US 20070294973A1

(19) United States

(12) Patent Application Publication (10) Pub. No.: US 2007/0294973 A1

Inglese (43) Pub. Date: Dec. 27, 2007

(54) METHOD OF PRIMING A CONCRETE PUMP

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(21) Appl. No.: **11/472,937**

(22) Filed: **Jun. 22, 2006**

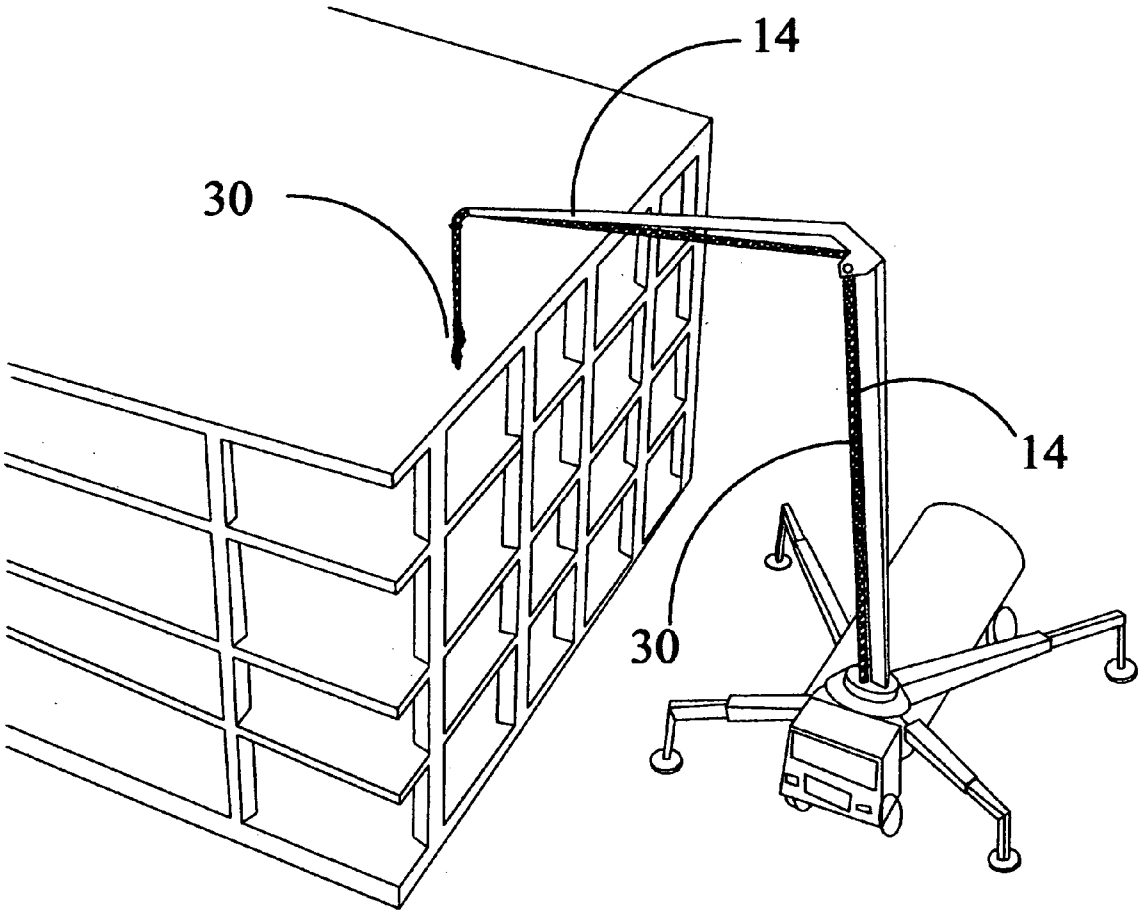
Publication Classification

(51) **Int. Cl.**
E04B 2/00 (2006.01)

(52) **U.S. Cl.** **52/426**

(57) **ABSTRACT**

The present invention is a method of priming a concrete placing system that provides improved coating and lubrication to the inner walls of a concrete placing system as it passes therethrough during priming. The method uses less water than conventional pump primers and can be used on all types of jobs, i.e., with line pumps, boom pumps, or high-rise pumping. The present invention provides a method of priming a concrete placing system having a foam priming port comprising the steps of connecting an outlet of a foam generator to an inlet of a foam priming port; operating the foam generator to generate a foam having a system lubricating agent; and filling the placing system with foam through the foam priming port. The method further comprises the step of closing the foam priming port utilizing a foam priming port shut-off valve or other isolation means well known in the art after the placing system has been filled with foam, or alternatively, when the placing system has been at least partially filled with foam. Additionally the present method provides the step of cleaning the foam priming port.



