Fig. 1.

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VERTICAL PUMP AND MOUNTING

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Attys.
My Invention relates to centrifugal pumps and is particularly directed to the provision of a satisfactory mounting for vertical pumps.

While the preferred form of my invention hereinafter illustrated is adapted to meeting the needs of a liquid sealed self-priming centrifugal pump disclosed in my co-pending application, Serial No. 262,239, filed March 17, 1939, there are certain features of the invention which are applicable to other forms of self-priming pumps, and to vertical centrifugal pumps of the non-self-priming type.

Also, while a direct coupled motor-pump unit is herein illustrated as the preferred embodiment, it is to be understood that the particular form of driving means is not of the essence of the Invention.

I am aware that vertically mounted pumps and motor-pump units are old, and I do not lay claim to such.

The specific problem with which the present invention is primarily concerned is the mounting of a liquid sealed self-priming pump of the type shown in the aforesaid application, so that minimum of floor space is normally required for the unit, so that the pump may function to best advantage in normal operation, and so that the pump may conveniently be inspected and serviced.

In pumps handling corrosive liquids, the impeller is subject to greater mechanical and corrosion attacks than the other parts, and may require renewal. The impeller casing parts may also occasionally require renewal. In a vertically mounted unit of the prior art, no adequate provision has been made for convenient renewal of parts and pulling apart a vertical pump of the prior art is difficult and expensive.

According to the present invention, I suspend the pump by a mounting which reaches from the floor around to a point above the pump body and holds the pump in suspension from above. Then, according to the preferred practice of my invention I hinge the pump upon the support so that the axis of the impeller shaft which is normally vertical may be swung through substantially 90°. The pivot is preferably arranged along one side of the axis of the pump, so that in moving into the horizontal position the body of the pump, is elevated.

The pump itself is arranged to be opened up by the removal of a cover plate which lies at the normal bottom of the pump.

The connected motor or other parts extending normally above the pump may in some degree act as counterbalancing weights to the pump itself, so that the load to be handled is greatly reduced and the moving of the pump into position to be inspected or serviced is greatly reduced and lessened. Because of the pivotal connection, the motor-pump unit, or the pump alone always remains connected to the base or mounting, and it may be rested in either the vertical position in which it normally operates, or it may be rested in the horizontal position when so desired.

For mounting the pump upon a floor or foundation the stationary hinge part is preferably formed on a pedestal which is bolted to the floor, but the concept of hinging the vertical pump allows an adaptation to a wide variety of situations such as mounting the pump along the rim of a tank or container, or the edge of a pool or the like, with the advantages above enumerated of being able to swing the pump into horizontal position for servicing and the like.

To assist in the ease of inspection and maintenance, the pump is provided with short inlet and discharge necks provided with flanges which lie in parallel planes at right angles to the axis of the pivot. The intake and discharge pipes are also preferably provided with clamping flanges readily detachable from the flanges of the aforesaid necks, so that when it is desired to swing the pumps into the horizontal position, the pipes do not need to be moved except to be sprung apart far enough to allow the pump flanges to be swung sideways out of register with the flanges of the pipes.

The motor pump unit and the supporting member or base are arranged to be clamped together rigidly independently of the hinge connection between them.

The preferred form of the pump herein illustrated is of the type which is sealed by a liquid seal around the impeller shaft. Provision is made for draining the overflow liquid of this seal clear of the mounting, and the pump is so designed and related to the mounting that when it is brought to a horizontal position such liquid as may be held in the pump adjacent the impeller shaft is given free opportunity to drain away and not to run along the impeller shaft into the bearings. Particularly in the case of a pump handling corrosive liquids this provision is of practical importance.

