

Feb. 26, 1952

F. J. AVERY

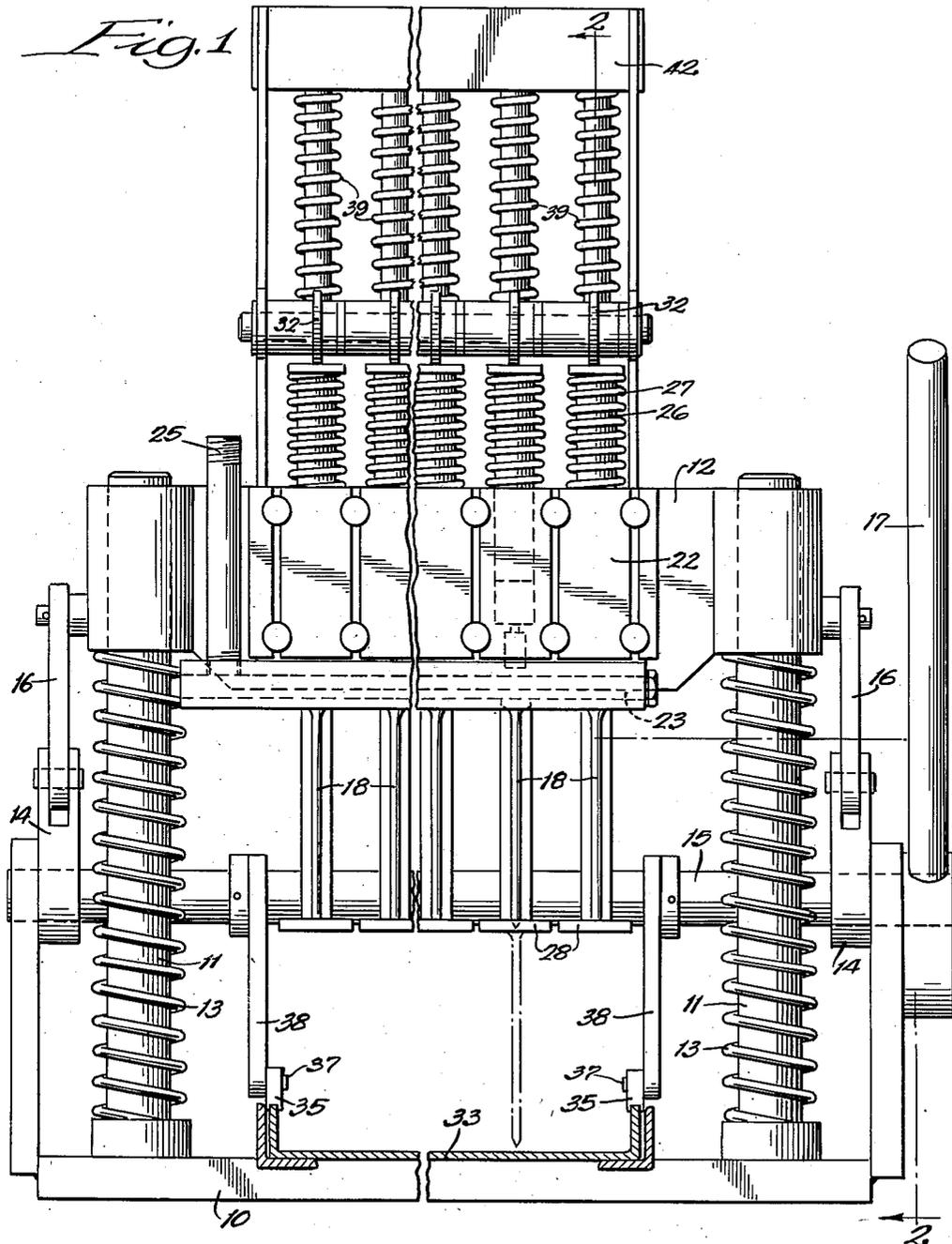
2,587,024

APPARATUS FOR TREATING MEAT AND THE LIKE

Filed June 22, 1949

2 SHEETS—SHEET 1

Fig. 1



INVENTOR:

Fred J. Avery,

BY *Edward, Corwin, Cuthbert, Spangenberg,*
ATTORNEYS.