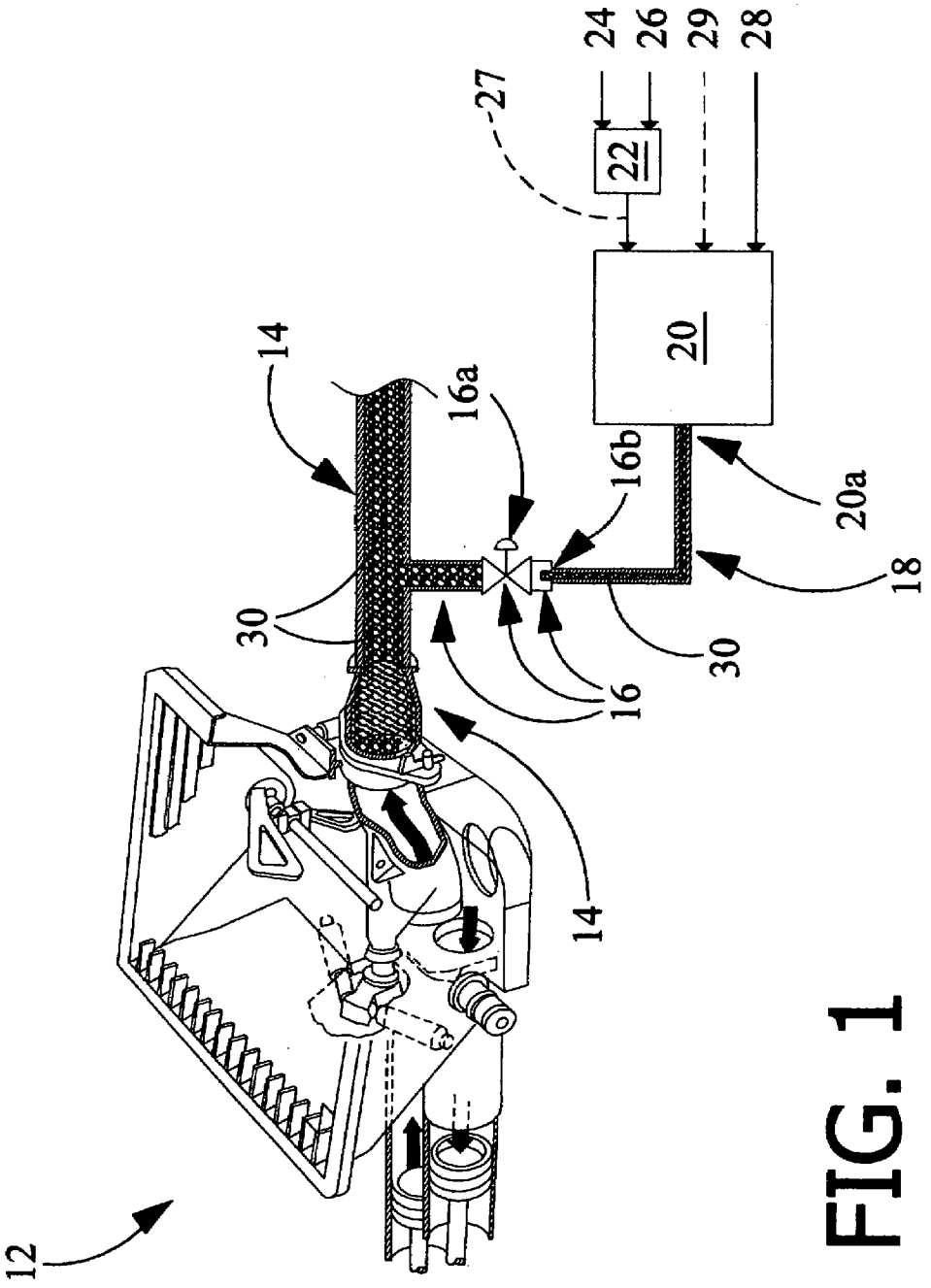


FIG. 1

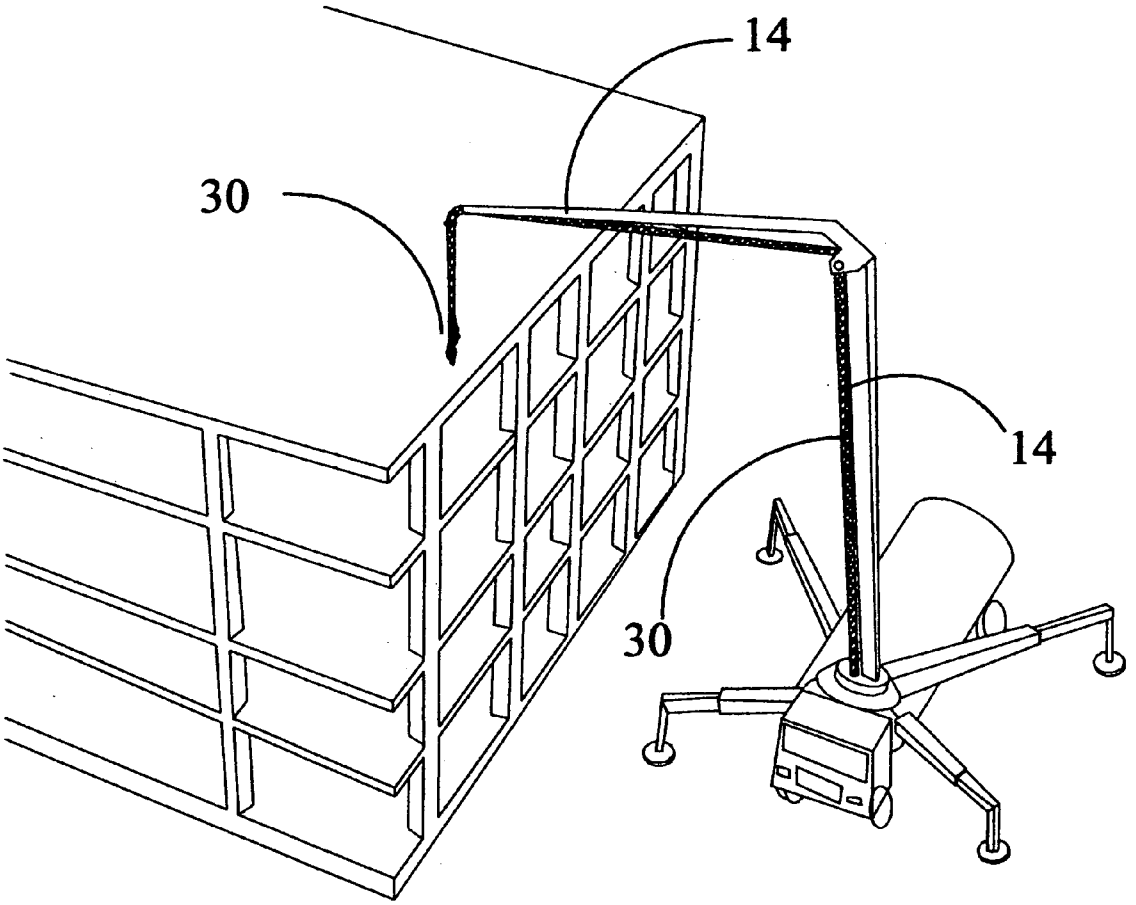


FIG. 2

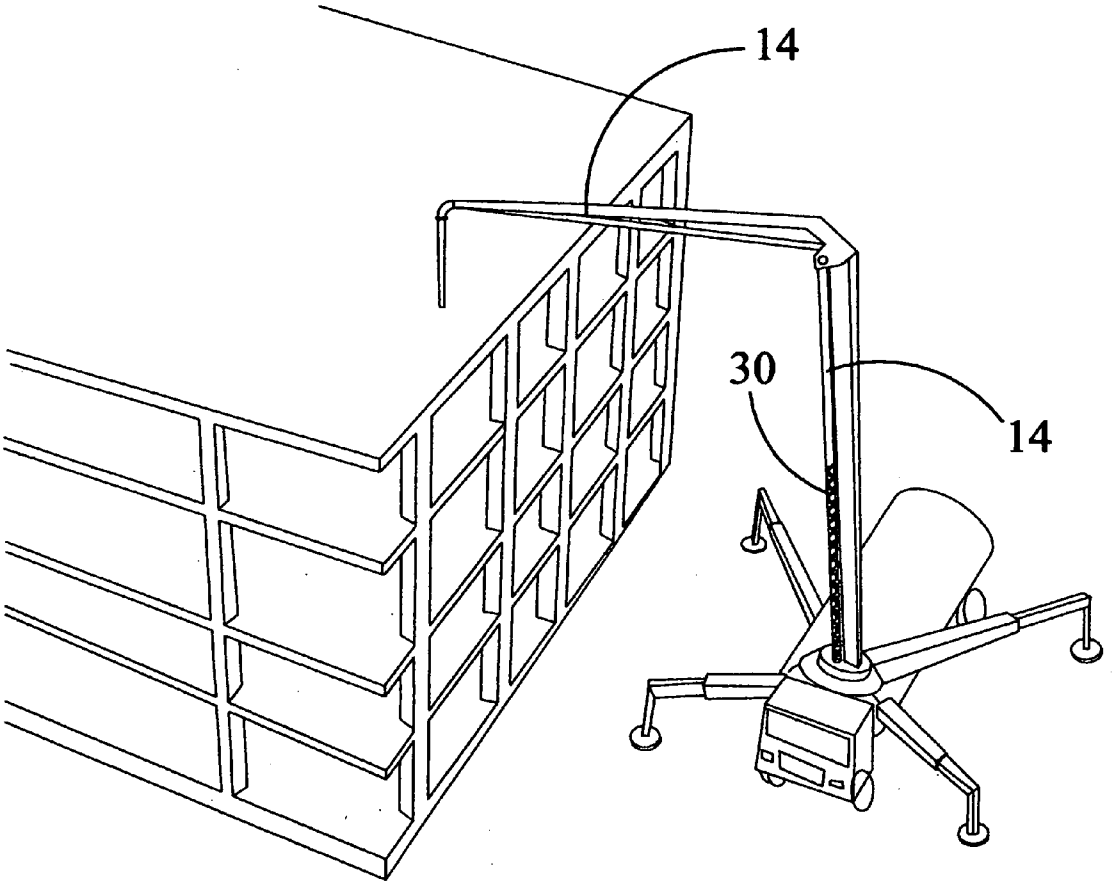


FIG. 3

METHOD OF PRIMING A CONCRETE PUMP

FIELD OF THE INVENTION

[0001] The present invention relates generally to the field of concrete pumping for commercial, highway, industrial and residential construction projects; and more particularly to the field of priming concrete pumps and lines. In greater particularity, the present invention relates to methods of priming concrete pumps and lines.

