(No Model.)

C. COUPLAND.

SPINDLE AND BEARING FOR ROTARY CUTTERS OF MACHINES FOR CUTTING DOUBLE PILE FABRICS.

No. 294,969. Patented Mar. 11, 1884.

Fig 1

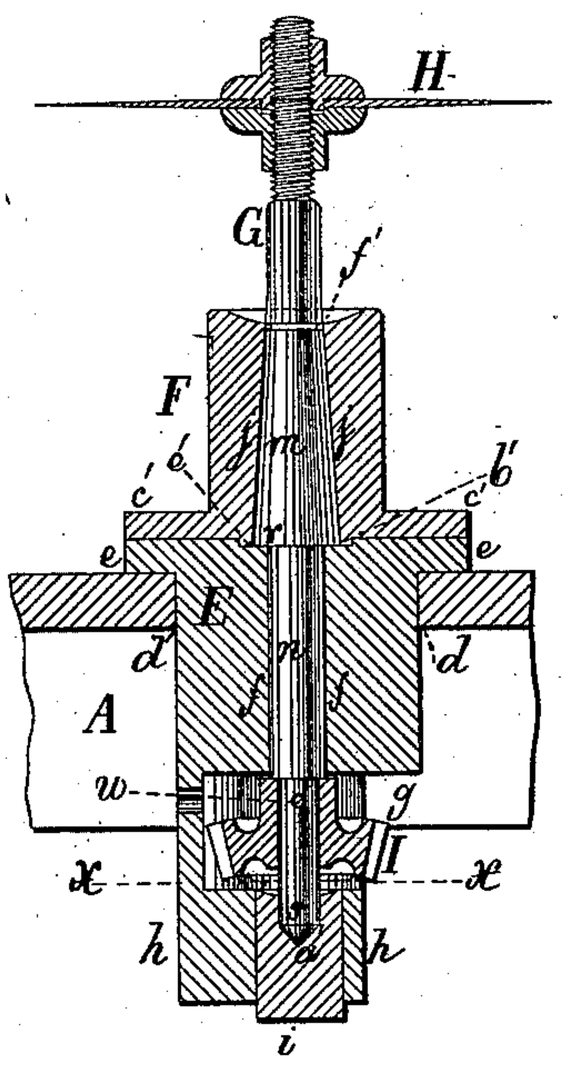


Fig 2

