Jan. 20, 1959 G. O. VERCH 2,869,940

LADLE

Filed March 2, 1956 3 Sheets-Sheet 1

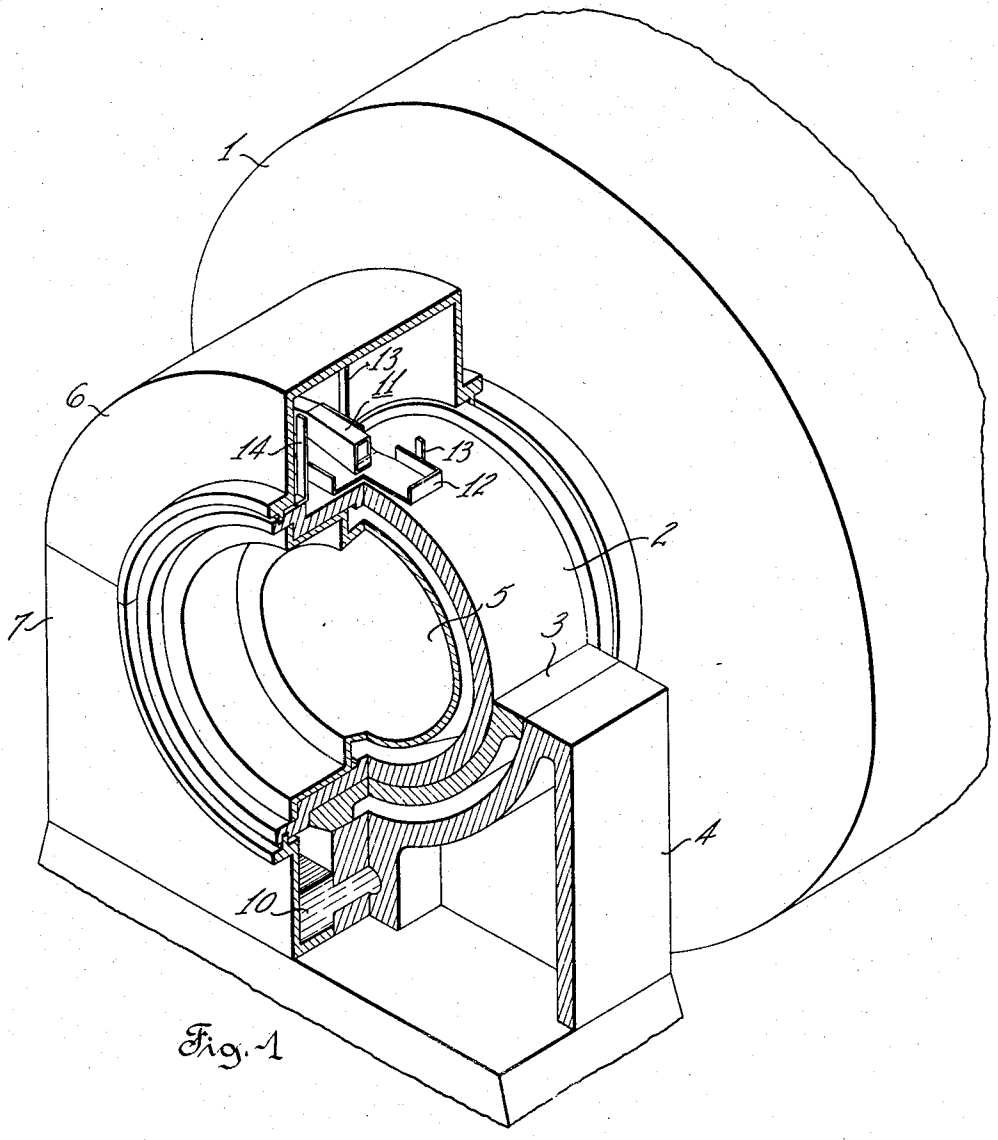


Fig. 1

Inventor
George O. Verch
by Arthur M. Streich
Attorney

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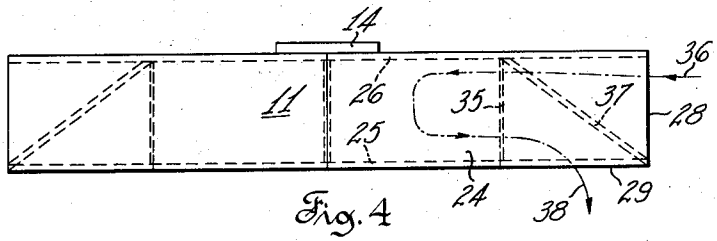


