

May 24, 1927.

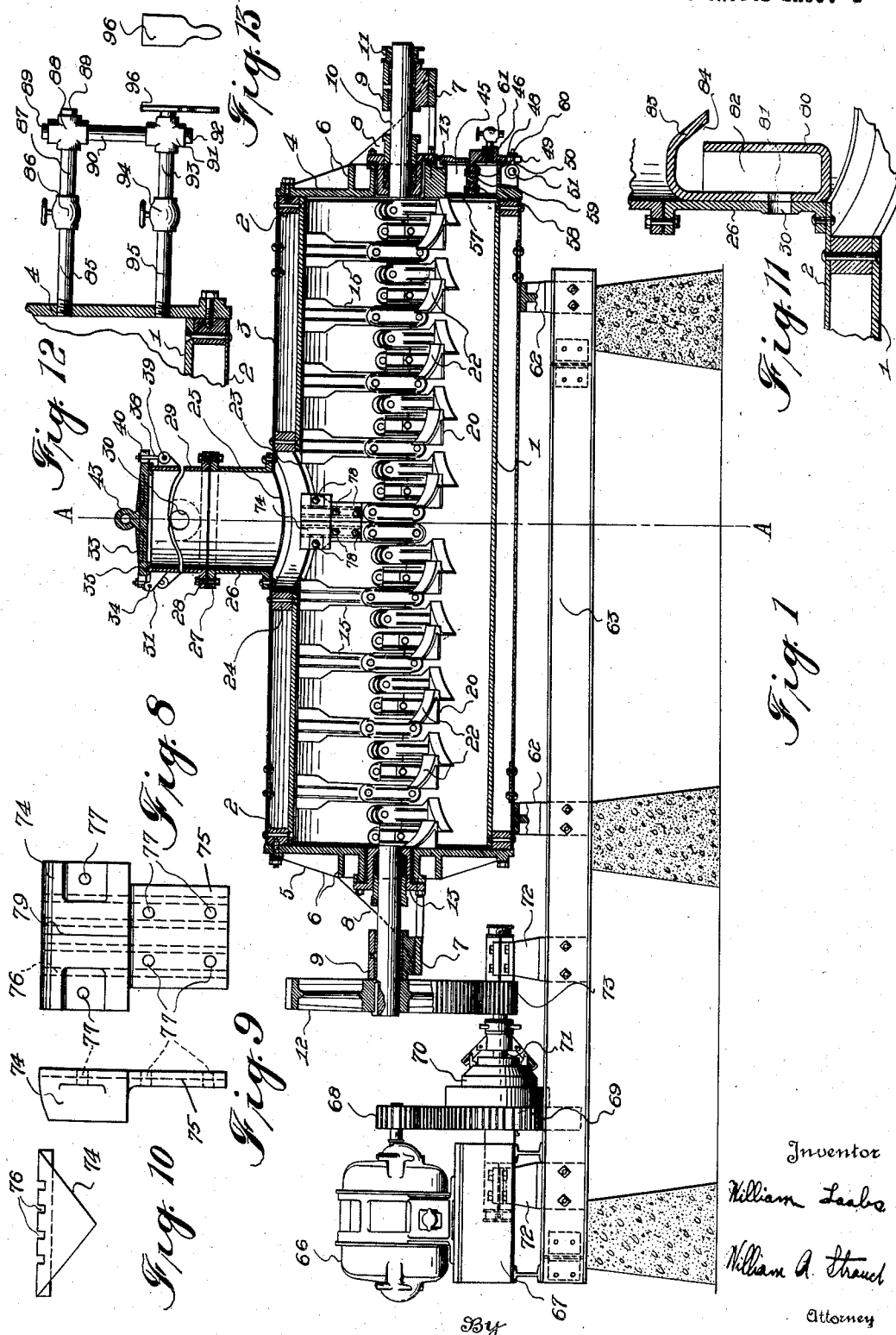
W. LAABS

1,630,124

COOKER

Filed March 20, 1926

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

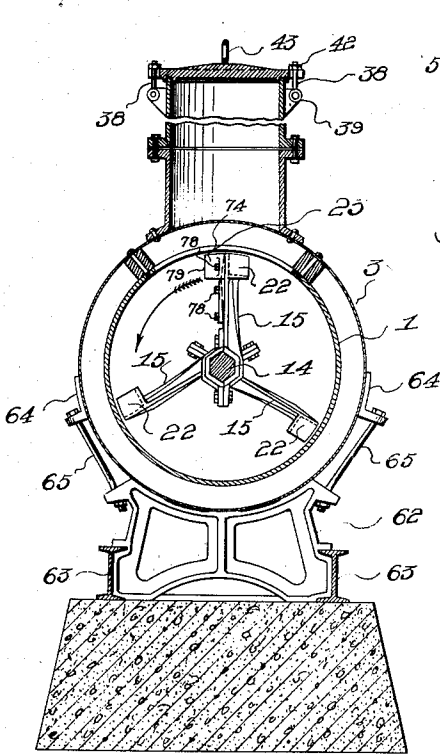


Fig. 3

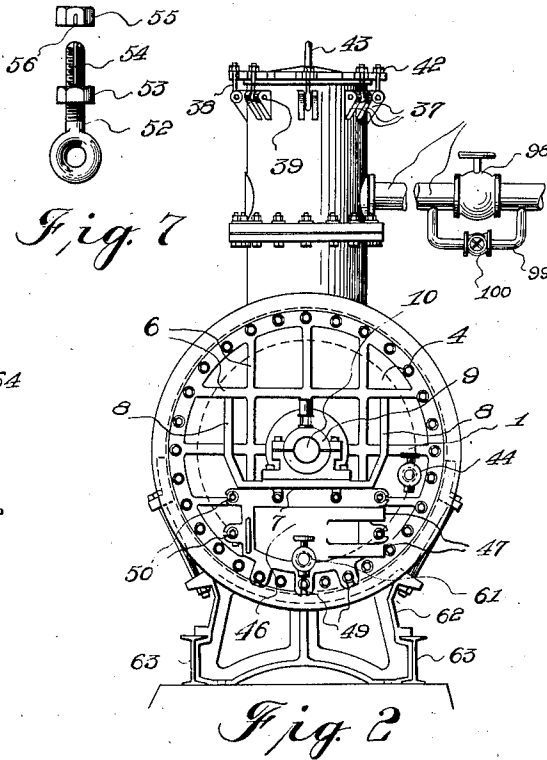


Fig. 2

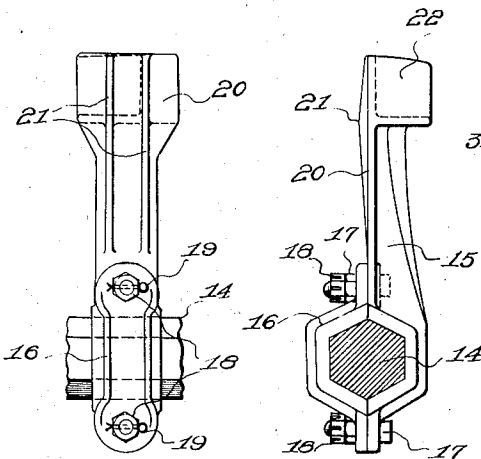


Fig. 6

Fig. 5

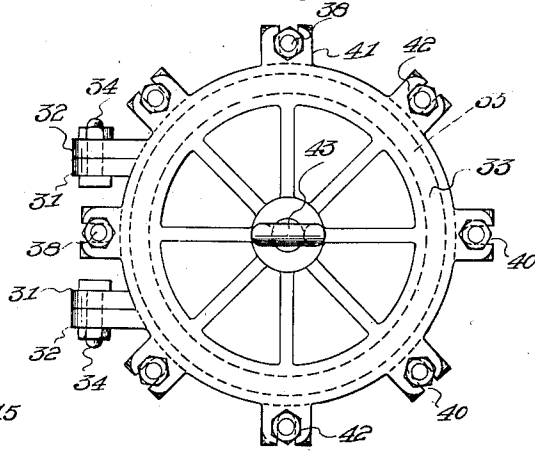


Fig. 4

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COOKER.

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The present invention relates to improved cookers and more particularly the invention relates to improved cooker constructions especially adapted for both high pressure and high vacuum cooking and rendering operations set forth in my Patent 1,578,245, dated Mar. 23, 1926, of which the present application is a continuation in part.

The primary object of the invention is to provide apparatus especially adapted for high pressure and vacuum digesting and cooking operations in carrying out the improved processes of my co-pending application. The various improved details and detailed objects of my invention will be specifically pointed out as the description of the preferred embodiments thereof proceed, and are such as may be attained by a utilization of the various combinations, sub-combinations, and principles hereinafter set forth, and as more fully defined by the scope of the appended claims.

As shown in the drawings:

Figure 1 is a sectional side elevation of a preferred arrangement of the invention.

Figure 2 is an end elevation of the form of invention shown in Figure 1.

Figure 3 is a sectional view taken along line A—A of Figure 1, with parts of the dome broken away.

Figure 4 is a detailed plan view showing the method of securing the cover in position.

Figure 5 is a detailed end view of an agitator arm.

Figure 6 is a side elevation of the agitator arm shown in Figure 5.

Figure 7 is a detail view showing a special form of sealing bolt.

