Metallic Wire for High-Speed and High-Production Cotton Card

Part 4 : Testing in taker-in part

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— Abstract —

In high-speed and high-production carding, the yield rate of sliver is generally lowered as the speed of taker-in roller is increased.

To find out the countermeasures against the contraversial point mentioned above, carding tests were carried out by lowering the taker-in speed and by using the toothed mote knife in place of the conventional one (without teeth).

This report is related to the results of these tests.

Results

(1) The number of neps in the sliver in case of standard taker-in speed was less than that in case of the low taker-in speed.

(2) At the standard speed of taker-in there was no difference in the yield rate of taker-in wastes between the toothed mote knife and the conventional one. The yield rate of flat strip was higher with the toothed mote knife than that with the conventional one regardless of the taker-in speed.

(3) The results of Shirley Analysis of taker-in waste show that the lint contents in the wasts are the lowest at the low speed of taker-in with the toothed mote knife.

(4) The mean fibre length of sliver is kept unchanged with the toothed mote knife or the conventional one. Contrarily, the taker-in speed has the significant influences on the mean fibre length.

1. Introduction

The results of high-speed and high-production carding tests have created two problems on the taker-in part.

One is the fibre breakage on the taker-in part and the other is the decrease in yield rate of sliver according to the increase in taker-in waste.

The increase in taker-in speed and the quick opening on the taker-in part are considered to have the adverse effect on those problems.

Many of the card manufacturers keep an eye recently on the preliminary carding devices around the taker-in part to improve the carding and cleaning efficiencies in high-speed and high-production carding.

This report concerns with the results of carding tests practiced by lowering the taker-in speed and by using the toothed mote knife to resolve problems mentioned above.

2. Test condition

2-1 Toothed mote knife used for this test

Photo. 1 shows the appearance of toothed mote knife.

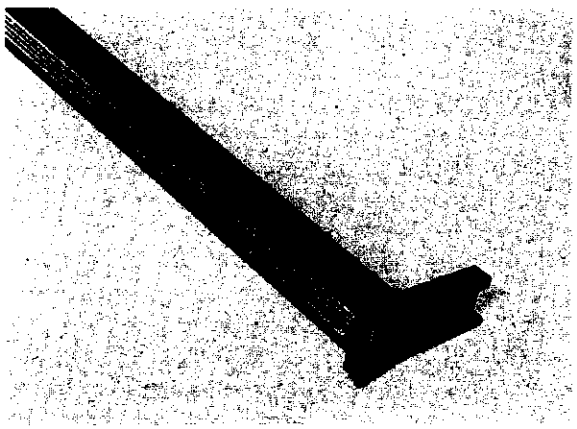

Photo. 1

Four rows of blades are buried into the mote knife as shown in Photo. 1.

2-2 Carding conditions

Carding conditions for this test are shown in table 1.

The carding test was carried out by two

Table 1 Carding conditions

Speed (rpm) Surface speed (m/s)				Top speed (mm/min)	Sliver weight (grains /6yd)	Production rate (lbs/hr)
Cylinder	Doffer	taker-in	Standard low speed			
300 (20.3)	18 (0.66)	792 (10.2)	584 (7.5)	104	590	60
450 (30.4)	27 (0.98)	1,187 (15.2)	880 (11.3)	156	590	90
650 (43.9)	39 (1.42)	1,715 (22.0)	1,260 (16.2)	226	590	130

different taker-in speeds ; i.e. the standard and the low speed.

The surface speed ratios of the cylinder speed to the taker-in speed were set at 2:1 for the standard speed of taker-in and 2.6:1 for the low speed.

The standard speed of taker-in is 1,715 rpm and the low speed is 1,260 rpm when the cylinder speed is 650 rpm.

The effect of the toothed mote knife was examined in both cases of the standard speed and the low speed of taker-in.

2-3 Main settings

Settings of each part of the card are shown in fig. 1.

When a conventional mote knife is mounted, the setting between the conventional mote knife and the taker-in is adopted at 12/1,000 inch as illustrated in Fig. 1.

The setting between the toothed mote knife and the taker-in is adopted at 12/1,000 inch at the inlet part of the toothed mote knife and at 32/1,000 inch at the outlet part of it.

3. Testing results

The changes in the quality of sliver given under the above conditions are as follows.

