

July 11, 1939.

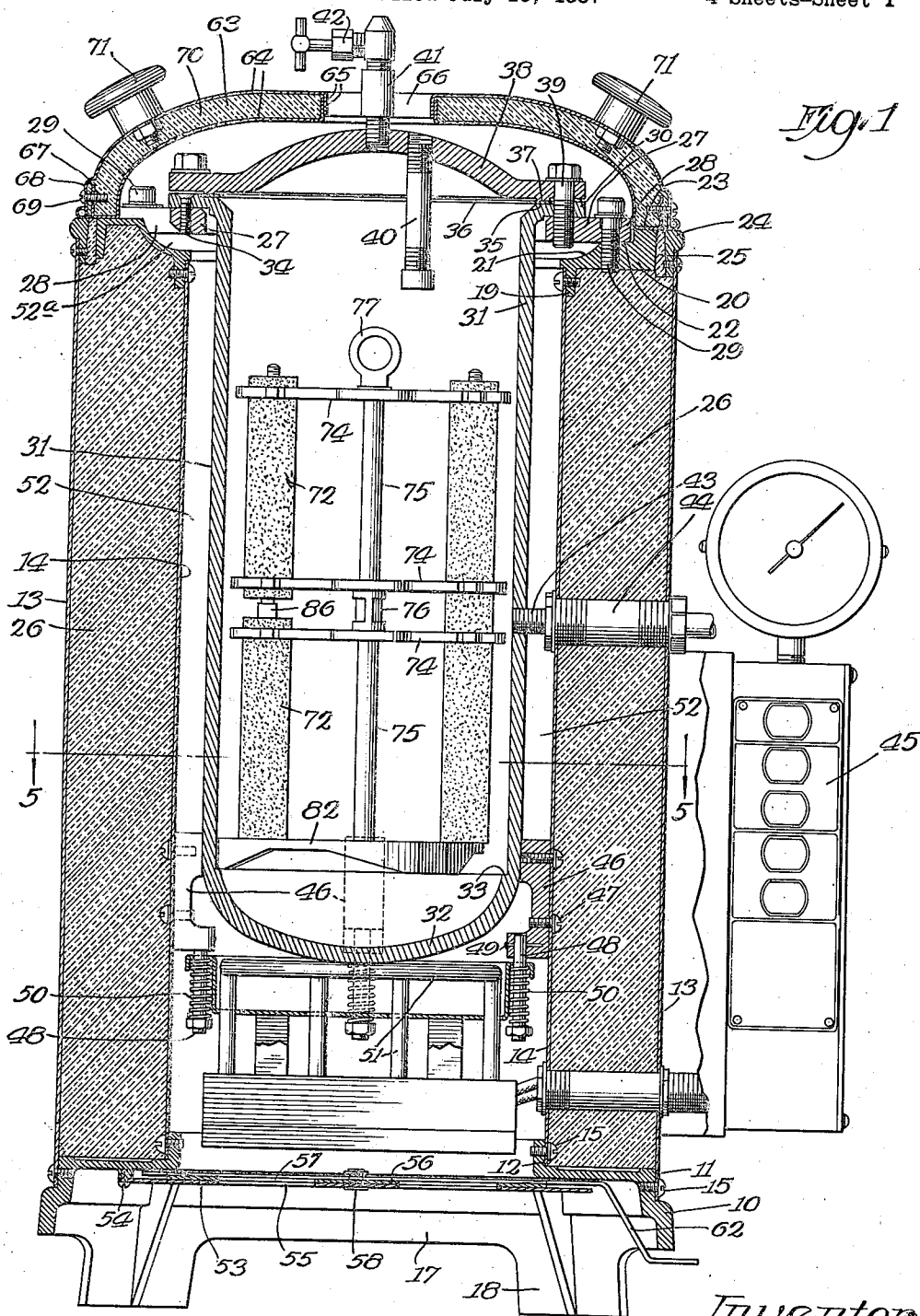
C. A. MENZEL

2,165,935

AUTOCLAVE

Filed July 16, 1937

4 Sheets-Sheet 1



Inventor
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