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C. A. ELLIS ET AL

2,070,828

FLOATING DECK FOR TANKS

Filed April 6, 1934

3 Sheets-Sheet 1

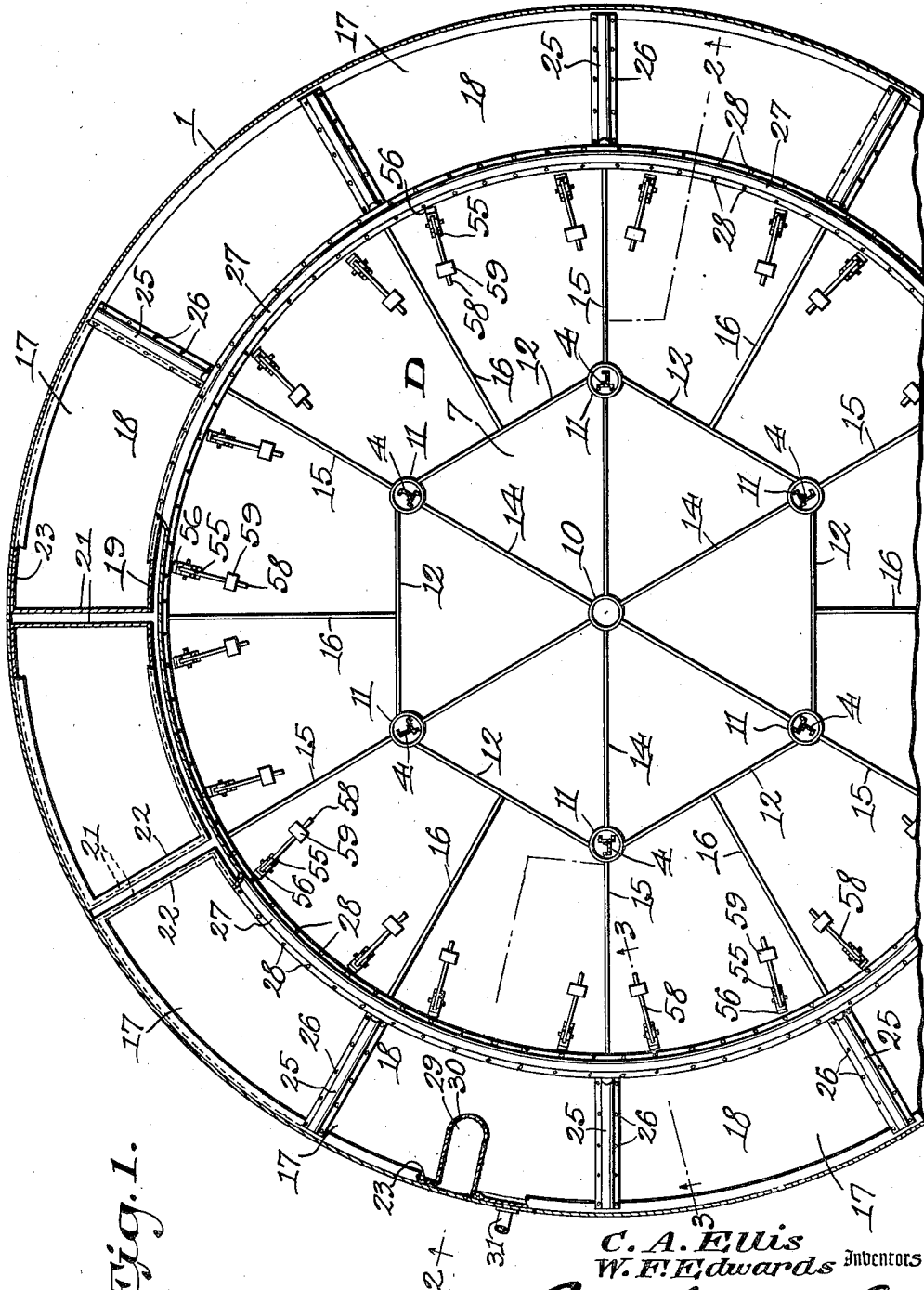


Fig. 1.

