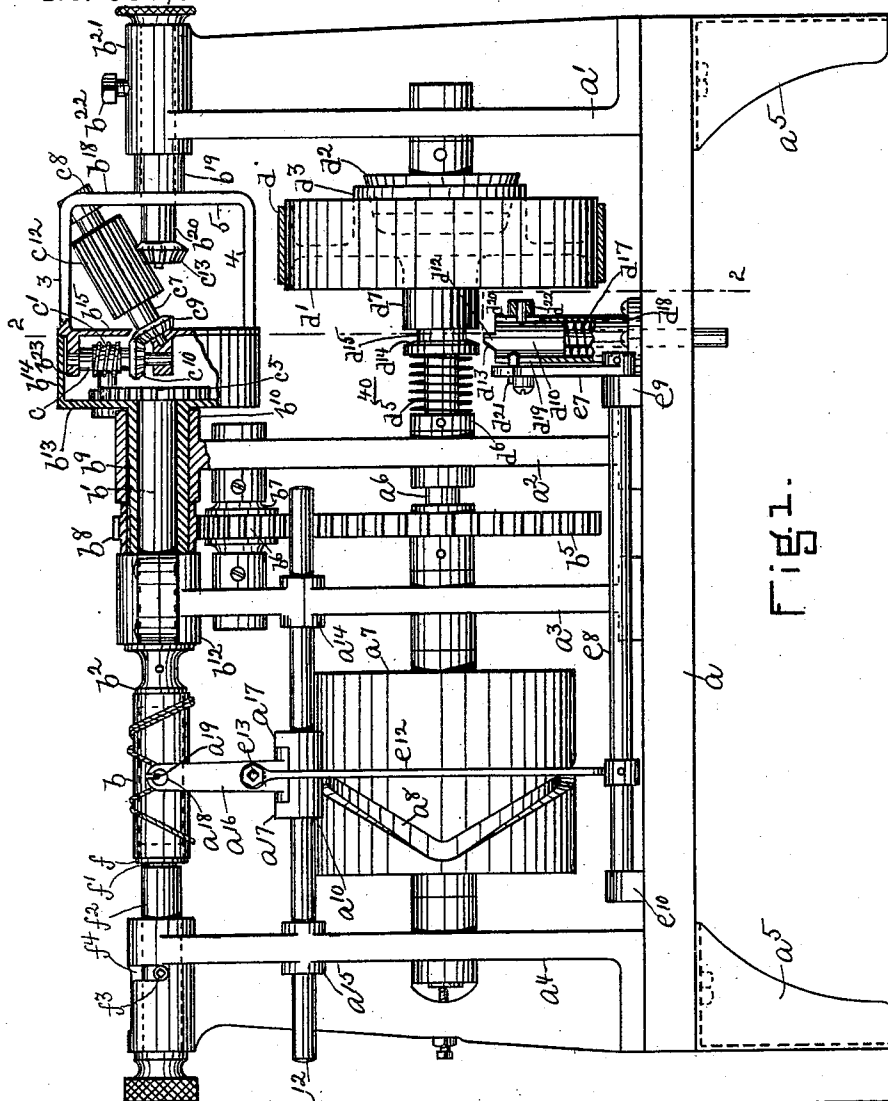
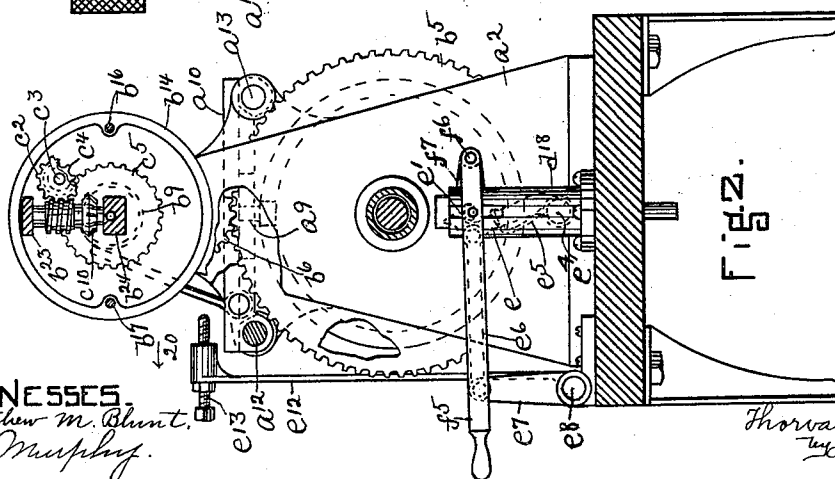


