(No Model.) 2 Sheets—Sheet 1.

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LOOM FOR WEAVING DOUBLE PILE FABRICS.

No. 414,646. Patented Nov. 5, 1889.

Fig 1

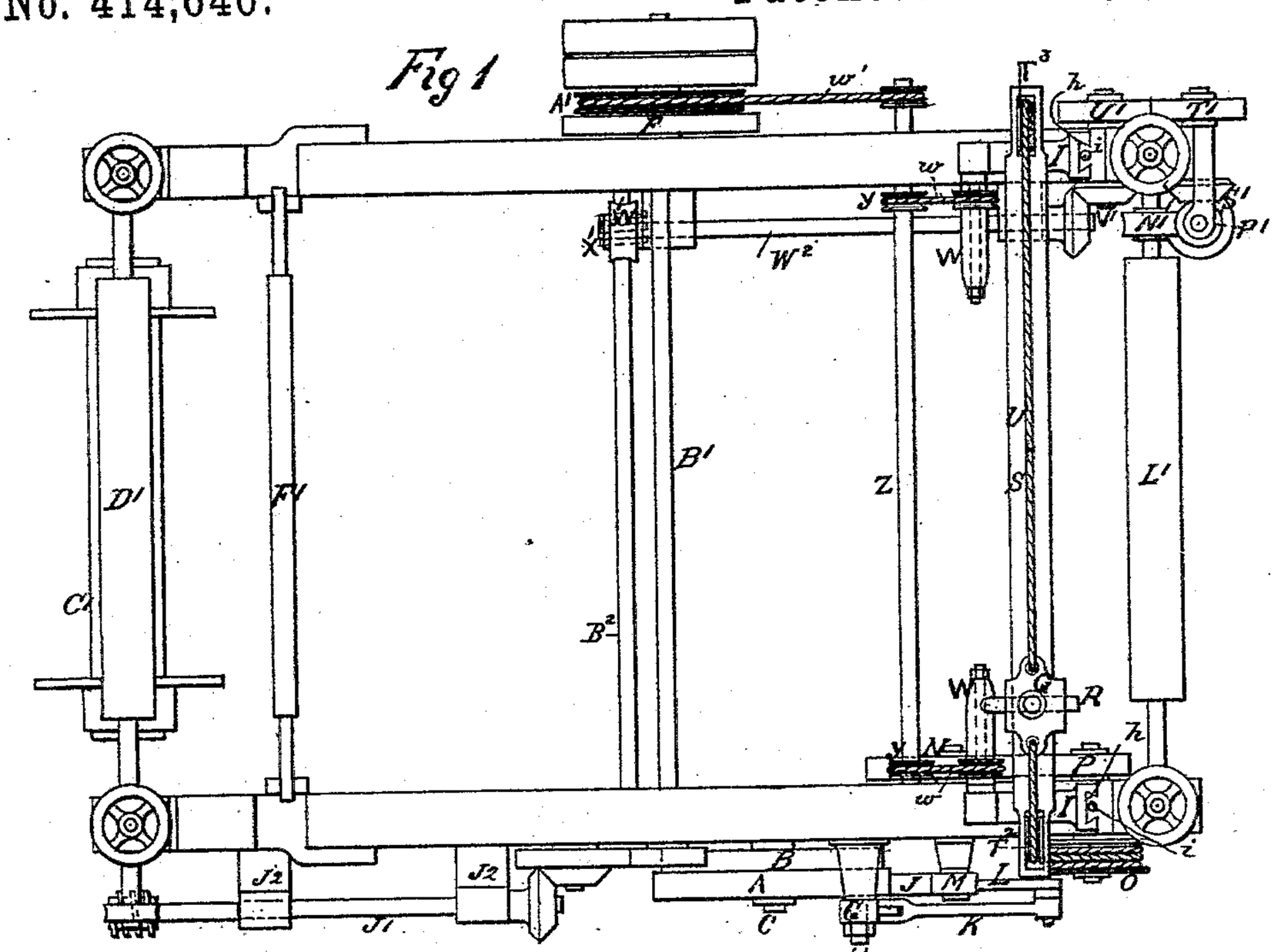
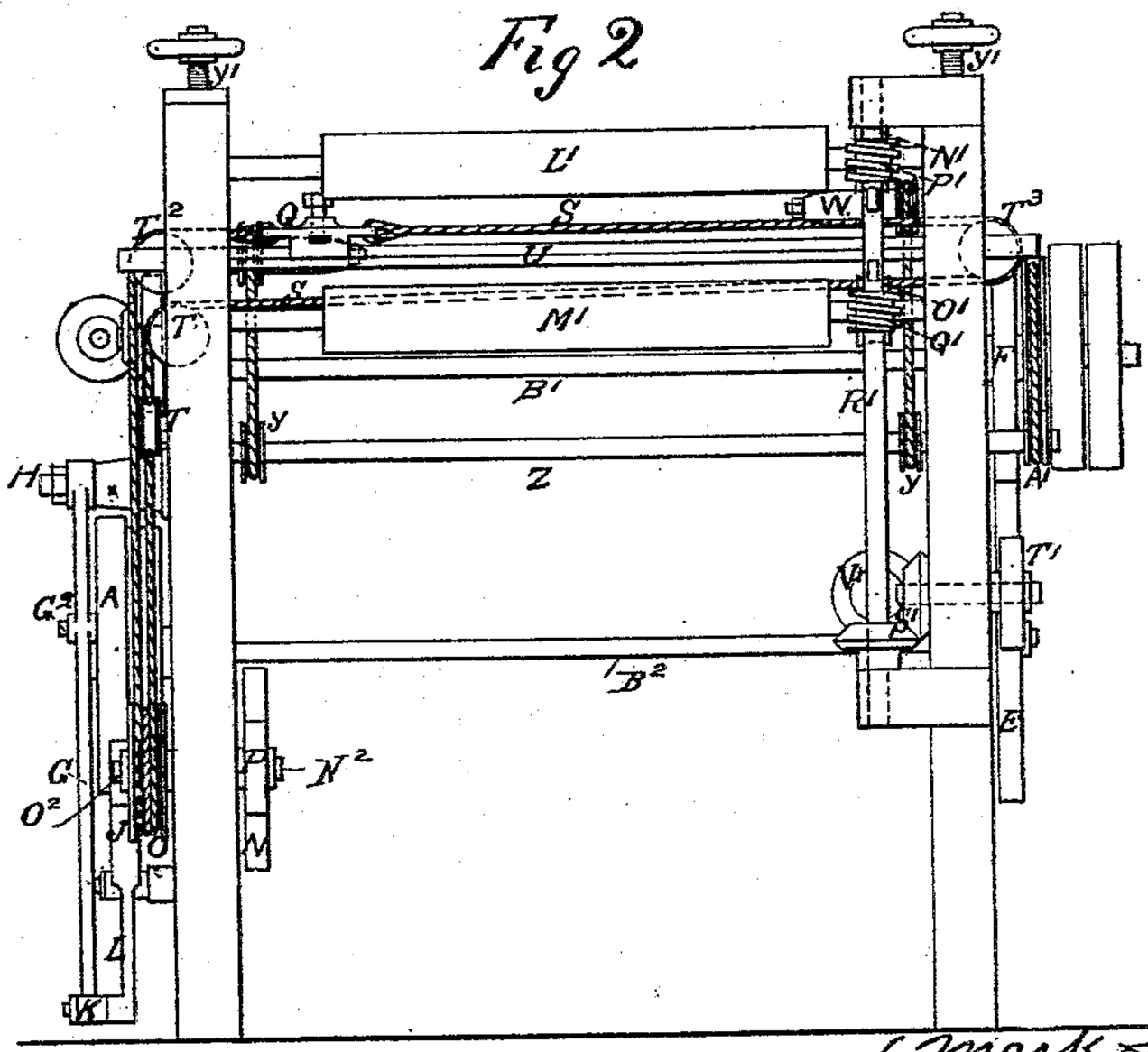


