July 24, 1956 W. L. SIEGERIST 2,755,858

SEVERING APPARATUS FOR CONTINUOUSLY MOVING MATERIAL

Filed Nov. 18, 1953 4 Sheets-Sheet 1

FIG. 1.

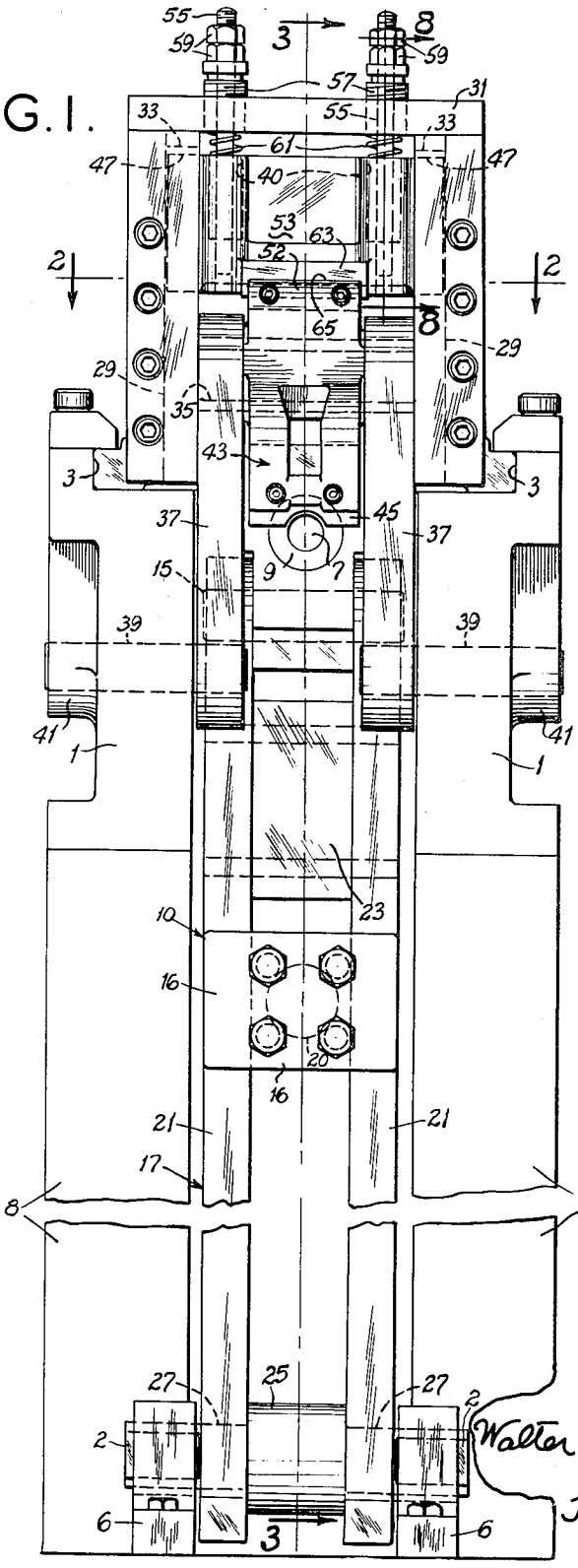
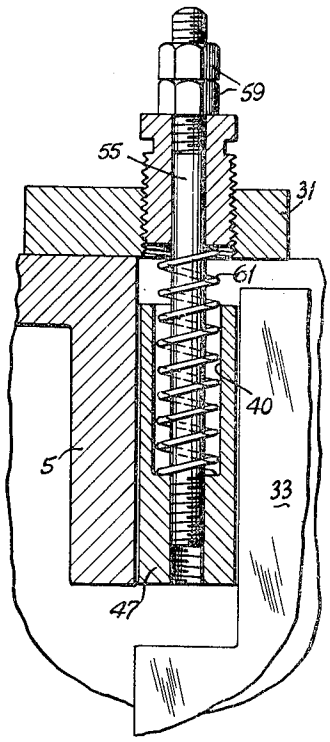


FIG. 8.



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July 24, 1956 W. L. SIEGERIST 2,755,858

SEVERING APPARATUS FOR CONTINUOUSLY MOVING MATERIAL

Filed Nov. 18, 1953 4 Sheets-Sheet 2

FIG. 3.

