

July 16, 1963

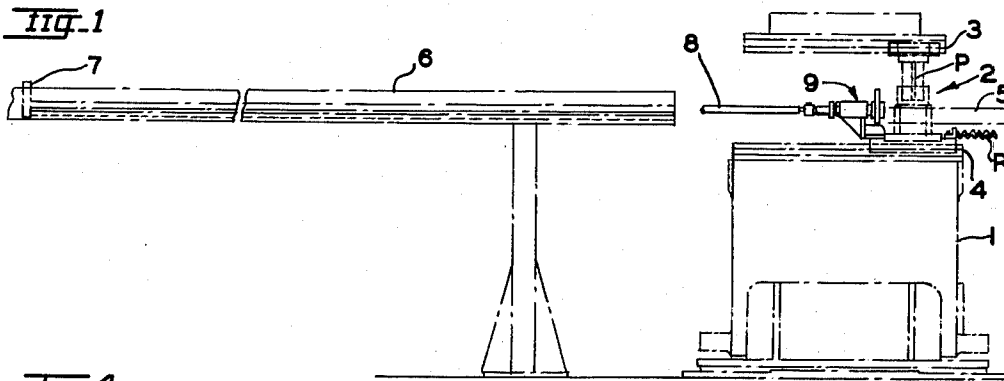
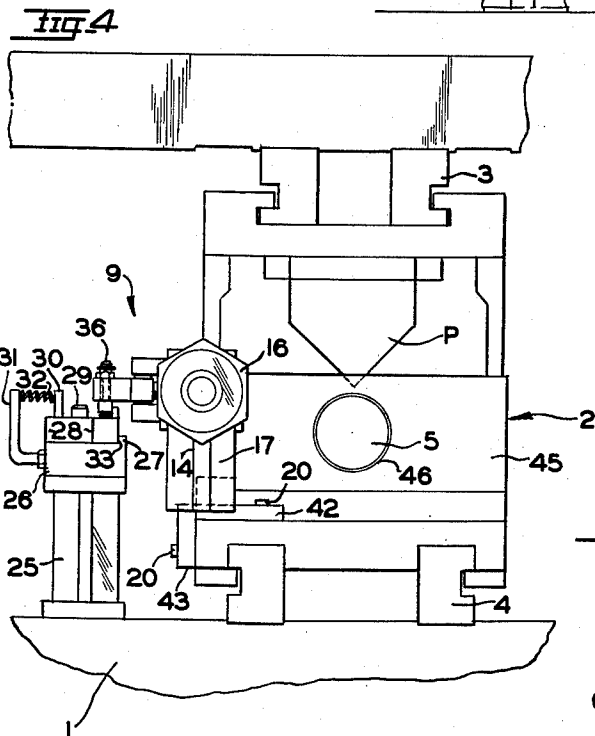
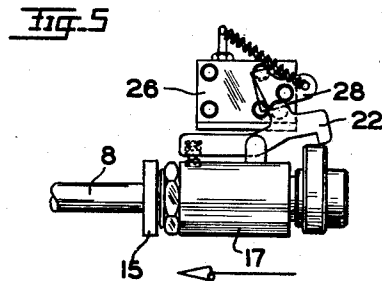
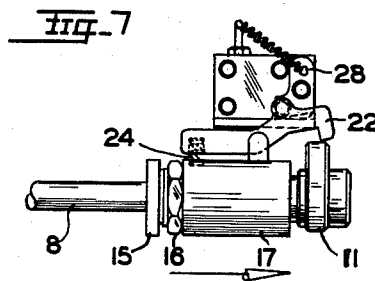
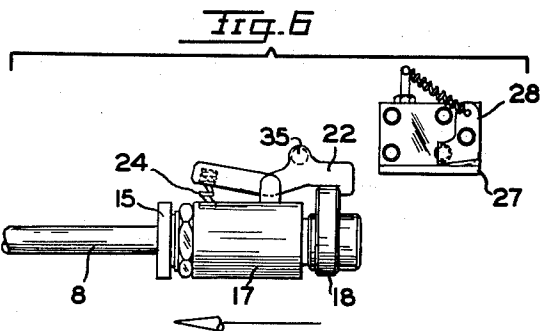
E. L. MACKEY