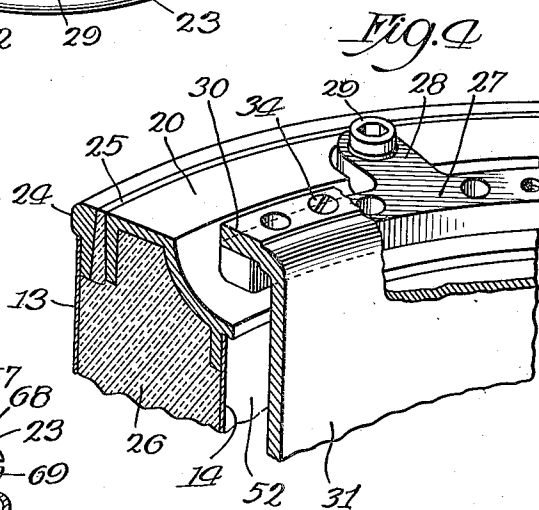
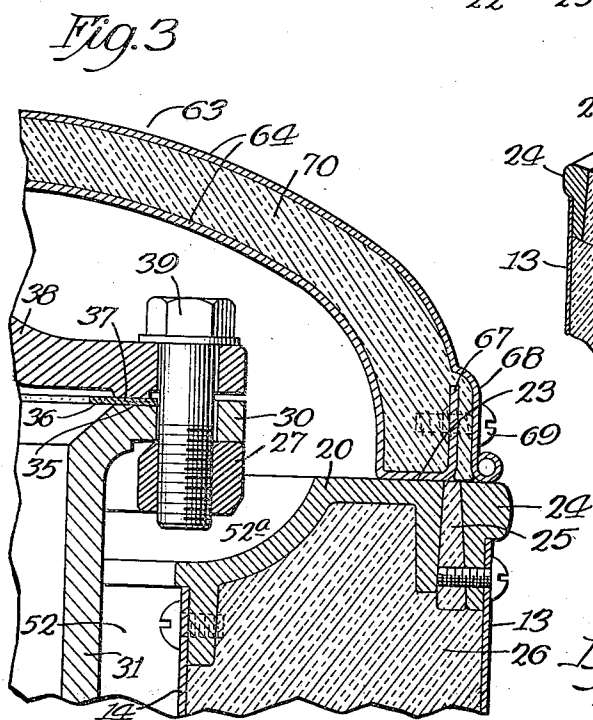
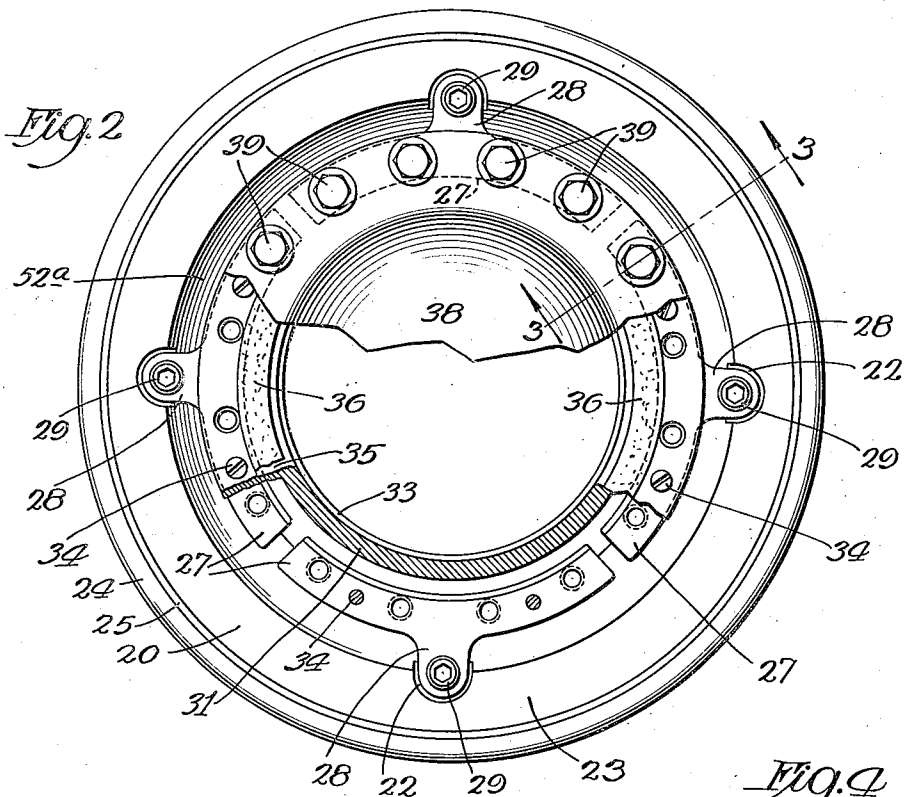
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AUTOCLAVE

