Feb. 18, 1964 J. M. HILL 3,121,360

STOCK SEVERING APPARATUS

Filed Jan. 24, 1961 4 Sheets-Sheet 1

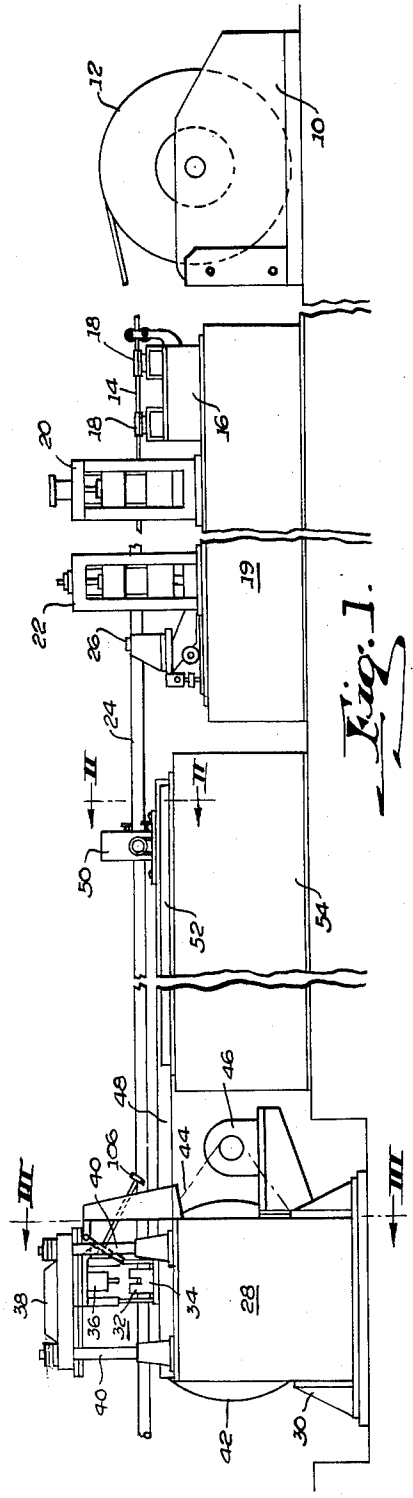


Fig. 1.

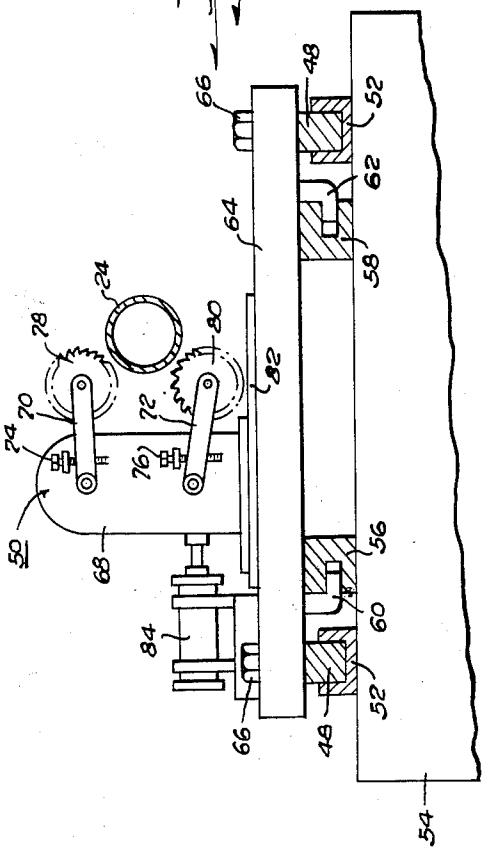


Fig. 2.