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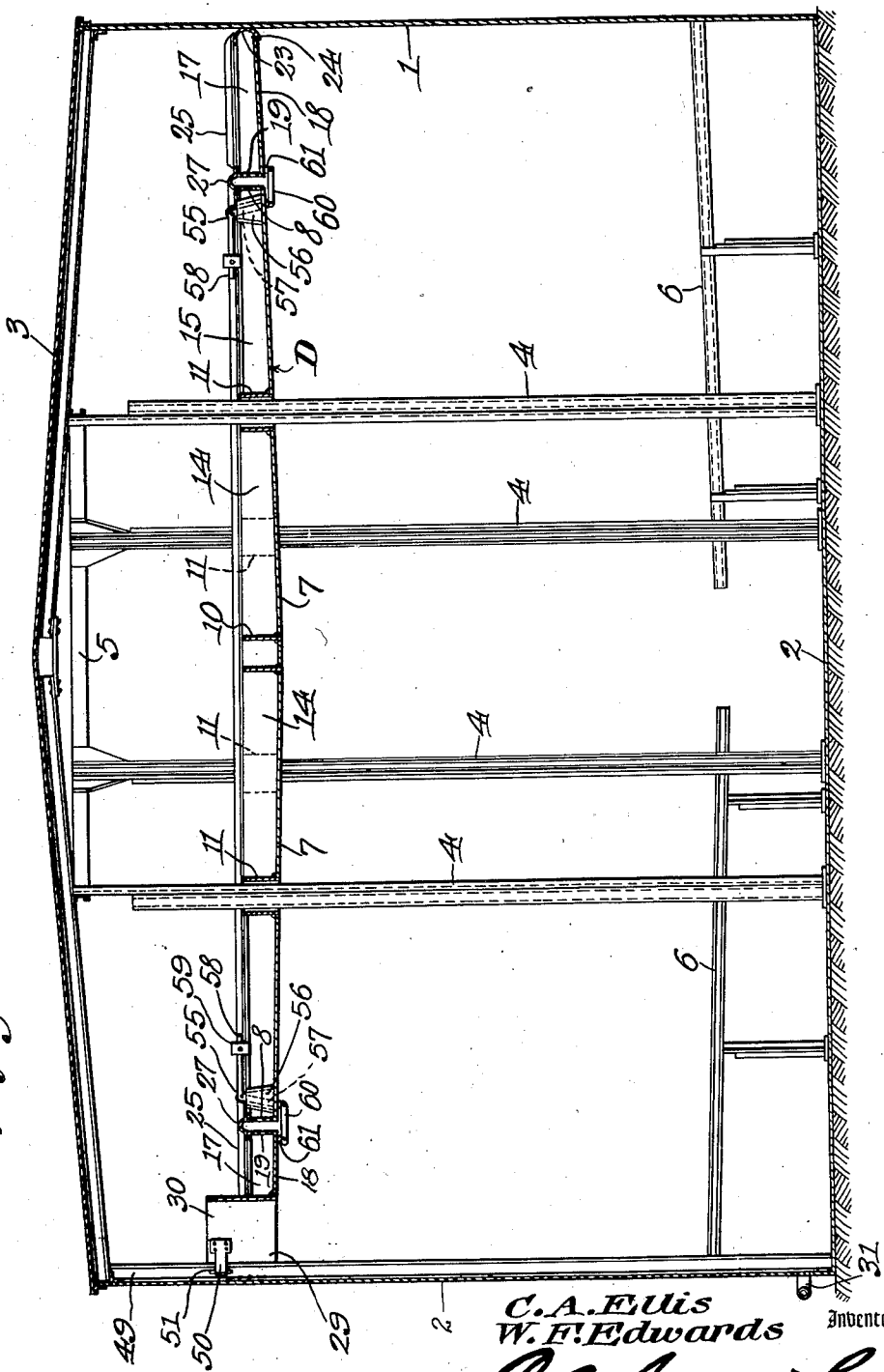
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3 Sheets-Sheet 2

Fig. 2.