T. HANSEN.
MACHINE FOR WINDING THREAD.

Patented Dec. 10, 1895.



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Matthew M. Blunt.
J. Murphy.

Thorvald Hansen
by Jas. H. Churchill
ATT'Y

UNITED STATES PATENT OFFICE.

THORVALD HANSEN, OF SOMERVILLE, ASSIGNOR OF ONE-HALF TO JOSEPH F. MERRILL, OF BOSTON, MASSACHUSETTS.

MACHINE FOR WINDING THREAD.

SPECIFICATION forming part of Letters Patent No. 550,966, dated December 10, 1895.

Application filed December 15, 1894. Serial No. 531,879. (No model.)

To all whom it may concern:

Be it known that I, THORVALD HANSEN, residing in Somerville, county of Middlesex, and State of Massachusetts, have invented an Improvement in Machines for Winding Thread, of which the following description, in connection with the accompanying drawings, is a specification, like letters and numerals on the drawings representing like parts.

This invention relates to an apparatus or machine for winding thread, yarn, or other like fibrous cord upon a cop-tube or other holder, and has for its object to provide a simple, cheap, and efficient machine for the purpose specified.

In accordance with this invention the cop-tube or holder is secured to a shaft to rotate therewith, and the said shaft is positively connected by a system of gears with a shaft having a cam for reciprocating a thread-guide, which co-operates with the said cop-tube or holder to lay the thread thereon in such manner as to produce a ball or spool of thread having substantially square ends, the said gears being so graduated as to produce the desired rotation of the cop-shaft and the driving-shaft as will produce the result desired. These and other features of this invention will be pointed out in the claims at the end of this specification.

Figure 1 is a front elevation, with parts broken away, of a machine embodying this invention; and Fig. 2, a vertical transverse section, with parts broken away, of the machine shown in Fig. 1, the section being taken on the line 2 2, looking toward the left.

The operating parts of the apparatus are supported by a suitable framework, which may be of the construction herein shown, it consisting of a platform or table *a* and up-rights or standards *a'* *a''* *a'''* *a''''*, erected upon and secured to said table, the latter being represented as mounted upon legs *a⁵*. The up-rights *a'* *a''* *a'''* *a''''* support in suitable bearings a shaft *a⁶*, having fast on it a hub *a⁷*, provided with a cam-groove *a⁸*, into which extends a pin or stud *a⁹*, (see dotted lines, Fig. 2,) depending from a plate *a¹⁰*, secured to two rods *a¹²* *a¹³*, longitudinally movable in suitable bearings *a¹⁴* *a¹⁵* in the up-rights *a³* *a⁴*.

The plate *a¹⁰* constitutes a carrier for the thread-guide of the apparatus, the said guide in the present instance being shown as an arm or lever *a¹⁶*, pivoted at its lower end in suitable lugs or ears *a¹⁷* on the plate or carrier *a¹⁰* and provided near its opposite end with an eye *a¹⁸*, through which the thread or other cord *a¹⁹* is passed to the cop-tube or other holder *b* to be wound thereon, as will be described. The cop-tube or holder *b* is shown in the present instance as a cylindrical tube, and one end is slipped over the end of a shaft *b'* and is fitted thereon sufficiently tight to cause the said cop-tube to rotate with the said shaft, which latter may be herein- after referred to as the "cop-shaft."

