other points onto the exterior surface of the tomato. By concentrating oppositely inclined jets upon the circumferential medial line of the tomato not only is the outwardly expansive force developed inside the skin of the tomato increased along such line that at the instant of rupture of the skin along this line due to the opening of closed chamber to exhaust, and the resulting explosive action, as above described, the jets engage underneath the ruptured edges of the skin and very materially aid in action, of stripping the skin from the tomato. The action in this respect of the oppositely inclined jets which are concentrated at the medial line referred to is supplemented on the opposite sides respectively of said medial line by the other series of inclined jets above mentioned which impinge on the tomato at points more or less removed from the circumferential medial line, thereby resulting in a very rapid stripping of the skin from the tomato and the removal of the stripped skin from the closed space in which the action takes place. It is obvious that as many jets or series of jets may be employed as are desired or required to accomplish expeditious and efficient results.

The area of the exhaust opening should, in practice, greatly exceed the combined areas of the supply jets in order to secure the best results.

By opening the closed chamber to exhaust in advance of the closing of the pressure supply to the chamber the jet action is intensified thereby insuring an expeditious and efficient skin stripping and removing action. Ordinarily one cycle of operation is sufficient if proper timing and regulation is observed as only practical experience can demonstrate; but if a single operation is found insufficient then it may be repeated as often as may be necessary, until the peeling action is complete.

The degree of inclination of the jets as well as the numbers thereof and their areas, the size and structure of the closed chamber, the area and location of the exhaust, the control and location of the pressure and heating medium supply, the length of time during which the supply is maintained before opening the chamber to exhaust, the length of time during which the exhaust remains opened, the character of the pressure medium, the degree of heat and of pressure, the manner of supporting the tomato or other fruit or vegetable while being treated, and other matters and variations are all details which are largely dependent upon and determined by the nature, size and condition of the particular fruit or vegetable to be treated, the experience gained by actually carrying out the process, and other considerations which will be readily recognized and appreciated by those skilled in the art.

The process above described may be carried out in a wide variety of arrangements and structures of apparatus. I have shown and will now describe an illustrative arrangement of apparatus which I have found suitable for the purpose, and wherein a casing 1 is employed having a removable portion 2, these parts when assembled forming a closed chamber or space 3. The portion 2 is detachable to permit the article 4 to be inserted and removed from the chamber 3. The article 4 is supported within the chamber 3 in any suitable or convenient manner. A cork-screw point 5 is shown as one form of means for this purpose. The casing is formed with an annular chamber 6 to which the steam or other medium is supplied through connections 7, 8 respectively controlled by the valves 9, 10. A supply connection to the chamber and preferably delivering to the core end of the article 4 is afforded by a connection 11 which is controlled by a valve 12. This feature is particularly desirable and preferred where tomatoes are to be peeled for the reason that, ordinarily, the skin is thickest and toughest at the core end thereof, and by the provision of a supply of heating and pressure medium at this point the complete, expeditious and

thorough removal of the skin is insured. The various supply connections 7, 8, 11, may be disposed in any suitable relation with respect to each other, and while I have shown each one provided with its own control valve, my invention, of course, is not to be limited or restricted in this respect, the essential object being to supply the jet medium in such manner as to accomplish in the most advantageous way the objects and purposes in view.

Communicating with the chamber 3 are the exhaust connections 13, 14, 15, 16, which are controlled in any suitable manner, as for example, by means of the valves 17, 18, 19, 20.

The chamber 6 is separated from the chamber 3 by an annular wall 21, which, in the particular arrangement shown, is provided with jet openings 22, 23, 24, 25, 26, arranged in a plurality of annular series. The jets 22, 23, are preferably so inclined as to deliver at different circumferential lines toward one end of the article 4, while the jets 24, 25, 26, are so inclined as to deliver at different lines toward the other end of the article. The jets 24, 25 are so disposed as to deliver in oppositely or relatively inclined directions upon the circumferential medial line of the article 4. The supply connection 11 is also provided with jet openings 27, which in the form shown, deliver in relatively inclined directions upon or toward the core end of the article 4.

