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2,424,722

JET FOR TANKS AND THE LIKE

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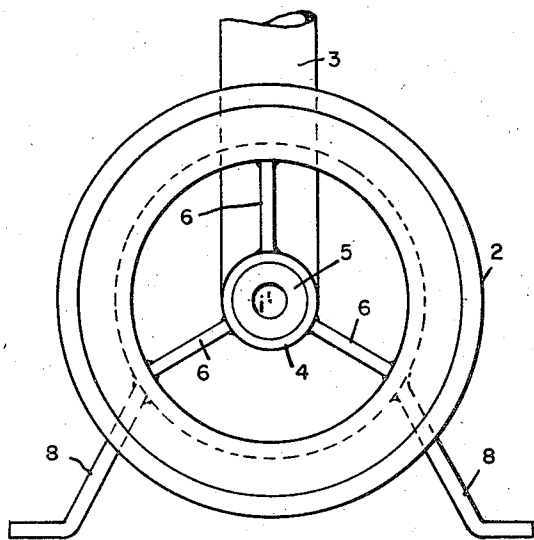


Fig. 2

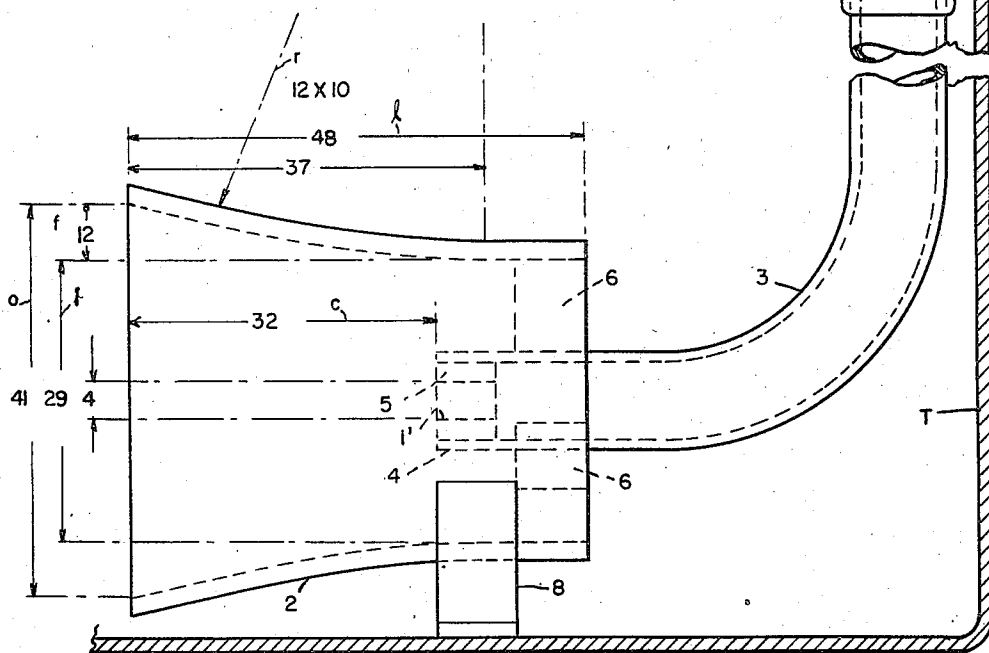


Fig. 1

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JET FOR TANKS AND THE LIKE

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Injector jets, as in pickling tanks, ore digestion, sludge acid treating, etc., particularly where steam is the gasiform fluid injected in contact with the liquid, tend to occasion more or less "hammering." This is always objectionable on account of the noise, and is detrimental and in many cases destructive to the piping and tank equipment. In accordance with the present invention, however, a construction may be had which eliminates "hammering," and which in general is particularly durable, even with liquids of highly corrosive character.

To the accomplishment of the foregoing and related ends, the invention, comprises the features of construction set out in the following description, the annexed drawing and the accompanying description including but one of the various forms in which the principle of the invention may be employed.

In the said annexed drawing:

Fig. 1 is a side elevational view showing the apparatus embodying the invention, as set up in the tank indicated in fragmentary section; and

Fig. 2 is an end elevational view.