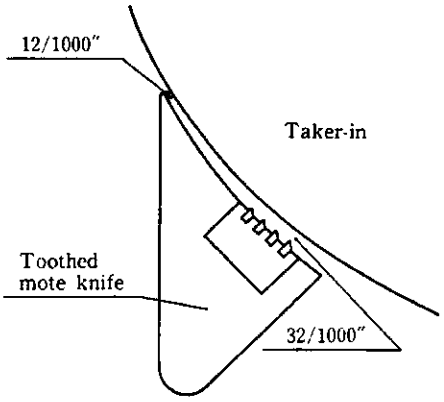

Fig. 2 Settings between the toothed mote knife and the taker-in roller

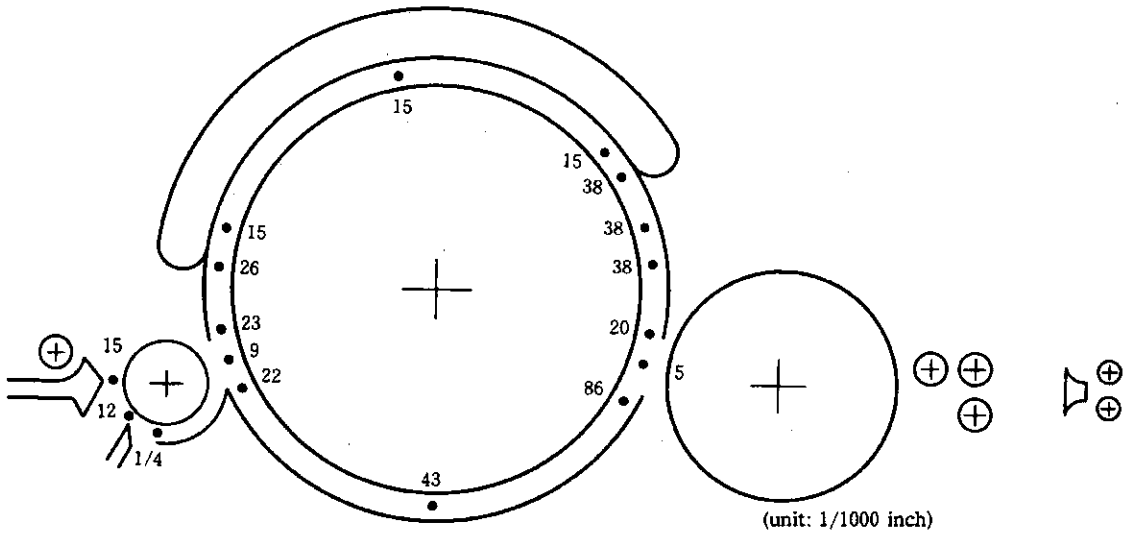

Fig. 1 Main Settings

3-1 Number of neps

The changes in the number of neps in the sliver of 1 gram are shown in Fig. 3.

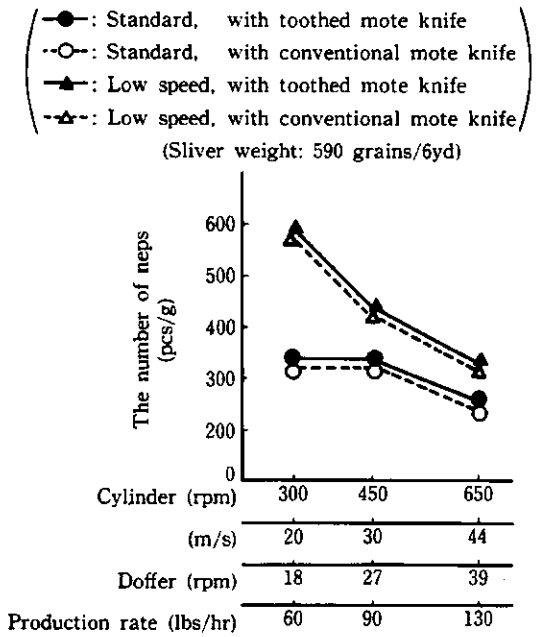

Fig. 3 The number of neps in sliver

The numbers of neps in Fig. 3 are the total number of neps including large, medium and small.

As Fig. 2 indicates, the numbers of neps are remarkably less at the standard spped of taker-in than those at the low speed.

This is probably because the carding action on the taker-in part is lowered as the result of the reduction of the taker-in speed.

In both cases of the standard speed and low speed of taker-in, no difference in the number of neps between the toothed mote knife and the conventional one was recognized in this test.

It can be, therefore, regarded that the appliance of toothed mote knife does not affect the number of neps in the sliver.

3-2 Yield rate of carding products

Fig. 4 shows the changes in the yield rate of carding products.