Fig 2



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(No Model.) 2 Sheets—Sheet 2.

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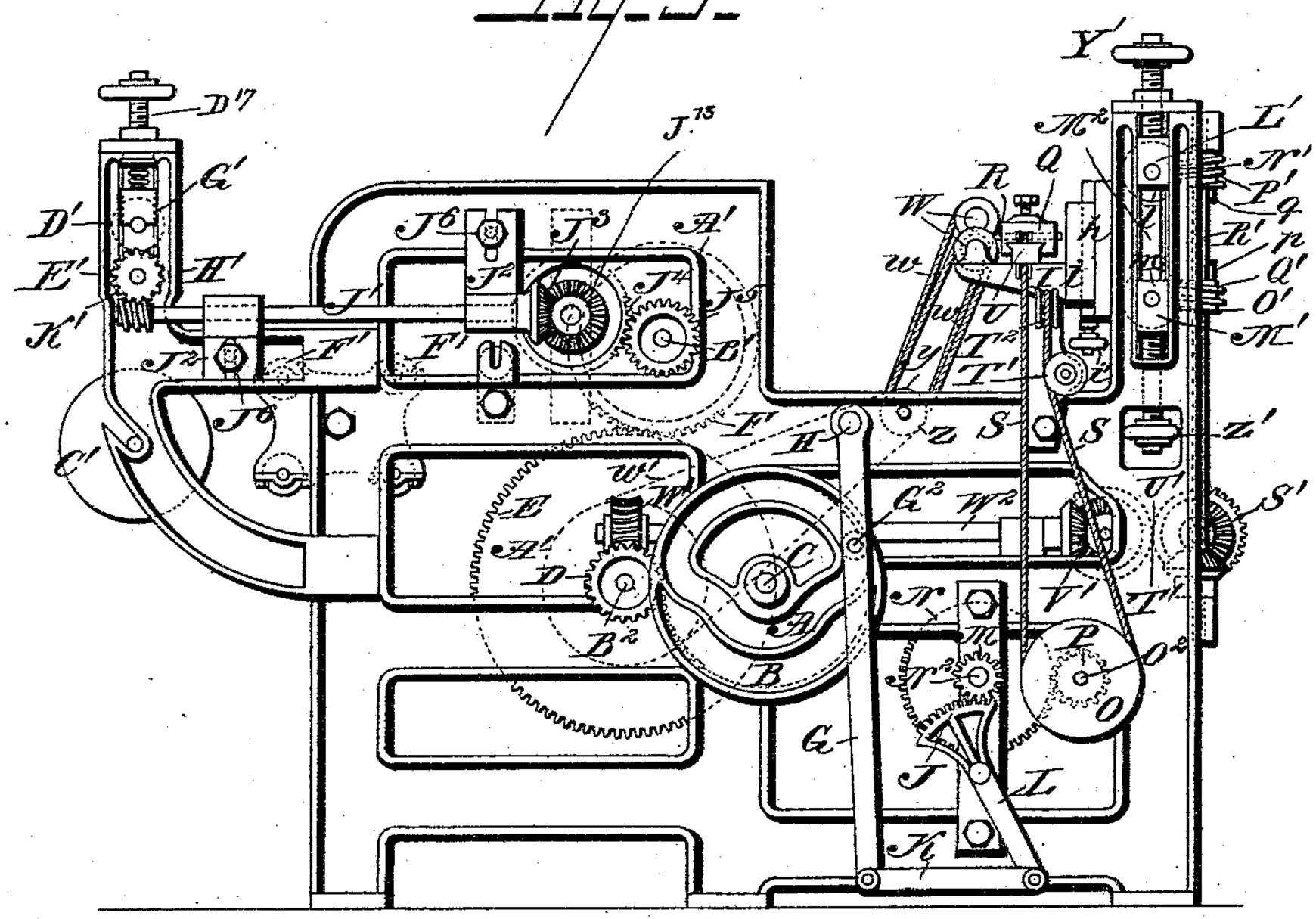
FIG. 3.



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UNITED STATES PATENT OFFICE.

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LOOM FOR WEAVING DOUBLE PILE FABRICS.

SPECIFICATION forming part of Letters Patent No. 414,646, dated November 5, 1889.

Application filed December 10, 1884. Serial No. 149,959. (No model.) Patented in England January 26, 1884, No. 2,231; in Austria-Hungary May 29, 1884, No. 20,415; in France May 29, 1884, No. 162,442; in Belgium May 29, 1884, No. 65,313, and in Germany May 30, 1884, No. 31,119.

To all whom it may concern:

Be it known that we, MARK LEACH, JOHN HEATON, and JOHN BENTLEY, subjects of the Queen of Great Britain, residing at 89 Whetley Lane, Bradford, England, have invented new and useful Improvements in Looms for Weaving Double Pile Fabrics, (for which we have obtained Letters Patent in Great Britain, No. 2,231, January 26, 1884; in Germany, No. 31,119, May 30, 1884; in Austria-Hungary, No. 20,415, May 29, 1884; in France, No. 162,442, May 29, 1884, and in Belgium May 29, 1884, No. 65,313,) of which the following is a specification.

