May 11, 1943. H. G. ALLEN 2,319,103

TAPE SEVERING MECHANISM

Filed Oct. 1, 1941 5 Sheets-Sheet 1

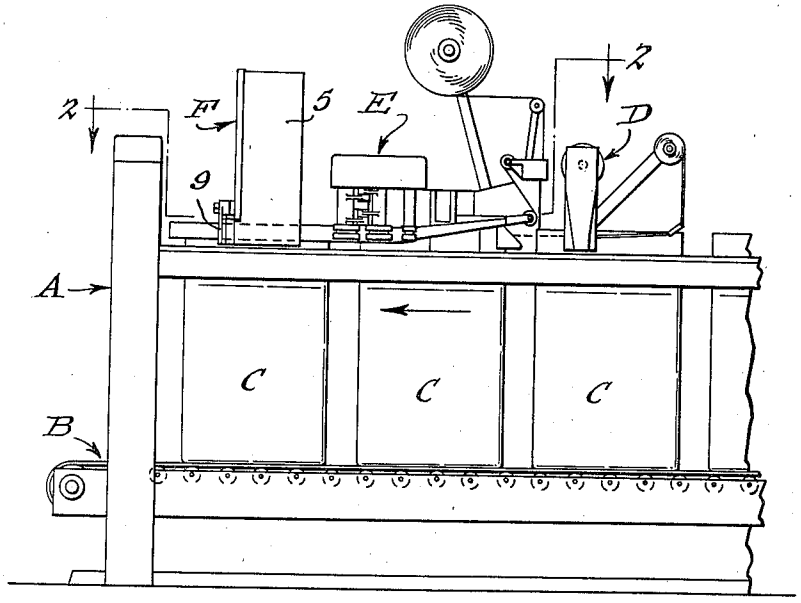

Fig. 1.

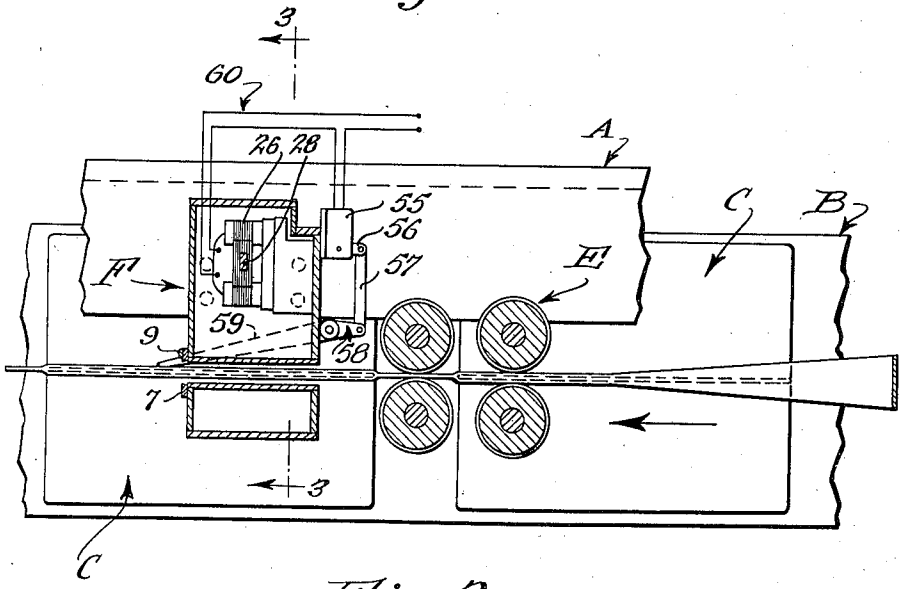

Fig. 2.

