H. W. LOWE.

STERILIZING MACHINE.

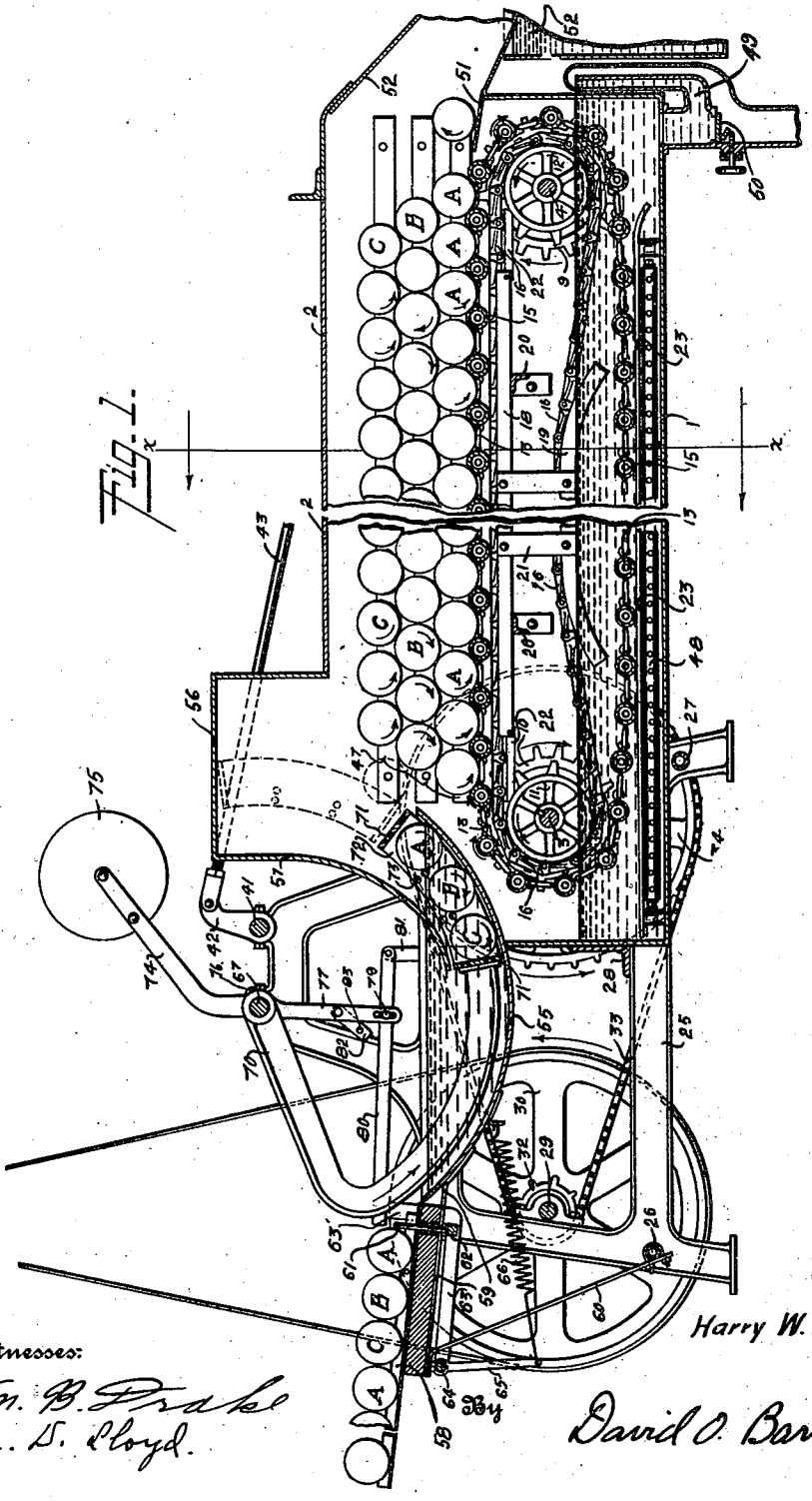
APPLICATION FILED DEC. 16, 1913.

1,157,017.

Patented Oct. 19, 1915

4 SHEETS—SHEET 1.

Fig. 1.



