Feb. 26, 1952

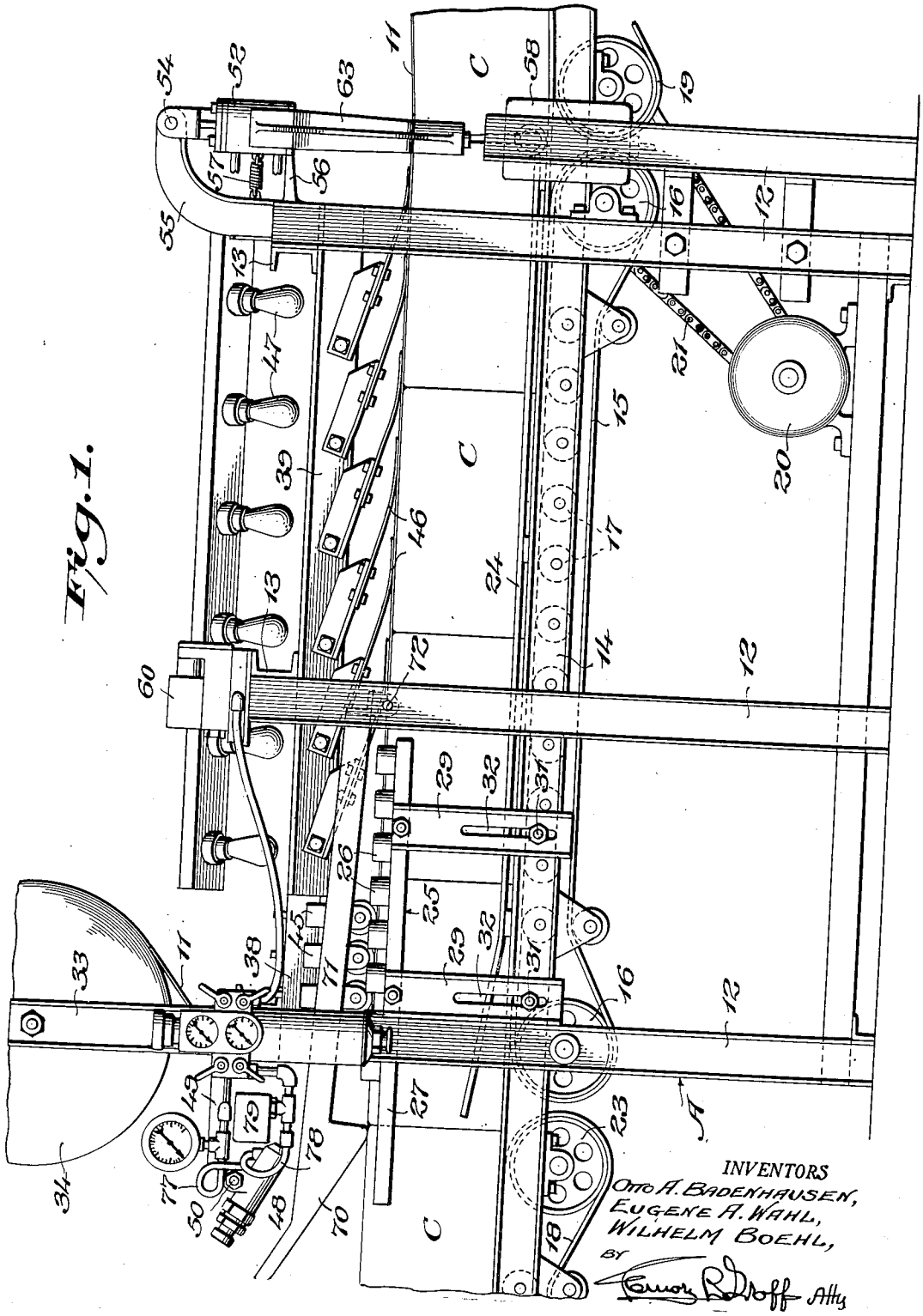
O. A. BADENHAUSEN ET AL
MECHANISM TO SEVER TAPE BETWEEN
ADJACENT ENDS OF CARTONS

2,586,903

Filed June 15, 1949

5 Sheets-Sheet 1

Fig. 1.



