

(No Model.)

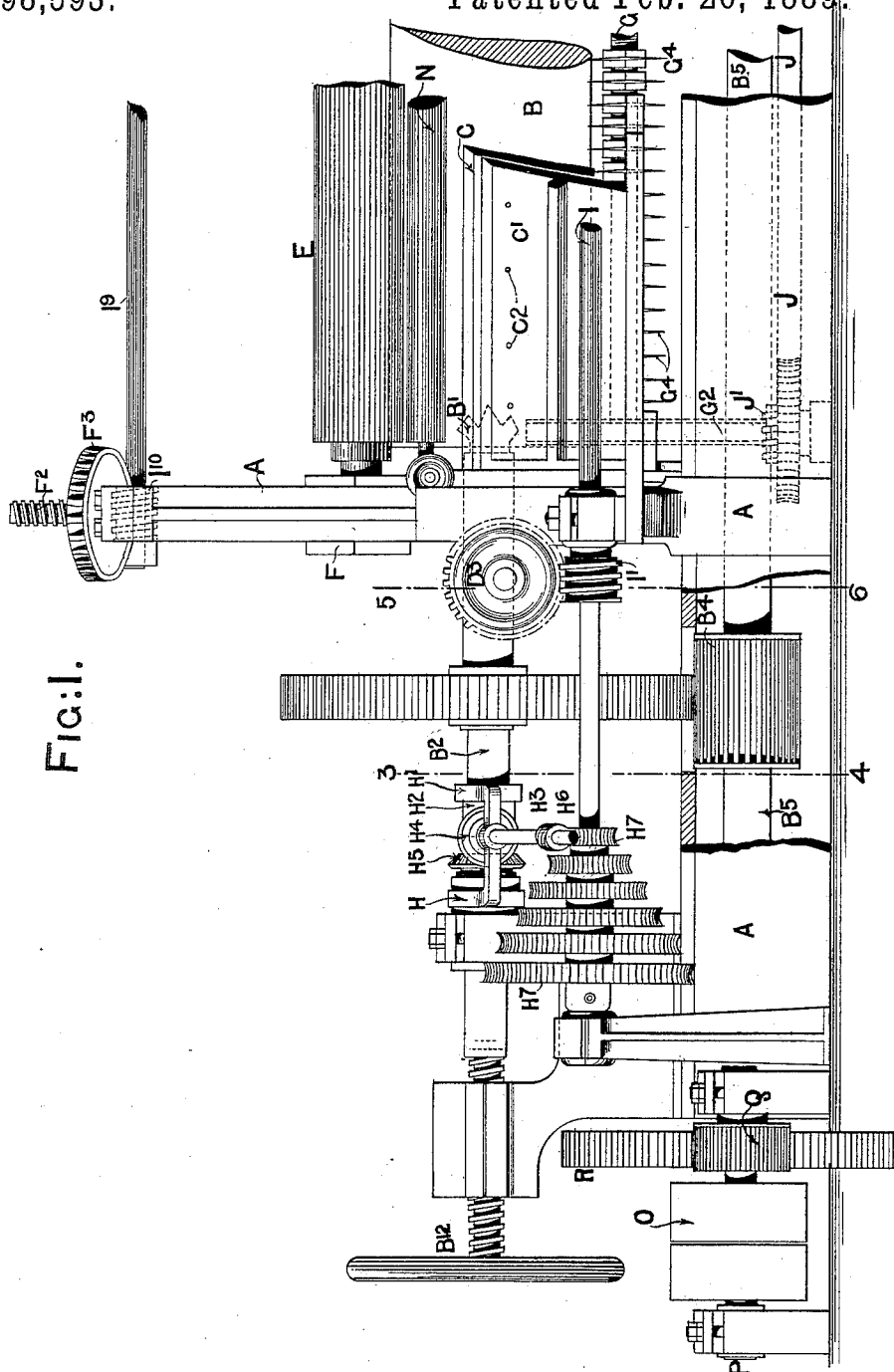
7 Sheets—Sheet 1.

W. ELLIS.

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

No. 398,593.

Patented Feb. 26, 1889.



Witnesses.
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W. G. Perrin.

Inventor
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By *F. Prince*
Attorney

(No Model.)

