United States Patent [19]

Fraser

[11] **3,738,782**

[45] **June 12, 1973**

[54] **CENTRIFUGAL PUMP WITH CONCRETE VOLUTE**

[75] Inventor: **Warren H. Fraser,** Westfield, N.J.

[73] Assignee: **Worthington Corporation,** Harrison, N.J.

[22] Filed: **Sept. 1, 1971**

[21] Appl. No.: **176,929**

[52] **U.S. Cl.** ..... **417/424,** 415/200, 415/219 C

[51] **Int. Cl.** **F04b 17/00**

[58] **Field of Search** ..... 415/121 G, 200, 219 C; 417/424

[56] **References Cited**

UNITED STATES PATENTS

1,530,569	3/1925	Moody	417/424
3,407,747	10/1968	Role	417/424
1,107,591	8/1914	De Huff	415/219 C
1,504,737	8/1924	Brown	415/200
1,723,254	8/1929	Popp	415/200
2,077,883	4/1937	Hand	415/219 C
2,295,391	9/1942	Durdin, Jr.	417/424
2,626,086	1/1953	Forrest	417/424
3,024,730	3/1962	Towle	417/424
3,532,445	10/1970	Scheffler, Jr.	417/424

FOREIGN PATENTS OR APPLICATIONS

558,595	1/1944	Great Britain	417/424

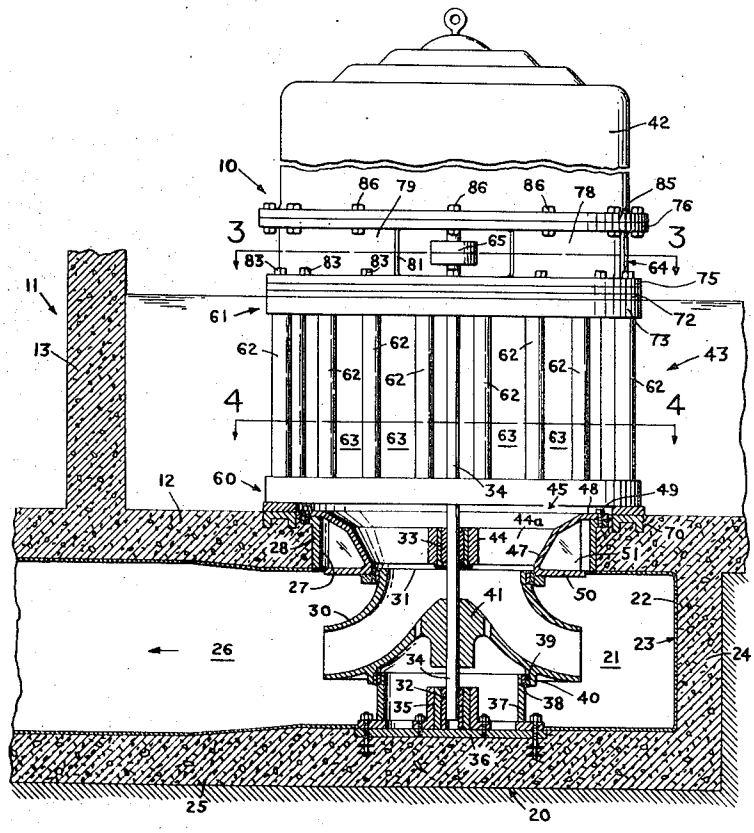
Primary Examiner—C. J. Husar
Attorney—Popper, Bain, Bobis & Gilfillan

[57] **ABSTRACT**

A Centrifugal Pump disposed in a reinforced concrete reservoir with a free standing body of fluid to be pumped which has a concrete volute having one side thereof formed by a part of the reservoir to permit the suction inlet of the volute to be connected into the lower portion of said reservoir, a rotatable shaft vertically disposed in the suction inlet and extends into the volute to receive an inverted impeller at one end, the suction eye of the impeller which is at the upper end communicate with the suction inlet of the volute so that fluid from the reservoir is delivered downwardly into the suction eye of the impeller by gravity flow, the volute having a discharge outlet for discharging the pumped fluid, and driving means for rotating the shaft and impeller is connected to the end of the shaft remote from the imepller.

Additionally in the present disclosure a combined stand and trash rack is connected about the suction inlet for the volute and is disposed to support the driving means for the shaft in assembled position. The combined stand and trash rack may include vane means adjustable to guide or to prerotate the fluid delivered from the reservoir to the suction inlet of the volute for the pump.

