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[54] COATING APPARATUS FOR TUBULAR OBJECTS

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[52] **U.S. Cl.**.....**118/320**, 118/DIG. 11, 118/DIG. 16, 222/281

[51] **Int. Cl.**.....**B05c 5/00**, B05b 13/02

[58] **Field of Search**.....118/321, 308, 320, DIG. 16, 118/DIG. 11; 25/38; 222/252, 281

[56] **References Cited**

UNITED STATES PATENTS

1,215,826	2/1917	Little	222/281
2,352,749	7/1944	Wills	25/38 X
2,368,742	2/1945	Brend	118/321 X
3,061,150	10/1962	Lindquist	118/308 X

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[57] **ABSTRACT**

A pair of elastomeric coated drums is arranged so that the longitudinal axis of the lower of the pair of drums is positioned rearwardly, or offset from, the longitudinal axis of the upper of the pair of drums to thereby provide a receiving area on the lower drum for receiving a mixture of aggregate, cement, and water. One of the drums of the pair is mounted so that it may be moved along its support toward and away from the longitudinal axis of the other drum, and it may be adjusted to any desired position, up and down, in spaced relation to the other drum. As the drums are rotated, the mixture deposited on the lower drum will be conveyed between the drums and impelled onto the surface of a tubular member. The angle or direction of the stream discharged from between the drums may be changed by moving and positioning one of the drums relative to the other drum. The desired angle of discharge of the stream depends upon the diameter of the tubular member being coated. The drums are elastomeric coated to provide a more uniform surface for contacting and impelling the mixture from between the drums in a more uniform stream, and the elastomeric coating is wear resistant.

