(No Model.) 7 Sheets—Sheet 1.

W. ELLIS.

MACHINERY FOR CUTTING WOOD FOR MATCHES, SPLINTS, AND MATCH BOXES.

No. 398,593. Patented Feb. 26, 1889.

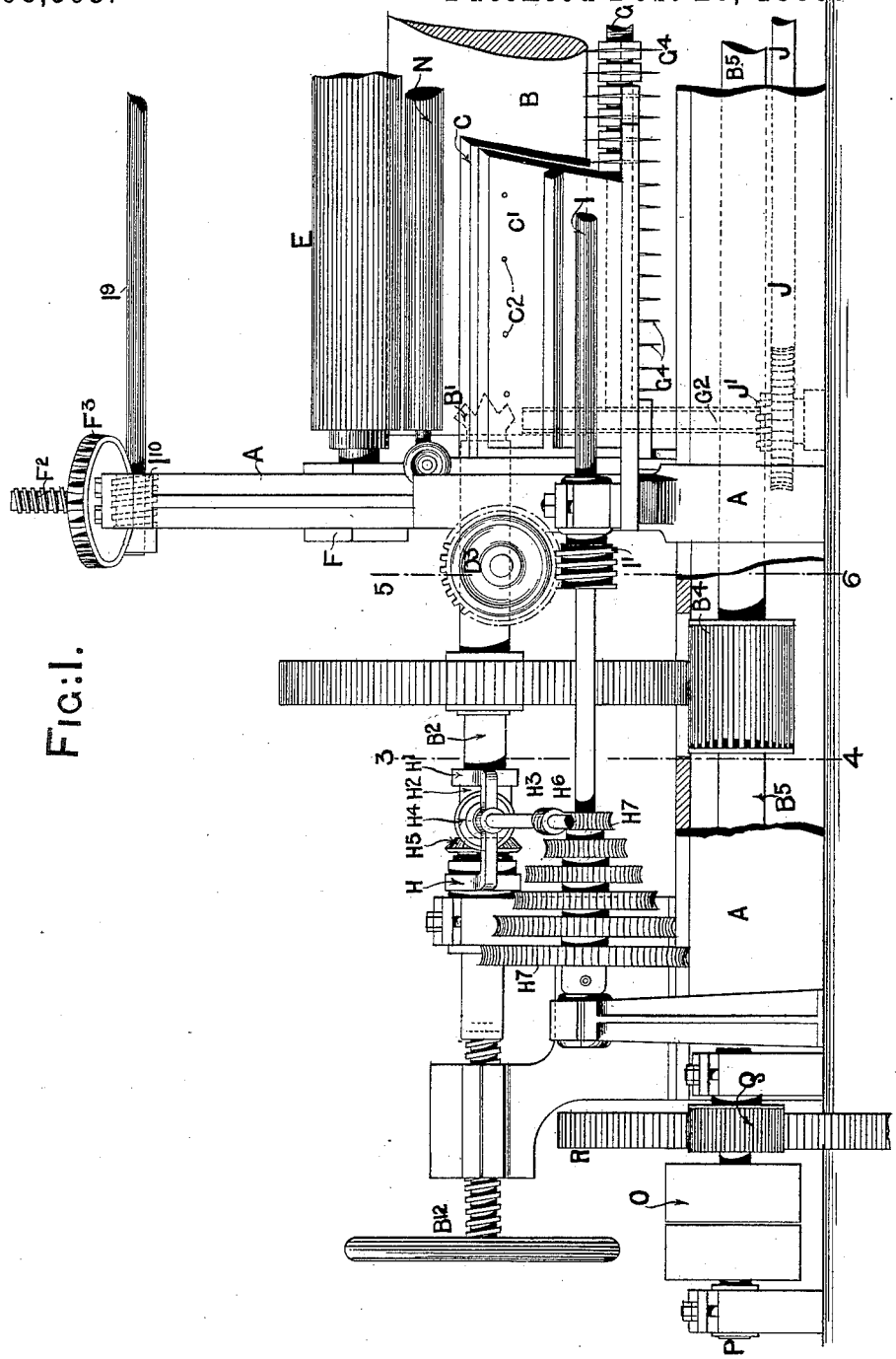

FIG. 1.

Witnesses.
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W. G. Perrin.

