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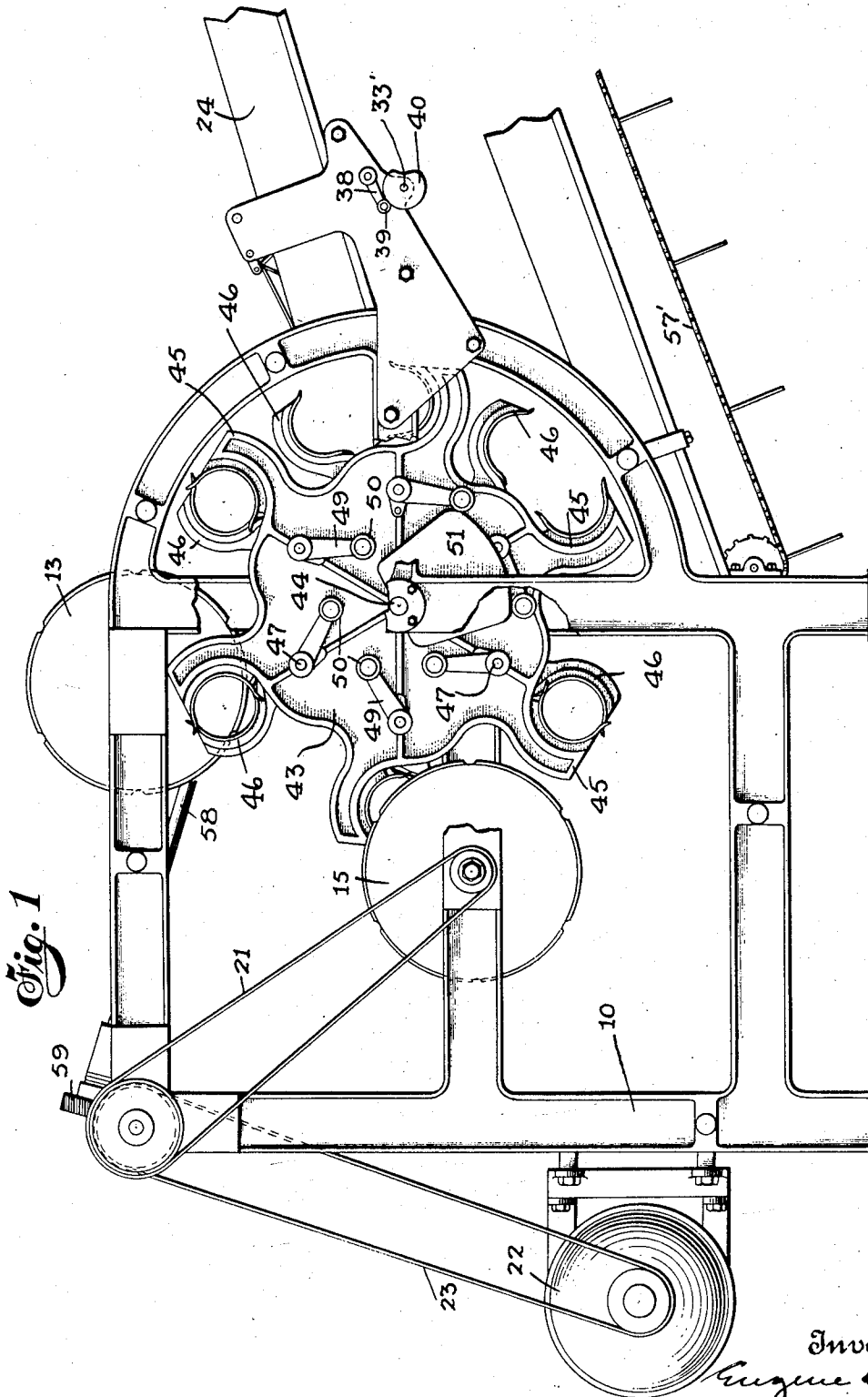
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1,813,340

