

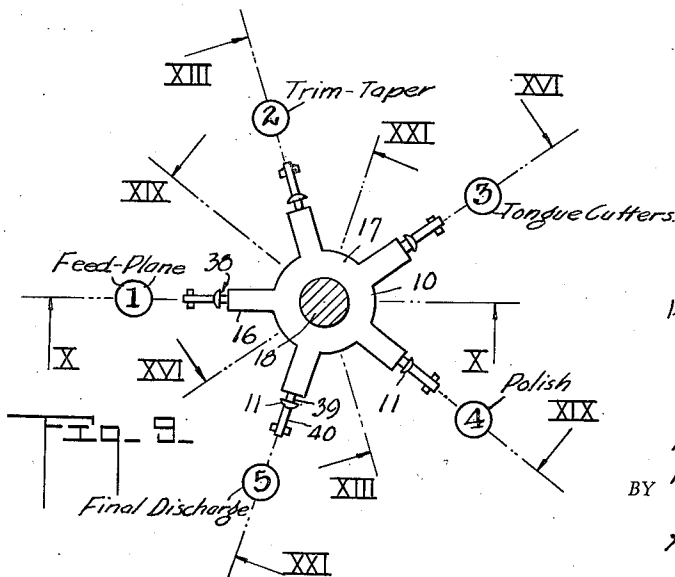
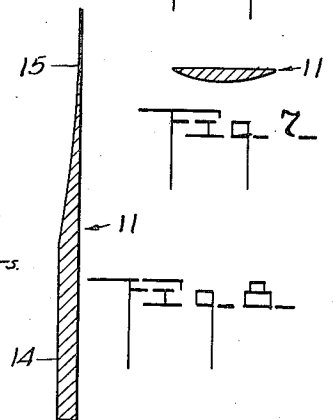
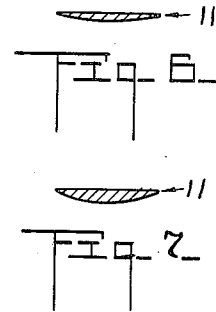
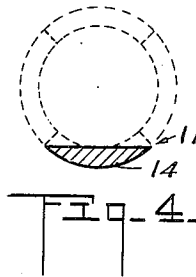
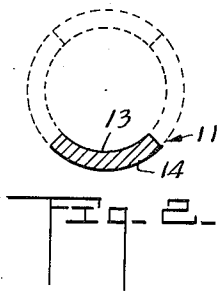
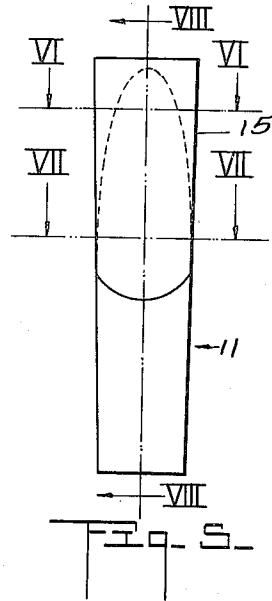
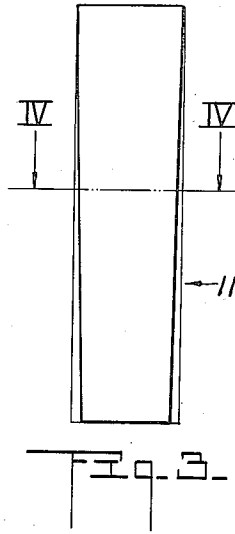
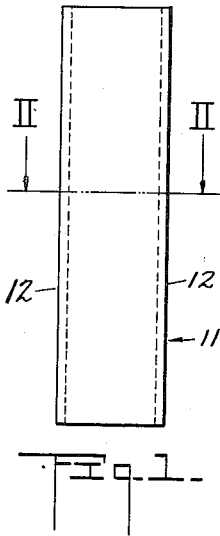
June 18, 1940.

P. STRANO ET AL
REED FORMING MACHINE

Filed Aug. 29, 1938

2,204,871

5 Sheets-Sheet 1



INVENTORS
PETER STRANO
RAY E. HULBERT.
BY
Schapp & Cole
ATTORNEYS.

June 18, 1940.