3,097,556

SNUBBER TYPE TRIGGER MECHANISM

Filed June 19, 1959

2 Sheets-Sheet 1



INVENTOR.  
EUGENE L. MACKEY

BY

*Oberlin, Mackey & Donnelly*  
ATTORNEYS



3,097,556

**SNUBBER TYPE TRIGGER MECHANISM**  
Eugene L. Mackey, Fairview Park, Ohio, assignor to The Yoder Company, Cleveland, Ohio, a corporation of Ohio

Filed June 19, 1959, Ser. No. 821,540  
14 Claims. (Cl. 83—287)

This invention relates as indicated to a snubber type trigger mechanism, and more particularly to such mechanism especially adapted to be employed with a flying saw, shear, die punch or the like for severing lengths of rapidly traveling elongated stock such as tubing, for example.

It is, of course, necessary that a flying shear move with the stock at the same rate of speed in order to sever a predetermined length therefrom, and a difficult problem is encountered in accelerating the shear to the speed of the stock issuing from the forming mill or the like inasmuch as such shear represents a considerable mass and the stock may be moving at very high speeds such as 1,000 feet per minute or more. When operating at such high speeds, it has been a problem to obtain uniform predetermined lengths of tubing or the like, and it is an important object of this invention to provide an improvement in the flying shear enabling much more accurate cuts to be made even when operating at very high speeds.

The leading end of the stock such as tubing is ordinarily caused to engage a "flag" in the path thereof, such flag being connected to a trigger rod which in turn is connected to the flying shear mounted for reciprocation along a path parallel to the path of the stock. In this manner, the advancing stock pushes the flag which in turn pulls the shear along with the stock until a predetermined point is reached where the shear is actuated to cut off the leading end portion of the stock. When the stock thus engages the flag, however, it is traveling at such a high rate of speed that there is a pronounced tendency for the flag to bounce away from the end of the stock so that the shear may not engage and sever the stock at the exact predetermined point intended. On the other hand, if the flag is sufficiently rigidly connected to the flying shear, there is a tendency for the stock to buckle, particularly when such stock is of relatively thin gauge, thereby likewise causing irregular lengths to be severed as well as damaging the stock itself. In attempting to overcome this problem in the past, various spring devices have been utilized interconnecting the flag and shear, but once such spring has been either compressed or extended it naturally tends to return to its normal position and thus, while somewhat relieving the shock, nevertheless still causes the flag to bounce somewhat away from the end of the stock. It is accordingly a further object of my invention to provide a trigger snubber mechanism for flying shears and the like which will prevent the flag from bouncing away from the end of the stock to be cut off and yet will at the same time avoid buckling or other damage to such stock.

It is yet another object of my invention to provide a snubber mechanism for flying shears or the like providing an initial impact absorbing connection which will automatically lock the shears and the stock in a predetermined relation to ensure constant lengths being severed therefrom.

Other objects and advantages of the present invention will become apparent as the following description proceeds.

To the accomplishment of the foregoing and related ends, the invention, then, comprises the features hereinafter fully described and particularly pointed out in the claims, the following description and the annexed draw-

2

ings setting forth in detail a certain illustrative embodiment of the invention, this being indicative, however, of but one of the various ways in which the principles of the invention may be employed.

In said annexed drawings:

FIG. 1 is a somewhat schematic fragmentary view of a flying shear or die punch and runout table employing my invention;

FIG. 2 is a fragmentary sectional view of my snubber type trigger mechanism;

FIG. 3 is a top plan view of the mechanism shown in FIG. 1;

FIG. 4 is an end elevation of the snubber type trigger mechanism shown in FIG. 2 on a somewhat reduced scale illustrating the manner in which it is attached to the flying shear or die punch;

FIG. 5 is a fragmentary schematic view of my snubber type trigger mechanism showing the latching mechanism shortly after the stock has hit the flag;

FIG. 6 is a view similar to FIG. 5 but illustrating the snubber mechanism in latched position; and

FIG. 7 is a view similar to FIG. 6 illustrating the manner in which the snubber mechanism is unlatched as the shear returns to its starting position.

Referring now to the drawings and more particularly to FIG. 1, there is shown a conventional cut-off press comprising a base 1 having mounted thereon a flying shear or cut-off die punch 2 for horizontal sliding movement in slideways 3 and 4. The tube or stock 5 enters from the right and passing through the cut-off dies 2 extends outwardly to the left on runout table 6. Positioned in the path of the stock 5 on runout table 6 is a flag 7 which is connected to the flying shears 2 by means of an elongated trigger rod 8. Interposed between the flying shears 2 and the flag end of the trigger rod is my snubber type trigger mechanism generally indicated at 9.

