No. 674,685. Patented May 21, 1901.

R. C. PAYSON.

STEAM COOKING APPARATUS.

(Application filed Mar. 11, 1898.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1,

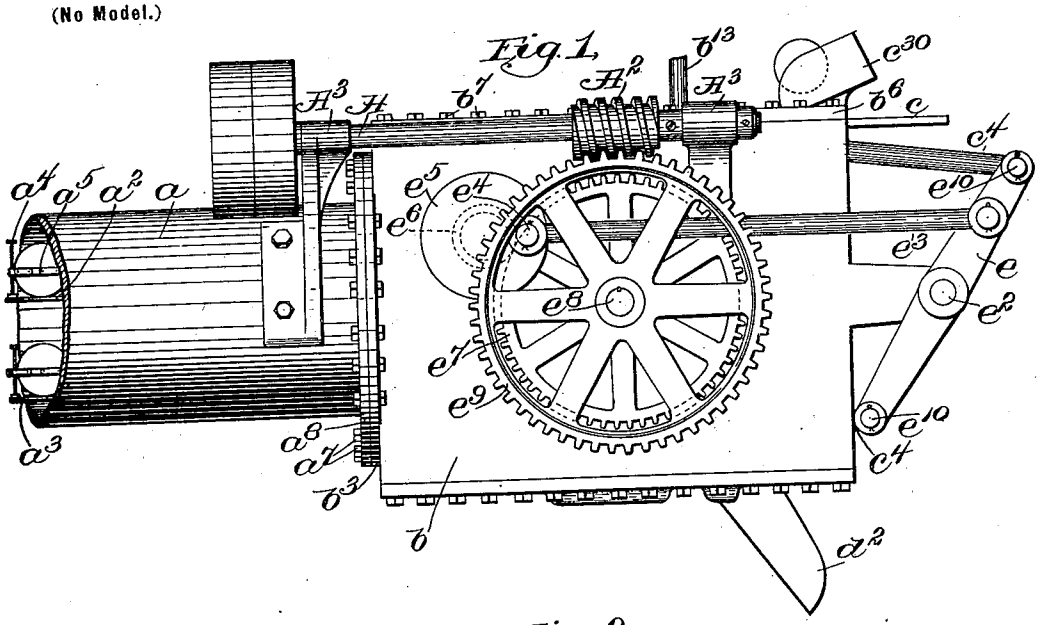
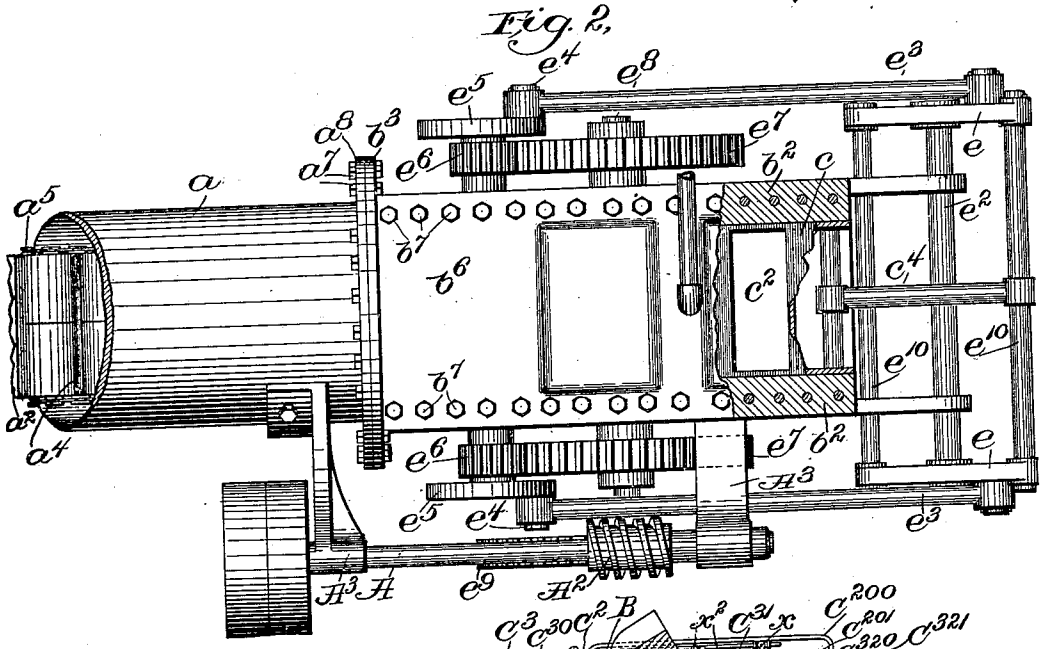