APPARATUS FOR CUTTING DRINKING TUBES

Filed Sept. 22, 1922

4 Sheets-Sheet 1



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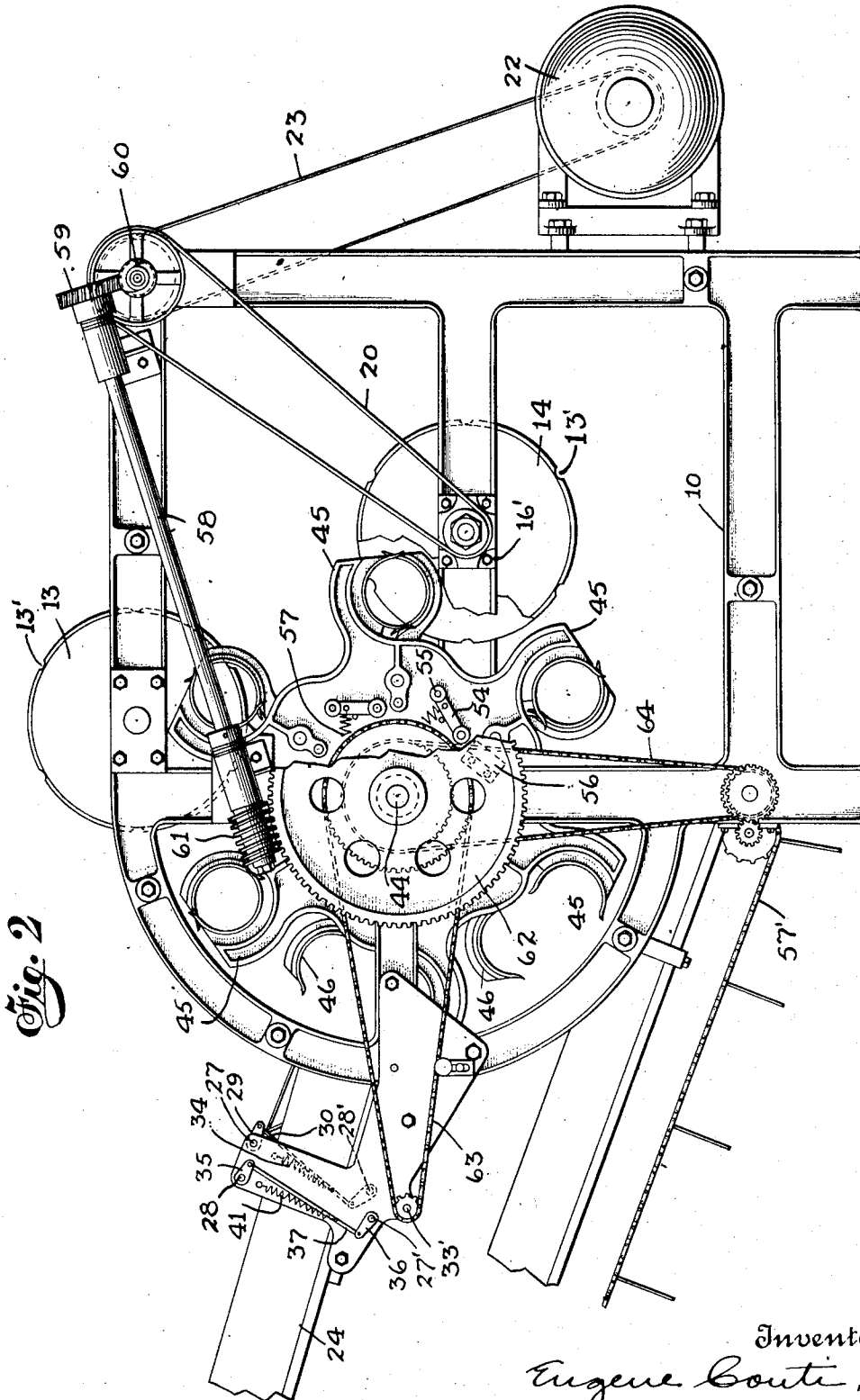