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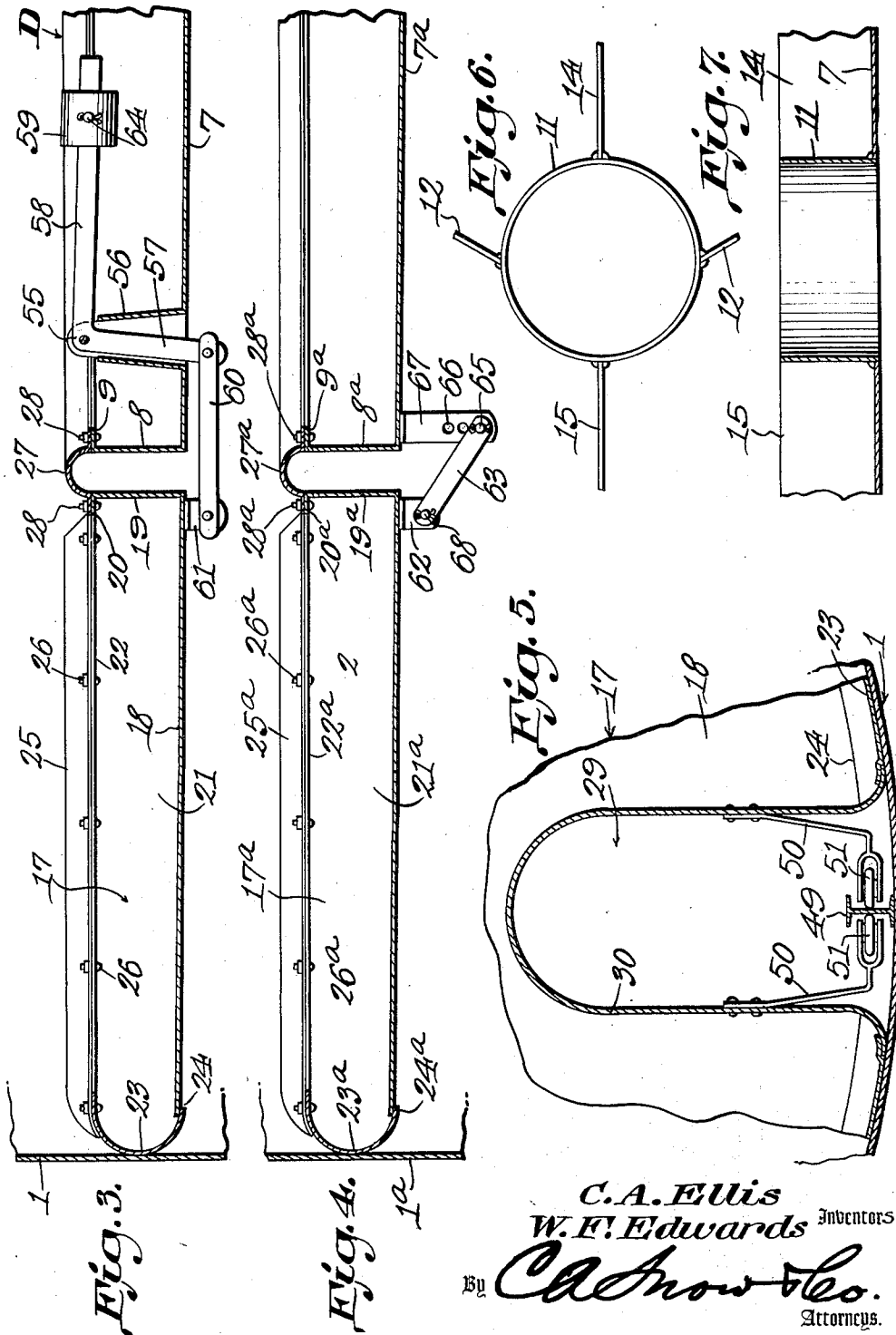
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3 Sheets-Sheet 3



UNITED STATES PATENT OFFICE

2,070,828

FLOATING DECK FOR TANKS

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Application April 6, 1934, Serial No. 719,384

6 Claims. (Cl. 220—26)

The device forming the subject matter of this application is a tank, adapted to contain oil and similar liquids.

One object of the invention is to improve the construction of the pontoons of the deck, so that they will bear properly against the shell of the tank. Another object of the invention is to provide a novel means for sealing the radial spaces between the pontoons, and for sealing the circumferential spaces between the pontoons and the deck proper. A further object of the invention is to provide novel expansion joints at the intersections of the partitions of the deck. A further object of the invention is to provide novel means for forcing the pontoons outwardly against the shell of the tank.

It is within the province of the disclosure to improve generally and to enhance the utility of devices of that type to which the invention appertains.

With the above and other objects in view, which will appear as the description proceeds, the invention resides in the combination and arrangement of parts and in the details of construction hereinafter described and claimed, it being understood that changes in the precise embodiment of the invention herein disclosed, may be made within the scope of what is claimed, without departing from the spirit of the invention.

In the accompanying drawings:

Fig. 1 shows in top plan, a device constructed in accordance with the invention, parts being broken away, and parts being in section;

Fig. 2 is a section on the line 2—2 of Fig. 1;

Fig. 3 is a fragmental radial section, taken approximately on the line 3—3 of Fig. 1;

Fig. 4 is a section similar to Fig. 3, but showing a modification;

Fig. 5 is a fragmental horizontal section disclosing the means whereby the pontoons are connected to the shell of a tank for vertical sliding movement;

Fig. 6 is a plan showing one of the expansion joint members;

Fig. 7 is a section of the structure shown in Fig. 6.

