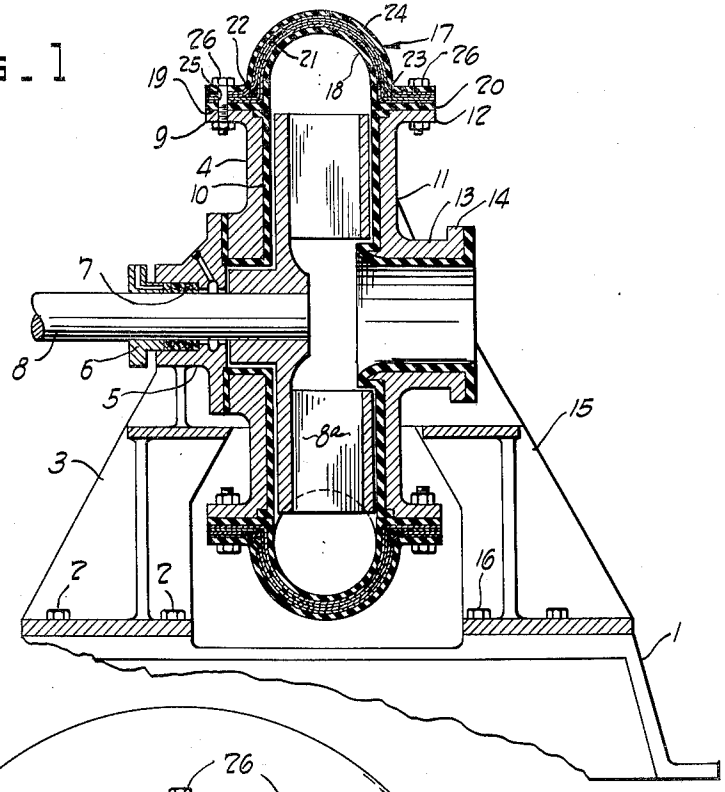
Jan. 30, 1962 A. T. CLAY 3,018,736

DREDGE PUMP

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Fig. 1



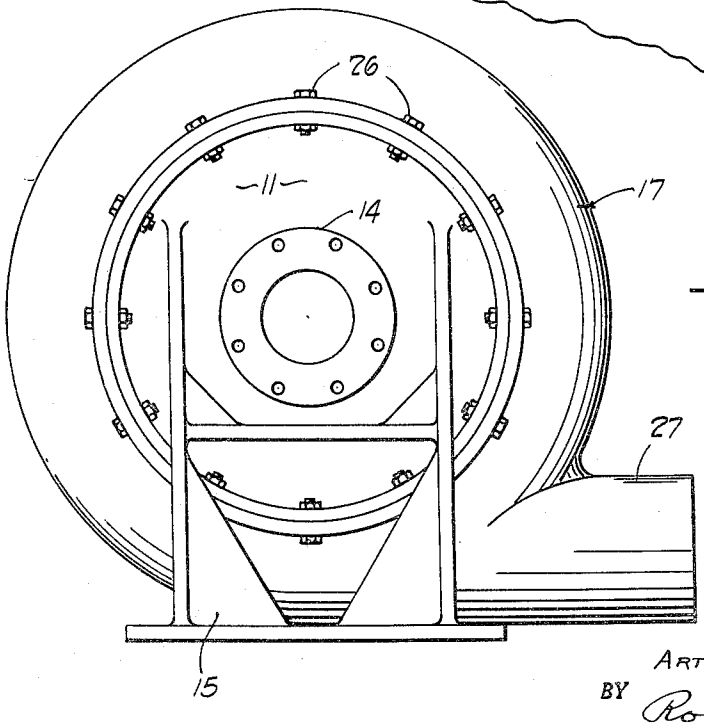


Fig. 2

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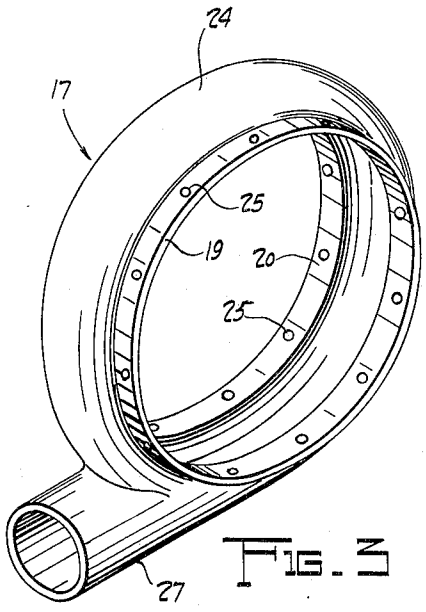


