April 23, 1957 R. N. HILL 2,789,514

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Fig. 1

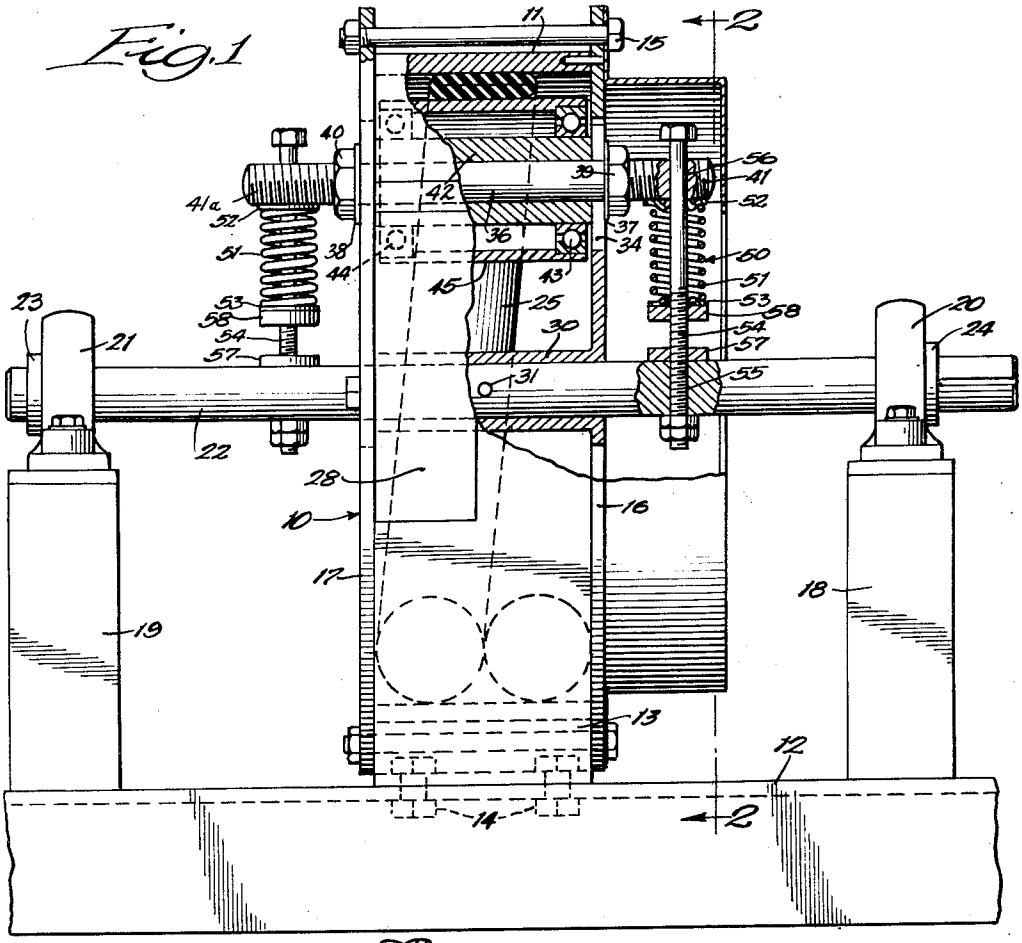
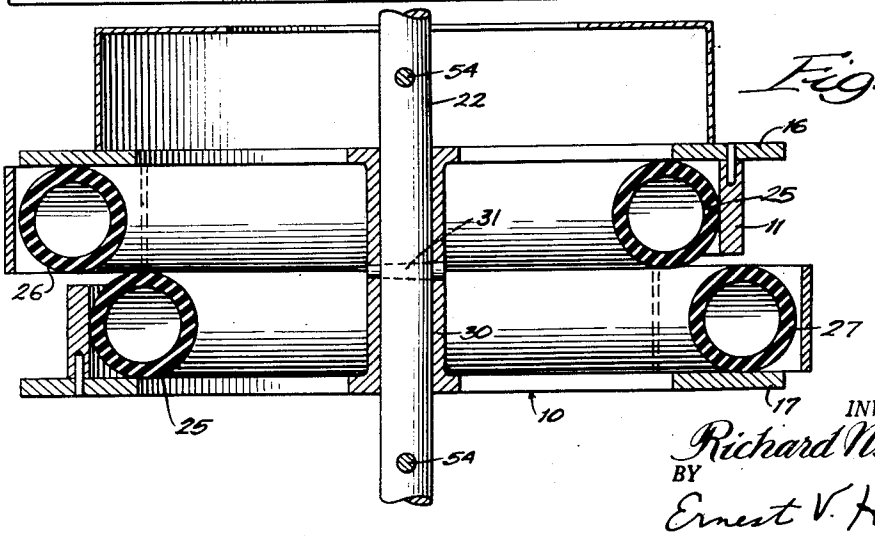