In the present instance the end of the shaft *b'* is provided with an annular collar or flange *b²*, against which bears the end of the cop-tube *b*. The thread-guide *a¹⁶* is reciprocated by the cam-hub *a⁷* to lay the thread *a¹⁹* on the rotating cop-tube *b*; and it is the object of this invention to provide a simple and efficient intermediate positive connection between the cop-shaft *b'* and the cam-shaft *a⁶*, which positively gears the two shafts together in such manner as will produce a sufficient difference in the rotation of the cop-shaft and the cam-shaft as will effect the winding of the thread into a ball or cop with substantially square ends.

The intermediate positive connection referred to and herein shown is made as follows: A gear *b⁵* on the cam-shaft meshes with an intermediate gear or pinion *b⁶* on a shaft *b⁷*, having bearings in the up-rights *a²* *a³*, and the said gear or pinion meshes with a gear *b⁸*, rendered fast in any suitable manner on a sleeve *b⁹*, having bearings in suitable boxes *b¹⁰* *b¹¹* on the upper end of the up-rights *a²* *a³*, and through which sleeve the cop-shaft *b'* is extended. The sleeve *b⁹*, at its end remote from the cop-tube or holder *b*, is provided with a substantially large drum or cylinder, comprising a disk or plate *b¹³*, secured to or forming part of the said sleeve and forming one side or end of the said drum or cylinder, an annular rim or flange *b¹⁴*, extended from said disk and forming the periphery of the said drum or cylinder, and a second disk

or plate b^{15} , detachably secured to the annular rim or flange b^{14} and forming the other side or end of the said cylinder or drum.

The disk or plate b^{15} may be secured to the rim or flange b^{14} by screws $b^{16} b^{17}$. (Represented in section, Fig. 2.) The disk or plate b^{15} has secured to or forming part of it a yoke or U-shaped piece or bar b^{18} , comprising two horizontal parts or arms 3 4 and a connecting vertical part or arm 5, provided with a boss or hub b^{19} , loosely supported on a spindle or rod b^{20} , extended through a bearing-box b^{21} , carried by the upright a' , and secured therein against movement by a set-screw b^{22} , for a purpose as will be described.

The disk or plate b^{15} is provided, as herein shown, with two projections, arms, or lugs $b^{23} b^{24}$, extended into the drum or cylinder and forming bearings for a worm-shaft c , having thereon a worm c' , which engages a worm-gear c^2 (see Fig. 2) on the end of a short shaft c^3 , supported in suitable bearings within the cylinder or drum and having on its opposite end a pinion c^4 in mesh with a gear c^5 , fast on the cop-shaft b' within the said drum.

The disk or plate b^{15} is provided with a substantially central opening, through which projects one end of an inclined shaft c^7 , having its opposite end supported in a bearing c^8 , carried by the yoke or U-shaped bar b^{18} . The shaft c^7 has fast on it a bevel-pinion c^9 , which meshes with a bevel-pinion c^{10} , fast on the worm-shaft c , and the shaft c^7 also has fast on it a substantially long gear or toothed hub c^{12} , which meshes with a bevel-pinion c^{13} , fast on the stationary spindle b^{20} , the bevel-pinion c^{13} being detachable from the spindle b^{20} , for a purpose as will be described.

From the above description it will be seen that the gear b^5 drives the pinion b^6 , which drives the gear b^8 , the sleeve b^9 , and the drum secured thereto, and the drum in its rotation carries the yoke b^{18} with it, thereby causing the inclined gear c^{12} to revolve about the fixed gear or pinion c^{13} , the gear c^{12} in its revolution rotating its shaft c^7 , which by means of the bevel gears or pinions $c^9 c^{10}$ produces rotation of the worm-shaft c . The worm-shaft c rotates the shaft c^3 through the worm c' and gear c^2 , and the rotation of the shaft c^3 produces rotation of the cop-shaft b' through the pinion c^4 and gear c^5 . The cam-shaft a^6 may be driven in any suitable or desired manner, and in the present instance the said shaft is represented as driven by a belt d , passed about a pulley d' , normally loose on the shaft a^6 , but adapted to be rendered fast thereon by means of a clutch mechanism, which may be of any suitable or desired construction, but which in the present instance is shown as composed of two parts or members $d^2 d^3$, the part d^2 being fast on the shaft a^6 and the part d^3 being fast to the pulley d' and adapted to fit over and make frictional contact with the part d^2 , as represented in Fig. 1.

