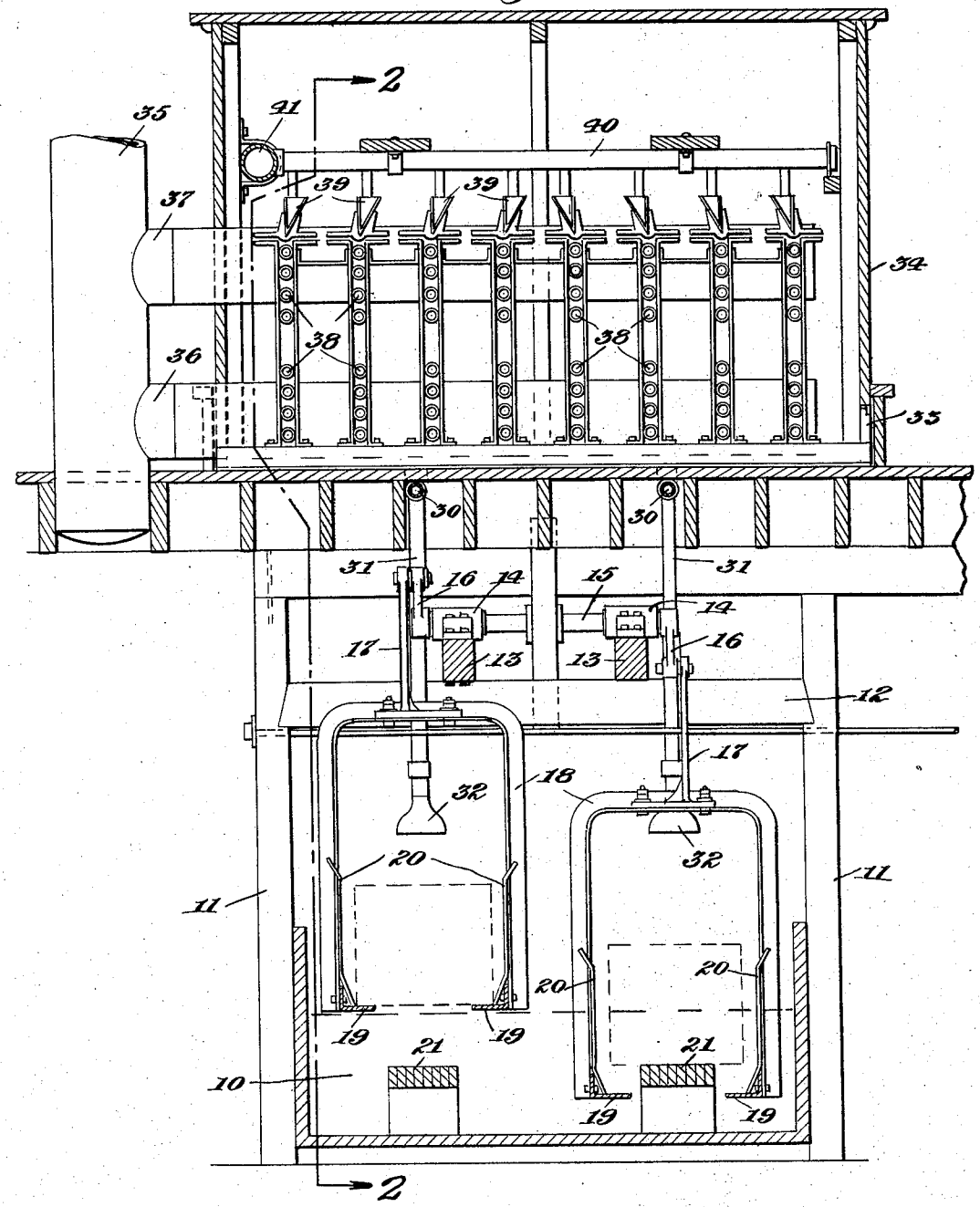
May 22, 1934. N. H. GAY 1,960,104

WASHING AND COOLING MACHINE FOR CELERY AND LIKE ARTICLES

Filed July 16, 1931 8 Sheets-Sheet 1

Fig. 1.



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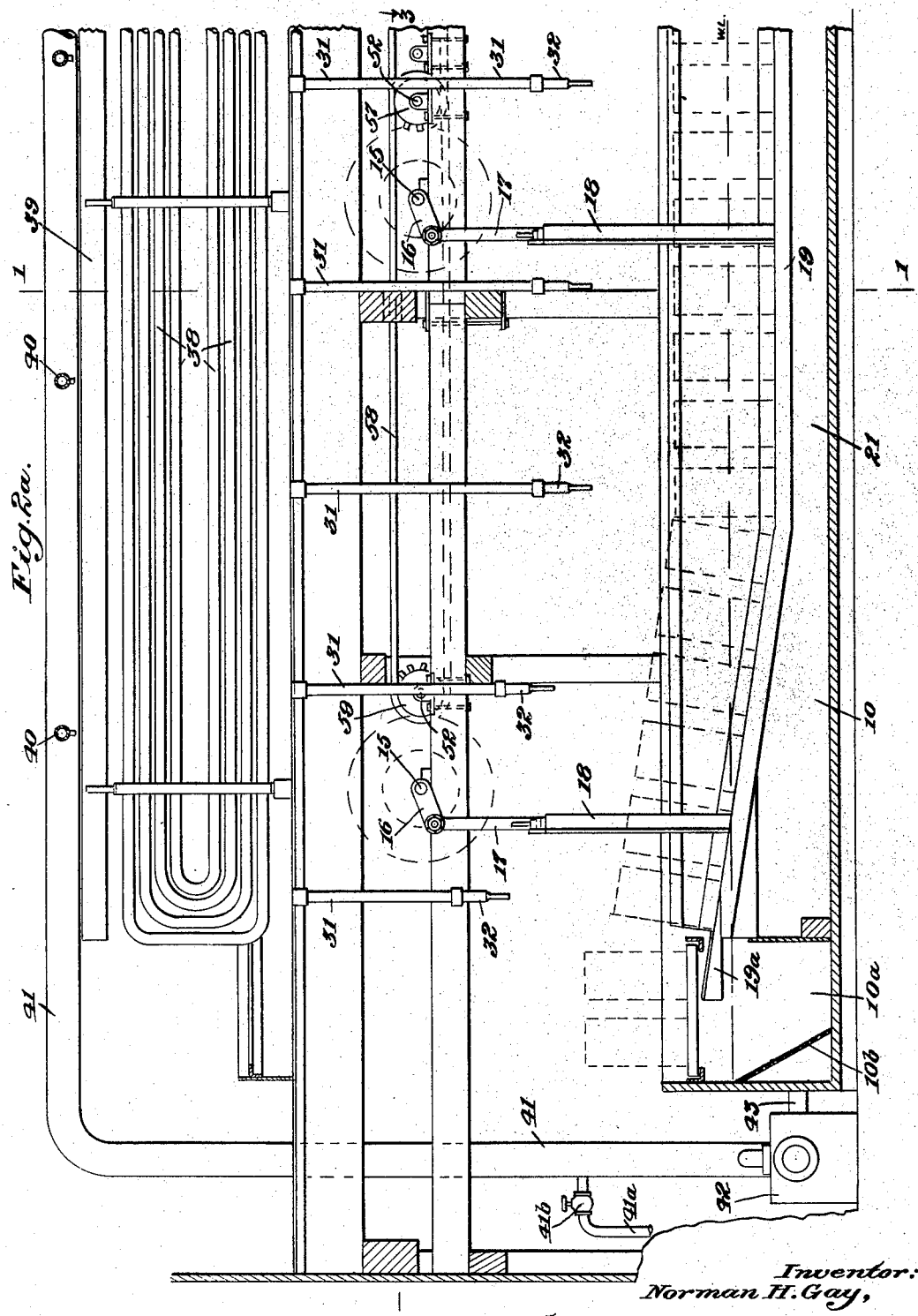
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WASHING AND COOLING MACHINE FOR CELERY AND LIKE ARTICLES