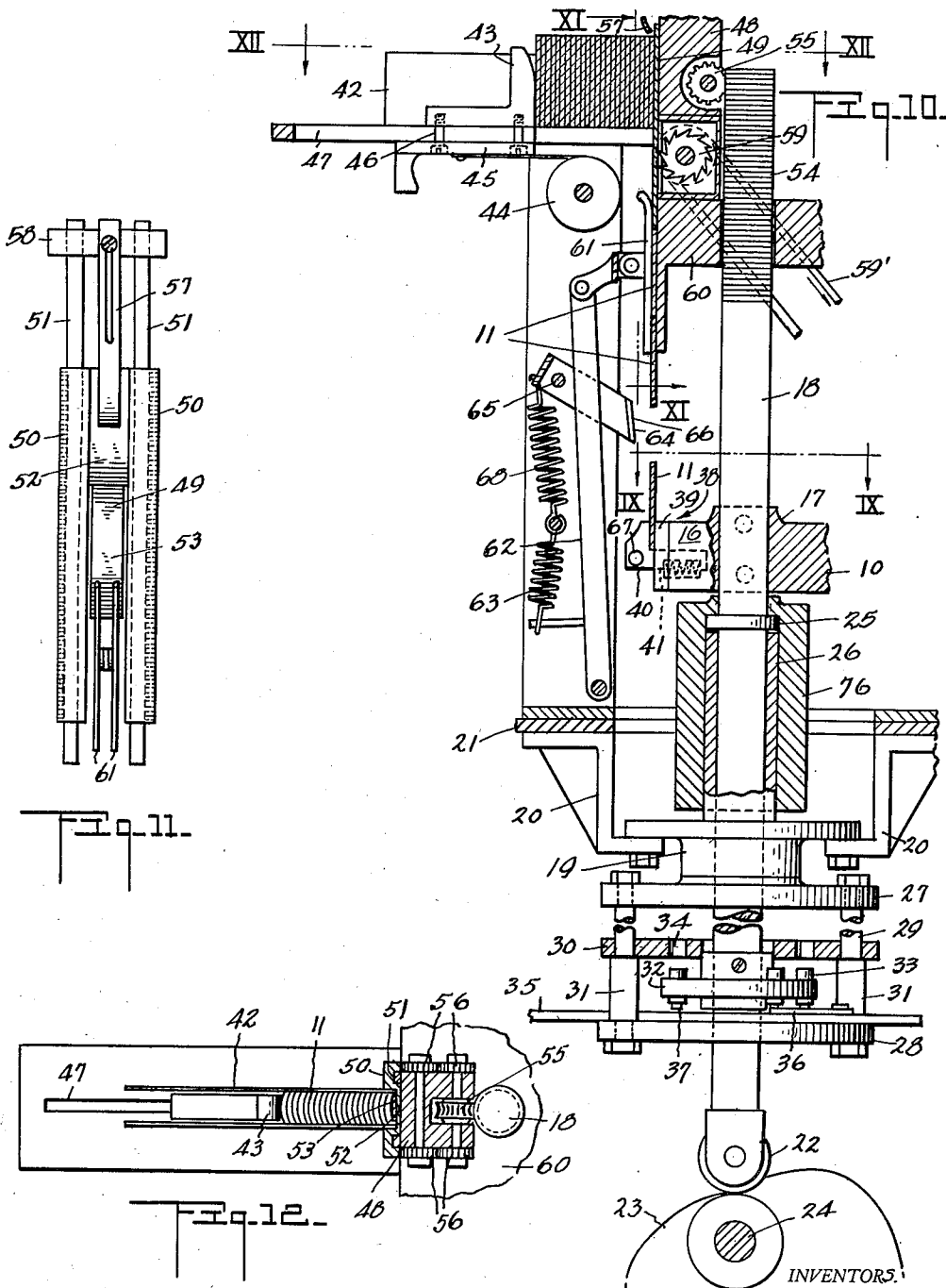
P. STRANO ET AL

2,204,871

REED FORMING MACHINE

Filed Aug. 29, 1938

5 Sheets-Sheet 2



INVENTORS:
PETER STRANO
BY RAY E. HULBERT.
Schapp & Cole
ATTORNEYS.

June 18, 1940.