18 Claims, 9 Drawing Figures



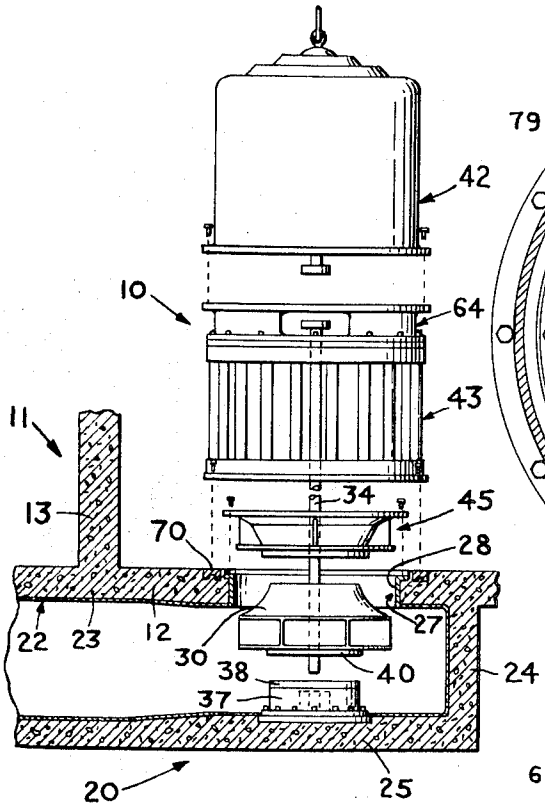


FIG. 1

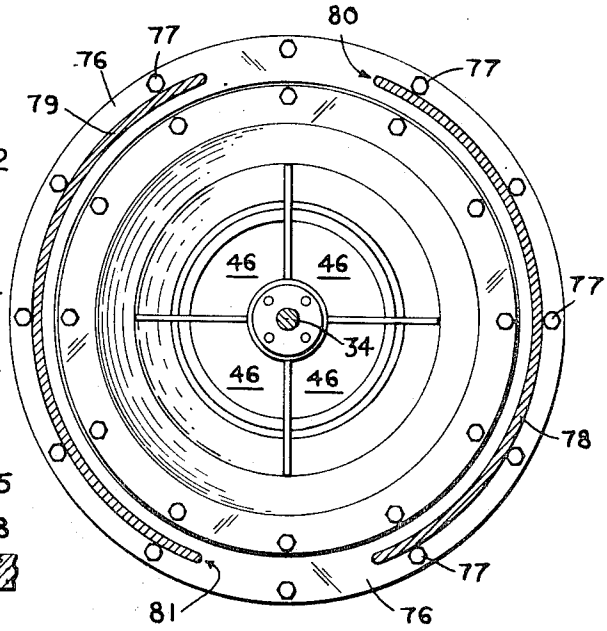


FIG. 3

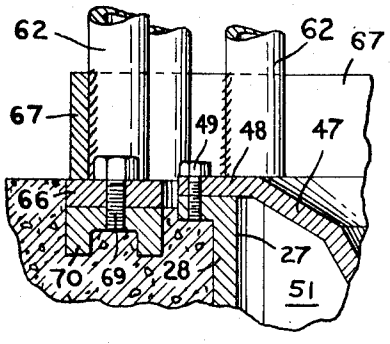


FIG. 5

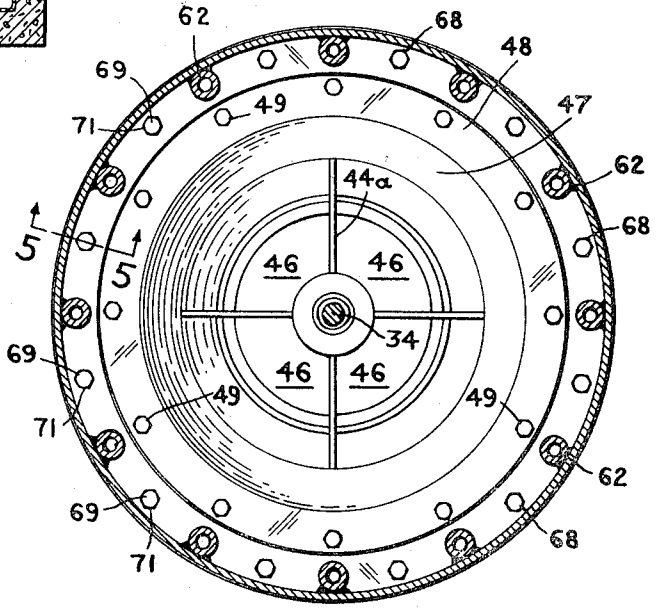


FIG. 4

WARREN H. FRASER
INVENTOR.