Fig. 3



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Fig. 2

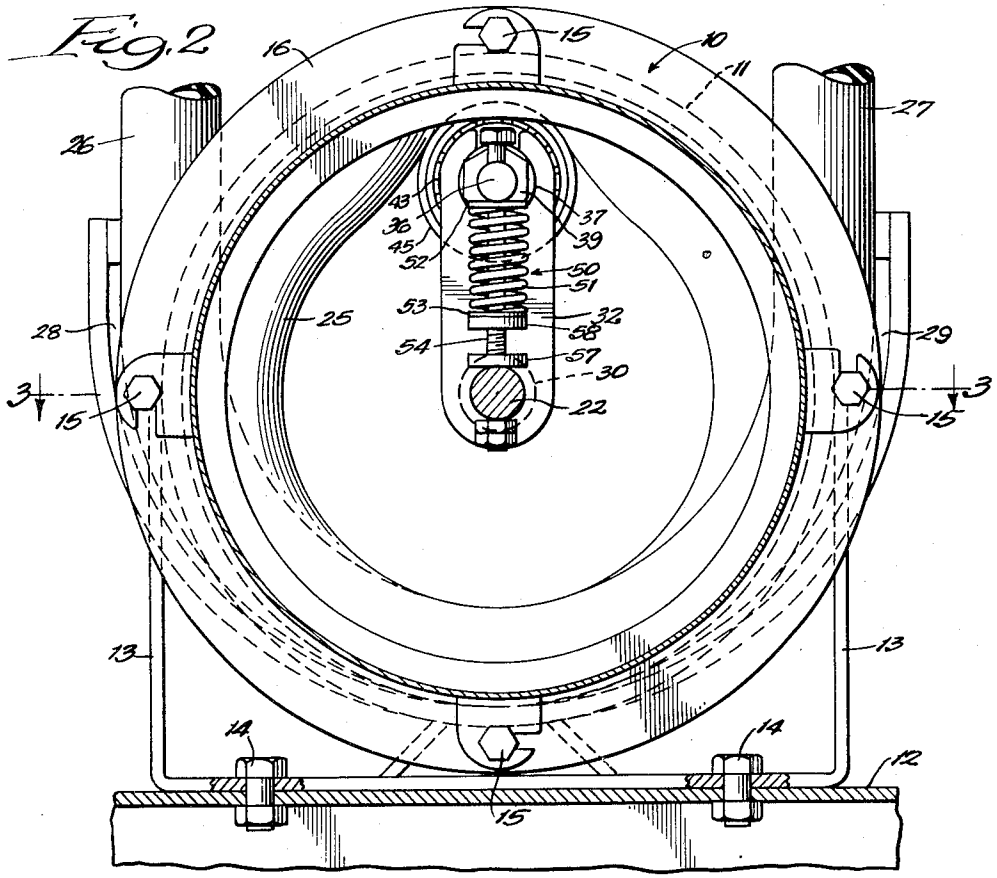


Fig. 4

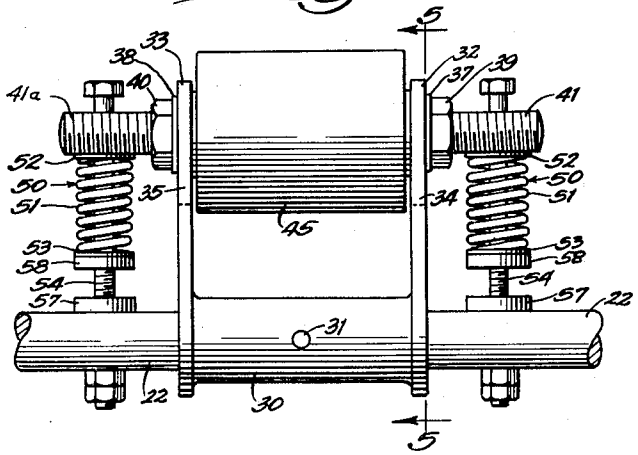
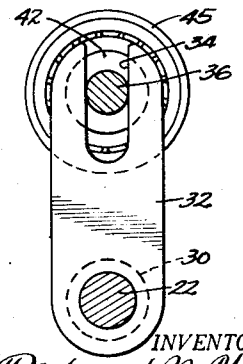