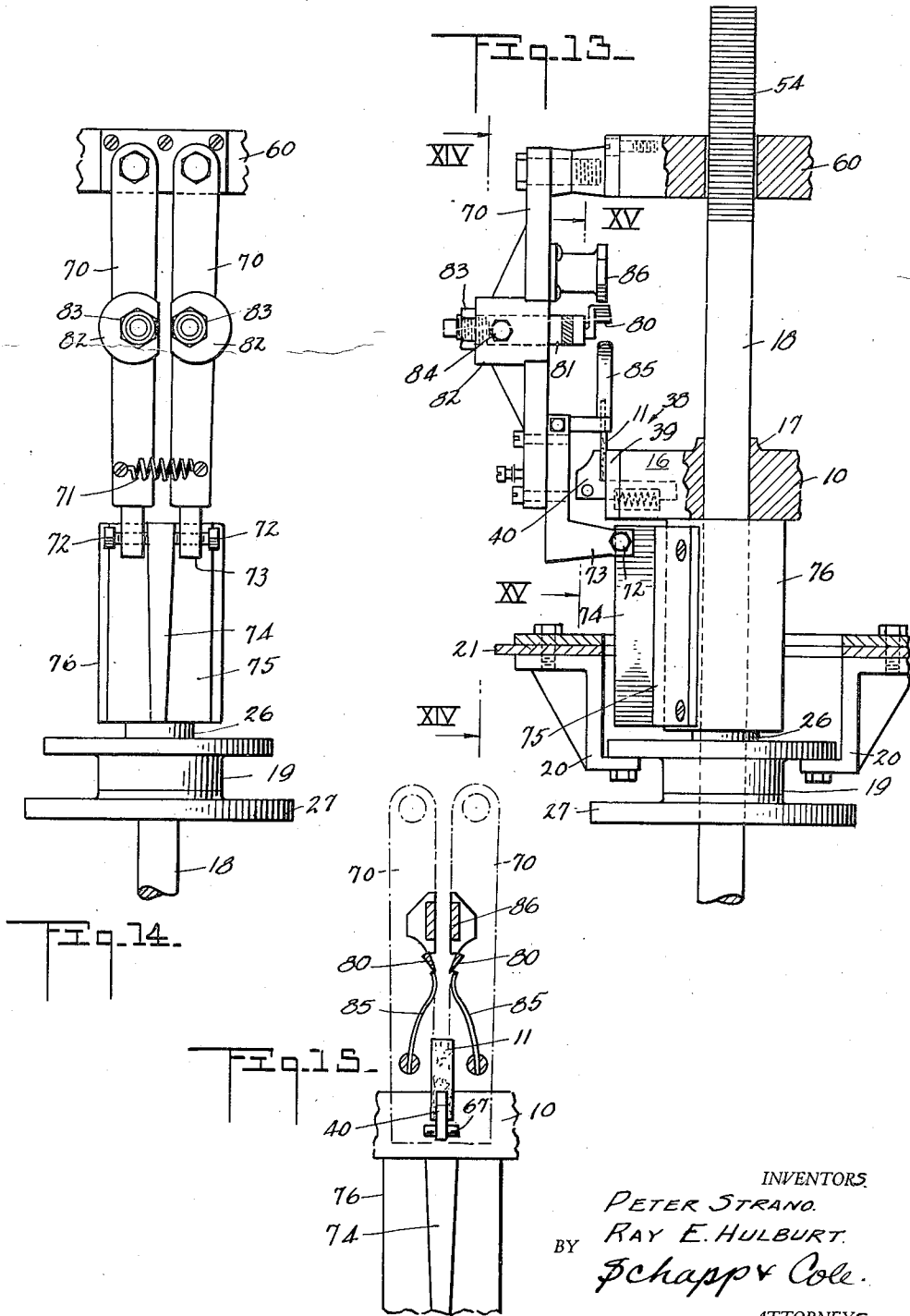
P. STRANO ET AL

2,204,871

REED FORMING MACHINE

Filed Aug. 29, 1938

5 Sheets-Sheet 3



INVENTORS
PETER STRANO.
RAY E. HULBERT.
BY Schapp & Cole.
ATTORNEYS.

June 18, 1940.

P. STRANO ET AL

2,204,871

REED FORMING MACHINE

Filed Aug. 29, 1938

5 Sheets-Sheet 4

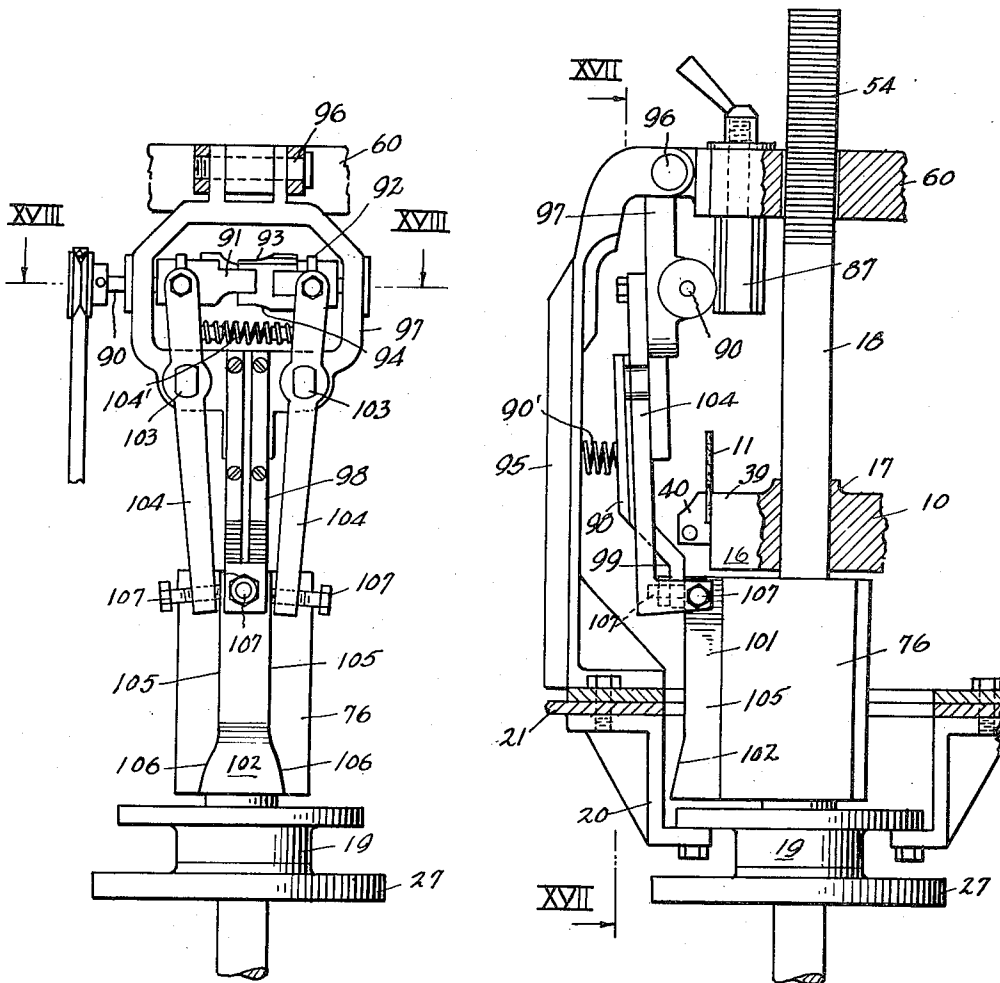
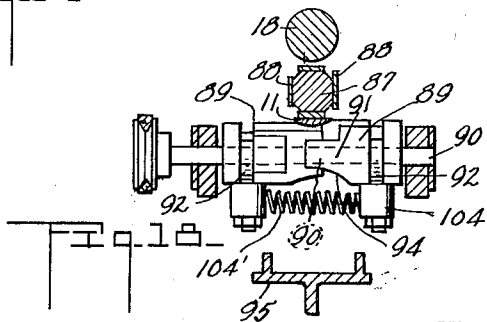


