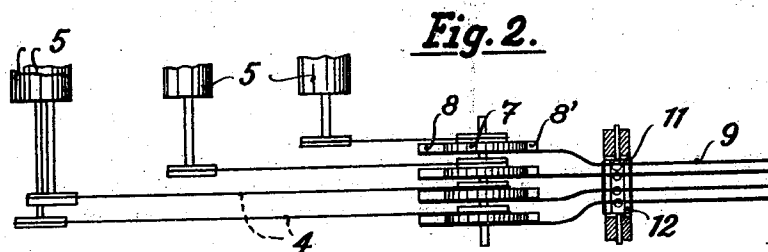
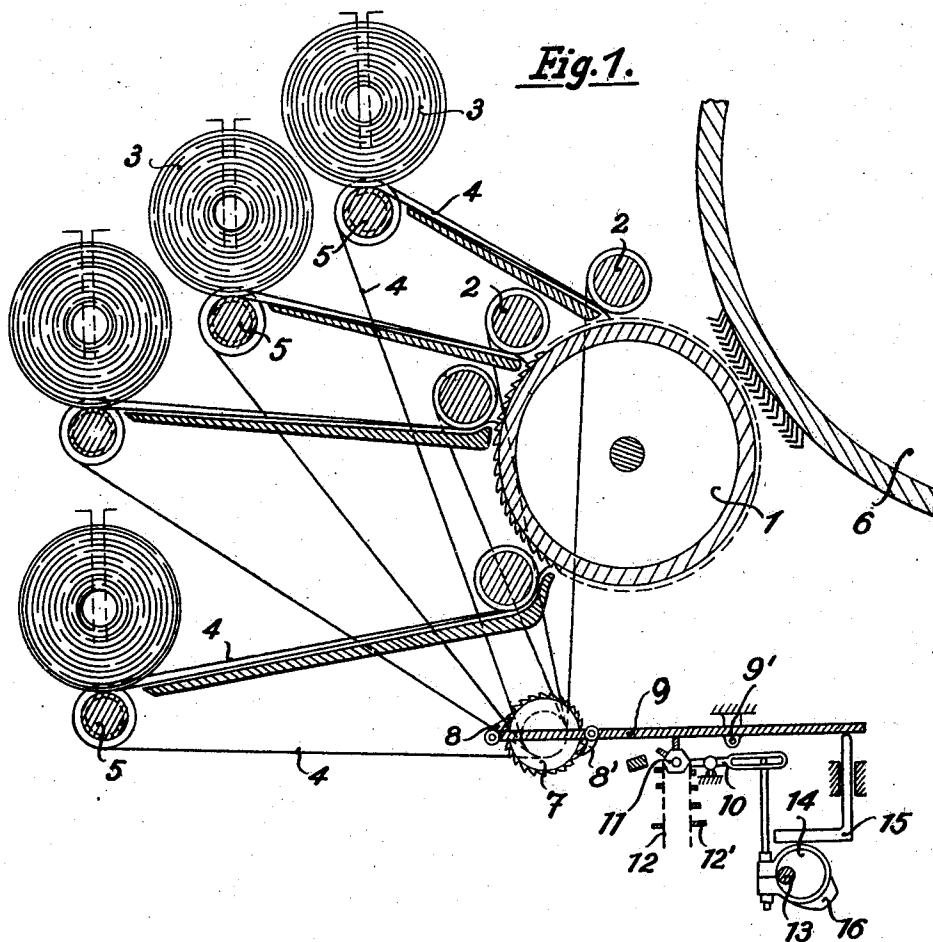


May 20, 1930.