Fig. 4

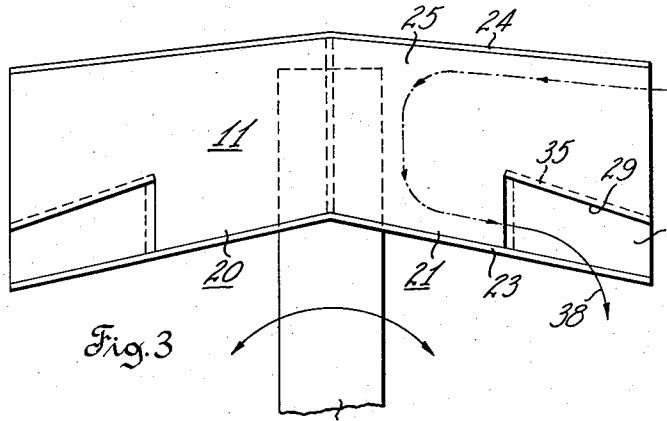


Fig. 3

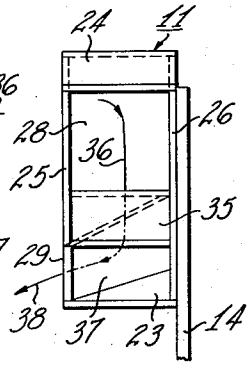


Fig. 5

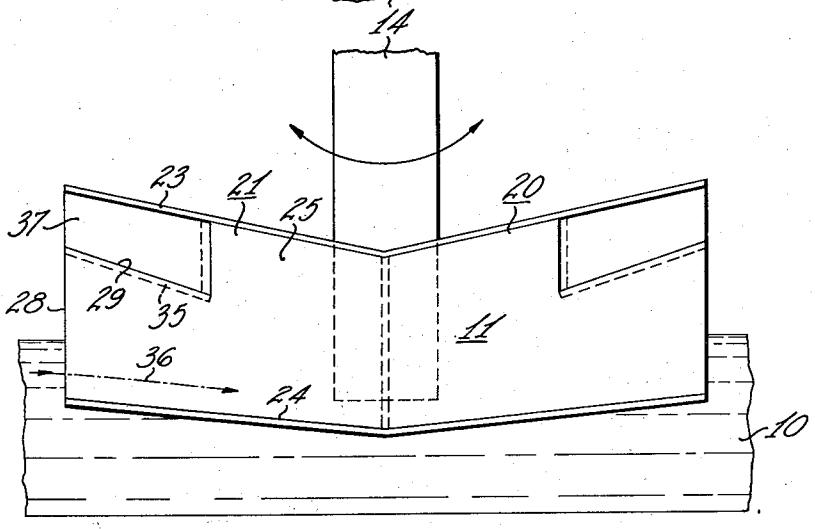


Fig. 2

Inventor
George O. Verch
by Arthur M. Streich
Attorney

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LADLE

Filed March 2, 1956 3 Sheets-Sheet 3

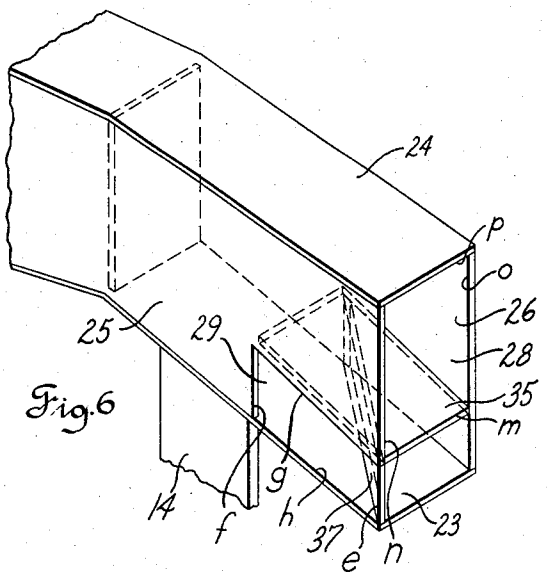


Fig. 6

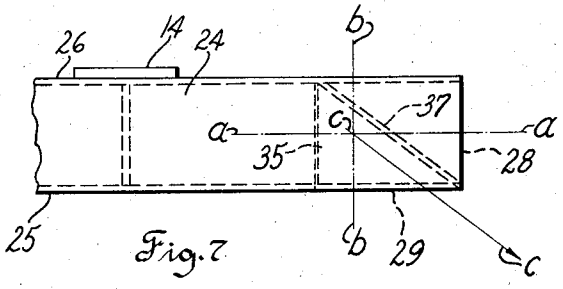


Fig. 7

Inventor
George O. Verch
by Arthur M Streich
Attorney

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LADLE

George O. Verch, West Allis, Wis., assignor to Allis-Chalmers Manufacturing Company, Milwaukee, Wis.