Fig. 17.

Fig. 16.



INVENTORS.
PETER STRANO
RAY E. HULBURT.
BY
J. Schapply Cole.
ATTORNEYS.

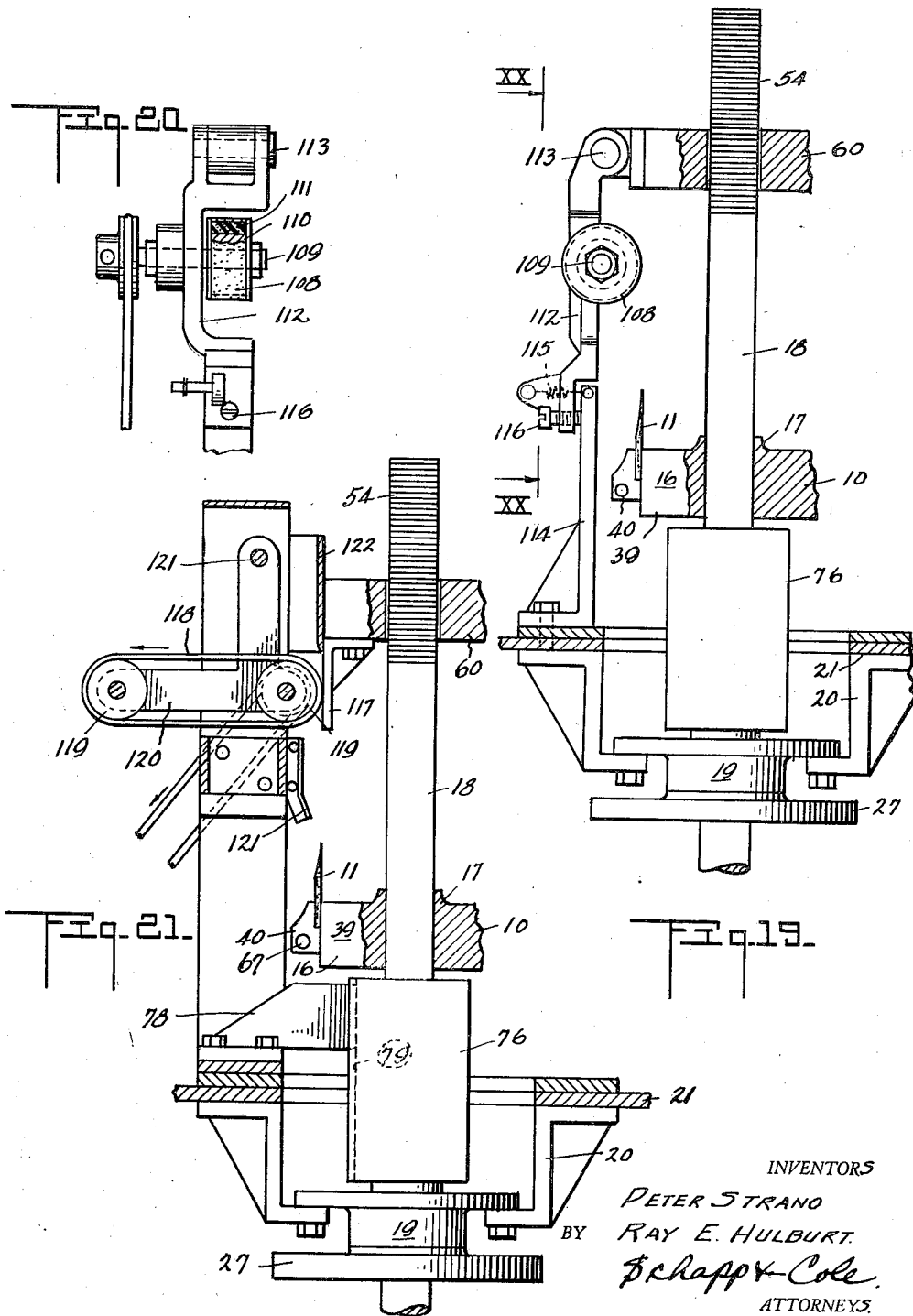
June 18, 1940.