Witnesses:

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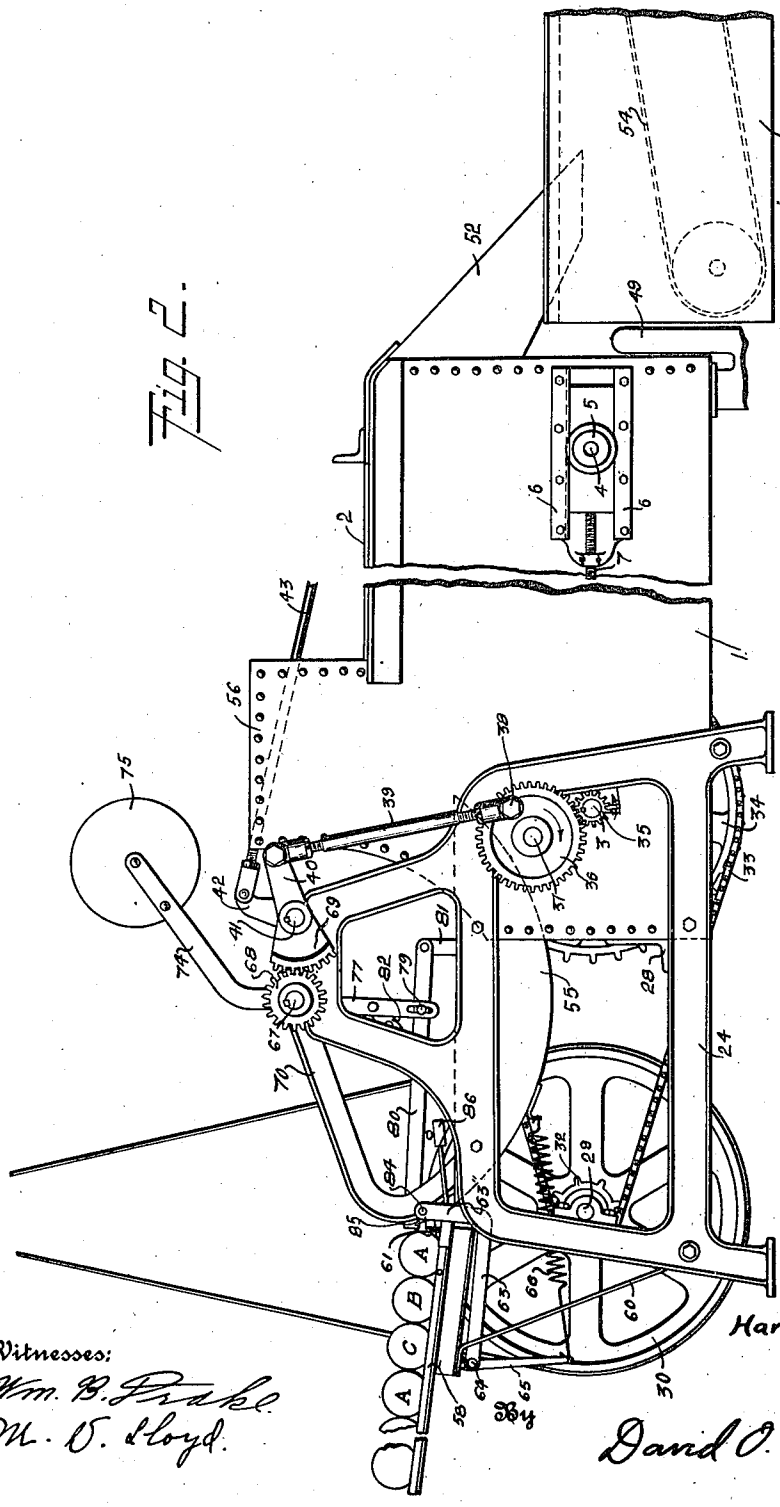
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4 SHEETS—SHEET 2.

Fig. 2.



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4 SHEETS—SHEET 3.

Fig. 3.

