Dec. 4, 1951 A. W. FRENCH, JR 2,577,010

COOKER

Filed April 5, 1949 2 SHEETS—SHEET 1

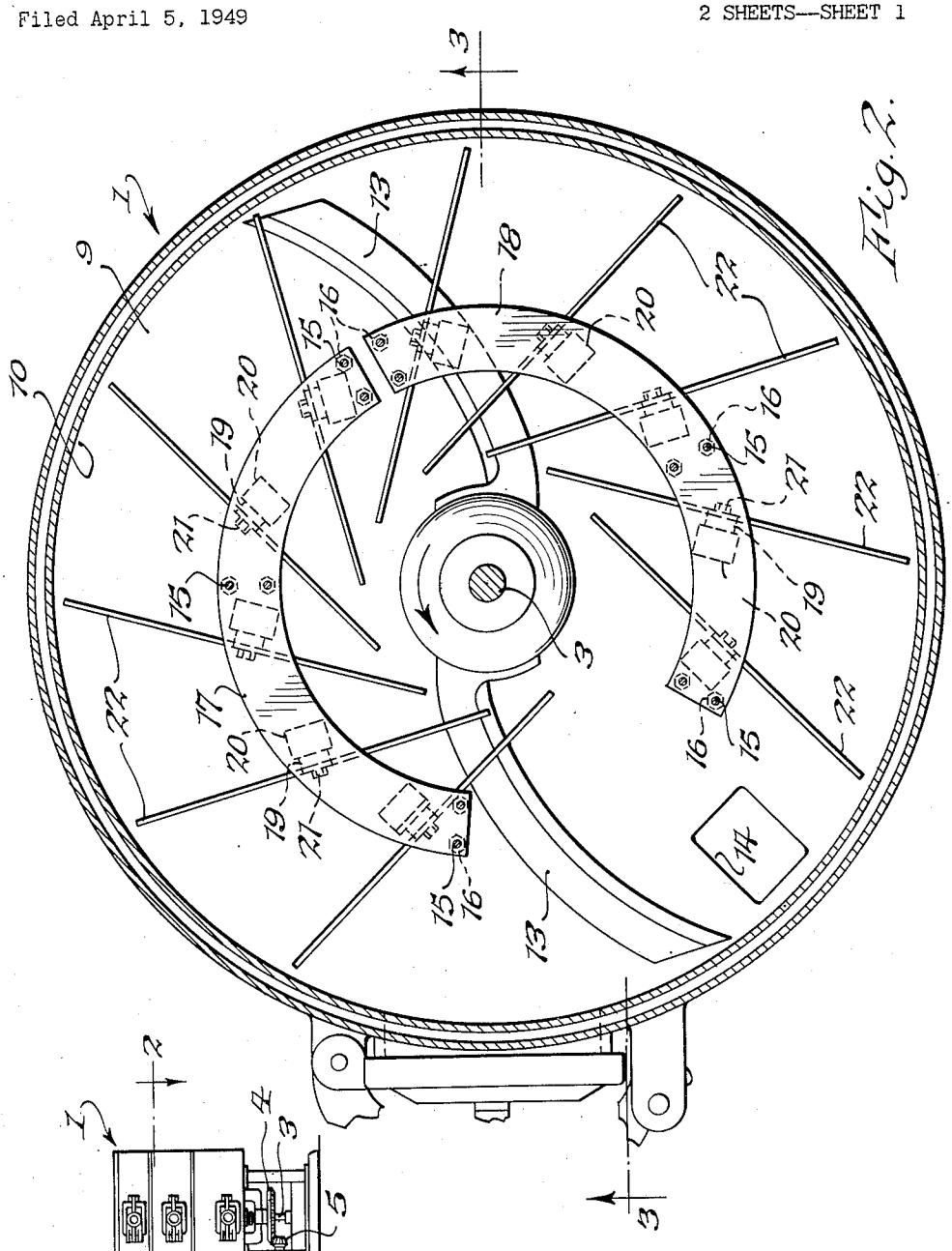


Fig. 2.

Fig. 1.

