

J. A. AND J. L. ANDERSON.
STERILIZER.
APPLICATION FILED OCT. 3, 1918.

1,408,429.

Patented Mar. 7, 1922.
8 SHEETS—SHEET 1.

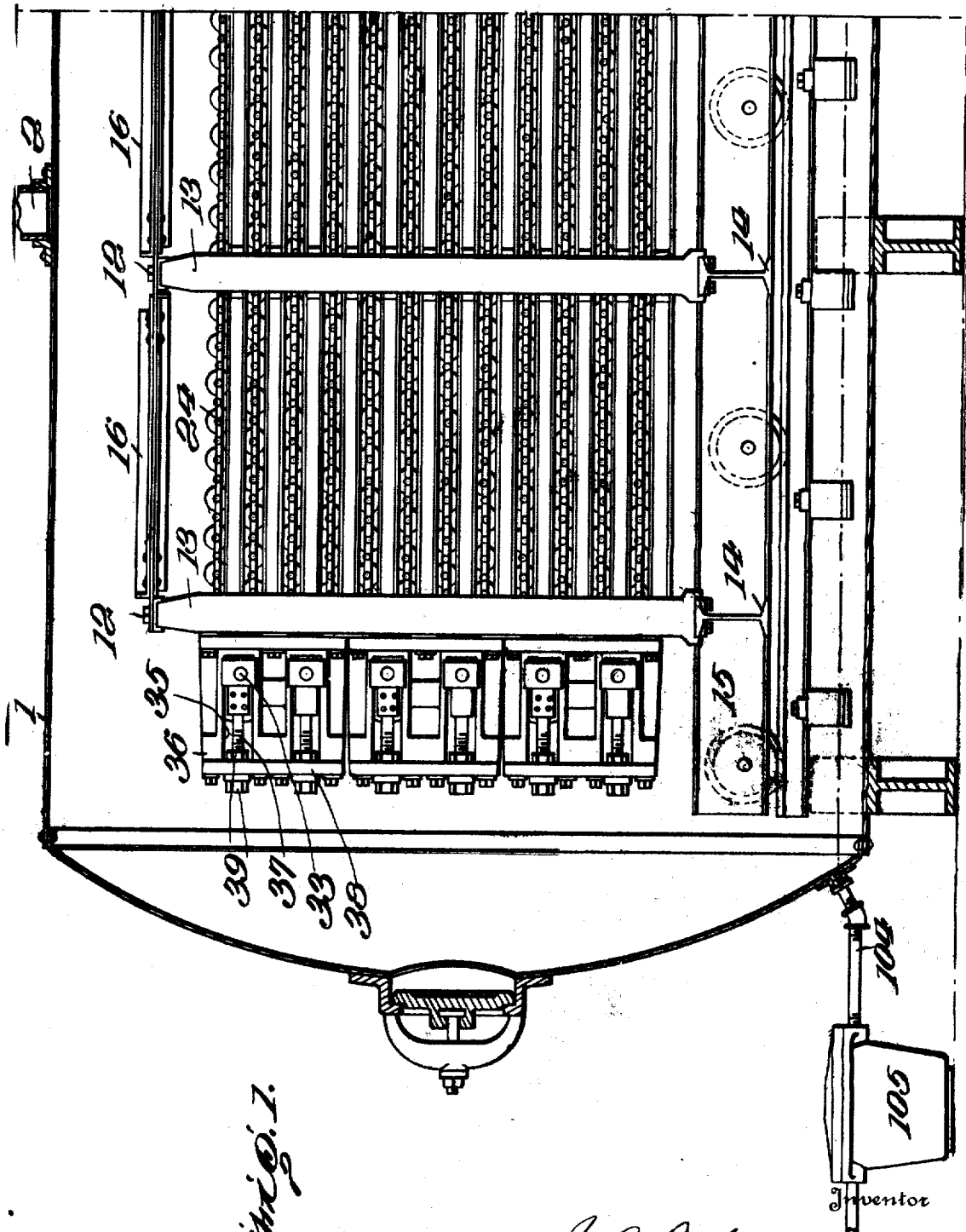


Fig. 1.