BY Popper, Bain, Bobis & Gilfillan
attys

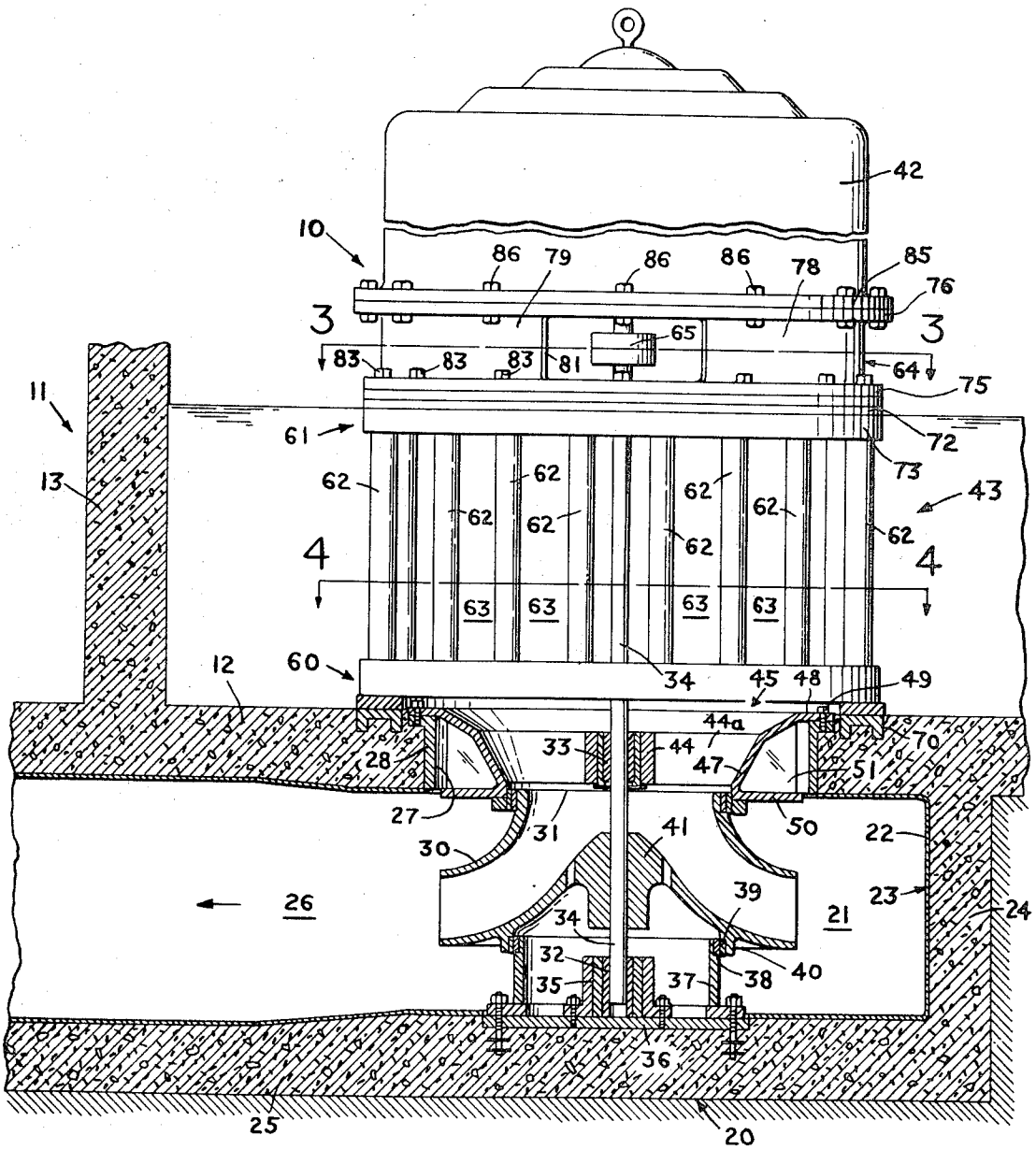


FIG. 2

WARREN H. FRASER
INVENTOR.

