(No Model.)

3 Sheets—Sheet 1.

E. J. F. COLEMAN.

BLOCK SHAPING MACHINE.

No. 461,866. Patented Oct. 27, 1891.

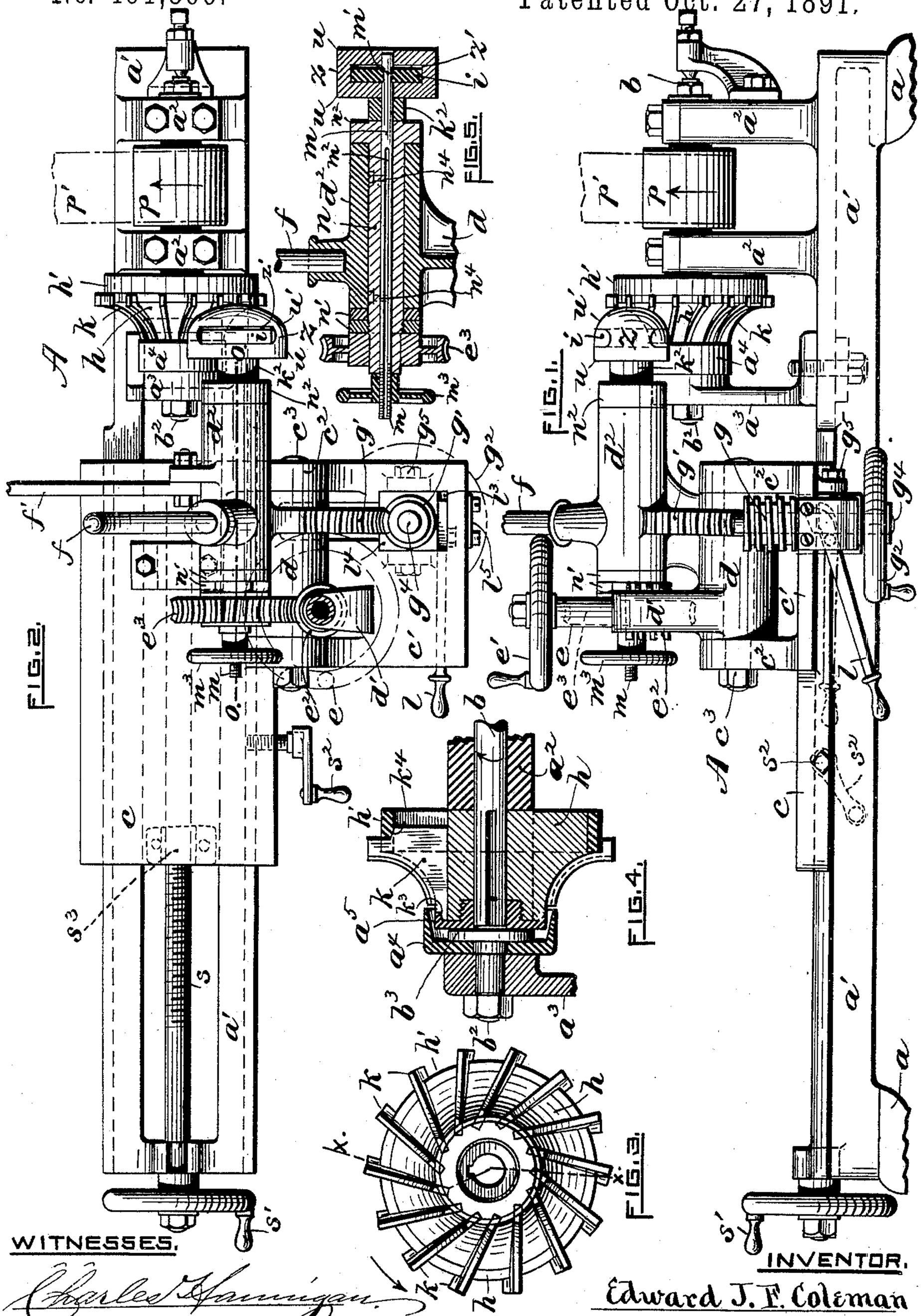

FIG. 2.

