

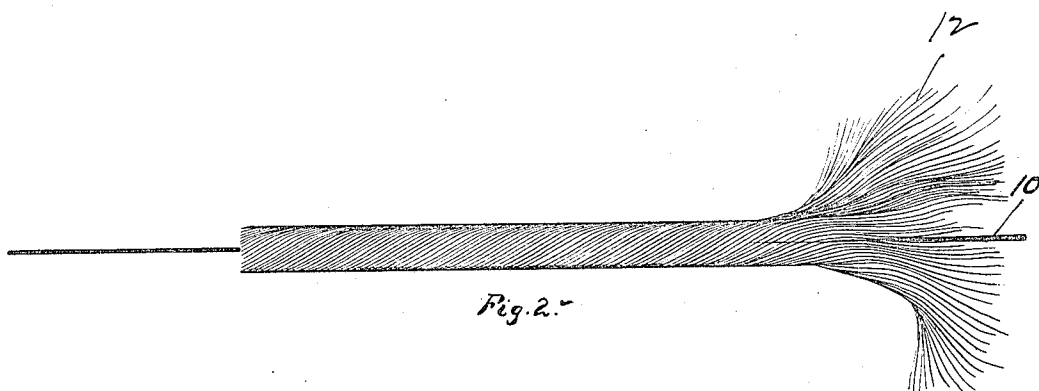
No. 831,108.

PATENTED SEPT. 18, 1906.

H. RYDER.
YARN.

APPLICATION FILED AUG. 29, 1905.

3 SHEETS—SHEET 1.



WITNESSES

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J. W. Ellis

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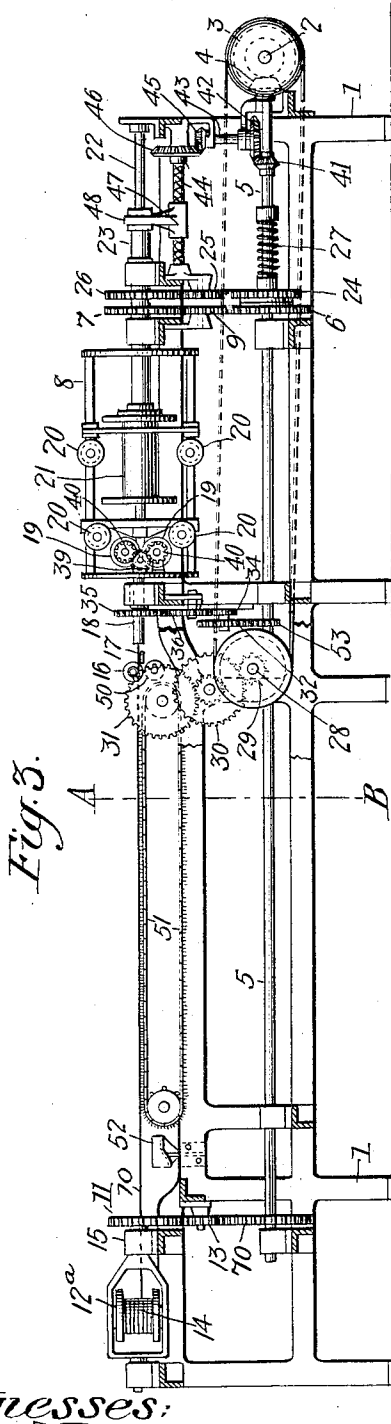
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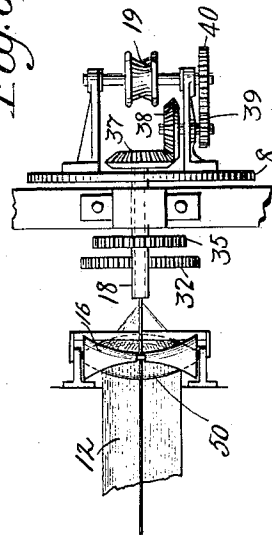
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3 SHEETS—SHEET 2.



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D. W. Edlin
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Fig. 6.