INVENTOR
Howard G. Allen
BY
James D. Bock
ATTORNEY

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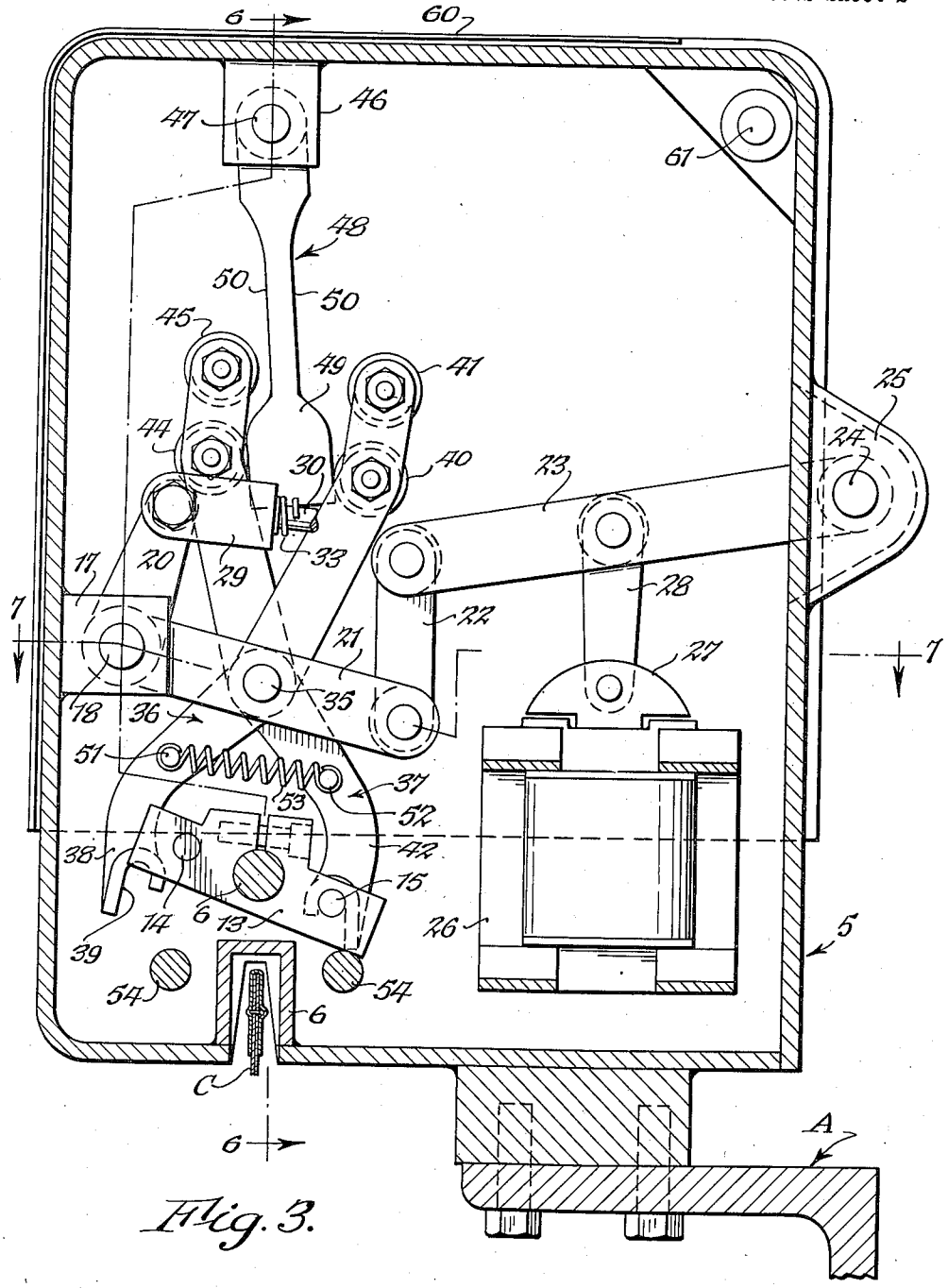

Fig. 3.

