Fig. 2

Fig. 3

INVENTORS.
WERNER NAGELI,
HANSUERICH EICHENBERGER.

BY
ATTORNEY.
FEED ROLLER ARRANGEMENT IN A COMBING MACHINE

Werner Naegeli and Hansulrich Eichenberger, Winterthur, Switzerland, assignors to Joh. Jacob Rieter & Co. Ltd., Winterthur, Switzerland, a corporation of Switzerland
Filed May 28, 1958, Ser. No. 738,559
Claims priority, application Switzerland June 1, 1957
9 Claims. (Cl. 19—116)

The present invention relates to a feed roller arrangement, more particularly to a feed roller drive for combing machines having a swinging nipper mechanism.

In conventional drive mechanisms the feed roller is actuated by means of a ratchet wheel mounted on the feed roller which is driven by a pawl placed in a separate casing. The latter includes a downwardly extending lever carrying a pin which enters a recess in an abutment mounted on the machine frame, upon the forward and rearward swing of the nippers. When the nippers swing to the rear the aforesaid pin slowly glides upwards in the stationary recess and turns the casing so that the ratchet wheel is advanced by the pawl which swings with the casing.

Another conventional arrangement includes a separate casing which rests on the feed roller axis and in which a pawl actuates a ratchet wheel. In this case the casing is provided with a lever which is connected by means of an elbow lever with a shaft supported by the machine frame so that the lever and the casing swing upon the reciprocating movement of the nippers.

The actuation of the feed roller by the movement of the nippers relatively to a stationary part requires a complicated drive mechanism which has the additional disadvantage of making it difficult to remove the feed roller.

The object of the present invention resides in the provision of a drive for the feed roller of a combing machine which avoids the aforesaid disadvantages of conventional drives by using the relative motion of the top nipper and of the bottom nipper for actuating the feed roller, i.e., by using the relative movement of elements which are inherently close to the feed roller so that all levers and the like, which are needed in the conventional mechanisms, can be omitted.

In the system according to the invention the entire drive mechanism is located between the lateral cheeks or arms of the top nipper and of the bottom nipper. The teeth of a segment held in engagement by spring pressure with an arm of the top nipper mesh with a gear which is freely rotatable on the feed roller. A pawl connected with the aforesaid gear engages a ratchet wheel which is fast on the feed roller.

The segment is provided with an angular protuberance extending laterally beyond the support arm of the top nipper which protuberance affords actuation of the feed roller against the spring pressure when the machine is standing still.

The novel features which are considered characteristic of the invention are set forth with particularity in the appended claims. The invention itself, however, and additional objects and advantages thereof will be understood from the following description of embodiments thereof when read in connection with the accompanying drawing in which:

FIG. 1 is a part sectional plan view of a feed roller drive according to the invention, the left top nipper cheek being omitted.

FIG. 2 is a cross section of the combing machine, the section being made along the longitudinal axis of the arm supporting the top nipper.

FIG. 3 is an exploded perspective view of a modification of a detail of the feed roller drive according to the invention.

Referring more particularly to the drawing, numeral 4 designates a stationary support shaft swingably supporting an arm 5 to the free end of which the forward end of a lateral cheek or support arm 2 (1) of a bottom nipper 3 is pivoted. For oscillating the bottom nipper 3 a bracket having a rearward extension 8 is pivoted to the free end of a crank 9 which is fast on an oscillating drive shaft 10. A top nipper 13 is provided with lateral cheeks or arms 11 and 12 which are pivotally connected with the arms 1 and 2, respectively, of the bottom nipper by means of a pin 15. The rear ends of the arms 11 and 12 are pivotally connected with the free ends of a link 21 which is freely swingable on the shaft 10. The link 21 and the support arm 5 form guide means controlling the relative movement of the nippers upon oscillation of the bottom nipper by the crank 9. The portion Z of the pin 15 rotatably supports the lateral arm 12 of the upper nipper adjacent to the cheek 2 of the bottom nipper, the arm 12 being removed in FIG. 1. The pin 15 rotatably supports a hub 60 of a segment 61 adjacent to the carrier 47 of the top comb. The hub 60 is located between the carrier 47 and the portion Z of the pin 15.

