Dec. 5, 1961 J. R. BROWNELL 3,011,327

APPARATUS FOR SETTING TEXTILE FIBERS

Filed May 22, 1961 4 Sheets-Sheet 1

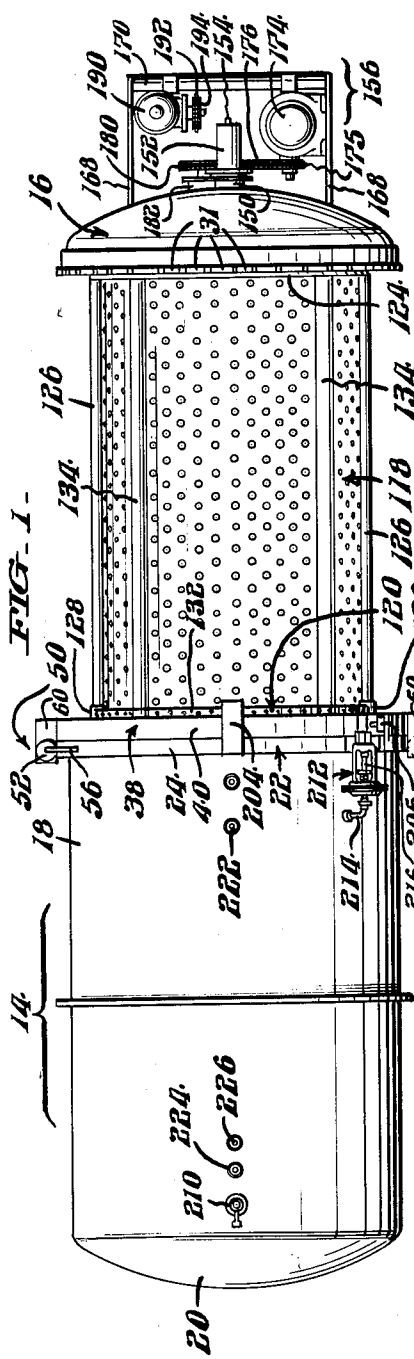


FIG. 1.

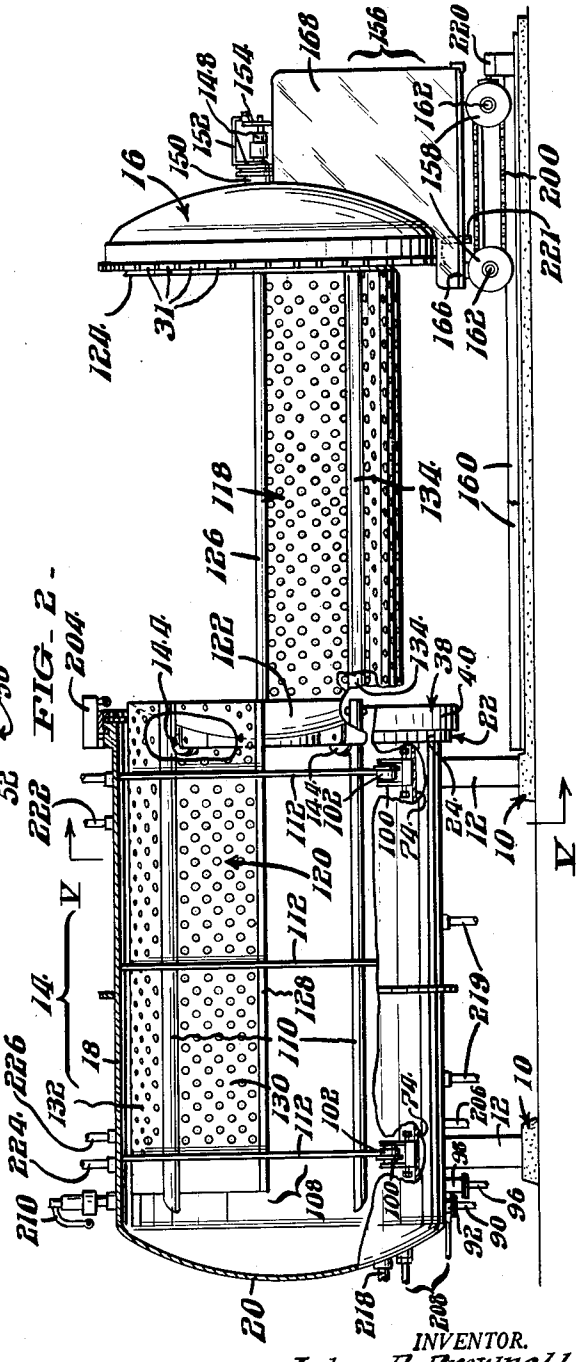


FIG. 2.