Feb. 26, 1952

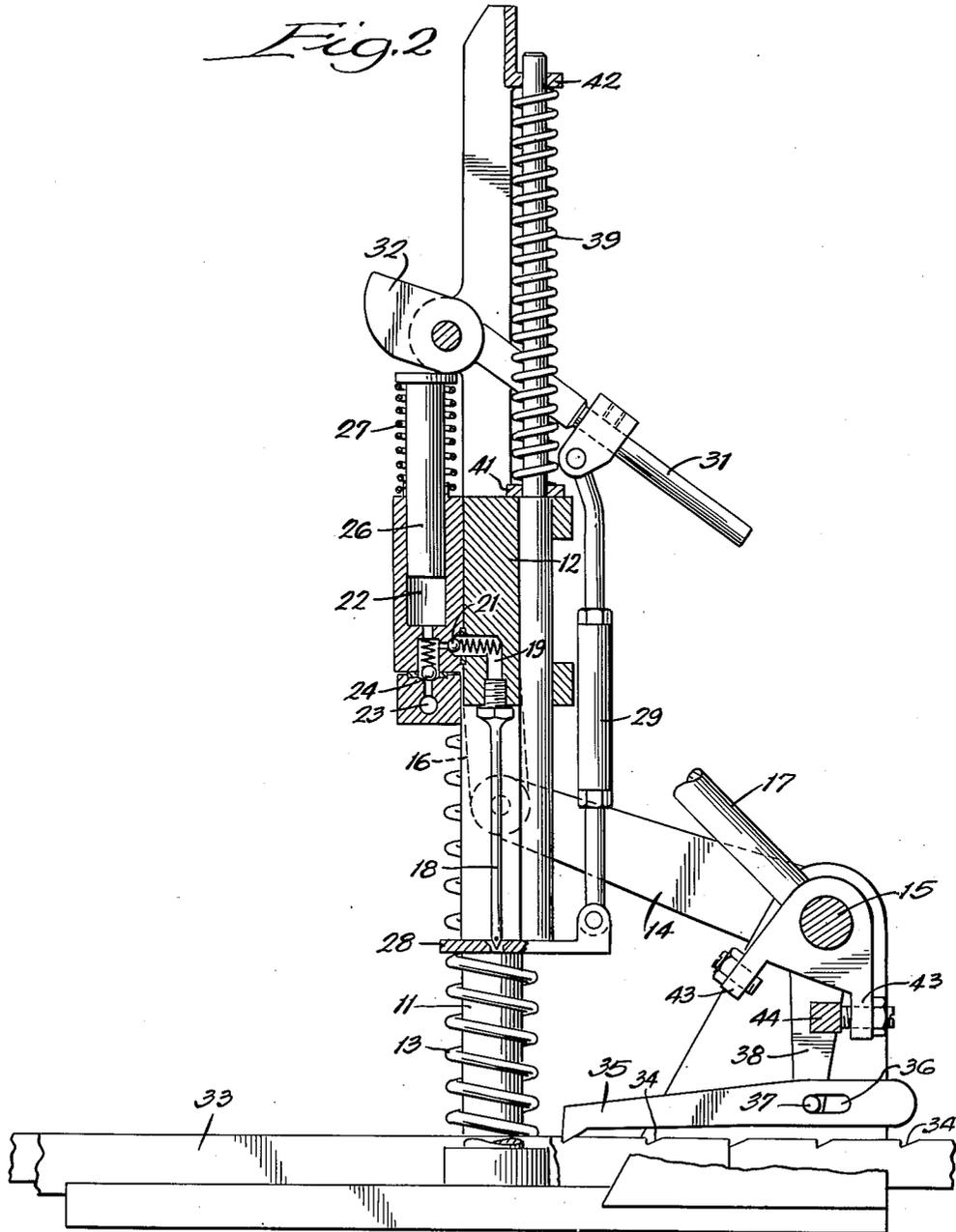
F. J. AVERY

2,587,024

APPARATUS FOR TREATING MEAT AND THE LIKE

Filed June 22, 1949

2 SHEETS—SHEET 2



INVENTOR:

Fred J. Avery,

BY *Dawson, Coors, Borthen, Spangenberg,*
ATTORNEYS.