FIG. 5.

FIG. 1.

FIG. 4.

FIG. 3.

WITNESSES.

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ATTYS.

(No Model.) 3 Sheets—Sheet 2.

E. J. F. COLEMAN.

BLOCK SHAPING MACHINE.

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FIG. 7.

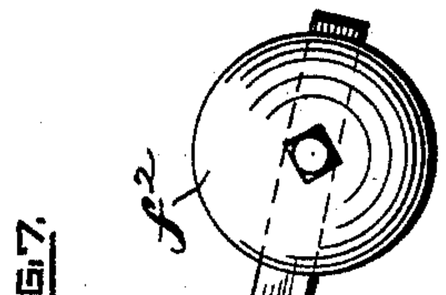

FIG. 9.

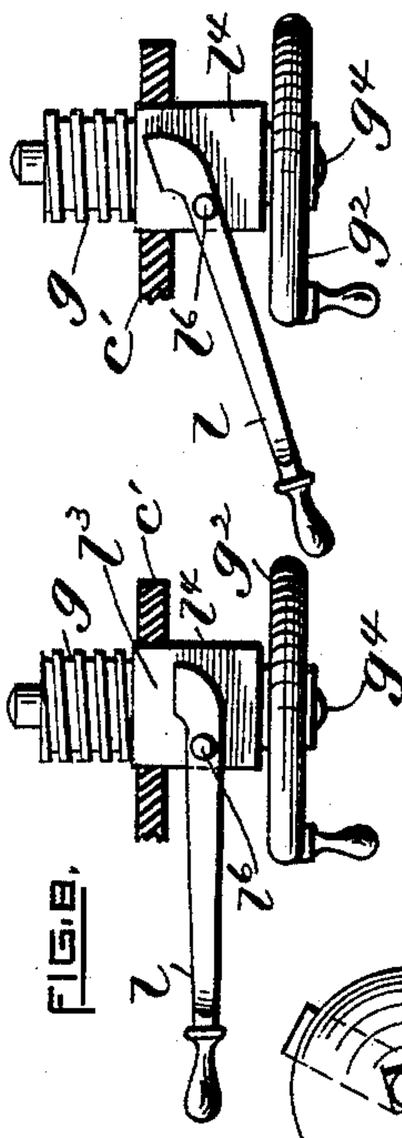

FIG. 8.

FIG. 6.

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(No Model.) 3 Sheets—Sheet 3.

E. J. F. COLEMAN.

BLOCK SHAPING MACHINE.

No. 461,866. Patented Oct. 27, 1891.