Now in order to acquaint those skilled in the art with the manner of constructing and operating a device embodying my invention, I shall describe, in connection with the accompanying drawings, a specific embodiment of the same.
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In the drawings, Fig. 1 is a perspective view of a motor driven pump embodying my invention. This view shows the unit in normal pumping position viewed from the front side; Fig. 2 is a similar perspective view of the same unit viewed from the back side; Fig. 3 is a perspective of the unit where the pump has been swung into horizontal position; Fig. 4 is an elevational view looking endwise and showing the shaft from the right of Figure 3, and showing the cover plate at the bottom of the pump removed; Fig. 5 is a vertical sectional view through the particular pump herein shown, this section being taken on a vertical axis parallel with the axis of the hinge on which the pump and motor unit is mounted; Fig. 6 is a similar view taken at right angles to the section of Figure 5; and Fig. 7 is an elevational view of the mounting of a pump at the side of a liquid containing tank.

Referring first to Figures 1 and 2, the major parts of the device comprise the pump 1 which is of the vertical type, and which has a generally cylindrical body with its impeller shaft extending vertically upwardly, the swinging bracket or frame 2, the driving motor 3, the supporting stand 4 which is hinged to the bracket frame 2 on the hinge pins 5, and the means for rigidly connecting the frame 2 and the stand 4, including the angle bracket 6.

The stand 4 comprises a foot 7 which is adapted to rest upon the floor or foundation and to be bolted down to such floor, foundation or other suitable support. A stem or column 8 rises preferably vertically from the foot 7, the column being a relatively thin curved plate-like body preferably cast integral with the base and with hinge portions 8-9 disposed at the upper inner corner of the column or stem 8. In cross section the upright or column 8 is preferably arcuate for the dual purpose of providing the necessary strength and also to provide a hollow space into which the pump body 1 is swung when the pump is in the position shown in Figure 1. The stem 8 is gutter-shaped, that is, it has a concavity on one side and a corresponding convexity on the other side throughout the major part of its length.

At the rear edge of the top of the upright 8, there is provided a pad or plate-like extension 10 which is engaged with a cooperating foot portion of the angle bracket 6. The swinging bracket frame 2 is provided with a padlike boss 12 and adapted to be clamped to the face of the angle bracket 6 when the pump is in vertical position or to match with the pad 10 at the top of the upright 8, as shown in Figure 3 when the pump is swung to the horizontal position. Bolts 13 extend through the corresponding part of the angle bracket 6 and the pad 10 to hold these parts together. Bolts 14 are employed for clamping the pad 10 and the corresponding foot portion of the angle bracket 6 together. Hence, it may be seen that by removing the bolts 13 and 14, and removing the angle bracket 6, the pad 12 may be swung down into register with the plate or pad 10 and the bolts 13 may then be inserted through the holes in the plate 10 and the holes matching therewith in the pad 12, and thus the pad 12 and the plate 10 are connected rigidly together either through the angle bracket 6 or by direct engagement with each other.

It will be apparent that the hinge and pad arrangement above described provides a simple and inexpensive way of holding the parts 2 and 8 rigidly together whether in the vertical position or in the horizontal position. The angle bracket 6 may of course be hinged to the pad 10 at its lower edge or to the pad 12 at its upper edge if desired and swung out of the way when the pump is to be brought to its horizontal position, but this is an optional detail. Obviously, also, a toggle mechanism connecting these parts which would be made rigid in either the vertical position of the pump or the horizontal position of the pump may be employed, but not so simply nor to as good an advantage. The intermediate swinging bracket member 2 has a clamping ring flanged inwardly to provide a suitable support for the motor 3. This mounting or clamping ring is preferably flush on the outside with the cylindrical intermediate portion of swinging bracket 2 for the sake of appearance. Obviously, the flange might extend outwardly. The motor 3 herein shown is a self-ventilating flame-proof motor which is substantially totally enclosed against moisture falling upon the same. It has a bell member 16 provided with a clamping flange 17 which mates the flange 18, these two parts being suitably bolted together. Quite obviously the form of the motor employed for driving the pump may optionally be varied. Any suitable form of vertical motor or even a driving pulley or sprocket gear might be employed if so desired. It is to be observed that the motor and the pump are approximately of equal moments about the pivot pin 5, so that very little effort is required to move the pump from vertical to horizontal position or vice versa.

