Aug. 17, 1943. K. SIEG 2,326,978

TUBE CUTOFF MECHANISM

Filed Jan. 20, 1942 3 Sheets-Sheet 1

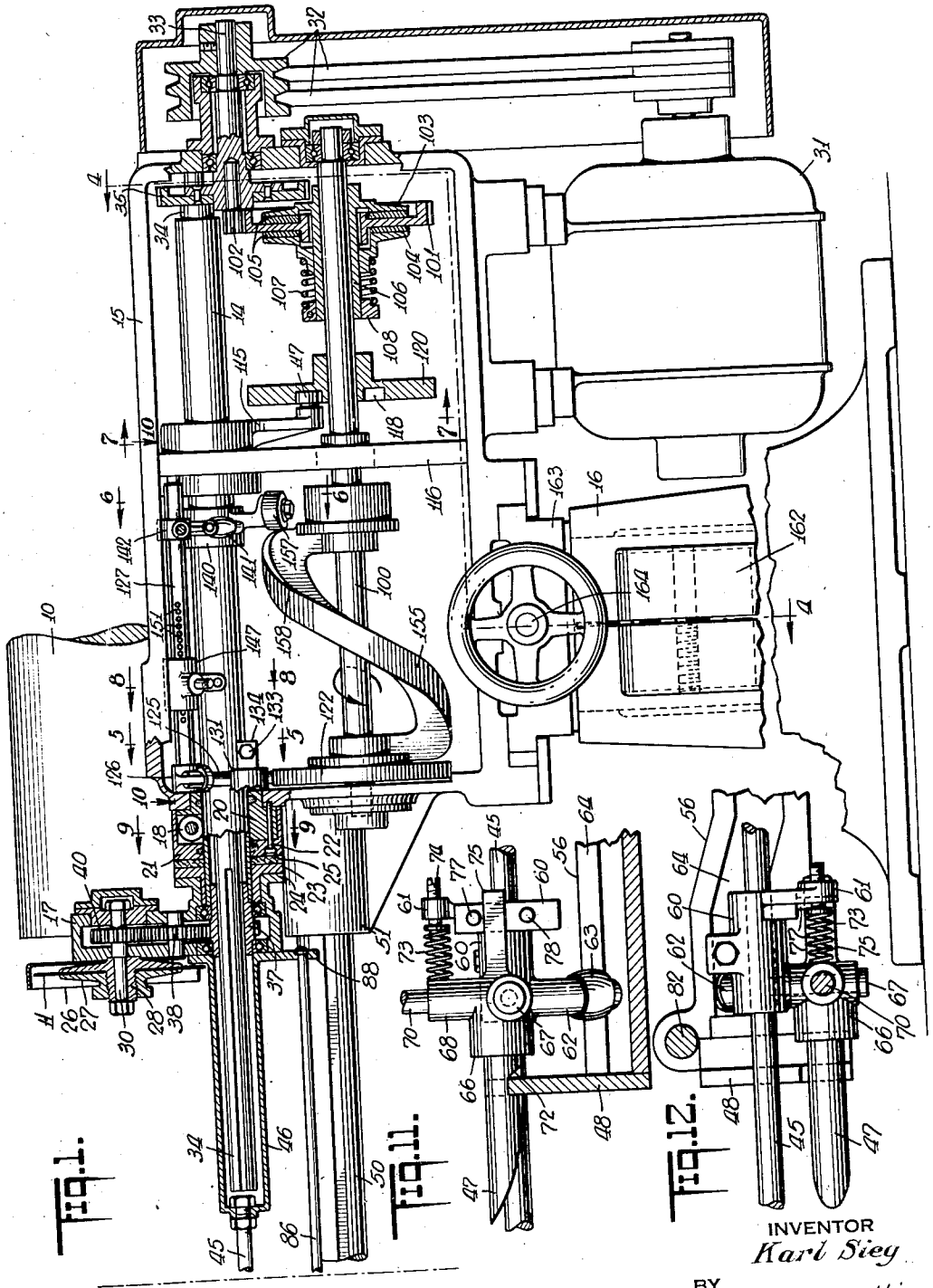


Fig. 1.

Fig. 11.

Fig. 12.

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Filed Jan. 20, 1942 3 Sheets-Sheet 2

Fig. 2.