Fig. 2,



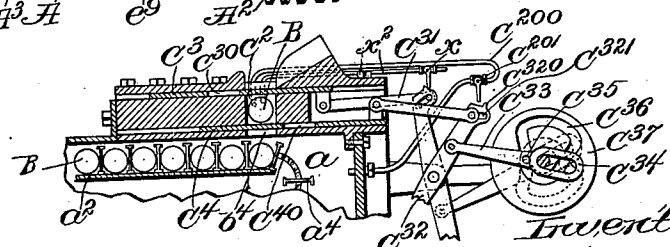


Fig. 6,

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Fig. 3.

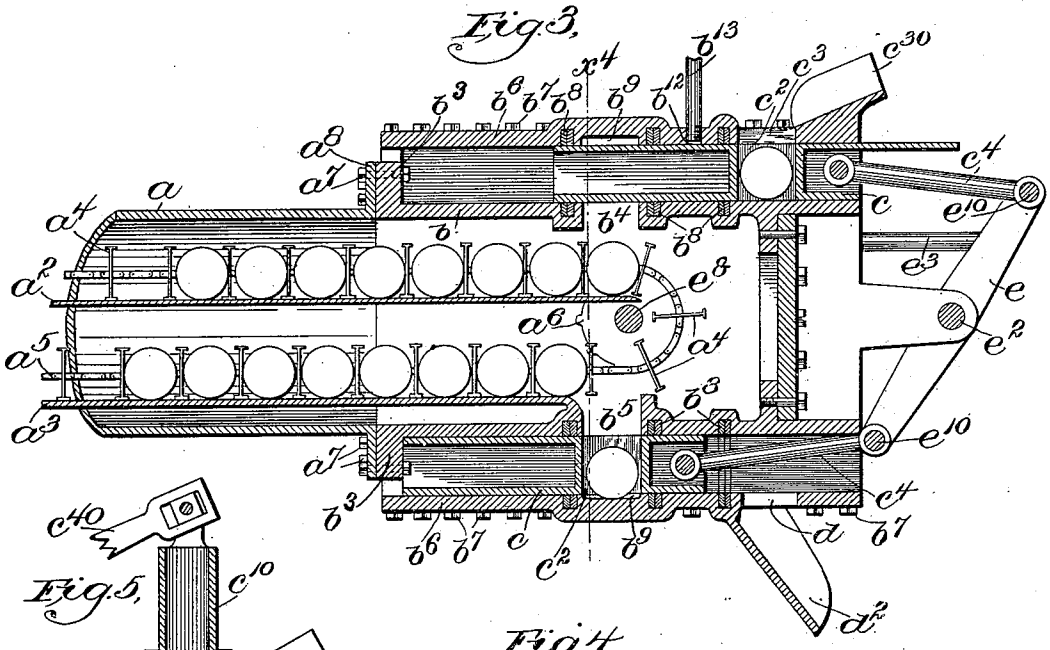


Fig. 5.

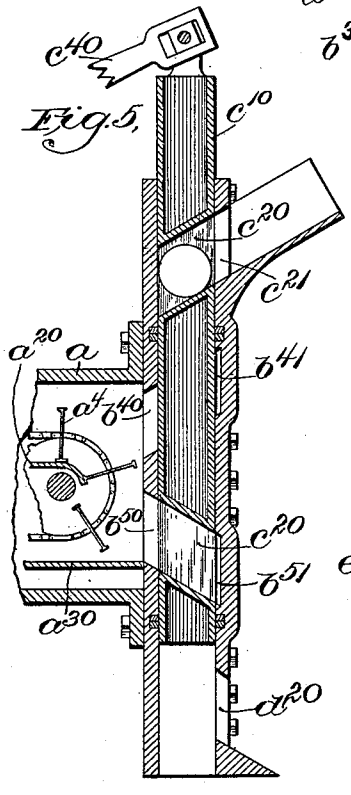
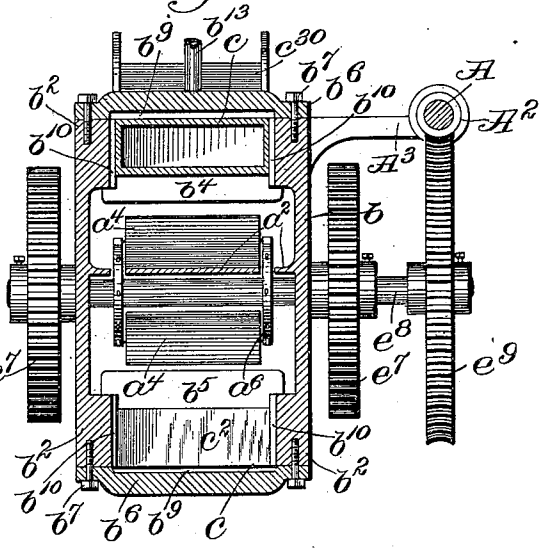


Fig. 4.



