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P. D. SCHENCK.
ARMORED CONTAINER.
FILED MAY 3, 1920.

FIG. 1.

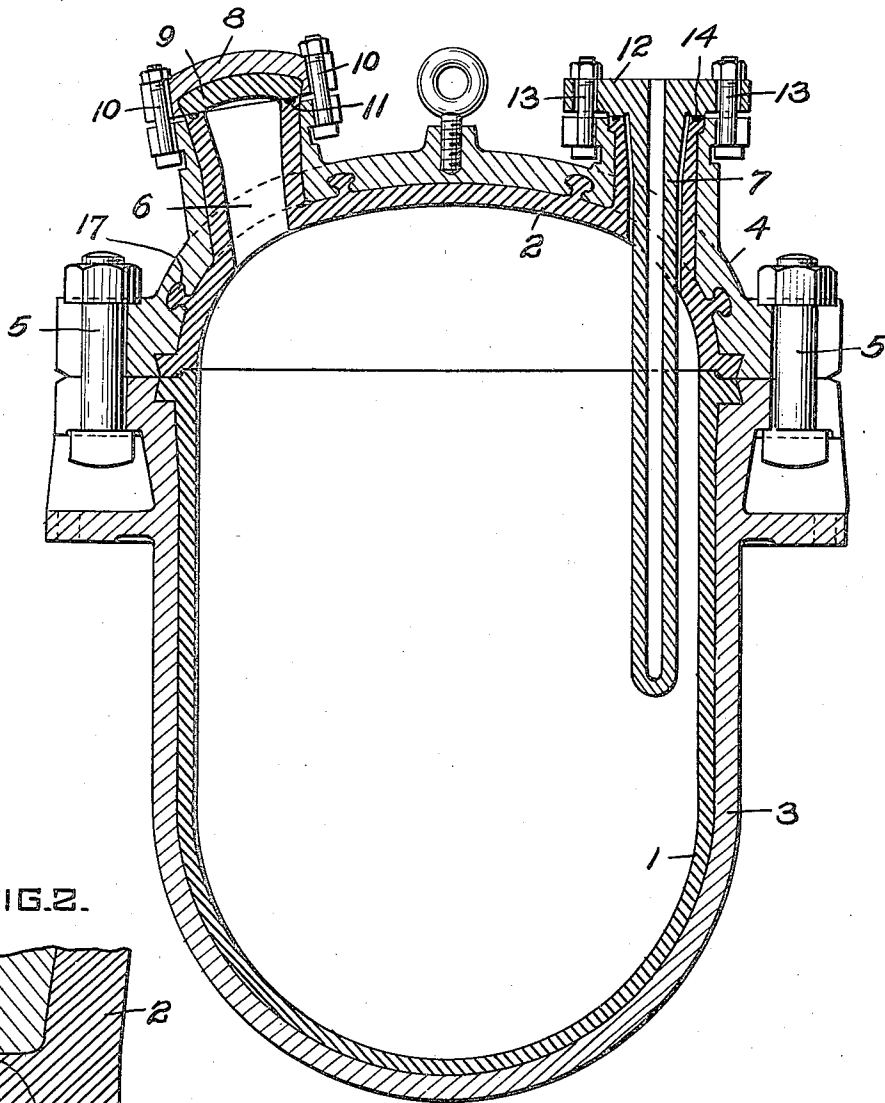
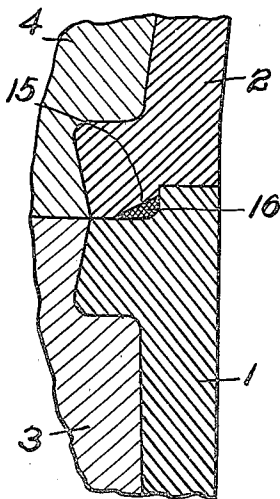


FIG. 2.



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UNITED STATES PATENT OFFICE.

PIERCE D. SCHENCK, OF DAYTON, OHIO, ASSIGNOR TO DURIRON COMPANY INC., A CORPORATION OF NEW YORK.

ARMORED CONTAINER.