UNITED STATES PATENT OFFICE

2,587,024

APPARATUS FOR TREATING MEAT AND THE LIKE

Fred J. Avery, La Grange, Ill.

Application June 22, 1949, Serial No. 100,727

15 Claims. (Cl. 99—257)

1

This invention relates to apparatus for treating meat and the like and particularly to apparatus for injecting curing or other treating liquids into bodies of meat or other material to be treated.

In curing meat products such as slabs of bacon, it has been the usual practice to soak the slabs for a substantial length of time in the curing liquid in order to obtain substantially complete penetration of the liquid throughout the slabs. Hams have been cured by injection of curing solutions into the veins, but this is not possible with materials such as bacon because of the fatty character of the slabs and the lack of adequate vein systems. It is also desirable with other types of food materials such as cheeses to distribute curing or treating solutions uniformly through the bodies of the materials.

The present invention, therefore, has for its principal object the provision of a novel apparatus for distributing by injection a treating or curing liquid substantially uniformly through a body of material to be treated.

Another object is to provide an apparatus in which a hollow, apertured movably mounted needle is injected into the material, and treating liquid is forced through the needle into the material in predetermined volume per unit of travel of the needle. According to one feature of the invention, the solution is forced through the needle by a positive displacement pump that is operated by a pressure foot engaging the material.

Still another object is to provide an apparatus in which a plurality of needles are movable simultaneously into the material and are individually supplied with treating liquid in proportion to their respective penetrations. Preferably, a positive displacement pump is provided for each needle in order that there is a uniform distribution of the liquid regardless of non-uniformity of the texture of the material, and each pump is operated by a presser foot adjacent its respective needle.

A further object is to provide an apparatus of the character under consideration in which a body of material to be treated is advanced step by step through the apparatus by reciprocation of a head carrying the needles. In this way liquid is injected into the material at uniformly spaced points throughout its length and width to produce uniform treatment.

The above and other objects and advantages of the invention will be more readily apparent when read in connection with the accompanying drawings, in which—

2

Figure 1 is an elevation of an apparatus embodying the invention with certain parts thereof shown in section; and

Figure 2 is a transverse section with parts in elevation.

The apparatus, as shown, comprises a frame including a base 10 on which a pair of upright or vertical posts 11 are supported. A horizontally elongated head 12 is mounted for vertical sliding movement on the posts 11 and is urged upward thereon by spiral compression spring 13 around the posts. The head is reciprocated on the frame by a pair of levers 14 mounted on a horizontal transversely extending shaft 15 and connected by links 16 to the head. The shaft may be oscillated by a handle 17 or by any other desired mechanism to move the head downward when desired and to permit it to raise again under the influence of the springs 13. It together with the handle constitutes driving means for operating the head reciprocating mechanism consisting of the levers 14 and the links 16.

The head carries a series of hollow depending needles 18 uniformly spaced along its length and each of which is formed with one or more laterally facing openings adjacent its tip, as best seen in Figure 2. The upper end of each of the needles is removably attached by a screw thread connection to the lower portion of the head and communicates with a passage 19. The latter is formed in the head, has a check valve 21 in it, and communicates with a vertically extending pump cylinder 22 in the head, there being a separate pump cylinder for each needle. The lower ends of the pump cylinders are supplied with curing liquid from a manifold 23 in individual communication with the cylinders through individual check valves 24, and, as seen in Figure 1, the manifold is supplied with treating or curing liquid through a supply pipe 25.

A piston 26 is reciprocable in each of the cylinders 22 and is urged upward by a spring compression spring 27. As the pistons move downward, they force through the respective needles predetermined quantities of treating liquid per unit of piston travel. In connection with upward sliding movement of the pistons liquid is drawn into the cylinders after passing the check valves 24.