O. HOFFMANN
SPINNING PROCESS FOR POLYCHROMATIC YARNS, DEVICE FOR
SAID PROCESS, AND THE PRODUCT OF SAID PROCESS
Filed March 2, 1926

1,759,260

3 Sheets-Sheet 1



Inventor

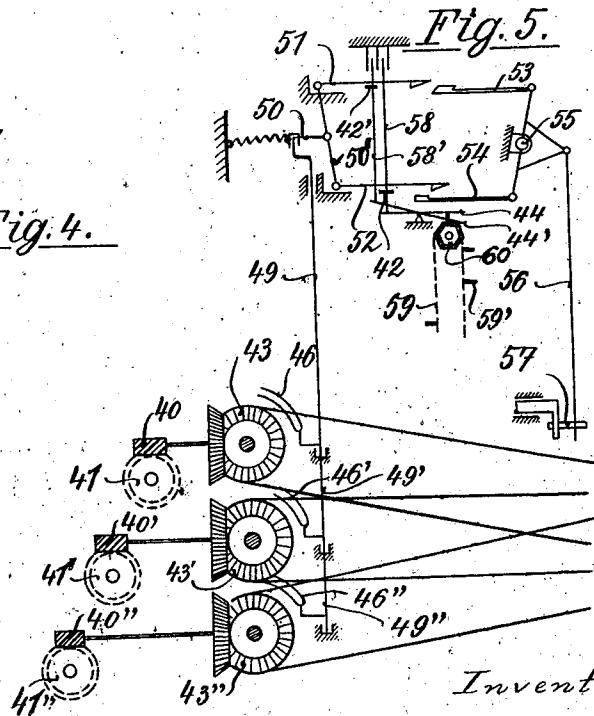
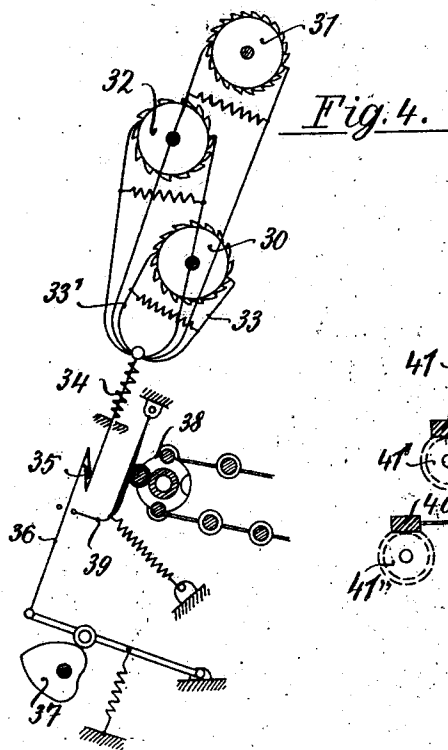
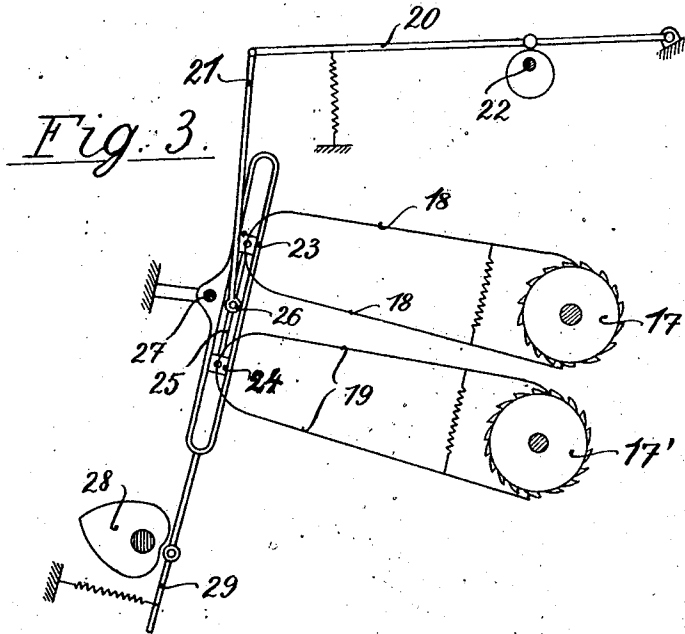
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3 Sheets-Sheet 2