Customarily, devices of this character have been made of castings, particularly lead, and have necessarily from that fact been conformed to proportions and shaping which have been detrimental in respect to efficiencies of liquid flow distribution, and the structures have been particularly subject to crystallization and breakage. In the present invention, the device is formed along lines which we have found to especially meet requirements of hydraulic flowage and at the same time the construction may be made especially durable against corrosive action of liquids with which it may be applied. Thus, with a bell member 2 shaped, as by welding, from sheet stock or plate of Monel, stainless steel or other weldable corrosion-resistant metal selected for the particular application, as by welding, there is assembled a center jet member made up of a pipe 3 which terminates in the nozzle 4 having a choke 5 through which the gasiform fluid or steam has its inlet. The nozzle and bell are connected by equi-spaced webs 6 which are radially arranged, and which extend for a distance axially of the assemblage at the rear or end 7 of the open bell member 2. If the bell be shaped to a flare proportion such that the flare f , i. e., the difference between the outlet diameter o of the bell and the internal diameter i is in the ratio of 12 to the flaring length of 37, particularly efficient and quiet operation is obtained. The precise dimensions of the bell may be as desired in view of size of equipment, but whether in terms of a selected fraction of an inch or a centimeter or whatever is adopted, the proportion is desirable as stated. The outward flare of the bell is on an external arc whose

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radius r is ten times the flare f or 12. A further feature making for increased efficiency is the ratio of the diameter of the center fluid inlet i' to the bell outlet o , this being about 4:41. It is desirable also generally to set a ratio of the clearance or length c in front of the center fluid inlet i' in relation to the total bell length l as 32:48, the same standards of measurement adopted being maintained throughout all of the various ratios indicated. With such construction, in operation the central jet bodily propels the liquid in the bell forwardly in uninterrupted smooth pumping action, and depending upon where the device is installed such action thus may forward liquid as desired, and when installed in the general manner as the device in Patent No. 2,008,853, it provides a particularly active circulation in a pickling tank, etc.

On the outside of the bell near its smaller end there may be supporting lugs 8 which permit support or attachment on the floor or wall of the tank or the like which is equipped. Covering the inlet pipe 3, at least a good part of its length, where corrosive or acid liquids are encountered, and especially at the surface of such liquid as where the liquid level is rapidly fluctuated from boiling, etc., a coating 9 may be provided such as wiped lead, tin, or other material for additional corrosion resistance.

Depending upon the particular conditions of usage, the device may be mounted at the bottom of the tank, as shown, or it may be suspended in the liquid or be positioned against the tank wall. In any case, the structure, by its relatively thin walled form and preferred ratios of proportioning, allows an especially effective functioning in pickling sheet metal, dissolving lump chemicals, treating ores, etc., and durability and long life has particularly characterized the construction, along with its efficiency and quietness of operation.

Other modes of applying the principle of the invention may be employed, change being made as regards the details described, provided the features stated in any of the following claims or the equivalent of such be employed.

We therefore particularly point out and distinctly claim as our invention:

1. In a device of the character described, an open bell of welded Monel plate and a feed pipe entering the bell and ending in a coaxial center nozzle fluid inlet, an acid-proof covering on said pipe for at least part of its length, external support lugs on the rear portion of the bell, equi-spaced radial webs along said center nozzle between said nozzle and the adjacent end of the bell, said bell having ratio of the difference between outlet diameter and smallest internal diameter to the length from outlet to point of smallest internal diameter about 12:37 and on an

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external arc of radius 10 times the difference between outlet diameter and smallest internal diameter, and the ratio of the center fluid inlet to the diameter of the bell outlet being about 4:41, and the ratio of the distance from the outlet of the center nozzle to the outlet of the bell being to the bell length as about 32:48.

2. In a device of the character described, an open bell of welded Monel plate and a feed pipe entering the bell and ending in a coaxial center nozzle fluid inlet, external support lugs at the rear portion of the bell, equi-spaced radial webs along said center nozzle between said nozzle and the adjacent end of the bell, said bell having ratio of the difference between outlet diameter and smallest internal diameter to the length from outlet to point of smallest internal diameter about 12:37 and on an external arc of radius 10 times the difference between outlet diameter and smallest internal diameter, and the ratio of the center fluid inlet to the diameter of the bell outlet being about 4:41, and the ratio of the distance from the outlet of the center nozzle to the outlet of the bell being to the bell length as about 32:43.