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4 Sheets-Sheet 2



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AUTOCLAVE

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Fig. 5

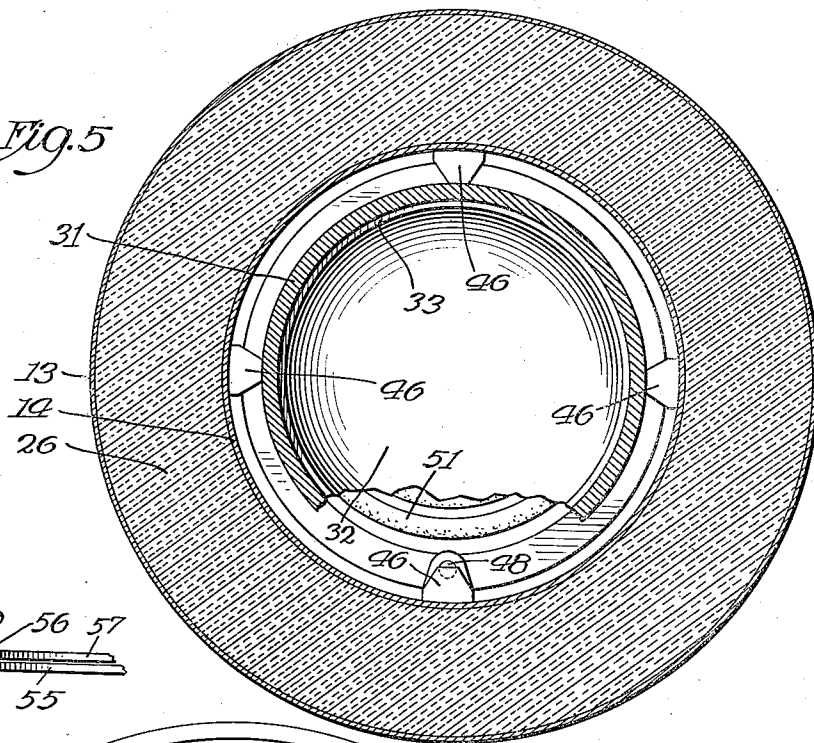


Fig. 7

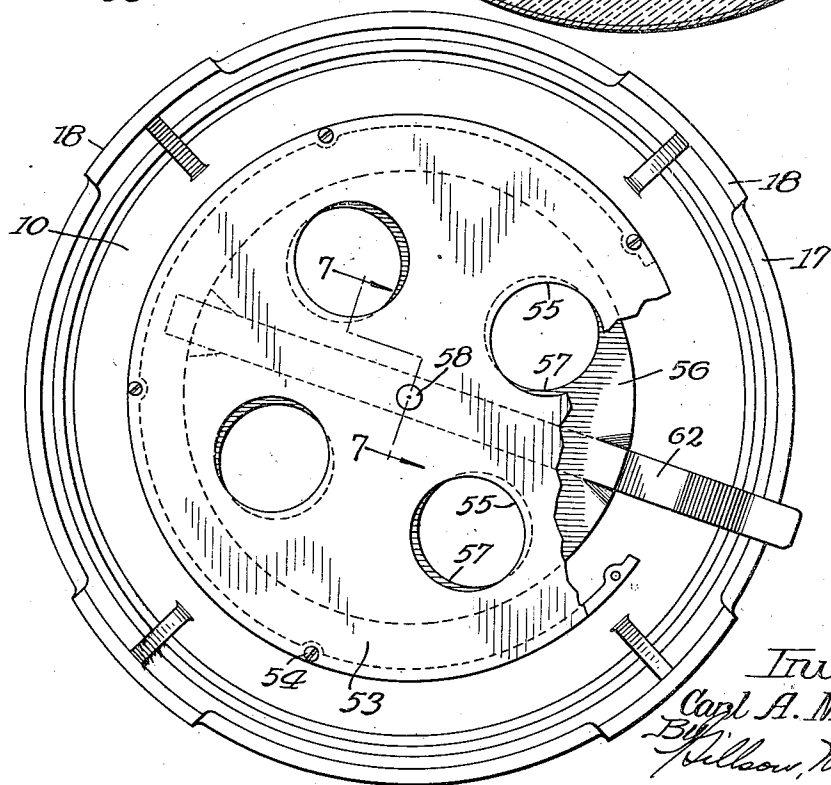
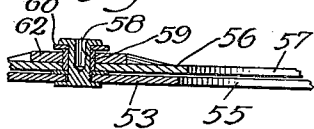


Fig. 6

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AUTOCLAVE .