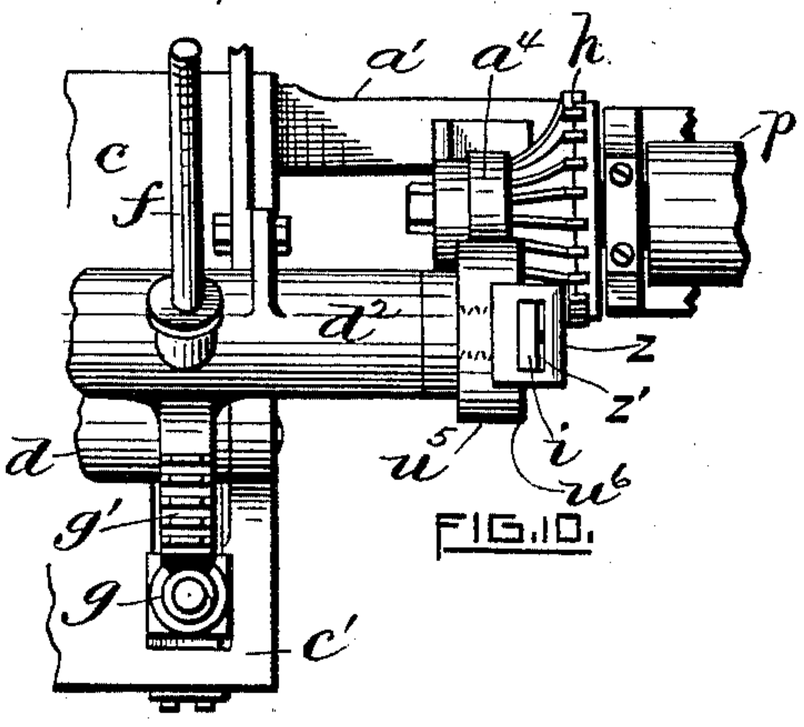

FIG. 10.

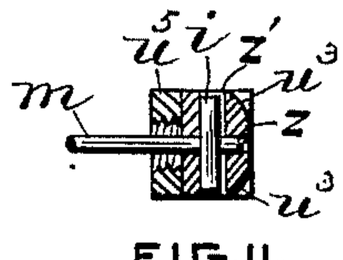

FIG. 11.

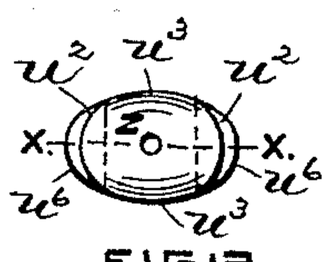

FIG. 12.

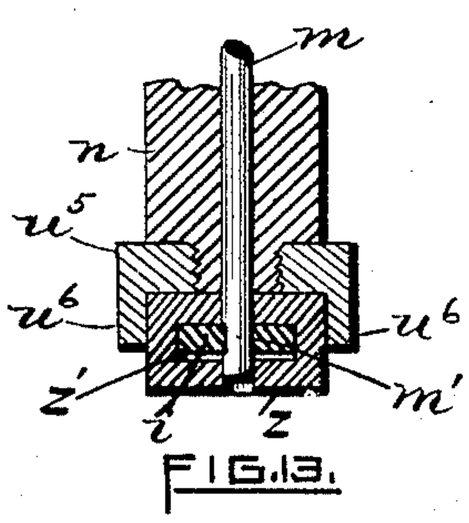

FIG. 13.

