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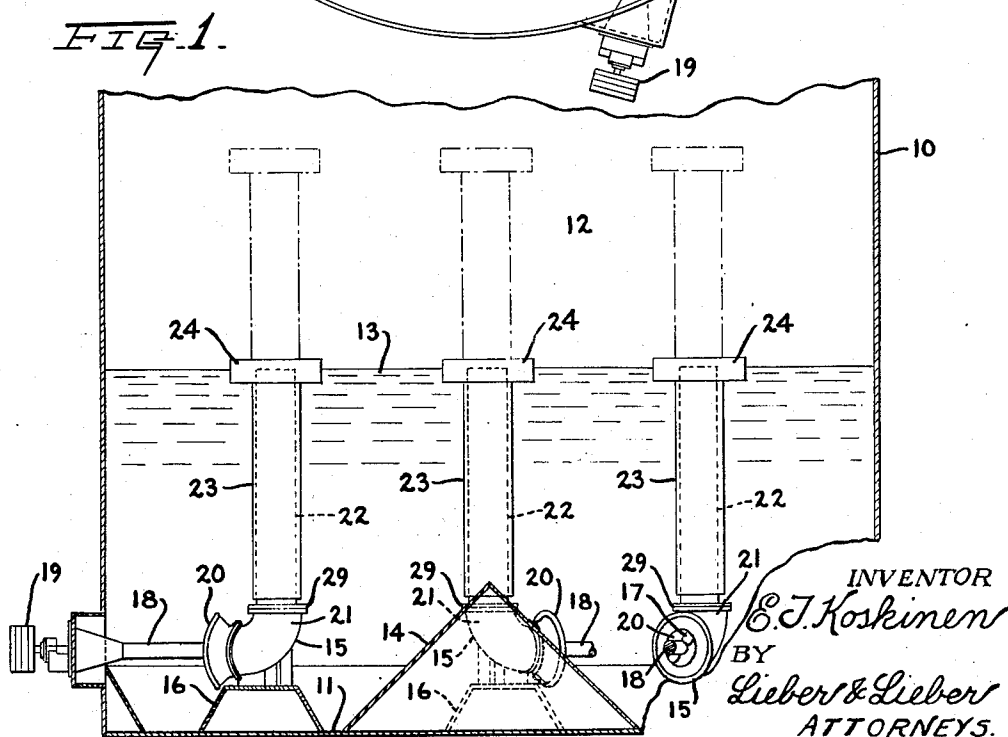
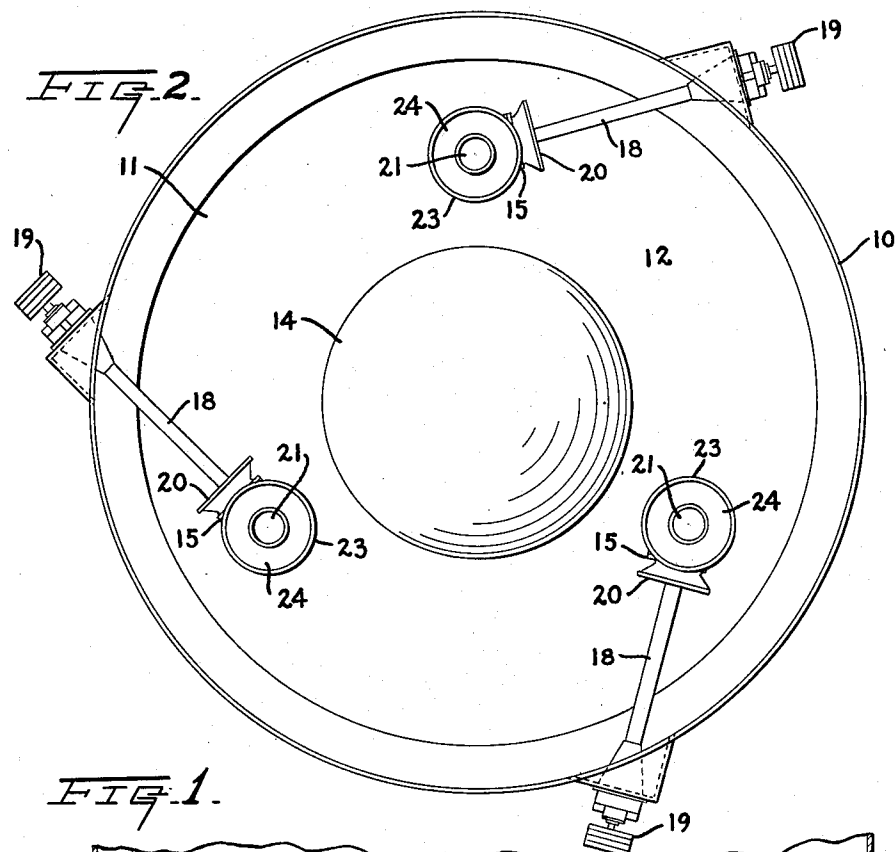
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VARIABLE OUTLET FOR LIQUID CONDUITS