Figure 8 is a front elevation of a splitting and reinforcing device provided for the new adjacent central paddle or agitator arm.

Figure 9 is a side elevation of the device shown in Figure 8.

Figure 10 is a plan view of the device shown in Figure 8.

Figure 11 is a fragmental view showing an improved vapor outlet connection, located in the lower section of the dome.

Figure 12 is a detail fragmental view showing an improved sampling arrangement.

Figure 13 is an elevation of the sampling paddle.

Referring to Figure 1, the preferred form of cooker comprises an inner steel cylinder

1 which may be hammer welded steel tubing and is capable of withstanding internal steam pressures of from 40 to 75 or more pounds per square inch, and capable of withstanding in an internal vacuum of from 23 to 27 inches or more while external pressures of from 10 to 100 pounds per square inch are maintained thereon. Cylinder 1 is secured at its end in the mud rings 2 which in turn fit within and are secured to an outer steel shell or jacket 3 built to withstand as high as 100 pounds per square inch or more of internal pressure and forming a heating jacket space for the inner cylinder 1. Secured to the mud rings 2 by studs or in any other suitable manner and closing the end of the cylinder 1 are the cast steel heads 4 and 5. Heads 4 and 5 are reinforced with the heavy rib 6 (Figures 1 and 2) in order to withstand the heavy internal pressures and the high degree of vacuum developed in operation within the cylinder 1. Extending from the heads 4 and 5 are the bearing supporting shelves 7 which are reinforced by the supporting and strengthening ribs 8 constituting brackets formed integrally with the heads. Secured to shelves 7 are the bearings 9 (Figures 1 and 2) in which the agitator shaft 10 is supported and journaled for rotation. Secured on one end of the shaft 10 is the locating collar 11 and keyed to the opposite end thereof is a driving spur gear 12. Supported centrally in the heads 4 and 5 are the stuffing boxes of packing glands 13 through which the shaft 10 extends into the interior of the cylinder 1. The stuffing boxes 13 are designed to maintain an effective seal against leakage past the shaft 10 through the heads 4 and 5 under the high pressures and high vacuums maintained in the cylinder 1 during operation. As clearly shown in Figure 1 said boxes are separate from the heads and fit loosely in the head openings so that they can be readily applied after the shaft is centered in spite of any irregularities in the castings the flanges of the stuffing boxes overlapping the heads being relied upon to maintain a tight joint between the bodies of the boxes and the heads. It will be noted that the weight of shaft 10 is supported by the bearings 9 from the shelves 7 and that ample space is provided between the bearings 9 and heads 4 and 5 to permit the provision of rugged stuffing box structures. This con-

struction is an important feature of the invention enabling operation at very high steam pressures and very high degrees of vacuum to be maintained in operation.

5 The shaft 10 is provided with a hexagonal section 14 (Figures 3, 5 and 6) within the cylinder 1 upon which the agitator arms 15 are secured. The agitator arms 15 are provided with a half-hexagonal recess or
10 seat at their lower end which fits closely over half of the hexagonal shaft section 14. A collar 16 provided with a half-hexagonal recess or seat clamps around the remaining half of the hexagonal shaft section 14 and
15 the arms and collar or securing section 16 are held securely together by means of the bolts 17, provided with standard nuts, lock washers, and crown nuts 18, which are held in position against inadvertent turning or loss
20 in operation by means of the cotter pins 19 (Figure 6). As clearly shown in Figure 1 the end agitators are provided with straight sides to sweep over the entire inner surface of the heads. The agitator arms or paddles
25 15 are provided with a lifting surface 20 upon which the gripping and strengthening ribs 21 are formed. In operation of the apparatus the material in the agitator or in the cooker is lifted on the faces 20 upward
30 through the cooker and the raised portions or ribs 21 aid in the lifting action and tend to prevent sliding of the material being raised off the sides of the arms. Formed on the rear face of the arms 15 are the
35 curved discharge surfaces or faces 22. The faces 22 are so curved and inclined at such an angle that when it is desired to discharge the materials in the cooker as will more fully hereinafter appear, the rotation of the
40 agitator shaft 10 may be reversed and the material is forced end-wise along the cooker out of the discharge opening. The construction and arrangement of the agitator arms in the cooker is an essential feature of the
45 invention. The hexagonal shape of the shaft permits a firm grip to be secured on the paddle and at the same time provides an easy means for obtaining the proper angular spacing of the paddles with relation to
50 each other. Referring to Figures 1 and 3 it will be noted that the two center paddles 15 are in alignment and the remaining paddles are spaced at angles of 120 degrees around the shaft, simply by shifting adjacent
55 arms relatively two faces around the hexagonal section 14 of the shaft when being secured thereto. The arms 15 are in this manner disposed in three aligned rows along the shaft. This arrangement of the
60 central arms 15 leaves a central charging space through which the material being loaded drops to the bottom of cylinder 1 and the alignment of the remaining arms permits the material to spread uniformly throughout the cylinder 1.