Fig. 5



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2,789,514

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Application March 13, 1953, Serial No. 342,221

1 Claim. (Cl. 103—149)

This invention relates to pumps. More particularly the invention relates to pumps of simple construction. Still more particularly it relates to pumps adapted to handle corrosive and erosive materials.

In the pumping of liquids such as water the choice of a pump usually depends upon its efficiency, giving primary consideration to pressure conditions to be met on the intake and outlet sides of the moving element, which may be a piston or rotor, depending upon whether the pump is a reciprocating or centrifugal pump.

When the aqueous medium contains in solution corrosive materials the problems of choosing a pump are multiplied. Materials of construction sufficiently resistant to corrosion may present machining problems and in addition valves and stuffing boxes require expensive special construction in order to prevent or minimize rapid deterioration.

If in addition to corrosion there is added the problem of erosion due to solids present in a corrosive liquid, the operating life of most pumping equipment is reduced to uneconomical lengths of time.

It is a primary object of this invention to provide a pump which overcomes the disadvantages and shortcomings of equipment heretofore in commercial use.

It is a further object of this invention to provide a pump which is of simple construction and comprises a minimum number of parts.

It is still another object of this invention to provide a pump which will operate against high back pressure.

It is still a further object of this invention to provide a pump which will operate on fluctuating feed without danger of air locking.

It is still another object of this invention to provide a pump durable in use whether the feed is corrosive or not.

It is a still further object of this invention to provide a pump durable in use even when operating on corrosive and/or erosive slurries.

These and other objects of the invention will be apparent from the following description of one embodiment of the invention read in conjunction with the accompanying drawings in which:

Figure 1 is a side elevational view.

Figure 2 is a front elevational view along the line 2—2.

Figure 3 is a view in horizontal section taken along the line 3—3 of Figure 2.

Figure 4 is a side elevational view of the pressure exerting mechanism.

Figure 5 is a view along the line 5—5 of Figure 4.

As shown in the drawing, the structure comprises a casing **10** formed of a body member **11** of cylindrical form. Body member **11** is secured to a base **12** by suitable means **13** such as angle arm support members welded at the extremities to body member **11**. The angle arm support members **13**, are secured to a base **12** by suitable means **14** such as bolts. To the front and rear faces of body member **11** are secured by suitable means **15** such as fixed or adjustable studs or bolts the

retainer rings **16** and **17**, which in combination with the body member form a recess. As shown in the drawings, vertically aligned units **15** are bolts, but the horizontally aligned units would be studs. If units **15** were positioned approximately 45 degrees displaced from the positions shown, all units **15** could be bolts.

On each side of the casing **10** are secured to base **12** positioned channel members **18** and **19**. Mounted atop channels **18** and **19** are bearings **20** and **21** respectively adapted to receive and support a shaft **22** which is in line with the center of the cylindrical body member **11**.

Shaft **22** is positioned against lateral movement by thrust collars **23** and **24** mounted on the outward side of the bearings **20** and **21**. Shaft **22** is adapted at one end to receive a suitable coupling for transfer of rotary motion to the shaft from a power source not shown such as an electric motor either directly or through a suitable speed reduction mechanism.

A resilient tube **25** of circular, eliptical or other suitable cross sectional configuration and formed of rubber or synthetic elastomers is positioned within body member **11** so as to be adjacent to and to press against the inner periphery of said body member in the race or recess formed by the body member **11** and rings **16** and **17**. Tube **25** crosses itself inside the casing and the tube ends **26** and **27** project to the outside of body member **11** through apertures **28** and **29** in a manner approaching the tangential position.