The segment 61 has a circular periphery coaxially surrounding somewhat more than half of the circumference of the portion Z of the pin 15. This circular periphery is provided with teeth 62 which are in mesh with a gear 63. The latter is freely rotatable on a feed roller 23 and is provided on the outside with a flange 64, the inside of the gear 63 facing the center of the feed roller. The latter is provided with a boss 65 on which a ratchet wheel 66 is made fast, the ratchet wheel cooperating with a pawl 67 for rotating the ratchet wheel and the feed roller connected therewith in the desired direction. The pawl 67 is swingable on a pin 68 which is inserted in the flange 64. A spring 69 having an end connected with the pin 68 and an end connected with the pawl 67 assures engagement of the pawl with the wheel 66.

The rear end of the segment 61 is provided with an angular protuberance 70 having a radial portion continuing into a portion which is parallel to the pin 15 and forms a handle. A bore 71 is provided in the top of the protuberance 70 for receiving the end of a spring 74 which is wound around a pin 73 pivotally connecting the lateral cheek 12 of the upper nipper with the link 21 which is swingable on the oscillating drive shaft 10 for the nippers. The free end of the spring 74 rests on a flange of the arm 12. The spring 74 urges the upper free end 75 of the segment 61 to abut against the arm 12 so that the segment 61 rotates through the same angle as the upper nipper arm 12 rotates relatively to the bottom nipper 3.

In order to protect the pawl and the ratchet wheel against dust and fly a shelf may be provided as indicated by dash-dot lines in FIG. 1.

The device operates during each combing cycle as follows: Feeding begins shortly after the nippers have left the forward dead center position and continues until the
nippers are closed. As seen in FIG. 2, nipper closing movement of the lateral arm 12 of the top nipper produces a counterclockwise rotation of the segment 61 and a clockwise rotation of the gear 63 and of the pawl 67 mounted thereon. Upon engagement of the pawl 67 with the ratchet wheel 66 which is fast on the feed roller 23, the latter moves synchronously with the top nipper, however, at a speed corresponding to the gear ratio of the segment 61 and of the gear 63. When the nippers are closed there is no movement of the top nipper relatively to the bottom nipper and consequently no rotation of the feed roller. After the nippers are reopened when moving from the forward position the segment 61 rotates clockwise due to the action of the spring 74, causing sliding of the pawl 67 on the ratchet wheel 66 which is, at this time, not rotating until the movement of the nippers is again reversed.

Feeding by hand is effected as follows: The protruberance 70 of the segment 61 is pressed in counterclockwise direction against the action of the spring 74 until the protruberance 70 abuts against the surface portion 76 of the arm 12. The feed roller is thereby rotated in the feeding direction in the same manner as if the arm 12 rotates the segment 61 by abutting against the upper end 75 of the toothed portion 62 of the segment 61. Return of the upper end 75 of the toothed portion 62 of the segment 61 after the latter has been turned counterclockwise by hand is effected by the spring 74, whereupon hand feeding can be repeated by again pressing the protruberance 70 in counterclockwise direction.

The above drive mechanism of the feed roller affords convenient removal of the feed roller 23 without special tools. For this purpose the joint formed by link 21, pin 73, and arm 13 is pressed down as seen in FIG. 2 until a Jubile dead center position is passed and a pin 77 extending laterally from the arm 12 engages the hook at the upper end of a spring 49 pulling the spring 49 away from the feed roller 23 so that the latter can be removed by rolling its gear 63 upwards on the toothed portion 62 of the segment 61 and out of the recesses 24 (FIG. 1) in the top of the lateral arm 2 of the bottom nipper 3. The spring 49 is connected with a hub portion of the arm 2 of the bottom nipper 3 which arm is mirror symmetric to the arm 1 which is shown in FIG. 2. The spring 49 engages and normally presses the feed roller 23 into the recess 24.

In the modification of the drive of the feed roller 23 shown in FIG. 3 a gear 63 is freely rotatable on a boss 65 projecting from the end of the feed roller 23. The gear 63 is integral with a double disc wheel 78 having two discs 79 and 80 between which a pawl 81 is located which is pivotable to the discs 79 and 80. The pawl 81 is resiliently urged to swing outwardly by conventional means, not shown. A drum 82 which is provided with a hub 88 having an internal thread 83 is screwed onto the threaded end 86 of the boss 65. The drum 82 has a cylindrical shell 84 whose interior diameter is somewhat greater than the outside diameter of the wheel 78. The shell 84 surrounds the double disc wheel 78. The interior of the shell is provided with teeth 85 adapted to be engaged by the pawl 81 when the wheel 78 is rotated in clockwise direction. The double disc wheel 78 is rotatable on the boss 65 whereas the drum 82 is rigidly connected with the feed roller 23. The shell 84 forms a cover for the pawl 81 which is in a cylindrical box closed in the direction towards the feed roller 23 by the disc 79 which is separated only by a small clearance from the shell 84. The axilar position of the drum 82 is assured by abutment of the hub 88 against the double disc wheel 78 and gear 63 and by abutment of the latter against the shell 84 between the boss 65 and the feed roller 23. The arrangement shown in FIG. 3 affords quick connection and disconnection of the internally toothed drum 82 to and from the feed roller. This is important, if it is desired to change the rate of feed by using a ratchet wheel having a greater or smaller number of interior teeth. Otherwise the operation of the embodiment shown in FIG 3 is the same as shown in FIGS. 1 and 2.