Formed in the cylinder 1 directly above the adjacent central paddles 15 is a charging opening 23 around the outside of which the strengthening and spacing ring 24 is secured between the cylinders 1 and 3 forming the side walls of the charging space and at the same time sealing the heating jacket space from the interior of the cylinder 1. The shell of cylinder 3 extends beyond the opening through the strengthening and
75 spacing ring 24 and has formed therein a charging opening 25 which is smaller than the opening 23. This arrangement is a further important feature of the invention as it permits relatively large pieces of bone, meat and the like to enter through openings
80 25 and 23 without being caught and wedged against the edges of the opening 23 by the ends of the paddles 15. In this manner injury to the mechanism is avoided when
85 relatively large pieces of material are charged into the cooker. Secured to the outer shell 3 adjacent the opening 25 by riveting or in any other suitable manner, is a charging dome section 26 provided with
90 a securing flange 27. Bolted to the flange 27 is the flange 28 of the charging dome top section 29. The provision of a divided charging dome is a further feature of the invention in enabling standard parts to be
95 utilized in the construction of the cooker and permitting suitable length of dome sections to be interposed between the flanges 27 and 28 to suit the different cooking and charging floor levels found in practice in the installation of the improved units.

Provided in the top dome section 29 is a standard pipe connection 30 for withdrawing vapors from the cooker. Formed integrally with the exterior of dome section
105 29 are the hinge sections 31 (Figures 1 and 4) to which the hinge extensions 32 of the dome cover 33 are pivotally secured by means of the hinge pins or bolts 34. It will be understood that the dome sections
110 26 and 29 and the hinge dome cover 33 are of metal sufficiently heavy to withstand the high internal pressures and the high vacuum developed in the operation of the cooker. Because of the high pressure and vacuum
115 operation, special means are provided for clamping the cover 33 into position without permitting leakage and at the same time permitting rapid opening and closing of the cover. To provide an effective seal, cover 33
120 is provided with an annular recess 35 in the lower surface thereof in which a suitable gasket or packing is fitted and into which the upper circular end of the dome section 29 nests when the cover is in position.
125 Formed integrally with the dome section 29 are the pairs of projecting ears 37 to which the lower ends of fastening bolts 38 are pivotally secured by means of the pins 39. Bolts 38 are spaced substantially equally
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around the cover 33 with one bolt disposed between hinge extensions 32 of the cover and are arranged to swing into slots 40 formed in the projection 41 of the cover 33.

5 When the nuts 42 of the bolts 38 are tightened against the projections 41, the dome cover 33 is tightly clamped in position in a manner which will permit high pressures and vacua to be developed within the
10 cooker without substantial leakage occurring around the cover. When the cover is to be opened the nuts 42 are loosened, bolts 38 are swung downward and the cover is raised upward about the hinge pins 34 by
15 means of the hook or handle 43 formed integrally therewith.

Provided in the head 4 is a sampling cock 44 (Figure 2) disposed slightly below the center of the cylinder 1 and adjacent the
20 inner surface thereof through which samples of the material in the cooker may be withdrawn in the pressure stages of the operation, and through which the vacuum may be broken if desired after the vacuum stage
25 of the cooking or treatment has been completed, and it is desired to discharge materials from the cooker. These materials are discharged from the cooker through the discharging opening 45 (Figure 1) formed in the lower part of the
30 head 4 with its lower edge flush with the inner surface of the cylinder 1. Opening 45 is closed by a heavily ribbed cover plate or door 46 which is secured by hinges 47 (Figure 2) to suitable hinge projections of the head 4. The cover plate 46 is recessed at 48 on its inner side surface. A suitable
35 packing or gasket is fitted in the recess 48 and the outer edge of the opening 45 is shaped to fit into the packing in the recess when the cover plate is clamped into position. Spaced around the cover plate or discharge door 46 are slots 49 into which the
40 ends of the bolts 50 are adapted to swing. The bolts 50 are pivoted at 51 to suitable projections formed on the discharge head 4. When the bolts 50 are swung into the slots 49 and the nuts on the ends thereof are tightened, discharge door 46 is drawn
45 tightly into position and no leakage past the discharge door can occur or will occur under very high operating pressures and high vacuums developed within the cylinder 1. It will be noted that the bolts 50 are spaced
50 practically uniformly around the discharge door and one of the securing bolts is positioned between the hinges of the door. This arrangement of the securing bolts is an important feature of the invention. When it
55 is desired to open the discharge door the nuts on the bolts 50 are loosened, the bolts are swung outward from the slots and then the door 46 may be swung back on its hinges.