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5 Sheets-Sheet 2

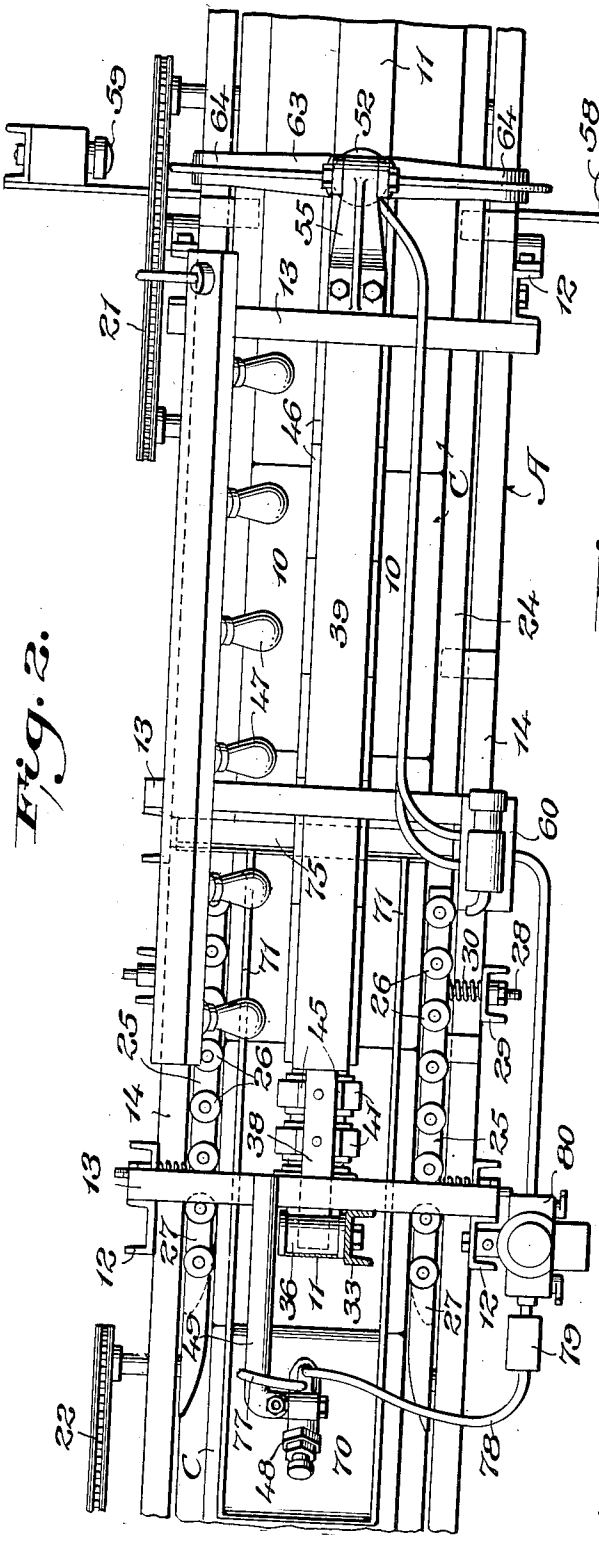

Fig. 2.

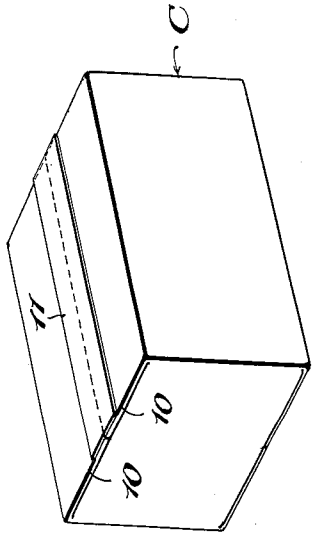

Fig. 9.

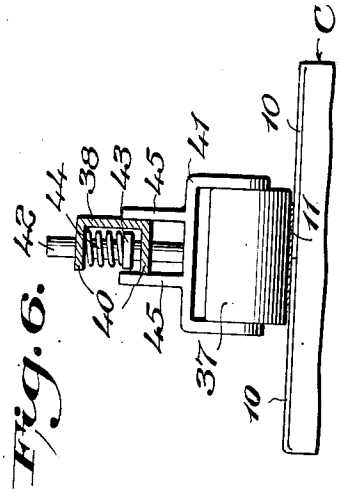

Fig. 6.

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5 Sheets-Sheet 3

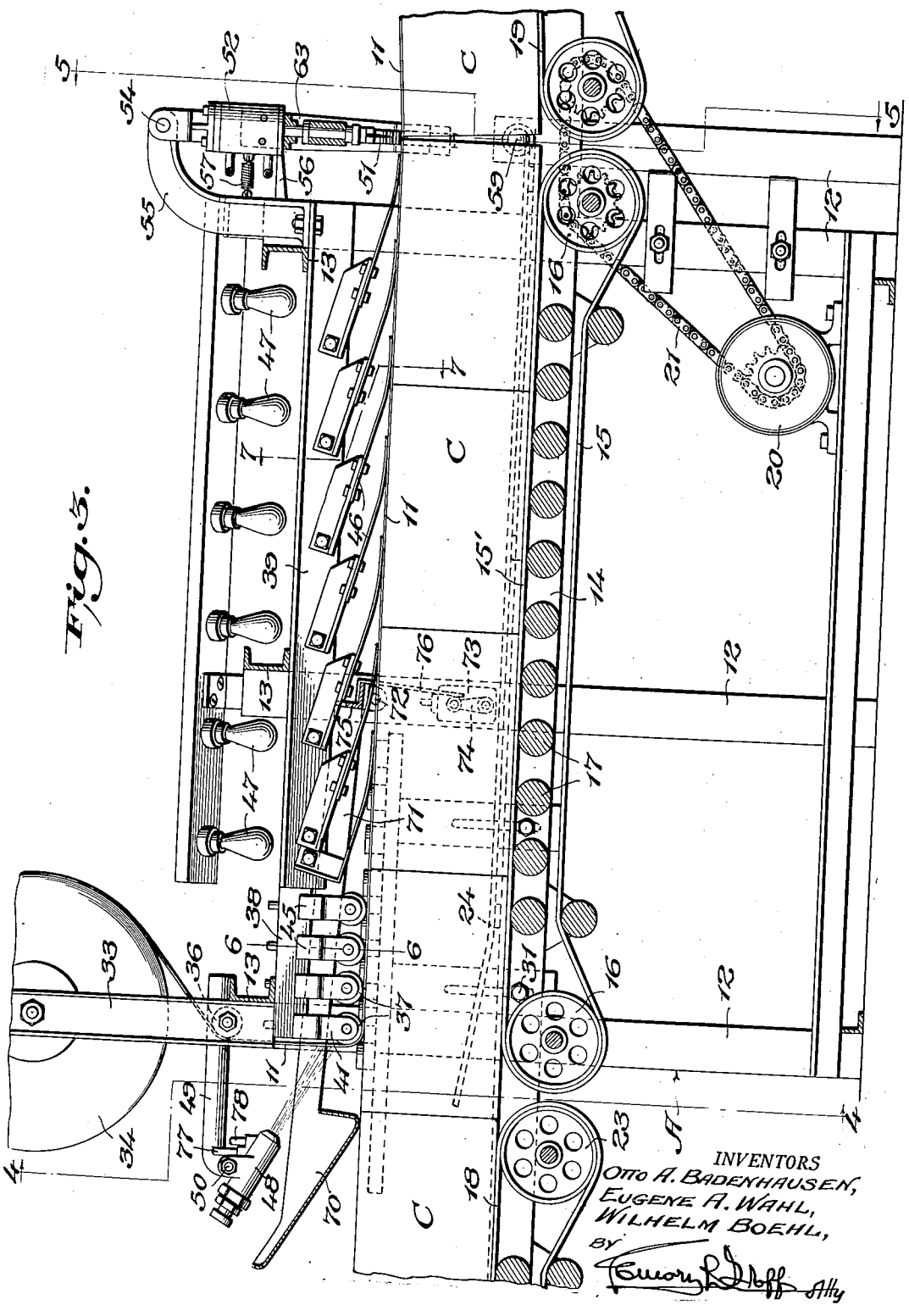

Fig. 5.

