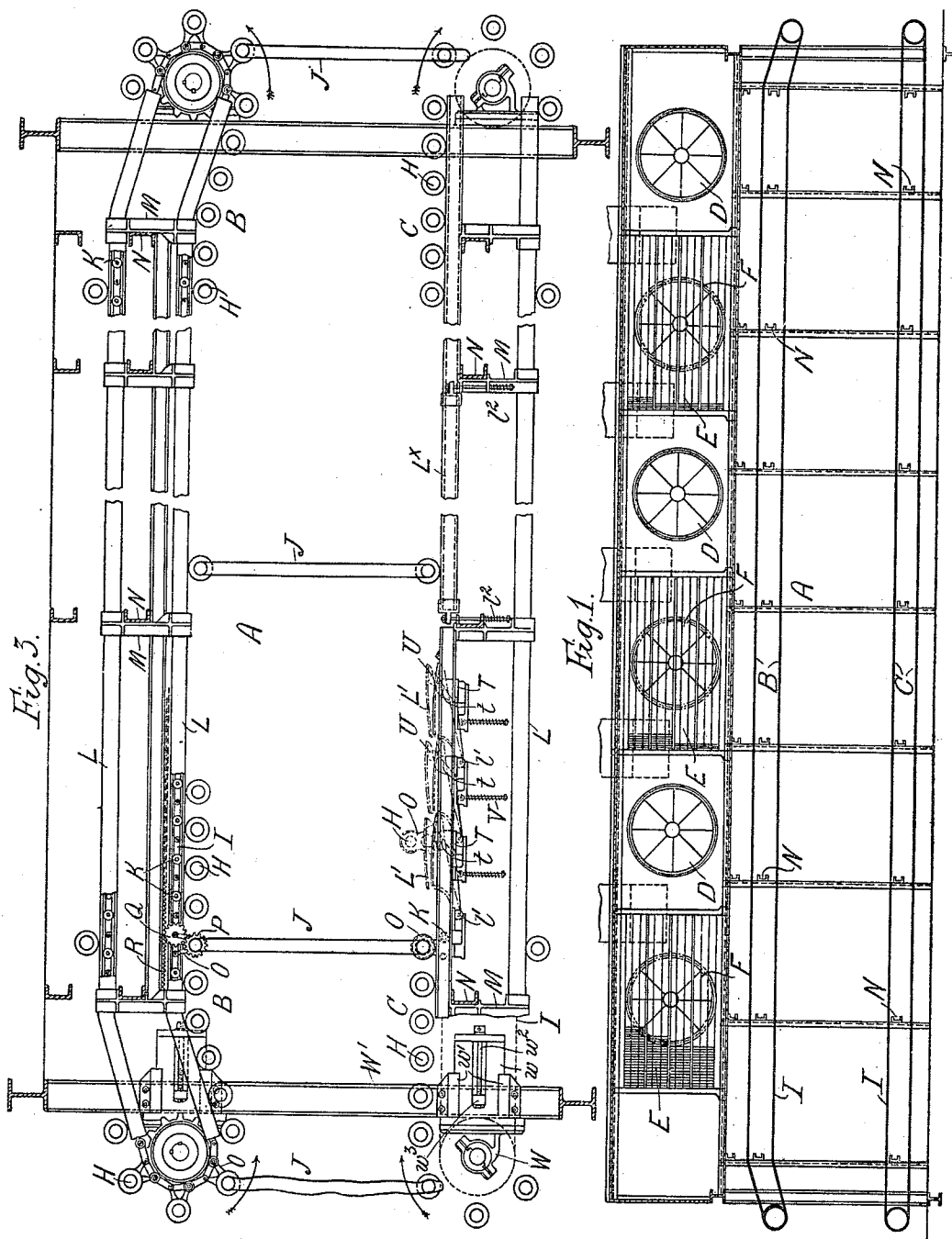


J. KEITH & W. W. WARDLE.
 APPARATUS FOR OPENING AND SEPARATING THREADS OF YARN AND THE LIKE.
 APPLICATION FILED JUNE 2, 1909.

957,610.

Patented May 10, 1910.

