June 19, 1962 C. VAN HOUDEN KING, JR., ETAL 3,039,370

PORTABLE CARTON BOTTOM SEALERS

Filed July 28, 1960 5 Sheets-Sheet 1

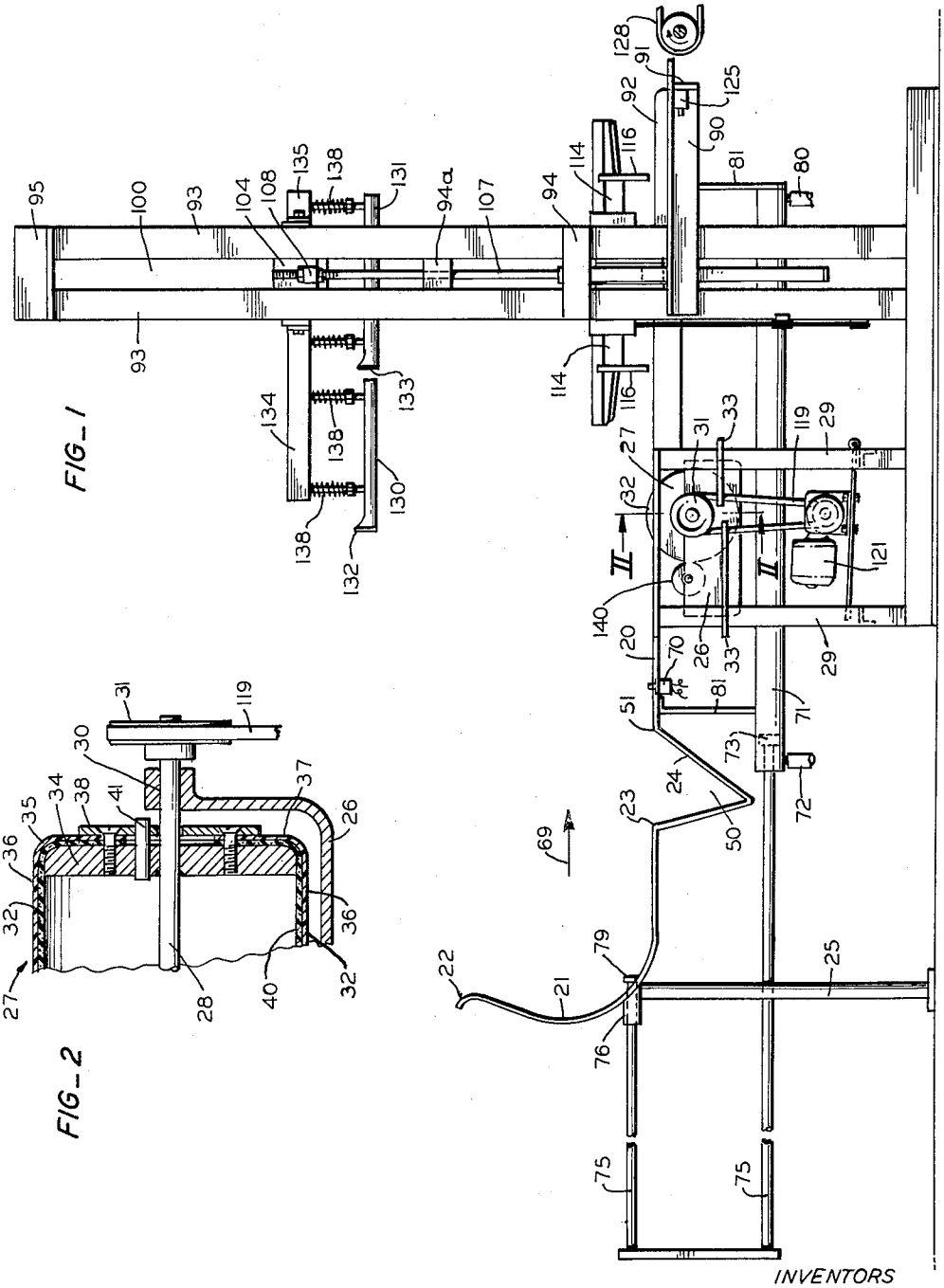


FIG_1

FIG_2

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PORTABLE CARTON BOTTOM SEALERS