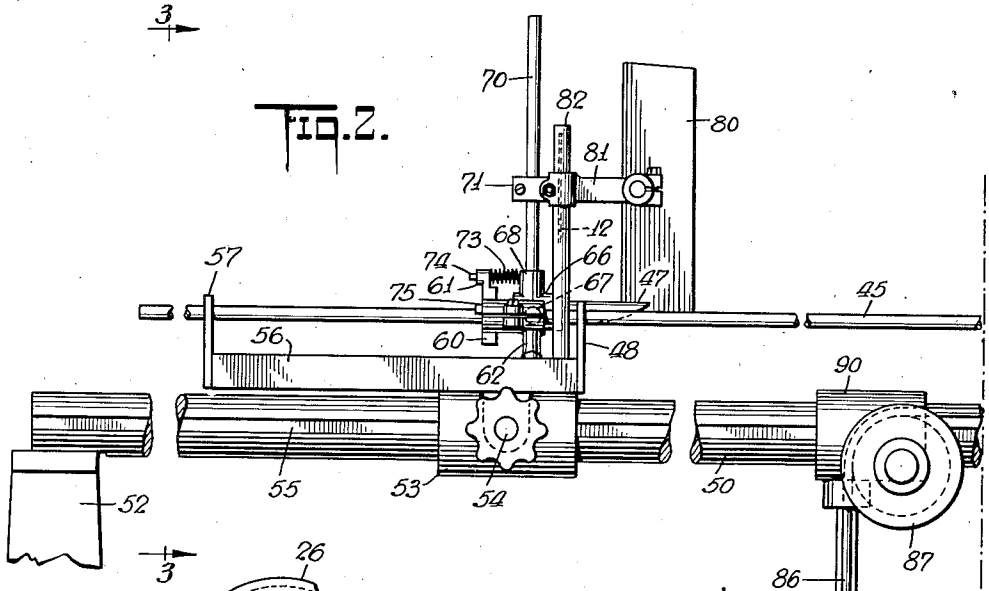
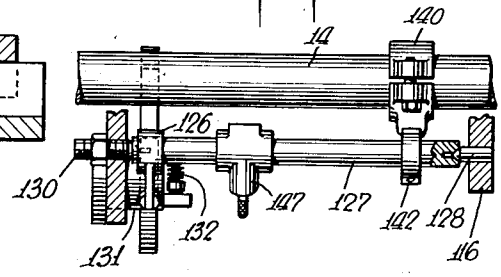


Fig. 10.



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Filed Jan. 20, 1942 3 Sheets-Sheet 3

Fig. 3.

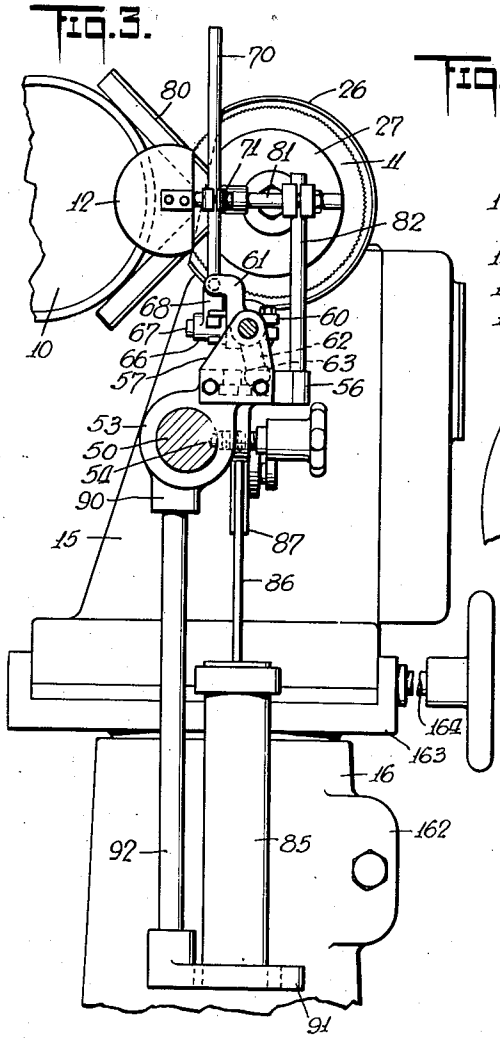


Fig. 5.

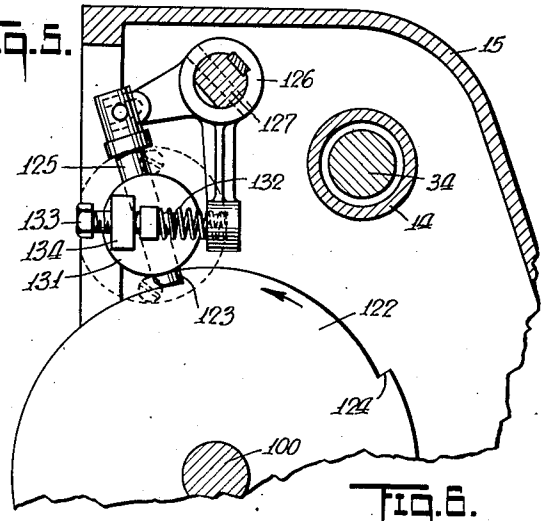


Fig. 6.

