

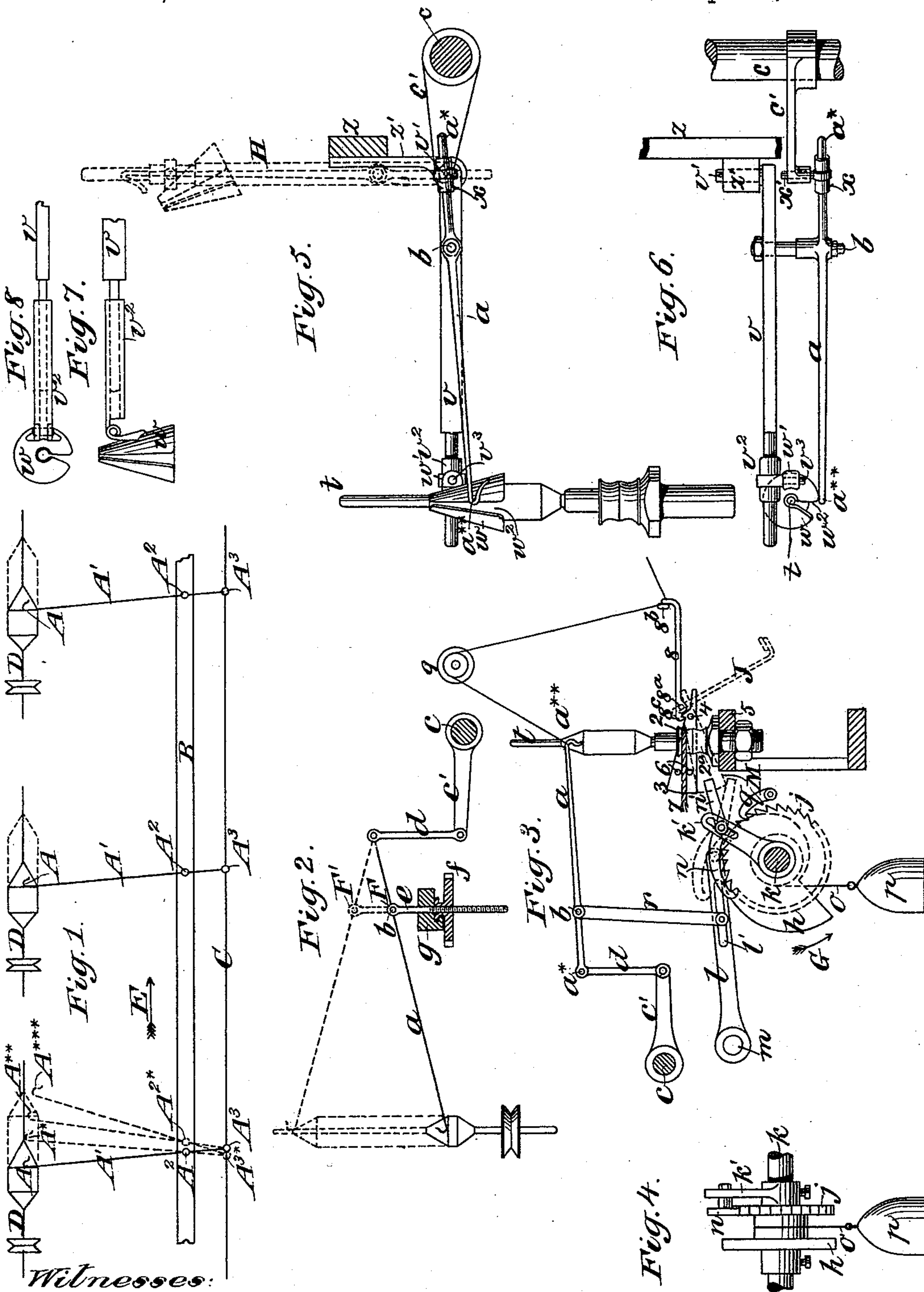
(No Model.)