10 Claims, 4 Drawing Figures

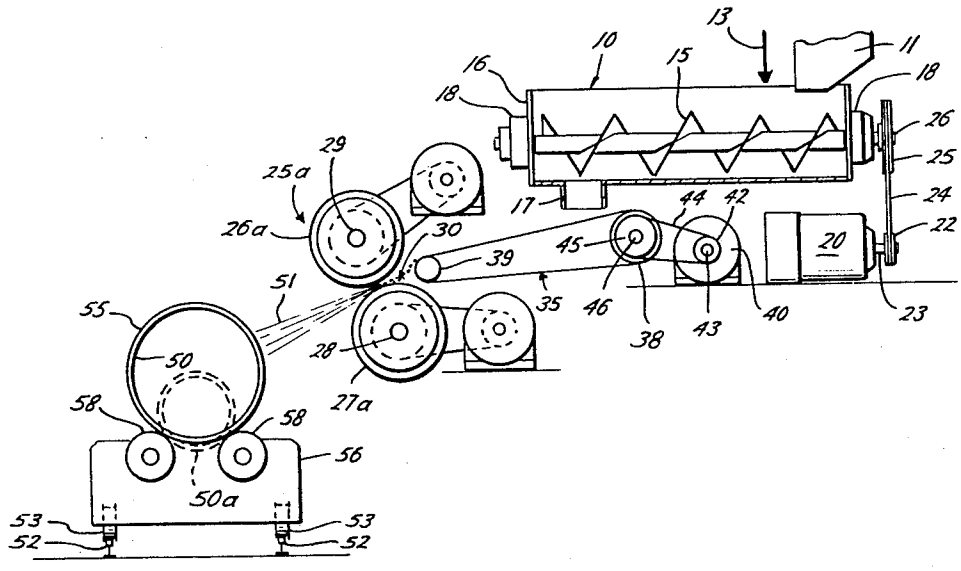


Fig. 1

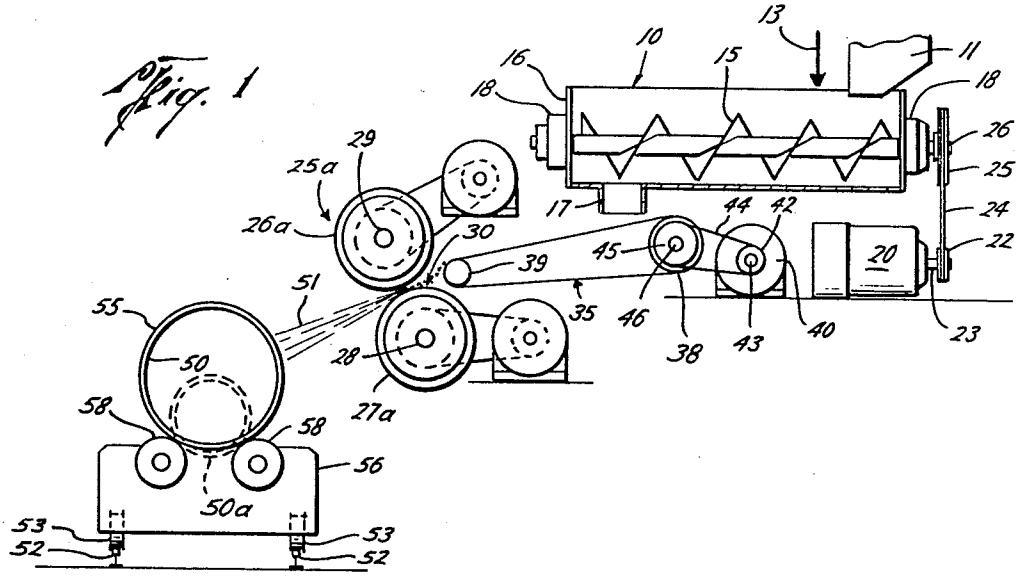


Fig. 2

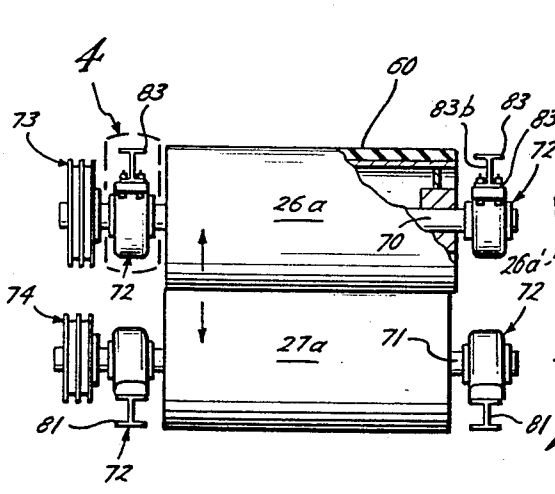


Fig. 3

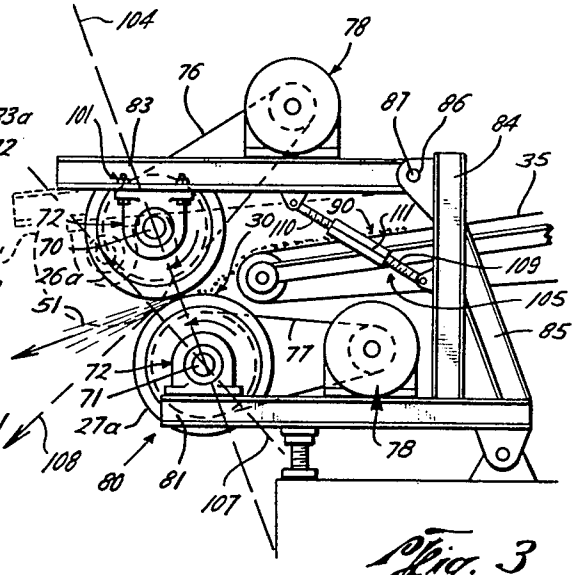
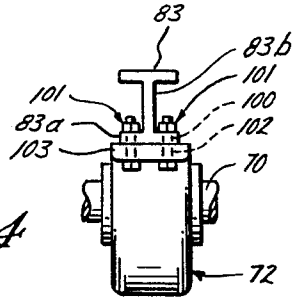


Fig. 4



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COATING APPARATUS FOR TUBULAR OBJECTS

BACKGROUND OF THE INVENTION

The present invention relates to an improved arrangement for applying a cementitious coating to tubular members.