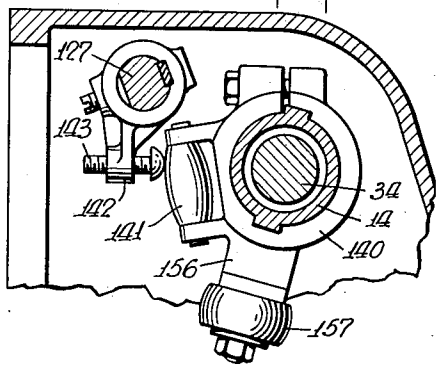


Fig. 7.

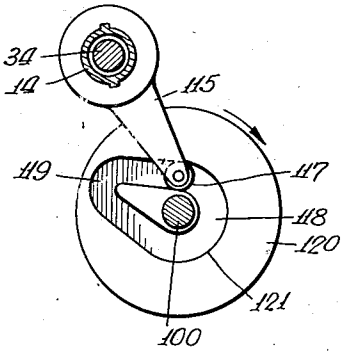


Fig. 8.

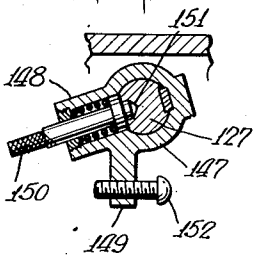
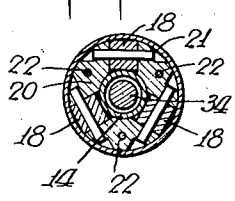


Fig. 9.



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UNITED STATES PATENT OFFICE

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TUBE CUTOFF MECHANISM

Karl Sieg, Philadelphia, Pa., assignor to Samuel M. Langston Co., a corporation of New Jersey

Application January 20, 1942, Serial No. 427,415

20 Claims. (Cl. 164—69)

The present invention relates to machines for cutting paper tubes into sections of desired length as they are being continuously produced and advanced endwise.

This invention relates to that type of cut-off in which a tube cutter is movable into and out of the path of travel of the advancing tube, and advances with the tube during cutting operation. After the tube section has been cut, the cutter moves out of the path of the tube and returns to its initial position for the next cutting operation. The initiating of the cutting operation is controlled by a target also in the path of movement of the tube.

In certain constructions heretofore employed, the tube has to push both the cutter and the target, and must also overcome the force of a spring or weight employed to return the cutter to its initial position. Therefore, to relieve the end thrust on the tube resulting from this operation, different elements of the machine must be made light at the expense of ruggedness and durability. Since the return weight or spring must be as light as possible to reduce to a minimum the strain on the tube, the return of the target and cutter will be relatively slow, so that the minimum tube length obtained by this machine is comparatively long.

An object of the present invention is to provide a tube cut-off having features which eliminate the disadvantages referred to.

In carrying out the features of the present invention, a spring or weight is provided to assist in the travel of the cutter and target during the cutting period, thereby minimizing the end thrust on the advancing tube.

As a further feature, positive drive means are provided for returning the cutter to its initial position at the end of the cutting operation.

As another feature, means are provided for adjusting the position of the cutter to compensate for any deflection that may occur in the tube winding mandrel on which the tube is formed and along which it is advanced.

Various other objects, features and advantages of the invention will be apparent from the following particular description, and from an inspection of the accompanying drawings, in which

Fig. 1 shows partly in vertical section and partly in side elevation a portion of a tube cut-off embodying the present invention.

Fig. 2 is a continuation of Fig. 1, and shows the other portions of the cut-off in side elevation.

Fig. 3 is an end view of the cut-off.

Figs. 4, 5, 6, 7, 8, 9 and 10 are sections taken on lines 4—4, 5—5, 6—6, 7—7, 8—8, 9—9 and 10—10 of Fig. 1.

Fig. 11 is an elevation of a portion of the target trip mechanism taken from the side opposite to that shown in Fig. 2, and

Fig. 12 is a top plan view of the target trip mechanism shown in Fig. 11.

The cut-off of the present invention is operated in conjunction with a tube forming apparatus of any suitable type in which an endless tube is continuously advanced as it is formed. This tube-forming apparatus may, for instance, be similar to that shown in the Langston Patent No. 981,774, in which two or more plies or strips of paper are spirally wound by a belt around a rotating mandrel 10 to form the tube. As the tube is formed on this mandrel 10, it is advanced therealong and cut into sections of the desired length.

The tube cut-off of the present invention comprises a cutter 11 mounted beyond one end of the tube winding mandrel 10 and movable periodically across the axial path of the advancing tube, and with said tube during cutting action. This operation of the cutter 11 is initiated and controlled by a target 12 when tripped by the end of the advancing tube.