4 SHEETS—SHEET 1.



WITNESSES:

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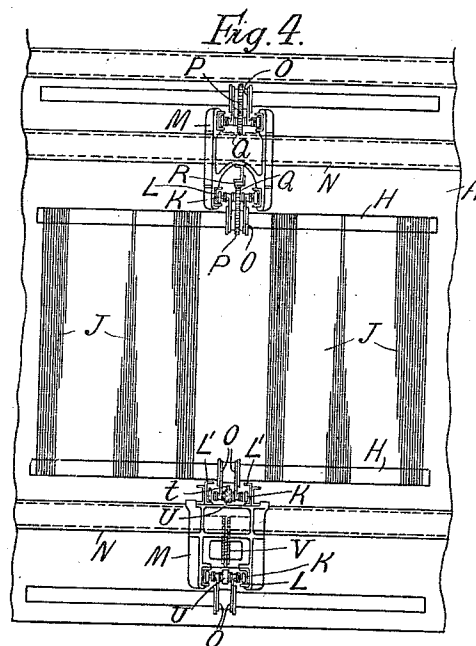
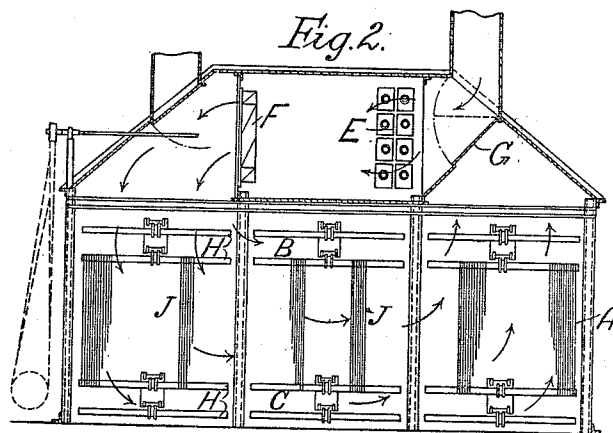
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4 SHEETS—SHEET 2.



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4 SHEETS—SHEET 3.