3. In a device of the character described, an open bell of welded Monel plate and a feed pipe entering the bell and ending in a coaxial center nozzle fluid inlet, external support lugs at the rear portion of the bell, equi-spaced radial webs along said center nozzle between said nozzle and the adjacent end of the bell, said bell having ratio of the difference between outlet diameter and smallest internal diameter to the length from outlet to point of smallest internal diameter about 12:37 and on an external arc of radius 10 times the difference between outlet diameter and smallest internal diameter, and the ratio of the diameter of the center fluid inlet to the diameter of the bell outlet being about 4:41.

4. In a device of the character described, an open bell of welded Monel plate and a feed pipe entering the bell and ending in a coaxial center nozzle fluid inlet, external support lugs at the rear portion of the bell, equi-spaced radial webs along said center nozzle between said nozzle and the adjacent end of the bell, said bell having ratio of the difference between outlet diameter and smallest internal diameter to the length from outlet to point of smallest internal diameter about 12:37 and on an external arc of radius 10 times the difference between outlet diameter and smallest internal diameter.

5. In a device of the character described, an open bell of welded plate and a feed pipe entering the bell axially without transverse obstruction at the back and ending in a coaxial center nozzle fluid inlet, a corrosion-resistant covering on said pipe for at least part of its length, external support lugs at the rear portion of the bell, and equi-spaced radial webs symmetrical in the current along said center nozzle between said nozzle and the adjacent end of the bell, the ratio of the distance from the outlet of the center nozzle to the outlet of the bell being to the bell length as about 32:48.

6. In a device of the character described, an open bell of corrosion-resisting sheet metal and a feed pipe entering the bell and ending in a coaxial center nozzle fluid inlet, a covering on said pipe for at least part of its length, equi-spaced radial webs along said center nozzle between said nozzle and the adjacent end of the bell, said bell having ratio of the difference between outlet di-

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ameter and smallest internal diameter to the length from outlet to point of smallest internal diameter about 12:37 and on an external arc of radius 10 times the difference between outlet diameter and smallest internal diameter, and the ratio of the diameter of the center fluid inlet to the diameter of the bell outlet being about 4:41.

7. In a device of the character described, an open bell of corrosion-resisting sheet metal and a feed pipe entering the bell and ending in a coaxial center nozzle fluid inlet, equi-spaced radial webs along said center nozzle between said nozzle and the adjacent end of the bell, said bell having ratio of the difference between outlet diameter and smallest internal diameter to the length from outlet to point of smallest internal diameter about 12:37 and on an external arc of radius 10 times the difference between outlet diameter and smallest internal diameter.

8. In a device of the character described, an open bell of welded plate and a feed pipe entering the bell and ending in a coaxial center nozzle fluid inlet, external support lugs at the rear portion of the bell, equi-spaced radial webs along said center nozzle between said nozzle and the adjacent end of the bell, said bell having ratio of the difference between outlet diameter and smallest internal diameter to the length from outlet to point of smallest internal diameter about 12:37 and on an external arc of radius 10 times the difference between outlet diameter and smallest internal diameter, and the ratio of the diameter of the center fluid inlet to the diameter of the bell outlet being about 4:41.

9. In a device of the character described, an open bell of welded plate and a feed pipe entering the bell and ending in a coaxial center nozzle fluid inlet, external support lugs at the rear portion of the bell, equi-spaced radial webs along said center nozzle between said nozzle and the adjacent end of the bell, said bell having ratio of the difference between outlet diameter and smallest internal diameter to the length from outlet to point of smallest internal diameter about 12:37 and on an external arc of radius 10 times the difference between outlet diameter and smallest internal diameter.

10. In a device of the character described, an open bell of corrosion-resisting sheet metal and a feed pipe entering the bell axially without transverse obstruction at the back and ending in a coaxial center nozzle fluid inlet, and radial web support means symmetrical in the current between said center nozzle and the adjacent end of the bell, the ratio of the distance from the outlet of the center nozzle to the outlet of the bell being to the bell length as about 32:48.

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REFERENCES CITED

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

UNITED STATES PATENTS

Number	Name	Date
1,960,013	Jacobsen	May 22, 1934
2,008,853	Dietzel	July 23, 1935

FOREIGN PATENTS

Number	Country	Date
386,876	Great Britain	1933