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Henry Ryder,
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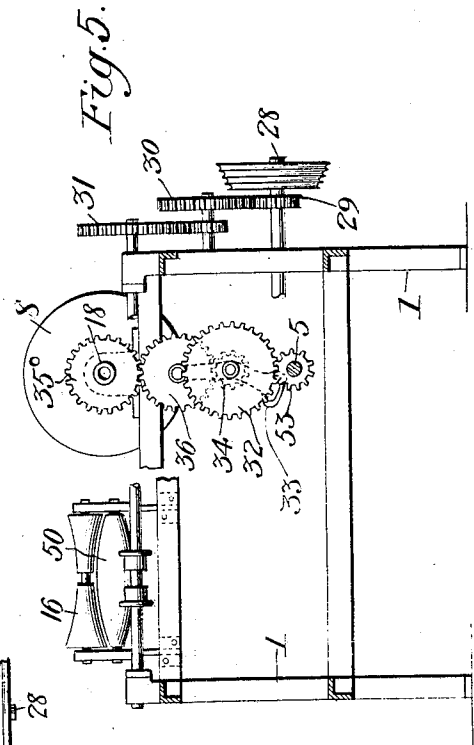
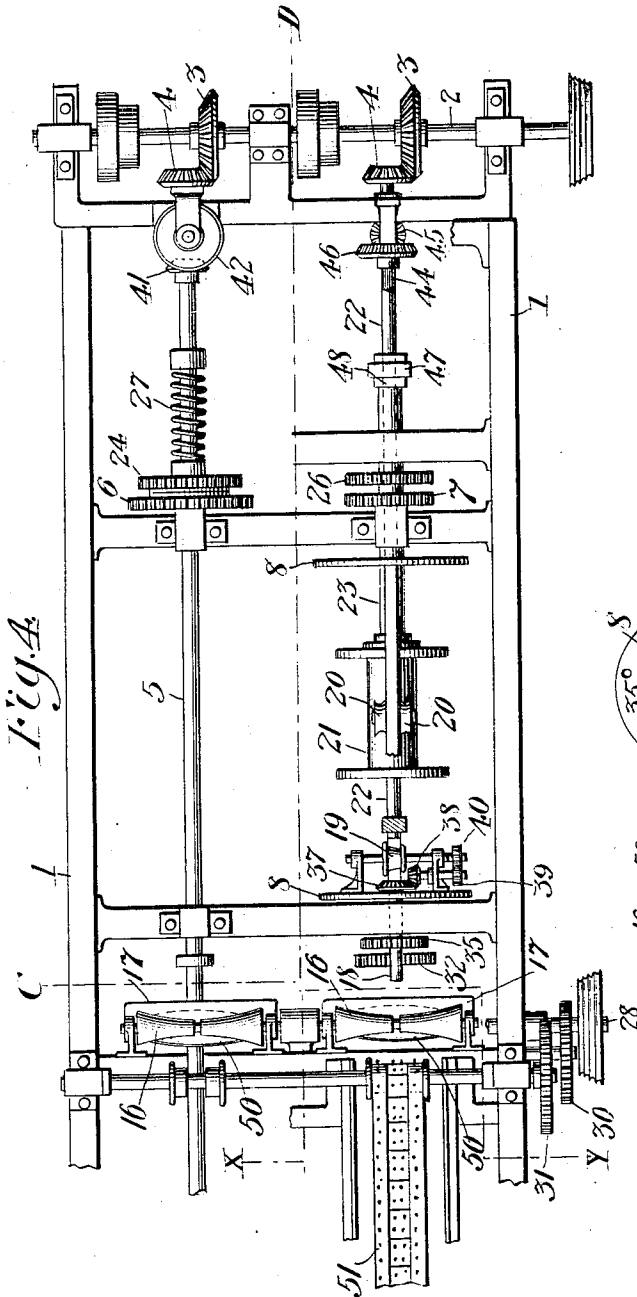
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3 SHEETS—SHEET 3.



Witnesses:
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UNITED STATES PATENT OFFICE.

HENRY RYDER, OF NEW YORK, N. Y., ASSIGNOR TO THE RYDER WIRE & FIBRE MANUFACTURING COMPANY, OF JERSEY CITY, NEW JERSEY, A CORPORATION OF NEW JERSEY.

YARN.

No. 831,108.

Specification of Letters Patent.

Patented Sept. 18, 1906.

Application filed August 29, 1905. Serial No. 276,267.

To all whom it may concern:

Be it known that I, HENRY RYDER, a citizen of the United States of America, residing at New York, in the county of New York and State of New York, have invented new and useful Improvements in Yarns, of which the following is a specification.

My invention relates to yarn, and is adaptable for use in all kinds of textile work—such, for example, as hose, belts, cordage, matting, or any other fabric which is made up of yarns.

More particularly, my yarn is composed of a core of wire and parallel fibers spun around said wire.

One of the chief objects of my invention has been to produce a yarn that would be free from a hollow center and one that would be so composed that when put under longitudinal tension every fiber would bear a strain equal to that borne by every other fiber.