INVENTOR
Howard G. Allen
BY
James D. Bock
ATTORNEY

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TAPE SEVERING MECHANISM

Filed Oct. 1, 1941 5 Sheets-Sheet 3

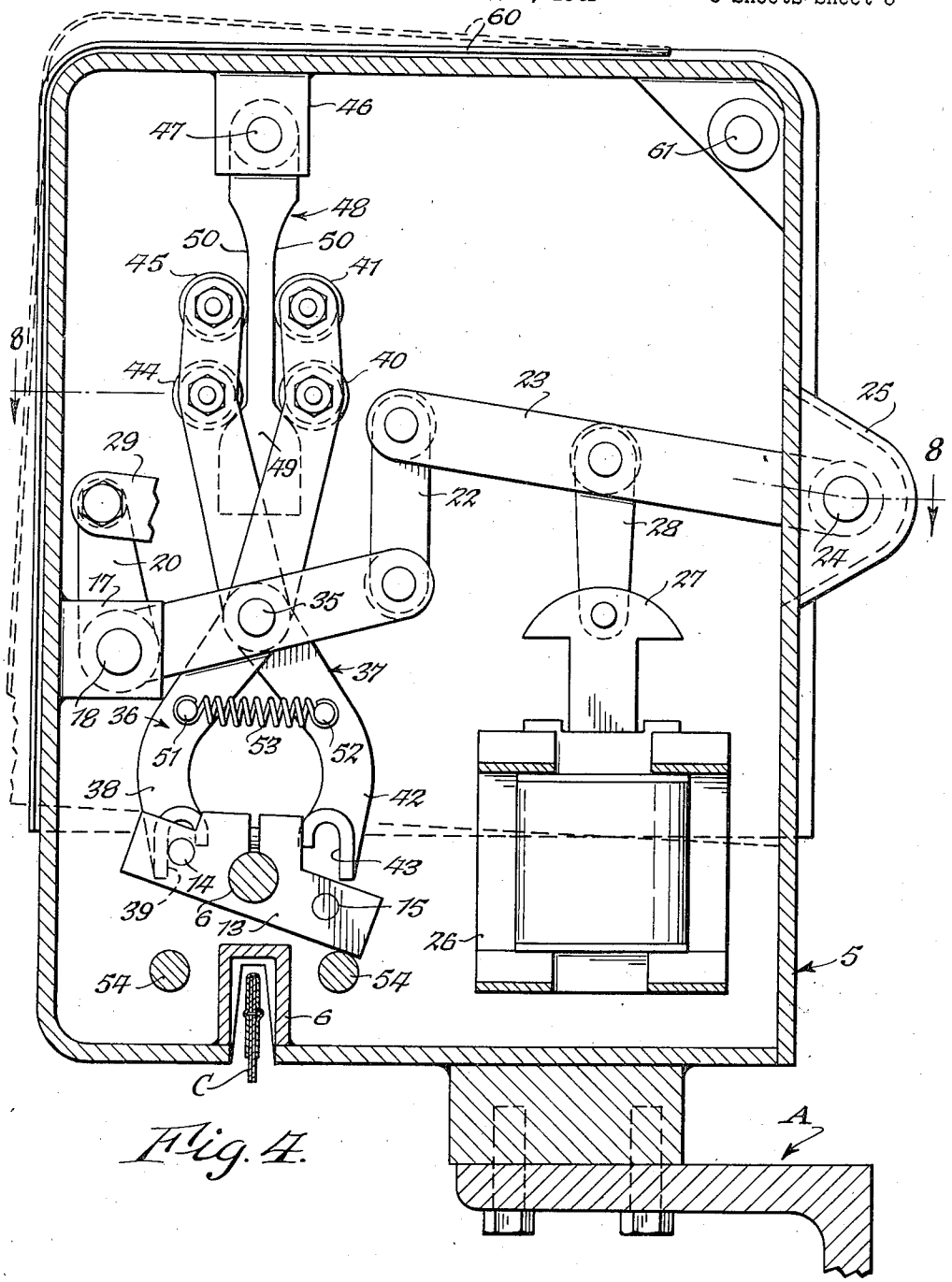

Fig. 4.

INVENTOR
Howard G. Allen
BY
James D. Bock
ATTORNEY

May 11, 1943. H. G. ALLEN 2,319,103

TAPE SEVERING MECHANISM

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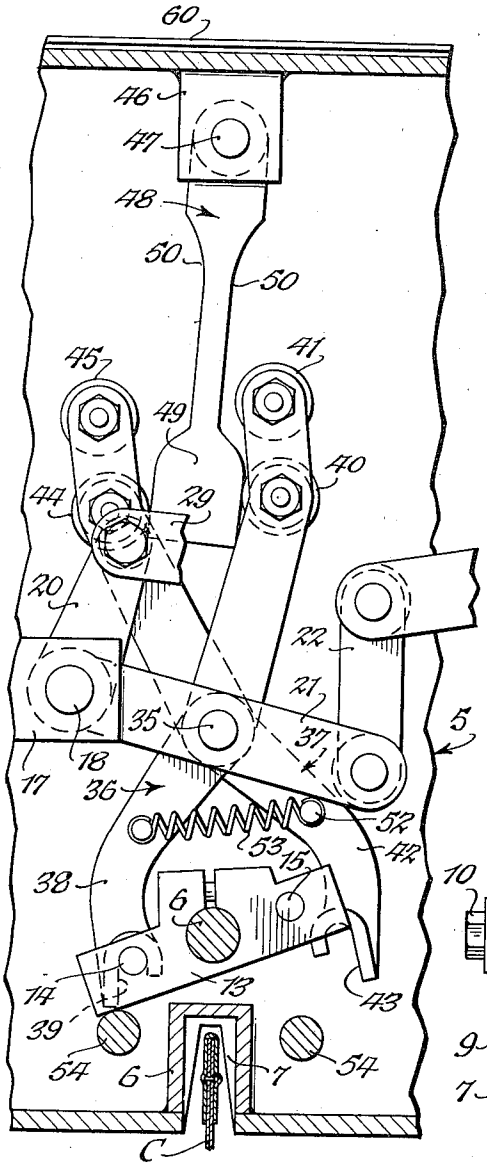

Fig. 5.