When the cooker is to be used in handling
65 condemned carcasses or products in pack-

ing houses under Government inspection, it is desirable to provide means for sealing the cooker to comply with requirements that all condemned carcasses shall be rendered in a sealed vessel. The arrangement of my im-
70 proved charging dome cover and discharge door lends itself readily to the provision of effective sealing means. When the apparatus is to be used for rendering products under seal, a special sealing bolt 52 (Figure 7) is
75 provided which is substituted for one of the bolts 38 and 50, preferably for the securing bolts opposite the hinged sections of the dome covers and discharge door. When the apparatus is to be used for rendering prod-
80 ucts under seal, the pivot pins 39 for the sealing bolts 52 and the hinge pins for the dome cover 33 and for the discharging door 46 are applied and secured in position in such
85 a manner that they cannot be removed without the removal becoming apparent to an inspector. This may be provided for example, by welding securing nuts on the ends of the pins, when in place, or by drilling holes in the ends of the pivot pins through which
90 sealing wires may be passed and the wires sealed in usual manner. Bolt 52 is provided with a standard nut 53 and is elongated sufficiently to provide a protruding end in which
95 a slot 54 is cut. A nut 55 with a slot 56 cut therein is adapted to thread on the protruding end of the bolt 52 when in clamping position. When the cooker is to be sealed up after being loaded, the covers are clamped in
100 position, nuts 53 are tightened upon the bolts 52, and the nuts 55 are then applied to the protruding ends of the bolts 52 and screwed in position with slots 56 in alignment with the slots 54, and the nuts 55 positioned as
105 closely as possible to nuts 53. A wire is then inserted through the aligned slots and the protruding ends thereof are sealed with a lead seal by an inspector. At the end of the rendering operation the seals of the bolts 52 are broken, and the doors opened. The re-
110 maining seals need not be broken until it is desired to remove the hinge or pivot pins. It will be seen that in this manner convenient rugged, securing and sealing means are provided which may be rapidly manipulated.

To prevent large particles of the product being treated, such for example, as large chunks of meat or large pieces of bone from lodging in the discharge opening 45 and
120 wedging thereof against the end paddle arm 15, an inner cover plate 57 fitting loosely in the discharge opening 45 is provided. The cover plate 57 is pivotally secured by means of a pin 58 to the inner end of a link 59 which at its opposite end is connected pivot-
125 ally by means of a pin 60 to the discharge door 46. When the door 46 is closed, the cover plate 57 is reinserted into the opening 45 and will be held flush with the inner surface of the head 4. Provided in the door
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46 is a drain cock 61 through which free hot fats may be drained from the cooker, before opening the discharge door 46, in this way avoiding danger of injury to the operator 5 when opening the discharge door at the end of a cook if a large percentage of free hot fats are contained in the cooker.

The cylinder 3 is supported on suitable saddles 62 which in turn are secured to and 10 supported from the channel iron 63. Suitable clamping projections or securing straps 64 are provided on the exterior of the cylinder 3 through which the securing bolts 65 extend and rigidly clamp the cooker body to 15 the saddle 62. The channels 63 are extended and form a frame-work upon which a drive motor 66 is supported by means of the structural support or frame-work 67. The drive motor 66 is preferably any well known type 20 of electrical reversing motor in order that the agitator shaft 10 may be driven in either direction. The motor 66 drives a pinion 68 which meshes with and drives a spur gear 69. Spur gear 69 is secured to and drives one ele- 25 ment of a clutch 70 which may be of any well known type, the other element of which is secured to and drives a shaft 71. Shaft 71 is supported from the channels 63 by means of the journals 72. Secured to and driven by 30 the shaft 71 is a pinion 73 which meshes with and drives the spur gear 12. It will be understood that any well known belt or reversing gear drive may be provided for the shaft 10 and the drive arrangement is not 35 limited to that shown in the drawings.

When the cooker is utilized for handling dead animal and condemned carcasses where the carcasses are simply dismembered and very large pieces are fed into the cooker, it 40 is found that even with the arrangement of the charging openings 23 and 25 as disclosed, there is a tendency for breakages of the adjacent central agitator arms 15 to occur. When a cooker is applied to such use, 45 very large pieces, such for example as animal heads, quarters and the like are loaded into the cooker, it has been found that the provision of a strengthening and splitting member on the central paddle is desirable. An 50 effective device for this purpose is shown in detail in Figures 8, 9 and 10 of the drawings and is shown bolted into position in Figures 1 and 2. This device comprises a triangular shaped cleaving section 74 of sufficient width 55 to extend across the faces 20 of the two adjacent paddles or arms 15. The cleaving section 74 is provided with a securing extension 75 suitably recessed at 76 to fit over the ribs 21 of the central agitator arms 15. The 60 splitting device is provided with the bolt holes 77 through which the securing bolts 78 are passed and by means of which the splitting device is secured to the two central adjacent agitator arms 15 with the sharp cleaving edge 79 thereof disposed midway be-

tween the central arms. This splitting device provides a strengthening member, which as the simple agitator arm rotates and comes into contact with large pieces will tend to split the large pieces saving the central arm 70 from injury.

