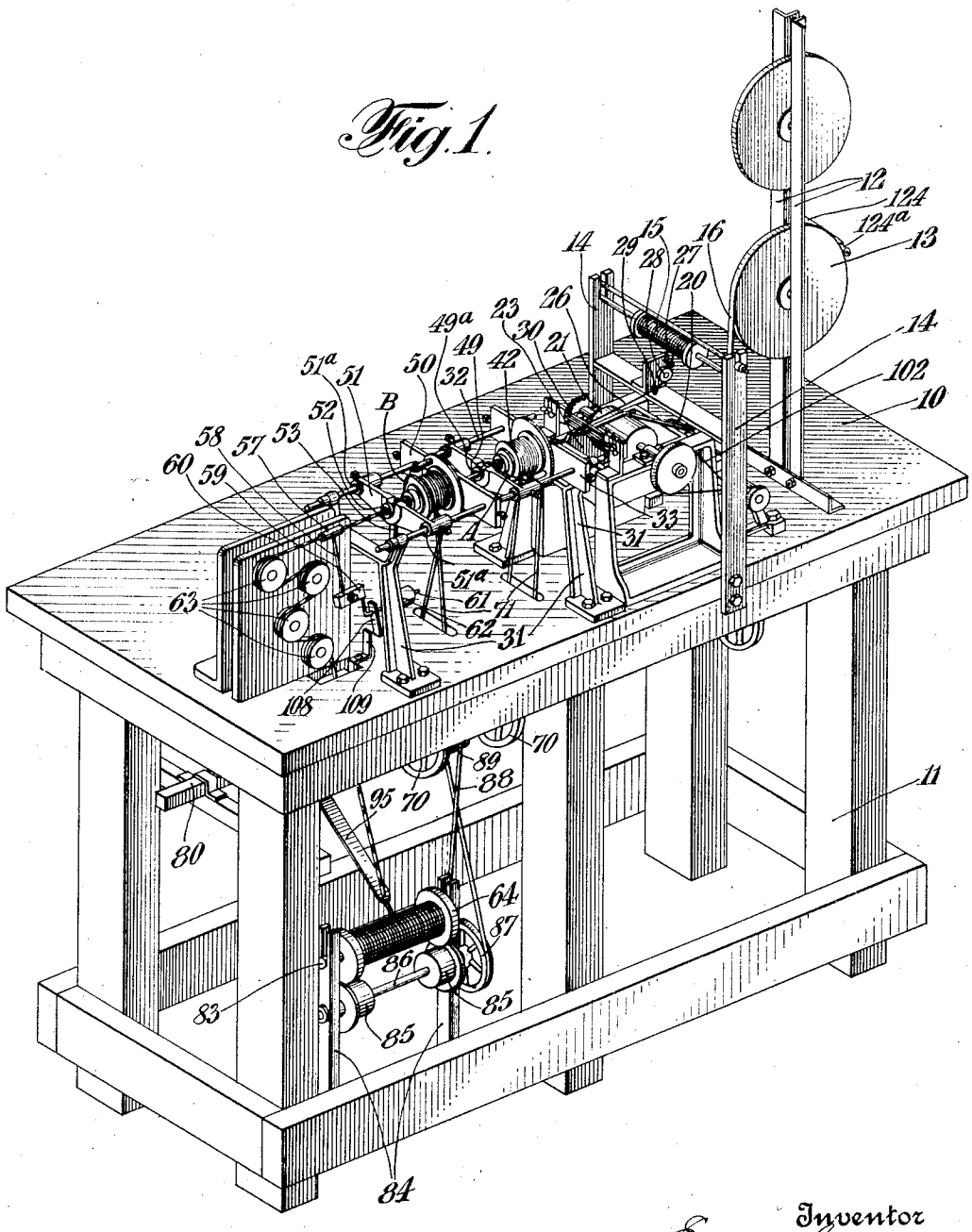
March 31, 1931. E. SLADE 1,798,359

MANUFACTURE OF YARNS

Filed April 5, 1928 7 Sheets-Sheet 1

Fig. 1.



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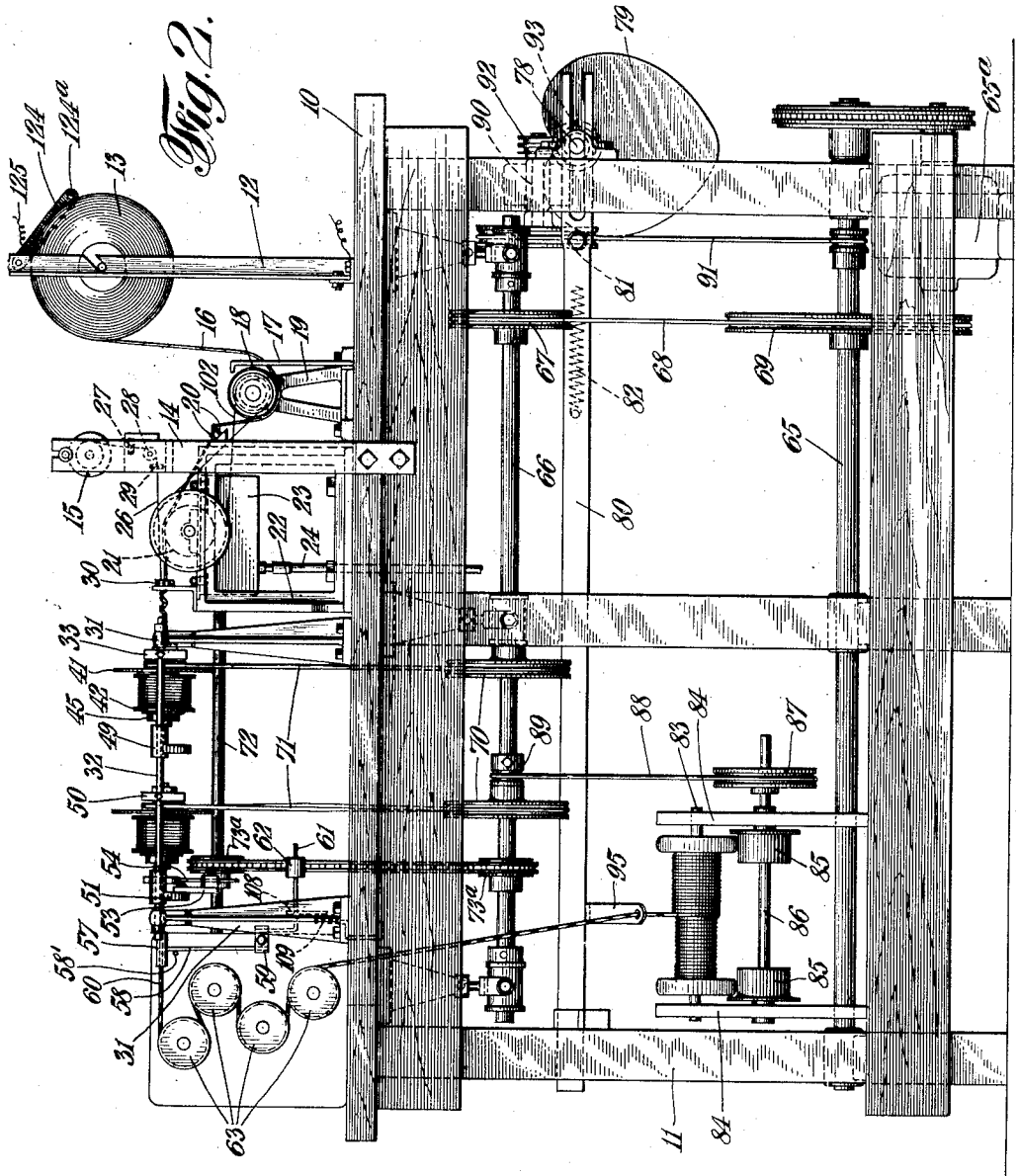
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MANUFACTURE OF YARNS