BACKGROUND OF THE INVENTION

[0002] The placement of concrete into forms is a critical phase of most commercial, highway, industrial and residential construction projects. Typically, construction contractors are required to place concrete into forms as soon as possible after mixing, while the concrete is in a plastic and workable state. In many projects it is also required that concrete placement be continuous to allow for appropriate consolidation of adjoining layers thus forming uniform, impervious concrete. The failure to properly place concrete in conformance with such exacting standards can result in structurally defective concrete that in many instances must be replaced at great cost to the construction contractor.

[0003] The use of concrete pumps for the placement of concrete into forms has gained widespread acceptance as a safe, efficient, and cost effective method of concrete placement. Concrete pumping allows for direct placement of concrete into forms without rehandling, resulting in significantly reduced labor costs and improved concrete quality. More generally, the use of concrete pumps is faster than traditional methods, because pumping allows for continuous placement of concrete. This can increase the productivity of concrete finishers and decrease total construction time for the overall project, minimizing overhead costs and monetary penalties associated with construction delays.

[0004] Placement of concrete utilizing the pumping method involves the flow of concrete from a pump through a placing system, namely a conduit otherwise referred to as a pump line, such as a flexible rubber hoses or metal pipe. Concrete exits the placing system in a precisely controlled manner directly into forms. Pumping concrete offers a steady, predictable flow of concrete delivered to the point-of-use resulting in a smooth-flowing operation. A significant concern in concrete pumping operations is ensuring that the inner, concrete-contacting surfaces of the placing system are lubricated to facilitate the flow of concrete therethrough. This is not a problem after the flow of concrete has been established, because as it passes through a placing system the concrete acts as a self-lubricating agent by leaving a layer of slick cement slurry on the inner walls of the placing system. This is a problem, however, in initially establishing concrete flow in a placing system. Attempting to pump concrete through a dry placing system will cause the placing system to plug, resulting in costly construction delays as the plug is located, removed and system reconnected.

[0005] Without assistance, the water and sand in concrete tend to move to the outside of the placing system and the aggregate tends to concentrate in the center of the line. In addition, as the initial batch of concrete is pushed through the placing system the water content in the concrete falls as the water adheres to the surface of the dry placing system. As the concrete moves around bends, the aggregate in the concrete may plug, or lock-up, if too much water is lost to the placing system wall or if sand and water is separated from the aggregate. It is the water, cement, and small particles of sand in concrete that prove the fluidity necessary for the aggregate to flow through concrete placing systems.

[0006] To address this problem, concrete pumpers prime concrete placing systems each time a concrete pump is used. Traditionally this has involved adding water to the first batch of concrete to allow it to pump easier. This conventional, "just wetting" technique is unacceptable because in most cases too much water causes concrete separations, i.e., the aggregate is separated from the sand, cement, and water, that leads to plugging of the placing system. Further, the introduction of excess water into the mixed concrete alters the target water-cement ratio (slump) of the concrete, causing decreased strength of the finished concrete and segregation of the components of the concrete. To address the problem, many pump manufacturers and the American Concrete Pumping Association recommend always priming a concrete pump and line with more than water.

[0007] True priming of a concrete placing system involves the application of a lubricating agent to the inner walls of the placing system to promote the establishment of concrete flow through the line. Using conventional methods, this is accomplished by pumping a liquid priming fluid through the placing system immediately prior to initiating the pumping and flow of concrete through the placing system. In practice, conventional liquid priming fluid once prepared is placed in fluid communication with the suction side of a concrete pump. The liquid priming fluid is often placed in a vessel, referred to as a hopper, that is in fluid communication with the concrete pump. As the liquid priming fluid is being pumped from the hopper, concrete is typically added to the hopper such that the final portion of the liquid priming fluid is in contact with the initial portion of the concrete, with the liquid priming fluid thereby preceding the concrete that is pumped through the concrete placing system. The liquid priming fluid acts to lubricate the inner, concrete-contacting surfaces of the concrete placing system to facilitate the initial movement of concrete therethrough.

[0008] Various liquid compositions for priming concrete pumps and placing systems are known in the prior art, however, all are disadvantageous when compared to the present invention. For instance, one method of priming concrete pumps utilizes ready-mixed priming grout consisting of water, cement, and sand. This priming grout slurry has the disadvantage of being expensive, requiring the use of a ready-mix truck. This method also has the disadvantage of typically requiring large volumes of priming grout slurry that cannot be mixed with concrete, i.e., added into the form or mixed with concrete. This method therefore produces a large volume of priming grout slurry waste that requires offsite disposal. This grout method of priming is, however, presently the only method used for either long horizontal runs, i.e., typically greater than 150 feet, or for high-rise construction pumping runs that exceed 150 feet in the air.