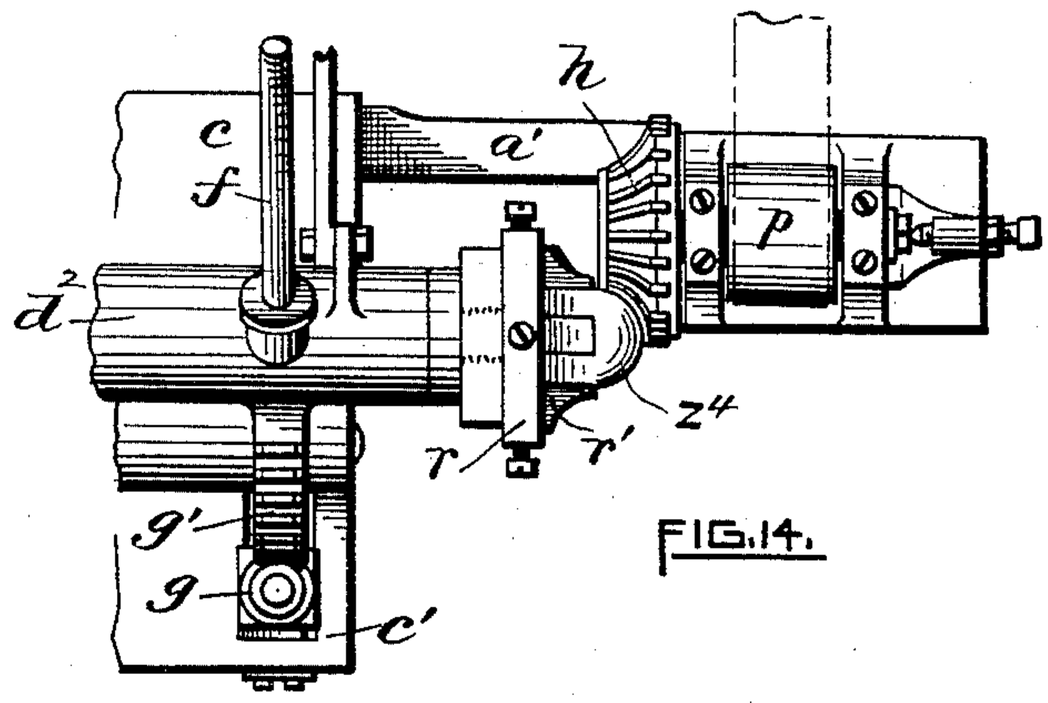

FIG. 14.

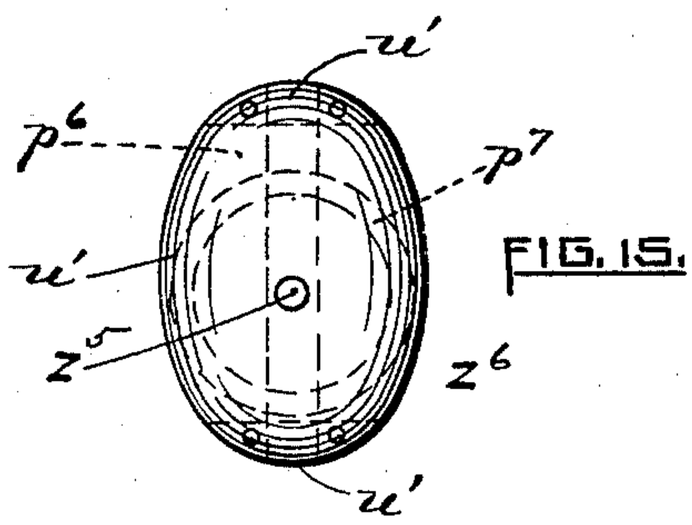

FIG. 15.

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UNITED STATES PATENT OFFICE.

EDWARD J. F. COLEMAN, OF PROVIDENCE, RHODE ISLAND.

BLOCK-SHAPING MACHINE.

SPECIFICATION forming part of Letters Patent No. 461,866, dated October 27, 1891.

Application filed January 15, 1891. Serial No. 377,857. (No model.)

To all whom it may concern:

Be it known that I, EDWARD J. F. COLEMAN, a citizen of the United States, residing at Providence, in the county of Providence and State of Rhode Island, have invented certain new and useful Improvements in Block-Shaping Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters of reference marked thereon, which form a part of this specification.

Heretofore in the manufacture of wooden pulley-blocks or tackle-blocks it has been usual to leave the two outer peripheral edges substantially square or at most slightly rounded. This is done mainly for the reason that it is found to be extremely difficult to mechanically truly round and smooth the edges of the blocks and otherwise oval them to a great extent at one operation, particularly when the blocks are made of ash or other comparatively tough and coarse-grained wood, owing to the fact that the cutters or knives are compelled to cut the wood four ways of the grain in making a continuous circuit of the block. Sometimes, however, blocks have been rounded by first suitably mounting them on an arbor or holder adapted to axial movement and then turning them slowly one-half of a revolution, at the same time bringing them in contact with a series of continuously-revolving knives, thus turning one-half of one edge of the block. The block is then withdrawn from the knives and revolved one-half a revolution and again slowly revolved and brought into contact with the knives to complete the cut, the operation just described being repeated to round the opposite edge of the block. Sometimes they have been turned in a "Blanchard" lathe.

The object I have in view is to greatly facilitate the production of pulley-blocks, &c., but more especially the means for rounding the edges thereof.