F. ROSSKOTHEN.

MACHINERY OR APPARATUS FOR WINDING YARNS OR THREADS.

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Witnesses:

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UNITED STATES PATENT OFFICE.

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MACHINERY OR APPARATUS FOR WINDING YARNS OR THREADS.

SPECIFICATION forming part of Letters Patent No. 494,723, dated April 4, 1893.

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To all whom it may concern:

Be it known that I, FERDINAND ROSSKOTHEN, engineer, of Aachen, Prussia, in the German Empire, have invented certain new and useful Improvements in Machinery or Apparatus for Winding Yarns or Threads into Cops or Pirns, (for which British Letters Patent numbered 7,439 and dated May 4, 1889, and a German patent numbered 54,888 and dated November 8, 1889, have been granted unto me,) of which the following is a specification.

When winding yarn or thread into the shape of a "cop" or "pirn" the thread-guide by means of which the yarn or thread is guided while being wound requires to have two movements in relation to the spindle, one an oscillating movement and the other a movement in a direction parallel or nearly parallel to the axis of the "pirn" or "cop" being wound. The two motions together serve to cause the yarn or thread to be so distributed as to form a "cop" or "pirn."

The above mentioned movements of the thread-guide in relation to the spindle, can be obtained either by imparting to the thread-guide in addition to its oscillating movement an additional movement which moves it gradually from the base to the point of the "cop" or "pirn" or by imparting to the thread-guide an oscillating movement only, and causing the spindle to move in the direction of its axis so as to carry the base of the "cop" or "pirn" away from the thread-guide. The motions first referred to are those generally adopted in forming a "cop" or "pirn" on the "mule" and the latter motions are those generally employed in winding or forming a "cop" or "pirn" in winding machines. Machines for winding yarn or thread into the form of "cops" or "pirns" have as hitherto constructed been considerably defective, among other defects being that those machines in which both the spindles and the thread-guides are moved, could not be "run" at a high speed because the spindles on which the "cops" or "pirns" are wound cannot be firmly supported and in those machines in which the spindles are not moved in the direction of their axes the spindles are usually not independent of each other

or in those cases in which they are independent of each other the independence of such spindle is only obtained by the employment of complicated arrangements of apparatus. 55

By means of my invention hereinafter described I am enabled to form "cops" or "pirns" upon spindles which have no movement other than rotation.

In the accompanying drawings Figure 1 is a diagram illustrative of the principle upon which the apparatus constructed according to my invention operates; Fig. 2 a cross section of such portion of a machine as is requisite to show the application of my invention to winding yarns or threads on to independent spindles. Figs. 3 and 4 illustrate a method of causing the fulcrum of the thread-guide lever to be moved by means of a spiral cam, and also a method of arresting the rotation of the spindle and the movement of the fulcrum of the thread-guide lever when the yarn or thread breaks or becomes absent. Figs. 5 and 6 are respectively an elevation and plan illustrative of a method in which the fulcrum of the thread guide lever is caused to be moved by the winding of the yarn or thread upon the spindle, and Figs. 7 and 8 are respectively a side elevation and a plan showing a slightly varied arrangement of the apparatus by means of which the winding of the yarn or thread upon the spindle is caused to move the fulcrum of the thread-guide lever. 60 65 70 75 80

According to my invention I employ as a thread-guide a lever, which is capable of being turned upon a pivot to which I impart a motion which gradually carries it in the direction of the axis of the spindle. On one end of the lever I form or secure a thread guide. The other end of the said lever is acted upon by suitable mechanism so that an oscillating motion will be imparted to the lever by which each layer of the yarn or thread being wound is distributed upon the "pirn" or "cop." The movement of the pivot on which the lever is mounted, causes the layers of the yarn or thread to be so arranged as to form a "cop" or "pirn." 85 90 95

The pivot before referred to can be caused to move in the direction of the axis of the spindle by any convenient means. According to one arrangement I mount the said 100

pivot upon a lever so placed that each layer of yarn or thread wound upon the "cop" or "pirn" will cause the said lever to be turned upon its fulcrum, and carry the thread-guide
 5 away from the base of the "cop" or "pirn." During the above described motion of the thread-guide the part at which such thread-guide receives its motion will continue to oscillate in the same or nearly the same path.
 10 Instead of the lever which carries the pivot of the thread-guide being directly acted upon by the yarn or thread being wound upon the "cop" or "pirn" the said lever may be provided with a cup or roller or rollers, against
 15 which the yarn or thread may act, such cup, or roller or rollers being connected to or mounted upon a tube capable of being slid upon the lever aforesaid.

