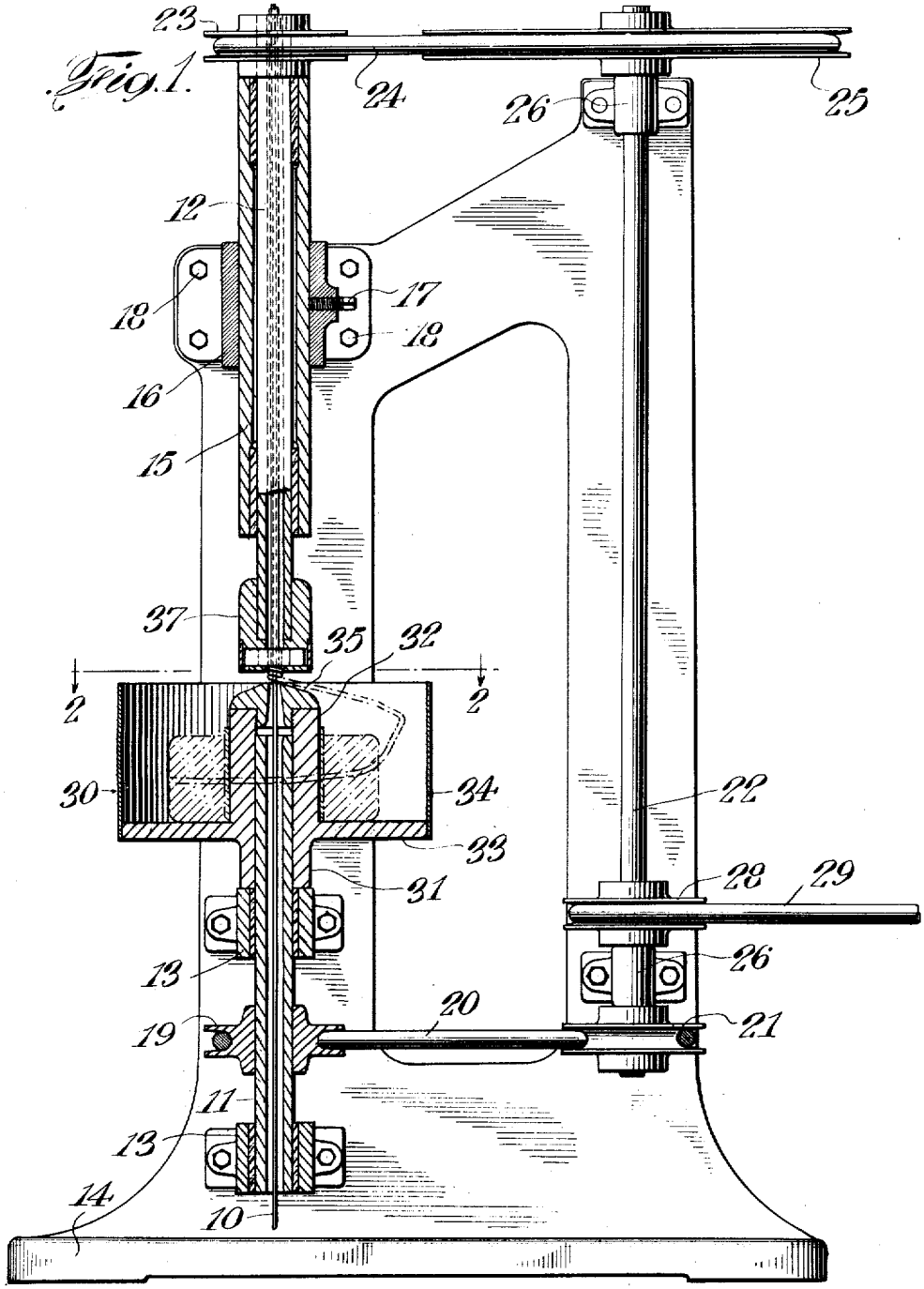
Sept. 13, 1932. C. E. TRAXEL 1,876,794

METHOD OF AND APPARATUS FOR SERVING STRANDS

Filed March 23, 1929 2 Sheets-Sheet 1

Fig. 1.



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Fig. 2.