To that end my invention consists, essentially, of a revolving head provided with a series of cutters, the form of the cutters being the counterpart of the turned portion of the block, a chuck or dog, and a block-holding spindle arranged to move endwise in a hollow arbor adapted to be revolved, the said chuck and arbor being mounted in a suitably-operated pivoted counterbalanced adjustable frame or holder, whereby the slowly-revolving block is brought into contact with the rapidly-revolving cutters, the block making but one continuous revolution to complete the rounding of the edge while being subjected to the action of the cutters.

In the accompanying three sheets of drawings, Figure 1, Sheet 1, is a side elevation of a machine embodying my improvements. Fig. 2 is a plan view of the same. Fig. 3 is an end view of the cutter-head. Fig. 4 is a longitudinal sectional view of the head, taken on line $x\ x$ of Fig. 3. Fig. 5 is a central sectional view of the block-carrying spindle, arbor, &c., taken on line $o\ o$ of Fig. 2, showing a block mounted thereon preparatory to being operated upon by the cutters. Fig. 6, Sheet 2, is an enlarged end elevation of the carriage, &c., the several parts being in the normal position ready to feed the block into engagement with the revolving cutters, the latter being indicated by dotted lines. Fig. 7 is a similar view of the parts just referred to, showing the block in position to be acted upon by the cutters. Figs. 8 and 9 are side elevations showing different positions of the locking-lever. Fig. 10, Sheet 3, is a partial plan view corresponding to Fig. 2, showing a modification of the block and holder. Fig. 11 is a transverse sectional view taken through said block and holder. Fig. 12 is a front view thereof. Fig. 13 is a longitudinal sectional view taken on line $x\ x$ of Fig. 12. Fig. 14 is a partial plan view showing a centering-chuck secured to the end of the block-carrying spindle, the block or work being round or spherical and Fig. 15 represents a pulley-block complete.

A more detailed description of my invention is as follows:

The bed a' of the complete machine A may be an ordinary lathe-bed or other suitable frame having sufficient strength. The bed is mounted on legs a, and is provided at the head end with uprights a^2, in which the driving-spindle b is fitted to revolve, motion being imparted to it by means of a belt p' passing over the pulley p, secured to the spindle.

To the inner end of the spindle is secured a cutter-head h, Figs. 3, 4, &c. The head or holder is cut through transversely at an angle or diagonally to its axis for each of the series of knives k, the latter being ground along the cutting-edge to a concave form, such curved form producing its counterpart upon the block. The several knives are beveled slightly at the two ends or point and heel k^3 k^4, respectively, thereby insuring a snug fit and preventing longitudinal movement when in contact with the respective rings or flanges h' and a^5. The former ring h' is made of steel and shrunk onto the head after the knife-holding grooves have been cut. The other flange a^5 is screwed into the corresponding end of the head, as clearly shown. By simply unscrewing this flange all the knives may be easily removed. Contiguous to this end of the cutter-head is adjustably secured to the bed a stationary holder a^3, carrying a center-pin b^2, having a head b^3. A flanged guide-roll a^4 is mounted to revolve freely upon this pin between the adjacent faces of the head and holder. The roll extends over the screw-threaded flange a^5 and the corresponding ends of the knives, all as clearly shown in Fig. 4. The guide-roll in use serves as a rest, against which the unfinished pulley-blocks z bear during the turning operation, and at the same time prevents the knives from cutting too deeply into the wood.