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Fig. 5.

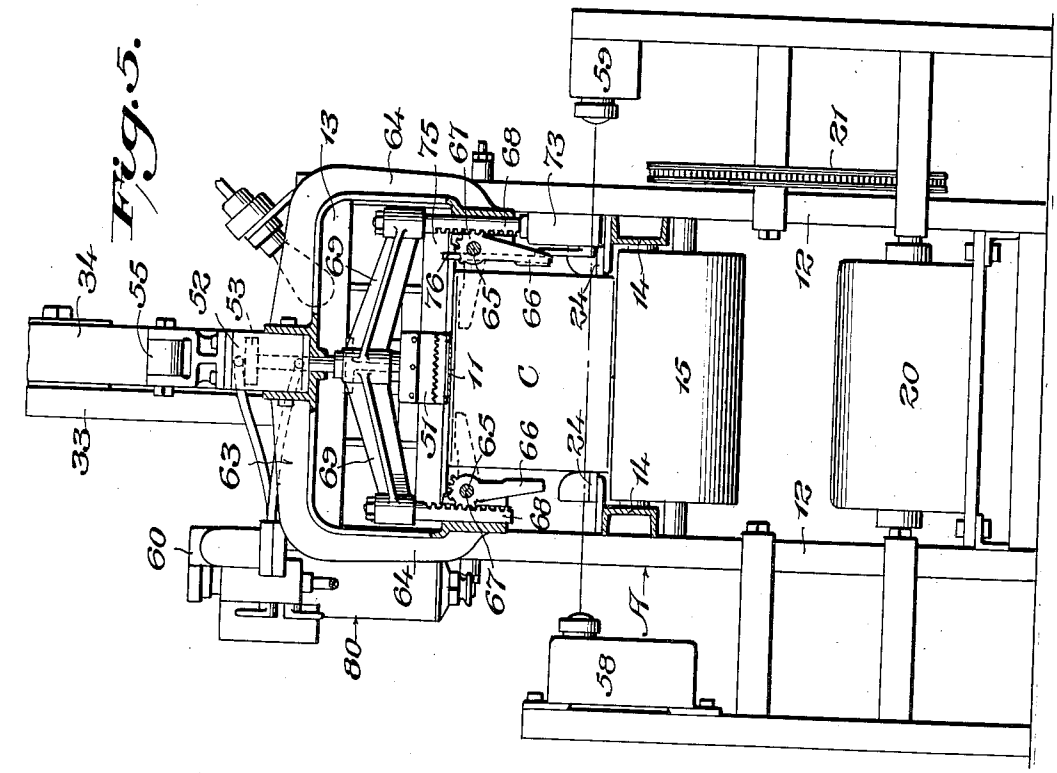

Fig. 6.

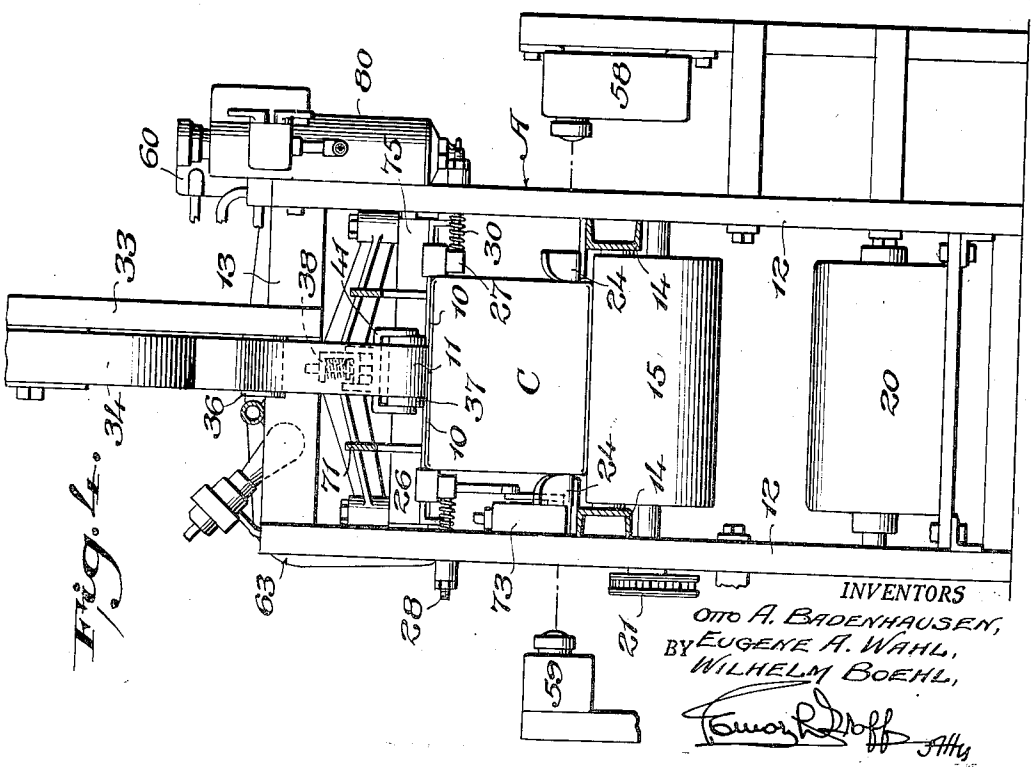

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Fig. 7.