In order to operate the pumps, a presser foot 28 is provided adjacent each of the needles. As best seen in Figure 2, each presser foot is mounted for vertical sliding movement with respect to the head by way of a vertically sliding rod and has a central opening therein through which the associated or corresponding needle

may extend to penetrate into the body of material to be treated. Each presser foot is connected through a longitudinally adjustable link 29 to a lever 31 which carries a cam 32 engaging the upper end of the piston 26 of the pump that is associated with the same needle as the presser foot. Preferably, the connection between the link 29 and lever 31 is adjustable lengthwise of the lever in order to vary the volume of liquid injected per unit of presser foot movement.

The material to be treated such, for example, as a slab of bacon is supported on a carrier 33 which is horizontally slidable on the frame transversely to the length of the head 12. To advance the carrier the latter's edge portions are provided with two similar series of spaced apart notches 34 for engagement by a pair of pawls 35. The pawls, as shown in Figure 2, are formed with elongated slots 36 through which extend pins 37. The latter are carried by arms which are positively connected to, and extend radially from, the shaft 15. As the shaft is rocked counter-clockwise, as seen in Figure 2, the pins 37 will move throughout the length of the slots 36 and will eventually engage the right ends of the slots and shift the pawls 35 to the right. During this movement, the head 12 will move downward carrying with it the presser feet and needles until the presser feet engage the material on the carrier 33. The presser feet are urged downward with respect to the head by means of spiral compression springs 39 which surround the upper ends of the rods on which the presser feet are supported. The lower ends of the springs 39 abut against collars 41 on the central portions of the rods and the upper ends of the springs engage a crossbar 42 which is carried by the head 12. Thus when the presser feet engage the material to be treated their further downward movement will be stopped and continuing downward movement of the head will force the needles through the presser feet and into the material. As the head moves downward relatively to the presser feet the levers 31 will be rocked to turn the cams 32 and force the pistons 26 downwards into the cylinders 22. It will be noted that with this construction a predetermined quantity of liquid is forced through each of the needles per unit of penetration of the needle into the material so that the liquid is uniformly injected into the material throughout its thickness. In the case of materials of varying thickness and varying width such as slabs of bacon, there will, therefore, be discharged into the material a quantity of treating solution which is in direct proportion to the mass of the material and which is distributed throughout the material in proportion to its mass. As shown in Fig. 2 of the drawings the cams 32 are so shaped or contoured that in connection with initial relative movement of the head and presser feet 28 after the presser feet are arrested and the lower ends or tips of the needles initially penetrate the material no downward sliding movement of the pistons 32 into the pump cylinders 22 occurs. After further relative sliding movement of the head and presser feet in connection with further penetration of the needles into the material the cams operate to effect downward sliding movement of the pistons into the cylinders and resultant discharge of the curing or treating liquid into the material. By increasing or decreasing the operative length of the longitudinally adjustable links 29 the time when the needles

commence to inject the curing liquid into the material may be controlled or varied.

When the handle 17 is released, the springs 13 will urge the head upward until the needles are withdrawn from the material, the presser feet during this operation holding the material down on the carrier. After the needles are completely withdrawn, the head will travel upward a further distance to clear the material, and the presser feet will move upward with it. During this operation the pistons 26 will be moved upwards with respect to the cylinders by the springs 27 and hence will draw in an additional charge of liquid in readiness for the next operation or cycle.

At the same time the levers 33 will move the pins 37 to the left to a sufficient extent to cause the pawls 35 to slide to the left and thereby advance the carrier 33 one step. The amount by which the carrier is advanced is preferably substantially the same as the spacing between the needles so that when a body of material has traveled completely through the apparatus it will have been injected with solution at uniformly spaced points throughout its length and width. I have found, for example, that with bacon the penetration outward from each of the needle punctures is approximately one-half inch so that if the needles are spaced one inch apart and the carrier is advanced one inch at each movement of the head, the bacon will be uniformly treated throughout. With other types of materials the spacing and carrier feed may be varied, as desired. Rocking movement of the handle 17 and the shaft 15 may be limited by engagement of arms 43 on the shaft with a fixed stop block 44 on the frame.