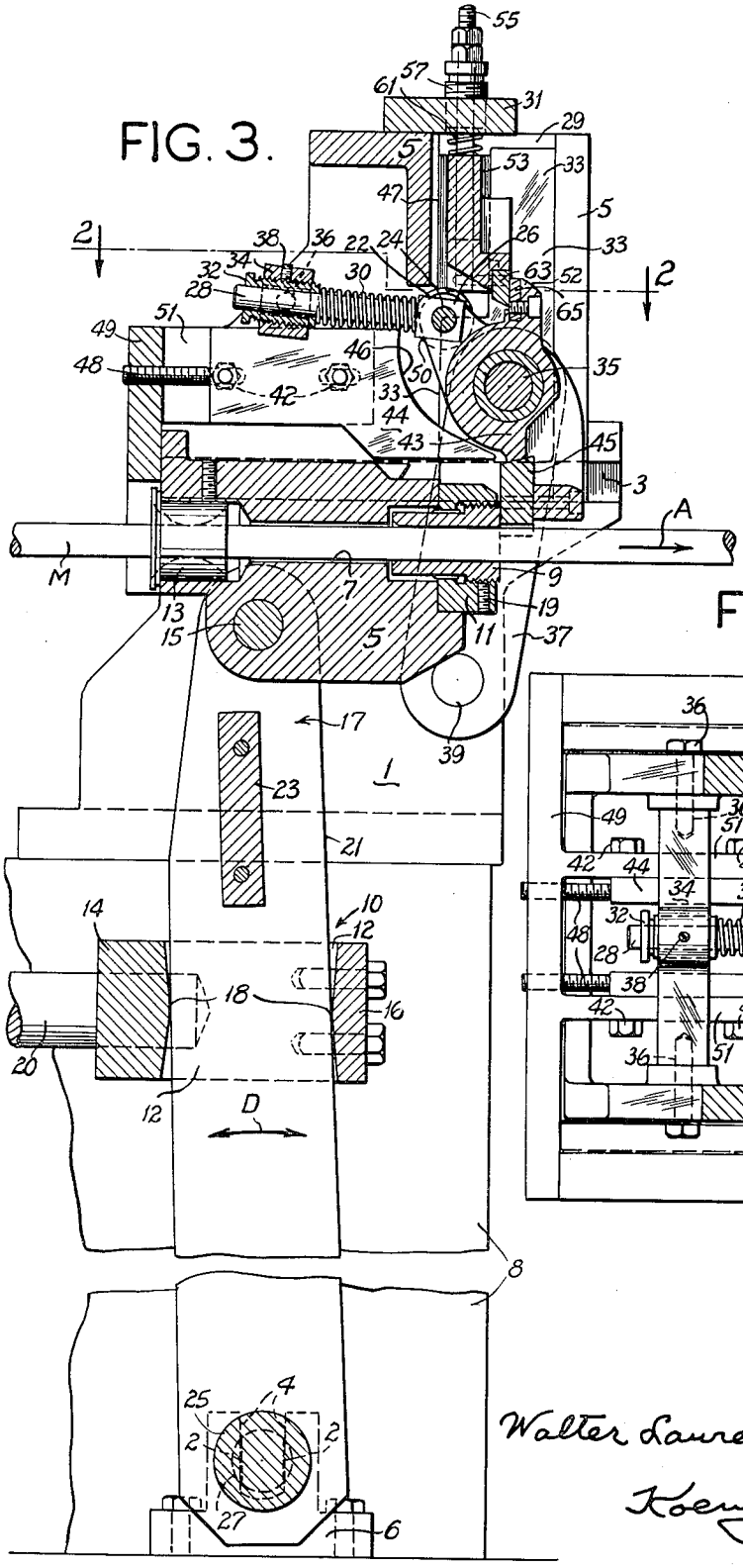
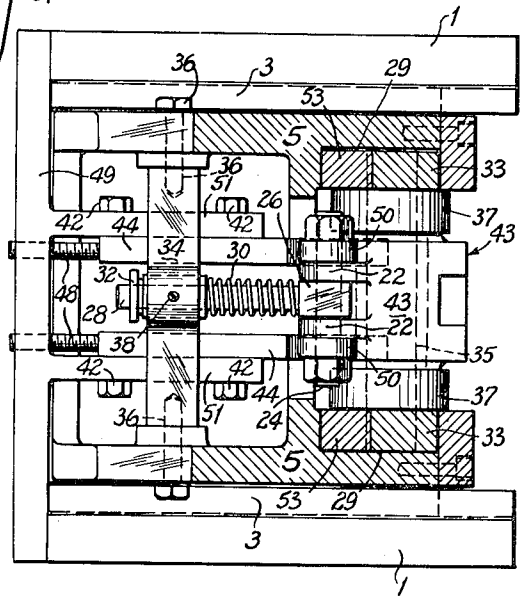


FIG. 2.



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July 24, 1956 W. L. SIEGERIST 2,755,858

SEVERING APPARATUS FOR CONTINUOUSLY MOVING MATERIAL

Filed Nov. 18, 1953 4 Sheets-Sheet 3

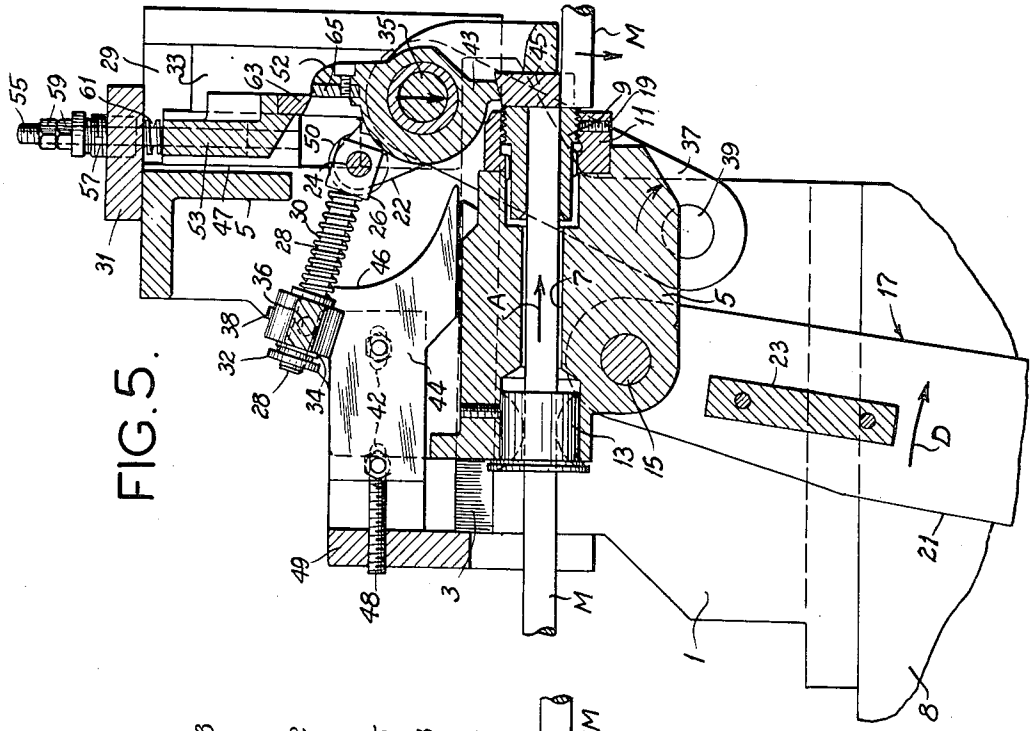


FIG. 5.