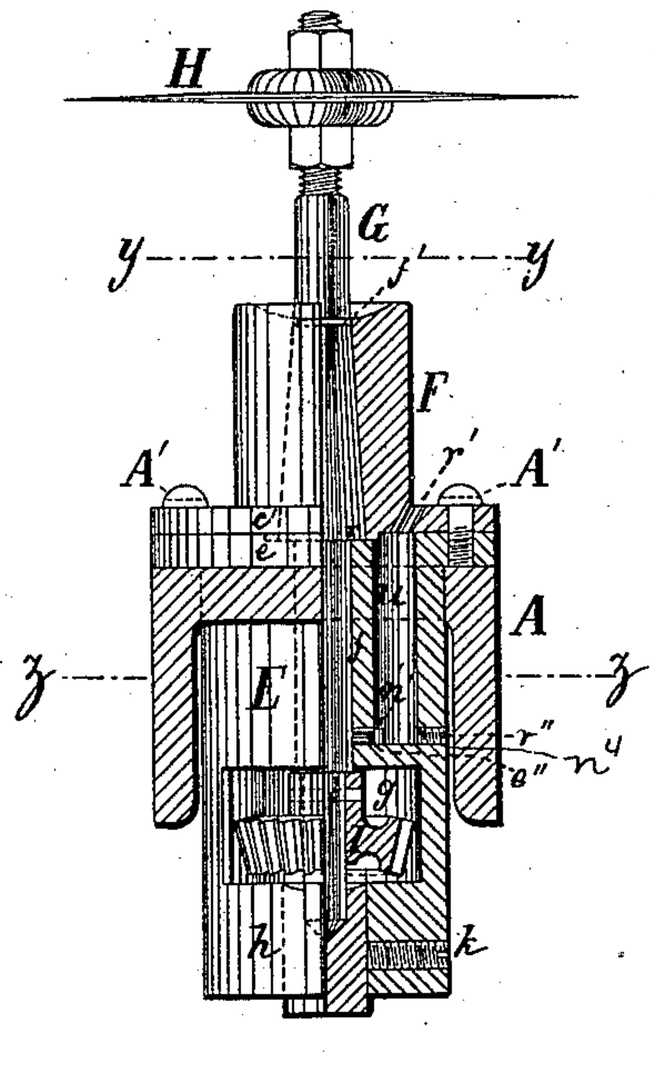


Fig 3

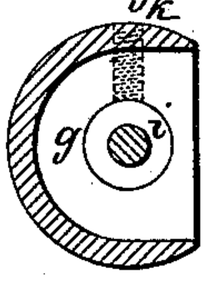


Fig 4

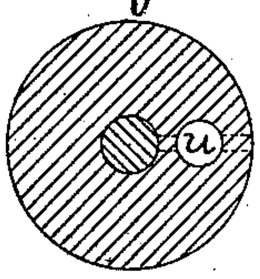


Fig 5

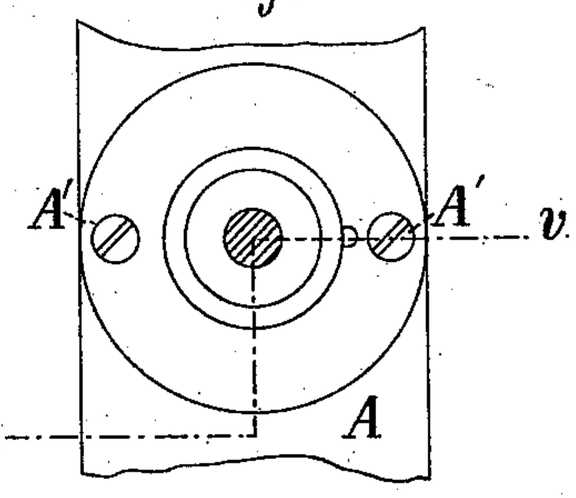
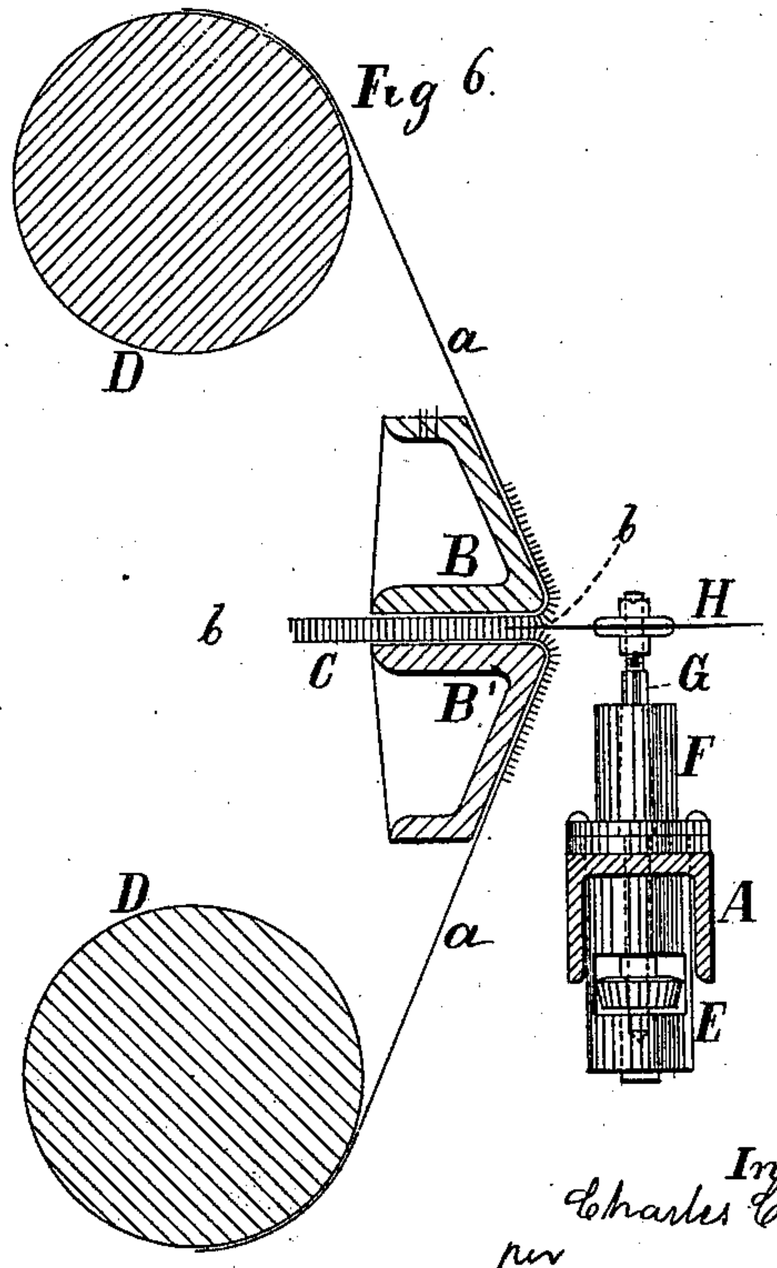


