

UNITED STATES PATENT OFFICE

2,490,949

PIPE-JOINT COMPOUND

Joseph P. De Lorenzo, Rosedale, N. Y.

No Drawing. Application October 16, 1947,
Serial No. 780,299

4 Claims. (Cl. 252—28)

1

This invention relates to a pipe joint compound for application to pipe threads as well as to the unthreaded portions intended to be coupled to another section of pipe to prevent seizing or stripping and to processes of producing such pipe joint compounds.

In the construction of pipe line for household and industrial uses considerable difficulty is encountered in the coupling of successive sections of pipe to form the desired pipe line. Such difficulties are particularly pronounced in the coupling of sections jointed together by threaded joints because such joints tend to "freeze," i. e. the threads seize and when it is attempted to separate the sections forming the joint, stripping of the threads frequently takes place. Furthermore, pipe joint compounds heretofore used are in the form of soft plastic masses similar to a soft grease, or in liquid form. This is objectionable because (1) such compounds are invariably packaged in bulky containers which plumbers find objectionable, (2) they require stirring before application, and (3) their application is a messy operation resulting in soiling and staining of the applicator's hands and clothes.

Among the objects of this invention is to provide a pipe joint compound which remains homogeneous and does not require stirring before application, which lubricates the joint preventing "freezing" or binding and stripping of threads when the joints are uncoupled, which can be easily applied to the threads in adequate amounts to produce a good joint and which preferably is in solid form so that it may be shaped into cylindrical sticks or other desired shapes and applied to the pipe with little or no danger of soiling the applicator.

The pipe joint compound of this invention comprises as its essential constituents,

1. An absorptive finely divided, e. g., colloidal, solid carrier;
2. A binder for the carrier and other constituents of the pipe joint compound;
3. A hygroscopic dispersing agent for the binder to obtain uniform distribution thereof throughout the compound and retain the compound in condition so that it does not dry out;
4. A saponified fatty acid having at least 12 carbon atoms which imparts lubricating properties to the compound and also serves as a binder for other constituents;
5. A metallic soap, e. g., calcium, zinc or aluminum stearate also imparting lubricating properties to the pipe joint compound; and

2

6. Lubricating material, e. g., mineral oil lubricants, poly alkylene glycols or poly alkylene glycol derivatives sold under the trade name "Ucon," or lubricating greases such as petroleumatum.

In addition to the above constituents the compound preferably contains some coloring material to impart the desired color. It may contain small amounts of water added as such or present in the saponified fatty acid or metal soap. Small amounts of colloidal or powdered graphite, say about 2% or 3% by weight, may be added to take the place of a portion of the lubricating material, or in addition to the lubricating material. A portion of the alkali metal saponified fatty acid may be replaced by rosin soap.

The preferred pipe joint compound of this invention comprises as its essential constituents,

- (1) Absorptive finely divided, e. g., colloidal aluminum silicate;
- (2) Sodium meta silicate;
- (3) Glycol or glycerin dispersing agent;
- (4) Sodium stearate which may be added as such or in the form of a soap of commerce of high titer which contains sodium stearate as its chief constituent;
- (5) Calcium stearate;
- (6) Petroleum lubricating oil having a viscosity at 100° F. of from about 30 to about 2100 (Saybolt Universal seconds); and
- (7) Oil soluble color such as tetrazobenzene- β -naphthol known as oil red and Sudan red III (A).

The constituents of the pipe joint compound of this invention cooperate to produce a surprisingly good pipe joint compound. Threaded joints made with the compound of this invention show no appreciable tendency to "freeze." This may be attributed to the fact that the alkali metal saponified fatty acid, the metal soap, and lubricating material impart to the product lubricating properties which, due in part to the carrier and binder effecting uniform distribution and dispersion of these constituents throughout the compound, are substantially greater than the lubricating properties of the individual constituents. In other words, the lubricating properties of the combination appear to be greater than those of the sum of the constituents, i. e., the constituents appear to have a synergistic effect resulting in a compound having greater lubricating properties than the sum of the lubricating properties of the individual constituents.