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Fig. 2.



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MANUFACTURE OF YARNS

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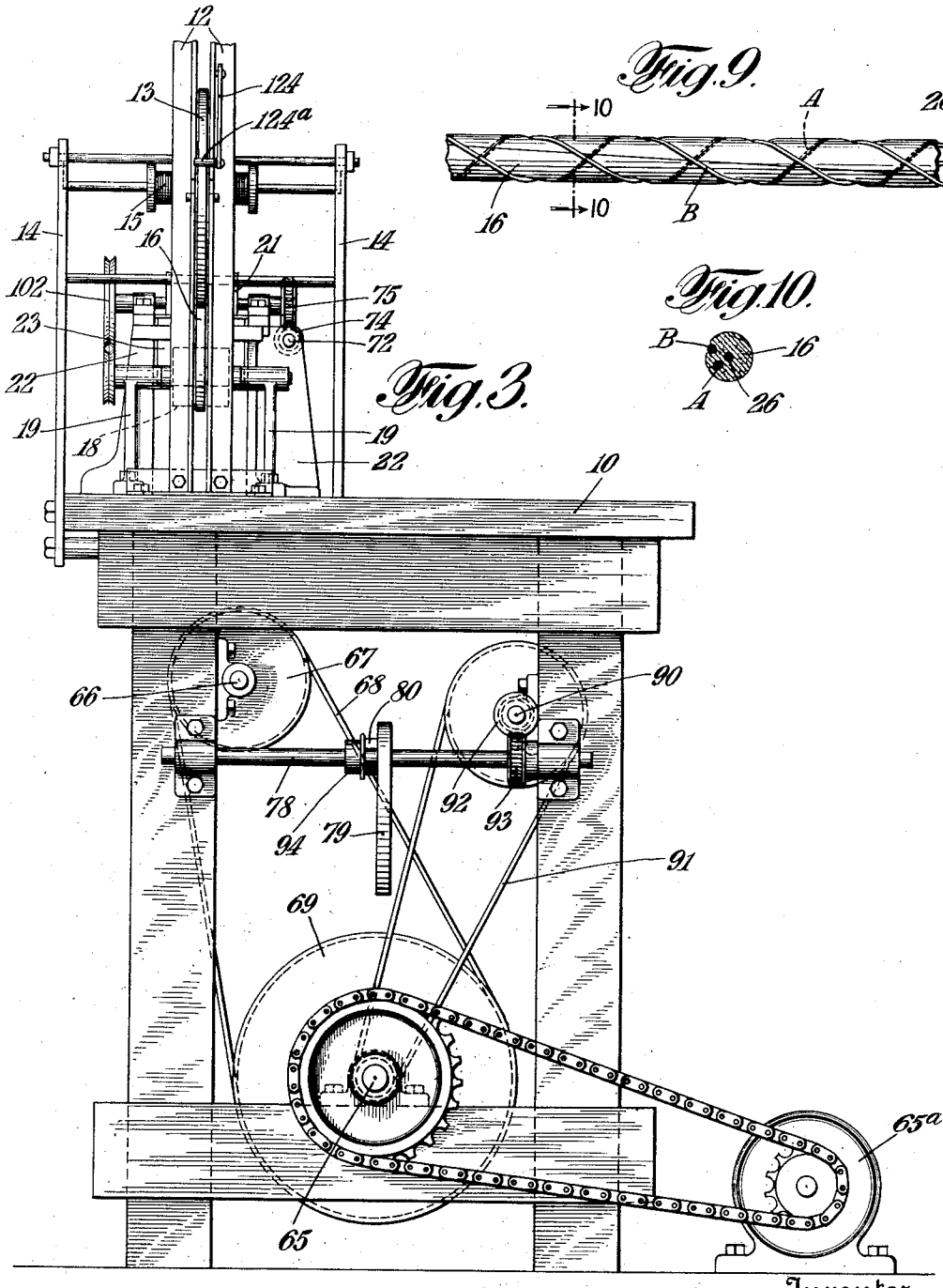


Fig. 3.

Fig. 9.

Fig. 10.

