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Semple

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[54] **SLURRY PUMP PISTON SEAL**

[75] Inventor: **Charles A. Semple,** Midland, Tex.

[73] Assignee: **Engineered Concrete Placer, Inc.,** Midland, Tex.

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[52] **U.S. Cl.** **92/86.5,** 92/87, 92/160

[51] **Int. Cl.** **F16j 1/08,** F16j 15/40

[58] **Field of Search** 92/86.5, 87, 174, 181, 92/182, 160; 277/DIG. 8; 417/900; 123/41.36

[56] **References Cited**

UNITED STATES PATENTS

2,367,185	1/1945	Cary	92/87
2,748,718	6/1956	MacClatchie	92/160 X
3,104,619	9/1963	Swarthout	92/86.5 X
3,279,383	10/1966	Smith	92/87 X

FOREIGN PATENTS OR APPLICATIONS

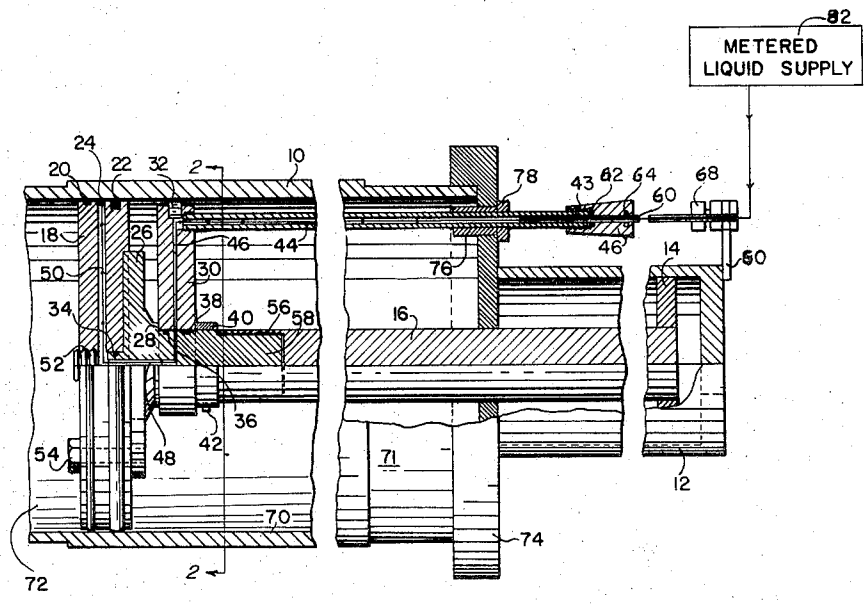
455,943	10/1936	Great Britain	277/DIG. 8
36,075	12/1912	Sweden	123/41.36

Primary Examiner—Irwin C. Cohen

[57] **ABSTRACT**

In a slurry pump pumping cylinder, a system for liquid-sealing of the pumping cylinder head with respect to the interior walls of the pumping cylinder. Particularly, a pair of spaced apart resilient rings peripherally encircling the pumping head, a annular sealing recess intermediate the rings and a source of liquid pumping sealant continuously supplied to the annular liquid recess by means of a conduit extending reciprocably within the pumping cylinder.

