

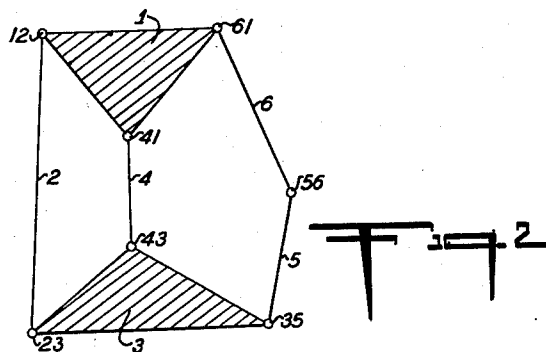
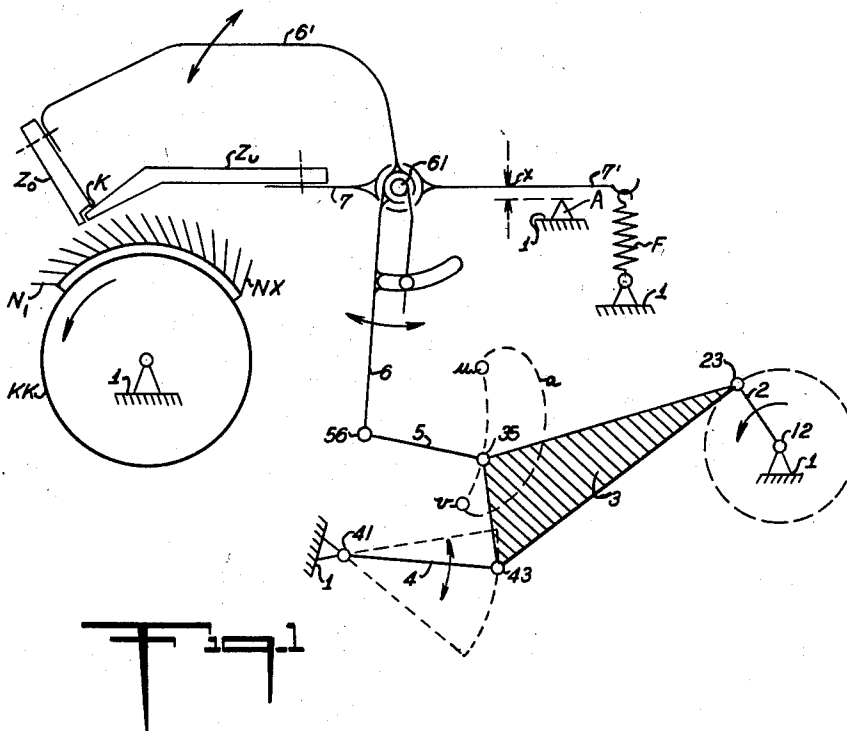
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F. SCHUMANN

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DRIVING MECHANISM FOR THE NIPPERS OF COMBING MACHINES

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INVENTOR

FRITZ SCHUMANN

BY Burgess, Dublager & Sprung.

ATTORNEY

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DRIVING MECHANISM FOR THE NIPPERS OF COMBING MACHINES

Fritz Schumann, Ingolstadt, Germany, assignor to Deutscher Spinnereimaschinenbau Ingolstadt, Niederlassung der Schubert & Salzer Maschinenfabrik Aktiengesellschaft, Ingolstadt-Oberbayern, Germany, a corporation of Germany

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4 Claims. (Cl. 19-116)

This invention relates to new and useful improvements in the driving mechanism for the nippers of combing machines.

In connection with combing machines having stationary nippers and a rotatable combing roller with a comb segment, the nippers must be opened and closed in synchronization with the rotating comb segment.

In the previously known combers of this type, the actuation of the nippers was effected by a cam system. The cam used required a relatively elaborate shape which made its production difficult and expensive. Furthermore, in the course of continuous operation, the cam was subject to extensive wear which unfavorably influenced the action, operating speed, and life of the machine. The cam follower in the conventional drive had to be spring-biased against the cam with a relatively high force in order to effect positive closing and holding of the nippers. This, in addition to poor lubrication possibilities, led to noisy operation and a relatively low speed limit.

One object of this invention is a positive drive for the nippers of a combing machine to overcome the above-mentioned disadvantages. This, and still further objects will become apparent from the following description, read in conjunction with the drawings, in which:

Fig. 1 is a diagrammatic representation of a combing machine with stationary nippers, incorporating an embodiment of a drive in accordance with the invention; and

Fig. 2 is a kinematic diagram of the connection of parts of the drive shown in Fig. 1.

In accordance with the invention, the drive for the combing machine having stationary nippers comprises a pivotal lever arm mounted for pivoting about a fixed pivot point and connected to the nippers for opening and closing actuation thereof upon pivoting, in the conventional manner. There is additionally provided a bell crank lever, a rocker arm pivotally mounted at one end for pivoting about a fixed pivot point, a connecting rod, and a crank mounted for rotation about a fixed axis. The bell crank lever is pivotally connected at one end to the free end of the rocker arm and at the other end to the crank. The connecting rod is pivotally connected at one end thereof to the pivotal lever, and at the other end to the angular apex of the bell crank lever. The pivotal connection between the connecting rod and pivotal lever R is preferably effected at a mean angle of roughly about 90°, while the pivotal connection between the rocker arm and the bell crank lever preferably form a mean acute angle.