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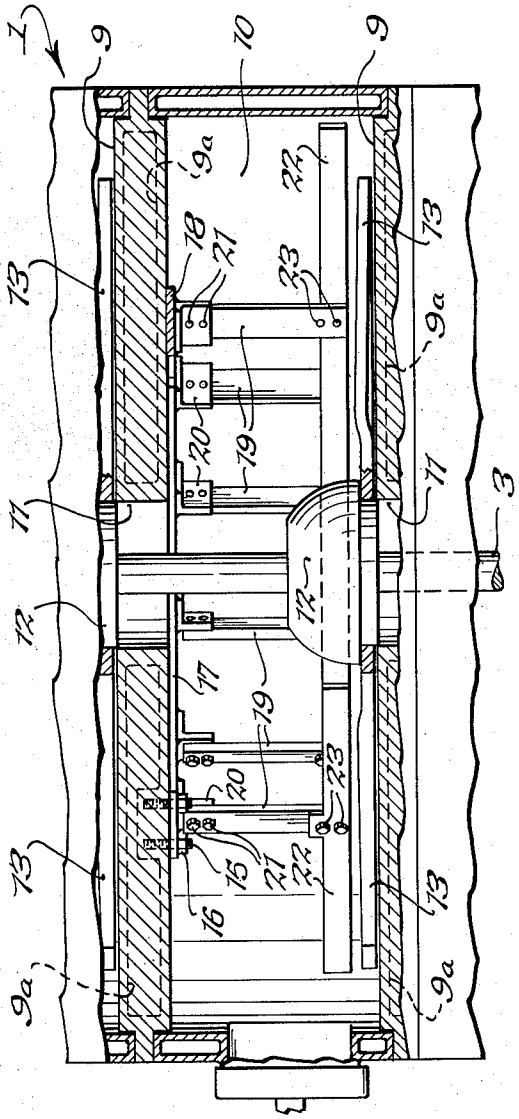


Fig. 3.

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2,577,010

COOKER

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12 Claims. (Cl. 259—8)

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This invention relates to vertical cookers of the type having superposed cooking chambers, with a shaft extending vertically through the chambers and carrying one or more stirrer arms in each chamber which sweep the floor of each chamber. Charges of materials, such as meats, for example, are placed in the uppermost chamber, cooked awhile, then passed into the next lower chamber, cooked further, and then passed into another lower chamber for further cooking, and so on for the desired number of chambers. From the lowest chamber the cooked materials are discharged into a press. Heretofore, cookers of this type could not handle well a light charge in each chamber, because centrifugal forces on the loose materials in the chambers, as they were stirred by the stirrer arms, would pile the materials against the outside wall and leave part of the bottom wall or floor bare. This resulted in inefficient utilization of available heating surface.

An object of this invention is to provide an improved vertical cooker which will handle light charges well, which will keep the charges fairly uniformly distributed over the floor of the chamber during the stirring and cooking, in which light charges of materials to be cooked will not pile up against the outside wall but will remain fairly uniform over the bottom or floor of the chamber, which will give uniformity in the mixing, which will require a shorter period for cooking, with which the cooking will be uniform throughout each charge, which will give a more uniform product, which decreases the time required to prepare meats before they are charged into the cooker, which will be relatively simple, practical and inexpensive, and which will require a minimum of change in existing types of cookers.

Other objects and advantages will be apparent from the following description of one embodiment of the invention, and the novel features will be particularly pointed out hereinafter in connection with the appended claims.

In the accompanying drawing, Fig. 1 is a schematic elevation of a vertical type cooker constructed in accordance with this invention;

Fig. 2 is a sectional plan of the same; and

Fig. 3 is a sectional elevation of a portion of the same.

In the illustrated embodiment of the invention, and referring first to Fig. 1, the improved cooker is provided with an upright housing or shell 1 having a charging duct 2 leading to the interior of the upright housing, at the top thereof, by which charges of loose material, such as meats, may be introduced into the cooker. A shaft 3 extends vertically through the housing 1, and below the lowermost chamber it carries a driving gear 4 that meshes with and is driven by a pinion 5 on a shaft 6. Shaft 6 is driven in any suitable manner, such as by an electric motor directly coupled to the shaft 6, or through a belt passing selectively over either an idler pulley 7 or a pulley 8 which is fixed on the shaft 6. The particular manner in which the shaft 6 is driven from a suitable source of power is not material.