In carrying out the invention there is provided a tank including a cylindrical body 1, having a bottom 2. The tank is shown as being provided with a conical roof 3, although whether or not such a roof is provided, is a matter left to the builder. The roof 3 is centrally supported from the bottom 2 by posts 4, joined together at their upper ends by connections 5. The bottom 2 carries supports 6 for the deck D hereinafter described, the supports preferably slanting downwardly and inwardly, slightly, to conform to the bottom of the deck.

The deck, as a whole, is marked by the letter D. It comprises a bottom 7 which slants down-

wardly and inwardly toward the geometrical center of the deck. At its perimeter, the bottom 7 of the deck D has an upstanding rim 8, shown in detail in Fig. 3. The rim 8 has an inwardly extended flange 9. As shown in Fig. 1 of the drawings, a central thimble 10 is assembled with the bottom 7 of the deck D. Arranged around the central thimble 10 are outer thimbles 11, also connected with the bottom 7 of the deck. The thimbles 10 and 11 are made of resilient metal, preferably steel, and they serve to effect expansion joints between certain parts of the structure, as will be hereinafter pointed out.

The outer thimbles 11 are connected by upstanding walls 12, arranged to form a polygon, for instance a hexagon, as shown in Fig. 1. Inner radial partitions 14 extend between the central thimble 10 and the outer thimbles 11. Outer radial partitions 15 extend between the outer thimbles 11 and the rim 8 of the deck. Other outer partitions 16 may be employed, and join the intermediate portions of the walls 12 with the rim 8 of the deck. The deck D is bouyant, and floats on the oil or other material in the tank.

Arranged in a ring around the deck D are a plurality of pontoons, denoted generally by the numeral 17. As shown in Figs. 1 and 3, each pontoon 17 comprises a bottom 18, an inner member 19 disposed opposite to the part 8 of the deck D, and radial end walls 21. The inner member 19 of each pontoon 17 is supplied with an inwardly extended flange 20, and the end walls 21 have similar flanges 22. An outwardly convexed outer wall 23 is joined to the end walls 21, and overlaps the bottom 18, as shown at 24. The wall 23 may have some resiliency. The wall 23 has sliding contact with the body 1 of the tank, and owing to the convexity of the wall 23, a tight joint is effected, without undue friction.

A means is provided whereby the space between the end walls 21 of the pontoons 17 in Fig. 1 may be sealed, and whereby the parts 21 of the adjoining pontoons may be joined together. With this end in view, upwardly arched flexible strips 25 are provided, and these strips may be made of canvas or any other suitable material. The strips 25 are attached by securing elements 26 to the inwardly extended flanges 22 of the end walls 21 of the pontoons 17.

A means is provided whereby the space between the parts 19 of the pontoons 17 and the part 8 of the deck D is sealed, and whereby the pontoons are yieldably connected to the deck D, reference being had especially to Fig. 3. The means referred to includes upwardly arched flexible strips 27, of any desired material, attached by securing elements 28 to the flange 9 of the rim 8 of the deck D, and attached by like securing elements to the flanges 20 on the inner members 19 of the pontoons 17. It will be seen

that a construction is provided whereby the escape of gas, or the entrance of rain or the like is prevented, the flexible connections between the respective pontoons 17, and the flexible connections between the pontoons 17 and the deck D being in nowise impaired.

Figures 2 and 5 show that one of the pontoons 17 is provided in its outer edge with an inwardly extended opening 29, bounded by an upstanding U-shaped rim or tube 30. An outlet 31 is secured to the body 1 of the tank, near to the bottom of the tank.

A track 49, preferably in the form of a vertical I-beam, is secured to the inner surface of the body 1 of the tank, as shown in Fig. 5. The tube 30 of one of the pontoons 17, shown in Fig. 5, has outwardly extended converging arms 50 provided with approaching forks wherein wheels 51 are journaled, and these wheels 51 move on the main flange of the I-beam or track 49.