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4 Sheets-Sheet 4

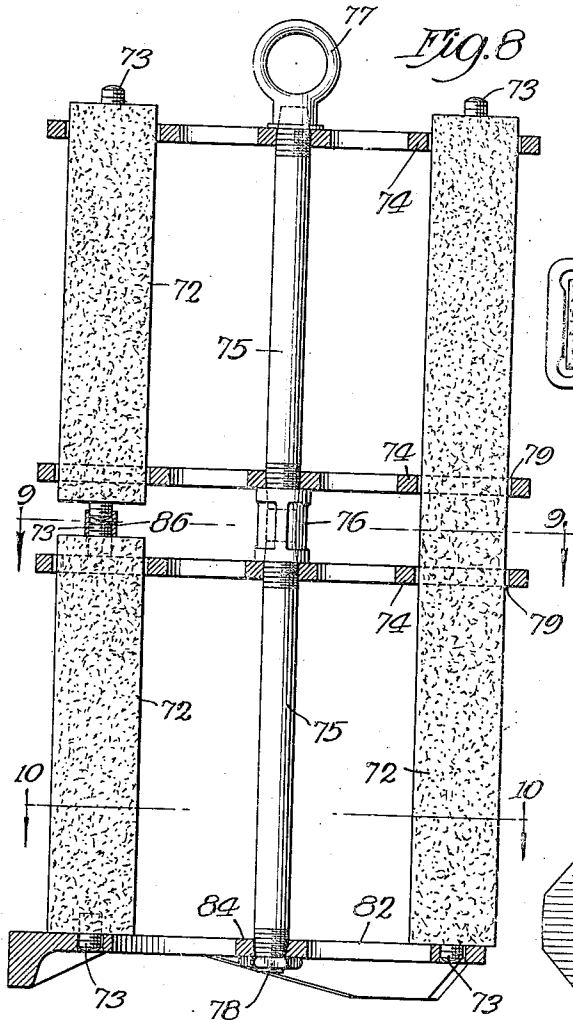


Fig. 8

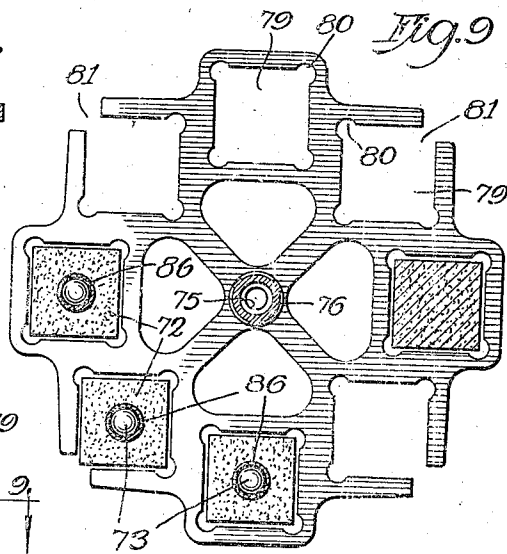


Fig. 9

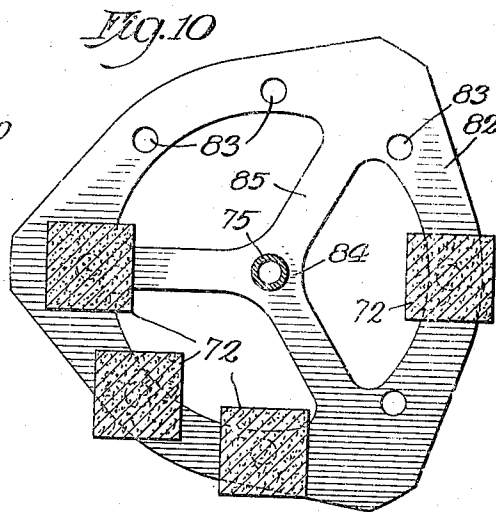


Fig. 10

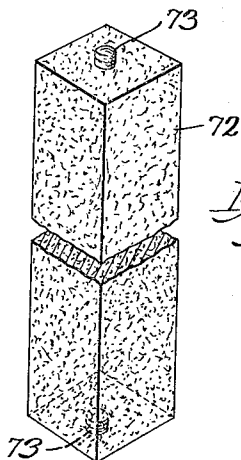


Fig. 11

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UNITED STATES PATENT OFFICE

2,165,935

AUTOCLAVE

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Application July 16, 1937, Serial No. 153,974

17 Claims. (Cl. 23—290)

Some Portland cement contains magnesium and calcium compounds that enlarge with age and, when used as an ingredient in concrete, causes the latter to expand with age. Instances are reported in which concrete bridge piers have grown as much as six inches. Aside from the fact that such change of dimensions is often intolerable in engineering construction, the enlargement or growth appears to be accompanied by breaking down of the concrete.

Chemical analysis cannot be relied upon to determine the presence or absence of the unsound constituents in deleterious quantities in a particular lot of cement.

The growth which normally takes years can be produced artificially by putting the cement or concrete in a moist atmosphere at about 425° F. and 300 lbs. pressure for approximately five hours, or at 120 lbs. pressure and 350° F. for forty-eight to seventy-two hours.

By measuring test bars before and after this pressure cooking the presence of the undesirable ingredients can be detected with reasonable quickness.