BY Popper, Bain, Bobis & Gelfillan
Attys

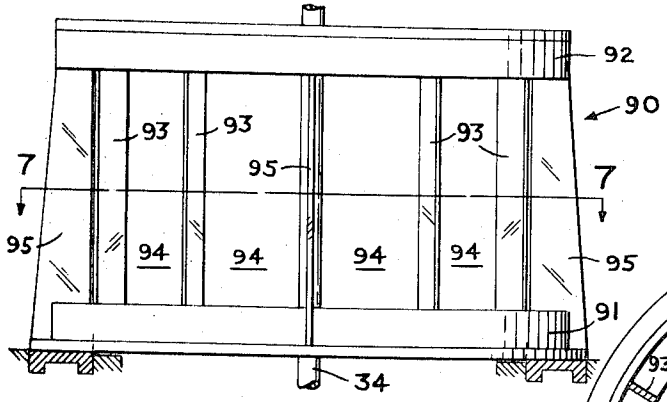


FIG. 6

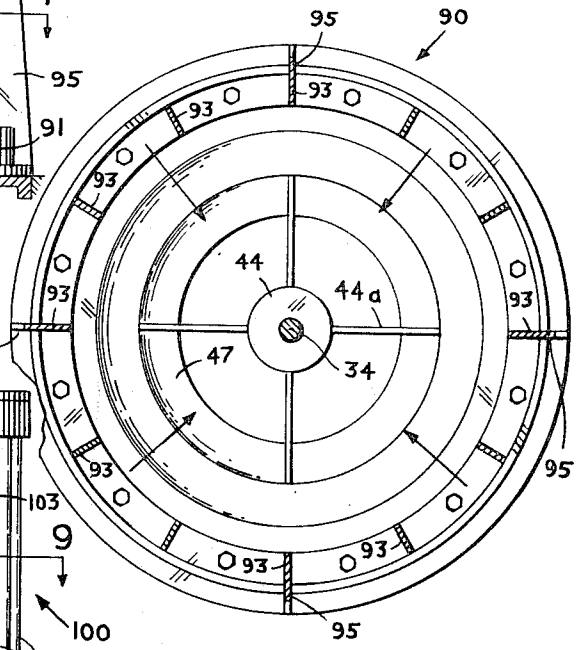


FIG. 7

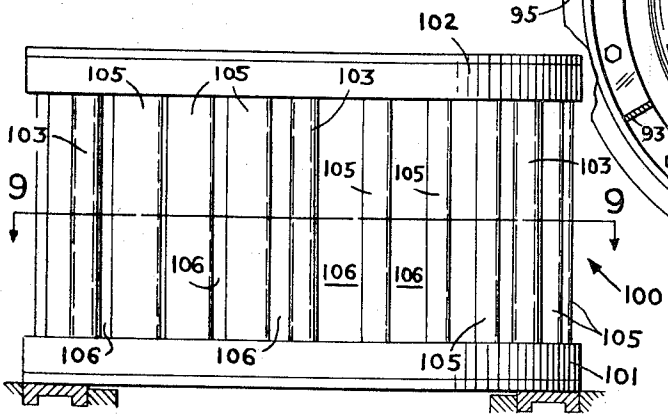


FIG. 8

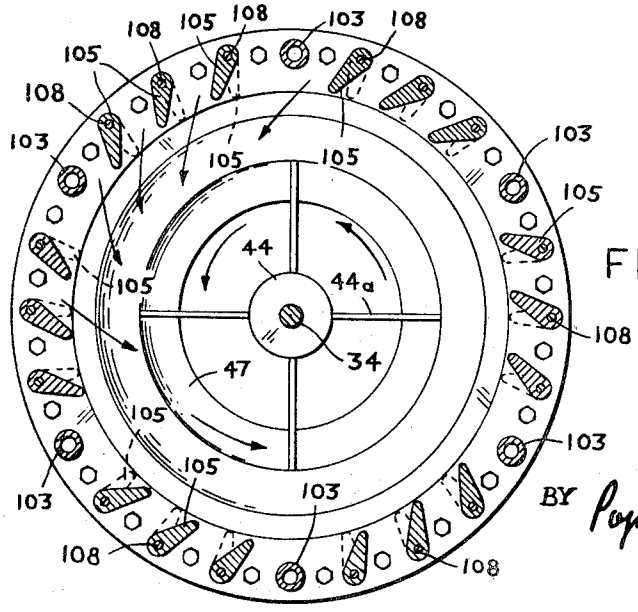


FIG. 9

WARREN H. FRASER
INVENTOR.

BY Popper, Bain, Bobo & Gilfillan
attys

CENTRIFUGAL PUMP WITH CONCRETE VOLUTE

BACKGROUND OF THE INVENTION

The use of river or lake water as a heat sink and cooling media in large non-contacting heat exchange apparatus for power plants and other commercial and industrial equipment has been a conventional expedient for many years.

However, the quantity of heat dissipated to the heat sink was so great under normal operating conditions, thermal pollution problems developed which were met by new cooling techniques for accomplishing the same result.

One such arrangement to meet this problem is the use of a private reservoir—man made of reinforced concrete to provide a sufficient volume of cooling water—coupled with a cooling tower to which the heated cooling water is pumped, cooled and returned to the reservoir.

To those skilled in the art it is at once apparent that this arrangement produces an increased load on the pump because in addition to pumping losses in the flow path for the heat exchanger apparatus there will be pumping losses to move the heated cooling water from the heat exchange apparatus to the top of the cooling tower.

As a result it has been found for example, and more particularly in the area to which the present invention is specifically applicable, that for power generating installations the above mentioned reservoir—cooling tower technique will require three to four times more horsepower for each kilowatt of electrical power generated.

The present invention recognizes in the manufacture of the reservoir that large quantities of reinforced concrete are poured "in situ" and takes advantage of this fact to reduce the cost of installation first by also making the volute casing of the main circulating pump of reinforced concrete and second utilizing a portion of the poured concrete to form the volute casing of the reservoir.

Additionally other advantages can be achieved because the concrete volute casing for the main circulating pump can be provided with a smooth surface as contrasted to the surfaces of the known cast iron or fabricated steel volutes of conventional main circulating pumps as are known to the prior art and these smooth surfaces will reduce fluid friction losses in the volute casing which will increase the efficiency of the main circulating pump by the same proportion as the reduction in fluid friction losses in the casing.

Further, since the suction inlet for the volute casing is disposed to receive fluid from the reservoir downwardly by gravity flow this permits the use of an inverted impeller in the volute casing which at all times will be completely submerged and thus require no priming means for start up.

Since the impeller is completely submerged at all times, it further permits higher operating speeds with a reduced risk of cavitation.

In the overall relation for mounting the impeller and its driver in the concrete volute casing there is provided a combined motor support, trash rack and serves to provide a systematical flow pattern to the suction eye of the impeller through the suction inlet for the concrete volute casing.

Additionally, the overall structure permits each removal of the driving means the entire rotating pump assembly being adaptable for removal through the combined motor support and trash rack without dewatering the inlet channel or the concrete volute casing of the system.

SUMMARY OF THE INVENTION

Thus, the present invention covers a centrifugal or mix flow pump assembly for use with a concrete formed reservoir having a free standing body of fluid to be pumped from said reservoir comprising, concrete means forming a volute casing for said pump disposed adjacent to the lower portion of the reservoir, said concrete volute casing having a suction inlet communicating with said free standing body of fluid to receive the same by gravity flow and a discharge outlet for pumped fluid. Bearing means is provided about the suction inlet of the volute casing to receive and rotatably mount a driven shaft which extends into said volute casing. The driven shaft has a driving means connected to one end for rotating the shaft and an impeller fixedly connected to the end of the shaft remote from the driving means in said volute casing. The impeller is disposed with the suction eye in communication with the suction inlet for the concrete volute casing whereby fluids to be pumped enters the suction eye of the impeller from the top or upper side thereof.

Additionally the present invention contemplates the use of a combined motor stand and trash rack disposed about the suction inlet for the volute casing and connected to the bottom of the reservoir so that in assembled position it will support said driving means in spaced relation to the suction eye and to the surface of the free standing body of water in the reservoir. The combined stand and trash rack being provided with means forming flow passages therethrough to permit fluids from said reservoir to pass to the suction inlet of the concrete volute casing.

Additionally the means on said combined stand and trash rack for forming flow passages may be adjustable to prerotate the fluid flowing into the suction inlet of the concrete volute casing.

These and other objects and advantages of the invention will become evident from the following description with reference to the accompanying drawings in which:

FIG. 1 is an exploded side view of a centrifugal pumping unit in accordance with the present invention.

FIG. 2 is an enlarged side elevation of the centrifugal pumping unit shown in FIG. 1 in assembled position partly in sections.

FIG. 3 is a horizontal section taken on line 3—3 of FIG. 2.

FIG. 4 is a horizontal section taken on line 4—4 of FIG. 2 showing one embodiment of the flow controlling vanes for the combined stand and trash rack.

FIG. 5 is a partial section taken on line 5—5 of FIG. 4.