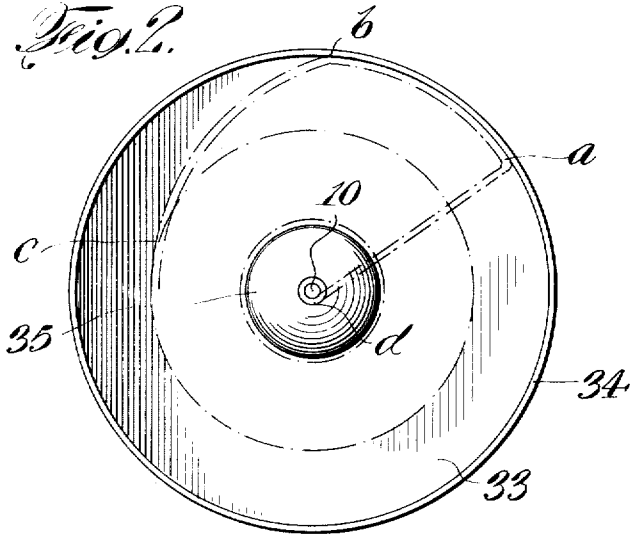


Fig. 3.

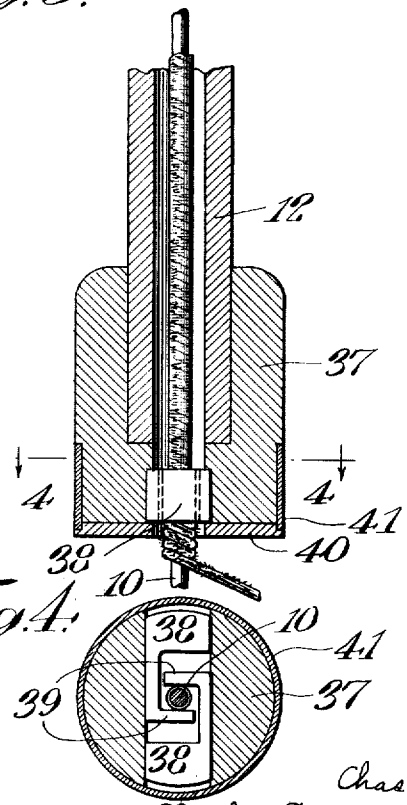


Fig. 4.

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UNITED STATES PATENT OFFICE

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METHOD OF AND APPARATUS FOR SERVING STRANDS

Application filed March 23, 1929. Serial No. 349,327.

This invention relates to a method of and apparatus for serving strands of low tensile strength and has for an object the provision of improvements in this art.

The invention has been developed in connection with the application of asbestos roving to electrical conductors so will be described in this connection for the purpose of giving a concrete and readily understood disclosure of the invention, but without intention of imposing any limitation upon the broad concepts of the invention.

Heretofore, for successful application of asbestos strands, it has been necessary to give them a considerable twist, to run with them a strengthening strand of stronger material, or to run the serving machine at a very low speed.

Each of these methods has undesirable attributes. When the strand is hard twisted it cannot be distributed evenly about the conductor to provide full coverage at all points. When a strengthening strand is used extra reeling operations are required to lay it alongside the asbestos strand and even when the strengthening strand is used the strand of roving is liable to be pushed into lumps leaving corresponding thin spots when passing guides or tensioning devices. When a slow speed machine is used the profit of its operation is largely if not altogether lost and further, even a slow speed machine will frequently break the strand.

The present invention aims to avoid all of the enumerated and other objections and provide for the application of loose-twisted weak strands at high speed.

As specific embodiment of the invention, given by way of illustration, will now be described, reference being made to the accompanying drawings, in which:

Figure 1 is a vertical axial sectional view;

Figure 2 is a plan view taken from the line 2—2 of Figure 1;

Figure 3 is an enlarged view of a portion of Figure 1; and

Figure 4 is a section taken on the line 4—4 of Figure 3.

Referring to the drawings which show apparatus for serving asbestos roving upon an electrical conductor, at the bottom of Figure 1, a core in the form of an uncovered conductor 10 is shown entering the lower end of a hollow flyer spindle 11 and at the top of the figure the conductor with a covering is shown emerging from the upper end of a hollow distributor spindle 12.

The flyer spindle is mounted in spaced bearings 13 attached to a frame 14. The distributor spindle is mounted in a bearing sleeve 15 retained in a guide 16 by a set screw 17. The guide 16 is attached to the frame 14 by bolts 18.

The flyer spindle is provided with a pulley 19 and is driven by a belt 20 from a driving pulley 21 fast on a power shaft 22. The distributor spindle is provided with a pulley 23 and is driven by a belt 24 from a driving pulley 25 fast on the power shaft 22. The pulley 25 driving the distributor is larger than the pulley driving the flyer so that the distributor may rotate faster than the flyer for a purpose to be explained later. The power shaft 22 is mounted in bearings 26 secured to the frame 14 and is driven through a pulley 28 and belt 29.