It will be seen, referring to Fig. 3, that by securing the knives spirally into the head instead of being radially arranged, the cutters operate upon the wood in a shearing manner, the action being not unlike that of a hand-plane, whereas if the knives were radially arranged the action would be more like that of a milling-tool or combined cutting and scraping tool.

c indicates a carriage fitted to slide longitudinally of the bed a' by means of a feed-screw s, as common. The base of the carriage extends toward the front, as at c', in order to receive the block-feeding mechanism, &c. A frame d is mounted to vibrate upon a pivot-pin c^3, held in ears c^2, formed in the carriage. The frame is provided with an elongated upper hub d^2, arranged to carry the block-holding spindle, &c. It is also provided with a vertical extension d', bored out to receive the shaft e, to which is secured a worm e^2, which intergears with a toothed wheel e^3, secured to the rear end of the hollow arbor or spindle n, adapted to revolve in the said hub d^2. (See Figs. 1, 2, 5, 7, &c.) In the front side of the carriage-extension c' is formed an opening, Fig. 2, &c., into which is loosely fitted a bearing or box l^4, pivotally mounted on pins g^5, held by ears formed on the under side of the carriage. A vertical shaft g^4 is fitted to revolve in the box l^4, the same having secured to its upper portion a worm g, adapted to intergear with a toothed wheel or quadrant g', secured to the frame d, the shaft being rotated by means of the attached hand-wheel g^2. The shaft-bearing is pivoted so that the worm g may be readily withdrawn from the quadrant when desired. A small rectangular pocket or opening l^3 is formed in front of the box, (see Fig. 2,) into which the enlarged end of a pivoted locking-lever l is snugly inserted, thereby insuring a positive engagement of the worm and wheel, (see also Figs. 7, 8, and 9,) the latter figure showing the position of the lever when the parts are intergeared, and Fig. 8 the lever when the worm is disconnected from the gear. Fig. 6 also represents a corresponding relation of the parts when out of gear, a spring l^5 being employed to prevent the accidental engagement of the worm and gear, the lever l being jointed or pivoted at l^6 to the box l^4.

The hub portion d^2 of the frame d is bored out to receive the hollow shaft n, Fig. 5, &c., the latter having a fixed collar n^2 at one end and collar-nuts n' at the other. The shaft is reduced in diameter beyond the collars n' to receive the fixed worm-wheel e^3. The shaft is centrally bored longitudinally to receive the splined spindle m. The spindle is flattened at its front end at m', (see also Figs. 6 and 7,) thereby forming shoulders, between which a metallic plate or chuck i is held. This plate is provided with a transverse slot or opening m^4, by which it is passed over the spindle to engage therewith. The plate is slightly smaller than the opening z', formed in the pulley-block z. The rear end of the spindle is screw-threaded and provided with a wheel-nut m^3. By means of this arrangement the block is held firmly between the plate i and the corresponding end of the shaft n. Sometimes I use a loose spacing-collar k^2 intermediate of the plate and shaft. By substituting collars varying in thickness or other equivalent means I am enabled to accurately adjust the relation of the pulley-block mounted upon the spindle to the revolving knives. This is rendered desirable, because then the machine is well adapted to turn blocks correspondingly varying in thickness. The spindle is provided with a long spline m^2, into which the points of screw-threaded pins n^4, mounted in the shaft n, are introduced, thereby preventing the spindle from turning axially during the operation of chucking the block, as clearly shown in Fig. 5.

The swinging frame d (see Fig. 7, &c.,) is provided with an arm f', carrying a weight f^2, the latter serving in use as a counter-balance to maintain the block in contact with the guide-roll a^4 when the worm g is disengaged from the quadrant g'. A handle f, extending from the upper portion of the frame, affords means by which the attendant may readily vibrate the frame, &c., as desired, in lieu of the worm g.