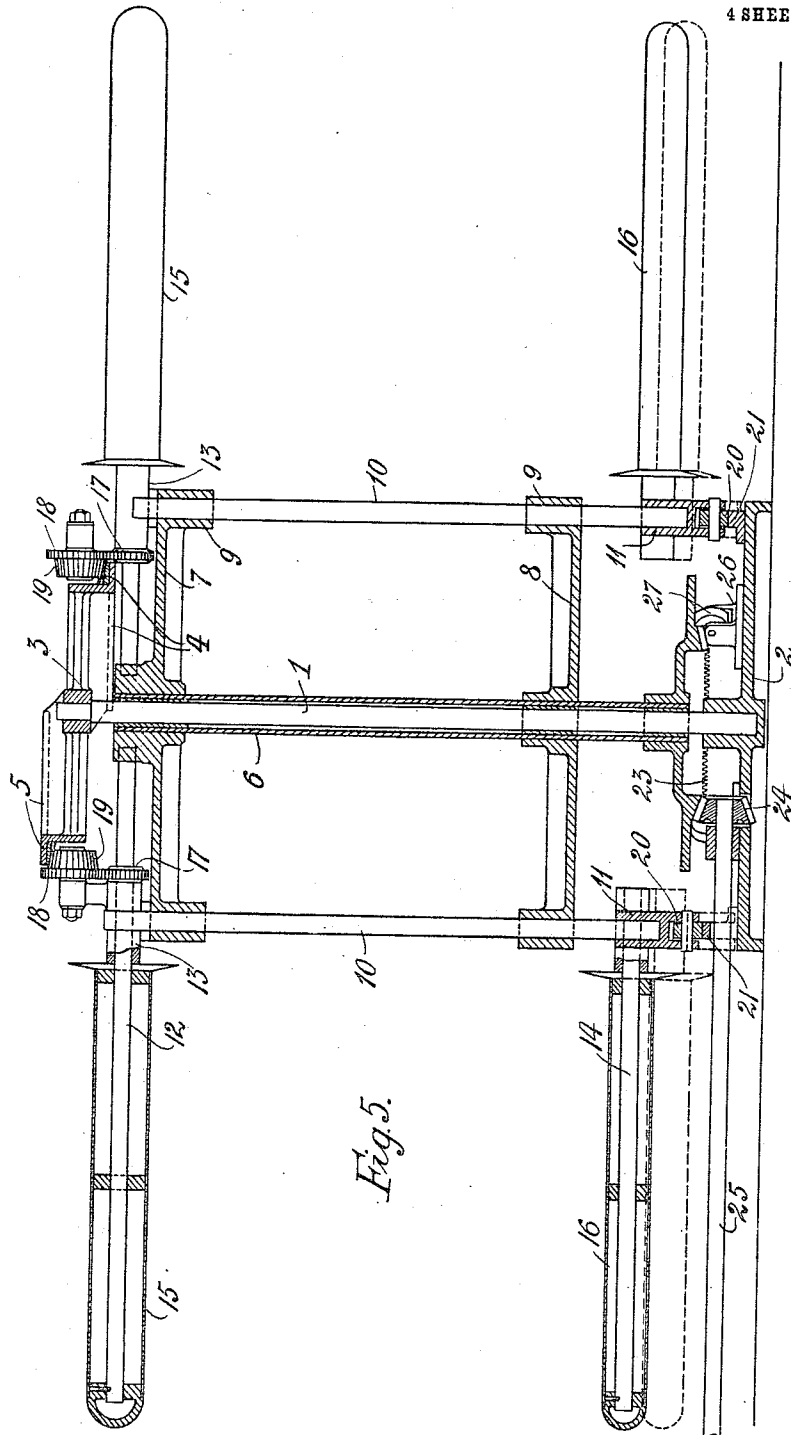


Fig. 5.

WITNESSES
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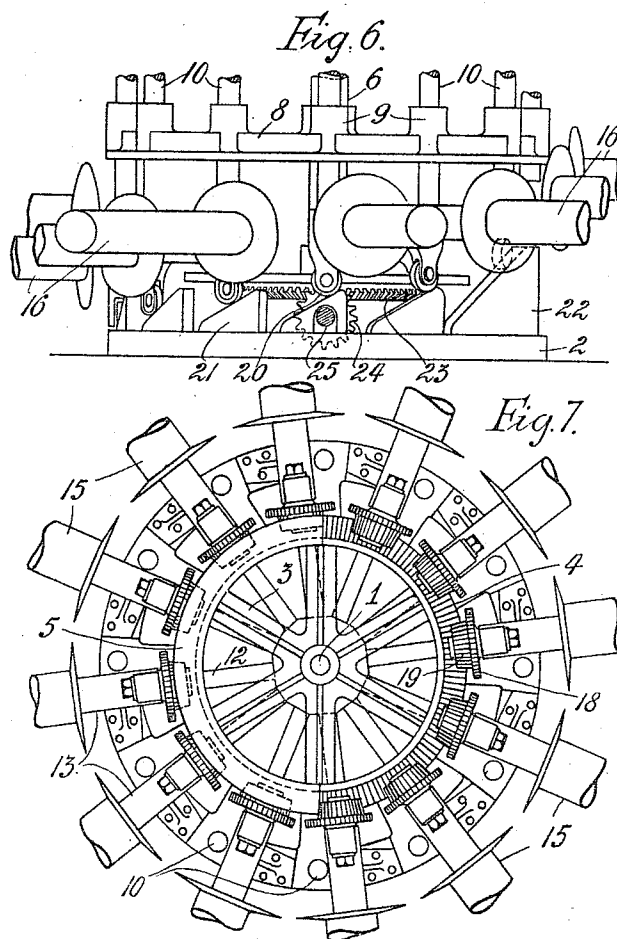
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UNITED STATES PATENT OFFICE.

JAMES KEITH AND WILLIAM WINSHIP WARDLE, OF LONDON, ENGLAND.

APPARATUS FOR OPENING AND SEPARATING THREADS OF YARN AND THE LIKE.

957,610.