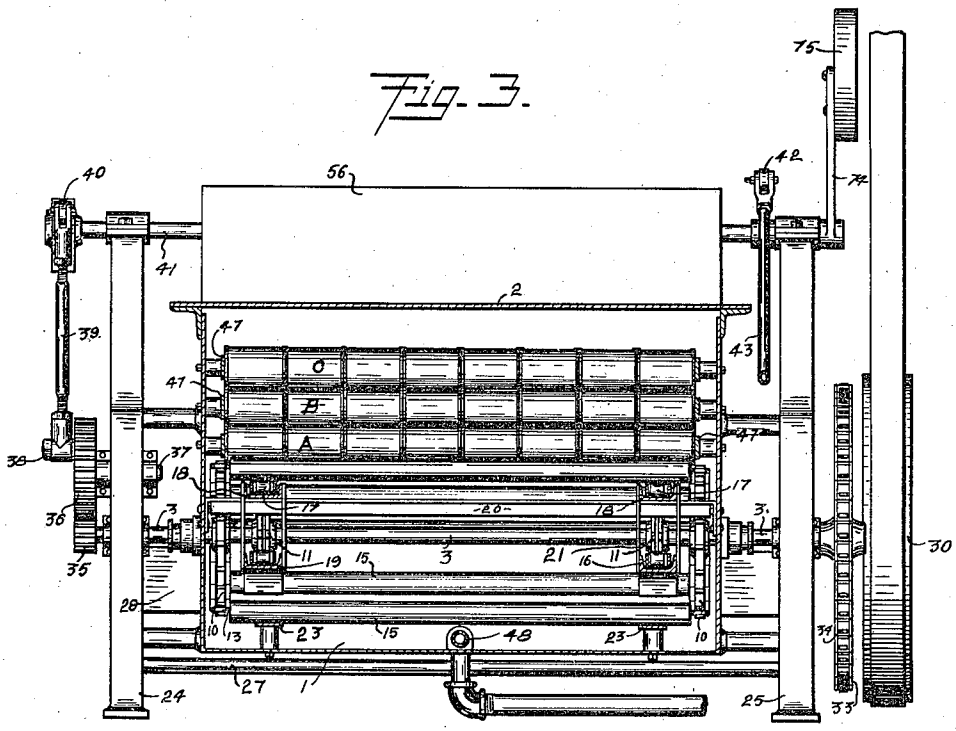


Fig. 4.

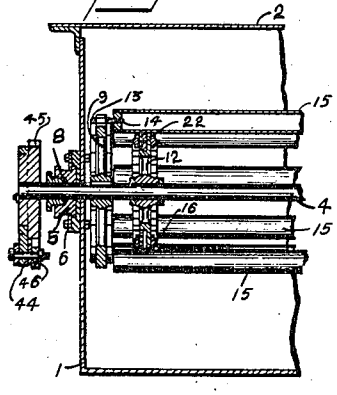
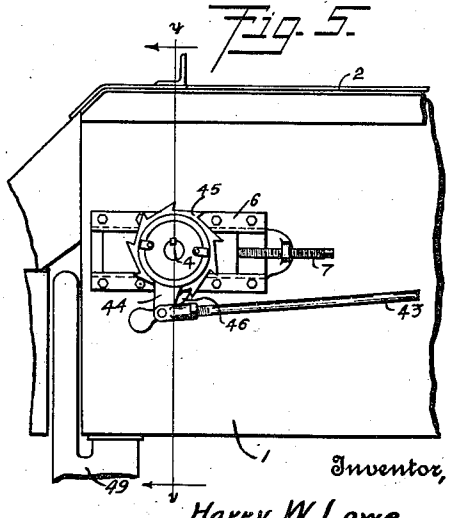


Fig. 5.



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4 SHEETS—SHEET 4.

Fig. 6.

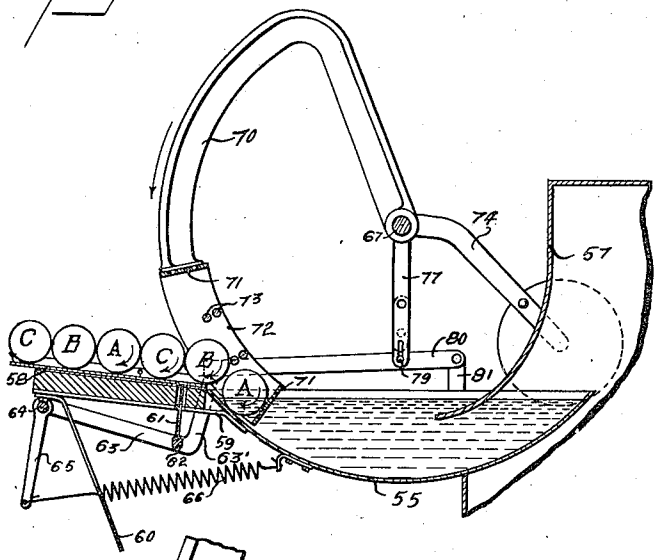
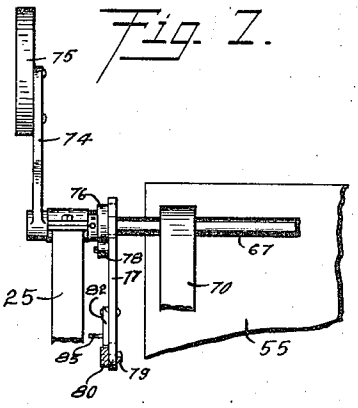


Fig. 7.



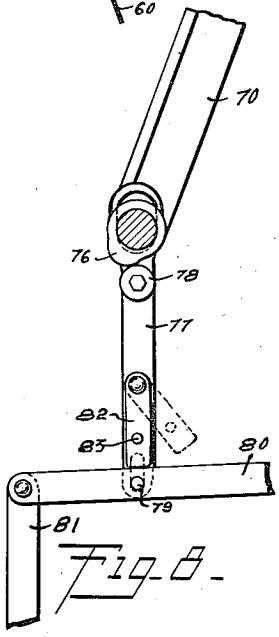


Fig. 8.

Fig. 9.