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By F Prince
Attorney

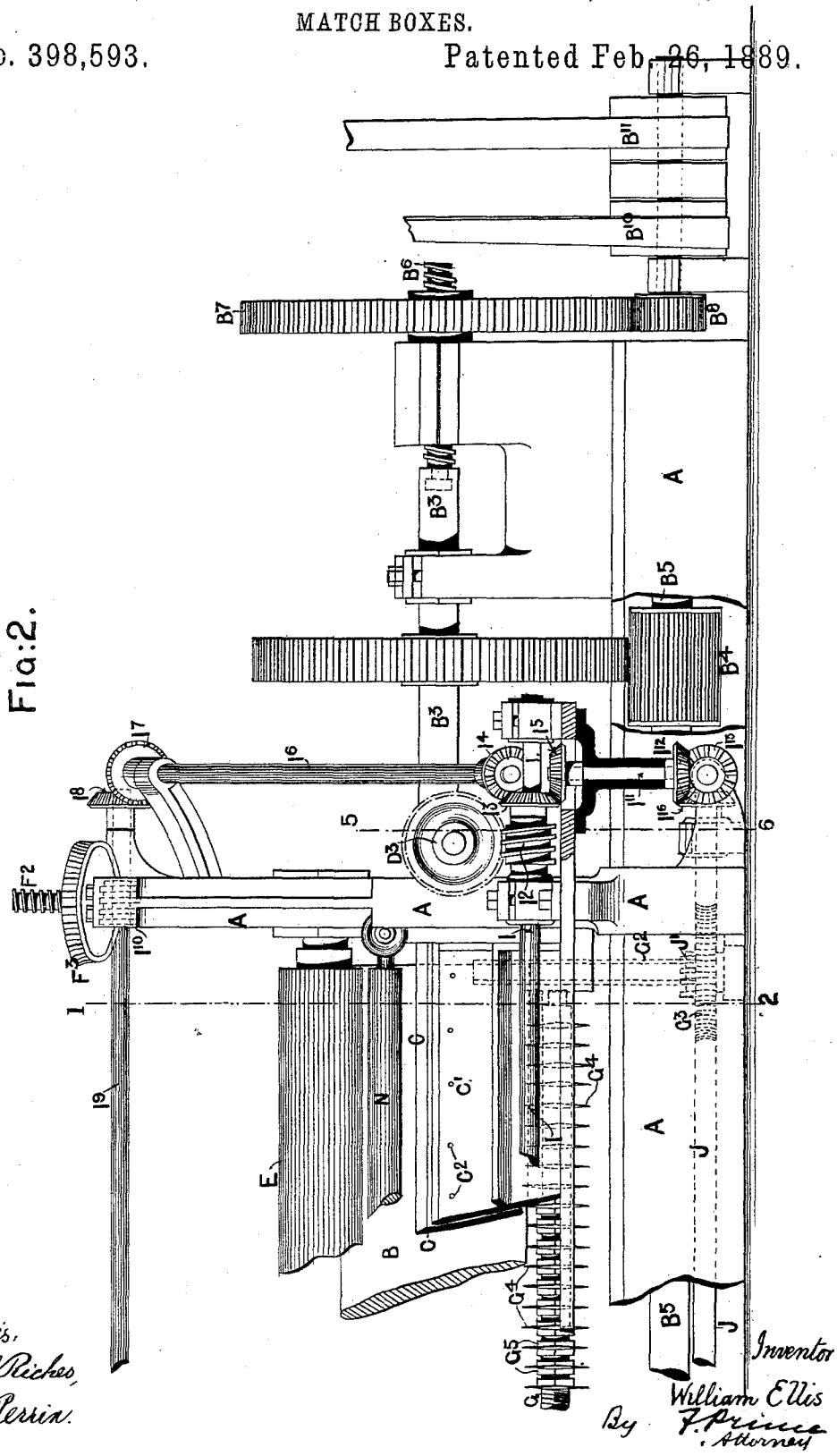
(No Model.) 7 Sheets—Sheet 2.

W. ELLIS.

MACHINERY FOR CUTTING WOOD FOR MATCHES, SPLINTS, AND MATCH BOXES.

No. 398,593. Patented Feb. 26, 1889.

FIG. 2.