The operation is exceedingly simple. The fruit or vegetable 4 is placed within the chamber 3 which is then closed steam tight, in case steam is employed as the heating medium. The supply connections 7, 8, and 11, are then opened until the desired maximum temperature and pressure are attained within the chamber. In practice, and in the case of tomatoes, for illustration, I have found that a temperature of approximately 323° F. and a pressure of approximately 75 pounds within the chamber 3 is ordinarily sufficient. One of the exhaust connections, say connection 13 is then suddenly or quickly opened and then closed after permitting a momentary flow of the pressure medium through the supply connections and the exhaust. The explosive action resulting from the sudden opening of the exhaust, causes the skin of the article 4 to become ruptured. Where the supply of pressure medium is concentrated along the circumferential medial line of the article this rupture of the skin takes place along said line as indicated at *a*, *b*. At the same time the jet action is intensified by reason of the opening of the closed chamber to exhaust. The centrally concentrated inclined jets catch the edges of the ruptured skin and start the stripping or peeling action, in both directions from this line. The other jets 23, 25, 26, catch the skin as it is stripped from the fruit and continues the stripping actions. This operation takes place almost instantaneously with the result that the skin is stripped or peeled from the fruit or vegetable quickly and efficiently and without carrying with the stripped skin any of the meat or body of such fruit or vegetable and without injury to such meat or body. The skin is not only stripped or peeled from the article, but is expelled from the closed chamber along with the exhaust through the exhaust opening.

If the opening and closing of one of the exhaust connections is found insufficient to effect a complete removal of the skin then the operation is repeated by the sudden opening and closing of the same or of another exhaust connection, thereby repeating the action above described as often as may be necessary.

As above stated the area of each exhaust connection should greatly exceed the combined areas of all the jets.

I have found that the efficiency and expedition of the action of the apparatus is increased where one or more of the exhaust connections is located on one side of the circumferential medial line of the article and one or more of the others on the opposite side of such line. This, however, is a detail to which my invention is not to be limited or restricted.

The various exhaust connections may be opened and closed, as above described, in successive order, if desired, or in any desired order, or only one or another or some of them operated. In like manner the speed at which the exhaust connections are opened and the duration of time they are held open are all details which can be controlled and varied and best determined by the operator through experience gained in handling the apparatus, and dependent upon the nature, character, and condition of the particular fruit or vegetables being treated.

As above stated the apparatus shown and described for carrying out the process of my invention is purely illustrative of one form which I have found practical for the purpose. In practice, however, and particularly where large quantities of fruits or vegetables are to be peeled, more elaborate and automatic apparatus will be employed. My invention, therefore, is not to be limited or restricted in respect to the particular structure or arrangement of apparatus employed for carrying it into practical operation. I have also explained what I believe to be the correct theory of the action which takes place in carrying out my invention as well as the best mode in which I at present contemplate carrying my invention into practical operation. It is obvious, however, that another theory or explanation of the

action may be equally correct, and that the invention may be practised and its benefits and advantages achieved by immaterial or obvious variations from the details set forth without departure from the spirit or scope of my invention.

What I claim as new and useful and of my own invention, and desire to secure by Letters Patent is—

1. The method of removing the skin from tomatoes or similar fruit or vegetables, which consists in subjecting the article to heat and pressure and then reducing the pressure, for the purpose described.

2. The method of removing the skin from tomatoes or similar fruit or vegetables which consists in subjecting the article to steam under pressure and then reducing the pressure, for the purpose described.

3. The method of removing the skin from tomatoes or similar fruit or vegetables which consists in subjecting the article to heat and pressure and then quickly reducing the pressure for the purpose described.

4. The method of removing the skin from tomatoes or similar fruit or vegetables which consists in subjecting the article to heat and pressure and then momentarily reducing the pressure for the purpose described.

5. The method of removing the skin from tomatoes or similar fruit or vegetables which consists in subjecting the article to heat and pressure within a closed space, and then opening said space to exhaust, for the purpose described.

6. The method of removing the skin from tomatoes or other fruits or vegetables, which consists in subjecting the article to be treated to the action of a heated medium supply under pressure and then rupturing the skin of such article by reducing the pressure to which the article is subjected, and utilizing the said medium to strip off and carry away the ruptured skin.

7. The method of removing the skin from tomatoes or other fruit or vegetables, which consists in subjecting the article to steam under pressure, and rupturing the skin of the article by reducing the pressure, and utilizing the steam pressure supply to strip off and remove the ruptured skin.

8. The method which consists in confining a tomato or other article of fruit or vegetable within a closed space and supplying a heating medium under pressure to such space, then opening such space to exhaust to effect a rupture of the skin of the article, and utilizing the supply of heating medium to strip the skin from the article and carry the same away.

9. The method of removing the skin from tomatoes or other vegetables or fruits, which consists in confining the article within a closed space, then supplying a heating medium under pressure to such space and concentrating the delivery of such medium upon a circumferential medial line of the article, and finally opening the closed spaced to exhaust.