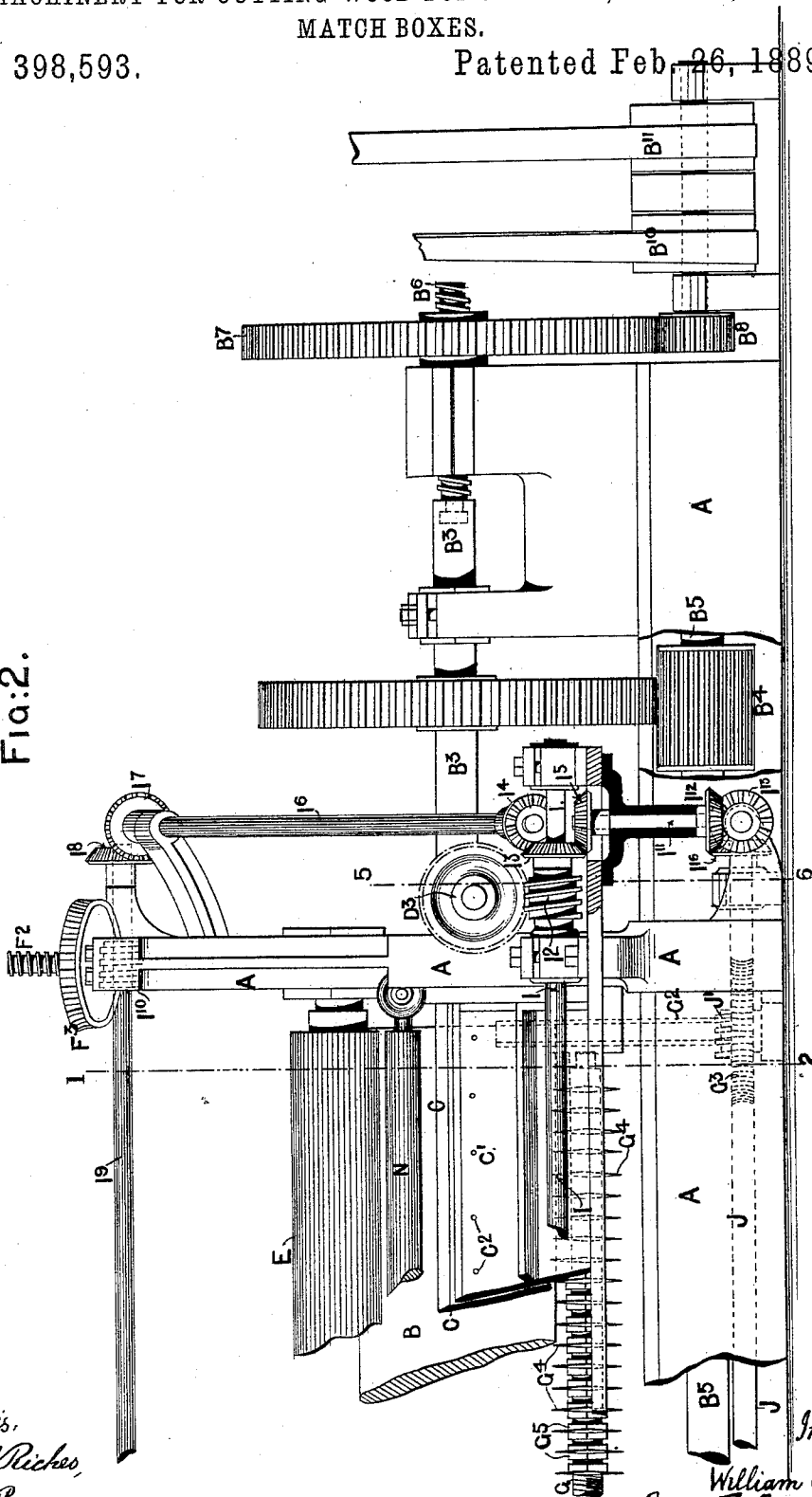
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FIG. 2.