In the form of invention so far described, the vapor outlet 30 is shown in the top dome section 29. In practice floor conditions are frequently such that there is no room for the 75 vapor connections in the top dome section. When the vapor connection is placed in the lower dome section 26, there is a tendency for materials which are being cooked or rendered to pass through the outlet connection into 80 the vapor outlet pipe with the vapors or steam being withdrawn. In order to avoid passage of material into the vapor line, when connection 30 is made in the lower dome section 26, a special casting 80 (see Figure 11) 85 is provided which is secured to the interior of the dome section 26 with the opening 81 thereof in alignment with the vapor outlet 30. Formed in casting 80 is an enclosed pas- 90 sage 82 for the vapors open at its upper end. A baffle projection 83 formed integrally with casting 80 projects over passage 82 and forms an opening 84 for the vapors and steam to pass from the interior of the dome 95 26 downward through the passage 82 and through the opening 81, out of the vapor outlet 30. By this arrangement the vapors are withdrawn from the dome section 26, and clogging of the vapor or vacuum line with materials, even though foaming may occur 100 during the cooking operation, is prevented.

For the most effective operation of my improved apparatus, it is desirable to take samples of the material, both during the pressure, and vacuum stages of rendering 105 operations. To permit the removal of samples in the vacuum stage without the necessity for breaking the vacuum, a special sampling arrangement has been provided as shown in Figures 12 and 13. In this ar- 110 rangement, a sampling pipe connection 85 is substituted for the sampling connection 44 in the head 4, and is connected at its outer end to the valve 86. Valve 86 is coupled by a pipe connection 87 to a cross 88 which 115 is provided with plugs 89 fitting two of its outlets, and the remaining outlet thereof is connected by means of the pipe 90 to a cross 91. A suitable plug 92 is provided in the lower outlet of the cross 91. A pipe 93 120 is connected at one end to the third outlet of cross 91 and the remaining outlet is open to atmosphere. At its inner end the pipe section 93 is connected to a valve 94 which in turn is connected to the interior of the 125 cooker cylinder 1 at a point preferably about a foot below the connection 85 by means of a pipe 95. A sampling paddle 96 which may be of wood is provided with a flat face which may be held against the open outlet of the 130

cross 91. In operation of the sampling device, the valves 86 and 94 are normally closed. When it is desired to secure a sample while the materials in the cooker are under pressure, either valve 86 or 94, or both, may be opened, and the pressure in the cooker will force a suitable sample outward and the valve or valves may then be closed. When it is desired to secure a sample while the materials in the cooker under a vacuum, the operator holds the flat face of paddle 96 against the open outlet of cross 91 and then opens the valve 86. The air in the sampling connection will be exhausted and a vacuum will be induced in the sampling connections which will cause the paddle 96 to be held against the opening in the cross 91, by atmospheric pressure on the outside thereof. The withdrawal of air from the sampling pipe connections clears the connections. Valve 94 is then opened and it will be found that a sample of the material will enter the sampling connection. The valves 86 and 94 may then be closed, and the paddle 96 removed from the connection, leaving the sample in the sampling connection.

In operation of the cooker, motor 66 is started driving shaft 10, charging dome cover 33 is opened, and the material to be cooked is dropped through the dome sections 29 and 26 into the cooker. Paddles 15 are rotated in the direction of the arrow in Figure 3, at a speed which will lift the materials in the cooker and permit them to tumble downward through the cooker, the preferable speed of rotation of the shaft 10 is from 10 to 25 revolutions a minute at which speeds an effective tumbling action is maintained within the cooker. When handling cookers with high fat content, the cooker is preferably loaded cold in order to prevent overloading thereof by inexperienced operators who fail to make allowance for the melting of the fats which immediately commences when the jacket steam pressures are applied while loading is being effected. Materials entering into the cooker may be in pieces of any size that will enter through the man-hole and due to the arrangement of the central paddles the pieces will pass downward to the bottom of the cooker. The arrangement of the paddle arms in three rows spaced relatively at 120 degrees permits pieces of material that drop downward to the bottom of the cooker to spread sideways through the cooker without interference. Furthermore the angular spacing of the arms at 120 degrees permits the material to tumble effectively, giving a continual agitation and mixing the materials, which aid in the rapid disintegration and effective disintegration of the materials. The cooker may be loaded with materials when rendering fats until the mass rotates as a unit with the agitator shaft. When filled to this ex-