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FIG_3

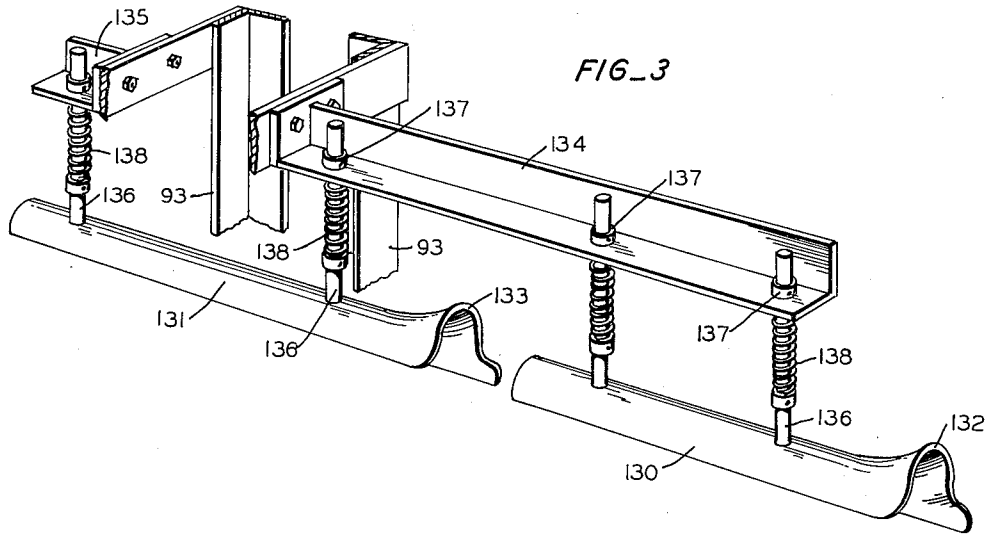
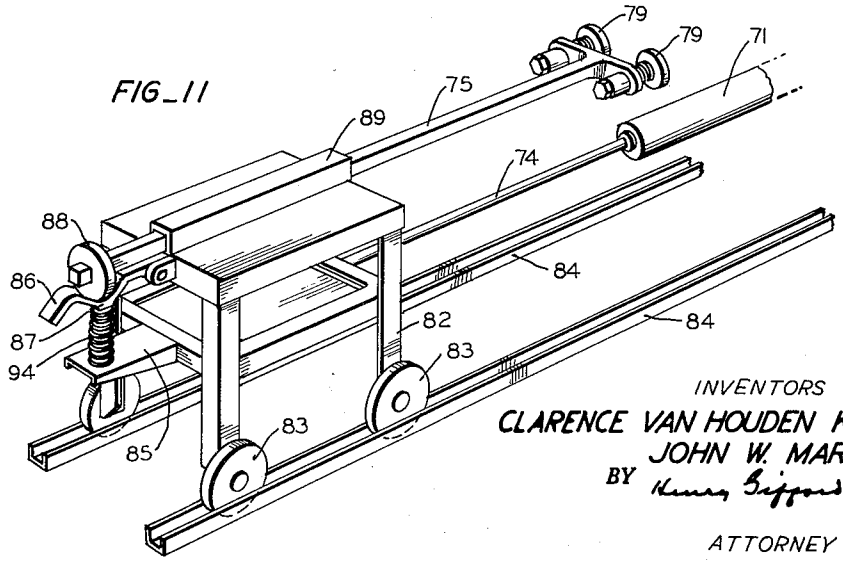


FIG_11



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PORTABLE CARTON BOTTOM SEALERS