Shaft **22** is provided with a hub **30** which preferably is of a length slightly less than the width of body member **11**. Hub **30** is secured to shaft **22** for rotation therewith by suitable means **31** such as a bolt, a threaded stud or the like. Hub **30** is adapted at its extremities with arm members **32** and **33**, preferably formed integral therewith. Arm members **32** and **33** are slotted as at **34** and **35** respectively. Arm members **32** and **33** support a shaft **36** which may be externally threaded and may be secured in place by engagement of washers **37** and **38** and nuts **39** and **40** against arm members **32** and **33** for operation at increased pump pressures. Both ends of shaft **36** are formed so as to have extending portions **41** and **41*a*** projecting beyond the securing nuts **39** and **40**.

Shaft **36** has mounted thereon as by a press fit a rotor hub member **42** held in fixed position between arm members **32** and **33** when nuts **39** and **40** are properly tensioned. Mounted on rotor hub member **42** are the inner races of ball bearing units **43** and **44**. The outer races of units **43** and **44** are secured as by a press fit to a suitable roller **45** circular in shape and preferably constructed of metal. This roller is generally of a length slightly less than the axial width of the recess within the casing body and of a diameter preferably about one-half the radius of the casing.

Roller **45** is caused to exert compressing or collapsing pressure on the tube **25** by two flexible tensioning members **50** secured in identical fashion between the shaft **22** and the extending portions **41** and **41*a*** respectively of shaft **36**. Flexible tensioning member **50** preferably consists of a spring **51** closed at the ends by washers **52** and **53** secured to the spring as by tack welding or formed with flat ends for mounting against suitable supports. Washers **52** and **53** are provided with central apertures of a size adapted to receive a suitable securing element **54** such as a bolt. Shafts **22** and **36** are provided with aligned bores **55** and **56** respectively of a size adapted to receive said securing element **54**.

Bolt **54** may be secured to shaft **22** in a suitable manner permitting movement axially of the bolt as, for example, by a thrust arresting means such as, for example, nut **57** positioned on one side of the shaft **22**. Bolt **54** is provided with an adjustable tension member support means such as nut **58**. Bolt **54** further is of such length

that the head thereof is not in direct contact with shaft **36**. This spacing permits radial movement of shaft **36** as required. When spring **51** is mounted on bolt **54** between support nut **58** and shaft **36**, the spring contacts with adjustable pressure the shaft **36** supporting roller **45** thus giving control over the pressure exerted by roller **45** against the tube **25**.

In operation of such a pump the quantity of liquid and/or slurry moved is controlled by the inlet pressure, often referred to as net positive suction head, the liquid head against which the pump is working, the pressure between roller **45** and tube **25** and the revolutions per minute made by roller **45**.

Under such conditions as net positive suction head of one-half foot and the material to be moved being a slurry of about 30% solids content, a pump having a casing 14 inches in diameter with a 1½ inch I. D. rubber vacuum tube looped in the casing which is contacted by a roller of 3 inch diameter exerting a pressure from a 1 inch coil spring the pump will move slurry as follows:

R. P. M.	Gallons per Minute Pumped against 30 ft. Head
50	15
100	25
200	40

When such pump is to be used as a vacuum pump springs **51** are tensioned by means of the spring supporting nuts **58** until such reduced pressure is maintained relatively constant as measured by a vacuum gauge mounted in the pump line.

I claim:

A slurry pump comprising a casing with a recess therein, the peripheral wall of which is generally circular and said peripheral wall having spaced openings therein, a collapsible tube looped within said casing so that the inlet and outlet ends of the tube lie adjacent and parallel to one another at one point within said casing and adjacent said wall, a shaft extending through said casing and mounted for rotation about the axis of cylinder defined by said wall, a hub member mounted on said shaft of a width less than that of said recess and having a pair of parallel radially extending arms, radially extending aligned apertures in said radially extending arms, a roller supporting shaft supported by said arms and radially slidable in the apertures in said radially extending arms, a roller hub member mounted on said roller supporting shaft, ball bearing means mounted on said roller hub member, a circular roller mounted for rotation on said ball bearing means, aligned apertures in said shaft and said roller supporting shaft, spring securing elements mounted in said apertures, thrust arresting means mounted on said securing elements and in contact with said first-mentioned shaft, spring supporting means mounted on said securing elements, and compressible springs positioned between said support means and the roller supporting shaft.

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