The loose pulley d' is adapted to be moved longitudinally on the shaft a^6 in one direction

to engage the clutch part or member d^3 with the part or member d^2 by means of a spring d^5 , encircling the shaft between a fixed collar d^6 and the end of the hub d^7 of the said pulley. The pulley d' is adapted to be moved in the opposite direction on the shaft a^6 by mechanism which is automatically operated by the thread-guide a^{16} .

The mechanism referred to and as herein shown comprises a spindle or rod d^{10} , provided with a nose or projection d^{12} , having an inclined side d^{13} , which is adapted to engage the inclined wall d^{14} of an annular groove d^{15} in the pulley-hub d^7 , the lower end or portion of the said spindle being encircled by a spiral spring d^{17} , located within a tube or hollow casing d^{18} , in which the said spindle reciprocates and through which and the table a the lower end of the said spindle extends. The tube or casing d^{18} is provided with diametrical slots $d^{19} d^{20}$, through which extend pins $d^{21} d^{22}$, attached to the spindle d^{10} , and by which the said spindle is held from rotating.

In order that the spindle d^{10} may remain inoperative until the cop or ball has attained the desired or required diameter, a locking device is provided, which may be made as herein shown, it consisting of a lever e , provided at its upper end with a latch or finger e' , (see Fig. 2,) which in the normal or forward position of the lever e hooks over or engages the pin or projection d^{21} , extended from the spindle d^{10} . The lever e is pivoted at its lower end, as at e^4 , (see dotted lines, Fig. 2,) to the outside of the tube or hollow casing d^{18} and is normally thrown forward by a spring e^5 . The lever e , as herein shown, is joined by a link e^6 (see dotted lines, Fig. 2) to a crank e^7 on a rock-shaft e^8 , having bearings in suitable lugs or uprights $e^9 e^{10}$, erected from the base-plate or table a , the said rock-shaft having fast to it a vertical rod or arm e^{12} , preferably provided at its upper end with an adjustable bolt or set-screw e^{13} , which is adapted to be struck by the thread-guide a^{16} as the latter is forced backward by the increasing size of the ball or cop.

The thread-guide a^{16} , when moved backward in the direction indicated by arrow 20, Fig. 2, by the increasing size or diameter of the ball, forces the upright arm e^{12} backward and rocks the shaft e^8 , so as to withdraw the finger or latch e' on the lever e from engagement with the stud or pin d^{21} , thereby leaving the spindle or rod d^{10} free to be forced upward by its spring d^{17} into the annular groove d^{15} in the hub of the pulley d' . As the spindle d^{10} is moved upward, as described, the inclined face d^{13} of its nose or projection d^{12} strikes the inclined wall d^{14} of the groove d^{15} and moves the hub d^7 and its pulley d' on the shaft a^6 in the direction indicated by arrow 40 against the action of the spring d^5 , which movement disengages the part or member d^3 of the clutch from the part or member d^2 , fast on the shaft a^6 , thereby stopping rotation of the shaft a^6 , the cop-shaft b' , and the intermediate gearing.

The cop-tube b has one end fitted over the end of the shaft b' and is held at its other end by means of an enlargement f on a rod f' , extended loosely into a tubular socket in a bearing-rod f^2 , the rod f' revolving with the cop-shaft b' and the tube b . The bearing-rod f^2 is carried by the upright a^4 , and the said rod is longitudinally movable in the said upright to effect the disengagement of the enlargement or head f from the cop-tube b when it is desired to remove the said tube from the machine. The bearing-rod f^2 may be fastened in its forward position (represented in Fig. 1) against longitudinal movement in the upright a^4 by means of a stud or pin f^3 , working in a bayonet-slot f^4 in the said upright.