Our improvements consist, first, in mechanism for actuating the pile-cutting knife in looms for weaving and cutting double pile fabrics; second, in the mechanism used to sharpen such knife; third, in the means for actuating and regulating the speed of the rollers delivering the pile-warps; fourth, in the means for supporting, actuating, and adjusting the rollers that take up the finished fabric; fifth, the combination, with the loom-frame, of a single device placed on either side of the frame for supporting both the transverse guide-bar carrying the reciprocating pile-cutter and the sharpening-rollers therefor; sixth, in mechanism for adjusting the same vertically, and, lastly, in the construction and arrangement of the sharpening-rollers and the mechanism for driving the same.

Figure 1 of the accompanying drawings represents a plan of a double-pile-fabric loom, the known working parts being as far as possible omitted to show more distinctly those parts it is necessary to describe herein. Fig. 2 is an end view, and Fig. 3 a side view, of the same.

The cam A, projecting from the face of the wheel B, revolves about the stud C, on which the wheel B is mounted. A pinion D, keyed to the outer end of the transverse shaft B^2, meshes with the teeth formed on the periphery of the wheel B. Gear-wheel E on the opposite end of the shaft B^2 meshes with and derives its motion from a gear-wheel F on the main driving-shaft B'. The lever G is suspended from the stud H, and a stud G^2 is attached to it, carrying a friction-roller working in the groove of the cam A. Thus at every revolution of the cam A an oscillating motion is imparted to the lever G, which is communicated to the toothed quadrant J by the connecting-rod K and the lever L. The toothed quadrant J actuates the pinion M, keyed on the same shaft N^2 as the wheel N, which communicates an alternate backward and forward motion to the drum O by means of the pinion P, keyed on the drum-supporting shaft O^2. This motion is transmitted to the carriage Q, carrying the pile-cutting knife R and sliding on the guide-bar U by means of the cords S, one end of each cord being attached to and coiled around the drum O, and the other ends of the cords being passed the one up and over a guide-roller T^2 at one end of the bar and connected to one side of the carriage, and the other over a guide-roller T' beneath the roller T^2, and thence under the guide-bar U, and up and over a guide-roller T^3, located at the other end of the bar and attached to the opposite side of the carriage. Thus a revolution of the cam by vibrating the levers G and L imparts a to-and-fro motion to the carriage Q, carrying the pile-cutting knife R.

But we do not claim, broadly, as our invention the combination and arrangement, with the actuating-cords S, of a single drum O, placed upon one side of the loom-frame only and operating in both directions alternately to wind and unwind successively both the actuating-cords which reciprocate the knife-carriage, apart from the driving mechanism described to actuate said drum O in the manner and for the purpose mentioned, the same having been previously invented by one Charles Pearson, as we are informed, and who has filed a previous application for Letters Patent therefor.

An important part of our invention consists in novel devices for supporting the sharpening-rollers, and which at the same time constitute the supports for the transverse guide-bar upon which the cutter reciprocates, said supporting mechanism being so constructed as to be capable of vertical adjustment, which thereby produces a simulta-

neous lowering or raising, as the case may be, of both the guide-bar and rollers, and consequent regulating of the height of the pile-cutting knife. Heretofore in such looms the transverse guide-bar for the cutter was supported by the frame of the loom and incapable of easy adjustment, and the sharpening-rollers were placed in housings or frames in front of or in recesses in the guide-bar, which frames were caused to reciprocate vertically by means of cam mechanism actuated indirectly from the main shaft. We adopt a different system entirely, supporting the sharpening-rollers on brackets, which also support the guide-bar, the said brackets being stationary, except for the purpose of adjusting the height of the pile-cutting knife. The construction of this supporting device, its adjusting mechanism, and its combination and arrangement with the sharpening-rollers and guide bar may be described as follows:

Dovetail ribs *h* project from the face of the main frame on either side of the loom and form vertical guideways for the brackets I, which support the guide-bar U. These guideways each have a portion cut away between their ends, and internally-threaded projections of the brackets I extend within the spaces thus formed. A rod *i*, journaled in the upper and lower portions of the guideways and passing through the projection of the bracket, is threaded to correspond with the cut-away portion thereof, and by means of a hand-wheel *i'* the rod *i* may be turned to the right or left to adjust the bracket I and bar U up or down, thus regulating the height of the pile-cutting knife, which is mounted on the knife-carriage, which reciprocates on said guide-bar.