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MANUFACTURE OF YARNS

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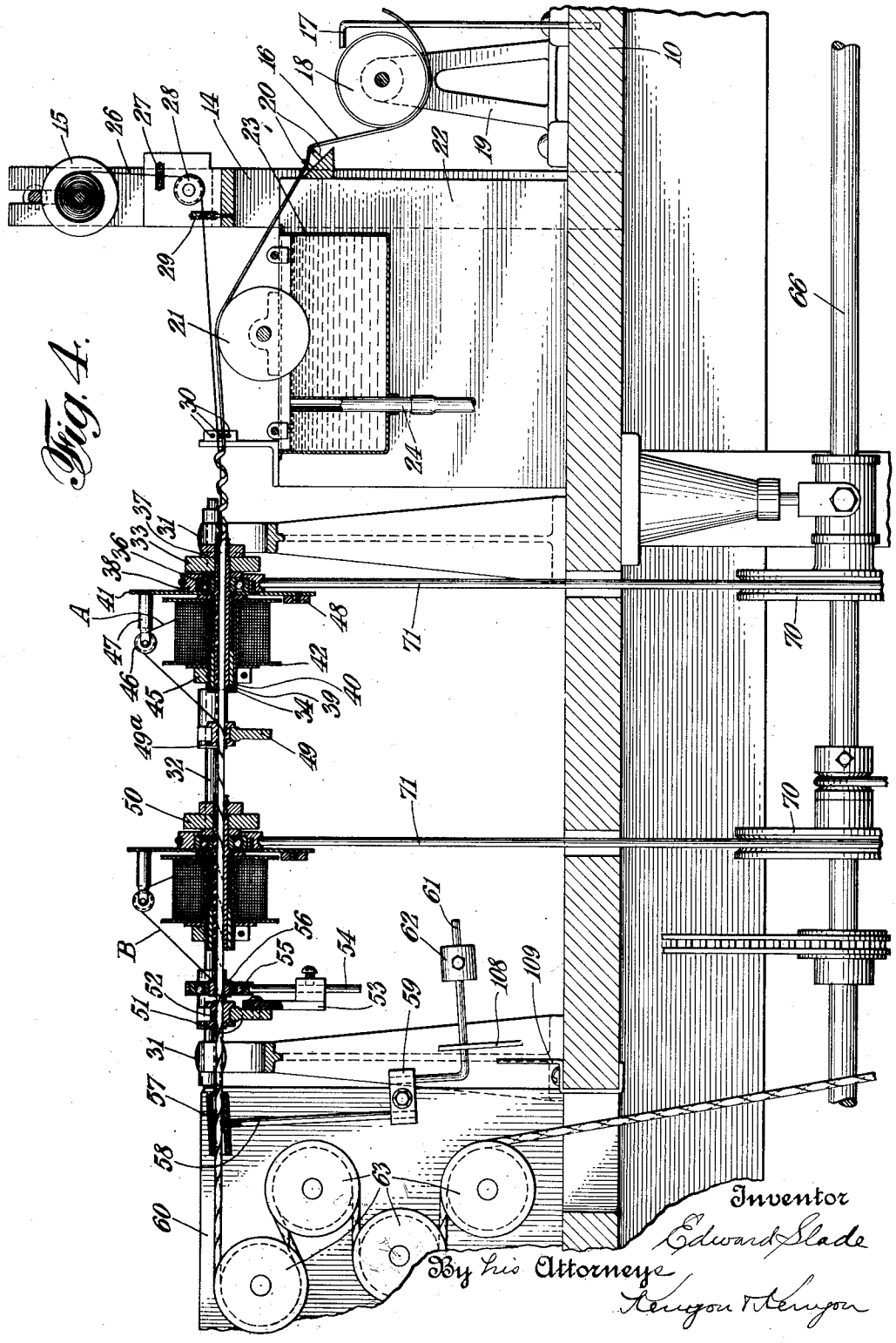


Fig. 4.

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MANUFACTURE OF YARNS

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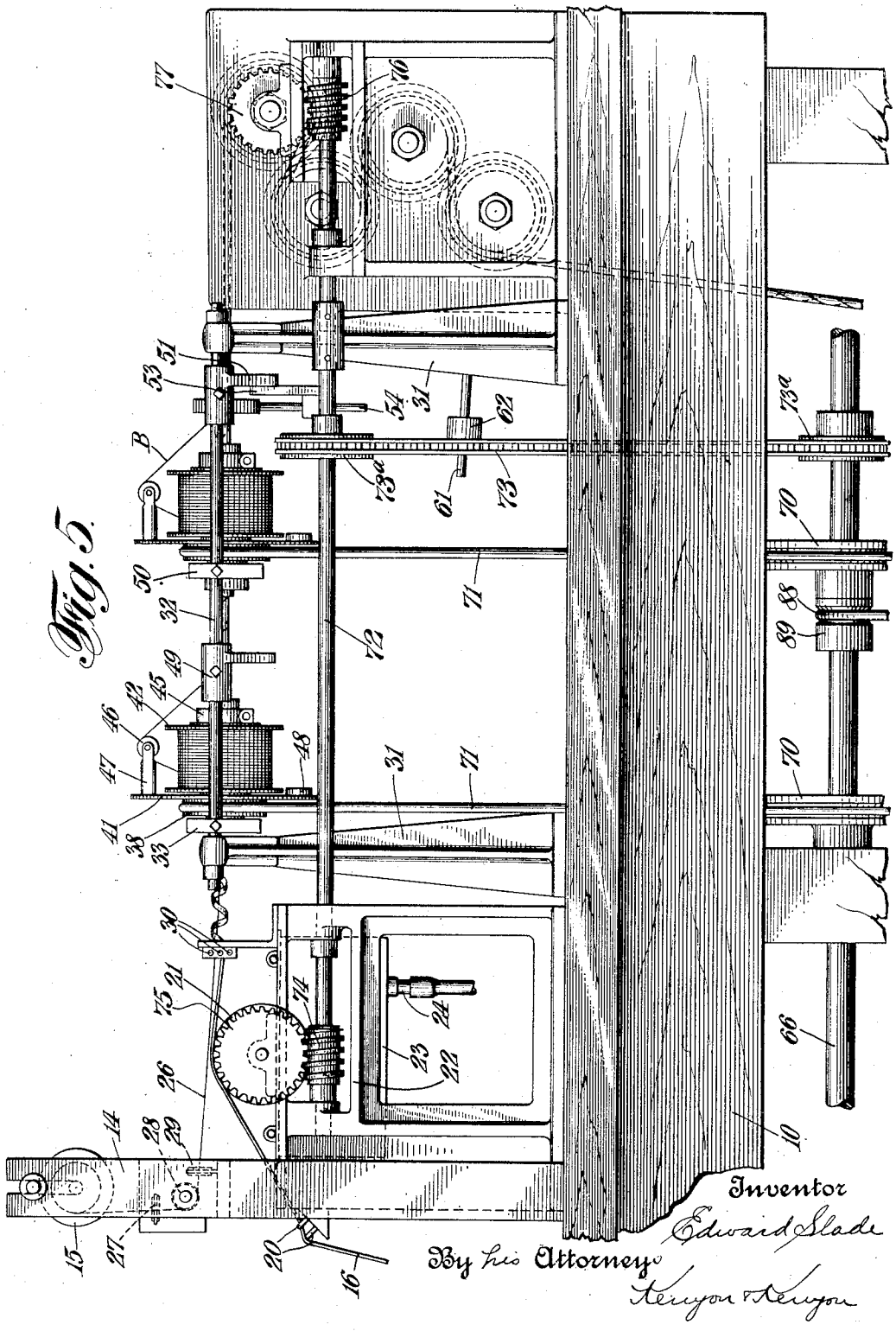


Fig. 5.

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MANUFACTURE OF YARNS

Filed April 5, 1928 7 Sheets-Sheet 6

Fig. 6.