Filed July 28, 1960 5 Sheets-Sheet 3

FIG_4

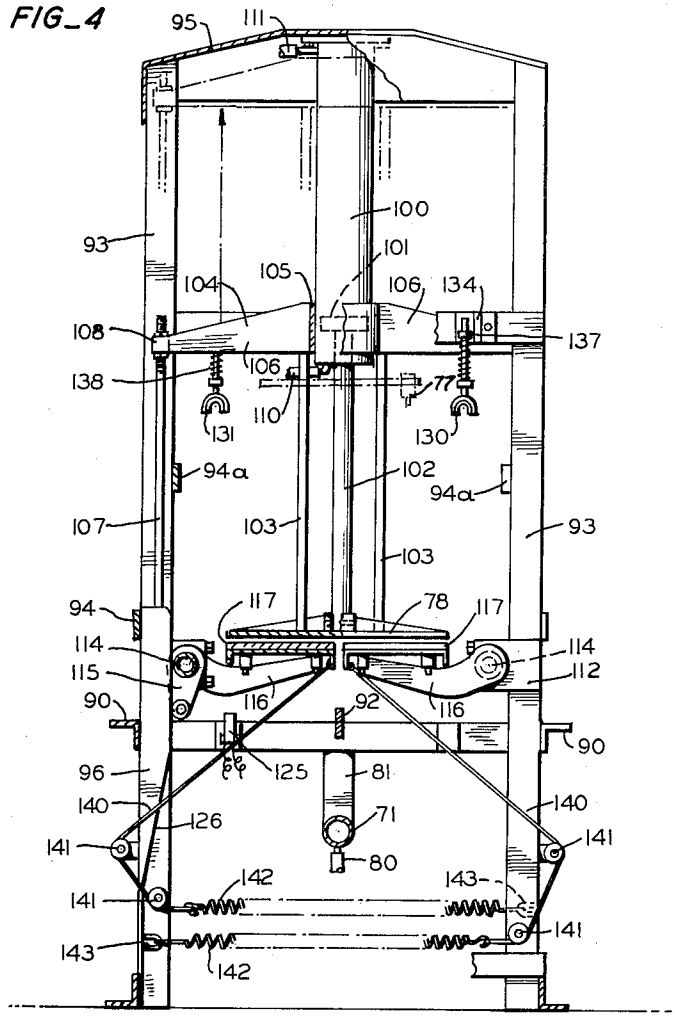


FIG_5

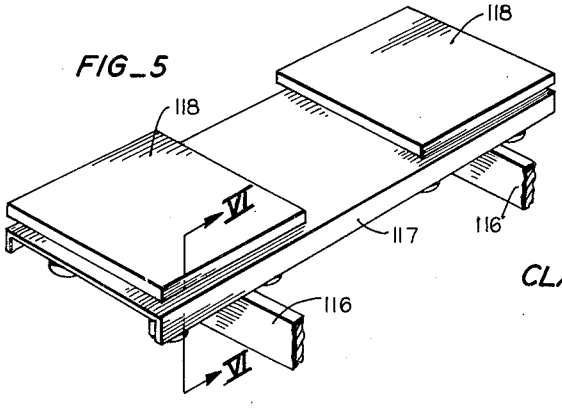
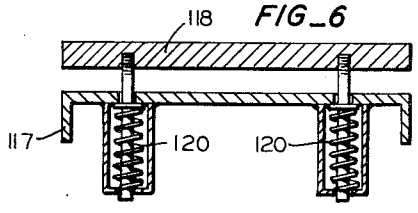


FIG_6



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PORTABLE CARTON BOTTOM SEALERS

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FIG_7

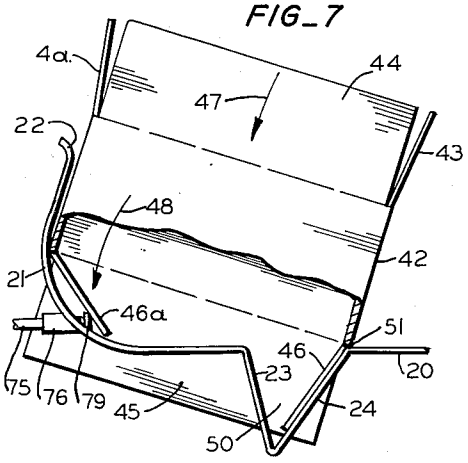
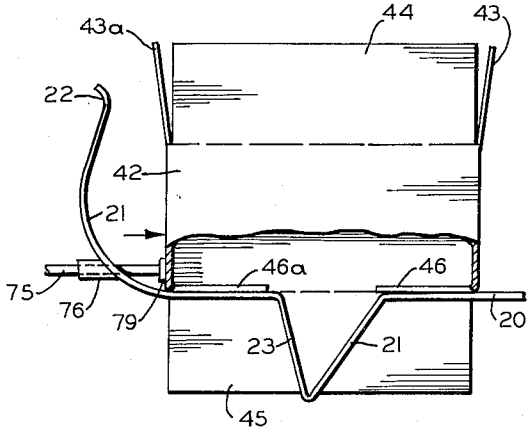