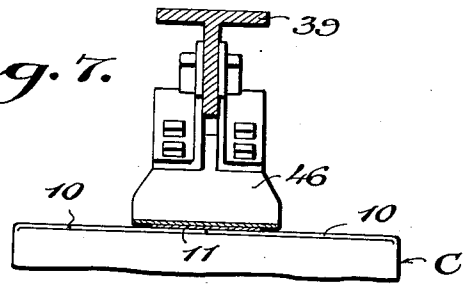
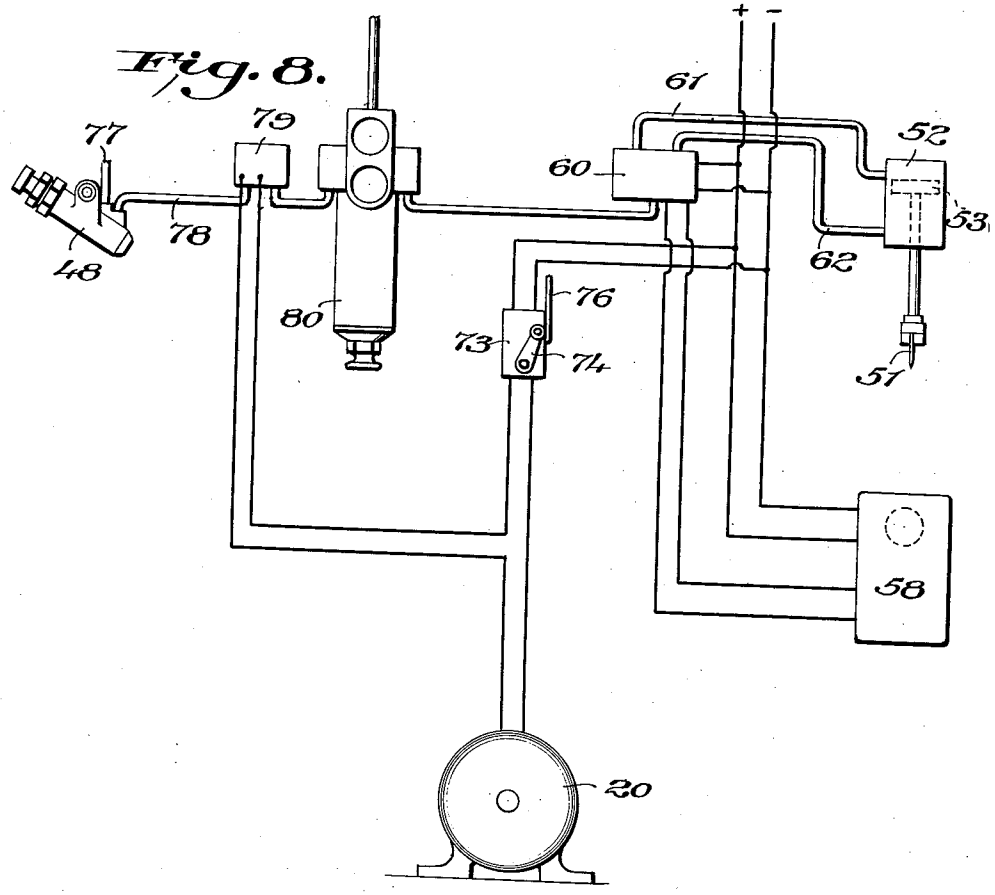


Fig. 8.



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Patented Feb. 26, 1952

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UNITED STATES PATENT OFFICE

2,586,903

MECHANISM TO SEVER TAPE BETWEEN ADJACENT ENDS OF CARTONS

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Application June 15, 1949, Serial No. 99,316

8 Claims. (Cl. 164—48)

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This invention relates to a machine for sealing cartons of the type having inwardly foldable closure flaps, by applying in overlapping relationship to the free edge portions of the inwardly folded flaps a binding strip of adhesive tape, and has for its general object to provide for this purpose a simple, practical machine which is fully automatic, rapid and reliable in its operation.

With the foregoing and other objects in view, as will become apparent as the nature of the invention is better understood, the same consists in a carton sealing machine embodying the novel features of construction, combination and arrangement of parts as are illustrated by way of example in the accompanying drawings and as will be hereinafter more fully described and claimed.

In the accompanying drawings, wherein like characters of reference denote corresponding parts in the different views:

Figure 1 is a side elevation of a carton sealing machine constructed in accordance with one practical embodiment of the invention;

Figure 2 is a top plan view of the machine;

Figure 3 is a vertical, longitudinal section through the machine;

Figure 4 is a cross section through the machine taken approximately on the line 4—4 of Fig. 3;

Figure 5 is a cross section through the machine taken approximately on the line 5—5 of Fig. 3;

Figure 6 is a detail cross section on the line 6—6 of Fig. 3;

Figure 7 is a cross section on the line 7—7 of Fig. 3;

Figure 8 is a diagrammatic view illustrating the fluid and electrical connections between different elements of the machine; and

Figure 9 is a perspective view of a carton illustrating the manner in which the same is sealed by a machine constructed and operable in accordance with the invention.

In the drawings, cartons of the type which the present machine is designed to seal are designated generally as C. They are of rectangular or box-like form and usually are formed from cardboard, being employed extensively for packaging canned goods and various other commodities. At their tops they are provided with end and side closure flaps which constitute upward extensions of their end and side walls, respectively. After the cartons are filled the end closure flaps (not shown) first are folded downwardly and inwardly and then the side closure flaps, designated as 10, 10, are folded downwardly and

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inwardly upon said end closure flaps. The said side closure flaps are approximately one-half the width of the cartons and when they are folded downwardly they lie in a common horizontal plane with their free edges abutting or substantially abutting each other midway between the sides of the cartons. Following downward and inward folding of the end and side flaps of any given carton to close the top of the carton, the carton is sealed by means of a strip 11 of adhesive tape applied to the top faces of the meeting or free edge portions of the side flaps 10, 10.

Heretofore, it has been usual to employ semi-automatic machines, each requiring the constant presence and performance of an attendant, to apply the sealing strips 11. The rate of sealing of the cartons therefore has been limited by the human factor involved and the attendant's wages have represented a major part of sealing costs. Comparatively, the present machine is operable at a high rate of speed and is fully automatic. It thus increases production and, at the same time, very materially reduces production costs.

The present machine includes a frame, designated generally as A, which may be of any suitable form and which is illustrated in the drawings as being fabricated principally from channel-iron. It is composed, primarily, of a plurality of upright members 12 at each side thereof connected together in suitably spaced apart relationship to each other by cross members 13 and includes, at each side thereof, a longitudinal member 14 which is welded or otherwise suitably fastened rigidly to the related set of upright members 12.