10 Claims, 2 Drawing Figures



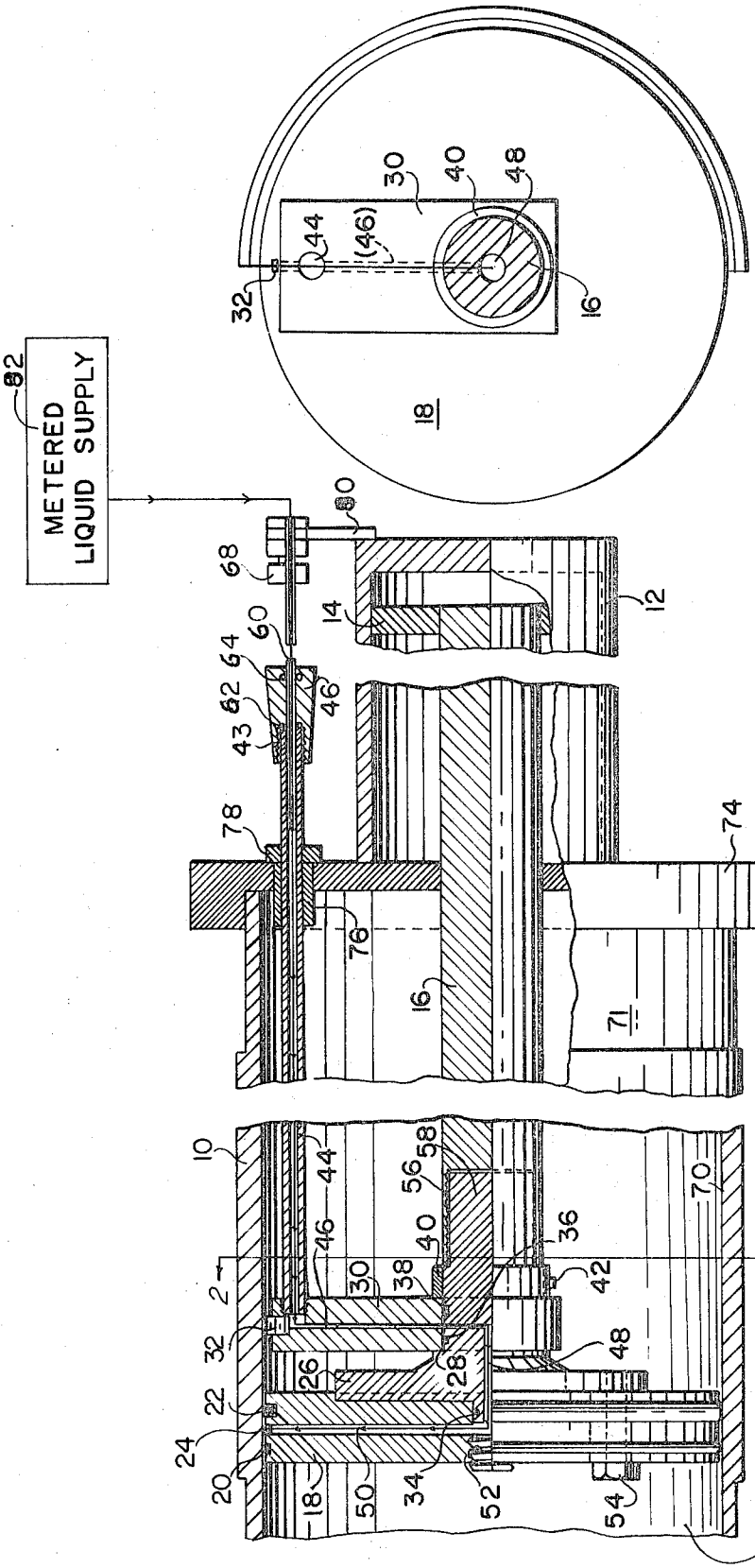

METERED LIQUID SUPPLY
82
80
68
60
64
62
43
46
14
12
78
76
16
71
74
10
44
46
56
58
40
36
30
38
42
70
2
2
32
26
28
48
22
24
20
18
50
34
52
54
72

FIG. 1

30
40
48
44
(46)
32
16
18

FIG. 2

SLURRY PUMP PISTON SEAL

BACKGROUND OF THE INVENTION

1. Field of the Invention

Slurry or cement pumping systems of the type employing a pumping cylinder, and a pumping piston reciprocably supported therein. A principal difficulty in pumping slurries is maintaining the seal intermediate the sides of the piston head and the interior walls of the pumping cylinder. Previous inventors have employed numerous O-rings and similar peripheral seals encircling the piston head. However, these encircling seals are subject to abrasion or misplacement due to the aggregate in the slurry with constant breakdown in seals and loss of pumping pressure.

2. Description of the Prior Art

The present invention is particularly adaptable to use in pumping cylinders of the type disclosed in earlier U.S. Pat. No. 3,326,135, entitled "Slurry Pump."

SUMMARY OF THE INVENTION

According to the present invention, a slurry pump of the type having a pumping cylinder and a pumping piston reciprocably supported therein is modified by the employment of spaced apart resilient peripheral seals in the piston head and an intervening annular liquid sealant recess. Sealant liquid such as oil or water is introduced under pressure into the annular sealant recess and acts as a continuous sealant, maintaining pumping pressure as the piston is reciprocated against the interior walls of the cylinder. The sealant liquid is introduced into the cylinder via a sealant conduit which extends reciprocably into the cylinder in parallel with the piston rod and a swivel which supports the conduit while the piston head and piston rod may be rotated therein.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a fragmentary, vertical elevation partialy in section, showing the positioning of the reciprocable piston and longitudinally extending liquid sealant conduit within the pumping cylinder, the direction of liquid sealant flow being shown by means of arrows; the top section being taken above center and the bottom half section being taken below center; and

FIG. 2 is a vertical section taken along section 2—2 FIG. 1 and showing the positioning of the swivel with respect to the locking ring and piston rod upon which it is mounted.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

In FIG. 1 a concrete or slurry pumping cylinder **10** is illustrated as having interior walls **70** and reciprocably supporting a piston rod **16** having a piston head **18** at one end and a driving head **14** at the other end extending into hydraulic cylinder **12** positioned adjacent the cylinder head **74.** The open or discharge end of the cylinder is designated as **72.**