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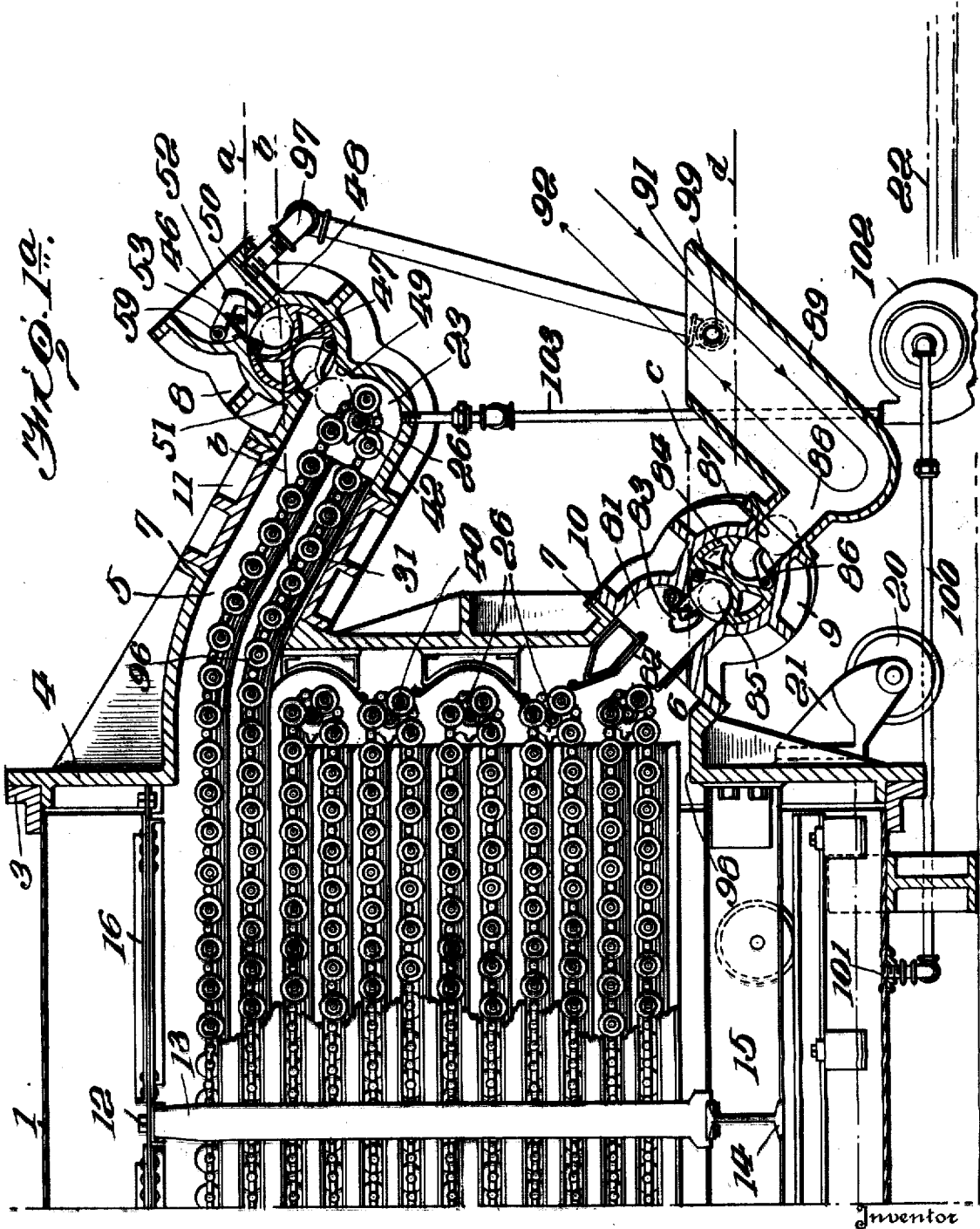
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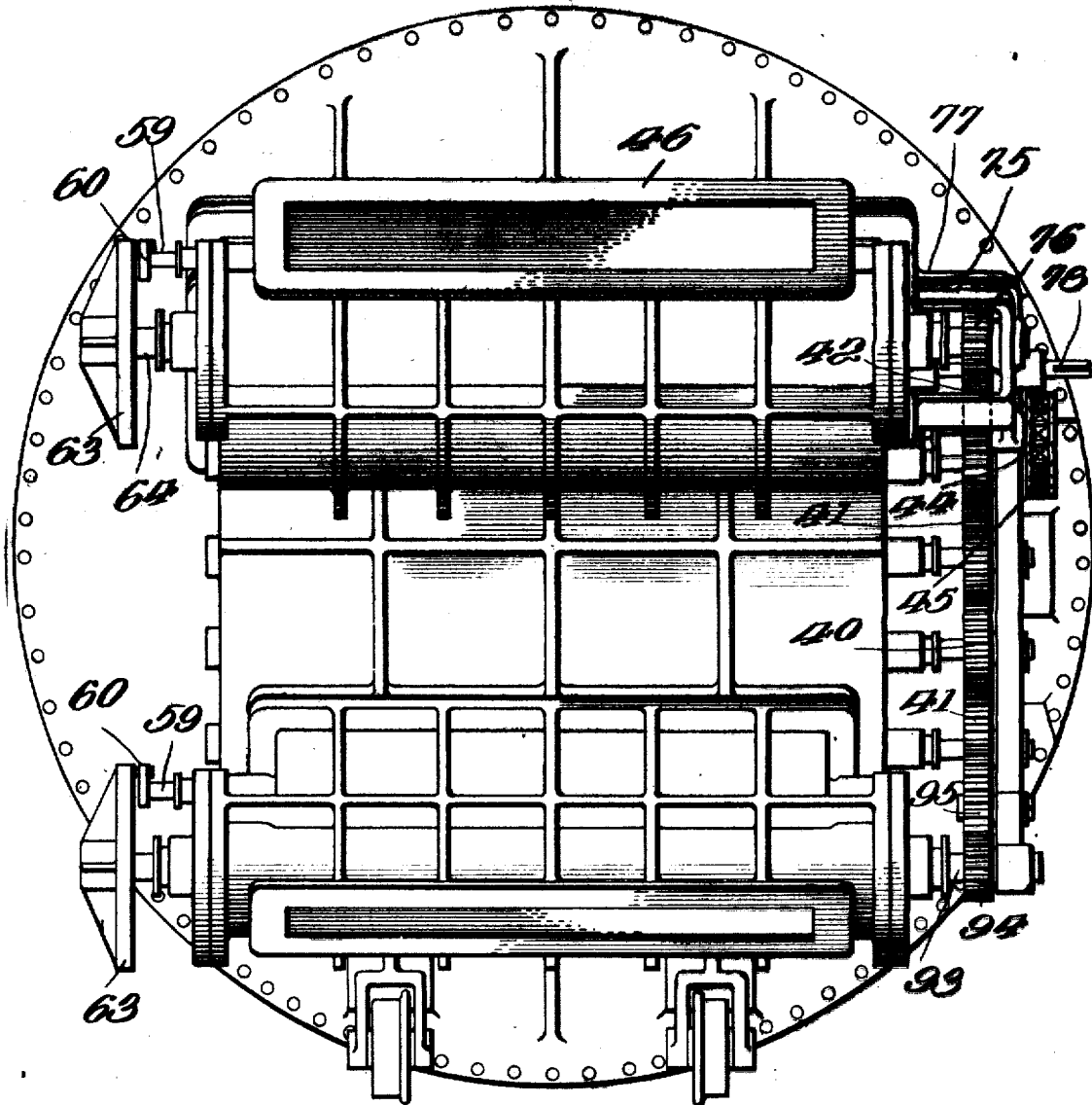
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Fig. 2.