The flyer spindle 11 at its upper end has rigidly secured thereto the flyer head 30 comprising a hub 31, the upper portion of which provides an arbor 32 for a package or cheese of stranded material, a bottom 33 upon which the package rests, and a retaining wall 34 concentric with the axis of the spindle and the package arbor. The upper end of the arbor 32 is provided with a mushroom guide cap 35 having a rounded sloping upper surface for guiding a strand thereover toward the spindle axis along which the core travels.

The lower end of the distributor spindle

12, as shown at the center of Figure 1 and in Figures 3 and 4, supports a distributor head 37. The lower end of the distributor head is transversely slotted to receive a pair of distributor blocks 38 having overhanging fingers 39 for pressing upon the covering material when the body portions of the blocks are thrown outward by centrifugal force caused by rotation of the spindle 12. The blocks 38 may be retained axially by an end plate 40 and circumferentially by a ring 41, the plate and ring being secured to the spindle head in any convenient manner.

In operation a package of stranded material—in the present example, unreinforced asbestos roving—is placed upon the arbor 32.

The lower end of the distributor spindle and the upper end of the flyer spindle normally are positioned close together to define the space along which roving may be fed to the travelling core but when a package of roving is to be inserted the distributor spindle may be raised within its bearing sleeve. If this does not provide sufficient space for inserting the package then the bearing sleeve may be moved up temporarily by loosening the set screw 17.

An end of the roving is taken from the outside of the package and started on the core. The machine is then started to cause the core or wire 10 to travel upward and the flyer and distributor to rotate. The rotation of the flyer if sufficiently rapid will cause a loop of the roving to balloon outward into contact with the retaining wall 34. As best shown in Figure 2, a considerable portion of the loop lies against the wall. The length of this portion which may be designated *a*—*b* is determined by the co-efficient of friction between the roving and the surface of the wall and the centrifugal force exerted by the portion of the loop *b*—*c* being thown off the package.

The rotation of the flyer will cause the portion *a*—*d* of the loop to be wound upon the advancing core 10 under tension caused by centrifugal action on the portion *a*—*d*. This tension may be made sufficient to tighten the strand as much as desired upon the core without breaking the strand. If the attempt is made to place tension on the strand by rings or other mechanical devices which exert a drag on the passing strand it will be frequently broken or puckered.

As the portion *a*—*d* of the loop winds upon the core, the portion *a*—*b* slips back to allow more of the portion *b*—*c* to be thrown out against the wall and more of the roving beyond the point *c* to be fed off the package. Thus, while the lengths *a*—*d*, *a*—*b* and *b*—*c* are constant for a given speed, the sector of contact of *a*—*b* with the surface of the retaining wall is constantly travelling in the direction of *a* to *b*.

The lower end of the distributor head and the upper end of the mushroom guide cap 35 are positioned closely together to limit the opening through which the strand may pass in travelling to the core. The rounded upper surface of the cap 35 directs the strand properly without offering any considerable opposition to its movement thereover.

The distributor fingers present a wide flat surface to the covering and remove the material from the tops of the loose strands of roving into the valleys between the strands thus forming a covering of uniform thickness at all points on the circumference. Since the strands of roving are put on as a helix it is desirable that the distributor be made to cross the strands of the helix. This may be accomplished by running the distributor faster than the flyer. When the distributor is rotated in the same direction as the flyer it will travel down the core with the helix and thus have no tendency to loosen the strands from the core. Preferably the distributor is run at about three times the speed of the flyer. A flyer speed of 1000 R. P. M. has been mentioned so in this case the distributor will have a speed of about 3000 R. P. M.

The distributor speed determines the pressure exerted by the centrifugal blocks upon the covering and hence the density of the covering. From this it will be seen that the density may be varied by varying the distributor speed and that the speed of 3000 R. P. M. mentioned merely represents one speed which has proved satisfactory for a certain grade of finish.

By the arrangement described, the roving is thrown clear of the package by centrifugal force at all times and in all positions. Consequently there will be no pull on the roving tending to break it as would be the case if the strand were pulled upward along the side of the package. Furthermore, the desired winding tension on the strand is secured without the use of rings, eyes or other usual guide and tensioning devices, and without pulling the strand over a surface such as would cause a re-entrant angle to form in the strand calculated to break it. On the contrary, the strand describes a smooth path with only gradual curves from the time it leaves the package until it is wound on the core. And all surfaces touching the strand are large and smooth insuring that such friction as is required will be distributed over a considerable length of the strand and not localized to cause damage.