Various devices have been provided and are suggested in the prior art for impelling a cementitious mixture onto the surface of a tubular object. For example, the prior art shows paired round brushes which receive the cementitious mixture therebetween and impel the mixture onto a tubular member. Such arrangement, however, is disadvantageous for several reasons. The brush means wears quite rapidly and unevenly so that not only is frequent replacement thereof required, but the uneven wearing of the brush means causes the material to be propelled between the brushes in an uneven manner so as to make it more difficult to provide a coating of uniform thickness on the tubular member.

Also, the brushes must flex to accommodate the passage of the mixture therebetween, and the amount of flexing may not be uniform which, in turn, affects the uniformity of the stream being impelled therefrom onto the tubular member.

Some difficulty is encountered in feeding the mixture in a proper and uniform manner between the brushes.

SUMMARY OF THE INVENTION

The present invention overcomes the above and other disadvantages of the prior art in that it provides a pair of elastomeric coated drums for receiving cementitious aggregate therebetween; the drums are in a predetermined position relative to each other, and as the drums are rotated, the cementitious aggregate is discharged in a stream at a desired angle onto a tubular member.

Since the drums are elastomeric coated, it has been found that a more even coating may be applied on the tubular member and that the elastomeric coating tends to resist wearing and abrasion which occurs with the brush means of the prior art.

Also, the present invention overcomes the disadvantages of the prior art in that it provides a unique arrangement for receiving the mixture between the drums for discharge therebetween. This is accomplished by arranging the drums in a predetermined offset relationship so that a receiving area is formed on one of the drums for receiving the mixture thereon so that as the drums are rotated, the mixture is moved between the drums and impelled or discharged therefrom and onto the tubular member.

Another object of the present invention is to provide an arrangement for supporting a pair of drums so that upon rotation, material may be discharged therebetween in a stream.

A further object of the present invention is to provide an arrangement for supporting a pair of drums so that upon rotation, material may be discharged therebetween in a stream, one of the drums being adjustable relative to the other drum so that the angle of discharge of the stream may be changed, depending upon the diameter of the tubular member against which the stream is to be directed.

Still a further object of the present invention is to provide an arrangement for supporting a pair of drums so that upon rotation, material may be discharged therebetween in a stream and means for adjusting and spacing one of the drums relative to the other drum with a minimum of effort so that the angle of discharge of the stream may be quickly and easily changed to coat tubular members of varying diameter.

Other objects and advantages of the present invention will become more readily apparent from a consideration of the following description and drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a schematic side elevation illustrating the various components including the paired drums of the present invention arranged for receiving a cementitious mixture from mixing means and impelling it onto the surface of a tubular member;

FIG. 2 is an enlarged end view of the drums to illustrate in greater detail the elastomeric coating on the drums as well as the shafts which extend along the longitudinal axis of each of the drums and projects beyond the end of each of the drums so that suitable bearing and pulley means may be provided for each of the drums for rotation of the drums;

FIG. 3 is an enlarged side view illustrating in greater detail a suitable structure for supporting the upper and lower drums, and more particularly, an arrangement for supporting the upper drum so that it can be moved along its support toward and away from the longitudinal axis of the lower drum and an arrangement for maintaining the upper drum in any desired spaced up and down relation to the lower drum; and

FIG. 4 is an enlarged view of the portion of FIG. 2 which is circled illustrating in greater detail an adjusting arrangement for the drums.

