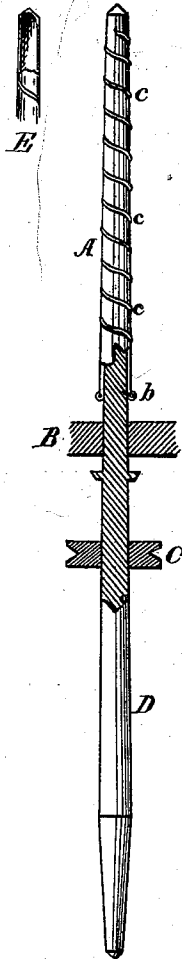


J. ESSEX.

COP-TUBE.

No. 174,505.

Patented March 7, 1876.



WITNESSES

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UNITED STATES PATENT OFFICE.

JEREMIAH ESSEX, OF BENNINGTON, VERMONT.

IMPROVEMENT IN COP-TUBES.

Specification forming part of Letters Patent No. **174,505**, dated March 7, 1876; application filed January 3, 1876.

To all whom it may concern :

Be it known that I, JEREMIAH ESSEX, of the town of Bennington, in the county of Bennington and State of Vermont, have invented an Improved Cop-Tube or Hollow Portable Cop-Spindle, of which the following is a specification:

This invention consists of a cylinder constructed from any material adapted to the purposes for which this cylinder is used, of appropriate external form, having its exterior surface roughened by means hereinafter described, made hollow from its bottom partially through its length to adapt it to be slipped upon the spindles of ordinary spinning mules or frames, upon the surface of which spindles it is securely held by the force of interior frictional contact, and a length sufficient to extend entirely through the cop designed to be spun or manufactured thereon.

The objects sought to be accomplished by this invention are several, among which may be enumerated the following, enumerating in the order in which they appear in the process of manufacture. By their use the cop is provided with a rigid cylindrical inflexible core, which cannot be removed therefrom without destroying the yarn, except by unwinding or reeling off, as in process of weaving or spooling, and which, in process of weaving, absolutely prevents the cop from being thrown off the skewer or breaking in two by the force of the blow of the picker-staff, or from being detached by the operative, and wasted when either the yarn or loom may be working improperly. These cop-spindles being constructed by machinery of uniform size or caliber, each with the other, are much more readily adjusted on spindles adapted to receive them than the old style of short paper or metallic tube now very generally used. The existence of this rigid core permits a much softer cop to be made than when made on a spindle without it, and, as a consequence, cotton of much shorter staple may be used in spinning fine yarn than can be worked by the old appliances, because neither so long a "drag" nor so much tension in winding the yarn onto the spindle is called for as is necessary to make a firm, strong, hard cop of very fine yarn in the old way. This is owing to the fact that

the intricate cross-winding or reticulation of the yarn incident to the drag movement, so essential to secure a firm, strong cop, which will weave well, becomes a matter of inferior or secondary importance when these cop-spindles are used, for experience shows that when made altogether too soft and with too short a drag to weave without a tube or core, with one, the yarn in weaving runs off freely and to the last inch without breaking. It is well known that in working short staple cotton into fine yarn, especially on self-acting English mules, much difficulty is met in the tendency of the yarn to break, growing out of the fact that so much tension must be used to wind the cop firmly to get the desired degree of hardness that this very tension has a tendency to, and in many cases does really, draw out and partially or entirely sever the yarn under or between the rolls, so that on close examination it will be found that weak or attenuated spots in the yarn, recurring at regular intervals of each stretch, may be found. These weak, thin spots are less liable to be found or occur where a moderate tension in winding is used than when it is rigid. From the fact that cops can be made with a shorter drag, it follows that the maximum size of the cop can be preserved a greater portion of its length than otherwise, thus putting more yarn into the cop, and, at the same time, rendering the doffings less frequent. When completed, the cop is in a most perfect condition either for weaving or transportation, and may be handled with impunity, the danger of crushing, by which common cops are materially injured, being entirely prevented by the core. It frequently happens in mule-spinning, where short tubes or none at all are used, when a thread has broken and several stretches have been made before the end has been picked up and pieced, that when so pieced a weak, scant, or soft place will be left in the body of the cop, thus rendering it very liable in process of weaving to be broken in two by the blow of the picker-staff, the nose end of the cop being detached and lodging in the shuttle, and the butt or bottom end adhering to the shuttle-skewer, thereby occasioning a stoppage of the loom, and, in many instances, a loss of the whole or a considera-

ble portion of the cop. With cops made on these cop spindles or tubes such accidents are obviated, as well as the resultant loss of waste, which in many mills amounts to a very considerable item.