Referring now more particularly to FIG. 2, the trigger rod 8 is connected by means of a head pin 10 to a stop ring 11. Interposed between the stop ring 11 and the trigger rod 8 is a spring barrel 12 which has suitable aligned holes therein through which passes the head pin 10. The spring barrel is formed with an annular shoulder 13 against which abuts a compression spring 14. The compression spring extends between the shoulder 13 of the spring barrel 12 and an adjusting screw 15 in the form of a sleeve surrounding the trigger rod 8. Externally threaded on the adjusting screw is a jamb or lock nut 16 abutting a die slide bracket 17. The die slide bracket is formed with an inwardly directed shoulder or flange 18 overlapping an outwardly directed shoulder 19 on the spring barrel 12. The die slide bracket 17 is bolted to the flying shears as for example at 20 so that these parts will move as a unit when propelled by the trigger rod.

It will now be seen that when the end of the elongated stock hits the flag and moves the trigger rod to the left, as seen in FIG. 2, the motion starts to compress spring 14 because the spring barrel 12 and the stop ring 11 are connected to the trigger rod 8 by means of the head pin 10. The compression of spring 14 exerts a force against adjusting screw 15 which is in turn threaded on the die slide bracket 17 and held in position by the lock or jamb nut 16.

The proper compression of the spring 14 may be adjusted by means of the screw 15 which will move longitudinally within the die slide bracket 17 either to compress the spring or allow it to expand. The spring 14 has to be so adjusted that the stop ring 11 will seat against the end of the die slide bracket, as shown at 21, before the punch or shear is actuated to sever a length of the stock.

3

Referring now to FIG. 3, it will be seen that when the stop ring 11 seats against the die slide bracket at 21, the position of which is shown in phantom lines, a latch 22 being pivoted at 23 will snap into place behind the stop ring 11 to keep it in abutting relation with the die slide 17 as a result of the force of compression spring 24 pivoting the latch 22 in a clockwise direction as viewed in FIG. 3. This locking action keeps the spring 14 compressed and positively positions the trigger flag with respect to the die or shears to produce consistent accurate lengths of cut. When the latch 22 is locked behind the stop ring 11, the flying shears will be moving at the same rate of speed as the stock. After the shears have cut the stock, the die reverses its direction and moves back toward its original position with the latch 22 still holding the stop ring, a conventional kickout device having removed the severed length of stock from the runout table 6. The reversing of the shears may be accomplished in any conventional manner as for example by means of two tension springs R, shown in FIG. 1, which are attached by brackets to the sliding die plate and to some stationary object as, for example, the housing of the last pass of the sizing mill.

Referring to FIGS. 3 and 4, it will be seen that there is mounted on the base 1 in a stationary position a cam support bracket 25 on which is rigidly supported a cam holder 26 having a shoulder 27 thereon extending the entire length thereof. A cam member 28 is pivotally mounted on the holder 26 about a stripper bolt 29. The cam member 28 is of a generally L-shape configuration, as shown in FIG. 3, and has a pin on the outer end, as indicated at 30. Between this pin 30 and a stationary pin 31 is a tension spring 32. As will be seen, the cam member 28 has a surface 33 abutting shoulder 27 to preclude the cam member 28 from moving further in a counter-clockwise direction than its position as illustrated in FIG. 3. On this same end of the cam member is an inclined portion or ramp 34 which is positioned to catch the underside of a bearing follower 35 on cam screw 36 mounted on the latch 22. In this manner, as the snubber mechanism returns past the cam 28, the follower 35 will ride up the ramp 34 pulling the latch 22 away from the stop ring 11 against the force of compression spring 24 permitting the spring 14 to return the stop ring and trigger rod to the original extended position.

The cam member 28 is pivoted about stripper bolt 29 so that it may be pivoted or kicked out of the way of the follower 35 when the snubber mechanism is traveling to the left, as seen in FIG. 5. The cam 28 will rotate about stripper bolt 29 against the force of tension spring 32 when the follower 35 strikes the end of the inclined ramp 34, as shown in FIG. 5. In this manner the cam is removed from the path of the follower 35 and returned by the tension spring when the follower has passed. Since the cam member has a rounded recessed portion generally shown at 37 in FIG. 3, it is perfectly free to pivot in a clockwise direction from the position shown in FIG. 3.