Since taking out my Letters Patent No. 682,641 I have experimented much with yarns constructed out of steel and fibers and I have discovered that in order to make such yarns carry an equal even tension on each of the materials used it is necessary to spin the fibers around the wire in such a manner that when the resulting yarn is put under a longitudinal strain the settlement of the fibers will be substantially equal to the elasticity of the steel wire. In order to attain this end just described, I have discovered that the fibers must be spun so that they will lie substantially parallel to each other around the wire core or center.

The yarns composing the rope which are described in my aforesaid Letters Patent are made into a tape out of slivers rolled and flattened to such a width as when rolled or twisted on the wire there would be no spaces left between the edges of the tape. My experiments have taught me that a yarn constructed out of a tape-covered wire as described in said patent cannot be made to carry an equal tension on both the fibers and the wire, but instead the wire would carry all of the tension and the fibers none of such tension until the strain had reached or passed the elastic limit of the wire. By means of the product herein described, which I am able to produce with the spinning-machine herein described

and also described in my copending application filed on the 29th day of August, 1905, Serial No. 276,268, I have overcome and avoided the difficulties above set forth.

In the drawings, Figure 1 is a cross-section of my improved yarn. Fig. 2 is a side elevation of the same. Fig. 3 is a side elevation, partially in section, of the said machine for making the product. Fig. 4 is a top plan view of that portion of the machine which is to the right of line A B of Fig. 3. Fig. 5 is a sectional view taken on the line X Y of Fig. 4. Fig. 6 is an enlarged detail of my capstan mechanism.

The wire 10 is inclosed entirely by the spirally-spun individual fibers 12.

By means of the said spinning-machine described herein and also described in my copending application for Letters Patent I am able to take a core of wire from a reel or other suitable feeding device and spin spirally around it any desired number of straight fibers, which when thus spun will lie parallel to each other spirally around said wire core.

By means of the construction above described I am able to produce a yarn provided with a wire center or core and covered with any desired quantity of fibers which when put under longitudinal strain will bear such strain partly in the fibers and partly in the wire. Manifestly I am able by my invention to produce a yarn of any desired tensile strength, since such strength will always be proportionate to the size of wire used and the quantity of fiber covering put around it.

It is apparent that the yarn herein described may be used for forming strands, rope, belts, fabrics, or other similar products.

Without limiting myself to the use of any particular fibers or metal wire in the practice of my invention I may say that in some instances I can employ as the metal-wire core a wire of steel, aluminium, copper, iron, or the like, and I can employ as the fibers cotton, hemp, flax, manila, ramie, sisal, silk, wool, asbestos, and similar fibers.

It should be noted that the preferred machine for making the product is illustrated as composed of twin parts. Thus in Fig. 3 there is shown on the front and to the left of the line C D a plan of the mechanism con-

ected with the upper shaft, while to the back of the said line C D all of the upper shaft and its mechanism are broken away and the lower main shaft and its mechanism are shown.

The machine is mounted on the frame 1, which carries a driving-shaft 2, upon which is mounted a bevel-gear 3, which meshes with the pinion 4, carried by the main shaft 5. Upon the main shaft 5 is mounted a spur-gear 6, which drives gear 7, rigidly mounted on the flier 8 through the medium of the intermediate gear 9. Also mounted on the main shaft 5 is mounted the gear 70, which, through the medium of intermediate gear 13, drives gear 11, which is rigidly mounted on the wire-stand 12^a. The two trains of gears 6 7 9 and 70 11 13 are so proportioned and placed that the flier 8 and the wire-stand 12^a have exactly the same speed of rotation.

Upon the wire-stand 12^a is mounted the wire-spool 14, from which the wire 10 leads through the hollow spindle 15, through the gear 11, thence through a groove in the upper nipper-roll 16, over the divider 17, through the sleeve 18, where it is spun with the fiber.

The fiber is fed through the trumpet 52 to the endless belt or chain 51, which carries it to the nipper-rolls 16 and 50 below the divider 17, where it enters sleeve 18 and is then spun about the wire. The finished yarn then travels around the capstan-sheaves 19 and the guide-sheaves 20 and then is wound upon the yarn-spool 21.

The yarn-spool is supported by the shaft 22 and driven by the hollow shaft 23, which receives its motion through a train of gears 24, 25, and 26. The gear 24 is loosely mounted on the shaft 5 and is held in frictional contact with the gear 6 by means of the spiral spring 27.

The carrier 51 is driven from the driving-shaft 2 by any suitable means connecting said shaft with the shaft 28. Motion is given the carrier 51 from the shaft 28 through the train of gears 29, 30, and 31. Thus it is possible to give the carrier 51 a speed which is variable from the speed of the wire-stand 12^a and the flier 8. Mounted on the shaft 5 is a spur-pinion 53, which meshes with a gear 32, which is carried by a bearing 33, mounted in the frame 1. The bearing 33 also carries a pinion 34, which drives the gear 35, mounted on the spindle 18, through the intermediate gear 36.