It will be apparent that the invention may have various embodiments other than that specifically described above within the scope of the subjoined claims.

What I claim is:

1. In a machine for serving a strand of low tensile strength upon an axially advancing

core, in combination, a flyer rotatable about said core, a package of said stranded material on said flyer, a retaining wall concentrically surrounding said package, means for rotating said flyer to cause a loop of said strand to balloon off said package against said retaining wall, said loop feeding off the package against the drag of the portion of the loop in contact with the wall, rotation of said flyer also winding the strand against the action of centrifugal force upon said advancing core to form a helix thereon, and a distributor concentric with said advancing core for smoothing the material of the strand evenly about the core, said distributor rotating faster than said flyer and in the same direction so as to cross said helix and prevent loosening of the helix on the core.

2. In a machine for serving a strand of low tensile strength upon an axially advancing core, in combination, a flyer supporting a concentric package of the stranded material, a hollow spindle through said flyer through which said core advances freely, a cylindrical retaining wall against which a loop of said strand is thrown by centrifugal force, and means closely defining the axial location at which the strand is served upon said core, said retaining wall and location-defining means being the only means capable of touching or exerting a drag upon the strand prior to its winding upon the core.

3. In a machine for serving a strand of low tensile strength upon an axially advancing core, in combination, a flyer supporting a package of strand material disposed concentrically of the flyer axis, means to rotate the flyer at sufficient speed to cause a loop of material to balloon from said package, and means including a retaining wall rotatable with the flier for limiting the length of said loop.

4. In a machine for serving a strand of low tensile strength upon an axially advancing core, in combination, a flyer supporting a package of strand material disposed concentrically of the flyer axis, means to rotate the flyer at sufficient speed to cause a loop of material to balloon from said package, and means including a retaining wall rotatable with the flyer to confine said loop and lead the strand to said core without forming a reentrant bend in it.

5. In a machine for serving a strand of low tensile strength upon an axially advancing core, in combination, means to wind the strand upon the core substantially under the tension of centrifugal force alone, and means to distribute the strand material upon said core under pressure caused by centrifugal force.

6. In a machine for serving a strand of low tensile strength upon a core, means for supporting a package of strand material concentrically of the core, means defining the location of said strand at its point of contact with the core, there being no part or portion of the machine which materially deflects the length of strand in its approach to the core in combination, means for winding a strand upon the advancing core substantially under tension of centrifugal force alone and means for spreading the material of said strand smoothly around said core.

7. In a machine of the kind described, a flyer comprising in combination, a concentric rotary arbor supporting a spool package of stranded material, and an outer concentric rotary retaining wall provided with a smooth interior surface for confining strand material fed off the outside of said package.

8. In a machine of the kind described, in combination, means to support a strand package concentric with an advancing core, means to free a strand of material from any point about the circumference of a strand package by centrifugal force and to serve the strand to an advancing core against the tension of centrifugal force, the strand being presented laterally to said core whereby centrifugal force acting on the strand is established as the major force tensioning the strand as it winds upon the core.

9. In a machine of the kind described, in combination, a flyer including a package arbor and a concentric annular strand retaining wall, said arbor carrying a strand package from which strand material is fed off its outer circumference, and means for restricting the point at which the strand is served to an advancing core after it emerges from the hollow spindle of said flyer, said serving point being above the end of the flyer spindle but not high enough to permit the strand to drag on the upper edge of the wall.

10. The method of covering an elongated core with a strand of low tensile strength, which comprises, supporting a strand package concentrically of the core, winding the strand upon the core with tension exerted substantially alone by the centrifugal force of a length of the strand while axially advancing the core, keeping the length of strand which is being wound free from deflecting elements or elements which exert any appreciable frictional drag thereon and smoothly distributing the material of the strand upon the core.

11. The method of covering a wire with an unstrengthened strand of asbestos roving which comprises, centrifugally ballooning a loop of the roving outward from a roving package against a concentric retaining element rotating with the package and serving one end of the loop to the axially advancing wire under tension of centrifugal force exerted upon the infeeding end of the loop.

12. The method of covering a wire with a strand which comprises, supporting a strand package concentrically of an advancing core,

winding the strand upon the wire substantially alone against the action of centrifugal force upon a freely floating length of the strand.