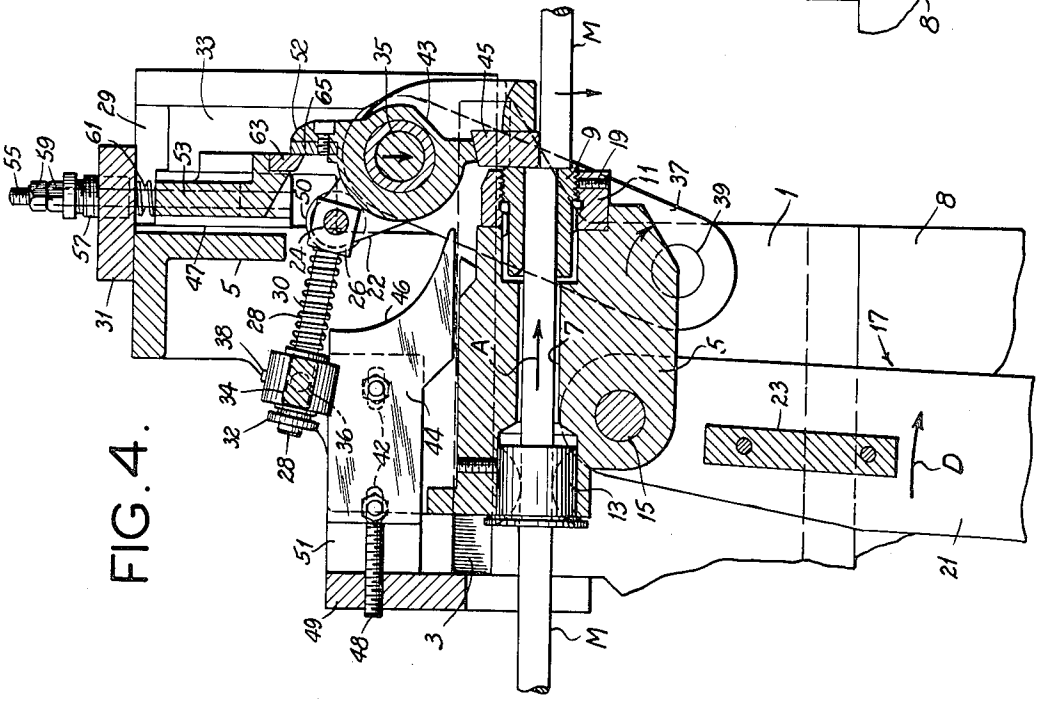


FIG. 4.

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July 24, 1956 W. L. SIEGERIST 2,755,858

SEVERING APPARATUS FOR CONTINUOUSLY MOVING MATERIAL

Filed Nov. 18, 1953 4 Sheets-Sheet 4

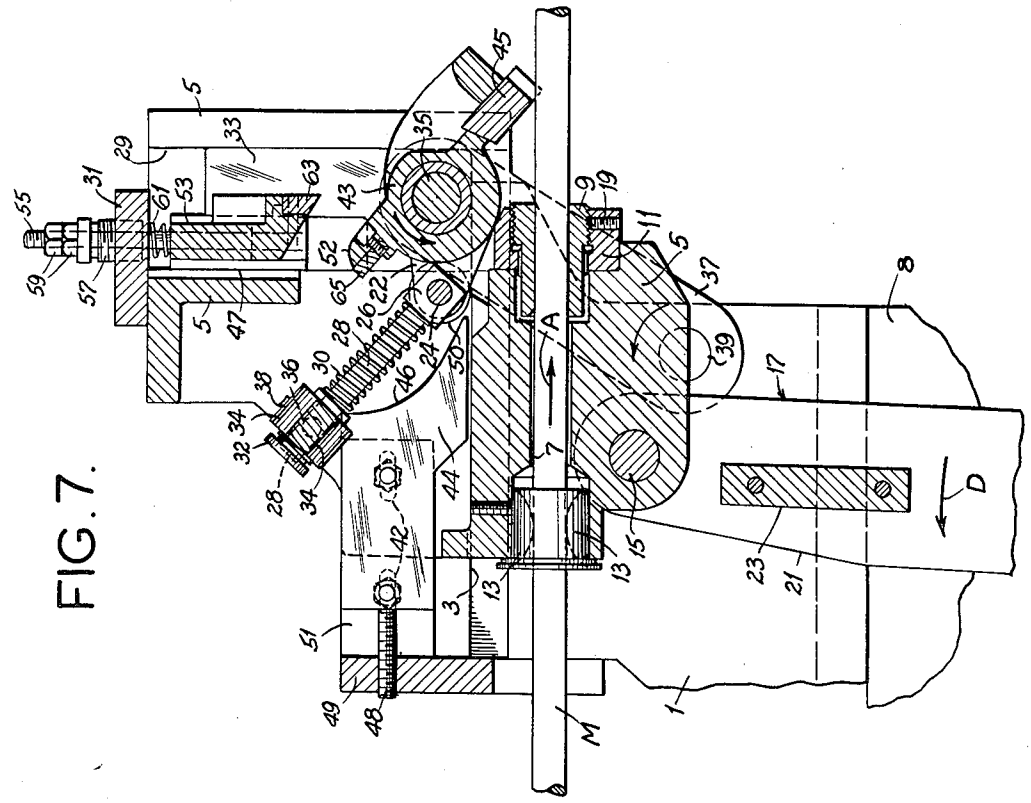


FIG. 7.