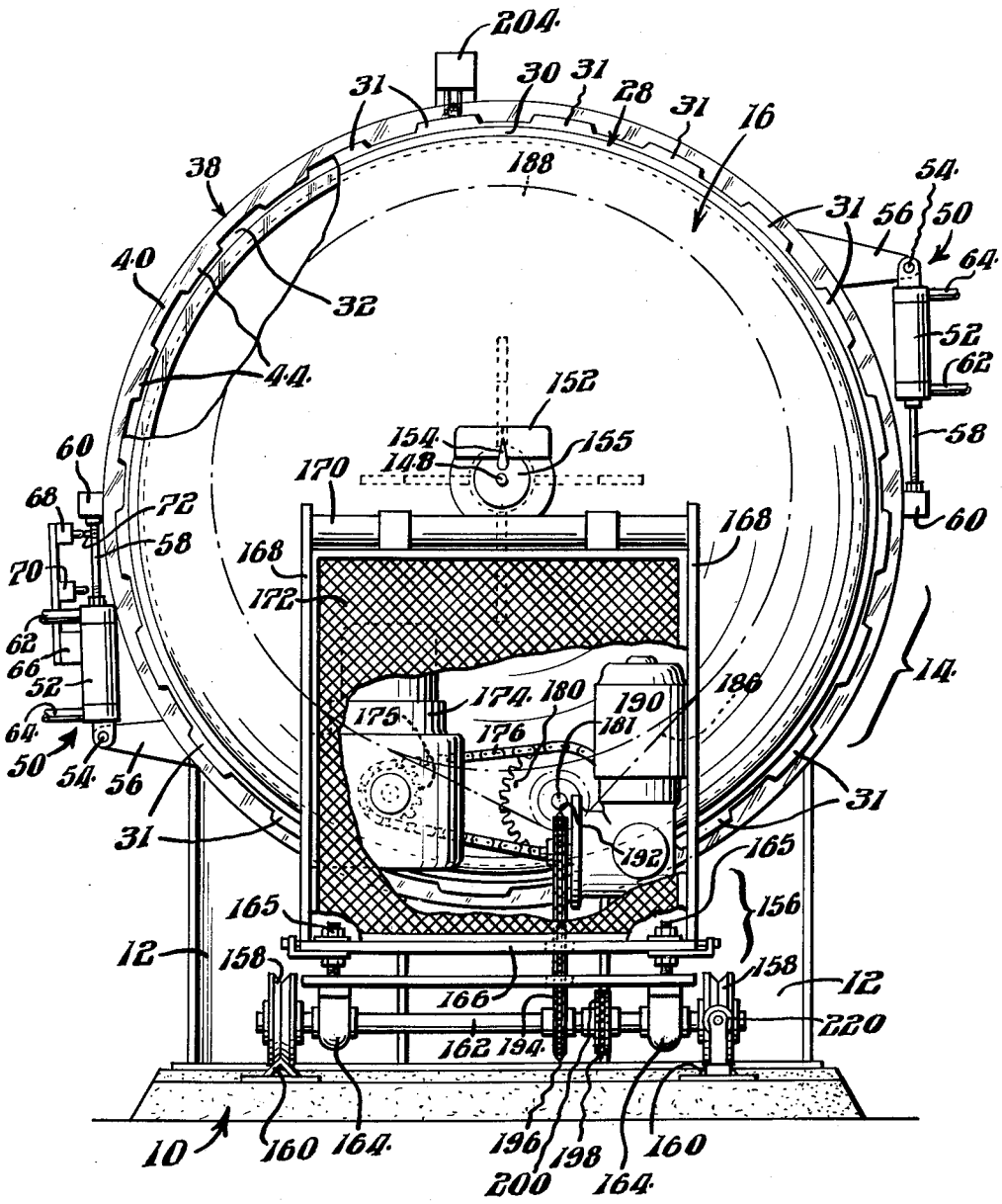
INVENTOR.
John R. Brownell,
BY
Paul & Paul
ATTORNEYS.

Dec. 5, 1961 J. R. BROWNELL 3,011,327

APPARATUS FOR SETTING TEXTILE FIBERS

Filed May 22, 1961 4 Sheets-Sheet 2

FIG. 3



INVENTOR.
John R. Brownell,
BY
Paul & Paul
ATTORNEYS.

