F. A. HOLT AND G. KERSHAW.

WINDING MACHINE.

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1,353,474.

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Fig. 1.

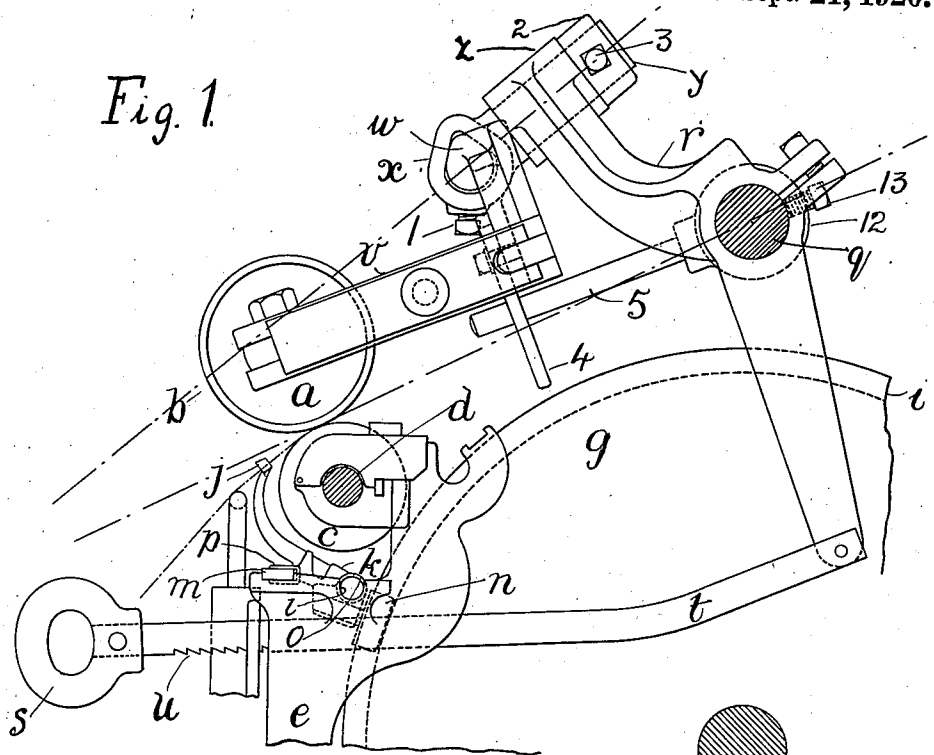
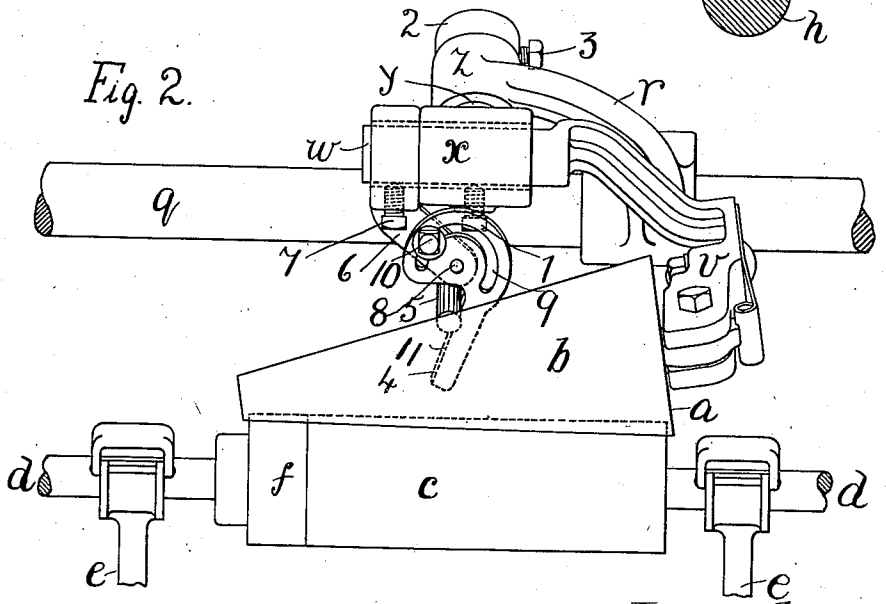


Fig. 2.



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UNITED STATES PATENT OFFICE.

FRANK ASHWORTH HOLT, OF ROCHDALE, AND GRINDROD KERSHAW, OF WHITWORTH, ENGLAND, ASSIGNORS, BY MESNE ASSIGNMENTS, TO FOSTER MACHINE COMPANY, OF WESTFIELD, MASSACHUSETTS, A CORPORATION OF MASSACHUSETTS.

WINDING-MACHINE.

1,353,474. Specification of Letters Patent. Patented Sept. 21, 1920.