FIG. 3

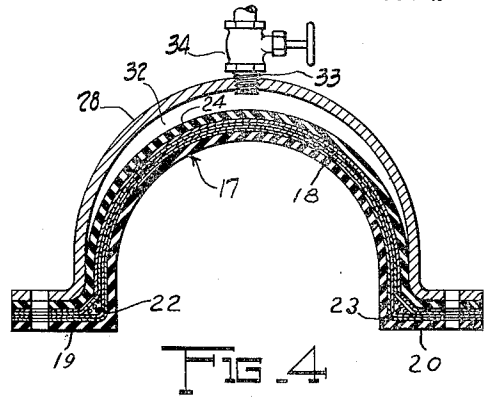


FIG. 4

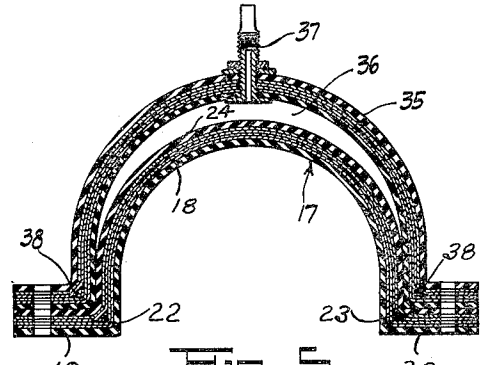


FIG. 5

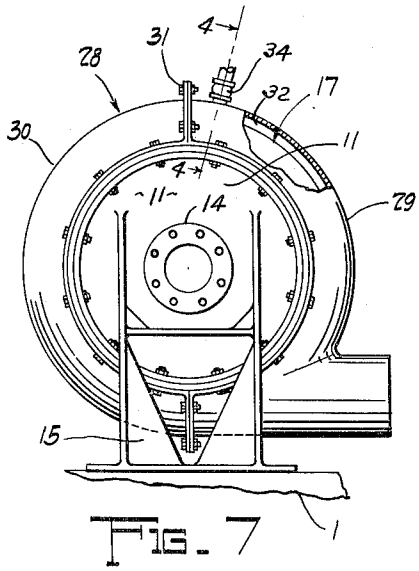


FIG. 7

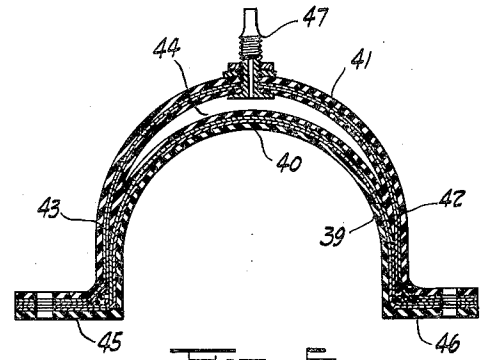


FIG. 6

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United States Patent Office 3,018,736 Patented Jan. 30, 1962

3,018,736

DREDGE PUMP

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Filed Jan. 4, 1954, Ser. No. 402,068
3 Claims. (Cl. 103—103)

This invention relates to dredge pumps and more particularly to pumps of this class for handling large solids and abrasive material without breakage or unduly rapid wear of parts thereof.

Heretofore many different constructions have been evolved in an attempt to overcome the above mentioned problem, but only a relatively small advance has been made.

The problem is accentuated by the fact that the material pumped is normally extremely abrasive and the large solids carried by the pump may cause fracture of metallic parts. Even though liners have been developed which decrease the abrasive effect, whether comprised of metal or other material, all of the desirable characteristics have not heretofore been provided in a single unit.