The cutter 11 is mounted on a reciprocable carriage comprising a horizontal tubular shaft 14 supported on a frame structure shown in the form of a gear box 15, which is mounted on a base or pedestal 16 in a manner to be described. This carriage shaft 14 is partially enclosed in the gear box 15 and is connected at its outer end outside said gear box to the drive housing 17 of the cutter 11. The carriage shaft 14 has a slide bearing in the gear box 15 as will be more fully described, and is slidably supported outside said box by a series of guide rollers 18 (Figs. 1 and 9), rotatably mounted on a housing 20 enclosed in a cover 21. The housing 20 and cover 21 are connected together and to an end wall of the gear box 15 by a series of studs 22.

A tube flange 23 fixed to the end of the carriage shaft 14 is secured to a flange 24 on the cutter drive housing 17 by studs (not shown). In limiting position of the cutter carriage shown in Fig. 1, the flange 23 engages a bumper 25 made of leather or similar resilient material fixed to the end of the carriage guide cover 21.

The cutter 11 is shown in the form of a circular saw mounted within a guard 26 (Fig. 1), and held between a clamp washer 27 and a flanged hub member 28 which is fixed to a shaft 30. For driving this cutter 11, there is provided a motor 31 supported from the underside of the

gear box 15, and having a rope drive connection 32 to a main drive shaft 33. A cutter drive shaft 34 (Figs. 1 and 4) extending through the tubular carriage part 14 is driven from the main drive shaft 33 through a transmission comprising a spur gear 35 in the gear box 15 affixed to said main drive shaft, and meshing with a pinion 36 near one end of the cutter drive shaft 34.

The transmission between the cutter drive shaft 34 and the cutter 11 comprises a gear 37 (Fig. 1), supported in suitable bearings on the cutter drive housing 17, and splined to said drive cutter shaft for slide movement therealong with the cutter carriage 14. An idler gear 38 having bearings in the cutter drive housing 17 meshes with the gear 37 and with a gear 40 affixed to the cutter shaft 30, so that the drive to the cutter 11 is continued without interruption, even while said cutter is moving with the advancing tube being cut.

In order to effect the movement of the cutter carriage and the target 12 in unison, there is provided a rod 45 (Figs. 1 and 2) anchored at one end to a tubular shield 46, which encloses the end section of the cutter shaft drive 34, and which is affixed to the cutter drive housing 17 for movement therewith. To initiate the movement of the cutter carriage, the rod 45 carries a target 12 in a manner to be described, and is held against axial movement by a trip pawl 47, which engages a latch plate 48, and which is released from said plate when the target 12 is engaged by the end of the advancing paper tube.

For supporting the latch plate 48 in adjustable position in accordance with the desired length of the sections to be cut, there is provided a shaft 50, fixed at one end to a bracket 51 secured to an end wall of the gear box 15, and supported at its outer end on a stand 52. Slidably embracing the shaft 50 is a sleeve 53 carrying a clamp screw 54 having an outer reduced end extending into a groove 55 on said shaft to lock said sleeve in selected position thereon. Integral or otherwise secured to this sleeve 53 is a target cam 56 (Figs. 2, 3, 11 and 12), which serves a purpose to be described and which carries the latch plate 48 at one end and a plate 57 at the other end. These plates 48 and 57 are apertured to form slide bearings for the rod 45.

For supporting the target 12 on the rod 45, there is provided a block 60 having a sleeve section clamped in selective position on said rod in accordance with the length of the tube sections to be cut, and having an upwardly extending arm 61 at one end and a downwardly extending arm 62 at the other end. A roller 63 rotatably supported in the arm 62 rides in a cam groove 64 formed in the cam 56. A target rod head 66 is pivotally mounted on the block 60 by means of a pivot pin 67, and has an upwardly extending arm in the form of a sleeve 68 receiving the lower end of a target rod 70 on which the target 12 is adjustably mounted by means of a clamp 71. This head 66 carries the trip pawl 47 formed with a notch 72 adapted to receive the edge section of the latch plate 48 in latched position shown in Figs. 2 and 11 to lock the rod 45 against axial movement. A spring 73 has one end bearing against the arm 68 of the target rod head 66 and the other end bearing against an adjusting screw 74 threaded in the arm 61 of the block 60, so that the head 66 is urged in a clockwise direction about its pivotal support 67 (Fig. 2) to normally urge the trip pawl 47 into latched position shown. A stop arm 75 (Fig. 11) integral or otherwise secured to the target rod head 66 extends between a pair of superposed limiting stop pins 77 and 78 projecting from one side of the block 60 to determine the angular limiting position of the target rod head 66 about its pivotal support 67.

A guide 80 for steadying the advancing tube while it is being cut is shown (Figs. 2 and 3) in the form of an angle connected to an arm 81, which is secured to a support 82 fixed to the target cam 56.