Upon application of the pipe joint compound of this invention to a threaded pipe, formation of the joint and later uncoupling of the sections

of the joint it was found the sections could readily be separated without danger of stripping the threads, and that the compound resulted in the formation of a liquid tight joint eliminating the necessity for wicking the threads. Moreover, inspection of the joint sections showed that the threads of both sections were uniformly coated throughout with the compound preventing metal to metal contact in the joint.

As the carrier, a finely divided absorptive solid having a particle size such that substantially all passes a 200 mesh screen or a screen having more openings per square inch may be used. Preferred carriers are the aluminum silicates, such as bentonite, fuller's earth and clays having the particle size above mentioned. Particularly preferred is bentonite. It adds adhesive power to the mass, functions as a pigment and filler, absorbs the lubricating material, and aids in forming and retaining a uniform mixture of all the constituents in the finished product. From 10% to 50% by weight of carrier is incorporated in the product. In general the amount of carrier should be equal to the combined amounts of hygroscopic dispersing agent, e. g., glycol and lubricating material, e. g., petroleum oil lubricant.

As the binder, sodium, potassium, or ammonium silicates are preferred. Instead of silicates, gums, or glues may be used. Particularly preferred is sodium meta silicate having the formula $\text{Na}_2\text{SiO}_3 \cdot 5\text{H}_2\text{O}$, because it is relatively inexpensive, readily available, and as contrasted with other silicates, is more stable in that when mixed with the other constituents it does not tend to produce a precipitate. The sodium meta silicate functions to some extent as an emulsifier of the other constituents resulting in more uniform distribution of such constituents in the final product. When using sodium meta silicate a small amount of water may be added as a solvent for the silicate to aid in its uniform distribution throughout the mass. About 5% to about 15% by weight of binder is incorporated in the final product.

As the hygroscopic dispersing agent for the binder, glycols, such as ethylene glycol, diethylene glycol, propylene glycol, polyethylene glycols, mixtures of such glycols, or glycerin may be employed; propylene glycol is preferred. The amount of hygroscopic dispersing agent used is at least 3% by weight, and preferably from 10% to 50% by weight. In general the amount of hygroscopic dispersing agent used is about the same as the amount of lubricating material.

As the saponified fatty acid, sodium stearate, potassium stearate, commercial soaps containing sodium stearate, tetraethanolamine stearate, other soluble salts of long chain fatty acids, e. g., fatty acids containing at least 12 carbon atoms may be used. The amount of such saponified fatty acid used is within the range of from about 5% to about 50% by weight.

As the metallic soap calcium, zinc, or aluminum salts of long chain fatty acids, i. e., fatty acids having at least 12 carbon atoms are used. The stearates of these metals are preferred; particularly preferred is calcium stearate. The amount of such metallic soap used is within the range of from 2% to 20% by weight.

As the lubricating material a mineral oil, such as paraffin or other petroleum oil or residue including petrolatum having a viscosity at 100° F. of from about 30 to about 2100 (Saybolt Universal seconds), synthetic lubricants, such as poly alkylene glycols and poly alkylene glycol derivatives

sold under the trade name "Ucon" may be employed. The amount of lubricating material used is within the range of about 10% to about 50% by weight.

In one specific embodiment of the process of this invention water and binder, e. g., sodium meta silicate, were first heated together at a temperature of about 200° F. to 212° F. while agitating until a clear solution is obtained. Hygroscopic dispersing agent, e. g., propylene glycol and saponified fatty acid, e. g., sodium stearate, were then added and the agitation continued until the sodium stearate had dissolved and melted producing a solution. The lubricating material, e. g., paraffin oil, was then worked into the solution and when a good dispersion of the lubricating material in the solution had been obtained coloring material and metallic soap, e. g., calcium stearate, added and finally the carrier, e. g., bentonite. It is important to add the bentonite last because by so doing a more uniform product results; if the bentonite were added before the lubricating material, difficulty of incorporating the desired amount of lubricating material would be encountered because the bentonite would have adsorbed other constituents and would not therefore effect the desired homogeneous distribution of the lubricating material along with the other constituents throughout the product.