In addition necessary replacement of heavy metal liners at frequent intervals is obviously expensive, not only adding to the initial cost but by reason of the lost time in effecting such replacement.

It should be noted that not the least of the problems encountered is the shock incurred by causing large solids to be moved through a centrifugal pump which transmit shock forces of relatively high values and thus massive and expensive metal parts have been relied upon to accommodate the same.

In the present invention an entirely new concept is availed of to handle materials normally moved by dredge pumps, primarily residing in the provision of a relatively flexible and/or resilient volute member in place of a rigid metallic construction, which is capable of handling not only large solids but also abrasive materials with notably reduced consequent wear and virtual elimination of rupture by shock.

It is a principal object of this invention to provide a dredge pump arranged to handle both heavy solids and abrasive material, without availing of heavy metal liner units or excessively heavy shell elements and yet be equally as efficient and less costly than presently constructed pumps.

A further object is to construct a pump of the class described including a resilient and/or flexible volute section.

Yet a further object of this invention is to provide a volute section in a dredge pump which provides cushioning or shock absorbing qualities, yet is resistant to abrasion and rupture.

A still further object of this invention is to provide a volute section which is readily replaceable as a unit.

Another object of the invention is to provide a pump having a volute section including an inner resilient self-supporting member and an outer member equivalent to a shell, the members being spaced apart so as to provide a chamber to receive a fluid therein.

A further object of the invention is to provide a resilient volute member, substantially enclosed by a relatively rigid shell, a space being provided therebetween to form a chamber for receiving fluids having different characteristics.

Other and further objects of the invention will be understood from a consideration of the specification appended hereto and shown in the drawings wherein:

FIGURE 1 is a vertical cross-sectional view taken through a pump showing the arrangement of the parts thereof, the pump being constructed in accordance with this invention.

FIGURE 2 is a side elevation view showing the exterior of the pump looking at the same from the intake side thereof.

FIGURE 3 is a perspective view showing the volute member in one form.

FIGURE 4 is a fragmentary sectional view showing a form of volute constructed in accordance with this invention in relation to a shell member which may be used therewith.

FIGURE 5 is a cross sectional view, likewise fragmentary, illustrating another form of volute and shell member associated therewith.

FIGURE 6 is a further modified form of volute member, the same being shown in a fragmentary section, and illustrating certain of the desirable characteristics thereof.

FIGURE 7 is a side elevational view of a pump construction in accordance with this invention, showing a shell member in place over the flexible or resilient volute member and the manner of maintaining the same in position.

Referring initially to FIGURES 1, 2, and 3, the pump of this invention is of the centrifugal type, and is shown as being comprised of a bed **1**, above which and supported thereon as by means of the bolts **2** is a bearing side cover support **3**. The bearing side cover support **3** is in turn fastened at its upper end to a bearing side cover **4**. The bearing side cover includes therein the necessary bearing **5**, stuffing box nut **6**, stuffing box packing **7** so as to receive and support therein for rotation a shaft **8**.

The shaft **8** in turn supports at its end an impeller of generally conventional form and denoted **8***a*, the impeller being fastened to the shaft in any preferred manner. It will be understood that the shaft **8** is intended to be rotated in accordance with conventional practice and by any known means not shown.

As will be understood from the drawings, the bearing side cover **4** is a circular member and includes at its outer periphery a flange **9** thereon. At the inner face of the bearing side cover the same may preferably be provided with a rubber or other similar material bonded to the face and indicated at **10**. The said material **10** will extend as shown in the drawings over the entire face and assist in preventing abrasion of the metal from which the side cover **4** is formed.

Parallel to and spaced from the bearing side cover **4** just above described, is the suction side cover designated **11**, which is a similar member to the side cover **4**, being of round configuration and being provided with a flange **12** at its outer periphery. The covers **4** and **11**, form what may be termed an impeller housing section, since the impeller **8***a* is mounted therebetween and substantially confined thereby. At the inner portion of the cover **11**, is the inlet or suction sleeve section **13**, which section **13** extends as shown and terminates in a flange **14**, as is customary in pumps of this general class. The flange **14** may be provided with suitable bolt holes, to which a suction line may be connected as is well known, there being no such connection shown in the drawing.

