

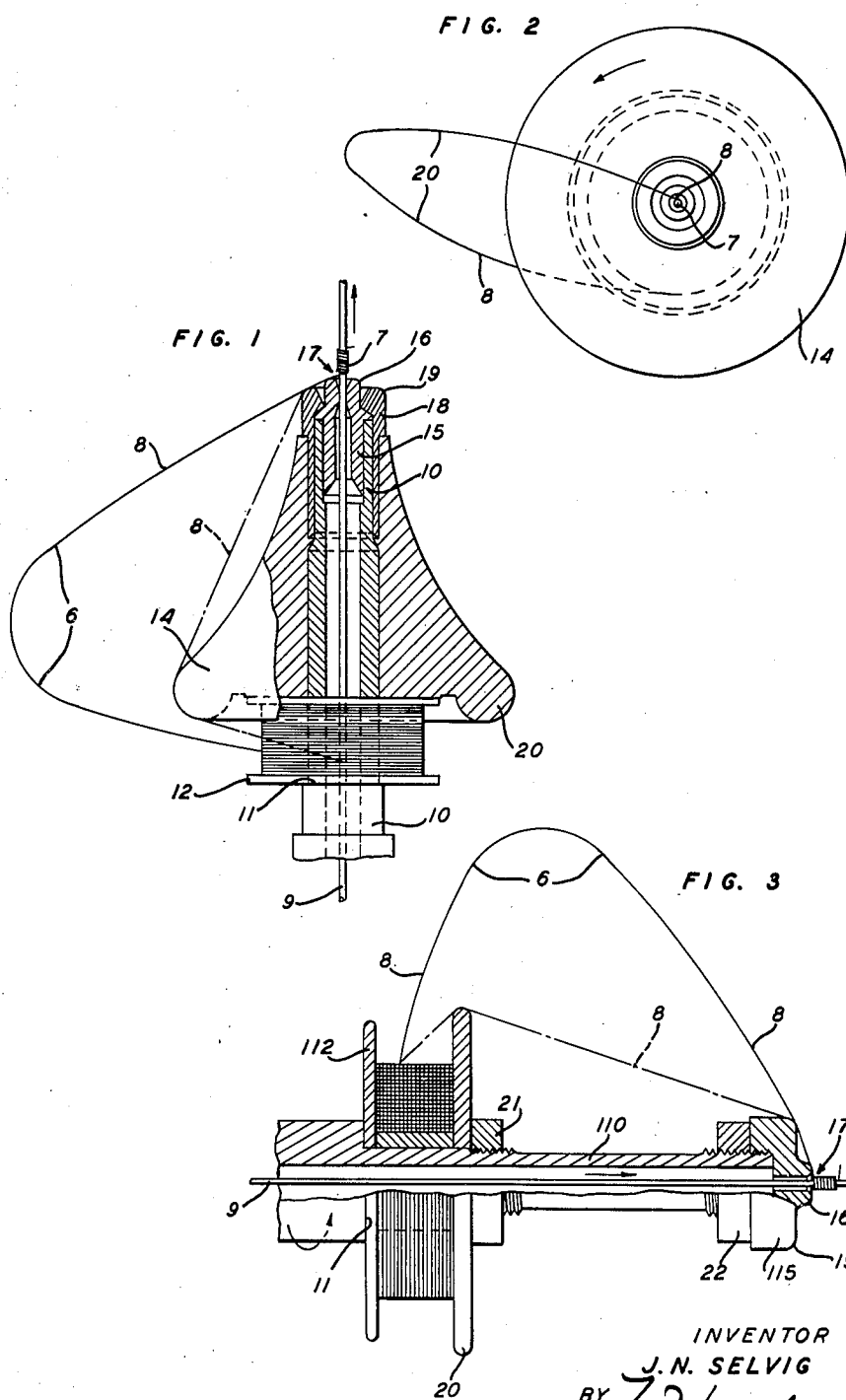
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J. N. SELVIG

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STRAND HANDLING APPARATUS

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INVENTOR
J. N. SELVIG
BY *J. J. Woodman*
ATTORNEY

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STRAND HANDLING APPARATUS

John N. Selvig, Westfield, N. J., assignor to
Western Electric Company, Incorporated, New
York, N. Y., a corporation of New York

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This invention relates to strand handling apparatus and more particularly to apparatus for serving a cover strand upon a core strand, especially a very fine wire upon a soft spun, textile core.