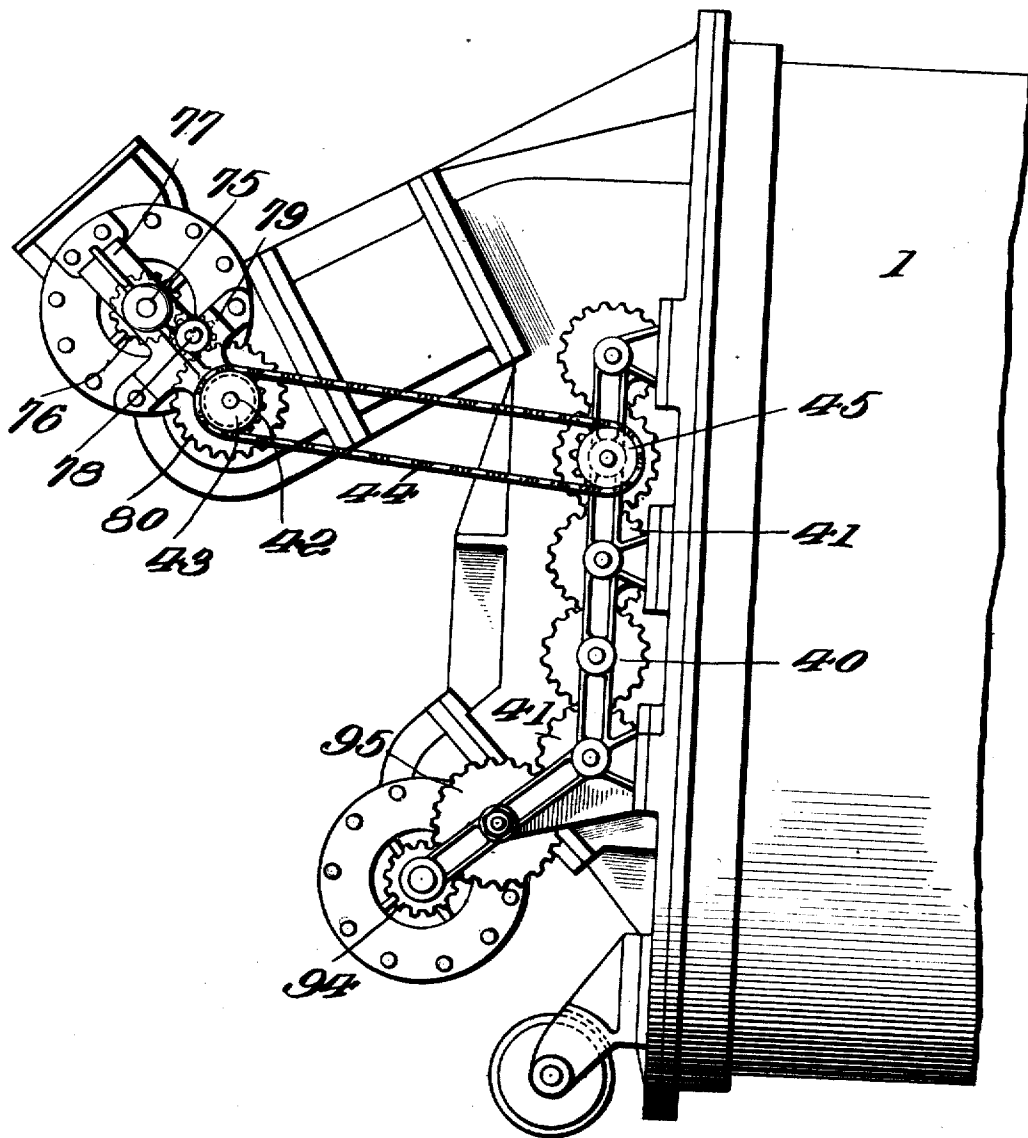
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Fig. 3.



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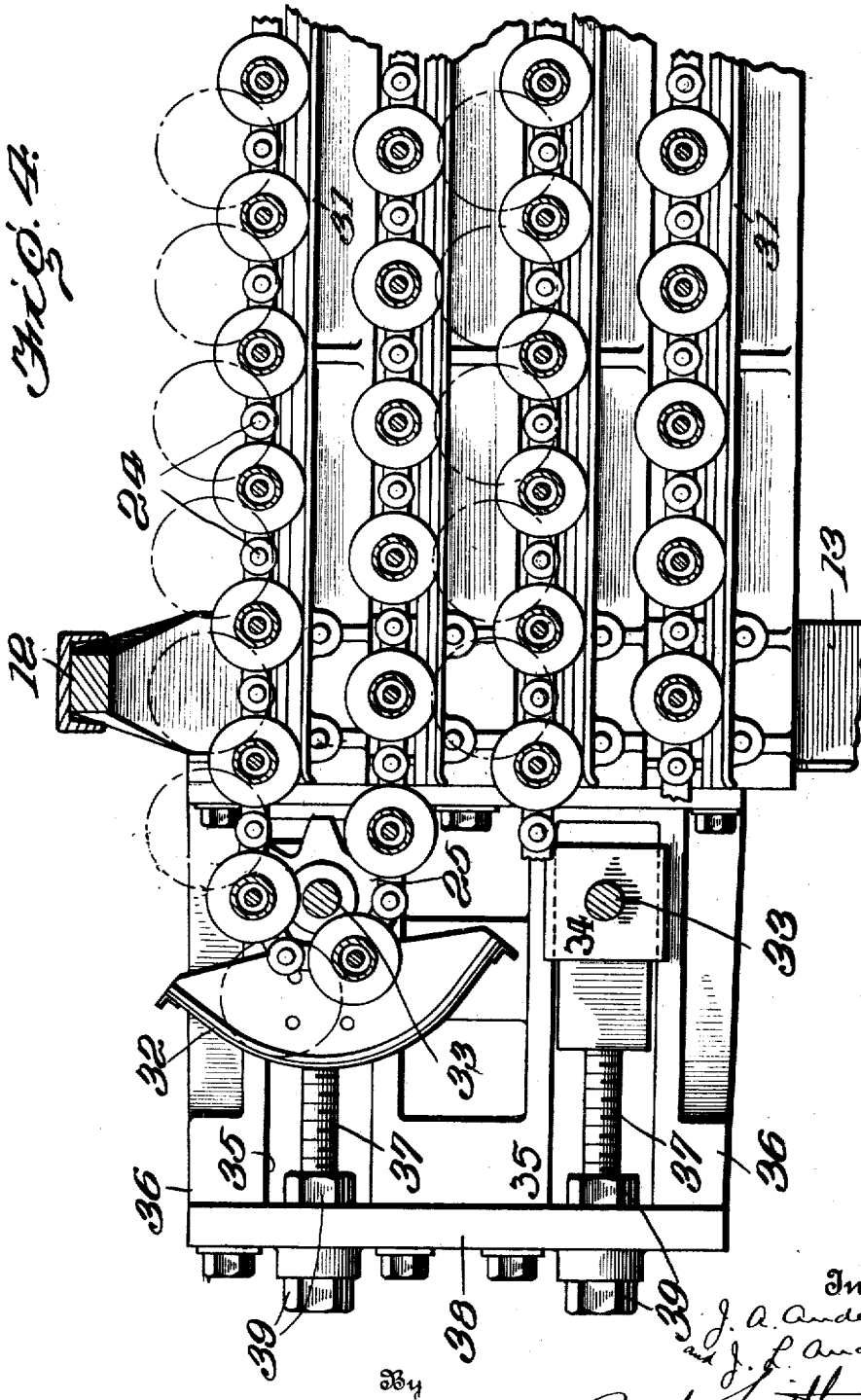
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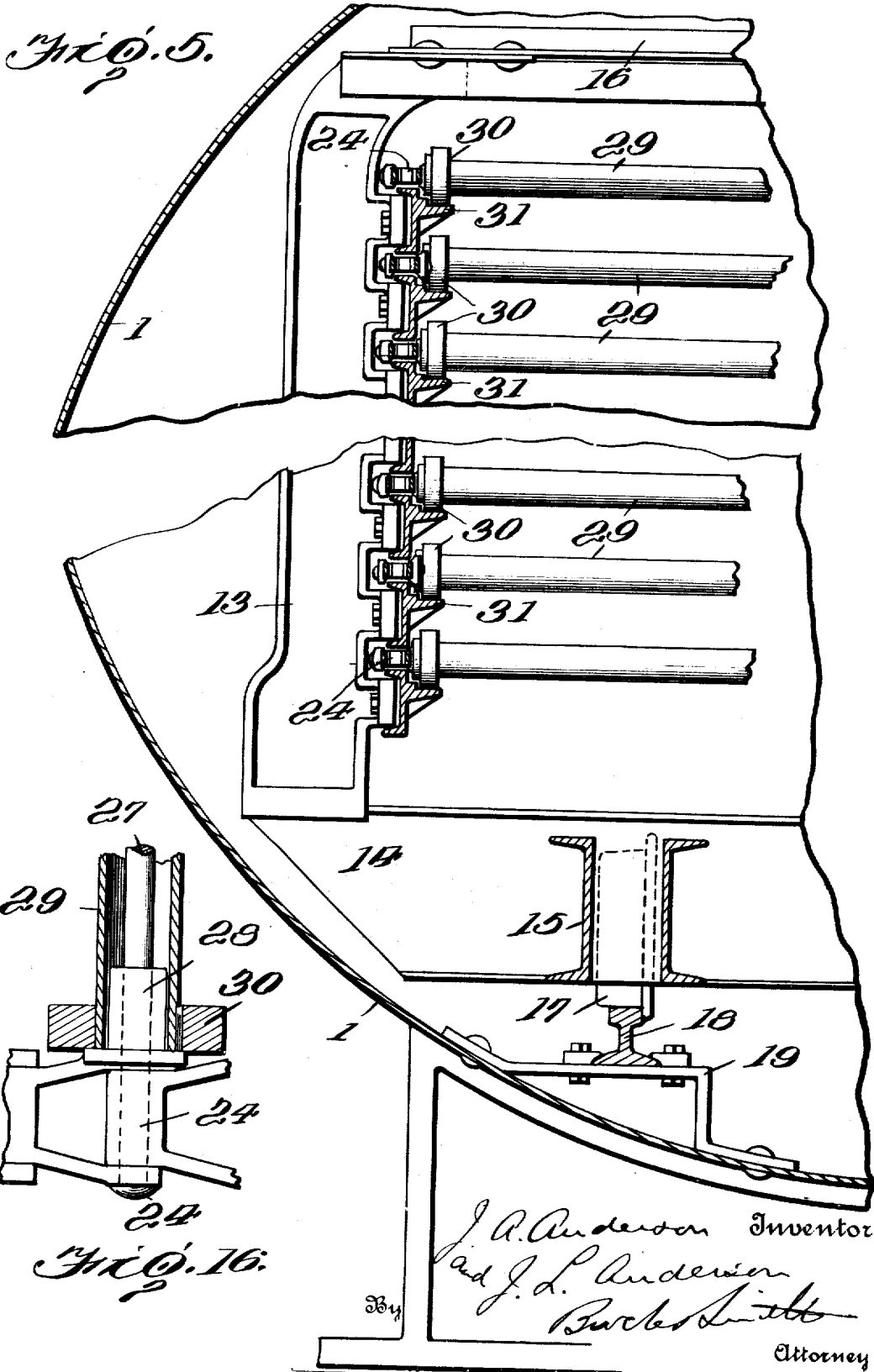
8 SHEETS—SHEET 5.