FIG. 6 is a side view of another form of combined stand and trash rack.

FIG. 7 is a horizontal section taken on line 7—7 of FIG. 6.

FIG. 8 is a side elevation of still another form of combined stand and trash rack.

FIG. 9 is a horizontal section taken on line 9—9 of FIG. 8.

Referring to the drawings, FIGS. 1 and 2 show a centrifugal pump assembly generally designated **10**, associated with a reservoir only a fragment of which is shown generally designated **11**.

Reservoir **11** is preferably formed of poured reinforced concrete by conventional methods so as to provide a receptacle having a volume sufficient to hold fluid to be pumped for the purposes for which the reservoir will be used for example, a volume of water sufficient to provide a cooling water source for a large heat exchanger used in a power generating station to which the present invention is particularly applicable.

The reservoir **11** has a floor or bottom **12** and side walls **13**.

In order to move or pump the fluid from the reservoir to the point of use, the centrifugal pump assembly **10** is vertically mounted to extend through the floor or bottom **12** of the reservoir **11** and is particularly associated with the reservoir **11** to utilize advantageously the fact that the reservoir is made of poured reinforced concrete in that the main casing generally designated **20** forming the volute **21** of the centrifugal pump assembly **10** is also formed of the same reinforced concrete and thus can be poured and constructed simultaneously with the fabrication of the reservoir **11**.

The formation of the volute casing **20** in this manner not only reduces the cost of installation of a circulating pump of this type but in addition provides means to reduce fluid friction losses in that the inner wall **22** of the volute casing **20** can be made extremely smooth and can be coated as at **23** with compounds or materials for further reducing friction such as filled fluorocarbon resins, silicone compounds or other non-wetting or non-sticking materials.

Those skilled in the art will recognize that an increase in efficiency occurs in any pump having smooth inner volute walls as contrasted with the known uneven walls in pumps where the main casings are of conventional cast iron or fabricated steel. Increase in efficienty of such pumps is directly proportional to the reduction in fluid friction losses.

FIGS. 1 and 2 show that in the formation of the main casing **20** forming the volute **21**, a portion of the associated floor or bottom **12** of the reservoir forms the upper side of casing **20** and continuous therewith are the side walls **24** and the lower wall **25** which are provided with the desired shape to form the volute **21** and the discharge outlet **26** for the centrifugal pump assembly **10**.

Where the floor or bottom **11** of the reservoir forms the upper side of the volute casing **20** as illustrated in FIGS. **1** and **2** the arrangement will permit the formation of a suction inlet **27** for the volute casing **20** which opens through the floor or bottom **12** forming the upper or top side of the volute **21**. Thus, fluid in the reservoir **10** may pass freely through the floor or bottom **11** by gravity to maintain the volute **21** completely filled at all times or during operation will permit delivery by gravity flow to the suction inlet of the volute **21**, of fluid to be pumped.

The inner surface **22** of the respective underside of the lower portion of the reservoir the side walls **24** and the bottom wall **25** is rendered as smooth as possible during formation by conventional concrete trowelling techniques and by the addition of a suitable coating material as above mentioned.

An annular connecting ring **28** lines the suction inlet **27** and is embedded in the concrete so that an annular connecting flange **29** thereon is disposed adjacent the upper side of the floor **12** for purposes which will appear clear hereinafter.

The construction as above described allows for the unique positioning of an impeller **30** in the volute **21** in that the impeller **30** will be rotatably mounted with the suction eye **31** of impeller at the upper or top side of the impeller so that it communicates with the suction inlet **27**. In this position, fluid from the reservoir will be delivered into the top of the impeller.

Referring now to FIG. **2**, a lower bearing **32**, and an upper bearing **33** are shown in alignment with each other for rotatably mounting shaft **34**.

Lower bearing **32** is disposed in a lower bearing holder **35** which is mounted on a bearing plate **36**. An annular wearing ring supports **37** is disposed about the bearing holder **35** and spaced therefrom a sufficient distance so that the lower inner wall **38** of said annular wearing ring support **37** can coact with the lower outer wearing ring **39** connected at the back portion **40** of the impeller **30** which is disposed in the volute **21**. The hub **41** of the impeller **30** is fixedly connected to the shaft **24** between the lower bearing **32** and upper bearing **33**, and thus will be rotated whenever shaft **34** is rotated by driving means generally designated **42** which is connected to the end of the shaft **34** remote from the impeller **30**.

Driving means **42** is preferably en electric motor and is supported in spaced relation from the floor or bottom **11** of the reservoir and preferably above the surface of the fluid therein by a combined motor stand and trash rack generally designated **43** which is more fully described hereafter.

Upper bearing **33** is mounted in an upper bearing holder **44** which forms the central portion of a suction ball or mounting frame **45**.

Strip like support members **46** are connected at one end to the upper bearing holder on central portion **44** and radiate laterally to connect with the funnel shaped portion **47** on the mounting frame **45** at the respective ends of the support member **45** remote from the end connected to the central portion **44**.

Mounting frame **45** defines spaced openings as at **46** formed by the funnel shaped portion **47**. An upper flange **48** extends radially outward from the upper end of the funnel shaped portion **47** for mounting the suction bell or mounting frame **45** annular ring **49** fixedly embedded in the reinforced concrete about the suction inlet **27** at the point where the suction inlet **27** extends through the floor **11** of the reservoir as above described.

The mounting flange **27** will be connected to the annular connecting ring **28** by a plurality of circumferentially disposed threaded members **49** and is constructed so that in assembled position the spacing of the central position **44** of the mounting frame **45** will place the upper bearing in alignment with lower bearing **32**.