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STOCK SEVERING APPARATUS

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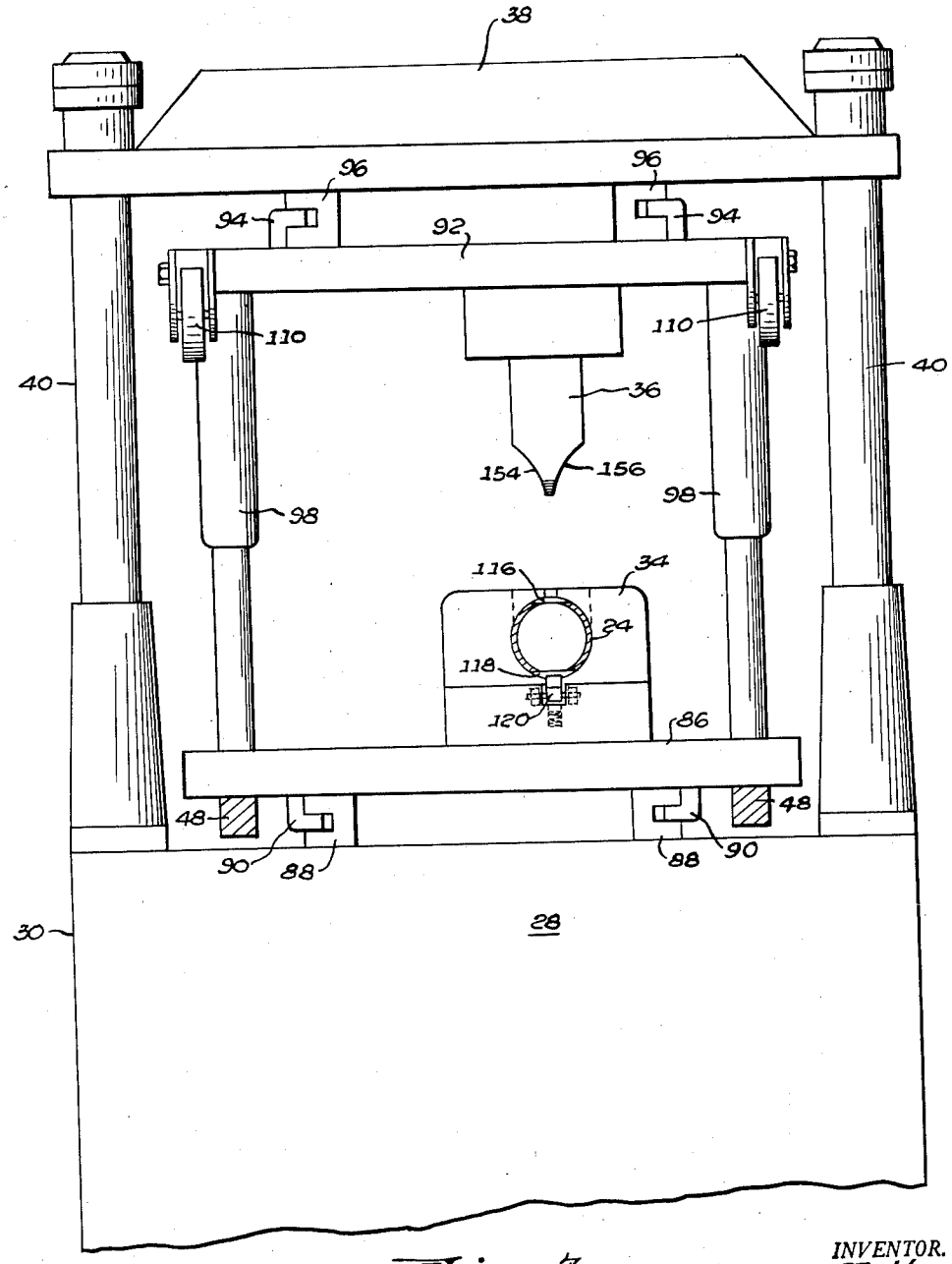


Fig. 3.

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STOCK SEVERING APPARATUS

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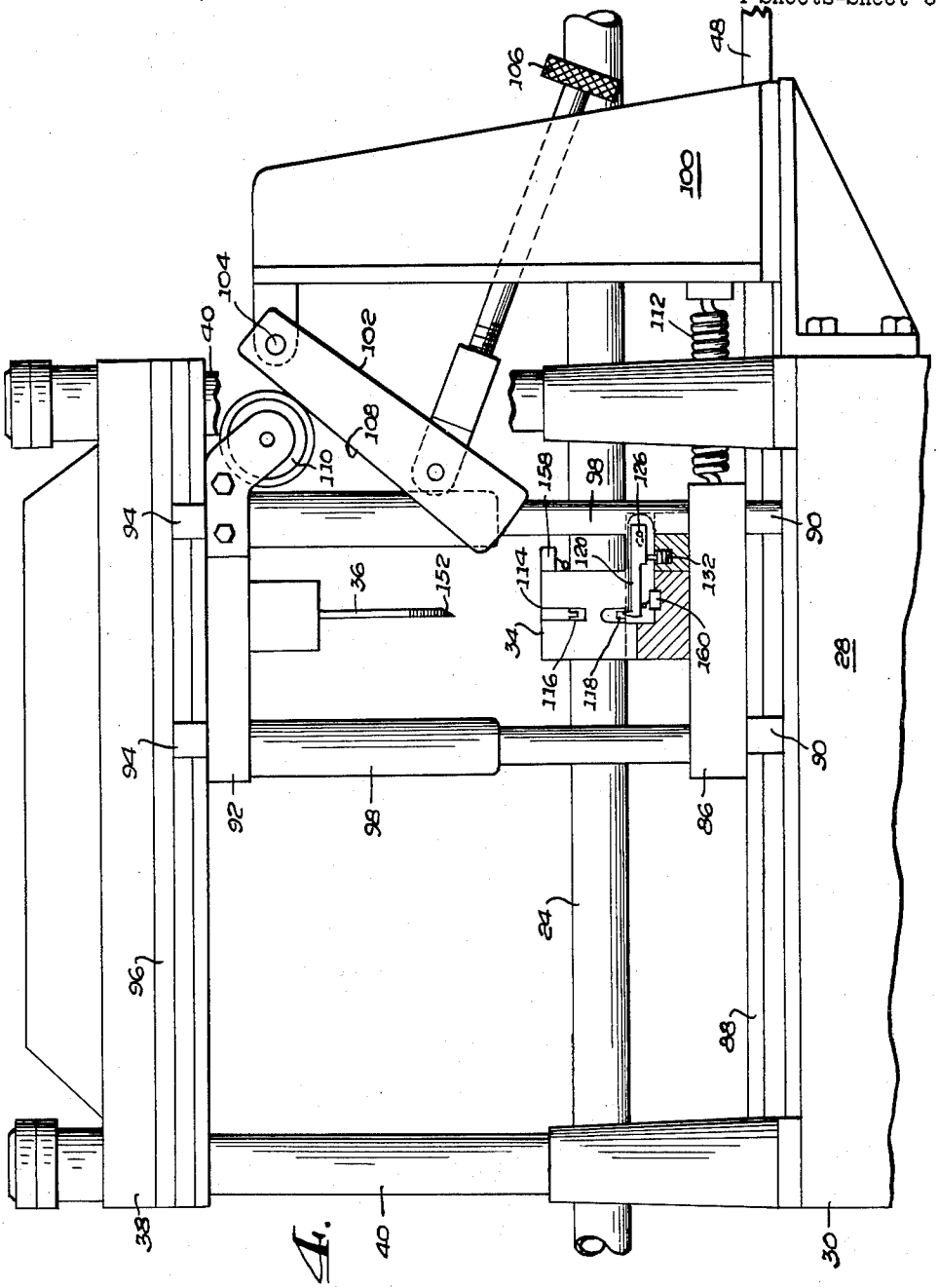


Fig. 4.