As shown in FIG. 2, the trigger rod 8 may have an extension 38 in the form of a pipe or tube removably connected thereto by means of a pin 39 passing through the enlarged annular end 40 and a stud 41 welded or otherwise secured in the extension 38. In this manner extensions of various lengths may be secured to the rod 8 selectively to vary the distance between the flag and the shears and thereby vary the length of the section severed from the stock. It will, of course, be understood that the flag itself may be removably secured to the rod in a manner permitting the flag to be spaced along the rod as desired and that the rod may be calibrated so the flag need only be placed at the proper calibration to obtain the desired length of severed stock.

As seen in FIGS. 2-4, the die slide bracket is mounted on the reciprocating shears or die punch by means of

4

suitable bolts 20. These bolts pass through a horizontal plate portion 42 and a vertical plate portion 43 of the die slide bracket to fasten it to the corner of the flying shears or die punch, such plates being connected to the barrel of the die slide bracket by ribs 44.

The illustrated severing mechanism comprises a V-shape punch P which is actuated downwardly through suitable guides 45 to sever the stock passing through openings 46 therein. It will, of course, be understood that any suitable severing mechanism may be employed and moreover, the die slide bracket 17 may be attached thereto in any convenient manner.

#### Operation

Referring to FIGS. 3 and 5-7, it will now be seen that my snubber type trigger mechanism operates in the following manner. As shown in FIG. 3, the snubber is in its unlatched extended position awaiting the impact of the end of the stock against the flag which is spaced to the left. When the stock strikes the flag, the spring 14 immediately begins to compress and the entire unit starts moving in the direction of the arrow shown in FIG. 5. The follower 35 strikes the right end of the inclined ramp portion pivoting the cam member 28 out of its path of travel as shown in FIG. 5.

As shown in FIG. 6, the trigger rod with the stop ring attached thereto has now completely overcome the inertia of the shears or the like, the stop ring 11 abutting against the die slide 17, the spring 14 being compressed, and the latch 22 snapped into a locking position as a result of the force of spring 24. The distance between the shears and the die slide is now fixed and the shears will be actuated to sever the stock passing therethrough. As soon as the shears have severed the stock, a gravity drop or kickout device will remove the severed length from the runout table and the snubber mechanism will now move in the direction shown in FIG. 7 as the result of the action of the return mechanism R. It will, of course, be understood that the return mechanism, while illustrated as springs, may, however, be such mechanism as hydraulic or air cylinders.

As the snubber mechanism moves back to its original position, the follower will ride up the incline or ramp 34 on the cam member 28 which has been seated against the stop or shoulder 27 by the tension spring 32. This will cause the follower 35 to pull the latch from its locked position and release the stop ring so that it will extend to its original position as the result of the force of spring 14. When the parts of my snubber mechanism are again in the relative positions shown in FIG. 3, the mechanism is again awaiting the impact of the severed end of the stock against the flag.

When the impact of the stock against the flag compresses the spring 14 and the inertia of the shears is overcome, there will always be a tendency for the parts to bounce away from each other due to the resiliency of the spring. Without the latch this would result in a series of impacts as the stock again and again strikes the flag after it has bounced away. This, of course, would not ensure that the lengths of severed stock would in any wise be uniform. Even without a spring there will always be a tendency for the parts to bounce away. However, without an impact absorbing spring, there will be a tendency for stock, such as thin walled aluminum extrusions or tubes or small diameter bars, etc., to buckle. This can not only affect the length of the stock severed but may also affect the continued operation of the entire mill. A snubber mechanism that can both absorb the inertial impact of the stock and guarantee uniform lengths of severed stock will permit the entire mill to be run at a much higher rate of speed since the speed of the mill is generally governed by how fast and efficiently the stock lengths may be severed and disposed of for storage or shipment.

It will now be seen that by incorporating the self lock-

5

ing and unlocking features of my invention with the impact absorbing features, I have provided a snubber type trigger mechanism that will prevent the flag from bouncing away from the stock and also preclude the stock from buckling.

It will, of course, be understood that my snubber type trigger mechanism is equally applicable to a flying punch or shear to sever holes or openings in sheet material, the flag abutting or being contacted by the previously severed openings.