Dec. 5, 1961 J. R. BROWNELL 3,011,327

APPARATUS FOR SETTING TEXTILE FIBERS

Filed May 22, 1961 4 Sheets-Sheet 3

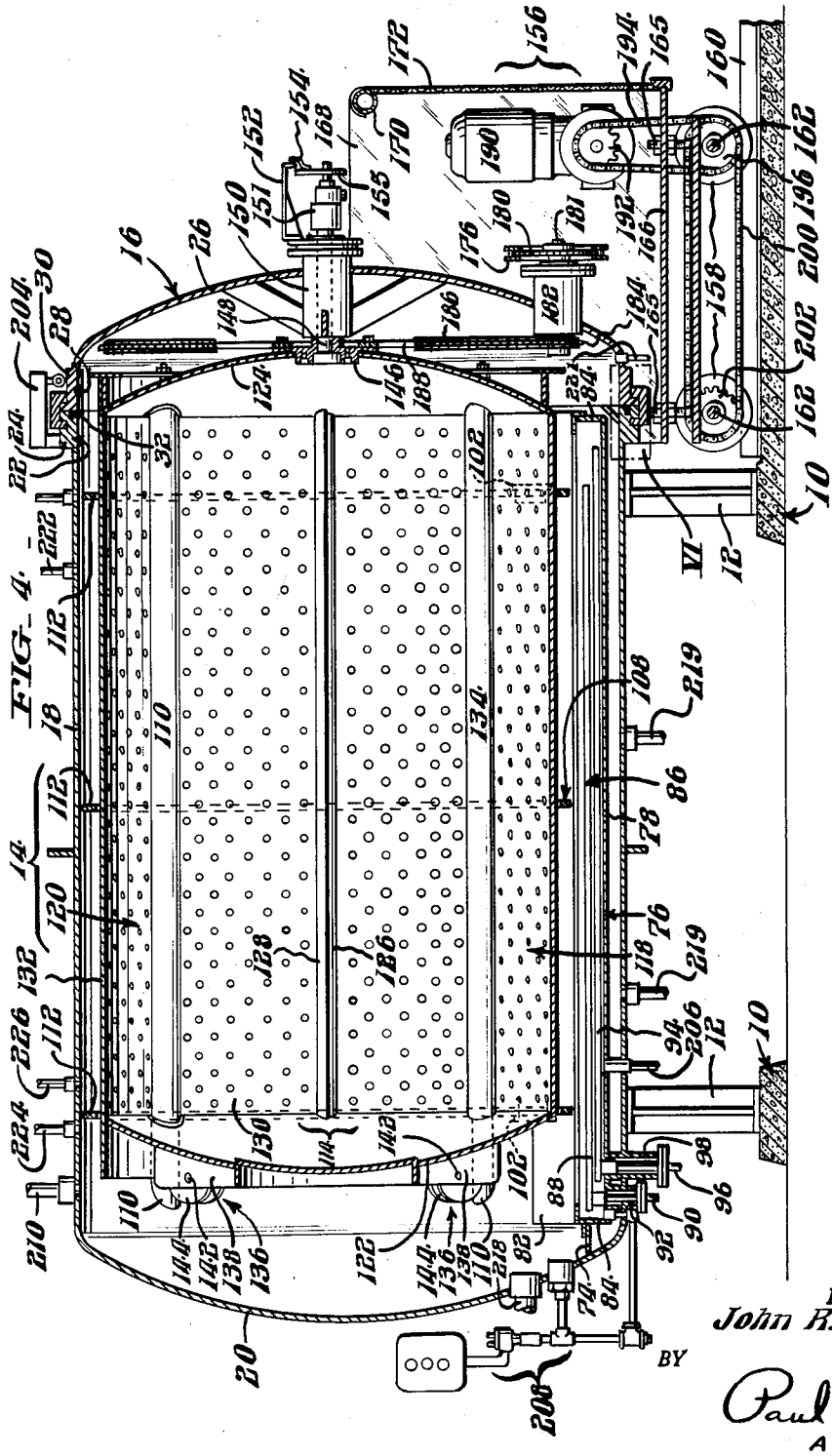


FIG. 4.

INVENTOR.
John R. Brownell,

BY

Paul & Paul
ATTORNEYS.

