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(54) **COMBING MACHINE AND RESPECTIVE COMBER SIMPLIFIED GROUPS**

KÄMMASCHINE UND ENTSPRECHENDE VEREINFACHTE KÄMMGRUPPEN

PEIGNEUSE A GROUPES PEIGNEURS SIMPLIFIES

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(73) Proprietor: **VOUK MACCHINE TESSILI S.p.A.**
I-34170 Gorizia (IT)

(72) Inventors:
• **BENEDETTI, Sergio**
I-34170 Gorizia (IT)

• **UCCELLO, Corrado**
I-34170 Gorizia (IT)

(74) Representative: **D'Agostini, Giovanni, Dr.**
D'AGOSTINI ORGANIZZAZIONE
Via G. Giusti 17
I-33100 Udine (IT)

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Description

The present invention concerns a combing machine and respective comber groups for cotton strip particularly downwards drawing machines.

This solution is conveniently applicable for the combing and the separation (tearing) in stumps (example of 20-30 centimeters) of fibres aligned tape (cotton strip) successively rolled up, these stumps after drawing (tearing) being rejoined in new in cotton strips that successively is twined in wire form.

In prior art these machines and respective comber groups and respective technology are known (Ref. "Pettinatura del cotone" Chapter 111 pag .250 and followings of the book in the name of Carlo Carminati "11 filature di cotone", editor U. Hoepli 1960, see also US PS 3562865 in the name of H. Heichenberger et al). These comber groups essentially comprise:

- A combing roll of the end of the cotton strip or involving fringe circular sector of combing tips;
- A nipper group with upper nipper jaw and lower nipper jaw movable with the cotton strip and an upper guide for the separation of the combed cotton from the continuous cotton strip.

And this obviously for the successive operations as expressed and explained in introduction well known prior art means.

The drawbacks of this solution consist in the fact that for the operation of the two drawer-roll couples, a very complex gearing transmission and inverter system is required in order to allow a perfect synchronized movement of the rotation of the drawer rolls with the combing roll and the respective nipper group.

A gear transmission system as above exposed is bulky, complex and expensive and needs a container in closed box for the gears in bath of oil, with consequent frequent necessity of maintenance.

MORE PERTINENT PRIOR ART

As stated before, in US-A-3 562 865 it is well known to a person skilled in the art that the combing roll, the nipper group and the drawer rolls are mechanically connected, these characteristics form the preamble of claim 1.

US-A-3277790 (cf. column 1, lines 1-44; column (2), lines 26-63; claim 5) discloses a combing machine wherein the drawer rolls are driven by an hydraulic motor.

US-A-3277790 regards an Hydraulic apparatus and in particular its object is "to provide a servo-mechanism incorporating a reversible hydraulic motor whose operation is controlled by a valve and which is suitable for, among other purposes, the provision of a non-uniform drive to the detaching rollers of a textile combing machine. It is a further object of said invention "to provide

a valve suitable for use in such a servo mechanism."

US-A-3277790 discloses the use of "an hydraulic control valve which controls the supply of power to an hydraulic motor in response to the sum of a pair of input signals. In the application to a textile combing machine, one input signal represents a continuous, and the other represents the required oscillatory movement. Such a valve however, being capable of producing an output movement in response to the sum of two input movements, has applications other than to textile combing machines."

This solution is limited to only one movement feature (sinusoidal addition), and does not allow easy changes in the drawer roll cycle parameters.

EP-A-0374723 (MASKINEFABRIK RIETER AG) - 27 June 1990, (this document is only comprised in the state of the art according to Article 54(3)EPC), discloses the use of an electric moto- and speed reducer to drive by belt transmission, said drawer (tearing) roll couples, in clockwise and anti-clockwise rotation according to an angular rotation of a combing roll, by encoder detecting of its angular rotation.

Said detector means is intercepted by a command device to command the rotation in both directions of the electric motor geared to said drawer (tearing) rolls.

Said command device can be endowed with (non disclosed) regulator means to regulate the command pulses sent to the electric motor to make said tearing roll couples rotate in a prefixed angular value. This solution as the previous one, being able to operate strictly in a proportional way without any changes during operation, and differs from the previous one by the use of an electric motor in place of an hydraulic motor, complexity and rigidity of the transmission structure therefore remains.

Scope of the present invention is to obviate to said drawbacks.