When the end of the advancing tube reaches the target 12, it tilts the target rod head 66 about its pivotal support 67 and against the action of the spring 73, so that the trip pawl 47 is angularly moved upwardly from the position shown in Fig. 11, out of latch engagement with the latch plate 48. This releases the rod 45, so that it is free to move axially with the cutter carriage towards the left (Fig. 2). The pushing action of the advancing tube on the target 12 urges the cutter carriage and the target 12 to move with the advancing tube.

As a feature of the present invention, the movement of the target 12 and the cutter carriage is aided by a counter-balancing member, as for instance, a spring or counterweight. In the form shown in Figs. 2 and 3, a counterweight 85 is provided secured to one end of a cable 86 passing over a sheave 87 and anchored at its other end to a part rigid with the cutter carriage, as for instance, an extension 88 (Fig. 1) on the tubular shield 46. This sheave 87 is supported on a bearing member 90 (Figs. 2 and 3) shown in the form of a sleeve embracing the shaft 50. In order to prevent the swaying of the weight 85 during its vertical movement, there is provided a guide 91 rigidly secured to the bearing 90 by means of a bar 92, and having an aperture 93 slightly larger than the outside diameter of the weight 85 to permit the free guided movement of this weight through said aperture. Additional radially slotted removable counterweights 94 may be provided in order to regulate the counterweight force acting upon the cutter carriage.

Upon the release of the rod 45 by the tripping of the target 12 as described, the target with its tripping mechanism, the rod 45 and the cutter carriage are moved by the pushing action of the advancing tube on said target, and also by the gravitational action of the weight 85, so that the cutter 11 is moved with the advancing tube while cutting said tube. During this movement of the target 12, the roller 63 riding in the cam groove 64 of the cam 56 will cause said target to swing away from the path of movement of the tube after the cutter 11 has entered the tube and has started cutting.

For swinging the cutter 11 transversely across the advancing tube, there is provided a horizontal cam shaft 100 in the gear box 15, driven from the main drive shaft 33 through a suitable friction clutch. As shown, this clutch comprises a gear 101, meshing with a pinion 102 on the main drive shaft 33, and rotatably supported with respect to a pair of friction plates 103 and 104 on opposite sides of said gear. Friction discs 105 of asbestos or other suitable material separate these plates 103 and 104 from the gear 101. The friction plate 103 has a hub section 106 keyed to the cam shaft 100, while the friction plate 104 is splined for slidable movement along said hub and for rotation therewith. A spring 107 between the friction plate 104 and a nut 108 clamped on the friction plate hub 106 urges the

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friction plate 104 axially towards the right as shown in Fig. 1 to effect a friction drive between the gear 101 and the cam shaft 100.

The rotation of the cam shaft 100 causes oscillation of the cutter 11 towards and away from the advancing tube. For that purpose, an arm 115 (Figs. 1 and 7) has its hub splined to the carriage shaft 14 and journalled in a frame wall 116 of the gear box 15. Collars on the hub of this arm 115 engage opposite sides of the gear box frame wall 116, so that said hub is held against axial movement and serves as a slide bearing for the carriage shaft 14. The arm 115 carries at its outer end a follower roller 117 riding in the cam groove 118 of a face cam 120 fixed to the cam shaft 100. This cam groove 118 is formed with a rapidly rising section 119 extending from a circular section 121, so that during the initial period of rotation of the cam shaft 100, while the carriage shaft 14 is moving axially with the advancing tube, said shaft is rotated in a direction to tilt the cutter 11 towards said tube.

The cam shaft 100 is normally locked against rotation while the paper tube is advancing towards the target 12, and is released by the tripping of the target 12 to cause the tilting of the cutter 11 towards said tube as described. For locking this cam shaft 100, there is provided a ratchet wheel 122 (Figs. 1 and 5) fixed to one end of the cam shaft 100 in the gear box 15, and formed with a pair of stop conformations 123 and 124. A pawl 125 is pivotally connected to one arm of a bell crank lever 126 (Figs. 1 and 5), which is fixed to a rock shaft 127 supported for rotation in the gear housing 15. This rock shaft 127 may, for instance, be supported on shaft centers, one of said centers 128 (Fig. 10) being shown fixed to the frame wall 116 of the gear housing 15, while the other center 130 in the form of a stud is threaded in the end wall of said housing.

The pawl 125 is guided for slidable movement in the diametrical hole of a fixed bushing 131 (Figs. 1, 5 and 10), and is urged into locking engagement with the ratchet 122 by a spring 132 extending between one arm of the bell crank lever 126 and an adjusting screw 133 threaded in a lug 134 integral or otherwise rigid with the bushing 131.

To release the ratchet 122 and thereby release the cam shaft 100 for rotation through the friction clutch drive, there is clamped to the carriage shaft 14 a lever 140 (Figs. 1, 6 and 10) carrying a roller 141. Fixed to the rock shaft 127 is a cam lever 142 carrying an adjustable screw 143, adapted to be engaged by the roller 141 as the carriage shaft 14 moves toward the left (Fig. 1).

