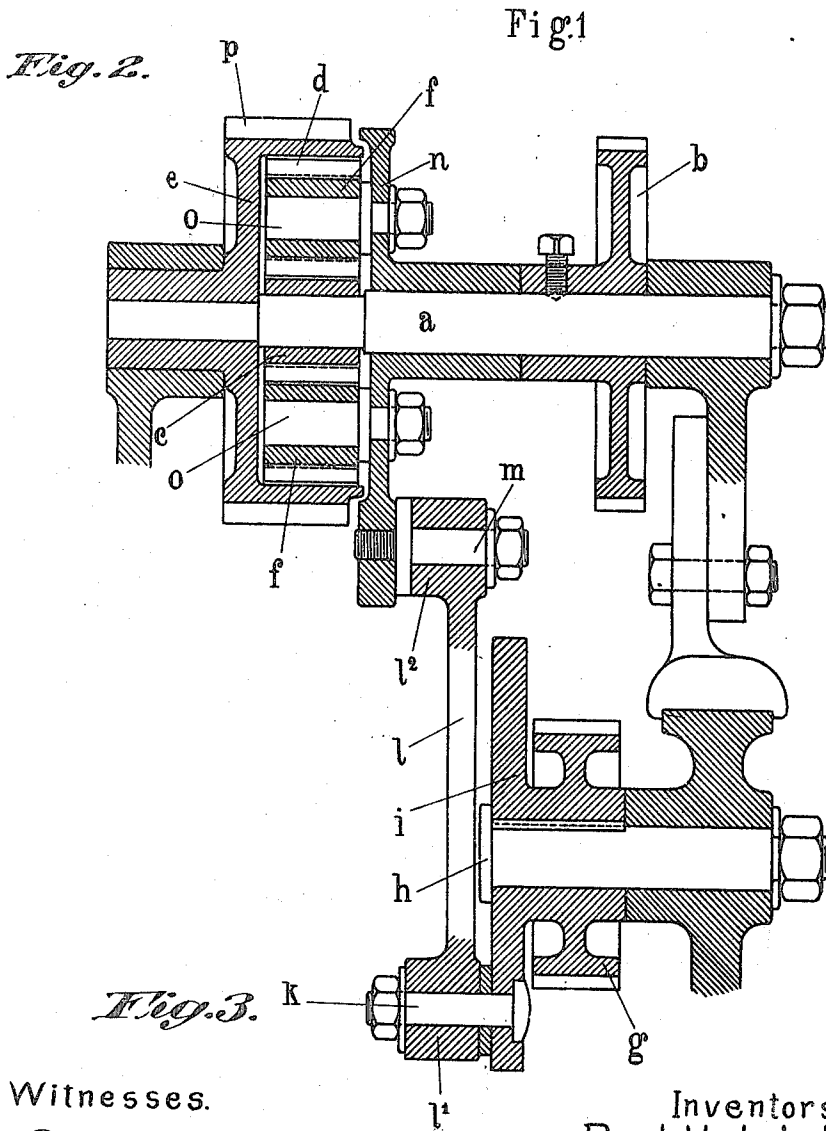


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 DIFFERENTIAL FEED MECHANISM FOR SPINNING OR COMBING MACHINES.
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1,190,407.

Patented July 11, 1916.



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UNITED STATES PATENT OFFICE.

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DIFFERENTIAL FEED MECHANISM FOR SPINNING OR COMBING MACHINES.

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Specification of Letters Patent. Patented July 11, 1916.

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To all whom it may concern:

Be it known that we, PAUL HELMBOLD, a subject of the Emperor of Germany, residing at Colmar, Alsace, Germany, and JULIUS WEINBRENNER, a subject of the Emperor of Germany, resident at Thann, Alsace, Germany, have invented new and useful Improvements in Differential Feed Mechanism for Spinning or Combing Machines, of which the following is a specification.

This invention has reference to improvements in differential gear for producing periodic variations of speed of the feed rollers or drawing-off rollers in spinning or combing machines.

The characteristic feature of our invention is the combination with a spinning or combing machine of a differential gear for driving the feed rollers or drawing-off rollers, in which gear the motion of the differential wheel is the resultant of the motion of a wheel which is rotated forward continuously from the main shaft of the machine, and of an oscillatory motion which is imparted by a crank mechanism.

The feeding of fibrous material in spinning machines with periodic increase and reduction of speed for various purposes is already known. This is effected for example by interposing between a shaft which has a reciprocating motion and the actual feed mechanism, a sweeping out device which is alternately put into and out of action. A portion of the rearward movement is thereby affected in such a manner that it is shortened as compared with the forward movement. This feeding arrangement is in general use in combing machines. As a further known example of variations of the feed at regular intervals, may be mentioned the driving of the rear fluted rollers of a ring spinning machine through toothed cam disks in the manufacture of yarn which is thickened at certain parts. Both of these methods of feeding have serious defects. When the first method of driving is adopted, shocks and vibrations are unavoidable while an objection to the latter is its slight adaptability to the various requirements in ring spinning operations.

