June 4, 1929. P. V. APPLEBY 1,715,443

MACHINE FOR THE COMBING OR HACKLING OF COCO BRISTLE FIBERS OR OTHER LIKE OPERATIONS

Filed April 20, 1928 2 Sheets-Sheet 1

Fig. 1

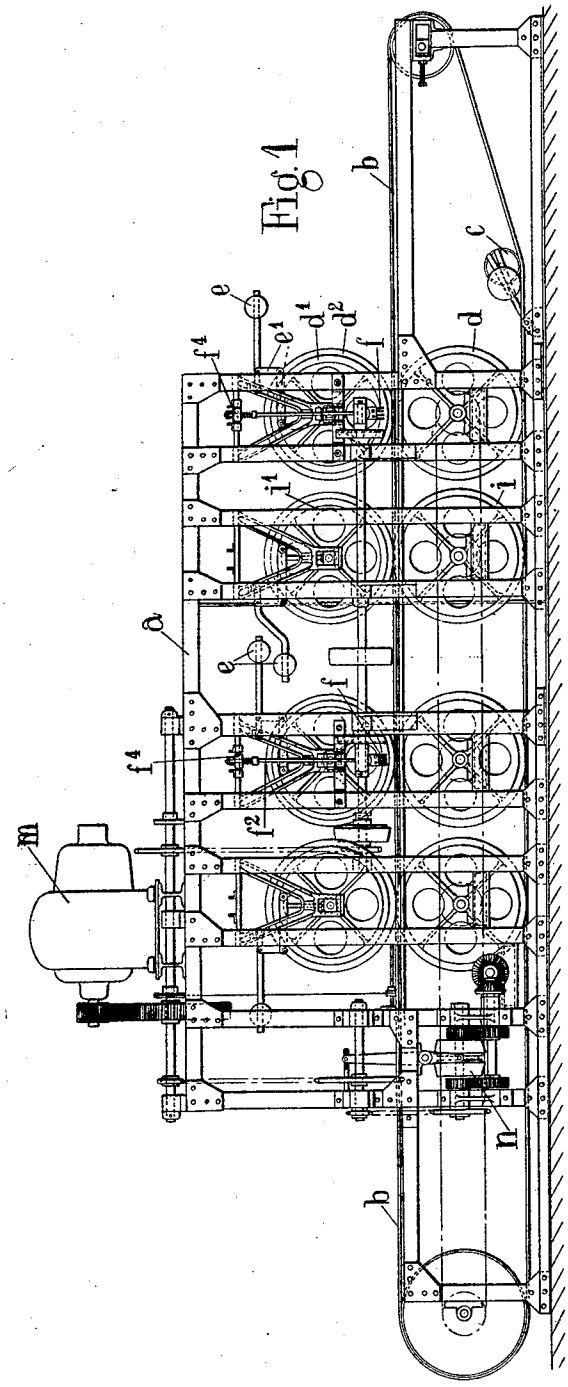
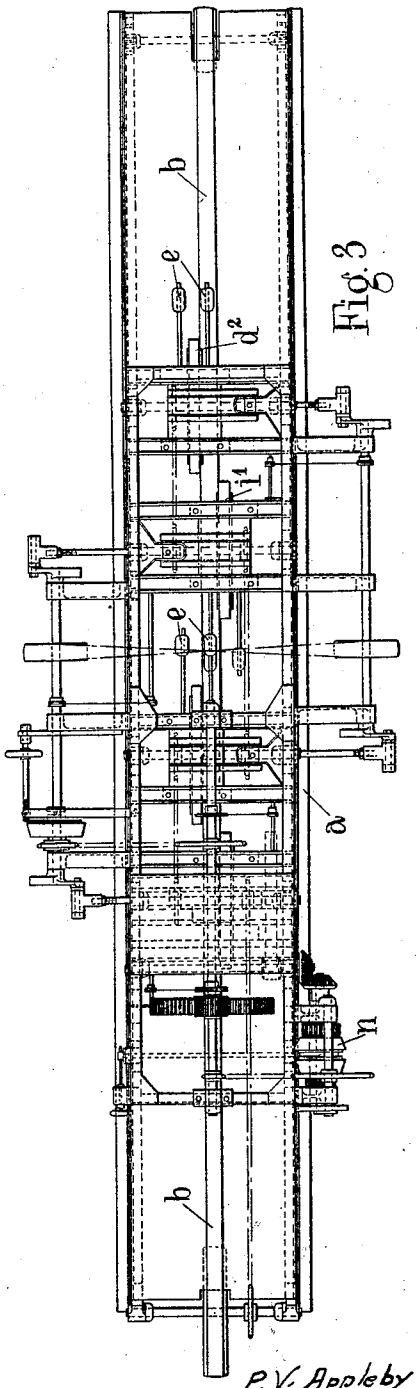