[0009] Another method of priming concrete pumps utilizes a concrete priming slurry consisting of cement (almost always bagged) and water. Although the concrete priming slurry may be prepared without the use of a ready-mix truck, this concrete priming slurry method has the disadvantage of requiring the onsite delivery and handling of extra bags of cement. Additionally, as in the case of priming grout this

material must be disposed of offsite since this concrete priming slurry will not develop adequate strength to stay in the concrete pour.

[0010] The prior art also teaches the use of specialized liquid lubricants as a priming fluid. For instance, U.S. Pat. No. 5,997,633 to Montgomery teaches the use of a priming fluid comprising an additive mixed with water, the additive having a composition by weight of 80 to 90 percent alkaline material and 10 to 20 percent polymeric material. Such a priming fluid presents disadvantages, as the strongly alkaline nature of the priming fluid, having a pH of between 11 and 12, presents safety concerns associated with the handling of the priming fluid. Further, the strongly alkaline nature of the priming fluid increases the risk of producing weak or unstably set concrete as a result of alkali-silica reactivity and alkali-aggregate reactivity. Other disadvantages with the use of alkaline priming fluid are associated with the cost of the alkaline materials and the relatively long duration of additive mixing and hydration. The use of the priming fluid prior to full hydration presents the risk of drawing water from concrete as it passes through a placing system, which interferes with the desired lubricating effect of the priming aid.

[0011] U.S. Pat. No. 5,318,408 to Davidsson teaches the use of an aqueous suspension, in contrast to an aqueous solution, as a concrete priming fluid. This reference discloses the use of an aqueous suspension comprising amorphous silica, namely silica fume, and a water dispersable polymer consisting of vinyl esters, acrylic acid esters, styrene, butadiene, and vinyl-halogen compounds. The use of such suspensions instead of aqueous solutions as a priming fluid presents several disadvantages. For instance, the suspension becomes unpumpable if subjected to pumping pressures higher then the segregation pressure required to separate the solids and liquids in the suspension. Therefore, the user must carefully monitor the pumping pressure to ensure that it does not exceed the suspension's segregation pressure. Further, the limitation of using water dispersable polymers provides a pump primer having inferior lubricating properties. Other disadvantages with the use of an aqueous suspension are associated with the difficulty of maintaining a uniform suspension during use, which interferes with the lubricating effect of the pumping aid.

[0012] There are other disadvantages with the use of conventional slurries and liquid pump primers. These liquid formulations must be mixed on the jobsite, a costly time-consuming process. Cement slurries must be well mixed and liquid primers require time to become effectively viscous after being mixed with water. It is also difficult for liquid primers to coat all surfaces of a placing system, particularly horizontal sections of a line. In horizontal lines, there is a risk with slurries and liquid primers of the primer running down the bottom half of a placing system leaving the upper half dry and unlubricated.

[0013] In addition to the limitations inherent with the use of a liquid primer, there are also disadvantages associated with conventional priming ports utilized with liquid primers. Conventional priming ports are typically a round hole formed in a top portion of the placing system on the delivery side of the concrete pump into which liquid pump primer is poured. The conventional liquid priming port is closed using a cap that must be manually removed to open the port each time liquid primer is poured into the placing system. The cap must them be manually put back on to close the port before operation of the concrete pump. The use of conventional priming ports is cumbersome.

[0014] Accordingly, it is recognized in the construction industry that there is a need for improved methods of priming a concrete placing system to lubricate all surfaces of the placing system to promote the initial flow of concrete through the line. The present invention addresses the need for improved methods for use in priming concrete placing systems in commercial, highway, industrial and residential construction projects

SUMMARY OF THE INVENTION

[0015] It is the object of the present invention to provide an improved method of priming a concrete placing system that can be used on all types of jobs, i.e., with line pumps, boom pumps, or high-rise pumping.

[0016] An additional object of the present invention is to provide a method of priming a concrete placing system that provides improved coating and lubrication to the inner walls of a concrete placing system as it passes therethrough during priming.

[0017] A still further object of the present invention is to provide a method of priming a concrete placing system that uses less water than conventional pump primers.

[0018] Another object of the present invention is to provide a method of priming a concrete placing system that effectively coats longer concrete placing systems.

[0019] A further object of the present invention is to provide a method of priming a concrete placing system that is fast and easy to use.

[0020] An additional object of the present invention is to provide a method of priming a concrete placing system that coats the entire circumference of placing systems.

[0021] These and other objects of the present invention are accomplished through an improved method of priming a concrete pump comprising the step of introducing a foam into the placing system, wherein the foam contains a system lubricating agent. The use of foam provides several benefits over conventional pump primers. For all other methods of priming, concrete must be present to start the priming process because the primer is introduced into the line ahead of the primer and concrete is used to push the primer through the system to coat the concrete placing system. The use of foam as a concrete pump primer does not require the use of concrete. Foam coats the surface of the concrete placing system without the necessity of using concrete. This allows the pumper to prime the concrete line before concrete is onsite, and to then begin pumping as soon as concrete arrives. The use of foam provides a method of priming a placing system that is independent of pumping concrete itself.