Dec. 5, 1961 J. R. BROWNELL 3,011,327

APPARATUS FOR SETTING TEXTILE FIBERS

Filed May 22, 1961 4 Sheets-Sheet 4

FIG. 5

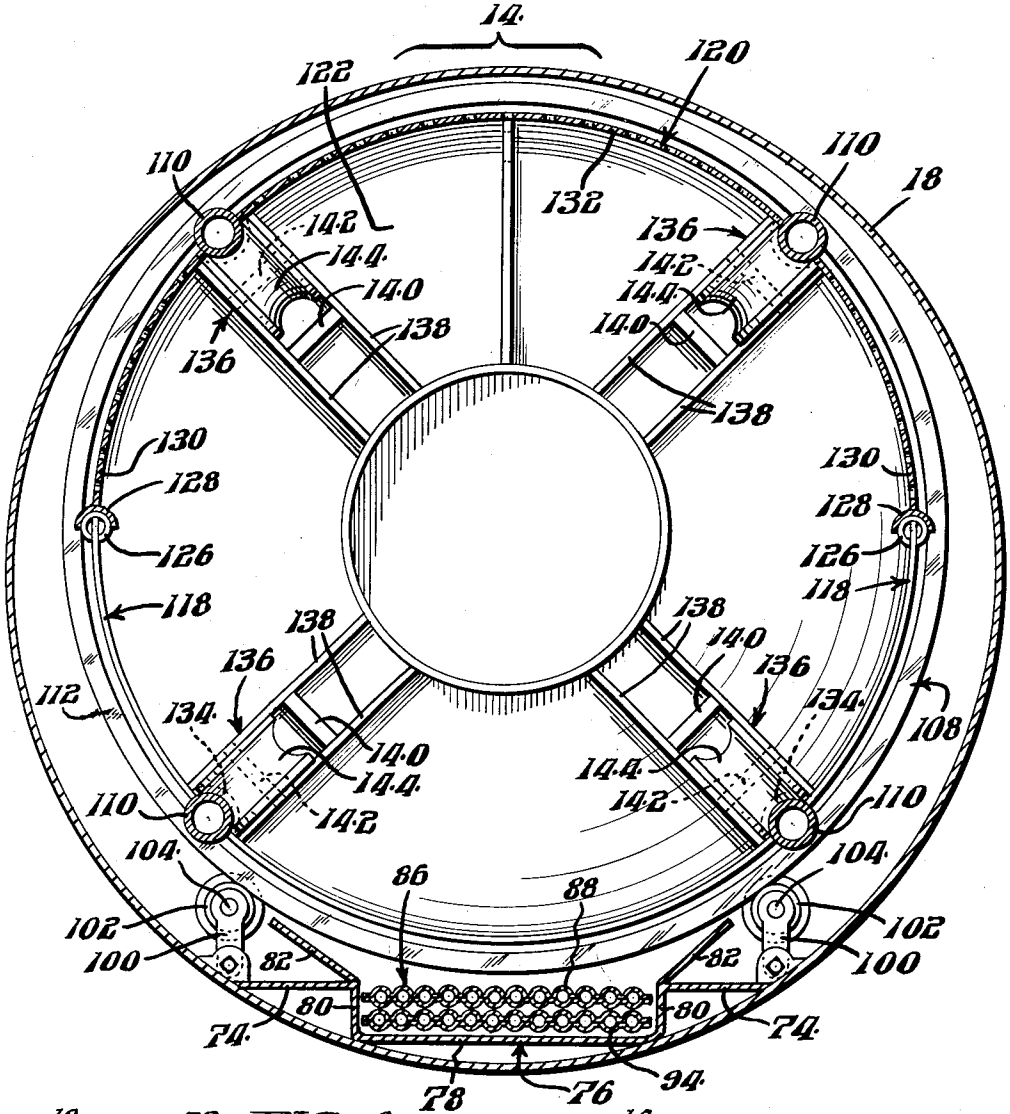
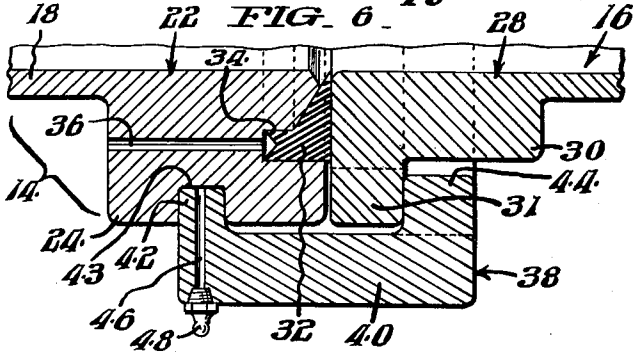


FIG. 6



INVENTOR.
John R. Brownell,
BY
Paul & Paul
ATTORNEYS.

United States Patent Office 3,011,327 Patented Dec. 5, 1961

3,011,327

APPARATUS FOR SETTING TEXTILE FIBERS

John R. Brownell, Telford, Pa., assignor to Turbo Machine Company, Lansdale, Pa., a corporation of Pennsylvania

Filed May 22, 1961, Ser. No. 111,711
10 Claims. (Cl. 68—5)

This application relates generally to apparatus for treating textile materials and particularly to apparatus primarily for treating loose textile materials in bulk, such, for example, as pre-crimped nylon staple, with steam or other hot gaseous treating medium under pressure to permanently set the crimps.

An object of the invention is to provide improved apparatus in the nature of an autoclave capable of being loaded and unloaded with extreme facility.

Another object is to provide such an autoclave with a revolvable receptacle for containing the work which receptacle is automatically opened for being loaded and unloaded when the door of the autoclave is opened and automatically closed when the door of the autoclave is closed.

Another object is to provide an autoclave with a door and such a receptacle movable rectilinearly as a unit between fully open and fully closed positions.

Other objects of the invention will become apparent when the following description is read with reference to the accompanying drawings in which:

FIG. 1 is a plan view of apparatus constructed in accordance with the invention, the apparatus being shown in the condition thereof when being loaded or unloaded;

FIG. 2 is a side elevation of the apparatus shown in FIG. 1, part being broken away to expose the interior;

FIG. 3 is an enlarged front elevation of the apparatus, the apparatus being shown closed but not locked;

FIG. 4 is an enlarged vertical longitudinal section through the apparatus, the apparatus being shown closed and locked;

FIG. 5 is an enlarged section on line V—V of FIG. 2; and

FIG. 6 is an enlargement of the area designated VI in FIG. 4.