The inner face of the side cover and the interior of the suction sleeve section **11** and **13** respectively are covered with a rubber or similar material, preferably bonded thereto so as to resist the abrasive effect of the material carried by the pump.

In order to support the cover **11** in the position as shown and make the necessary clearances with respect to the impeller **8***a*, a cover support **15** is provided, the same being in turn fastened as at the lower part by means of the bolts **16**, to the base **1** previously mentioned. It will

be apparent that the support **15** is suitably formed either integral with the side cover **11** or otherwise fastened thereto so as to provide rigid support therefor and proper positioning of the same with respect to the other parts of the pump including the impeller **8***a* and the bearing side cover **4** as previously described.

As will be understood from a consideration of FIGURE 1 the flanges **9** and **12** on the respective covers **4** and **11** are intended to engage a volute or a volute member **17**, which member **17** is formed with an interior relatively thick layer of rubber or similar flexible material **18**, comprising a portion forming a flange **19** at one edge thereof, and a similar flange **20** opposite thereto and parallel therewith. The portion **18** is preferably of very tough abrasion resistant material and as indicated may be of rubber or suitable composition, and exterior thereto and bonded therewith are the fabric layers **21**, the fabric layers **21** being equipped at portions adjacent the flanges **19** and **20** with the bead sections **22** and **23** respectively. An outer layer or covering of rubber or similar material **24** may be provided, and the whole unit molded or otherwise formed substantially along the lines of manufacture resorted to in building truck tires or the like. It will be understood of course that the flanges **19** and **20** are provided with suitable openings spaced as necessary around the flanges and indicated at **25** for fastening the said flanges as by means of the bolts **26** to the corresponding flanges **9** and **12** of the covers **4** and **11** respectively.

It should be understood that the structure above described, as comprising the volute or volute member **17**, is intended to be representative, and may be formed in any preferred manner so as to provide the necessary characteristics set forth hereinafter. Primarily such characteristics will comprise a self supporting structure, formed of resilient material or flexible material and having a tough abrasion resistant surface which is capable of handling the solids and materials of other types carried by the pump. The volute **17** is formed as shown in order to permit the passage of large solids, permitting deflexion of the volute under certain conditions and yet the volute will thereafter assume its original shape and carry out its function as part of the pumping operation. It should also be clear that the volute **17** as a whole may be removed from its position as shown by removing the suction side cover **11**, of course after preliminarily having disengaged the bolts and nuts **26** on the respective flanges as shown, and thereafter the volute as a whole may be slipped off of its position on the flange **9** and the flange **12**.

It is also noted that the outlet section **27**, is formed with the volute **17** and is of the same material from which the volute is constructed, it being apparent that the outlet piping may be connected thereto in any preferred manner not shown.

As is well known the rotation of the impeller **8***a*, creates the usual suction through the suction sleeve section **13** drawing materials from any source as directed by the operator, and thereafter carries the water and abrasive materials together with solid matter through the volute **17** and thence outwardly through the outlet member **27** in the usual manner. The pump as a whole is intended to be of conventional operating characteristics, improved by the provision of the novel volute member **17** which is resilient and flexible as has been explained.

Turning now to a consideration of FIGURE 4 and FIGURE 7, it will be seen that the volute **17** may be further equipped so to speak with a shell **28**, of substantially similar shape, the shell **28** being comprised of a section **29** and a section **30**. The sections are formed as shown in FIGURE 7 in order to provide for placement over the volute **17** and to be fastened in place by means of the bolts and nuts **31** as will be clear. The shell member **28** is formed so as to provide a chamber or space **32** between the outer surface of the volute **27** and the inner surface of the shell **28**, which chamber is equipped

with an inlet **33**, the inlet **33** in turn being provided with suitable valve means **34** whereby fluids of various types may be introduced into the chamber **32** or permitted to be removed therefrom.

The purpose of providing the chamber **32** is to enable the application of a fluid as has been generally indicated, which may be in the form of water or other liquid, so as to form a backing so to speak for the volute **17**. If water is used in the chamber **32** of course substantially more support will be provided for the volute **17**, but it is also contemplated that air or other similar gas or fluid may be used in said chamber.