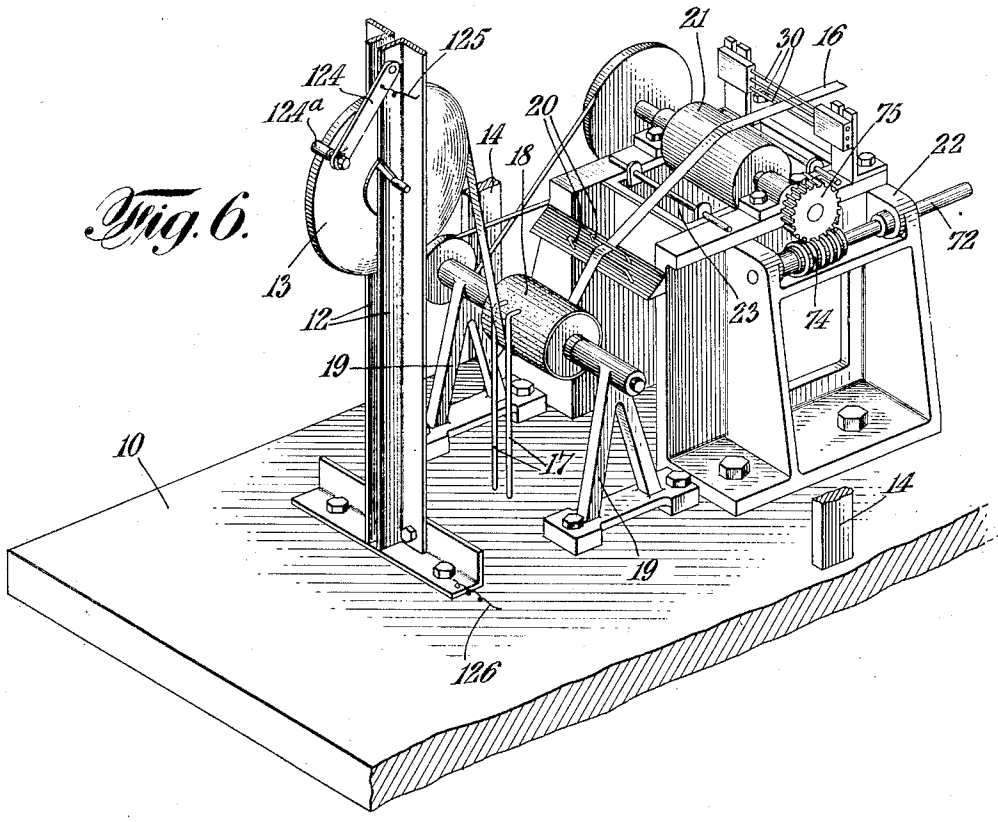
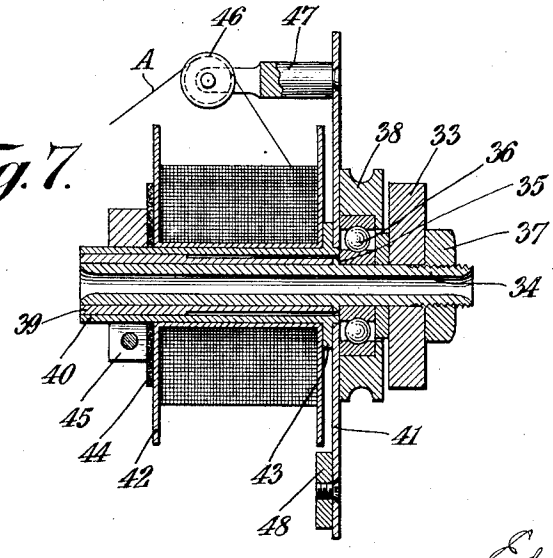


Fig. 7.



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MANUFACTURE OF YARNS

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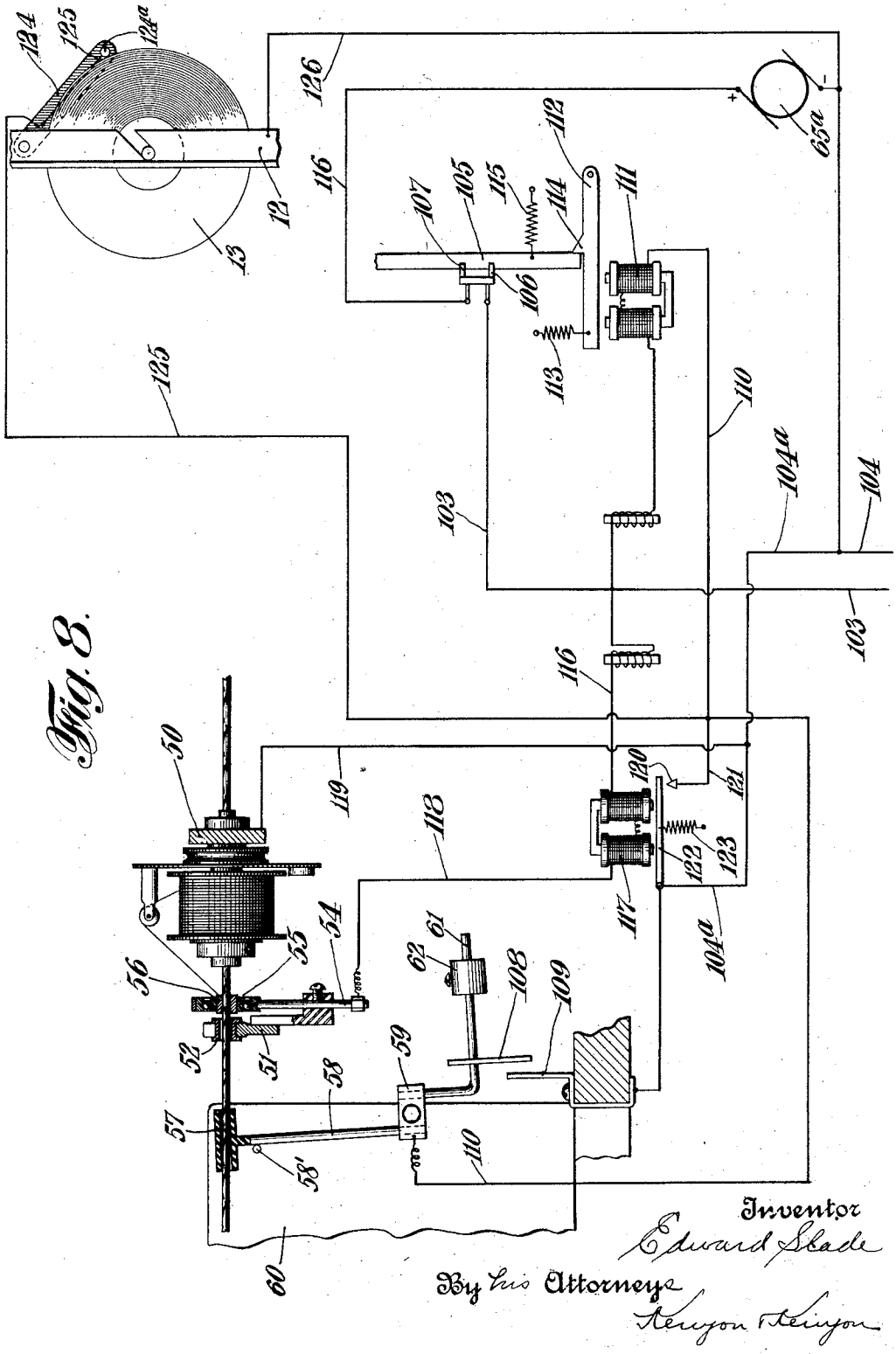


Fig. 8.