At its lower end the bracket frame 2 is provided with a clamping ring 18 which is clamped to a suitable ringlike part 19 rigid with the pump 1 whereby the bracket frame 2 rigidly holds the motor and pump in axial alignment at all times. When the unit is in the position shown in Figure 1, the pump 1 is supported in suspension from the said swinging bracket 2.

The pump has a bearing housing 20 which holds a bearing section in suitable ball bearings for both endwise and lateral support, this bearing housing 20 being provided with a clamping flange 19 by which it is clamped to a cooperating flange 22 on the pump 1.

The length of the bearing housing 20 shown in Figure 1 is greater than that shown in Figure 5, but that is obviously a matter of choice for the particular mounting employed.

The intermediate shaft section 23 which is supported in the bearings in the housing 20 is coupled through the flexible coupling 24 to the vertical motor shaft. The motor itself has suitable bearings for supporting its shaft radially and axially. By providing a separate shaft section 23 rigidly and carefully journaled in the housing 20 the unit is made very steady and free of vibration.

The intermediate shaft section 23 has a shrunken fit telescopically receiving the upper end of the impeller shaft 25, which impeller shaft is made of a metal suitable for the intended use of the pump. That is to say, if the pump is to handle corrosive liquids, the shaft 25 should be made of corrosion-resistant metal, whereas the intermediate shaft section 23 is not intended to be subject to attack of the corrosive liquid and may uniformly be made of a suitable metal.

The pump 1 is a vertical self-priming centrifugal pump having a cylindrical body portion,
provided with two horizontally extending necks, namely, the intake neck 26 and the discharge neck 27. These necks are provided with clamping flanges 28 and 29, the outer faces of which are parallel to each other, and at right angles to the axis of the hinge 5.

These necks are axially in the same line rather as an element of symmetry than of necessity.

Inlet pipe 32 and discharge pipe 34 are provided with mating flanges 34 and 35 which may be secured by bolts and the separable clamping rings 30 to the clamping flanges 28 and 29 of the inlet and discharge necks, respectively. As may be seen in Figure 4, so long as the flanges 34 and 29 are parallel and at right angles to the axis of the hinge pin 5, it is not necessary to remove the pipe 33, but merely to release the split clamping ring 30, whereon upon the flange 29 on the neck 28 may be slid sidewise, free of the flange 25, without disturbing the discharge pipe 32. In like manner, the flange 26 on the intake neck and the flange 34 on the suction pipe may at the same time be slid past each other when the pump is to be swung from one position to the other. This is of great convenience, since frequently the pipes such as 28 and 29 are rigidly supported, and it is a matter of great inconvenience to be compelled to move them in order to remove the pump from between them. Obviously, suitable packing gaskets may be inserted, the parts being sprung sufficiently to insure that the gasket may readily be inserted, if desired. In the pump illustrated, the inlet neck 26 leads into an inner concentric intake trap space 35, and the discharge neck 27 leads from the annular separator space 37 which surrounds the intake trap space 35. The walls of these two functional spaces are substantially concentric and the intermediate wall 38 is common to the two. At the lower end of this wall, there is disposed the impeller housing generally designated as 39. It consists of two parts, namely, the top plate 40, which has the opening 42, so that the inside of the housing may be seen. Within the bottom of the intake trap space 35 and the bottom or main housing member 43. The main housing member 43 is a composite member performing a number of functions. First of all, it is a cover plate for the bottom of the pump itself. It forms a complete wall of the pump discharge and priming throats. At its central part it forms a cover plate for the impeller housing 39 and at its periphery it forms a sealing flange 44, which is adapted to be clamped by the mating clamp 45 and flange 46 to form a liquid-tight joint.

This cover member 43 has a flange-like extension 47 extending axially of the impeller shaft 28 and surrounding the impeller 48 with peripheral walls which are at suitable places uninterrupted to provide discharge and priming throats. The form of the throat is not for the purpose of this invention decisive. Suffice it to say that there are in the present structure, two pairs of throats arranged on a diameter, the anterior throat represented by the discharge passageway 43 being arranged to discharge a mixture of impeller and fluid flange of partition 50 during priming and the auxiliary or priming throats which are adapted to receive liquid from the space or manifold 52 below the said flange or wall 50, as represented by the throat 52.