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7 Claims. (Cl. 308—127)

This invention relates to a ladle of a new and improved design particularly adaptable for attachment to a rotating member for scooping a fluid such as lubricating oil from a reservoir beneath a rotating member and pouring the fluid at a level above the rotating member.

Machines such as cylindrical grinding mills are supported for rotational movement by a trunnion on each end of the mill cylinder. Each trunnion is supported by a semicircular bearing supported by a base. Since material to be ground in a grinding mill is often fed to the interior of the mill through a central opening in the trunnion, the greater capacity of a mill, the larger must be the trunnion in order to provide a central opening of sufficient size to admit the desired quantity of material to the grinding mill. According to the teachings of the prior art the surfaces of the trunnions and bearings were often lubricated with oil taken from a reservoir beneath the bearing by a ladle. The ladle is usually attached to the trunnion to rotate with the trunnion. As the trunnion rotates the ladle dips into the reservoir and scoops up a quantity of oil which when the ladle reaches the upper portion of its travel around the trunnion, the ladle is inverted and the oil is poured from the ladle into a pan mounted above the trunnion. The oil then runs from the pan onto the top surface of the trunnion and as the trunnion rotates the oil is carried around the trunnion and between the trunnion and bearing to prevent metal to metal contact between the trunnion and bearing. The ladle utilized in the past consisted of an arm for attaching the ladle to the trunnion and a cup like member for scooping the oil out of the reservoir and pouring it into the distributing pan. This cup like structure comprised a wall member partially enclosing a fluid confining space having a single opening serving as both an inlet and an outlet opening for the space within the cup like member. It has been discovered, however, that such a simple ladle was not capable of delivering sufficient oil to a distribution pan to satisfy the requirements for bearings larger than about forty-four inches in diameter. When it was attempted to use such a simple ladle with bearings of fifty-four and sixty-four inches in diameter it was found that as the ladle was carried by the trunnion from the reservoir upwardly oil spilled out of the ladle before it reached the top of its swing and so much oil spilled from the ladle that when the ladle passed over the distribution pan there was no longer enough oil in the ladle to satisfy the requirements of such large sized trunnion bearings.

According to the present invention premature spilling of the oil from the ladle is reduced by providing a ladle with wall means defining a separate inlet and outlet opening and with a baffle arranged between the two openings to prevent oil taking the shortest possible path from the inlet opening to the outlet opening. The time interval required for the oil to find its way from the inlet opening to the outlet opening is thereby increased. The spilling

of the oil from the ladle is therefore delayed so that the ladle has a better chance of being carried to a position over the distribution tray before oil begins to spill from the ladle.

In addition to delaying the oil being poured from the ladle until the ladle is over the distribution tray, the present invention also provides for rapid emptying of the ladle while the ladle is over the distribution tray so that the ladle pours the maximum amount of oil into the distribution tray before it passes beyond the distribution tray. To insure this rapid discharge of oil into the distribution tray, the outlet opening is arranged so that the opening defines a plane that intersects with the plane of the inlet opening rather than having the inlet and outlet openings in the same plane. By having the inlet and outlet openings in different and intersecting planes, the size of the outlet opening may be increased to insure rapid pouring of oil from the ladle. If the discharge opening were to be in the same plane as the inlet opening the discharge opening could not be larger than the total area of the ladle in that plane minus the area circumscribed by the inlet opening. On the other hand with the outlet opening in a plane other than the plane defined by the inlet opening the area circumscribed by the inlet opening plus the area circumscribed by the outlet opening may be greater than the total area circumscribed by the wall structure of the ladle lying in the plane of the inlet opening.

It is also within the nature of the present invention that in addition to the first baffle which prevents oil taking a short path from inlet to outlet a second baffle is provided between the first baffle and the outlet opening to direct the discharge of fluid from the ladle through the discharge opening in a stream that diverges from the path taken by liquid passing through said inlet opening to the space within the ladle. It is therefore not absolutely necessary that the ladle pass over the oil distributing pan in order to insure the oil being poured into the pan. With the stream diverging from the plane in which the ladle rotates the ladle may pass next to rather than over the distributing pan and the oil will pour out of the ladle into the distributing pan even though the ladle does not pass over the distributing pan.