What is claimed is:

1. In a combing machine, a pair of movable nippers, actuating means connected to one of said nippers for imparting an oscillating movement thereto, said nippers being operatively interconnected for relative movement of the nippers upon movement of one of said nippers by said actuating means, a feed roller rotatably supported by one of said nippers, and drive means operatively connected to both nippers for actuation by said nippers upon a relative movement of said nippers, said drive means being operatively connected with said feed roller, said drive means being operatively connected to said feed roller for actuating said feed roller when said nippers are standing still.

2. In a combing machine as defined in claim 1 and wherein said drive means includes a ratchet connected to said feed roller.

3. In a combing machine as defined in claim 1 and wherein each of said nippers is provided with an arm for supporting the respective nipper, pivot means being provided for pivotally connecting the arm of the bottom nipper to the arm of the top nipper, said drive mechanism being entirely interposed between said pivotally connected arms.

4. In a combing machine as defined in claim 1 and wherein said nippers are individually provided with pivotally interconnected lateral arms supporting said nippers, said feed roller being rotatably supported by the lateral arms of said bottom nipper, said drive mechanism including an element movable to and adapted to abut against one of said lateral arms of said top nipper, means connected to said feed roller and engaged by said element for rotating said feed roller upon relative movement of said nippers, and means connected to said element and to said arm of said top nipper to which said element is connected for maintaining said element in the position in which said element abuts against arm of said top nipper to which said element is movable connected.

5. In a combing machine as defined in claim 1 and wherein said drive mechanism includes an element operatively connected with said nippers, and a ratchet mechanism mounted on said feed roller and operatively connected with said element for actuating said element.

6. In a combing machine as defined in claim 1 and wherein said nippers are individually provided with pivotally interconnected lateral arms supporting said nippers, said drive means including an element movably connected with and adapted to abut against said lateral arm of said top nipper, means for supporting said feed roller and engaged by said element for rotating said feed roller upon relative movement of said nippers, and yieldable means connected with said element and with said arm of said top nipper for yieldably urging said element into the position in which said element abuts against said arm of said top nipper, said yieldable means permitting movement of said element by hand to actuate said drive mechanism when said nippers are standing still.

7. In a combing machine as defined in claim 1 and wherein said nippers are individually provided with lateral arms, a pin being provided for pivotally interconnecting said arms, said drive means including a toothed segment swingable on said pin and adapted to abut against said lateral arm of said top nipper, means connected with said feed roller and including a gear engaged by the teeth of said segment for rotating said feed roller upon relative movement of said nippers, resilient means connected with said segment and with said arm of said top nipper for urging said segment into the position in which said element abuts against said arm of said top nipper, and a handle provided on said segment for actuation of said segment by hand against the action of said resilient means for actuating said drive mechanism when said nippers are standing still.

8. In a combing machine according to claim 7 and
wherein said means connected with said feed roller include a ratchet having a pawl connected with said gear.

9. In a combing machine, a top nipper, a bottom nipper, a support arm provided at each end of said nippers, said support arms of said top nipper being individually pivotally connected with the support arms of said bottom nipper, recesses in the support arms of the bottom nipper, a feed roller having end portions received in said recesses, a spring connected with at least one of said arms and engaging said feed roller for pressing the ends of the feed roller into said recesses, actuating means connected with an arm of one of said nippers for imparting an oscillating movement thereto, guide means connected with said arms for controlling the relative movement of said nippers, said guide means affording folding back of said top nipper, at least one of said support arms of said top nipper including means engaging and pulling said spring away from said feed roller upon folding back of said top nipper whereby said feed roller is laid open for lifting out of said recesses.

References Cited in the file of this patent

UNITED STATES PATENTS

131,133 Sweeney ----------------- Sept. 3, 1872
2,378,465 Crockett ----------------- June 19, 1945
2,781,556 Foster ----------------- Feb. 19, 1957

FOREIGN PATENTS

333,636 Great Britain -------------- Aug. 21, 1930