The operation of the machine is as follows: The pulley-block z, usually oval in shape and provided with one or more openings z', is first secured or chucked to the spindle by means of the plate i and nut m^3, the edges u of the

block then being sharp or substantially square, (see Fig. 5,) the frame d at the time being in a rearward position, as in Fig. 6. The worm g is next swung into gear with the arc g' (see dotted-line position) and locked by the lever l. The attendant now rotates the frame, &c., in the arrow direction or ahead by means of the hand-wheel g^2 until the block touches the guide-roll a^4. (See Fig. 7.) He then withdraws the locking-lever l from the pocket l^3, the spring l^5 instantly acting to swing the box l^4 to the dotted-line position, thereby detaching the worm from the teeth g'. Meanwhile the revolving knives k have removed the contiguous stock from the stationary block, the counter-weight f^2 holding the latter in contact with the loose guide-roll a^4. The attendant now turns the block one revolution in the proper direction by means of the hand-wheel e', which actuates the worm e^2, intergearing with the wheel e^3, for the purpose, thereby completely shaping the corresponding edge and side of the block, as indicated at u', Figs. 1 and 2. He then swings the frame, &c., rearwardly by means of the handle f to the position shown by Fig. 6, and re-engages the worm g with its toothed quadrant. The half-finished block is next removed from the spindle m, then reversed and rechucked thereon, thereby placing the corresponding edge u in position to be turned upon feeding the frame d ahead to its limit and then maintaining the block in revolving contact with the knives, as before described. The frame is finally carried back to its normal position, Fig. 6, and the now completely-turned block removed.

In certain lines of blocks it is desirable to preserve the edges of the blocks at the two ends u^2, only the lateral portion u^3 of the edges being turned. (See Fig. 12.) In such case I provide a chuck-head u^5, Figs. 10 to 13, inclusive, arranged to be secured to the end of the shaft n. The head is provided with short crescent-shaped projecting ends u^6, the inner surfaces conforming to and protecting the corresponding ends of the block z, while the outer surfaces engage the guide-roll a^4 during the turning operation. Figs. 10 and 13 show a block z thus mounted in the shaping-chuck u^5 preparatory to being turned, and Fig. 11 represents the same after the corresponding edges u^3 have been turned. The block is next removed and rechucked and again subjected to the cutters to remove the other lateral edges of the block.

The machine is well adapted to turn cylindrical and spherical shaped pieces of wood z^4 by simply substituting a proper chuck or holder r, to be secured to the hollow spindle n, and provided with jaws r'. (See Fig. 14.) In such case, however, the guide-roll a^4 may be omitted, the latter being employed only when irregular or non-concentric blocks are to be turned.

The adjustment of the carriage c and its attached mechanism to accommodate blocks greatly varying in size is effected by a screw s, working in a nut s^3, secured to the carriage, as common, the screw s^2 holding the latter in position after being adjusted by turning the hand-wheel s'.

Obviously changes or modifications in the mechanism hereinbefore described may be made in some of its details without departing from the spirit of the invention.

Sometimes, in fact usually, as is well known, the location of the pins for holding the pulleys or sheaves is not at the actual center of the blocks longitudinally, but the center of the pulley is a little nearer one end of the block than the other, as indicated at z^5, Fig. 15. This is done in order to provide for the passage of the rope, thereby forming at the top a space p^6, the sheave itself p^7, being indicated by the dotted circles. By means of my improvement the eccentricity due to such location of the center in no wise affects the operation of the knives in cutting the block, as the latter is uniformly cut around its entire periphery, as indicated by u' of the finished block z^6.

I would further state that it is common to turn wooden pulley-blocks and other articles having an irregular form by means of the "Blanchard" lathe, so-called, the work in such case being mounted longitudinally on revolving centers, the revolving-cutters in action being fed along and at the same time carried nearer to or farther from the axis of the work by means of a "former," which gives the desired shape to the block, &c., acted upon. A serious objection to work thus turned, especially in the case of pulley-blocks, is that the cutters, being usually round-pointed, produce a series of grooves or ridges which must be subsequently removed, an operation requiring considerable time. Even when they have been subjected to a smoothing-machine the result is often unsatisfactory.

In my improved machine the blocks are centered transversely. The cutters are a series of knives, each ground to a form having the counterpart of that to be given to the block. By this means no grooves or ridges are produced, nor is the block "broomed" or splintered during the operation. Moreover, the shape of the rounded portion imparted to the block by the knives is uniform cross-sectionally throughout its periphery, a result that cannot be attained by the lathe before referred to.

