ABSTRACT

A process to separate fibers from pierced cocoons comprising is disclosed. The process comprises in the steps of deflossing of cocoons. Placing a heavy metal piece inside the cocoons and then reeling silk fiber from the cocoons into a bobcoons to obtain continuous silk filament.

FIELD OF INVENTION

This invention relates to a process to obtain continuous silk filaments from pierced and cut cocoons. The process is useful as a continuous silk filament is obtained from the cut / pierced cocoons.

BACKGROUND OF THE INVENTION

Silk cocoons are sorted out according to the color, size, shape and texture as these affect the final quality of the silk. More importantly, the cocoons are sorted on the basis of whether there is cut or pierce on the surface of the cocoons. Only those cocoons are selected for reeling which are not pierced to obtain a continuous filament of silk. The pierced cocoons do not contribute in the production of silk filaments. This phenomenon leads to a lot of wastage of the silk that could be obtained from the pierced cocoons.

Attempts to recover silk filaments from the pierced cocoons have been made earlier. According to a known process pierced / cut cocoons are placed in a solution of soap and water for around two weeks to permit fermentation to destroy gummy substance, sericin, by rotting process and thus to allow silk fibers to separate from each other. However, the method employed has certain shortcomings such as emission of foul odour, affecting sanitary conditions, aggravating pollution and the uncertainty of the fermentation conditions as it depends upon temperature, weather conditions and impeccable skill.

In the US patent no. 335958, a process for the separation of silk fibers from pierced cocoons is disclosed. According to the process a solution of hydrochloric acid mixed with water is utilized for the separation of silk fibers. A disadvantages associated with the conventional process is that it is not an eco-friendly process and requires hydrochloric acid to be removed from the silk fibers once it is separated from the pierced cocoons leading to water pollution. Moreover, the patent does not speak anything about obtaining continuous filament of silk after separation of the fibers from the pierced cocoons.

Therefore, there is a need for a process of separation of silk filaments from pierced cocoons which yields continuous filaments to be used in textiles as well as other accessories.

OBJECTS OF THE INVENTION

Therefore, an object of the present invention is to provide a process to obtain continuous silk filaments from pierced and cut cocoons which obviates the disadvantages associated with the prior art.

Another object of the present invention is to provide process to obtain continuous silk filaments from pierced and cut cocoons to obtain continuous raw silk filament from pierced cocoons.

STATEMENT OF THE INVNTION

According to this invention there is provided a process to obtain continuous silk filament from pierced and cut cocoons comprising (i) deflossing of cocoons (ii) placing a heavy metal piece inside the cocoons and (iii) reeling silk fiber from the cocoons into a bobcoons to obtain continuous silk filament.

DETAILED DESCRIPTION OF THE INVENTION

A process to obtain continuous silk filament from pierced and cut cocoons according to a preferred embodiment is herein described and illustrated with reference to the accompanying examples.

In the following description, like reference characters designate like or corresponding parts throughout the several illustrations shown in examples. It is also understood that the terms "a", "an", "the" and like are words for the sake of convenience and are not to be construct as limiting terms. Moreover, it will be understood that the illustrations are for the purpose of describing a particular exemplary embodiment of the invention and do not limit the invention thereto.

Silkworms possess a pair of specially modified salivary glands called sericteries, which are used for the production of fibroin – a clear, viscous, proteinaceous fluid that is forced through openings called spinnerets on the mouthpart of the larva. Liquid secretions from the two large glands in the insect emerge from the spinneret, a single exit tube in the head. The diameter of the spinneret determines the thickness of the silk thread, which is produced as a long, continuous filament. The secretions harden on exposure to the air and

form twin filaments composed of fibroin, a protein material. A second pair of glands secretes a gummy binding fluid called sericin which bonds the two filaments together. The silkworm rotates its body in a figure-8 movement some three lakh times, constructing a cocoon. It is an oval casing of silk filaments spun by the silkworm around itself when it transforms into the next stage called pupa. Cocoon is the most desirable stage for the silk producers.

The conventional method practiced by the silkworm farmers is that they sort and select the best cocoons according to the colour, size, shape, texture as these affect the final quality of silk. These cocoons are treated as seed cocoons, i.e. for cultivating for the next generation.

However, after the grain age when the moths emerge out of the seed cocoons by secreting an enzyme which dissolves the cementing substance in the cocoon walls, the seed cocoons transform into cut or pierced cocoons. Grain age is defined as an institution where silkworm seed is produced and sold to rearers. These cut or pierced cocoons are rejected from being used in good quality silk production because of their incapability of generating continuous silk filaments. Thus, a lot of silk goes to waste.

According to the process of this invention the cur / pierced cocoons are de-flossed in a medium. A heavy weight piece, preferably of round shape, is then placed inside the cut / pierced cocoon. The cocoon is then placed in the medium for reeling of the silk fiber from the cocoon in the form of a bobcoon so as to obtain a continuous silk filament.

All the above mentioned steps of the process can be conducted both in dry as well as in wet conditions. Dry condition means all the steps of the said process being conducted without coming into contact with a medium. Wet condition involves the use of cooking medium comprising water with the concentration of washing soda (sodium carbonate) in the range of 5 - 17%. Preferably, the concentration of washing soda in the water is kept in the range of 8 - 15%. The cooking medium is kept in a metal tray so as to keep the cooking medium at a temperature range of 55 - 85° C. The preferable temperature range is 62 - 80° C. This cooking medium is needed to practice the process of the present invention from the step of deflossing to the step of reeling of silk fibers from the cocoons.