The apparatus constructed in accordance with the invention comprises a concrete foundation, generally designated **10**, upon which are two upright supports **12** carrying an horizontally extending vessel, generally designated **14**, having a door, generally designated **16**.

The vessel **14** is provided with a cylindrical main body **18** at one end of which is a dished end wall **20**. About the opposite end of the body **18** is a collar **22** which is provided with a radially outwardly extending flange **24**. The door **16** is provided with a dished main body **26** about the rim of which extends a collar generally designated **28**. This collar is provided with a radially outwardly extending flange **30** bearing circumferentially equally spaced lugs **31**. Interposed between the flanges **24** and **30** is a gasket **32** nested in a groove **34** formed in the flange **24**. Pressure may be supplied to the groove **34** through an air line (not shown) communicating with an opening **36** in the flange **24**.

Extending about the flanges **24** and **30** in a lock ring, generally designated **38**. The lock ring is provided with a cylindrical main body portion **40** at one end of which is a radially inwardly extending flange **42** nested in a groove **43** in the flange **24**. The opposite end of the body **40** is provided with circumferentially equally spaced radially inwardly extending lugs **44**. The ring **38** is bored as at **46**, and fitted into the bore is a grease fitting **48**.

On each side of the vessel is a pneumatic motor, generally designated **50**, having a cylinder **52** pivoted at

54 on a bracket **56**, which is affixed to the body **18** of the vessel **14**. Working in the cylinder **52** is a piston having a rod **58**. The free end of the rod **58** is attached to a bracket **60** affixed to the locking ring **38**. Air is supplied to the cylinder **52** through lines **62** and **64**. Mounted upon one of the cylinders **52** is a bracket **66**, which carries a pair of limit switches **68** and **70** operated by an element **72** carried by the associated piston rod **58**.

Extending horizontally across the bottom of the vessel **14** is a plate **74** into which is set a pan generally designated **76**. The pan has a bottom **78** and opposite side walls each including an upright area **80** and a sloping skirt **82**. At each end of the pan is an upright end wall **84**. The pan contains heat exchange means, generally designated **86**, which means includes a plate coil **88** connected to a line **90** which extends through a sleeve **92** and a plate coil **94** connected to a line **96**, extending through a sleeve **98**.

Mounted upon the plate **74** are four roller assemblies, each comprising a bracket **100** mounting a flanged roller **102** upon a pin **104**.

Revolvably mounted upon the rollers **102** is a rigid frame, generally designated **108**, including four longitudinally extending tubular runner members **110** circumferentially equally spaced about the inner periphery of three ring members **112**.

Within the frame **108** is a receptacle, generally designated **114**, having an horizontally extending perforated cylindrical body including a lower half section **118** and an upper half section **120**. At the rear of the cylindrical body is a dished end wall **122**, and at the front end of the cylindrical body is a dished end wall **124** both affixed to the lower half section **118** of the cylindrical body.

Affixed to each longitudinally extending edge of the lower half section **118** is a split tubular member forming a bead **126**, and overlying each bead **126** is a flange **128** affixed to the longitudinally extending edge of the upper half section **120** and to the ring members **112**, the flange **128** being semi-circular in transverse section. The upper half section **120** or cover is provided with opposite side longitudinally extending sections **130** and an intermediate section **132** secured to the two upper ones of the runner members **110**. The lower half section **118** is crimped as at **134** to fit over the two lower ones of the runner members **110**.

Mounted upon the end wall **122** of the receptacle **114** are four radially extending brackets, generally designated **136**, each of which includes a pair of laterally spaced plates **138**, a spacer **140**, and a pin **142** having opposite end portions journalled respectively in the plates **138** and mounting a grooved roller **144**.

Mounted upon the end wall **124** of the receptacle **114** is a fitting **146** to which is affixed one end of a shaft **148**. The opposite end of the shaft **148** extends through a sleeve journal **150** mounted upon the door **16**. The shaft extends forwardly beyond the door **16**, and on the outside of the door the journal **150** is provided with a gland **151**. Mounted upon the journal **150** is an index bracket **152**, and coacting with the index bracket **152** is a pointer **154** affixed to a cam **155** mounted upon the shaft **148**. The cam **155** controls a microswitch (not shown) mounted upon the bracket **152** for a purpose to appear.

Underlying the door **16** is a carriage, generally designated **156**, provided with four grooved wheels **158** movable over a pair of rails **160** of inverted V-shape in transverse section. Wheels **158** are mounted upon axles **162** journalled in bearings **164** secured by adjusting studs **165** to a frame including an horizontally extending plate **166**. The frame also includes upright opposite side plates **168** secured together at the upper fore extremities there-

of by an horizontally extending tubular tie member 170. Underlying the tubular member 170 is a guard screen 172.