Within the frame A is mounted in any suitable manner an endless conveyor 15 of any suitable form. In the drawings, said conveyor is illustrated as being of the belt type and as extending at its ends over a pair of rollers 16, 16 suitably supported by the frame A. The rollers 16, 16 are disposed horizontally at suitable elevations adjacent to the ends of the frame A and extend transversely relative to the frame. The conveyor 15 thus extends longitudinally of the frame and includes an upper reach 15' which is disposed preferably horizontally longitudinally of the machine as well as transversely thereof and which may be supported in any suitable manner, as, for example, upon a series of transverse rollers 17 supported at their ends by the frame longitudinal members 14.

The conveyor 15 constitutes what may be termed the primary conveyor of the machine. In addition, the machine includes supply and

discharge conveyors 18 and 19, respectively, which may be of the same type and which may be mounted in the same manner as the primary conveyor 15, or which may be of any other suitable type and which may be mounted in any other suitable manner. In any event, the discharge end of the supply conveyor 18 is disposed adjacent to the receiving end of the primary conveyor 15, and the receiving end of the discharge conveyor 19 is disposed adjacent to the discharge end of the primary conveyor 15. The supply and discharge conveyors 18 and 19 may, if desired, be constructed as units separate from the present machine, but in any event they preferably constitute elements of the machine.

The supply conveyor 18 conveys the filled cartons C from a source of supply to the upper reach of the primary conveyor 15, and from said primary conveyor the cartons are delivered to the discharge conveyor 19 to be carried by the latter to any desired point.

Preferably the primary conveyor 15 is of a type such that is effectively resists slippage relative thereto of cartons resting thereon. The discharge conveyor 19 preferably is of the same type and preferably is driven at the same speed as said primary conveyor 15. On the other hand, the supply conveyor 18 preferably is of a type to permit slippage relative thereto of cartons resting thereon and preferably is driven at a faster speed than the primary conveyor 15 to compensate for the normal spacing of the cartons on said supply conveyor as they come from filling and flap-folding stations and to insure a substantially constant supply of cartons to the primary conveyor 15.

A suitably mounted electric motor 20 is suitably connected as, for example, by means of a sprocket chain 21, to one of the rollers 16 for driving the latter and thus driving the primary conveyor 15, and preferably also is employed for driving the discharge conveyor 19. On the other hand, the supply conveyor 18 preferably is separately driven by a separate motor (not shown) through a sprocket or other suitable connection 22 with one of the supporting rollers 23 of said supply conveyor.

Suitably mounted upon the frame Aa at the sides thereof, as, for example, upon the frame longitudinal members 14, are guide rails 24 which are substantially coextensive in length with the primary conveyor 15 and between which the cartons C enter as they move from the supply conveyor 18 onto said primary conveyor 15. By means of said guide rails, which are spaced part approximately corresponding to the width of the cartons C and which are engageable with the sides of the cartons near their bottoms, the said cartons are centered relative to the primary conveyor 15 and are held in longitudinal alinement with each other as well as with said primary conveyor.

Also suitably mounted on the frame A at the sides thereof are suitable units 25 for the purpose of exerting inward pressure upon the sides of the cartons C near the tops thereof to eliminate any bulging of the carton sides and to insure abutment, or substantially abutment, of the free edges of the carton side flaps 10, 10 with each other.

While the units 25 may be in the form of rails or bars for sliding or wiping contact with the sides of the cartons C, each preferably includes a series of rollers 26 for rolling contact with the related sides of the cartons. The rollers 26 are suitably mounted on bars 27 and the latter are suitably mounted for inward and outward movement, as, for example, by means of pins 28 which extend outwardly therefrom and are slidable in suitable guides or bearings in members 29 which are suitably secured to the frame A. Suitable springs, such as helical springs 30 surrounding the pins 28, react from the members 29 to urge the bars 27 and, hence, the rollers 26 inwardly, whereby said rollers are caused to accomplish the purpose of urging the sides of the cartons inwardly.

The members 29 may be bolted to the frame longitudinal members 14, as indicated at 31, and may be slotted, as indicated at 32, to provide for vertical adjustment of the bars 27 and the rollers 26 carried thereby to adapt said rollers to cooperate properly with cartons of different heights.

Suitably mounted at a suitable elevation above the front end portion of the primary conveyor 15, as upon an upright 33 fixed to and rising from a front cross member 13 of the frame A, is a roll 34 of adhesive tape 11 to be applied to the tops of the free or meeting edge portions of the side flaps 10, 10 of cartons C resting upon the primary conveyor 15 for the purpose of sealing said cartons.

The roll 34 is disposed in the central, vertical, longitudinal plane of the machine with its axis extending transversely of the machine, and from said roll the tape 11 extends first forwardly and downwardly over the front portion of a guide roller 36 carried by the upright 33 or by any other suitable support and then downwardly to and rearwardly beneath a series of horizontally disposed rollers 37 by which it is pressed downwardly upon the tops of the free or meeting edge portions of the side flaps 10, 10 of an underlying carton C resting upon the front end portion of the primary conveyor 15.

The rollers 37 extend transversely of the machine and are spring urged downwardly independently of each other whereby they insure desired downward pressure of the tape 11 against the carton flaps 10, 10 regardless of undulations or irregularities in said flaps.

While the rollers 37 may be mounted in any suitable manner, they are illustrated by way of example in the drawings as being mounted upon a horizontally disposed channel member 38 which extends longitudinally of the machine and is welded or otherwise suitably fastened at its front end to a front cross member 13 of the frame A and at its rear end is welded or otherwise suitably fastened to the front end of a member 39 of T-shape in cross section which likewise is horizontally disposed and extends longitudinally of the machine and at its rear end is welded or otherwise suitably fastened to a rear cross member 13 of the frame A.

The channel member 38 has its flanges 40 disposed horizontally and each roller 37 is mounted in a yoke 41 from which a pin 42 extends upwardly freely through guide openings in the flanges 40. On each pin 42 is an abutment 43. Also on each pin 42, between the abutment 43 thereon and a flange 40 of the channel member 38, is a helical spring 44 which reacts from said flange to urge the yoke 41 and the roller 37 carried thereby downwardly. Rising from each yoke 41 are fingers 45 which respectively engage opposite sides of the channel member 38 and serve to hold the yokes and, hence, the rollers 37 against rotation about the pins 42.