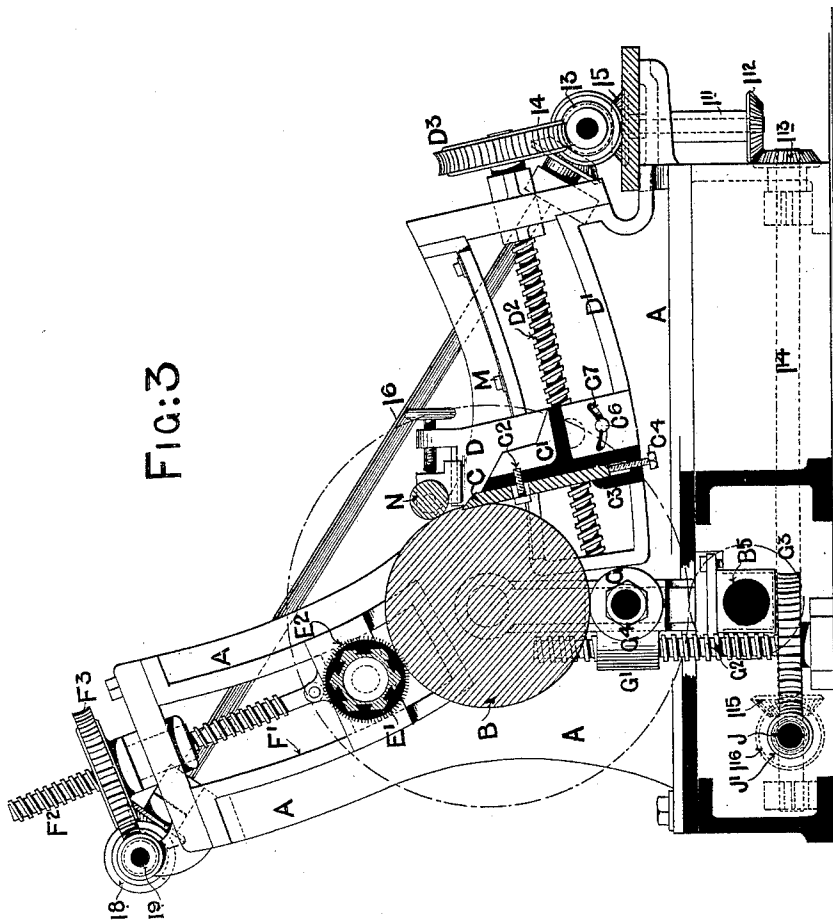
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7 Sheets—Sheet 3.

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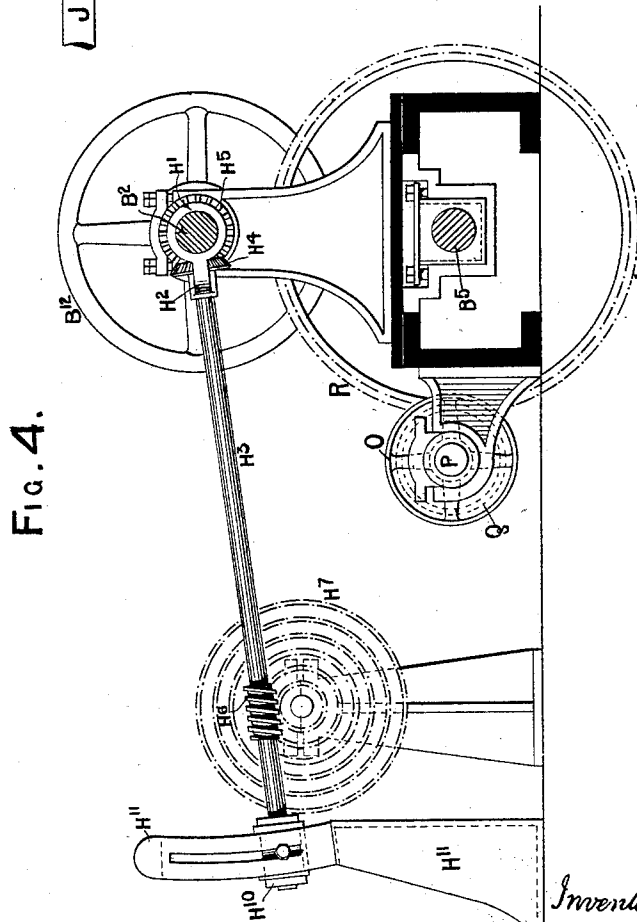
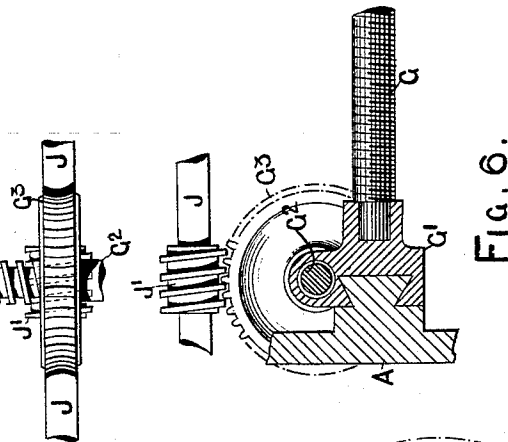
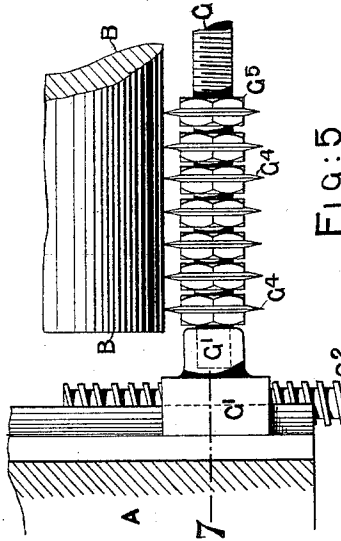
7 Sheets—Sheet 4.