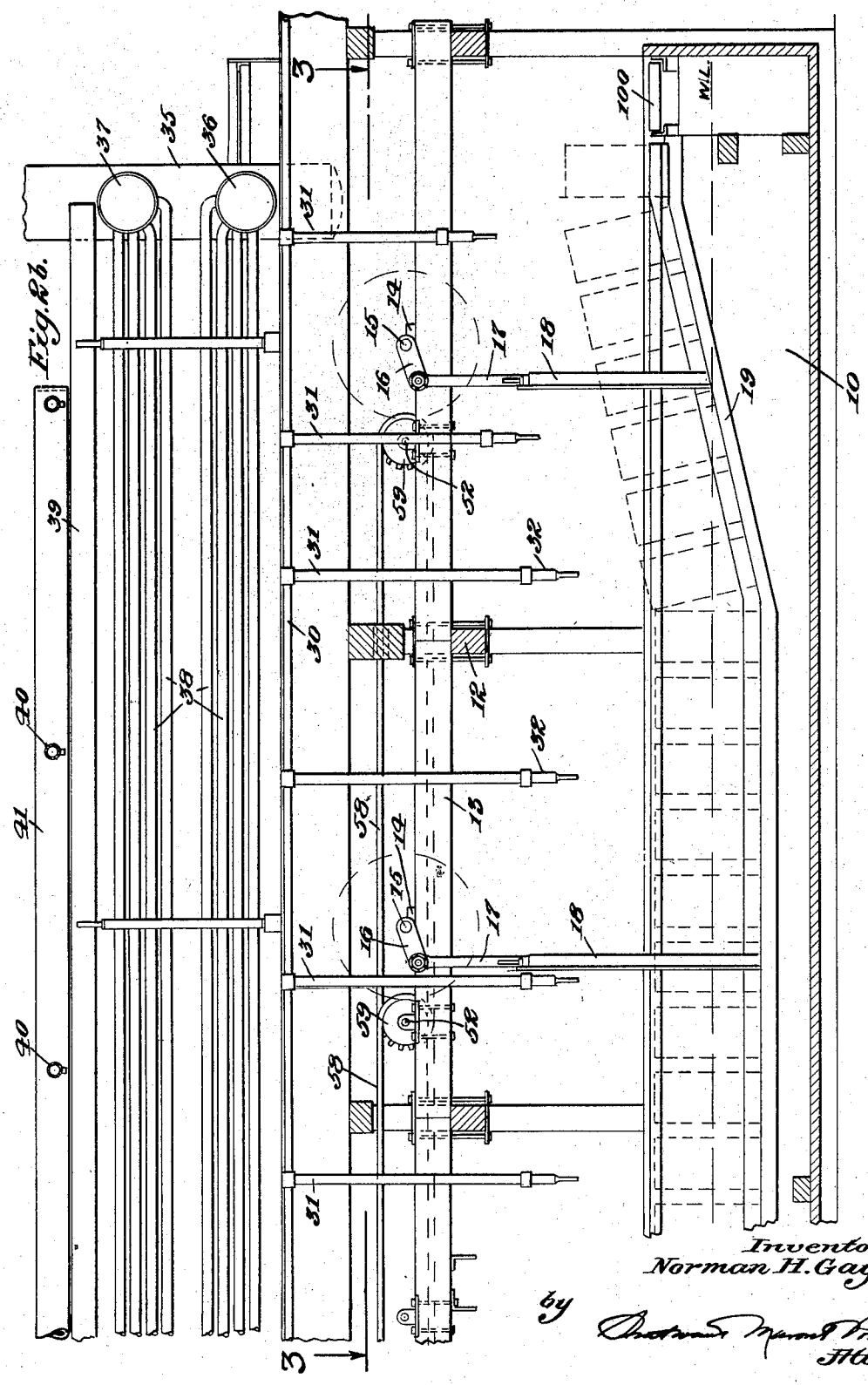
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WASHING AND COOLING MACHINE FOR CELERY AND LIKE ARTICLES