While one embodiment of the invention has been shown and described in detail herein, it will be understood that this is illustrative only and is not to be taken as a definition of the scope of the invention, reference being had for this purpose to the appended claims.

What is claimed is:

1. An apparatus adapted to treat a body of material, such as meat, and comprising a frame, a head reciprocable vertically on the frame, a hollow apertured needle carried by the head and projecting downward therefrom, a presser foot positioned in associated relation with the needle and carried by the head so that it and the head are movable vertically relatively to one another, a carrier movable on the frame to carry a body of material to be treated beneath the head, needle and presser foot, means operated during downward movement of the head and by relative movement of the head and presser foot to force curing liquid through the needle and into the body, and means operative automatically in response to upward movement of the head to move the carrier.

2. An apparatus adapted to treat a body of material, such as meat, and comprising a frame, a head reciprocable vertically on the frame, a hollow apertured needle carried by the head and projecting downward therefrom, a presser foot positioned in associated relation with the needle and carried by the head so that it and the head are movable vertically relatively to one another, a carrier movable on the frame to carry a body of material to be treated beneath the head, needle and presser foot, a pump on the head connected to a source of curing liquid and communicating with the needle, a connecting between the presser foot and the pump whereby

5

the pump is caused to force liquid through the needle during downward movement of the head and after arrest of the presser foot due to engagement with the body, and means operated by upward movement of the head on the frame to advance the carrier.

3. An apparatus adapted to treat meat or the like and comprising a frame structure having means thereon for supporting the meat to be treated, a horizontally elongated head positioned over the supporting means, provided with a longitudinal series of fixed downwardly extending spaced apart hollow needles, and mounted on the frame structure so that it is bodily movable towards and away from the supporting means in order to effect insertion of the needles into the meat on said supporting means and subsequent withdrawal therefrom, mechanism operative in connection with actuation thereof successively to move the head towards and away from the supporting means and also to feed the meat a predetermined distance under the head each time the head is moved towards and away from said supporting means, and mechanism embodying movable mounted parts and operative automatically each time the needles are brought into penetrating relation with the meat on the supporting means to force curing liquid under pressure through the needles into said meat.

4. An apparatus adapted to treat meat or the like and comprising a frame structure having means thereon for supporting the meat to be treated, a head member mounted on the frame structure over said means to move bodily to and from the latter, a plurality of laterally spaced hollow needles connected to, and extending downwards from, the head member and provided at the lower ends thereof with discharge apertures, mechanism for moving the head member to and from the meat supporting means in order to effect successive penetration and removal of the needles with respect to the meat, mechanism including a cam arrangement on the head member and operative automatically each time the needles are brought into penetrating relation with the meat to force curing liquid under pressure through the needles into the meat, and means whereby the meat on the supporting means is caused automatically to be fed a predetermined distance under the head member after each withdrawal of the needles from the meat.

5. An apparatus adapted to treat a body of material, such as meat, and comprising a frame having means thereon to support the body, a head disposed over said means and mounted on the frame so that it is slidable vertically, a hollow apertured needle carried in a depending manner by the head and adapted during downward sliding movement of the head to penetrate the body, mechanism for sliding the head together with the needle upwards and downwards, a presser foot positioned in associated relation with the needle, carried by the head so that it and said head are movable vertically relatively to one another, and adapted to engage and be arrested by the body on the aforesaid supporting means, and means operative automatically during downward sliding movement of the head relatively to the presser foot after arrest of the latter by the body to force curing fluid through the needle and into said body.

6. An apparatus adapted to treat a body of material, such as meat, and comprising a frame having means thereon to support the body, a

6

head disposed over said means and mounted on the frame so that it is slidable vertically, a hollow depending needle carried by the head, having a discharge aperture at its lower end and adapted during downward sliding movement of the head to penetrate the body, power mechanism for sliding the head together with the needle upwards and downwards, a presser foot positioned in associated relation with the needle, carried by the head so that it and said head are movable vertically relatively to one another, and adapted during downward sliding movement of the head to engage and be arrested by the body of material on the aforementioned means, a positive displacement pump carried by the head, connected to a source of curing liquid and having the discharge thereof in communication with the needle, and an operating connection between the presser foot and the pump whereby the pump in connection with downward sliding movement of the head and arrest of the presser foot by the body is automatically operated so as to pump liquid from the source through the needle and into said body.