P. STRANO ET AL
REED FORMING MACHINE

2,204,871

Filed Aug. 29, 1938

5 Sheets-Sheet 5



INVENTORS

PETER STRANO

RAY E. HULBURT.

BY Schapp & Cole

ATTORNEYS

UNITED STATES PATENT OFFICE

2,204,871

REED FORMING MACHINE

Peter Strano and Ray E. Hulburt, San Francisco, Calif.; said Strano assignor to Morgan J. Doyle, San Francisco, Calif.

Application August 29, 1938, Serial No. 227,272

2 Claims. (Cl. 144-142)

The present invention relates to improvements in a reed forming machine and its principal object is to provide a machine of the character described which, in a number of successive steps will act on a reed blank to plane the bottom face, to trim the edges, and to shape and polish the tongue of the reed.

A further object of the invention is to arrange the different operations so that a plurality of blanks may be fed through the machine, corresponding to the number of operations so that each operation delivers a completed reed at the discharge end of the machine.

A still further object of the invention is to provide a tongue-shaping means which leaves a so-called heart in the tongue, that is, a slightly thickened central portion, so that in cross-section the upper face of the tongue changes gradually, being perfectly flat at the extremity of the tongue and changing to convex as it approaches the base of the tongue.

A further object of the invention is to provide a machine in which the different parts are organized into a relatively simple unit, a machine which is rugged in construction, easy to operate and which requires little service and attention on the part of the operator.

Further objects and advantages of our invention will appear as the specification proceeds.

The preferred form of our invention is illustrated in the accompanying drawings, in which,

Figure 1 shows a top plan view of a reed block;

Figure 2 a section taken along line II—II of Figure 1, complementary reed blocks being shown in dotted lines;

Figure 3 a top plan view of a reed block after it has passed through a bottom planing and an edge trimming operation;

Figure 4 a section taken along line IV—IV of Figure 3, illustrating the bottom planing operation;

Figure 5 a top plan view of the finished reed;

Figures 6 and 7 sections taken along lines VI—VI and VII—VII of Figure 5, respectively;

Figure 8 a central vertical section through the finished reed taken along line VIII—VIII of Figure 5;

Figure 9 a diagrammatic sectional view of a revolvable turret as seen from line IX—IX of Figure 10, this view illustrating the general organization of the machine.

Figure 10 a vertical section through the machine taken along line X—X of Figure 9, and illustrating particularly the feeding mechanism;

Figure 11 a vertical section taken substantially along line XI—XI of Figure 10;

Figure 12 a horizontal section taken along line XII—XII of Figure 10;

Figure 13 a vertical section taken along line XIII—XIII of Figure 9, illustrating particularly the edge-trimming mechanism;

Figure 14 a side elevation of the latter mechanism as viewed from line XIV—XIV of Figure 13;

Figure 15 a sectional elevation as seen from line XV—XV of Figure 13;

Figure 16 a vertical section through the machine taken along line XVI—XVI of Figure 9 and illustrating the tongue-shaping device including the revolvable cutters;

Figure 17 a vertical section taken along line XVII—XVII of Figure 16;

Figure 18 a horizontal section taken along line XVIII—XVIII of Figure 16;

Figure 19 a vertical section through the machine illustrating the polishing device as seen from line XIX—XIX of Figure 9;

Figure 20 a detail view of the polisher as viewed from line XX—XX of Figure 19; and

Figure 21 a vertical section through the machine illustrating the ejecting means, as seen from line XXI—XXI of Figure 9.

While we have shown only the preferred form of our invention, we wish to have it understood that various changes or modifications may be made within the scope of the claims hereto attached without departing from the spirit of the invention.

Referring to the drawings in detail, our machine comprises in its general structure and organization a revolvable turret for carrying the reed blank from station to station and a peripheral assembly of different stations grouped around the turret as illustrated in Figure 9 and comprising a feeding and planing station 1, an edge-trimming station 2, a tongue-shaping station 3 with revolvable cutters, a polishing station 4 and a final discharge station 5.

The reed blank 11 illustrated in Figures 1 and 2 may be a quarter section of a cylindrical stem of bamboo having substantially parallel side edges 12 and concentric inner and outer faces 13 and 14. The inner face will eventually form the bottom and the outer face the top of the reed. The general organization of the machine is such that at station 1 the reed blank is fed into the machine and has its bottom planed to become absolutely flat, at station 2 the edges of the reed are trimmed to a slight taper, at station 3 the tongue 15 is formed, at station 4 the tongue is

polished and finally at station 5 the reed is ejected.