The present invention obviates these defects. Its adoption insures perfectly quiet running without shocks, with the most favorable speed curves. The differential gear which forms the subject-matter of the in-

vention meets all requirements as regards frequency of the speed variations and maximum speed and it can be adjusted very readily.

In accordance with our invention a differential mechanism of peculiar construction is interposed between a driving shaft and the actual feed mechanism, the chief characteristic of the said differential mechanism consisting in that the driven toothed wheel of the differential mechanism is subjected to the simultaneous action of two toothed driving systems, one of which is regularly and continuously rotated while the other has a reciprocating motion imparted to it. From the compound action of these two driving mechanisms there results a regular periodic succession of variations of speed in the motion of the driven wheel and of the feed mechanism controlled thereby, without any shock.

One constructional form of the invention is illustrated by way of example in the accompanying drawing, in which:—

Figure 1 is a diagrammatic longitudinal section of the mechanism, and Figs. 2 and 3 are corresponding motion diagrams.

A driving system which rotates regularly and continuously and consists of a shaft *a*, a spur wheel *b* keyed on the shaft and a spur wheel *c* likewise keyed on the said shaft is mounted in any suitable manner on the frame of the machine. The wheel *b* receives its rotary motion from the source of power by means of suitable intermediate wheels. The motion is transmitted from *c* to a wheel *e*, mounted concentrically with *c* and provided with inwardly projecting teeth *d*, by means of planet wheels *f*. Another driving system serves for producing a reciprocating swinging motion which is likewise transmitted to the wheel *e*. In the constructional form illustrated this driving system consists of various members combined as follows:—A shaft *h* which is rotated regularly from the source of power in any suitable manner, for example through the intermediary of the spur wheel *g* keyed thereon, rotates constantly in a suitable bearing arranged on the frame of the machine. On the said shaft a disk *i* is keyed which carries a crank pin *k*, on which the head *l* of a crank rod *l* is mounted. On the shaft *a* a disk *n* provided with a guide sleeve and carrying a crank pin *m* is mounted concentrically. The other

head l^2 , of the crank rod l is mounted on the pin m . The disk n which has a reciprocating swinging motion imparted to it carries one or more pins o which serve as bearings for the toothed planet wheels f . In addition to acting as already indicated these planet wheels serve for transmitting the oscillating movement of the disk n to the internal teeth d of the wheel e .

The simultaneous action of the two driving mechanisms described upon the driven wheel e , the individual graphic curves of which mechanisms unite in one combined kinematic curve, is seen from the diagrams given in Figs. 2 and 3. The curve in Fig. 2 represents the result when the oscillating stroke of the disk n is long, so that the swinging movement of the said disk during the rearward movement produces a retardation of the wheel e beyond the zero point, *i. e.* produces movement in the negative direction. The wheel e is therefore likewise subjected to an oscillating movement but in such a manner that the travel in one direction appears greater than the stroke in the opposite direction.

The curve in Fig. 3 represents the result of a short oscillating stroke of the disk n , so that the swinging movement of the said disk during the rearward movement only produces a slight retardation of the plus-movement of the wheel e . The wheel e is not subjected to any oscillating movement but only to a plus-movement with periodic increase or decrease of speed. The oscillating motion represented by the curves in Figs. 2 and 3 meets all the requirements in feeding the fibrous material in a combing machine in an ideal manner, as the outer teeth p of the wheel e are utilized for driving the stripping cylinder. The motion represented by the curve in Fig. 3 is suited for

every requirement in ring-spinning in the manufacture of thickened yarn. The teeth p are employed in this case for driving the rear fluted roller of the ring spinning machine.

The adjustment of the apparatus described for the various cases that occur in practice with reference to frequency of the speed undulations as well as highest and lowest speed at any particular moment, is brought about by increasing or reducing the speed of rotation of the shaft h and further by shortening or lengthening the stroke of the crank pin k .

What we claim as our invention and desire to secure by Letters Patent is:—

In a combing machine, the combination with a frame, of a driven wheel having a hub journaled in the frame and provided with internal and external gear teeth, a driving shaft having one end journaled in the frame and the other end journaled in the hub of said driven wheel, a gear on said shaft by which it is rotated, a sun-wheel fixed on the shaft, a disk loosely mounted on said shaft, planet wheels which are mounted on pins carried by said disk and are in gear with the sun-wheel on the one hand and with the internal teeth of the driven wheel on the other hand, a crank device connected to said disk for imparting oscillatory motion thereto, and means independent from said shaft for rotating said disk.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

PAUL HELMBOLD.

JULIUS WEINBRENNER.

Witnesses:

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ARNOLD ZUBER.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."