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UNITED STATES PATENT OFFICE.

RICHARD C. PAYSON, OF PORTLAND, MAINE.

STEAM COOKING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 674,685, dated May 21, 1901.

Application filed March 11, 1898. Serial No. 673,485. (No model.)

To all whom it may concern:

Be it known that I, RICHARD C. PAYSON, of Portland, county of Cumberland, and State of Maine, have invented an Improvement in Steam Cooking Apparatus, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

The present invention relates to a steam cooking apparatus, and is mainly intended for use in cooking canned food in the cans.

It is the object of the invention to use a high degree of heat by maintaining the steam within the cooking-chamber at high pressure and at the same time to keep the food within the cans mixed or agitated, so as to prevent the same from being scorched at the outside and not properly cooked within. To accomplish this, the cooking-chamber is provided with supports for the canned goods along which the cans are caused to travel on their sides, rolling over and over, this being accomplished in any suitable way, as by utilizing continually-movable drag-chains having links to engage the cans and cause the same to travel along.

To render the apparatus practicable, it is necessary to provide means for inserting and taking out the cans without at any time leaving a direct opening from the chamber to the air, which would result in the escape of steam and a lowering of the pressure. It becomes necessary, therefore, that there should be an intermediate chamber having independent openings, one of which is accessible to the attendant, so that a can may be placed therein, and the other of which communicates with the interior of the cooking-chamber, so that the cans may be delivered thereto from said intermediate chamber. It is obvious, however, that any valve or controlling device will, if of ordinary construction, be subjected to such pressure that it can be operated only with difficulty, if at all, as it is moved to open and close the opening. This difficulty is obviated in accordance with the present invention by affording means for neutralizing the steam-pressure on the said valve or controlling device at the time when the same is being operated. This may be accomplished in a number of ways, it being practical, for example, to afford a movable member having a chamber or recess adapted to come alternately into alinement with an external opening convenient to the attendant and a separate opening leading to the interior of the cooking-chamber, the transfer of the can being accomplished by the movement of said member. In this instance the member itself constitutes a cut-off valve or controlling device having a steam-tight fit in the guideway, along which it is movable, and in order that the steam-pressure may not act upon the same in such a manner as to cause it to bind in its guideway the said steam-pressure is neutralized at the opening from the cooking-chamber by permitting the steam to communicate with a chamber opposite the said opening, so that the steam therein will exert a counterbalancing pressure upon the opposite side of the movable member. Substantially the same result may be accomplished, however, without employing the said movable member, but by having a chamber or pocket for the reception of the can, the said chamber being provided with two controlling devices, one of which is always closed, the said devices, however, being alternately opened to permit the can first to enter the chamber and then to pass from the chamber into the interior of the cooking-chamber.

It is obvious that when the valve which controls the direct opening from the cooking to the intermediate chamber is opened the steam will be retained by the valve which controls the external opening from the intermediate chamber, so that the said valve is then under pressure and not readily operated. The other valve, however, can be easily closed at this time, because the pressure in the cooking-chamber is equal to that in the intermediate chamber, since the two are in open communication, there being therefore no unbalanced pressure to prevent the closure of said valve. At this time, however, the pressure in the intermediate chamber is substantially equal to the normal pressure of the main cooking-chamber, so that there is an unbalanced pressure on the valve at the other opening from the intermediate chamber, which at this time must be opened in order that a can may be inserted. With this construction, therefore, means are provided whereby the steam

in the intermediate chamber may be exhausted prior to the opening of the said valve, so that the same will open easily. By the exhaust of the steam from the intermediate chamber, however, there is at once established an unbalanced pressure on the valve which controls the opening from the cooking-chamber to said intermediate chamber, so that the valve controlling said opening is then rendered inoperative or difficult to operate. To neutralize this pressure, therefore, so that the said valve can be opened after the other valve is closed, the apparatus is provided with means for admitting steam to the chamber when both valves are closed, thus neutralizing the pressure on the valve which controls the opening from the chamber to the main cooking-chamber, so that the said valve is then capable of being easily opened.