Carried by the member 39 is a series of downwardly and rearwardly extending spring blades 46 which maintain the tape 11 pressed downwardly upon the carton flaps 10, 10 and exert an ironing effect upon said tape to flatten it against said flaps as the cartons are advanced by the primary conveyor 15. In this connection and as will be understood, the tape 11 is unrolled from the roll 34 and is advanced with the cartons C as the latter are advanced by the primary conveyor 15. Also in this connection, suitable means preferably is provided for applying heat to the tape 11 and to the blades 46 to hasten firm adhesion of the tape to the carton flaps 10, 10, said means comprising, for example, a battery of electric lamps 47 suitably mounted to radiate heat upon said tape 11 and said blades.

The tape 11 is, of course, laid upon the carton flaps 10, 10 with its adhesive side disposed downwardly but before it is laid upon said flaps its normally dry, adhesive side must, of course, be softened to render the same adhesive. In this connection, while any suitable means may be employed for softening the adhesive side of said tape after it is unwound from the roll 34 and before it is laid upon the carton flaps 10, 10, one suitable means for this purpose may comprise a water spray nozzle 48 of any suitable type mounted in any suitable manner to direct a fine spray of water against the adhesive side of said tape at any point along its length between the roll 34 and the forwardmost of the series of rollers 37. In the present instance said nozzle 48 is illustrated as being mounted upon an arm 49 secured to and extending forwardly from a front cross member 13 of the frame A and as being disposed in front of that portion of the tape 11 which extends between the guide roller 36 and the forwardmost of the series of rollers 37 so as to direct a spray of water rearwardly against said portion of said tape. Preferably said nozzle is pivotally mounted upon said arm 49, as indicated at 50, for swinging adjustment vertically so that its water spray may be directed most advantageously against the tape 11.

The primary conveyor 15 may be of a length to accommodate any desired number of cartons C in end to end abutting relationship to each other, and the tape 11 extends from the roll 34 continuously over the tops of all of the cartons on said primary conveyor, regardless of their number, as well as over the last carton on the discharge conveyor 19. In this connection, a knife 51 is provided to sever the tape 11 between adjacent ends of the cartons as the latter move off the primary conveyor 15 onto the discharge conveyor 19.

The knife 51 is disposed normally above the cartons C, substantially in vertical alinement with the center of the space between the rear end of the primary conveyor 15 and the front end of the discharge conveyor 19, and is vertically reciprocable, being downwardly projectable from its normal, elevated or retracted position to sever the tape 11. Said knife may be operated either electrically by means of a solenoid or the like, mechanically by means of a suitable cam or other appropriate mechanism, or by fluid pressure. In the drawings it is illustrated as being operable by fluid pressure through the instrumentality of a cylinder and piston power unit comprising a cylinder 52 and a piston 53. In any event, said knife is shiftable longitudinally of the machine whereby it may be alined with the space between adjacent ends of the cartons even though said space may not always be located at the same point longitudinally of the machine when said knife descends, and whereby it may also be maintained in alinement with said space even though the cartons may be advancing while said knife is descending. According to the particular construction illustrated in the drawings, the cylinder 52 is pivoted, as indicated at 54, to a bracket 55 carried by the frame A of the machine for swinging movement longitudinally of the machine, whereby the knife 51 is shiftable longitudinally of the machine. Normally the cylinder 52 is held yieldably in its forwardmost position, against a suitable stop 56, by a suitable spring 57. Hence, the knife 51 normally is held yieldably in its forwardmost position.

While descent and elevation of the knife 51 may be controlled in any desired manner, electrical means preferably is employed for this purpose. The discharge conveyor 19 is suitably inclined upwardly and rearwardly relative to the primary conveyor 15 so that as each carton moves from said primary conveyor onto said discharge conveyor its rear end assumes a downwardly and rearwardly inclined spaced relationship to the front end of the carton immediately therebehind. At one side of the machine, at an elevation above the conveyors 15 but below the tops of the cartons C, preferably in a vertical, transverse plane including the knife 51 when the latter is in its forwardmost position, is a photo-electric switch unit designated generally as 58, while at the other side of the machine, preferably directly opposite said switch unit, is a lamp 59 by which a beam of light is directed toward said switch unit. As long as a carton C is interposed between the lamp 59 and the switch unit 58 it acts as a shield preventing light emanating from said lamp from affecting said switch unit. When, however, the space between adjacent ends of the forwardmost carton on the primary conveyor 15 and the rearmost carton on the discharge conveyor 19 becomes alined with the switch unit 58 and the lamp 59, light from said lamp is permitted to pass through said space to affect said switch unit and thereby the latter is caused to be operated.

Suitably mounted on or adjacent to the machine is a solenoid operated valve 60 to which compressed air is supplied from any suitable source and which is connected by hose or pipes 61 and 62 with the upper and the lower ends, respectively, of the cylinder 52 whereby it is effective to control supply of compressed air to said ends of said cylinder for the purpose of projecting and retracting the knife 51. The photo-electric switch 58 controls operation of said solenoid valve to admit compressed air to the top of the cylinder 52 to cause the knife 51 to be projected. On the other hand, when said photo-electric switch is deenergized, the solenoid of valve 60 likewise is deenergized and said valve assumes a normal position admitting compressed air to the bottom of the cylinder 52 whereby the knife 51 is retracted. It will thus be apparent that as the cartons C are advanced the knife 51 will be projected to sever the tape 11 each time the space between adjacent ends of adjacent cartons becomes alined transversely of the machine with the photo-electric switch 58 and the lamp 59, and that as each carton moves between said photo-electric switch and said lamp said knife will be retracted.

To insure that the knife 51, when projected, will aline with the space between adjacent ends

of adjacent cartons, a yoke 63 is fixed with respect to the cylinder 52 and includes a pair of arms 64, 64 between which the cartons C pass as they are advanced. To each arm 64 is pivoted at one end, as indicated at 65, a finger 66 which is swingable downwardly and outwardly to a substantially vertically disposed position, as illustrated by full lines in Fig. 5, and upwardly and inwardly to a substantially horizontally disposed position, as indicated by dotted lines in Fig. 5. When said fingers 66 are disposed substantially vertically they also are disposed beyond the sides of the cartons C so that they do not interfere with advance of said cartons. When, however, said fingers are disposed substantially horizontally they extend inwardly into the path of advance of the cartons.

