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H. GIES

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METHOD OF AND APPARATUS FOR PREPARING SLIVERS

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Fig. 1

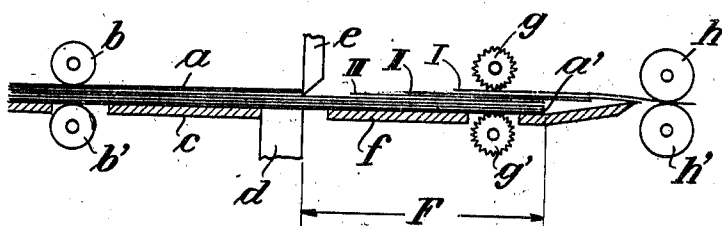


Fig. 2

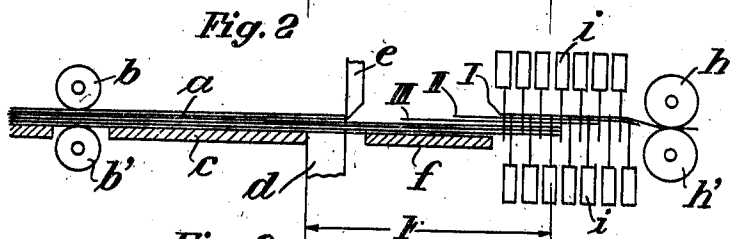


Fig. 3

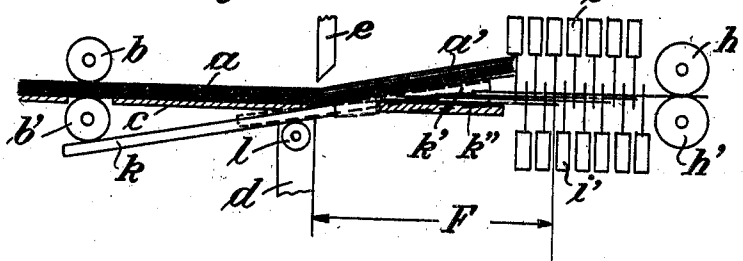
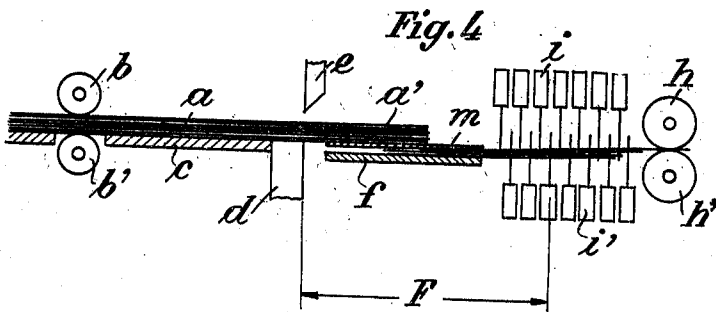


Fig. 4



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METHOD OF AND APPARATUS FOR
PREPARING SLIVERS

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13 Claims. (Cl. 19—150)

My invention relates to a method of, and to apparatus for, preparing slivers from a hank.

It is an object of my invention to provide a method resulting in a sliver which is practically, or to a great extent, homogeneous, that is, of substantially uniform condition throughout its cross-section.

To this end, I feed a hank to cutting means arranged to cut transversely to the thickness of the hank, cut the threads, and exert tension on each thread while it is being severed by such cutting means, so that each thread is taken up under this tension immediately after it has been completely severed.

Instead of cutting each thread individually, I may cut the threads in groups or layers and take up each group or layer under tension in the manner described.

In this manner, the operation of cutting the complete hank is subdivided into as many individual cuts as there are threads, or groups or layers of threads, in the hank, and each thread, group, or layer is taken up. The take-up pulls the threads, etc., away from the hank as soon as they have been severed, and combines them into a sliver.

It is another object of my invention to provide a method of the kind described in which the end of the hank, after having been fed and before it is cut, is united with the sliver already partly formed, and taken up with the sliver after having been severed.

To this end, I feed the hank as described, interrupt the feed, cut the threads of the hank, take up the cut threads, interrupt the taking-up before all of the cut threads have been taken up, restart the feed, deposit the fed end of the hank on the thread residue remaining after the taking-up has been interrupted, and restart the cutting and the taking-up operations on the fed end of the hank and the thread residue.

It is another object of my invention to provide suitable apparatus for performing the aforesaid methods.

To this end, I have designed the machines which have been illustrated by way of example in the accompanying drawing in which

Fig. 1 is a diagrammatic elevation of a machine with a pair of cylinders as the take-up means,

Fig. 2 is a similar elevation of a machine with two sets of needle bars as the take-up means,

Fig. 3 shows the machine illustrated in Fig. 2 equipped with a reciprocating and oscillating support for the fed end of the hank, and

Fig. 4 shows the same machine with a transversely reciprocating plate instead of the support.

Referring now to the drawing, and first to Fig. 1, *a* is the hank from which the slivers are prepared, *b* and *b'* are an upper and a lower feeding cylinder, and *c* is a feeding table along which the hank *a* is fed to the anvil *d* of a cutter equipped with a reciprocating blade *e* for cutting the hank transversely to its thickness. Means, not shown but old in the art, may be provided for imparting oscillating or similar movement to the blade *e* while it cuts the threads of the hank *a*.