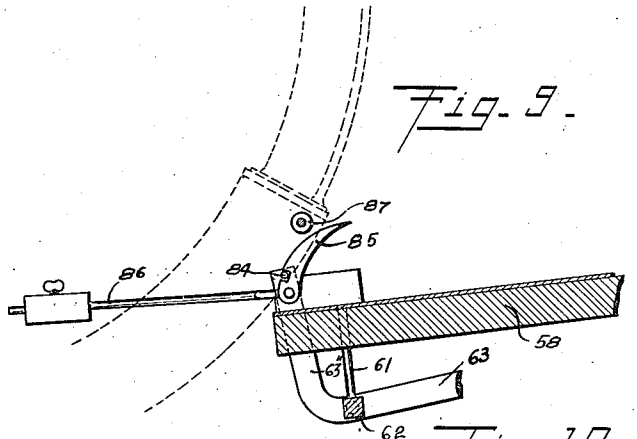
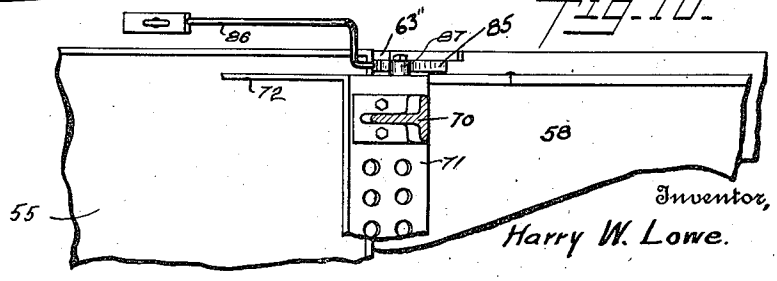


Fig. 10.



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UNITED STATES PATENT OFFICE.

HARRY W. LOWE, OF FLORENCE, NEBRASKA.

STERILIZING-MACHINE.

1,157,017. Specification of Letters Patent. Patented Oct. 19, 1915.

Application filed December 16, 1913. Serial No. 806,996.

To all whom it may concern:

Be it known that I, HARRY W. LOWE, a citizen of the United States, and a resident of Florence, in the county of Douglas and State of Nebraska, have invented certain new and useful Improvements in Sterilizing-Machines, of which the following is a specification.

My invention relates to apparatus for sterilizing or cooking materials contained in sealed vessels, and it is especially applicable for use in the processes of preserving fruits, vegetables and the like in metal cans.

It is the object of my invention to provide a machine for the above purpose wherein the cans are heated in a closed vessel provided with water-sealed openings for the introduction and discharge of the cans, to provide means for automatically introducing the cans into the heating vessel through one of the water-sealed openings thereto, to provide conveying mechanism for carrying the cans through the heating vessel, to adapt the conveying mechanism to support a plurality of layers of the cans in superposed relation and to constantly revolve the cans upon their own axes during the period of sterilization so as to agitate the contents thereof and cause a more rapid and even distribution of heat throughout the contained materials, to provide means for automatically discharging the sterile cans from the heating vessel through one of the water-sealed openings thereof, to provide means for cooling the cans as they are discharged, to provide means for retaining a supply of cans adjacent to the feeding mechanism for carrying them into the heating vessel, and means actuated by the feeding means for controlling the supply-retaining means.

Further objects of my invention will appear and be more fully set forth hereinafter.

In the accompanying drawings, Figure 1 is a longitudinal vertical sectional view of a machine embodying my invention, certain repetitional parts being broken away, Fig. 2 is a side elevation of the same, Fig. 3 is a transverse vertical section through the heating vessel on the plane of the line *x*—*x* of Fig. 1, Fig. 4 is a detail section on the plane of the line *y*—*y* of Fig. 5, Fig. 5 is a detail side elevation of the intermittent drive device, Fig. 6 is a vertical sectional view through the feed mechanism, Fig. 7 is a detail front elevation of a part of the trip mechanism, Fig. 8 is a side view of the same, Fig. 9 is a detail vertical sectional view showing the latch for the trip mechanism, and Fig. 10 is a detail plan view of the same.

In carrying out my invention I provide a tank 1 of rectangular form, preferably made of boiler-plate, and of which the upper side is normally closed by a removable cover-plate 2. The length of the tank is proportioned according to the desired capacity of the machine for the particular purposes for which it is to be employed, but in the drawings all the central part of the tank is broken away, since the parts that might be shown in the removed portion are merely repetitions or continuations of the parts actually shown.

Near the front end of the tank is a shaft 3 of which the end portions extend through fixed bearings in the sides of the tank. Near the rearward end of the tank is a transverse shaft 4 disposed parallel with the shaft 3 and of which the end portions are journaled in boxes 5 at the sides of the tank. The boxes 5 are held slidably in guide-plates 6, and adjusting-screws 7 are provided which bear against the ends of the boxes for moving them longitudinally of the guide-plates to adjust the tension of the chains for the conveyer and moving trackway for the conveyer rollers. Each of the bearings for the shafts 3 and 4 is provided with a packing-gland at the outer end, as shown at 8 in Fig. 4.