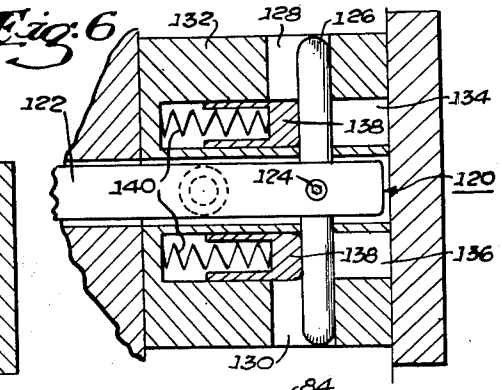
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Feb. 18, 1964 J. M. HILL 3,121,360

STOCK SEVERING APPARATUS

Filed Jan. 24, 1961 4 Sheets-Sheet 4

Fig. 6



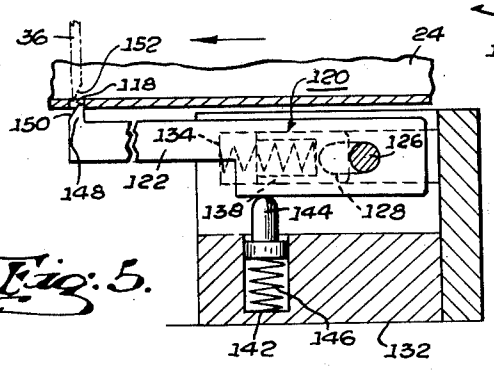


Fig. 5.

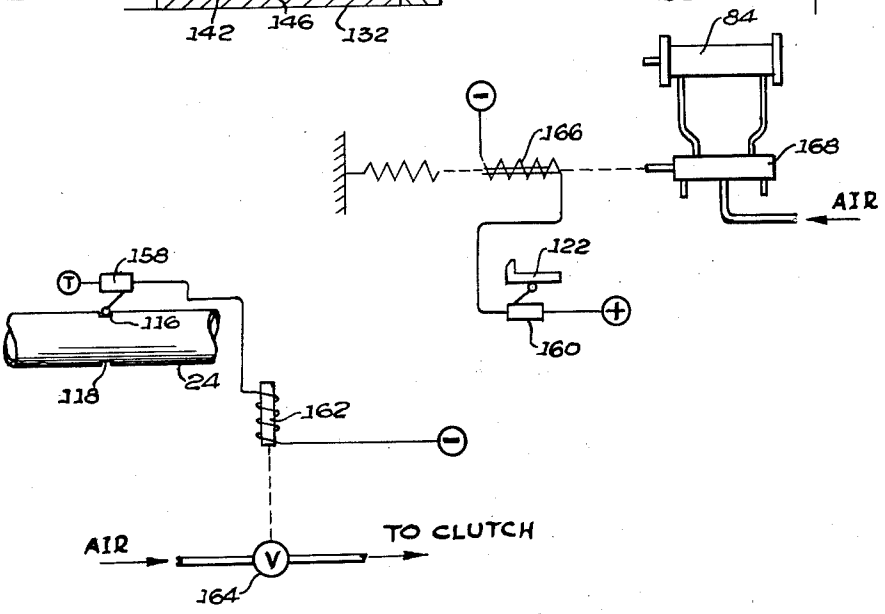


Fig. 7.

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United States Patent Office 3,121,360 Patented Feb. 18, 1964

3,121,360

STOCK SEVERING APPARATUS

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Filed Jan. 24, 1961, Ser. No. 84,688
12 Claims. (Cl. 83—292)

This invention relates to flying cutoff shears for moving lengths of tubing and other shapes. More particularly, the invention relates to flying cutoff apparatus adapted to sever successive equal lengths of stock from a continuous moving ribbon of such stock.

Although not limited thereto, the present invention is particularly adapted for use with a continuous forming line for tubes and other cross-sectional shapes. In such a line, flat strip material is passed through a succession of forming rolls which progressively shape the flat stock into the desired cross-sectional configuration. After leaving the forming rolls, the continuous moving shape is cut or severed into pieces of uniform length, the cutting operation being accomplished by means of flying cutoff apparatus which moves with the stock during the cutting operation. Such flying cutoff apparatus is necessary since the stock itself is continuously moving, and any attempt to sever the stock with a stationary tool would cause the stock to buckle and possibly bend.

In the usual cutoff apparatus, the continuous shape passes through a slidable die adapted to receive a shear or punch which itself slides with the die, the arrangement being such that during a severing operation, the die and shear move forwardly with the shape while the shear is forced downwardly into the die to produce a cut, usually removing a slug across the shape equal in length to the shear punch thickness.

In order to cut successive equal lengths of material from the end of the continuous shape, it is, of course, necessary to trigger the slidable die and shear to move forwardly after the stock has moved through the die by an amount equal to the desired length. In the past, the die and shear were triggered by one of several methods, one of which comprises a plate or target connected to the forward end of a rod having its trailing end connected to the slidable die such that the shape will push the target, the die and the shear forwardly with the stock. The sliding motion of the die actuates a trigger which, in turn, actuates a press to complete the cut.

