

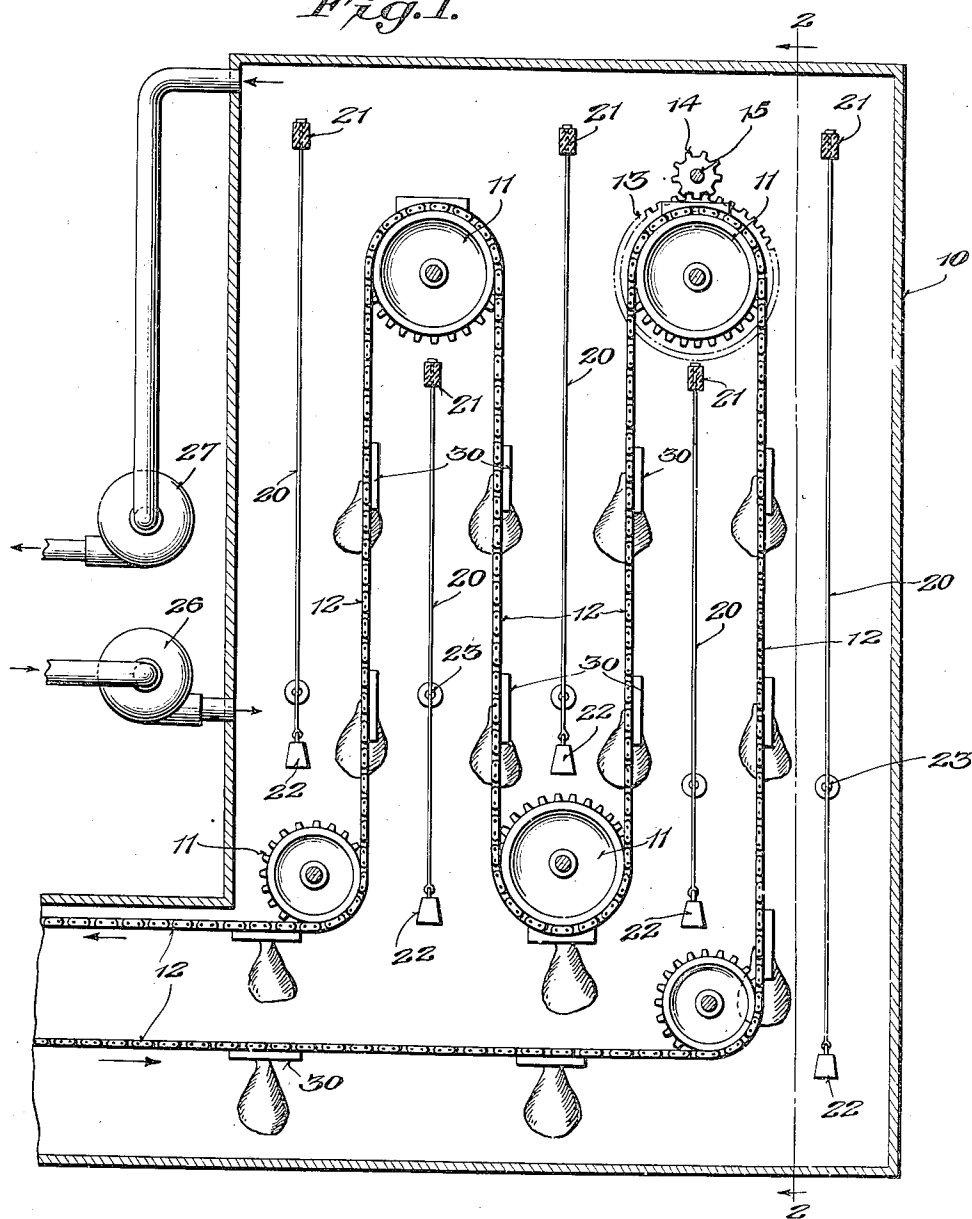
J. N. ALSOP.
METHOD OF AND APPARATUS FOR TREATING ORGANIC SUBSTANCES,
APPLICATION FILED NOV. 12, 1920.

1,402,204.

Patented Jan. 3, 1922.

3 SHEETS—SHEET 1.

Fig. 1.