On the shafts 3 and 4 adjacent to the sides of the tank are mounted sprocket-wheels 9 and 10, the wheels 9 being keyed to the shaft 4 and the wheels 10 being revoluble on the shaft 3. Adjoining the inner sides of the sprocket-wheels 9 and 10 are smaller sprocket-wheels 11 and 12, of which the wheels 11 are keyed to the shaft 3 and the wheels 12 are revoluble on the shaft 4. Endless chains 13 are passed around the sprockets 9 and 10, extending between the shafts 3 and 4 adjacent to the sides of the tank. Projecting laterally from the inner sides of the chains at regularly spaced intervals are pins 14, shown in Fig. 4, which extend into

the ends of transverse rollers 15, so that said rollers are revoluble on the pins. Endless chains 16 are passed around the sprockets 11 and 12, and extend between the shafts 3 and 4 inside the conveyer apron or belt formed by the chains 13 and rollers 15. The chains 16 are preferably provided with rollers 17 at the joints thereof, between the sides of the links, said rollers projecting slightly beyond the links on the sides of the chains adjoining the sprocket-wheels. The parts of the chains 16 between the sprocket-wheels are supported on fixed tracks 18 and 19, said tracks preferably being formed of ordinary rolled channel-bars. The upper tracks 18 are supported by transverse angle-bars 20 of which the ends are secured to the sides of the tank, and the lower tracks 19 are suspended from the upper by means of the connecting-plates 21. The lower tracks 19 are arranged so as to hold the chains 16 at a level considerably above the corresponding portions of the chains 13, the ends of said tracks being curved downwardly adjacent to the sprocket-wheels 11 and 12, as shown in Fig. 1. The upper tracks 18 hold the chains 16 slightly above the level of the upper sides of the sprockets 11 and 12, so that the upper edges of the chains bear against and form a movable trackway and support for the conveyer-rollers 15.

To prevent sagging of the chains 16 between the sprocket-wheels and the ends of the tracks 18, bars 22 are provided which are pivoted to the ends of the tracks and extend into peripheral grooves in the sprockets 11 and 12, said grooves being located centrally with respect to the sides of the sprocket teeth, the depth of the grooves being greater than that of the teeth, and the end portions of the bars 22 resting on the bottoms of the grooves. Said bars 22 serve to hold the chains 16 up against the rollers 15 between the sprockets and the ends of the tracks 18. Near the bottom of the tank are tracks 23 on which the conveyer rollers 15 rest during their return movement from the sprockets 9 to the sprockets 10.

At the front end of the tank is a frame consisting of the side-pieces 24 and 25, cross-rods 26 and 27, and a cross-bar 28 which is secured to and supports the front end of the tank. Near the front side of said frame are carried bearings for the main drive shaft 29 which carries at one end, adjacent to the frame-member 25, a large drive pulley 30, the same being driven by a belt 31 extending to a suitable source of power.

Adjacent to the pulley 30 a small sprocket-wheel 32 is secured to the shaft 29 and from said sprocket a chain 33 extends to a large sprocket-wheel 34 carried on the end of the shaft 3. The shaft 3 is thus driven continuously in a direction such that the upper portions of the chains 16 move forwardly, or from the sprockets 12 toward the sprockets 11, being driven from the latter which are keyed to the shaft 3.

On the end of the shaft 3 opposite the sprocket-wheel 34 is a pinion 35 which meshes with a crank-gear 36 mounted on a stub-shaft 37 carried by the side-frame 24.

On the side of the crank-gear is a crank-pin 38 from which a connecting-rod 39 extends upwardly and is connected with a crank-arm 40 carried on the end of a transverse rocking-shaft 41 journaled in the upper portion of the frame. On said rocking-shaft adjoining the inner side of the frame-member 25 is a crank-arm 42 from which a long connecting-rod 43 extends rearwardly and downwardly, and is connected with a crank-arm 44. The latter crank-arm is pivotally mounted on the hub of a ratchet-wheel 45 which is secured on the end of the shaft 4.

The arm 44 carries a pawl 46 of which one end is weighted, and which normally engages the ratchet-wheel 45 as shown in Fig. 5.

The rotation of the crank-gear 36 causes an oscillating or alternating rotary movement of the shaft 41, and this movement is communicated to the crank-arm 44 by the rod 43 so the ratchet-wheel 45 and shaft 4 are thereby intermittently advanced. The sprockets 9, being keyed to the shaft 4, are driven thereby so that the conveyer is intermittently actuated, the upper portion thereof being moved toward the rearward end of the tank.