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WASHING AND COOLING MACHINE FOR CELERY AND LIKE ARTICLES

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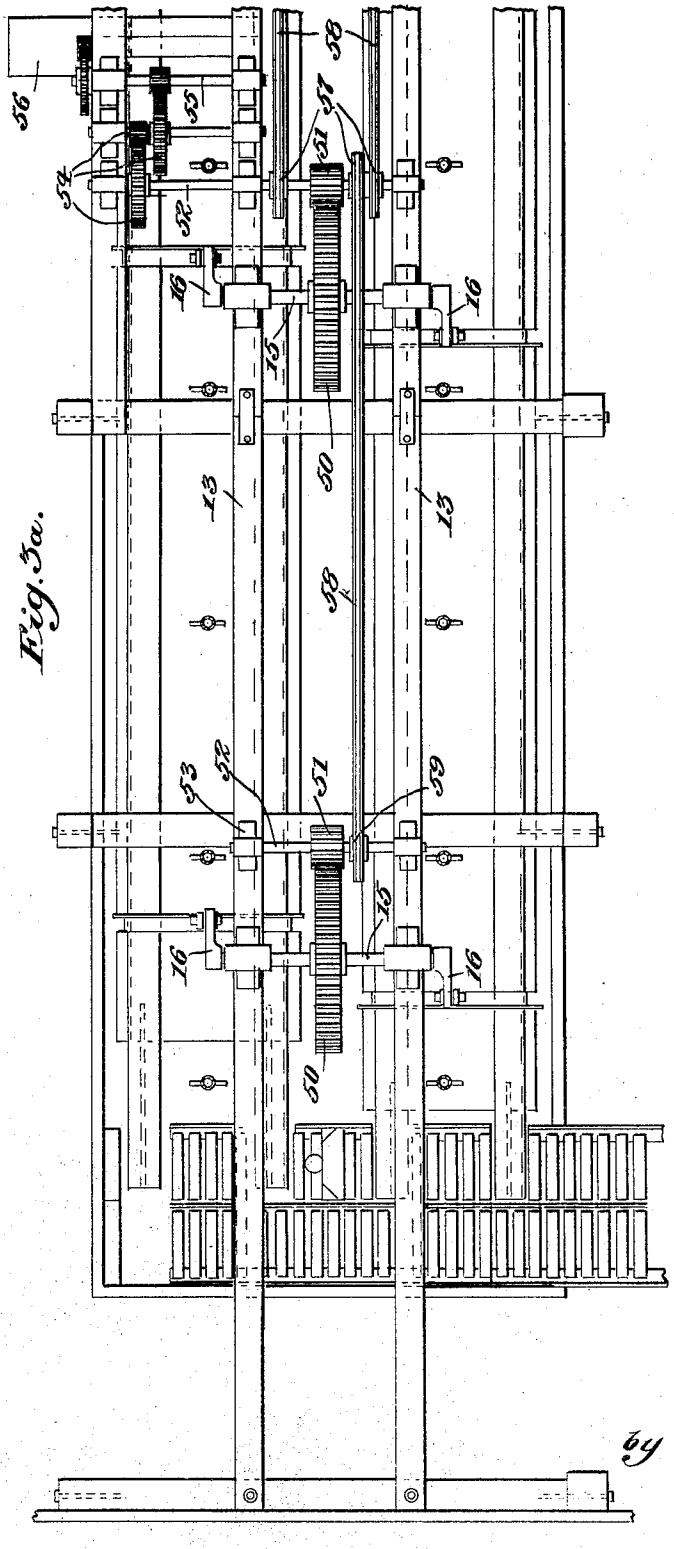


Fig. 5a.

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WASHING AND COOLING MACHINE FOR CELERY AND LIKE ARTICLES

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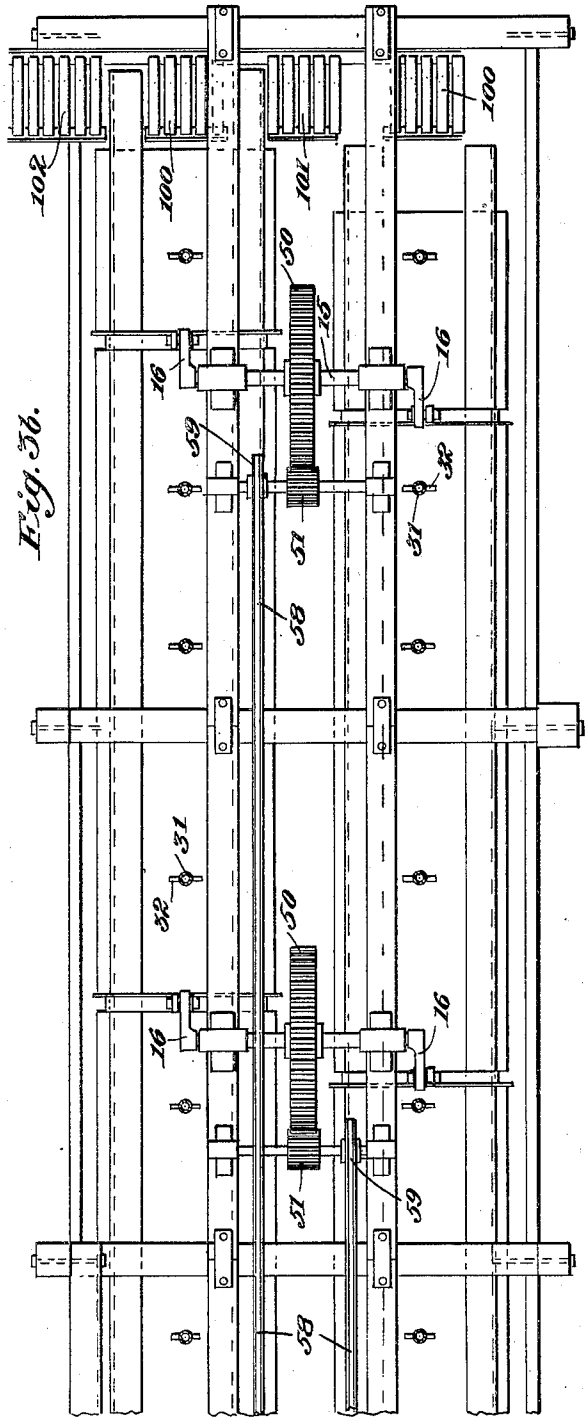


Fig. 5b.

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WASHING AND COOLING MACHINE FOR CELERY AND LIKE ARTICLES

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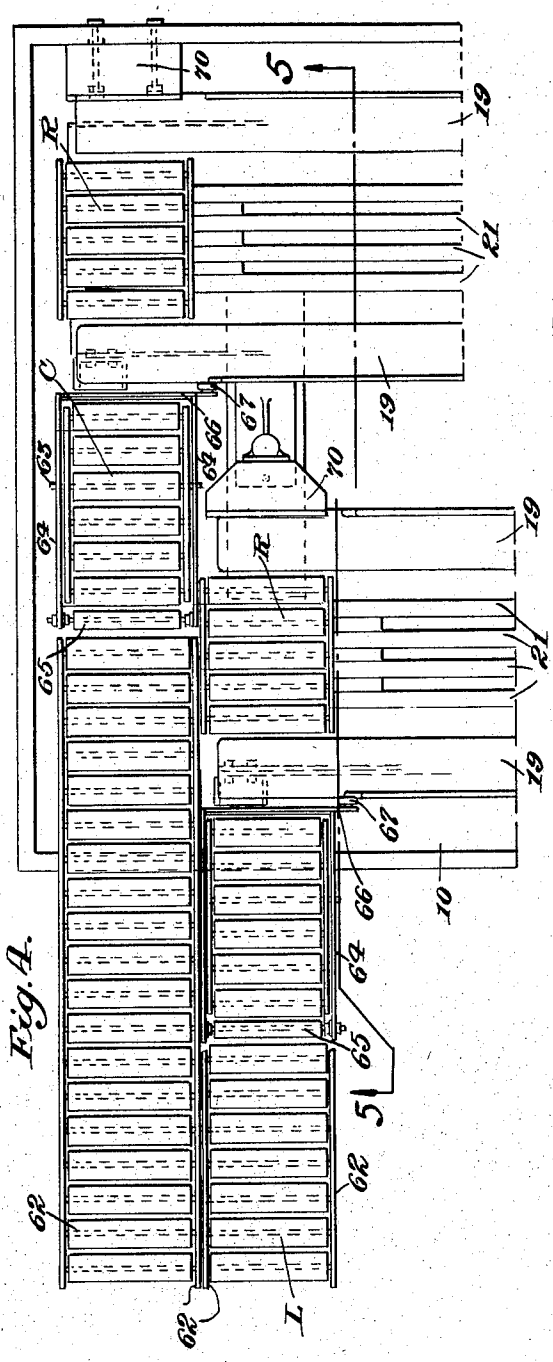