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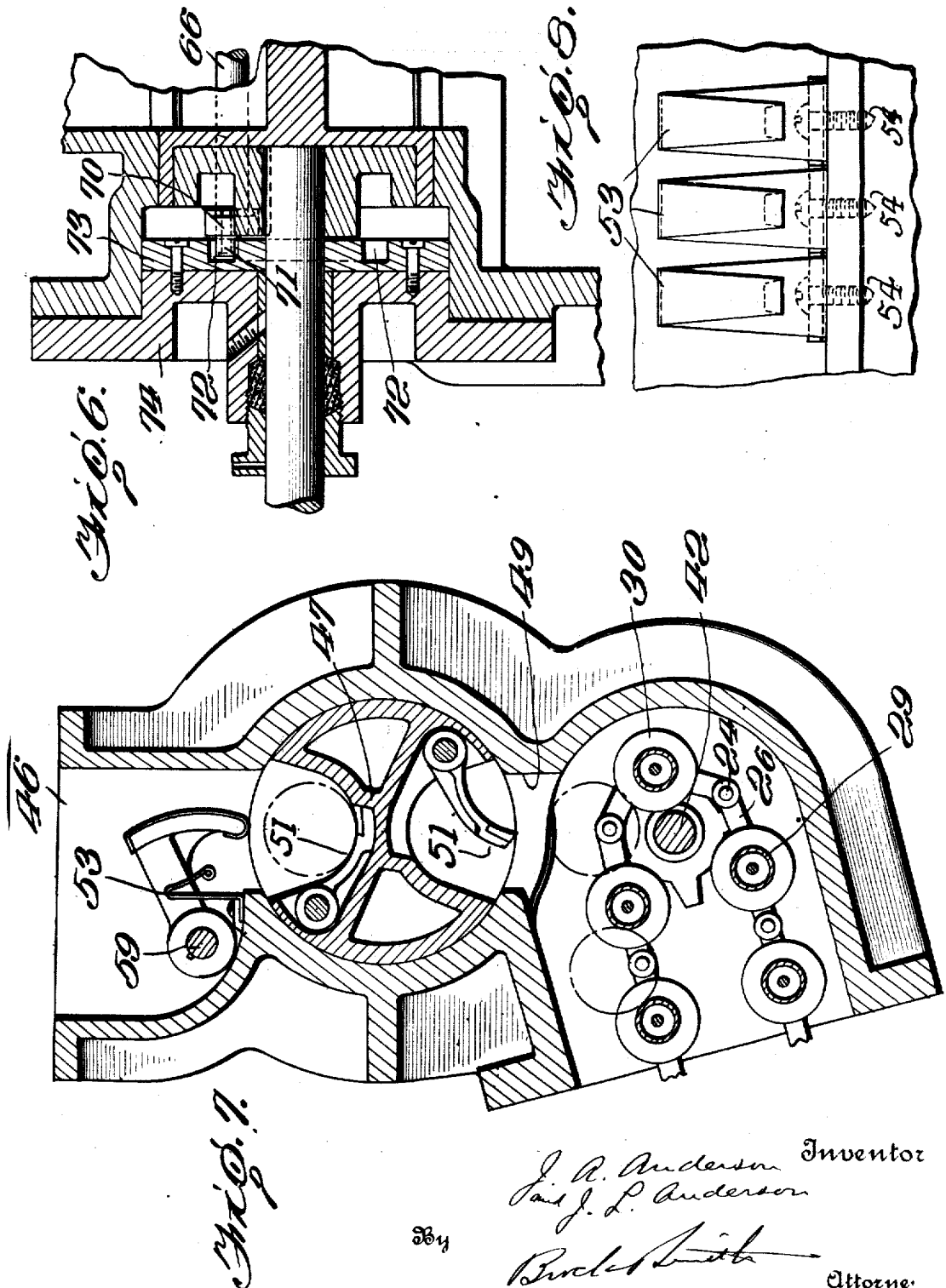
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8 SHEETS—SHEET 7.