The means for delivering the cans from the cooking-chamber may be substantially the same as the means for feeding them thereto, and the operating mechanism for both is shown as connected with the driving mechanism for the drag-chains and properly timed so that the can in entering will drop between two of the cross-bars and in dropping off after it has traveled its course will fall into the delivery-chamber, the operation being therefore automatic, since it is only necessary to place a can or cans in the feed chamber or pocket when the same is accessible to the attendant.

Figure 1 is a side elevation of an apparatus embodying the invention, a part of the cooking-chamber being broken away. Fig. 2 is a sectional plan of the same; Fig. 3, a vertical longitudinal section; Fig. 4, a cross-section on line x^4 of Fig. 3; Fig. 5, a detail showing a modified form of feeding device; Fig. 6, a detail on a smaller scale showing a further modification.

The cooking-chamber a is herein shown as mainly cylindrical and may be of any desired length to afford a requisite distance for the cans to travel in order to be subjected to heat during a sufficient length of time. The said chamber is adapted to receive steam, it being the purpose of the invention to utilize steam at a high pressure, so as to obtain an intense degree of heat, and thereby hasten the cooking operation. Within the said chamber are the upper and lower can-supports a^2 and a^3, along which travel the cross-bars or drag-links a^4, carried by sprocket-chains a^5, traveling over sprocket-wheels a^6, so that the cans are dragged along a shelf, upon which they are first received, to the end of the chamber, and thence back on the other shelf, the feeding and delivery openings being both at the same end of the apparatus for convenience in operating the same. The farther end of the chamber is not herein shown, since the only mechanism at that end is an idler-sprocket and means for guiding the cans from the upper to the lower shelf, which may be of any suitable or usual construction.

The feed and delivery chambers and sprockets, as has been stated, are shown as both at one end of the chamber, the said chamber being provided with a rectangular casing b, to which the cylindrical portion a is suitably secured, as by the bolts a^7, extending through the flange a^8. The said casing b is herein shown as consisting of a single casting, having the upwardly-projecting flanges b^2 and an annular flange b^3, to which the flange a^8 is bolted, and openings b^4 and b^5 of sufficient size to allow one or more cans to pass through, the said openings being herein shown as of sufficient length to accommodate two cans placed end to end, the cans entering through the opening b^4 and coming out through the opening b^5.

It is obviously essential in the operation of the device that there should never be direct communication between the interior and the exterior of the cooking-chamber, since this would result in the escape of steam and consequent lowering of the steam-pressure. For the purpose of feeding and delivering the cans, therefore, the apparatus is provided with intermediate chambers or pockets c^2, which are arranged to have an external opening for the insertion or delivery of the cans and an internal opening through which the cans may pass to or from the cooking-chamber. The apparatus must also be arranged so that one of the said openings must at all times be closed, the parts being so arranged that when the chamber is open to receive or deliver a can the cooking-chamber openings are correspondingly closed. In the construction shown in Figs. 1 to 5 the said feed and delivery chambers are formed in rectangular traveling slides c, movable longitudinally in guides formed by the outer surface of the chamber b, the flanges b^2, and the plates b^6, supported on said flanges and secured thereto, as by cap-screws b^7. The said traveling slides c have the pockets or chambers c^3 formed therein, the chamber in the upper slide being adapted to receive a can and to convey the said can to the opening b^4, so that it will drop into the chamber a and be received upon the support a^2, and the chamber in the lower slide being adapted to receive a can from the support a^3 and convey it to a delivery-opening d, having a delivery-chute d^2. The said traveling slides c have a steam-tight fit in the guideways, the said guideways being herein shown as provided with packing-plates b^8 in contact with the said slides, so that all communication is cut off between the openings b^4 and b^5 and the receiving and delivering openings c^3 and d for the cans, the said slides thus constituting the controlling devices for the openings. In order that the said slides may not be acted upon by steam-pressure in such a manner as to cause them to bind in their guideways, means are provided for neutralizing the effect of the steam-pressure thereon, the inner walls of the said guideways being herein shown as having chambers

or enlargements b^9, there being one of such chambers at each of the openings b^4 and b^5 of such size as to afford a steam-space at the sides of the members c opposite the sides which are adjacent to the openings b^4 and b^5, the said chambers being in communication with the interior of the cooking-chamber. Such communication may be afforded in any suitable or usual way, the side walls of the guide being herein shown as also chambered or channeled, as at b^{10}, Fig. 4, so that steam enters the chambers b^9 around the traveling members themselves.