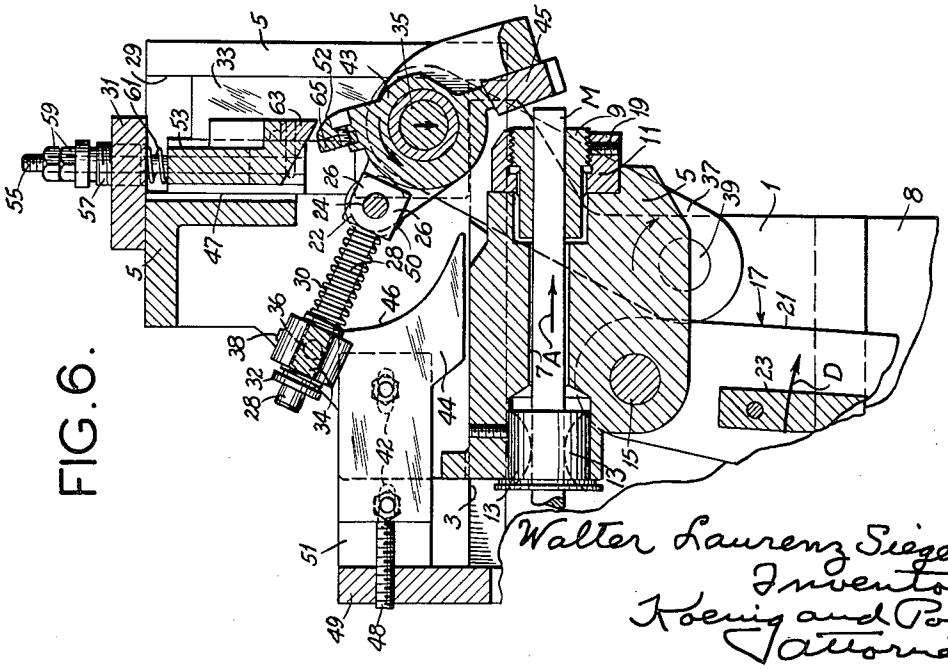


FIG. 6.

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United States Patent Office 2,755,858
Patented July 24, 1956

2,755,853

SEVERING APPARATUS FOR CONTINUOUSLY MOVING MATERIAL

Walter L. Siegerist, Affton, Mo., assignor, by mesne assignments, to Blaw-Knox Company, Pittsburgh, Pa., a corporation of Delaware

Application November 18, 1953, Serial No. 392,957

14 Claims. (Cl. 164—49)

This invention relates to severing apparatus, and with regard to certain more specific features, to apparatus of this class for automatically segmenting continuously moving material or articles. It is an improvement upon the construction shown in my copending United States patent application, Serial No. 252,959, filed October 24, 1951, for Severing Apparatus for Continuously Moving Material, eventuated as Patent No. 2,697,489, dated December 21, 1954.

Among the several objects of the invention may be noted the provision of severing apparatus of the general type shown in said application, wherein the severing member, after a severing action, becomes automatically locked in spaced relation to oncoming unsevered material, so as positively to prevent scarification of the latter; the provision of apparatus of the class described which automatically unlocks the severing member upon a retractive stroke and relocks it in preparation for a succeeding cutting stroke; the provision of apparatus of the class described having an improved variable-stroke driving means permitting close adjustments for optimum action; and the provision of apparatus of this class wherein the improved features are economical to produce. Other objects and features will be in part apparent and in part pointed out hereinafter.

The invention accordingly comprises the elements and combinations of elements, features of construction, and arrangements of parts which will be exemplified in the structures hereinafter described, and the scope of which will be indicated in the following claims.

In the accompanying drawings, in which one of various possible embodiments of the invention is illustrated,

Fig. 1 is a front elevation of the improved apparatus shown in a retracted position of parts;

Fig. 2 is a cross section taken on the stepped plane 2—2 indicated on Figs. 1 and 3;

Fig. 3 is a longitudinal section taken on line 3—3 of Fig. 1, the parts being shown in retracted positions assumed at the start of a severing action;

Figs. 4–7 are schematic views based upon Fig. 3, but illustrating a sequence of functional positions throughout a cutting cycle; and,

Fig. 8 is an enlarged vertical detail section taken on line 8—8 of Fig. 1.

Corresponding reference characters indicate corresponding parts throughout the several views of the drawings.

The invention, like the invention described in said application, accomplishes severing of material which continuously moves through the severing apparatus. The apparatus consists of a carriage which is forwardly movable in the direction of movement of the material to be severed from an initial position through a severing stroke and back through a return stroke to the initial position. On the carriage is a rotary severing member the center of which is movable with the carriage. This severing member has translating and rotary movements relative to

the carriage but is locked in a first position against rotary movement during the severing action which drives the severing member in pure translation across the material. After the material has been crossed and severed, the lock is released so that the severing member may rotate clear of oncoming material. The carriage then reverses its movement to execute a return stroke, whereupon the severing member, due to its inertia and an overcentering mechanism, is automatically rotated to and locked in a second locked position clear of the oncoming material. During the return stroke a cam-actuated return mechanism forces the severing member from its second locked position. The construction is such that after complete execution of the return stroke the severing member is again automatically locked in the first locked position and prepared for a cutting action during the next cycle of operations. The means for causing the severing member to assume said second locked position and returning it to the first locked position constitutes one of the important features of the present invention, since by this means scarification of the oncoming material is prevented.