tent the material in initial stages will rub against the interior surfaces of the cooker and will wipe the surface clean so that formation of a heat insulating coating is prevented and a sanitary condition is maintained in the cooker. After the cooker is filled to a proper degree with the charge, the dome cover 33 is clamped in position and steam pressures as high as 100 or more pounds per square inch may be admitted into the heating jacket through suitable inlet and outlet pipes (not shown) causing pressures as high as 60 pounds per square inch or more to be developed within the body of the cooker depending upon the moisture present in the materials being heated. The excess vapors and steam developed are withdrawn through the opening 30. At the end of the pressure cooking stage, the pressure may be lowered in the interior of the cooker, preferably by exhausting the vapors through the opening 30 and drawing a vacuum which may run as high as 27 inches or more until the cooking operation is complete. When the vacuum cooking operation is completed the vacuum may be broken by permitting air to enter through the cock 44 or by cracking the dome cover 33 slightly, or both, the free hot fats may be drained by opening the drain cock 61 and the discharge door 46 may then be opened. The direction of rotation of the agitator shaft 10 is then reversed and the inclined surfaces 22 of the agitator arms force the material end-wise along the cooker and out of the discharge opening 45.

In operation of my improved apparatus, close regulation and control of the steam pressures in the interior of the cooker should be maintained, and steam should be continuously withdrawn from the cooker during the pressure cooking or disintegrating stage in order that the moisture content of the materials may be reduced as disintegration proceeds while in the final cooking and dehydration stage vapors and steam evolved from the materials should be withdrawn rapidly at atmospheric or subatmospheric pressures. Accordingly, a large vapor exhaust pipe 97 (Figure 2) is connected to the vapor outlet 30 and connected in pipe 97 is a valve 98. A by-pass connection 99 of reduced sectional area provided with the control valve 100 is connected around the valve 98. Pipe 97 may be as large as eight inches or more in diameter, while the by-pass connection 99 is preferably not more than two inches in diameter in practice. During the pressure stage the valve 98 is closed and the by-pass 100 is regulated to permit by-passing of steam around the valve 98 at a rate which will maintain the desired pressure in the cooker and at the same time will remove as much excess moisture as is permissible. At the end of the pressure and disintegrating stage, valve 98 is opened and the remaining

moisture is removed to the desired degree to the large vapor outlet pipe 97 at atmospheric or sub-atmospheric pressures as the case may be. By the vapor outlet arrangement and by-pass arrangement disclosed, close control and regulation of the pressures in the cooker and the removal of moisture from the materials contained therein may be effected.

10 It will accordingly be seen that an improved cooker especially adapted for both very high pressure and high vacuum cooking operations has been provided which may be easily handled and is of rugged and durable construction. It will also be understood that details of construction may be modified widely by those skilled in the art, without departing from the spirit of the invention and accordingly, what is desired to be secured by Letters Patent and claimed as new is:

1. A pressure cooker comprising a drum including two open ended cylinders forming a jacket between them and having reinforced heads covering the ends of the jacket and cylinders, brackets integral with said heads extending in opposite directions endwise of the drum, horizontal shelves supported by said brackets and substantially spaced from said heads, a shaft extending longitudinally through said drum and journaled in bearings supported on said shelves, agitators secured to said shaft, stuffing boxes separate from the heads having portions projecting substantially through openings in said heads and adapted to provide packed pressure tight joints between said shaft and each of said heads, said openings being appreciably larger in diameter than the portions of the stuffing boxes projecting thereinto, means to rotate said shaft, means to supply steam to said jacket, and means to lead away vapors from said drum.

2. A cooker comprising a cylindrical jacketed drum having heads with plane inner surfaces substantially at right angles to the side walls of the drum, a shaft extending through said heads, a plurality of unitary reinforced agitator arms secured to said shaft and extending substantially to the inner surface of said drum, said agitator arms being arranged laterally in close proximity to each other from one head to the other, adjacent arms on said shaft radiating in substantially different directions from the axis of said shaft, and the end agitators being provided with straight side surfaces designed to sweep in close proximity to substantially the entire inner surfaces of said heads.

3. The combination in claim 2 in which the shaft is hexagonal in cross section, having agitator arms so arranged thereon that adjacent arms are spaced angularly 120° along the shaft.

4. A cooker comprising a jacketed drum having heads with plane inner surfaces substantially at right angles to the side walls of the drum, a shaft extending through said heads, agitators on said shafts, the agitators adjacent said heads being arranged in close proximity thereto and being provided with straight side surfaces sweeping over substantially the entire surface of said heads, the intermediate agitators between the end agitators being arranged in close proximity laterally but spaced angularly 120°, the ends of said intermediate agitators being widened and extending closely to the inner surface of the drum so that adjacent intermediate agitators move in overlapping paths over the inner surface of said drum.