Inventor:

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WITNESS:—

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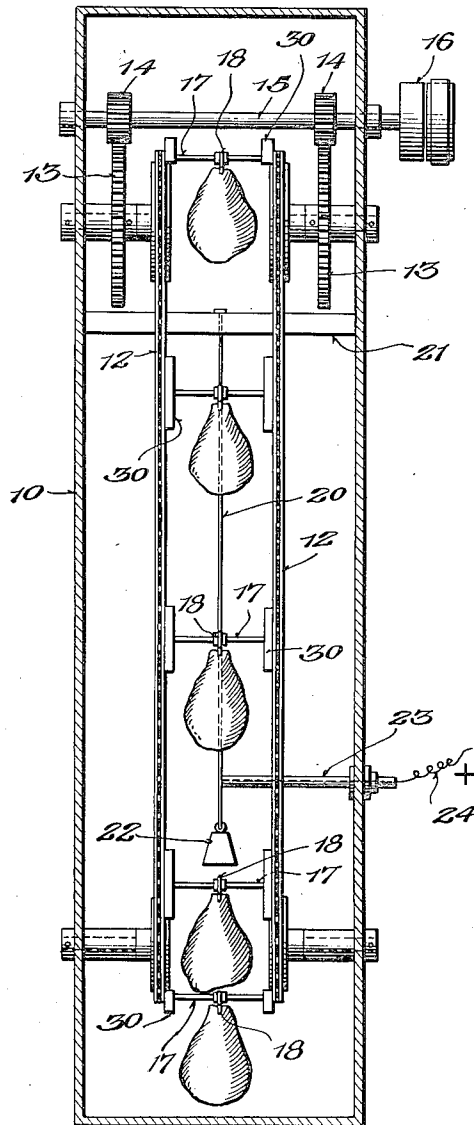
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3 SHEETS—SHEET 2.

Fig. 2.



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3 SHEETS—SHEET 3.

Fig. 3.

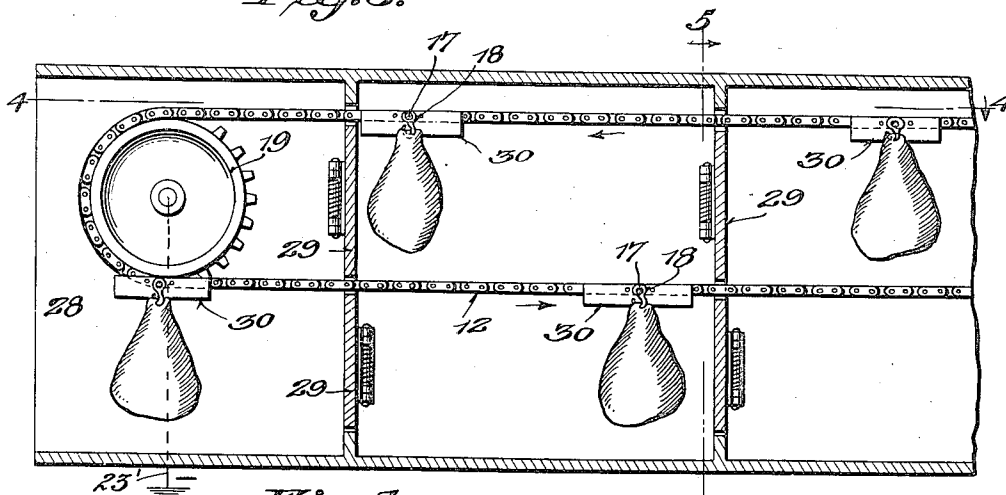


Fig. 4.