A lower flange **50** extends radially outward from the lower end of the funnel shaped position **47** to permit a plurality of circumferentially disposed reinforcing plates **51** to be connected between the lower flange **50** and upper flange **48**.

Connected to lower flange **50** about the opening **46** formed by the funnel shaped portion **45** is the upper outer wearing ring **52** which connects with the upper

inner wearing ring 43 about that portion at the top or upper end of the impeller 39 forming the suction eyes.

As will be understood by those skilled in the art, the alignment of the bearings and of the upper and lower wearing ring assemblies above described will prevent excessive wobbling or uneven rotation of impeller 28 when the pump 10 is in operation.

Further since mounting frame 45 defines the spaced openings 46 fluid from the reservoir can easily pass through the openings 46 into the suction eye 31 of impeller 30.

If impeller 30 is not rotating fluid will drop by gravity and pass through the impeller into the volute 21 and discharge outlet 26 until both the volute and discharge outlet are filled with fluid.

When the pump is to be placed in operation since the impeller 30 is completely submerged it will not be necessary to first prime the pump before pumped fluid will flow.

Additionally after operation is commenced and the impeller is rotating since fluid is delivered by gravity at all times it will continue to maintain the impeller submerged and this permits higher motor operating speeds with a reduced risk of cavitation.

Where an open free standing body of fluid exists as in the case of the reservoir for the cooling fluid above described it tends to collect debris which is harmful to the impeller of the main circulating pump of such cooling water systems. Accordingly, in prior art systems an independent trash rack or trash filter has been provided to prevent such debris from passing with the fluid being delivered to the impeller.

In the present centrifugal pump assembly above described the support for the motor and trash rack may be advantageously combined into a single unit and this construction additionally will provide straightening vanes for forming a symetrical or rotating flow pattern to the suction eye 31 of impeller 30 as will be described hereinafter.

Further with references to FIGS. 1 and 2 of the drawings when the driving motor is separated from the motor support and moved out of the way the entire rotating portion of the pump assembly which is mounted on or about the shaft 34 may be removed upwardly through the combined motor support and trash rack 43 without dewatering the suction inlet channel, the volute and the discharge outlet of the centrifugal pump assembly. Thus when the pump is reassembled it is once again ready for immediate operation.

Combined Motor Support and Trash Rack

The combined motor support and trash rack 43 shown in FIGS. 1, 2, 3, 4 and 5 is a cylindically shaped member having a lower connecting member generally designated 60 and upper connecting member generally designated 61 and a plurality of spaced circumferentially disposed vertical pipe member or straightening vanes 62 which are connected at their respective ends so as to hold the lower connecting member and upper connecting member 61 in predetermined spaced relation to each other and at the same time form fluid flow passages 63 therebetween to permit fluid to pass from the reservoir 11 through openings 46 into the suction eye 31 of impeller 30.

Spacing of the upper connecting members 60 and lower connecting member 61 will be a function of the depth of the fluid in the reservoir 11 the vertical dimension of the combined motor support and trash rack being such that the upper connecting member 61 will just be above the surface level of the fluid in the reservoir. This in association with a spacer member 64 insures that the driving motor 42 will be disposed well above the surface and can be removely coupled to the driven shaft 34 as by a conventional coupling means 65.

The lower connecting member is L-shaped in cross section and includes a thin flat horizontally disposed circular ring 66 and a thin flat vertically disposed annular ring 67. The annular ring 67 being welded to the pipe members or vanes 62 as is clearly shown in FIGS. 4 and 5 of the drawings.

The annular ring 66 is provided with a plurality of openings as at 68 which are circumferentially spaced to receive correspondingly spaced threaded members 69 which are mounted on a connecting ring 70 embedded in the floor 11 of the reservoir adjacent to and about the suction inlet at the point where it extends through the floor 11.

The combined motor support and trash rack 43 is removely connected to the threaded members 69 on the connecting ring 70 by means of nut members 71 so that it can be easily assembled or disassembled as may be required for maintainence of the reservoir or repair of the centrifugal pump assembly.

The pipe members or vanes 62 in the form of the invention shown in FIGS. 1 to 5 of the drawings are round in cross section and will be spaced from each other and placed in sufficient number about the combined motor stand and trash rack 42 to provide an adequate filter means for the debris and also to support the weight of the motor 42 which for the size of the main circulating pumps involved will be extremely heavy.

The upper connecting means 61 is constructed substantially identical to the lower member as above described and thus includes the thin flat horizontal annular ring 72 and the thin flat vertical annular member 73. The thin flat horizontal member 72 similarly is also provided with a plurality of circumferentially spaced openings as at 74 to permit the upper connecting member 61 to be connected to one side of the spacer member 64 now to be described.

The spacer member 64 is a hollow cylindrical element having a lower flat horiziontal connecting flange 76 and an upper flat horizontal connecting flange 77 which are connected to each other by vertically disposed arcuate webs 78 and 79. The arcuate webs 78 and 79 have their lateral edges in spaced relation to form openings as at 80 and 81 to facilitate access to the coupling member 65.

The lower connecting flange 76 will have a plurality of circumferentially spaced openings 77 which coincide with the corresponding spaced openings 74 of the upper connecting means 61 on the combined motor stand and trash rack 43 so that threaded means such as bolts 82 and nuts 83 can be passed therethrough to connect the lower connecting flange 76 of the spacer 64 to the upper connecting means 61 of the combined motor stand and trash rack during assembly of the elements of the centrifugal pump assembly 10.