Referring now more particularly to the drawings, there is shown at numeral 1 a frame having horizontal guides 3 which support and guide a movable carriage 5 of generally arch shape (Figs. 1–3), which may reciprocate in the guides. This carriage has an opening 7 through it for passage of a continuous length of the article or material M which is to be severed. This material feeds out continuously from the machine which supplies it, as, for example, a rod or bar straightening machine. The material may be in the form of a wire, rod, strip, or the like. In the present example, the material M is illustrated as being a continuous length of rod issuing from a straightening machine located to the left of Fig. 3 but not shown. The material moves continuously at a substantially constant speed, depending upon the production rate of the supplying machine.

At the outlet of the opening 7 is mounted a first severing element or cutting die 9, which in the present case is constituted by a hardened flat-ended cylinder adjustably threaded into a fixed bushing 11 and held in place by a set screw 19. The rear of the opening 7 is provided with a guiding die 13 for aligning the entering material M with the cutting die 9.

The carriage 5 includes a pin connection 15 with a downwardly extending rocker arm 17. The arm 17 is made up of two bars 21 held in rigid spaced relation by upper and lower spacer pieces 23 and 25. The spacer piece 25 forms a shoulder between pintles 27, which are rotary in the bars 21. The ends of the pintles 27 are provided with flats 2 slidable in vertical slots 4 of stationary pillow blocks 6. The blocks 6 are rigid with respect to stationary supports 8 for the frame 1.

Rocker 17 may be oscillated, as indicated by the dart D (Fig. 3), by means of a yoke 10. This yoke is constituted by a centerpiece 12, passing between the bars 21 and provided with end cross members 14 and 16, the latter being bolted thereto. These cross members have bevelled reliefs providing substantial line contacts 18 with the front and rear edges of the bars 21 and allowing angling of the rocker 17. A drive rod is shown at 20, reciprocated from a suitable reciprocating mechanism such as a hydraulic engine (not shown), whereby the rocker 17 may be oscillated. This reciprocates the pin 15 is a straight line, compensation for the required movement being afforded by slight vertical movements of the pintles 27 in the pillow blocks 6. It will be seen that the resulting reciprocation of the carriage 5 for a given stroke of the rod 20 is determined by the location of the contact points 18 between the pin 15 and pintles 27. The higher this location, the smaller the stroke

of the carriage 5 for given stroke of the rod 20. It will be understood that the machine which reciprocates the rod 20 may be elevated or lowered in order to effect the desired stroke adjustment. This convenient driving arrangement, provides an adjustable stroke for the carriage 5 even though rod 20 may have a constant stroke. This arrangement constitutes one of the improvement features of the present invention.

Returning to the carriage 5, it includes sidewise vertical guides 29 which are bridged by a plate 31. L-shaped slide blocks 33 are constrained to move vertically in the guides 29. These blocks are connected by a crankpin 35 passing through double crank elements 37. The crank elements are carried on double crankshaft sections 39 which are rotary in aligned bearings 41 in the frame 1. Supported upon the crankpin 35 between adjacent cheeks of the crank elements 37 is a ram 43. This ram carries at its lower end a second severing element or cutting tool 45 for vertical shearing cooperation with the end of the cutting die 9.

The ram 43 is normally biased clockwise to hold the tool 45 against the end of the die 9. This is accomplished as follows: Ears 22 are provided on the ram 43 and carry a cross pin 24. The pin 24 passes through an eye 26 formed at the end of a rod or link 28. Around the link 28 is coiled a compression spring 30. The link slides or telescopes through a rocking sleeve 32, threaded centrally through a rocking crosshead 34. The crosshead rocks on pintles 36, carried in the frame 5. The compression spring 30 reacts between the sleeve 32 and the eye 26, thus biasing the ram 43 clockwise, so as normally to engage the tool 45 against the end of the die 9. Adjustment of the compression in spring 30 is accomplished by threading adjustment of the sleeve 32. A set screw 38 holds any desired adjustment.

Beneath the plate 31 is a vertically slidable block 53 from which studs 55 extend upward. Sliding shoes 47, forming side parts of the block 53, move in the vertical guides 29, being guided thereby and also by upper parts of the L-shaped slide blocks 33. The studs 55 on the block 53 slide through threaded bushings 57 in the plate 31 (Fig. 8). Springs 61 located around rods 55 and nested in sockets 40 of member 53, react from the bushings 57 to bias the block 53 downward. The biasing pressure may be adjusted by adjustably threading the bushing 57 in plate 31. The downward movement of the block 53 is limited by adjustable head stops 59, constituted by lock nuts on the studs 55.

On the front of the block 53 is a hardened catch 63 for engagement by a latch element 65 on the ram 43. Thus when the catch 63 is behind (to the left of) the latch 65, the ram 43 is held in a vertical position, with the cutting tool 45 against the front face of the die 9 (see Figs. 1–5). Its motion relative to the carriage is then restricted to vertical sliding translation. When the ram 43 is moved downward by elements 37 and 39 (in a manner to be described below), the latch element 65 retracts from the catch 63 (which it is about to do in Fig. 5 after having passed through the Fig. 4 position). Thereafter the ram 43 is free to rotate counterclockwise under circumstances also to be described in connection with the showings in Figs. 6 and 7. As shown in Figs. 6 and 7, latch 65 may then move under the catch 63, which at this time retains its lowermost position as determined by the head stops 59.