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Patented Mar. 31, 1931 1,798,359

UNITED STATES PATENT OFFICE

EDWARD SLADE, OF NEW YORK, N. Y.

MANUFACTURE OF YARNS

Application filed April 5, 1928. Serial No. 267,564.

This invention relates to the manufacture of yarns consisting primarily of asbestos and has for an object an improved yarn structure as well as an improved method of and an improved apparatus for producing such yarn.

Yarn embodying the invention comprises a light core enclosed in a strip of asbestos paper with one or more binding light wires wrapped around the same. The core may be merely a strengthening element for the asbestos strip as in the case of yarns produced for use in the manufacture of brake lining, or the cover may be merely a protection for the core as in the case of an electrical conductor.

The above-described yarn is rapidly and cheaply produced by the apparatus which is one of the objects of the invention. Such yarn is capable of standing bending and crushing strains while remaining flexible, and is particularly adapted for use in weaving into fabric for brake lining and the like. In the yarn both the light metallic core and the light binding wires are twisted in with the asbestos strip in such a way that a strong and otherwise suitable strand is formed which, when woven into fabric and suitably treated, forms an ideal brake lining. The yarn and the brake lining formed therefrom are composed entirely of asbestos and wire and are therefore non-inflammable. Short-fibred asbestos may be used in making the asbestos strip of which the yarn is formed, thereby cheapening to a very considerable extent the cost of the yarn.

According to this invention, the yarn is formed by advancing the wire or other core metallic element, bringing the asbestos strip substantially free from tension into enveloping relationship with the wire and then winding one or more binding elements or wires under tension around the core. Means are provided at a point in advance of the point at which the binder is applied, to hold the strip against twisting, and means also are provided positively to feed the strip to said means in order that the strip may be loose with respect to the core prior to the application of the binder. The combination of the application of the binding element under tension and the mechanism rearwardly spaced for holding the strip against twisting or rotation has the result of causing the cover strip as fed with the advancing core to assume a convolute form around the core prior to and at the point of application of the binding element. Accordingly, the core is completely and uniformly covered by the asbestos strip in convolution before the binding operation. After binding, the convolution of the covering strip may become somewhat loosened and may practically entirely disappear. The presence of the convolutions at the binding point, however, insure that the core is uniformly and completely enclosed by the covering strip. The core enclosed in the asbestos strip is fed through one or more winding heads, depending upon the number of binding wires that are to be applied. Where two binding wires are applied, the first is wrapped around the wire in one direction and the second is wrapped around it in the opposite direction, thus firmly holding the asbestos paper on the metal core. Electrical means are provided for automatically stopping the machine should the core wire or either of the binding wires break or should the asbestos strip become ruptured.

According to this invention, there is produced quickly and economically a yarn of uniform size and quality in which the sheath is securely bound mechanically to the core by means of one or more binding wires. As both the core and binding wires are thin and flexible, the yarn lends itself particularly to the manufacture of brake lining preferably in accordance with the process disclosed in applicant's co-pending application Serial Number 267,563 filed on even date herewith. A fabric woven with this yarn forming either the warp or weft or both and processed as described in the aforementioned application constitutes an ideal brake lining which has a high coefficient of friction, great density, long life and a smooth surface, and the characteristics of which resemble more a molded product than a woven one, the lining being a solid homogeneous mass of asbestos and metal.

Other objects, novel features and advan-

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tages of the invention will be apparent from the following specification and accompanying drawings, wherein

Figure 1 is a perspective view of the improved yarn-forming machine;

Fig. 2 is a side elevation of the machine;

Fig. 3 is an elevation of the right end of the machine as shown in Fig. 2;

Fig. 4 is a vertical longitudinal section through the machine;

Fig. 5 is a back view of Fig. 2;

Fig. 6 is a perspective view of the asbestos strip-feeding mechanism;

Fig. 7 is a sectional view of the winding heads;

Fig. 8 is a wiring diagram of the automatic stop mechanism;

Fig. 9 is a view disclosing the finished yarn; and

Fig. 10 is a section on the line 10—10 of Fig 9.

One embodiment of a machine for producing yarn according to the invention comprises a bench 10 which is supported by a frame 11. At one end of the bench 10 are provided standards 12 upon which is rotatably supported a roll 13 of asbestos paper ribbon which is to comprise the sheath for the core. A second set of standards 14 is provided for supporting a spool 15 upon which is wound the wire that is to be the core of the yarn. The asbestos strip 16 passes from the reel 13 between guide pins 17 and beneath a roller 18 supported by the frame 19 and then over and under horizontally arranged guide rods 20. The roller 18 is provided with a roughened surface and constitutes means for drawing off the asbestos strip from the roll 13. From the guide rods 20, the strip 16 passes over a moistening roller 21 carried by a frame 22 which also supports a tank 23 in which water is constantly maintained at a proper level to at all times come in contact with the roller 21. The level of the liquid is maintained constant by means of the overflow pipe 24 and the inlet pipe 25. From the moistening roller 21, the strip 16 passes between the lower and intermediate horizontal rods 30 which are so closely related as to maintain the strip flat and prevent twisting thereof. The strip 16 then passes through the first winding head where it is brought into enveloping relationship to the core wire 26. The core wire passes from the spool 15 through a guide 27 around a roller 28 to change its direction and then through a guide 29 after which it passes between the upper and middle horizontal rods 30 and from there into contact with the asbestos strip and through the first winding head.