The difficulty with this method, however, is that the target and rod comprise a rather clumsy mechanism, difficult to change from length to length, and requiring an extensive amount of shut-down time between length changes. In a variation of the method described above, an electrical switch replaces the target and rod for actuating the press; however, in this case random lengths are again obtained. Another method sometimes employed to trigger the slideable die and press employs an electronic system which measures the length of the shape as it passes by and actuates the shear to make a cut at a predetermined length determined by an electrical control system. This method, although workable, is very costly and is sometimes subject to malfunctioning due to failures in the electrical system.

Still another method previously employed for triggering the sliding die and shear was to form notches at equally spaced intervals in the flat stock before forming, the idea being that these notches in the formed product would engage a lever on the die, whereupon the stock would push the die and the shear forwardly with it while actuating the shear to complete the cutting operation at the position of the notch. Alternatively, the lever could be used to actuate an accelerating means for the die which would move the die and shear forwardly without requiring the stock itself to push the die. The stock, however, is oftentimes distorted in length as it passes through the forming rolls, meaning that the spacing between the notches previously formed in the flat stock often does not represent the true desired length between cuts with the result that the cut pieces are also of incorrect lengths.

It can thus be seen that all of the devices for triggering a flying cutoff heretofore known are deficient for one reason or another. Accordingly, as a primary object, the present invention seeks to provide new and improved flying cutoff apparatus which overcomes all of the foregoing disadvantages and others.

More specifically, an object of the invention is to provide triggering means for a flying cutoff which will insure that all cut pieces are of exactly the same length, or within reasonably close tolerances.

Still another object of the invention is to provide flying cutoff apparatus which eliminate the dimple or depression characteristic of shear-type cutoff dies on tubing and other similar shapes at the point of shear penetration.

In accordance with the invention, the slidable die of the main cutoff shear is connected to a slidable notching saw or tool positioned ahead of the main shear in the main shear in the path of travel of the stock to be cut, the arrangement being such that the notching device will reciprocate with the main shear as a single unit. In this manner, the main shear will sever the stock while the notching device simultaneously forms a notch in the stock ahead of the main cut to trigger the next cutoff operation; and since the notching device is rigidly secured to the main shear, the distance between successive notches will always be the same as will the length of cut pieces. To facilitate pieces of different lengths, the notching device may be adjustably spaced from the main shear, and since each notch is formed in the stock after it leaves the forming rolls, no possibility exists of altering the spacing between successive notches in the stock due to deformation in the forming rolls.

As will be seen, pre-notching in the manner described above has the further advantage in tubes and the like of eliminating the undesirable dimple or depression at the point of penetration of the main shear. At the same time, the notch enables the use of a smaller cutoff shear and minimizes the possibility of burred ends on the cut lengths.

The above and other objects and features of the invention will become apparent from the following detailed description taken in connection with the accompanying drawings which form a part of this specification and, in which:

FIGURE 1 is a side elevational view of a continuous forming line in combination with the novel flying cutoff apparatus of the present invention;

FIG. 2 is a view taken along line II—II of FIG. 1 illustrating the operation of the pre-notching apparatus of the invention;

FIG. 3 is a view taken along line III—III of FIG. 1 illustrating the operation of the main sliding die, shear and press arrangement of the invention;

FIG. 4 is a side view of the die and shear arrangement shown in FIG. 3;

FIG. 5 is a cross-sectional side view of the indexing lever arm of the invention;

FIG. 6 is a top view of the apparatus shown in FIG. 5; and

FIG. 7 is a schematic illustration of the control apparatus for the invention.

Referring now to FIG. 1, the apparatus shown includes a coil box **10** which supports a coil **12** of flat strip material which is to be formed into a tubular or other desired cross-sectional shape. From the coil **12**, the strip material **14** passes through a starting table **16** where it passes between four rollers **18** which guide the material into a cold-roll forming machine **19**. The cold-

roll forming machine which follows the starting table 16 comprises a plurality of roll stands, only the first and last of such stands 20 and 22 being shown in FIG. 1. As the strip material 14 passes through successive ones of the stands in the roll forming machine, it is progressively formed into the desired cross-sectional shape which may be a tube, a channel, molding or the like. In the present case, we will assume that the article formed comprises a continuous open butt or welded tubular shape 24 which emerges from the last roll stand 22 and passes through exit rolls 26 to the flying cutoff apparatus of the invention.

As shown, the cutoff apparatus includes a cutoff press 28 having a base 30 which supports the slideable cutoff shear mechanism 32 having a die 34 through which the tube 24 passes and a cutting tool 36 which is adapted to be forced downwardly into the die 34 by the upper ram 38 of the press 28. The ram 38 is connected through columns 40 to a crankshaft, not shown, contained within the base 30. This crankshaft, in turn, is connected through a pneumatic clutch to a flywheel 42 which is driven by a belt 44 connected to a motor 46, the arrangement being such that when the pneumatic clutch is engaged, the flywheel will rotate the crankshaft through one revolution to lower the upper ram 38 and force the cutting tool 36 into the die 34 while effecting a cutoff operation.

Connected to the slideable shearing mechanism through rods or bars 48 is a slideable pre-notching mechanism 50, the arrangement being such that as the shearing mechanism 32 moves forwardly, the rods 48 will pull the pre-notching mechanism 50 forwardly along with it.