Fig. 2

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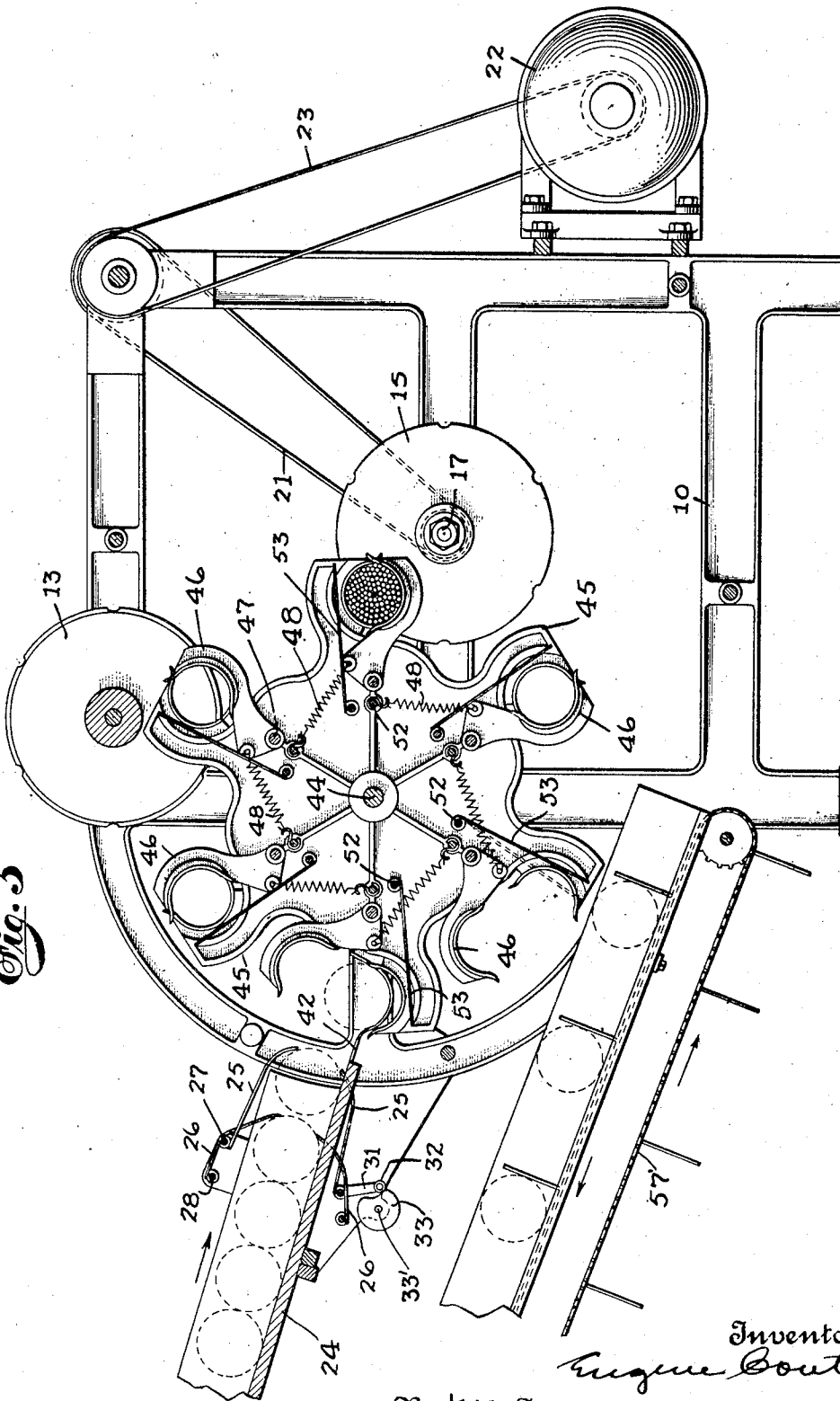
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Fig. 3