The impeller will be revealed, as shown in Figure 4, by removal of the bottom plate 43, and since the impeller is releasably held to shaft 25 as by means of the clamping nut 54, the impeller itself may be readily removed and replaced. The member 43 may easily be replaced if desired. In the same body various forms of impeller housings may be mounted. The top housing section 40 has a flange 55 gripping the lower end of the intermediate circular wall 38 and this member 40 is thermally shrunk upon the lower circular margin of the wall 38. To remove it, it may be heated with a blow torch and it readily drops off.

A pump constructed with the functional parts above described might be provided with a conventional form of packing gland, but the present pump is provided with a liquid seal, as disclosed in my above mentioned connection.

It is to be understood that the pump per se herein illustrated is described in full and claimed in the said copending application, and reference is made thereto for a detailed description of the same.

A peculiar virtue of the said form of pump is the ability to mount the shaft bearings very close to the impeller itself. That is to say, the overhang from the bearing housing 20 to the impeller 48 can be less than would be possible if a conventional form of packing gland employing fibrous or other removable packing were utilized. The bearing housing 20 is mounted on top of the pump. In the structure illustrated the housing projects into a pocket 56 recessed into the top wall of the pump, for the saving of space axially. The pocket 56 leads to the outside by an open cut or groove 57 shown more clearly in Fig. 6. The walls 58 of the pocket 56 provide a complete bottom, which, however, is extended in the shape of a cylindrical housing 59 for receiving the liquid sealing sleeve 60. The liquid sealing sleeve 60 has a head 61 at the lower end, and a shaft which is extended through the bore of the housing member 59 and it has a threaded end extending just above the bottom wall of the pocket 56, this threaded end being engaged by a perforated nut 63 which forms both a slinger pocket and a holding means for the sleeve 62. The housing 59 is divided into two compartments or chambers 64 and 65. The chamber 66 communicates by a pair of passageways shown more clearly in Figure 6 with a separator space 57. As its central part it forms a liquid separator space and deliver it through one of the passageways 66 into the chamber 65. The other passageway 67 allows circulation of liquid through the pocket 56 to keep it washed clear and to deliver a flow of liquid back into the separator. The sealing sleeve 62 has a series of tangential slots leading into the clearance 68 for causing liquid from the supply chamber 65 to crowd against the shaft 25 and to be squeezed tight therewith and lengthwise of the shaft 25. The shaft 25 and the sleeve 62 have sufficient clearance between them to prevent rubbing of these parts and to permit such solids as are carried in the liquid to escape through said clearance. Obviously, this clearance may be varied for the different services for which the pump is designed. A short distance above the clearance 68 to where the wedging ports lead is another clearance 69 with radially arranged ports to permit the escape of liquid thrown from the shaft by the centrifugal action of the shaft upon such ports. Above the clearance 68 the sleeve extends with a minimum gap to a clearance 70 opening by way of a series of large ports into the relief or overflow cham-
4. ber 64, which, as will be seen from Figure 6, extends by way of passageway 72 to the outside and to a drain pipe 73 (see Figs. 2 and 6) to permit free escape of all liquid which passes through the liquid sealing gap between the shaft 57 and the central part of the sleeve 69. It will be seen that the circulating passageways 66 and 67, the drain passageway 72, and the drain groove 57, which opens into it at 71, lie substantially on a diameter. The passageway 72 and the groove 57 drain downwardly when the pump is swung into the horizontal position as shown in Figure 3, the circulating passageways 66 and 67 being substantially vertical, so that any liquid which may remain in them is allowed to drain through the drain passageway 72 and the cut or groove 67.

The drain passageway 72 has at its outer end a flanged connection for the drain pipe 73 and the upright 8 has an opening 74 therethrough through which the pipe 73 may extend for draining away overflow liquid from the seal during operation. The pipe 73 is unscrewed when it is desired to bring the pump to the horizontal position.

