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METHOD OF PRESERVING FRUITS.

(Application filed Mar. 15, 1902.)

Fig. 2.

Fig. 3.

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Fig. 12.

Fig. 13.

Fig. 14.

INVENTOR

George curb.

WITNESSES:

n. lamour.

THE SHEET MUST BE POSTED, ANN AND BOR, B. L.
To all whom it may concern:

Be it known that I, JEAN MARIE AUGUSTE LACOMME, a citizen of the Republic of France, and a resident of New York, borough of Brooklyn, in the county of Kings and State of New York, have made and invented certain new and useful Improvements in Methods of Preserving Fruits and other Substances, of which the following is a specification.

My invention relates to an improved method or process of sterilizing, purifying, and preserving or arresting the decay of vegetable and animal foods, such as fruits, cereals, vegetables, meat, fish, &c.; and it consists in certain steps hereafter described, and pointed out in the claims.

In order to carry out the process, I have devised means which are illustrated in the accompanying drawings, in which—

Figure 1 represents a box or closed compartment in perspective having attached thereto the several devices for carrying out the various steps of the process. Figure 2 is a vertical sectional view showing the interior of the box. Figure 3 is a horizontal sectional view of the same taken on the line 3 3 of Figure 2. Figure 4 is a vertical sectional view taken on the line 4 4 of Figure 2, one of the shelves or supports being partially withdrawn from the box. Figure 5 is a view of the rear side of the box, showing the arrangement of the electric wires or conductors. Figure 6 is a sectional view of one of the detached drawers or shelves. Figure 7 is a rear end view of one of the shelves, showing the arrangement of the push-buttons or electric contacts attached thereto. Figure 8 is a detail view of the contacting device attached to the rear end of the shelf and the back of the box. Figure 9 is a view in side elevation of the air-pump and its operating devices. Figure 10 is a view of the pump, partly in section and partly in elevation and on an enlarged scale. Figure 11 is a top plan view of the same. Figure 12 is a view in side elevation of a cylindrical wire screen to be substituted in the place of the shelves in the treatment of grains. Figure 13 is an end view of the same, and Figure 14 is a detail view showing the arrangement of the rolling electric contacts thereon. Figure 15 is a sectional view of the boiler or steam-generator. Figure 16 is a sectional view of the fumigating apparatus. Figure 17 is a view, partly in section and partly in elevation, of a device for purifying the air to be subsequently utilized in the treatment of the fruits or other substances; and Figure 18 is a sectional view of the receptacle containing the refrigerating liquids or gases. Figure 19 is a detail view showing one set of valves in the air-pump.

In carrying out my improved method I employ an air-tight box or compartment 15, preferably made with outwardly-swinging doors 16 17, the latter being provided with the glass windows 18, in which air-tight box or compartment is placed the substances to be treated. Within the box 15 and to the ends 19 20 are secured the horizontal rails or tracks 21, and to the vertical supports 22, located midway between the ends 19 20 and in the front 23 and rear of the box, are secured the ends of the horizontal tracks or rails 23, on which tracks or rails are supported the shelves 24 in vertical rows or tiers, and which, in order to facilitate their entrance into and removal from the box or compartment, are provided with the wheels or rollers 25. Each of these shelves is preferably constructed with a forward end piece 26, rear end 27, and with the side pieces 28, the front and rear sides 26 and 27 being formed of non-conducting material—such as wood, hard rubber, &c.—and connected by a series of metal bars or rods 29, placed at such distances apart as will hold or support the material or substance under treatment without allowing it to drop or fall through or between them and insulated from each other. To the rear side or end piece 27 of each of these shelves or drawers are secured the pins or push-buttons 30 31, each being electrically connected to the alternate bars 29—as, for instance, in Figure 7 the pin or contact-piece 30 has leading therefrom the wire or conductor 32, from which the branches 33 lead to and are connected with the alternating rods 29, and the pin or contact-piece 31 has leading therefrom the wire or conductor 34, from which the branches 35 lead to the remainder of said rods—the effect of this arrangement being that when the negative and positive
poles of a battery, dynamo, &c., are brought into contact with the buttons 30, 31. The circuit will be completed through the material or substances resting upon and supported by the rods or bars 29. As shown in Fig. 8, each of the contact-pins 30 passes through the rear end piece 27 of the shelf or drawer and also through a box or receptacle 36, secured to said end piece, and which box or receptacle contains a spring 37, one end of which bears against the non-conducting material 27, of which said end piece is made, and the other end against the disk 38, secured to said pin 30, the tendency of the spring being to afford a yielding contact and to keep or retain the pin in its outer adjustment.