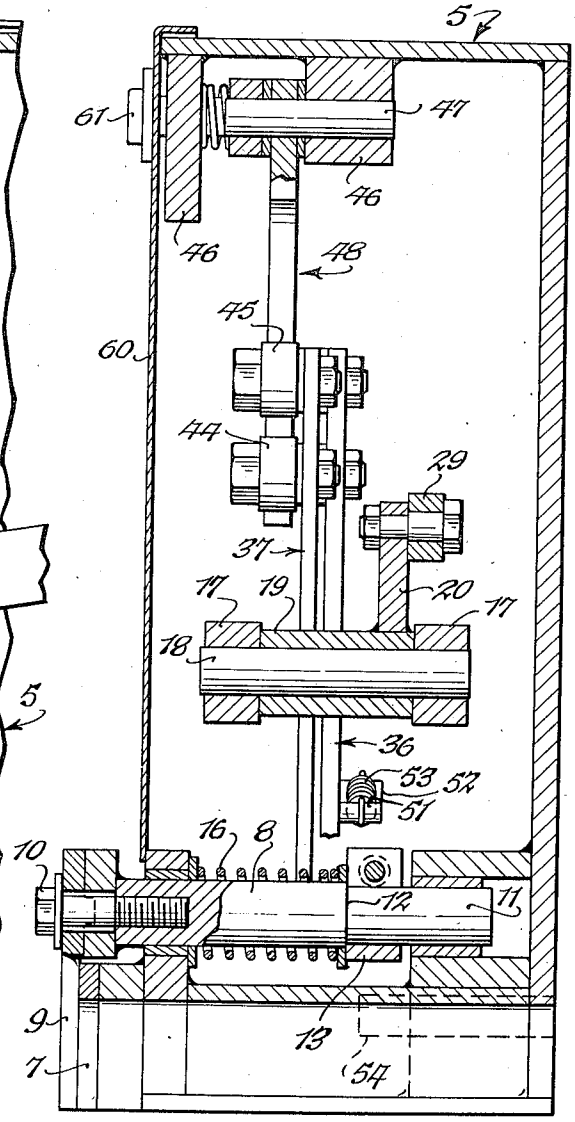

Fig. 6.

INVENTOR
Howard G. Allen
BY
James D. Bock
ATTORNEY

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TAPE SEVERING MECHANISM

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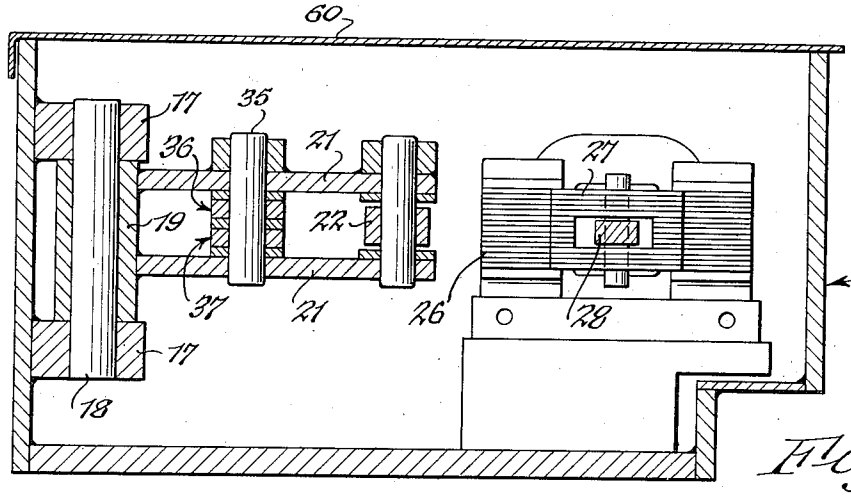

Fig. 7.