Mounted upon one of the side plates 168 is an electric motor and change speed unit 174, the output shaft of which mounts a sprocket 175 over which a chain 176 is trained, which is also trained over a sprocket 180 carried by a shaft 181 journalled in a sleeve bearing 182 carried by the door 16. The opposite end of the shaft 181 mounts a chain sprocket 184, and trained over the chain sprocket 184 is a chain 186, which is also trained over a sprocket 188 affixed to the fitting 146.

Mounted upon the other plate 168 is a reversible motor and change speed unit 190, the output shaft of which mounts a sprocket 192. Trained over the sprocket 192 is a chain 194, which is also trained over a sprocket 196. The latter sprocket is mounted upon the fore axle 162, which also mounts a sprocket 198. Trained over the sprocket 198 is a chain 200, which is also trained over a sprocket 202 mounted upon the rear axle 162.

Referring particularly to FIGS. 1 and 2 the apparatus is shown open, in its condition for receiving the load of textile materials to be treated. The materials are lowered into the lower half section 118 of the receptacle 114 between the opposite end walls 122 and 124 thereof. Then the apparatus is closed.

This is effected by energizing the motor 190. Chain drives 194 and 200 drive axles 162 and wheels 158 in a direction to move the carriage 156 rearwardly toward the vessel 14.

The door 16 and the fore end of the lower half section 118 of the receptacle 114 are carried by the carriage. The rear end of the lower half section 118 of the receptacle 114 is carried by the rollers 144 bearing on the two lower ones of the runner members 110. Movement of the lower half section 118 of the receptacle 114 is rectilinear, all four rollers 144 working respectively on runner members 110 and all four wheels 158 of carriage 156 working on the rails 160 to guide the section 118 during this rectilinear movement. The beads 126 shift rearwardly and slide into and under the flanges 128 while the crimped areas 134 slide rearwardly over the underlying runners 110.

As the door approaches its closed position the several lugs 31 of door collar 28 pass between the several lugs 44 of locking ring 38, and a limit switch 204 is operated, whereupon the electric circuit supplying power to the motor 190 is opened and movement of the carriage is terminated.

Now the door is locked by supplying pressure through lines 62 to the cylinders 52 of the pneumatic motors 50, whereupon piston rods 58 are retracted. Locking ring 38 is turned counterclockwise (as viewed in FIG. 3) to position each lug 44 on the locking ring 38 alongside a lug 31 on the door collar 28. Air pressure is relieved when the limit switch 70 is operated by the element 72. Thus the gasket 32 is compressed and the door sealed tight. Air pressure may be introduced through a line (not shown) and through an opening 36 to the gasket groove 34 to aid in sealing the door tight. Movement of the locking ring may be facilitated by injecting grease into the locking ring groove 43 through an opening 46 and a grease fitting 48. When the door is locked, a limit switch 205 is operated, which signals the fact to the electric system.

The pan 76 is supplied with water through line 206 and is kept full of water sufficient for covering plate coils 88 and 94. The water level is controlled automatically by means indicated at 208. Steam is supplied to the plate coils 88 and 94 through lines 90 and 96. Water boils off and charges the interior of the vessel with steam for treating the textile materials in the receptacles 114. A safety valve is provided at 210.

The apparatus is provided with an automatic safety door lock, generally designated 212, which is supplied with pressure through a line 214. When pressure in the vessel 14 is built up to a predetermined point, a diaphragm is moved which actuates a rod 216. The rod shifts axially and projects forwardly, operatively between the lugs 31 of the collar 28 and the lugs 44 of the locking ring 38 so that the locking ring cannot turn. When the pressure in the vessel 14 drops, the rod 216 is retracted and the locking ring may be turned to unlock the door.

The motor 174 is now energized and operates through the chain drives 176 and 186 to actuate the shaft 148, whereupon the receptacle 114 and the frame 108 rotate as a unit, frame 108 being cradled for rotation on the set of rollers 102.

From the top of the vessel 14 extend a temperature capillary tube 222 and a steam pressure line 224 to a control panel (not shown). A steam pressure line 226 extends to a warning light on the control panel.

After a predetermined treatment time, the electric circuit supplying power to the motor 174 is opened, whereupon receptacle 114 and the frame 108 stop rotating. The circuit will not open, however, until the cam 155 operates the microswitch mounted upon the bracket 152, at which time the lower half section 118 is lowermost. The indicator 154 tells what the position of the receptacle is. Steam may be exhausted from the vessel through line 218, and condensate may be drained from the vessel through lines 219 and 221. As indicated hereinabove, the safety lock operates when the pressure in the vessel drops.

Now the door is unlocked by supplying pressure through lines 64, instead of lines 62, to cylinders 52 of pneumatic motors 50. The piston rods 58 are extended, whereupon the locking ring 38 is turned clockwise to its initial position wherein the lugs respectively on the collar 28 and the locking ring 38 are disposed in staggered relation. The air pressure is relieved when the limit switch 68 is operated by the element 72. When the locking ring is in its unlocked position the limit switch 205 is operated and signals the electrical system that such is the fact.

