Dec. 12, 1950 J. W. STEWART 2,533,697

SUCTION BOX

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Fig. 1

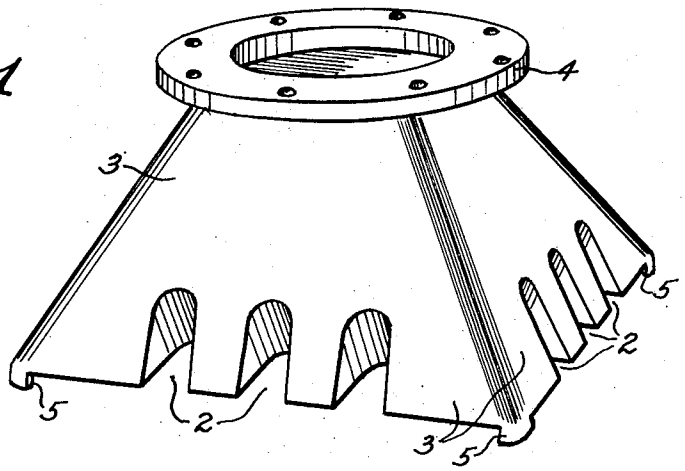

Fig. 2

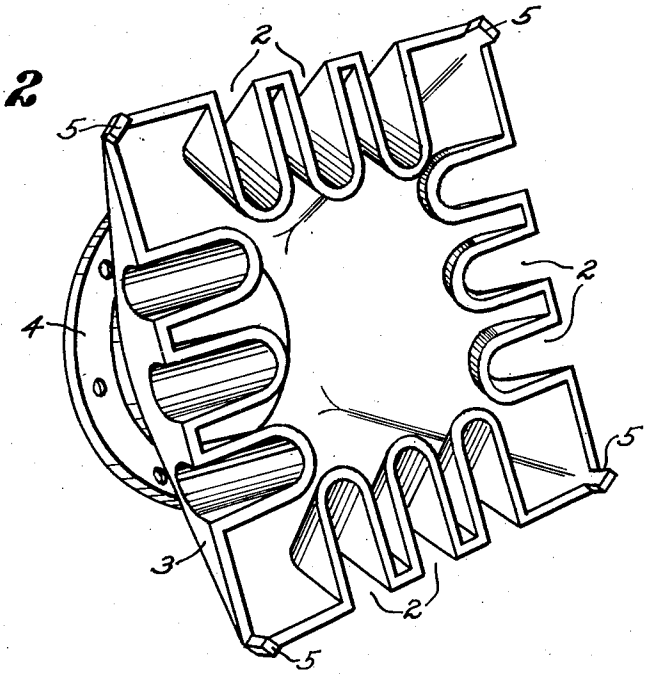

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Fig. 3

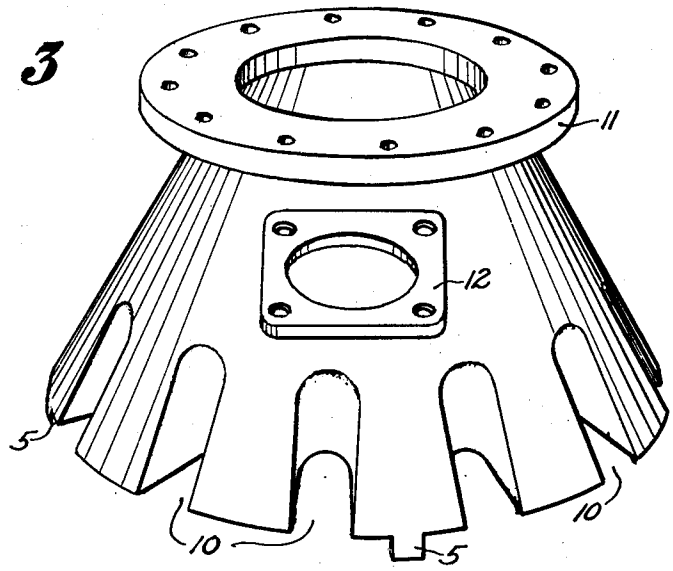
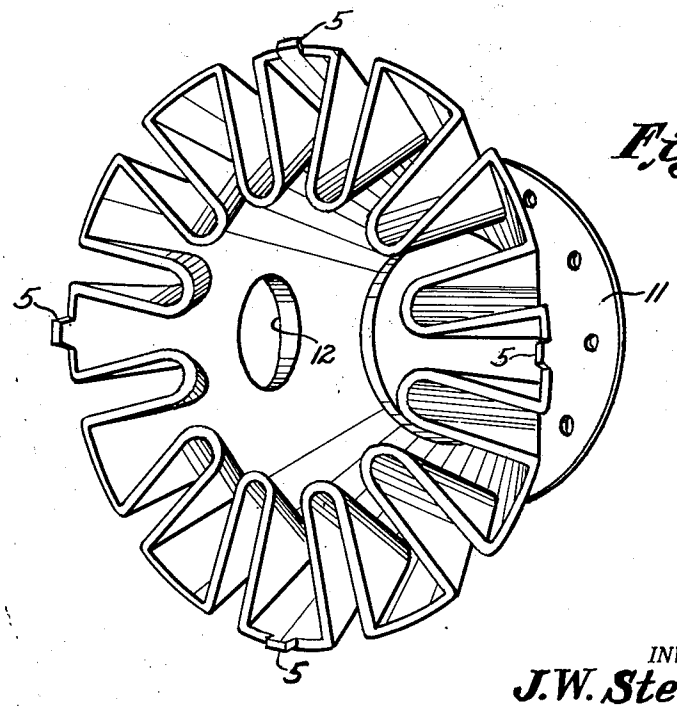