Referring to Fig. 1 of the drawing, the combing device comprises a rotatable roller provided with a comb segment N_1-N_x and the nippers Z_0 and Z_u . The lower nipper Z_u is connected to the support 7, 7', which is mounted for limited pivoting about the pivot joint 61 against the spring F_1 . The nipper Z_u is thus pivotal in

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the direction of the roller KK for the limited distance X against the force of the spring F_1 . The pivoting in the opposite direction is limited by the stop A. The upper nipper Z_0 is connected to the pivotal lever arm 6' 6, which is mounted for pivoting about the fixed pivot point 61. By pivoting actuation of the lever arm 6' 6 about the pivot point 61, the nippers Z_0 and Z_u may be brought to nipping engagement at the point K and this point may be pivoted for a limited distance toward the roller KK. The construction of the combing machine as described to this point is conventional and well known.

In accordance with the invention, a crank 2 is provided for rotation about a fixed axis 12. A bell crank lever 3 is pivotally connected to the crank 2 at the pivot joint 23. The term "bell crank lever" as used herein is intended to define any connecting member provided with three pivot points disposed with respect to each other in the form of a triangle. The other end of the bell crank lever 3 is pivotally connected at the pivot joint 43 to a rocker arm 4, which is pivotally mounted at the fixed pivot joint 41. A connecting rod 5 is pivotally connected at one end by means of the pivot joint 56 to the pivotal lever 6, and at the other end by the pivot joint 35 to the angular apex, i. e., the intermediate pivot point of the bell crank lever 3. The mean angle formed at the pivot joint 56 between the pivotal lever arm 6 and the connecting rod 5, is preferably roughly about 90°. The mean angle formed at the pivot joint 43 between the bell crank lever 3 and the rocker arm 4 is preferably acute.

The kinematic connection of the various elements is shown diagrammatically in Fig. 2. The portion 1 represents a stationary or fixed member, as, for example, the machine frame. As may be noted, the pivot joints 12, 61, and 41 are fixed with respect to this member, as, for example, the frame. The pivot joints 23, 43, 35 are on the bell crank lever 3 and connected to the fixed points 12, 41, and 61 by the crank arm 2, the rocker arm 4, and the members 5 and 6, respectively. The members 5 and 6 i. e., the connecting rod and pivotal lever are pivotally connected to each other through the pivot joint 56.

In operation, the roller KK and the crank arm 2 are rotated preferably at a constant angular velocity. The speeds of rotation between these two members are preferably synchronized.

As the crank 2 rotates, the rocker arm 4 holds the pivot point 43 so that the same can only reciprocate back and forth along a circular arc, as shown on the dotted lines. At the same time, the pivot point 35 describes a sausage-shaped curve as indicated by the dotted lines. The complete sausage-shaped curve is described upon each revolution of the crank 2.

As the pivot point 35 starts in the position u , the pivotal lever arm 6 is pivoted toward the roller KK so that the nipper Z_0 is spaced from the nipper Z_u and fibrous material is allowed to pass therethrough. At the same time, the spring F_1 urges the support arm 7 in contact with the rest A, so that the point K of the nippers is pivoted away from the roller KK. As the pivot point 35 moves along the arc between the points u and v , the nippers will remain in this position, since this portion of the arc is an arc of a circle with the point 56 as its center.

As the pivot point 35 passes around the point v and reverses itself, the pivotal lever arm 6 is pulled away from the rollers KK so that the nipper Z_0 is pivoted in contact pressing against the nipper Z_u grasping any fibrous material. Upon further motion of the turnable lever arm 6, the support arms 7, 7 are pivoted against

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the force of the spring F_1 , bringing the point K closely adjacent to the roller KK. As the pivot point 35 then passes along the curve a , the nippers will remain in this position, since the curve a is also an arc of a circle with the point 56 at its center. When pivot point 35 reaches the upper end of the curve a and reverses itself, the pivotal lever arm 6 is again pivoted towards the roller KK, opening the nippers and moving them away from the roller KK.

The rotation of the roller KK and the crank 2 is so synchronized that the nippers Z_0 and Z_u come in clamping engagement and move toward the roller KK when the first row of needles at the point N1 just passes below the clamping point K. This will hold the fibrous material so that the same is combed by the needle segment. When the point Nx passes below the clamping point K, the pivotal clamping arm 6 is moved in the opposite direction, moving the nippers Z_0 and Z_u out of engagement and away from the roller KK. The fibrous material is thus allowed to pass through the nippers until the same is clamped again for combing of the next portion. The nipper Z_0 will not come out of engagement contact with the nipper Z_u until the support arm 7, 7' is pivoted so that the support arm 7' is in contact with the rest A.

While the invention has been described in detail, with specific reference to the embodiment shown, various modifications and changes will become apparent to the artisan which fall within the spirit of the invention and the scope of the appended claims.

I claim:

1. In a combing machine having nippers mounted in a fixed position, the improvement in the means for opening and closing the nippers which comprises a pivotal lever arm pivotally mounted about a fixed pivot point

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and connected to the upper jaw of said nippers for opening and closing actuation thereof upon pivoting, a bell crank lever, a rocker arm pivotally mounted at one end thereof for pivoting about a fixed pivot point spaced apart from said first mentioned pivot point, a connecting rod, and a crank mounted for rotation about a fixed axis, said bell crank lever being pivotally connected at one end to the free end of said rocker arm and at the other end to said crank, said connecting rod being pivotally connected at one end thereof to said pivotal lever arm and at the other end to the angular apex of said bell crank lever and being so arranged, whereby, upon rotation of said crank, the angular apex of said bell crank lever describes a sausage-shaped curve.

2. Improvement according to claim 1, in which said connecting rod is pivotally connected to said pivotal lever arm at a mean angle of about 90° .

3. Improvement according to claim 2, in which said bell crank lever is pivotally connected to said rocker arm, so that a mean acute angle is formed therebetween.

4. Improvement according to claim 3, in which said rocker arm and said connecting rod extend substantially horizontally and in which the portion of said bell crank lever between the angular apex thereof and the end connected to said rocker arm extends substantially vertically.

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