The motor 190 is now re-energized and it operates in reverse direction to move the carriage 156 forwardly away from vessel 14. The rear of the carriage is carried by the lower rollers 144 working on the lower runners 110 and, as in the closing movement described hereinbefore, the opening movement of the receptacle is rectilinear. The beads 126 slide outwardly from under the flanges 128 and the crimped areas 134 slide outwardly over the underlying runners 110. As the carriage approaches the end of its outward movement, a limit switch 220 is operated by the carriage, whereupon the electric circuit supplying power to the motor 190 is opened and the movement of the carriage is terminated. The treated material in the receptacle 114 may now be unloaded and other material to be treated may be loaded into the receptacle.

An exemplary method of treating material in the apparatus is as follows: Vacuum may be applied through the line 218 to evacuate the vessel and to drop the internal pressure to sub-atmospheric. Then the vessel may be charged with steam and the pressure raised to superatmospheric. The steam is generated in the vessel itself, being boiled off from the water in the pan at the bottom of the vessel. Then the vessel may be exhausted. The foregoing treatments may now be repeated as often as desired, then the vessel may be vented to atmosphere prior to opening the door for unloading the work.

It will be understood, of course, that the invention is susceptible of various changes and modifications which may be made without departing from the real spirit or general principles thereof, and it is accordingly intended to claim the same broadly, as well as specifically, as indicated in the appended claims.

Having thus described my invention, I claim as follows:

1. In textile treating apparatus, means providing a closed chamber having a fluid tight door hermetically sealing said chamber from atmosphere, a receptacle in

said chamber including a cover over an opening in said receptacle through which said receptacle may be loaded with work and unloaded, means mounting said receptacle for rotation, means for rotating said receptacle, means for charging said chamber with and exhausting therefrom a heated vaporous work treating medium under superatmospheric pressure, means mounting said receptacle for shifting horizontally from beneath said cover to a loading and unloading position without said chamber, and means for opening said door and shifting said receptacle through the door opening to said loading and unloading position.

2. In textile treating apparatus, means providing a closed chamber having a fluid tight door hermetically sealing said chamber from atmosphere, a receptacle in said chamber including a generally horizontally disposed cylindrical body, upright opposite end walls, and a cover over an opening in said receptacle through which said receptacle may be loaded with work and unloaded, said cover being a section of said cylindrical body, means mounting said receptacle for rotation about its longitudinal axis, means for rotating said receptacle, means for charging said chamber with and exhausting therefrom a heated vaporous work treating medium under superatmospheric pressure, means mounting said receptacle for axially shifting horizontally from beneath said cover to a loading and unloading position without said chamber, and means for opening said door and shifting said receptacle through the door opening to said loading and unloading position.

3. In textile treating apparatus, means providing a closed chamber having a fluid tight door hermetically sealing said chamber from atmosphere, a receptacle in said chamber including a generally horizontally disposed cylindrical body, upright opposite end walls, and a cover over an opening in said receptacle through which said receptacle may be loaded with work and unloaded, said cover being a section of said cylindrical body, means mounting said receptacle for rotation about its longitudinal axis including anti-friction means under said receptacle, and a frame embracing and carrying said receptacle and revolvably mounted upon said anti-friction means, means for rotating said receptacle and frame as a unit on said anti-friction means, means for charging said chamber with and exhausting therefrom a heated vaporous work treating medium under superatmospheric pressure, means mounting said receptacle for axially shifting horizontally from beneath said cover to a loading and unloading position without said chamber, and means for opening said door and shifting said receptacle through the door opening to said loading and unloading position.

4. In textile treating apparatus, means providing a closed chamber having a fluid tight door hermetically sealing said chamber from atmosphere, a receptacle in said chamber including a generally horizontally disposed cylindrical body, upright opposite end walls, and a cover over an opening in said receptacle through which said receptacle may be loaded with work and unloaded, said cover being a section of said cylindrical body, means mounting said receptacle for rotation about its longitudinal axis including anti-friction means under said receptacle, and a frame including axially spaced ring members embracing and carrying said receptacle and revolvably mounted upon said anti-friction means, said cover being fixed relative to said frame, means for rotating said receptacle and frame as a unit on said anti-friction means, means for charging said chamber with and exhausting therefrom a heated vaporous work treating medium under superatmospheric pressure, means mounting said receptacle for axially shifting horizontally from beneath said cover to a loading and unloading position without said chamber, and means for opening said door and shifting said receptacle through the door opening to said loading and unloading position.