Fig. 4.

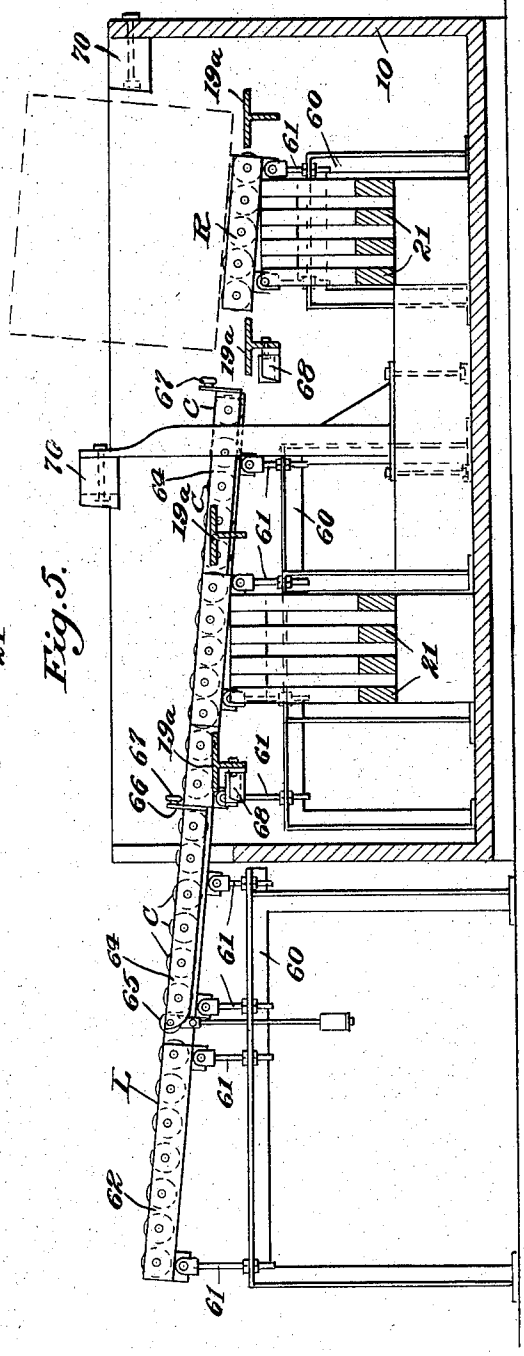


Fig. 5.

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WASHING AND COOLING MACHINE FOR CELERY AND LIKE ARTICLES

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Fig. 7.

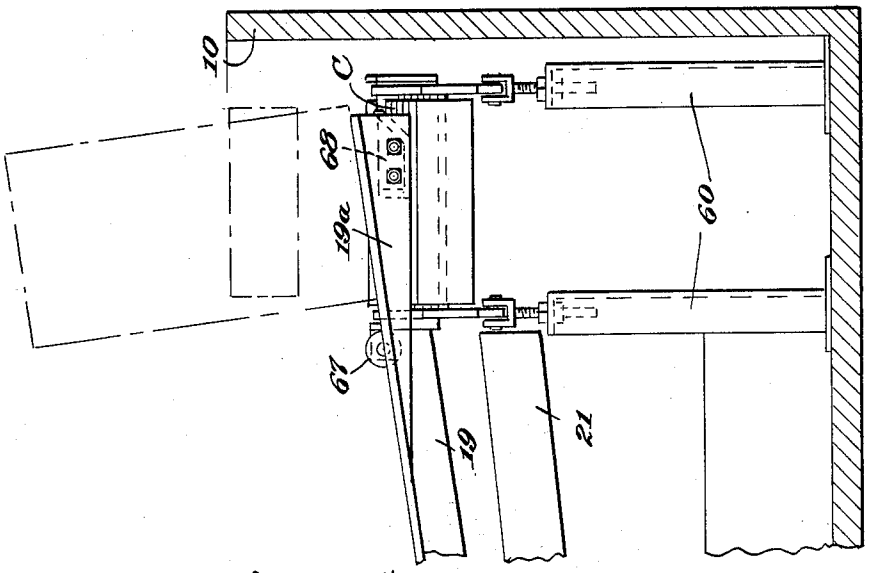
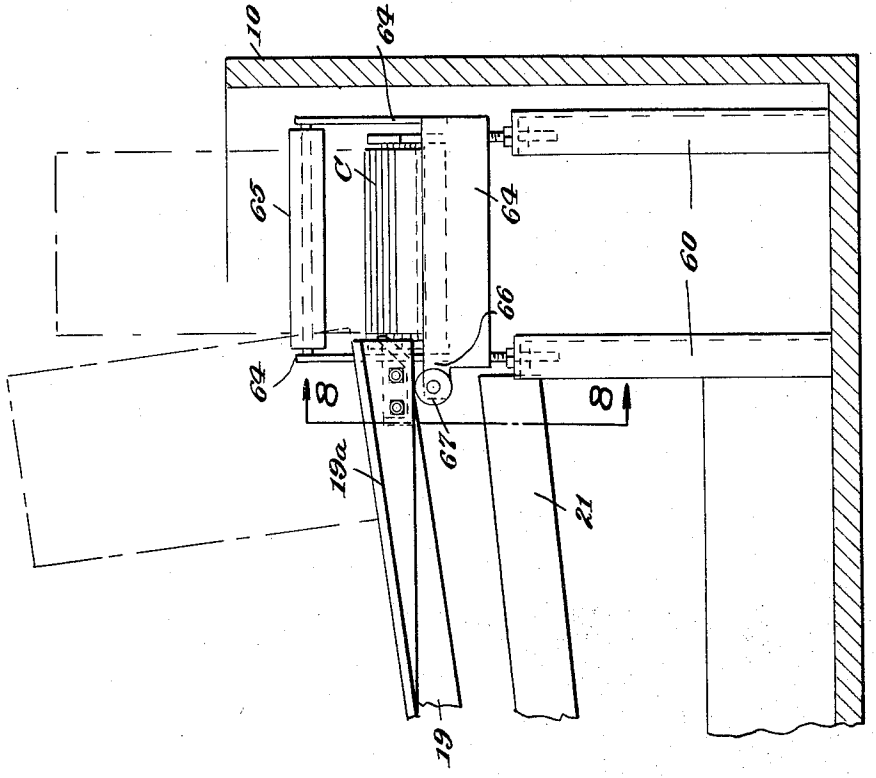


Fig. 6.