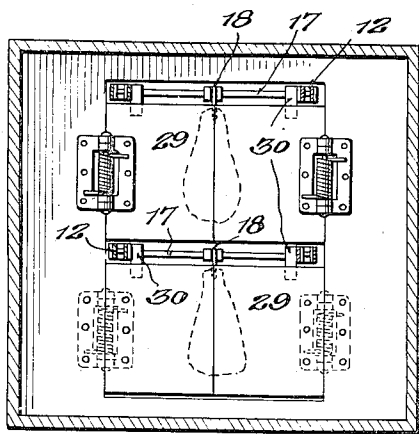
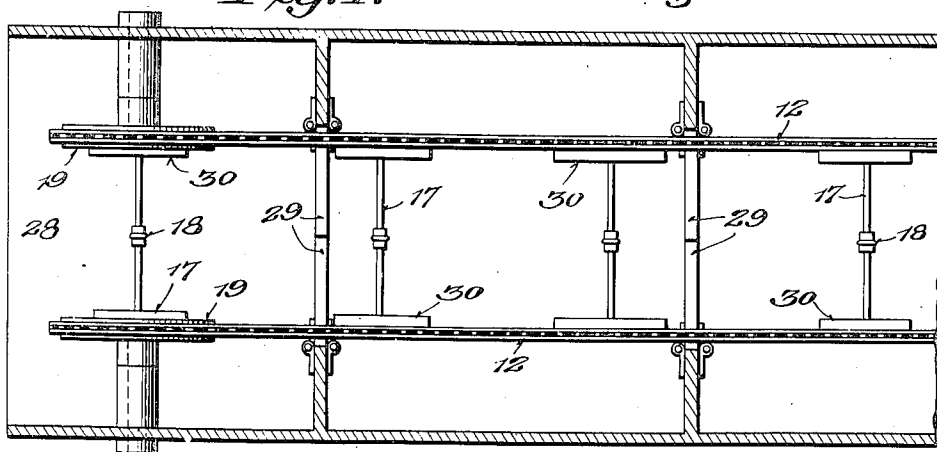


Fig. 5.

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UNITED STATES PATENT OFFICE.

JAMES N. ALSOP, OF OWENSBORO, KENTUCKY, ASSIGNOR TO PACKER'S MEAT SMOKING CORPORATION, OF CHICAGO, ILLINOIS, A CORPORATION OF DELAWARE.

METHOD OF AND APPARATUS FOR TREATING ORGANIC SUBSTANCES.

1,402,204.

Specification of Letters Patent.

Patented Jan. 3, 1922.

Application filed November 12, 1920. Serial No. 423,596.

To all whom it may concern:

Be it known that I, JAMES N. ALSOP, a citizen of the United States, residing at Owensboro, in the county of Daviess and State of Kentucky, have invented new and useful Improvements in Methods of and Apparatus for Treating Organic Substances, of which the following is a specification.

The present invention relates to a method and apparatus for curing substances which it is desirable to treat for the purpose of curing, conditioning, or otherwise imparting thereto the characteristics of any treating media which are capable of or suitable for utilization for the purposes of practicing my invention.

In the present disclosure of my invention, I shall describe and illustrate it as applied to the curing of meats, and the specific curing disclosed will be the smoking of meats.

While the present disclosure utilizes the smoking of meats as an illustrative example of the uses to which my process and apparatus may be put, it will be understood that this example is merely illustrative and in no sense restrictive of my invention, as it is obvious that it may be applied to the treatment of substances other than meats, and, furthermore, that treating agents other than smoke may be used.

In order that the invention may be clear to those skilled in the art, I have shown in the accompanying drawings, somewhat conventionally, but with sufficient clearness to enable my invention to be practised, apparatus designed to carry out my method, and in said drawings:

Fig. 1 is a view in section, some of the parts being diagrammatically indicated, of an apparatus for practising my invention.

Fig. 2 is a sectional view at right angles to Fig. 1.

Fig. 3 is a vertical, longitudinal sectional view of a portion of the receiving and delivery opening or chute.

Fig. 4 is a horizontal sectional view on substantially the line 4—4 of Fig. 3.

Fig. 5 is a vertical, transverse sectional view on substantially the line 5—5 of Fig. 3.

Referring to the drawings by numbers, like numbers indicating like parts in the several views, 10 indicates a smoke house or container, which may be of any suitable or desired dimensions and contour, the smoke

house or container being conventionally and diagrammatically indicated. Said container is provided with a receiving and delivery opening as are shown near the bottom thereof, and such opening may be provided with suitable closures hereinafter to be described.

Within the smoke house 10 are mounted a plurality of sprocket wheels 11, the number of which may, of course, be increased or decreased, dependent on the desired capacity of the smoke house or chamber to be installed.