As shown in FIG. 2, the rods 48 are slideable within channels 52 mounted on a supporting table 54. Also mounted on the table 54 are a pair of guideways 56 and 58 which receive slide blocks 60 and 62 depending downwardly from a bed plate 64. The bed plate 64 is secured to rods 48 by means of bolts 66 which extend through elongated slots, not shown, in the bed plate and threadedly engage the sliding rods 48. In the particular embodiment of the invention shown herein, a plurality of tapped holes will be spaced along the tops of the rods 48 whereby the bed plate 64 may be positioned at any location along the rods to facilitate cutting off tubes of different lengths. However, it should be understood that any adjustable fastening means may be used for this purpose to suit requirements.

Carried on the bed plate 64 is the pre-notching mechanism 50 which comprises a housing 68 having a pair of adjustable arms 70 and 72 pivotally connected thereto about horizontal axes. Thus, the arms 70 and 72 may be adjusted upwardly or downwardly by turning the adjusting screws 74 and 76, respectively. On the ends of arms 70 and 72 are carried circular saws 78 and 80, respectively, which are driven by chains or belts from a motor and gear reducer positioned within the housing 68. As shown, the housing 68 is mounted for transverse sliding movement on guideway 82 and is adapted to be reciprocated on this guideway by means of an air cylinder 84. The continuous length of tubing 24 passes adjacent the saws 78 and 80, and these saws are adjusted whereby they will cut notches in the top and bottom of the tube to a depth equal to the tube wall thickness when the air cylinder 84 is pressurized to move the housing 68 to the right as shown in FIG. 2. During a cutting or sawing operation, the bed plate 64 and the entire pre-notching mechanism 50 is pulled forwardly on guideways 56 and 58 by the rods 48 as will hereinafter be explained.

Referring, now, to FIGS. 3 and 4, the die 34 is carried on a bed plate 86 slideably supported on guideways 88 mounted on top of the base 30 of press 28. Depending downwardly from the bed plate 86 are slide blocks 90 adapted to reciprocate within slots provided in the guideways 88, substantially as shown. In a similar manner, the cutting tool 36 is carried by a second plate 92 having

slide blocks 94 which fit into slots in a pair of guideways 96 secured to the underside of the press ram 38. Interconnecting the plates 86 and 92 are telescoping columns 98, the arrangement being such that when the press is actuated to move columns 40 and the ram 38 downwardly, the plate 92 and cutting tool 36 will also be moved downwardly while the two parts of the columns 98 telescope one within the other. As shown, the rods 48 which are connected to the notching mechanism 50 shown in FIGS. 1 and 2 are also connected to the bed plate 86.

Carried on the backside of the press base 30 is a frame 100 which carries, at its upper extremity, a pair of pivoted cams 102 positioned on either side of the press and each pivotal about an axis 104. Connected to each of the cams 102 is an adjusting screw 106 which may be turned to vary the angular position of the cam surface 108 on cam 102. Carried on the upper plate 92 which supports the cutting tool 36 are a pair of rollers 110 which engage the cam surfaces 108, the arrangement being such that when the press is actuated and the upper ram 38 forced downwardly, the rollers 110 will engage the cam surfaces 108 whereby the plates 86 and 92 will be moved to the left as shown in FIG. 4 against the force of coil spring 112. Since the continuous tubular stock 24 is also moving to the left as shown in FIG. 4, the punch 34 and cutting tool 36 will move with the stock during a cutting operation; and, at the same time, by virtue of the connection of the bed pate 86 to the bed plate 64 of the notching mechanism 50 through rods 48, the notching mechanism will be pulled along with the die and cutting tool as the upper ram 38 moves downwardly. On the second half of the cycle of operation of the press 28 when the ram 38 moves upwardly, the coil spring 112 will pull the plates 86 and 92 backwardly and will push the notching mechanism 50 backwardly also to its original position by virtue of its connection to plate 86.

The die 34 is provided with a central notch 114 which is adapted to receive the cutting tool 36 during a severing operation. In the pre-notching operation effected by notching mechanism 50, two notches 116 and 118 (FIG. 3) will be formed in the top and bottom of the tubular stock 24. Carried on the die assembly 34 is an indexing lever mechanism 120, best shown in FIGS. 5 and 6. It comprises a lever arm 122 connected by means of a set screw 124 to a transversely-extending pin 126 slidable within slots 128 and 130 provided in a block 132 which is positioned behind the main die assembly 34 as shown in FIG. 4. Provided in the block 132 are a pair of bores 134 and 136, each of which receives a slideable plunger 138. Interposed between each plunger 138 and the bottom of bores 134 and 136 are coil springs 140, the arrangement being such that the springs 140 will force the plungers 138 into engagement with the pin 126 whereby the pin will be normally moved to its extreme right position within slots 128 and 130 as shown in FIG. 6. Beneath the lever arm 122 in block 132 is a third bore 142 (FIG. 5) which receives a bullet-shaped plunger 144. Interposed between the plunger 144 and the bottom of bore 142 is a coil spring 146 which serves to resiliently urge the plunger upwardly into engagement with the bottom surface of the lever arm 122. Thus, the left end of the lever arm 122 as shown in FIG. 5 will be forced upwardly into engagement with the bottom surface of the moving stock 24. The said left end of the lever arm 122 is provided with an upwardly-extending projection 148 having a tapered or beveled surface 150 on its forward end.