Witnesses,
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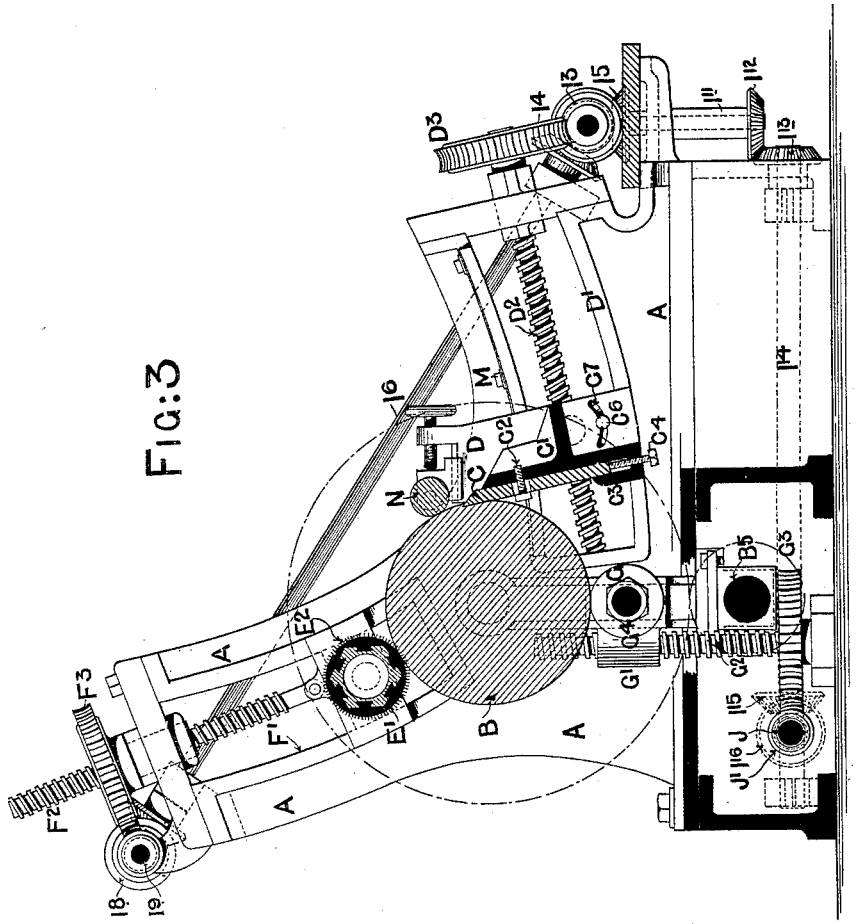
(No Model.) 7 Sheets—Sheet 3.

W. ELLIS.

MACHINERY FOR CUTTING WOOD FOR MATCHES, SPLINTS, AND MATCH BOXES.

No. 398,593. Patented Feb. 26, 1889.

FIG:3



Witnesses.
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(No Model.) 7 Sheets—Sheet 4.

W. ELLIS.

MACHINERY FOR CUTTING WOOD FOR MATCHES, SPLINTS, AND MATCH BOXES.

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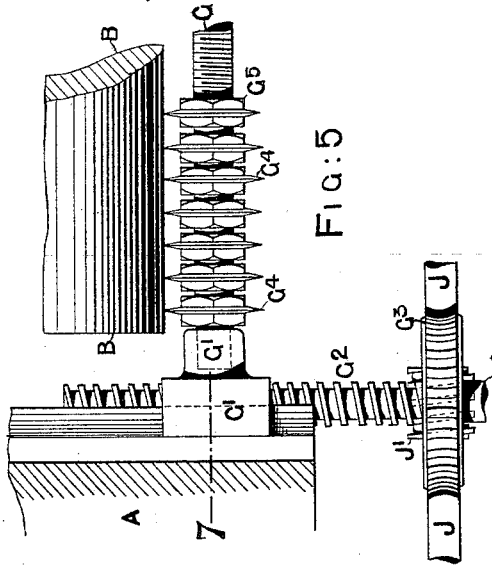

FIG. 5

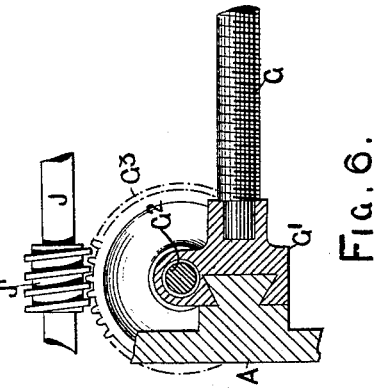

FIG. 6.