As shown in Fig. 5 of the drawings, the rear side 39 of the box is provided with a series of binding-posts passing through the same and with the inner ends of which the pins or buttons 30, 31, secured to the shelves, come in contact. From any suitable source of electricity—as, for instance, a battery, dynamo, or other street-mains—lead the positive and negative wires or conductors 40, 41, the former by means of branches 42 connecting the vertical series of binding-posts 43 and the latter by means of the branches 44 connecting the series of binding-posts 45, said posts 43 being arranged or located to make electrical contact with the push pins or buttons 31 and the binding-posts 45 to make electrical contact with the push pins or buttons 30 when the shelves are in their proper positions within the box or compartment 15, as illustrated in Fig. 4. It will be understood from the foregoing that when these shelves or drawers 24 are pulled outwardly electrical contact is made with the posts 43 and 45 in broken and that when rolled backwardly into their proper positions the push-buttons 30, 31 come into contact with the inner ends of the binding-posts 43, 45, the circuit being completed through the material or substance resting upon the alternating bars or rods 29.

Within a short distance of the box or compartment 15 is mounted an air-pump on the bracket or support 46, the latter being provided with suitable bearings throughout which passes the shaft 47, Fig. 9, on one end of which shaft is the air-pump 48 and on the opposite end the gear-wheel 49. This pump 48 is made in the form of an annular tube or hollow ring and provided at the top with the air-tight partition 50, dividing the ring or tube into two sections, each of which is partially filled with the liquid 51, hereinafter referred to. On either side of the partition are two valve-openings 52, 53, connected by means of the hollow yoke 64, the latter being provided with the short tube or pipe 55, the outer end of the latter being open. Within the tube or hollow ring 48 are located the valves 56, adapted to close the opening 52, and the valve 57, adapted to close the opening 53. In the annular tube 48 are formed two other openings, one on either side of the partition 50 and connected by the hollow yoke 58, which openings are also adapted to be closed by valves similar to those numbered 56, 57, but working in the opposite direction, as illustrated in Fig. 19. From the hollow yoke 58 leads the pipe 59, provided with a valve 130, the lower end of which pipe is connected with the pipe 60, Fig. 3, provided in dotted lines in Fig. 1, passing through the side 19 of the box or compartment 15 and extending along the floor the length of said box, that portion of said pipe 60 within the box being provided with perforations, the free end of the pipe being closed in order that the air forced in and through the pipe by the pump 48 may be distributed through the box through said perforations. Meshing with the gear-wheel 49 is the sector 61, Fig. 9, formed on the upper end of the rod 62, the lower end of which rod is pivoted to the bracket 46. On this bracket are also mounted the gears 63, 64, meshing with each other, and the former connected to the rod 62 by means of the rod 65. The gear 64 being turned or rotated by hand or power, its motion will be transmitted through the gear 63 and rod 65 to the sector 61, causing the latter to oscillate, a similar oscillating movement being imparted to the pump 48 through the gear 49 meshing with said sector. During this oscillation the liquid 51 in the annular tube or pipe 48 acts as a piston, each half of the ring alternately drawing in the air through the pipe 55 and expelling the same through the pipe 59 and out of the perforations in the latter into the box or compartment 15.

From the top of the box or compartment 15 leads a pipe 66, to which is connected the pipe 67, provided with the valves 68, 69, on either side of its connection with the pipe 66, one end, 70, of said pipe 67 being open and the opposite end leading to the box or receptacle 71, Fig. 1, which is preferably made of glass and contains the filtering-cotton 73, and from which box or receptacle leads the pipe 72 to the lower end of the reservoir 73, which latter is partially filled with liquid 74, as illustrated in Fig. 17. From the upper end of the receptacle or reservoir 73 leads an exhaust-pipe 75, provided with the valve 76, and also a pipe 77, leading into the upper end of the chamber or box 15, which pipe 77 is provided with a valve 78.