The operation of this specific pump may be briefly stated as that of a self-priming pump, in which liquid is trapped in the intake 35, discharges 37, and within the impeller housing 39. As soon as the shaft 25 is rotated by operation of the motor the liquid in the trap 36 is driven over into the separator 37 and the function of carrying out air by recirculation of liquid is begun. At the same time, the discharge of liquid from the intake trap into the separator raises 35 the gravity head of liquid on the pipes 66 and 67 in the separator to a point where the liquid stands higher in the separator than it does in the liquid supply chamber 65 of the seal for the shaft and liquid is thereby introduced into the shaft seal at the port leading to the clearance 68, and since the pump is then sealed and suction may be exerted, any escape of liquid along the shaft 25 will be in a downward direction back into the impeller. Thus, when the pump starts to perform its priming operation two circulations are set up, one being the main circulation for carrying out air from the intake to the separator, and hence around peripherally into the impeller, the other being the circulation of liquid from the separator to the liquid seal and back into the intake of the pump. Both of these circulations are internal circulations and no liquid is lost thereby, so that this operation may continue indefinitely.

In Figure 7 I have illustrated the manner of mounting the unit of my invention at the side of a liquid containing tank. The tank 89 may have a platform 82 extending across one side of the tank 89 and to this platform 82 corresponding 40 to the top of the upright 8, shown in Figures 1 and 2, may be attached. The drain pipe 73 is arranged to drain liquid directly back into the tank 89, and inlet and discharge pipes 84 and 85 are arranged in suitable locations. The clamping bracket member 6 holds the plate or bracket 63 rigidly to the intermediate swinging frame 2. When desired the bracket 6 is released and the unit swung into horizontal position on the hinge 8 as described in connection with Figures 70 and 2. The intermediate swinging frame member 2 has the hinge part 11 and the stationary plate or bracket 63 has the cooperating hinge part 8.

Now, when it is desired to open up the pump for inspection or for renewal of an impeller, or for renewal of the pump housing, if necessary, all that is required is to release the clamping bracket 63, disconnect the suction and discharge lines and swing the pump into horizontal position, whereupon, by release of the clamping ring 43 the closure member 43 may be withdrawn, revealing the impeller and the top plate 48 of the housing, as is clearly illustrated in Figure 4. The impeller may then be removed by means of the casing sections if desired, and the pump again closed up with minimum of difficulty. Since the shaft is liquid-sealed, scoring of the shaft is not nearly so likely to be encountered as heretofore, with the result that it may be expected to last a long time, but provision is made that if necessary to remove it, this may be done.

Obviously, if desired, the lower end of the pump may be threaded against the foot 7 or against the upright 8, and in the illustration I have shown in Figure 4 a boss 78 which may be engaged by the pump 7 or any part thereof so as to steady this pump when the clamping bracket 63 is clamped into place.

The unit is very steady as the center of gravity lies well within the foot 7; the parts are rigid; the alignment may be accurately made, and the outboard overhang of the rotating parts is a minimum.

The pump may be filled by releasing the plate 66 (Fig. 1) which is normally held closed by yoke 87 and clamping screw 88. Alternately a screw plug may be employed. If so it may be placed in the side wall at the desired filling level. I do not wish to be limited to the precise details shown and described, as equivalents will at once be obvious to those skilled in the art by means of the specific description of the preferred embodiment.

I claim:

1. A vertical motor driven self-priming pump unit adapted to be disposed wholly above the level of the liquid to be pumped comprising a combination of a relatively short bracket the length of which bracket is independent of the relative level of the source of liquid to be pumped, a vertical driving motor rigidly mounted on one end of the bracket, a pump rigidly mounted on the other end of the bracket, said pump and motor having independently journaled axially aligned and coupled shafts, flanged releasable inlet and discharge connections for the pump independent of the bracket, said pump having a casing including a releasably mounted closure plate on the lower end of the casing, removal of said plate exposing the impeller, and supporting means to which said bracket is hinged, said hinged being out of line with the inlet and discharge connections and permitting the unit to be swung from substantially a horizontal position into substantially a horizontal position clear of said inlet and discharge connections when the latter are released.