As shown in Fig. 4, the yield rate of taker-in waste was evidently less with the toothed mote knife than that with the conventional mote knife at the standard speed of the taker-in.

At the low speed of taker-in, there is no

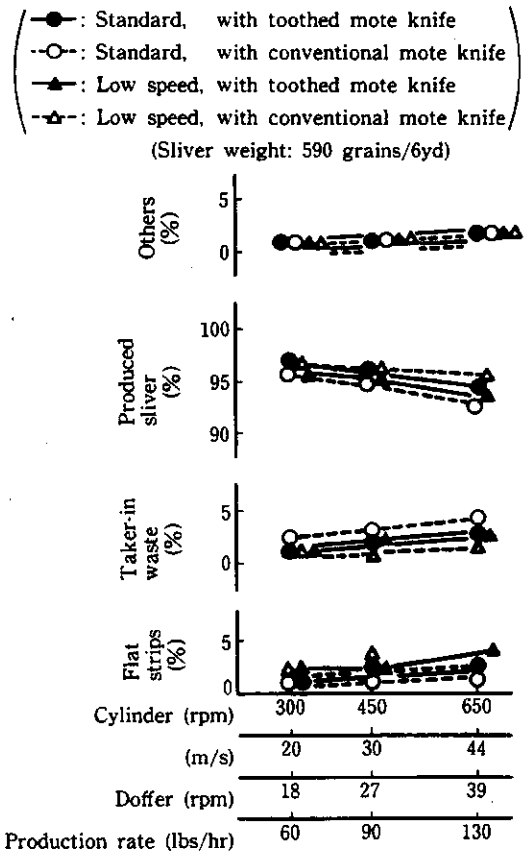

Fig. 4 Yield rate of carding products

difference in the yield rate of taker-in waste between the toothed mote knife and the conventional one.

It is supposed that the use of toothed mote knife on the taker-in part causes the facts of making the fibre tufts finer and of preventing the large fibre tufts from dropping so that the yield rate of taker-in waste could be reduced.

In view of the taker-in speed, the yield rate of taker-in waste was reduced at the low speed. Therefore, the reduction of taker-in speed is effective for reducing the taker-in waste.

The yield rate of flat strips is increased when the toothed mote knife is mounted in both cases of the standard speed and the low speed of the taker-in, but its increasing rate is higher at the low speed.

This is probably because the volume of fibre fed into the section between the cylinder and the top is increased by reducing the volume of taker-in waste.

The yield rate of sliver was lowest when the

conventional mote knife was used.

3-3 Shirley Analysis of carding wastes

(i) Shirley Analysis of taker-in waste

The result of Shirley Analysis of the taker-in waste is shown in Fig. 5.

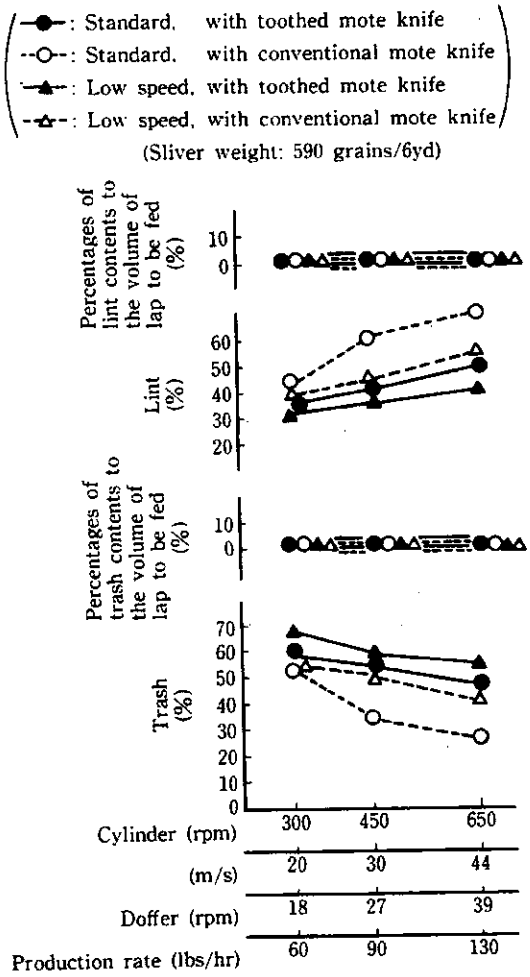

Fig. 5 Shirley Analysis of taker-in waste

As indicated in Fig. 5, the percentages of lint contents in the taker-in waste are reduced remarkably by using the toothed mote knife and also at the low speed of taker-in.