In place of employing the yarn or thread
 20 wound upon the "cop" or "pirn" to move the lever before mentioned, I in some cases employ a cam, incline or screw, to move such lever, and in those cases in which it is desired to "doff" at one time all the "cops" or
 25 "pirns" wound simultaneously in a machine, the pivots of all the thread-guides are moved simultaneously but, if as I prefer, it be desired that each spindle shall be independent of the others, each pivot must be moved independ-
 30 ently of the others.

In some cases I mount the pivot on which is mounted the thread-guide, on a lever which rests upon a spiral cam which is slowly rotated by means of a ratchet wheel or by other
 35 suitable means. The rotation of the cam will cause the pivot on which the thread-guide is mounted to be raised. By varying the rate at which the cam is rotated, "cops" or "pirns" of different diameters may be formed. By
 40 altering the length of the lever resting upon the spiral cam, a greater or less amount of movement may be caused to be imparted to the said lever and thus the diameter of the "cops" or "pirns" may be varied without
 45 the rate of rotation of the cam being varied.

In those cases in which I cause the yarn or thread wound upon the "cop" or "pirn" to raise a lever, cup or roller or rollers, I prefer to employ a "stop motion" to stop the rota-
 50 tion of a spindle when the yarn or thread being wound upon such spindle becomes broken or absent, and thereby prevent injury to the yarn or thread being caused by the last layer of yarn or thread continuing to rub against
 55 the lever, cup or roller or rollers.

In those cases in which the lever on which the pivot of the thread-guide is mounted is moved by means of a spiral cam, screw, or incline, or other suitable means, I prefer to
 60 cause the movement of such spiral cam, screw, or incline or other suitable means to be stopped when the spindle is stopped, so that "thin places" are prevented from being formed in the "cops" or "pirns."

I have above described each of the levers or thread-guides as being mounted upon a lever moved as the "building" of the "cop"

or "pirn" proceeds, either by the yarn or thread wound upon the spindle in conjunction with which such lever or thread-guide is
 70 used, or by means of a cam or incline or other suitable apparatus, but I would have it understood that each of such levers or thread-guides may be mounted and arranged to be
 75 moved in any suitable manner so that while guiding the yarn or thread to be wound upon the spindle such lever or thread-guide may be moved away from the base of the "cop" or "pirn" as the "building" of such "cop" or "pirn" proceeds.
 80

In the accompanying drawings Figure 1 is a diagram showing the movements of the thread-guide which are necessary to be made in relation to the spindle in order that yarn or thread may be wound upon a spindle in
 85 the form of a "cop." In addition to an oscillating movement such thread-guide must also have a slow progressive motion, which progressive motion causes the yarn or thread to be wound on the spindle in layers.
 90

In Fig. 1 A indicates the part of the thread-guide lever A' which guides the thread. The thread-guide lever A' is joined at A² and A³ to the rods B and C respectively. If a short oscillating motion be imparted to the rod C
 95 in the direction of the length of such rod C so that the point A³ is moved to A^{3*} the part A of the thread-guide lever A' will be moved to A* and so guide the yarn or thread that a conical layer of yarn or thread will be coiled
 100 upon the spindle D. If the rod B is gradually moved in the direction indicated by the arrow E so that the pivot A² shall be moved into the position indicated by dotted lines A^{2*} and without the amount or direction of the
 105 motion of the rod C being altered the part A of the yarn or thread-guide A' which guides the yarn while being wound upon the spindle D will be moved along the path indicated by the dotted lines A^{2*} A^{3*}.
 110

By the longitudinal movement of the rod B in the direction indicated by the arrow E the path of the part A is gradually moved from the base to the point of the "cop." If instead of an oscillatory motion being imparted to the
 115 rod C and gradual longitudinal motion being imparted to the rod B an oscillating motion be imparted to the rod B and the rod C be caused to be gradually advanced in the direction opposite to that indicated by the arrow
 120 E the movement of the guide wire A will be similar to that above described.

