

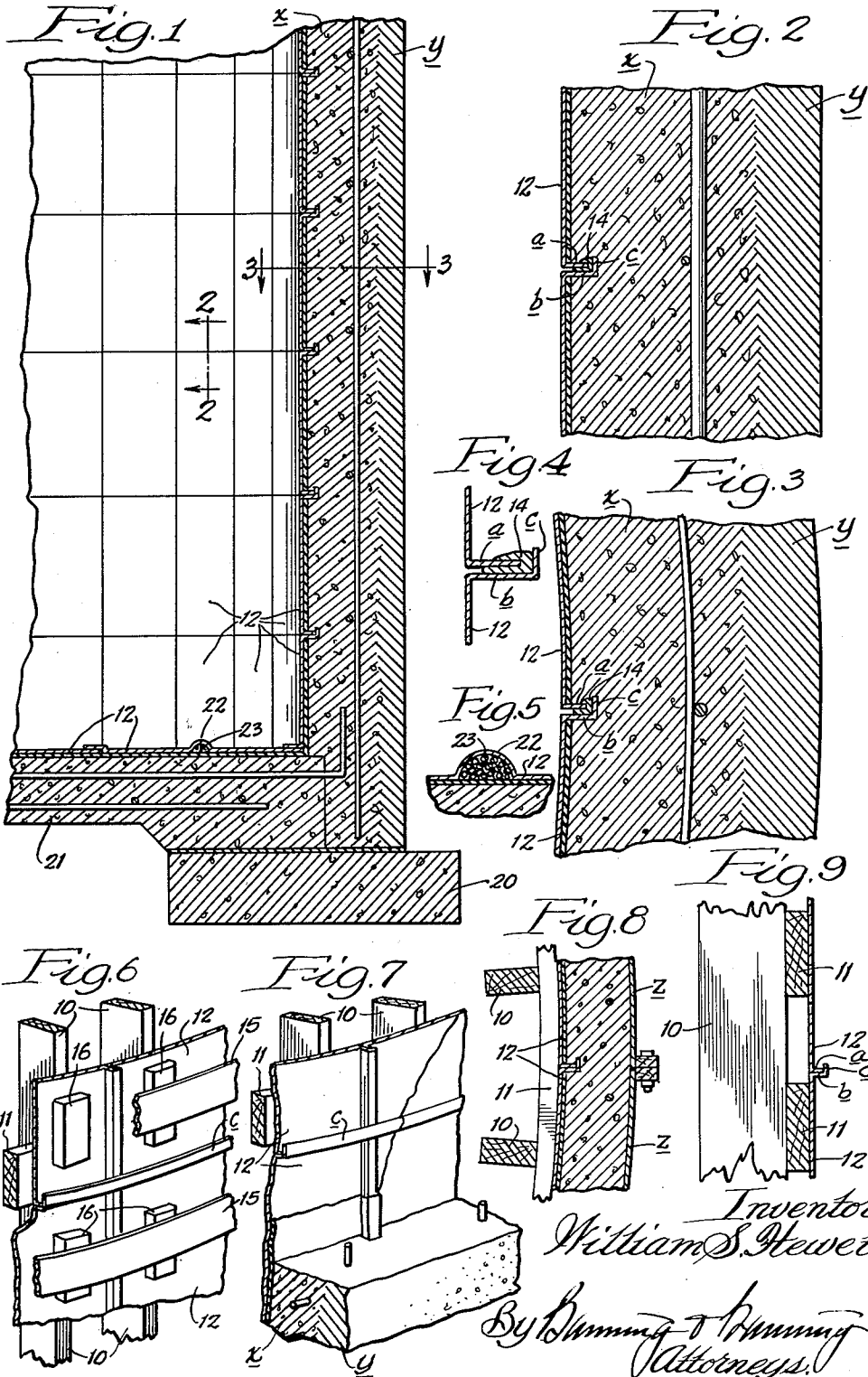
Sept. 21, 1943.

W. S. HEWETT

2,329,719

CONCRETE TANK

Filed March 24, 1941



Inventor:
William S. Hewett.

By *Hammond & Hammond*
Attorneys.

UNITED STATES PATENT OFFICE

2,329,719

CONCRETE TANK

William S. Hewett, Evanston, Ill., assignor to The
Preload Company, Boston, Mass., a corporation
of Massachusetts

Application March 24, 1941, Serial No. 384,793

2 Claims. (Cl. 72-14)

My invention relates to certain improvements in tanks of concrete or the like, such as may be used for the storage of liquids containing acids or other active chemicals. More particularly, the present improvements are directed to the application upon the interior surfaces of the tank of a metal lining having capacity for expansion or contraction together with an elastic anchoring means by which the lining is adhered to the interior surfaces of the tank at every point thereupon, to the joints between the several plates which, when united, provide the lining for the tank, and to certain means by which the lining is endowed with capacity for expansion or contraction as required by changes in thermal conditions.

A suggestive embodiment of my invention is illustrated in the accompanying drawing, wherein

Figure 1 is a fragmentary vertical section showing my lining in place within a concrete tank structure;

Figs. 2 and 3 are enlarged details in section taken on lines 2-2 and 3-3, respectively, of Fig. 1;

Fig. 4 is an enlarged detail in section through one of the joints between two of the lining plates;

Fig. 5 is a detail in vertical section through a padded ridge which may be formed in the floor or elsewhere to take care of expansion or contraction in the lining;

Fig. 6 is a detail in perspective showing several assembled plates supported against a framework in the position which they occupy prior to placing of the concrete wall therearound;

Fig. 7, which is a similar view, shows the tension belts removed, the adhesive coating applied over part of the outer surface of the lining plates, and the concrete wall in process of being poured;

Fig. 8 is a fragmentary detail in horizontal section showing a concrete wall poured around a lining of assembled plates with the supporting framework therefor still in place; and

Fig. 9 is a fragmentary detail in vertical section showing a framework supporting the lining against which concrete is to be placed as by projection from a gun or the like.