7. An apparatus adapted for treating a body of material, such as meat, and comprising a frame having means thereon to support the body, a head disposed over said means and mounted on the frame to slide vertically, a hollow apertured needle carried by the head in a depending manner and adapted during downward sliding movement of the head to penetrate the body, power mechanism for sliding the head together with the needle upwards and downwards, and a presser foot positioned in associated relation with the lower end of the needle, carried by the head so that it and said head are movable vertically relatively to one another and adapted during downward sliding movement of the head to engage and be arrested by the body of material on the aforementioned supporting means, a spring arranged to urge the presser foot downwards relatively to the head, and a pump carried by the head, connected to a source of curing liquid, having the discharge thereof in communication with the upper end of the needle, and so operatively connected to the presser foot that it is caused to be operated to pump liquid from the source and through the needle into the body in connection with downward sliding movement of the head and arrest of the presser foot by said body.

8. An apparatus adapted to treat a body of material, such as meat, and comprising a frame having means thereon to support the body, an elongated head disposed over said means and mounted on the frame so as to slide vertically, a plurality of hollow needles positioned in spaced apart relation on the head, projecting downwards from the latter and provided at the lower ends thereof with discharge apertures, mechanism for sliding the head together with the needles upwards and downwards, a presser foot located adjacent the lower end of each needle and mounted so that it and the head are movable vertically relatively to one another, and a plurality of pumps mounted on the head, connected to a source of curing liquid, communicating with the upper ends of the needles respectively, and so connected to the presser feet respectively that they are caused to pump liquid from the source through the needles when in connection with downward sliding movement of the head the presser feet and head are caused to move vertically relatively to one another.

9. An apparatus adapted to treat a body of meat and the like, and comprising a frame having means thereon for supporting the body, a horizontally elongated head disposed over said means and mounted on the frame to slide vertically, a rectilinear series of hollow equidistantly spaced needles connected to, and projecting downwards from, the head and provided at the lower ends thereof with discharge apertures, power mechanism for sliding the head together with the needles upwards and downwards, a presser foot located adjacent the lower end of each needle and carried by the head so that it and the head are movable vertically relatively to one another, a longitudinal series of spaced apart positive displacement pumps carried by the head, connected to a common source of curing liquid, and having their discharges in communication with the upper ends of the needles respectively, and operating connections between the presser feet and the pumps respectively whereby the pumps are caused automatically to pump liquid from the source and through the needles when in connection with downward sliding movement of the head the presser feet are arrested by engagement with the body of meat on the aforesaid supporting means.

10. Apparatus adapted to treat a body of meat and the like, and comprising a frame, an elongated head mounted on the frame to slide vertically, a plurality of hollow apertured needles spaced apart on, and projecting downwards from, the head, power mechanism for sliding the head together with the needles upwards and downwards, a presser foot located adjacent the lower end of each needle and carried by the head for vertical sliding movement relatively thereto, means operative automatically in response to vertical movement of each presser foot relatively to the head to force liquid downwards through the adjacent needle, a carrier adapted to support the body of meat and mounted on the frame so that it is horizontally movable under the needles and the presser feet, and means operative automatically in response to upward sliding movement of the head to move the carrier a predetermined distance.

11. An apparatus adapted to treat a body of meat and the like, and comprising a frame, an elongated head mounted on the frame so that it is slidable vertically, a plurality of hollow needles connected fixedly to, and projecting downwards from, the head, power mechanism for sliding the head together with the needles upwards and downwards, a presser foot disposed adjacent the lower end of each needle and carried by the head for vertical sliding movement relatively thereto, a plurality of pumps on the head connected to a source of curing liquid and communicating respectively with the upper ends of the needles, connections between the pumps and the presser feet respectively whereby the pumps are caused to be operated automatically when the presser feet are slid in one direction relatively to the head, a carrier adapted to support the body of meat and mounted on the frame so that it is slidable horizontally under the head and needles, and automatic feed mechanism operative to slide the carrier a predetermined distance in response to upward sliding movement of the head.