To automatically operate the feeding and delivery devices, the traveling slides c are herein shown as connected, by means of links c^4, with rocker-arms e, pivoted at e^2 and operated by means of a pitman e^3, connected with the wrist-pin e^4 on a wheel or disk e^5, having a suitable bearing at the side of the machine and provided with a gear-wheel e^6, driven by a gear e^7 on a shaft e^8, which extends across through the chamber a and which also may be utilized, as shown, to drive the sprocket-wheels a^6. As a matter of mechanical construction the said gears and wheels are shown as duplicated, there being one set for each side of the machine, while there are two rocker-arms e connected by cross-rods e^{10}, to which the links c^4 are directly connected at the middle.

The shaft e^8 is herein shown as provided with a worm gear-wheel e^9, meshing with a worm A^2 on the main shaft A, upon which are fast and loose pulleys, said shaft being mounted in bearings A^3, suitably secured to the outer walls of the main chamber.

All the moving parts are properly timed to operate as follows: The parts being substantially in the position shown in the drawings, the attendant places two of the cans end to end in the pocket c^2, a delivery-chute c^{30} at the opening c^3 being herein shown to facilitate the feeding operation, and the said cans are conveyed by the member c to the opening b^4, at which time two of the drag-links a^4 are in position to receive the cans between them, so that they will be carried forward along the shelf a^2. At the same time that the new cans have been put in the machine by the attendant one pair of the cans which have traveled through the machine will drop off the lower shelf a^3 through the opening b^5 into the pocket of the lower delivery member C, which is then in position to receive them, and will be moved along by said delivery member to the lower opening d, which is shown as provided with the delivery-chute d^2.

At each operation it is obvious that the pockets c^2 will fill with steam, so that there is a certain amount of exhaust, and in order that the said steam may not escape through the feed-opening c^3, which would be objectionable, the guide-passage is shown as provided with an outlet b^{12} between the openings c^3 and b^4, the said outlet communicating with a pipe b^{13} to carry off the exhaust-steam. The lower guide may be, if desired, provided with a similar outlet; but in this instance it is not so essential, since much less steam is carried off by the lower pocket, owing to the presence of the cans therein, while the escape of the steam from the lower opening d is not liable to be troublesome to the attendant.

It is obvious that the means for feeding and delivering the cans may be largely modified in specific construction and arrangement, the means for neutralizing the effect of the pressure of the steam on the traveling member being that feature which is essential to the best operation of the device. It should be further understood, moreover, that the term "neutralizing" is not intended to be interpreted as meaning merely counterbalancing the steam-pressure, since in some instances it might be advisable to so arrange the movable slides that there would be a greater pressure of steam upon one side thereof than upon the other—as, for example, by making the area exposed to steam-pressure from the chamber b^9 of the upper member c less than the area exposed to the steam-pressure at the opening b^4, so that there would be a slight upward pressure, tending to support the weight of the member c and reduce the friction. In the same way the chamber b^9 might be so constructed as to cause the pressure upon the under side of the lower member c to be greater than that exerted upon the upper side thereof. As shown in Fig. 5, it is practicable to form the intermediate chambers in a single movable slide to accomplish both the feed and delivery of the cans, the said slide c^{10} being shown in Fig. 5 as vertically movable and adapted to travel in a guideway formed at the end of the chamber a, said guideway having openings b^{40} and b^{50} leading to the cooking-chamber, the former of which openings is adjacent to the end of the upper support a^{20}, while the latter opening is adjacent to the end of the lower support a^{30}, so that the cans will be fed to and delivered from the said support as before. Corresponding to the said openings b^{40} and b^{50} the feed member c^{10} has the upper and lower pockets c^{20}, the upper being adapted to receive a can from the opening c^{21} and transfer the same to the opening b^{40}, while the lower pocket in the same movement receives a can from the opening b^{50} and transfers it to the delivery-opening d^{20}. At the openings b^{40} and b^{50} the guideway is provided with the chambers b^{41} and b^{51}, which communicate with the cooking-chamber a for the purpose of admitting steam to neutralize the pressure at the said openings, as above described. In this instance the member c^{10} may be reciprocated by means of a link c^{40}, arranged to operate substantially as in the construction hereinbefore described.