There is a great variety of types and forms of apparatus or devices for serving one strand upon another; and most of these are eminently satisfactory for dealing with the particular kinds of cover and core strands to which they are adapted. There has recently come into extensive use in the electrical arts, a compound strand called mandrellated wire which consists of a soft spun, relatively large core of textile material having a very fine metallic conductor wire served in a very close but not entirely closed helix thereon. In one instance in practise such a mandrellated wire has a soft spun, silk core of about 0.022 inch before serving; and the strand served on this core is a metal wire having a diameter of 0.001 inch. The wire is served on to have 600 turns per inch of core. Whatever the serving apparatus may be, to make one inch per minute, i. e. only five feet per hour of this product, it must serve on 600 turns per minute of the 0.001 inch wire, which is much finer than the average human hair. The best performance known to applicant of any apparatus of the prior art is about 4500 turns per minute, or about 37.5 feet per hour of product.

An object of the present invention is to provide a serving head, particularly for use in the manufacture of mandrellated wire, which shall be simple, rugged, and capable of serving a fine and fragile cover strand upon a core strand at high speed and with minimum danger of breakage of the cover strand.

With the above and other objects in view, the invention may be embodied in a serving head consisting solely of a hollow driven spindle through which a core strand may be advanced, means on the spindle to support coaxially with the spindle a supply reel of cover strand to be driven by the spindle, a starting guide of larger diameter than the pool and mounted on the spindle adjacent to the spool to guide the cover strand from the spool only during acceleration and deceleration of the serving head, and a winding guide mounted on the spindle adjacent to the winding point on the core and having as its only operative winding guide means an annular guide surface surrounding the core strand at the winding point thereon in the form of a quarter torus.

Other objects and features of the invention will appear from the following detailed description of

one embodiment thereof in a serving head for making mandrellated wire, taken in connection with the accompanying drawing in which the same reference numerals are applied to identical parts in the several figures and in which

Fig. 1 is a view in elevation and partly in vertical central section of a serving head constructed in accordance with the invention;

Fig. 2 is a plan view thereof, and

Fig. 3 is a view similar to Fig. 1 of a modified form.

In Figs. 1 and 2 there is shown a vertical type serving head in which the core 9 to be wound is drawn upwardly, by means not shown, axially through a hollow, vertical spindle 10 driven in rotation by means not shown. The spindle is formed at 11 with an annular shoulder to support removably a cover strand supply spool 12 coaxial with the spindle. The spindle above the shoulder and the spool are proportioned to each other so that when the spool is in position as shown there is an easy fit, without shake and yet without material frictional engagement of the spool and spindle, the spool being easily removable from the spindle for replacement when empty. A relatively heavy, concavely conoidal, combined weight and cover strand guide 14 rests on the spool. Like the spool, this fits over the part of the spindle passing through its axial bore, easily but without shake although without material frictional engagement therewith. However, because of the weight of the guide 14, there is sufficient frictional engagement of the shoulder 11 with the spool 12 and of the spool with the guide 14 so that the driven spindle drives the spool and the spool drives the guide.

Into the upper end of the guide 14 is inset an inner cover strand winding guide 15 presenting, as the uppermost limit of the whole serving head, the quarter torus surface 16 facing outwardly and upwardly, which is the winding guide proper and is positioned to lie around the core just below the winding point 17 where the cover strand 8 is served or wound on the core 9. The guide member 15 has an axial bore to pass the core 9, which bore is narrowed just below the tip to barely pass the core freely, and thus supports the core almost at the winding point.

Over the upper end of the spindle and around the upper part of the guide member 15 is mounted a guide collar 18, extending upwardly not quite to a level with the surface 16, and having on its outer upper edge a quarter torus strand guide surface 19, whose outer diameter is about two and one-half times the outer diameter of the guide

surface 16. The bottom of the conoidal member 14 is considerably wider than the head of the spool 12 on which it rests, and is formed to have a half torus guide surface 20 on its bottom periphery extending down somewhat below the level of the inner surface of the top head of the spool.

In operation, with the apparatus stationary and a core 9 threaded through the central bores of the spindle 10 and winding guide 15, the end of the cover strand 8 is unwound from the spool 12, brought tautly up over the guide surface 20, the guide surface 19, and the guide surface 16 to the winding point 17, and there secured to the core 9. The apparatus is then started and the driving means, not shown, begins to advance the core 9 upwardly and to rotate the spindle 10 in the direction indicated by the arrows in Fig. 1 at such relative speeds (in the particular case illustrated) that the core advances one inch for each 600 turns of cover strand laid on as hereinafter described. At the start, the cover strand 8 has the position shown in dotted lines in Fig. 2. As the device accelerates the centrifugal pull of the strand 8 between the surfaces 20 and 19 causes the strand 8 gradually to assume the form of the loop 6, shown in full lines, which runs ahead of the spool and unwinds from the spool until the air resistance to the motion of the loop balances the tendency of the loop to run ahead. The length of the loop varies with the diameter of the coiled body of wire on the spool, diminishing as this diminishes.