12. An apparatus adapted to treat a body of meat and the like, and comprising a frame having means thereon to support the body, a head disposed over the supporting means and mounted

on the frame to slide vertically, a plurality of hollow apertured needles connected to, and depending from, the head, power mechanism for sliding the head together with the needles upwards and downwards, presser foot means carried by the head adjacent to the needles and so that said means and head are movable vertically relatively to one another, a plurality of pumps mounted on the head, connected to a source of curing liquid, and communicating with the upper ends of the needles respectively, and means whereby the pumps are caused automatically to pump liquid from the source to the needles when during downward movement of the head relative vertical movement of said presser foot means and head occurs due to engagement with said presser foot means with the meat on said supporting means.

13. An apparatus adapted to treat meat and the like, and comprising a frame, a head mounted on the frame to slide vertically, a plurality of hollow apertured needles connected to, and depending from, the head, power mechanism for sliding the head together with the needles upwards and downwards, presser foot means carried by the head adjacent to the lower ends of the needles and so that said presser foot means and the head are movable vertically relatively to one another, a plurality of pumps mounted on the head, connected to a source of curing liquid, and corresponding in number to, and communicating respectively with, the needles, means whereby the pumps are caused automatically to pump liquid from the source to the needles when during downward sliding movement of the head relative vertical movement of said presser foot means and head occurs, a carrier adapted to support the meat and mounted on the frame so that it is movable horizontally under the head and needles, and means operative automatically in response to successive upward sliding movement of the head intermittently to move the carrier.

14. Apparatus for treating meat and the like, comprising a support adapted to hold a body of meat to be treated, a head mounted above the support for movement towards and away from said support, a plurality of hollow spaced apart needles connected to the head so as to project downwards therefrom and provided at the lower ends thereof with discharge apertures, a plurality of positive displacement pumps mounted on the head, having means associated therewith for connecting them to a common source of curing liquid, and corresponding in number to, and communicating respectively with, the upper ends of the needles, means connected to the head to move the latter towards and away from the support in order to insert the needles into the body of meat on the support and withdraw them therefrom, means mounting the support for horizontal movement under the head, means operative in connection with successive upward movements of the head to move the support step by step, and mechanism embodying movable elements on the head and operative automatically each time the needles are brought into inserted relation with the meat to operate the pumps so as to force measured quantities of curing liquid through the needles and into the meat.

15. An apparatus adapted to treat a single piece of meat or the like and comprising a frame structure having means thereon for supporting the meat to be treated, a head member mounted on the frame structure over said means to move bodily to and from the latter, a plurality of hol-

low needles laterally spaced from each other a distance less than the width of a piece of meat to be treated and connected to, and extending downwards from, the head member and provided at the lower ends thereof with discharge apertures, driving means, mechanism operated by the driving means for moving the head member to and from the meat supporting means in order to effect successive penetration and removal of the needles with respect to the meat, mechanism embodying movably mounted parts and controlled automatically each time the needles are brought into penetrating relation with the meat to force curing liquid under pressure through the needles and into the meat, and feeding means connected to, and operated by, said driving means for feeding the meat on the supporting means under the head member a predetermined distance less than the length of the piece of meat each time the head member is moved to and from the meat supporting means.

FRED J. AVERY.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

	Number	Name	Date
	312,648	Merrell	Feb. 24, 1885
	554,999	Fowler	Feb. 18, 1896
	740,735	Blake	Oct. 6, 1903
5	1,126,579	Servatius	Jan. 26, 1915
10	1,271,490	Servatius	July 2, 1918
	1,315,242	Servatius	Sept. 9, 1919
	1,787,900	Goff	Jan. 6, 1931
	1,918,118	Marzocchi	July 11, 1933
15	2,466,772	Kenyon	Apr. 12, 1949

FOREIGN PATENTS

	Number	Country	Date
	123,230	Great Britain	Feb. 20, 1919
20	502,486	Germany	Feb. 12, 1928