When the carriage shaft 14 is released for axial movement by the tripping of the target 12, the lever 140 moving with said shaft engages the head of the screw 143, and thereby rocks the lever 142 in a clockwise direction as shown in Fig. 6. This clockwise rotation of the lever 142 is transmitted through the shaft 127 to the bell crank lever 126, so that the pawl 125 is lifted out of engagement with the stop conformation 123 on the ratchet 122. This action causes the cam shaft 100 to rotate through the friction clutch drive as already described, so that the cutter tilting cam 120 is rotated to tilt the cutter 11 towards the advancing tube. After the lever 140 has passed beyond the lever 142, this latter lever is released, so that the shaft 127 is returned to normal position under the action of the spring 132, and the pawl 125 is moved downwardly in position to engage the next stop conformation 124 on the ratchet 122 when said conformation reaches said pawl.

After the completion of the cutting operation, the cutter 11 is tilted back into position out of the path of movement of the advancing tube, and is returned into initial position shown in Fig. 1 in preparation for the next cutting operation. To effect this return tilting movement of the cutter 11, there is fixed to the shaft 127 a lever 147 (Figs. 1, 8 and 10) provided with a pair of arms 148 and 149. The lever arm 148 slidably carries a spring-pressed slip pin 150 having its inner end urged into any one of a series of holes 151 provided along a flat surface section of the shaft 127, so that the position of the lever 147 along said shaft can be adjusted in accordance with the desired length of travel of the cutter 11 with the tube, this length of travel depending on the diameter of the tube to be cut. The other arm 149 carries a screw 152 similar to the screw 143 on the lever 142.

When the lever 140 travelling with the carriage shaft 14 reaches a position in which the roller 141 engages the screw 152, the lever 147 is rotated, and the shaft 127 again rocked to effect release of the pawl 125 from engagement with the ratchet stop conformation 124. This again releases the cam shaft 100 and permits the cutter tilting cam 120 to complete its revolution. During this period, the cutter 11 is tilted by the cam 120 out of the path of movement of the advancing tube. At the same time, the target 12 and cutter 11 are returned into original position in preparation for the next cutting operation.

As a feature of the present invention, the cutter 11 and target 12 are returned into original position by a positive drive desirably comprising a cam 155 (Fig. 1) shown in the form of an angle iron supported on the cam shaft 100 and spirally bent around said shaft. The lever 140 is provided with an arm 156, which carries a follower roller 157. As the cam shaft 100 completes its revolution, the helical edge 158 of the cam 155 comes in contact with the follower roller 157 and moves the lever 140 axially. This returns the carriage shaft 14 axially towards the right (Fig. 1) against the action of the weight 85, so that the cutter 11 and the target 12 are positively driven at a predetermined rate into initial position. During this return movement, the pawl 125 riding in engagement with the periphery of the ratchet 122 locks the cam shaft 100 as soon as the ratchet stop conformation reaches said pawl.

As another feature of the present invention, the cutter mechanism is supported for pivotal adjustment with respect to the tube winding mandrel 10 to compensate for deflections in said mandrel. For that purpose, the gear box 15 is supported on a swivel or pivot pin 161 (Fig. 4) extending into the bore of the pedestal 16. A clamp conformation 162 on this pedestal 16 permits rotative adjustment of the pivot pin 161 and in turn the gear box 15.

To permit the adjustment of the cutting mechanism towards or away from the tube winding mandrel 10, the gear box 15 is supported on a slide 163 forming the upper part of or otherwise rigid with the swivel pin 161. A hand screw 164 threaded in a nut 165 fixed to the gear box 15 effects the slide adjustment of said gear box.

As many changes can be made in the above apparatus, and many apparently widely different embodiments of this invention can be made

without departing from the scope of the claims, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

What is claimed is:

1. A cut-off mechanism for tubes having endwise and rotational movement, in which there is provided a target with which the end of the tube may engage, a rotatable cutter having an axial movement in a direction parallel to the axis of the tube and a lateral movement toward and from the tube axis and into and out of the wall of the tube, said mechanism being characterized by a latch interconnecting said target and said cutter, and means for releasing said latch after engagement of said tube with said target and prior to the starting of said lateral movement of said cutter.

2. A cut-off mechanism for tubes having endwise and rotational movement, in which there is provided a target with which the end of the tube may engage, a rotatable cutter having an axial movement in a direction parallel to the axis of the tube and a lateral movement toward and from the tube axis and into and out of the wall of the tube, said mechanism being characterized by means for holding said cutter and target at a predetermined constant distance apart during the total period while both said cutter and said target are in contact with the advancing tube, and counterbalancing means exerting a substantially constant force tending to move said cutter and target along with said tube.