The conveyer rollers 15 are spaced apart so that a row of cans A may lie between each adjoining pair of the rollers, as shown, the adjoining rows of the cans not being in contact with each other. Upon the lower layer of cans A a second layer of cans B may be placed, and upon the latter a third layer of cans C may rest, as shown. Guide-bars 47, arranged at the sides of the tank, keep the rows of cans A, B and C in proper transverse relation to the conveyer.

The tank may be heated by any suitable means, and in the drawings there is shown a perforate steam-pipe 48 at the bottom of the tank, through which live steam may be admitted thereto. When the temperature desired in the tank is not greater than that of water boiling at atmospheric pressure, the lower part of the tank is filled with water to a level above the steam-pipe 48, so that the steam from the pipe will pass into the water and raise the same to boiling temparature.

The desired water-level is maintained in the tank by means of a trap 49 which is connected with the bottom of the tank as shown in Fig. 1. The trap is preferably provided with a gate 50 which may be opened when

it is desired to empty the tank or to clean and flush out the same. Where higher temperatures than that of boiling water are desired in the tank the drainage trap may be arranged so that the water level will be slighty below the bottom of the tank, and dry super-heated steam admitted to the tank.

The movement of the track-chains 16 causes a constant rotary movement of the conveyer rollers 15 engaged by the chains, said movement of the rollers is communicated to the cans A which rest thereon, and each layer of the cans serves to actuate the next succeeding layer above them, so that all of the cans are constantly revolved upon their axes in the directions indicated by arrows in Fig. 1. By said rotation of the cans the contents thereof are agitated, and the inner portions of the contained materials are thereby brought to the surface and more rapidly and uniformly heated.

The intermittent movements of the conveyer, before described, gradually carry the cans toward the rear end of the tank where they are received upon an inclined shelf 51 as the rollers commence to pass around the sprockets 9. The shelf 51 is, in effect, an inward extension of the lower side of the chute or spout 52 which extends diagonally downward from the rearward end of the tank. The lower end of the spout extends into a cooling-vat 53 so that the opening of the spout is below a water-level maintained in said vat and is thus water-sealed. The cans rolling down the chute pass into the water, and may be removed from the vat by suitable means, such as the inclined conveyer represented by dotted lines 54 in Fig. 2.

Automatic means are provided for feeding the cans into the tank and placing them in proper position on the conveying and rotating mechanism. At the front end of the tanks is a forwardly extending trough 55 of cylindro-segmental form. At the top of the tank adjoining the trough is an upwardly extending hood 56 of which the front-plate 57 extends down into the trough, the lower edge of the said plate curving forwardly so as to be substantially concentric with the curved bottom-plate of the trough, thus leaving a curved space between said plates somewhat greater in thickness than the diameter of the can to be handled by the machine. The trough is filled with water to a level above the lower edge of the plate 57, so that the opening into the tank between said plate and the bottom of the trough 55 is water-sealed. Along the front edge or lip of the trough is an inclined feed-table 58 which is connected to the trough by the bars 59, and is further supported by means of brace-bars 60 which extend downwardly to the cross-rod 26. On the feed-table are disposed rows of cams A, B and C which roll down the table toward the trough until the first row engages a series of fingers 61 which extend up through openings in the table near the lower edge thereof. Said fingers 61 are carried by a transverse bar 62 disposed beneath the table, the ends of the finger-bar fitting rotatably in and being supported by the arms 63. Said arms 63 are secured to a transverse shaft 64 which is pivoted on the lower side of the table near the front edge thereof.

At the center of the shaft 64 is a downwardly extending arm 65, to the lower end of which is connected a spring 66. Said spring extends rearwardly and is connected to a lug on the lower side of the trough 55, the tension of the spring serving to pull the arm 65 rearwardly and thus keep the arms 63 and the finger-bar normally in raised position.

A shaft 67 is journaled in the upper part of the frame-members 24 and 25, parallel with the rocking-shaft 41. On one end of said shaft 67 is a pinion 68 which meshes with a gear-segment 69 carried by the shaft 41, so that the rocking movements of the latter shaft produce similar movements of the shaft 67, such movements being, however, greater in extent than the movements of the shaft 41.

On the shaft 67 between the frame-members are secured the cradle-arms 70, the same comprising straight portions which extend radially from the shaft, and curved portions joined to the outer ends of the radial portions and extending concentrically with the shaft. The bottom of the trough 55 is also substantially concentric with the shaft 67, so that during rotation of said shaft the curved portions of the cradle-arms move adjacent to the trough-bottom, but without coming into contact therewith.

To the ends of the curved portions of the cradle-arms is secured the cradle or feeding-carrier, comprising the flat perforate end-plates 71, curved side-plates 72, and cross-rods 73 extending between the side-plates.