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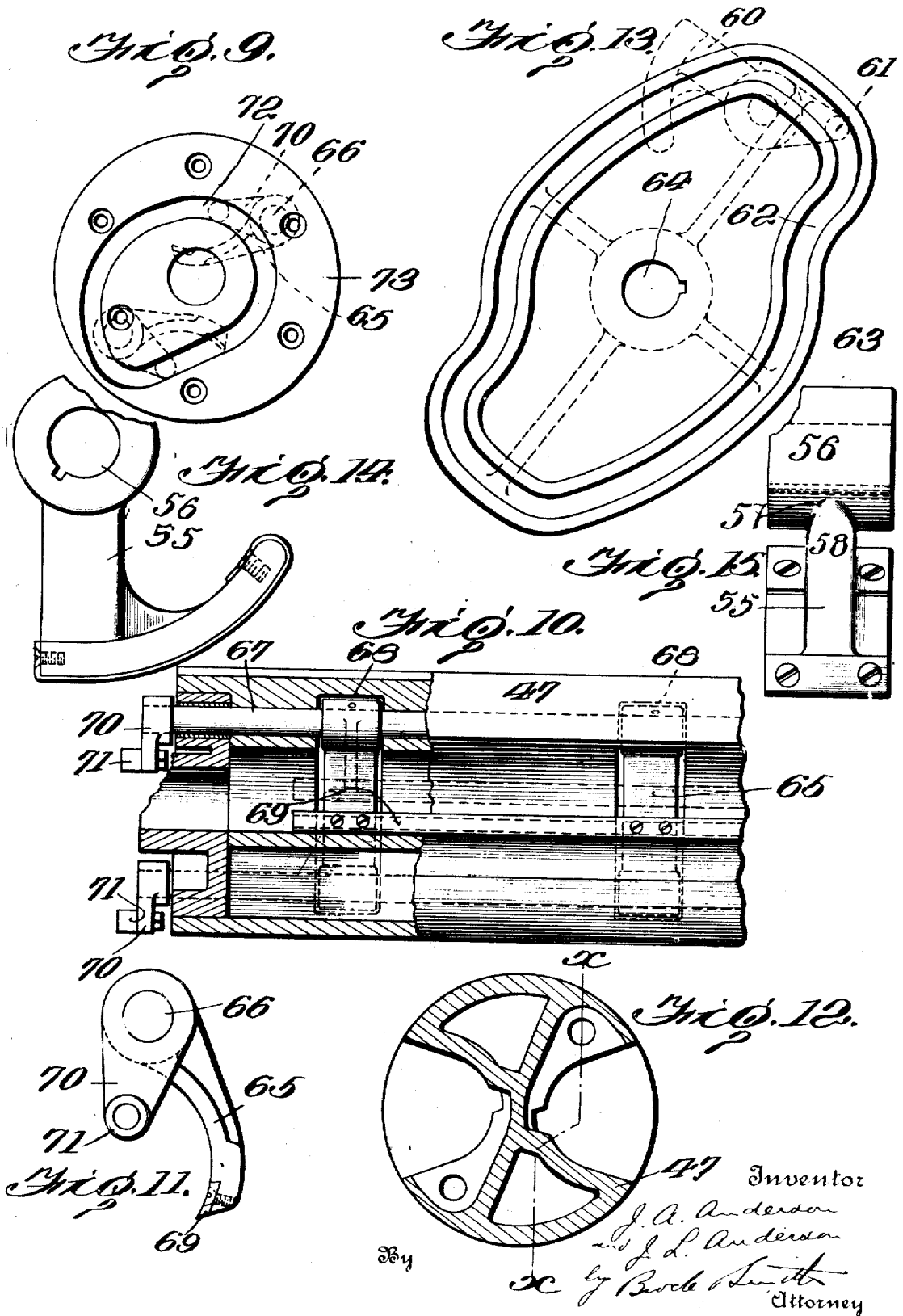
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8 SHEETS—SHEET 8.



UNITED STATES PATENT OFFICE.

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STERILIZER.

1,408,429.

Specification of Letters Patent.

Patented Mar. 7, 1922.

Application filed October 3, 1918. Serial No. 256,709.

To all whom it may concern:

Be it known that we, JAMES A. ANDERSON, a citizen of the United States, and resident of Morgan, Utah, and JOHN L. ANDERSON, a citizen of the United States, and a resident of Salt Lake City, Utah, have invented certain new and useful Improvements in Sterilizers, of which the following is a specification.

Among the objects of the invention are to provide improved means for moving filled and sealed cans into a sterilizing chamber and removing them therefrom; improved means for conveying the cans within the chamber in a course long enough to provide for thorough cooking or sterilizing when running at a suitable speed; to construct and arrange the parts so that the apparatus may be used advantageously for pressure cooking with practically no loss of steam and consequent conservation of heat, although the machine may also be used for pressureless sterilizing, that is for sterilizing at atmospheric pressure; and to improve various structural features of the machine.

More particularly stated, one of the principal objects is to improve the construction of the type of machines in which the cans are fed to and discharged from the chamber by rotary members containing pockets to receive the cans, by providing a water seal for such rotary members having novel characteristics, and by providing improved and positive devices for feeding the cans to and from such rotary devices. In connection with our feed and discharge means, and the water seal therefor, we provide new and improved means of circulating the water for the purposes hereafter described.

The accompanying drawings show one exemplifying embodiment of the invention, and in connection with the detailed description of it, the objects, advantages and novel characteristics of the invention will be further explained so far as is necessary to enable them to be understood by persons skilled in the art. After considering this representative embodiment, it will be evident that the invention may be embodied in different forms, and we do not limit ourselves to details, except as claimed.