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3 Sheets-Sheet 3

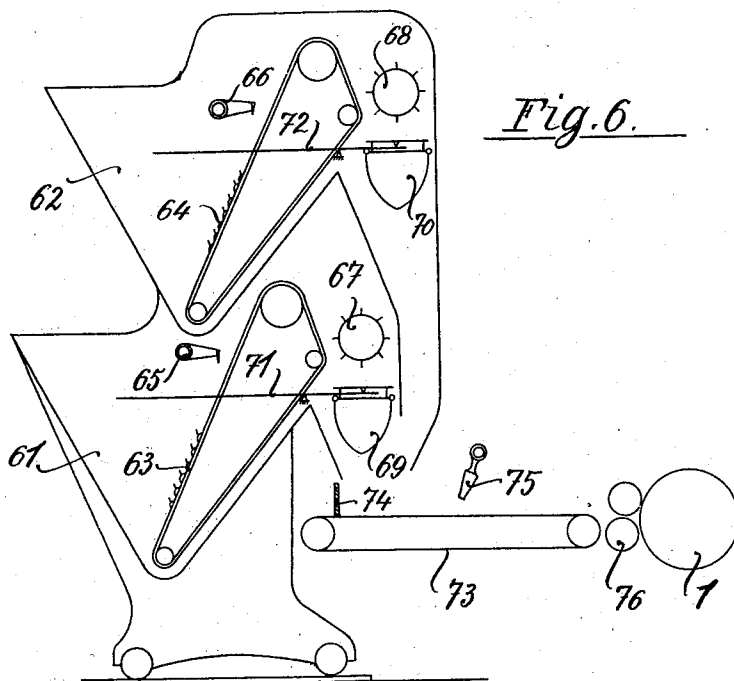


Fig. 6.

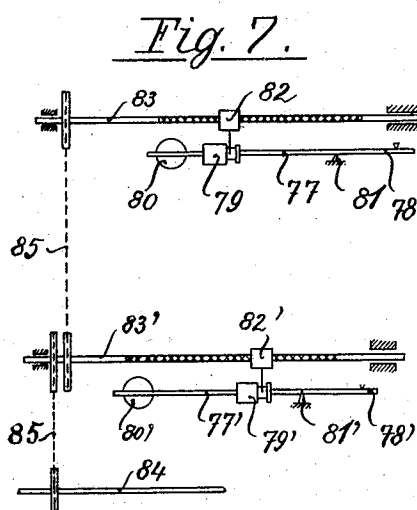


Fig. 7.

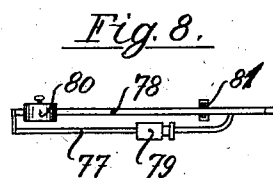


Fig. 8.

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UNITED STATES PATENT OFFICE

OSWALD HOFFMANN, OF NEUGERSDORF, GERMANY

SPINNING PROCESS FOR POLYCHROMATIC YARNS, DEVICE FOR SAID PROCESS, AND THE PRODUCT OF SAID PROCESS

Application filed March 2, 1926, Serial No. 91,754, and in Germany January 20, 1906.

Yarns, which have different colours in their length, in which the colour gradually shades off to another tinge, were hitherto made by dyeing. Such yarns, having different colours in great length, where not produced in the spinning, only so-called mixture yarns, were spun, multi-coloured, whereby fibres of different colours were mixed together either in the loose wool in a carder, in the slubbing, or the slubbing which was printed.

The present spinning process is intended to produce yarns, which are, in their length, gradually shaded off from one colour to another, whereby the shading off is obtained by gradually altering the mixing proportions of the dyed fibres from 0 to 100% of each single dyed material. According to the invention, the process for producing the slubbing is the following:

The loose fibrous spinning material, e. g. wool, is first-dyed separately to the colours, that are to show themselves in the yarn. The loose wool is fed to the speed frame, in most cases a carding machine, not in the usual manner, but at intervals. One at a time a coloured strip of one colour of the dyed material is spread over the whole breadth of the carder, then a strip of the other colour follows, of the required length.

The first colour is next worked up, and the card web or fleece delivered by the carder, shows the initial colour. Gradually the first and second colours mix together in the carder, and the delivered fleece gradually shades off to the second colour, till at last the fleece is almost entirely of the second colour.

This shading can be regularly repeated, or a second or third shade in different colours, can be attached, and then be repeated again, so that the same repetition of colours will show itself in the yarn at certain distances.