Fig 6.



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CHARLES COUPLAND, OF SEYMOUR, CONNECTICUT.

SPINDLE AND BEARING FOR ROTARY CUTTERS OF MACHINES FOR CUTTING DOUBLE PILE FABRICS.

SPECIFICATION forming part of Letters Patent No. 294,969, dated March 11, 1884.

Application filed March 29, 1883. (No model.)

To all whom it may concern:

Be it known that I, CHARLES COUPLAND, of Seymour, in the county of Hew Naven and State of Connecticut, have invented certain Improvements in Spindles and Bearings for Rotary Cutters of Machines for Cutting Double Pile Fabrics, of which the following is a specification.

This invention relates more particularly to spindles for the rotary cutters used in that class of textile machinery which is employed for severing or cutting the connecting pile-threads of double pile fabrics; but it may also be employed in connection with rotary cutters used for other purposes where an extremely high speed of rotation is required.

The object of my said invention is to provide a spindle which shall be stable and free from any irregularity or jar when rotated at a high velocity, and which may be readily kept in a state of constant and effective lubrication, notwithstanding the great velocity at which it is run.

My invention comprises certain novel combinations of parts, hereinafter pointed out in the claims, whereby these results are very effectually and thoroughly secured.

Figure 1 is a partial vertical section of a spindle and its immediate adjuncts constructed according to my said invention. Fig. 2 is a vertical sectional view, taken in the line *v v* of Fig. 5, as seen from the right-hand side of Fig. 1. Fig. 3 is a horizontal sectional view taken in the line *x x* of Fig. 1. Fig. 4 is a horizontal sectional view through the bearing, taken in the line *z z* of Fig. 2. Fig. 5 is a horizontal sectional view taken in the line *y y* of Fig. 2; and Fig. 6 is a vertical transverse sectional view of part of a machine for cutting the pile of double pile fabrics, illustrating the relation of the spindle and the rotary cutter to the double pile fabric when the cutter is arranged to sever the same.

When my said invention is used in a pile-cutting machine, the spindle and its immediate adjuncts are mounted upon a bar, A, suitably constructed, supported, and arranged to receive a reciprocating motion, any desired number of the spindles and their cutters being arranged along the said bar, with the cutters placed opposite the space between two straining-bars, B B′, through which the double pile fabric C is passed, the two fabrics *a* of said double fabric, when separated, passing over rollers D, which draw them in opposite directions, and present the pile *b* to the action of the cutters in such manner that the latter, having a reciprocating movement simultaneous with their rotary movement, sever the pile at or about the middle thereof, so that one half remains projecting from the surface of one of the fabrics *a*, while the other half remains projecting from the surface of the other of the fabrics *a*, substantially as shown in my separate and distinct application for a patent on improvements in apparatus for cutting pile fabrics filed November 7, A. D. 1882. When the cutters are to be applied to other purposes, the spindles and their adjuncts are secured upon any suitable or appropriate support, either movable or stationary, as the circumstances of the case may require, the object of my invention being, as hereinbefore explained, to provide a means whereby the very highest required or attainable speed or rotation of the cutters may be rendered consistent with perfect steadiness and regularity of motion, and perfect lubrication of the bearings of the spindle during such motion, these conditions meeting the requirements of the pile-cutting machine, as hereinbefore indicated, and also of various other branches of mechanism in which an exceedingly high velocity of the rotary cutters is required.