At the end of the cradle-shaft 67 opposite the pinion 68 is an arm 74 which carries a counterweight 75 arranged so as to substantially balance about the axis of the shaft the weight of the cradle-arms and cradle. The movements of the cradle-shaft are such that at one extreme of movement thereof the cradle is in a position a little higher than that shown in Fig. 6. As the cradle reaches the extreme forward and upper position the retaining fingers 61 are depressed so as to permit the cans on the feed-table to roll into the spaces in the cradle between the end-plates and cross-rods. The depression of the retaining-fingers is caused by the following means: On the cradle-shaft 67 adjacent to the frame-member 25 is secured a cam 76. A bar 77 has a head portion which fits around the shaft adjoining the cam, said bar ex-

tending downwardly and the opening through the head being elongated vertically to permit movement of the bar relative to the shaft. On the side of the bar is a roller 78 which may be engaged by the raised portion of the cam, as shown in Fig. 8, to push the bar downwardly. The lower end of the bar is slotted vertically and passes slidably around a stud 79 secured to a lever 80 of which the rearward end is pivoted on a lug 81 at the side of the trough 55, while the other end of the lever rests upon the upwardly extending end portion 63′ of one of the arms 63.

On the side of the cam-bar 77 is pivotally mounted a bar 82 of which the lower end normally rests on the upper side of the lever 80, so that as the cam-bar is pushed down by the cam the movement is communicated through said bar 82 to the lever 80 and thence to the arm 63 and shaft 64, the finger-bar 62 being moved to the release position shown in Fig. 6. If it is desired at any time to stop the feeding of the cans from the table 58 the bar 82 is pulled forward, by means of a handle 83 thereon, to the position shown in Fig. 1 and by dotted lines in Fig. 8. At this position the cam-bar is permitted to drop down until the roller 78 is not engageable by the cam, so that the finger-bar is not moved to the release position and the cans are retained upon the feed-table instead of being permitted to roll into the cradle.

For retaining the finger-bar temporarily in release position while the cradle is moving downwardly as represented in Fig. 6, one of the arms 63 is provided with an upwardly extending end-portion 63″, the same carrying a pin 84 which is engageable with a latch 85 pivoted at one edge of the table. Said latch 85 is provided with a counterweight carried on an arm 86 and arranged so that the latch is normally held thereby in the position shown in Fig. 9. When the finger-bar is depressed the pin 84 engages the upper curved face of the latch, first pressing the latch forwardly and then passing into a notch in the lower part of the latch as shown in Fig. 9. After the pin is engaged in the notch the finger-bar is thereby held in release position until the latch is moved to disengage it from the pin.

For releasing the latch a roller 87 is provided on one side of the cradle at the position indicated in Figs. 9 and 10. As the upper side of the cradle approaches the lower edge of the feed-table, a position at which the cradle will be completely filled with cans, said roller 87 strikes the latch and disengages it from the pin 84, whereupon the finger-bar is moved by the spring 66 to the normal raised position at which the fingers 61 prevent the cans from rolling off the table.

After the cradle is filled with cans, as described, its rearward movement continues and the cans therein are carried through the water-seal around the lower edge of the plate 57 and up inside the tank, as represented in Fig. 1, the extreme of movement of the cradle being indicated by dotted lines in said figure. As the cradle moves up into the hood 56 the rows of cans are successively carried above the rearward edge of the trough 55 and are deposited upon the conveying and rolling mechanism, the successive rows being disposed in the superposed relation before described, it being obvious that the first row of cans A to pass from the trough will fall directly onto the conveyer-rollers, the next row of cans B being disposed on top of the first, and the next row of cans C being deposited on top of the cans B. The movements of the cradle are made comparatively slowly so that during the passage of the cradle through the trough 55 the water therein may flow through the perforate plates 71 and around the cans, so that the latter pass into the tank without destroying the water-seal. The movements of the conveyer are, of course, timed the same as the movements of the cradle mechanism, since both groups of mechanism are driven primarily from the rocking-shaft 41.

From the foregoing the operation of the machine as a whole will be clearly apparent and need not be here recapitulated. It will be obvious that the machine as described provides an efficient and economical means for sterilizing materials in metal cans, and that the machine will occupy a comparatively small floor space proportionally to its output, due to the fact that a plurality of layers of the cans are superposed in passing through the heating vessel. It will also appear to those skilled in the art that various changes in the specific structure of the machine may be made without departing from the spirit of the invention as herein set forth and hereinafter claimed.

Now, having described my invention, what I claim and desire to secure by Letters Patent is:

1. In a sterilizing machine, a heating vessel, an endless conveyer disposed in said vessel and having horizontally spaced parallel rollers, means for placing rows of cylindrical cans on said conveyer rollers, means for continuously revolving the rollers, and means for intermittently actuating the conveyer.