Specification of Letters Patent.

Patented May 10, 1910.

Application filed June 2, 1909. Serial No. 499,754.

To all whom it may concern:

Be it known that we, JAMES KEITH and WILLIAM WINSHIP WARDLE, subjects of the King of the United Kingdom of Great Britain and Ireland, and residing at London, England, have invented a certain new and useful Improvement in Apparatus for Opening and Separating Threads of Yarn and the Like, of which the following is a specification.

This invention relates to machines for treating hanks of yarn and other materials, and more particularly to devices for automatically stretching, shaking and tensioning the hanks.

In the accompanying drawings, Figure 1 is a longitudinal section and Fig. 2 is a transverse section showing diagrammatically the general arrangement of a drying machine fitted with devices according to the invention. Fig. 3 is a part longitudinal section, and Fig. 4 is a part cross section of the machine on an enlarged scale. Fig. 5 is an elevation. Fig. 6 is a part elevation at right angles thereto and Fig. 7 is a plan of a modification.

Referring to Figs. 1 to 4, the yarn or the like is dried within a rectangular chamber A fitted with devices for circulating air and for regulating its temperature and along which chamber move traveling bands B, C, arranged one above the other in pairs. The said devices may comprise circulating fans D, heating coils E and fans F for blowing fresh air into the machine, the air supply being controlled by a hinged door or doors G, which doors, according to their position, permit the fans F to blow in fresh air or shut off the supply of fresh air so that the fans will draw their supply of air from the machine, or partly from the machine and partly from outside, as occasion may require. Each of said bands B, C is constituted by a number of bars H connected by a chain I at or about the middle of their length the ends being left free to receive the hanks J. The upper loops of the hanks J are slipped over the ends of the bars H of the upper band B and the lower loops are slipped over the ends of the bars of the lower band C, as shown in Figs. 3 and 4.

Connected to each chain I are rollers K which run in races L supported by upright brackets M carried by horizontal members such as channels N. Connected to the chain of the upper band B are supporting brack-

ets O through which the poles H pass and in which they are free to turn. The bars H of the said upper band are each fitted with a cog wheel P which engages directly or, as shown, indirectly, by means of a cog wheel Q with a rack R so that when the bands B, C are in motion the bars will be caused to rotate around their own axes. Connected to the chain of the lower band are like supporting brackets O through which the bars H of the lower band C pass, and connected to which brackets O are side rollers K similar to those aforementioned and running in races L, said races consisting in part of sections L¹ hinged at L² and arranged in pairs so that they can rise and fall together, inclined blocks T being interposed between the hinged sections L¹ of each pair.

When the bands are in motion, central rollers U carried by the lower chain I ascend the inclines *t* of the blocks T, tilting the hinged sections L¹ until the rollers U reach the summits of the inclines *t* at which point they drop by the action of gravity or are pulled down by springs V or the like, thus imparting a succession of tensile efforts to the hanks J and thereby stretching and shaking the strands of the hanks apart, each of said springs V having an abutment between the bottom face of the block T and the nut of a bolt surrounded by the spring and connected to the hinged section L¹. After the hanks have been subjected to this treatment, they are kept in tension by the side rollers K coming in engagement with a part L^x of the lower race L which is held down by springs L² or by weights sufficient to give the desired tension.

To secure the required tension of the chains I, tension gear is provided at one end of each band, the sprocket shaft being mounted on a plummer block W having an extension *w* adapted to slide in guides *w*¹ on an end standard W¹ by means of a screw *w*² engaging a threaded portion *w*³ on the standard.