Since the core does not rotate and the loop is carried around the core, the cover strand is wound on the core, one turn for each revolution of the loop. The loop 6, therefore, runs ahead of the spool 12 at each rotation so far as needed to take off the spool the same length of cover strand that is being wound on the core. Thus, in the particular instance, already mentioned, where 0.001 inch wire is being wound on an 0.022 inch textile core, if the spool be driven at 10,000 R. P. M., the loop will run at an average rate of about 10,275 R. P. M. Hence, if 600 turns per inch of cover strand on the core be desired, the core must be advanced at the rate of 1.0275 inches per 600 revolutions of the spool because for each 600 revolutions of the spool the loop makes about 616.5 revolutions and lays the same number of turns on the core, or at about 17.125 inches per minute if the spool be driven at 10,000 R. P. M. It is found, in the particular case under discussion, that the device may be run at 10,000 R. P. M., or even faster. Hence, by means of the serving head of the invention, it is possible to produce some 85.6 feet per hour as compared with 37.5 feet per hour of the prior art.

In Figs. 1 and 2, the invention is illustrated as embodied in a vertical serving head. Fig. 3 illustrates a possible horizontal type. The horizontal, hollow spindle 110 has the stop shoulder 11 to support the spool 112 which has the guide surface 20 formed on its periphery and is held against the shoulder 11 by a nut 21. The surfaces 16 and 19 are here formed on a single member 115 threaded on the end of the spindle and held in place by a lock nut 22. So long as the wire 8 is fine enough to make the mass of the loop 6 negligible, the horizontal form may be as efficient as the vertical form.

In operation, the lower (Figs. 1 and 2) or left (Fig. 3) end of the loop 6 travels to and fro across the face of the supply of wire on the spool. This may tend to vary slightly the approach of the wire to the winding point. Hence, the

guide surface 19 is so located that the wire coming to the winding point 17 must always bend a trifle over the surface 19 and therefore must come in an unvarying manner to the guide surface 16 and thence to the winding point.

The embodiments of the invention above described are illustrative and may be variously modified and departed from without departing from the spirit and scope of the invention as described and particularly pointed out in the appended claims.

What is claimed is:

1. A high speed serving head consisting of a hollow spindle to be driven at high speed and to have a core to be served drawn axially there-through, means to engage and support coaxially on the spindle a wound supply of cover strand to be served on the core, an annular coaxial starting and stopping strand guide surface adjacent to the supply engaging means, a relatively large annular coaxial strand guide surface near the winding point of the cover strand on the core strand, and a relatively small annular coaxial strand guide surface immediately adjacent to the winding point.

2. A high speed serving head consisting of a hollow spindle to be driven at high speed and to have a core to be served drawn axially there-through, a shoulder on the spindle to engage a spool containing a wound supply of cover strand to be served on the core and supported coaxially on the spindle, a member removably held on the spindle to force the spool into driving engagement with the shoulder, an annular coaxial starting and stopping strand guide surface formed on the member and adjacent to the spool, a relatively large annular coaxial strand guide surface near the winding point of the cover strand on the core strand, and a relatively small annular coaxial strand guide surface immediately adjacent to the winding point.

3. A high speed serving head consisting of a hollow spindle to be driven at high speed and to have a core to be served drawn axially there-through, a spool positioned coaxially on the spindle to contain a wound supply of cover strand to be served on the core, a shoulder on the spindle to engage the spool, a member removably held on the spindle to force the spool into driving engagement with the shoulder, an annular coaxial starting and stopping strand guide surface formed on the member and adjacent to the spool, a relatively large annular coaxial strand guide surface near the winding point of the cover strand on the core strand, and a relatively small annular coaxial strand guide surface immediately adjacent to the winding point.

4. A high speed serving head consisting of a hollow spindle to be driven at high speed and to have a core to be served drawn axially there-through, a spool positioned coaxially on the spindle to contain a wound supply of cover strand to be served on the core, a shoulder on the spindle to engage the spool, a member removably held on the spindle to force the spool into driving engagement with the shoulder, an annular coaxial starting and stopping strand guide surface formed on the spool, a relatively large annular coaxial strand guide surface near the winding point of the cover strand on the core strand, and a relatively small annular coaxial strand guide surface immediately adjacent to the winding point.

JOHN N. SELVIG.