Filed April 11, 1949

2 Sheets-Sheet 1



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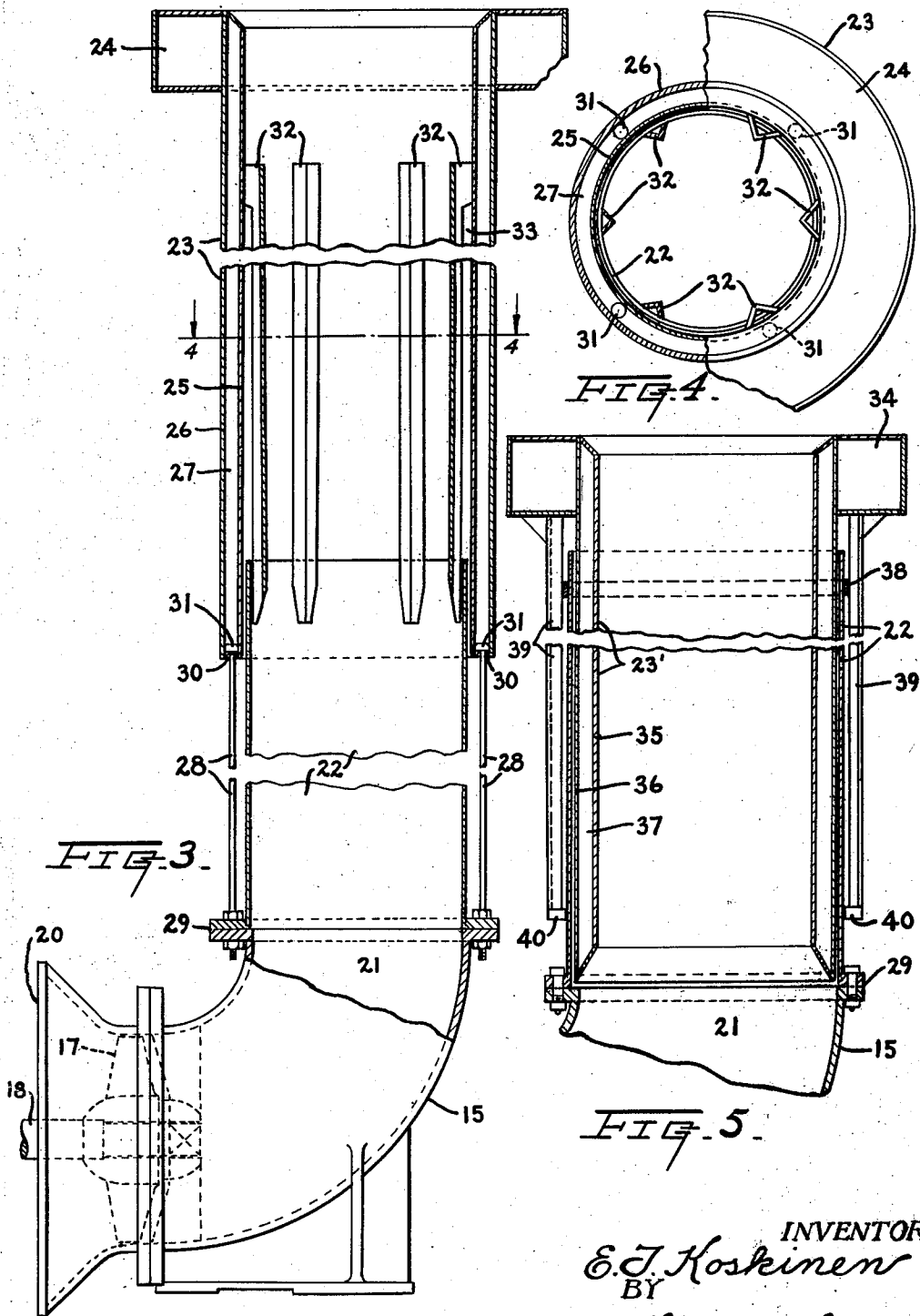
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VARIABLE OUTLET FOR LIQUID CONDUITS

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4 Claims. (Cl. 259—1)

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The present invention relates generally to improvements in the art of paper making and relates more particularly to improvements in the construction and operation of equipment for conveying and agitating fibrous pulp stock or like solutions.