The sprocket wheels 11 are disposed as shown, so as to provide up and down runs for sprocket chains 12 on which the substances, in this instance meat, to be treated will be carried.

The sprocket wheels 11 are preferably arranged in pairs, as shown in Fig. 2, their shafts being suitably mounted in any preferred arrangement of bearings, so that the sprocket wheels will stand opposed to each other, as shown in Fig. 2, with the chains 12 passing over them, thereby giving a clearance between the facing sprocket wheels 11 for the passage of the substances carried by said chain.

One set of sprocket wheels 11 will be utilized as the driving set, that pair located in the upper right hand corner of the smoke house (Fig. 1) being shown in the present instance as the driving sprockets. The sprocket driving mechanism will comprise any suitable driving means, and, as here shown, I have adopted gear wheels 13, one on each of the shafts of the pair of driving sprocket wheels 11, which gear wheels 13 mesh with driving gears 14 on a shaft 15 mounted in suitable bearings, one end of which shaft 15 may extend outside of the smoke house where it is provided with any suitable drive as a pulley, gear, or other equivalent driving element 16.

The carrier chains 12 are shown in the present instance as coupled by cross-bars 17, which cross-bars are provided with suitable suspending means, as hooks 18, or equivalent devices, from which the substances to be treated may be suspended.

With this construction, an endless flight of carrier chains is provided so that the substances to be cured may be carried in a zig-zag fashion through the smoke house, passing from one sprocket to another, as indi-

cated, this arrangement giving a very compact construction.

It will be apparent, of course, that similar or other carrier means arranged in different 5 or similar lines of travel may be provided, but the present disclosure shows one efficient arrangement.

The carrier chains at one point in their line of travel are so disposed as to permit 10 the ready loading and unloading of the meats or other substances to be cured, this point, as shown in the present instance, being at the lower left hand corner of the smoke house or chamber, where there are 15 arranged carrier pulleys 19, so that the lower leg of the carrier chain may be thrown outwardly over the pulleys 19, which pulleys are located conveniently to the loading and unloading station, so that a workman may 20 suspend the meats on the ingoing run of the carrier chain for treatment in the smoke house or chamber and remove the treated meats or substances from the outcoming run of the chain.

While I have shown, for the purpose of illustration, carrier chains 12 and hanger rods 17 so proportioned as to carry a single article to be treated, it will, of course, be understood that these proportions may be 30 varied and the chains 12, their pulleys 11, and the rods 17 connecting the chains be of such proportions and so related as that a number of articles can be hung from the same carrier rod.

Adjacent the several runs of the carrier chains, I provide electrodes 20, these being 35 disposed, preferably as shown in Fig. 1, parallel to and alternating with the runs of the carrier chain, the said electrodes 20 being 40 preferably in the form of wires hung at their upper ends from suitable supports 21 insulated from the smoke house. The said electrodes 20 are preferably free at their 45 lower ends and provided with a suitable weight 22 to maintain them in proper position, although, their lower ends could, of course, if desired, be fastened to insulating bars or supports similar to the bars or supports 21 at the upper end.

I have shown in the present example, as 50 will be apparent from Fig. 1, a single electrode 20, this being disposed in alignment with the path of movement of the substances being treated. It will be obvious, of course, 55 that the number of electrodes 20 can be increased and, preferably, there will be provided one electrode for each line of substances being treated so that in event of the proportions of the carrier chains being increased, as stated above, to provide for supporting several rows of articles being treated on the rod 17, there would be provided an 60 electrode 20 for each of the lines of substances being treated, this, of course, being 65 mere duplication of the parts.

The electrodes 20 are connected in any suitable manner, with a source of electric current, and one satisfactory means for leading the current to the electrodes 20 is the provision of a conductor passing through 70 the wall of the smoke house or chamber, which conductor will be connected at its inner end with the electrode 20, and at its outer end coupled with the lead wire from the source of electricity. This conductor 75 23 may, if desired, be a rigid conductor, and will, in that case, serve to maintain the electrode 20, if it be of the loose swinging type, in substantially the same position.

The electrodes 20, described, when connected in circuit as set forth, preferably become the positive elements or anodes of the apparatus.