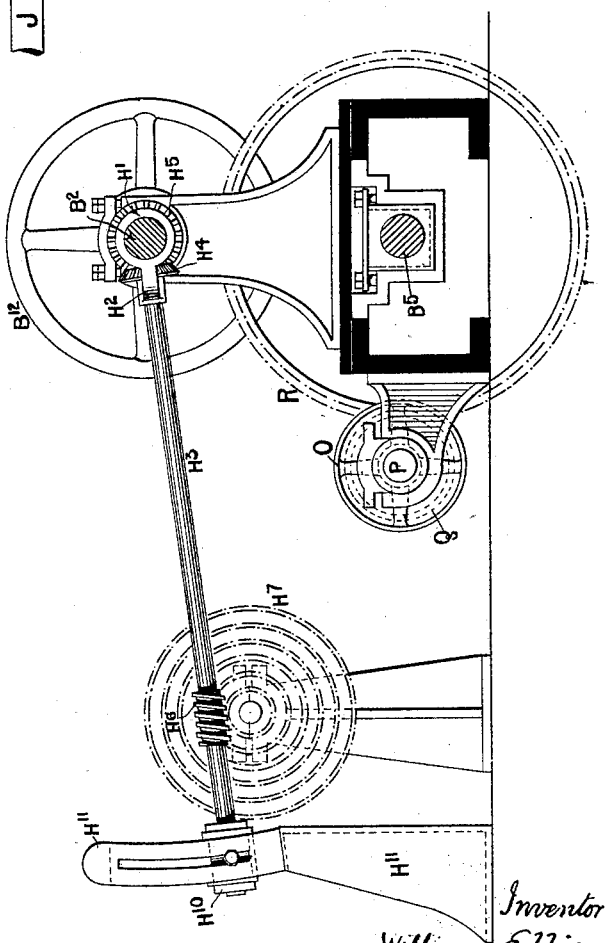

FIG. 4.

Witnesses,
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MACHINERY FOR CUTTING WOOD FOR MATCHES, SPLINTS, AND MATCH BOXES.

No. 398,593. Patented Feb. 26, 1889.

FIG:8.

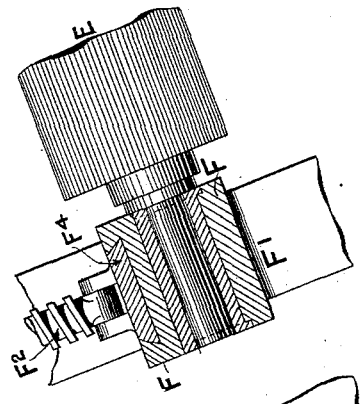


FIG:9.

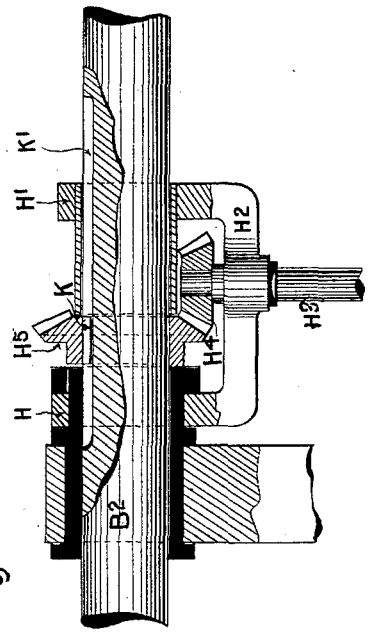
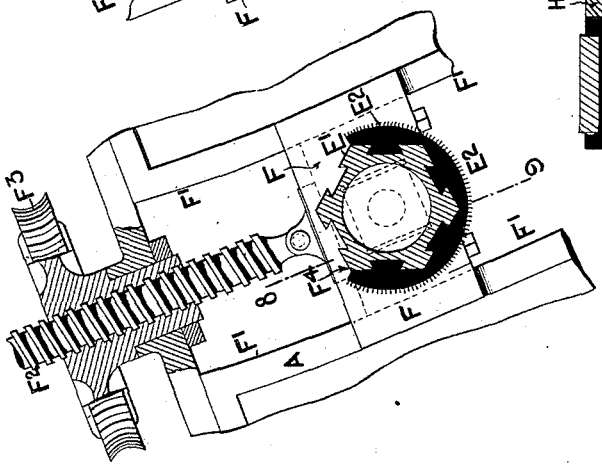


FIG:7.



Witnesses.
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MACHINERY FOR CUTTING WOOD FOR MATCHES, SPLINTS, AND MATCH BOXES.

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FIG. 12.

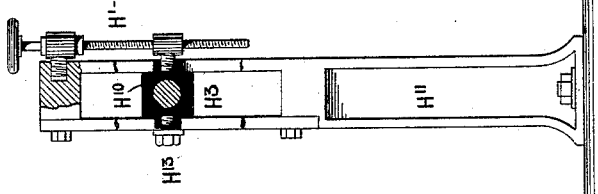


FIG. 11.