2. In a sterilizing machine, a heating vessel, an endless conveyer disposed horizontally in said vessel and having transverse rollers, actuating means for revolving said rollers, and separate actuating means for advancing the conveyer.

3. In a sterilizing machine, a heating vessel, a conveyer disposed in said vessel and

having a series of transverse rollers spaced apart horizontally, continuously moving means engaging said rollers for revolving the same, and means for intermittently moving the rollers horizontally.

4. In a sterilizing machine, a tank, transverse shafts journaled on parallel axes near opposite ends of the tank, means for revolving one of the shafts continuously, means for revolving the other shaft intermittently, sprocket-wheels secured on the intermittently-moving shaft, other sprocket-wheels revolubly mounted on the other shaft, an endless conveyer apron extending around said sprocket-wheels and horizontally between them, said conveyer having transverse rollers, sprocket-wheels secured on the continuously moving shaft, other sprocket-wheels revolubly mounted on the intermittently moving shaft, and endless chains extending over said sprockets and having portions engaging the conveyer rollers to revolve the same.

5. In a machine of the class described, a conveying mechanism having a series of horizontally spaced rollers adapted to support a plurality of cylindrical cans in horizontally spaced relation to each other, means for moving the conveyer rollers horizontally, supporting means on which the rollers rest, and means for moving said supporting means transversely of the rollers to continuously revolve the same.

6. In a machine of the class described, a pair of parallel horizontal shafts, separate driving means for said shafts, an endless conveyer having transverse rollers, wheels on said shafts engaging said conveyer, other wheels disposed on said shafts inside the conveyer, and endless flexible means engaging the latter wheels and adapted to engage the transverse rollers to revolve the same, said means being driven from one of the shafts and the conveyer being driven from the other shaft.

7. In a machine of the class described, a horizontal conveying mechanism provided with means for retaining rows of cans in horizontally spaced relation to each other, means for actuating said conveying mechanism, means for heating the cans carried by the conveying mechanism, and means for feeding rows of cans onto the conveying mechanism and placing said rows of cans in a plurality of superposed layers thereon.

8. In a machine of the class described, a horizontal conveyer having transverse rollers, means forming movable tracks for said rollers, actuating means for moving said tracks to revolve the rollers, actuating means for progressively moving the conveyer longitudinally of the tracks, and means for placing rows of cylindrical cans upon the conveyer, said means being adapted to place said cans in a plurality of layers of which each layer comprises axially alined rows of the cans, the adjacent rows being spaced apart, each row of the lowermost layer resting upon an adjacent pair of the conveyer rollers, and each succeeding layer of the cans resting upon the cans of the layer below them.

9. In a machine of the class described, an inclined feed-table, a cradle swingable on a horizontal axis and adapted to move adjacent to said table to receive therefrom a plurality of rows of cans, a trough disposed concentrically with the cradle-axis and extending adjacent to the lower edge of the feed-table, a tank to which the trough is connected, conveying mechanism within the tank and extending adjacent to one end of the trough, and means for actuating the cradle to move the rows of cans through the trough and discharge them from said end of the trough onto the conveyer mechanism in successively superposed relation.

10. In a machine of the class described, a horizontal cradle-shaft, cradle-arms secured to the shaft, said arms having portions extending radially from the shaft and curved portions concentric with the shaft and joining the outer ends of the radial portions, a cradle carried at the ends of the curved arm-portions, a trough arranged with the bottom thereof substantially concentric with the cradle-shaft, means for actuating said shaft to swing the cradle through the trough in alternating directions, an inclined feed-table disposed at one edge of the trough, means for retaining rows of cans on the feed-table, means for releasing said retaining means as the cradle is moving adjacent to the edge of the table so that the rows of cans may roll from the table into the cradle, means for resetting said retaining means as the cradle moves beyond the table to carry the cans through the trough, and conveying means for receiving the cans from the cradle at the other edge of the trough.

11. In a machine of the class described, a tank having at one end a passage opening thereinto, said passage being substantially rectangular in transverse vertical section and being downwardly curved in longitudinal vertical section, horizontal conveying means arranged within the tank and extending adjacent to the inner end of said passage, and a curvilinear reciprocating device for pushing cans through said passage onto said conveying means.

12. In a machine of the class described, a tank having at one end a curvilinear water-sealed passage opening thereinto, a swingable cradle adapted to enter the tank from the outside thereof through said passage, conveying mechanism disposed in the tank adjacent to the inner end of said passage, means for admitting cans to the cradle at a

position thereof outside the tank, means for actuating the cradle to swing the same through the passage so as to place the cans held thereby onto the conveying mechanism, and means for actuating the conveying mechanism synchronously with the cradle-actuating mechanism.

In testimony whereof I have hereunto subscribed my name in the presence of two witnesses.

HARRY W. LOWE.

Witnesses:
LELAND A. BABCOCK,
ROSE MOCKLER.