The pile-cutting knife R is sharpened on the preferably conically-shaped revolving rollers W, which are covered with emery or other suitable material. These rollers are placed facing each other from end to end, are arranged at the ends of the traverse of the cutter on the guide-bar U, and have their bearings in uprights on the brackets I, and one of said rollers is located above and the other below the line of travel of the knife. These rollers operate, respectively, on the top and bottom of the knife near the termination or end of each side-to-side stroke or traverse of such knife, and are actuated by bands *w*, passing from the pulleys *y* on the cross-shaft *z*, which shaft is driven by a band *w'* from the pulley A', placed either on the secondary shaft B^2 or on the main shaft B'. Thus one side of the cutter only, near each end of its traverse, will contact with a conically-shaped roller and be sharpened. It will also be seen that by this construction of supporting device, using the same mechanism for both the guide-bar and sharpening-rollers, any vertical adjustment of the brackets I I found necessary in regulating the height of the pile-cutting knife must be uniform with respect both to the sharpening-rollers and reciprocating cutter, because the former, as well as the guide-bar which supports the latter, are both supported and adjusted by the same pair of brackets I I, arranged on opposite sides of the loom-frame.

The let-off mechanism for the pile-warp is represented in Figs. 1 and 3. This consists of a pair of feed-rollers D' and E', mounted on shafts having bearings in the frame of the loom, and one or more friction-rollers F', acting as guide-rollers only, the number depending on the quantity of tension desired, according to circumstances. These feed-rollers D' and E' are pressed together by the usual tension-screw D^{17}, as shown in the drawings, and clamp the warps between them and feed the same forward on being rotated, the upper or outer one being rotated from the lower one by frictional contact and the warps passing directly between them, by which means it is drawn off in the required quantity from the warp-beam C', on which it is wrapped. It is not essential to describe this more fully, as it is the usual and common form of let-off-roller mechanism, our improvement in this part of the loom consisting only of the adjustable driving mechanism for the said feed-rollers, as hereinafter described, and which is as follows: The shaft which carries the lower one of said feed-rollers extends through the frame of the loom and has on its extreme end the worm-wheel K'. The driving mechanism operates, therefore, on this lower feed-roller, and the power is communicated to the upper feed-roller by frictional contact with the lower or with the intervening pile-warp passing between them, as mentioned.

The driving mechanism consists of a horizontal shaft J', which has on its extreme end a worm gearing with the above-mentioned worm-wheel K'. The other end of said shaft J' is provided with bevel-gear J^3, which meshes with bevel-gear J^{18} on the face of the cog-wheel J^4, which in turn is driven by the gear-wheel J^5, mounted on the end of the main shaft. The shaft J' has its bearings in brackets J^2, which are both slotted at J^6 and provided with set-screws in said slots, so as to be adjusted vertically; hence by changing the gear K' for a larger or smaller gear and vertically adjusting the shaft J' accordingly the speed of the feed-rollers D' and E' is regulated, and the quantity of pile-warp fed forward is thereby governed. The take-up rollers L' and M' are driven by means of the worm-wheels N' and O', which wheels gear into the worm P', (which has a right-turn,) and the worm Q', (which has a left-turn,) both fixed on the vertical shaft R', which is driven from the pair of bevel-wheels S', such wheels being connected by the change-wheels T' and U' with the pair of bevel-wheels V'. The shaft W^2 carries the worm-wheel W', which gears with the worm X', keyed on the shaft B^2. The change-wheels T' and U', connecting the two pairs of bevel-wheels S' and V', may be changed for wheels having a differ-

ent relative size to each other, and the speed of the taking-up rollers L′ and M′ thereby regulated. The bearings *l* and *m* of the take-up rollers L′ and M′ are arranged in recessed arms M^2 of the loom-frame, and free to move vertically therein, and are so adjusted therein by the screws Y′ and Z′, and the worms P′ and Q′ are fixed at the proper position to gear in the worm-wheels N′ and O′ by means of keys *p q*, respectively.