A primary object of the invention is to provide an improved variable outlet of simple, compact and durable construction for discharging liquids or the like at varying levels and for facilitating agitation thereof within a receptacle in a highly efficient and economical manner.

In the paper making industry, it is customary practice to utilize tanks or containers for agitating and/or storing quantities of fibrous pulp stock preparatory to converting the same to paper. These tanks or containers are commonly known as stock chests and are obtainable in diverse sizes to meet different requirements. Frequently, it is desired to have these stock chests of extremely large size, with capacities of several hundred thousand gallons, and such large chests are necessarily of considerable depth so as to minimize the floor space required therefor. To prevent undesirable packing or matting of the coarse and fibrous pulp stock, it is necessary to constantly gently agitate the same, and such agitation is generally effected by recirculating the stock within the tanks. However, since the liquid level in these large stock chests or tanks varies considerably from time to time dependent upon operating conditions, it has generally heretofore been considered impossible to properly agitate the fibrous pulp stock within the chest in an efficient, economical and practical manner under such widely varying conditions of operation. This is primarily due to the fact that although some of these large chests may operate quite efficiently when filled to maximum level, the horse power required to drive the stock circulating pumps, when the level drops materially below the upper delivery ends of the discharge pipe or pipes, becomes excessive and thus prevents economical operation of the units. While it has heretofore been proposed to discharge the liquid or pulp stock at various widely spaced and fixed points along these pipes through utilization of complicated valve mechanisms operable by floats, such prior proposal has not solved the problems because it fails to provide for discharge of the circulating liquid into the tank at any level of the tank contents.

It is therefore a more specific object of this invention to provide an improved pulp agitator which obviates the disadvantages attendant prior

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installations and particularly those embodying relatively large stock chests.

Another specific object of the present invention is to provide an improved pulp agitating unit wherein the upright circulating pump delivery conduit or conduits automatically attain a height corresponding to the level of the liquid confined within the agitating chamber or chest.

Another specific object of the invention is to provide an improved liquid circulating system wherein the circulating pump or pumps are operable with minimum power consumption at all times, thereby insuring maximum efficiency of operation.

Another specific object of my invention is to provide an improved fibrous stock agitator wherein the solution is gently circulated and thoroughly agitated without violent disturbance.

An additional specific object of my present invention is to provide an improved liquid delivery duct for a circulating pump or the like which is automatically variable in length so as to meet varying operating conditions.

A further specific object of the present invention is to provide an improved fibrous pulp stock agitating unit composed of relatively few parts which may be readily manufactured, quickly and easily assembled or dismantled, and effectively utilized at low cost.

Still another specific object of the present invention is to provide an agitator for liquid confined within a space which comprises, a liquid circulating pump having an upwardly directed discharge conduit for delivering the liquid into the confining space, and means for automatically varying the delivery end of said conduit to conform with the level of the liquid within the space.

These and other objects and advantages of the invention will be apparent from the following detailed description.

A clear conception of the several features constituting the present improvement, and of the mode of constructing and of utilizing pulp stock agitators embodying the invention, may be had by referring to the drawing accompanying and forming a part of this specification wherein like reference characters designate the same or similar parts in the various views.

Fig. 1 is a more or less diagrammatic section through a fragment of a typical stock chest provided with conventional liquid recirculating pumps, each having one of the improved variable delivery conduits associated therewith, and with the delivery ends of the conduits being

shown in raised position by means of dot-and-dash lines;

Fig. 2 is a top view of the assemblage of Fig. 1;

Fig. 3 is a fragmentary vertical section through one type of improved variable delivery conduit associated with an axial flow pump and showing the same in uppermost position;

Fig. 4 is a top view of the discharge end of the delivery conduit shown in Fig. 3, a portion of the conduit being shown in horizontal section taken along the line 4—4 of Fig. 3; and

Fig. 5 is a fragmentary vertical section through a modified type of improved variable delivery conduit and showing the same in lowermost position.

While the invention has been shown and described herein as being associated with a conventional axial flow type of liquid circulating pumps for continuously agitating fibrous pulp stock confined within a typical stock chest, it is not desired or intended to thereby unnecessarily restrict or limit the scope or utility of the invention; and it is also contemplated that specific descriptive terms employed herein be given the broadest possible interpretation consistent with the disclosure.