A frame comprising standards 31 and rods 32 connecting the standards is provided as a support for the winding heads by means of which the binding wires are applied. A plate 33 extends between and is slidably mounted on the rods 32. A tubular member 34 having a bell-shaped mouth at either end is supported by the plate 33. The tubular member 34 is provided with an annular shoulder 35 which engages the inner race of a ball bearing 36, the bearing and tubular member being clamped to the plate 33 by means of the nut 37 threaded on the end of the tubular member 34. A pulley 38 is carried by the outer race of the ball bearing 33. A bearing sleeve 39 surrounds one end of the tubular member 34 and abuts against the shoulder 35. On the bearing sleeve is rotatably mounted a hollow shaft 40 to which is attached a disk 41 and upon which is rotatably mounted a spool 42 of binding wire. The spool 42 is held between a shoulder 43 on the hollow shaft 40 and a friction washer 44 by means of a split adjustable clamping member 45. By proper adjustment of the clamping member 45, the friction between the washer and spool may be varied, thus regulating the tension required to draw off the binding wire from the spool. The disk 41 carries a guide pulley 46 mounted on a stud 47 and is also provided with a counterweight 48. The binding wire A is led from the spool 42 around the guide 46 and thence to the core and sheath around which it is wrapped. As the wire is drawn off, the spool 42 is caused to rotate on the shaft 40 and the wire is maintained under tension by virtue of the friction applied to the spool through the washer 44. As the paper strip 16 passes into the mouth of the tubular member 34, its edges are curled up and around the core wire 26, so that, when the core wire and strip emerge from the opposite end of the tubular member, the core wire is enveloped by the strip 16.

A bar 49 slidably supported by the rods 32 is arranged at a short distance from the unsupported end of the tubular member 34. In this rod is supported a guide 49*a* through which the yarn passes after emerging from the tubular member 34. The binding wire is applied to the yarn just before it passes through the guide 49*a* and by the spinning action of the revolving head, the wire is bound tightly around the yarn. The frictional engagement between the spool 42 and the washer 44 causes the binder to be applied to the yarn under tension. Due to the tension, the strip 16 is twisted or rotated slightly on the core to form convolutions at the point of application of the binding element and extending rearwardly to the point at which the rods 30 maintain the strip 16 in flat condition. The guides 49 prevent ballooning of the yarn and minimize vibration thereof. By applying the binding wire under tension at a given point to a core loosely surrounded by the asbestos strip and holding said strip at a point rearwardly from the binding point, there is provided a sim-

ple and effective means for wrapping the covering on the core to completely enclose the same and bind it in position. The advancing core carries with it the covering and the binding element and is the force for feeding the covering strip to the core and for drawing the binding element from the reel to its point of application to the core and the covering as a binder.

The wrapped yarn after emergence from the guide 49*a* passes through the second spinning head. The second spinning head is identical in structure with the first spinning head and will not be described in detail. By this head, the second binding wire B is wrapped about the yarn in the opposite direction. The head is supported by a plate 50 slidably mounted on the rods 32. A cross-bar 51 is slidably supported by the rods 32 by means of bushings 51*a* composed of electrically insulating material. A guide 52 for receiving the wrapped yarn is carried by the bar 51. A strip of insulating material 53 is attached to the bar 51 and depends therefrom. A metal rod 54 is adjustably carried by the member 53 and is provided at its upper end with an eye in which is mounted the outer race of a ball bearing 55. The inner race member of the ball bearing 55 carries a guide 56 which is rotatable about the yarn which passes through it. Between the second winding head and the guide 56, the second binding wire B is wrapped around the yarn. The second binding wire is wrapped in a different direction than is the first binding wire. Set screws are provided in the bars and plates 33, 49, 50 and 51 for holding the same in position on the rods 32.

From the guide 56, the yarn passes through a tubular member or sleeve 57 which is arranged at the end of an arm 58 carried by member 59 pivoted to the vertical plate 60 and which is provided with an arm 61 upon which is mounted a counterweight 62. The function of this arrangement will be later described. The plate 60 supports a plurality of pulleys 63 which are driven by a mechanism later to be described, the pulleys being geared together for uniform movement. The finished yarn is passed around the pulleys 63 which draw the same through the machine, and in being drawn through this machine two oppositely-wound binding wires are applied by means of which the asbestos covering is firmly attached to the core. The asbestos strip is moistened by the roll 21 prior to being brought to the tubular member 31 so that it will be soft and fold about the wire readily. From the pulleys, the yarn passes to a takeup reel 64 upon which it is wound, the takeup reel being operated by a mechanism later to be described.

Power is supplied to the various rotating parts of the machine from a main shaft 65 which is driven from a motor 65*a*. On a countershaft 66 is mounted a pulley 67 over which passes a belt 68 which also passes about a pulley 69 on the main shaft 65. The countershaft 66 is equipped with pulleys 70, and belts 71 are provided passing around these pulleys and the pulleys 38 of the winding heads. The belts are so arranged that the winding heads rotate in opposite directions. A shaft 72 supported above the bench 10 is driven from the shaft 66 by means of a chain 73 which passes around sprocket wheel 73*a* provided on the two shafts. At one end of the shaft 72 is provided a worm 74 which meshes with a worm wheel 75 connected to the moistening wheel 21. At the other end of the shaft 72 is provided a worm 76 which meshes with a worm wheel 77 connected to one of the draw pulleys 63, and as the draw pulleys are provided with intermeshing gears, power is supplied to all of them. A shaft 78 is supported by the frame 11 and carries a heart-shaped cam 79. A bar 80 is slidably mounted at one end of the frame and has a forked end which receives the shaft 78. This rod also is provided with a roller 81 which engages the periphery of the cam 79 and with a spring 82 keeps the roller 81 in contact with the cam at all times. The takeup reel 64 is rotatably mounted upon a shaft 83 which is received within the forked end of standards 84. The rims of the reel 64 rest upon rollers 85 carried by a shaft 86 mounted in the standard 84 and to one end of which is affixed a pulley 87. A belt 88 passes over the pulley 87 and a pulley 89 on the shaft 66. The reel 64 is frictionally driven by the rollers 85, thus insuring that the reel will take up the finished yarn as fast as it is produced. A countershaft 90 is driven from the main shaft 65 by means of a belt 91 passing over pulleys on the shaft 65 and the shaft 90. On the shaft 90 is provided a worm 92 which meshes with a worm wheel 93 carried by the shaft 78. A collar 94 co-operates with the cam 79 to act as a guide for the bar 80.

By means of the various shafts, pulleys, belts, gears and the like above described, the yarn is drawn through the various spinning heads and is then wound upon the reel 64. Between the last draw pulleys 63 and the reel 64, the yarn passes through an eye in the end of a guide arm 95 carried by the bar 80. The bar 80 is caused to reciprocate by means of the cam 69 and the spring 82 and distributes the finished yarn evenly over the length of the reel 64. Also by the means above enumerated, the roughened roller 18 which is driven from the moistening roller 21 by means of a belt 102, is caused to draw the asbestos strip 16 from the reel 13 to supply it to the moistening roller and the winding heads are rotated to wrap the binding wire about the yarn.

