

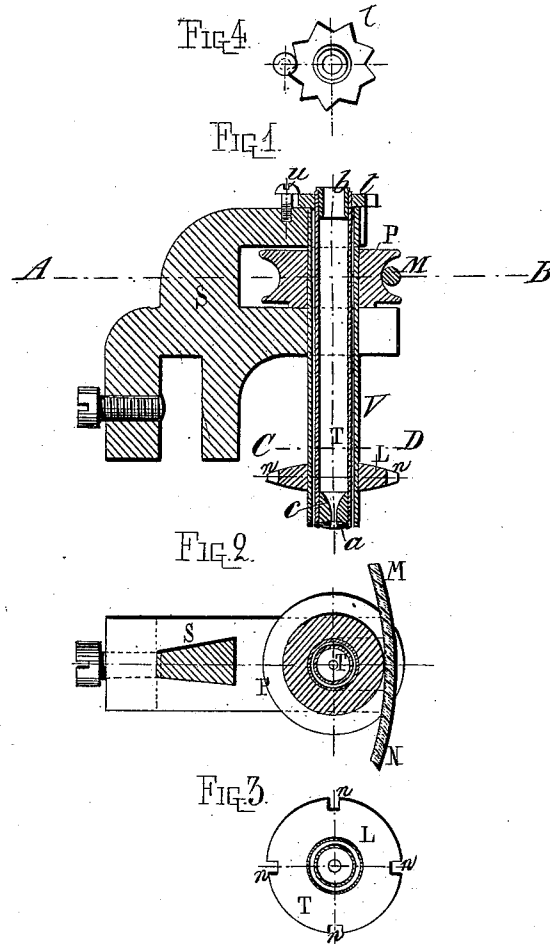
(No Model.)

L. CAMEL.

THREAD FORMING DEVICE FOR SILK SPINNING MACHINES.

No. 361,129.

Patented Apr. 12, 1887.



Witnesses:

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UNITED STATES PATENT OFFICE.

LÉON CAMEL, OF LYONS, FRANCE.

THREAD-FORMING DEVICE FOR SILK-SPINNING MACHINES.

SPECIFICATION forming part of Letters Patent No. 361,129, dated April 12, 1887.

Application filed April 26, 1886. Serial No. 200,132. (No model.) Patented in France February 22, 1886, No. 174,320.

To all whom it may concern:

Be it known that I, LÉON CAMEL, a citizen of the Republic of France, residing at Lyons, in said Republic, have invented a new and useful Improvement in Thread-Forming Devices for Silk-Spinning Machines, (for which I have obtained a patent in France, No. 174,320, dated February 22, 1886,) of which the following is a specification, reference being had to the accompanying drawings.

This invention consists in a novel device, hereinafter described and claimed, for the purpose of mechanically throwing the ends of the cocoon fibers in cocoon-spinning.

Of all the operations in cocoon-spinning, the most delicate is that of throwing the ends of the cocoon fibers for the purpose of adding to the thread which is being spun the fiber from a new cocoon whenever a cocoon gives out or is accidentally detached. To throw an end, the spinner seizes before her the free end of a cocoon fiber. She takes it up on her index-finger and breaks off a portion to give it a proper length. Then, by a delicate movement of the hand and finger, she throws the thus-shortened end upon the collection of fibers which are being spun, and which by their ascending movement carry it along with them and cause it to combine with them to form the thread of raw silk. Great skill, dexterity, and practice are necessary for this operation. The spinner must break the end in such a manner as to retain upon her finger but a very short piece of fiber, for if it is long this piece will gather itself up more or less in kinks upon the thread and produce thereon a nap, which is a grave defect. If the piece is too short it will be more difficult to throw to make it take hold, and consequently, if it misses, the thread continues to be formed, but will be too thin in places and irregular—a defect as serious as that first mentioned. Moreover, an inexpert spinner by failing to throw the ends properly causes weak places in the thread and breakages, which necessitate stopping to piece up. From this it results that she makes less thread, and, besides obtaining a product of inferior quality produces great waste of a costly raw material.