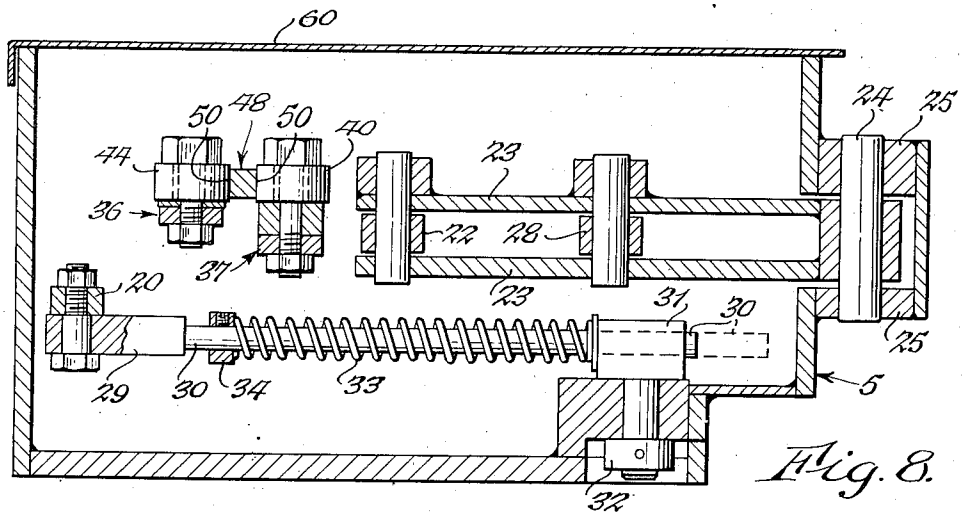

Fig. 8.

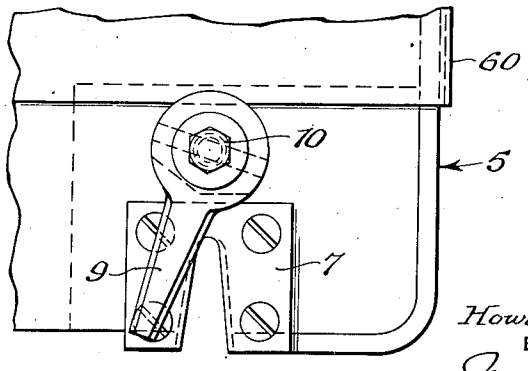

Fig. 9.

INVENTOR
Howard G. Allen
BY
James D. Bock
ATTORNEY

Patented May 11, 1943 2,319,103

UNITED STATES PATENT OFFICE

2,319,103

TAPE SEVERING MECHANISM

Howard G. Allen, Niagara Falls, N. Y., assignor to Bagpak, Inc., New York, N. Y., a corporation of Delaware

Application October 1, 1941, Serial No. 413,109

6 Claims. (Cl. 164—43)

This invention relates to new and useful improvements in machines for automatically closing and sealing bags and the like and particularly seeks to provide novel mechanisms for severing tape employed in the closing of heavy bags.

It is common for machines of this nature to operate upon bags successively presented to closing and tape applying mechanisms in spaced relationship. Normally, the tape is continuously withdrawn from a supply reel and applied to the bags. Consequently, the tape spans a space between successive bags and must be severed in order to permit subsequent handling of individual bags.

Older forms of mechanisms employed to sever the tape or closing media often included cutter elements simulating a pair of scissors in action or included cutter elements comprising a stationary shear anvil and a movable shear blade which was normally maintained open with respect to the anvil and partook of a cyclic shearing operation each time severing occurred. More recent mechanisms include a cutter blade which swings across a stationary shear anvil spanning the path of travel of the material to be severed to effect one severing action and then swings back to effect another severing action after a proper interval of time. This invention relates to the latter type of severing mechanism and provides novel devices for effecting and controlling actuation of the cutter blade.

It is, therefore, an object of this invention to provide novel severing mechanism for use in conjunction with bag closing machines and which includes a stationary shear anvil adapted to span the path of travel of material to be severed, a cutter blade adapted to be oscillated across the face of the anvil, and solenoid actuated cam controlled devices for effecting oscillation of the cutter blade.

Another object of this invention is to provide a mechanism of the character stated which is positioned adjacent the path of travel of the closure elements of serially connected bags and includes sensing elements effective to initiate operation of the actuating solenoid each time a space between two bags is in registry with the cutter elements.

Another object of this invention is to provide a mechanism of the character stated in which the cutter oscillating devices are effective to oscillate the cutter blade in one direction upon energizing of the solenoid and effective to oscillate the cutter blade in the other direction upon the next succeeding energization of the solenoid.

Another object of this invention is to provide a mechanism of the character stated having actuating linkages including a cutter blade assembly having a tilt bar carried thereby, a pair of bodily movable crossed links or arms pivotally connected intermediate their ends and having their lower ends selectively engageable with the respective ends of the cutter blade tilt bar, means for bodily and vertically reciprocating the crossed links, and means associated with the upper ends of the links for selectively determining which of the links will actively engage an associated end of the cutter blade tilt bar.

Another object of this invention is to provide a mechanism of the character stated in which the link position selecting or controlling means includes a floating cam element operatively associated with the upper ends of the crossed links.

Another object of this invention is to provide a mechanism of the character stated which is simple in design, rugged in construction and economical to manufacture.

With these and other objects in view, the nature of which will become more apparent, the invention will be more fully understood by reference to the drawings, the accompanying detailed description, and the appended claims.