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WASHING AND COOLING MACHINE FOR CELERY AND LIKE ARTICLES

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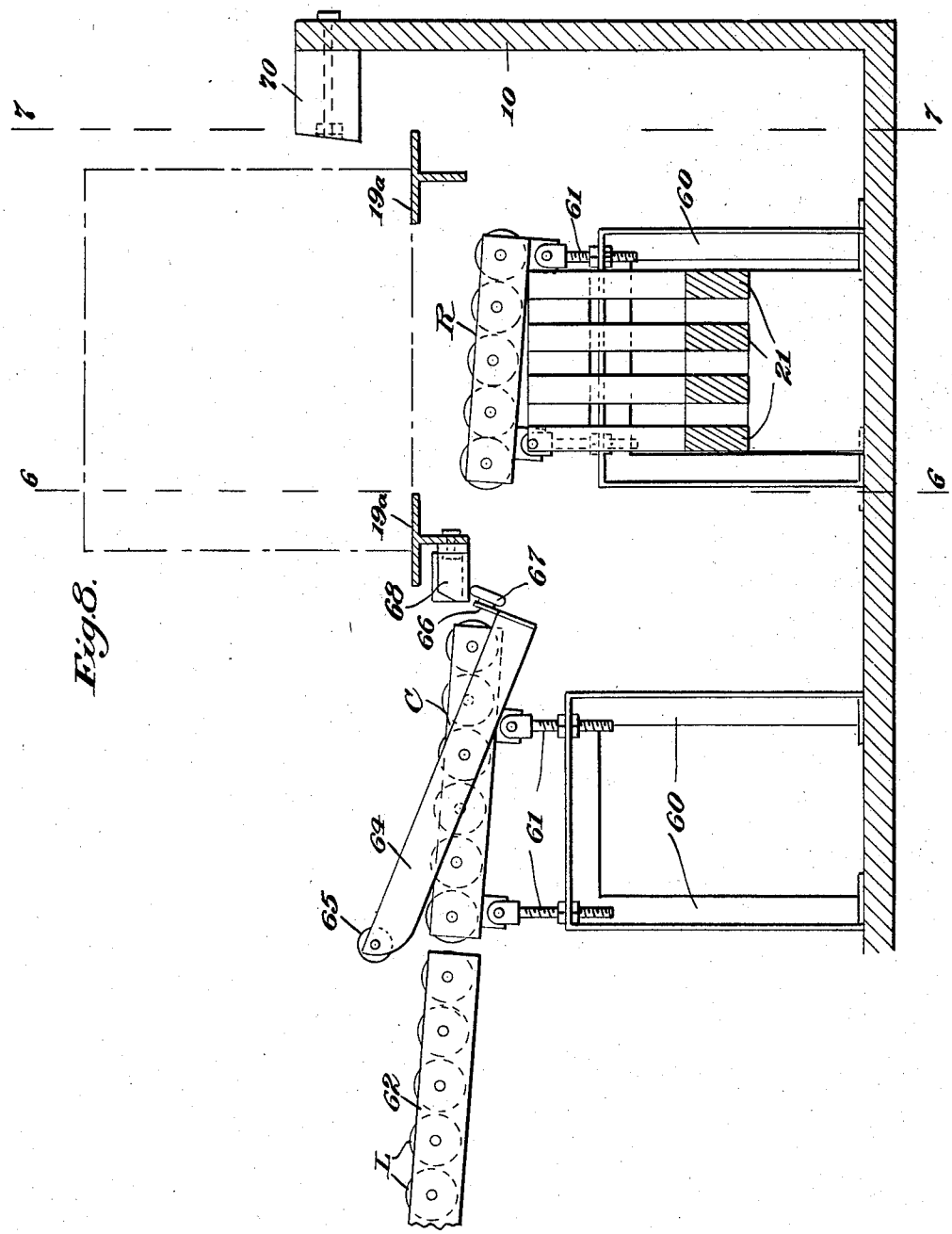


Fig.8.

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Patented May 22, 1934 1,960,104

UNITED STATES PATENT OFFICE

1,960,104

WASHING AND COOLING MACHINE FOR CELERY AND LIKE ARTICLES

Norman H. Gay, Los Angeles, Calif.

Application July 16, 1931, Serial No. 551,275

12 Claims. (Cl. 146—195)

This invention relates to a cooler for celery and like products and is intended to remove the heat from the same so that they may be placed in refrigerated compartments and maintained at a low temperature to prevent deterioration.

One of the features of the present invention is a machine for cooling the celery and like products by means of a liquid having a high heat capacity and adapted to cool the same rapidly to a low temperature.

Another feature of the invention is the provision of means in such a machine for producing a continual flow and movement of the liquid whereby to cause a cooling of the celery and like products in all parts at a rapid rate.

Another feature of the invention is the provision of a machine for cooling celery and like products by dipping the celery or the like into a cooling liquid and then removing it therefrom so that drainage occurs, and repeating the operation.

A further feature of the invention is the provision of a machine for washing and cooling celery or like products in which the celery or like products are rapidly dipped into a cooling liquid and then raised therefrom for draining while successively advancing the celery or like products from an intake to an outtake.

A further feature of the invention is the provision of a machine for washing the celery and like products during the process of cooling, so that the celery and like products, upon emerging from the machine, have been washed of dirt and brought to the desired low temperature.

Still another feature of the invention is the provision of a machine which is automatic and continuous in its operation so that the attendants need only place the celery and like products upon an inlet conveyor system and withdraw the cooled and washed celery or like product from an outlet conveyor.