2. In a vertical motor driven self-priming pump unit the combination of a vertical driving motor and a vertical centrifugal pump having their shafts separately journaled in axial alignment and coupled together, the motor and pump being disposed for operation entirely above the level of the liquid to be pumped, a short rigid connecting frame connecting the motor and the pump, a supporting frame to which the connecting frame is hinged adjacent the top of the pump in such relation that the connecting frame and its attached parts may be swung from normally vertical operating position to horizontal position,
the pump having fluid intake and discharge connections independent of and disposed below said frame, and a releasable bridging frame member for rigidly joining the confecting frame and the supporting frame while the pump is in vertical operating position.

3. In combination, a vertical centrifugal pump comprising a pump body, an impeller in the body, an upwardly extending impeller shaft, said body having inlet and discharge nozzles provided with clamping flanges disposed in parallel planes on opposite sides of the said body for connection with inlet and discharge pipes respectively, said casing having a removable plate on the bottom providing access to the impeller, a supporting bracket clamped to the body, said bracket having a hinge part at one side of the casing and spaced from said flanges, a stationary support having a cooperating hinge part, a pintle for said hinge parts, the axis of the pintle being horizontal and normal to the planes of said flanges whereby the pump may be swung on the hinge from vertical position to horizontal position to bring the bottom plate to readily accessible position and to swing the flanges laterally out of register with the positions of the inlet and discharge pipes.

4. In combination a mounting base having a hinge portion, a relatively short frame having a cooperating hinge, said hinge portion being articulated on a horizontal axis to permit the frame to be swung between vertical and horizontal positions, a vertical centrifugal pump clamped to the lower end of the frame and being disposed below and adjacent said hinge, a driving shaft for the pump having a bearing rigid with said frame, said pump having a body including a plate releasably clamped to the bottom of the body, said plate being removable for pulling the impeller only when the pump is swung out of vertical position.

5. In combination a mounting base having a hinge portion, a frame having a cooperating hinge portion, said hinge portion being articulated on a horizontal axis to permit the frame to be swung between vertical and horizontal positions, a vertical centrifugal pump clamped to the lower end of the frame and being disposed below and adjacent said hinge, a driving shaft for the pump having a bearing rigid with said frame, said pump having inlet and discharge connections provided with clamping flange surfaces disposed in substantially vertical planes at right angles to the axis of said hinge whereby said pump connections may be moved clear of cooperating inlet and discharge conduits when the frame is swung to horizontal position.

6. In combination a vertical centrifugal pump having a body, an impeller and an impeller shaft, said body having a releasable closure member at the bottom thereof for revealing the impeller, a base for normally supporting the pump in vertical position, in which position said releasable closure is substantially inaccessible, the base and the pump having a bearing rigid with a horizontal and vertical axis to permit the pump to be swung to horizontal position to render the closure member readily accessible, said hinge being disposed at one side of the axis of the shaft and near the top of the pump whereby when the pump is swung into horizontal position it is as a whole raised above its normal position.

7. The combination of claim 6 with means for fixedly clamping the pump to the base in either vertical or horizontal position independently of the hinge.

8. The combination of claim 6 wherein the pump has inlet and discharge necks extending in directions parallel to the axis of the hinge, inlet and discharge pipes aligned with said necks, said pipes and said flanges having mating flanges lying at right angles to the axis of the hinge, whereby when said flanges are releasable the pump may be swung on its hinge without appreciably shifting the position of said pipes.

9. The combination of claim 6 wherein the base comprises a pedestal the body of which provides a concavity into which the body of the pump is disposed when the pump is in normal vertical position.