[0022] Similarly, compared to conventional primers, the use of foam provides better coating than use of a liquid or slurry. Liquids have a difficult time coating the entire circumference of a pipe, particularly one placed in a horizontal configuration. In horizontal lines, there is a risk with slurries and liquid primers of the primer running down the bottom half of a placing system leaving the upper half dry and unlubricated. In contrast, foam expands to fill the entire line, including voids, and therefore provides more uniform coating of the entire concrete placing system surface. Foam can also be used to coat longer runs of concrete pipe than liquids, providing a distinct advantage for larger concrete projects. An additional advantage of using foam compared

to conventional primers is foam requires the use of less water than conventional aqueous pump primers. Foams are coarse dispersions of gas in a relatively small amount of liquid.

[0023] Foam, an aggregate of gas-filled bubbles formed from aqueous foaming solutions, is produced when gas is introduced under the surface of a foaming solution that has enough elasticity to expand and thereby enclose that gas with a film. An essential ingredient in a liquid-based foam is a foaming agent, otherwise referred to as a surfactant distinguished by having both a hydrophilic region and a hydrophobic region. The foaming agent is responsible for the tendency of a liquid to foam and the stability of the resulting dispersion of bubbles. Foams for use with the present invention are typically made from a concentrated foaming agent diluted with water to form a foam solution that is subsequently mixed with air. The foam solution is typically aerated or agitated to form the bubble structure of the foam. In the present invention foam concentrate comprises a foaming agent and a system lubricating agent for using in lubricating the inner surfaces of concrete pump pipe lines. Foams may be defined according to their expansion ratio, which is the ratio of final foam volume to original foam solution volume before adding air. The break down is low expansion foam (20:1), medium expansion foam (20 to 200:1), and high expansion foam (200 to 1000:1).

[0024] The foam of the present invention may be generated using foam generators well known in the art. One significant benefit of using foam to prime pumps is this method will work on all types of pumping jobs, i.e., those with line pumps, boom pumps and high-rise pumping. Priming concrete placing systems using foam is also fast, limited only by the volume output of the foam generator. It is also advantageous that foam generators are typically relatively simple mechanically, and therefore easy to use. A common foam generator utilizes an air pump or other compressed air supply that mixes a foam solution with air and directs the foam solution and air through baffles to create foam. The foam generator may utilize other inert gases, such as but not limited to nitrogen. Other types of foam generators known in the art may be used without departing from the scope of the present invention. For example of one such foam generator known in the art, U.S. Pat. No. 5,900,191 to Gray, et al. teaches an apparatus for producing a thick, stable foam having inlets for a pressurized gas and a foaming solution (comprising water and a foaming agent); and an outlet.

[0025] The method of the present invention provides introducing foam having a lubricating agent into a concrete placing system at the delivery side, i.e., discharge of the concrete pump typically through a foam priming port. The foam priming port, otherwise referred to as a system connector, is provided with means for opening and closing the foam priming port such as but not limited to an isolation valve of the ball valve type. The shut-off valve can be opened manually or by way of an automatic closing system that can further comprise an automatic, self-cleaning system. A foam delivery line may be used to connect the outlet of the foam generator to the receiving end of the foam priming port. The receiving end of the foam priming port may be configured as a threaded nipple adapted for connection with the end of the foam delivery line.

[0026] Having begun introducing foam into the placing system through the foam priming port, this continues until the placing system is sufficiently filled with foam to prime the line. The method may further comprise the step of stopping the introduction of foam after the concrete placing system has been filled with foam. This can be determined visually because when the placing system is full foam will begin exiting the end of the placing system. Alternatively, introduction of foam may be stopped after the concrete placing system has been at least partially filled with foam.

[0027] The present invention provides a method of priming a concrete placing system having a foam priming port comprising the steps of connecting an outlet of a foam generator to an inlet of the foam priming port; operating the foam generator to generate a foam having a concrete placing system lubricating agent; and at least partially filling the placing system with foam through the foam priming port. The method further comprises the step of closing the foam priming port utilizing a shut-off valve when the placing system has been fully or at least partially filled with foam.

[0028] The foaming agent of the present invention comprises one or more surfactant well known in the art from any of the primary classifications, such as but not limited to anionic surfactants, nonionic surfactants, cationic surfactants, zwitterionic surfactants, and polymeric surfactants (i.e., surface active polymers).

[0029] Anionic surfactants are dissociated in water in an amphiphilic anion, and a cation, which is in general an alkali metal (Na+, K+) or a quaternary ammonium. They are the most commonly used surfactants. They include but are not limited to alkylbenzene sulfonates (detergents), (fatty acid) soaps, lauryl sulfate, di-alkyl sulfosuccinate (wetting agent), and lignosulfonates (dispersants).