The turret 10 serves as a carrier for the reed blanks and is formed with five arms 16 projecting symmetrically from the hub section 17. The turret is arranged to alternately reciprocate and revolve by one-fifth of a turn. One way of accomplishing this is illustrated in Figure 10, which shows the turret in its lowermost position. The turret is secured to a vertical shaft 18 which latter extends downwardly through a bearing 19 supported in hangers 20 suspended from the main bed plate 21 and has its lower end terminating in a roller 22 adapted to ride on a substantially heart shaped cam 23 mounted on the shaft 24, the roller being revoluble on the axis of the shaft. The cam causes the shaft and the turret to rise and fall and to remain in the lowermost position for a short period of time. When the shaft is in this position a collar 25 on the shaft comes to rest on a sleeve 26 rising from the bearing 19.

The bearing 19 has a disc 27 secured to its lower end and a second disc 28 is secured in fixed spaced relation to the former disc by means of spacing rods 29. A third disc 30 is slidable on the spacing rods between the two former discs, but is prevented from going beyond the position indicated in Figure 10 by means of spacing sleeves 31 surrounding the rods 29. All three discs are held against rotary motion and allow the shaft to turn therein. The latter has a fourth disc 32 fixed thereto between the discs 28 and 30, and this disc has five pins 33 rising from its surface in symmetrical arrangement about the axis of the shaft and in registering relation to five holes 34 arranged in the disc 30.

When the shaft 18 is in its lowermost position the pins 33 clear the holes 34 and while the shaft retains this position the disc 32 is turned through one-fifth of a turn by means of a reciprocating bar 35 and a spring-pressed pawl 36 engaging with a downward extension 37 of the pin which is in operative proximity to the pawl at the time. After the shaft has been turned through one-fifth of a turn, it begins to rise again, the five pins 33 enter the holes 34 and the shaft is now firmly held against any further turning motion. This arrangement insures an absolutely true vertical movement of the turret and perfect alinement of the reed blanks carried by the turret with respect to the different operating stations.

It is apparent that different means may be substituted for effecting the desired alternation of reciprocating motion with turning motion of the shaft as long as the arrangement is such that the reed blanks carried by the turret are made to occupy the correct positions relative to the stations.

Each of the arms 16 terminates in a gripping device 38, (see Figure 10) comprising a fixed jaw 39 and a movable jaw 40 which latter has a spring-pressed shank 41 slidable in the former, and the two jaws being adapted to clamp upon the lower end of the reed blank 11 for holding the latter in vertical position with the major upper portion of the reed blank fully exposed for the different operations to be performed thereon. The jaws gripping the lower edge are somewhat narrower than the reed blank so that the edges of the blank are also fully exposed.

The first station is the feeding and planing station and is illustrated in detail in Figures 10-12. Its function is to feed the reed blanks successively to a planing device, to plane the

concave bottom face of the blank and to deliver a previously planed blank into the registering gripping device of the turret.

The feeding device comprises a horizontal trough 42 mounted radially with respect to the axis of the turret, at the upper end of the machine, and adapted to slidably hold an array of reed blanks in upright position and in nested relation, as seen in Figure 12, the concave bottoms of the blanks facing the machine. A pusher 43 slidable in the trough urges the reed blanks toward the machine and is actuated by a clock spring 44 pulling on a plate 45 underneath the trough, the plate being connected to the pusher by means of bolts 46 riding in a slot 47 in the bottom of the trough.

Opposite the inner end of the trough is mounted a fixed block or abutment 48 and between the abutment and the inner end of the trough operates a vertically movable ejector slide 49 which reciprocates for successively pushing the innermost blanks downward. The ejector slide comprises two parallel rack bars 50 slidable on vertical rods 51 and interconnected by a plate 52 which forms a groove with the bars adapted to receive the inner end of the trough and formed with a slightly projecting plate 53 extending into the trough.

As the ejector plate ascends its bottom and rises above the innermost reed blank, which latter is pushed by the pusher 43 to enter into the space immediately underneath the ejector plate, so that, when the latter descends it pushes the innermost blank downwardly.

The ejector plate rises and descends in timed relation to the reciprocating movements of the main shaft 18, the upper end of which is formed with gear rings 54 which operate a pinion 55 mounted in the block 48, and this pinion transmits corresponding motion to the rack bars of the ejector plate by means of two sets of pinions 56, (see Figure 12). Thus, each time the shaft 18 rises, the ejector plate also rises to clear the innermost reed blank, and each time the shaft descends the ejector plate also descends for pushing the reed blank downward. A spring finger 57, adjustably mounted on a crossbar 58 supported by the rods 51, prevents the innermost reed blank from accidentally rising with the ejector plate.

On its downward path the reed blank passes a rotary cutter 59 driven by the belt 59', which cutter planes the concave bottom face of the reed blank. At the end of the operation the reed blank 11 is in the position indicated in Figure 10 and is confined between a fixed block 60 and a pair of shoes 61 shaped with their upper ends curved away from the block 60, like snowshoes, to facilitate the entry of the reed blank. The shoes are urged toward the block by pivoted links 62 and coacting springs 63.

During the downward travel of the reed blank it also advances a previously planed blank to project downwardly from between the block 60 and the shoes in readiness to be gripped by one of the gripping devices of the turret on the next upward move. The drawing, Figure 10, shows three reed blanks in position, the uppermost one having just been planed, the middle one being in position ready to be gripped and the lowermost one having been gripped in the previous operation.