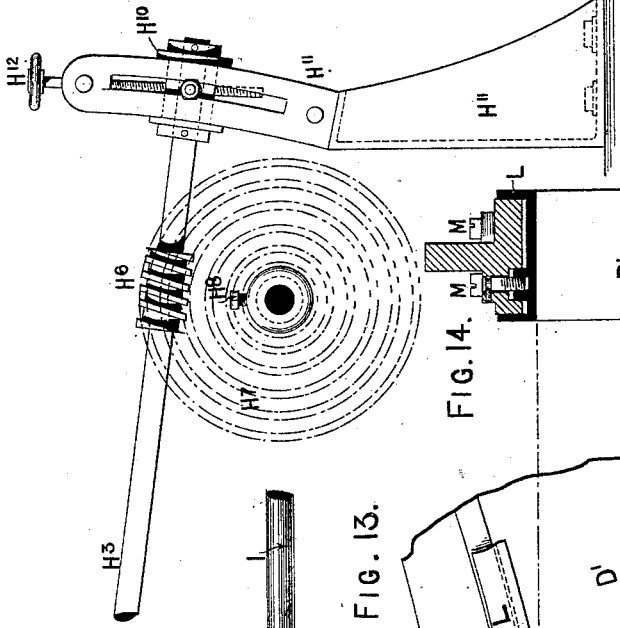


FIG. 14.

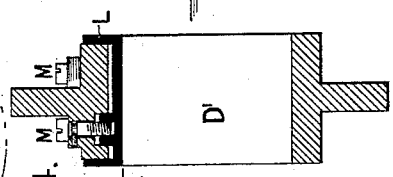


FIG. 13.

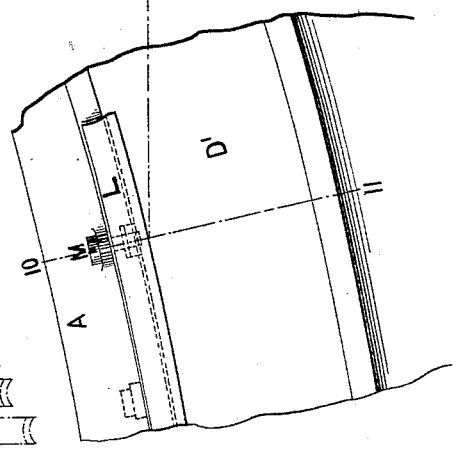
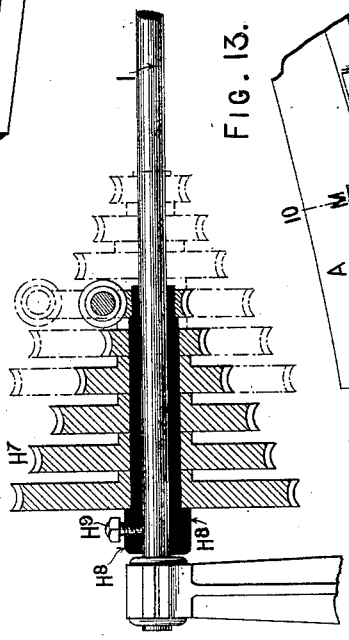


FIG. 10.



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(No Model.) 7 Sheets—Sheet 7.

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MACHINERY FOR CUTTING WOOD FOR MATCHES, SPLINTS, AND MATCH BOXES.

No. 398,593. Patented Feb. 26, 1889.

FIG: 16.

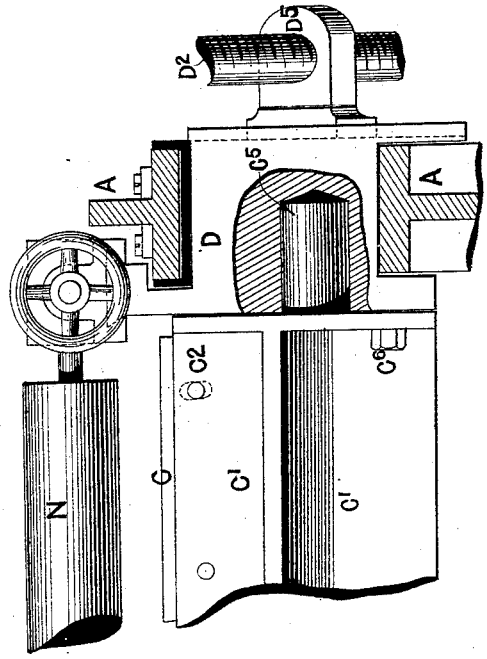


FIG: 17.

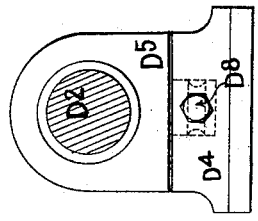


FIG: 18.