5. In textile treating apparatus, means providing a closed chamber having a fluid tight door hermetically sealing said chamber from atmosphere, a receptacle in said chamber including a generally horizontally disposed cylindrical body, upright opposite end walls, and a cover over an opening in said receptacle through which said receptacle may be loaded with work and unloaded, said cover being a section of said cylindrical body, means mounting said receptacle for rotation about its longitudinal axis including anti-friction means under said receptacle, and a frame including axially spaced ring members embracing and carrying said receptacle and revolvably mounted upon said anti-friction means, said cover being fixed relative to said frame, means for rotating said receptacle and frame as a unit on said anti-friction means, means for charging said chamber with and exhausting therefrom a heated vaporous work treating medium under superatmospheric pressure, means mounting said receptacle for axially shifting horizontally from beneath said cover to a loading and unloading position without said chamber including a plurality of runner members circumferentially spaced about said ring members and extending longitudinally of said receptacle, and rollers carried by said receptacle respectively engaged with said runner members, and means for opening said door and shifting said receptacle through the door opening to said loading and unloading position, said rollers moving over said runner members thereby to carry the trailing end of said receptacle.

6. In textile treating apparatus, means providing a closed chamber having a fluid tight door hermetically sealing said chamber from atmosphere, a receptacle in said chamber including a generally horizontally disposed cylindrical body, upright opposite end walls, and a cover over an opening in said receptacle through which said receptacle may be loaded with work and unloaded, said cover being a section of said cylindrical body, means mounting said receptacle for rotation about its longitudinal axis, means for rotating said receptacle, means for charging said chamber with and exhausting therefrom a heated vaporous work treating medium under superatmospheric pressure, means mounting said door and receptacle for shifting as a unit outwardly from said chamber to open said door and move said receptacle from beneath said cover to a loading and unloading position without said chamber, and means for opening said door and shifting said receptacle through the door opening to said loading and unloading position.

7. In textile treating apparatus, means providing a closed chamber having a fluid tight door hermetically sealing said chamber from atmosphere, a receptacle in said chamber including a generally horizontally disposed cylindrical body, upright opposite end walls, and a cover over an opening in said receptacle through which said receptacle may be loaded with work and unloaded, said cover being a section of said cylindrical body, means mounting said receptacle for rotation about its longitudinal axis, means for rotating said receptacle including a shaft revolvably journalled in said door and affixed to said receptacle, means for charging said chamber with and exhausting therefrom a heated vaporous work treating medium under superatmospheric pressure, means mounting said door and receptacle for shifting as a unit outwardly from said chamber to open said door and move said receptacle from beneath said cover to a loading and unloading position without said chamber including a mobile carriage, said means for rotating said receptacle including means mounted upon said carriage and operatively connected with and operable for actuating said shaft, and means upon said carriage operable for actuating the same thereby to open said door and shift said receptacle through the door opening to said loading and unloading position.

8. In textile treating apparatus, means providing a closed chamber having a door, means locking said door and hermetically sealing said chamber from atmosphere

including a pair of abutting flanges respectively upon said chamber providing means and door, a gasket between said flanges, a lock ring embracing and releasably locking said flanges together, and means operatively interposed between said chamber providing means and said ring and operable for shifting said ring circumferentially relative to said flanges for unlocking said door, a receptacle in said chamber including a cover over an opening in said receptacle through which said receptacle may be loaded with work and unloaded, means mounting said receptacle for rotation, means for rotating said receptacle, means for charging said chamber with and exhausting therefrom a heated vaporous work treating medium under superatmospheric pressure, means mounting said receptacle for shifting horizontally from beneath said cover to a loading and unloading position without said chamber, and means for opening said door and shifting said receptacle through the door opening to said loading and unloading position.

9. In textile treating apparatus, means providing a closed chamber having a fluid tight door hermetically sealing said chamber from atmosphere, a receptacle in said chamber including a cover over an opening in said receptacle through which said receptacle may be loaded with work and unloaded, means mounting said receptacle for rotation, means for rotating said receptacle, means for charging said chamber with and exhausting therefrom a heated vaporous work treating medium under superatmospheric pressure including means underlying said receptacle and adapted for containing a fluid medium,

and heat exchange means operable for vaporizing said fluid, means mounting said receptacle for shifting horizontally from beneath said cover to a loading and unloading position without said chamber, and means for opening said door and shifting said receptacle through the door opening to said loading and unloading position.

10. In textile treating apparatus, means providing a closed chamber having a fluid tight door hermetically sealing said chamber from atmosphere, a receptacle in said chamber including a cover over an opening in said receptacle through which said receptacle may be loaded with work and unloaded, means mounting said receptacle for rotation, means for rotating said receptacle, means for charging said chamber with and exhausting therefrom a heated vaporous work treating medium under superatmospheric pressure including an open pan underlying said receptacle, and heat exchange means in said pan operable for vaporizing a fluid medium in said pan, means mounting said receptacle for shifting horizontally from beneath said cover to a loading and unloading position without said chamber, and means for opening said door and shifting said receptacle through the door opening to said loading and unloading position.

References Cited in the file of this patent

UNITED STATES PATENTS

318,205	Rau	May 19, 1885
2,700,883	Jacobs	Feb. 1, 1955
2,857,922	Effinger	Oct. 28, 1958