BRIEF DESCRIPTION OF THE PREFERRED EMBODIMENTS

Attention is first directed to FIG. 1 of the drawings wherein suitable means for mixing cement, aggregate, and water is represented generally by the numeral **10**. The cement and aggregate may be dumped into the mixer **10** through the receptacle **11**, and water may be discharged into the mixer means **10** in any suitable manner as schematically represented at **13**.

The mixer **10** is illustrated as being in the form of a combination screw conveyer and mixer **15** which conveys and mixes cement, aggregate, water, and any weighting substance or other additive desired through the housing **16** for discharge through the opening **17**. The conveyer **15** is rotatably mounted within the housing **16** by any suitable bearing means generally represented at **18** and rotation may be imparted to the mixer **15** by the motor **20** which has pulley means **22** mounted on the motor shaft **23** with a belt **24** connected therewith and to the pulley means **25** mounted on the shaft **26** of the combination screw conveyer and mixer **15**.

As diagrammatically represented in FIG. **1**, a pair of drums referred to generally at **25***a* is mounted so that one of the drums **26***a* is above the drum **27***a*. The lower drum **27***a* is arranged so that the longitudinal axis thereof represented at **28** is in a vertical plane which is rearward of, or offset from, the longitudinally extending axis **29** of the upper drum **26***a* as illustrated in the drawings. This arrangement provides a receiving area referred to generally at **30** on the lower drum **27***a* for receiving the mixture from the mixing means **10**.

The discharge opening **17** from the housing **16** of the mixer **10** is arranged above the endless conveyer **35** mounted on drums **38** and **39**, the drum **38** being somewhat larger in diameter than the drum **39** as illustrated in the drawings. The endless conveyer **35** extends about the drums **38** and **39**, and the smaller drum is adjacent and above the receiving area **30** on the lower drum **27***a* for conveying the mixture from the mixer **10** and discharging the mixture onto the receiving area **30** on the drum **27***a*. A motor means **40** having pulley means **42** mounted on its shaft **43** is provided with a belt **44** which connects with the pulley means **45** on the shaft **46** of the drum **38** for imparting continuous movement to the endless conveyer **35**.

The tubular member **50** which is to receive the mixture as it is propelled in a stream as represented at **51** from between the upper and lower drums **26***a* and **27***a* is adapted to be moved longitudinally in front of the upper and lower drums **26***a* and **27***a* and is moved along its longitudinal axis while simultaneously being rotated about its longitudinal axis so that the stream **51** sprays the mixture onto the exterior surface **55** of the tubular member **50**.

As illustrated in the drawings, suitable track means **52** are provided for receiving the rollers **53** on which is supported the carriage **56**. Suitable motor means (not shown) are provided in the carriage **56** for imparting rotation to the rollers **58** on which the tubular member **50** is carried on carriage **56** for rotating the tubular object about its longitudinal axis and the

motor means also imparts movement to the wheels **53** on the carriage **56** for moving the carriage **56** and the tubular member **50** supported thereon along the tracks **52**. It can be appreciated that at least a pair of carriages **56** supports the tubular member **50** to maintain it in proper alignment with the stream **51** as the tubular member is rotated and moved laterally across the path of stream **51**.

In FIG. **2**, the upper and lower drums **26***a* and **27***a* are shown as being each coated with an elastomeric coating **60** which aids in impelling the mixture from between the drums and simultaneously inhibits uneven wearing such as occurs where brush means have been employed in the prior art. The uneven brush wear may provide an uneven discharge of mixture and an uneven coating on the tubular member **50**.

Shafts **70** and **71** form the longitudinal axis of each of the drums **26***a* and **27***a* and project beyond the ends of each of the drums **26***a* and **27***a* as shown so that suitable bearing arrangements as illustrated generally at **72** may be provided for accommodating rotation of the shafts **70** and **71** and the drums **26***a* and **27***a* with which they are connected. Pulley means **73** and **74** are provided, respectively, on each of the shafts **70** and **71** for receiving belt means, respectively, as illustrated at **76** and **77** in FIG. **3** which, in turn, is connected with the shaft of motor means **78** for imparting rotation to each of the drums **26***a* and **27***a*.