Application filed May 3, 1920. Serial No. 378,478.

To all whom it may concern:

Be it known that I, PIERCE D. SCHENCK, a citizen of the United States, and a resident of Dayton, in the county of Montgomery and State of Ohio, have made a new and useful Invention in Armored Containers, of which the following is a specification.

The invention relates to containers designed to resist extreme pressures and at the same time resist the action of acid or alkali mixtures treated in the containers. Such containers find their largest use in the manufacture of dyes, in which art they are known as "autoclaves" but it will be understood that the invention is not restricted to this particular art and is of utility in any relation in which a container for resisting pressure and subject to corrosion from the contents is required. The invention has for its principal objects: the provision of a container of the character specified having an inner shell of acid or alkali resisting material and an outer shell of high tensile strength having compositions of such character that the co-efficients of expansion are substantially the same so that the two shells act as a unit under widely varying temperature conditions; the provision of a container comprising an inner shell and an outer shell so constructed that there is no tendency of the outer shell either to crush the inner shell or to pull away from such shell under varying temperature conditions; and in general, the provision of a container which can be manufactured at a reasonable cost and which combines a large factor of safety with a maximum degree of durability incident to the use of the most desirable acid and alkali resisting material available for the lining of the device. One embodiment of the invention is illustrated in the accompanying drawings wherein;

Fig. 1 is a vertical section through a container constructed in accordance with the invention, and Fig. 2 is an enlarged vertical section through the container at the joint between the body thereof and the top or cover.

Briefly stated, the invention in its broad form contemplates a container comprising an inner and an outer shell of different compositions, the inner shell being formed of an acid resisting material, which material is ordinarily of relatively low tensile strength, and the outer shell of material having a relatively high tensile strength, the composi-

tions being so adjusted that the inner and outer shells have the same coefficients of expansion. This latter condition is necessary to prevent the two shells from separating under varying conditions of temperature and to prevent the crushing of the inner shell by the relatively stronger outer shell as would occur if the coefficient of expansion of the outer shell were greater than that of the inner shell.

The inner shell is preferably made of a silicon-iron composition having high acid resisting qualities although of relatively low tensile strength and somewhat brittle, while the outer shell is composed of a copper-aluminum composition or alloy with the percentages of aluminum and copper so adjusted that this outer shell has a coefficient of expansion the same as that of the inner shell.

Referring to the drawings, the reference numerals 1 and 2 indicate the inner shell or lining of the container, 1 being the lining of the body portion and 2 the lining of the cover, while 3 and 4 indicate the outer or supporting shell, 3 being the body portion of such shell and 4 the cover portion. The inner shell is preferably composed of iron containing about 14 per cent of silicon, such iron having the trade name of "duriron." This material is very resistant to the action of corrosive liquids of either alkaline or acid character but is of relatively low tensile strength and brittle so that alone it is not suitable for resisting the high pressures to which an autoclave or other similar container is exposed. The outer shell is preferably of a bronze or copper composition, the particular composition preferred containing 87 per cent of copper and 13 per cent of aluminum. This composition has the same coefficient of expansion as the duriron so that under widely varying conditions of temperature there is no separation of the two shells and no strain tending to crush the inner shell is imposed by the outer shell. The two shells are made practically a unit by casting the bronze shell in position around the duriron shell after preheating the latter. This is the more practical method although it is possible by proper relative preheating to reverse the operation and cast the duriron shell inside the bronze shell.

The cover may be secured to the body portion of the container in various ways but this is preferably accomplished by slotted

flanges formed upon the body portion and cover of the outer shell and clamped together by means of the bolts 5. The cover of the device may be provided with any of the various accessories known in the art, the drawing however illustrating only the inlet 6 and the opening for the thermostat tube 7. The passage 6 is closed by means of the cap illustrated and comprising the bronze outer member 8 provided with the lining 9 of duriron, such cap being held in position by the bolts 10. In order to give greater security between the two shells the lugs 17 may be provided upon the inner shell. When it is desired to admit a liquid to the container the cap is removed and a flanged inlet connection secured in place by means of the bolts 10. In order to give a tight joint, a groove 11 is provided in which is placed a lead gasket.