Attached to the back of the frame 1 is a cam bracket 49 having forwardly extending cheeks 51 to which, by means of adjustable bolt and slot combination 42, are attached cam plates 44. The effective cam surfaces are shown at 46. By loosening the fasteners 42, the cams may be adjusted to bring their surfaces 46 into desired positions by means of adjusting screws 48, after which the fasteners 42 may be tightened. Follower rollers 50 are carried on the ram 43 next to the ears 22, being supported by the cross pin 24. Each follower roller 50 is in the plane of the operating surface 46 of a cam plate 44. Both cam surfaces 46 are of the same shape and are located in the same transverse position (see Figs. 2 and 3).

Operation is as follows, assuming that the material M is advancing at constant speed in the direction shown by the dart A in Fig. 3. It passes freely through guide member 13, opening 7 and die 9. Then as the rocker 17 swings to the right, the carriage 5 moves through the successive positions shown in Figs. 3–7. Initial acceleration of the carriage to the right moves the pin 35 forward (to the right). Being constrained by the slide blocks 33 in the vertical guides 29, the pin 35, by reason of its mounting on members 37 which are centered at 39, has a vertical component of movement relative to the carriage which is imparted to the center of rotation of the ram 43. At this time the ram cannot rotate, being constrained by the contact of latch 65 on catch 63 and by contact between the tool 45 and the end of die 9. Thus the ram 43 moves forward and downward through positions each parallel to the other, such as shown in Figs. 3–5. At this time the tool 45 shears through the advancing material M. The forward velocities of the material and of the severing elements 9 and 45 are at this time equal. Finally the material is sheared off. As indicated in Fig. 5, the block 53 has been adjusted by means of head stops 59 to cause the catch 63 at this instant to release the latch 65. This occurs under decelerating conditions at or near the end of the right-hand stroke of the carriage 5. At this time, or soon thereafter, the carriage reverses its movement while the oncoming material M continues its movement in the opposite direction. Figs. 6 and 7 show the final action in which a slight additional advance to the right of carriage 5 just prior to return precedes a reversal of carriage movement. This additional slight advance may under some circumstances be adjusted out of the action, and stroke reversal effected at the instant that severance is completed.

Upon carriage deceleration and/or reversal of carriage movement, the inertia of the ram 43 is sufficient to cause it to move anticlockwise, its center of gravity being below its pivoting center in pin 35 (compare Figs. 6 and 7). This action causes the tool 45 to withdraw to a position above the oncoming material which has not been cut off, thus clearing it so that it can move freely under the tool 45 without contacting it (Fig. 7). As this inertial movement of the ram 43 occurs, the spring 30 is initially compressed while the rod 28 is pushed through the bushing 32 and angled downward. Thus during a first range of retractive positions of the ram 43, the center of pin 24 is driven to the center line between the centers of members 35 and 36. During a second range of retractive positions of the ram 43, pin 24 is driven by spring 30 to continue anticlockwise movement of the ram 43. The entire overcentering action occurs during the movements of parts from the Fig. 5 position through the Fig. 6 position to the Fig. 7 position. The resulting overcentering movement first compresses the spring 30 (Fig. 6), which thereafter reexpands (Fig. 7) and forces the ram 43 into its final position shown in Fig. 7, wherein the tool 45 is positively maintained clear of contact with the oncoming work M. The above action also drives down the rollers 50 to positions adjacent the bottoms of the cams 44. Note that what may appear to be a tool and work contact in Fig. 7 is not such, since the bottom of the tool is of semicircular form, arcing over the material M.

Upon the return stroke of the carriage 5, the crankpin 35 rises, thus further tending to clear the tool 45 from the work M. During this carriage return movement the follower rollers 50 engage and ride up the cam surfaces 46. This rotates the ram 43 clockwise (cranks 37 rotating anticlockwise), thus to return the ram 43 to its vertical position, as shown in Fig. 3. During this action, as the pin 24 approaches the center line between members 36 and 35, the spring is recompressed and, as said center

line is crossed by the pin 24, the spring 30 reexpands. During this reexpansion a cam-forming surface 52 behind the latch element 65 engages under the catch 63 to lift it momentarily under power of spring 30, so as to allow the latch to assume its position to the right of the catch 63, as shown in Fig. 3. It will be noted in this connection that the catch 63 is on the block 53, which during this action moves up momentarily and compresses the springs 61. It will be observed that the cam surfaces 46 are designed so that at no time during the return movement will the lowermost portion of the tool 45 engage the workpiece M. In other words, the rising action of the center of the crankpin 35 is not permitted in its lifting effect upon the tool to be completely cancelled out by any downward component of tool movement. Note that Fig. 6 does not represent any arrangement of parts during a return stroke.

It will be observed that upon initiating each cycle of movement, starting with the Fig. 3 position, cutting starts immediately, the moving parts being coordinately locked with the material M. Since at this time the downward component of movement of the tool 45 is small, its cutting force is relatively large. This is at the time when such force is most required. As the downward component of velocity of the tool 45 increases and its cutting force decreases, the point is reached at which break-away shearing occurs (Fig. 4). Up until this point, the motions of the material M and the forward motion of the tool 45 are equal, because the severing elements grip the material during severance. If the material M normally moves at a speed greater than that of the carriage 5 and is stiff enough, it aids the driving mechanism. If the material is flexible, such as flat strip, and tends to move forward at such greater speed, a loop is allowed to form ahead of the device, suitable space and a table being provided for this purpose between the device and the machine which is feeding the material M to it. An advantage of the form of shear herein described, like that of said application No. 252,959, is that its cross-cutting action is so rapid that the flow of material is not long interrupted, thus minimizing the loop, even though the movement of the shear in the direction of the material movement may be less than that of the latter, say by as little as one-half. However, if the normal speed of the material M is not greater than, or slower than, the forward speed of 9 and 45, this looping is not necessary. In the event of the slower normal speed, whether the material is stiff or flexible, the action of the severing machine exerts a pull on it, tending to withdraw it from the supplying machine. This somewhat brakes the action of the severing mechanism. In any event, as soon as severance has been effected (Fig. 5), the material M is free to advance. In doing so, it follows up the anticlockwise movement of the ram 43 (Figs. 6 and 7).