It is well known that tubes to assist in the formation and use of cops of various kinds, and made from a diversity of materials and of various lengths, and constructed with their surfaces roughened in a great variety of ways to facilitate the adhesion of the yarn to, and its retention by, such tubes, have heretofore been made; and I am aware that tubes and bobbins to facilitate the spinning of yarn and its formation into cops ready for spooling, reeling, or weaving, provided with various kinds of flanges at the bottom have heretofore been used; and I am also aware that metallic tubes extending entirely through the cop, having both ends open, provided with a flange at bottom end, and provided with longitudinal slots and round perforations, through the material of which its cylindrical portion was composed, of which latter class the tubes shown in the English Patent No. 1,162, granted to James Milton in the year 1870, is an example, have also been made, and that hollow metallic flanged cop-tubes, provided on their external surfaces with raised circumferentially-parallel rings or ribs, and having a solid or closed top of conical shape to adapt it for spinning, have been devised; but in none heretofore used or made am I aware that such useful, desirable, or extensive results are accomplished as are attained by the subject of the present invention.

To enable others skilled in the art to which my invention relates to construct and use the same I will here briefly describe its construction and operation, reference being made to the accompanying drawing, which forms a part of this specification, in which my invention is shown in elevation and partial vertical longitudinal section applied to an ordinary mule-spindle.

I have preferably constructed this tube or cop spindle of metal, although I do not restrict myself as to material in its construction. I have shown a flange, *b*, at its base, which may either be made from the same piece of material as the tube, or may be in another piece and suitably attached. This flange serves to add strength to the tube or spindle, as well as to keep dirt and dust from getting into the bearing below it and oil from the bolster getting onto the cop; but the invention is operative without this flange, although I have preferably shown it.

The form or style which I have adopted for the top of my cop-tube or cop-spindle is a solid or closed one, and the apex thereof is constructed in form similar to the top or apex of an ordinary mule-spindle, as shown at *E*, and the chambered, hollow, or interior portion is designed to be sufficiently capacious vertically to allow the same to be applied to very short mule-spindles by slipping the tube over the

top of the spindle, it being held thereon by force of internal frictional contact; but when it is designed to use my invention on long spindles the tops of the mule-spindles may be cut off sufficiently to permit the cop-spindle to be attached at its proper elevation.

To secure adhesion of the yarn to and its retention on the tube I have elected from many devices the spiral rib *c c c*, which preferably consists of a very fine wire wound spirally, with gradually-diminishing pitch from the bottom nearly to the top, where it merges into the surface of the tube on a line nearly parallel with its axis.

It is preferable, in making these tubes, to have the spiral ribs *c c c* wind about the tube in a direction opposite to the winding on of the yarn, by which several points of advantage are secured, to wit, when the mule is running in or toward the rolls the spiral formation of the rib near the top of the tube assists the thread to find the top of the spindle after the mule is geared ready to make a stretch, and when the spindles leave the rollers on their retrograde movement, and have finished the stretch, the motion having been reversed, this rib materially facilitates the movement or action of the yarn known to spinners as "backing-off" thereby, at all times, preserving a smooth nose on the cop. It is preferable that the interior surface of these tubes or cop-spindles be smooth throughout the entire length thereof.

In mutually adapting these cop-spindles and mule-spindles to each other it is desirable to relieve both the cop-spindle and the mule or driving spindle of as much of their weight as possible. Therefore, I preferably have the union of the two effected for as short a distance as possible above the bottom of the cop-spindle, by which form of construction I am enabled to shorten the driving-spindle to its minimum practicable length, and at the same time I construct the cop-spindle hollow or chambered out from its bottom to as near its top or apex as is possible. A special advantage of my peculiar form of spiral rib consists in the fact that it provides an uninterrupted or continuous ledge upon, over, or behind which every convolution of the yarn wound thereon finds lodgment.

From the foregoing description it becomes apparent that my invention embraces the following elements, which in their various combinations serve to distinguish mine from previous inventions of similar character:

First, a tapering cylindrical tube, (old;) second, a flange at bottom thereof, (which is also old;) third, a roughened surface of the tube, (which is also old;) fourth, a tube with a closed top, which renders the tube thus constructed capable of performing some of the functions of a spindle, (which is old;) fifth, the construction and adjustment of the bottom portion of the caliber of the tube or cop-spindle with closed top, which renders it susceptible of attachment to short driving-spindles of

mules or frames and short skewers in shuttles, (which is new;) sixth, the mode of roughening by means of a very fine rib applied to the surface of the tube and running spirally with variable pitch from base nearly to the top thereof, (which is claimed as new,) and which adds materially to the strength and durability of tubes made of light or fragile material; hence

I claim as new and desire to secure by Letters Patent—

Hollow or chambered cop-tubes or cop-spindles provided with a flange at bottom, hav-

ing their exterior surface roughened by a spiral rib with variable pitch, and constructed with a solid or closed end in the form of a conical apex, substantially as described and set forth.

In testimony whereof I have hereto affixed my hand at North Bennington, Vermont, this 29th day of November, 1875.

JEREMIAH ESSEX.

Witnesses:

S. B. HALL,

J. W. ESSEX.