The carrier chains 12 and their sprockets are grounded in any suitable manner, as, for 85 example, by the ground wire 23', shown in Fig. 3, so that they, together with the substances carried on the chain, become preferably the negative terminals or cathodes of the apparatus, and an electrical field is created through which the substances to be 90 treated pass as they travel over the sprockets arranged as described, in the smoke house.

While the relation of the anodes and 95 cathodes to one another may, of course, be varied, and will probably be varied under different conditions, I have found in the apparatus which I have used, that a distance of 30 inches between the electrodes 20, giving 100 a clearance of 15 inches on each side of the chains 12 is satisfactory for standard sizes of meats, but with different substances and with meats of different sizes, it is obvious that variation in the disposition of the 105 parts and their relative distances from one another may be resorted to and still be within the range of my invention.

The anodes 20 are, as stated, connected with a source of electricity, and this may be 110 either a static machine, an induction coil, a direct current generator, or an alternating current generator. In my present experiments, I have found that an alternating current, say 220 volts, the usual municipal voltage, passed through a transformer to step 115 the current up to the degree required and then rectified to give a unidirectional current is admirably suited to my purpose.

Phase, voltage, and amperage of the current used may, of course, vary. In my experiments I have used currents ranging 120 from a voltage which will produce, in air, a spark from 3 inches up to 10 inches, so that it will be seen a wide range, both in current 125 phase, intensity, and flow is permitted in practising my invention. These examples of suitable electrical conditions are given merely to illustrate what I have determined, by my experiments, to be practicable, but 130

it is to be understood that I do not confine myself, by reason of giving these practical examples, to any particular range of current flow, phase or intensity.

Under the conditions and with the apparatus specified, the negative side, namely, the carriers with the meats suspended thereon, is brought to a highly electrified condition while in the electrical field, and, in such condition, takes up very rapidly the treating agent, in this case a curing smoke, and meats so treated will, in much less time than is now possible with present smoking methods, become uniformly and completely smoked. For example, with the apparatus conventionally illustrated in the drawings, the meat is in transit in the smoke house for substantially 30 minutes, and is in the electrical field substantially 15 minutes; whereas, under present smoking methods, the period of time required to smoke meats of the standard sizes is a considerable number of hours; and, as is well known, to give what is called a "hard" smoke to meats, a greater length of time is required.

One great advantage of the system of smoking meats herein disclosed, in addition to the saving in time of curing, is that the meats are not subjected to high temperatures and consequent shrinkage in weight by reason of loss due to heat, and the percentage of saving in weight over the present known methods is, therefore, very considerable. Under the present methods, heat is essential to proper smoking, as the meat will not, while cold, take the curing agent at all satisfactorily, and unless the meat is brought to a relatively high temperature, the period of curing is correspondingly lengthened. Meats cured by the old methods, since they are necessarily subjected to a relatively high temperature, lose, to a considerable extent, their firmness, whereas, by my method and using my apparatus the meats are not subjected to the action of heat, the temperature remaining substantially the same during the treatment of the meats in the smoke house.

Furthermore, since the rapid smoking of the meat in this electrified condition occupies but a small period of time, the saving in the curing agent is considerable. In the case of smoking meats with hickory smoke, for example, this item of cost of the curing agent amounts to considerable in the handling of large batches of meats, as wood or sawdust, which is the practical form by which smoking may be effected in large operations, is a considerable item of cost in the matter of curing meats.

By practising my process and utilizing the apparatus described, fresh meats may be cured very satisfactorily, as the curing action is so rapid and uniform that there is no opportunity for putrefaction to set in.

as would be the case were it attempted to treat fresh meats by the ordinary smoke house methods.

The smoking agent or other treating agent may, of course, be introduced into the smoke house, heretofore described, in any suitable manner, but preferably I will introduce that smoke by means of a suitable blower 26, conventionally shown in Fig. 1, this blower 26 being supplied from any suitable source with smoke or other treating agents and delivering to the smoke house or chamber 10, preferably near the bottom thereof, so that the smoke, after being introduced, will envelop the apparatus and the substances being cured and will then pass upwardly in the smoke house. I find that under the conditions of electrification described, the smoke is very rapidly taken up by the meat, so that the air in which the smoke constituents are suspended rises to the top of the chamber or house in a relatively pure condition. This air may, of course, pass out through suitable ventilating openings or be disposed of in any usual manner, but preferably there will be provided an exhaust apparatus 27 comprising the exhaust fan coupled into the smoke house or chamber 10 at the top thereof and having any suitable delivery pipe.