The different coloured wools could be fed by hand to the carder, but even with the most careful handling, unevenness of the length of repetition or the thickness of the yarn can hardly be avoided. In order to produce even thickness of yarn, mechanical execution of the process must be preferred. Herewith it is namely a question of two means. Either

the different coloured wools are fed to the carder as different coloured laps, or an automatic hopper feed, having several bins, which is controlled by cards, is used. While hitherto only one unicoloured lap was fed to the licking-in rollers of the carder; for carrying out the process in consideration; three or more different coloured laps are fed to the licking-in rollers, whereby devices are made use of, which regulate the feed of each single lap as required, and obtain even yarns, in such a way that the quantity of fleece (web) from the single laps remains the same, during a certain unit of time, which is led to the licking-in rollers. The regulation of the switch-arrangement for feeding the wool can be carried out either by eccentric pulleys, chains with corresponding cams, or holed card or cards with pegs etc.

On the accompanying drawings two forms of execution of the invention, with different possibilities of form of the control and switch arrangements, are illustrated wherein,

Fig. 1 is a cross section of the lick-in with part of the carder-swift, and the arrangement of the different coloured laps of fibre with switch-arrangement for feeding with pattern card and rope transmission.

Fig. 2 is a plan view thereof.

Fig. 3 is a side view of another form of execution of the switch-arrangement, with ratchet-wheels controlled by an eccentric.

Fig. 4 is a side view of a third form of execution of the reversing motion by means of ratchet-wheels controlled by the roller-card.

Fig. 5 is a side view of a fourth form of the invention of the reversing motion with cone-wheel drive, controlled by a pattern card.

Fig. 6 is a sectional side view of an arrangement for employing a hopper feed with several bins.

Fig. 7 is a side view of the automatic control-arrangement of the weighing-abilities of two scales of a hopper feed with several bins.

Fig. 8 is a plan view of a scale beam of this arrangement.

According to Figs. 1 and 2, it is assumed that the raw-material is fed to the carder in the form of laps, accordingly there are four laps 3, each of a certain colour, which are fed to the licking-in roller 1 of the carder swift, either simultaneously or partly successively through the delivery rollers 5 and the feed rollers 2. The motion of the pair of rollers 2, 5 is attained by a fork catch and pattern card system, in such a manner, that the speed of the ratchet wheel is regulated by the pattern element. The pattern card 12 must be made of suitable length, and have four rows of holes, in which pins 12' of different lengths are fixed. The pattern card is laid over a prismatic element-feed cylinder, 11, which is journaled on the one end of a double-armed lever 10 and raised and lowered by an eccentric 14, engaging the other end of said lever 10 from a revolving shaft 13, and slowly revolves intermittently on its own axle in a known manner by means not shown. Fork latches 9 pivoted at 9' and provided for working the delivery rollers 2, are arranged above said cylinder 11.

When the card feed cylinder 11 moves up and down, those pins 12' of the change card being in vertical position on the cylinder 11 will thrust each time against (left hand) parts of the fork latches 9 which carry double fork catches 8, 8' and move these parts more or less upwardly, corresponding to the length of the pins 12', so that the said catches 8, 8' reach out more or less to the accompanying ratchet wheels 7, and when the levers 9 of these wheels 7 are lowered, and by means of the rope-transmission 4 the accompanying delivery and feed rollers 5, 2 are set in motion correspondingly. The said catch carrying ends of the levers 9 are lowered by accompanying drivers 15, which push against the other ends of the levers 9 and are driven from projecting lugs 16 on the eccentric shaft 13. The length of the pins 12' regulates the angle-movement of the ratchet levers 9 each time, and in this manner the lap in question is revolved in the desired manner, that is, the required amount and colour of material is fed to the carder.

Fig. 3 shows another form of execution of the guide motion, for only two differently dyed materials. The delivery and feed rollers, (not shown in the plan) are also driven by rope-transmission, likewise by ratchet wheels 17, 17'. A pair of latch levers 18, respectively 19, interlock with said wheels 17, respectively 17' and by means of the arranged sliding neckguides 23, 24, are attached to a lever 29, swinging on a pivot 27 and controlled by an eccentric disc 28. Both latch lever carriers or sliding necks 23, 24 are rigidly connected with one another by a stay 25. The lower end of the lever 29 is pressed by

means of a spring towards the eccentric disc 28 which is rotated by the shaft 28' driven in known manner from the main shaft of the machine.