Each finger 66 includes a pinion portion 67 which is engaged by a related, vertically disposed rack bar 68 which is slidably mounted in the related yoke arm 64. Moreover, said rack bars are carried by arms 69 which are fixed with respect to the knife 51. Furthermore, said fingers are disposed substantially vertically when the knife 51 is raised and are swingable to their substantially horizontal positions as said knife descends. Consequently, each time the knife 51 descends, the rack bars 68 descend therewith and act to swing the fingers 66 from their substantially vertically disposed positions to their substantially horizontally disposed positions. Conversely, each time the knife 51 ascends, the rack bars 68 ascend therewith and act to swing the blades 66 from their substantially horizontally disposed positions to their substantially vertically disposed positions.

When the knife 51 is in its forwardmost position it is as aforesaid, disposed substantially in the same vertical plane transversely of the machine as the photo-electric switch 58 and the lamp 59. The fingers 66 are disposed in, or substantially in, this same plane. Therefore, said fingers substantially aline with the space between adjacent ends of adjacent cartons when said space alines with the photo-electric switch 58 and the lamp 59. As a result, when the knife 51 descends due to alinement of said space with the photo-electric switch 58 and the lamp 59, the fingers 66 are swung upwardly and inwardly into said space and by cooperation with the ends of the cartons insure alinement of the knife 51 with the space between the ends of the cartons as the knife 51 completes its descent. This, of course, in turn insures severing of the tape 11 at the meeting ends of the cartons and thereby avoids any possibility of the knife 51 being projected into a carton. Obviously, any advance of the cartons during projection of the knife 51 will result in advance of the knife with the cartons due to the blades 66 being interposed between the cartons and being advanced therewith, thereby causing the cylinder and piston power unit as well as the knife 51 to be swung forwardly in harmony with advance of the cartons. This further insures severing of the tape 11 at the meeting ends of the cartons. When raised, the knife 51 is, of course, disposed sufficiently above the cartons so that before it engages and severs the tape 11 during its descent, the fingers 66 will have been moved between the cartons to accomplish their purpose.

Obviously, the machine will operate continuously as long as cartons are delivered sufficiently rapidly by the supply conveyor 18 to the primary conveyor 15 to maintain the latter con-

veyor filled with cartons in end to end relationship to each other. However, there may be times when cartons are not delivered to the primary conveyor 15 at the rate that they are advanced by said primary conveyor. The machine accordingly includes means whereby it is stopped automatically whenever there is absent from the delivery end of the supply conveyor 18 a carton C in, or substantially in, abutment with a carton on the receiving end of the primary conveyor 15. This means includes a shoe 70 which overlies the rear end of the supply conveyor 18 and which is carried by a pair of arms 71 which extend rearwardly therefrom and are pivoted at suitable points to suitable portions of the frame A, as indicated at 72, whereby said shoe 70 is vertically movable.

As long as cartons C are delivered by the supply conveyor 18 at a rate to maintain a carton on the delivery end of said supply conveyor with its front end abutting, or substantially abutting, the rear end of a carton on the rear end of the primary conveyor 15, the shoe 70 rests upon the top of the carton on the delivery end of said supply conveyor and thereby is maintained elevated. However, in the absence of a carton from the delivery end of the supply conveyor 18, or in the event of any material spacing of the front of a carton on the discharge end of said supply conveyor from the rear end of a carton on the front end of the primary conveyor 15, the shoe 70 is free to drop and does so either under the influence of gravity alone or under influence of gravity assisted by any suitable spring means.

Mounted upon a suitable portion of the frame A is an electric switch 73 which includes a pivoted actuating arm 74, while extending either from one of the shoe arms 71 or from a cross member 75 which connects them, is an arm 76 the free end portion of which is disposed for cooperation with said switch arm 74. The arm 76 is, of course, swingable responsive to upward and downward movements of the shoe 70, and the arrangement in this connection is such that said arm 76 acts through the switch arm 74 to hold the switch 73 closed as long as the shoe 70 is held elevated by a carton C on the delivery end portion of the supply conveyor 18, and acts either to open said switch or to permit said switch to assume an open position under the influence of suitable spring means whenever said shoe is permitted to drop due to the absence of a carton from the delivery end portion of the supply conveyor 18.

The switch 73 controls the motor 20 which drives the primary conveyor 15. Manifestly, therefore, as long as cartons are being delivered by the supply conveyor 18 as fast as they are being advanced by the primary conveyor 15, the shoe 70 will be held elevated and will hold the switch 73 closed, thus maintaining the motor 20 and the primary conveyor 15 in continuous operation. If, for any reason, however, there should occur an absence of a carton from the delivery end of the supply conveyor 18, the shoe 70 will drop and the switch 73 will be opened with consequent stopping of the motor 20 and the primary conveyor 15.

The bottom of the shoe 70 is inclined upwardly and forwardly and any suitable stop means is provided to limit downward movement of said shoe so that when it is in its lowermost position its inclined bottom is engageable by the upper, front corner of a carton being advanced

by the supply conveyor 18. The supply conveyor operates continuously and, hence, as soon as a carton thereon approaches the rear end thereof it moves beneath and elevates the shoe 70, thus automatically starting the motor 20 and the primary conveyor 15. It will thus be apparent ously or intermittently, depending upon the rate of supply of cartons by the supply conveyor 18 to the primary conveyor 15.

The nozzle 48 is supplied with water through a hose or pipe 77 and with compressed air through a hose or pipe 78, and is of a type such that it operates to deliver a spray of water therefrom only when it is supplied with compressed air. In the compressed air supply pipe 78 is interposed a solenoid valve 79 which controls delivery of compressed air to said nozzle 48 and which is electrically connected in series with the motor 20 and the switch 73, whereby it is operable to permit flow of compressed air to said nozzle when said motor is operating and to deny flow of compressed air to said nozzle when said motor is not operating. Thus, the tape 11 is sprayed and wetted only when the primary conveyor 15 is in operation and the tape 11 is being advanced with the cartons on said conveyor.

Compressed air for operation of the nozzle 48 and the knife 51 may be derived from a common source of supply and preferably passes through a suitable filtering and pressure regulating device 80 interposed at a suitable point between the source of supply and the solenoid valves 60 and 79.