In FIG. **3**, the details of a form of support means for the drums **26***a* and **27***a* are referred to generally at **80**. Spaced vertically extending supports **84** are provided and secured thereto are laterally extending frame members **81** which are spaced to receive the drum **27***a* therebetween (only one member **81** is visible in FIG. **3**, however, both are shown in FIG. **2**). Suitable bearing means **72** are mounted on each frame member **81** and receive the ends of the shaft **71** therein to support the drum **27***a* for rotation. The motor means **78** may be mounted on the frame members **81** in any suitable manner as illustrated in FIG. **3**.

The endless conveyer is illustrated at **35** in FIG. **3** with the mixture **90** thereon being discharged onto the receiving area **30** of the lower drum **27***a*.

It will be noted that the upper drum **26***a* is shown as being offset relative to the lower drum **27***a*. Suitable frame members **83** are spaced to receive drum **26***a* therebetween. A bracket **86** is provided on members **84** adjacent their upper ends with a pivot rod **87** extending therethrough and through the rear end of each of the spaced frame members **83** for pivotally supporting the frame members **83** and drum **26***a* on the vertical frame members **84**. It will be noted that, as shown, the frame members **83** extend generally parallel to the frame members **81** which support the lower drum **27***a*. The drum **26***a* is supported on frame members **83** so that the drum **26***a* may be positioned along frame members **83** toward and away from a vertical plane extending through the longitudinal axis of the lower drum **27***a*.

As illustrated in the drawings, FIGS. **3** and **4**, the means to accommodate movement or adjustment of the drums, such as drum **26***a*, along the frame members **83** comprises slots or openings **100** in the portion **83***a* on each side of the web **83***b* of each frame member **83**. Suitable means such as a nut and bolt arrangement referred to at **101** extend through the openings or slots **100** and through openings **102** in bearings base **103** which carries bearing **72** to retain the bearing means **72** which support the shaft **70** at any position along the frame members **83**. The bearing means **72** at each end of shaft **70** is adapted to be adjusted in this manner.

An additional adjustment referred to generally at **105** is provided for raising or lowering frame members **83** and drum **26***a* supported thereon relative to drum **27***a* and maintaining drum **26***a* in a predetermined spaced relation to drum **27***a*.

These adjustments enable the angle of the stream **51** to be varied to direct the stream **51** from between drums **26***a* and **27***a* in a proper and desired manner onto a tubular object of a particular diameter.

For example, in FIG. **1**, a tubular member **50** having a given diameter is shown with the stream **51** impinging thereagainst in a desired manner to coat the tubular member **50**. As illustrated in FIG. **3**, an imaginary plane through the longitudinal axis of drums **26***a* and **27***a* is represented at **104**. The stream **51** represented in FIGS. **1** and **3** discharges from between drums **26***a* and **27***a* at approximately a right angle relative to the plane **104** as shown.

However, when a smaller diameter tubular member as represented in dotted line at **50***a* of FIG. **1** is to be coated, then it can be seen that the relationship of drums **26***a* and **27***a* as shown in FIGS. **1** and **3** will discharge stream **51** therefrom at an improper angle to hit and coat tubular member **50***a*.

By adjusting drum **26***a* on supports **83** and by the adjustment represented at **105** drum **26***a* may be moved to the dotted line position **26***a'*. An imaginary plane through the longitudinal axis of drums **26***a* and **27***a* in this adjusted position is shown at **107**. The stream **51** of mixture discharging from between rotating drums **26***a* and **27***a* in this adjusted position is represented by the dotted arrow **108**. Thus, the angle of discharge of the stream **51** may be varied to suit the diameter of the tubular member to receive the stream **51**.