Similarly the upper connecting flange 77 will be removely connected to a flange 85 about the lower portion of the driving motor 15 as by threaded members 86.

Assembly and Operation

The centrifugal pump is first assembled as shown in FIGS. 1 and 2 of the drawings and the reservoir is filled with fluid to be pumped.

Since the fluid fills the reservoir and the volute the driving motor which is connected to any suitable source of current through a fail safe control panel (not shown) may be placed into operation.

As the impeller **30** rotates the fluid will pass to the suction eye **31** of the impeller and will be discharged through the discharge outlet **22** of volute **21** to the point of use.

FIG. 6 Form of Combined Motor Support & Trash Rack

FIGS. **6** and **7** show another form of combined motor stand and trash rack. This form of the invention differs in that the rounded hollow vertically disposed vanes **62** are replaced by flat solid rods or vanes coupled with reinforcing members.

Thus referring to FIG. **6** the combined motor support and trash rack generally designated **90** is shown to include a lower connecting means **91** and upper connecting means **92** and the vertically disposed circumferentially spaced solid rods or vane members **93.** The flow passages **94** between the respective vane members **93** will permit fluid to pass from the reservoir through the openings **46** in the mounting frame **45** on into the suction eye **31** of the impeller **30.**

In order to provide additional strength for support of the driving motor **42** vertical reinforcing buttresses **95** are also connected between the upper and lower connecting members at intervals about the circumference of the combined motor stand and trash rack.

FIG. 8 Form of Combined Motor Stand and Trash Rack

FIGS. **8** and **9** show still another form of combined motor stand and trash rack. This form of the invention differs from the form of combined motor stand and trash rack shown in FIGS. **1** through **5** and FIGS. **6** and **7** in that the vertically disposed vane members are provided with a streamlined shape, are rotatable so that the flow path for fluid between the respective vanes can serve as a flow guide to prerotate the fluid being delivered from the reservoir to the suction eye of the impeller.

Thus referring to FIGS. **8** and **9** the form of combined motor stand and trash rack generally designated **100** is also shown as having a cylindrical shape. It includes a lower connecting member **101,** an upper connecting member **102** and the vertically disposed pipe members **103** which are circumferentially spaced at approximately every 60° around the circumference of the combined motor stand and trash rack to hold the lower connecting member and the upper connecting member in spaced relation to each other, the length of the pipe members being predetermined in the same manner as has been described in the form of the invention shown in FIGS. **1** to **5** of the drawings.

Between the rod members are a plurality of spaced vertically disposed vane members **105** which form flow channels as at **106** therebetween. The vane members **105** are connected between the lower connecting members and the upper **39** connecting member so that they are movable about their axis generally designated **107.** Further the vane members have a streamlined shaped and accordingly can be angled to direct the flow of fluid through the flow channels **106** between the vane members.

If the vane members are not disposed at an angle as indicated by the phantomized or dotted lines shown in FIG. **8** fluid will flow from the reservoir through the flow passages **105** to the openings **46** in the mounting bracket **45** substantially identical to the manner above described for flow in the forms of the combined motor stand and trash rack shown in FIGS. **1** to **5** and FIG. **6** of the drawings. This flow will be symmetrical and uniform.

However, if the vanes are disposed at an angle as indicated by the solid lines of the vanes as shown in FIGS. **8** and **9,** then as the fluid passes from the reservoir through the flow passages **105** it will be prerotated in the given direction shown by the arrows thus the flow pattern of the fluid being delivered by gravity will be given a rotational characteristic which will permit the centrifugal pump assembly to operate at a lower net positive suction head then called for in the original design.

It is believed easily understood by those skilled in the art that any conventional form of control could be established such as a worm and wheel design coupled with an annular connecting ring (not shown) to rotate the vane members either manually or by some automatic control means to any given angle that will provide the desired degree of prerotation for the given pump operation.

This form of combined motor stand and trash rack is thus distinguishable from the fixed forms of combined motor stand and trash rack above described.

The unique technique of fabricating the volute casing of the centrifugal pump assembly of reinforced concrete as above described not only reduces the cost of installation but further permits a modification of the pump design first for continuous top delivery by gravity of fluid to be pumped as the suction inlet to the volute is disposed at the top of the volute casing and the impeller is inverted to permit the suction eye to coact with such suction inlet. Second development of a combined motor stand and trash rack of a configuration for supporting the motor and rotating portion of the pump assembly so that these elements can be easily assembled and disassembled through the combined motor stand and trash rack without dewatering the volute casing and discharge outlet. And further the trash rack can be provided with either stationary vanes for establishing a symetrical flow pattern to the suction inlet of the volute or movable vanes for inverting a degree of prerotating for the fluid as delivered to the suction inlet of the volute.

Since the impeller is completely submerged at all times in assembled position the pump assembly requires no priming for start-up and can operate at higher speeds with reduced risk.

It will be understood that the invention is not to be limited to the specific construction or arrangement of parts shown but that they may be widely modified within the invention defined by the claims.

What is claimed is:

1. A centrifugal pump assembly for use with a reservoir formed from reinforced concrete or the like materials to contain a free standing volume of fluid to be pumped therefrom comprising:

A. means made of the same material as said reservoir forming a volute casing for said pump in a plane lower than the bottom of the reservoir,

B. said volute casing means having a suction inlet communicating at the upper portion with the bottom of said reservoir and with said free standing volume of fluid therein, and a discharge outlet for pumped fluid,

C. Bearing means connected in the suction inlet of the volute casing means,

D. a driven shaft rotatably mounted in said bearing means and disposed to extend into the volute casing means through the suction inlet,

E. driving means connected to one end of said driven shaft for rotating the same,

F. inverted impeller means in said volute casing means fixedly connected to and rotatable with said driven shaft,

G. and said inverted impeller means disposed with the suction eye in communication with said suction inlet whereby said free standng volume of fluid to be pumped enters the inverted impeller means at the top side thereof by gravity flow.