As the stock 24 moves through the die, the upper surface of projection 148 will be held in engagement with the lower surface of the stock 24 by spring 146 and will slide along this lower surface until it engages a lower notch 118. At this point, the spring 146 will force the lever arm 122 and the projection 148 upwardly into the notch; and since the direction of stock movement is

that indicated by the arrow in FIG. 5, the lever arm 122 and pin 126 will initially move forwardly in slots 128 and 130 while compressing springs 140 until the pin 126 engages the left ends of the slots. At this point, the die assembly 34, plates 86 and 92, and columns 98 will be positively locked to the stock and will move with the stock on guideways 88 and 96 to the left as shown in FIG. 4. At the same time, the rods 48 will pull the notching mechanism along with the die, and since the notching mechanism is rigidly secured to the die which is now moving at the same speed as the tubular stock 24, the notching mechanism 50 will also move with the stock at the same speed so that a zero relative velocity will exist between the notching mechanism and the stock.

It will be noted in FIGS. 4 and 5 that the lower end of the cutting tool 36 is provided with a beveled surface 152. As the cutting tool 36 moves downwardly, its curved cutting edges 154 and 156 (FIG. 3) will exert shearing forces substantially radially outwardly of the tube section whereby a clean cut is produced characterized by the absence of internal deformation and burrs at the edges of the cut. As was mentioned above, it has heretofore been a problem in cutoff devices for tubing and the like to prevent a dimple or depression in the finished piece due to the initial penetration of the point of the cutting tool into the top of the stock. In the present invention, however, by virtue of the upper notch 116, the lower pointed end of the cutting tool will pass into the stock through this notch without causing a depression in the stock. Usually, the notch is cut slightly larger than the width of the cutting tool 36 to permit easy entrance of the same.

When the cutting tool 36 moves downwardly through the die 34 and completes a cutting operation, the beveled surface 152 will engage the beveled surface 150 (FIG. 5) on the lever arm 122, thereby forcing the arm downwardly to move the projection 148 out of the notch 118. At this time, however, the cutting tool will have already cut into the main portion of the stock 24 so that the die, cutting tool and notching mechanism will still move with the stock since they are locked to the stock by virtue of the cutting tool's penetration. When the lever arm 122 moves downwardly, the coil springs 140 will force plungers 138, the pin 126 and the lever itself to the right as shown in FIGS. 5 and 6, thereby preparing it for the next successive notch 118. Thus, once the lever 122 is moved downwardly by the cutting tool 36 at the completion of a cutting operation and the cutting tool 36 moves upwardly to clear the stock, the coil spring 112 will force the plates 88 and 96 and the die assembly 34 carried thereby to the right as shown in FIG. 4 preparatory to the next cutting operation. During this time, the rollers 110 will, of course, move upwardly on the cam surfaces 108 to their original positions.

In FIG. 4, it can be seen that a limit switch 158 is carried by the die assembly 34 above the moving stock 24 whereby this limit switch will be tripped by the upper notch 116 as it passes thereby. A second limit switch 160 (FIG. 4) will be tripped when the lever arm 122 moves upwardly into the notch 118. These limit switches are employed in control apparatus shown in FIG. 7. Thus, when limit switch 158 is tripped, it will close a circuit to solenoid 162 to momentarily energize the solenoid and open air valve 164 which engages the clutch connecting the flywheel to the upper ram 38. This action moves the ram downwardly and then back up to its original position where it stops preparatory to second and succeeding trip signals from the limit switch 158.

When the limit switch 160 is tripped by movement of lever arm 122 into the lower notch 118, it will close a circuit to a solenoid 166 which actuates an air valve 168 to cause the air cylinder 84 on the notching mechanism 50 to move the rotary saws 78 and 80 to the right as shown in FIG. 2 whereby they will form the notches 116 and 118 in the tubular stock 24. When the lever arm

122 is forced out of the notch by cutting tool 36 and held out of that notch, however, the circuit to solenoid 166 will be broken so that the valve 168 will actuate the cylinder 84 to return the saws 78 and 80 to their original positions shown in FIG. 2. While the saws are being retracted, the tool 36 has not as yet cleared the top of the stock so that the notching mechanism will still be moving with the stock during this time, notwithstanding the fact that the lever arm 122 has been forced out of notch 118.

In the operation of the device, a cycle of operation will be started by the upper notch 116 engaging the limit switch 158 whereby the solenoid 162 will be energized to actuate the press clutch and bring the upper ram 38 downwardly. As the ram 38 moves downwardly, the die assembly 34 and cutting tool 36 will be accelerated forwardly in the direction of movement of the stock 24 by the rollers 110 which engage cam surfaces 108. During the initial acceleration phase, the tubular stock 24 will be moving faster than the die 34 so that the notch 118 will move into the die where it will be engaged by the lever arm 122. At this point, the die 34, the cutting tool 36, and the notching mechanism 50 will be locked to the tube and will move along with the tube as the cutting tool moves downwardly through the notch 116 and performs a severing operation. At the same time, when the lever arm 122 moved upwardly into notch 118, the limit switch 160 is closed to energize the solenoid 166 and pressurize air cylinder 84 shown in FIG. 2 to move saws 78 and 80 to the right to notch the tubular stock 24. It will be noted, therefore, that the notching operation is performed at the same time as a severing operation; and since the notching mechanism 50 is tied to the die 34 through rods 48, the distance between the cut made by tool 36 and the newly formed notches 116 and 118 will always be the same, it being understood that the distance between the notching mechanism 50 and the die assembly 34 may be adjusted to accommodate pieces of different lengths. Thus, since the notching mechanism always moves in synchronism with the die 34, the distance between the notching mechanism and the die must always be the same to produce cut pieces of identical length. Furthermore, since the die, the cutting tool and the notching mechanism are set into motion before they are locked to the tubular stock 24 by lever arm 122, very little possibility exists of buckling in thin-walled sections which would otherwise occur if the stock itself had to accelerate these relatively heavy parts. The invention thus overcomes all of the disadvantages of previous methods heretofore employed which produced cut tubes and other cross-sectional shapes of random lengths.