In the drawings:

Fig. 1 is a somewhat diagrammatic fragmentary front elevation of a portion of a bag closing machine in connection with which mechanisms constructed in accordance with this invention are adapted to be employed;

Fig. 2 is a horizontal section taken along line 2—2 of Fig. 1;

Fig. 3 is a vertical transverse section taken along line 3—3 of Fig. 2 and shows the cutter actuating linkages positioned at one lower extremity of movement;

Fig. 4 is a transverse vertical section generally similar to Fig. 3 but showing the actuating linkages in an intermediate position;

Fig. 5 is a fragmentary vertical transverse section generally similar to Figs. 3 and 4 but shows the actuating linkages in the other lower extreme position;

Fig. 6 is a longitudinal vertical section taken along line 6—6 of Fig. 3;

Fig. 7 is a horizontal section taken along line 7—7 of Fig. 3;

Fig. 8 is a horizontal section taken along line 8—8 of Fig. 4; and

Fig. 9 is a detailed elevational view of the cutter elements.

Referring to the drawings in detail, the invention as illustrated is embodied in a bag closing machine which may be of the type shown in U. S. Letters Patent 2,097,450, granted to R. N. Cundall et al. on November 2, 1937, and which includes a main supporting frame A, a continuously moving horizontal conveyor B adapted to support and advance a line of spaced bags C, a sewing head D carried by the frame and effective to seal the bag mouths by a line of stitches, a tape applying assembly E for adhesively applying a strip of tape to the stitched bag end for sealing the same, and severing mechanisms F effective to sever the tape and the underlying stitching at positions intermediate successively presented bags.

The severing mechanism F to which this invention particularly relates includes a housing 5 rigidly affixed to a horizontal member of the main supporting frame A. The housing 5 is positioned after the tape severing mechanism and is disposed over the path of travel of the sealed bag mouths. The bottom of the housing 5 is provided with a longitudinally extending inverted U channel 6 which is adapted to receive the bag mouths during passage thereof through the severing mechanism. One end of the channel 6 is provided with an externally disposed inverted U-shaped shearing anvil 7 which is rigidly affixed thereto. A rock shaft 8 is journalled between the end walls of the housing 5 and is disposed in alignment with and slightly above the channel 6. One end of the shaft 8 projects outwardly beyond the housing and is provided with a depending shear or cutter blade 9 removably affixed thereto as by a bolt 10 and is disposed in cooperative shearing relation with respect to the stationary anvil 7. The other end of the shaft 8 is provided with a portion 11 of reduced diameter defining a shoulder 12. A tilt bar 13 is releasably secured to the reduced diameter portion 11 of the shaft 8 and abuts the shoulder 12 thereof. The end portions of the tilt bar are provided with studs 14 and 15 projecting normally therefrom towards the cutter blade. A compression spring 16 is carried by the shaft 8 and extends between the tilt bar 13 and the opposed wall portion of the housing and serves to constantly urge the shaft axially to maintain the cutter blade 9 in yielding spring urged contact with the anvil 7. Obviously, tilting of the bar 13 in either direction will effect a corresponding oscillation of the cutter blade 9 across the shearing anvil 7. Novel devices are provided whereby tilting of the bar 13 may be effected in the desired manner and at the proper intervals of time.

One side wall of the housing 5 is provided with a pair of spaced inwardly projecting lugs 17, 17 which carry a shaft 18. A sleeve 19 having an upstanding pitman 20 rigidly secured thereto at one end is journalled on the shaft 18. The sleeve 19 is also provided with a pair of spaced parallel inwardly projecting arms 21, 21, the free ends of which are pivotally attached to the lower end of a connecting link 22. The free end of the link 22 is pivotally connected intermediate the free ends of a pair of spaced parallel arms 23, 23, the other ends of which are carried by a shaft 24 journalled in lugs 25 on the adjacent wall of the housing 5. A solenoid 26 having a plunger 27 is secured within the housing and is positioned below the arms 23. The plunger 27 of the solenoid is operatively connected to the arms 23 through the medium of a link 28 pivotally attached at its ends to the arms and plunger. Thus, the solenoid through the connection with the arms 23 is adapted to effect a downward swinging movement of the arms 21 about the shaft 18.

The upper or free end of the pitman 20 is pivotally connected to the shouldered end 29 of a rod 30. The other end of the rod 30 is slideably carried in bearing block 31 pivotally attached to the adjacent wall of the housing 5 as by stud and collar connections 32. A compression spring 33 is carried by the rod 30 and extends between the bearing block 31 and the shoulder 29. Thus the action of the spring 33 through axial movement of the rod 30 is constantly effective to tend to swing the pitman 20 in a counter-clockwise direction and constantly tends to lift the arms 21 and 23 as well as the plunger 27 of the solenoid. In order that the effective strength of the compression spring 33 may be selectively varied the shaft 30 may be provided with an abutment collar 34 adjustably carried thereby. By varying the axial position of the collar 34 it is obvious that the effective strength of the spring 33 may be varied.