The turret being in its lowermost position, it is next turned through one-fifth of a revolution and presents a new gripping device under-

neath the reed blank ready to be gripped. For opening the gripping device as it now ascends into operative proximity to the depending reed blank, we provide the cam 64 which comprises

5 a frame pivoted at 65 and presenting two spaced cam faces 66 straddling the ascending movable jaw 40 of the gripping device and engaging with pins 67 projecting laterally from the jaw for urging the latter outward while the gripping device engages with the depending reed blank. After the pins pass the cam the jaw 40 snaps back upon the reed blank and the latter is now firmly clamped between the jaws. On the downward travel of the gripping device, the pins 67 ride on the upper faces of the cam and the latter, which is held in place by a spring 68, yields sufficiently to allow the pins to pass.

The reed blank is next advanced by the gripping device of the turret to station 2, the function of which is to trim the edges of the blank to a slight taper. The mechanism for this operation is illustrated in Figures 13-15. The reed blank 11 is shown in position between the jaws 39 and 40 ready to start on its upward movement.

25 The block 60, at this station, has two bars 70 pivotally suspended therefrom in a tangent plane, the two bars being urged toward one another by a spring 71 connecting their lower ends and being held apart, over the opposition of the spring, 30 by two bolts 72 projecting laterally through inward extensions 73 and bearing on a cam 74 which rises and drops with the shaft 18, but is held against rotary motion.

This cam 74 forms part of a segment 75 which is secured to a sleeve 76 carried by a collar 25 on the shaft (see Figure 10), the sleeve being held against rotary motion by a fixed vertical plate 78 riding in a groove 79 in the sleeve, (see Figure 21). We provide a number of different shapes of cam and it will be readily seen that they can be easily interchanged.

The two bars 70 carry oppositely disposed cutting blades 80 arranged to trim the edges of the rising reed blank. Each blade is supported at the end of stud 81 threaded into a bushing 82 and locked in position by a nut 83 and set screw 84. The blades are arranged angularly so as to point downwards on a slant toward the edges of the rising reed. The spacing between the blades and their angularity may be readily adjusted by effecting a slight turn of studs 81.

A pair of spring fingers 85 supported by the bars 70 guide the reed blank into the proper position relative to the blades and guides 86 disposed above the blades serve to steady the upper end of the reed after it has passed the blades.

After the edges of the reed blank 11 have thus been trimmed to the desired taper, the turret descends again and turns through another one-fifth of a turn to bring the reed to station 3 for shaping the tongue of the reed. This station is illustrated in detail in Figures 16-18.

Figure 16 shows the reed blank 11 in the gripping device at the beginning of the operation. Above the fixed jaw 39 of the gripping device is mounted an abutment 87 which has four different faces 88 and is adjustably supported in the block 60 so that any one of the faces may be lined up with the face of the jaw 39 to serve as an abutment for the flat bottom face of the reed blank as the latter rises.

In operative proximity to this abutment 87 are mounted, in axial alinement with one another and partly overlapping, the two rotary cutters 89. These two cutters are mounted on the shaft 90

and each has two peripheral cutting blades 91 which alternate and interlock to form an assembly of four peripheral cutting blades. The depth of the overlap is adjusted during the operation by means of forks 92. The innermost sections of the blades which normally overlap, have straight cutting edges 93, parallel to the axis of rotation so that they, when they are active on the reed backed up against the abutment, make a straight cut in the top face of the reed, parallel to the bottom face.

The straight cutting edges are joined by outwardly curved or concave cutting edges 94 which overlap when the engagement between the two cutters is deepened so that the contours of the cut made by the cooperating blades gradually changes from a straight line to a concave one. To effect this cut, which produces the tongue illustrated in Figures 5, 6 and 7, flat at the extremity, slightly oval at a point spaced slightly from the extremity and pronouncedly oval as the spacing increases (see Figures 5 and 6), it is necessary, that, apart from the rotary motion, a twofold movement be imparted to the cutters, namely a movement toward one another for deepening the overlap and a movement of the blade assembly away from the abutment to lessen the depth of the cut.

This effect is brought about by the following structural features: An outer frame 95 is made to rise from the bed plate 21 and is connected to the block 60 by means of the pin 96. A second frame 97 is suspended from the latter and carries, in spaced frame members, the shaft 90 on which the cutter assembly is mounted. A spring 90' urges the frame inward. This frame has a depending structure 98 terminating in a flat piece 99 adapted to ride on the outer face of a cam 101 which is secured to the sleeve 76, which latter has been previously described as being held against rotary motion but following axial motions of the shaft 18. This cam presents a nose 102 at its lower end and as the sleeve and the cam travel upward, the nose, when coming in contact with the flat piece 99 of the frame 97, crowds the frame and the cutter assembly away from the abutment.

The frame 97 also supports, on pivots 103, two levers 104, the upper ends of which operate the forks 92 while the lower ends ride on the side faces 105 of the cam 101 and these side faces spread toward the bottom of the cam as at 106 to cause a corresponding spreading of the lower ends of the levers and a resulting approach of their upper ends whereby the overlap between the two cutters is deepened. A spring 104' opposes this movement.