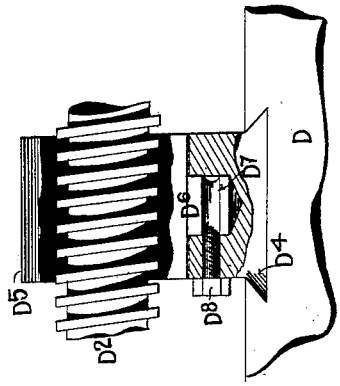
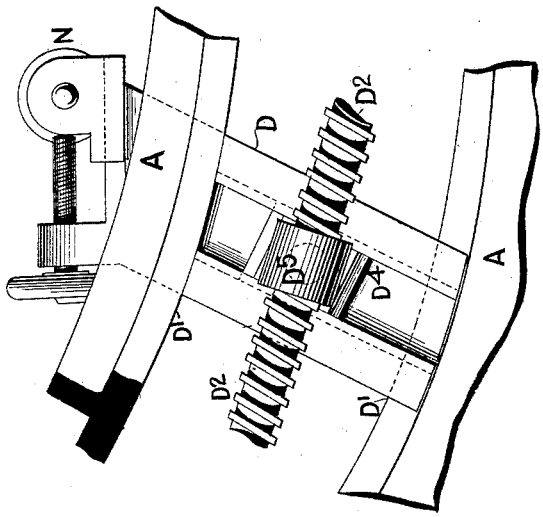


FIG: 15.



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UNITED STATES PATENT OFFICE.

WILLIAM ELLIS, OF PECKHAM, COUNTY OF SURREY, ENGLAND.

MACHINERY FOR CUTTING WOOD FOR MATCHES, SPLINTS, AND MATCH-BOXES.

SPECIFICATION forming part of Letters Patent No. 398,593, dated February 26, 1889.

Application filed May 1, 1888. Serial No. 272,509. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM ELLIS, a subject of the Queen of Great Britain, residing at Peckham, county of Surrey, England, have invented certain new and useful Improvements in Machinery for Cutting Wood for Matches, Splints, and Match-Boxes, of which the following is a specification.

This invention relates to machinery for cutting wood for matches, splints, and match-boxes from a large log revolved, as in a lathe, against a long knife, which takes off a shaving the whole length of the log, the knife regularly following up the log while cutting, so as to cut up a whole log. Arranged before the knife is a rotary longitudinal incisor, which makes longitudinal incisions in the log the width and depth of a match, and circular cutters, which make circumferential incisions in the log the length of a match or splint or match-box wood apart, so that the shaving when cut off by the long knife is in match-wood or splints or box-wood, according as the incisors have been set. These results are obtained by the mechanism illustrated in the accompanying drawings, with aid of which I will proceed to fully describe my invention, the various parts in all the views being denoted by the same letter of reference.

Figure 1 represents in front elevation the left-hand part of a machine constructed according to this invention; Fig. 2, a similar view of the right-hand part; Fig. 3, a vertical transverse section at line 1 2, Fig. 2; Fig. 4, a left-hand transverse sectional view taken at line 3 4, Fig. 1, with the addition thereto of a means for holding a cross-shaft. Fig. 5 shows in front sectional elevation a detail view, drawn to a larger scale than the previous figures embodied in Figs. 1, 2, and 3, of the means employed inside machine at each end for upwardly advancing the shaft carrying the circular knives for circumferentially incising the revolving log; Fig. 6, a sectional plan view at line 7, Fig. 5; Fig. 7, an enlarged sectional side elevation of upper portion of frame with sliding block carrying the device for longitudinally incising the surface of the log, shown fully in Fig. 3 and embodied in Figs. 1 and 2; Fig. 8, partial transverse sectional view of Fig. 7 at line 8 9; Fig. 9, an enlarged longitudinal sectional view, embodied in Fig. 1, of the arrangement of gearing for transmitting motion for advancing the long knife, the longitudinal incisor, and the circumferential incisor toward the log, and for allowing a cross worm-shaft to be lifted to allow different-sized worm-wheels to engage worm to alter the speed of the advance of the long knife to enable different thicknesses of shaving to be cut off the log. Fig. 10 is a detached enlarged longitudinal sectional view, embodied in Fig. 1, of the series of different-sized worm-wheels mounted on a sleeve arranged to slide on shaft to engage the worm to change the speed of the advance of the knives. Fig. 11 is a side view, and Fig. 12 a front view, of the sectoral bearing and bracket for holding the end of the cross worm-shaft. The bearing in these two figures is shown provided with a screw device for obtaining the requisite accurate adjustment of the worm to different sized worm-wheels and a clamping-screw for securing such adjustment. Fig. 13 is an enlarged side elevation of a portion of a curved guide at each side of the machine, shown fully in Fig. 3, in which the sliding blocks that hold the long knife-carrier travel; and Fig. 14 is a section of same through line 10 11 of Fig. 13. These two views show an adjustable wear-shield for the upper bearing of the guide. Fig. 15 is a detail partial end elevation at lines 5 and 6, either at Fig. 1 or 2, of the outside of one of the long knife-carrier sliding blocks embodied in Figs. 1, 2, and 3, showing compensating means to enable the sliding block to be moved along a curved guide by a held straight screw. Fig. 16 is a front view of Fig. 15, with the addition of a partial view of the long knife-carrier, the means for securing the same to the sliding blocks, and steadying-roller for the knife while cutting. Figs. 17 and 18 are respectively front and sectional elevations of detached enlarged views of compensating means embodied in Figs. 1, 2, and 3, and on a larger scale in Fig. 15.