The spaced arms 21, 21 are provided intermediate their ends with a transversely extending pin 35 which pivotally supports a pair of crossed symmetrically opposed arms 36 and 37 at the point of crossing. The arm 36 is provided with a lower end portion 38 terminating in a downwardly opening slot 39 adapted to receive the stud 14 of the cutter blade tilt bar 13. The upper end of the arm 36 is provided with a pair of vertically spaced roller cam followers 40 and 41, the purpose of which will be hereinafter described. The arm 37 is similarly provided with a lower end portion 42 which terminates in a slot 43 symmetrically opposed to the slot 39 of the arm 36 and is adapted to receive the stud 15 of the cutter blade tilt bar. The upper end of the arm 37 is provided with a pair of vertically spaced roller cam followers 44 and 45. The top of the housing 5 is provided with a pair of depending lugs 45, 46 between which a shaft 47 is journalled. A pendant cam element generally indicated at 48 is pivotally supported from the shaft 47 and is provided with an enlarged lower end portion 49 and symmetrical cam surfaces 50, 50 on its opposite longitudinal edges. The pendant cam 48 overlies the arms 36 and 37 and has its lower end portion 49 disposed intermediate the sets of roller cam followers 40, 41 and 44, 45 carried by the upper ends of the arms 36 and 37. The lower portions 38 and 42 of the arms 36 and 37 are respectively provided with studs 51 and 52 between which a tension spring 53 extends and is effective to bias the lower ends of the arms toward each other and to also constantly bias the upper ends of the arms toward each other and thus effect constant yielding contact between one or more of the roller cam followers 40, 41 or 44, 45 with the adjacent cam surfaces 50 of the pendant cam 48.

In operation, the above described mechanism functions in the following manner to effect oscillation of the cutter blade in alternate directions. In Fig. 3 of the drawings, the parts are shown in position at the end of one severing oper-

ation following energization of the solenoid 26. When the solenoid is deenergized the spring 33 on the rod 30 becomes effective to rotate the sleeve 19 and its associated arms 20 and 21 counterclockwise. This raises the plunger 27 of the solenoid to a proper position for actuating another severing operation and simultaneously repositions the arms 36 and 37 so that the stud 14 of the tilt bar will be engaged by the slot 39 of the arm 36 to oscillate the cutter blade in the opposite direction during the next succeeding shearing operation. When the parts are fully raised they assume the positions illustrated in Fig. 4 of the drawings. Upon the next energization of the solenoid, downward movement of the arms 21 causes the slot 39 of the lower arm portion 38 to become actively engaged with the stud 14 of the tilt bar. During downward movement of the arms 36 and 37 it will be noted that since the slot 39 and stud 14 are actively engaged, any free swinging movement of the arm 36 will be prevented. This causes the roller cam followers 40 and 41 of the arm 36 to exert lateral pressure on the adjacent cam surface 50 of the pendant cam 48 to thereby displace the lower end of the same laterally. This lateral displacement of the pendant cam in turn effects lateral displacement of the roller cam followers 44 and 45 of the arm 37 during downward movement of the arm. Obviously, when the upper end of the arm 37 is thus displaced, the lower end of the arm will be likewise displaced but in the opposite direction Thus the lower end of the arm 37 is swung sufficiently aside to prevent engagement of the slot 43 with the stud 15 of the tilt bar and permits the arm 36 to effect proper tilting of the bar to the position shown in Fig. 5 of the drawings. Deenergization of the solenoid will permit the several parts to again assume the position shown in Fig. 4 of the drawings and then upon the next succeeding energization of the solenoid the parts will return to the position initially shown in Fig. 3 of the drawings. Abutment pins 54 may be provided beneath the ends of the tilt bar to limit the degree of tilting thereof, if desirable.