This and other scopes are reached with the present invention as claimed, by means of a tearing combing roll couple group rotating in both directions and between said combing roll and said tearing group, said tearing group having two couples of tearing rolls (11-12), each couple having one drawing roll (12) and a counter roll (11), operated by a step electric motor; a nipper group with upper nipper jaw and lower nipper jaw mobile with the cotton and an upper guide comb for separation of the combed cotton from the continuous cotton strip, Characterized in that:

- said step electric motor has in its motor axis a central pinion that directly in mesh, commands in the same rotation sense, two driven gears, said driven gears being coaxial and keyed with the respective axes of said drawing rolls;
- in at least one axis of said tearing couple of tearing group, a step by step reversible electric motor is connected for their rotation;
- an electric corresponding impulses emitter of respective angular rotational values is associated to

the rotation axis of said combing roll;

- said electric impulses emitter is connected to a programmable computer to elaborate said impulses, connected to said step by step reversible electric motor, in order that, with opportune software,
- it is possible to allow movement in programmed mode, of said tearing rolls both in clockwise and in counterclockwise direction in function of the corresponding impulses to determined rotation angles of said combing roll.

With this solution we obtain the advantage to eliminate all the mechanical in oil bath gear transmission system previously necessary for synchronization of the movements of the combing roll and of the drawer roll couples, eliminating even the mechanical complexity of a rotation inverter, and reducing the encumber to a minimum size required with this new solution that requires only a small electric motor to the end of one axis of only one of said drawer roll couples, being the second couple operated by a simple not expensive gear transmission using an intermediate idle gearing wheel for obtaining the same rotation with same angular speed.

The invention is better understood with the joined description and drawings as an example, in which:

Left side of Figure 1 represents a frontal schematic view of an operating group according to the invention.

Right side of Figure 1 is a frontal schematic view of the same operating group. Figures 2, 3, 4 represent in transverse section the schematic view of three successive phases of the displacement of the comber group. Making reference to the drawings the invention concerns:

A combing machine and respective comber groups for cotton strip wherein each comber group includes:

- a combing roll (5) of the cotton fringe (p) involving a circular sector of combing tips (51);
- a tearing combing roll couple group rotating in both directions (1) and between said combing roll (5) and said tearing group (1),
- a nipper group with upper nipper jaw (2) and lower nipper jaw (4) mobile with the cotton (p) and an upper guide comb (3) for separation of the combed cotton (p1) by the continuous cotton strip (p), characterized in that:
- in at least one axis (121) of said tearing couple of tearing group (12) a step by step reversible electric motor (6) is connected for their rotation;
- an electric corresponding impulses emitter of respective angular rotational values is associated to the rotation axis of said combing roll (52); - said electric impulses emitter is connected to one programmable computer to elaborate said impulses connected to said step by step reversible electric motor (6), in order that with opportune software,
- it is possible to allow movement in programmed mode said tearing rolls (11 12) both in clockwise and

in counterclockwise direction in function of the corresponding impulses to determined rotation angles of said combing roll (5) Advantageously:

- the drawer roll couples are two and each drawer roll couple involves a lower drawer motor toothed roll (112) and an upper idle smooth counterroll (111).
- the step by step driving motor (6) involves a reducer in which the motor axis act by central pinion (61) that commands in the same rotation in mesh two driven gears (62) coaxial and keyed with the respective axes of the drawer rolls (121).

The working system of the comber group is indicated according to well known prior art in figures 2 to 4 in which:

- in Figure 2 is illustrated the phase in which the cutting and guide group of the continuous cotton strip is portrayed and the combed stump (p1) is extracted to be conveyed to the throwing by means of rotation in counterclockwise sense of the drawer rolls 1, while the combing roll (5) begins the combing of the cotton (p) advancing it by means of engagement with the own toothed sector (51);
- in Figure 3 after combing that advanced stump (p), the combed cotton stump (p) being even, in the same time, further advanced with the nipper guide group (2-3-4) toward the couples of the drawer rolls and, after that these have taken the combed head of the cotton and before advancement and when the combing roll (5) is disengaged from the cotton stump (p), with the own combing sector (51), the respective rotation of drawer rolls 1 is inverted, to draw back a small portion of downwards portion p1, laying on a surface of the lower roll of the first couple, to allow super-imposition of the extremity stump of the upwards cotton (p) closest to the mouth of the first roller couple (see detail in Fig.3)
- in Figure.4 it is shown the following phase at the moment of the clamping of both stumps (p1-p) of the cotton by said rolls (1), with the comb 3, placed closest for combing, being the drawer rolls (1) again made rotate in advancing direction to repeat the cycle after further tearing of the cotton, and so on.