A is the main frame and bed of machine; B, the log of wood held on chucks B′, carried in one end of short chuck-shafts B^2 B^3, suitably held in bearings in the frame and revolved by large gear-wheels turned by pinions B^4 on the main driving-shaft B^5. The log-chucks B′ are driven into the log by the screw ar-

rangement B^6, operated by gear-wheels B^7, turned by pinions B^8 on short shaft B^9, revolved by pulleys B^{10} and B^{11}, pulley B^{10} being for driving the chucks B′ into the log B at each end of it and pulley B^{11} for withdrawing the chucks. To enable these actions to be done, the shafts B^2 B^3 are free to slide the requisite distance for "chucking" the log. To allow this sliding action without throwing the machine out of working gear, the pinions B^4 are made wide, as shown. To enable the chucks B′ to be withdrawn by hand, the end of the shaft B^2 is connected to a screw, to which is fitted a hand-wheel, B^{12}, to turn screw.

C is the long knife extending the length of the log, secured to the front of a knife-carrier, C′, by front screws, C^2, and further secured at the bottom by claws C^3, (see Fig. 3,) arranged at intervals along the bottom of carrier C′. The height of the knife is first adjusted by screws C^4 and then secured against the face of the carrier C′ by the screws C^2. The knife-carrier C′ is held by trunnions C^5 in sliding blocks D. The trunnions C^5 admit of the carrier C′ being turned to adjust the edge of the knife C to the log, when it is secured by the screws C^6, passing through the curved slots C^7. The sliding blocks D travel in a curved guide, D′. Consequently the edge of the knife C is compelled to take the radial direction of the curve, by which means the edge of the knife will be automatically adjusted and held in the necessary position throughout for cutting up a log from its largest diameter to the smallest it is possible to cut it. The sliding blocks D are moved by a straight screw, D^2, held in suitable bearings and turned by worm gear-wheels D^3. To enable a held straight screw to move a sliding block in a curved guide, the following compensating means are employed: On the side of each of the blocks D is fitted a slide, D^4, having a pivoted block, D^5, through which the straight screw D^2 passes and engages, the pivot D^6 of blocks D^5 being held in sliding pieces D^4 by a groove, D^7, and set-screw D^8.

E is the incisor for longitudinally incising the surface of the log B. This is composed of a polygonally-shaped roller, E′, (shown in detail at Figs. 7 and 8,) with dovetail slots to hold sections of steel, E^2, with the incising teeth or knives planed out of the solid. This incisor is carried in sliding bearings F, moving in a guide, F′, preferably of a curve corresponding to the curve of guide D′, so as to travel at exactly the same speed as the knife C. If, however, the guide F′ is made straight, the bearings F must be arranged to move a trifle slower than the knife C, to compensate for the extra distance given by the curve. The bearings F are pressed down by the screws F^2, operated by worm gear-wheels F^3, through which the screws pass and engage. These wheels are held in the top of main frame A. The screws F^2 press the knives into the surface of the log the depth of a match. If the guides F′ are made curved, as shown in the drawings, compensating means will be necessary for the screws F^2. Such means are shown in the drawings, similar in principle to what has already been described for screws D^2, but slightly different in detail, as follows:

The top of bearings F is formed with a dovetail groove, in which is a slide, F^4, to which is hinged the bottom end of the screw F^2. Under the log B is arranged the circumferential incisor. This consists of a loose running shaft, G, carried in suitable bearings, G′, arranged to slide vertically in the inside of the frame of the machine at each end, the bearings G′ being pressed upward by screws G^2, revolved by worm gear-wheels G^3. This shaft G is finely screw-threaded along its length, and carries a number of circular knives, G^4, held between nuts G^5, screwed on the shaft and set the length of a match or splint or box-wood apart. These knives are pressed into the log by the screws G^2, and so circumferentially incise the log as it revolves, so that the shaving, when cut off by the long knife C, is in match wood or splints or box-wood.