The bar A, or other equivalent support which may be provided for the mechanism, is formed with a circular or other suitably-shaped socket, *d*, which receives the bearing E, which has at its upper end a circumferential flange, *e*, which rests upon the top of the bar A or its equivalent, thereby preventing the bearing E from displacement in a downward direction. This bearing E has at its upper and central part a vertical cylindrical bore, *f*. At its lower end it is laterally recessed, as shown at *g*, for a purpose which hereinafter appears. In its bottom *h* it has securely fitted a step-block, *i*, of steel or other suitable material, in the upper end of which is formed a conical step-bearing, *a′*. The block *i* is retained in place by a screw, *k*, inserted laterally through the adjacent portion of the bottom *h* of the

bearing E, as represented in Fig. 2 and in dotted outline in Fig. 3. At the upper end of the bore *f*, and concentric therewith, is a circular recess, *b'*. (More fully indicated in Fig. 1.)

F is a cap, which has at its lower end a flange, *c'*, which rests upon the flange *e* of the bearing E, and is securely affixed thereto by means of suitable screws or bolts, A', as shown in Fig. 2. This cap F has an upwardly-tapering bore, *j*, circular in its cross-section, and broadest at its lower end. Concentric with the said lower end of the said bore *j* is a shoulder, *e'*, which fits into the recess *b'* of the bearing E. The upper end of the cap F is hollowed out, as represented at *f'*, forming a cup-shaped cavity concentric with the adjacent end of the tapering bore *j*.

G is the spindle, which is provided at its upper extremity, in any ordinary or suitable manner, with a circular knife or cutter, H. This spindle has an upwardly-tapering portion, *m*, which corresponds in shape to the tapering bore *j*, in which it is situate, and a cylindrical portion, *n*, which corresponds with the cylindrical bore *f*, in which it is situate, there being a circumferential shoulder, *r*, at the junction of the parts *m* and *n*, which said shoulder rests upon the adjacent upper surface of the bearing E, as represented in Figs. 1 and 2. The lower extremity, *s*, of the spindle G is made of conical shape to fit into the conical step *a'*. The pinion I, from which a rotary motion may be communicated to the spindle G, is attached to the lower part of said spindle, below the part *n* thereof, and of course above the lower extremity, *s*, the pinion I being placed within the lateral recess *g*, hereinafter described. One side of the pinion projects beyond the adjacent parts to an extent sufficient to enable other suitable gearing to mesh therewith to communicate rotation thereto, to actuate the spindle.

Formed in one side of the bearing E, and parallel with the bore *f*, is a chamber, *u*, which at its bottom communicates by an opening or passage, *n'*, with the said bore *f*.

Formed in the flange *c'* of the cap F is an orifice, *r'*, which affords access to the top of the chamber *u*. The opening or passage *n'* is to be filled with a plug, *e''*, of porous material—such, for example, as pine wood of open texture and free from pitch, or other material which will permit the slow passage or percolation therethrough of the oil or lubricating material. In order that this plug may be applied in place, there is provided in line with the opening *n'*, but extending outwardly from the bottom of the chamber *u*, a corresponding opening, *n*^{4}, normally occupied by a screw, *r''*, so that by removing the bearing E from the bar or support A, to afford access to the screw *r''*, the latter may be removed and afford access in a straight line to the passage or opening *n'*.

In order to put the several parts together, the pinion I is placed in the cavity *g*, and the spindle G is thrust downward to the requisite extent through the bore *f*, until its lower end, having passed through the boss of the pinion I, brings its conical extremity into the step *a'*, with the shoulder *r* resting upon the adjacent surface of the top of the bearing E, whereupon the pinion I may be attached to the spindle by means of a transverse pin, *w*. The cap F is then placed over the part *m* of the spindle and secured in place by the set-screws or bolts A', as hereinbefore explained, after which the cutter H may be suitably secured to the stock of the spindle by nuts above and below the same, screwed upon the threaded upper part of the spindle, as shown in Fig. 1, and substantially as shown in my former application just hereinbefore referred to, and the bearing E put in position upon the bar or support A. The parts being constructed and placed in relation with each other as aforesaid, the spindle G is supported not only by the step-bearing *a'*, but also by the contact of the shoulders *r* at the top of the bearing E. Furthermore, while the cylindrical bore *f* determines the axis of rotation of the spindle G, the conical bore *j* and the tapering part *m* of the spindle, acting in conjunction with the conical extremity *s*, fitted into the conical step *a'*, obviate any liability to endwise movement of the spindle, inasmuch as by simply grinding down the under side of the cap F to the requisite degree and adjusting the shoulders *r* in proper relation with the conical end *s* the surfaces are brought in such relation as to prevent such endwise movement without unduly binding upon the spindle. Furthermore, by pouring the oil or lubricating material through the orifice *r'* into the chamber *u*, the latter passes through the cylindrical bore *f* and lubricates the length of the cylindrical part *n* of the spindle, the lubricant being caused to be fed with the requisite moderation by means of the porous material inserted, as hereinbefore explained, in the said opening *n'*. By pouring the requisite quantity of oil or lubricating material into the annular recess *f'*, the latter is caused to flow downward between the tapered portion *n* of the spindle and the tapering bore *j* of the cap F, thereby lubricating the said parts, and also, by the descent of the oil or lubricant, the surface upon which rests and moves the shoulder *r*.