Timing of the reciprocation of the carriage 5 depends upon the timing of the device which reciprocates rod 20. The timing may be manual or automatic, and if automatic, in response to a predetermined length of the material M to be cut off. Further details of the machine that may drive rod 20, and the timing, are not necessary, since these have been set forth in said application.

The stroke-adjusting feature of the invention, constituted by rocker 17 and its adjustable driving parts 10, 12, 14, 16 and 18, is important. It allows critical adjustments of the carriage stroke so that the amount of carriage travel after severance has occurred may be minimized or entirely eliminated. Thus the ram can be caused by inertia upon reversal of carriage movement at the end of its stroke immediately to snap out of interfering position of the tool 45, so that oncoming material M can immediately advance in the clear. This results in the ability of the machine to retract the carriage 5 promptly to its initial position in readiness for a succeeding cycle. Moreover, it also results in the ability to adjust the action for certainty in rotating the ram 43 to its Fig. 7 position immediately after severance, so that the forward nose of the oncoming material never touches the tool. If adjustment of the machine is such that there is some overtravel of the carriage to the right after severance, there will be some tendency of the nose of the oncoming material to aid in the counterclockwise rotation of the ram, as indicated in Fig. 6. It will be understood, however, that the machine may be adjusted so that the entire overcentering action on the ram is accomplished by inertia alone, by having the reversal of the carriage movement occur precisely at the time that severance is accomplished. But even with the adjustment indicated by the action shown in Figs. 6 and 7, there is never any tendency of the tool 45 to drop back from the Fig. 7 position onto the top of the work M during the return stroke. This is because of the holding effect of the overcentering mechanism.

In view of the above, it will be seen that the several objects of the invention are accomplished by the structure which has been described, including (1) the improved rocker drive for the carriage 5 which permits of close stroke adjustments; (2) the means for positively setting the ram 43 in a clearing position with respect to the work as the ram reverses its stroke; and (3) the overcentering and cam mechanism for holding the tool 45 clear of the material during its advance and for returning the tool to severing position at the start of a cycle of severance.

As various changes could be made in the above constructions without departing from the scope of the invention, 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.

I claim:

1. Severing apparatus for acting upon continuously advancing material, comprising a frame forming a first guide, a carriage, means to reciprocate the carriage in the guide from an initial position through forward severing and rearward retractive strokes, said carriage having a first severing element past which the material is adapted to move, and a second guide located crosswise of the first guide, a pivoted swinging ram mounted for reciprocating movement with the carriage and carrying a second swinging severing element, crank means connecting the ram and the frame and enforcing severing movement of the ram along the second guide during forward movement of the carriage and retractive movement of the ram during retractive movement of the carriage, resilient means adapted in a first position to bias the ram toward its severing position, and in a second position to bias the ram away from its severing position, and latch means between the ram and the carriage adapted to lock the ram against pivoting and in severing position during substantial forward movement of the carriage and thereafter releasing the ram to be pivoted upon retraction and held by said resilient means in its second position to cleared positions relative to said second severing element and relative to advancing unsevered material, said last-named positions being maintained throughout the retractive stroke of the carriage.

2. Severing apparatus made according to claim 1, including means operative during the retractive stroke of the carriage pivoting said ram against the biasing action of said resilient means and adapted to return the ram toward an initial severing position clear of the material.

3. Severing apparatus made according to claim 2, wherein said latch means is spring biased toward locking position and is adapted momentarily to be pushed aside by the ram in approaching its initial severing position so as again to lock the ram against pivoting.

4. Severing apparatus for acting upon continuously advancing material, comprising a frame forming a first guide, a carriage, means to reciprocate the carriage in the guide from an initial position through forward severing and rearward retractive strokes, said carriage having a first severing element past which the material is adapted to move and a second guide located crosswise of the first guide, a pivoted swinging ram mounted for reciprocating

movement with the carriage and carrying a second swinging severing element, crank means connecting the ram and the frame and enforcing severing movement of the ram along the second guide during forward movement of the carriage and retractive movement of the ram during retractive movement of the carriage, overcentering spring means adapted to bias the ram either first toward its severing position at the beginning of a forward stroke or second away from its severing position after severance, the pivot of the ram being arranged so that reversal of the carriage at the end of its stroke will cause said ram by its inertia initially to rotate against action of said overcentering spring means to move the ram from severing position, and said overcentering means being adapted subsequently to drive the ram to a clearing position relative to the advancing material, and latch means between the ram and the carriage adapted to lock the ram against pivoting and in severing position during substantial outward movement of the carriage but thereafter releasing the ram for pivoting.

5. Severing apparatus made according to claim 4, including means on the frame adapted to be engaged by an element of the ram and upon a retractive stroke of the carriage to pivot said ram against the second biasing action of said spring means and to move the ram toward a position for receiving the first biasing action of the spring means so as to drive the ram to its initial severing position.

6. Severing apparatus made according to claim 5, wherein said latch means is spring biased toward locking position and is adapted to be reset against its bias by the ram as the latter approaches its severing position under said first biasing action of said overcentering spring means.

7. Severing apparatus made according to claim 1, including a rocker arm articulated at one end with the carriage and at the other end with the frame, reciprocating means having a connection with the rocker arm adapted to oscillate the arm, the position of said connection along the rocker arm being adjustable, whereby with a predetermined stroke of the reciprocating means the stroke of the carriage may be adjusted.