Mixing the constituents within the ranges hereinabove given, the products will vary in consistency from firm solid products having no oily, sticky or moist feel to the touch to putty-like products. By using an amount of silicate, calcium stearate, sodium stearate and bentonite within the upper portion of the ranges hereinabove given and an amount of lubricating material within the lower portion, firm solid products result, which can be extruded or molded in the form of sticks and therefore can be conveniently handled. For example, the sticks may be packaged in a cylindrical container and applied to the pipe joints, much as a crayon pencil is employed, one end only of the wrapper being removed as the product is consumed. On the other hand, if a putty-like product is desired the constituents are mixed in the order hereinabove given, but an amount of binder, metallic soap and carrier is employed within the lower portion of the ranges hereinabove given and a correspondingly greater amount of lubricating material is used. Both the solid and putty-like materials remain homogeneous and require no stirring before application.

The following is an example of a preferred form of solid pipe joint compound embodying this invention; it will be understood the invention is not limited to this example.

Constituents	Parts by Weight
bentonite (mesh about 400).....	25.00
sodium meta silicate.....	5.00
propylene glycol.....	13.75
sodium stearate.....	10.00
paraffin oil having a viscosity at 100° F. of 170.....	10.00
calcium stearate.....	1.10
oil red.....	.02
water.....	4.50

It will be noted this invention provides a pipe joint compound, preferably in solid form which is not sticky or oily to the touch, remains homogeneous, does not require stirring before application, efficiently lubricates the joint, and can be easily applied to the threads in adequate amounts to produce a good joint.

5

Since certain changes may be made in the above product and different embodiments of the invention could be made without departing from the scope thereof, it is intended that all matter contained in the above description shall be interpreted as illustrative and not in a limiting sense.

What is claimed is:

1. An improved pipe joint compound consisting essentially of from about 10% to about 50% aluminum silicate, from about 5% to about 15% sodium meta silicate, from about 10% to about 50% propylene glycol, from about 5% to about 50% sodium stearate, from about 2% to about 20% calcium stearate, and from about 10% to about 50% petroleum lubricating oil.

2. An improved pipe joint compound consisting essentially of about 25 parts by weight of bentonite, about 5 parts sodium meta silicate, about 13.75 parts propylene glycol, about 10 parts sodium stearate, about 10 parts paraffin oil, and about 1.1 parts calcium stearate.

3. An improved pipe joint compound consisting essentially of from about 10% to about 50% by weight of finely divided aluminum silicate, from about 5% to about 15% of a binder of the group consisting of sodium silicate, potassium silicate and ammonium silicate, from about 3% to about 50% of a hygroscopic dispersing agent for the binder, said hygroscopic dispersing agent being from the group consisting of ethylene glycol, diethylene glycol, propylene glycol, polyethylene glycols, mixtures of such glycols and glycerin, from about 5% to about 50% of alkali metal saponified fatty acid having at least 12 carbon atoms, from about 2% to about 20% of a metallic

6

soap from the group consisting of calcium, zinc and aluminum salts of fatty acids having at least 12 carbon atoms, and from about 10% to about 50% lubricating material from the group consisting of mineral oils and mineral oil residues.

4. An improved pipe joint compound consisting essentially of from about 10% to about 50% by weight of finely divided aluminum silicate, from about 5% to about 15% of a binder from the group consisting of sodium silicate, potassium silicate and ammonium silicate, from about 3% to about 50% of a hygroscopic dispersing agent for the binder, said hygroscopic dispersing agent being from the group consisting of ethylene glycol, diethylene glycol, propylene glycol, polyethylene glycols, mixtures of such glycols and glycerin, from about 5% to about 50% of alkali metal saponified fatty acid having at least 12 carbon atoms, from about 2% to about 20% of a metallic soap from the group consisting of calcium, zinc and aluminum salts of fatty acids having at least 12 carbon atoms, and from about 10% to about 50% mineral lubricating oil.

JOSEPH P. DE LORENZO.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,517,577	Olsson	Dec. 2, 1924
1,739,631	Cross	Dec. 17, 1929
2,038,689	Taylor	Apr. 28, 1936
2,083,176	Willsson	June 8, 1937