Fig. 3



P. V. Appleby INVENTOR

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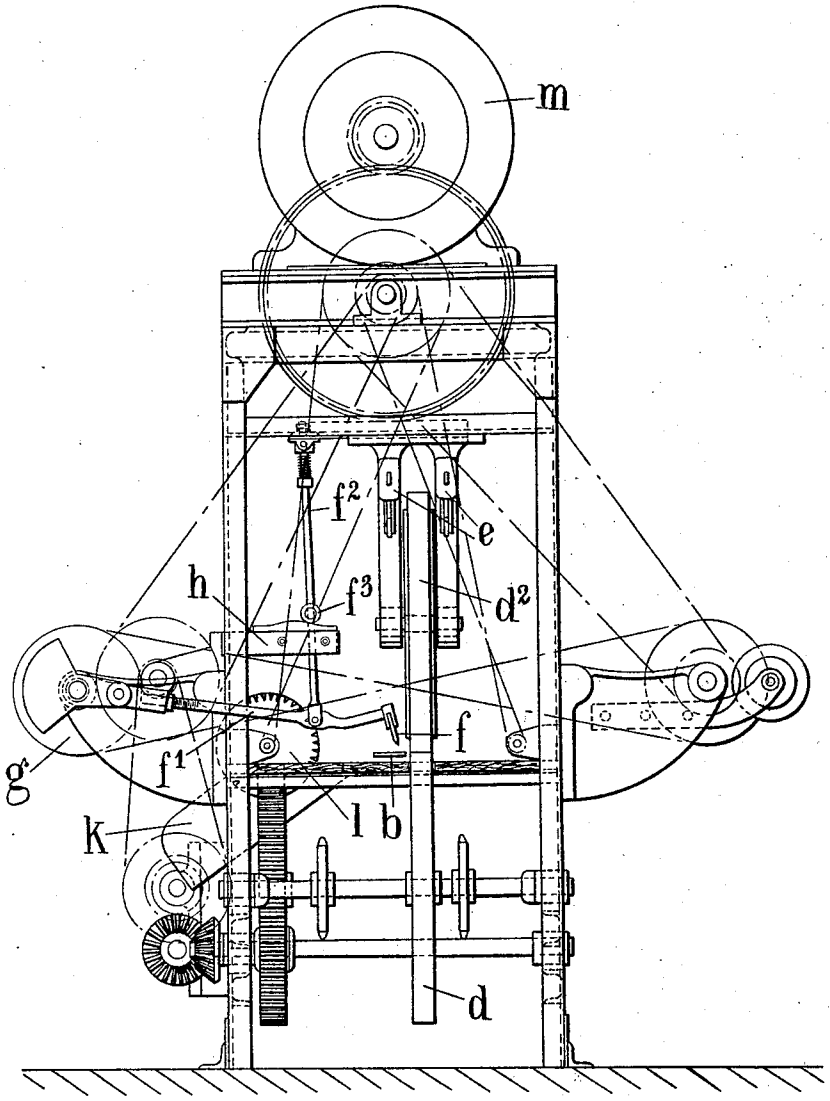


Fig. 2

P. V. Appleby, INVENTOR

By: Marks & Clark Attys.

Patented June 4, 1929. 1,715,443

UNITED STATES PATENT OFFICE.

PERCY VAVASSEUR APPLEBY, OF LONDON, ENGLAND.

MACHINE FOR THE COMBING OR HACKLING OF COCO-BRISTLE FIBERS OR OTHER LIKE OPERATIONS.

Application filed April 20, 1928, Serial No. 271,616, and in Great Britain May 4, 1927.

This invention relates to machines for combing or hackling fibers and while it is particularly designed for the combing of coco bristle fiber it may be applied with like advantage and equal effect to the combing or hackling of fibers or fibrous material generally.

The object of the present invention is to devise a simple and efficient machine for automatically effecting the combing operations hitherto generally performed by hand by native labour in the countries in which the fibers are produced.

The invention consists in a machine for combing fibers comprising means for conveying the fibers in a direction transverse to the length of the fibers and means for combing the same in the direction of their length, that is, in a direction transverse to the direction of travel of the fibers.

The invention also consists in a machine for combing fibers comprising a belt, band or rope conveyor travelling longitudinally of the machine and carrying fibers which are laid across said conveyor and one or more laterally moving rakes or combs for combing the fibers in the direction of their length, means being provided for holding the fiber ends during the combing operations.

The invention further consists in a fiber-combing machine according to the preceding paragraph in which the fibers are held alternately at one end and then at the other so that the whole length of the fibers may be adequately combed or hackled.