2. In a centrifugal pump assembly as claimed in claim 1 including means forming a combined motor stand and trash rack connected at one end about the suction inlet of the volute casing, said combined motor stand and trash rack connected at the end remote from the suction inlet to said driving means to support said driving means in assembled position, and spaced vane means on said combined motor stand and trash rack forming flow passages therethrough to adjust the direction of flow of fluid passing from said reservoir to the suction inlet of the volute casing means.

3. In a centrifugal pump assembly as claimed in claim 2 wherein the spaced vane means on the combined motor stand and trash rack are rotatively mounted to permit angular adjustment thereof.

4. In a centrifugal pump assembly as claimed in claim 3 including means for adjusting the angular position of the spaced vane means.

5. In a centrifugal pump assembly as claimed in claim 2 wherein the combined motor stand and trash rack includes:

A. an upper connecting member and a lower connecting member,

B. at least two of said spaced vane means disposed to connect said upper connecting member and lower connecting member in predetermined spaced relations.

6. In a centrifugal pump assembly as claimed in claim 2 including, spacer means between the combined motor stand and trash rack and the driving means.

7. In a centrifugal pump assembly as claimed in claim 6 wherein the spacer means has an upper connecting flange and a lower connecting flange, acruate web means connecting said upper connecting flange to said lower connecting flange, said arcuate web means disposed in spaced relation to each other to form at least one opening for access to the point of connection between the driving means and the driven shaft.

8. In combination, a centrifugal pump assembly and a reservoir formed of concrete or the like material to contain a free standng volume of fluid to be pumped therefrom comprising:

A. means made of the same material as said reservoir forming a volute casing for said pump continuous with the formed reservoir and disposed adjacent to the lower portion of said reservoir,

B. said volute casing means having a suction inlet communicating with said free standing volume of fluid in the reservoir to receive the same by gravity flow and a discharge outlet for passing pumped fluid from said volute casing means to any desired use,

C. bearing means,

D. bearing support means forming said suction inlet for the volute casing means, and having means thereon for mounting at least one of said bearing means in assembled position,

E. a driven shaft rotatably mounted in said bearing means and extending into the volute casing means through the bearing support means,

F. an inverted impeller in said volute casing means fixedly connected to and rotatable with said driven shaft,

G. driving motor means for rotating said driven shaft connected to said driven shaft at a point remote from said impeller,

H. means forming a support for said driving motor means disposed to hold said driving motor means a spaced distance from the suction inlet for said volute casing,

I. and a plurality of spaced vane means on said support means to provide a trash rack in said reservoir about the suction inlet and to form flow passages for fluid passing by gravity from said reservoir to said suction inlet.

9. In the combination as claimed in claim 8 wherein at least two or more of said spaced vane means are rotatively mounted for movement to an angular position to impose rotational motion to the fluid passing from the reservoir to the suction inlet of the volute casing means.

10. In the combination as claimed in claim 8 wherein the motor support is cylindrical in shape to permit the rotating parts of the pump to be mounted through the suction inlet and to be removed therethrough.

11. In the combination as claimed in claim 8 wherein the motor support includes an upper connecting member and a lower connecting member, and the spaced vane means are of predetermined length and are connected to hold the upper connecting member and the lower connecting member in a given space relation as a function of the depth of the reservoir.

12. In the combination as claimed in claim 8 including spacer means disposed between the means forming the motor support and the driving motor.

13. In the combination as claimed in claim 12 wherein the spacer means includes:

A. a upper connecting flange,

B. a lower connecting flange,

C. arcuate web means connecting the upper connecting flange to the lower connecting flange,

D. said arcuate web means in space relation to form at least one opening for access to the point where the driving motor is connected to the driven shaft.

14. A centrifugal pump assembly as claimed in claim 8 wherein, the inverted impeller is disposed with the suction eye in operative association with the suction inlet whereby said free standing volume of fluid to be pumped enters the inverted impeller at the top side thereof by gravity flow.

15. A centrifugal pump assembly as claimed in claim 8 wherein the bearing support means includes,

A. an outer annular ring to be connected into the volute at the upper end thereof,

B. an inner annular ring having a flange at the upper end for connecting the inner annular ring to the outer annular ring,

C. a support spider connected transversely of the inner annular ring,

D. and a bearing hub mounted in the support spider in the axial line of the driven shaft.

16. A centrifugal pump assembly as claimed in claim 15 wherein the inverted impeller is disposed with the suction eye in operative association with the lower portion of the inner annular ring whereby said free standing volume of fluid to be pumped enters the top side of the inverted impeller by gravity flow.

17. A combined motor stand and trash rack for a centrifugal pump assembly comprising:

A. lower connecting means,

B. upper connecting means,

C. a plurality of spaced vane means connecting the lower connecting means to the upper connecting means and disposed to form fluid flow passages therebetween,

D. said spaced vane means having a predetermined length to hold the upper connecting means a given spaced distance from the lower connecting means,

E. and at least a portion of the spaced vane means are rotatably mounted to dispose the said portion of the spaced vane means at any desired angular setting for controlling the direction of rotation of the fluid passing through the flow passages formed by the spaced vane means.

18. A combined motor stand and trash rack as claimed in claim 17 wherein the spaced vanes which are rotatively movable each have a streamlined shape.

* * * * *