If a sliding neck is opposite the fulcrum 27 of the lever 29, the movement of the accompanying pair of latch levers is too slight, in order to accomplish a revolution of the ratchet wheel. The further the sliding neck and therewith the accompanying pair of latch levers are pushed from this fulcrum, the greater the leverage and the rotation of the accompanying ratchet wheel will be. The rigid connection of both latch lever bearers 23, 24 causes the total movement of both ratchet wheels to be entirely equal during any time unit, and therefore the movement of one ratchet wheel diminishes if the movement of the other one increases. The shifting of the rigidly connected sliding necks in the movable lever 29, relative to their position to the fulcrum 27, and the regulation of the feed of each single material to the carder, in connection with same, is attained by the lever system 20, 21 which is controlled by an eccentric 22. By means of such an arrangement the single laps 3 and feed rollers 2 can be revolved in any desired manner, so that the licking-in roller 1 can be fed with either one or the other colour, or a mixture of colours together, since, with corresponding adjustment, by moving the two necks with rod 25 backwards and forwards, one of the laps stands entirely still, and only the other one delivers wool, or by altering the necks to about the position of Fig. 3, both laps work in a limited manner, and by further shifting, the lap which was working in the first case, stands still, if the corresponding neck is opposite the stud 27, whilst the other wool-lap delivers to full extent.

The other style of execution like Fig. 4 comprises a cylinder with a roller-card 38 attached. This influences, in a manner which is well known, a lever 39 for each colour, in the guide-eye of which each lever a mill-bar 36, worked by the eccentric 37, swings evenly backwards and forwards. By moving the mill-bar 36 into the position shown, it comes within reach of the counter-bar 35, on which a pair of latches, for forward and backward movement, are attached, which interlocks with a ratchet wheel 30. In this manner reversing motion, when working forwards or backwards, is attained, whereby the delivery roller 5 and the corresponding lap 3 with feed roller 2, are set in motion.

A spring 34 draws the counter-mill-bar 35 back. For ratchet wheels 31 and 32 a similar working mechanism is provided as the one just described. For example, the ratchet wheels are attached to the feed-rollers 2, or connected with same by chains.

Instead of revolving the laps by ratchet wheels, the same can be also worked by

worm wheels and worms, which is for example shown in Fig. 5. The motion of the worms 40, 40', 40'' and therewith the feeding arrangements connected with the worm-ratchet-wheels 41, 41', 41'', can be attained by making use of such arrangements as are made use of with shaft-looms. By means of lags or pattern cards 59 with pegs 59' or holes, which run over a rack prism 60, the movement of the lags is controlled, either directly or by levers 44, 44', which bring the mill bars 51, 52 by means of needles 58, 58' with stop catches 42, 42' within reach of the oscillating knives 53, 54, which swing on a stud 55 by means of crank 57 and lever-system 56. The bill bars are connected by draw rod 50, and vertical shafts 49, 49', 49'' with the corresponding strap forks 46, 46', 46'', which shift the straps driving the driving gears 43, 43', 43'', and therewith the worms 40, 40', 40'', on to either the fast or loose pulleys.

If a double lever 50' as shown is used for working the mill bars, the strap forks can remain alternately for some time, in either position, whereby the fleeces of the single laps 3 can be fed to the carder, either uniformly and for any length of time, or at suitable intervals.

In corresponding manner the reversing motion can be also controlled by adjustable friction gear.

If the carder is fed with loose dyed wool instead of laps, each colour must be separately placed in a bin of the hopper feed. Hopper feeds with two or more receptacles, in the well known execution, are used, the number of receptacles being chosen according to the number of colours to be used. The hopper feeds are controlled by cards; a well known method, to be determined by a certain fixed rule beforehand, whereby one of the already described styles of execution can be made use of in the sense given.