When severing mechanisms of the above described type are positioned in automatic bag closing machines such as disclosed in the above referred to U. S. Letters Patent 2,097,450, means must be provided to initiate operation of the actuating solenoid each time the space between two bags is disposed in registry with the cutter elements in order that the tape and underlying stitching may be severed without cutting into any portion of a bag. To this end a switch 55 having a circuit controlling arm 56 is secured to one wall of the housing 5. The free end of the arm 56 is pivotally connected to one end of a link 57, the other end of which is pivotally connected to one end of a bag sensing finger 58. The sensing finger is pivotally connected intermediate its ends to the housing 5 and has a relatively long end portion 59 projecting into the path of travel of the bag mouths. Suitable spring means (not shown) may be carried within the switch 55 for constantly urging the swing arm 56, connecting link 57, and sensing finger 58 in proper direction to project the end portion 59 of the sensing finger into the path of travel of the bag mouths. The switch 55 is connected to the solenoid 26 and a source of electrical energy through suitable wiring generally indicated at 60. The switch, connecting link, and sensing finger are so positioned and arranged that the circuit is open when the parts are in the positions shown in Fig. 2 of the drawings. As soon as a bag C has been sufficiently advanced by the conveyor B that the end portion 59 of the sensing finger drops off the trailing edge of the bag, the switch 55 will be crossed and the solenoid energized to actuate the cutting mechanism in the manner required. Engagement of the sensing finger by the leading edge of the succeeding bag will cause the end portion 59 of the finger to be displaced laterally and will effect breaking of the circuit to deenergize the solenoid preparatory to the next severing operation.

It should be noted that one face of the housing 5 may be provided with a displaceable cover 60 pivotally secured thereto as at 61 for facilitating inspection and servicing of the enclosed mechanism.

Thus it will be seen that the herein described invention provides new and useful improvements in cutting mechanisms for use in conjunction with automatic bag closing machines or the like and includes novel solenoid actuated cam controlled and spring returned severing mechanisms.

It is, of course, to be understood that certain details of arrangement and proportions of parts may be variously modified without exceeding the scope of the appended claims.

I claim:

1. Tape severing mechanism including a stationary shear anvil, an oscillatable cutter blade associated therewith, a tilt bar connected to said cutter blade, linkage means for oscillating said cutter blade and including a pair of arms having their lower ends associated with the respective ends of said tilt bar and being selectively alternately engageable therewith, means for controlling and selecting the engagement of one of said arms with an associated end of said tilt bar while preventing engagement of the other of said arms with said tilt bar, and means for imparting cutter oscillating motion to said linkage means.

2. Tape severing mechanism including a stationary shear anvil, an oscillatable cutter blade associated therewith, a tilt bar connected to said cutter blade, linkage means for oscillating said cutter blade and including a pair of arms having their lower ends associated with the respective ends of said tilt bar and being selectively alternately engageable therewith, means for controlling and selecting the engagement of one of said arms with an associated end of said tilt bar while preventing engagement of the other of said arms with said tilt bar, and a solenoid operatively connected to said linkage means for imparting cutter oscillating motion thereto.

3. Severing mechanism including a stationary shear anvil, an oscillatable cutter blade associated therewith, a tilt bar connected to said cutter blade, linkage means for oscillating said cutter blade and including a pair of crossed arms having their lower ends alternately engageable with alternate ends of said tilt bar, a pendant cam element associated with the upper ends of said arms and effective to control the engagement of one arm with the associated end of said tilt bar while preventing engagement of the other of said arms with said tilt bar, and means for imparting cutter oscillating motion to said linkage means.

4. Severing mechanism including a stationary shear anvil, an oscillatable cutter blade associated therewith, a tilt bar connected to said cutter blade, linkage means for oscillating said cutter blade and including a pair of crossed arms hav-

ing their lower ends alternately engageable with alternate ends of said tilt bar, a pendant cam element associated with the upper ends of said arms and effective to control the engagement of one arm with the associated end of said tilt bar while preventing engagement of the other of said arms with said tilt bar, and a solenoid operatively connected to said linkage means for imparting cutter oscillating motion thereto.

5. Tape severing mechanism including a stationary shear anvil, an oscillatable cutter blade associated therewith, a tilt bar connected to said cutter blade, linkage means for oscillating said cutter blade and including a pair of relatively movable arms having their lower ends associated with the respective ends of said tilt bar and being selectively alternately engageable therewith, means to control and effect the engagement of one of said arms with the associated end of said tilt bar as an incident to a severing operation while preventing engagement of the other of said arms with said tilt bar, said last named means being effective as an incident to an ensuing severing operation to alternate the engagement of said arms and tilt bar, and means for imparting cutter oscillating motion to said linkage means.

6. Tape severing mechanism including a stationary shear anvil, an oscillatable cutter blade associated therewith, a tilt bar connected to said cutter blade, linkage means for oscillating said cutter blade and including a pair of relatively movable arms having their lower ends associated with the respective ends of said tilt bar and being selectively alternately engageable therewith, means including a pendant cam to control and effect the engagement of one of said arms with the associated end of said tilt bar as an incident to a severing operation while preventing engagement of the other of said arms with said tilt bar, said last named means being effective as an incident to an ensuing severing operation to alternate the engagement of said arms and tilt bar, and means for imparting cutter oscillating motion to said linkage means.

HOWARD G. ALLEN.