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Referring next to Figs. 2 and 3, the interior of the housing is divided by floors 9 into a plurality of chambers 10, which chambers are arranged vertically in superposed relation. The stirrer shaft 3 extends through an opening 11 in each floor 9, and within each chamber carries a flange or head 12 that overlies and abuts the periphery of the opening 11, so as to close communication between superposed chambers along the stirrer shaft. Extending approximately radially from each head 12 at diametrically opposite sides thereof are stirrer arms or blades 13 which extend into close proximity to, but do not touch the peripheral wall of that chamber. Each of these stirrer arms 13 is somewhat arcuate along its length, as shown in Fig. 2, so that its outer end leads its inner end during its rotary movement with the stirrer shaft 3. By having the outer end lead the inner end, there is some tendency for the stirrer arm to push the materials on the floor of the chamber towards the center, but it has been found that centrifugal forces acting on the loose materials being stirred will more than offset this pushing or camming of materials by the shape of the stirrer blades, and the present invention overcomes the effect of centrifugal forces.

The floor of each chamber is provided with an opening 14 adjacent its outer periphery, so that after the materials have been cooked for a desired length of time, the gate, slide or valve normally closing the opening 14 in the floor of that chamber, is opened so as to discharge the contents of that chamber into the next lower chamber, until the lowermost chamber is reached. The lowermost chamber has its floor opening 14 connected to the charging opening or inlet of a suitable expressing press, which press serves to press out all liquid from the cooked materials as heretofore done. Since the expressing of the liquids from the cooked materials is not a part of the present invention, the expressing means has not been illustrated. The

opening 14 is located near the outer periphery of the chamber, so that when opened, the particles will be gradually pushed toward this discharge opening by the movement of the stirrer blades which sweep closely over the floor of each chamber.

Secured to the ceiling of each chamber, in any suitable manner, such as by studs 15 and nuts 16, are two arcuate plates 17 and 18. These arcuate plates 17 and 18 are approximately midway between the stirrer shaft 3 and the outer periphery of the chamber, and extend arcuately about the shaft 3. Arms 19 are arranged in vertical positions in each chamber, and at their upper ends are connected by angular bars or members 20 to the underface of one of the arcuate strips 17 and 18, the connections being by screws 21. These arms 19 are thus rigidly supported by the ceiling of each chamber, and depend nearly to the paths of movement of the stirrer blades 13. Supported upon the lower end of each arm 19 is a baffle strip or plate 22 which is arranged horizontally in the chamber just above, but close to the path of travel of the stirrer blades 13, as shown in Fig. 3. These baffle strips are rigidly secured to the arms 19 in any suitable manner, such as by screws 23. These baffle strips or plates 22 are arranged in a row around the interior of the chamber and each, if extended, is approximately tangent to a theoretical circle that is concentric with the axis of the shaft 3, and that theoretical circle is spaced from the head 12 so that there will be a space between the inner end of each baffle strip and the head 12, as shown in Fig. 2. In other words, the radial distance from the shaft 3 to the inner end of each baffle strip 22 is greater than the radial distance from the shaft 3 to the inner end of each stirrer arm 13. Because of this tangent relation just discussed, each baffle strip 22 is oblique to the radius of its rotation, and is so disposed that each stirrer arm 13 passes under the outer end of each baffle plate considerably before it passes the inner end of the same baffle plate. Each baffle plate or strip extends for only a minor part of the distance between the stirrer blades and the ceiling of that chamber, so that there will be a substantial clearance between each baffle strip and the ceiling of that chamber, as shown in Fig. 3. In the particular example illustrated, the distance from the lower edge of each baffle strip to the ceiling of that chamber is 14 inches, and the vertical width of the baffle strip is 2 inches, so that there is approximately 12 inches between the upper edge of each baffle strip and the ceiling of that chamber. The outer end of each baffle strip terminates in proximity to but is slightly spaced from the outer periphery of the chamber. The side walls of each chamber may or may not be steam jacketed, and suitable connections are made between the jackets and a source of steam to furnish heat to the chambers, if and when desired. The floors 9 of the various chambers are heated, such as by providing steam chambers 9a therein (Fig. 3). In addition, steam may also be added directly to each chamber at the start of the operation, in order to quickly bring the contents of the chamber to cooking temperature.