To the end 30 of the box or compartment 15 is secured a small rectangular box 80, opening into the compartment and containing a sparking coil 81 of any desired pattern or construction, the purpose of which is to partially decompose the air and produce or generate ozone to spread through the interior of said compartment, said box or receptacle 80 being hermetically sealed around the outer sides. To the sparking coil lead the wires or conductors 82, 83, branching from the wires or conductors 84, 85, leading from a suitable battery, dynamo, or other source of electricity. It will be understood, of course, that instead
of locating the sparking coil itself within the box or receptacle 80 it may be located at any other convenient place and the electrodes connected therewith by wires or conductors placed or located within the receptacle 80. Below this receptacle 80 and to the end 29 of the box 15 is secured the receptacle 86, which contains an X-ray apparatus 87, consisting of the usual induction-coil and Crookes tube, this box or compartment 86 opening into the compartment 15 and hermetically sealed to prevent the escape of air and gases from the interior of said compartment 15. The boxes or receptacles 80 and 86, with their contained sparking coil and X-ray apparatus, are duplicated on the opposite end 19 of the compartment, as illustrated at 88 and 89, and branch wires or conductors 90 91 leading from the main wires 84 85 to the sparking coil contained within the receptacle 88 and branch wires 92 93, leading from said main wires to the X-ray apparatus contained within the box or receptacle 89. Connected with the box or compartment 15 is a boiler or steam-generator 94, from which leads a steam-supply pipe 95 into the lower end of said box or compartment, that portion of the pipe 96 contained within the box and extending practically the length thereof being perforated, in order to allow of the escape of the steam therefrom into and throughout the compartment. This boiler or steam-generator 94 may be constructed in any desired way, that shown in the drawings, Fig. 15, consisting of an outer casing 97, supported on the base 98, in which latter is contained a gas or other burner 99, the casing containing the tubes 100 surrounded by the water 101. To the top of the casing is secured the dome 102, provided with the pipe 103, through which the boiler may be filled, and with a safety-valve 104, the pipe 95 leading from said dome being provided with the valve 105. Connected with the box or compartment is a fumigating device 106, which may be constructed in any desired manner, but preferably like that illustrated in Fig. 10 of the drawings, wherein 107 represents an outer casing supported on the base 108, in which latter is contained the burner 109. The outer casing 107 is partially filled with water 110, admitted through the pipe 111 leading from the dome 112, secured to the top of the casing. Within the outer casing is contained an inner receptacle 113, resting upon the bottom of the outer casing, and from which leads a pipe 114, the latter passing through the top of the dome 112 and provided with a valve 115. This pipe 114 passes into the box or compartment 15, that portion of the pipe 116 contained within said box being perforated, as illustrated in Fig. 13 and in dotted lines, Fig. 1. Within the inner casing or receptacle 113 is contained a fumigating material 117, consisting of gums, resins, or other harmless antiseptic substances—such, for instance, as arabic, tragacanth, myrrh, and other aromatic gums—such being let into the inner receptacle or chamber 113 through the pipe 118, the purpose and effect being that when the burner 109 is lighted the bottoms or lower plates of the inner and outer receptacles will be heated and fumes from the antiseptic gums or resins caused to pass through the pipe 114 and out through the perforated pipe 116, contained within the box or compartment 15 when the valve 115 in the pipe 114 is opened and the water 110 contained within the outer receptacle heated and boiled for assisting the burner in heating the fumigating substances contained within the inner receptacle. With the box or compartment 15 is also connected the box or receptacle 119, containing ice 120, or as a substitute therefor any cooling liquid organs, such as liquid air or petroleum, ether, introduced through the pipe 121. From the lower end of the receptacle 119 leads the pipe 122, containing a valve 123, said pipe 122 passing into the lower end of the box 15 and crossing and recrossing the lower part or portion thereof, as illustrated in Fig. 3, until finally it passes out of the opposite end thereof and ending in the faucet or tap 124, from which the water or cooling liquid may be drawn and again supplied, if desired, to the receptacle 119 through the pipe 121. To the top of the box or compartment 15 is connected a pipe 125, provided with a valve 126, to the end of which pipe may be secured when desired an air-compressor of any desired type or pattern, (not shown,) such being used in case it is necessary to subject the contents of the box to air or gas under pressure, a gage 127, Fig. 1, being provided to indicate such pressure within the box and 105 also a safety-valve 128 to allow of the escape of said air or gases should the pressure become too great. If desired, a thermometer 129 may also be connected with the box to show the temperature of the air or gases contained within the same. After placing the substances to be treated on the shelves 24 the latter are run into the box or compartment 15, the doors 10 17 being then tightly closed, it being understood that at the commencement of the operation all of the valves are closed. When the shelves are properly located within the box 15, the push-buttons 30 31 will make electrical contact with the binding-posts 43 45, and thereby complete the circuit of electricity through the material or substances resting upon the alternating bars or rods 29 of said shelves, as heretofore described, the intensity being employed, whereby all animal life—such as grubs, worms, parasites, &c.—contained in or on the substances under treatment is killed, the electric current being allowed, if necessary, to flow through the bars of the shelves and the substances supported thereon during the entire time of the following operation: The valve 69 in the pipe 68 be-
ing opened, as well as the valve 130 in the pipe 59, the air-pump 48 is put into operation by oscillating the same, whereby a volume of air (the amount depending on the velocity of the oscillations) is directed and forced through the pipe 59 and out through the perforated pipe 60 into the chamber or compartment 15, from which it escapes through the pipe 68 and out of the open end 70 of the pipe 67, the current or draft of air thus flowing into, through, and out of the chamber or compartment, carrying with it the dust and other impurities contained within said chamber and held in suspension in the atmosphere. This operation being completed I then close the valve 68 and open the valve 60, thereby causing the air to pass through the pipe 67 into the receptacle 71 containing the filtering-cotton 79, and down through the pipe 72 into the liquid 74 contained within the receptacle 73, from which it escapes through the pipe 77 or exhaust 75, the valves 78 and 79 being so regulated as to determine the amount of air which shall flow back from the receptacle 73 into the box or chamber 15 and the amount which will escape into the atmosphere through the exhaust-pipe 75. The liquid 74 contained in the reservoir 73 is preferably water; but by reason of the fact that the air from the box or compartment 15 is from time to time forced through the same, as above described, it is oxygenized, ozonized, and rendered antisep tic by reason of the treatment of the air within said box, as will be hereinafter described, portions of this liquid 74 being employed from time to time in supplying the air-pump 48 as the liquid in the latter evaporates and may also be utilized for washing and cleansing various kinds of substances to be purified or treated, the amount of liquid taken from said reservoir being replaced by fresh water, which also soon becomes ozonized and oxygenized by the air and gases forced into and through the same from the box or compartment 15. After this operation, which should be carried on for a short time, all of the several valves should be closed, the air-pump stopped, and the sparking coil 81 and X-ray apparatus 87 set into operation on either side of the box or compartment, whereby the air contained within said box will undergo various changes and modifications by reason of the generation of ozone, which, as is well known, is highly effective in completely destroying the parasites, microbes, germs, and organic life of all kinds which may be present in or upon fruit or other substances under treatment and which organic life causes the decay and destruction of said fruits or substances. By these means also the X-rays assist in the destruction of the animal life, as the same penetrate to the interior of the substances, the ultra violet rays thereof being highly effective in the destruction of all organic matter, either in suspension in the atmosphere or lodged within the animal or vegetable matter under treatment, and which organisms, as before stated, are responsible for the decay and putrefaction of the alimentary substances.