Referring to the drawing, the improved variable outlet is illustrated in conjunction with a receptacle or stock chest of conventional design and a plurality of circulating pumps of conventional axial flow type; but it is, of course, to be understood that the design or construction of the tank may be varied and pumps of other types may be utilized advantageously with the invention. The specific chest or container shown herein has a cylindrical side wall 10 and a bottom wall 11 forming a confining space 12 for a quantity of pulp stock or other liquid 13. The circulating pumps 15, as shown are equally spaced in annular series about a central deflecting cone 14 formed in the bottom 11 of the container. These pumps 15 may each be supported upon a suitable base member 16 with the impeller 17 of each pump being driven by a shaft 18 coupled thereto and having a belt drive 19 associated with the outer end thereof, the belt drive 19 is adapted to receive power from any suitable source in a well-known manner. Each of the pumps 15 is provided with the usual suction inlet 20 opening into the interior of the chest and with an upwardly directed discharge 21 for delivering the liquid into the confining space 12 formed by the container walls; and as these pumps are driven, they circulate the liquid 13 within the chest or tank in an obvious manner.

With special reference to Figs. 3 and 4, the improved variable outlet shown therein comprises, in general, an upright discharge conduit 22 fixedly secured to the outlet or discharge end 21 of the pump 15 and forming a vertical extension therefor; and a tubular liquid delivery section 23 telescopically associated with the fixed conduit 22 for vertical movement relative thereto, the delivery section 23 being of slightly greater internal diameter than the external diameter of the discharge conduit 22 to permit freedom of movement and also being provided with an upper annular air chamber 24 forming a float for automatically varying the position or height of the delivery section 23 to definitely conform with the level of the liquid 13 within the space 12. To impart strength and rigidity to the tubular movable delivery section 23, this delivery section is formed with inside and outside walls 25, 26 respectively extending the length of the section 23

to provide a double full length wall and a second annular air chamber 27 therebetween, thus also adding to the buoyancy of the delivery section. The section 23 is preferably guided to prevent binding in its vertical movement by means of an annular series of guide and stop rods 28 fixedly secured in suitable fashion at their lower ends in spaced series to the flange 29 of the pump discharge conduit, the upper end of each rod piercing the lower wall 30 of the annular chamber 27 and being provided with an enlarged portion or head 31 co-operating with the walls of the chamber 27 to guide the section 23 and to positively stop or limit upward movement thereof at a predetermined position; and to aid in guiding the delivery section 23, an annular series of equally spaced inner guide members 32 may be secured to the interior of the inner wall 25, the guide members 32 being slotted or spaced from the wall 25 at 33, as shown in Figs. 3 and 4, to receive the upper end of the wall of the fixed discharge conduit 22.

The modified device shown in Fig. 5 as embodying the invention likewise comprises, a fixed discharge conduit 22 having a similar tubular delivery section 23' telescopically associated therewith. However, in this embodiment of the invention, the delivery section 23' is of slightly less external diameter than the internal diameter of the discharge conduit 22 and is vertically slidable within the fixed discharge conduit. The modified tubular delivery section 23' is also provided with an upper annular air chamber or float 34; and is likewise formed with inside and outside walls 35, 36 respectively providing a double wall and auxiliary air chamber 37 and strengthening as well as adding buoyancy to the section 23'. In the modified device of Fig. 5, the delivery section 23' is guided in its vertical movement by a ring 38 embracing and secured to the upper portion of the fixed conduit 22 and an annular series of spaced guide members 39 carried outwardly by the delivery section 23' and cooperating with inwardly directed lower flanges 40 formed on the members 39 to guide and limit the movement of the section 23'.

In operation of the improved device, any desired quantity of fibrous pulp stock 13 may be introduced to the confining space 12 within the tank or container and the pumps 15 may be operated in the usual known manner to circulate the stock inwardly through the suction inlets 20 and outwardly through the discharge conduits 22, thereby constantly gently agitating the same. While the liquid level within the tank is at or below the upper ends of the fixed discharge conduits 22, the delivery sections 23, 23' will remain in lowermost positions as shown by full lines in Fig. 1 due to the weight of these sections and force of gravity; and the material will thus be discharged upwardly into the tank at the level of the fixed conduits 22 by the pumps. However, as material is added to the supply within the confining space 12, thereby raising the level of the stock above the upper ends of the fixed conduits 22, the material will act on the floats or buoyant air chambers 24, 34, as the case may be, and elevate the delivery sections therewith so that the material is discharged through the delivery sections at, or approximately at, the liquid level; and as this level of liquid varies, the position of the delivery sections will also correspondingly automatically vary in an obvious manner.