[0030] Nonionic surfactants do not ionize in aqueous solution, because their hydrophilic group is of a non-dissociable type, such as alcohol, phenol, ether, ester, or amide. Many of these nonionic surfactants are made hydrophilic by the presence of a polyethylene glycol chain, and are called polyethoxylated nonionics. The lipophilic group may be the alkyl or alkylbenzene type, the former coming from fatty acids of natural origin.

[0031] Cationic surfactants are dissociated in water into an amphiphilic cation and an anion, most often of the halogen type. This class corresponds to nitrogen compounds such as fatty amine salts and quaternary ammoniums, with one or several long chain of the alkyl type, often coming from natural fatty acids.

[0032] When a single surfactant molecule exhibits both anionic and cationic dissociations it is called amphoteric or zwitterionic. This is the case of synthetic products like betaines or sulfobetaines and natural substances such as aminoacids and phospholipids.

[0033] Another class of surfactants is the polymeric surfactants or surface active polymers, which result from the association of one or several macromolecular structures exhibiting hydrophilic and lipophilic characters.

[0034] Concrete placing system lubricating agents comprise one or more lubricants well-known in the art, including one or more of the foaming agents identified herein. It is contemplated as part of the scope of this invention that a foaming agent may also function as both a foaming agent and a concrete pump lubricating agent. Alternatively, a concrete pump pipe lubricating agent may be different from the foaming agent. Lubricating agents may include those known in the art, including but not limited to polymeric materials including polyethylene oxide, polypropylene

oxide, polyacrylate, polymethacrylate, polyacrylamide, polymethacrylamide and copolymers thereof, maleic anhydride/methylvinyl ether copolymers, polyvinyl alcohol, polyvinylpyrrolidone, polyvinylacetate, copolymers of acrylamide and 2-acrylamido, 2-methylpropane sulfonic acid and copolymers of N,N-dimethylacrylamide and 2-acrylamido, 2-methylpropane sulfonic acid, guar gum, locust bean gum, karaya gum, carboxymethylguar, hydroxyethylguar, hydroxypropylguar, carboxymethylhydroxyethylguar, carboxymethylhydroxy-propylguar, carboxymethylcellulose, carboxymethylhydroxyethylceilulose, carboxymethylcellulose, hydroxyethylcellulose, hydroxy-ethylcellulose, cellulose ethers, starches, alginates and carrageenans. Further examples of polymers and copolymers useful as lubricating agents in the present invention include polysaccharides, galactomannan gums, glucomannan gums, cellulose derivatives, and cellulose, galactomannan or glucomannan gums that have been modified by reaction with hydrophilic constituents including hydroxyalkyl groups, carboxyalkyl groups and mixed hydroxyalkyl and carboxyalkyl groups to form ether derivatives. Other hydrophilic constituent groups include cis-hydroxyl, hydroxyl, carboxyl, sulfate, sulfonate, amino and amide groups.

[0035] These and other objects and advantages of the invention will become apparent from the following detailed description of the preferred embodiment of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

[0036] A concrete placing system primed utilizing the method of the present invention is depicted in the accompanying drawings which form a portion of this disclosure and wherein:

[0037] FIG. **1** is a partial sectional view of an embodiment of a concrete placing system primed utilizing the method of the present invention;

[0038] FIG. **2** is a partial sectional view of a concrete placing system filled with foam; and

[0039] FIG. **3** is a partial sectional view of a concrete placing system partially filled with foam.

DESCRIPTION OF THE PREFERRED EMBODIMENT

[0040] Referring to FIGS. **1-3** for a clearer understanding of the invention, it may be seen that the present invention provides a concrete pump **12** connected on its delivery side to a concrete placing system **14**, otherwise referred to as a pump line or boom. In the preferred embodiment the placing system **14** is comprised of metal pipe. As shown in FIG. **1**, the placing system **14** is provided with a foam priming port **16** and means known in the art for opening and closing the foam priming port **16**. In the preferred embodiment, means for opening and closing the foam priming port **16** is comprised of a manually-operated shut-off ball valve **16***a*. The receiving end of the foam priming port **16***b* is comprised of a threaded nipple adapted for connection with the outlet end of a foam delivery line **18**. In the preferred embodiment, the foam delivery line **18** is a flexible hose.