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No. 398,593.

Patented Feb. 26, 1889.



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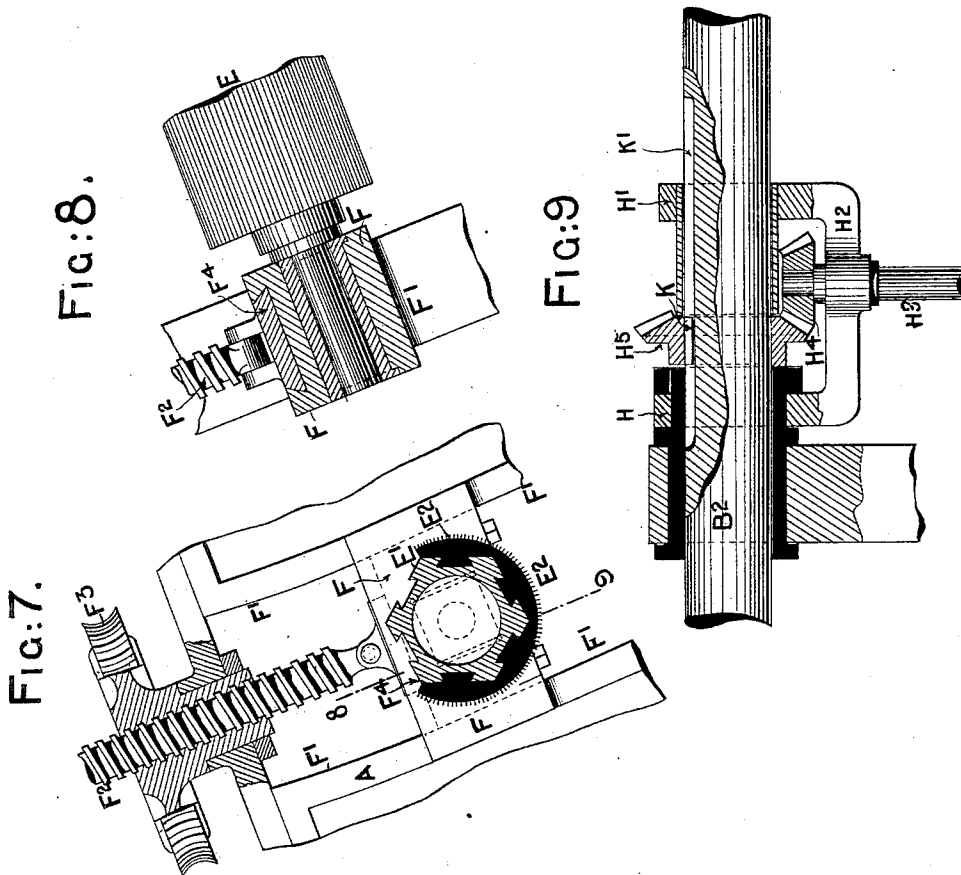
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FIG. 12.