3. A cut-off mechanism for tubes having endwise and rotational movement, in which there is provided a target with which the end of the tube may engage, a rotatable cutter having an axial movement in a direction parallel to the axis of the tube and a lateral movement toward and from the tube axis and into and out of the wall of the tube, said mechanism being characterized by means for effecting travel of said cutter and said target at the same linear speed in a direction parallel to the axis of the advancing tube while both said cutter and said target are in contact with said tube, and a counterbalancing weight for moving said cutter and target along with said tube.

4. A cut-off mechanism for tubes having endwise and rotational movement, in which there is provided a target with which the end of the tube may engage, a rotatable cutter having an axial movement in a direction parallel to the axis of the tube and a lateral movement toward and from the tube axis and into and out of the wall of the tube, said mechanism being characterized by means for maintaining a predetermined constant distance between said cutter and said target during the travel of said cutter and said target in a direction parallel to the axis of the tube and after said cutter has completed its lateral movement toward the axis of the tube and while the target is in contact with the tube, and counterbalancing means exerting a substantially constant force tending to move said cutter and target along with said tube.

5. A cut-off mechanism for tubes having endwise and rotational movement, in which there is provided a target with which the end of the tube may engage, a rotatable cutter having an axial movement in a direction parallel to the axis of the tube and a lateral movement toward and from the tube axis and into and out of the wall of the tube, said mechanism being characterized by a latch interconnecting said target and said cutter, means for maintaining said cutter and said target at a predetermined constant distance apart after said latch has been released and during the total period while both the cutter and the target are in contact with the advancing tube.

6. A cut-off mechanism for tubes having endwise and rotational movement, in which there is provided a target with which the end of the tube may engage, a rotatable cutter having an axial movement in a direction parallel to the axis of the tube and a lateral movement toward and from the tube axis and into and out of the wall of the tube, said mechanism being characterized by a helical cam having its axis parallel to that of said tube, a counterbalancing weight for moving said cutter along with said tube, and a member connected to said cutter and engaging said helical cam for moving said cutter axially in the opposite direction.

7. A cut-off mechanism for tubes having endwise and rotational movement, in which there is provided a target with which the end of the tube may engage, a rotatable cutter having an axial movement in a direction parallel to the axis of the tube and a lateral movement toward and from the tube axis and into and out of the wall of the tube, said mechanism being characterized by a drive shaft for rotating said cutter, a sleeve encircling said shaft, a pair of cams having their axes parallel to said shaft, means engaging one of said cams for oscillating said sleeve and moving said cutter laterally, and means engaging the other of said cams for moving said sleeve and cutter along said shaft.

8. A cut-off mechanism for tubes having endwise and rotational movement, in which there is provided a target with which the end of the tube may engage, a rotatable cutter having an axial movement in a direction parallel to the axis of the tube and a lateral movement toward and from the tube axis and into and out of the wall of the tube, said mechanism being characterized by a drive shaft for said cutter, a sleeve encircling said shaft on which said cutter is mounted, a cam for oscillating said sleeve and moving said cutter laterally, a cam for moving said sleeve and cutter parallel to said tube, friction driving means connecting said cams and said cutter shaft, means normally preventing rotation of said cams, and means controlled by said target for intermittently releasing said cams and permitting rotation thereof through said friction means.

9. A cut-off mechanism for tubes having endwise and rotational movement, in which there is provided a target with which the end of the tube may engage, a rotatatable cutter having an axial movement in a direction parallel to the axis of the tube and a lateral movement toward and from the tube axis and into and out of the wall of the tube, said mechanism being characterized by means normally tending to move said cutter axially of said tube, a latch normally preventing said axial movement, means normally tending to move said cutter laterally, a latch normally preventing said lateral movement, means controlled by said target for releasing said first mentioned latch and permitting said axial movement, and means actuated by said axial movement for releasing said second mentioned latch.

10. A cut-off mechanism for tubes having endwise and rotational movement, in which there is provided a target with which the end of the tube

may engage, a rotatable cutter having an axial movement in a direction parallel to the axis of the tube and a lateral movement toward and from the tube axis and into and out of the wall of the tube, said mechanism being characterized by a counterbalancing weight normally tending to move said cutter axially of said tube, a latch normally preventing said axial movement, a friction drive normally tending to move said cutter laterally, a latch normally preventing said lateral movement, means controlled by said target for releasing said first mentioned latch and permitting said axial movement, and means actuated by said axial movement for releasing said second mentioned latch.

11. A cut-off for a continuously advancing tube, comprising a rotary cutter, means for automatically moving said cutter towards said advancing tube for cutting action when a predetermined length of said tube has passed beyond said cutter and for automatically returning said cutter at the completion of said cutting action, a counterweight urging said cutter to move with said advancing tube while it is cutting said tube, means normally locking said cutter against the action of said counterweight, and means for automatically releasing said cutter when a predetermined length of said tube has passed beyond said cutter.