The meats or other loose material to be cooked are preferably provided in each chamber to a depth of about three inches, but may be more or less, and as the cooker or stirrer shaft 3 rotates at from about 20 to 40 revolutions per minute, the stirrer arms will sweep across the floor of each chamber to keep the meats or materials from cooking to the floor, stir them and raise an advancing wave in the loose materials as the stirrer arms rotate. This causes the meats or materials to cascade in succession over the tops of the baffle strips, which causes an agitating and aerating effect. Without these baffle strips, the stirrer arms, at these rotation speeds, tend to throw the meats or materials against the outside walls of the chamber, so that approximately half the bottom of the chamber would be bare, and the meats would be about 7 inches or more deep along the outer wall of the chamber. While the stirrer shaft commonly rotates anywhere from 20 to 40 R. P. M., the usual rate of rotation is around 40 R. P. M. As the wave of loose materials cascades over the tops of the baffle strips, the baffle strips tend to cam or push the meats toward the center, so as to keep them distributed fairly uniformly over the floor of the chamber. This arrangement of the baffle strips decreases the amount of cooking necessary by from 25% to 35%, and makes it possible to handle the same tonnage with the same cooker with less steam, and doing a better job. With this arrangement, the time required to prepare the meats or materials before pressing has also been cut down. Because of the fact that the loose materials are kept well agitated and distributed uniformly over the floor of the chamber, the cooking is more uniform throughout, so that all of the charge receives uniform cooking. In this way, none of the materials is overcooked or undercooked, and consequently a better product is obtained.

It will be noted from Fig. 2 that there is a larger space between the baffle strips nearest the opening 14 than between the other adjacent baffle strips because at that point a little movement of the materials being cooked towards the opening 14 is desired to facilitate discharge of the materials, after the opening 14 has been opened for discharge by the operation of a suitable gate, not shown, but usual in this type of cooker.

It will be understood that various changes in the details and arrangement of parts, which have been herein described and illustrated in order to explain the nature of the invention, may be made by those skilled in the art within the principle and scope of the invention as expressed in the appended claims.

I claim:

1. In a vertical cooker of the type having superposed cooking chambers with a stirrer arm mounted for rotation about a central vertical axis in the chamber and sweeping the floor of each chamber, and the floor of each chamber having a closable discharge passage into which loose material being cooked in that chamber may be pushed for discharge by the stirrer arm, that improvement which comprises a plurality of horizontally arranged baffle plates rigidly suspended from the ceiling of each chamber and each having its lower edge close to but just above the path of travel of the stirrer arm is that chamber and its upper edge only a minor part of the distance from the stirrer arm to the ceiling of that chamber, said baffle plates in each chamber being arranged at spaced intervals along the path of travel of the stirrer arm in that chamber, and each disposed if extended, approximately tangentially to a circle concentric with said chamber and having a slightly larger diameter than that of the circle generated by the path of travel of the inner end of the stirrer arm, the outer ends

of the baffle plates terminating in proximity to the periphery of that chamber.

2. In a vertical cooker for a mass of loose, solid particles, and of the type having superposed cooking chambers with a stirrer arm in each chamber mounted for rotation about a central vertical axis and sweeping the floor of that chamber, and the floor of each chamber supporting said mass and having a closable discharge passage into the next lower chamber and from the bottom chamber to the exterior of the cooker, into which passage loose material being cooked in any chamber may be pushed for discharge by the stirrer arm, that improvement which comprises a plurality of horizontally arranged baffle plates supported in each chamber and each having its lower edge close to but just above the path of travel of the stirrer arm in that chamber and its upper edge only a minor part of the distance from the stirrer arm to the ceiling of that chamber, said baffle plates in each chamber being arranged at spaced intervals along the path of travel of the stirrer arm in that chamber, and each disposed oblique to radii of said chamber and having their inner ends further advanced than the outer ends in the direction of travel of the stirrer arm.