The relative speed of introduction of smoke into, and exhaustion of air from, the smoke house or chamber 10 through the blower 26 and the exhaust fan 27 may, of course, be varied to meet conditions and regulated in accordance with the needs of the work being performed.

In my experiments and use of the apparatus I have so proportioned the blower 26 and exhaust device 27 as that the exhaust 27 would have a capacity slightly greater than the blower 26, so as to insure the movement of the smoke upwardly through the smoke house or chamber and guard against the smoke escaping through the loading opening 28, where the workman put on and remove the meat from the carrier chain.

The blower 26 and exhaust device 27 may, if desired, be supplemented by what I term a "smoke lock" to further guard against egress of smoke through the loading opening 28, and in Figs. 3 and 4 I have shown one satisfactory arrangement for preventing the escape of smoke.

The loading opening 28 extends from the container 10 a considerable distance and is provided interiorly with spring doors. There are two sets of spring doors 29, preferably arranged as shown, one set between the runs of the carrier chain 12, and the other set below the carrier chain so that between the two sets of spring doors an effective lock is provided.

These spring doors 29 will be automatically opened, preferably by suitable projec-

tions 30 on the chain, which projections 30 are arranged adjacent the points of suspension of support of the meat and are of sufficient length to maintain the doors 29 in open position until the meat has passed through, whereupon the spring doors 29 will automatically close.

With this arrangement it will be seen that as the chain travels in and out of the container 10 through the loading opening 28, the spring doors 29 will be opened and closed automatically so that the meat will pass, both as it is fed to the smoke house and delivered therefrom, into the smoke lock and the egress of smoke through the loading opening will be prevented, thus eliminating all danger of the escape and consequent annoyance of smoke through the loading opening.

While I have shown the carrier chains as forming the negative side of the apparatus, and the electrodes lying between those chains as the positive side of the apparatus, and this, according to my present experiments, is the best disposition of the parts, the treatment could be accomplished by making the chains and the substances carried thereby the positive side, and the electrodes lying between the chains the negative side of the system. The results, however, are not as satisfactory, and from a practical standpoint, of course, it is more desirable that the chains form the negative and grounded side of the system, as there is then no danger to the workmen who are manipulating the apparatus and placing the meat upon and removing it from the carrier chains.

I have also found in the practice of my invention that good results may be obtained by suspending the meats or other substances to be cured both from the negative terminals and the positive terminals. I prefer, however, the arrangement and apparatus herein shown and described, although, so far as the mechanical features of the apparatus are concerned, it will be understood that they may be varied within wide limits without departing from my invention.

From the foregoing, it will be seen that an apparatus is provided and a method is disclosed by which the continuous smoking of meats may be expeditiously and satisfactorily carried on. While I have referred to meat throughout the specification as being the substance treated, I contemplate the treatment of other edible substances, potable liquids, and in fact any substance which it is desired to rapidly and thoroughly impregnate with a treating agent.

I claim:

1. The method of treating substances, which consists in moving them through an electrical field, and subjecting them while passing through such field to the action of a treating agent.

2. The method of treating meat, which consists in moving it through an electrical field, and subjecting it while passing through such field to the action of a treating agent.

3. The method of smoking meat, which consists in moving it through an electrical field, and subjecting it while passing through such field to the action of a smoking agent.

4. The method of treating substances, which consists in bringing the substances to an electrified condition, moving the substances so electrified past a terminal of opposite polarity to that of the electrified substance, and while in such relation subjecting them to the action of a treating agent.

5. The method of treating substances which consists in constituting such substances the negative terminal of an electric circuit, moving them past a positive terminal, and while so moving them subjecting them to the action of a treating agent.