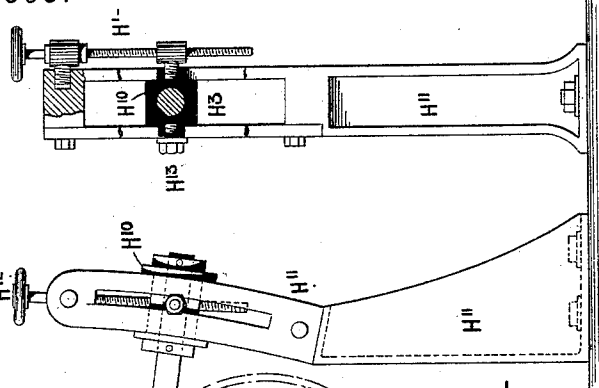


FIG. 11.

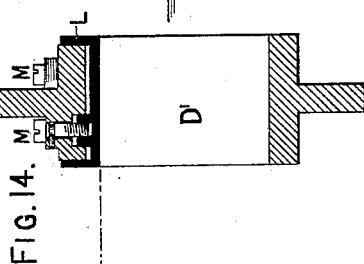
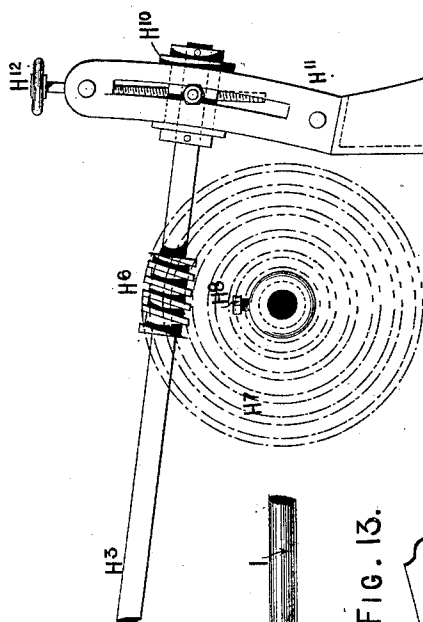


FIG. 13.

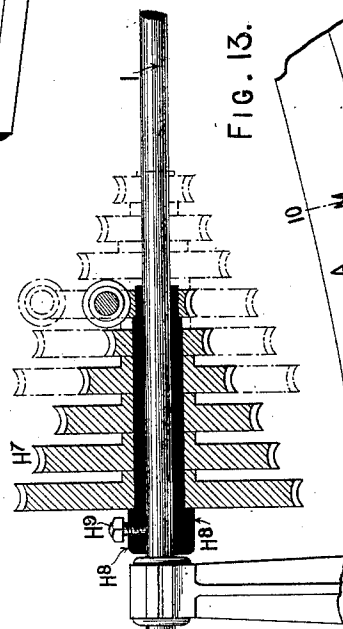
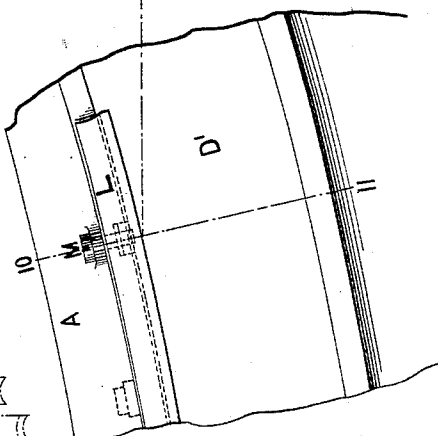


FIG. 10.



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FIG:16.

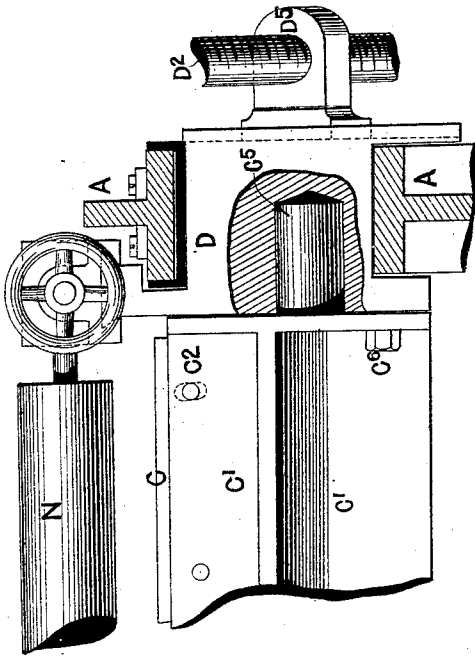


FIG:17.