The piston head **18** has a leading edge peripheral O-ring sealing band **20,** intervening annular liquid sealant recess **24,** fed by radially extending liquid supply channel **50** and a trailing edge resilient seal **22** such as the type designated as a "Polypac." A piston adaptor **26** is complementally fitted to the trailing edge of head **18** and secured thereto by means of axial threads **52,** O-ring seal **34** intermediate the axially abutting faces and bolts **54** or the like. The piston adaptor **26** includes a reduced diameter end portion **58** secured within the piston rod by complementally engaging threads **56.** A swivel **30** may encircle the adaptor being sealed with respect thereto by means of O-ring seals **36** and **38,** its forward face abutting inner shoulder **28** of adaptor **26.** A locking ring **40** may be secured to the piston rod **56** by means of set screw or the like **42,** so as to retain the swivel in a position of encircling adaptor **26.**

A liquid sealant conduit **44** extends through the cylinder head **70** in which it is supported by means of inner bushing elements **76** and outer bushing elements **78.** Conduit **44** extends into the swivel radial liquid sealant channel **46** which is openable by means of threaded plug **32** or the like. An axial conduit **48** within the adaptor **26** interconnects radial channel **46** and radial channel **50** in the piston head.

At the outer rim a smaller liquid feeding tube **60** may extend through the sealing nut **66** and into the conduit **44** being sealed with respect to these elements, respectively by means of O-rings **64** and **62.** The outer end of the smaller feeding tube is supported in bushing element **68** mounted upon bracket **80** secured to the cylinder head **12.** The liquid sealant may be pumped from metered liquid supply element **82** through reduced diameter tube **60** into the liquid sealant conduit **44,** so as to maintain constant pressure in the annular peripheral recess **24,** as the piston and the liquid sealant conduit **44** are reciprocated within the pumping cylinder.

The sealant is maintained under a differential pressure so as to prevent the slurry in chamber **72** in front of the piston from passing the seal and filling the chamber **71** on the other side of the piston head.

The swivel **26** is unique in that it reciprocates with the piston rod but is maintained integrally with the piston head and rod. O-ring seals **34, 36** and **38** permit the piston rod adaptor **26** to rotate inside the bore of swivel **30** and simultaneously seal the liquid sealant supply conduits **46, 48** and **50.** Rotation of the slurry pump piston rod **16** head **18** and adaptor **16** is permitted since the piston is connected to the hydraulic cylinder rod by the piston adaptor and the adaptor rotates freely within swivel **30.**

Manifestly, variations in piston rod and liquid sealant construction may be used without departing from the spirit of invention.

I claim:

1. A slurry pump assembly comprising:

A. a pumping cylinder having an inner and outer wall;

B. a pump piston including a piston head and an axially extending rod reciprocably positioned within said cylinder, said head further including:

i. longitudinally spaced apart peripherally extending seals in contact with the inner wall of said pumping cylinder and a peripheral sealing recess defined intermediate said seals;

C. a sealant liquid supply conduit supported in said chamber and connected to said peripheral sealing recess and to an external source of liquid sealant;

D. a radially extending swivel rotatably mounted upon said piston axially extending rod and adjacent said piston head and supporting said sealant liquid supply conduit; and

E. a piston adaptor mounted upon said piston head and said rod intermediate said swivel and said piston head and including an internal conduit interconnecting a piston channel means connected to said peripheral sealant recess and said sealant liquid supply conduit extending into said swivel.

2. A slurry pump assembly as in claim **1,** said piston head, piston rod and piston adaptor being rotatable with respect to said swivel and within said chamber.

3. A slurry pump assembly as in claim **2,** said swivel extending radially away from said rod and being reciprocable together with said rod and said liquid supply conduit.

4. A slurry pump assembly as in claim **3,** including a pumping cylinder head, said liquid supply conduit extending through said pumping cylinder head and being reciprocable axially together with said piston rod.

5. A slurry pump assembly as in claim **4,** including an inner liquid tube leading from said liquid sealant into said liquid supply conduit.

6. A slurry pump assembly as in claim **5,** including guide bushing means mounted on said pumping cylinder head and guiding said sealant liquid supply conduit at its point of entry into said pumping cylinder.

7. A slurry pump assembly as in claim **5,** said swivel including an independent pipe plug communicating with said liquid supply conduit and internal conduit.

8. A slurry pump assembly as in claim **7,** said swivel being secured on said piston rod by a lock ring encircling said rod and abutting said swivel.

9. A slurry pump assembly as in claim **8,** said spaced apart peripheral seals including an O-ring at the forward end of said piston head and a resilient seal at the trailing edge of said head.

10. A slurry pump assembly as in claim **9,** said piston head channel means including an axial sealant conduit passage communicating with a corresponding passage in said adaptor and including a channel portion leading radially to said peripheral sealant recess.

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