The thermostat tube 7 is preferably of duriron and has a flange 12 held in position by means of the bolts 13. A groove 14 is also provided here for the reception of a lead gasket in order to seal the joint.

Fig. 2 illustrates the preferred means of securing a tight joint between the body portion and cover of the autoclave. As here illustrated, the annular recess 15 is provided for the reception of the lead gasket 16. This lead gasket is preferably circular in cross section, but is crushed into the section illustrated at 16 when the cover is clamped into position by means of the bolts 5. This gives a very tight secure joint which protects the material of the outer shell from the action of the contents of the container. It will be understood that various forms of gaskets might be employed both at the juncture between the cover and body portion of the container and between the other closures used upon the cover of the container. It will be seen from the foregoing that the construction provides for a high resistance to rupture incident to pressure as the outer shell is made of a composition having great tensile strength and of a high degree of toughness and that long life is insured by the resistance against corrosion incident to the silicon-iron lining. This lining can be made of any desired thickness so that there is no danger of its cracking or peeling off such as is the case where enamels or other relatively thin coatings are employed upon the inside of supporting casings to protect them. A relatively deep corrosion may occur before the outer shell is subject to the action of the contents of the device. Other advantages incident to the construction will be apparent to those skilled in the art.

It will be understood that the particular construction shown is merely illustrative of the invention and that a wide variety of forms of containers may be constructed in which the invention is utilized. Also, that

the compositions of the two shells as stated are not limited to the proportions or combinations of elements stated, the invention in its broad form contemplating the use of two shells having substantially the same coefficients of expansion and with the inner one of corrosion-resisting material and the outer one of a material having a higher degree of tensile strength than the inner one so as to provide the necessary resistance to rupture. The alloys or compositions specified as heretofore are regarded as the best for the purpose and at the same time are of reasonable cost, but other compounds or alloys might be employed if desired.

What I claim is:

1. A container comprising an inner cast shell of a composition having high acid resisting properties and an outer supporting shell cast thereon and consisting of a material having greater tensile strength than the composition of the inner shell but having substantially the same coefficient of expansion.

2. A container comprising an inner cast shell of corrosion resisting material, and an outer supporting shell of a material having a coefficient of expansion substantially the same as that of the material of the inner shell but more tough and having greater tensile strength.

3. A container comprising an inner cast shell of silicon-iron composition and an outer shell of copper composition having substantially the same coefficient of expansion as the silicon-iron composition.

4. A container comprising an inner cast shell of iron composition containing approximately 14 per cent of silicon and an outer shell of a copper composition containing approximately 87 per cent of copper and having substantially the same coefficient of expansion as the composition of the inner shell.

5. A container comprising an inner cast shell of silicon-iron composition and an outer cast shell of copper-aluminum composition having substantially the same coefficient of expansion as the silicon-iron composition.

6. A container comprising an inner cast shell of iron composition containing approximately 14 per cent of silicon and an outer shell of a copper composition having substantially the same coefficient of expansion.

7. A container comprising an inner cast shell of iron composition containing approximately 14 per cent of silicon and an outer cast shell of a composition comprising approximately 87 per cent of copper and 13 per cent of aluminum and having substantially the same coefficient of expansion as the composition of the inner shell.

8. A container having a body portion

comprising an inner shell and an outer shell,
and a cover comprising an inner shell and
an outer shell, with an annular recess be-
tween the opposing edges of the inner shell
5 of the body portion and the inner shell of
the cover, means for clamping the cover to
the body portion and a metal gasket in said
annular recess, the inner shell being of acid
resisting material and the outer shell of a
10 material having a greater tensile strength
than that of the inner shell.

9. A container comprising an inner cast

shell having high acid resisting qualities
and an outer cast supporting shell of a ma-
terial having greater tensile strength than 15
the composition of the inner shell but hav-
ing substantially the same coefficient of ex-
pansion, one of said shells being provided
with holding lugs lying in the cast metal of
the other shell.

In testimony whereof, I have hereunto 20
subscribed my name this 26th day of April,
1920.

PIERCE D. SCHENCK.