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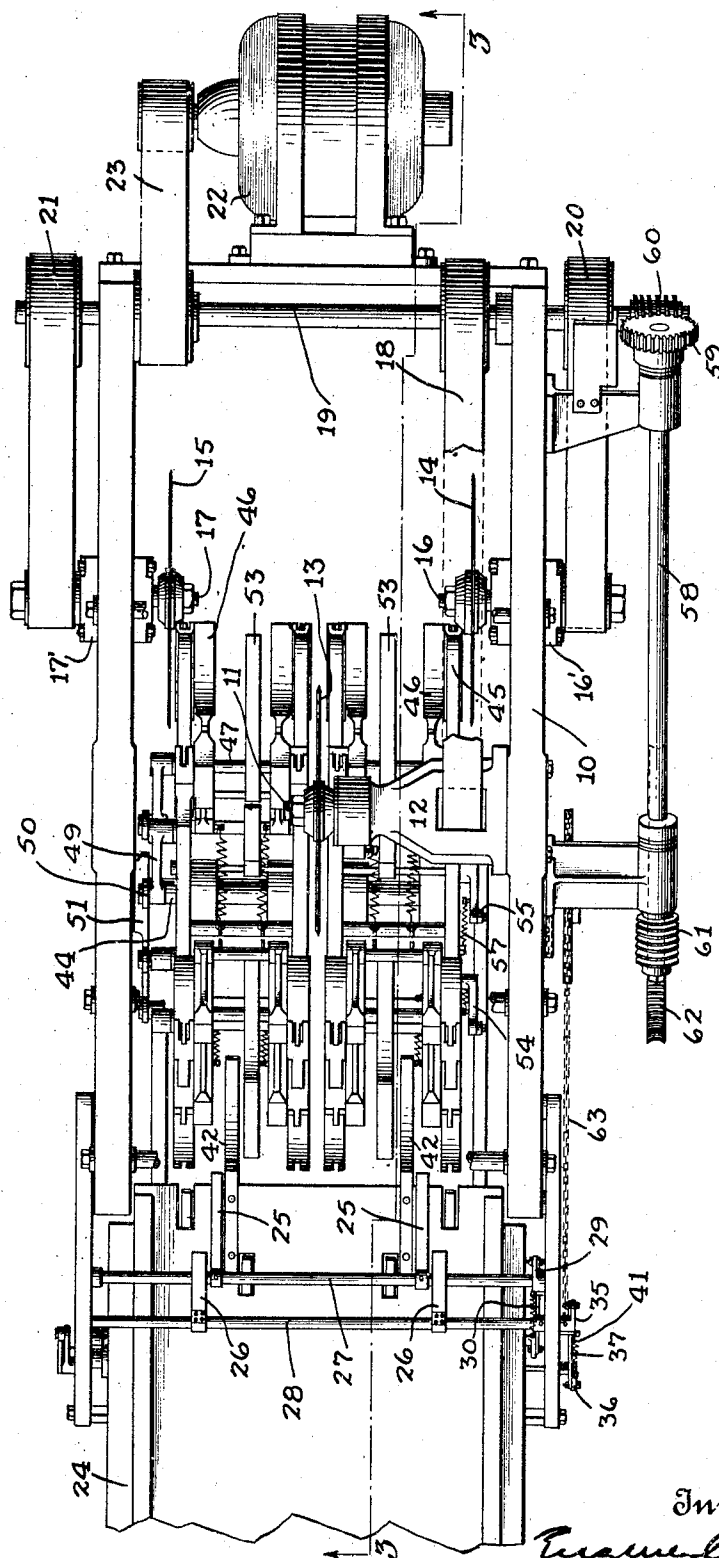
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4 Sheets-Sheet 4

Fig. 4



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UNITED STATES PATENT OFFICE

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APPARATUS FOR CUTTING DRINKING TUBES

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In the manufacture of drinking tubes it is the practice to form continuous tubing of paper or similar material, to cut the tubing as it is formed into lengths greater than that of the drinking tubes, bundle the thus cut tubing, trim the ends of the tubing of the bundles, and, if the length of the tubing forming the bundles be two or more times that of the ultimate drinking tubes, cut the bundles at such points as to divide them into drinking tube lengths.