[0041] The preferred embodiment of the present invention also provides a foam generator **20** having an outlet **20***a* connected to the receiving end or inlet of the foam priming port **16***b*. The foam generator **20** may be directly connected to the foam priming port **16** or alternatively use other such connection means known in the art. In the embodiment shown on FIG. **1** a foam delivery line **18** is used to connect the foam generator outlet **20***a* and the priming port inlet **16***b*. The inlet end of a foam delivery line **18** is adapted for connection with the foam generator outlet **20***a*. The foam generator **20** may be of any configuration known in the art such as one having inlets as generally shown in FIG. **1** for air **28** and a foam concentrate **27** comprising a foaming agent **24** and concrete pump lubricating agent **26**. In the preferred embodiment the foaming agent **24** and concrete pump lubricating agent **26** combine to form the foam concentrate in a foam concentrate reservoir **22**. The foam concentrate is provided with sufficient water to form a foam solution for proper operation of the foam generator **20**. Alternatively, and without departing from the scope of the invention, it is contemplated that water **29** be supplied as an inlet to the foam generator **20** as shown on FIG. **1** or alternatively as an input (not shown) to the foam concentrate reservoir **22** or combined (not shown) with the foam concentrate **27** between the reservoir **22** and the foam generator **20** to provide input of the foam concentrate into the foam generator as a foam solution. Similarly, the foam generator **20** may provide separate inputs (not shown) for the foaming agent **24** and the concrete pump lubricating agent **26** without departing from the scope of the invention. All such configurations for providing for inputs of air, water, foaming agent, and concrete pump lubricating agent for operation of a foam generator **20** known in the art are contemplated for the method of the present invention.

[0042] The preferred embodiment of the present invention provides a method of priming a concrete pump comprising the step of introducing a foam **30** into the placing system **14**, wherein the foam contains a foaming agent **24** and a system lubricating agent **26**. The foam **30** is generated using the foam generator **20** and introduced into the placing system **14** through a foam priming port **16**. The method further comprises the step of stopping the introduction of foam **30** after the concrete placing system **14** has been filled with foam **30**, as generally shown in FIG. **2**, or alternatively, when the concrete placing system **14** has been at least partially filled with foam **30**, as generally shown in FIG. **3**.

[0043] The preferred embodiment of the present invention provides a method of priming a concrete placing system **14** having a foam priming port **16** comprising the steps of connecting an outlet **20***a* of a foam generator to an inlet of a foam priming port **16***b*; operating the foam generator **20** to generate a foam **30** having a system lubricating agent **26**; and filling the placing system **14** with foam **30** through the foam priming port **16**. The method further comprises the step of closing the foam priming port **16** utilizing a foam priming port shut-off valve **16***a* or other isolation means well known in the art after the placing system **14** has been filled with foam **30**, or alternatively, when the placing system **14** has been at least partially filled with foam **30**. The shut-off valve **16***a* may be manually operated or provided with means for automatically operating the shut-off valve **16** wherein the method further comprises the step of either manually or automatically closing the shut-off valve. The method of the present invention may also provide a step of cleaning the foam priming port **16** during or after use of the concrete delivery system **14**. This cleaning step allows for the priming port **16** to be readily reused and may be accomplished either manually or utilizing automatic means

such as the operation of an automatic self cleaning mechanism (electromechanical, air actuated, spring loaded, etc.) as known in the art.

[0044] It is to be understood that the form of the invention shown is a preferred embodiment thereof and that various changes and modifications may be made therein without departing from the spirit of the invention or scope as defined in the following claims.

1. A method of priming a concrete placing system comprising the step of introducing a foam into said placing system, wherein said foam contains a system lubricating agent.

2. A method of priming a concrete placing system as described in claim **1** further comprising the step of generating said foam using a foam generator.

3. A method of priming a concrete placing system as described in claim **1** further comprising the step of stopping the introduction of said foam after said concrete placing system has been filled with said foam.

4. A method of priming a concrete placing system as described in claim **1** further comprising the step of stopping the introduction of said foam after said concrete placing system has been partially filled with said foam.

5. A method of priming a concrete placing system having a foam priming port comprising the steps of,

a. connecting an outlet of a foam generator to said foam priming port;

b. operating said foam generator to generate a foam comprising a system lubricating agent,

c. filling said placing system with said foam through said foam priming port.

6. A method of priming a concrete placing system as described in claim **5** further comprising the step of closing said foam priming port when said placing system has been at least partially filled with foam.

7. A method of priming a concrete placing system as described in claim **5** further comprising the step of closing said foam priming port when said placing system has been filled with foam.

8. A method of priming a concrete placing system as described in claim **5** wherein said connecting step comprises the steps of connecting an inlet end of a foam delivery line to said outlet of said foam generator and connecting an outlet end of said foam delivery line to an inlet of said foam priming port.

9. A method of priming a concrete placing system as described in claim **6** wherein said foam priming port has a shut-off valve and said closing step comprises the step of manually closing said shut-off valve.

10. A method of priming a concrete placing system as described in claim **7** wherein said foam priming port has a shut-off valve and said closing step comprises the step of manually closing said shut-off valve.

11. A method of priming a concrete placing system as described in claim **6** wherein said foam priming port has a shut-off valve and means for automatically operating said shut-off valve and said closing step comprises the step of automatically closing said shut-off valve.

12. A method of priming a concrete placing system as described in claim **7** wherein said foam priming port has a shut-off valve and means for automatically operating said shut-off valve and said closing step comprises the step of automatically closing said shut-off valve.

13. A method of priming a concrete placing system as described in claim **6** further comprising the step of cleaning said foam priming port.

14. A method of priming a concrete placing system as described in claim **7** further comprising the step of cleaning said foam priming port.

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