After the air enclosed within the compartment 15 is sufficiently transformed or modified, as above described, the valve 105 in the pipe 95, leading from the boiler or steam-generator 94, is opened for a few seconds in order to supply heat and the necessary amount of moisture or dampness, such moisture being subsequently condensed and deposited upon the outer sides or surfaces of the substances under treatment. This valve 105 being subsequently closed the valve 115 in the pipe 114, leading from the fumigator, is opened, thereby allowing the fumes to pass into the box or compartment 15 for the purpose of imparting to the fruits or substances under treatment an invisible, antiseptic, and preserving coating or covering and which antiseptic will be absorbed through the pores of the fruit or other substances, whereby the latter will be preserved from future attack by all animal life and from decay and putrefaction.

To induce the deposit or precipitation of the antiseptic and preserving coating or covering upon the substances under treatment, the valve 115 is closed and that number 123 in the pipe 122, leading from the box or receptacle 118, opened, whereby the cooling or refrigerating liquid contained therein is allowed to pass through said pipe 122, contained within the box or compartment 15, thereby materially reducing the temperature of the air or gases contained within said compartment and causing the deposit or precipitation of the fumes from the fumigating apparatus, said cooling liquid being allowed to slowly issue from the tap 124. If this liquid be sufficiently cold, it may be returned to the receptacle 119, wherein it is further cooled and again allowed to pass through the refrigerating-pipe 122. The valve 123 is then closed and the electric current shut off, whereupon the fruits or other substances may be removed from the compartment.