Arranged at the rear of the cutter *d*, *e* is a take-up table *f* with a pair of taking-up cylinders *g*, *g'*. Means may be provided for slightly elevating the upper take-up cylinder *g* for a purpose which will be explained with reference to Figs. 3 and 4. The taking-up cylinders may be fluted as shown, or they may be plain, roughened, or knurled, or equipped with needles. The cylinders may be built up from disk-shaped elements arranged at right angles, or at some other angle, to the axis of the corresponding cylinder. The rear end of the table *f* is curved in upward direction toward the gap between two delivery cylinders *h* and *h'*.

In operation, the feeding cylinders *b*, *b'* are rotated to feed the hank *a* through between the anvil *d* and the blade *e* onto the take-up table *f* for a distance *F* from the rear end of the anvil *d*. The feeding cylinders are then stopped and the blade *e* descends to cut the threads of the fed hank end *a'*. The distance *F* is so determined that the rear end of the fed hank portion *a'* projects beyond the taking-up cylinders *g* and *g'*. The taking-up cylinders are normally pitched apart for a distance substantially equal to the thickness of the hank so that the end *a'* passes freely between them. The cylinders are now moved nearer together, or the upper cylinder *g* is lowered toward the lower one *g'* so that some pressure is exerted on the threads of the end *a'*, and the taking-up cylinders are rotated while the blade *e* descends. In this manner the threads are under tension while being severed, and each completely severed thread is immediately taken up and moved to the rear by the cylinders *g*, *g'*. The topmost thread I of the hank end *a'* leads and the other threads follow in stepped relation, as shown for the two subsequently cut threads II and III. The threads are finally engaged by the delivery cylinders *h* and *h'* and united to form a sliver by means known in the art and not illustrated.

When all threads of the hank have been cut, taken up and delivered, the taking-up and delivery cylinders are stopped, the taking-up cylinders are moved apart, or the upper cylinder *g* is elevated, the blade *e* is moved clear of its anvil *d*, and the feeding cylinders *b*, *b'* are rotated to feed the hank for another distance *F*. The machine is now ready for the next cycle.

Referring now to Fig. 2, this machine is similar to the machine in Fig. 1 and is only distinguished from it by the arrangement of an upper set *i* of needle bars, and a lower set *j'* of needle bars, instead of the taking-up cylinders *g* and *g'*. The needles engage, and take up, the threads as they are cut by the blade *e*, in a manner similar to the operation of the taking-up cylinders *g*, *g'*. In addition to the taking-up movement of the needles, they comb and separate the threads.

The sets of needles—instead of which a single set may be provided if desired—may be adjustable so as to vary their distance from the anvil *d*, and a similar arrangement might obviously be provided for the taking-up cylinders *g* and *g'*. Any number of needle-bar sets, or of pairs of taking-up cylinders, may be arranged in series.

Instead of uniting the threads to form a continuous sliver after they have moved past the delivery cylinders *h*, *h'*, as described, it is preferred to unite part of the threads which have been cut but have not yet been taken up, with the threads of the end of the hank which is fed for the subsequent cutting operation. This is effected by stopping the taking-up cylinders *g*, *g'*, or the needle bars, or bar, *i* and *i'* before all of the cut threads on the take-up table *f* have been taken up, and depositing the newly fed end *a'* of the hank *a* on the thread residue, so that the residual threads and the threads of the fresh end are taken up together and form a continuous sliver.

Means designed for the uniting operation just detailed, have been illustrated in Figs. 3 and 4 in combination with the machine illustrated in Fig. 2, but it is understood that such means might also be combined with a machine having the taking-up cylinders *g* and *g'* instead of the needle bar sets *i* and *i'*.

Referring now to Fig. 3, a movable support *k* is provided for the end *a'* of the hank, and mounted to slide on, and to oscillate about, a roller *l* on the anvil *d*.

The operation of this support is as follows: When the taking-up means *g*, *g'* or *i*, *i'* are stopped, a residue of thread is still present on the take-up table *f*. The feeding cylinders *b*, *b'* are now operated and feed the end *a'* of the hank *a* for the distance *F*. The support *k* is normally in its initial position as shown in full lines in which it is inclined upwardly. When the feeding cylinders *b* and *b'* start, the support *k* is at the same time shifted into the position *k'* in which it is inclined at the same angle as before but its rear end is now above the take-up table *f* and holds the end *a'* above the thread residue on the take-up table *f*. From this position, it is oscillated about the roller *l* and into the substantially horizontal position *k''*, and finally retracted into its initial or full-lines position, leaving the end *a'* on the thread residue on the take-up table *f*. The taking-up means *i*, *i'*—or the cylinders *g*, *g'*—are now operated and take up together the residue and the fresh threads. Preferably, in order to facilitate the introduction of the end *a'* between the taking-up means, the upper cylinder *g*, or the first needle bar in

the upper set *i*, is slightly elevated until the end has passed below it.

