A. BEUTLER.

COVERING MACHINE.

APPLICATION FILED JULY 20, 1906.

1,073,085.

Patented Sept. 16, 1913

2 SHEETS—SHEET 1.

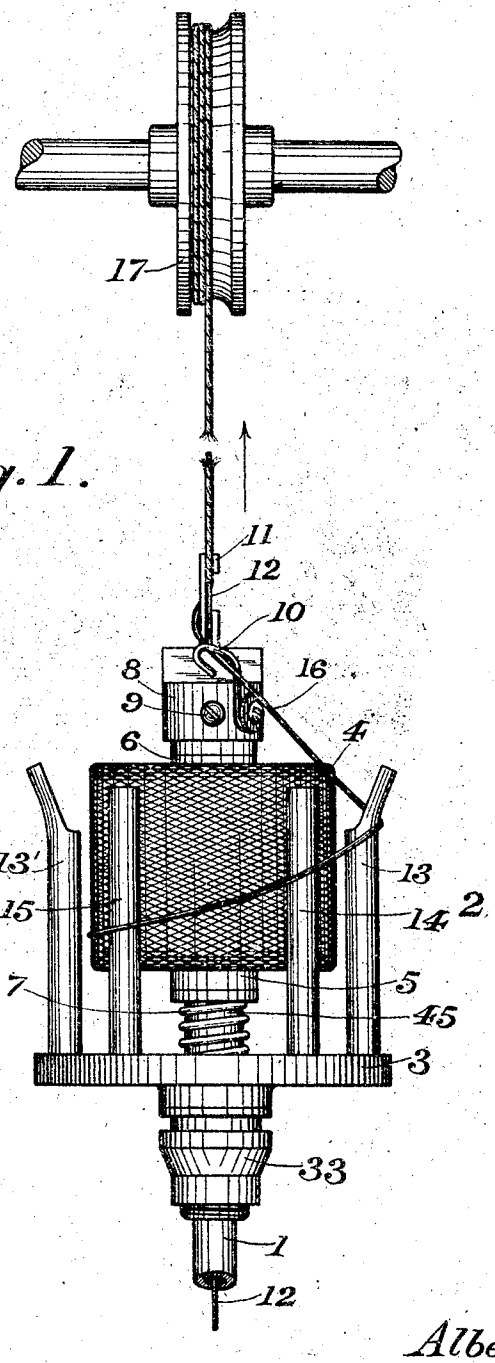


Fig. 1.

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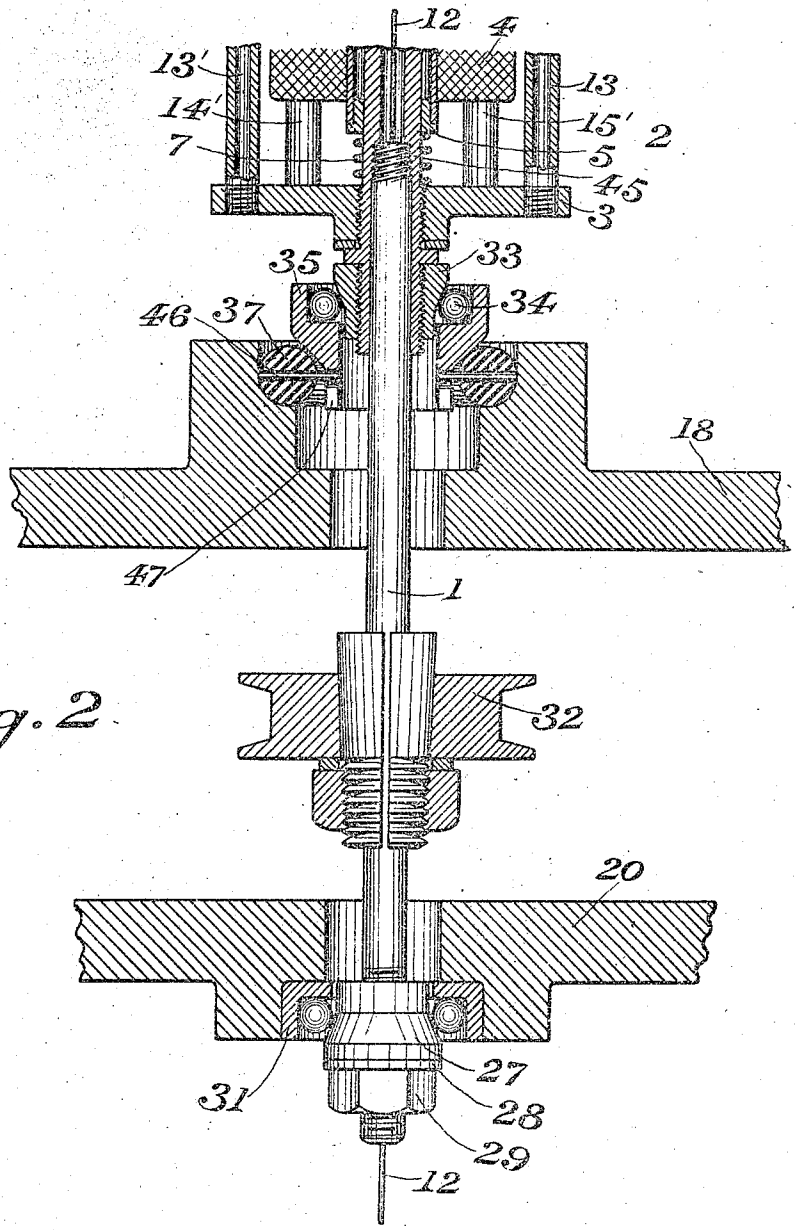


Fig. 2.