The principal object of this invention is to provide an autoclave for making the growth treatment of the test bars that will make the operation easy, safe and economical.

Further objects and advantages of the invention will appear as the disclosure proceeds and the description is read in connection with the accompanying drawings, in which:

Fig. 1 is a vertical section through the preferred form of autoclave embodying the invention;

Fig. 2 is a plan view with parts broken away to reveal the otherwise hidden construction;

Fig. 3 is an enlarged detail of the upper portion of Fig. 1;

Fig. 4 is a perspective view showing the support for the boiler on the insulated casing;

Fig. 5 is a transverse section on the line 5—5 of Fig. 1;

Fig. 6 is an inverted plan view showing the damper for controlling the draft through the autoclave;

Fig. 7 is a vertical section taken on the line 7—7 of Fig. 6;

Fig. 8 is a vertical section through a gauge for holding the test bars in the boiler of the autoclave;

Fig. 9 is a transverse section on the line 9—9 of Fig. 8;

Fig. 10 is a transverse section on the line 10—10 of Fig. 8; and

Fig. 11 is a perspective view of one of the test bars.

But these specific drawings and the corresponding description are used for the purpose of disclosure only, and are not intended to impose unnecessary limitations on the claims.

The foundation of the autoclave is a base casting 10, having finished cylindrical portions 11 and 12, telescoping with outer and inner shells 13 and 14, secured to the base by screws 15. The base has a strengthening flange 17 cut away to form feet 18.