Other modes of applying the principle of the invention may be employed, change being made as regards the details described, provided the features stated in any of the following claims or the equivalent of such be employed.

I, therefore, particularly point out and distinctly claim as my invention:

1. In a snubber type trigger mechanism for flying shears and the like comprising shear means mounted for movement with an elongated moving stock, flag means in the path of such stock, inertia absorbing means interconnecting said flag and said shear means for relative movement resiliently to absorb the inertial impact of such stock engaging said flag means; and latch means to lock said flag means and shear means against such relative movement after such inertia has resiliently been absorbed.

2. The mechanism of claim 1, including means to release said latch means to unlock the flag and shear means whereby the flag and shear means may move relative to each other after a length has been severed from such stock.

3. The mechanism of claim 1, wherein said inertia absorbing means comprises a compression spring adapted to be compressed by the impact of such stock against said flag means and the inertia of said shear means.

4. A mechanism as set forth in claim 3 including a stop ring connected to said flag mounted for movement with respect to said shear means and engaging said compression spring, said latch means being operative to lock said stop ring and shear means against relative movement after said stop ring has moved a predetermined distance with respect to said shear means compressing said spring.

5. A mechanism as set forth in claim 4 including means to adjust such predetermined distance that the stop ring moves before it is locked to said shear means.

6. A mechanism as set forth in claim 5 including means to release said latch means to unlock the flag and shear means after a length has been severed from such stock.

7. In a snubber type trigger mechanism for a cut-off die and the like adapted to sever lengths from traveling work, means mounting the cut-off die for movement parallel to the path of such traveling work, a trigger flag disposed in the path of such traveling work forwardly of said cut-off die, a trigger rod extending from said flag to said cut-off die, inertia absorbing means interconnecting said trigger rod and cut-off die for relative resilient movement whereby said rod may move away from said

6

cut-off die a predetermined distance when such traveling work strikes said trigger flag; latch means automatically to lock said rod and cut-off die against further relative movement after said rod has moved such predetermined distance with respect to said cut-off die and the inertia thereof has been absorbed.

8. A mechanism as set forth in claim 7 wherein said inertia absorbing means comprises a compression spring surrounding said rod and said latch means comprises a pivoted latch member operative to hold said spring in a compressed condition after such traveling work has struck said trigger flag and said rod and cut-off die have moved such predetermined distance.

9. A mechanism as set forth in claim 8 wherein said rod has a stop ring on the end thereof abutting said spring and said rod moves away from said cut-off die against the force of a compression spring to be automatically locked in a state of compression by said latch means engaging said stop ring.

10. A mechanism as set forth in claim 7 including cam means engageable with said latch means operative to release said latch means to unlock said rod and cut-off die after said cut-off die has severed a length from such work.

11. A mechanism as set forth in claim 10 wherein said cam means is mounted in a stationary position with respect to said cut-off die and such traveling work.

12. A mechanism as set forth in claim 11 wherein said cam means comprises a pivot cam member having a ramp thereon engaging said latch means to release said latch means as the snubber mechanism moves therepast in a direction opposite to that of the traveling work.

13. A mechanism as set forth in claim 12 wherein said pivot cam member is engaged by said latch means and is pivoted out of the path of said latch means as said cut-off die moves in the same direction as the traveling work.

14. In a cut-off mechanism, a cut-off die operative to sever lengths from traveling work, means mounting said cut-off die for movement parallel to the path of such traveling work, a flag disposed in the path of such traveling work, inertia absorbing means interconnecting said flag and cut-off die for relative resilient movement whereby said flag may move relative to said cut-off die a predetermined distance when such traveling work strikes such flag; latch means operative to lock said flag and cut-off die against relative movement, and means responsive to the relative movement of said flag and cut-off die such predetermined distance automatically operative thus to actuate said latch means to lock said flag and cut-off die against further relative movement.

#### References Cited in the file of this patent

##### UNITED STATES PATENTS

|           |          |               |
|-----------|----------|---------------|
| 1,269,635 | Neuman   | June 18, 1918 |
| 1,930,295 | VonHenke | Oct. 10, 1933 |
| 2,133,542 | Jensen   | Oct. 18, 1938 |
| 2,341,870 | Johnston | Feb. 15, 1944 |
| 2,582,025 | Frank    | Jan. 8, 1952  |