For the treatment of grain and other small particles of matter in order that each particle shall be subjected to the action of the air and gases contained within the box or compartment 15 it is necessary to move or disturb them during the process; otherwise those portions of the surfaces in contact with each other will not receive the preserving antiseptic coating. To carry out this part of the process, I have constructed a revolving cylindrical screen, (shown in Figs. 12, 13, and 14,) which when desired to be used is substituted for the shelves or drawers already referred to. This cylindrical screen is constructed with the transverse supports 132, such supports being constructed of non-conducting material—such as wood or hard rubber, or, if desired, of metal or coated on the outer surfaces with insulating material—the ends of said bars or supports 131 being secured or fas-
tended in rings of non-conducting material, such as wood or hard rubber 133, the inner ends of the supports 132 being secured in the hub 134, also made of non-conducting material. Through these hubs 134 passes the shaft 135, mounted in the ends 19 and 20 of the box or compartment 15, one end of said shaft being provided with a gear 138, meshing with the gear 137, secured to one end of a shaft or spindle 138, mounted in the bracket 130, secured to the end 20 of said box, the opposite end of said spindle or shaft 138 being provided with the pulley or belt-wheel 140, by means of which the rotating movement is imparted to said cylinder or screen. To the rods or supports 131 are secured the edges of the sectional screens 141, preferably made of wire gauze or netting, the adjacent sections of said screen or netting being insulated from each other, as illustrated in Fig. 14. Between the rods or supports 132 are secured the sections of screen or netting 142, also insulated from each other. On the two end rings 133 are secured the metal bands or rings 143 144, from which pass pins 145 through the insulating-rings 133 to the screen-sections 141, the pins passing through the rings 143 making electrical contact with the alternating sections, and those passing through the ring 144 making electrical contact with the intermediate sections, the purpose and effect of this arrangement being to permit the alternating sections to receive the positive current of electricity and the intermediate sections the negative current. On the outer side or surface of the rings 143 144 are the rolling contacts 146 147, the former being connected to the positive pole and the latter to the negative pole (or vice versa) of a dynamo, battery, or other suitable source of electricity.

In the upper side or top of the box 15 is formed an opening or door protected by the cover 148, through which the grain or small substances may be fed through the door 149, made in one of the sections of the cylindrical screen.

From the foregoing it will be understood that as the cylindrical screen is rotated the current of electricity will flow through the rolling contacts 146 147, rings 143 144, through the sections 131, the circuit being completed through the grain or other substances resting upon the adjacent sections of said screen, said screen at the same time so moving or disturbing the grain or particles of the substance under treatment during its rotation that each and every of said particles will be exposed to the air and gases contained within the box or compartment, whereby all organic life will be destroyed in and upon said grain and the surfaces thereof protected by the antiseptic fumes, as in the case of the substances heretofore referred to.

Having fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The method hereinbefore described of preserving fruits and other substances which consists in subjecting the same while in a closed compartment, to the action of air previously passed through ozonized, oxygenized and antiseptic liquid, simultaneously with the action of an electric current, secondly, charging the contained air with ozone and oxygen by means of an electric sparking coil, simultaneously with X-rays, thirdly, subjecting the substance to the action of steam and finally depositing a preserving antiseptic coating on the surfaces of said substance.

2. The method hereinbefore described which consists in subjecting fruit or other substances while in a closed compartment to the action of an electric current, simultaneously charging the air in said compartment with X-rays and with gases produced by an electric sparking coil, then charging said compartment with steam, then with antiseptic fumes and finally cooling said charged air.

3. The method hereinbefore described of preserving fruits or other substances while in a closed compartment, which consists in forcing through said compartment a current of air previously passed through ozonized, oxygenized and antiseptic liquid, simultaneously charging the air contained within said compartment with X-rays and with gases produced by an electric sparking coil, then charging said compartment with steam, and subsequently with antiseptic fumes for forming a preserving coating on said substance, and finally cooling said air contained within said compartment for inducing the precipitation and absorption of the preserving fumes, the above operations being performed during the transmission of an electric current through said substances.

Signed at New York, in the county of New York and State of New York, this 11th day of March, A. D. 1902.

JEAN MARIE AUGUSTE LACOMBE.

Witnesses:

GEORGE COOK,

M. VAN NORTWICK.