The motor 65*a* is furnished with current from any suitable source, not known, by a circuit including the feed wires 103 and 104 and switch blade 105 bridging the contacts 106 and 107. Means are provided for automatically stopping the motor and the machine should the core wire or strip 16 break or should either of the binding wires break. The sleeve 57 is of such diameter that when the yarn passing through it is covered with asbestos, there is sufficient friction exerted to pull the sleeve to the left until the arm 58 strikes the pin 58′. However, should there be no covering on the wire passing therethrough, the sleeve will not be so drawn over and the weight 62 will cause the contact 108 to be brought into engagement with the contact 109, thus closing a shunt including conductor 104, contacts 108 and 109, conductor 110, and electromagnet 111. Energizing electromagnet 111 pulls down the armature 112 against the action of the spring 113, thereby moving the shoulder 114 out of engagement with the end of the blade 105 which is pulled out of engagement with the contacts 106 and 107 by means of the spring 115. The circuit through the motor 65*a* is thus opened, thus causing the machine to stop.

In order to effect stopping of the machine should the second binding wire break, there is provided a circuit which may be traced through conductor 116, field winding of an electromagnet 117, conductor 118, rod 54, ball bearing 55, guide 56, the binding wire itself, the reel for the binding wire, the shaft upon which it is mounted, cross rod 50, conductor 119, and conductor 104*a*. The relay contact 120 is connected by conductor 121 with the conductor 110 and the armature 122 of the relay is connected with the conductor 104*a*. Thus the relay is normally energized and the armature 122 is held up against the action of the spring 123 out of contact with the contact 120. However, if the binding wire breaks, the circuit is opened, the relay becomes deenergized and the armature drops into contact with the contact 120, thereby closing the circuit through the electromagnet 111 whereupon the switch blade 105 is released as previously described and the machine stops. Should the first binding wire break, the asbestos strip will also quickly be broken and in a very short time there will be passing through the sleeve 57 merely one wire wrapped about another. There will not then be sufficient friction exerted to hold the contact 108 out of engagement with the contact 109 and immediately upon the engagement of these two contacts, the machine will be stopped as before described. Means are also provided for stopping the machine when the asbestos strip becomes exhausted. Such means comprises an arm 124 pivotally attached to the standards 12 but insulated therefrom and carrying at its free end a pin 124*a* which rides upon the roll of asbestos. The arm 124 is connected by a conductor 125 to conductor 110 and the standard 12 is connected by conductor 126 with the conductor 104. Thus, when the roll of asbestos becomes exhausted, the arm 124 drops down so that the pin 124*a* contacts with the standard 12. This again closes a circuit through the electromagnet 111, thereby causing the motor circuit to be opened as previously described, thereby stopping the machine. By having the bar 51 supported through the medium of insulating bushings, the establishment of a short circuit through the rods 32 is prevented.

Figs. 9 and 10 disclose the finished product, comprising a wire core enclosed in a strip of asbestos paper and a pair of oppositely-wound binding wires by means of which the asbestos strip is firmly held on the core. This yarn may be used in the manufacture of brake lining as both the warp and weft of such brake lining, or may be used in combination with bare wire. The yarn may be impregnated with waterproof heat-resisting compound and otherwise prepared for weaving, as fully described in applicant's copending application, Serial No. 267,563, filed on even date herewith. Both the metal core and the binding wires preferably are very thin and the binding wires are twisted with the core wire and the covering strip so that the yarn produced consists entirely of asbestos and wire with the wire twisted in and around the asbestos in such a manner as to strengthen the same and make the strand or yarn suitable for weaving into fabric for brake lining and the like.

By the machine described in this application, it is possible to make brake lining very quickly and of a uniform quality and size. The core and asbestos strip are positively fed to the winding head so that there is no or very little danger of breakage of either of these. After the asbestos strip has been associated with the wire core and bound thereon, the finished yarn is drawn through the machine with an even steady pull and wound up on the takeup reel, thus avoiding any unnecessary strain or pull on the yarn. By means of the roughened roller 18 and the moistening roller 21, the ribbon 16 is drawn off the roll and is positively fed to the guide bars 30. The only tension exerted on the ribbon is that necessary to draw it from the guide bars 30 to the point at which the winding wire is applied. The strip is therefore loose and substantially free from tension or subject to but very slight tension. Preferably, the ribbon is fed by these rollers at a slightly higher speed than the speed at which the core is drawn through the machine, thus providing sufficient slack ribbon that no appreciable tension is developed. As the asbestos strip is free from tension and loosely encloses the core and the binding wire is applied

under tension, the asbestos strip is twisted or rotated upon the core, thus resulting in convolutions forming at the point of application of the binding wire and extending rearwardly. The presence of these convolutions insures that the core wire will be completely covered by the asbestos strip, so that there will be no bare spots and the yarn will be of uniform and regular thickness.

I claim:

1. A method of continuously producing yarn comprising a core, sheath and binder which consists in advancing the core, drawing the sheath into enveloping relationship on said core, winding a filamentary binder under tension in spaced convolutions about said sheath and core and separately feeding the sheath to a point adjacent the point at which the sheath is brought into enveloping relationship to the core, whereby the sheath is subject to relatively slight tension at the time the binder is applied.

2. A method of continuously producing yarn comprising a core, sheath and a binder, which consists in advancing the core, drawing the sheath into enveloping relationship on said core, winding a filamentary binder under tension in spaced convolutions about said sheath and core, separately feeding the sheath to a point somewhat removed from the point at which the sheath is brought into enveloping relationship to the core and preventing twisting of the sheath at a point in advance of the last-mentioned point.

3. The method of continuously producing yarn comprising a core, sheath and binder which consists in advancing the core, separately drawing the sheath from a supply reel and bringing the sheath into enveloping relationship to the core under relatively slight tension, and winding a filamentary binder under tension in spaced convolutions about said sheath and core.

4. The method of continuously producing yarn comprising a core, sheath and binder which consists in advancing the core, separately drawing the sheath from a supply reel and bringing the sheath substantially free from tension into enveloping relationship to the core, winding a filamentary binder under tension in spaced convolutions around said sheath and core, and preventing rotation of the sheath at a point in advance of the binding point.

5. The method of producing yarn comprising a core, sheath and binder which consists in advancing the core, separately drawing the sheath from a supply reel and bringing the sheath substantially free from tension to said advancing core through a guide adapted to hold said sheath against rotation, and winding a filamentary binder under tension in spaced convolutions about said sheath and core at a point removed from said guide.