In FIGURE 5 a somewhat similar arrangement as is shown in FIGURE 4 is provided. In this particular case however the shell is denoted **35**, the volute **17**, the shell **35** being formed of material of substantially the same characteristics as the volute **17**. Furthermore the shell **35** is likewise spaced so as to form a chamber **36** between the shell **35** and volute **17**, the chamber **36** being adapted to contain therein fluid admitted by means of the valve member **37** which may be of conventional form.

As will be understood from the above described construction, the volute **17** and shell **35** thus provide additional support and relative rigidity for the pump, as far as the materials being carried thereby are concerned. However the fact that the shell **35** and volute **17** are formed of relatively resilient or flexible material, provides a certain range of operating characteristics which may be required under certain circumstances. It is contemplated of course that cushioning effect provided by the fluid in the chamber **36**, which may be air or under some conditions water, will enhance the flexibility of the pump as a whole. As indicated the shell **35** is substantially the same in all respects as the volute **17**, and may include a bead section **38** in each side adjacent the flange portion provided.

In FIGURE 6 another modified form of volute is disclosed, in which the volute is designated **39** and includes an inner section **40**, and an outer section **41**. As will be understood, the respective sections **40** and **41** are connected as at **42** and **43** so as to provide a closed chamber **44** between the parts **40** and **41**. The volute is likewise provided with a flange section **45** and **46** for attachment of the unit to the covers **4** and **11** as the case may be, for removal therefrom when necessary.

The provision of the chamber **44** in this particular form of volute, is to enable the introduction thereinto of air or other gaseous material by means of the valve **47** as will be understood, the chamber construction thus providing further cushioning and backing for the volute section **40** under certain conditions. It is also contemplated that other fluids such as water or the like may be introduced into the chamber **44** to provide for other conditions which may be encountered during operation of the pump.

It should be noted that in the above described form of volute and its associated parts, the construction of the same will be in general similar to that shown in describing the volute **17** originally mentioned. In other words there will be a layer of tough abrasive resistant rubber material for example in the interior thereof and the same may be backed up or otherwise formed with suitable plies of fabric. In this particular form, the parts **41** may be similarly formed and of similar material. Also the availing of the knowledge of construction of truck tires or similar pneumatic tires may be resorted to in providing the various volutes and their associated parts as will be apparent.

I claim:

1. In a pump of the class described, in combination, an impeller housing section, an impeller in said section, a shaft supporting said impeller for rotation in the section, a volute comprised of self-supporting resilient material fixed to said housing section, and a shell member enclosing said volute and fixed to the housing section, said member thereby providing a sealed space between the

volute and said member, said space constituting a chamber confining a fluid, and inlet means for said space.

2. In a pump of the class described, in combination, a housing section, said housing section comprising a bearing side cover having a circular periphery and an intake side cover having a circular periphery, an impeller intermediate said covers, means for supporting said covers in alignment, and a flexible self-supporting volute member having inner peripheral portions connected to said covers and defining a chamber around said impeller whereby materials moved by said impeller will be confined therewithin and the volute member will return to its normal shape after passage of abnormal masses of such material through the pump, said volute member being provided with cushioning means comprising a secondary member enclosing a substantial portion of the periphery of the volute member and spaced therefrom so as to provide a fluid confining chamber.

3. In a pump of the class described, in combination, a housing section, said housing section comprising a bearing side cover having a circular periphery and an intake side cover having a circular periphery, an impeller intermediate said covers, means for supporting said covers in alignment, and a flexible self-support volute member having inner peripheral portions connected to said covers and defining a chamber around said impeller whereby materials moved by said impeller will be confined therewithin and the volute member will return to its normal shape after passage of abnormal masses of such material through the pump, said volute member being provided with cushioning means comprising a secondary member enclosing a substantial portion of the periphery of the volute member and spaced therefrom so as to provide a fluid confining chamber, an inlet for said chamber, and means in said inlet for introduction and withdrawal of fluid thereto.

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