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UNITED STATES PATENT OFFICE.

ALBERT BEUTLER, OF CHICAGO, ILLINOIS, ASSIGNOR TO BELDEN MANUFACTURING COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

COVERING-MACHINE.

1,073,085. Specification of Letters Patent. Patented Sept. 16, 1913.

Application filed July 20, 1906. Serial No. 326,996.

To all whom it may concern:

Be it known that I, ALBERT BEUTLER, a citizen of the United States of America, and resident of Chicago, county of Cook, and State of Illinois, have invented a new and useful Improvement in Covering-Machines, of which the following is a specification.

My invention relates to an improvement in covering machines for magnet wire, and has for its object the production of a machine which will not only greatly increase the output for each unit, but effect a marked economy in the amount of silk, cotton or other covering material required for a given length of wire. In the best machines existing at the time of my invention, the speed of revolution of the head, or part carrying the covering material, has been limited by practical conditions, to not over 4500 revolutions per minute or thereabout. By my improved device I am enabled to obtain a speed as high as, or higher than, 13,000 revolutions per minute, and at the same time secure a thinner and more closely wrapped covering of a very uniform character.

In the accompanying drawings, which illustrate my invention, Figure 1 is a view of a complete covering head constructed in accordance with my invention, the bearings and driving mechanism being omitted from this view; and Fig. 2 is a view showing particularly the bearings and driving means, as employed by me with the head shown in Fig. 1.

In these drawings the numeral 1 refers to a shaft or spindle upon which the covering head 2 is mounted. The head which as a whole is referred to by the numeral 2 is composed of a horizontal plate 3 of metal sufficiently strong to resist the breaking stress due to centrifugal action when the spindle is revolving at the high rate of speed contemplated in carrying out my invention. This plate is rigidly secured to a hollow center stud 45 by a tight screw-thread connection, the center stud 45 forming a bearing upon which a bobbin 4 of insulating material such as silk or cotton may revolve. These bobbins of insulating material are well known in the art and usually are constructed by winding the insulating material on a tube of pasteboard in such manner that the mass of thread binds itself together, thus making the use of heads for the spool unnecessary. This form of bobbin is particularly advantageous in carrying out my invention on account of the fact that there is no superfluous weight to the bobbin as would be the case where regular spools with metal heads are used. This is not essential to my invention, however, as any of the well known types of bobbin may be used, providing of course that they are constructed of sufficient strength and are sufficiently well balanced to stand the high speed to which my invention subjects them. In applying one of these bobbins to the head 2, steel thimbles 5 and 6 are inserted into the bobbin to assure a proper wearing surface between the bobbin and the center stud 45. A friction spring 7 serves to press the bobbin upwardly against a block 8 which is put on the upper end of the center stud 45. The block 8 is secured in place on the upper portion of the center stud by one or more set screws as 9, the block 8 being pressed down a sufficient distance against the force of the spring 7 to assure just about the proper amount of friction to prevent the bobbin 4 from turning too freely upon the center stud. It is evident that a certain amount of rotative movement must be allowed for between the center stud and the bobbin in order that the insulating material may be slowly wound off from the latter. The block 8 carries a wire eyelet 10 and a guide 11, these two elements being for the purpose of guiding the insulating material onto the surface of the wire 12 as it goes up through the hollow center stud. Arranged near the periphery of the plate 3 are two posts 13 and 13', these being tubular throughout their upper portions, as indicated in Fig. 2. These posts are diametrically opposite each other. Secured in similar manner to the plate 3 and spaced at an equal distance from the center stud are the posts 14 14' 15 15', the posts in each pair being diametrically opposite each other and the arrangement being such that all six posts are equally spaced with respect to the circumference of the plate 3. The posts 13 and 13' are each provided with an outwardly bent portion near their upper extremities, while the remaining posts are straight and slightly shorter, these being the only differences between them.

The thread 16 of insulating material of which the bobbin 4 is formed is led in wind-

ing off the bobbin, first around the post 15, then around the post 14 and then around the longer curved post 13, after which it extends through the eyelet 10 and around the guide 11, at which point it is wrapped onto the slowly moving wire 12 which is being covered. The silk strand 16 is prevented from pulling off of the upper portion of the post 13 by the outward bend in the upper portion of that post.