With these and other objects in view, as will appear in the course of the following specification and claims, an illustrative form of construction of such a machine is set forth in the accompanying drawings, this machine being particularly designed for the cooling and washing of celery, although obviously it may be employed for the cooling and washing of similar products which require such treatment prior to storage and/or sale. In these drawings:

Fig. 1 is a vertical transverse sectional view through the machine, substantially on line 1—1 of Fig. 2*a*.

Figs. 2*a* and 2*b* represent a vertical longitudinal sectional view on line 2—2 of Fig. 1, these views constituting a single longitudinal section.

Figs. 3*a* and 3*b* represent a horizontal sectional view of the celery treating portion of the machine substantially on line 3—3 of Figs. 2*a* and 2*b*.

Fig. 4 is a plan view of the feeding conveyor system, on a larger scale than that of Fig. 3*a*.

Fig. 5 is a vertical sectional view substantially on line 5—5 of Fig. 4.

Fig. 6 is a vertical longitudinal sectional view of the pick-up portion of the washing device, with parts omitted for clearness, and showing the pick-up portion being lowered for releasing a second celery crate.

Fig. 7 is a view corresponding to Fig. 6, but showing the pick-up portion in the position in which it is initially raising the celery crate.

Fig. 8 is a vertical transverse sectional view substantially on line 8—8 of Fig. 6.

As shown in the drawings, a tank is provided which is filled to a predetermined depth with cold water. A carrier frame is caused to move forwardly and upwardly to receive a crate of celery, and then rearwardly and downwardly to deposit the crate upon a support. A succession of such movements causes the crate to be advanced along the tank and finally discharged therefrom and also causes the stalks and butts of celery to be repeatedly and continually submerged in the cold water and then raised therefrom for drainage. Spray devices are provided for delivering cold water onto the celery tops, whereby to wash and assist in cooling them. The water is withdrawn from the tank and cooled by a suitable refrigerating system and then delivered to the spray nozzles. The movement of the carrier frame is coordinated with a conveyor system so that the carrier frame in each cycle of movement picks up a crate from the conveyor system and moves it out of the path of other crates on the conveyor system so that there is an automatic feeding of crates from the conveyor system to the carrier frame during the movement of the latter. It is preferred to employ a pair of carrier frames, whereby to have an equilibrium or balancing of the parts whether loaded or empty.

The tank 10 is represented as having side and bottom walls and an open top and is, for example, filled with cold water substantially to the water level shown in Fig. 1, during operation. Standards 11 support the side walls of the tank and may also be employed to support the beams 12 which carry longitudinal members 13 upon which

are mounted the bearings 14 for a plurality of shafts 15 of which four are shown in the drawings. These shafts are provided at their ends with the crank arms 16 which are arranged 180 degrees apart so that one crank arm is at the top of its movement when the corresponding arm is at the bottom of its movement. Carrier links 17 are pivoted at the outer ends of each crank arm and are rigidly connected with the stirrups 18 which extend downwardly and are provided with connecting angle iron feet 19 within the tank 10. These feet extend substantially from end to end of the tank and constitute a pair of carrier frames for receiving and advancing the celery crates. The guard or side plates 20, having flares at top and bottom, are fastened within the stirrups and above the feet 19 to guide the crates into their proper position upon the feet 19. It will be noted that the end stirrups 18 are shorter than the central stirrups 18, and that the feet 19 are bent upwardly at the end so that the central portion of the feet are much closer to the bottom of the tank 10 than the end portions. The feet 19 of each series of stirrups are separated along a longitudinal line so that during the downward movement of the feet they may pass at either side of the supports 21 mounted on the bottom of the tank 10, as shown at the righthand portion of Fig. 1. These supports may be made of any desired construction but are shown as being a plurality of wooden members arranged on edge and secured together.

Supported above the carrier frames is a shallow basin or pan 33 having extending therefrom a plurality of downcomer pipes 31 which terminate above the positions of the crates in nozzles 32, from which cold water may be discharged onto the celery in the crates. The couplings 30 are connected as drain pipes from basin or pan 33 located in the refrigerator housing 34, illustrated as located on the floor above the celery cooling apparatus proper. A refrigerating system of any desired type may be provided, but preferably one of the Baudelot cooler type and is illustrated as comprising an accumulator 35 having the lower inlet header 36 and the upper outlet or return header 37, connected by a plurality of evaporator coils 38 arranged in respective vertical planes beneath the drip troughs 39 which are fed from the water inlet manifold branches 40 leading to the common water inlet manifold 41, which in turn is connected to the pump 42 having a pipe connection from the tank 10. Thus, during the operation of the plant, water is withdrawn from the tank through the pipe 43 to the pump 42 and then is delivered through the manifold 41 into its several branches 40 and thence into the troughs 39, so that the water trickles over the evaporator coils 38 and is re-cooled thereby. This water is finally collected by the pan 33 and is delivered through coupling 30 and pipe 31 into the nozzles 32 and thus serves to wash and cool the celery, and to maintain the water level in the tank 10. Water lost by evaporation, splashing, and by remaining in the celery etc., is compensated by the flow of water through the "makeup" pipe 41*a* and the regulating valve 41*b*.

In Fig. 2*a*, a chamber is indicated at the lefthand end of the tank 10, into which the water passes, for treatment by a filter conventionally illustrated as a screen 10*b* for separating leaves, trash, dirt, etc., before the water is received by the pipe 43.

The crank arms 16 are of the same diameter, so that during their revolution, the carrier frames are moved so that each point therein describes a circular arc, with a portion of the arc beneath the top surface of the support 21 and preferably a larger portion of the arc above this surface. The several shafts 15 are driven coordinately in any appropriate manner. In the drawings, each of the shafts carries a large gear 50 which is in mesh with a driving pinion 51 carried by a jack shaft 52 mounted on bearings 53 supported by the longitudinal beams 13. One of the jack shafts is also provided with a gear train 54 driven from a shaft 55 which in turn is rotated by an electric motor 56 or other desired source of power. This jack shaft also is provided with three sprockets 57 which are connected by chains 58 with corresponding sprockets 59 located on the other three jack shafts. In this way, all of the shafts 15 are driven in synchronism.