Accordingly, through the presently proposed use of a stationary or fixed discharge conduit

of relatively short length provided with a telescopic floating section of any required length, the horse power requirement for pumping and agitating the pulp stock is in direct relation to the level of stock in the chest; and the horse power consumption for proper agitation of the stock is only a fraction of that required with a full length stationary pipe when the stock level is below the pipe delivery end. In addition to the saving of power resulting from the use of the improved variable outlet requiring elevation of the liquid only to the level of the supply within the tank, the stock is advantageously gently agitated during circulation thereof by reason of the discharge at approximately the liquid level at all times.

From the foregoing detailed description, it is apparent that the present invention contemplates provision of an improved agitator for fibrous pulp stock which is highly efficient and economical in operation and which may be advantageously utilized in conjunction with tanks or stock chests of diverse sizes and designs. The improved devices comprise exceedingly few parts which may be readily manufactured and assembled of more or less standard piping, sheet metal, rods and angle irons at relatively low cost. The assembled units are also extremely compact and durable, and all parts are readily accessible for inspection, replacement or repair. Through use of the upper air chamber 24, 34, the upright circulating pump delivery conduit or conduits automatically attain a height corresponding to the level of the stock 13 within the confining space 12; and the telescopic section 23, 23' is rendered more rigid and also more buoyant by the double wall construction shown herein. Since the circulating pumps 15 are obviously operable with minimum power consumption through use of the improved devices, maximum efficiency of operation results; and the pulp stock is gently circulated throughout the tank to effectively agitate the same without violent disturbances.

It should be understood that it is not desired or intended to limit this invention to the exact details of construction or to the precise mode of use, herein shown and described, since various modifications within the scope of the claims may occur to persons skilled in the art to which this invention pertains.

I claim:

1. A liquid agitator comprising, a liquid confining tank, a fixed upwardly directed liquid circulating conduit rising from the bottom of said tank, an annular float adapted to ride upon the upper surface of the liquid within said tank and having a hollow tubular depending section telescopically cooperable with said fixed conduit for conducting liquid over said float and upon said upper liquid surface, the telescoping surface of said tubular section being spaced from and movable along the adjacent conduit surface while said float assumes a position conforming with the level of the liquid in said tank, and a series of local float guides carried by said float and slidably coacting with the opposite surface of said fixed conduit.

2. A liquid agitator comprising, a liquid confining tank, a fixed upwardly directed circular liquid circulating conduit rising from the bottom

of said tank, an annular sealed float disposed outwardly beyond the upper open end of said conduit and adapted to ride upon the upper surface of the liquid within said tank, said float having a rigid hollow circular tubular depending section telescopically cooperable with said fixed conduit for conducting liquid outwardly over said float and upon said upper liquid surface, the telescoping circular surfaces of said tubular section and of said conduit being spaced apart but relatively movable while said float assumes a position conforming with the liquid level in said tank, and a series of local float guides depending from said float and slidably coacting with the surface of said conduit opposite to that cooperating with said tubular section.

3. A liquid agitator comprising, a liquid confining tank, a fixed upwardly directed liquid circulating conduit rising from the bottom of said tank, an annular float disposed outwardly beyond and above the upper end of said conduit and adapted to ride upon the upper surface of the liquid in said tank, said float having a rigid hollow annular depending section telescopically cooperable with the exterior of said fixed conduit for conducting liquid outwardly over the top of said float and upon said upper liquid surface, the inner surface of said hollow section being spaced from the outer surface of said conduit but being movable therealong while said float assumes a position conforming with the liquid level in said tank, and a series of local float guides carried by said float and coacting with the interior of said conduit.

4. A liquid agitator comprising, a liquid confining tank, a fixed upwardly directed liquid circulating conduit rising from the bottom of said tank, an annular float disposed outwardly beyond and above the upper end of said conduit and adapted to ride upon the upper surface of the liquid in said tank, said float having a rigid hollow annular depending section telescopically cooperable with the interior of said fixed conduit for conducting liquid outwardly over the top of said float and upon said upper liquid surface, the outer surface of said hollow section being spaced from the inner surface of said conduit but being movable therealong while said float assumes a position conforming with the liquid level in said tank, and a series of local float guides carried by said float and coacting with the exterior of said conduit.

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