FIG_8



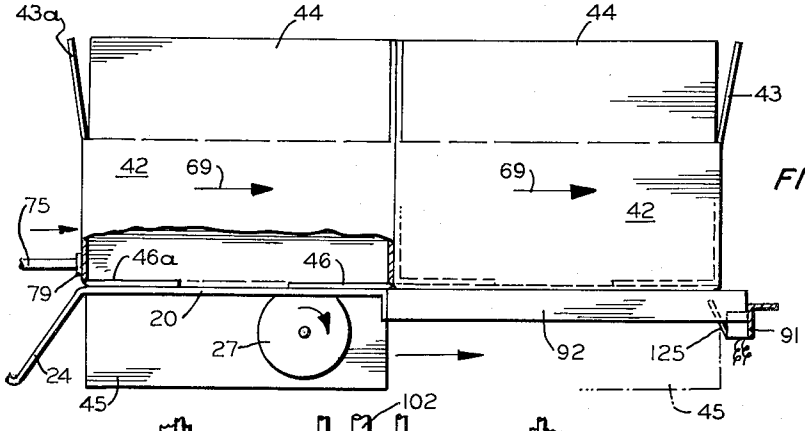


FIG_9

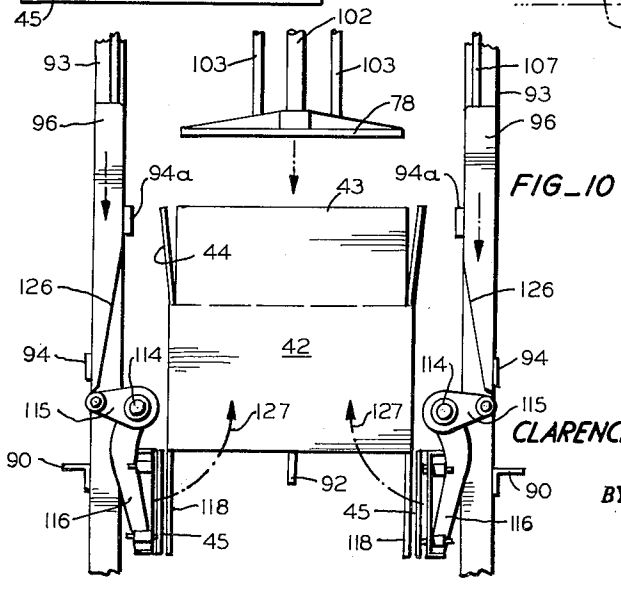


FIG_10

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PORTABLE CARTON BOTTOM SEALERS

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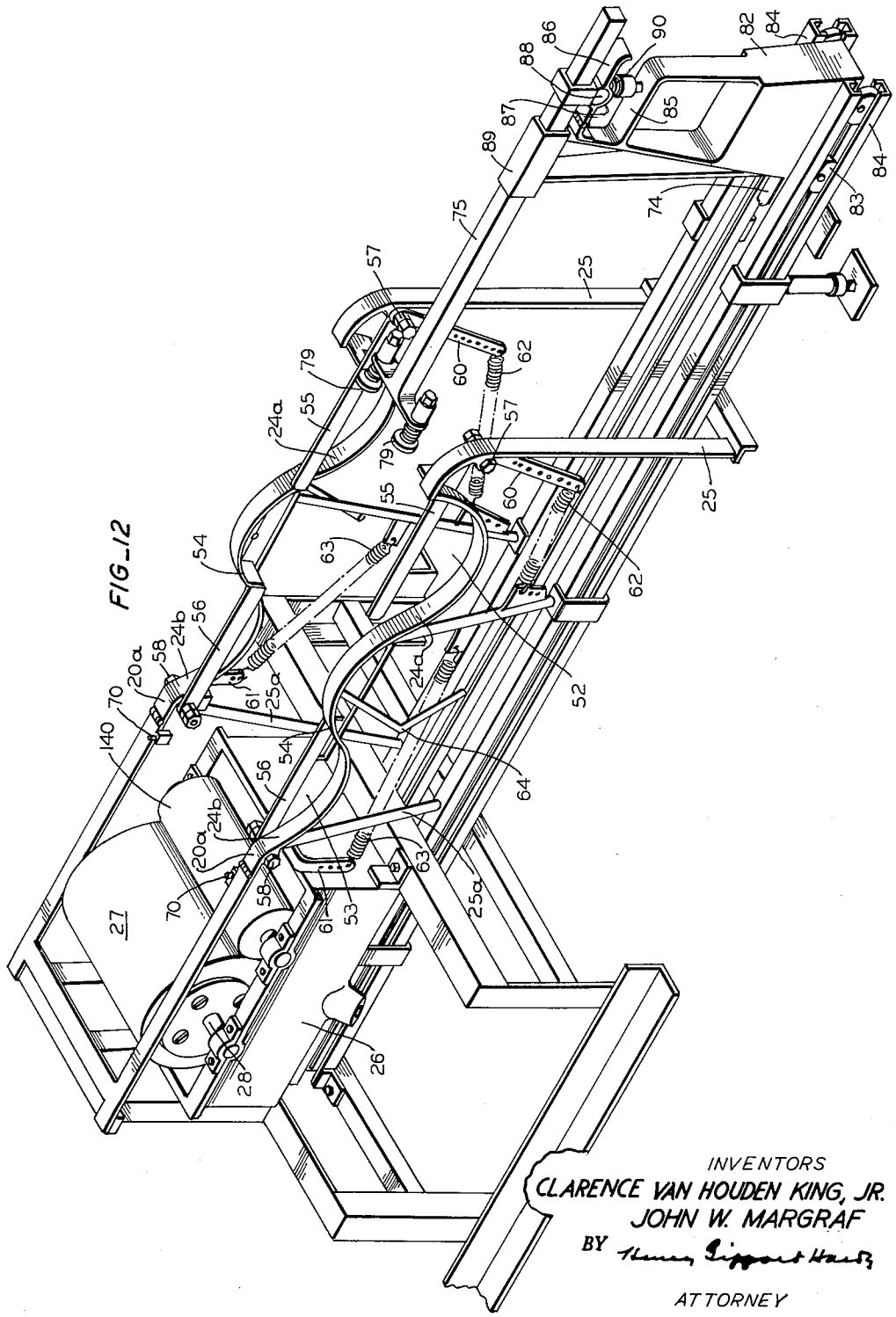


FIG_12

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United States Patent Office

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Patented June 19, 1962

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PORTABLE CARTON BOTTOM SEALERS

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Filed July 28, 1960, Ser. No. 45,908
10 Claims. (Cl. 93—49)

This invention relates to improved equipment for bottom sealing cartons or boxes and particularly to a light weight machine which makes both a fast and an accurate sealing operation portable for the first time.