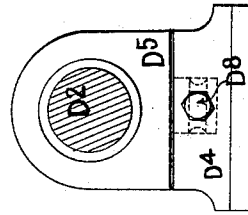


FIG:15.

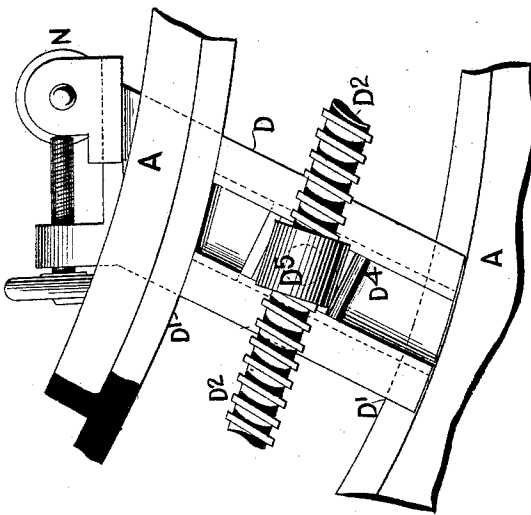
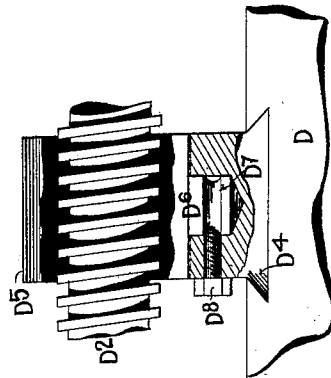


FIG:18.



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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 B² B³, suitably held in bearings in the frame and revolved by large gear-wheels turned by pinions B⁴ on the main driving-shaft B⁵. The log-chucks B' are driven into the log by the screw ar-

rangement B⁶, operated by gear-wheels B⁷,
 turned by pinions B⁸ on short shaft B⁹, re-
 volved by pulleys B¹⁰ and B¹¹, pulley B¹⁰ being
 for driving the chucks B⁷ into the log B at each
 5 end of it and pulley B¹¹ for withdrawing
 the chucks. To enable these actions to be
 done, the shafts B² B³ are free to slide the
 requisite distance for "chucking" the log.
 To allow this sliding action without throw-
 10 ing the machine out of working gear, the pin-
 ions B⁴ are made wide, as shown. To enable
 the chucks B⁷ to be withdrawn by hand, the
 end of the shaft B² is connected to a screw, to
 which is fitted a hand-wheel, B¹², to turn screw.
 15 C is the long knife extending the length of
 the log, secured to the front of a knife-car-
 rier, C', by front screws, C², and further se-
 cured at the bottom by claws C³, (see Fig. 3,)

arranged at intervals along the bottom of
 20 carrier C'. The height of the knife is first
 adjusted by screws C⁴ and then secured
 against the face of the carrier C' by the
 screws C². The knife-carrier C' is held by
 trunnions C⁵ in sliding blocks D. The trun-
 25 nions C⁵ 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 C⁶, passing
 through the curved slots C⁷. The sliding
 blocks D travel in a curved guide, D'. Con-
 30 sequently 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 nec-
 essary position throughout for cutting up a
 35 log from its largest diameter to the smallest
 it is possible to cut it. The sliding blocks D
 are moved by a straight screw, D², held in
 suitable bearings and turned by worm gear-
 wheels D³. To enable a held straight screw to
 40 move a sliding block in a curved guide, the
 following compensating means are em-
 ployed: On the side of each of the blocks
 D is fitted a slide, D⁴, having a pivoted
 block, D⁵, through which the straight screw
 45 D² passes and engages, the pivot D⁶ of blocks
 D⁵ being held in sliding pieces D⁴ by a
 groove, D⁷, and set-screw D⁸.