The present invention relates to a machine for cutting and trimming the bundles of tubing.

In the drawings,

Figure 1 is a side elevation of one embodiment of the invention with parts broken away;

Figure 2 is a similar view looking from the opposite side of the machine;

Figure 3 is a vertical longitudinal sectional view taken on the line 3—3 of Figure 4; and

Figure 4 is a plan view of the machine.

I have chosen to illustrate the invention as embodied in a machine for operating on bundles of tubing of twice the length of the ultimate drinking tubes, but this is merely for convenience of illustration and the invention is not to be considered as limited to the particular machine illustrated as it is understood that the invention may be embodied in machines for operating on bundles of tubing of greater length.

The invention includes, broadly, means for dividing the bundles of tubing into drinking tube lengths; means for trimming the ends of the tubing of the bundles; means for successively supplying bundles of tubing; and means for transferring the bundles of tubing from the supply means to the dividing and trimming means and for supporting the bundles during the operation of the said means.

The machine includes a frame 10 for supporting the various operating parts.

A rotary cutter 13 which is included as part of the means for dividing the bundles of tubing into drinking tube lengths is fixedly mounted on a shaft 11 which extends inwardly from one side of the frame 10 and is rev-

olubly mounted in a bracket 12 adjacent the upper portion of the frame. A pair of rotary cutters 14 and 15, which are included as parts of the trimming means for the tubing, are mounted on shafts 16 and 17 which latter are supported in bearings 16' and 17' on the frame 10. The cutters of this pair are located laterally with respect to the cutter 13 and below the same so as to be in position to operate on the ends of the bundles of tubing.

The cutter 13 is actuated by a suitable connection, such as a belt 18, between the shaft 11 and the shaft 19 while the cutters 15 and 14 are actuated by suitable connections, such as belts 20 and 21, between the shafts 16 and 17 and the shaft 19, which latter shaft is driven by a motor 22 through a suitable connection, such as a belt 23.

The cutter 13 is beveled on both faces to facilitate its passage through the bundles, while the cutters 14 and 15 are beveled only on their outer faces, that is to say the faces remote from the bundles. Because of this construction of the cutters the staggered relation of the same is necessary, inasmuch as the cutter 13 in passing through the bundles moves the resulting tubes apart since it removes no material. Thus, if the cutters 14 and 15 which trim the ends of the bundles, were aligned with the cutter 13 and operated simultaneously therewith there would be a buckling and consequent distortion of the tubes. When, however, as in the present machine, the bundles are first divided and then, thus divided, passed to the cutters 14 and 15 the ends are trimmed evenly and cleanly without any distortion of the tubes.

The cutter 13, preferably, has depressions 13' in the cutting edge thereof thus forming a non-continuous or interrupted cutting edge. The depressions 13' are of relatively small size preferably not substantially greater in diameter than the diameter of the tubes to be cut, as best indicated in Figure 3. The bevelling of the cutter is, however, such that the edges of the depressions will be sharpened to cutting edges which lie in the plane of the major edge of the cutter. The interruption of the edge of the cutter in this manner prevents the heating of the cutter and, there-

fore, not only prevents the destruction of the cutter but also the scorching of the ends of the tubes. The depressions, in effect, cause the cutting of the tubing to begin anew periodically.

5 In order that the bundles of tubing may be presented first to the cutter 13 for division and then to the cutters 14 and 15 for trimming, I have provided means for storing a plurality of the bundles and releasing the same successively together with means for transferring the successively released bundles to the cutter 13 and then to the pair of cutters 14 and 15.