In the drawings—

Figures 1 and 1^a when combined are a vertical longitudinal section of a machine embodying the invention;

Fig. 2 is a front end elevation;

Fig. 3 is a side elevation of the front end of the machine from the right of Fig. 2;

Fig. 4 is an enlarged view in vertical longitudinal section of a portion of the conveyor;

Fig. 5 is an enlarged view in vertical transverse section of a portion of the conveyor;

Fig. 6 is an enlarged detail in vertical section of one end of one of the can cylinders and its housing in the plane of the axis of the cylinder;

Fig. 7 is a section on a smaller scale in a plane at right angles to that of Fig. 6 of one of the cylinder housings and certain associated parts;

Fig. 8 is an enlarged detail of the can check springs;

Fig. 9 is a detail of one of the discharge cams and certain related parts;

Fig. 10 is a side view partly in section and partly in elevation of one end of one of the can cylinders;

Fig. 11 is a detail of one of the can ejectors or discharge devices;

Fig. 12 is a detail of one of the cylinders in transverse section showing the can pockets and the recesses to receive the ejectors;

Fig. 13 is a detail of one of the feed cams and certain related parts on the same scale as Fig. 9;

Fig. 14 is a detail of one of the feed devices viewed from the end of its shaft;

Fig. 15 is a side view of the same; and

Fig. 16 is a detail mainly in section of a part of the conveyor.

The sterilizing enclosure consists of a substantially cylindrical shell 1 designed to resist the necessary steam pressure, say about fifteen pounds to the square inch, and having a suitable steam supply connection 2 and other fittings which do not form a part of this invention. At one end, which may be named for convenience the front end, as shown in Fig. 1^a, the shell has a flange 3 to which is bolted a head or front plate 4.

This plate has upper and lower can openings 5 and 6 and adjacent to each opening is provided a flange 7 for the connection of the feed and discharge devices carried by housings 8 and 9, respectively. The housing 9 is connected to the lower flange 7 directly by means of a flange 10 on the housing, and the housing 8 is connected to the upper flange 7 by an intermediate hollow spacer 11. The housing 8 with its cylinder and its associated parts are referred to as the feed mechanism in the sense that these parts are for introducing the cans into the shell or casing 1, and similarly the housing 9 with its cylinder and other parts is for discharging the cans from the retort; but for each of the can cylinders there is also provided means for feeding the cans to the cylinder and discharging them from it, as will appear in later explanation, and this distinction as to feeding and discharging means should be kept in mind.

Within the retort or shell 1 is a conveyor carried by a conveyor frame 12, consisting mainly of side uprights 13 resting on cross beams 14 which are in turn connected to longitudinal beams 15. The tops of the uprights 13 are connected by suitable transverse and longitudinal bars 16. Wheels 17 are journaled in the beams 15 and are flanged to run on rails 18 carried by suitable brackets 19 near the bottom of the shell; and the front ends of the beams 15 and certain of the longitudinal connecting members 16 are bolted to the head 4. By this arrangement when the head is unbolted from the flange 3 it, with the entire conveyor structure carried by the frame 12, may be run out of the shell for examination or repair. To facilitate this the head may also be provided with exterior wheels 20 carried by brackets 21 arranged to run on outside rails 22.

The conveyor is really a group of conveyor units, each consisting of an endless articulated belt, the belts being arranged one above the other and each being of substantially the same construction except the top one which is extended through the feed opening 5 of the head and through the spacer 11 into the inner chamber 23 of the housing 8.

Each belt has at each side a chain 24 and these chains run on rear sprockets 25, which are idlers, and front sprockets 26, which are the driving sprockets. At regular intervals opposite blocks of the two chains are connected by rods 27. At each end of each rod, adjacent to the chain link is a bearing stud 28, and sleeves 29 are mounted to turn on these bearings. Each sleeve has at each end adjacent to the chain links a wheel 30, and these wheels are arranged to run on track 31 at each side of the belt structure bolted to the uprights 13. Each of the conveyor

units has a track for the lower side of both the upper and lower stretches of its belt. The sleeves 29 are spaced apart somewhat less than the diameter of the cans so that, as indicated in dotted lines in Fig. 4, each can rests upon two of the sleeves. As the conveyor moves, the wheels 30 are rotated by contact with their tracks, and thus the sleeves 29 are rotated, and each can is rotated continuously on its axis during all of its travel through the retort. It will now be apparent by comparing Figs. 1, 2, 4 and 5 that the conveyor is adapted to receive cans in rows of a suitable number, say ten cans in each row, and the conveyor and all of the can handling devices are arranged to handle the cans in rows of the stated number. Upper stretches of alternate conveyor units run in opposite directions, that is beginning with the upper unit the top stretch runs to the rear; in the second unit from the top the upper stretch runs forward and so on alternately until the bottom unit is reached, of which the upper stretch runs forward. The cans are thus conveyed first backward by the upper unit, and are then passed to the upper stretch of the second unit which carries them forward, and so on, until they are delivered at the front of the machine to be discharged from the retort by the discharge mechanism, as will be described. To guide the cans from one conveyor unit to the other, guide plates 32 are provided at the rear of the upper conveyor unit, and at the front of the second unit, and so on, alternately down. The rear conveyor sprockets 25 are carried by shafts 33 and for ease and convenience in adjusting the conveyor belts, these shafts are mounted in bearings in blocks 34, and the blocks are mounted to slide in guideways 35 of brackets 36 bolted to the rear uprights 13. A screw 37 is connected to each of the blocks, and these screws pass through rear plates 38 of the brackets, and by means of nuts 39 engaging the front and rear faces of the plate 38, the screws are drawn forward or back and locked to adjust the sprocket shafts 33. Conveniently also the rear guide plates 32 are secured to the bearing blocks 34 so that the normal spaced relation of the plates to the end of the conveyor belt is maintained, irrespective of the adjustment of the belt. The front sprockets 26 of all the conveyor units, except the top unit, are carried by shafts 40 mounted in bearings in the head 4, and these shafts project outside of the head at one end and are provided with gears 41 of all of which mesh together so that when any one is revolved, all of the conveyor sprocket shafts are driven in the proper directions. As previously stated, the upper conveyor unit extends at the front through the hollow spacer 11 into the inner chamber 23 of the housing 8, and the drive sprockets

26 for this conveyor are carried by shaft 42, passing through the chamber and extending outside of it at the right where it is provided with a sprocket 43 connected by a chain 44 to a sprocket 45 carried by one of the other conveyor drive shafts—the third from the top—so that the upper conveyor shaft and all the others are caused to run together in the proper relative directions.