The standard method for bottom sealing cartons is by means of metal stitches. To accomplish this result a flat folded carton is opened and placed upon a mandrel. The end and side flaps are folded in on each other and held in the overlapped position while the stitcher with a hand or power machine, secures them together with metal clamps, usually eight in number, at each end of the bottom. Besides the fact that it takes two men for this operation, i.e., the helper and the stitcher, it is really a hand operation which regardless of the speed and dexterity of the operators, is subject to their individual fatigues which have, of course, a great effect upon production. There are numerous other disadvantages to stitching which will develop as the invention here is described.

Another method of sealing the bottoms of cartons is by means of pressure sensitive adhesives, where the cartons in folded form, have pressure sensitive adhesive coated on the outer face of each of the end flaps at the time the cartons are fabricated. When the cartons are unfolded or opened for bottom sealing, they are presented to a mandrel with the end and side flaps overlapped in the proper position. The operator, using a wooden mallet, pounds each bottom end to secure the adhesion of the side flaps to the bottom end flaps. In addition to the expense of this type of carton, there are many other disadvantages.

It is true that there is a further method of sealing cartons by gluing which is accomplished by expensive and permanently installed machines where all conditions for operation may be controlled within reasonable limits.

It is the object of the present invention to meet and overcome the many disadvantages of the previous methods at a reduced cost, at greater speed, and with portable equipment.

Amongst the objects is the provision of equipment which has many advantages over stitch closing of carton bottoms and particularly the following:

(*a*) To produce a machine where a single operator can bottom seal up to 1800 cartons per hour without any unusual fatigue or strain, which is to be compared with 300 to 400 cartons per hour with two men employing metal stitching.

(*b*) To provide a carton of greater strength and stability. At best wire stitching holds the several flaps together only at the actual stitched places, whereas gluing secures the parts together over a wide area greatly increasing the structural strength of the carton.

(*c*) To provide a machine which will automatically produce boxes or cartons which are uniformly squared. In the stitching operation a stitcher is subject to the influence of fatigue and during the latter part of the shift and it is most common to bottom stitch the carton without being squared up. It is apparent that the cartons must be squared to be acceptable. In the present invention squaring of the box is entirely mechanical and automatic in the operation of the machine.

(*d*) To speed the immediate production of bottom sealed cartons in the field where, for example, lettuce cartons have heretofore been bottom sealed in the field by operators with equipment mounted on flat bed trucks, either by the metal stitch method or by the pressure sensitive adhesive method. Two trucks are usually required to supply a given crew in the field. The machine of the present invention requires only one truck per field crew, and, therefore, releases the other truck for profitable operation.

(*e*) To provide a truly waterproof carton. Regulations governing the transport of certain fresh fruits and vegetables require a waterproof corrugated carton. It will be observed that closing the bottom flaps by stitching involves piercing of the carton bottoms and permits leaks therethrough from both the inside and the outside. The moistening of the holes of the stitching causes a weakening of the bottom of the stitch points. In addition, water passing through the pierced locations will penetrate the interior of the corrugated board itself causing a general structural weakening of the carton. The glue of the present invention being waterproof prevents the waterproof qualities of the corrugated board to remain intact and be truly waterproof in every sense.

(*f*) To provide a device which has minimum maintenance. Because of the very complex nature of stitching machines and the constant hammering in the operation, the stitching equipment breaks down and requires constant maintenance. In the present invention there are so few moving parts and each is so accessible that maintenance usually can be done on the spot and the down time is reduced to a minimum. It should be appreciated that down time is a very important factor as, for example, a grower is required to hire a complete crew for each two machines and, if the machine is incapacitated for any reason the crew still has to be maintained. Obviously if the sealing machine is used in a plant the entire production line must stop until the machine is repaired.

(*g*) To provide a machine which uses only standard parts so that repairs can be made substantially anywhere. The manufacturer of stitching machine equipment in their eagerness to make their machines different from every other stitcher have further made it necessary to supply repair parts only from their own plant and no interchangeability between the parts of different makes of stitches has yet been developed or contemplated.

The inline sealing equipment is primarily for permanent installations in plants, and, therefore, is in no sense portable. The present equipment has many objectives not attainable by inline equipment, such as:

(*a*) Complete portability requiring no permanent installation of any kind.

(*b*) Easy adaptability to change in box or carton size. It takes approximately two hours to change the inline equipment to accommodate a different size box and this time factor prevents such equipment from ready use for anything but a constant size box. In the present equipment it takes only a very short time to alter the pressure plates to make any size box. Within the range of the present machine, the time required to change the pressure plates and make the necessary adjustments is approximately fifteen minutes.