With using the toothed mote knife, the rate of reduction is higher at the standard speed than that at the low speed of taker-in.

The low speed of taker-in or the use of toothed mote knife is effective for reducing the percentages of lint contents in the taker-in waste.

The percentages of trash contents show the same tendency as those of lint contents.

(ii) Shirley Analysis of flat strip

The result of Shirley Analysis of flat strip is shown in Fig. 6.

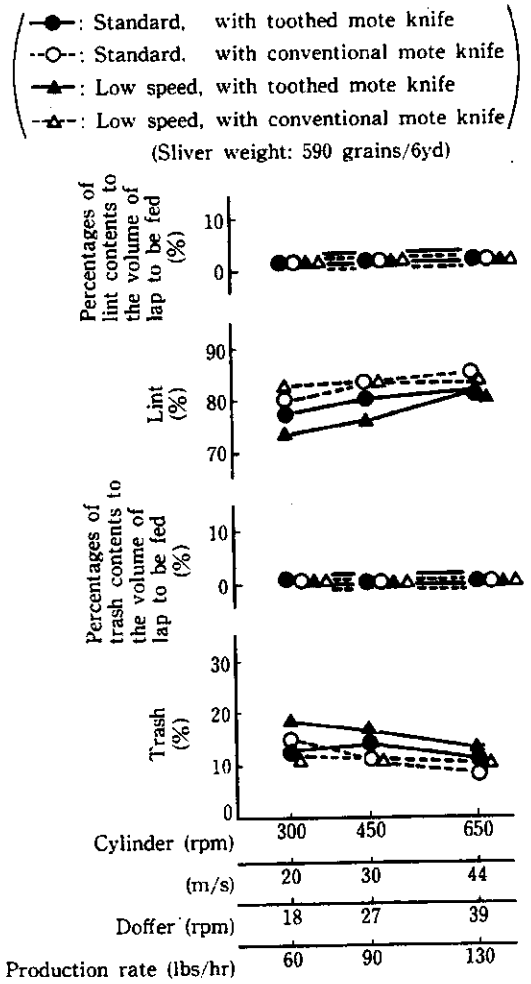

Fig. 6 Shirley Analysis of fiat strip

As the results indicate, the percentages of lint contents in the flat strips are less and the percentages of trash contents are more when the toothed mote knife is used in both cases of the standard speed and the low speed of taker-in.

This is probably because the tufts are made finer by using the toothed mote knife and because the cleaning efficiency between the cylinder and the tops is improved.

4. Mean fibre lengths of the sliver

The changes in mean fibre length of the sliver are shown in Fig. 7.

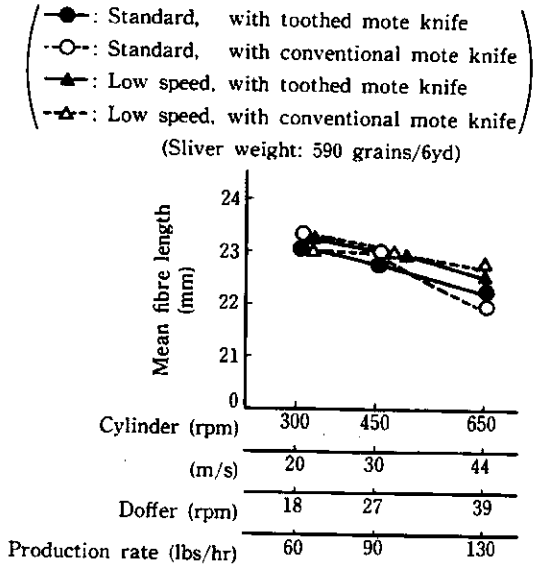

Fig. 7 Mean fibre length of sliver (with Fibrograph)

Up to the range of cylinder speed of 450 rpm, the mean fibre length of sliver was kept unchanged regardless of the taker-in speed and the type of mote knife.

At the cylinder speed of 650 rpm, the fibre length was longer and the fibre breakage was less at the low speed of taker-in.

Consequently, the use of toothed mote knife does not affect the fibre length but the taker-in speed has a strong influence on the mean fibre length.

5. Consideration

From the results of the test on taker-in part, the use of toothed mote knife does not affect the number of neps and the fibre length but improves the yield rate of sliver.

The reduction of taker-in speed improves the fibre length of sliver and the yield rate of carding products but lowers carding efficiency.

To solve these problems, therefore it will be necessary to mount the stationary flat to the taker-in side.