Fig. 6 shows for example a hopper feed of this kind for two different kinds of material, with intimation of the manner of feeding to the licker-in of the carder. 61, 62 are the receptacles or bins for the material, 63, 64 the endless feeding lattices, 65, 66 the doffing combs, 67, 68 stripper rollers, and 69, 70 scale receptacles with intimated scale-beams 71, 72. 73 is the endless feeding lattice to the carder, with pair of feed rollers 76 and 74 is the feed board, 75 the evenner.

By altering the speed of the endless feeding lattices 63, 64 by one of the styles of reversing motions already described, when using laps, the time taken for filling the scale receptacle, or the number of weighings, therefore the quantity of the different materials fed to the feeding lattice 73 and the carder 76, 1, during a certain unit of time, can be regulated to suit the desired mixing ratio.

For example if a simple shade of blue and white is to be spun, the hopper feed is furnished with two separate receptacles, each having their separate feeding arrangement. The feeding arrangements for blue and white are put to work by cards (lags) in the following manner:—

It is assumed that the carder shall receive five prescribed loads (fillings) (subsequently called "weighings") during a certain unit of time, in order to assure uniform work.

The feeding arrangement performs (weighing in the same unit of time):—

Blue	White	
0	5	80
1	4	
2	3	
3	2	
4	1	
5	0	85
4	1	
3	2	
2	3	
1	4	
0	5	90

Or it is worked in this manner that instead of the necessary five weighings in the unit of time, only two are made, but for which the weighing ability of the scales is altered, meaning that one weighing contains for example once 5 units and another time 10 units. A suitable arrangement for this, with corresponding form of the scale beams, is for example shown in Fig. 7 and 8, and indeed in Fig. 7 for two receptacles corresponding to Fig. 6 and Fig. 8.

The scale beams 77, 78, 77', 78' (corresponding to intimated beams 71, 72 in Fig. 6) are arranged with double arms. A balance weight 80 respectively 80' rests on the one arm 78 respectively 78'. A regulating weight 79 respectively 79' is shifted by means of a sleeve 82 respectively 82' and is pushed forward on the other arm 77, respectively 77'. This sleeve sits on a spindle 83 respectively 83' with right- and left-handed thread, which is driven from the main shaft 84 by a chain 85 or similar transmission. On account of these spindles 83, respectively 83' being cross-cut, there is an automatic reversing of the sleeve-movement. The sleeves of the weighing-arrangements shown run in opposite directions, so that the total delivery always remains the same.

In this manner it is possible for the carder to deliver slubbing, which gradually shades off in length to another colour, besides being a mixture. This slubbing can then be spun in the usual way into yarn. The length of the relative joining or shading off of the colours in the yarn can be obtained in any desired size or length by means of the process already described. The process can be used for all kinds of fibrous material, and accord-

ing to the singularities of same, the carders for working same must be suitably equipped. On the other hand it may be frequently recommended to so simplify the carders used for the whole spinning process, in such a manner that they are only essentially used for combining different coloured fleece, in alternate mixture, to one fleece or sliver.

It is also possible to blend different kinds of fibres, such as artificial silk and cotton, in the carder, according to the invention, and to regulate the mixing ratio at will, and only dye the ready yarns or fabrics, whereby the different kinds of material take up the colour in different manner.

Having now particularly described and ascertained the nature of my invention and the manner in which it is made and applied, I declare that what I claim and desire to secure by Letters Patent of the United States is:

1. Carder for producing slubbing or yarn from differently dyed fibres with altering mixing ratio of the single coloured fibres between 0 and 100% of the portions of the total material comprising in combination mechanical arrangements for feeding each color of the different coloured fibres, and adjustable means for regulating the amount of each single colour required.

2. Carder for producing slubbing or yarn from differently dyed fibres with altering mixing ratio of the single coloured fibres between 0 and 100% of the portions of the total material comprising in combination arrangements for feeding each color of the different coloured fibres; and adjustable means for regulating the amount of each single colour required, said regulating means being constructed for delivering constantly uniform total quantities of fibres, but being adjustable for any desired alteration of the constituent ratios of each single material.