Instead of setting up the concrete tank structure first, I reverse the procedure, and, as a first step, erect a framework of vertical studs 10 arranged preferably in a circle, with interconnecting horizontal wales 11 for bracing to provide spaced supports against which may be placed metal plates 12 desirably all alike as to size, shape and material and adapted, when assembled and

sealed, to form a continuous self-bracing lining about which the tank walls may later be constructed. Each lining plate may be formed with outturned adjacent edges *a* extended less than the two remaining adjacent edges *b* the latter being bent to provide flanges *c* (see Fig. 4), and when assembled in place, the turned edges lying in parallelism and slightly spaced from each other. A solder 14 may then be introduced between the turned edges, the flanges *c* providing a convenient retaining wall therefor. When so sealed the solder will extend completely around one of the turned edges and into the space between the two proximate edges of adjacent plates. Since the turned edges of the plates extend outwardly from the lining, as indicated in Fig. 6, the joints to be sealed are both exposed and conveniently accessible.

When the lining is assembled around the framework, it is desirably held in place thereagainst and concurrently subjected to a compressive force with the aid of tension belts 15 which are extended around the lining and tightened to exert an inward pressure against spacer blocks 16 which are placed opposite the studs or wales so that pressure directed against the lining is confined to points where inward support is afforded by the framework. These belts and blocks are desirably set in place before soldering of the plate joints is undertaken. As necessary, these belts may be released and removed, starting perhaps from the top, inasmuch as there will no longer be any need for outward support when assembling and sealing of the plates has been completed.

After the work has been completed up to this point, an asphalt, tar, or other elastic adhesive is applied over the entire outer surface of the lining. Thereafter the concrete wall is placed around the lining, this being done either by the gunite or pouring methods, or both. In Fig. 1 I have shown such a wall having a poured section *x* with an outer gunite section *y*. An outer form *z* (see Fig. 8) is, of course, employed when pouring is to be done. If desired, the gunite method of construction may be dispensed with and the wall be placed entirely by a pouring operation with suitable rod reinforcements in line with current practice.

The tank walls may be rested, as is customary, upon a suitable foundation 20 which also may be used to support the floor 21 adjacent its periphery. Over the floor I also extend a lining comprising plates 12 having soldered joints which may be generally the same as those already de-

scribed. In addition, it may be desirable, at intervals, to form an arched ridge 22 in the lining (see Fig. 5) to provide between the lining and the adjacent elastic adhesive a hollow space which may be filled with a compressible material 23 such as soft yarn saturated with asphalt, tar or other appropriate material. Such a ridge may change its shape as required by contraction or expansion of the lining plates so as to take up or give out as necessary to compensate for changes in the linear dimension of the lining. The yarn provides a sufficient reinforcement within the ridge to withstand the pressures which are directed thereagainst by the liquid contained within the tank, but may also yield as required when contraction takes place and also fill out again when expansion occurs. In this way the ridge is automatically maintained in its extended position without danger of collapse. An expansion ridge of this kind may be employed wherever needed in the lining, either along the floor or sides of the tank, or both.

It has been previous practice to apply interior linings of such metals as lead or copper to reinforced concrete tanks in which acids or chemicals are to be contained. The plates of which such linings are made are relatively heavy and require the use of a great many anchoring ties which are entered through the concrete wall. This is not only expensive, but tends to weaken the wall and cause leaks. In such cases the concrete structure is first erected and then later the lining plates are set in place. This is the reverse of the procedure employed with the present tank. As indicated, the outturned edges of my relatively light plates are extended into the concrete wall so as to be anchored therein. Such a positive locking of the plates to the walls is supplemented by a coating of some elastic adhesive material, such as asphalt or tar which is extended over the entire outer surface of the lining. In this way connection with the cement wall is assured at every point over its interior surface. Such a coating provides for continuous adhesion between the lining and the surrounding wall, while permitting unequal

linear expansion without material stress in any part of the wall. This is important when hot liquids are to be received within the tank, inasmuch as it is impossible to erect a concrete structure which will meet the temperature within the tank with the ordinary atmospheric temperature that prevails exteriorly thereof.

I claim:

1. A tank for the reception of liquids of varying temperatures comprising a wall of concrete, a lining extended over the interior surface of the wall and including a plurality of plates, each plate having outwardly directed edge portions anchored in said wall, the wall and lining having unequal linear expansions and contractions, an elastic adhesive medium connecting the lining substantially throughout its entire area with said wall so as to provide a continuous elastic bond between the lining and the wall, an expansion ridge formed in the lining, and a compressible, expansible filler within said ridge and confined thereby so as to provide change in shape of the ridge as required by contraction or expansion of the lining plates, compensating for changes in the linear dimension of the lining and reinforcing said ridge to withstand and pressures directed thereagainst by the liquid contained within the tank.

2. A tank having a wall of concrete, a lining extended over the interior surface of the wall and including a plurality of plates, each plate having outwardly extending substantially horizontal edge portions extending in parallel relation into and anchored in said wall, the lower outwardly extending edge portion of each plate being of less width than the width of the adjacent edge portion of the adjacent lower plate and the last mentioned edge portion of each plate having a flange extending upwardly toward and transversely of the narrower edge portion and spaced therefrom to provide an entrance to the space between the parallel portions for the introduction of solder or the like into the space between the edge portions.

WILLIAM S. HEWETT