10 The embodiment of the storing and releasing means illustrated comprises an inclined hopper 24, the width of which is substantially equal to the length of the bundles of tubing being handled. At the lower end of this hopper the releasing mechanism is located which mechanism operates to periodically release single bundles of tubing.

This mechanism consists of alternately operating fingers 25 and 26, the fingers being 25 arranged in pairs above and below the hopper 24. The upper fingers 25 are rigid with a transversely extending shaft 27 while the lower fingers 25 are rigid with a parallel shaft 27'. These shafts 27 and 27' are provided with crank arms 29 which extend from opposite sides of the shafts and are connected together by a link 30, so that the movement imparted to one shaft will be transmitted to the other to cause the fingers 35 to move apart. A cam arm 31 carrying a cam roller 32 which bears upon a cam 33 mounted on a shaft 33' and is held in contact therewith by a spring 34 (see Figure 2) extends from the lower shaft 27'. This cam 33 is 40 continuously rotated, by means which will later be described, to alternately move the upper and lower fingers 25 apart and release the retained bundles of tubing to the transferring mechanism.

45 The fingers 26 are actuated in a similar manner. The shafts 28, 28' with which these fingers are rigid are provided with oppositely extending crank arms 35 and 36 which are connected together by a link 37. A cam arm 50 38 carrying a roller 39 extends from the lower shaft 28' and cooperates with a cam 40 rigid and rotating with the shaft 33'. The cam roller 39 is held in contact with the cam 40 by a spring 41. The continuous rotation of the cam 40 alternately separates the upper and lower fingers 26. The cams 33 and 40 are so designed and arranged with relation to each other that the fingers 26 separate while the fingers 25 remain closed or in 55 their retaining positions. As the fingers 26 separate, a single bundle of tubing is released, and passes down the inclined hopper to the lower fingers 25 where its movement is arrested by the latter. The continued rotation of the cam 33 then separates the 60

fingers 25 while the fingers 26 close under the action of the cam 40 and the cooperating spring 41. The separation of the fingers 25 permits the bundles of tubing to successively pass to the transferring mechanism which 70 will later be described. By the use of this escapement mechanism one bundle of tubing is released at a time.

Extending from the lower end of the hopper 24 are brackets 42 which receive the 75 bundles of tubing after they are released from the supply hopper and maintain them in position to be engaged by the transferring mechanism.

This latter mechanism comprises a rotor 80 which includes a plurality of plates 43 arranged vertically in spaced relation to each other and rigid with a supporting shaft 44 which extends between the sides of the frame 10. Radially extending clamps having jaws 45 which are rigid with the plates 43 are disposed in spaced relation around the peripheries of said plates. The clamps on the several plates are in alignment with each other for the reception of the bundles of tubing. 90 Movable jaws 46 which are adapted to cooperate with the fixed jaws to clamp the bundles are fixed on rotatable rods 47 which extend between the plates 43. These movable jaws 46 are normally held in clamping positions, that is to say, they are normally urged towards the stationary jaws 45 by yielding means, such as springs 48.

A cam arm 49 having a roller 50 thereon is rigidly associated with and extends from 100 one end of each rod 47 and is adapted to cooperate with a stationary cam 51 so that upon the movement of the rotor the movable jaws carried by the rod are opened against the action of the retaining means. 105

An additional set of rotatable rods 52 extend between the plates 43 and each rod carries, adjacent to each of the stationary jaws, an ejector 53 which is in the form of a flat spring. A cam arm 54 having a roller 55 110 thereon is fixed with relation to each of the rods 52 and is adapted to cooperate with a stationary cam 56 to actuate the ejectors and move them beyond the bottoms of the stationary jaws to eject the bundles therefrom against the action of springs 57 which 115 normally operate to maintain the ejectors in inoperative positions.