10 The tracks 31 of the upper conveyor are extended through the spacer 11 to support the forward extension of the upper conveyor.

The feed and discharge mechanisms carried by housings 8 and 9 differ somewhat in detail but are similar in principle. The feed mechanism will first be described and the differences in the discharge mechanism will then be pointed out.

The housing 8 has an outer chamber 46 in which cans are to be placed in rows by any suitable supply mechanism, the details of which are not here shown. Substantially centrally in the housing is the feed cylinder 47 which is machined to have a close running fit in the walls of the housing. A port 48 leads from the outer chamber 46 to the cylinder, and port 49 leads from the cylinder to the inner chamber 23. The cylinder has two longitudinal pockets 50 at opposite sides, each deep enough and long enough to contain a row of cans. Each pocket is provided with a can discharging device or ejector designated as an entirety in Fig. 1^a by the numeral 51. When the cylinder pockets 50 are opposite the port 48 and during the travel of each pocket from that port until it is opposite to the port 49, the ejector lies under the can at the bottom of the pocket. When the pockets are opposite the inner port 49, the ejector is thrown out, as shown in Fig. 1^a, to positively eject the cans. In the further travel of the cylinder from the port 49 back to port 48, the ejector is returned to the bottoms of the pockets ready for the reception of another row of cans. Located within the outer chamber 46 is a positively acting can feeding device, designed as a whole in Fig. 1^a by the numeral 52. Before each row of cans is placed in the outer chamber, this feed device is retracted permitting the cans to fall against the row of check springs 53. When a cylinder pocket is opposite the port 48, the feed device is advanced to the position shown in Fig. 1^a, forcing the row of cans past the check springs and positively into the pocket. The feed device is then retracted ready to receive another row of cans.

The check springs are shown in detail in Fig. 8. A row of strips of spring metal 53 bent to proper shape is secured in the housing by screws 54 adjacent to the port 48. The positive feed device comprises a plurality of arms 55 (see Figs. 14 and 15), each having a hub 56 and an arc-shaped head 57,

which may be covered with a strip 58 of rubber composition or other material to protect the cans. A row of these members is mounted at suitable intervals on shaft 59 and secured by keying. The shaft has bearings near its ends in the housing, and at least one end extends outside of the housing, as best seen in Fig. 2, and is there provided with an arm 60 (compare Figs. 1^a, 2 and 13) bearing a cam follower 61 which engages the cam groove 62 of the feed cam 63. This cam is carried on a shaft 64 which is in effect the shaft of cylinder 47 and revolves with it, although for structural reasons the shaft will usually be a separate piece from cylinder. The cam is shaped to give two oscillations of the feed shaft 59 for each rotation of the cylinder, and the movement of the heads 57 toward the pockets, of course, is timed to occur just as the pockets approach alignment with the port 48. The check springs therefore hold the cans away from contact with the surface of the cylinder until the pockets are in position to receive the cans and then the feed devices positively force the cans past the springs and into the pockets. Since the surface of the cylinder should have a high polish to insure a proper running fit, this device for keeping the cans from engaging and scratching the surface is quite important. Each of the discharging or ejecting devices 51 (compare Figs. 1^a, 6 and 9 to 12) comprises arms 65 keyed to a shaft 66 and this shaft has bearings 67 formed at intervals in the body of the cylinder. The hubs of the arms are provided with recesses 68 formed in the cylinder body. At their outer ends the arms are recessed to carry a strip 69 which is removably connected to all of the arms so that it may be removed if worn. At, at least, one end of the cylinder the ejector shafts 66 project somewhat beyond the end of the cylinder proper, and are there provided with arms 70 carrying cam followers 71, and these cam followers engage in the cam groove 72 of the discharge cam 73, which is a disk fixed in the housing, in this embodiment by being screwed to the head 74, Fig. 6. Since there are two ejecting elements for each cylinder, the discharge cam is designed to give a single oscillating movement for each ejector for each rotation of the drum, and is arranged so that the strip 69 is thrown away from the center of the drum when pockets 50 are opposite the port 49. The cans are thus positively forced out of the pockets, and immediately onto the adjacent end of the upper conveyor unit. It is possible, and preferable in some cases although not necessary, to provide a discharge cam and cam arms on the ejector shafts at both ends of the cylinder.

At one end of the cylinder, and preferably at the end away from the feed cams 63, is

provided a shaft 75 operatively integral with the cylinder extending outside of the casing, and this carries a gear 76. A yoke 77 secured to one end of the housing provides a bearing for main drive shaft 78 on which is main drive pinion 79 which engages both gear 76 and a gear 80 secured to conveyor shaft 42. Thus, from the main pinion 79 the cylinder 47 and all of the conveyor driving shafts are driven in unison in the proper relation.

The discharge housing 9 has an inner chamber 81 communicating with the interior of the shell, and guides 82 are provided to lead cans the short distance from the discharge end of the lower conveyor to the chamber 81. A positive charging device 83 is located in the chamber 81, substantially similar to the one previously described in connection with the feed cylinder 47, only in this case the charging device 83 is located inwardly of its cylinder since cans here require to be positively fed away from the interior of the shell and into the cylinder pockets. The discharge cylinder 84 is substantially identical with cylinder 47 and has can pockets 85 and positive ejecting devices 86 constructed and operated substantially like the similar devices already described. Outwardly from the cylinder the housing has a short discharge passage 87 leading to downwardly directed passage 88 of the trough-like member 89 which is bolted to housing 9 by means of flanges 90. The upwardly directed portion 91 of the trough 89 receives at its bottom the cans discharged from the shell by the discharge cylinder, and it also serves as a water container for a part of the water seal, later described, and this chamber 91 also usually encloses one end of a conveyor 92 serving to remove the cans from it. The discharge cylinder is provided with a feed cam 63 identical with that of the upper cylinder and other parts similarly numbered, similarly constructed, and acting in a similar manner. The discharge cylinder has a shaft 93 carrying a gear 94 by which the shaft and the cylinder are driven and gear 94 is driven from gear 41 of the lower conveyor unit by means of an intermediate idler gear 95. Thus, the discharge cylinder and its related parts are driven in proper relation to the rest of the apparatus. Water seals will now be described which, in connection with the cylinder, effectively prevent escape of steam from the shell, and at the same time act as a lubricant for the cylinders as they revolve in their housings. The cylinders are made with a reasonably close running fit, but there must be some running clearance, and the water of the water seals takes up this clearance and at the low speed at which cylinders revolve acts as an effective lubricant as well as a steam seal. Adjacent to the feed cylinder 47, water is