13. The method of serving a strand of low tensile strength which comprises, supporting a strand package concentrically of an advancing core, throwing the strand off a strand package by centrifugal force and winding the strand upon a core substantially alone with tension of centrifugal force upon a freely floating length of the strand to tighten it thereon.

14. The method of serving a strand of low tensile strength which comprises, supporting a strand package concentrically of an advancing core, throwing the strand radially outward from all sides of a package of the strand material and returning the strand inward in a free span directly to a central core so as not to come in contact with the package.

15. The method of serving a strand of low tensile strength to a core which comprises throwing a loop of the strand from the circumference of a package rotating on its own axis which coincides with the core axis and confining the strand by a frictional surface having a long surface of contact with the loop but no relative rotation with respect to the strand package.

16. Apparatus for serving a strand of low tensile strength which comprises means to throw a loop of the strand outward from a strand package by centrifugal force, one end of the loop passing outward from the package and the other end passing inward to an advancing core upon which it is wound, and directing means for said loop presenting only extensive surface contact and no sharp edges thereto.

17. Apparatus for serving a strand of low tensile strength which comprises means to throw a loop of the strand outward from a strand package by centrifugal force, one end of the loop passing outward from the package and the other end passing inward to an advancing core upon which it is wound, and means having slidable contact with said loop for directing the loop, the contact with the core surface being of considerable extent and the strand travelling substantially parallel to the surface thereof.

18. The method of serving a strand of low tensile strength upon an advancing core from a strand package concentric with the core which includes throwing a loop of the strand by centrifugal force and controlling the loop by frictional contact with smooth surfaces of considerable extent concentric with the package and core and having no rotation relative to the package.

19. The method of serving a strand upon an advancing core from a supply package or spool of the strand material which comprises, supporting a strand package concentrically of the core, throwing a loop of the strand clear of the package by centrifugal force acting with equal effect on all sides of the package and so selecting the axial length of the package, the distance to which said loop is thrown and the point at which the end of the loop is wound upon the core that the loop will at all times clear the package.

20. In a machine for applying a covering to an advancing core, in combination, a rotatable hollow spindle through which said core loosely advances, and means carried by said spindle for rubbing said core, said means including oppositely acting free-floating weights adapted to prevent whipping of the core in the spindle, the weights being urged toward active position by centrifugal force.

21. The method of serving an unstrengthened strand of tensilely weak strand material from a circular package of the same to a core which advances axially through and along the axis of the package, which comprises, rotating the package about its axis at sufficient speed to cause a loop of the strand material to balloon off the outer circumference of the package under the influence of centrifugal force, limiting the outward travel of said loop, and leading the free end of the loop to a point of winding contact with the core along a path disposed laterally of the core and there causing the strand to be wound upon the core whereby the centrifugal force on the free end of the loop may be constituted as the major or controlling force providing the tension for winding the strand upon the core.

22. Apparatus of the character described comprising in combination, a hollow spindle, a flyer mounted thereon, a package of stranded material mounted on said flyer concentric with the axis of said spindle, the package rotating with said flyer, and a concentric wall also rotatable with said package and flyer for confining a loop of stranded material thrown outward by centrifugal force from the package.

23. Apparatus for serving a strand of material to a core, comprising in combination, a rotatable flyer, a strand package mounted upon and rotatable with said flyer, a rotatable member retaining said package, a rotatable means for retaining a portion of said strand when thrown outward by centrifugal force, a concentric core, guide means to direct said strand to said core, said guide means being not substantially above the means against which said strand is thrown.

24. Apparatus as set forth in claim 23 in which the retaining and guide means direct said strand to said core in a substantially normal direction.

25. In a machine for serving a strand of low tensile strength upon an axially advancing core, in combination, a flyer supporting a

concentrically disposed package of strand material, a concentric rotatable retaining wall for a strand loop thrown from said package, means to rotate the flyer at sufficient speed to cause a loop of strand to be thrown from said package to produce frictional resistance on the surface of the rotatable retaining wall, thereby governing the flow of said strand from said package to the advancing core.

In testimony whereof, I have signed my name to this specification this 19th day of March, 1929.

CHARLES E. TRAXEL.

CERTIFICATE OF CORRECTION.

Patent No. 1,876,794. September 13, 1932.

CHARLES E. TRAXEL.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 3, line 63, claim 6, before "means" insert the words in combination; and line 70, strike out the words "in combination"; same page, line 77, claim 7, strike out the word "spool"; and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 29th day of November, A. D. 1932.

(Seal)

M. J. Moore,
Acting Commissioner of Patents.

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