A flange 19 telescopes over the upper end of the inner shell 14, and projects from a bronze top ring 20, having a curved upper surface 21 and two seats 22 and 23. Spaced slightly from this top ring is another, 24, of cast aluminum, and between the two is a body of insulation, such as an asbestos ring 25.

The annular space between the two shells 13 and 14 is filled with insulating material 26, of any suitable character. The base 10, the walls 13, 14, the rings 20 and 24, with the insulating material 26, form an insulated casing which supports and protects the other parts of the autoclave.

A bracket 27, which may be in the form of a ring, but is preferably (as shown) in four like segments each having an outwardly directed arm 28 resting upon the seat 22 and made fast by a bolt 29, is preferably made of bronze castings which are finished and cadmium plated. On the bracket, or these segments, rests the top flange 30 of a steel boiler 31, having a dished or dome-shaped bottom 32 above which is a seat 33 for a test bar cage.

The flange 30 is made fast to the bracket 27 by eight screws 34, and its upper surface is provided with a gasket seat 35, receiving a suitable heat resisting gasket 36 to cooperate with a finished seat 37 on the dome-shaped lid 38, which is secured to the flange 30 and also the bracket 27 by sixteen bolts 39, affording ample strength to resist the pressure during the aging operation.

Threaded into the lid 38, and extending downwardly into the cooker, is a nipple 40 to receive a thermometer, and next to it is a vent 41, equipped with a valve 42. In an intermediate position the boiler 31 is fitted with a pipe connection 43, extending through the insulated casing, as indicated at 44, to the control box 45, whereby pressure is communicated to the box for regulating the heat input, etc.

Adjacent to the lower end of the boiler 31

the inner shell 14 is fitted with four brackets 46, secured by screws 47 and having bolts 48 fastened at their lower ends by pins 49. Each bolt is equipped with a spring 50, and the four springs serve to support a burner, generally indicated at 51, which may be of any suitable form for gas, electricity, or such like, but in this instance is shown an electric heater of the general form and construction disclosed in the patents to Abbott, No. 1,345,730, July 6, 1920, and to Mallett, No. 1,837,975, December 22, 1931.

The four brackets 46 serve to steady the lower end of the boiler, center it in the inner shell 14, and also support the heating equipment.

Between the inner shell 14 and the boiler 31 is a flue 52 for conveying the hot gases from the heat source to the passage 52^a, through which the gases pass in their course to the central opening 66 in the top of the autoclave.

Some control of the draft through the flue 52 between the insulated casing and the boiler will save heat during the heating operation and materially assist in cooling off the apparatus, and thereby reduce the pressure when the heat treatment is finished. This is achieved in the present instance by a damper comprising a disk 53, secured to the base 10 by screws 54, and provided with large openings 55 adapted to be opened or closed by a rotatable disk 56, having similar openings 57 and fixed to the upper side of the disk 55 by a hollow rivet 58, equipped with a spacer 59 and a washer 60.

The rotatable disk 56 is also fitted with a laterally and downwardly projecting handle 62, by which it may be adjusted to control the draft as desired.

On top of the casing there is an insulated cover 63, comprising two dished sheets 64, having telescoping flanges 65 at a central opening 66 and other slightly spaced flanges 67 and 68 secured together by screws 69. Between the disks is a body of suitable insulating material 70, and secured to the outer disk 64 are two knobs 71 by which it may be conveniently lifted into and out of place.

The test bars 72 (Figs. 8, 9, 10 and 11) are preferably of a definite length, such as five inches or ten inches, and each end is fitted with a stainless steel measuring stud 73.

In order to support a group of these test bars in the boiler of the autoclave, a cage or carrier, shown in Figs. 8, 9 and 10, is provided. It consists of four frames 74, of the general form indicated in Fig. 9, secured together by a stem composed of tubing, 75, nipple 76, an eye 77, and a nut 78.