Referring now to Fig. 4, the shiftable and oscillating support *k* is replaced by a plate *m* which is only shiftable transversely and in substantially horizontal position. It is advanced when the end *a'* starts for its feeding movement, an intermediate stage of which is illustrated in Fig. 4, and holds the end *a'* above the thread residue still on the take-up table until the feeding movement has been completed. After the completion of the feeding movement, the plate *m* is retracted and the hank end *a'* and the residual threads are taken up together, as described with reference to Fig. 3.

Any suitable mechanism, not shown, may be provided for operating the support *k*, or the plate *m*. For instance, a pin is arranged at a suitable point of the support *k* and is moved about a cam plate, or through a cam slot, for moving the support into its several positions, and similar means may be employed for advancing and retracting the plate *m*.

The sets of needle bars *i*, *i'*, or the taking-up cylinders *g*, *g'*, if equipped with needles, may be arranged to oscillate so that their needles can enter between the threads of the hank end *a'* and separate and comb them before the cutter *d*, *e* is started to operate, in order to produce a more open structure of the sliver.

It is also possible to provide an extra set of needle cylinders, or of needle bars, for combing the threads, and another set for taking up the threads in the manner described.

It is understood that the term "threads" as used in the specification and the claims includes any elements making up the hank *a*, such as strands or fibers.

I claim:

1. The method of preparing continuous slivers from a hank, comprising feeding the hank, interrupting the feed, cutting the threads of the hank, taking up the threads during the cutting operation, interrupting the taking-up before all of the cut threads have been taken up, restarting the feed, depositing the fed end of the hank on the thread residue remaining after the taking-up has been interrupted, and restarting the cutting and the taking-up operations.

2. In a machine for preparing slivers from a hank, cutting means arranged to cut transversely to the thickness of the hank, means for feeding the hank to the cutting means, and taking-up means arranged at the rear of the cutting means for exerting tension on each thread while it is being severed during the cutting operation and taking up each thread immediately after it has been severed.

3. In a machine for preparing slivers from a hank, cutting means arranged to cut transversely to the thickness of the hank, means for feeding the hank to the cutting means, and taking-up means arranged at the rear of the cutting means at a distance which is shorter than the distance through which the hank is fed, for exerting tension on each thread while it is being severed during the cutting operation and taking up each thread immediately after it has been severed.

4. In a machine for preparing slivers from a hank, cutting means arranged to cut transversely to the thickness of the hank, means for feeding the hank to the cutting means, and taking-up cylinders arranged at the rear of the cutting means for exerting tension on each thread while it is being severed during the cutting operation

and taking up each thread immediately after it has been severed.

5. In a machine for preparing slivers from a hank, cutting means arranged to cut transversely to the thickness of the hank, means for feeding the hank to the cutting means; and a taking-up cylinder arranged at the rear of the cutting means for exerting tension on each thread while it is being severed during the cutting operation and taking up each thread immediately after it has been severed.

6. In a machine for preparing slivers from a hank, cutting means arranged to cut transversely to the thickness of the hank, means for feeding the hank to the cutting means, and a pair of sets of needle bars arranged at the rear of the cutting means for exerting tension on each thread while it is being severed during the cutting operation and taking up each thread immediately after it has been severed.

7. In a machine for preparing slivers from a hank, cutting means arranged to cut transversely to the thickness of the hank, means for feeding the hank to the cutting means, and a set of needle bars arranged at the rear of the cutting means for exerting tension on each thread while it is being severed during the cutting operation and taking up each thread immediately after it has been severed.

8. In a machine for preparing slivers from a hank, cutting means, means for feeding the hank to the cutting means, means arranged at the rear of the cutting means for taking up part of the threads during the cutting operation, and means for first keeping the fed end of the hank away from, and then depositing it on, the threads which have not been taken up.

9. In a machine for preparing slivers from a

hank, cutting means, means for feeding the hank to the cutting means, means arranged at the rear of the cutting means for taking up part of the threads during the cutting operation, and reciprocating means for first keeping the fed 5 end of the hank away from, and then depositing it on, the threads which have not been taken up.

10. In a machine for preparing slivers from a hank, cutting means, means for feeding the 10 hank to the cutting means, means arranged at the rear of the cutting means for taking up part of the threads during the cutting operation, and reciprocating and oscillating means for first keeping the fed end of the hank away from, 15 and then depositing it on, the threads which have not been taken up.

11. The method of preparing slivers from a hank, comprising feeding the hank, cutting its threads transversely to the thickness of the hank, 20 exerting tension on each thread while it is being severed, and taking up each thread immediately after it has been severed.

12. The method of preparing slivers from a hank, comprising feeding the hank, cutting its 25 threads transversely to the thickness of the hank, exerting tension on each thread while it is being severed, taking up each thread immediately after it has been severed, and combing the threads during the taking-up.

13. The method of preparing slivers from a hank, comprising feeding the hank, cutting its 30 threads transversely to the thickness of the hank, exerting tension on each thread while it is being severed, combing the threads, and taking up 35 each thread immediately after it has been severed.

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