The drawer rolls rotation synchronism in clockwise and in counterclockwise direction with the combing roll that before this invention was realized with gearing means, and now is carried out by means of the invented system above exposed, taking particularly in account the rotation angle of the combing roll corresponding to the hoop arch that covers the corresponding combing sector (51) which is the essential element that determines the rotational behavior of the drawer rolls.

We understand so that with a pulse emitter programmed for rotation angles on the axis of the combing roll (5) and in collaboration with a computer, respective program and command to one electric step by step motor, we can

transmit to the drawer rolls the desired movement (1), so we can change it, without expensive, bulky and complex mechanical transmissions.

Claims

1. A combing machine and respective comber groups for cotton strip wherein each comber group includes:
a combing roll (5) of the cotton fringe (p) involving a circular sector of combing tips (51);

- a tearing combing roll couple group rotating in both directions (1) and between said combing roll (5) and said tearing group (1), said tearing group having two couples of tearing rolls (11-12), each couple having one drawing roll (12) and a counter roll (11), operated by a step electric motor;
- a nipper group with upper nipper jaw (2) and lower nipper jaw (4) mobile with the cotton (p) and an upper guide comb (3) for separation of the combed cotton (p1) by the continuous cotton strip (p),
characterised in that:
- said step electric motor (6) has in its motor axis a central pinion (61) that directly in mesh, commands in the same rotation sense, two driven gears (62), said driven gears being coaxial and keyed (121) with the respective axes of said drawing rolls (12);
- in at least one axis (121) of said tearing couple of tearing group (12) is reversible step by step electric motor (6) s connected for their rotation;
- an electric corresponding impulses emitter of respective angular rotational values is associated to the rotation axis of said combing roll (52);
- said electric impulses emitter is connected to a programmable computer to elaborate said impulses connected to said reversible step by step electric motor (6), in order that with opportune software,
- it is possible to allow movement in programmed mode of said tearing rolls (11 12) both in clockwise and in counterclockwise direction in function of the corresponding impulses for a determined rotation angles of said combining roll (5).

2. A machine according to claim 1, characterized in that each **tearing**-drawer roll couple involves a lower drawer motor toothed roll (12) and an upper idle smooth counterroll (11).

Patentansprüche

1. Kämmaschine und dazugehörige Kämgruppen für Baumwollstreifen, wobei jede Kämgruppen enthält:

eine Kämwalze (5) für die Baumwollfranse (p) mit einem runden Sektor von Kämmspitzen (51);

- ein Zieh-Kämwalzenpaar (1), das in beide Richtungen drehbar ist sowie zwischen der Kämwalze (5) und der genannten Ziehgruppe (1), wobei die genannte Ziehgruppe zwei Ziehwalzenpaare (11-12) aufweist, jedes Paar mit einer Ziehwalze (12) und einer Gegenwalze (11), von einem elektrischen Schrittmotor angetrieben;
- eine Quetschwalzengruppe mit oberer Quetschwalzenbacke (2) und unterer Quetschwalzenbacke (4), die mit der Baumwolle (p) beweglich sind, und einem oberen Führungskamm (3) zur Trennung der gekämmten Baumwolle (p1) durch den durchgehenden Baumwollstreifen (p),
gekennzeichnet dadurch, daß:
- der elektrische Schrittmotor (6) in seiner Motorachse ein zentrales Ritzel (61) aufweist, das in direktem Eingriff in derselben Rotationsrichtung zwei angetriebene Getriebe (62) steuert, welche koaxial und mit den Achsen der Ziehwalzen (12) verkeilt ist;
- auf zumindest einer Achse (121) des Ziehpaars der Ziehgruppe (12) ist für deren Rotation ein elektrischer Umkehr-Schrittmotor (6) verbunden;
- ein Ausstrahler von entsprechenden elektrischen Impulsen von entsprechenden Rotationswinkelwerten ist mit der Rotationsachse der Kämwalze (52) verbunden;
- der genannte Ausstrahler von elektrischen Impulsen ist mit einem Computer verbunden, der programmierbar ist, um diese Impulse in Verbindung mit dem elektrischen Schrittmotor (6) zu verarbeiten, so daß es mit geeigneter Software
- möglich ist, die Ziehwalzen (11 12) programmiert zu bewegen, sowohl im als auch gegen den Uhrzeigersinn, abhängig von den Impulsen für einen bestimmten Rotationswinkel der genannten Kombinationswalze (5).

2. Maschine nach Anspruch 1, gekennzeichnet dadurch, daß jedes Ziehwalzenpaar eine untere Ziehwalzen-Kämwalze (12) und eine obere glatte Leerlauf-Gegenwalze (11) umfaßt.