E is the incisor for longitudinally incising
 the surface of the log B. This is composed of
 50 a polygonally-shaped roller, E', (shown in de-
 tail at Figs. 7 and 8,) with dovetail slots to
 hold sections of steel, E², with the incising
 teeth or knives planed out of the solid. This
 incisor is carried in sliding bearings F', mov-
 55 ing in a guide, F', preferably of a curve cor-
 responding 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
 60 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
 F², operated by worm gear-wheels F³, through
 which the screws pass and engage. These
 65 wheels are held in the top of main frame A.
 The screws F² press the knives into the sur-
 face of the log the depth of a match. If the

guides F' are made curved, as shown in the
 drawings, compensating means will be neces-
 sary for the screws F². Such means are shown 70
 in the drawings, similar in principle to what
 has already been described for screws D², but
 slightly different in detail, as follows:

The top of bearings F is formed with a
 dovetail groove, in which is a slide, F⁴, to 75
 which is hinged the bottom end of the screw
 F². Under the log B is arranged the circum-
 ferential incisor. This consists of a loose
 running shaft, G, carried in suitable bearings,
 G', arranged to slide vertically in the inside 80
 of the frame of the machine at each end, the
 bearings G' being pressed upward by screws
 G², revolved by worm gear-wheels G³. This
 shaft G is finely screw-threaded along its
 85 length, and carries a number of circular knives,
 G⁴, held between nuts G⁵, 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 G², and so circumfer-
 90 entially 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 95
 of the match-box and the circumferential in-
 cisors 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 100
 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 G⁴ toward 105
 the log B are effected from the shaft B² as
 follows: On an elongation of one of the bear-
 ings of the shaft B², (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 110
 a bracket-bearing, H², carrying one end of a
 cross-shaft, H³. One end of this shaft has keyed
 to it a bevel-wheel, H⁴, gearing with another
 bevel-wheel, H⁵. The latter is loose on shaft 115
 B², but prevented from turning by a feather,
 K, let into a groove, K', (see Fig. 9,) to allow
 the shaft B² to be moved for chucking the log.
 Near the other end of shaft H³ is a worm,
 H⁶, which gears with change-wheels H⁷. These 120
 wheels are carried on a sleeve, H⁸, arranged to
 slide on shaft I, and held where desired by
 set-screw H⁹. The outer end of shaft H³ is
 held in a sectoral bearing, H¹⁰, sliding in a
 corresponding guide in pedestal-frame H¹¹,
 the bearing H¹⁰ being lifted or lowered by a 125
 screw, H¹², and secured by clamping-screw
 H¹³. This arrangement enables the worm H⁶
 to be set to engage wheels of different diam-
 eter to impart different speeds to the shaft I
 without change of speed of shaft B². On shaft 130
 I are keyed two worms, I' I², gearing with
 worm-wheels D³, and a bevel-wheel, I³, which
 imparts motion to bevel-wheels I⁴ and I⁵, the
 former being keyed onto a shaft, I⁶, which has

a bevel-wheel, I⁷, at the end, gearing with bevel-wheel I⁸, keyed on a horizontal shaft, I⁹, having worms I¹⁰, which operate the worm-wheels F³. The bevel-wheel I⁵ is keyed onto
 5 a short shaft, I¹¹, at the end of which is another bevel-wheel, I¹², gearing with another bevel-wheel, I¹³, keyed onto one end of a shaft, I¹⁴, which has on the other end a bevel-wheel, I¹⁵, gearing with bevel-wheel I¹⁶, keyed on shaft
 10 J. This shaft has worms J¹, which engage the worm-wheels G³ to operate the vertical screws G². By this arrangement, at whatever speed the shaft I may be driven, the knife C, the longitudinal incisor E, and the circumferential incising-knives G¹ all approach the log
 15 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
 20 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
 25 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 B⁵.

30 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, 35 of the curved guides D', screws D², slides D⁴, pivoted blocks D³, curved guides F', and screws F², hinged to slides F¹, 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', 40 straight screws D², suitably turned, slides D⁴, and pivoted blocks D³, as and for the purposes described.

3. In machinery for the purposes stated, the combination, with the shaft B², of the bracket H², held by rings H and H', shaft H³, 50 bevel-wheels H⁴ H⁵, worm H⁶, change worm-wheels H⁷, sleeve H⁸, screw H⁹, sectoral bearing H¹⁰, frame H¹¹, screw H¹², and shaft I, all substantially as and for the purposes described.

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