The step-bearing *a'* may be supplied with the lubricating material at intervals, and may be readily cleaned, when desired, by simply removing the block *i* and replacing the same.

What I claim as my invention is—

1. A spindle, G, for carrying a rotary knife or cutter, constructed with the upwardly-tapering part *m*, the shoulder *r*, the cylindrical part *n*, and the conical extremity *s*, substantially as and for the purpose herein set forth.

2. The bearing E, having a conical step, *a'*, and cylindrical bore *f*, and the cap F, having the upwardly-tapering bore *j*, in combination with the spindle G, constructed with the upwardly-tapering part *m*, shoulder *r*, cylindrical part *n*, and conical extremity *s*, all

substantially as and for the purpose herein set forth.

3. The combination of the bearing E, having the step a', cylindrical bore f, and flange e, the cap F, having the upwardly-tapering bore j and flange c', and the bolts or set-screws A′, with the spindle G, constructed with the upwardly-tapering part m, shoulder r, cylindrical part n, and conical extremity s, all substantially as and for the purpose herein set forth.

4. The combination of the bearing E, having the cylindrical bore f, lateral recess g, and step a', and the cap F, having the upwardly-tapering bore j, with the spindle G, constructed with the upwardly-tapering part m, shoulder r, cylindrical part n, and conical end s, all substantially as and for the purpose herein set forth.

5. The combination of the bearing E, having the cylindrical bore f, lateral recess g, and step a', the cap F, having the upwardly-tapering bore j and flange c', and the bolts A′, with the spindle G, constructed with the upwardly-tapering part m, shoulder r, cylindrical part n, and conical extremity s, and a circular knife or cutter, H, attached to the upper end of said spindle, all substantially as and for the purpose herein set forth.

6. The combination of the movable block i, constructed with the conical bearing a', screw k, bearing E, constructed with the lateral recess g, flange e, and cylindrical bore f, and the cap F, constructed with the upwardly-tapering bore j, with the spindle G, constructed with the upwardly-tapering part m, shoulder r, cylindrical part n, and conical extremity s, all substantially as and for the purpose herein set forth.

7. The combination of the bearing E, constructed with the cylindrical bore f, chamber u, and passage or opening n', and the cap F, constructed with the upwardly-tapering bore j, with the spindle G, constructed with the upwardly-tapering part m and cylindrical part n, all substantially as and for the purpose herein set forth.

8. The combination of the cap F, constructed with the opening or orifice r' and upwardly-tapering bore j, and the bearing E, constructed with the chamber u, passage n', and cylindrical bore f, with the spindle G, constructed with the upwardly-tapering part m and cylindrical part n, all substantially as and for the purpose herein set forth.

9. The combination of the plug e'', of porous permeable material, the bearing E, constructed with the chamber u, passage n', and cylindrical bore f, and the cap F, constructed with the upwardly-tapering bore j, with the spindle G, constructed with the upwardly-tapering part m and cylindrical part n, all substantially as and for the purpose herein set forth.

10. The combination of the bearing E, constructed with the chamber u, opening or passage n', and the coincident opening or passage n^4, the screw r'', and cylindrical bore f, and the cap F, constructed with the upwardly-tapering bore j, with the spindle G, constructed with the upwardly-tapering part m and cylindrical part n, all substantially as and for the purpose herein set forth.

CHARLES COUPLAND.

Witnesses:
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S. HART CULVER.