It may be seen from what has been stated that in the spinning from cocoons in the usual way the success depends essentially on the

skillfulness of hand-work, and that therefore the apprenticeships of the operatives are long and costly. It may then be seen how desirable it is to have a mechanical device for throwing, by which an attendant without skill or practice may perform the work as well or even better than the most skillful spinner. After many experiments I have obtained a throwing device which presents the following advantages: first, of throwing upon a collection of fibers constituting the thread a cocoon end which is neither too long nor too short—from two to three millimeters as the maximum—and to obtain a perfect union of the end with the thread; second, of preventing the pieces of fiber which are broken off from the ends, to make them the proper length for throwing, from being caught upon the thread, where it would produce kinks or nap; third, of avoiding friction upon the thread by keeping it out of contact with all rotating surfaces, and only allowing it to pass through fixed guides in order to prevent the fraying and the detachment of the united fiber ends and the breakages which are produced when a cocoon jumps against a turning-guide, or when the winding-swift is stopped for knotting or for any other reason while the throwing device continues to rotate; fourth, of being simple and inexpensive, easily managed, and easily kept in order.

In short, the object of my invention is to obtain an apparatus which will throw better than the most skillful spinner, and which may be attended to by less skillful help, and one that will permit cocoon-spinning in countries wherein it has not heretofore been practiced.

Figure 1 in the accompanying drawings represents a vertical section of my invention. Fig. 2 is a horizontal section on the line A B of Fig. 1. Fig. 3 is a horizontal section on the line C D of Fig. 1; and Fig. 4 is a plan view of a toothed wheel and its stop, which will be hereinafter described.

Similar letters of reference designate corresponding parts in all the figures.

The support S is fixed above a basin in such a manner that the lower part of the tube V, which it carries, will be in the plane occupied by the ordinary agate. This support comprises two forks arranged one above the other and receiving loosely within them the metallic tube V, on which are firmly secured a pulley,

P, and a lenticular disk, L. The disk L has in its periphery one, or preferably several, notches, *n n*. It should be placed at a certain distance from the lower end of the tube V, and leave a certain length of free tube between it and the lower fork of the support S. A driving-band, M N, drives the pulley P, and consequently the tube V and the disk L.

T is a central tube arranged within the tube V, but not in contact therewith, and suspended from the top of the support S by means of a star-like flange, *t*, the teeth of which engage under the head of a screw, *u*, secured in the top of the support S, preventing this central tube from turning with the exterior tube, V, and from being raised by the act of drawing the thread into or through said tube T. At the lower end of this tube T is placed an agate bushing, *a*. At its upper end is a ferrule, *b*, of glass, porcelain, platinum, or agate. The bushing *a* is applied upon a small metal bushing, *c*, having a taper bore for the guiding of the drawing-hook, and the said bushing *a* is secured in the tube by burring over the end of the tube.

The driving-band M N is the only means of retaining the rotary tube V against the bearings formed by the back parts of the forks, the tube thus turning very easily with the slightest drop of oil, and even without any other lubrication than the little water which is naturally thrown upon it during the operation. The effort of the band M N is then very considerable in producing the regular rotation of the pulley M, tube V, and disk L, which rotate at the rate of twelve hundred or fifteen hundred revolutions a minute, and even at a higher velocity, if desired.

The operation of the apparatus is as follows: The thread of silk being formed by the union of a number of cocoon fibers and being passed through the tube T, then conducted to the swift, in order to add to the group of fibers the fiber from a new cocoon, it is sufficient to bring the free end of the fiber of this cocoon near the disk L, by simply passing the finger which holds it near the portion of the tube V, between the disk L and the lower fork of the support S. The lens L, rotating with great velocity, striking and quickly seizing this end, which is very slightly stretched at an intermediate point in its length between the finger of the spinner and the cocoon from which it comes, folds it in two parts, which, under this action, both tend to assume a horizontal position in such manner that the first part rolls itself upon and attaches itself to the tube above the disk, while the second part rolls itself upon and attaches itself to the portion of the tube below the disk, the cocoon by its weight being caused to yield its fiber in such manner that the latter, after having made two or three revolutions upon the lower portion of the tube, is thrown upon the thread or collection of fibers which is ascending in the same manner that it had previously been thrown by the disk upon the tube—that is to say, almost

horizontally, if its speed of rotation is sufficient.

It may be understood that the rising collection of fibers being met by this violently-projected fiber end produces upon the latter the effect of a fixed obstacle. The fiber end breaks on this obstacle or between it and the edge of the tube V—that is to say, in a space which cannot be in any case greater than the distance between the edge of the tube V and the hole in the agate bushing *a*—about from two to three millimeters. The extremity of the fiber of the cocoon is caught under another fiber, which connects it with the thread, as I have observed by inspection with a microscope. The throwing is thus very rapid, it never fails, and it is perfect, as the end is always thrown short, and consequently particularly well connected to the thread; hence no loose projecting fibers on the surface of the thread are caused by this throwing, which, owing to this fact, without speaking of the certainty and rapidity, is incomparably better than the throwing effected by any spinner, whatever may be her dexterity.