3. In a vertical cooker for a mass of loose, solid particles, and of the type having superposed cooking chambers through which chambers in succession the particles pass, with a stirrer arm in each chamber and mounted for rotation about a central vertical axis and sweeping the floor of that chamber, and the floor of each chamber having a closable discharge passage into which said mass of loose particles being cooked in that chamber may be pushed for discharge by the stirrer arm each chamber discharging into the next lower chamber until the bottom chamber, and then outside the cooker, that improvement which comprises a plurality of horizontally arranged baffle plates supported in each chamber and each having its lower edge close to but just above the path of travel of the stirrer arm in that chamber and its upper edge only a minor part of the distance from the stirrer arm to the ceiling of that chamber, said baffle plates in each chamber being arranged at spaced intervals along the path of travel of the stirrer arm in that chamber and each disposed oblique to a radius of the chamber which intersects it, and camming toward the center of the chamber, the loose particles on the floor of the chamber being pushed along by the stirrer arm.

4. In a vertical cooker for a mass of loose, solid particles, and of the type having superposed cooking chambers through which chambers in succession, said particles descend, with a stirrer arm in each chamber and mounted for rotation about a central vertical axis and sweeping the floor of that chamber, and the floor of each chamber having a closable discharge passage near the outer periphery of that chamber into which a mass of loose, solid particles disposed directly on the floor for cooking, may be pushed for discharge by the stirrer arm, that improvement which comprises a plurality of horizontally arranged baffle plates rigidly supported in each chamber just above the path of the stirrer arm and spaced well below the ceiling of the chamber, said baffle plates in each chamber being arranged at spaced intervals along the path of travel of the stirrer arm in that chamber, and each disposed if extended, approximately tangentially to a circle concentric with said chamber and having a diameter only slightly larger than that of the circle generated by the path of travel of the inner end of the stirrer arm, the outer ends of the baffle plates terminating in proximity to the periphery of that chamber.

5. In a vertical cooker for a mass of loose, solid particles, and of the type having superposed cooking chambers through which chambers in succession, the particles descend with a stirrer arm in each chamber and mounted for rotation about a central vertical axis and sweeping the floor of that chamber, and each chamber having a closable discharge passage into which loose material being cooked in that chamber may be pushed for discharge by the stirrer arm, that improvement which comprises a plurality of horizontally arranged baffle plates rigidly supported in each chamber just above the path of the stirrer arm and spaced well below the ceiling of the chamber, said baffle plates in each chamber being arranged at spaced intervals along the path of travel of the stirrer arm in that chamber and each disposed oblique to a radius of the chamber which intersects it, and camming toward the center of the chamber the loose materials on the floor of the chamber being pushed along by the stirrer arm.

6. In a vertical cooker for a mass of loose, solid particles, and of the type having superposed cooking chambers through which chambers in succession, the particles descend, a shaft extending into each chamber centrally and vertically thereof, and mounted for rotation, a stirrer arm fixed to and rotatable with said shaft in each chamber and running close to the floor of that chamber, each chamber having a discharge aperture at its floor level, that improvement which comprises the combination therewith of a plurality of horizontally long and vertically narrow baffle plates supported in each chamber just above the path of travel of the stirrer arm in that chamber, and disposed, if extended in directions generally tangentially to a circle concentric with said shaft and larger than the circular path of the inner end of the stirrer arm and with its inner end advanced more than the outer end in the direction of rotation of said arm, said baffle plates in each chamber being well spaced below the ceiling of that chamber, whereby as loose materials being cooked in that chamber are pushed in a wave by said stirrer arm, the wave may cascade over the baffle plates in succession and be cammed thereby towards the shaft to keep the level of materials approximately the same between the shaft and the peripheral side wall of that chamber.