maintained in the outer chamber 46 up to the level of line *a* and in the inner chamber 23 and the communicating passage in spacer 11 up to the level of the line *b* which is the level at which water will overflow at 96 into the shell. The level *a* is determined by an overflow pipe 97 communicating with chamber 46. Adjacent to the discharge cylinder 84 water is maintained in the bottom of the inner chamber 81 up to the level of the line *c* 75 which is the level at which water will overflow into the shell at the point 98. Water is maintained in the outer chamber 91 up to the level of the line *d* and this water is supplied by the overflow pipe 97 which communicates with the chamber at 99. A pipe 80 100 leads from the bottom of the shell at 101 to the intake of a suitable pump 102 and water discharged by this pump goes through the pipe 103 to the bottom of chamber 23 adjacent to the feed cylinder. The level of water in the shell is regulated by the pipe 104 which communicates with the shell at the rear end somewhat above the bottom, so that some water will always be 90 maintained at the bottom of the shell to supply pump 102. The pipe 104 leads to a suitable steam trap 105 which will take away excess water while retaining the steam.

Some water of condensation is always 95 maintained at the bottom of the shell, the level being controlled by the discharge pipe 104. When the machine is running some of this water is continually removed from the shell through pipe 100 by pump 102 and delivered to the chamber 23 where any excess overflows back into the shell at 99. As each row of cans is delivered into the chamber 23 by cylinder 47, water from the chamber fills the empty cylinder pocket and thus a pocket 105 full of water is taken from the chamber 23 and delivered to the outer chamber 46 at each half revolution of the cylinder. As each row of cans is pushed into a cylinder pocket by the positive feed device 52 the remaining space in the pocket is filled with 110 water from the chamber 46 and thus a certain amount of water is returned to chamber 23 along with the cans at each half revolution of the cylinder, leaving an excess of 115 water representing the volume of the cans, which is pumped outwardly by the cylinder at each half revolution. This excess flows away through pipe 97 to chamber 91. The action of the discharge cylinder 84 is substantially a reversal of the action of the feed cylinder, that is at each half revolution it pumps an amount of water equal to the volume of the cans from the chamber 91 into the inner chamber 81 and the excess 125 flows over the ledge 98 into the shell. There is thus substantially no difference in the volume of water handled by the charging and discharging cylinders. Since each of the cylinders is completely submerged in 130

water at both sides, there is no chance for either air or steam to get into the cylinder pockets. The loss of steam is practically zero, and the heat efficiency of the apparatus is very high.

In one embodiment of the machine, it is designed to run at such speed that 100 cans are fed into and discharged from the shell per minute. A desirable cooking period for food, such as peas which require thorough cooking under pressure to resist the internal pressure developed in the cans, is 18 minutes, and with the rate of feed above mentioned, therefore, the area of the conveying system is designed to accommodate 1800 cans, and the speed of each of the cylinders will be five revolutions per minute. At the moderate speed of all the moving parts, their movement, without any lubricant other than moisture, does not entail any considerable wear, or large amount of friction, and a machine of very moderate dimensions will handle a large number of cans while giving the necessary time required for proper pressure cooking. As previously explained, during their entire travel through the shell, the cans are continuously rotated so that all of their surface is exposed to the steam and the contents completely agitated. The conveyors with their guides and the feed and discharge devices are all constructed and arranged so that jamming or any injury or rough handling of the cans is avoided. It will be understood that while the feed and discharge devices and the water seal arrangement may in some cases be valuable independently of each other, they co-operate very advantageously since the positive can handling devices easily overcome any disturbances of normal movement of the cans, which might be caused by the necessity of moving them through a body of water at each side of each cylinder.

Many of the features of the conveyor system, and its mounting in the shell, are valuable in other adaptations. Either the feed or discharge cylinder with its associated parts has novel features of utility in other adaptations for handling cans or similar articles, and especially when the articles are to be handled in connection with the water seal such as described.

We claim:—

1. In a sterilizer, the combination of a shell, a conveyor frame therein, conveying means carried by the frame, and co-operating guideways in the shell and on the frame by means of which the conveyor frame with the conveyor may be run out of the shell as a unit.

2. In a sterilizer, the combination of a shell, a removable head connected to the shell at one end, a conveyor frame connected to the head and normally located within the shell, a conveyor carried by the frame, and

track and roller supporting means intermediate the conveyor frame and the shell, admitting of the head, conveyor frame and conveyor being run out of the shell as a unit for inspection and repair.

3. In a sterilizer, the combination of a substantially cylindrical shell, a head removably bolted to one end thereof, a conveyor frame connected to the head and normally located within the shell, track and roller supporting means intermediate the shell and the conveyor frame, and can feeding and discharging means carried by the head to co-operate with the conveyor.

4. The same as claim 3 with the addition of water seals for the feed and discharge means, and means for circulating water between the two water seals.

5. The same as claim 4 with the addition of a steam trap communicating with the shell somewhat above the bottom thereof.

6. In a sterilizer, the combination of a shell, a steam supply therefor, a head removably connected to the shell at one end, a conveyor frame normally located within the shell and connected to the head, slide-way supports intermediate the conveyor frame and the shell, a conveyor carried by the frame, a can supply chamber and a can discharge passage communicating with the conveyor through the head, said chamber having a depressed portion providing a water seal, and a rotary pocketed can cylinder in each of said passages within the water seal.

7. The same as claim 6 with the addition of positive means for moving cans into and out of the cylinder pockets.

8. The same as claim 6 with the addition of means for circulating water between said water seals and between one of them and the shell.

9. The same as claim 6 with the addition of positive means for moving cans into and out of the cylinder pockets, and means for circulating water between said water seals and between one of them and the shell.

10. In a sterilizer, the combination of a shell, a steam supply therefor, a head removably connected to the shell at one end, a conveyor frame normally located within the shell and connected to the head, slideway supports intermediate the conveyor and the shell, a plurality of continuous belt conveyors in superposed relation carried by the frame, conveyor adjusting means carried by the frame at the end remote from said head, a can supply passage communicating with the conveyor through the head near the top, a can discharge passage communicating with the conveyor through the head near the bottom, each of said passages having a depressed portion providing a water seal, and a rotary pocketed can cylinder in each of said passages within the water seal.

11. The same as claim 10 with the addition of positive means for moving cans into and out of the cylinder pockets.

12. The same as claim 10 with the addition of means for circulating water between said water seals and between one of them and the shell.

13. The same as claim 10 with the addition of positive means for moving cans into and out of the cylinder pockets, and means for circulating water between said water seals and between one of them and the shell.

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