6. The method of treating meat, which consists in constituting such meat the negative terminal of an electric circuit, moving it past a positive terminal, and while so moving it subjecting it to the action of a treating agent.

7. The method of smoking meat, which consists in constituting such meat the negative terminal of an electric circuit, moving it past a positive terminal, and while in such condition subjecting it to the action of a smoking agent.

8. The method of smoking meat, which consists in subjecting such meats to one of the terminals of an electric circuit, moving it past a terminal of opposite polarity, and while in such condition subjecting it to the action of a smoking agent.

9. In apparatus of the class described, the combination of a suitable container, an electric terminal in said container, means for moving the substance to be treated past said terminal and through the electric field created thereby, and means for introducing a treating agent into said container.

10. In apparatus of the class described, the combination of a container, electric terminals of opposite polarities in said container, means for moving one of said terminals relative to the other, means for supporting the substance to be treated on one of said terminals, and means for introducing a treating agent to said container.

11. In apparatus of the class described, the combination of a container, electric terminals of opposite polarities in said container, means for moving one of said terminals relative to the other, means for supporting the substance to be treated on the movable terminal, and means for introducing a treating agent to said container.

12. In apparatus of the class described, the combination of a container, a fixed positive electric terminal in said container, a

movable negative electric terminal in said container, means for supporting the substance to be treated on said movable negative terminal, and means for introducing a treating agent to said container.

13. In apparatus of the class described, the combination of a container, a plurality of electric terminals in said container, a movable carrier passing between said terminals, means for supporting the substance to be treated on said carrier, and means for introducing a treating agent to said container.

14. In apparatus of the class described, the combination of a container, a plurality of positive electric terminals in said container, a carrier of opposite polarity, movable between said positive terminals, means for supporting the substance to be treated on said carrier, and means for introducing a treating agent to said container.

15. In apparatus of the class described, the combination of a container, a plurality of positive electric terminals in said container, an endless carrier of opposite polarity passing between said positive terminals, means for supporting the substance to be treated on said carrier, and means for introducing a treating agent to said container.

16. In apparatus of the class described, the combination of a container, a plurality of staggered or offset electric terminals in said container, an endless carrier of a polarity opposite that of said terminals threaded through and about said terminals, means for supporting the substance to be treated on said endless carrier, and means for introducing a treating agent to said container.

17. In apparatus of the class described, the combination of a container, a plurality of vertically disposed and horizontally offset electric terminals in said container, an endless carrier of a polarity opposite to the polarity of said terminals threaded between and about said terminals, means for supporting the substance to be treated on said carrier, and means for introducing a treating agent to said container.

18. In apparatus of the class described, the combination of a container, a plurality of fixed electric terminals therein, an endless carrier of opposite polarity to the polarity of said fixed terminals threaded between and about said terminals, means for driving said carrier, means for supporting substances to be treated upon said carrier, means for introducing to said container a treating agent, and means for exhausting said container.

19. In apparatus of the class described, the combination of a container, an electric terminal in said container, carrier supporting pulleys in opposed and spaced relation in said container, a carrier of opposite polarity to the polarity of said terminal mounted on said pulleys, means for driving said pulleys and carrier, means for supporting sub-

stances to be treated on said carrier, means for introducing a treating agent to said container, and means for exhausting said container.

20. Apparatus for effecting the continuous smoking of meat, comprising a substantially closed container, an endless meat carrier mounted in said container and accessible from the outside of said container for the deposit thereon and removal therefrom of meat, means for driving said carrier, means in said container for creating an electrical field along and about the path of movement of said carrier and the meat thereon, and means for introducing smoke to said container.

21. Apparatus for effecting the continuous smoking of meat, comprising a substantially closed container, spaced-apart carrier pulleys in said container, an endless double-chain carrier having transversely disposed meat-supporting connections mounted on said pulleys and accessible from the outside of said container for the deposit and removal of meat, means for driving said carrier, means in said container for creating an electrical field along and about the path of movement of said carrier and the meat thereon, and means for introducing smoke to said container.

22. Apparatus for effecting the continuous smoking of meat, comprising a substantially closed container having an opening in its wall for receiving and delivering meat, an endless meat carrier in said container a section of which is accessible through said opening, means for driving said carrier, means in said container for creating an electrical field along and about a section of the carrier and the meat thereon in said container, and means for introducing smoke to said container.