A conveyor 57' is located beneath the hopper 24 and is adapted to receive the bundles 120 of drinking tubes after they have been cut and trimmed and ejected from the transferring means.

The rotor is continuously rotated through suitable connection to the motor 22. This 125 comprises, in the illustrated embodiment, a shaft 58 having a worm gear 59 on one end meshing with the worm 60 on the shaft 19 and a worm 61 on the opposite end meshing with a worm gear 62 fast on the shaft 44. 130

The cam shaft 33' is actuated by a chain connection 63 to the shaft 44. The conveyor 57' is actuated by a similar connection 64.

In operation, the bundles of tubing are successively released from the hopper by the fingers 25 and 26 and pass to the supporting brackets 42 and are thus retained in the path of movement of the clamps on the rotor. The release of the lowermost bundle of tubing occurs, through the timed action of the cam 40, when one set of the stationary jaws 45 rides beneath the supporting brackets 42 and after the cooperating movable or pivoted jaws 46 have passed beyond the brackets. At this time the movable jaws 46 are held open by the riding of the cam roller 50 on the cam 51 (Figure 1). However, immediately upon the bundle being engaged by the stationary jaws the cam roller 50 passes beyond the cam 51 and the spring 48 operates to close the movable jaws so that they will clamp the bundle in position. These movable jaws are limited in their movement under the action of the spring 48 by their engagement with the bundle so that the bundle is firmly clamped in position to be divided and trimmed.

It is to be noted that one clamp is located adjacent to each end of the bundle and a pair of clamps adjacent to the center of the bundle so that the rotary end trimming cutters operate adjacent to a clamp and the dividing cutter between a pair of clamps. Thus the bundles are supported adjacent to each cutter and the reinforcing action assures proper cutting of the tubing. As the rotor moves the bundle which is carried therewith by the clamps is first presented to the upper cutter 13 and cut into drinking tube lengths. The bundles, thus cut, are then presented to the rotary cutters 14 and 15 by the continued movement of the rotor and the ends of the bundles trimmed. As the rotor continues its movement, the cam roller 50 again rides upon the cam 51 and the movable jaw is opened against the action of the spring 48. Upon the opening of the movable jaw the cam roller 55 rides upon the face of the cam 56 and actuates the ejector 53 to cast the bundle from the clamp to the conveyor 57'.

I claim:

1. In a machine of the class described, the combination with means for dividing a bundle of tubing into shorter bundles of approximately drinking tube lengths, of means for subsequently trimming the ends of the shorter bundles to form straws of exact drinking tube length and conveying means for presenting the bundle to said dividing and trimming means.

2. In a machine of the class described, the combination with a rotary cutter for dividing a bundle of tubing into drinking tube lengths, of a pair of rotary cutters for trim-

ming the ends of the bundle the dividing means and the trimming means acting at different times and conveying means for presenting the bundle to said dividing and trimming means.

3. In a machine of the class described, the combination with a cutter for dividing a bundle of tubing into drinking tube lengths, of means for trimming the ends of the same and means movable relative to the cutter and trimming means for clamping and supporting the tubing during the operation of the cutter and trimming means the dividing means and the trimming means acting at different times.

4. In a machine of the class described, the combination with means for first dividing a bundle of tubing into a plurality of shorter bundles of drinking tube lengths, of means for thereafter trimming the ends of the same, means for separately clamping each bundle during the cutting operation and means for ejecting the resulting bundle of cut tubes from the clamping means.

5. In a machine of the class described, the combination with means for dividing a bundle of tubing into drinking tube lengths, of means for trimming the ends of the same, means for separately clamping each individual bundle during the cutting operation and automatically operable means for ejecting the resulting bundle of cut tubes from the clamping means.

6. In a machine of the class described, the combination with a plurality of cutters, of a supply hopper for bundles of tubing, means for holding and successively releasing said bundles from said hopper and means for transferring the bundles from the hopper to the cutters.