(*c*) Inline sealers producing a comparable production rate of bottom sealed cartons, require from 40 feet to 100 feet of machine length to accomplish this purpose. Some plants do not have this amount of space to devote to the bottom sealing of cartons and, therefore, inline sealers are not practical. The small size of the equipment of the present invention is a great advantage where space is at a premium.

The equipment of the present invention is not intended to replace inline sealers but to function as a supplement thereto, and in places where such inline sealers are not practical. For example, short runs or specialized products can be very easily handled economically by the equipment of the present invention, whereas they would

be totally impractical and uneconomical for inline sealers.

It is a further object of the invention to produce a machine of high speed capacity which is truly portable and small enough to be mounted on the bed of a flat bed truck without violating any law, so that it may be transported ready for immediate use to the place where the sealing operation is to be done. Because of the light weight of the present equipment (which is only approximately 200 pounds) no special type of truck bed is needed and no heavy anchoring means for securing the same to the truck bed is required for its full portable operation. Heavy lift equipment is not needed to move the machine from one location to another either in the plant or in the field. Furthermore, the power requirements for the machine are well within the limits of portability. The electrical power required to operate the machine and the auxiliaries can come either from a 110 volt power source or from an electrical motor driven by power supplied from the battery of the vehicle. Also, if necessary the air supply can be operated by a compressor from the air supply line of the engine. At the present time Westinghouse and other manufacturers produce an air brake supply compressor supplying twelve cubic feet per minute. This amount of air is well within the requirements of the present equipment. The compressor is furnished in a kit for attachment to the fan belt drive of the standard truck motor vehicle.

It is a further object of the present invention to supply and provide a glue applicator having the following benefits and advantages:

(*a*) The use of cold glue so that the glue itself is not influenced by weather or humidity changes.

(*b*) The elimination of any need for heating elements, thermostats or power for operation of these controls which are essential to keep hot glue at the constant operating temperature.

(*c*) The use of cold glue provides easy cleaning and maintenance which is almost impossible with the use of hot glue.

(*d*) A glue roll applicator formed with an inflated resilient sleeve so that not only the resilient material of the applicator but the interior air chamber or cushion permits it to conform to any shape or irregularity which may be encountered.

(*e*) An inflatable glue roll, the nature of which makes it possible to apply glue to a surface without the necessity of providing for backing up means on the opposite side or spraying the glue where the spray nozzles present a constant and difficult problem of maintenance.

It is a further object of the present invention to provide a folding track where the end flaps of a carton are automatically positioned and squared for subsequent presentation to operations such as gluing and sealing. The elimination of hand labor for the folding and positioning represents an extensive advantage in the cost of operation.

It is another object to provide a carton bottom sealing machine at a cost substantially 1/20 of the inline sealing machines of comparable capacity and, while the cost of the present machines may be twice that of stitching equipment, nevertheless, it would take four stitchers to equal the production obtained with this equipment.

Another object is to provide a machine which can be operated by unskilled help and thus eliminate the necessity of expert operators.

Further objects are to provide a construction of maximum simplicity, economy and ease of assembly and disassembly, also such further objects, advantages and capabilities as will fully appear and as are inherently possessed by the device and invention described herein.

The invention further resides in the combination, construction and arrangement of parts illustrated in the accompanying drawings, and while there is shown therein a preferred embodiment thereof, it is to be understood that the same is illustrative of the invention and that the

invention is capable of modification and change and comprehends other details of construction without departing from the spirit thereof or the scope of the appended claims.

Referring now to the drawings:

FIGURE 1 is a side elevation of the complete portable carton bottom sealer of the present invention.

FIGURE 2 is a fragmentary vertical section of the glue roller enlarged in scale, taken on the line II—II of FIG. 1.

FIGURE 3 is a perspective view of the resilient vertical guides for the upper side flaps.

FIGURE 4 is a front elevational view of the sealing station, partly in section, with the upper and lower pressure plates in the operative or sealing position.

FIGURE 5 is a perspective view of one of the lower pressure plates with the resilient pads mounted thereon.

FIGURE 6 is a vertical section taken on the line VI—VI of FIGURE 5.

FIGURE 7 is a diagrammatic side elevational view of the manner of presenting the opened carton to the folding track.

FIGURE 8 is a diagrammatic view in side elevation showing the end flaps of the carton folded at right angles to the sides with the carton automatically squared and under the influence of the plunger moving the carton to the gluing station.

FIGURE 9 is a diagrammatic side elevational view of two cartons, the one at the left being positioned at the gluing station and the one on the right at the sealing station.

FIGURE 10 is a fragmentary front elevational diagrammatic view of the sealing station, the carton having had its end flaps glued and with its side flaps positioned against the bottom pressure plates.