Although the invention has been shown in connection with a certain specific embodiment, it will be readily apparent to those skilled in the art that various changes in form and arrangement of parts may be made to suit requirements without departing from the spirit and scope of the invention. In this respect, it will, of course, be apparent that the invention is applicable to flat or other cross-sectional shapes as well as the tubular stock of the embodiment shown herein. In this latter case only one notch in the stock, rather than the two shown herein, would be required since the problem of tube deformation at the point of tool penetration would not exist.

I claim as my invention:

1. Apparatus for cutting off pieces of desired uniform length from a continuous length of moving stock comprising, in combination, stock severing apparatus including a stock severing tool, a device for forming a notch in the stock comprising a notching tool, said notching tool being spaced ahead of the severing apparatus in the path of travel of said stock with the spacing between the notching tool and severing apparatus being substantially equal to said desired length, and means located at said severing apparatus and including lever means in sub-

stantial alignment with said stock severing tool and adapted to be tripped by a previously formed notch in the stock as it passes the severing apparatus for actuating both the severing apparatus and the notching tool.

2. Apparatus for cutting off pieces of uniform length from a continuous length of moving tubular stock comprising, in combination, stock severing apparatus including a reciprocable stock severing tool, a device for forming notches in the top and bottom of the tubular stock comprising a pair of saws adapted to cut into the top and bottom of said tubular stock to form notches therein, said saws being spaced ahead of the severing apparatus in the path of travel of said stock, and means located at said severing apparatus and including lever means aligned with said severing tool and adapted to be tripped by a previously formed notch in the stock as it passes the severing apparatus for actuating both the severing apparatus and the saws.

3. Apparatus for cutting off pieces of uniform length from a continuous length of stock comprising, in combination, stock severing apparatus including a stock severing tool movable along the path of travel of said stock, a device for forming a notch in the stock comprising a notching tool movable along the path of travel of said stock ahead of the severing apparatus and rigidly connected to said severing apparatus whereby both will move in unison, and means located at said severing apparatus and including lever means vertically aligned with said severing tool and adapted to be tripped by a previously formed notch in the stock as it passes the severing apparatus for actuating both the severing apparatus and the notching tool, the arrangement being such that the stock will be severed at the same time that it is notched while the distance between the severing apparatus and the notching tool will be equal to the length of said uniform pieces.

4. Apparatus for cutting off pieces of uniform length from a continuous length of moving stock comprising, in combination, stock severing apparatus including a vertically reciprocable stock severing tool movable along the path of travel of said stock, actuating means for causing the severing apparatus to cut the stock including lever means vertically aligned with said severing tool and adapted to be tripped by a preformed notch in the stock as it passes the severing apparatus, a device for forming said notch in the stock comprising a notching tool movable along the path of travel of said stock ahead of the stock severing apparatus, the spacing between the notching and severing tools being substantially equal to said uniform length, a connection between the severing apparatus and the notching device whereby both may move with the stock in unison, and means for actuating the notching device when the severing apparatus is actuated whereby the stock will be notched at the same time that it is severed.

5. Apparatus for cutting off pieces of uniform length from a continuous length of moving stock comprising, in combination, stock severing apparatus movable along the path of travel of said stock, said stock severing apparatus comprising a die through which the stock passes and a reciprocable cutting tool adapted to be forced through the stock in the die, punch means for forcing the cutting tool through the stock, actuating means for the punch means including a lever aligned with the path of reciprocation of said cutting tool and adapted to be tripped by a preformed notch in the stock, a device movable along the path of travel of said stock ahead of the stock severing apparatus for forming said notch in the stock, a rigid connection between the stock severing apparatus and the notch forming device whereby the severing apparatus and notch forming device will move in unison, and means for actuating the notch forming device when the cutting tool is actuated whereby the stock will be notched at the same time that it is severed, the arrangement being such that the length of said pieces will be equal to the distance between said severing apparatus and said notch forming device.

6. Apparatus for cutting off pieces of uniform length from a continuous length of moving stock comprising, in combination, stock severing apparatus reciprocable along the path of travel of said stock whereby the severing apparatus may move with the stock from a starting position and thereafter return to its starting position, said stock severing apparatus comprising a die through which the stock passes and a reciprocable cutting tool adapted to be forced through the stock in the die, punch means for forcing the cutting tool through the stock, actuating means for the punch means including a lever aligned with the path of reciprocation of said cutting tool and adapted to be tripped by a preformed notch in the tube, and a device for forming said notch in the tube comprising a rotary saw reciprocable along the path of travel of said stock ahead of the stock severing apparatus, a rigid connection between the stock severing apparatus and the rotary saw whereby the severing apparatus and saw will move in unison, and means for actuating the saw to notch the stock when the cutting tool is actuated whereby the stock will be notched at the same time that it is severed.

7. Apparatus for cutting off pieces of uniform length from a continuous length of moving stock comprising, in combination, stock severing apparatus including a die through which the stock passes and a cutting tool adapted to be forced through the stock in the die, means for mounting said die and cutting tool whereby they may be reciprocated in unison along the path of travel of said stock, punch means for forcing the cutting tool through the stock, actuating means for the punch means including a lever adapted to be tripped by a preformed notch in the stock, a device for forming said notch, said device being mounted for reciprocating movement along the path of travel of said stock ahead of the stock severing apparatus, a rigid connection between the stock severing apparatus and the notch forming device whereby the severing apparatus and notch forming device will reciprocate as a unit, the spacing between said device and said cutting tool being substantially equal to said uniform length, means for actuating the notch forming device when the cutting tool is actuated whereby the stock will be notched at the same time that it is severed, and means actuated when said lever is tripped for accelerating the severing device and the notch forming device in the direction of stock movement during a severing and notching operation, said latter-mentioned means permitting the severing apparatus and notch forming device to return to their initial starting positions after a severing and notching operation.