Having thus described our invention, what we claim, and desire to secure by Letters Patent, is—

1. The combination, with the main driving-shaft, a cam-grooved wheel, and intermediate mechanism for imparting a rotary movement to the latter wheel from the main shaft, of a lever pivoted at one end and provided with a stud to enter the cam-groove in said wheel, a quadrant J, provided with a lever L, a link K, connecting the free ends of said levers, drum O, gearing M N P, actuated by the quadrant to impart motion to the drum, a guide-bar U and reciprocatory cutter, guide-pulleys, and cords S, passing over said pulleys and around the drum O, the ends of said cords being connected to the cutter, the parts being constructed and combined substantially as and for the purpose set forth.

2. The combination, with the main driving-shaft, a transverse guide-bar, a reciprocatory cutter, and intermediate mechanism for imparting motion to said cutter, of a pair of knife-sharpening rollers located one at each end of the traverse of the cutter, the one above and the other below its path of travel, and means, substantially as described, for supporting said guide-bar and sharpening-rollers, the said parts being constructed, arranged, and operating substantially as shown and described, whereby one side only of the cutter near each end of its traverse will contact with one of said abrading-rollers and be sharpened, as set forth.

3. The combination, with the frame of the loom, of two inwardly-projecting horizontal brackets I I, supported therefrom and located one on each side thereof, a transverse guide-bar or carriage-race mounted thereon, said brackets having on their extreme inner ends extensions or bearings, and sharpening-rollers mounted by one end only in said bracket-bearings and extending inwardly, said parts being constructed, combined, and arranged substantially as described.

4. The combination, with the frame of the loom provided with dovetail ribs *h*, projecting rearwardly, of horizontal brackets I I on either side of the frame, each of said brackets having an extension or bearing at the inner end supporting sharpening-rollers, and having at the outer end a bearing in the dovetail recess of the rib *h*, and supporting the guide-bar U, said guide-bar, the reciprocatory cutter, the sharpening-rollers, and adjusting screw-rods *i*, whereby the height of the pile-cutting knife and of the sharpening-rollers therefor may be adjusted, substantially as described.

5. The combination, with the frame of the loom, of the brackets I I, having extensions or bearings, sharpening-rollers mounted in said bearings by one end only, the main shaft, and mechanism to rotate said rollers from the same, consisting of a shaft extending from side to side of the loom-frame, with pulleys thereon, and cords connecting it with said rollers, and actuating mechanism connecting said cross-shaft with the main shaft, substantially as described.

6. The combination of the main driving-shaft and the pile-warp-delivering rollers D′ E′ and their shafts, the shaft carrying said roller E′ being extended and provided with a worm-wheel K′ on its extreme end, a shaft J′, provided at one end with a worm gearing with said worm-wheel K′ and at the other end with bevel-gearing communicating with gearing on the main shaft, and slotted bearings J^2 for said shaft J′, said parts being constructed, combined, and arranged substantially as set forth, whereby the speed of said rollers D′ and E′ may be varied from the main shaft by a variation in the size of the gear K′, connecting the shaft J′ with the shaft of one of said warp-delivering rollers, as specified.

7. The combination, with the frame of the loom, of the take-up rollers L′ M′ and their bearings *l* and *m*, arranged to slide vertically in the slotted or recessed arm M^2 of the loom-frame, with said arm M^2 and the adjusting-screws Z′ Y′, whereby said rollers may be adjusted vertically, the vertical shaft R′, extending at right angles to said rollers and provided with right and left hand worms engaging with worm-gearing on the axes of said take-up rollers, and the main driving-shaft and gearing connecting it with said vertical shaft R′, constructed, combined, and operating substantially as shown and described.

8. The combination of the main driving-shaft, the take-up rollers L′ M′, the vertical shaft R′, provided with right and left hand worms engaging with worm-wheels on the axes of said rollers, the wheel T′, and gearing connecting it with the shaft R′, the wheel U′, engaging the wheel T′, and mechanism, substantially as shown and described, for rotating the wheel U′ from the main driving-shaft, the wheels T′ U′ being adapted to be replaced by others of a different size, whereby the speed of the rollers L′ M′ may be varied at pleasure, substantially as and for the purposes specified.

In testimony whereof we affix our signatures in presence of two witnesses.

MARK LEACH.
JOHN HEATON.
JOHN BENTLEY.

Witnesses:
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