8. Severing apparatus made according to claim 4, including a rocker arm articulated at one end with the carriage and at the other end with the frame, reciprocating means having a connection with the rocker arm adapted to oscillate the arm, the position of said connection along the rocker arm being adjustable, whereby with a predetermined stroke of the reciprocating means the stroke of the carriage may be adjusted.

9. Severing apparatus for acting upon continuously advancing material, comprising a frame forming a first guide in the general direction of forward material movement, a carriage, means to reciprocate the carriage in the guide from an initial position through forward severing and rearward retractive strokes, said carriage having a first severing element past which the material is adapted to move and a second guide located generally crosswise with respect to the first guide, a crank assembly rotatable in the frame and including a pivot means including a part cooperative with said second guide, whereby upon reciprocation of the carriage in the first guide said crank assembly will rotate relative to the frame and said pivot means will have a first component of movement equal to that of the carriage and a second component of approaching and recessive crosswise movement relative thereto, a rotatable ram on said pivot means and carrying a second severing element engageable with said first severing element, spring means rotatably biasing the ram away from a position of such engagement to a position clear of advancing material after a severance, means responsive to a retractive stroke of the carriage to return said ram to a position wherein the second severing element engages the first severing element, and latch means operative between the ram and the carriage adapted to hold the ram when it is in recessive position to engage the severing elements for relative severing movement during forward movement of the carriage, said latch means automatically releasing the ram in its final severance position.

10. Severing apparatus for acting upon continuously advancing material, comprising a frame forming a first guide in the general direction of forward material movement, a carriage, means to reciprocate the carriage in the guide from an initial position through forward severing and rearward retractive strokes, said carrriage having a first severing element past which the material is adapted to move, said carriage having a second guide located generally crosswise with respect to the first guide, a crank assembly rotatable in the frame and including a pivot means including a part cooperative with said second guide, whereby upon reciprocation of the carriage in the first guide said crank assembly will rotate relative to the frame and said pivot means will have a first component of movement equal to that of the carriage and a second component of approaching and recessive crosswise movement relative thereto, a rotatable ram on said pivot means and carrying a second severing element engageable with said first severing element, overcentering spring means rotatably biasing the ram either toward a position of engagement of said severing elements or to a position clear of advancing material after a severance, a cam, a cam follower on the ram adapted upon a retractive stroke of the carriage to return said ram to a position wherein the second severing element engages the first severing element, and latch means operative between the ram and the carriage adapted to hold the ram when it is in recessive position to engage the severing elements for relative severing movement during forward movement of the carriage, said latch means automatically releasing the ram in its final severance position.

11. Severing apparatus for acting upon continuously advancing material, comprising a frame forming a first guide in the general direction of forward material movement, a carriage, means to reciprocate the carriage in the guide from an initial position through forward severing and rearward retractive strokes, said carriage having a first severing element past which the material is adapted to move, said carriage having a second guide located generally crosswise with respect to the first guide, a crank assembly rotatable in the frame and including a pivot means including a part cooperative with said second guide, whereby upon reciprocation of the carriage in the first guide said crank assembly will rotate relative to the frame and said pivot means will have a first component of movement equal to that of the carriage and a second component of approaching and recessive crosswise movement relative thereto, a rotatable ram on said pivot means and carrying a second severing element engageable with said first severing element, latch means operative between the ram and the carriage adapted to hold the ram when it is in recessive position to engage the severing elements for relative severing movement during forward movement of the carriage, said latch means automatically releasing the ram in its final position of severance, and a spring-actuated overcentering mechanism connected between the ram and the frame adapted in a first range of positions of the ram to hold the severing elements in engagement and in a second range of positions of the ram positively to disengage the severing elements to an extent that the second severing element cannot be touched by the advancing material during the retractive stroke of the carriage.

12. Severing apparatus made according to claim 11, including a cam mechanism connected between the frame and the ram adapted upon a retractive stroke of the carriage to move the ram out of said second range of positions into said first range.

13. Severing apparatus for acting upon continuously advancing material, comprising a frame forming a first guide in the general direction of forward material movement, a carriage, means to reciprocate the carriage in the guide from an initial position through forward severing and rearward retractive strokes, said carriage having a

first severing element past which the material is adapted to move, said carriage having a second guide located generally crosswise with respect to the first guide, a crank assembly rotatable in the frame and including a pivot means including a part cooperative with said second guide, whereby upon reciprocation of the carriage in the first guide said crank assembly will rotate relative to the frame and said pivot means will have a first component of movement equal to that of the carriage and a second component of approaching and recessive crosswise movement relative thereto, a rotatable ram on said pivot means and carrying a second severing element engageable with said first severing element, latch means operative between the ram and the carriage adapted to hold the ram when it is in recessive position to engage the severing elements for relative severing movement during forward movement of the carriage, said latch means automatically releasing the ram substantially in its final position of severance, an overcentering mechanism comprising a rocking sleeve on the frame, a link pivoted to the ram and telescoping with the sleeve, a spring coiled around

said link and reacting between the sleeve and the ram, the arrangement being such that in a first range of ram positions it is biased to a position to hold the severing elements in engagement and in a second range of positions to disengage the severing elements to an extent that the second severing element is positively separated from advancing material.

14. Severing apparatus made according to claim 13, including a cam mechanism connected between the frame and the ram adapted upon a retractive stroke of the carriage to move the ram out of said second range of positions against bias of the spring and into said first range of positions in which the ram is responsive to bias of the spring to move the second severing element into engagement with the first severing element.

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