In one embodiment the cocoon are first subjected to the step of flossing so loosen silk fibers from the outer part of the cocoons. The loose silk is retained before reeling starts and used in the production of spun silk. It is of low grade and is available only in small quantities.

According to the present invention deflossing of pierced cocoons is done manually. The floss of the cocoon surface i.e. the unwanted portion of the cocoon is removed gently by hand until a continuous filament is obtained. The same process is applied to both dry and wet reeling. However the deflossing of the wet reeling is easier than the dry reeling. This process is done at a temperature range of 15 - 35°C and pressure of 750 - 765mm Hg with the humidity range of 50% to 95%.

The next step of the process is to place at least one heavy material piece in the cocoon. The heavy material could be of lead, iron, other heavy metals, steel, alloys, marble, stone. The size of the heavy material piece varies upon the size of the open mouth (hole) of the cut and pierced cocoon. The weight of the material must be in a range of 5 – 12 gm with an average diameter in the range of 0.9 - 1.8 cm. The heavy material piece placed inside the pierced cocoon is preferably a ball made from pure lead metal in lieu of other metals because the shape of the lead ball can be changed so as to slip into the inside of the cocoon, irrespective of hole size.

Now the reeling of the silk fibers is done to form bobcoons. Reeling is the process of unwinding the silk filaments from the cocoon and combining them together to make a continuous thread of raw silk. As the filament of the cocoon is too fine for commercial use, three to ten strands are usually reeled at a time to produce the desired diameter of raw silk which is known as "reeled silk".

The bobcoon is a term used in the post cocoon technology. Several cocoons can be transformed into a bobbin cocoon i.e. bobcoon, which has a tremendous use in post cocoon technology. Various thickness of the silk yarn may be made using different numbers of bobcoons.

The process of reeling or transformation of a pierced cocoon into a bobcoon comprises finding the end of the silk filament after deflossing, followed by the tying of the end of the filament into a bobbin and reeling them to obtain a bobcoon. The bobcoon may be made from any type of bobbins available in the market or pulley with deep groove. The greatest advantage of bobcoon is that an endless continuous silk filament is obtained.

When the process of reeling is completed, measurement of the reeled filament is taken by extending the filament post to post (sticks) with 15 - 25 m apart.

The process of the present invention is now described with the help of the following examples.

Example 1

Reeling of dry cut and pierced cocoons

Deflossing of 'cut and pierced' cocoons in dry condition is done at 20° C and 760 mm Hg. A heavy material piece of the desired shape is then placed inside the cocoon to make it heavy. And then reeling of cut and pierced cocoons i.e., transforming a 'cut and pierced' cocoon into 'bobcoon' in dry condition is done.

Example 2

Reeling of cut and pierced cocoons in wet cooking medium

A cooking medium is prepared by adding 8% sodium carbonate solution in water at a temperature of 60° C. The cut / pierced cocoons are then subjected to the step of deflossing in wet condition that is cooking medium. A heavy metal piece (ball) is then placed inside the cocoon to make it heavy. And then reeling of silk fiber from the cut and pierced cocoons is done to form bobcoonc, i.e., transforming a 'cut and pierced' cocoon into 'bobcoon' in wet condition.

Certain features of the invention have been described with reference to the example embodiments. However, the description is not intended to be construed in a limiting sense. Various modifications of the example embodiments as well as other embodiments of the invention, which are apparent to the persons skilled in the art to which the invention pertains, are deemed to lie within the spirit and scope of the invention.

I CLAIM;

1. A process to separate fibers from pierced cocoons comprising (i) deflossing of cocoons (ii) placing a heavy metal piece inside the cocoons and (iii) reeling silk fiber from the cocoons into a bobcoons to obtain continuous silk filament.

2. The process as claimed in claim 1, wherein the step of deflossing is carried out manually to remove unwanted portion of the cocoons gently by hand in a medium.

3. The process as claimed in claim 1, wherein the heavy metal comprises a piece of lead, iron, metal alloy or another heavy metal and stone in a ball like shape having a weight in the range of 5 to 15 gm and diameter in the range of 0.9 to 1.8 cm.

4. The process as claimed in claim 1, wherein reeling of silk fiber is carried out preferably in a wet cooking media at a temperature ranging from 15 ^{0} to 35 ^{0}C, preferably at 20 ^{0}C to 25 ^{0}, and at pressure ranging from 750 to 770, preferably 755 to 760, mm of Hg with a humidity in the range of 50% to 95%.

5. The process as claimed in claim 4, wherein the wet cooking media comprises water having sodium carbonate (washing soda) in the range of 5% to 17%, preferably 8% to 15 % by weight kept in a metal tray at a temperature of 55 to 85^{0}C for use from deflssing to reeling of silk fiber.

6. The process as claimed in claim 4, wherein reeling of silk fiber from cocoon is done by taking three to ten strand to form a bobcoon so as to obtain continuous raw silk filament of the desired diameter.

7. The process as claimed in claim 5, wherein the wet cooking media is kept at a temperature in the range of 62 to 80^{0}C for use from deflossing to reeling of silk fiber from the cocoons.

8. The process as claimed in claim 3, wherein for the dry media all the steps of reeling silk filament from cocoons are carried out at room temperature and at atmospheric pressure.

9. The process to separate fibers from pierced cocoons substantially as herein described and illustrated.

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