The arrangement above described in reference to Fig. 1 is only applicable in those cases in which a number of "cops" or "pirns" are
 125 being formed or "built" simultaneously, that is, in which the whole number of such "cops" or "pirns" are begun simultaneously and finished simultaneously.

According to another arrangement of my
 130 invention each "cop" or "pirn" may be commenced, wound, and completed independently of the other "cops" or "pirns" which are being wound. One method of carrying

this arrangement of my invention into effect is shown in Fig. 2. The thread-guide *a* is capable of being oscillated upon a fulcrum *b*. *c* is a shaft which is caused to oscillate by any convenient means. Secured to the shaft *c* is an arm *c'*. Jointed to the arm *c'* is one end of a connecting rod *d* jointed at its other end to one end of the thread guide *a*. The fulcrum *b* of the thread-guide *a* is carried by a rod *e* upon which are formed screw threads which take into screw threads formed in the boss of a wheel *f* which is carried by and free to revolve in a rail *g* and is prevented by such rail *g* from being moved in the direction of the length of the rod *e*. The rotation of the wheel *f* will cause the rod *e* to be moved longitudinally thereby moving the fulcrum *b* of the thread-guide *a* from the point *F* to the point *F'*. A rod *e* and wheel *f* for raising the fulcrum *b* of the thread-guide *a* is applied to each thread-guide *a* so that each spindle is rendered independent of the others.

Figs. 3 and 4 show an arrangement in which the movement of the fulcrum *b* of the thread-guide *a* is caused by means of a spiral cam *h*. The spiral cam *h* is fast with the ratchet wheel *j* and is loose upon the shaft *k*. On the circumference of the spiral cam *h* rests a lever *l* carried by and capable of being turned upon a bar *m* secured to any convenient part of the machine. Fast upon the shaft *k* is an arm *k'* carried by and jointed upon which is a pawl *n* the tooth of which passes into the teeth of the ratchet wheel *j*. The shaft *k* is caused to oscillate by any suitable means. Coiled around the boss of the ratchet wheel *j* is a cord *o* by which is suspended a weight *p* such weight *p* tending to turn the ratchet wheel *j* in the direction indicated by the arrow *G*. *q* is a catch which prevents the ratchet wheel *j* from being turned by the weight *p* in the direction indicated by the arrow *G*. To the lever *l* is secured a rod *r* from the upper end of which projects a stud *b* which forms the fulcrum upon which the thread-guide *a* turns. The thread-guide *a* is jointed at one end *a** to one end of a connecting rod *d* the lower end of which is jointed to an arm *c'* fast upon a shaft *c* which is caused to be oscillated by any suitable means. The oscillation of the shaft *k* will by means of the pawl *n* cause the cam *h* to be slowly turned in the direction opposite to that indicated by the arrow *G*. Such turning of the cam *h* will cause the lever *l* to be gradually raised, thereby gradually raising the part *a*** of the thread-guide *a* which guides the yarn or thread while being wound upon the spindle *t* and thereby cause the yarn to be wound upon the spindle *t* in the form of a cop. In the lever *l*, I form a slot *l'* through which and through the rod *r* passes a bolt by means of which the rod *r* is secured to the lever *l*. By securing the lower end of the rod *r* in the slot *l'* so that such lower end of the rod *r* is se-

cured nearer to, or farther from the bar *m* the fulcrum *b* and also the part *a*** of the thread-guide *a* by which the yarn or thread is guided upon the "cop" will receive a greater or less amount of movement. By means of this simple device the diameter of the "cops" may be readily varied as when the end *a*** of the thread-guide *a* is raised slowly the "cops" are built of large "diameter" but if the point *a*** of the thread-guide *a* is caused to be raised more quickly the "cops" are formed of a less diameter.