Revendications

1. Une machine peigneuse et respectifs groupes peigneurs pour bande de coton où chaque groupe peigneur inclut: 5
 - un rouleau peigneur (5) de la frange du coton (p) comportant un secteur circulaire de pointes de peignage (51);
 - un groupe à couple de rouleau peigneur déchireur qui tourne dans les deux directions (1) et entre ledit rouleau peigneur (5) et dit groupe déchireur (1), dit groupe déchireur ayant deux couples de rouleaux déchireurs (11-12), chaque couple ayant un rouleau tireur (12) et un contre-rouleau (11), actioné par un moteur électrique pas à pas; 10
 - un groupe de serrage ayant une mâchoire de serrage supérieure (2) et une mâchoire de serrage inférieure (4) mobile avec le coton (p) et un peigne de guidage supérieur (3) pour la séparation du coton peigné (p1) par la bande de coton continue (p), 15
 - caractérisée par le fait que:
 - dit moteur électrique pas à pas (6) a dans son axe moteur un pignon central (61) qui directement dans l'engrenage, commande dans le même sens de rotation, deux roues menées (62), dites roues menées sont coaxiales et clavetées (121) avec les respectifs axes des dits rouleaux tireurs (12); 20
 - à au moins un axe (121) dudit couple déchireur du groupe déchireur (12) est connecté, pour leur rotation, un moteur électrique pas à pas réversible (6); 25
 - un émetteur correspondant d'impulsions électriques de respectives valeurs rotatives angulaires est associé à l'axe de rotation dudit rouleau peigneur (52); 30
 - le dit émetteur d'impulsions électriques est connecté à un ordinateur programmable pour élaborer les dites impulsions connectées à dit moteur électrique pas à pas réversible (6), afin qu'avec un opportun logiciel, 35
 - il est possible de permettre le mouvement, de manière programmée, des dits rouleaux déchireurs (11 12) soit dans le sens des aiguilles d'une montre que dans le sens contraire des aiguilles d'une montre en fonction des impulsions correspondantes à des angles de rotation déterminés dudit rouleau peigneur (5). 40
2. Une machine, selon la revendication 1, caractérisée par le fait que chaque couple de rouleau tirant-déchireur comporte un rouleau inférieur denté à moteur tirant (12) et un contre-rouleau lisse libre supérieur (11). 45