10. The method of removing the skin from tomatoes or other vegetables or fruits, which consists in confining the article within a closed space, then supplying a heating medium under pressure to such space in jets directed upon the article and then opening the space to exhaust.

11. The method of removing the skin from tomatoes or other vegetables or fruits, which consists in confining the article within a closed space, then supplying a heating medium under pressure to such space in jets directed upon, and in a direction inclined to the article, and then opening the space to exhaust.

12. The method of removing the skin from tomatoes or other vegetables or fruits, which consists in confining the article within a closed space, then creating a pressure and a heated condition within the closed space, and then opening the closed space to exhaust, to rupture, strip off and remove the skin from the article.

13. The method of removing the skin from tomatoes or other vegetables or fruits, which consists in confining the article within a closed space, then supplying a heated medium to said space and creating a pressure within said space, and then opening the closed space to exhaust to cause the skin of the article to be ruptured and stripped off.

14. The method of removing the skin from tomatoes or other vegetables or fruits, which consists in confining the article within a closed space, then supplying a heated medium to said space in jets directed against the article and creating a pressure within said space and then opening the closed space to exhaust to cause the skin of the article to be ruptured and stripped off.

15. The method of removing the skin from tomatoes or other vegetables or fruits, which consists in confining the article within a closed space, then supplying a heated medium to said space in jets directed against the article in oppositely inclined directions.

16. The method of removing the skin from tomatoes or other vegetables or fruits, which consists in confining the article within a closed space, then supplying a heated medium to said space in jets directed against the article circumferentially at its medial line.

17. The method of removing the skin from tomatoes or other vegetables or fruits, which consists in confining the article within a closed space, then supplying a heated medium to said space in jets directed against the article circumferentially at its medial line and in oppositely inclined directions.

18. The process of removing the skins

from tomatoes which consists in jetting steam upon the tomato in opposite directions whereby said jets impinge upon said tomato at its medial circumference.

19. The process of removing the skins from tomatoes which consists in delivering steam in jets in an inclined direction against the tomato.

20. The process of removing the skins from tomatoes which consists in delivering steam in jets in oppositely inclined directions against the tomato.

21. The process of removing the skins from tomatoes which consists in delivering steam in jets in oppositely inclined directions against the circumferential medial line of the tomato.

22. The process of removing the skins from tomatoes which consists in delivering steam in jets against the tomato at different circumferential lines.

23. The process of removing the skins from tomatoes which consists in delivering steam in jets against the tomato in inclined direction at different circumferential lines.

24. The process of removing the skins from tomatoes which consists in delivering steam in jets against the tomato in oppositely inclined direction at different circumferential lines.

25. The process of removing the skins from tomatoes which consists in subjecting the tomato to the action of steam under pressure, and then delivering jets of steam against the same in inclined direction.

26. The process of removing the skins from tomatoes which consists in subjecting the tomato to the action of steam under pressure, and then delivering jets of steam against the same in oppositely inclined directions.

27. The process of removing the skins from tomatoes which consists in subjecting the tomato to the action of steam under pressure, and then delivering jets of steam against the same at its circumferential medial line in an inclined direction.

28. The process of removing the skins from tomatoes which consists in subjecting the tomato to the action of steam under pressure, and then delivering jets of steam against the same at its circumferential medial line in oppositely inclined direction.

29. The process of removing the skins from tomatoes which consists in subjecting the tomato to the action of steam under pressure, and then delivering jets of steam against the same in inclined direction and at different circumferential lines.

30. The process of removing the skins from tomatoes which consists in confining the tomato within a closed space, then supplying steam under pressure in jets inclined thereto, and finally opening the space to exhaust.

31. The process of removing the skins from tomatoes which consists in confining the tomato within a closed space, then supplying steam under pressure in jets inclined thereto, in opposite directions, and finally opening the space to exhaust.

32. The process of removing the skins from tomatoes which consists in confining the tomato within a closed space, then supplying steam under pressure in jets and in oppositely inclined directions to the circumferentially medial line thereof, and finally opening said space to exhaust.

33. The process of removing the skins from tomatoes which consists in confining the tomato within a closed space and supplying steam under pressure thereto, and then jetting steam upon the tomato.

34. The process of removing the skins from tomatoes which consists in confining the tomato within a closed space and supplying steam under pressure thereto, and then jetting steam upon the tomato in an inclined direction.

In testimony whereof I have hereunto set my hand on this 26th day of February, A. D., 1917.

WILLIAM B. FENN.