The sides of the tank 10, opposite the nozzles 32 are preferably carried higher than the receiving and discharge ends of the tank, in order to prevent losses of water by splashing. The supports 21 conform to the inclined upper surface of the carrier frames 19, and hence extend upwardly at the ends. At the feeding or inlet end of the tank are provided a plurality of frames 60 which support the screw threaded rods 61 having pivots at their ends, for adjustably holding the frames 62 of a pair of conveyors which lead respectively to the right hand and left hand carrier frame systems in Figs. 1 and 4. The conveyor leading to the lefthand system in these figures is of course shorter than that leading to the righthand system. Each of these conveyor systems comprises a relatively fixed frame in two portions which are spaced apart. One portion, the lefthand portion L in Fig. 4, is a storage section in which a number of crates of celery may be placed for automatic gravitational feed downward and toward the right (Fig. 5). The righthand portions R are short and are likewise relatively fixed in position, and are each located between the planes constituting the paths of movement of the feet or carrier frames 19. Between these two sections L, R is located a third conveyor section C. The axis shaft 63 of one of the rolls in this section is provided with extensions to support the tiltable frame 64 which is provided at its upper end with a stop roller 65, and at its lower end with a stop rail 66, extending above the rollers C and having a projection toward the center of the tank for supporting a trip roller 67 which is encountered by the trip cam 68 secured to one T-shaped extension 19*a* of the carrier frames 19 during the downward movement of the carrier frame, whereby to tilt the frame 64 into the position shown in Fig. 8. Located at the end of each of the two feeding conveyors is a buffer block 70 to limit the movement of the crates along the respective conveyors.

The method of operation of the machine is as follows:

The celery is placed in crates with all the tops upward and these crates are placed upon the conveyor sections L so that they roll downward thereon and abut against one another for this storage portion of the conveyor. The crates are preferably arranged end to end on this storage portion, since this affords a maximum capacity in the cooling and washing portion of the machine. Depending on the position of the two carrier frames 19, and the positions of the trip rollers 65, and the stop rails 66, the lowermost crate on at least one of the conveyors will pass from the lefthand section L onto the center section C where it is stopped by the rail 66. As the motor 56 re-

volves, the cranks 16 are rotated in a clockwise direction (Figs. 2a and 2b), so that the proper carrier frame 19 is moved toward the left (Fig. 2a) and its extension 19a is brought beneath the crate resting on the conveyor section R and against the stop 70. The continued movement of the cranks 16 causes the carrier frame 19 and its extension 19a to be raised so that the crate is lifted from the conveyor section R, (Fig. 7). The continued movement of the carrier frame 19 causes its extension to make a movement upward and toward the center of the tank, until the cranks 16 have attained a horizontal position. It is preferred that the upper surfaces of the supports 21 shall be so located that upon a movement of the carrier frame 19, corresponding to a position of the cranks 16 slightly below horizontal during the downward movement, shall cause a depositing of the crates upon the carrier upon the support 21. The carrier frame 19 now continues its downward and leftward movement in Fig. 2a.

During the downward movement of the portion 19a of the carrier frame, the cam 68 has engaged the roller 67 and pushed it downward so that the trip roller 65 is moved against the action of gravity and now operates to raise the upper or lefthand end of the crate (Figs. 5 and 8) which has been retained by the engagement of its lower end against the stop rail 66. At this time, the carrier rail portion 19a has moved out of the path of this crate (Fig. 6). The stop rail 66 is lowered beneath the top line of the rollers C, so that the crate now resting upon the trip roller 65 and the lowermost or righthand intermediate rollers C slides toward the right in Fig. 8, until it drops from the trip roller 65 down onto all of the rollers C again. This crate then continues its movement down onto the rollers R until it is stopped by the bumper 70. Meanwhile the next succeeding crate on the storage section has been retained by the trip roller 65, against any substantial movement downward along the roller conveyor.

A moment later the cam 68 disengages the roller 67 and permits the frame 64 with the trip roller 65 and the stop rail 66 to return to their initial positions. The next succeeding crate, which has previously been retained by the trip roller 65 is now free to roll downward onto the central roller section C until it strikes the stop rail 66. This operation continues, being produced once for each rotation of the shafts 15, and hence for each cycle of movement of the carrier frame. The two roller conveyors operate in the same manner, but are timed substantially 180 degrees apart in the phase by reason of the relative positions of the crank arms 16 on the shafts 15.

As the carrier frames 19 and its portion 19a continues in its downward movement after having released the roller 67, the frame ultimately passes beneath the top surface of the supports 21 so that the crates which may be resting on the carrier frame are received and supported by these supports 21. The carrier frame in its cycle of movement now moves downwardly and rearwardly, i. e., toward the left in Figs. 2a and 2b, until its portion 19a is again located beneath the roller section R, and then in its cycle of movement moves upward at either side of this roller section R (Fig. 7), to receive the crate which has been resting upon this roller section, and then to bring it forward by one step and during this movement to trip the frame 64 as has been described above.

The continued movement of the frame thus results in a step by step advancing of the crates along the support 21. During this movement the crates are immersed so that the celery butts are submerged in the water while the crates are resting on the horizontal portion of the support 21, but are substantially raised out of the water when at the top of the movement of the carrier frame 19. Hence the crates are alternately subjected to submerging and to a suspension for free drainage. Further, they are subjected to sprays of cold water from above which assist in washing the tops or other portions which are not at the moment immersed in the water in the tank. By this alternate submerging and drainage, a quick reduction of temperature is effected as soon as there is substantially no stagnation of the water or other cooling liquid within the crates.

It is preferred that the distance by which the crates are moved for each cycle of movement of the carrier frames 19 shall be slightly in excess of the crates as seen in Figs. 2a and 2b so that the crates on the inclined portions of the carrier frames 19, and the corresponding portions of the supports 21, shall not be in contact with the crates on the horizontal portions of these members. After having progressed in succession through the tank, the crates are brought onto the discharge conveyor sections 100, which are located between the feet on the carrier frames 19 and are joined together by a central portion 101 and are continued as a delivery conveyor 102 leading to any desired point of storage or further treatment for the crates.

It will be noted that the celery or other product is admitted into the tank at the lefthand end in Figs. 2a and 2b, progressing regularly through the tank to be discharged at the righthand end. Further, the water is being continually withdrawn from the tank at the lefthand end for recooling and delivery throughout the length of the tank. This means that the coldest water is at the discharge end (righthand Fig. 2b), while the warmest and dirtiest water is at the feeding end (lefthand, Fig. 2a).

It is obvious that the invention provides a washing and cooling machine which may be employed with many articles, and that many changes in the construction and arrangement may be made without departing from the scope of the appended claims.

I claim:

1. In a machine of the class described, a tank for containing liquid, a support member below the liquid level in said tank upon which articles may be deposited while immersed in the liquid, a carrier member located adjacent said support and alternately immersible in the liquid and raised therefrom for picking up and draining the articles, and means to move said carrier member in a circuitous path whereby the carrier member is moved in succession forwardly with the articles thereon above the support, downwardly, for depositing the articles upon said support and thereby immersing them in the liquid, rearwardly below the support, and then upwardly to pick up the articles again at a different point on said carrier so that the said articles are successively advanced along said support and simultaneously to raise the articles above the liquid whereby to permit them to drain.