While the arrangement above described of the intermediate pocket and controlling devices for the feed and delivery of the cans is simple and practicable, it is obvious that the same result may be obtained in other ways,

and as an illustration a modified construction is shown in Fig. 6, in which the chamber C^2, instead of being formed in a slide which itself constitutes the controlling device for the openings, may be formed in a stationary portion of the cooking-chamber itself, the openings in this instance being controlled by the valves C^3 and C^4, the former of which is adapted to control the opening through which the can is to be inserted and the latter to control the opening through which the can passes from the chamber or pocket C^2 to the cooking-chamber *a*. The feeding and delivery chambers may be operated in substantially the same way, and in order to avoid complication the feed-chamber alone is herewith shown, it being understood that the delivery-chamber will be controlled in the same way and operated by substantially similar mechanism. With this construction the valves C^3 and C^4 may be ordinary slide-valves having, respectively, the ports C^{30} and C^{40}, through which communication is afforded between the pocket and the exterior and interior of the cooking-chamber, respectively. The valve C^3 is shown as connected by a link C^{31} with a rocker-arm C^{32}, operated by a link C^{33}, having a loop C^{34} to guide the same and a projection C^{35} to coöperate with a cam-groove C^{36} in a cam-wheel C^{37}, adapted to be rotated in any suitable or usual way. In the rotation of the said cam the said valve C^3 will be opened and closed, as indicated, so that a can may be inserted in the chamber C^2 when said valve is opened, at which time it will be supported upon the slide C^4, which is then in such a position as to close the opening b^4, which leads to the interior of the cooking-chamber *a*. The slide-valves C^3 and C^4 are arranged to be seated against the outer portion of the guide in which they run, (the word "outer" being used with relation to the cooking-chamber,) so that the pressure in said chamber will tend to seat the valves when acting thereon. The neutralizing of the pressure upon said valves is accomplished in this instance by letting steam into the pocket C^2 when the slide-valve C^4 is to be operated, so as to equalize the pressure on both sides of said valve, and by exhausting the steam from said chamber when the valve C^4 is closed and the valve C^3 is to be operated, so as to neutralize the pressure upon the latter. As herein shown, this is accomplished as follows: Assuming that a can B has been placed in the chamber C^2, Fig. 6, and the slide-valve C^3 closed, as shown, it is obvious that the pressure at the interior of the chamber *a* will force the valve C^4 upward against its seat, so that it will be operated with difficulty, if it can be operated at all. To neutralize the pressure, so that the said valve may slide easily, the chamber C^2 is shown as connected by a pipe C^{200} with the interior of the cooking-chamber *a*, the said pipe being controlled by a valve C^{201}. The said valve is shown as provided with a stem, which is adapted to be acted upon by a finger or projection C^{320} from the arm C^{32}, and in moving the said arm a certain amount of lost motion is provided for by means of the slot C^{321}, so that before the slide-valve C^4 is acted upon the said steam-valve will be opened, allowing the steam to enter the chamber C^2, thus equalizing the pressure at both sides of said valve. When the valve C^4 is moved to permit the can B to fall into the chamber and has been returned to the position shown in Fig. 6, however, it is obvious that the chamber C^2 will be full of steam, the pressure of which is equal to that in the cooking-chamber *a*. The pressure upon the valve C^3 is therefore unbalanced, so that the same cannot be easily operated until said pressure is neutralized. To accomplish this, the said valve is actuated in a manner similar to that already described; but in the first movement of the arm which actuates the same a valve *x* in an exhaust-pipe x^2, communicating with the chamber C^2, is opened, so that the steam escapes from the said chamber before the valve is acted upon to produce a movement thereof.

It is not intended to limit the invention to the specific construction and arrangement of the mechanism herein shown and described, since modifications may obviously be made without departing from the invention.

I claim—

1. A steam cooking apparatus comprising a chamber containing steam under high pressure; a feed-opening; means for controlling said opening to prevent the escape of steam during the insertion or removal of the articles to be cooked; means for preventing the action of an unbalanced steam-pressure on said controlling means; agitating devices for the articles within the chamber; and means for operating said agitating devices and said controlling means, as set forth.

2. A steam cooking apparatus comprising a chamber containing steam under pressure; an opening in a wall of said chamber for the articles to be cooked; a guide-recess communicating with said opening; a feeding device movable in said recess and having a steam-tight fit therein; a pocket in said feeding device to receive the article and convey it to said opening; and an outlet-passage communicating with said guide in the path of movement of said pocket to permit the escape of steam therefrom, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

RICHARD C. PAYSON.

Witnesses:
FRANKLIN C. PAYSON,
AURELIA C. PERCY.