6. The method of producing yarn comprising a core, sheath and binder which consists in advancing the core, drawing the sheath onto said advancing core through a guide adapted to hold said sheath against rotation, separately feeding the sheath from a supply reel to a point in advance of said guide, and winding a filamentary binder under tension in spaced convolutions around said sheath and core at a point beyond said guide.

7. The method of producing yarn comprising a core, sheath and binder which consists in advancing said core, separately withdrawing the sheath from a supply reel and drawing the sheath through a non-rotating guide substantially free from tension into enveloping relationship to said core, and winding a filamentary binder under tension in spaced convolutions about said sheath and core at a point removed from said guide.

8. The method of producing yarn comprising a core, sheath and binder which consists in advancing the core, bringing the sheath into enveloping relationship to the core, winding a binder about said sheath and core and separately feeding said sheath at a greater rate of speed than that of the advancing core to a point relatively near the point at which the binder is applied.

9. The method of producing yarn comprising a core, sheath and binder which consists in advancing the core, bringing the sheath into enveloping relationship to the core, winding a binder about said sheath and core and separately feeding said sheath at a greater rate of speed than that of the advancing core to a point relatively near the point at which the binder is applied, and holding said sheath against twisting at the aforementioned point.

10. In an apparatus of the character described, means for advancing a core, means for separately withdrawing a sheath from a supply reel and enveloping said core in said sheath substantially free from tension, and means for winding a filamentary binder under tension in spaced convolutions about said core and sheath.

11. In an apparatus of the character described, means for advancing a core, means for separately drawing a sheath from a supply reel and enveloping said core in said sheath free from tension, means for winding a filamentary binder under tension in spaced convolutions about said core and sheath, and means for holding said sheath against rotation at a point spaced from the point at which the binder is applied.

12. In a machine of the character described, means for advancing a core, a non-rotating guide through which a sheath is drawn into enveloping relationship to said core, means for winding a filamentary binder under tension in spaced convolutions about the core and sheath, and means for separately feeding said sheath from a supply reel to a point adjacent said guide.

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13. In a machine of the character described, means for drawing a sheath from a supply reel and advancing a core, means for bringing said sheath substantially free from tension into enveloping relationship to said core, means for winding a filamentary binder under tension in spaced convolutions about said core and sheath, and means for wrapping a second filamentary binder under tension in spaced convolutions about said sheath and core in the opposite direction.

14. In a machine of the character described, means for advancing a core, means for separately drawing a sheath from a supply reel and bringing said sheath substantially free from tension into enveloping relationship to said core, means for winding a filamentary binder under tension in spaced convolutions about said core and sheath, means for wrapping a second filamentary binder under tension in spaced convolutions about said sheath and core in the opposite direction, and a non-rotating guide through which said sheath passes prior to coming into enveloping relationship to said core.

15. In a machine of the character described, means for advancing a core, a stationary guide through which a sheath is drawn into enveloping relationship to said core, and separate means for feeding said sheath from a supply reel to a point adjacent said guide at a rate of speed slightly in excess of the rate of advancement of said core.

16. A method of uniformly sheathing a continuous core which comprises winding a filamentary binder under tension in spaced convolutions about an advancing core having an asbestos paper covering strip separately drawn from a supply reel and loosely advancing therewith up to the point of application of the binding filament and holding the covering strip against rotation at a point spaced rearwardly from the binding point.

17. A method of uniformly sheathing a continuous core which comprises advancing the core with a covering strip separately drawn from a supply reel and loosely applied thereto, winding a filamentary binder under tension in spaced convolutions around said core and covering thereby causing said covering to assume convolute form on the core at the point of winding.

18. A method of applying a covering to a core which comprises advancing said core, drawing a covering strip through a folding and guiding die onto said core and winding a binding filament around said covering and core in spaced convolutions at a point spaced from said folding and guiding die and separately feeding said covering strip from a supply reel to said die.

19. The method of making an asbestos strand which comprises drawing an asbestos strip to an advancing metallic core through guiding means adapted to prevent rotation of said strip, winding a binding filament under tension in spaced convolutions around said core and covering at a point spaced from said guiding means and separately feeding said strip from a supply reel to said guiding means.

20. In a machine for applying an asbestos paper strip to a core, the combination of core advancing means, means for separately feeding said strip from a supply reel and loosely supplying the said strip to the core, means rearwardly placed for holding said strip against rotation and means for winding a binding filament under tension around the core and loosely applied covering strip in spaced convolutions.

21. In a machine for making an asbestos covered strand, the combination of means for advancing a core, positively driven means for separately feeding a continuous covering strip from a supply reel and loosely supplying said strip to said core, means adapted to prevent twisting of the loosely supplied strip and means for winding a binding filament under tension around the advancing core and loosely applied strip.

22. In a machine for applying a covering to a core the combination of core advancing means, means for separately feeding a covering strip from a supply reel and loosely applying said strip along said core, means spaced rearwardly for preventing rotation of the covering strip, a rotatable head, a spool of binder filament supported by said head coaxial therewith and guiding means carried by said head for feeding the binding filament to the core at a predetermined angle.

23. In a machine for applying a cover to a core, the combination of core advancing means, means for separately feeding a covering strip from a supply reel and loosely applying said strip along the core, a tube rotatable around said core, a head mounted on said tube, and coaxial means on said head for feeding a binding filament to said core under tension.

24. In a machine for applying a cover to a core, the combination of core advancing means, means for separately feeding a covering strip from a supply reel and loosely supplying said strip along the core, means for winding a binder around the core and covering comprising a rotatable head, a spool rotatably mounted thereon, adjustable friction means between said head and said spool and binder guiding means located outwardly on said head.

25. In a machine for making an asbestos covered strand, the combination of core advancing means, means for separately feeding a continuous asbestos paper strip from a supply reel and loosely supplying said strip to the core, said means comprising a positively driven wheel, means adapted to prevent

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twisting of said asbestos paper strip and means for winding a filamentary binder under tension around the advancing core and covering strip in spaced convolutions.

26. In a machine for applying a covering to a core, the combination of core advancing means, means for separately feeding a covering strip from a supply reel and loosely supplying said strip along said core, means rearwardly placed for preventing rotation of the covering strip, means for applying a filamentary binder under tension around said core and covering in spaced convolutions, said means comprising a rotatable head, a binder feeding mechanism mounted coaxially thereon and means outwardly mounted on said head for feeding the filamentary binder to the core at an angle.

27. In a machine for applying a covering to a core, the combination of core advancing means, means for separately feeding a covering strip from a supply reel and loosely supplying said strip along the core, means for applying a binder around the core and covering, comprising a revolvable head, a spool rotatably mounted thereon, adjustable friction means between said head and said spool and binder guiding means located outwardly on said head.

In testimony whereof, I have signed my name to this specification.

EDWARD SLADE.

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