Each of the frames 74, except the bottom one, is made with a series of generally squared openings 79, cut away at the corners 80, and certain of them are broken at the outer corners 81 to allow free expansion and contraction without unduly straining the metal. The bottom frame (shown particularly in Fig. 10) is in the general form of a ring 82, provided with a plurality of openings 83 to receive the lower measuring stud 73. The ring is connected with a hub 84 by spokes 85. The four frames are arranged with their openings in proper alignment, as indicated, and their connections are silver soldered or otherwise made relatively permanent. Such a cage will receive ten-inch test bars, as indicated at the right in Fig. 8, or two five-inch test bars, as indicated in the left in that figure, the connection between them being made by a sleeve 86, into which adjacent measuring studs fit.

Autoclaves made in accordance with the foregoing description possess certain advantages over the best prior art constructions of which I am aware. One of these advantages results from the segmental character of the bracket 27. Repeated tightening of the bolts 39 may result in stripping some of the threads in the bracket. If the bracket were in one piece, the boiler would have to be removed before the bracket could be replaced, and this operation would require removal also of all the bolts 39, 34 and 29, as well as the entire bracket. With the bracket in segments, however, replacement of a portion having a stripped thread requires only the removal of the bolts 39, the lid 38, the two screws 34 which set in the defective segment, and the one bolt 29 carried by the segment. The free segment can then be tilted slightly and slipped out of place and a new segment can be installed by reversing these operations. This feature has been found to be of considerable practical value.

I claim:

1. In an autoclave, a casing comprising inner and outer shells and a top ring between the shells, a bracket on the top ring, a boiler suspended from the bracket within the casing and spaced from the casing to form a flue, a heater for the boiler and means to control draft through the flue.

2. In an autoclave, an insulated casing having a cover provided with an opening, a closed boiler within and spaced from the casing and cover to provide a flue between them, a bracket carried by the casing and engaging the upper portion of the boiler for supporting the same, substantially equally spaced passages between the bracket and casing placing the portions of the flue above and below the bracket in communication, and a heater in the lower portion of the casing.

3. In an autoclave, an insulated casing having a cover provided with an opening, a closed boiler within and spaced from the casing and cover to provide a flue between them, a peripheral flange formed on the upper portion of said boiler, a bracket carried by the casing and engaging said flange to support the boiler, substantially equally spaced passages between said bracket and casing placing the flue and the opening of the casing cover in communication, and a heater in the lower portion of the casing.

4. In an autoclave, an insulated casing having an opening at its bottom and having a cover provided with an opening, a closed boiler within and spaced from the casing and cover to provide a flue between them, a bracket carried by the casing and engaging the upper portion of the boiler for supporting the same, substantially equally spaced passages between the bracket and casing placing the portions of the flue above and below the bracket in communication, a heater in the lower portion of the casing, and means for controlling draft through the flue.

5. In an autoclave, an insulated casing, a cover therefor provided with a hot gas outlet opening, a closed boiler within and spaced from the casing, including the cover thereof, so as to provide a hot gas flue between the boiler and the casing and cover, means mounting the boiler in the casing and maintaining said spaced relation, a heater mounted in the lower portion of the casing, and means for controlling admission of air to the heater.

6. In an autoclave, an insulated casing having a bottom provided with an air inlet opening, a dome-shaped cover mounted on the casing and

provided with a hot gas outlet opening, a closed boiler within and spaced from the casing and cover so as to provide a hot gas flue between the boiler and the casing and cover, means mounting the boiler in the casing and maintaining said spaced relation, a heater in the casing between the boiler and the casing bottom, and valve means associated with the air inlet opening for controlling air admitted to the heater and draft through the flue.

7. In an autoclave, an insulated casing having a cover provided with an opening, a boiler within and spaced from the casing and cover to provide a flue between them, a peripheral flange formed on the upper portion of said boiler, a bracket carried by the casing and engaging said flange, a lid for the boiler also engaging said flange, fastening means connecting said lid, boiler flange and bracket together whereby said bracket supports the closed boiler within the casing, a passage between the bracket and casing placing the portion of the flue below the bracket in communication with the portion above it and with the cover opening, and a heater in the lower portion of the casing.