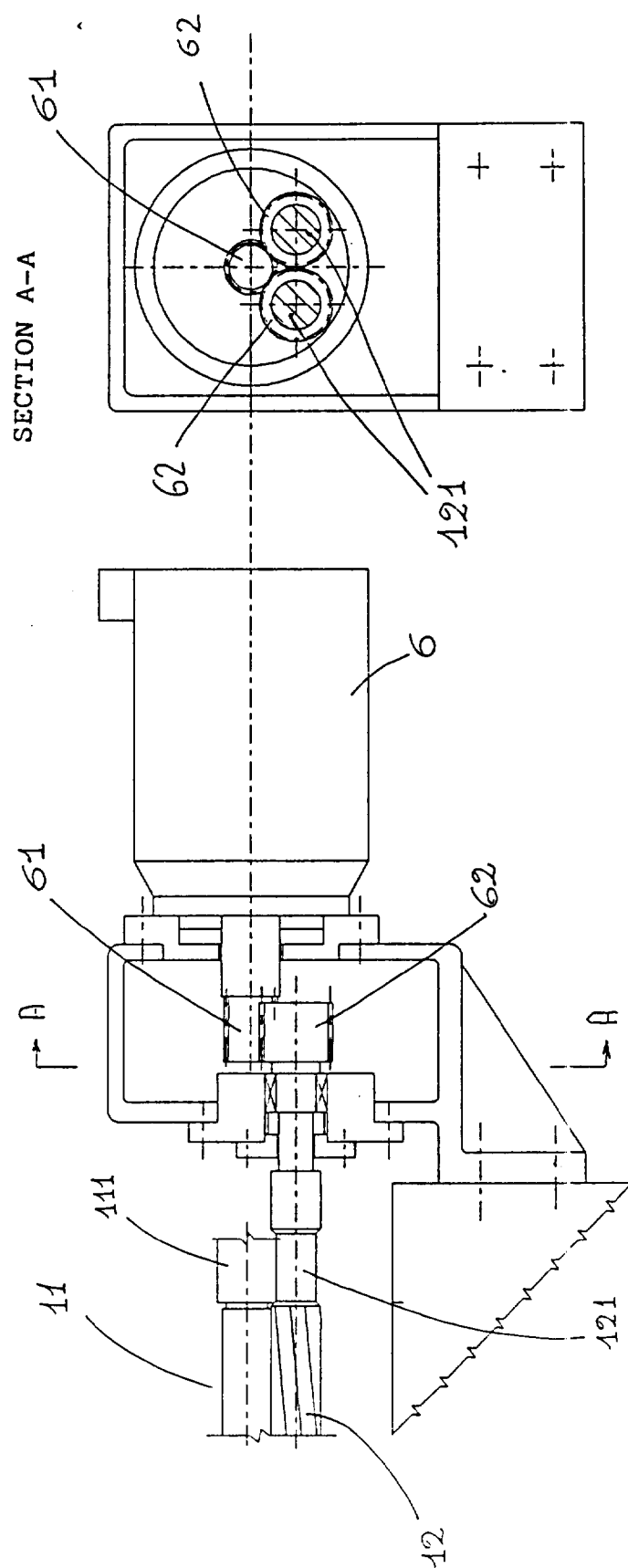


Fig. 1

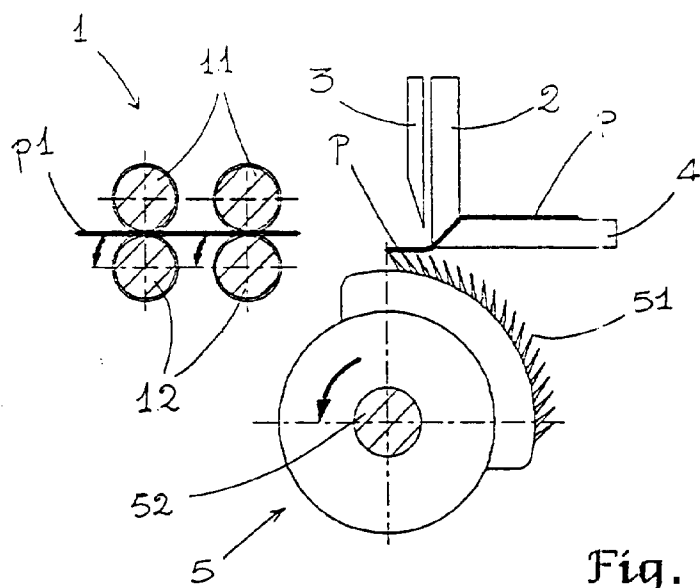


Fig. 2

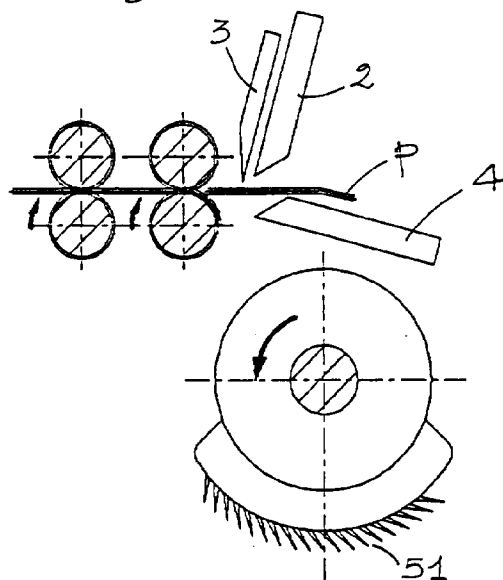


Fig. 3

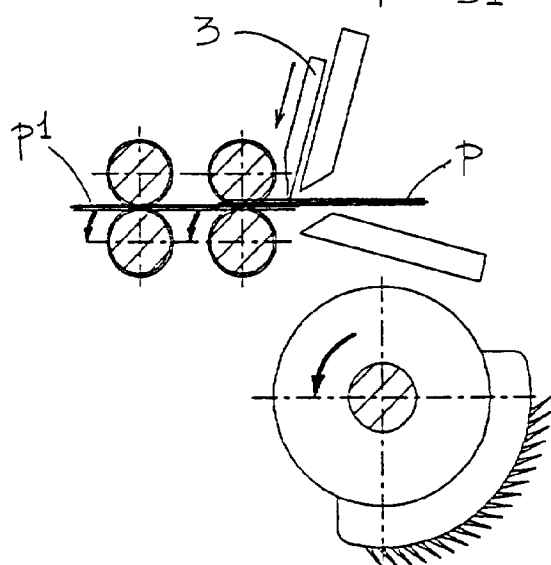


Fig. 4