As will be apparent from the foregoing, the present machine is of a simple, practical construction, operates either continuously or intermittently depending upon the rate of supply of the cartons to be sealed, is fully automatic in operation, and may be operated at high speed. It is, moreover, effective to apply and sever the tape 11 in a highly satisftactory manner and is thoroughly reliable in operation. It thus is effective to increase production and to materially reduce reduction costs.

From the foregoing description considered in connection with the accompanying drawings, it is believed that the construction. on operation of the machine will be clearly understood and that its advantages will be appreciated. It is desired to point out, however, that while only a single, specific structural embodiment of the machine has been illustrated and described, the same is readily capable of various other specifically different structural embodiments within the spirit and scope of the invention as defined in the appended claims.

We claim:

1. In a machine of the character described, a primary conveyor for advancing in end to end abutting relationship to each other a series of cartons having a continuous strip of adhesive tape applied to their tops, a discharge conveyor onto which cartons are delivered by said primary conveyor, said discharge conveyor being inclined upwardly relative to said primary conveyor to cause adjacent ends of the cartons to become spaced apart in downwardly divergent relationship to each other as the cartons move from said primary conveyor onto said discharge conveyor, a knife for severing the applied tape between adjacent ends of adjacent cartons, and means controlled by the said spacing of the cartons for controlling operation of said knife.

2. In a machine of the character described, a

primary conveyor for advancing in end to end abutting relationship to each other a series of cartons having a continuous strip of adhesive tape applied to their tops, a discharge conveyor onto which cartons are delivered by said primary conveyor, said discharge conveyor being inclined upwardly relative to said primary conveyor to cause adjacent ends of the cartons to become spaced apart in downwardly divergent relationship to each other as the cartons move from said primary conveyor onto said discharge conveyor, a knife for severing the applied tape between adjacent ends of adjacent cartons, and photo-electric switch means controlled by the said spacing of the cartons for controlling operation of said knife.

3. In a machine of the character described, a primary conveyor for advancing in end to end abutting relationship to each other a series of cartons having a continuous strip of adhesive tape applied to their tops, a discharge conveyor onto which cartons are delivered by said primary conveyor, said discharge conveyor being inclined upwardly relative to said primary conveyor to cause adjacent ends of the cartons to become spaced apart in downwardly divergent relationship to each other as the cartons move from said primary conveyor onto said discharge conveyor, a knife for severing the applied tape between adjacent ends of adjacent cartons, means controlled by the said spacing of the cartons for controlling operation of said knife, and means enterable into the space between the carton ends for cooperation with the carton ends to insure alinement of the knife with the space between adjacent ends of the cartons.

4. In a machine of the character described, a primary conveyor for advancing in end to end abutting relationship to each other a series of cartons having a continuous strip of adhesive tape applied to their tops, a discharge conveyor onto which cartons are delivered by said primary conveyor, said discharge conveyor being inclined upwardly relative to said primary conveyor to cause adjacent ends of the cartons to become spaced apart in downwardly divergent relationship to each other as the cartons move from said primary conveyor onto said discharge conveyor, a knife for severing the applied tape between adjacent ends of adjacent cartons, photo-electric switch means controlled by the said spacing of the cartons for controlling operation of said knife, and means enterab'e into the space between the carton ends for cooperation with the carton ends to insure alinement of the knife with the space between the carton ends during the severing of the tape by said knife.

5. In a machine of the character described, a primary conveyor for advancing in end to end abutting relationship to each other a series of cartons having a continuous strip of adhesive tape applied to their tops, a discharge conveyor onto which cartons are delivered by said primary conveyor, said discharge conveyor being inclined upwardly relative to said primary conveyor to cause adjacent ends of the cartons to become spaced apart in downwardly divergent relationship to each other as the cartons move from said primary conveyor onto said discharge conveyor, a projectable and retractable knife for severing the applied tape between adjacent ends of said cartons, said knife being mounted for movement with the cartons as the latter are advanced, photo-electric switch means controlled by the said spacing of the cartons for controlling

operation of said knife, and means enterable into the space between the carton ends for cooperation with the carton ends to move the knife with the cartons as the latter are advanced to insure alinement of the knife with the space between adjacent ends of the cartons when the knife is projected to sever the tape.

6. In a machine of the character described, a primary conveyor for advancing in end to end abutting relationship to each other a series of cartons having a continuous strip of adhesive tape applied to their tops, a discharge conveyor onto which the cartons are delivered by said primary conveyor, said discharge conveyor being inclined upwardly relative to said primary conveyor to cause adjacent ends of adjacent cartons on said primary and said discharge conveyors, respectively, to become spaced apart in downwardly divergent relationship to each other, a vertically reciprocable tape severing knife mounted above the space between the adjacent ends of the primary and the discharge conveyors for downward projection to sever the tape and for movement longitudinally of the machine with the cartons as the latter are advanced, means operable by projection of said knife to enter the space between the carton ends and to cooperate with the carton ends to aline the knife with the space between the carton ends and to maintain such alinement during projection of the knife while the cartons are advancing, a photo-electric switch at one side of the machine controlling projection and retraction of said knife, and a light source at the other side of the machine for directing a beam of light upon said switch, said switch and said light source being disposed at elevations such that light from said source is prevented from affecting said switch by cartons passing between said switch and said light source and is permitted to affect said switch only when the aforesaid space between adjacent ends of the cartons alines transversely of the machine with said switch and said light source.

7. In a machine of the character described, a conveyor for advancing in end to end abutting relationship to each other a series of cartons having a continuous strip of adhesive tape applied to the same, means to cause adjacent ends of the cartons to become spaced apart in divergent relationship to each other at a predetermined point during their advance, a knife for severing the tape between adjacent ends of the cartons, and means controlled by the said spacing of the cartons for controlling operation of said knife.

8. In a machine of the character described, a conveyor for advancing in end to end abutting relationship to each other a series of cartons having a continuous strip of adhesive tape applied to the same, means to cause adjacent ends of the cartons to become spaced apart in divergent relationship to each other at a predetermined point during their advance, a knife for severing the tape between adjacent ends of the cartons, and photo-electric switch means controlled by the said spacing of the cartons for controlling operation of said knife.

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