In Figs. 5 and 6 is shown in elevation and plan an arrangement in which the fulcrum *b* of the thread-guide *a* is raised by the yarn or thread as it is wound upon the spindle *t*. Upon the lever *v* which has its fulcrum at *v'* is a cone or cup *w*. When this cone or cup *w* is put on the "cop" which is in the course of being wound the axes of the spindle *t* cone or cup *w* are in one straight line. In order that this may be I mount upon the lever *v* and free to be slid thereon a tube *v²* provided with a stud *v³* upon which and free to be turned thereon is a collar *w'* to which the cone or cup *w* is secured. The thread-guide lever *a* is carried upon the lever *v* by means of a fulcrum *b*. Mounted upon and free to slide upon the end *a**, of the thread-guide lever *a* is a tube *x* provided with a stud *x'* which passes into a hole formed in an arm *c'* fast upon a shaft *c* to which an oscillating motion is imparted by any convenient means. The oscillation of the shaft *c* will by means of the arm *c'* stud *x'* and tube *x* impart an oscillating motion to the thread-guide lever *a*. In the side of the cone or cup *w* next to the thread-guide *a* I form a slot *w²* through which the yarn or thread passes from the thread-guide *a* to the "cop" being wound upon the spindle *t*. Each layer of yarn or thread which is wound upon the spindle *t* by means of the thread-guide *a* lifts the cone or cup *w* and along with it the lever *v* and the fulcrum *b* carried thereby. The lever *v* has its fulcrum at *v'* and when the thread-guide *a* is midway between the extremes of its oscillations upon the stud *x'* the axis of the stud *x'* and the fulcrum *v'* of the lever *v* are in the same straight line, consequently the path of the part *a*** of the thread-guide *a* by which the yarn or thread is guided upon the "cop" always remains opposite the slot *w²* of the cone or cup *w*. To facilitate the piecing of the yarn or thread the cone or cup *w* lever *v* and thread-guide *a* can be turned upward until the lever *v* rests against and is supported by a rail *z* secured to the framework of the machine, as shown by the dotted lines *H*. The rail *z* also supports by means of a bracket *z'* the stud *v'*. The turning of the parts above mentioned as indicated by the dotted lines may be accomplished without stopping or interrupting the oscillating motion of the arm *c'* for, as the tube *x* is free to be slid along the thread-guide *a* and can also turn the stud *x'*

round, it is free to follow the motion of the arm c' although the lever v , cone or cup w and thread-guide a are turned into the raised position shown by the dotted lines H.

5 In some cases I mount the cone or cup w upon the lever v as shown in Figs. 7 and 8, Fig. 8 being a plan of that which is shown in elevation in Fig. 7. Upon the lever v , a portion only of which is shown I mount so that
10 it is capable of being slid thereon a tube v^2 to one end of which is jointed the cone or cup w .

I am fully aware that before the date of my application for a patent, in machines or apparatus for winding yarn or thread into
15 "cops" or "pirns" spindles have been employed which have no movement other than rotation but, in such cases where the yarn or thread-guides used in conjunction with such spindles were influenced by the yarn or thread
20 wound upon the spindles, the entire thread-guide which was generally a bell-crank lever was moved from one position to another but according to my invention the apparatus
which I employ only turns upon the fulcrum v' .