2. In a machine of the class described, a tank for containing liquid, a support member having a central portion located in the tank below the liquid level and end portions inclined upwardly from said central member, a carrier member including article engaging elements comprising

central portions extending in parallelism to the central portion of the support member and end portions extending in parallelism with the adjacent end portions of the support member, and means to move said carrier member in a circular path to positions alternately above and below said support member, and relatively forwardly and rearwardly with relation thereto.

3. In a machine of the class described, a tank for containing liquid, a support member located in said tank below the liquid level, shafts, cranks on said shafts, links on said shafts having bifurcated ends extending into said tank, and carrier elements on said bifurcated ends for picking up articles from said support, and means to rotate said shafts whereby to produce a movement of said carrier elements in a circuitous path.

4. In a machine of the class described, a tank for containing liquid, a support member extending along the tank below the liquid level therein upon which articles may be deposited, a carrier member comprising spaced elements of substantially the same length and shape as said support member and extending in substantial parallelism to said support member and at the sides thereof, means for delivering articles in succession at one end of said carrier member and in alignment and opposite the end of said support member, and means for moving said carrier member in a circular path so that said elements may lift an article located on said delivery means and carry it forward and then lower it upon said support member, and return for engaging another article on said delivery means, said carrier member also being operated by said moving means to lift the articles located in the liquid and on said support member to a point above the liquid whereby the article may drain and to carry the article forward and deposit it upon a new and advanced position on said support member, so that an article is successively moved from said delivery means along said support member and is alternately immersed in the liquid in the tank and raised therefrom.

5. In a machine of the class described, a tank for containing liquid, a support member extending along the tank below the liquid level therein upon which articles may be deposited, a carrier member comprising spaced elements having substantially the same length as said support member and extending in substantial parallelism to said support member at the sides thereof, means for delivering articles in succession at a point in alignment with and at one end of said support member, a stop device for preventing the passage of the article on said delivery means to said point, means for moving said carrier member in a circular path so that said elements may in succession lift the article from said point to a position above the liquid for draining and carry it forward and deposit it upon said support member so that the article is immersed in liquid, and return after depositing the article for engaging a new article in said position, and means operated by said carrier movement while depositing one article upon said support member for releasing said stop device so that a new article may move to said position to be engaged by said carrier member during this succeeding forward movement.

6. In a machine of the class described, a tank for containing liquid, a support member extending along the tank below the liquid level therein and upon which articles may be deposited in the liquid, a carrier member extending parallel to and having substantially the same length as said support member and including article engaging means for lifting the articles from said support member, a plurality of horizontal shafts each extending at right angles to said support member and means to rotate the same at uniform angular speed, and cranks of the same radius on said shafts and connected to said carrier member for moving the same in a fixed circular path while being maintained parallel to said support member, whereby the articles are lifted out of the liquid and advanced along said carrier member, and then are deposited upon the carrier member in advanced position while the carrier member is returned to position for again lifting and advancing the articles.

7. In a machine of the class described, a tank for containing liquid, a longitudinally located support member extending below the liquid level in said tank upon which articles may be deposited while immersed in the liquid, a carrier member for picking up the articles and having substantially the same length and shape of said support member in a vertical longitudinal plane, a plurality of shafts, cranks on said shafts, means for suspending the carrier members from said cranks, and means to rotate said shafts whereby to move said carrier member in succession forwardly with the articles thereon above the support, downwardly for depositing the articles upon said support and thereby immersing them in the liquid, rearwardly below the support, and then upwardly to pick up the articles again at a different point on said carrier so that the said articles are successively advanced along said support and simultaneously to raise the articles above the liquid whereby to permit them to drain.

8. In a machine of the class described, a tank for containing liquid, a support member upon which articles may be deposited and having inclined ends extending above the liquid level and a central portion located so that articles positioned thereon are immersed in the liquid, a carrier member located adjacent said support for picking up the articles and having ends and a central portion conforming to said support members, and means to raise said carrier member and to move it forward with the articles thereon whereby to raise and drain the articles and advance them along said support member, and to lower the carrier member for depositing the articles in advanced positions on said support member and to return the carrier member for a further raising and forwarding operation.

9. In a machine of the class described, a tank for containing washing liquid, a support member upon which the articles may be deposited and having inclined ends extending above the liquid level and a central portion located so that articles positioned thereon are immersed in the liquid, a carrier member located adjacent said support for picking up the articles, means to move said carrier member in a circular path whereby to raise the articles from the support to a point above the surface of the liquid and move them simultaneously forward, then to lower the articles into the liquid and deposit them on said support, and thereafter to return for engaging said articles at a new position thereof whereby the articles are moved forward along said support by steps.

10. In a machine of the class described, a tank for containing liquid, a support member having upwardly inclined ends extending above the liquid level and a central portion extending along the tank below the liquid level therein, a carrier mem-

ber comprising spaced elements of substantially the same length and shape and extending in substantial parallelism to said support member and located at the sides thereof, and fixedly connected means to move said carrier member in a circular path so that said elements may in succession lift the articles from the support member when said carrier member is raised and deposit the articles upon said support member when the carrier is lowered, and travel forward for advancing the articles when lifted from said support member and return when the articles are deposited on said support member.

11. In a machine of the class described, a tank for containing liquid, a plurality of parallel supports beneath the liquid level in said tank, pairs of carrier members each pair cooperating with and positioned at the sides of one of said supports and being of substantially the same length as the corresponding supports, a plurality of shafts, cranks on said shafts extending in opposite directions from the axis of the respective shaft, and pivot connections between one of said carrier members and the cranks extending in one direction, and between the other carrier member and the cranks extending in the other direction, so that weights of the carrier members and articles thereon will counterbalance, and means to rotate said shafts to produce alternately an immersion and deposit of the articles upon said support and a lifting of the articles above the liquid for draining accompanied by a forward advancement thereof.

12. In a machine of the class described, a tank for containing liquid, a plurality of parallel supports beneath the liquid level in said tank, pairs of carrier members, each pair cooperating with and positioned at the sides of one of said supports and being of substantially the same length as the corresponding supports, a plurality of shafts, cranks on said shafts extending in opposite directions from the axis of the respective shaft, and pivot connections between one of said carrier members and the cranks extending in one direction, and between the other carrier member and the cranks extending in the other direction, so that the weights of the carrier members and articles thereon will counterbalance and operating for moving said carrier members in a fixed circular path, and means to rotate said shafts to produce alternately an immersion and deposit of the articles upon said support and a lifting of the articles above the liquid for draining accompanied by a forward advancement thereof.

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