FIGURE 11 is a perspective view of the detail involving the carriage for the plunger and the plunger safety release.

FIGURE 12 is a perspective view of an alternate form for the folding track, the gluing station and the plunger carriage.

Referring now more particularly to the drawings and with reference to FIGURES 1, 7, and 8, the folding track which precedes the gluing station and is preparatory thereto, is a parallel double track arranged substantially in a horizontal plane, comprising the track members **20**. The outer ends (the beginning ends) of the track members **20** are shaped in an upward smooth curve as in **21** which terminate in a short reverse curve **22** for safety reasons. From the curve **21** forward, the travel is in a horizontal plane until there is a sharp downward bend at **23** with an upward bend **24**, defining an irregular V in side elevation. The track then continues in a horizontal plane leading to the next operation or station which is gluing. Suitable supports toward the rear or the curved portion **21** of the folding track are indicated at **25**. The forward ends of the track are supported by and secured to the support frame **29** for the glue pot **26**, which as shown in FIGURE 1, exposes a portion of the glue roller **27**. The glue pot **26** is preferably rectangular in shape, having a glue roller **27** journaled in the sides thereof as at **30**. The shaft **28** of the glue roller extends beyond one wall of the glue pot **26** and to this exposed end is coupled a drive pulley **31**. However, the glue roller **27** is positioned so that its operating surface or gluing surface **32** is raised slightly above the level of the horizontal plane of the track **20**. The glue roller **27** is substantially the same width as the end flaps of the cartons which are to be glued and obviously, provision is made to divide a glue roller of such size to be commensurate with the width of the particular end flaps to be glued. To keep the bottom side flaps **45** of the carton from becoming inadvertently glued, guide shoes **33** are provided at each side of the glue pot.

Referring now to FIGURE 2, the glue roller is of unique construction, with the shaft **28** passing axially

therethrough. The ends of the glue roller are solid discs 34 which have their perimeters rounded as at 35. The discs 34 may be made of any suitable material but Teflon discs are indicated as preferable. The glue roll is formed of a neoprene sleeve 36 with its ends turned inwardly as shown in 37. The ends are held in position by retaining disc 38 which fits somewhat loosely over and around the shaft 28 and is secured to the discs 34 in any suitable manner with the in-turn end of the silicon sleeve therebetween. Both ends are formed in the identical manner. The disc at one end of the glue cylinder is provided with an air valve 41 which passes through the retaining disc 38 and the end disc 34 to the interior. By this means the silicon sleeve is inflated to provide a resilient cylinder for gluing. In order to provide uninterrupted operation in the event the sleeve 36 becomes punctured or fails to hold the arc, an inner sleeve 40 of foamed rubber or the like is provided.

The cartons 42 which are bottom sealed by this apparatus are a four sided carton, preferably of corrugated paperboard, although any other suitable box material may be used, having oppositely disposed top end flaps 43*a* and 43 respectively and top oppositely disposed side flaps 44. Correspondingly at the bottom it has bottom side flaps 45 and oppositely disposed bottom end flaps 46*a* and 46. The cartons come folded flat with the open corner of the body position securely joined in the conventional manner. They are opened to rectangular form by the operator with the side walls being in the same vertical plane as the side flaps 44 and 45 and the end walls being in the same vertical plane as the forward end flaps 43 and 46 and the rear end flaps 43*a* and 46*a* being in the same plane as the rear wall. The opened box in this form is presented to the folding track 20 at an angle indicated by the arrow 47. The bottom side flaps 45 straddle the track 20 and the bottom forward end flap 46 is guided downwardly in the rearwardly directed slope 24 of the well 50 while the rear flap 46*a* engages the curve 21 and as the pressure is downwardly and forwardly, as indicated by the arrow 48, the end flap 46*a* tends to be folded inwardly in the manner shown in FIGURE 7. As the box is moved forward along the track 8 (see FIGURE 8) the forward bottom end flap 46 engages that horizontal track 20 at the bend 51 so that it is folded back upon itself in the manner shown in FIGURE 8, while at the same time the rear bottom end flap 46*a* has also reached a horizontal position of the track 20 so that both flaps are now folded at a 90° angle with respect to the carton body walls and these body walls are now in a vertical position. As the carton 42 moves forwardly, the right angled bend of the bottom flap 46 is maintained as well as that of the rear end flap 46*a* which is of sufficient length to bridge the gap of the well 50.