23. Apparatus for effecting the continuous smoking of meat, comprising a substantially closed container having an opening in its wall for receiving and delivering meat, an endless meat carrier having a leg within said container and a second leg delivering to said opening, means for driving said carrier, means for creating an electrical field along and about the said first-named leg, and means for introducing smoke to said container.

24. Apparatus for effecting the continuous smoking of meat, comprising a substantially closed container having an opening in its wall for receiving and delivering meat, an endless meat carrier having a vertically disposed leg within said container and a second horizontally disposed leg delivering to said opening, means for driving said carrier, means for creating an electrical field along and about the said vertically disposed leg, and means for introducing smoke to said container.

25. Apparatus for effecting the continuous smoking of meat, comprising a substantially closed container having an opening in its wall for receiving and delivering meat, an endless meat carrier in said container having a plurality of vertically disposed legs and a horizontal leg delivering to said opening, means for driving said carrier, means adjacent each vertically disposed carrier leg to create an electrical field along and about said leg and the meat thereon, and means for introducing smoke to said container.

26. Apparatus for effecting the continuous smoking of meat, comprising a substantially closed container having an opening in its wall for receiving and delivering meat, an endless meat carrier in said container having a plurality of vertically disposed legs and a horizontal leg delivering to said opening, means for driving said carrier, means adjacent each vertically disposed carrier leg to create an electrical field along and about said leg and the meat thereon, means for introducing smoke to said container, and means to cause movement of the smoke introduced to said container away from said opening.

27. Apparatus for effecting the continuous smoking of meat, comprising a substantially closed container having an opening in its wall for receiving and delivering meat, an endless meat carrier in said container having a plurality of vertically disposed legs and a horizontal leg delivering to said opening, means for driving said carrier, means adjacent each vertically disposed carrier leg to create an electrical field along and about said leg and the meat thereon, means for introducing smoke to said container, and an exhaust device to cause the smoke introduced in said container to move upwardly therethrough and prevent its escape through the meat receiving and delivering opening.

28. In apparatus of the class described, the combination of a container having a loading opening, a closure for said loading opening, an endless carrier to receive and deliver through said opening, and means on said carrier for opening said closures at predetermined intervals.

29. In apparatus of the class described, the combination of a container having a loading opening, normally closed spring doors for said opening, an endless carrier to receive and deliver meat through said opening, and means on said carrier for opening said doors at predetermined intervals.

30. In apparatus of the class described,

the combination of a container having a loading opening, a plurality of closures in said opening, an endless carrier to receive and deliver through said opening, and means for opening said closures alternately at predetermined intervals.

31. In apparatus of the class described, the combination of a container having a loading opening, a plurality of closures in said opening, an endless carrier to receive and deliver through said opening, and means on said carrier for opening the said closures alternately at predetermined intervals.

32. In apparatus of the class described, the combination of a container having a loading opening, a plurality of closures in said opening, an endless carrier to receive and deliver through said opening, and means on said carrier for opening the said closures alternately at predetermined intervals and maintaining each closure in open position for a predetermined length of time.

33. In apparatus of the class described, the combination of a container having a loading opening, a plurality of spring doors in said opening, an endless carrier to receive and deliver through said opening, and means on said carrier for opening the said spring doors alternately at predetermined intervals and maintaining each spring door in open position for a predetermined length of time.

34. In apparatus of the class described, the combination of a container having a loading opening, an endless carrier to receive and deliver through said opening, a plurality of closures disposed between the runs of said carrier, a plurality of closures disposed below said carrier, and means on said carrier for opening said closures alternately at predetermined intervals and maintaining them in open position for a predetermined length of time.

35. In apparatus of the class described, the combination of a container having a loading opening, an endless carrier to receive and deliver through said opening, a plurality of normally closed spring doors disposed between the runs of said carrier, a plurality of normally closed spring doors disposed below said carrier, and means on said carrier for opening said spring doors alternately at predetermined intervals and maintaining them in open position for a predetermined length of time.

In testimony whereof I have hereunto set my hand.

JAMES N. ALSOP.