The invention also consists in other details and arrangements hereinafter described or indicated.

The accompanying drawings illustrate one convenient mode of carrying out the invention.

Figure 1 is a more or less diagrammatic side elevation of a machine in accordance with the invention;

Figure 2 is an end elevation on a somewhat larger scale, and

Figure 3 is a plan.

In carrying my invention into effect in one convenient manner as, for example, in its application to a machine designed for hackling coco bristle fiber, the length of which varies in general from about 8 inches to about 13 inches, I form my improved machine with any suitable framework or entablature *a* adapted to carry a conveyor *b* which may comprise two ropes or a leather or metal belt or band or other suitable conveying element which travels longitudinally of the machine, means being provided of suitable character to drive the conveyor at any suitable speed which may or may not be variable, and a weighted jockey pulley *c* or a screw operator or other movable bearing or other means being also preferably provided to maintain the requisite degree of tension in the belt or band or other member or members comprising the conveyor.

In practice the fiber to be combed is laid upon the conveyor at the feed end (that is the right-hand end of Figure 1) so to be carried through the machine for the various operations that are to be performed therein and I prefer to facilitate such feeding operation by the employment of a suitable metal rack formed of wire or rod or other suitable material of substantially U shape and of a width sufficient to enable it to span the conveyor member, the rack being of a suitable length to take a sufficient charge of fiber which may be laid transversely thereon and being conveniently fitted with a handle to facilitate its manipulation so that a charged rack may be laid over the feed end of the conveyor which thereupon automatically removes the charge of fiber from the rack for the purpose of conveying the same through the machine. Other similar racks in the meantime will be prepared with the fiber laid thereon so that in this way the feeding of the machine may be substantially continuous. For example, if a rack is 2 feet 6 inches long and the linear speed of the conveyor is 15 feet per minute a continuous feed will require the emptying of six racks per minute so that if there are two operators engaged in filling racks the maximum time for filling one rack will be 20 seconds.

The fiber is carried along upon the conveyor until it passes between two cast iron or other wheels *d*, *d'* of suitable size arranged one above the other and the vertical centre lines of which are located slightly to one side of the centre line of the machine (as clearly seen in Figure 3) so that the fibers will be gripped between the said wheels at one side of the belt conveyor, either or both of said wheels being provided

with tyres (such as d^2) of rubber or other compressible or friction material to facilitate the gripping of the fiber ends.

In order to compensate for varying thicknesses of fiber to be gripped the upper wheel of the pair of wheels is mounted in a bearing which is capable of vertical movement and the necessary gripping pressure is maintained in part by the weight of the wheel and in part also by a suitable counterweight e acting upon the wheel or its bearings preferably through the medium of a compound lever system e', it being understood, however, that such additional weighting means may be dispensed with if the weight of the wheel itself be found sufficient to provide the necessary grip. By such an arrangement the fiber is thus gripped over a certain width while at the same time travelling along at the same speed as the conveyor belt, the peripheral speeds of the gripping wheels d, d' being adjusted for the purpose so as to be equal to the travelling speed of the belt.

While the fiber is thus gripped at one end of the gripping wheels it is subjected to the action of a rake or comb f operated by levers or other suitable mechanism so as to be given a rapid motion in a direction transverse to the direction of movement of the feed belt and thus in the direction of the length of the fibers to be combed.

By a suitable cam action or other mechanism the comb may be made to travel so that it dips into the fibers only on the outward or active stroke, returning to its innermost position in a path located above the fiber so as not to disarrange the combed fibers.

In the construction illustrated the necessary movement of the comb or rake is imparted by a suitable crank g (preferably counter-balanced) operating upon an arm or lever f' carrying at one end the comb or rake f (which may comprise 4, 7, 8 or other convenient number of teeth in one or more rows in general limited by the width over which the fibers are held), the arm or lever f' being supported by a link or pair of links f^2 carrying a roller or rollers f^3 adapted during the oscillation of the links f^2 to move over a suitable cam path h so as to impart the dipping motion of the comb referred to in the preceding paragraph, and the upper end or ends of the link or links f^2 being spring-controlled and movable vertically in a suitable oscillating bracket f^4.

It will be understood, however, that this construction is given purely by way of illustration and that any other suitable means may be adopted for applying the necessary movements to the rake or comb as, for example, mechanisms similar to those employed in connection with wool-washing machines may be adopted provided that they are designed to move the rakes or combs at the requisite speed. Moreover, the feed belt and the combing mechanisms may be driven by separate motors.

The fibers having thus been submitted to a combing at one end are carried on by the conveyor until they are gripped at the other end by a similar pair of wheels i, i' to that previously described but located upon the opposite side of the conveyor, and while so gripped the other end of the fiber is then subjected to a combing operation by a rake similar to that hereinbefore described and similarly operated but again located at the opposite side of the conveyor.