Fig. 4



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SUCTION BOX

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5 Claims. (Cl. 103—202)

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This invention relates to suction boxes which are normally used for evacuating liquids from storage tanks, said boxes normally being supported above the bottom of the tank and having an open bottom and means for attaching a suction pipe or line.

This invention more particularly is applicable in the pumping of viscous liquids, such as heavy fuel oil, crude oils, creosote, molasses, cotton seed oil, palm oil and the like, carried in seagoing tankers. Heretofore known suction boxes have had disadvantages as set out below, when so used, and the principal object of this invention is to overcome or minimize these disadvantages. It is, however, to be understood that most of these disadvantages also apply to suction boxes for use in land tanks, and therefore the invention is also applicable to such tanks.

Prior known suction boxes generally have been formed with an elongated bell mouth, and provided with a suction pipe having commonly a 10-inch diameter with a resulting circumference of approximately 31.4 inches. It is known that to obtain efficient suction over the full area of the mouth, the box must be supported or spaced from the bottom of the tank at a height at least equal to one-quarter the diameter of the pipe, that is to say not less than 2½ inches in the above example of 10-inch suction pipe. If, however, the box is supported at such a height of 2½ inches than the tank cannot be properly drained, and proper drainage can only be had if the bottom of the suction box is supported at approximately ¾ inch from the bottom of the tank. With heretofore known boxes, for a 10-inch diameter suction pipe, the circumference at the box mouth must be about 105 inches, so that the diameter becomes

$$\frac{105}{\pi}$$

but, when pumping viscous liquids, it has been found and is generally accepted practice that this figure must be one-and-a-half times to double in order to effect the desired evacuation of the tank. Thus the diameter may even have to be as great as

$$\frac{210}{\pi}$$

or approximately 70 inches. Now in seagoing tankers it would be extremely difficult if not impossible to use a suction box with a diameter at its mouth of approximately 70 inches, due to the internal construction of the tankers. The object of the present invention therefore is to provide a suction box which will have the necessary circumference (or perimeter) at its mouth, that is to say of approximately 200 inches, but the diameter of which is such that the box can be effectively employed in restricted areas such as occur in tankers.

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According to the present invention the bottom peripheral or circumferential edge of a suction box is fluted so as to provide a number of inwardly projecting pockets spaced around the edge, which pockets are open only at their bottoms and at their outward ends, the arrangement being such that a greatly increased peripheral or circumferential length, on which suction acts, is attained with a considerably reduced overall dimension or diameter of the base of the suction box.

The suction box may be either square (or rectangular) or substantially circular at the base and is preferably upwardly convergent. The suction box may be provided with a single top flange for connection to a vertically disposed suction pipe, and/or if desired with a lateral flange for connection to an angularly disposed suction pipe.

With the foregoing general statements in mind, reference is had to the accompanying drawings, forming a part of this specification, in which like numerals designate like parts in all the views, and wherein—

Fig. 1 is a perspective view of the exterior of one form of the suction box;

Fig. 2 is a perspective view of the bottom thereof; and

Figs. 3 and 4 are similar perspective views of another form of the suction box.

Referring to Figs. 1 and 2 the bottom peripheral edge of the hollow suction box is substantially square (or rectangular) and is fluted to provide a number of inwardly projecting pockets 2 spaced around the edge, which pockets are open only at their bottoms and at their outward ends, and sloped downwardly and inwardly from the top, the amount of slope being dependent upon the areas required. The sides 3 of the box slope upwardly and inwardly so that the shape of the box is substantially pyramidal, and the top of the box is shown as being provided with a flange 4 adapted in known manner to receive a vertically disposed suction pipe. The box is supported on normally provided supporting legs or feet 5.

As shown in Figs. 3 and 4 the hollow suction box is substantially cone-shaped with the bottom

of the box substantially circular, and around the circumferential edge the box is also fluted to provide the pockets 10. In this modified form of the invention, in addition to the top flange 11, the box is provided with a lateral flange 12 surrounding an aperture provided for the inspection of, or the cleaning of dirt or foreign matter from, the interior of the box, said aperture to be provided with any suitable cover (not shown but readily understood).