10. The combination of a vertical centrifugal pump having a body provided with a platelike closure on the bottom, an impeller in the body adapted to be uncovered by removal of said plate, a shaft for the impeller, a pedestal comprising a flat top portion and a foot portion with a vertically extending stem generally arcurate in cross section, a hinge member on the top portion adjacent the open side of said stem, a clamping pad at the other side of said stem, the body of the pump having a relatively short vertical extension parallel to the impeller shaft, said extension having a cooperating hinge member adjacent the top of the pump, said cooperating hinge member being articulated to said first hinge member and having a clamping pad adapted to register with the clamping pad of the pedestal top when the pump is swung on said hinge into horizontal position, and a brace adapted to connect said pads when the pump is in vertical position, the pump body being adapted to be received into the concave position of the stem and the closure being substantially inaccessible when the pump is in vertical position.

11. A pedestal for supporting a vertical centrifugal pump comprising a foot member, a stem of gutter shaped cross section extending upwardly from one side of said foot with the concave side facing toward the other side of the foot and adapted to receive within its concavity a part of a vertical pump body, and a top portion extending across the top of the stem, said top portion having a bearing rigid with the said top portion when the pump is in vertical position.

12. In combination with the pedestal of claim 11 a relatively short pump supporting frame comprising an intermediate gutter shaped body with clamping rings at each end, a hinge member articulated with the hinge member of the pedestal adjacent the lower end of said body, said frame and said pedestal having means for permitting them to be clamped together rigidly in either extreme position of the frame.

13. In combination a vertical self-priming pump comprising a generally cylindrical body having a separator, an intake trap and an impeller housing coaxial with each other, the separator surrounding the trap, the impeller housing lying below the intake trap and having a removable bottom plate providing access to the inside of said housing, said pump having an impeller shaft and a liquid sealing sleeve with a liquid seal gap surrounding the impeller, a duct from the separator to the inside of the sleeve to supply sealing liquid to the sleeve, and a duct leading from the inside of the sleeve at a point adjacent the upper end of the sleeve to the outside of the body for draining away sealing liquid discharged upwardly along the shaft there being an open groove at the top of said body, the top of the sleeve draining into said groove, a support.
for the pump comprising a pivot the axis of which is at right angles to the vertical plane of said groove, the groove and both ducts leading downwardly to drain liquid away from the shaft when the pump is turned on said pivot.

14. In combination a pump including a hollow pump body of generally cylindrical shape, said pump having a vertical impeller shaft, a depression in the top of the body surrounded by an annular clamping face, a shaft bearing barrel projecting into said depression and having a mounting flange matching said face and secured against said face, a hollow frame member terminating at its lower end in a clamping ring secured against the top of said mounting flange, and means including a pedestal having a foot extending under the center of gravity of the pump, and a vertically extending member rigidly connecting said hollow frame member and said pedestal whereby the pump is mounted in suspension over said foot.

15. A vertically mounted centrifugal pump comprising a pedestal having a foot member, a stem of gutter-shaped cross section extending upwardly from one side of the foot and having the concave side facing the opposite side of the foot, a top portion at the top of the stem, said top portion having a hinge member at the edge of the top adjacent the concave side, a pump supporting frame comprising an intermediate open sided gutter-shaped body with a clamping ring at its lower end and a hinge member adjacent the top of the pump articulated with the hinge member of the pedestal, a centrifugal pump having a substantially cylindrical body closed at the top and having an opening at the lower end for access to the impeller, said opening being closed by a removable cover plate, the pump at its top being clamped to the clamping ring of the pump supporting frame, the pump body being of a diameter larger than the diameter of the frame whereby said body projects into the concavity of the stem and said cover plate lies over said pedestal foot when the pump is supported in vertical position, said frame and said pedestal having means for permitting them to be clamped together rigidly in either vertical or horizontal position of said frame, and releasable suction and discharge connections on the pump body.