12. A cut-off for a continuously advancing tube, comprising a rotary cutter, a target, means interconnecting said cutter and said target for movement in unison with said advancing tube during cutting action, means for tilting said cutter towards said advancing tube when said target is engaged by the forward end of said advancing tube to cut said tube, and for tilting said cutter away from said tube into initial position upon the completion of the cutting action, a counterweight, a pulley, a flexible cable passing over said pulley and connected at one end to said counterweight and at its other end to a part of the cut-off movable with said cutter along the path of travel of said tube, whereby said cutter and said target are urged by the action of said counterweight for movement with said tube during cutting, means for rendering said counterweight ineffective while said cutter is in initial position, and means for rendering said counterweight effective while said cutter is cutting said tube to assist in the movement of said target and said cutter with the advancing tube during cutting action.

13. In a tube cut-off, the combination comprising a substantially horizontal tube winding mandrel along which a tube is continuously advanced, a frame structure, a carriage supported on said frame structure and reciprocable thereon along the path of movement of said tube, a cutter mounted on said carriage, and a base having a pivotal clampable connection with said frame to permit angular adjustment of the cutting plane of said cutter about a substantially vertical axis with respect to said mandrel.

14. In a cut-off for an advancing tube, the combination comprising a shaft, a circular cutter blade encircling said shaft, a pair of clamping members on opposite sides of said blade, one of said clamping members being affixed to said shaft for rotation therewith, while the other clamping member is threaded on the shaft-affixed clamping member, said blade and said clamping members being mounted on said shaft in overhanging relationship thereto to permit easy removal of said blade, means for driving said shaft, means for supporting said shaft for oscillatory movement about a pivot axis spaced from the axis of said shaft, and means for oscillating said blade about said pivot axis towards and away from said advancing tube at predetermined intervals in accordance with the length of tube sections to be cut.

15. A cut-off for an advancing tube comprising a cutter, a target having its tube engaging face extending parallel to the forward end of the advancing tube, structural means aside from said tube interconnecting said cutter and said target as a unit for movement in unison with said advancing tube during cutting action, means for moving said cutter towards said advancing tube for cutting action when said target is tripped by the forward end of said advancing tube and for returning said cutter into initial position upon completion of said cutting action, a member applying a counterbalancing force to said cutter and said target to urge them to move in unison with the advancing tube during cutting action, means normally locking said cutter and said target against the action of said force applying member, means for releasing said cutter and said target upon the tripping of said target by the forward end of said advancing tube to permit the movement of said cutter and said target with the advancing tube with the assistance of said force applying member, and means operable after said cutter has entered said tube for moving said target transversely away from said advancing tube and out of engagement with said tube, while maintaining said target face parallel to said forward tube end.

16. A machine for cutting a continuously advancing tube into sections including a target in the path of movement of the tube, a cutter connected to said tube and movable with the latter while the tube end is in engagement with the target, a shaft parallel to said tube, a frictional drive for said shaft, a cam on said shaft for swinging the cutter toward and from the tube, a cam on said shaft for positively returning the cutter upon the completion of a cut and in a direction opposite to the path of movement of the tube, a ratchet wheel on said shaft, and means movable in the direction of the path of movement of the tube and with said cutter and said target for releasing said ratchet wheel and permitting intermittent rotation of said shaft.

17. In a tube cut-off, the combination of a tube winding mandrel, along which a tube is continuously advanced, a rotary cutter movable toward and away from said tube in a plane at right angles to the axis of said tube and movable along the path of movement of said tube, said cutter being mounted on an axis substantially parallel to the axis of said mandrel, and means for varying the angularity between the axes of said cutter shaft and said mandrel.

18. In a cut-off for an advancing tube, the combination of a target adjustable in the direction of travel of the advancing tube to cut tube sections of different lengths, a circular cutter blade movable toward and away from the tube in a plane at right angles to the axis of the tube, means for supporting said cutter blade for oscillation about and slidable movement along an axis spaced from the axis of said blade, and means for securing said cutter blade in overhanging relationship to said supporting means to permit easy removal of said blade.

19. In a cut-off for an advancing tube, the combination of a circular cutter blade movable

toward and from said tube in a plane at right angles to the axis of said tube and movable along the path of movement of said tube, means for adjusting the distance of travel along said path of movement in accordance with the diameter of the tube, and means for supporting said blade in overhanging relationship to permit easy removal of said blade.

20. A machine for cutting a continuously advancing tube into sections, including a cutter movable back and forth in a direction parallel to the axis of the tube and movable toward and from said tube, a shaft having a cam for effecting the second mentioned movement and a helix having its axis parallel to said tube for moving the cutter in a direction opposite to the direction of movement of the tube, and means independent of said helix for aiding the tube in moving the cutter in the same direction as the tube during the cutting action.

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