The adjustment **105** may be any suitable form and is shown as comprising a turnbuckle arrangement between each frame member **83** and support **84** and including opposite threaded shafts **109** and **110** which are threaded into the connecting link **111**.

While the invention has been described wherein the upper drum **26***a* is adjustable relative to the lower drum, it seems apparent that the reverse could be employed.

The frame members **83** also support motor means **78** which provides power through belt **76** for rotating drum **26***a*.

Also, it can be appreciated that belt means **76** and **77** will have to be changed if necessary to accommodate adjustment of drum **26***a*.

Also, should some large undesirable aggregate or foreign substance come through the mixing apparatus **10** and by conveyed to the receiving area **30**, the elastomer coating on drums **26***a* and **27***a* accommodates movement of the irregularly sharper or undesired object or debris between the drums **26***a* and **27***a* without damage to the drums **26***a* and **27***a*.

Also, since the drums **26***a* and **27***a* are coated with elastomeric **60** as previously noted, they present a relatively smooth and even surface which while being somewhat resilient, is substantially firm so as to impel the material therethrough in a desired manner to discharge in a uniform stream and at a desired angle.

Where roller brush means are employed as in the prior art, the brushes are flexible and may tend to impel the aggregate in an uneven manner onto the surface of the tubular member and also wear quite rapidly.

The foregoing disclosure and description of the invention are illustrative and explanatory thereof, and various changes in the size, shape, and materials as well as in the details of the illustrated construction may be made without departing from the spirit of the invention.

What is claimed is:

1. Apparatus for applying a coating of cementitious material to a tubular member comprising:

a. means for mixing cement, aggregate, and water and for discharging the mixture from the mixing means;

b. a pair of elastomeric coated rotatably mounted drums for receiving the mixture and propelling it therebetween to be discharged on the tubular member;

c. said drums having their longitudinal axis offset so that the lower of said pair is rearward of the upper drum to provide a receiving area for receiving the mixture between said pair of drums;

d. means for conveying the mixture from the mixer for discharge on the receiving area of the lower of said pair of drums;

e. means for rotating said pair of drums to convey the mixture therebetween and propel it onto a tubular member; and

f. support means supporting said drums in spaced relation, said support means including means to adjust the position of one of the drums relative to the other drum to adjust the angle of discharge of the mixture from between the drums.

2. The invention of claim 1 wherein said conveying means comprises an endless belt and means for moving said endless belt.

3. The invention of claim 1 wherein said support means for said upper drum includes spaced support arms, means pivotally mounting said arms at a pivot position spaced from said upper drum, and adjustable means for maintaining said upper drum in a predetermined spaced relation to said lower drum.

4. The invention of claim 1 including shaft means extending along the longitudinal axis of each of said drums and on which said drums are carried, said shafts projecting beyond each of said drums at each end thereof with bearing means supporting said shaft at each end of said drums, and pulley means mounted on each of said shafts.

5. The invention of claim 4 including motor means with belt means connecting said motor means and pulley means for rotation thereof.

6. The invention of claim 4 including adjustable means for maintaining said bearing means of at least one of said shafts at any predetermined position along said drum support means whereby the longitudinal axis of said drums may be adjusted toward and away from each other and maintained in a predetermined position.

7. The invention of claim 1 including means for moving a tubular member along its longitudinal axis while simultaneously rotating the tubular member about its longitudinal axis in spaced relationship to said pair of drums for receiving the mixture impelled therebetween on the surface of the tubular member.

8. The invention of claim 1 wherein said adjustable means associated with said support means includes means to adjust and maintain the drums in a predetermined vertically spaced relationship.

9. The invention of claim 1 wherein said adjustable means associated with said support means includes means to adjust and maintain the drums in a predetermined laterally offset relationship.

10. The invention of claim 1 wherein said adjustable means associated with said support means includes means to adjust and maintain the drums in a predetermined vertically spaced relationship and in a predetermined laterally offset relationship.

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