8. Apparatus for cutting off pieces of uniform length from a continuous length of moving stock comprising, in combination, stock severing apparatus reciprocable along the path of travel of said stock whereby the severing apparatus may move with the stock from a starting position and thereafter return to its starting position, said stock severing apparatus comprising a die through which the stock passes and a reciprocable cutting tool adapted to be forced through the stock in the die, punch means for forcing the cutting tool through the stock, means located ahead of said severing apparatus in the path of travel of the stock for actuating the severing apparaus and including a limit switch adapted to be tripped by a previously formed notch in the stock as it passes the limit switch, a spring-loaded lever in the die aligned with said reciprocable cutting tool and adapted to engage said notch as it moves into the die whereby the severing apparatus will be locked to the stock and will move therewith, and a device for forming said notch in the tube, said device being reciprocable along the path of travel of said stock ahead of the stock severing apparatus, a rigid connection between the stock severing apparatus and said notching device whereby the severing apparatus and notching device will move in unison, and means controlled by said spring-loaded lever for actuating the notching

device to notch the stock when the lever engages the previously formed notch in the stock whereby the stock will be notched at the same time that it is severed.

9. Apparatus for cutting off pieces of uniform length from a continuous length of moving tubular stock comprising, in combination, stock severing apparatus including a die through which the stock passes and a reciprocable cutting tool adapted to be forced through the stock in the die, means for mounting said die and cutting tool whereby they may be reciprocated in unison along the path of travel of said stock, punch means for forcing the cutting tool through the stock, actuating means for the punch means including a lever aligned with said reciprocable cutting tool and adapted to be tripped by a preformed notch in the bottom of the tubular stock, a device for forming notches in the bottom and top of said tubular stock, said device being mounted for reciprocating movement along the path of travel of said stock ahead of the stock severing apparatus, a rigid connection between the stock severing apparatus and the notch forming device whereby the severing apparatus and notch forming device will reciprocate as a unit, means for actuating the notch forming device when the cutting tool is actuated whereby the stock will be notched at its top and bottom at the same time that it is severed, and means actuated when said lever is tripped for accelerating the severing device and the notch forming device in the direction of stock movement during a severing and notching operation, said latter-mentioned means permitting the said severing apparatus and notch forming device to return to their initial positions after a severing and notching operation.

10. Apparatus for cutting off pieces of uniform length from a continuous length of moving stock comprising, in combination, stock severing apparatus including a die through which the stock passes and a cutting tool adapted to be forced through the stock in the die, means for mounting said die and cutting tool whereby they may be reciprocated in unison along the path of travel of said stock, a device for forming a notch in said stock, said device being mounted for reciprocating movement along the path of travel of said stock ahead of the stock severing apparatus, a rigid connection between the stock severing apparatus and the notch forming device whereby the severing apparatus and notch forming device will reciprocate as a unit, the spacing between the notch forming device and said cutting tool being substantially equal to said uniform length, actuating means for the punch means including a limit switch adapted to be tripped by a notch previously formed in the stock by said notching device, means actuated when said limit switch is tripped for accelerating the die, the cutting tool and the notch forming device in the direction of stock movement, and lever means carried on said die and adapted to be forced into a previously formed notch in the stock as it enters the die whereby the lever will lock movement of the die, the cutting tool and the notch forming device to the moving stock, and second limit switch means actuable upon movement of said lever means into the previously formed notch for actuating the notch forming device to form a notch in the stock while the notch forming device is locked to the stock by said lever means.

11. Apparatus for cutting off pieces of uniform length from a continuous length of moving tubular stock comprising, in combination, stock severing apparatus including a die through which the stock passes and a reciprocable cutting tool adapted to be forced through the stock in the die, means for mounting said die and cutting tool whereby they may be reciprocated in unison along the path of travel of said stock, punch means for forcing the cutting tool through the stock, a device for forming notches in the top and bottom of said tubular stock, said device being mounted for reciprocating movement along the path of travel of said stock ahead of the stock severing apparatus, a rigid connection between the stock severing apparatus and the notch forming device whereby the severing apparatus and notch forming device will reciprocate as a unit, actuating means for the punch means including a limit switch adapted to be tripped by a notch in the stock previously formed by said notch forming device, said limit switch being positioned ahead of said die in the path of travel of the stock whereby the punch means will be actuated before the previously formed notch in the stock enters said die, means responsive to actuation of said punch means for accelerating the severing device and the notch forming device connected thereto in the direction of stock movement, spring-loaded lever means carried by said die in alignment with said reciprocable cutting tool, said lever means being spring biased to move into a previously formed notch in the stock as it passes through the die and thereby lock the stock to the die, the cutting tool and said notch forming device, and means including a second limit switch actuable when said lever moves into said previously formed notch for actuating the notch forming device to form notches at the top and bottom of the tubular stock.

12. The combination claimed in claim 11 wherein the notch forming device comprises a pair of saws mounted for reciprocating movement along the path of travel of said tubular stock and for transverse reciprocating movement with respect to said path of travel, the arrangement being such that as the saws move with the stock they may be reciprocated transversely thereto to form said notches at the top and bottom of the stock.

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