5. The combination defined in claim 2 including cams on the side surfaces of the agitators, said cams being so designed that when the shaft is rotating in a direction opposite to its normal direction of rotation, for agitating the contents of the drum the said contents are moved endwise thereof by said agitators.

6. A cooker comprising a horizontally arranged jacketed drum, a charging dome extending vertically of said drum and secured to said drum over an opening therein that is substantially wider in the drum than in the drum jacket, a shaft extending endwise of said drum, reinforced agitator arms secured laterally in close proximity to each other on said shaft, said arms beneath said opening being of a width substantially less than the width of said opening and extending substantially to the inner surface of said drum, and means to rotate said shaft.

7. A cooker comprising a horizontally arranged jacketed drum, a charging opening in said drum arranged to permit the material to be fed vertically into said drum, a shaft extending axially through said drum, agitator arms secured to said shaft, and arranged to sweep over the interior surface of said drum, means having cutting edges carried by said shaft and arranged to sweep across said opening in a direction crossing the normal direction of feed of said material into the drum, whereby large portions of material fed through said opening are split by said last named means, and means to rotate said shaft.

8. A cooker comprising a horizontally arranged jacketed cylindrical drum, a charging opening in said drum and arranged to permit the material to be fed vertically to said drum, a charging dome over said opening, a shaft extending axially of said drum, agitator arms secured in close proximity to each other laterally along said shaft, said adjacent arms being out of alignment with each other and arranged to sweep over substantially the entire interior surface of said drum and across said opening, a plurality

of the adjacent arms beneath said opening being arranged in mutual alignment to provide a substantially uninterrupted feeding space beneath said opening throughout the major portion of each revolution of said shaft, and means to rotate said shaft.

9. A cooker comprising a horizontally arranged jacketed drum, a charging opening in said drum and arranged to permit the material to be fed vertically to said drum, a charging dome over said opening, a shaft arranged axially of said drum, agitator arms arranged laterally in close proximity to each other on said shaft and designed to sweep over substantially the entire inner surface of said drum and across said opening, certain adjacent arms that sweep across said opening being collectively provided with means to split large portions of material fed through said opening, and means to rotate said shaft.

10. A cooker comprising a horizontally arranged jacketed drum, a shaft extending endwise of said drum, agitator arms provided with means to sweep over substantially the entire inner surface of said drum including the ends, said arms being secured laterally in close proximity to each other on said shaft, adjacent arms being out of longitudinal alignment, a discharge door in one of said ends the inner surface thereof being flush with the inner surface of the end whereby the end arm will sweep over the inner surface of the door, and means on said arms to move the contents of the cooker endwise thereof and through said door when the rotation of the shaft is in a direction opposite to its normal direction for agitating the contents of the drum.

11. A cooker capable of operating under conditions of partial vacuum comprising a horizontally arranged jacketed drum, a shaft carrying blades to agitate the material during normal rotation of the shaft and including means on said blades to move the material toward one end of said drum upon reversal of the shaft, said blades being designed to sweep the entire inner surface of the drum, reversible means to rotate said

shaft, a charging dome arranged to guide the material vertically to the cooker, a discharge door in said end of the drum flush with the inner surface of said end, a door for said dome, means to seal the edges of said doors and means to lead away vapors from the drum, including a primary exhaust line controlled by a valve and a valve controlled by-pass of restricted capacity in said exhaust line around said first mentioned valve.

12. A cooker comprising a horizontally arranged drum, a shaft extending axially of said drum, reinforced unitary agitator arms secured to said shaft and radiating from the axis thereof, adjacent arms being arranged laterally in close proximity to each other but radiating in substantially different directions from said shaft, said arms extending substantially to the inner surface of the drum and being provided with substantially flat front faces arranged to agitate the material upon normal rotation of said shaft and having inclined rear faces designed to move the material endwise of the drum during reverse rotation of said shaft, and reversible means to rotate said shaft.

13. A cooker adapted to operate under conditions of partial vacuum comprising a jacketed drum, agitators in said drum, means to actuate said agitators, a charging dome on said drum having a charging opening therein and pressure sealing means therefor, a discharging opening in said drum and pressure sealing means therefor, means to supply steam to the drum jacket, a suction line opening into said dome to control the pressure in said drum, said suction line including a control valve and a valve controlled by-pass line around said valve, said by-pass line being of substantially smaller capacity than said suction line, and baffle means arranged in said dome adjacent the suction line inlet to minimize the withdrawal of the liquid contents of said cooker by said suction line.

In testimony whereof I affix my signature.

WILLIAM LAABS.