When using suction boxes in accordance with this invention, as applied to sea-going tankers or other vessels, and for pumping viscous liquids, one suction box can be positioned in each port tank and another box in each starboard tank, the box in a port tank being coupled through one suction pipe to the vessel's main port side suction line, whilst the box in a starboard tank is coupled through another suction pipe to the vessel's main starboard suction line, the said suction pipes from the boxes being valved. Also it is contemplated that a suction box can be employed in a starboard (or port) tank with similar valved pipes running to either or both of the main port and starboard suction lines. Thus it will be understood that if, for example, one type of viscous liquid is stored in a pair of adjacent port and starboard tanks, and a different type of viscous liquid is stored in another pair of adjacent port and starboard tanks, the two different viscous liquids can be evacuated from their tanks simultaneously without causing mixture of the liquids because, for example, the main port suction line can be in suction communication with the suction boxes in one pair of adjacent port and starboard tanks, whilst the main starboard suction line can be in suction communication with the suction boxes in the other pair of adjacent port and starboard tanks; hence various combinations of hook-ups are possible, to meet practically all liquid evacuation problems.

It will be apparent that only one connecting flange such as 4 may be provided on the suction box, and that it would preferably be arranged at the top of the box for connection with a vertically disposed suction pipe. However, it is contemplated that such a flange could be arranged on one or more of the sides of the box for connection with an angularly disposed suction pipe, said laterally arranged flange serving as a substitute for, or in addition to, the top flange.

Suction boxes constructed in accordance with the present invention are supported by the normally provided supporting legs 5 at a height of ¾ inch from the bottom of the tank. With a 10-inch suction pipe and a substantially circular base, the diameter of the mouth of the box is approximately 24 inches and, in view of the pockets or fluted formation, a total perimetric length of approximately 290 inches is provided, thus attaining the desired suction area with a considerably reduced diameter of suction box. The same is correspondingly true of the rectangularly formed suction box.

It is obvious that those skilled in the art may vary the details of construction and arrangements of parts without departing from the spirit of this invention, wherefore it is desired not to be limited to the exact foregoing disclosure except as may be required by the claims.

What is claimed is:

1. A suction box for evacuating liquids from storage tanks, comprising upwardly and inwardly converging side walls, a plurality of feet for supporting said box upon the floor of a storage tank with the lower edges of said walls spaced from the tank floor, and a plurality of inwardly projecting pockets formed in the lower edge of said walls, each pocket being open only at its bottom and at its outward end.

2. A suction box for evacuating liquids from storage tanks, comprising side walls, the bottom peripheral edge portion of said walls being fluted to provide a plurality of inwardly projecting pockets spaced around the said edge, each pocket being open only at its bottom and at its outward end, and a plurality of feet for supporting said box upon the floor of a storage tank with the lower edges of said walls spaced from the tank floor.

3. A suction box for evacuating liquids from storage tanks, comprising side walls, the bottom peripheral edge portion of said walls being fluted to provide a plurality of inwardly projecting pockets spaced around the said edge, each pocket being open only at its bottom and at its outward end, said box provided with a flange adapted to receive a suction pipe, and a plurality of feet for supporting said box upon the floor of a storage tank with the lower edges of said walls spaced from the tank floor.

4. A suction box for evacuating liquids from storage tanks, comprising side walls, the bottom peripheral edge portion of said walls being fluted to provide a plurality of inwardly projecting pockets spaced around the said edge, each pocket being open only at its bottom and at its outward end, each of said pockets sloping downwardly and inwardly from the top of the pocket, the amount of slope being dependent upon the area of pocket required, and a plurality of feet for supporting said box upon the floor of a storage tank with the lower edges of said walls spaced from the tank floor.

5. A suction box for evacuating liquids from storage tanks, comprising side walls, the bottom peripheral edge portion of said walls being fluted to provide a plurality of inwardly projecting pockets spaced around the said edge, each pocket being open only at its bottom and at its outward end, said box provided with a flange adapted to receive a suction pipe, each of said pockets sloping downwardly and inwardly from the top of the pocket, the amount of slope being dependent upon the area of pocket required, and a plurality of feet for supporting said box upon the floor of a storage tank with the lower edges of said walls spaced from the tank floor, whereby a greatly increased peripheral length on which suction acts is attained with a considerably reduced crosswise dimension of the base of the suction box.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
936,222	Dalzell	Oct. 5, 1909
969,997	Thiem	Sept. 13, 1910
1,192,409	Frame	July 25, 1916
2,023,586	Harrod	Dec. 10, 1935
2,078,101	Schmermund	Apr. 20, 1937