7. In a vertical cooker of the type having a housing provided with a plurality of cooking sections arranged one above another, and a common wall between adjacent superposed sections dividing the chamber of the housing into cooking chambers, each of said walls that forms the bottom of a chamber provided with a closable opening to discharge material being cooked into the next lower chamber until the lowest chamber is reached and then into an expressing device, a rotatable shaft extending vertically and centrally of said housing and into each chamber, a stirrer arm fixed on said shaft in each chamber and sweeping the floor of that chamber when the shaft rotates, that improvement therein which comprises a plurality of generally straight baffles supported in each chamber and disposed close to, but just above the path of travel of the stirrer arm in that chamber, each of said baffles extend-

ing vertically only a minor part of the distance from the stirrer arm to the top of that chamber and having its inner end advanced farther than its outer end in the direction of travel of the stirrer arm, the outer end of each baffle terminating in proximity to the peripheral wall of that chamber.

8. In a cooker for a mass of loose, solid particles of the type having a cooking chamber with a stirrer arm mounted for rotation about an upright axis and sweeping the floor of the chamber, and the floor of the chamber having a closable discharge passage into which loose, solid material being cooked in the chamber may be pushed, for discharge by said arm, that improvement therein which comprises a horizontally arranged baffle plate mounted in said chamber with its lower edge close to but just above the path of travel of said arm, and its upper edge spaced well below the ceiling of said chamber, said plate being disposed along the path of travel of the stirrer arm and in a position generally tangentially to a circle concentric with the axis of rotation of said arm, but with the outer end retarded with respect to the direction of rotation of said arm, to cause a cascade thereover of loose material pushed along by said arm.

9. In a cooker for a mass of loose, solid particles of the type having a cooking chamber and a stirrer arm rotatably mounted in said chamber to approximately sweep the floor of said chamber, and the floor of the chamber having a closeable discharge passage into which loose, solid material may be pushed by said arm when sweeping the floor of said chamber, that improvement which comprises a baffle plate mounted in said chamber in a position oblique to a radius extending from the axis of rotation of said arm, with its lower edge close to but just above the path of travel of said arm, and its upper edge spaced well below the ceiling of said chamber, to cause loose materials in said chamber and being pushed in a wave by said arm to cascade over said baffle plate and be mixed thereby.

10. In a cooker for a mass of loose, solid particles of the type having a cooking chamber and a stirrer arm rotatably mounted in said chamber to approximately sweep the floor of said chamber, and the floor of the chamber having a closeable discharge passage into which loose, solid material may be pushed by said arm when sweeping the floor of said chamber, that improvement which comprises a baffle plate mounted in said chamber with its lower edge close to but just above the path of travel of said arm, and its upper edge spaced well below the ceiling of said chamber, said plate having its longitudinal axis disposed oblique to a radius from any straight intermediate part thereof to the axis of rotation of said arm, with its end that is nearest said axis of rotation further ahead along the direction of movement of the stirrer arm than is the other end of the baffle plate, to cause loose materials in said chamber and being pushed in a wave by said arm to cascade over said baffle plate and be mixed thereby.

11. A cooker for a mass of loose, solid particles comprising a cooking chamber, a stirrer arm in said chamber mounted for rotation about a vertical axis, and approximately sweeping the floor of said chamber, said arm having its outer end advanced in the direction of its travel ahead of a radius to said axis from an intermediate part of the advancing edge of said arm, and a baffle plate supported in said chamber with its lower edge close to but just above the upper surface of said arm and its upper edge spaced well below the ceiling of said chamber, said plate being generally oblique to a radius to said axis from a point intermediate of the length of the plate, and with the inner end of the plate further advanced than its outer end in the direction of travel of said stirrer arm.

12. A cooker for a mass of loose, solid particles, comprising a heated cooking chamber, a stirrer arm in said chamber for rotation about a vertical central axis and approximately sweeping the floor of said chamber, and said chamber having a closeable discharge opening at the floor level, a baffle plate supported in said chamber with its lower edge close to but just above the upper surface of said arm and its upper edge spaced well below the ceiling of said chamber, said plate being disposed in a position oblique to the advance edge of said stirrer when the latter moves beneath the plate, said plate and the advance edge of said stirrer urging said loose particles in the chamber in opposite directions between said axis and the periphery of said chamber, whereby the loose materials will be effectively stirred and mixed.

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