It is therefore an object of the present invention to provide a new and improved ladle particularly adapted for attachment to a rotating member for scooping oil from a reservoir beneath the rotating member and pouring the oil into an oil distributing device above the rotating member to thereby make the oil available above the rotating member for lubrication of the member by gravity feed.

Another object of this invention is that the ladle shall be of such new and improved construction that will increase the time interval for oil to find its way out of the ladle and thereby reduce premature spilling of the oil before the ladle is in a position to pour the oil into the oil distributing device.

Another object of this invention is that the ladle shall be of such new and improved construction that the ladle will empty quickly once it has reached a position over the distributing device so that the ladle pours the maximum amount of oil into the device before it passes beyond the device.

And another object of the invention is that the ladle shall be of such new and improved construction that oil will pour from the ladle in a stream that diverges from the plane of rotation of the ladle so that the ladle can pour oil into a device even though the ladle does not pass directly over the device.

Objects and advantages other than those above set forth

will be apparent as the description of the invention proceeds.

In the drawings:

Fig. 1 is a view of one end of a grinding mill with portions of a trunnion bearing assembly cut away to show how the present invention may be applied to such a machine;

Fig. 2 is a side view of a ladle embodying the present invention with the ladle shown as it passes through an oil reservoir to scoop oil from the reservoir;

Fig. 3 is a side view of the ladle shown in Fig. 2 after it has been rotated 180° to an upside down position in which the oil will pour out of the ladle;

Fig. 4 is a top view of the ladle shown in Fig. 3;

Fig. 5 is an end view of the ladle shown in Fig. 3;

Fig. 6 is an isometric view of the ladle shown in Fig. 3, with a portion broken away; and

Fig. 7 is a top view of the ladle shown in Fig. 3, with a portion broken away, depicting the directional axis of oil flow diverging from the outlet of the ladle.

Referring to Fig. 1 a portion of one end of a grinding mill is shown having a revolvable cylinder 1 supported by a trunnion 2 that is journaled in a semicircular bearing 3 which is in turn supported by a base 4. Trunnion 2 has a central opening 5 communicating with the interior of the cylinder 1. A bearing protective assembly comprising cover members 6 and 7 enclose a space around trunnion and bearing assembly. A lubricating oil reservoir 10 is provided which may be defined by the cover member 7 and base member 4. A ladle 11 is provided to transfer lubricating oil from the reservoir 10 to a device such as an oil distributing pan 12 mounted above trunnion 2 in some manner such as by the supporting arms 13 connected to the cover member 6. The ladle 11 is connected to trunnion 2 by a mounting arm 14. The ladle 11 is attached to the trunnion 2 to rotate with the trunnion. As shown in Fig. 1 the ladle 11 is in its uppermost position which places the ladle in an upside down position for pouring oil from the ladle into the distributing pan 12. As the cylinder 1 and trunnion bearing 2 rotate ladle 11 will be carried around the circumference of a circle that is concentric with the trunnion 2 and ladle 11 will be dipped into reservoir 10 to scoop up a quantity of oil to be poured into pan 12. The oil deposited in pan 12 will in turn be gravity fed to the top of trunnion 2 and run down the external surface of the trunnion and flow between trunnion 2 and bearing 3 to prevent metal to metal contact therebetween.

The construction of the ladle 11 is shown in detail in Figs. 2 through 5. The ladle illustrated in these figures is a bi-directional ladle comprising a pair of ladle structures 20 and 21. For a machine that will always rotate in but one direction, of course only one of these structures will be necessary. The two ladle structures 20 and 21 may be made identical to each other so that the ladle 11 operates in exactly the same manner no matter which direction the mill and trunnion 2 rotate. Referring in particular to the ladle structure 21 this structure has wall means partially enclosing a fluid confining space. The wall means include a top wall member 23 and a bottom wall member 24 spaced apart from each other by a pair of spaced side walls 25, 26. The mounting arm 14 is connected to the ladle 11 and projects outwardly from the top wall member 23. Baffle means are inserted within the space enclosed by the wall means. The baffle means include a first baffle 35 extending between side walls 25 and 26. As shown in Fig. 6, baffle 35 is positioned so its edge *m*, and edges *n*, *o* and *p*, of side walls 25, 26 and bottom wall member 24, respectively, define an inlet opening 28. In Fig. 5, baffle 35 along with portions of the bottom wall member 24 and the side walls 25, 26 cooperate to define an inlet channel 36 from the inlet opening 28 to the interior of the ladle. A second baffle 37, as shown in Fig. 6, extends between baffle 35 and top wall member 23, and sidewalls 25 and 26. Baffle 37 is positioned so its edge *e* and edges *f*, *g* and *h*, of side wall 25 and the top wall member 23 respectively, define an outlet opening 29 in side wall 25.