8. In an autoclave, an insulated casing having a cover provided with an opening, a boiler within and spaced from the casing to provide a flue between them, a peripheral flange formed on the upper portion of said boiler, a bracket carried by the casing and engaging said flange, a lid for the boiler also engaging said flange, fastening means connecting said lid, boiler flange and bracket together whereby said bracket supports the closed boiler within the casing, a plurality of passages between the bracket and casing, spaced substantially equally around the periphery of the boiler and placing the portion of the flue below the bracket in communication with the portion above it and with the cover opening, and a heater in the lower portion of the casing.

9. In an autoclave, a casing body having spaced walls containing insulation, a metal ring surmounting the casing body, a casing cover supported on said ring and having a substantially central opening, a boiler within and spaced from the casing body and cover to provide a flue between them, a peripheral flange formed on the upper portion of said boiler, a bracket having arms mounted on said ring and having a portion engaging and supporting said boiler flange, said bracket portion being spaced from the ring to provide a passage establishing communication between the flue portion below the bracket and the flue portion above it, and a heater in the lower portion of the casing.

10. In an autoclave, a casing body having spaced walls containing insulation, a metal ring surmounting the casing body, a casing cover supported on said ring and having a substantially central opening, a boiler within and spaced from the casing body and cover to provide a flue between them, a peripheral flange formed on the upper portion of said boiler, a bracket having arms mounted on said ring and having a portion engaging and supporting said boiler flange, said bracket portion being spaced from the ring to provide a plurality of substantially equally spaced passages, one between each adjacent pair of arms, establishing communication between the flue por-

tion below the bracket and the flue portion above it, and a heater in the lower portion of the casing.

11. In an autoclave, a casing body having spaced walls containing insulation, a metal ring surmounting the casing body, a casing cover supported on said ring and having a substantially central opening, a boiler within and spaced from the casing body and cover to provide a flue between them, a peripheral flange formed on the upper portion of said boiler, a lid for the boiler secured to said flange, a bracket having arms mounted on said ring and having a portion engaging said boiler flange and supporting said boiler and lid, said bracket portion being spaced from the ring to provide a passage establishing communication between the flue portion below the bracket and the flue portion above it, and a heater in the lower portion of the casing.

12. In an autoclave, an insulated casing, a closed boiler within and spaced from the casing to provide a flue between them, a bracket carried by the casing and engaging the upper portion of the boiler for supporting the boiler in the casing, a heater in the lower portion of the casing, below the boiler, and other bracket means carried by the casing, centering the lower portion of the boiler in the casing and supporting the heater.

13. In an autoclave, an insulated casing, a closed boiler within and spaced from the casing to provide a flue between them, a bracket carried by the upper portion of the casing and engaging the upper portion of the boiler for supporting the boiler in the casing, a heater in the lower portion of the casing, below the boiler, and a plurality of brackets carried by the lower portion of the casing, spaced substantially equally apart, centering the lower portion of the boiler in the casing and supporting the heater.

14. In an autoclave, a casing, a bracket made in a series of separate segments each independently mounted in the casing and cooperating to provide a support for a boiler, a boiler and a lid therefor supported on the segments.

15. In an autoclave, a casing, a bracket made in a series of separate segments each independently mounted in the casing and cooperating to provide a support for a boiler, a boiler having a portion supported by the segments, screws securing said portion to the segments, a lid for the boiler, and bolts securing said lid to the segments.

16. In an autoclave, a casing, a bracket made in a series of separate segments each independently mounted in an upper portion of the casing and cooperating to provide a support for a boiler, a boiler having an upper flange supported by the segments, screws securing said flange to the segments, a lid for the boiler, and bolts securing said lid to the segments.

17. In an autoclave, a casing, a bracket made in a series of separate segments each independently mounted in an upper portion of the casing and cooperating to provide a support for a boiler, a boiler having a flange outwardly directed from its upper periphery, screws securing said flange to the segments, a lid mounted on said flange and covering said screws, and bolts threaded into the segments and securing the lid to the boiler and segments.

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