When using this machine for cutting wood for match-boxes, the longitudinal incising-knives must be the width apart of the length of the match-box and the circumferential incisors set the width apart of the length of the wood to be bent round to form the box. By this arrangement the grain of the wood will run the length of the wood, and so admit of the wood being bent round without breaking through.

The necessary movements in unison of the knife C, the longitudinal incisor E, and the circumferential incising-knives G^4 toward the log B are effected from the shaft B^2 as follows: On an elongation of one of the bearings of the shaft B^2, (best seen at Fig. 9,) and free to revolve thereon by a bearing-ring, H, and on the shaft by another bearing-ring, H′, is a bracket-bearing, H^2, carrying one end of a cross-shaft, H^3. One end of this shaft has keyed to it a bevel-wheel, H^4, gearing with another bevel-wheel, H^5. The latter is loose on shaft B^2, but prevented from turning by a feather, K, let into a groove, K′, (see Fig. 9,) to allow the shaft B^2 to be moved for chucking the log. Near the other end of shaft H^3 is a worm, H^6, which gears with change-wheels H^7. These wheels are carried on a sleeve, H^8, arranged to slide on shaft I, and held where desired by set-screw H^9. The outer end of shaft H^3 is held in a sectoral bearing, H^{10}, sliding in a corresponding guide in pedestal-frame H^{11}, the bearing H^{10} being lifted or lowered by a screw, H^{12}, and secured by clamping-screw H^{13}. This arrangement enables the worm H^6 to be set to engage wheels of different diameter to impart different speeds to the shaft I without change of speed of shaft B^2. On shaft I are keyed two worms, I′ I^2, gearing with worm-wheels D^3, and a bevel-wheel, I^3, which imparts motion to bevel-wheels I^4 and I^5, the former keing keyed onto a shaft, I^6, which has

a bevel-wheel, I^7, at the end, gearing with bevel-wheel I^8, keyed on a horizontal shaft, I^9, having worms I^{10}, which operate the worm-wheels F^3. The bevel-wheel I^5 is keyed onto a short shaft, I^{11}, at the end of which is another bevel-wheel, I^{12}, gearing with another bevel-wheel, I^{13}, keyed onto one end of a shaft, I^{14}, which has on the other end a bevel-wheel, I^{15}, gearing with bevel-wheel I^{16}, keyed on shaft J. This shaft has worms J′, which engage the worm-wheels G^3 to operate the vertical screws G^2. By this arrangement, at whatever speed the shaft I may be driven, the knife C, the longitudinal incisor E, and the circumferential incising-knives G^4 all approach the log in unison.

To provide for the wear at the top of the curved guides D′, the upper part is fitted with a steel shield, L, for the top of sliding blocks D to bear against. This shield L is held by screws M, which enable the shield to be raised or lowered, as required.

N is a long roller to bear against log B, to assist in steadying the edge of the knife C while cutting.

The machine is driven by the pulley O on short shaft P, having keyed on it a pinion, Q, gearing with large gear-wheel R on main driving-shaft B^5.

Having now fully described my invention, I declare that what I consider novel, and desire to secure by Letters Patent of the United States, is—

1. In machinery for the purposes stated, the combination, with a long knife, a longitudinal incisor, and a circumferential incisor, of the curved guides D′, screws D^2, slides D^4, pivoted blocks D^5, curved guides F′, and screws F^2, hinged to slides F^1, as and for the purposes set forth.

2. In machinery for the purposes stated, the combination, with longitudinal and circumferential incisors, of the long knife C, knife-carrier C′, blocks D, curved guides D′, straight screws D^2, suitably turned, slides D^4, and pivoted blocks D^5, as and for the purposes described.

3. In machinery for the purposes stated, the combination, with the shaft B^2, of the bracket H^2, held by rings H and H′, shaft H^3, bevel-wheels H^4 H^5, worm H^6, change worm-wheels H^7, sleeve H^8, screw H^9, sectoral bearing H^{10}, frame H^{11}, screw H^{12}, and shaft I, all substantially as and for the purposes described.

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