Application filed August 24, 1916. Serial No. 116,635.

To all whom it may concern:

Be it known that we, FRANK ASHWORTH HOLT, machine-maker, a subject of the King of the United Kingdom of Great Britain and Ireland, and resident of Noon Sun House, Whitworth Road, Rochdale, in the county of Lancaster, England, and GRINDROD KERSHAW, machine-maker, a subject of the King of the United Kingdom of Great Britain and Ireland, and resident of 62, Market street, Whitworth, in the county of Lancaster, England, have invented new and useful Improvements in Winding-Machines, of which the following is a specification.

This invention relates to mechanism for carrying the winding holders of winding machines of the kind in which a continuously revolving driving roll is made to revolve a winding holder by friction against such holder or a spool placed upon it or yarn or thread wound thereon, the winding holder being mounted on a support capable of being turned upward about an axis and of being turned about another axis in a plane transverse to the axis about which it can be raised.

The object of this invention is to insure by simpler means than have been heretofore provided that the axial lines at the apices of yarn packages shall not point to the side of the axial lines of the driving rolls, on the side remote from the axes of movement of the bearers, for at least so long, after the commencement of the winding of the several yarn packages, as such pointing of their axial lines would cause detrimental dispositions of yarn or thread in the yarn packages and such defects and inconveniences as the formation of packages with the ends unduly large and the intermediate parts unduly small and in the case of soft yarns or threads the pushing of yarn or thread over the large ends of the packages.

This invention consists in a carrier for a winding holder around which a conical or like yarn package is to be wound in a machine of the said kind positioned so that the tilting of the carrier and winding holder will counteract or compensate for the tendency of the raising of the carrier about the axis of the movement of the bearer to throw the axial line at the apex of the yarn package to the side of the axial line of the driving roll remote from the axis of movement of the bearer from the commencement of winding and for at least so long thereafter as pointing of the axial line at the apex of the yarn package, being wound around the holder on the side of the axial line of the driving roll further from the axis of movement of the bearer, would involve detrimental disposition of yarn in the yarn package being wound. This invention further consists in devices insuring that the raising of the carrier shall be accompanied by a corresponding tilting of the yarn package and so insuring that the axial line of the yarn package shall point in the proper direction for the intended disposition of yarn or thread in the yarn package, and also in devices by which the tilting of the winding holder may be adjusted, as may be desirable from time to time, in accordance with changes in the count or thickness or number of yarns or threads to be wound in a package or in the proportions of the length and diameter of packages to be wound and the fitting of parts to one another is simplified.

In the accompanying drawing in which the same letters and numerals of reference indicate corresponding parts in both of the figures an illustrative embodiment of this invention is shown.

In the drawing Figure 1 is a side elevation partly in vertical section of part of a winding machine showing part of one winding head. Fig. 2 is a front elevation showing some of the parts shown in Fig. 1.

Some of the parts shown in the drawing are of well known construction being very similar to parts shown in the drawings of United States Letters Patent No. 1014836 dated January 16th, 1912, granted to John Oliphant McKean and will be described herein so far as is convenient to facilitate the description of the parts provided or constructed according to this invention but it is to be understood that the parts provided or constructed according to this invention are applicable to winding machines of other kinds in which they may be desirable.

In the drawing, *a* is a holder of ordinary construction to receive a conical tube or shell *b* on which a package of yarn or thread may be wound. *c* is a driving roll mounted fast upon a shaft *d* extending lengthwise of the machine and revolved by any suitable means. *e e* are two of the brackets

supporting the shaft *d*. *f* is a collar adjacent to one end of the roll *c* and loose upon the shaft *d* to obviate undue friction upon the smaller end of a conical package being wound. *g* is a cam mounted fast upon a shaft *h* extending lengthwise of the machine and supported and revolved by any suitable means and provided with a cam track *i* formed as a groove in a way usual to work a thread guide *j*.

The thread guide *j* is mounted similarly to thread guides of machines already known in a carrier *k* mounted on round and rectangular guide bars *l m* fixed in position and is provided with an oscillatable die-*n* made to enter a cam track *i* of the cam *g*, the carrier *k* having a tubular part *o* to surround and to be slid upon the round guide bar *l* and a forked part *p* to embrace and to be slid upon the rectangular guide bar *m*.

q is a rod fixed in position and extending lengthwise of the machine for the support of a bearer *r* in the form of an arm for carrying the holder *a*. The bearer *r* is adapted to be turned about the rod *q*. Like the arms used for the support of the holders of winding machines already known, the bearer *r* is provided with a handle *s* connected to it by means of a rod *t* furnished with a rack *u* having ratchet teeth and serving for use in moving the holder *a* from or controlling its return toward or for holding the holder *a* away from the driving roll *c*.