16. A vertically mounted centrifugal pump comprising a supporting member having floor engaging means, a vertical frame portion, and a hinge member at its upper end, a vertical pump having a substantially cylindrical body closed at the top and having an opening at the bottom, a combined closure and impeller housing member clamped over the opening and being removable to expose the impeller, a pump supporting bracket clamped to the top of the pump body and having a hinge member adjacent the top of the pump body cooperating with the first hinge member to form a trunnion, said pump body being supported on said trunnion in vertical position with the closure member so close to the floor engaging means that it cannot be removed while the pump is in vertical position, and cooperating means on the supporting member and on said bracket for rigidly holding the pump in horizontal position whereby said closure member is exposed for removal.

17. A vertical motor-pump unit comprising a relatively short vertical bracket member having coaxial clamping faces at its ends, a self contained vertical centrifugal pump clamped to the lower clamping face, a self contained vertical motor clamped to the upper face, said pump and said motor each having its own independently journaled shaft and said shafts being coupled together, the pump having suction and discharge connections with readily releasable couplings for suction and discharge pipes independent of the bracket, said releasable couplings lying in substantially parallel planes on opposite sides of the pump at points remote from the pivot, a horizontal trunnion on said bracket between the motor and the pump adjacent the top of the pump, said bracket member being out of contact with the liquid to be pumped and a supporting bracket member having a bearing cooperating with the trunnion to permit the unit to be swung into a horizontal position clear of said suction and discharge pipes when said pipe couplings are released.

18. A vertical motor-pump unit comprising a relatively short vertical bracket member having coaxial clamping faces at its ends, a vertical centrifugal pump clamped to the lower clamping face, a vertical motor clamped to the upper face, said pump and motor each having its own independently journaled shaft and said shafts being coupled together, the pump having suction and discharge connections with readily releasable couplings for suction and discharge pipes independent of the bracket, a horizontal trunnion on said bracket between the motor and the pump and adjacent the top of the pump, and a supporting bracket member having a bearing cooperating with the trunnion to permit the unit to be swung into a horizontal position when said pipe couplings are released, wherein the vertical bracket and the supporting bracket member have mating clamping faces adapted to register for bolting together when the unit is swung into horizontal position.

19. A vertical motor-pump unit comprising a relatively short vertical bracket member having coaxial clamping faces at opposite ends, a vertical centrifugal pump clamped to the lower clamping face, a vertical motor clamped to the upper face, said pump and motor each having its own independently journaled shaft and said shafts being coupled together, the pump having suction and discharge connections with readily releasable couplings for suction and discharge pipes independent of the bracket, a horizontal trunnion on said bracket between the motor and the pump and adjacent the top of the pump, and a supporting bracket member having a bearing cooperating with the trunnion to permit the unit to be swung into a horizontal position when said pipe couplings are released, the vertical bracket and the supporting bracket members having mating clamping faces adapted to register for bolting together when the unit is swung into horizontal position, and a connecting bracket having faces registering with and clamped to said first named faces to hold the unit rigidly in vertical position.

20. In combination, a vertical centrifugal pump having a body comprising an impeller chamber with an opening in the bottom of the body for removal of the impeller from said chamber, a closure plate clamped to the body over the opening, a pedestal having a hinge member at its upper end, said pump having a cooperating hinge member adjacent to its upper end cooperating with the first hinge member to permit the pump body to be swung upward and into substantially horizontal position providing ready access to the closure plate for removal of the same.
21. In combination, a vertical centrifugal pump comprising a generally cylindrical body having an impeller chamber at its lower end and having an opening in the bottom for exposing the impeller, a closure plate for the opening, a pedestal having a hinge member at its top, said pump body having adjacent its upper end a cooperating hinge member for suspending the body below the hinge with the closure plate adjacent to and substantially parallel with the floor, said hinge members permitting the body to be swung angularly and thereby raised upwardly to bring the closure plate into exposed position where it may be readily removed to provide access to the impeller.

22. A supporting member for a vertical centrifugal self-priming pump, comprising a foot member adapted to be bolted to a foundation, a stem rising from one side of the foot member, said stem being arcuate in horizontal cross section, said stem having a substantially horizontal plate at the top provided with a clamping face and having a straight edge forming a chord across the top of the stem, and hinge means disposed along said straight edge.

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