The apparatus shown in Figs. 5, 6 and 7 comprises a stationary vertical spindle 1 secured to a central boss in a base plate 2 and having fixed to its upper end a wheel 3 on the half flanges of which are fixed semi-circular toothed sectors 4 and 5 at different levels the sector 4 having teeth on its upper face and the sector 5 having teeth on its lower face. Rotatably mounted on the spindle 1

is a sleeve 6 carrying a framing composed of upper and lower wheels 7 and 8 respectively, said wheels formed with sockets 9 in which are guided vertical sliding rods 10, the said upper wheel 7 carrying outwardly projecting radial arms 12 rotating in bearings 13 and the rods 10 having attached to their lower ends bushes 11 carrying fixed outwardly projecting radial arms 14 in vertical alinement with the arms 12. Over said arms 12 and 14 are passed bars 15 and 16 the bars 15 being fixed to the arms 12, and the bars 16 being rotatable relative to the arms 14. On the inner ends of the arms 12 are keyed pinions 17 engaging intermediate gears 18 integral with bevel pinions 19 which mesh with the sectors 4, 5. In each bush 11 is fitted a roller or caster 20 which rides on a track or peripheral line composed of level and inclined parts formed by a number of medium sized brackets or blocks 21 and one large bracket 22, the bracket 22 being higher than the bracket 21 and having a level top. At the lower end of the sleeve 6 is a bevel gear 23 driven by a bevel gear 24 on a spindle 25 which is extended to a distance convenient for a driving pulley or gear to be fixed on it: the spindle 25 thus serving to drive the sleeve 6 and the framing consisting of the wheels 7 and 8 and the rods 10 and the parts carried by said framing. On the base plate 2 are fixed a number of brackets 26 carrying rollers 27 on which the extended flange of the gear 23 runs, said rollers 27 thus carrying the weight of the revolving part of the apparatus.

The operation of the apparatus is as follows:—Hanks of yarn are hung over one of the upper bars 15 in loops, and then the lower ends of the loops are slipped under the corresponding lower bar 16 and spread along as far as the "leas" line of the yarns will allow; while this is being done, the rod 10 carrying the bar 16 is passing over the bracket 22 which has lifted the lower bar 16 high enough for the yarns to slip under free. The continuous movement of the apparatus brings the roller 20 to the edge of the bracket 22 and the roller 20 being fixed in the bush 11 on the rod 10 and carrying the arm 14, the bar 16 is allowed to fall and thus imparts a blow to the yarns. After the blow is given, the motion of the apparatus brings the roller 20 to the foot of the incline of the adjacent block 21 up which it rises; while rising it lifts the bar 16 clear of its yarns, and then falling over the edge of the block 21 it causes the bar 16 to impart a second blow to the yarns, and so on. The bracket 22 having a level top the time occupied by roller 20 in traveling over it is sufficient to allow the yarns to be taken off,

and fresh yarns to be put on, while the bar 16 is in raised position. While the yarns are being carried around the apparatus and subjected to the blows of the lower bar, they are also rotated by the upper bar at such a rate as will bring a different portion of the yarns under the blow. While each of the pinions 19 is being carried around the fixed wheel 3 it runs over and engages with the semi-circular sector 4 during about one half of its travel, and during the other half of its travel it runs under and engages with the other semi-circular sector 5. Accordingly, each of the upper bars 15 is rotated on its arm 12 in one direction during one half revolution of the framing, and rotates in the other direction during the other half revolution of the framing, so that the yarns are brought to a fresh place to receive the blow from the lower bar 16; the diameter of the upper bar 15 being such that it will rotate the yarn completely around and back again during one revolution of the framing. When the first hanks which were placed on the poles have completed the circuit, they are properly opened and ready to be transferred to the drying machine.

The apparatus is or may be placed at the feed end of the drying machine and in close proximity to it.

Having now described our invention what we claim and desire to secure by Letters Patent of the United States is:—

1. Apparatus for treating hanks of yarn or the like comprising upper and lower bars on which the hanks are hung, means for supporting said bars, means for rotating the upper bars, a track formed with inclines, rollers movable with said bars and riding said track and serving to raise and lower the lower bars to impart a series of blows to the hanks, and means for moving said bars over the track.

2. Apparatus for opening and separating threads of yarn and the like comprising upper and lower bands each comprising an endless chain and means for supporting said chains, bars attached to said chains, races consisting of stationary sections coöperating with the chain of the upper band, races including hinged and vertically movable sections coöperating with the chains of the lower band and means for operating the chains.

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

JAMES KEITH.
WILLIAM WINSHIP WARDLE.

Witnesses:

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JOHN MCCLEARY, Jr.