Upon the inner end of the spindle 18 is rigidly mounted a bevel-gear 37, which meshes with a bevel-gear 38, mounted on a stud. Mounted on the same stud is a spur-gear 39, which drives the spur-gears 40. The spur-gears 40 are rigidly connected with the capstan-sheaves 19. Inasmuch as the yarn-spool 21 is driven simply by frictional contact, as hereinbefore described, its travel is only sufficient to take up the slack of the yarn as it is delivered from the capstan-sheaves 19

around the guide-sheaves 20. Also mounted on the main shaft 5 is a bevel-pinion 41, meshing with the bevel-gear 42 upon the shaft 43, from which motion is transmitted to the shaft 44 by means of a bevel-pinion 45 and a gear 46. The shaft 44 is a screw provided with a right and left handed thread, and mounted thereon is a nut 47, whose forked end engages the collar 48 on the shaft 23. Thus by means of the train of gearing the screw-shaft, the nut, the collar, and the loosely-mounted shaft 23 the yarn-spool 21 is given a regular longitudinal motion back and forth, and the yarn is permitted to wind evenly on the spool.

The operation of the machine is as follows: The wire-spool 14 is filled with wire. The end of the wire 10 is passed through the hollow spindle 15, over the carrier 51, through the groove in the upper nipper-roll 16, and above the divider 17. The fibers 12 are at the same time passed through the trumpet 52, over the carrier 51, between the nipper-rollers 16 and 50, and under the divider 17. Thence both are carried through the sleeve 18 around the capstan-sheaves 19 and the guide-sheaves 20 to the yarn-spool 21, to which their ends are attached. Power is applied to the driving-shaft 2, and the main shaft 5 is revolved through the train of gearing 70, 11, and 13. This revolves the wire-stand 12^a, and at the same time and with the same speed of rotation the flier 8 is driven by means of the trains of gears 6, 7, and 9. Thus it will be evident that because the wire-spool and the flier have the same speed of rotation the wire will be delivered to the yarn-spool free from any torsional twist. The fibers as they are delivered from the carrier 51 lie parallel to each other. When these parallel fibers reach the spindle 18, which is in rapid rotation with the flier 8, they are given a twist that lays them still parallel in a spiral around the untwisted wire center. It should be noted that by means of the construction described the fibers are not massed into a tape formation, but throughout are laid parallel to each other, and thus are prevented from forming a hollow center or core, and so when put under a strain every fiber bears up to the limit of its tensile strength its own share of the strain.

The speed of feed of the fiber is regulated by means of the train of gears 29, 30, and 31. While the fiber and wire are being spun together the resulting yarn is given any desired amount of tension and twist by means of the train of gears 31, 32, 33, 34, 35, and 36 and the train 37, 38, 39, and 40. The completed yarn is then passed around the capstan-sheaves 19 and the guide-sheaves 20 to the yarn-spool 21, which, as heretofore described, is given both a rotary and a longitudinal motion.

It will of course be understood that I do

not claim the machine in this application, for the reason that it is claimed in my copending application hereinbefore referred to.

5 Having thus described my invention, what I claim is—

1. A yarn, comprising a core of wire and parallel fibers spun directly on lengthwise of and spirally around said wire core.

10 2. A yarn, comprising a core of wire and parallel fibers spun directly on lengthwise of and spirally around said wire core, in such a manner that the settlement of the fibers when the yarn is put under longitudinal strain is substantially equal to the elasticity of the
15 wire core.

3. A yarn, comprising a core of wire, and fibers supplied lengthwise of and enveloping said wire and then spun collectively in parallel position about said wire core, in such a man-
20 ner that each fiber has substantially the same tension with respect to the others, and the

fibers collectively have the same tension as the wire core, when the wire is put under longitudinal strain.

4. The method of producing yarn, which 25 consists in supplying fibers to a core of wire, lengthwise of and enveloping said core of wire, and then spinning said fibers collectively in parallel position about said core of wire in such a manner that when the yarn is 30 put under longitudinal strains, the individual fibers shall have substantially the same tension with respect to each other and the fibers collectively shall have the same tension as the
35 core of wire.

In testimony whereof I have hereunto set my hand in the presence of two witnesses.

HENRY RYDER.

Witnesses:

OCTAVIO SAYER, Jr.,
JOHN P. EELLS.