25 When the yarn or thread is employed to move the fulcrum b upon which the thread-guide lever a is carried such moving of the fulcrum b ceases simultaneously with the breakage of the yarn or thread being wound,
30 and as long as no more layers of yarn or thread are wound upon the "cop" or "pirn" the cone or cup and with it the fulcrum of the thread-guide remain stationary. In those arrangements in which the fulcrum of the
35 thread-guide is not moved by the yarn or thread wound upon the "cop" or "pirn" but by special mechanism it is desirable that the progressive motion of the fulcrum should cease when the thread breaks; for if this is
40 not the case, a gap or hollow will be formed in the body of the "cop" or "pirn" being wound corresponding with the time which has elapsed between the breaking and the piecing of the yarn or thread.

45 In Figs. 3 and 4 previously referred to, is shown a stop motion by means of which I cause both the revolution of the spindle and the progressive motion of the thread-guide to be stopped when a yarn or thread breaks.
50 For this purpose I provide the spindle t with two warves 2, 2^a, the upper warve 2 being fast upon the spindle t and the lower warve 2^a being loose upon the said spindle t . 3 is a lever carried and free to be turned upon a
55 stud 4 secured to the spindle rail 5 or any other convenient part of the machine. Projecting from the lever 3 are two pegs 6 between which passes the band 7 by means of which the spindle t is driven. Secured to the
60 spindle rail 5 or other convenient part of the machine is a stud 8^a upon which and free to be turned thereon is a lever 8 formed at one end with a curl or eye 8^b and at the other end with a tooth 8^c which at times hooks upon a
65 tooth formed upon the lever 3. The levers 3, 8 are shown in the position which they occupy

when yarn or thread is being wound upon the spindle t . The yarn or thread being wound upon the spindle t passes through the eye or curl 8^b and thence over the guide pulley 9
70 and thence through the guide of the thread guide lever a . So long as the tension of the yarn or thread maintains the lever 8 in the position in which it is shown, the band 7 will pass around the warve 2 and drive the spindle
75 t , but, upon the yarn or thread becoming broken or absent, the end 8^b of the lever 8 will be caused by its weight to descend into the position shown by dotted lines J and thereby carry the tooth 8^c clear of the tooth
80 upon the lever 3 which will then by its weight be caused to descend into the position in which it is indicated by the dotted lines M. The descent of the lever 3 will by means of the pegs 6 carry the band 7 from the warve
85 2 to the warve 2^a and thus stop the spindle t . The descent of the lever 3 will cause it to arrive against a projecting part n' on the pawl n and thus raise the pawl n clear of the teeth of the ratchet wheel j and consequently prevent
90 motion from being imparted to the ratchet wheel j . It may be here mentioned that this stop motion constitutes no part of the present invention.

I have above in most cases described and
95 shown my invention applied to regulate the building of the "cop" or "pirn" upon each individual spindle, but if desired such apparatus can be employed to govern the "building" of the yarn or thread upon a number of
100 spindles simultaneously.

In all the examples of my invention illustrated the thread guide is caused to have an invariable length of movement for directing
105 the layers of thread on the cop and a progressive movement in one direction for the building of the cop without the end a^* of the thread guide lever where the oscillation is imparted to it taking part in the progressive
110 movement of the fulcrum of said lever or of the thread guide, the point of connection between the said end a^* and the arm c' or rod d which transmits motion to it having an unvarying range of movement between two fixed
115 positions.

Having fully described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a machine for winding yarns or threads into cops or pirns, the combination
120 substantially as herein described of a thread-guide lever, a fulcrum for said lever, means for moving the said fulcrum progressively in one direction to carry the free end of the lever along the cop to be wound and means of oscillating the lever during its progressive movement, the point of connection between said lever and said oscillating means having an unvarying range of movement between two fixed
125 positions, as herein set forth.

2. In a machine for winding yarns or threads into cops or pirns the combination
130

with a thread-guide lever and means of imparting an oscillating movement thereto, of a lever *v* upon which the thread-guide lever is fulcrumed, a fixed fulcrum *v'* for said lever
5 *v*, a cup *w* and a tube *v*² secured to the said cup and having a sliding engagement upon the lever *v*, the thread-guide lever and the said cup *w* being capable of turning with the

said lever *v* around the said fulcrum *v'* substantially as herein set forth.

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