Baffle 35 is positioned between the inlet opening 28 and the outlet opening 29. Baffle 37 is arranged at a divergent angle to side walls 25 and 26, so that a portion of top wall member 23 and baffle 35 combines with baffle 37 to define an outlet channel 38 leading from the interior of the ladle to the outlet opening 29.

The planes defined by the edges *m*, *n*, *o*, *p*, circumscribing the inlet opening 28; and edges *e*, *f*, *g*, *h*, circumscribing the outlet opening 29 intersect with each other along a line coincident with the edge *e* that is parallel to the mounting arm 14. In the preferred embodiment of this invention these planes are perpendicular to each other so that the outlet opening 29 opens in a direction 90° from the inlet opening 28 for reasons that will appear as the description of this invention proceeds.

Fig. 7 shows the perpendicular axes of the planes defined by the edges of the inlet and outlet openings, *aa* the perpendicular axis of plane *m*, *n*, *o*, *p* and *bb* the perpendicular axis of plane *e*, *f*, *g*, *h*. The direction al axis *cc* diverging from axes *aa* and *bb* represents the flow of the stream of oil passing through outlet channel 38 and outlet opening 29.

The operation of the described device in an installation such as shown in Fig. 1 is as follows. Assuming the device shown in Fig. 2 is rotated about an axis clockwise, the ladle 21 will scoop into lubricating oil within the reservoir 10 and lubricating oil will enter inlet opening 28 and flow through the inlet channel 36 to fill a portion of the interior of the ladle structure 21. When the device has been rotated 180° to the position shown in Fig. 3, the top wall 23 will now be beneath the bottom wall 24 and the lubricating oil within the ladle 21 will fall by reason of gravity to the now lower top wall 23. The baffles 35 and 37 will in this position prevent the lubricating oil going out the way it came in, that is through the inlet channel and the inlet opening 28. The baffle 37 will direct the flow of lubricating oil through the outlet channel 38 and the outlet opening 29. Lubricating oil will pour from the opening 29 in a stream having a directional axis diverging from side wall 25 and the plane in which the ladle is rotated. As the ladle structure 21 is rotated around the central axis of a trunnion bearing, as shown in Fig. 1, the foregoing will be repeated to continuously deliver lubricating oil from the reservoir 10 to the distribution pan 12.

With the construction herein described the baffle 35 prevents lubricating oil taking the shortest path from the inlet opening to the outlet opening. The lubricating oil must follow a generally U-shaped path around the baffle 35 to get from the inlet opening 28 to the outlet opening 29, thus increasing the time that the lubricating oil is within the confines of the ladle structure and reducing premature spilling of lubricating oil from the ladle before the ladle begins to pass over the distribution tray 12. Furthermore, since the outlet opening is not in the same plane as the inlet opening, the area of the outlet opening 29 is not limited in any way by the area of the inlet opening 28. The outlet opening 29 may therefore be made as large as is necessary to insure rapid spilling of oil from the ladle once the ladle does begin its pass over the tray and insure the ladle emptying itself before passing beyond the distribution tray 12. And baffle 37 in guiding the discharge of oil to the outlet opening 29 and forming the discharge channel 38 directs the stream pouring from the ladle in a direction diverging from the ladle. It is therefore not necessary that the ladle pass over the oil distribution pan 12 but rather the ladle may merely pass the edge of the distribution pan 12 and still pour oil from the ladle over the adjacent edge of the pan edge into the interior of the pan.

From the foregoing it will be apparent to those skilled in the art that the illustrated embodiment of the inven-

tion provides an improved means for delivering lubricating oil from a reservoir beneath a bearing to an oil distributing structure above the bearing. On the other hand, it will also be obvious to those skilled in the art that the illustrated embodiment of the invention may be variously changed and modified or features thereof embodied in other combinations and for other uses than those illustrated without sacrificing or departing from the spirit of the invention or sacrificing all of the advantages thereof. The disclosure herein, therefore, is illustrative only and the invention is not limited thereto.