These wheels can be brought more closely together than shown in Figure 1 as long as the periphery of one wheel is clear of the axle of the succeeding wheel. In this way the overall length of the machine may be considerably reduced.

With some fibers a single combing operation at each end may be found sufficient but with other fibers it may be desirable to subject the same to a number of combing operations, in which case the machine may comprise a number of sets of gripping wheels and combs or rakes with their attendant mechanisms, and in such case any suitable means may be adopted for throwing one or more of such rakes out of operation when the machine is intended to treat fibers requiring a fewer number of combing operations.

The short fibers which are combed out by the action of the combs or rakes may be guided into hoppers or chutes k suitably placed for their reception, and in order to facilitate this guiding operation I may provide adjacent to each hopper or chute a rapidly rotating disc l having teeth or serrations round its periphery or a fan or any other suitable means may be adopted for the purpose.

When the combed fiber finally issues from the machine it may be collected upon a travelling band or any other way found most suitable for its eventual hanking, that is, tying into hanks.

The machine may be driven by an electric motor m or any other suitable form of prime mover with any clutch n or loose pulley and belt arrangement or other contrivance for permitting of the ready starting and stopping of the machine, and the gripping wheels, rake-driving mechanism and guiding discs for the combings may also be driven at the appropriate speeds by chain or belt or other suitable transmission mechanisms adopted for the purpose.

In a modification of the invention I may provide two electric motors, one for the belt or conveyor drive connected thereto by worm and worm wheel and skew or bevel or other gearing, and one for driving, through the medium of spur gearing and chain drives

or other transmission means, the comb shafts and fans or the like for clearing the loose fibers. Moreover, instead of providing chutes for the latter I may make the conveyor table of, say, sheet metal with sloping sides and an upper central part to take a wooden or other table or support over which the conveyor or feed belt runs.

Furthermore, in place of arranging the combs to be reciprocated as hereinbefore described, I may employ continuous chain combs driven from suitable countershafts or otherwise, or any other suitable laterally moving combs or rakes may be employed.

It will be understood that the details of construction and arrangement of the various parts may be varied from the foregoing to suit any particular kind of fiber or fibrous material upon which the machine is to operate or any practical requirements which the invention may be called upon to fulfil, it being understood that the details of construction hereinbefore given are by way of example only to illustrate the nature, and are not intended in any way to limit the scope, of the invention.

Having now described my invention, what I claim as new and desire to secure by Letters Patent is:—

1. A machine for combing fibers comprising a flexible conveyor on which the fibers are laid transversely, means for moving said conveyor, upper and lower wheels arranged at one side of said conveyor for gripping the fiber ends and laterally moving combing means for combing the fibers in the direction of their length.

2. A fiber combing machine according to claim 1 in which one of the wheel members is provided with a tyre of compressible material.

3. A fiber-combing machine according to claim 1 in which the upper wheel of a pair of gripping wheels is mounted in a movable bearing and acted upon by a counterweight.

4. A fiber-combing machine comprising in combination a longitudinally movable conveyor across which the fibers may be laid transversely, a laterally movable comb for combing the fibers in the direction of their length, upper and lower wheels arranged at one side of said conveyor for gripping the ends of the fibers during the combing operation and crank mechanism for operating said comb.

5. A fiber combing machine according to claim 4 having also cam means controlling the movement of the comb so that it dips into the fibers only on the outward or active stroke and returns to its innermost position in a path located above the fibers.

6. A fiber combing machine comprising in combination a longitudinally movable conveyor across which the fibers may be laid transversely, laterally movable comb means for combing said fibers in the direction of their length, an upper and lower wheel set to one side of the conveyor for temporarily gripping the ends of the fibers during the combing operation, crank mechanism for actuating the combing means and means for facilitating the ejection of the combings from the machine.

7. A fiber-combing machine according to claim 6 having also cam means controlling the movement of said combing means so that the comb dips into the fibers only on the outward or active stroke and returns to its innermost position in a path located above the fiber.

8. A fiber combing machine comprising an endless belt conveyor, upper and lower wheels located to one side of the conveyor, upper and lower wheels on the other side of the conveyor and in staggered relation to said first upper and lower wheels, and combing means adjacent each upper and lower wheel and on the opposite side of the conveyor therefrom.

9. A fiber combing machine comprising a flexible endless conveyor across which the fibers are laid, upper and lower wheels having flexible rims and located on each side of said conveyor in staggered relation, combing means associated with each pair of wheels and on the opposite side of said conveyor therefrom, and means for varying the pressure of the upper wheels on the lower wheels.

In testimony whereof I have signed my name to this specification.

P. V. APPLEBY.