The operation of this portion of the machine will now be readily understood. As the reed blank rises its upper end enters between the cutters and the abutment 87 at about the time when the nose 102 and the expanding side faces 106 of the cam reach the lower ends 99 of the frame 97 and of the levers 104. The extremity of the rising reed will receive a straight cut, but as soon as the cam faces become active the depth of the overlap is increased for gradually changing the cut from straight to oval while at the same time the cutter assembly is crowded away from the reed so as to leave more reed material.

For fine adjustments the lower end piece 99 of the frame 97 and the lower ends of the levers 104 are provided with suitable screws 107, the points of which are made to ride on the respective cam faces.

On the return motion of the reed it is subjected to the same cutting action in reversed order and after it has reached its lowermost position it is now advanced to the fourth station which is intended to polish the tongue.

The fourth station is illustrated in Figures 19 and 20. The reed 11 is again shown in operative position at the beginning of the operation and as it rises the upper end or tongue of the same passes into operative contact with the polishing wheel 108 mounted on the shaft 109. The polishing wheel comprises a solid hub structure 110, a resilient rim 111, made preferably of soft rubber and an outer layer of suitable abrasive material such as sandpaper. The soft rubber rim allows the sandpaper to flex and yield and to conform to the contour of the tongue. The wheel is further mounted with freedom of yielding motion, the shaft 109 being supported in frame 112 suspended from the block by a pin 113 and the lower end of the frame being urged toward a stationary member 114 by a spring 115 and adjustably spaced therefrom by a screw 116. The reed tongue is subjected to the polishing action on both its upward and downward movements and after it has returned to its initial position, it is advanced to the fifth station illustrated in Figure 21.

In this station, the reed, now in its finished form, is shown in its lowermost position. As it rises it enters between a vertical abutment 117 and a horizontally mounted, endless conveyor 118 carried by two wheels 119 supported in a frame 120 which latter is suspended from pivot 121 in such a manner that the force of gravity urges one of the wheels and the conveyor belt toward the abutment. This causes the conveyor belt to grip the reed and to carry it upward. At the same time a cam 121 acting on the pins 67 projecting from the movable jaw 40 pulls the latter outward and releases the reed from the gripping device.

A suitable channel 122 guides the reed while it is carried upward until it finally topples over on the belt of the conveyor and is ejected. After the gripping device has returned to its lowermost position, it is again advanced to station 1, ready to repeat the cycle of operations.

The latter may be briefly summarized as follows:

The reed blanks are first placed in the trough 42 at station 1 from where they are successively fed downward to pass the rotary cutter 59 which planes the bottom face of each blank, while at the same time the preceding blank is placed in position for being gripped by the jaws of the gripping device. On the next operation a gripping device takes hold of the lower end of the exposed blank and carries it to station 2. At this station the edges of the reed are trimmed to a desired taper by the blades 80 (Figure 13) and the reed is then

carried forward to the station 3, (see Figure 16), where the tongue or mouthpiece of the reed is formed by means of two overlapping cutters 89. Next the reed is advanced to station 4 where the mouthpiece is polished by the wheel 108. And finally the reed is advanced to station 5 where it is gripped by the conveyor belt 118 and discharged.

We claim:

1. In a reed forming machine, a pair of rotary cutters, means mounting said cutters in axial alignment for movement toward and away from each other with the cutting edges of one cutter alternating with those of the other cutter in overlapping relation, means for causing said movement of the cutters, including a pair of arms pivotally connected to the cutters at one of their ends and pivotally mounted intermediate their ends whereby upon swinging the ends of the arms opposite the cutters generally toward and away from each other, the cutters at the said one of their ends will be moved away and toward each other, and means for swinging said opposite ends comprising a pair of cam surfaces movable relative to said opposite ends and in sliding engagement with the latter, and means supporting a reed for longitudinal movement and into engagement with said cutters for cutting of the reed, said cam surfaces being connected with said last mentioned means for movement therewith.

2. In a reed forming apparatus, a pair of axially aligned rotary cutters, means mounting said cutters for movement axially toward and away from each other with the cutting edges of one cutter alternating with those of the other cutter in overlapping relation, means for rotating said cutters and means for moving said cutters axially relative to each other during rotation thereof, said cutting edges extending longitudinally of the axis of rotation of the cutters and the cutting edges of cutters respectively being formed to cooperate upon rotation of the cutters and movement axially toward each other to cut away one side only of a reed commencing with one end thereof to produce a reed of uniform thickness and extreme thinness at said end followed by a cross sectional convex contour of progressively increased cross sectional convexity in direction toward the opposite end when the said first mentioned end of said reed is brought into engagement with the overlapped edges of the cutters and the reed and cutters are moved relatively in direction longitudinally of the reed with the reed positioned with its longitudinal axis perpendicular to the axis of the cutters, means for so positioning said reed for cutting and for causing said relative movement between the reed and cutters.

PETER STRANO.
RAY E. HULBURT.