It is claimed and desired to secure by Letters Patent:

1. A ladle having wall and baffle means partially enclosing a fluid confining space and having edges defining an inlet and an outlet opening, a mounting arm connected to said wall means and projecting outwardly therefrom, said edges further defining a pair of planes intersecting along a line parallel to said mounting arm, and said baffle means positioned between said wall means separating said inlet and outlet openings and defining an inlet channel and an outlet channel communicating with said space.

2. A ladle having wall and baffle means partially enclosing a fluid confining space and having edges defining an inlet and an outlet opening, said edges further defining a pair of intersecting planes, and said baffle means positioned between said wall means including a first baffle extending between said inlet and outlet openings and said wall means defining a separate inlet channel and outlet channel communicating with said space, and a second baffle extending between said first baffle and said wall means to direct fluid through said outlet channel and out said outlet opening in a stream having a directional axis diverging from a pair of axes each of which is perpendicular to one of said pair of planes.

3. A ladle having wall and baffle means partially enclosing a fluid confining space and having edges defining an inlet and an outlet opening, a mounting arm connected to said wall means and projecting outwardly therefrom, said edges further defining a pair of planes intersecting along a line parallel to said mounting arm, and said baffle means positioned between said wall means including a first baffle extending between said inlet and outlet openings and said wall means defining a separate inlet channel and outlet channel communicating with said space, and a second baffle extending between said first baffle and said wall means to direct fluid through said outlet channel and out said outlet opening in a stream having a directional axis diverging from a pair of axes each of which is perpendicular to one of said pair of planes.

4. A ladle having wall and baffle means partially enclosing a fluid confining space said wall means including a top and bottom wall member spaced apart from each other by side wall means, a mounting arm connected to said wall means and projecting outwardly from said top wall member, said side wall means, said bottom wall member and said baffle means having edges defining an inlet opening and said said wall means said top wall member and said baffle means having edges defining an outlet opening, said edges circumscribing said openings defining a pair of planes intersecting along a line parallel to said mounting arm, and said baffle means positioned between said wall means including a first baffle extending between said inlet and outlet openings and said wall means defining a separate inlet channel and outlet channel communicating with said space, and a second baffle extending between said first baffle and said top wall member to direct fluid through said outlet channel and out said outlet opening in a stream when said ladle is in an upside down position, said stream having a directional axis diverging from a pair of axes each of which is perpendicular to one of said planes.

5. A ladle having wall means including a top and bottom wall member spaced apart from each other by a pair of side walls; baffle means positioned between said wall means, said wall and baffle means partially enclosing a fluid confining space; a mounting arm connected to said wall means and projecting outwardly from said top wall member; said side walls, said bottom wall member and said baffle means having edges defining an inlet opening to said space, one of said side walls, said top wall member and said baffle means having edges defining an outlet opening in said one side wall, said baffle means including a first baffle extending from one of said side walls to the other of said side walls and between the inlet and outlet openings for said space, and said baffle means including a second baffle extending between said first baffle and said top wall member, said baffle means thereby defining a separate inlet channel and an outlet channel connecting said inlet opening and said outlet opening with said space.

6. A bi-directional ladle having wall means including a top and bottom wall member spaced apart from each other by spaced side walls; baffle means positioned between said wall means, said wall and baffle means partially enclosing a pair of fluid confining spaces; a mounting arm connected to said wall means and projecting outwardly from said top wall member; said side walls, said bottom wall member and said baffle means having edges defining an inlet opening to each of said spaces; one of said side walls, said top wall member and said baffle means having edges defining a pair of outlet openings in said one side wall, one of said pairs of outlet openings for each of said spaces; said baffle means within each of said spaces including a first baffle extending from one of said side walls to the other of said side walls and between the inlet and outlet openings for its respective space, and each of said baffle means including a second baffle extending between said first baffle and said top wall member, said baffle means thereby defining a separate inlet channel and an outlet channel connecting one of said inlet openings and one of said outlet openings with each of said spaces.

7. A ladle having wall and baffle means partially enclosing a fluid confining space and having edges defining an inlet and an outlet opening, a mounting arm connected to said wall means and projecting outwardly therefrom, a pair of said edges of said inlet and outlet openings further defining a pair of intersecting planes, said baffle means positioned between said wall means separating said inlet and outlet openings and defining an inlet channel and an outlet chanel commuicating with said space.

References Cited in the file of this patent

UNITED STATES PATENTS

53,190 Scott ---------- Mar. 13, 1866