The débris which accumulates upon the disk and upon the tube above and below the disk, shows with what perfection and with what certainty my apparatus operates to mechanically throw the ends of the cocoon fiber.

The characteristic points of my new device for throwing are found—

First, in the position of the disk L with relation to the lower edge of the tube V, to which it is attached. In effect this position of the disk is determined by the speed with which the apparatus rotates. The greater this speed the more the fiber end caught tends to double itself near the disk. Then the shorter may be the portion of the tube below the lens, and vice versa. It is necessary that this caught end does not escape this portion of the tube; but, on the contrary, that it meets it and fixes itself thereto by about one and one-half to two coils. It is certain that with an exterior tube, V, of six or seven millimeters in diameter, and disk L, of twenty to twenty-five millimeters, a speed of twelve hundred revolutions a minute, the end will be forcibly thrown upon the lower part of the tube; that it will then have but four to five millimeters of length and will fix itself on the tube by two or three coils; that thence it will be thrown almost horizontally near the orifice of the agate bushing *a*; that it will be broken in this short space, and that the end, perfectly attached to the rising thread, will not have a length more than two or three millimeters at most. It may be seen from what has been just stated that the position of the disk L upon the tube V—that is to say, the spare portion of the tube below the disk—should be calculated according to the speed of rotation and the diameters of the disk and of the tube; that my apparatus, constructed according to the principles of physical laws well known and established, operates with mathematical precision. The cocoon-

fiber end, which is delivered to it without any particular precaution or special preparation, is seized and shortened by breaking off the extremity in a precise point. It preserves very carefully on one side the débris, which should not be taken upon the thread and which would foul it, and it feeds the thread without loss of time and without the least hesitation or possible default. The end of the new cocoon fiber is, by my invention, made shorter than it is possible for the most adroit spinner to make, for it may be assured that the said end will never exceed two or three millimeters in length if the construction of the apparatus and its speed of rotation have been calculated to obtain this precise result.

Second, in a centrally-fixed tube, T, isolated from the exterior revolving tube, thus preventing all friction, and consequently all fraying of the silk. Moreover, this central tube, being isolated from the movement of rotation, permits the stoppage of the winding reel or swift and the take-up movement of the thread for knotting or any other purpose without any danger of the thread kinking at the entering of the agate bushing and afterward breaking when it is again set in motion. In short, it prevents the accidents of breakage which are produced when the cocoon rises and encounters a rotating tube.

Third, in the mounting of the exterior tube in forked bearings in such manner that it turns with little resistance and lubrication; that it may be easily and rapidly removed by slipping of the band M N and as quickly replaced after the interior and exterior cleaning of the two tubes.

I will remark that without in any way changing the principles of my invention I may change the form of the disk L, which, instead of being lenticular, may be approximate to a sphere or any other form.

The tube V and its disk L may have an intermittent operation, so that it will only operate when desired, and even only at the proper moment for throwing, by leaving the band M N loose and only pressing upon it when it is desired to operate. The tube V, rotating about the fixed interior tube, T, may be compared with a sort of circular shears.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The combination of the fixed tube, the exterior rotatory tube, means for rotating the latter, and the notched disk or filament-throwing device fixed on said rotatory tube, the latter projecting a short distance below the edge of said disk or device from which the filament is thrown, substantially as described.

2. The combination of the stationary tube, the surrounding rotatory tube, the lower ends of said tubes being in approximately the same horizontal plane, and the notched disk carried by said rotatory tube, the latter projecting a short distance below the outer edge of said disk, substantially as described.

3. The combination of the support, the outer tube rotating in bearings therein, the stationary tube within but not in contact with the outer tube, the filament-throwing device carried by the outer tube, and means for rotating the latter, substantially as described.

4. The combination of the support provided with forked bearings, the rotatory tube supported in said bearings and readily removable therefrom, the filament-throwing device carried by said tube, and the inner stationary tube, substantially as described.

5. The combination of the support having two forked bearings, the rotatory tube supported in said bearings, the filament-throwing device fixed to said tube a short distance from the end, there being a length of free tube between it and the lower end of said tube and between it and the lower fork, means for rotating said tube, and the inner stationary tube, substantially as described.

6. The combination of the support, the rotatory tube supported in bearings therein, the filament-throwing device carried by said tube, the inner tube suspended from said support by a star-like flange, and the screw fixed to said support, under the head of which the said flange engages, preventing said tube from turning or moving longitudinally, but admitting its ready removal when desired, substantially as described.

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

LÉON CAMEL.

Witnesses:

F. J. RAYMON,
LOUIS JUBIEN.