3. Carder for producing slubbing or yarn from differently dyed fibres with altering mixing ratio of the single coloured fibres between 0 and 100% of the portions of the total material comprising in combination arrangements for feeding each color of the different coloured fibres, and adjustable means for regulating the amount of each single colour required, said regulating means being constructed corresponding to those known with shaft-machines of looms for obtaining patterned fabrics and delivering constantly uniform total quantities of fibres, but being adjustable for any desired alteration of the constituent ratios of each single material.

4. Carder for producing slubbing or yarn from differently dyed fibres with altering mixing ratio of the single coloured fibres between 0 and 100% of the portions of the total material comprising in combination separate means for feeding each color of the different coloured fibres; and adjustable means for regulating the amount of each single colour

required, said adjustable means comprising at least one pattern card with a corresponding controlled card rack prism and, for each colour, an arrangement controlled by said pattern card device for controlling the feeding of the fibres of each colour.

5. Carder for producing slubbing or yarn from differently dyed fibres with altering mixing ratio of the single coloured fibres between 0 and 100% of the portions of the total material comprising in combination separate means for feeding each color of the different coloured fibres; and adjustable means for regulating the amount of each single colour required, said adjustable means comprising ratchet wheels for driving said feeding means, latch levers cooperating with said ratchet wheels, and an eccentric pulley connected with the main driving shaft of the carder and moving said latch levers.

6. Carder for producing slubbing or yarn from differently dyed fibres with altering mixing ratio of the single coloured fibres between 0 and 100% of the portions of the total material comprising in combination separate means for feeding each color of the different coloured fibres; and adjustable means for regulating the amount of each single colour required, said adjustable means comprising ratchet wheels driving said feeding means, latch levers cooperating with said ratchet wheels, and an eccentric pulley connected with the main driving shaft of the carder and moving said latch levers being adjustably arranged on a movable bearer so that they may be attached to said bearer at points of different reaches of movement.

7. Carder for producing slubbing or yarn from differently dyed fibres with altering mixing ratio of the single coloured fibres between 0 and 100% of the portions of the total material comprising in combination separate means for feeding the different coloured fibres; and adjustable means for regulating the amount of each single colour required, said adjustable means comprising ratchet wheels driving said feeding means, latch levers cooperating with said ratchet wheels and an eccentric pulley connected with the main driving shaft of the carder and moving said latch levers, said eccentric pulley being adjustably arranged on a movable bearer so that they may be attached to said bearer at points of different directions of movement by a mechanically controlled arrangement.

8. Process for producing slubbing or yarns from fibers of several different colors which consists in that the said slubbing, during the spinning process, is composed of differently dyed fibers by feeding each single kind of unicolored material to a carder over its entire breadth either simultaneously, or consecutively by altering the mixing ratio of the single colored fibers between 0 and 100% portions of the total material continuously, which

total quantity of material is always maintained the same in each unit of time.

9. Process for producing slubbing or yarns from fibers of several different colors which consists in that the said slubbing, during the spinning process, is composed of differently dyed fibers by feeding each single kind of unicolored material to a carder over the entire breadth partly simultaneously, partly consecutively by altering the mixing ratio of the single colored fibers between 0 and 100% portions of the total material continuously, which total quantity of material is always maintained the same in each unit of time.

10. Process for producing slubbing or yarns from fibers of several different colors which consists in that the said slubbing, during the spinning process, is automatically composed of differently dyed fibers by automatically feeding each single kind of unicolored material to a carder always over its entire breadth alternatively either simultaneously or consecutively by automatically altering the mixing ratio of the single colored fibers between zero and 100% portions of the total material continuously, constantly feeding each single-colored fibers over the entire breadth of the carder, the total quantity of material fed to the carder being always maintained automatically the same in each unit of time.

11. Process for producing slubbing or yarns from fibers of several different colors which consists in that the said slubbing, during the spinning process, is automatically composed of differently dyed fibers by automatically feeding each single kind of unicolored material to a carder always over its entire breadth partly simultaneously, partly consecutively by automatically altering the mixing ratio of the single colored fibers between zero and 100% portions of the total material continuously, constantly feeding each single colored fibers over the entire breadth of the carder the total quantity of material fed to the carder being always maintained automatically the same in each unit of time.

In testimony whereof I affix my signature.
OSWALD HOFFMANN.