Above the guide 11 is a conical take-up wheel 17 around which the covered wire is passed several times, after which it is led to the reel on which it is wound for storage. The take-up wheel 17 revolves slowly, being so geared that its speed of rotation will be a constant function of the rotation of the shaft 1, and therefore of the head 2, thereby bringing about a certain fixed relation between the speed of the covering head and that of the take-up wheel. This relation is such as to make the longitudinal movement of the wire 12 just sufficient to secure an even laying on of the insulation, brought about by the rotative movement of the shaft 1 and head 2 with respect to the wire 12.

Referring now to the method of supporting and driving the shaft 1 which carries the head 2; 18 and 20 are stationary bars or rails forming portions of the frame of the complete insulating machine, the two bars being rigidly supported with respect to each other. These bars are preferably of cast iron, and of considerable cross section so as to secure great rigidity and at the same time afford ample facilities for taking away whatever heat may be generated in the bearings. The center stud 45 is screw threaded on that end projecting below the plate 3, for the reception of a hardened cone 33, forming one member of a ball bearing journal. This cone 33 is adapted to move upon a row of balls 34 rolling in a cup 35. The cup 35 is mounted loosely and flexibly in the rail 18, in the following manner: A chamber is formed in the rail 18 of sufficient area and depth to hold snugly the ring 37 of soft rubber or other resilient material; two pins 46 are driven radially into this resilient ring 37 and diametrically opposite, although the exact location or position is not an essential element; two slots, or a plurality of slots equal to the number of pins, and corresponding angularly with the locations of the pins, are cut into the downwardly extending flange of the cup 35, the side of such a slot being shown at 47; the cup 35 now is dropped inside the resilient ring with the slots of the cone flange receiving the pins of the resilient ring, the cone being supported by the engagement of the pins with the limiting surfaces of the slots or by the engagement of the outer conical surface of the cup 35 with the surface of the resilient ring itself, or both. The object of these transverse pins 46 is to interfere with the spinning of the cup element within the resilient ring whereby undue heat would be produced in a very short time; movement of the resilient ring upon the walls of the chamber in the rail 18 does not occur because of the snug fit and the large surface in contact. At its lower end, the shaft 1 is screw-threaded and carries a cone 27 with feather washer 28 and jam nuts 29, being the adjustable element of a ball-bearing journal whose remaining element 31 is rigidly fixed in the rail 20. The two cones of the two ball-bearing journals are opposed to each other and the adjustable feature of the lower cone provides for the adjustment of both journals, as is usual in journals of this type. At the upper journal, the resilient ring 37 serves to maintain the approximate position of the cup 35, but the ring 37 is elastic to such a degree as to allow considerable side motion of the cup 35 and therefore of the upper portion of the shaft 1. The shaft 1 is hollow throughout its length to permit the wire 12 which is to be insulated to pass up through it to the guide 11.

By the construction shown and described, the entire shaft 1 and the covering head which it carries is capable of considerable lateral motion, particularly at the upper end where lack of balance of parts is likely to be most noticeable.

The shaft 1 may be given a rotary motion by the pulley 32, rigidly fixed to the shaft 1 between the two journals, and adapted to receive a belt.

Under the extremely high speed of rotation under which I prefer to operate this machine, the spindle 1 and its head 2 is allowed to find its own natural center of rotation, on account of the flexibility provided in the bearing at the upper journal of the shaft 1. Under this condition a speed of rotation several times that possible without this flexible mounting may be attained without undue wear or excessive heating at the journals. By making the posts 13 14 15 13′ 14′ 15′ hollow in their upper portions their mass is considerably reduced without greatly impairing their strength and these posts are thus enabled to withstand the great centrifugal force to which they are subjected, posts of other designs being often bent at right angles to their normal positions by this force.

I refer to my prior Patent 908,539, patented January 5, 1909, entitled Covering machine for magnet wire, in which is disclosed a device in some respect similar to the one herein described, the device of this application being a simplification and improvement of the earlier type as developed by continued use of the original and modified devices in service.

Having now described my invention, what

I claim as new and desire to secure by Letters Patent, is:

1. In a covering machine, the combination the hollow shaft; a covering head mounted on said shaft; a rigidly mounted ball-bearing journal having one of its elements rigidly attached to the lower end of said shaft; a second ball-bearing journal for said shaft, a resilient ring flexibly supporting said second ball-bearing journal from said rigid frame; and means for preventing the ball race of said second ball-bearing journal from revolving within said resilient ring, substantially as described.

2. In a covering machine, the combination of a hollow shaft; a covering head mounted on said shaft; a rigidly mounted journal having one of its elements rigidly attached to the lower end of said shaft; a second journal for said shaft mounted for lateral movement in a rigid frame; a resilient ring supporting the non-rotating member of said second journal from said rigid frame; and means for preventing said non-rotating member of said journal from turning in said frame, substantially as described.

Signed by me at Chicago, county of Cook and State of Illinois in the presence of two witnesses.

ALBERT BEUTLER.

Witnesses:
DAVID S. HULFISH,
EVA A. GARLOCK.