7. In a machine of the class described, the combination with a plurality of cutters, of a supply hopper for bundles of tubing, means for successively releasing said bundles from said hopper, means for transferring the bundles one by one from the hopper to the cutters and means for releasing the bundles after the cutting operation.

8. In a machine of the class described, the combination with a plurality of cutters, of a supply hopper for bundles of tubing, means for successively releasing said bundles from said hopper, means for clamping the successive bundles one by one with the individual straws held in fixed relation to each other and transferring them to the cutters while so held, means for releasing the bundles after the cutting operation and means for ejecting the released bundles from the transferring means.

9. In a machine of the class described, the combination with a plurality of cutters, of a hopper for bundles of tubing, means for holding and successively releasing the bundles, means for transferring the bundles from the

hopper to the cutter said means including a rotor having automatically operable clamps thereon for engaging the bundles.

10. In a machine of the class described, the combination with a plurality of cutters, of a hopper for bundles of tubing, means for successively releasing the same, and means for transferring the bundles from the hopper to the cutter, said means including a rotor having automatically operable clamps thereon for engaging the bundles, said clamps being arranged to support the bundles adjacent the cutters.

11. In a machine of the class described, the combination with a plurality of cutters, of a hopper for bundles of tubing, means for successively releasing the same, and means for transferring the bundles from the hopper to the cutter, said means including a rotor having automatically operable clamps thereon for engaging the bundles, said clamps being arranged to support the bundles adjacent the cutters, and means for ejecting the resulting bundles from the clamps.

12. In a machine of the class described, the combination with a supply hopper for bundles of tubing having brackets extending therefrom, and means for successively releasing the bundles to the brackets, of means for cutting and trimming the bundles, and a rotor having clamps thereon for removing the bundles from the brackets and transferring them to the cutting and trimming means.

13. In a machine of the class described, the combination with a supply hopper for bundles of tubing having brackets extending therefrom, and means for successively releasing the bundles to the brackets, of means for cutting and trimming the bundles, a rotor having clamps thereon for removing the bundles from the brackets and transferring them to the cutting and trimming means, said clamps comprising fixed and movable jaws, and means for closing the movable jaws after the fixed jaws have removed the bundles from the brackets.

14. In a machine of the class described, the combination with a supply hopper for bundles of tubing having brackets extending therefrom, and means for successively releasing the bundles to the brackets, of means for cutting and trimming the bundles, a rotor having clamps thereon for removing the bundles from the brackets and transferring them to the cutting and trimming means, said clamps comprising fixed and movable jaws, and means for closing the movable jaws after the fixed jaws have removed the bundles from the brackets, and means for ejecting the cut and trimmed bundles from the clamps.

15. In a machine of the class described, the combination with a series of cutters, of means for presenting bundles of tubing to the

cutters comprising a rotor having radial bundle-carrying clamps thereon, said clamps being arranged in sets and including fixed and movable jaws, and means for operating the movable jaws of each set simultaneously to clamp the bundles to the fixed jaws said means including a shaft carrying all of said movable jaws and a single cam from which said shaft receives its motion.

16. In a machine of the class described, the combination with an intermediate and two end cutters of means for presenting bundles of tubing to the cutters, the intermediate cutter being bevelled on both faces to a cutting edge and each end cutter being bevelled only on the face remote from the intermediate cutter to a cutting edge.

17. In a machine of the class described, the combination with a cutter located at a fixed station, of means for grasping bundles of tubes between their ends at another station and conveying them while so grasped to said cutter the grasping means being located to pass closely adjacent the cutter and retaining the ends of said bundles after they have been cut.

18. In a machine of the class described, the combination of a cutter, a continuously rotating carrier movable past said cutter, and means on said carrier for picking up and clamping bundles and presenting them to said cutter the grasping means being located to pass closely adjacent the cutter and retaining the ends of said bundles after they have been cut.

In testimony whereof, I have signed my name to this specification this 20th day of September, 1922.

EUGENE CONTI.