For the purpose of this invention the carrier *v* of the holder *a* is mounted to turn upon its bearer *r* about an axis which is offset from the axis of the rod *q* and crosses over the axial line of the driving roll at an angle not greater than a right angle at the side toward the smaller end of a yarn package being wound and when the holder *a* is nearest the driving roll *c* is inclined toward the radial direction from the axis of the rod *q* to the place of contact of a yarn package on the holder *a* with the driving roll *c* at an angle not less than the angle through which the bearer *r* swings in any period in which precision of disposition of yarn in a yarn package is necessary. Consequently the axis about which the carrier *v* swings upon the bearer *r* will not become parallel to the radial direction from the axis of the rod *q* to the place at which a yarn package bears upon the driving roll *c* until nearly the limit of movement of the carrier *v* in the winding of a yarn package so that, until the bearer *r* in being raised reaches the position it attains when the winding of a yarn package is nearly completed, the swinging of the carrier *v* upon the bearer *r*, moving the downwardly pointing smaller end of the holder *a* downward will move it toward the axis of the rod *q* and so will counteract the tendency of the raising of the bearer *r* to move such smaller end of the holder *a* outward relatively to the driving roll *c* and thereby will cause the smaller end of the holder *a* to present the prolongation of its axis in some direction passing the axis of the driving roll in one relation regarded transversely of such axis. The requisite disposition of the axis about which the carrier *v* turns upon the bearer *r* may be obtained by different constructions. In the case illustrated, the carrier *v* for the holder *a* is formed as an arm with a shank *w* mounted in the cross head *x* of a pivot *y* mounted to turn in the bearer *r* about an axis crossing at right angles over the axis of the driving roll *c* and inclined downward toward it so as, when the holder *a* is nearest the driving roll, to make with a straight line from the axis of the rod *q* to the place of contact between a yarn package being formed and the driving roll *c*, an angle not less than the angle through which the bearer *r* is turned about the rod *q* from the commencement to nearly the completion of a yarn package and the bearer *r* is made to extend upward in an inclined direction and to afford a bearing for the pivot *y*. The cross head of the pivot *y* has a hole of a V section in its upper part to receive the shank *w* of the arm *v*.

The holder *a* is mounted on the arm *v* in a manner similar to that in which the holders of machines heretofore in use are mounted on their supports. The shank *w* is of a V section in its upper part to fit in the hole of the cross head *x* and is secured in position in the cross head *x* by means of a set-screw 1. The pivot *y* is held in position lengthwise by means of the cross head *x* and a collar 2 secured by a set screw 3 on the pivot *y* bearing against the arm *r*.

Further for the purpose of this invention the carrier *v* is provided with a projection 4 made to bear and to present an oblique face against a fixed part 5 so that as any raising of the carrier *v* about the rod *q* will be accompanied by a corresponding tilting of the carrier *v* about the axis of the pivot whether or not yarn is wound on the holder *a* precisely in such form as to tilt the holder *a* in a proper way. In the case illustrated the projection 4 is formed as a plate mounted adjustably upon an arm 6 secured by a set-screw 7 on the shank *w* the projection being connected to the arm 6 by a pivot 8 and provided with a curved slot 9 through which is passed a set-screw 10 provided with a washer and screwed into the arm 6 so that it may secure the projection 4 in position after adjustment on the arm 6.

The projection 4 may be of any appropriate shape but in the case illustrated is formed with a straight edge 11. The fixed part against which the projection 4 may be made to bear may be of any convenient form and secured in position in any suitable way

but in the case illustrated is represented as a stud secured in a collar 12 mounted upon the rod *q* and secured in position by means of a set-screw 13.

By the direction of the pivot *y* being duly chosen relatively to the intended tilting of the bearer *r* provision may be made for the axis of the holder *a* to be kept with any requisite degree of accuracy in some plane parallel and of one relation transversely to the axis of the roll *c*, as the holder *a* is raised from the driving roll *c* and by the projection 4 being suitably formed and adjusted the axis of the holder *a* may be tilted with any degree of precision requisite to keep it with any requisite degree of accuracy in some plane parallel and of one relation transversely to the axis of the roller *c*.

The case illustrated shows a construction generally preferable having the line of the axis about which the carrier *v* is turned on the bearer *r* passing the holder *a* at about midway in its length in order that in the tilting or turning of the carrier *v* the axial line of the holder *a* and yarn package shall be moved inward at the apical end and outward at the basal end relatively to the axis of the rod *q* about which the bearer is turned.

The yarn may be led to the holder *a* through the thread guide *j* in single thread or two or more threads together.