The novel manner of centering or chucking the block to the spindle I consider very important, as by the employment of the plate i, mounted in the sheave-opening z' and secured to the spindle m, the outer half of the entire peripheral surface, as well as the entire corresponding face of the block, may be simultaneously turned or finished by the cutters, the other half of the block being in like manner completed upon reversing and rechucking it. It is obvious that where the spindle extends entirely through the blocks,

or, in other words, when they are chucked from the outside, the cutters cannot engage such outer surfaces of the block retained by the chuck, therefore a subsequent operation is rendered necessary in order to complete the surfacing.

I claim as my invention—

1. In a block-turning machine, the combination of a revolving head carrying a series of removably-secured spirally-arranged cutters, a loosely-mounted guide-roll, as a^4, a pivotally-mounted frame, a spindle or chuck mounted therein arranged to receive and hold a pulley-block or other article to be operated upon by the cutters, mechanism for revolving the block-carrying spindle, and means for vibrating the frame back and forth, substantially as hereinbefore described, and for the purpose set forth.

2. In a block-turning machine, a suitably-mounted clamping-spindle adapted to be rotated, having a projecting end arranged to pass through the adjacent side of a pulley-block, and a chucking-plate detachably secured to or interlocking with said spindle end arranged to be introduced into the sheave opening or mortise of the block, substantially as hereinbefore described, and for the purpose set forth.

3. In a block-turning machine, the combination, with a revolving cutter-head and a suitably-mounted guide-roll a^4, of a pivotally-mounted counterbalanced frame, a chucking-spindle arranged therein to receive and hold the pulley-block, a hand-operated worm and wheel mounted in the frame for rotating the spindle, a toothed wheel or quadrant secured to the spindle-carrying frame, a hand-operated worm meshing into said quadrant to vibrate the counterbalanced frame, and means for readily disengaging the last-named worm from the quadrant, substantially as hereinbefore described, and for the purpose set forth.

4. In a block-turning machine provided with a suitable cutter-head, a guide-roll, and a counterbalanced frame d, carrying a block-chucking spindle and mechanism for revolving it, and a toothed quadrant g', the combination therewith of a pivoted box, a hand-operated shaft mounted therein, a worm secured to the shaft arranged to intergear with said quadrant, means for locking the box in position to insure the engagement of the worm and gear, and a spring for vibrating the box rearwardly to release the worm upon withdrawing the locking device, substantially as hereinbefore described.

5. In a block-turning machine, the combination of a screw-threaded and slotted spindle m, adapted to enter the pin-hole formed in the block, a chucking-plate i, arranged to pass into the block-opening and be detachably secured to the end of the spindle, a mounted hollow arbor or shaft having said spindle mounted to move endwise therein, a nut fitted to the spindle for frictionally holding the block between the adjacent faces of the chucking-plate and hollow shaft, and means for revolving the several parts in unison, substantially as hereinbefore described.

6. In a block-turning machine, the combination, with revolving cutters, of a chucking-plate arranged to enter the sheave-opening of the block, a spindle passing transversely through said plate and block and adapted to interlock with the plate, means for clamping the plate to the adjacent side of the sheave-opening, and mechanisms for bringing the block into contact with the cutters and rotating it, substantially as hereinbefore described.

7. In a block-turning machine, the combination of the block provided with one or more mortises or sheave-openings z', and a pin-hole z^5, arranged at right angles with the mortise, a mounted clamping-spindle adapted to be rotated having a projecting end portion extending into said pin-hole, and a removable chucking-plate located in the mortise and detachably secured to or interlocking with the spindle, substantially as set forth.

In testimony whereof I have affixed my signature in presence of two witnesses.

EDWARD J. F. COLEMAN.

Witnesses:

CHARLES HANNIGAN,

GEO. H. REMINGTON.