As represented in Fig. 1, the apparatus is in operative condition and the thread or cord a^{10} is being wound upon the cop-tube b , the rotation of the cop-shaft b' and the cop-tube b being effected by means of the gearing above described. When the spindle or rod d^{10} is moved upward, so as to move the pulley on the cam-shaft a^6 to stop the rotation of the cop-shaft b' , as above described, the nose or projection d^{12} on the spindle d^{10} remains in engagement with the groove on the hub of the pulley d' ; but when it is desired to again start the machine in operation the spindle d^{10} may be lowered, so as to withdraw its nose or projection d^{12} from the groove of the hub d' by means of a hand-lever f^5 , pivoted, as at f^6 , to a lug or projection f^7 on the tube d^{18} and connected to the rod or spindle d^{10} by the pin or projection d^{22} , which extends somewhat loosely into a suitable hole in the lever f^5 .

As above described, the intermediate gearing, which positively connects the cop-shaft b' with the cam-shaft a^6 , which latter in this case is the driving-shaft, is so graduated that the rotation of the cop-shaft b' and the reciprocation of the thread-guide a^{16} are timed with relation to each other, so as to effect the winding of the thread upon the cop-tube in such manner as will form a ball or cop having substantially square ends, and the machine herein shown is capable of winding a thread of a particular size or diameter into a ball or cop having substantially square ends.

If it is desired to wind a thread of a different diameter than that herein shown, the bevel-gear c^{13} is detached from its rod b^{20} and a like bevel-gear of a different size or diameter is substituted, and if the diameter of the substituted bevel-gear is larger than that herein shown the rod b^{20} is moved longitudinally in its bearing b^{21} by first releasing the set-screw b^{22} , and after the gear of larger diameter has been secured to the rod b^{20} the said rod is moved so as to engage the bevel-gear of larger diameter with the gear c^{12} —that is, the larger bevel-gear would engage with the gear c^{12} nearer the member 5 of the yoke b^{18} —and if a

smaller bevel-gear than that herein shown is required this smaller bevel-gear would be engaged with the forward end of the gear c^{12} .

I have herein shown the gear c^{12} as movable bodily about a bevel-gear c^{13} ; but I do not desire to limit my invention to the particular form of gear shown.

I claim—

1. In a thread winding machine, the combination of the following instrumentalities:—a cam shaft, a reciprocating thread guide operated therefrom, a cop shaft, a rotatable sleeve through which the cop shaft is loosely extended to revolve separately therefrom, gears connecting the said sleeve and cam shaft, mechanism intermediate of said sleeve and cop shaft and actuated by the rotation of the said sleeve to produce rotation of the cop shaft, for the purpose specified.

2. In a thread winding machine, the combination of the following instrumentalities, viz:—a cam shaft, a reciprocating thread guide operated therefrom, a cop shaft, a rotatable sleeve geared to the cam shaft and through which the cop shaft is extended, a drum secured to said sleeve, a worm shaft carried by the said drum and provided with a worm, gearing connecting said worm with the cop shaft, and mechanism operated by the rotation of the sleeve and drum to produce rotation of the worm shaft and cop shaft, for the purpose specified.

3. In a thread winding machine, the combination of the following instrumentalities, viz:—a cam shaft, a reciprocating thread guide operated therefrom, a cop shaft, a rotatable sleeve geared to the cam shaft and through which the cop shaft is extended, a drum secured to said sleeve, a worm shaft carried by the said drum and provided with a worm, gearing connecting said worm with the cop shaft, a shaft c^7 carried by the said drum, gears connecting the shaft c^7 with the worm shaft, a substantially long gear c^{12} on the shaft c^7 , and a stationary gear or pinion c^{13} about which the gear c^{12} is revolved bodily to produce rotation of the cop shaft, substantially as described.

4. In a thread winding machine, the combination with a driving shaft, of a rotatable sleeve geared therewith, a cop shaft loosely extended through the said sleeve and mechanism intermediate of said sleeve and cop shaft and actuated by the rotation of said sleeve to produce rotation of the cop shaft, for the purpose specified.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

THORVALD HANSEN.

Witnesses:

JAS. H. CHURCHILL,
J. MURPHY.