Referring to Fig. 3, it will be observed that a means is provided whereby the pontoons 17 are moved outwardly, so that their walls 23 will maintain contact with the body 1 of the tank. Having this consideration in mind, bell crank levers 55 are provided, and there are tubes 56 on the bottom 7 of the deck D. The bell crank levers 55 include short depending arms 57 and longer horizontal, inwardly extended arms 58. The arms 57 of the bell crank levers 55 extend downwardly through the tubes 56. Weights 59 are detachably secured at 64 to the arms 58 of the bell crank levers 55. To the lower ends of the arms 57 of the bell crank levers 55, substantially horizontal links 60 are pivoted, and these links are pivoted at their outer ends to depending brackets 61 on the bottoms 18 of the pontoons 17. A glance at Fig. 3 will show that the structure last above described affords a means whereby the pontoons 17 are forced outwardly, so that their parts 23 maintain slidable contact with the body 1 of the tank.

The structure shown in Fig. 3 is capable of many modifications, one of which is shown in Fig. 4. In Fig. 4, there is a bracket 62 on the bottom 18a of each pontoon 17a, and to the bracket 62 is pivoted the outer end of a link 63, the pivotal connection between the outer end of the link 63 and the bracket 62 being designated by the numeral 68. The inner end of the link 63 carries a pivot element 65, adapted to be mounted in any one of a plurality of vertically arranged holes 66 formed in a bracket 67 carried by the bottom 7a of the deck. The link 63 slants downwardly and inwardly, and by mounting the pivot element 65 in the proper one of the holes 66 in the bracket 67, such a construction will be afforded that the part 23a of the pontoon 17a makes a proper contact with the cylindrical body 1a of the tank. In Fig. 4, parts hereinbefore described have been designated by numerals previously used, with the suffix "a".

The thimbles 19 and 11, being resilient, give the deck D some resiliency, and form expansion joints. Moreover, the thimbles 11 receive the supporting posts 4 for the roof 3 slidably, if a roof happens to be used. The flexible connections 25 between the pontoons 17, and the flexible connections 27 between the pontoons and the deck D require no explanation over and above that already given. Moreover, the operation of the structures of Figs. 3 and 4, for forcing the pontoons outwardly into contact with the shell or body of the tank calls for no description.

As the deck D moves upwardly and downwardly, the wheels 51 of Fig. 5, cooperating with the vertical track 49, guide the deck and prevent it from turning about a central axis.

The liquid in the tank can be drawn off through the outlet 31.

Having thus described the invention, what is claimed is:

1. In a device of the class described, a tank including a body, a deck in the tank, pontoons arranged about the periphery of the deck, each pontoon comprising a bottom, an inner member, substantially radial end walls, and an outer wall carried by the end walls, the outer wall having its lower end overlapped on the bottom, the outer wall being outwardly convexed, and having its convexed portion in slidable engagement with the body of the tank, and means for yieldably connecting the inner members of the pontoons with the periphery of the deck.

2. In a device of the class described, a tank, a deck in the tank and including a bottom and a rim, thimbles carried by the bottom of the deck, and including an inner thimble and outer thimbles arranged about the inner thimble, walls extended between the outer thimbles, partitions extended between the inner thimble and the outer thimbles, and partitions extended between the outer thimbles and the rim, the thimbles being resilient and facilitating expansion and contraction of the deck.

3. In a device of the class described, a tank comprising a body, a deck in the body, pontoons arranged about the periphery of the deck, vertically inclined links located below the pontoons and the deck, pivot elements connecting the ends of the links with the pontoons and with the deck, and means for adjusting the pivot element at one end of each link vertically.

4. In a device of the class described, a tank, a deck in the tank, pontoons arranged about the periphery of the deck, depending brackets carried by the pontoons and by the deck, one of the brackets having a plurality of superposed openings, and pivot elements connecting the ends of the links with the brackets, the pivot element at one end of each link being adjustably mountable in any of the openings.

5. In a device of the class described, a tank, a deck in the tank, pontoons arranged about the peripheral portion of the deck, there being a space between the inner portions of the pontoons and the peripheral portion of the deck, and there being spaces between the end portions of the pontoons, a slack flexible strip bridging the space between the inner portions of the pontoons and the peripheral portion of the deck, means for securing the strip to the inner portions of the pontoons and to the peripheral portion of the deck, slack flexible strips bridging the spaces between the end portions of adjoining pontoons, means for securing each of the last-specified strips to the end portions of adjoining pontoons, and the strips constituting hermetic closures for the spaces which they bridge.

6. A device of the class described, constructed as set forth in claim 5, in combination with means independent of the strips and connecting the pontoons with the deck, for forcing the pontoons outwardly against the tank, the last-specified means being actuated by a settling movement of the pontoons relative to the deck.