When the yarn is attached to the spool *b* and led through the thread guide *j* and the driving roll *c* is revolving and the spool *b* is laid against the driving roll *c* yarn is wound upon it and as coils or layers are successively wound upon it the spool *b* is raised from the roller *c* and raises the holder *a* and carrier *v* and the weight of the holder *a* and carrier *v* pressing the surface of the yarn wound on the spool *b* against the surface of the driving roll *c* may cause the holder *a* to be tilted about the axis of the pivot *y* much as holders are tilted about the pivots carrying them in some winding machines already known but with the difference that so long as yarn is laid in proper form on the spool *b* by the traversing to and fro of the thread guide *j* the tilting of the holder *a* by reason of the disposition of the pivot *y* relatively to the axis or center lines of the roll *c* and rod *q* causes the axis or center line of the holder *a* to be kept approximately in a plane parallel and in constant relation to the axis of the roll *c* regarded transversely to such roll *c*. If the yarn wound on the spool *b* should fail from any cause to tilt the holder *a* about the pivot *y* in correspondence with the raising of the holder *a* from the roll *c* the projection 4 bearing against the fixed stud 5 will tilt the holder *a* and insure that the center line or axis of the holder *a* shall remain approximately in some plane in uniform relation to the axis of the roller *c* in a direction transverse to it.

By the projection 4 being adjustable upon the arm 6 the tilting of the holder *a* may be adjusted for the use of spools *b* of different tapers or lengths or the winding of yarn singly or in two or more threads together or the winding of yarn of different counts or thicknesses. The provision for the adjustment of the projection 4 also facilitates the construction and fitting of the apparatus.

The provision of the carrier *v* for a yarn holder *a* to be turned upon a bearer *r* about an axis downwardly toward the driving roll *c* at an angle not less than the angle of the upward swinging of the bearer as winding proceeds from the commencement to nearly the completion of a yarn package enables conical packages of yarn to be wound of very accurate form and true conical taper and rounded bases free from loose or projecting loops of yarn especially when provision is made for constraining the turning of the carrier *v* upon the bearer *r* in correspondence with the extent to which the holder *a* is raised from the driving roll *c*.

What we do claim as our invention and desire to secure by Letters Patent is:—

1. In a winding machine, a driving roll and means for supporting it, a revoluble holder for having material wound around it by contact with such driving roll, a carrier carrying the revoluble holder, a support providing a stationary axis parallel to the axial line of the driving roll, a bearer for said carrier carried by such support to swing about said axis and having a part offset in a direction transverse to said axis and affording bearing for carrying and allowing swinging of said carrier and presenting the axis of swinging of said carrier crossing over the axial line of the driving roll at right angles, and, when the revoluble holder is nearest the driving roll, inclined toward the radial direction from the said stationary axis to the place of contact between a revoluble holder and the driving roll at an acute angle not less than the angle through which the bearer swings in any period of winding in which precision of disposition of yarn in a yarn package is necessary, a turning means connected to such carrier having an oblique contact face and a stationary part to receive contact of the contact face of said turning means.

2. In a winding machine, a driving roll and means for supporting it, a revoluble holder for having material wound around it by contact with such driving roll, a carrier carrying the revoluble holder, a support providing a stationary axis parallel to the axial line of the driving roll, a bearer for

said carrier carried by such support to swing about said axis and having a part offset in a direction transverse to said axis and affording bearing for carrying and allowing swinging of said carrier about an axis crossing over the axial line of the driving roll at right angles and, when the revoluble holder is nearest the driving roll meeting the radial direction from the said stationary axis to the place of contact between a revoluble holder and the driving roll at an acute angle not less than the angle through which the bearer swings in any period of winding in which precision of disposition of yarn in a yarn package is necessary, a projection extending from such carrier having an oblique contact face and a stop on the said support for receiving contact of the contact face of said projection.

3. In a winding machine, a driving roll and means for supporting it, a revoluble holder for having material wound around it by contact with such driving roll, a carrier for carrying the revoluble holder, a support providing a stationary axis parallel to the axial line of the driving roll, a bearer for said carrier carried by such support to swing about said axis and having a part offset in a direction transverse to said axis and affording bearing for carrying and allowing swinging of said carrier about an axis crossing over the axial line of the driving roll at right angles and, when the revoluble holder is nearest the driving roll, meeting the radial direction from the said stationary axis to the place of contact between a revoluble holder and the driving roll at an acute angle not less than the angle through which the bearer swings in any period of winding in which precision of disposition of yarn in a yarn package is necessary, a projection extending from said carrier and an arm fixed and adjustable on such projection and having an oblique contact face and a stop on the said support for receiving contact of the contact face of said projection.

In testimony that we claim the foregoing as our invention, we have signed our names this fourth day of August, 1916.

FRANK ASHWORTH HOLT.
GRINDROD KERSHAW.