With reference now to FIGURE 12, there is shown an alternate form of folding track having double wells, or tandem wells 52 and 53. The track 20*a* is substantially horizontal but at the beginning of the track the curve is steeper, as at 21*a*, and extends only below the horizontal plane of the track 20*a* to the bottom of the first well 52. It has an upwardly curving forward portion 24*a*. Spaced forwardly from well 52 is another similar well 53, which has a rearward curving wall 54 and an upwardly curving wall 24*b*. Both of the walls 54 and 24*b* terminate in the horizontal plane of the track 20*a*. Because of the extended width of the open mouth of the wells 52 and 53, bell cranks 55 and 56 respectively are provided adjacent the inside of the tracks to bridge the mouths of the wells, the upper surface of which bell cranks 55 and 56 are in the same horizontal plane as the track 20*a*. The bell cranks 55 and 56 are pivotally mounted on the supports 25 and 25*a* for the tracks and pivot at 57 and 58 respectively. The depending arm of the bell cranks 60 and 61 respectively are retained in the normal horizontal position by the springs 62 and 63. In the stretch of track 20 which is between wells 52 and 53 and at either side of the run, two downwardly and outwardly directed flaring spreaders 64 are secured.

As the opened box 42 is presented to the form of track illustrated in FIGURE 12, the end walls are substantially vertical. As the forward bottom flap 46 arrives at the track it engages the bell crank arms 56 and depresses the same against the spring 63, while at the same time the rear bottom flap 46*a* engages the bell crank arms 55 and depresses the same against the spring 62. As the carton is moved forward or to the left as viewed in FIGURE 12, the bell crank arms 55 and 56 engage and fold the end flaps 46*a* and 46 respectively, urged by the return springs 62 and 63 so that by the time they reach the horizontal portions of the track, the bell crank arms are in the position shown in FIGURE 12 and the end flaps are folded at right angles to the vertical walls of the carton.

The ram feed system is controlled by the trip mechanism 70 mounted on the track 20 or 20*a*. As a box is moved slightly forward on the track 20, the valve 70 is tripped causing compressed air to enter the cylinder 71, through the air supply line 72. Air then moves the piston 73 forwardly in the direction of the arrow by indicating the direction of travel of the carton 42. Piston rod 74 is secured to a carriage frame 82 which moves the plunger 75 in the same direction. The plunger 75 moves through the guide 76 which is located centrally between the rails of the track 20 and slightly above the horizontal plane of the track. Plunger 75 has resiliently mounted button heads 79 which engage the rear wall of the carton 42 and automatically moves the carton forward over the glue roller 27 and on into the closing station.

The operation of the trip valve 70 is in series with the trip valve 77 (see FIGURE 4) so that the plunger 75 will not feed a box into the closing station until the pressure head 78 is at the top limit of its travel and trips the valve 77. When the valve 125 is tripped the air supply 72 to the cylinder 71 is cut off and the pressure relieved and the travel of the piston 73 is reversed. Compressed air enters at 80 which returns the piston 73 immediately to the position shown in FIGURE 1. Also when valve 125 is tripped the downward stroke of piston 101 is actuated. The cylinder 71 is suitably supported in rigid central longitudinal position by front and rear braces 81.

Referring now to the detail in FIGURES 11 and 12, it will be observed that the ram 75 is rectangular in form and guides through a rectangular tube 89 carried by the carriage 82. The piston rod 74 is directly connected to a carriage 82 which has four wheels 83 guiding in parallel U tracks 84. The carriage 82 carries a latch member 86 which extends rearwardly having a detent 87 for engaging a knob 88 secured at the rear end of the ram 75. The detent spring member 86 is itself spring loaded to the engaged position by coil spring 90 which may be mounted for suitable adjustable of the tension on the carriage portion 85.

The function of the spring 86 and the knob 88 on the plunger 75 is to provide a simple breakaway in the event there is a jam up in the machine itself. Thus, if a box being pushed over the gluer 27 into the closing station by the knobs 79 engages any obstacle in its path, such as a carton already occupying the station, the back pressure is sufficient to depress the clip 86 and permit the knob 88 to ride thereover, permitting the piston 73, rod 74, and carriage 82 to complete the forward travel but without moving the ram 75. Thus the box which has encountered an obstacle in its forward movement is not jammed, dented, or otherwise damaged, and the cycle can be completed without difficulty or damage to the box or operator. The return stroke of the piston 73 causes the knob 88 to automatically reengage the detent 87 and thus return the plunger 75 to the normal position.

The sealing station of the device is built around a rectangular frame made of angle irons flared outwardly, the same being numbered 90 at the sides and 91 at the rear.

(See FIGURES 1 and 4.) These are slightly lower than the horizontal track 20 which feeds to this device but the uniform horizontal plane is maintained by a central vertical support member 92. Secured to the open ends of the side frames 90 are four vertical right angle frame members 93, two at each side. At each side these angled frame members 93 are spaced apart from each other not only by the angular frame 90, but by a spacer bar 94 and 94*a*. At the top these angular vertical frames 93 are maintained in position by the top housing cover plate 95. The reason for having these side vertical members 93 spaced from each other in the longitudinal direction, is to provide a guide means for wedges 96 which guide loosely in this gap for vertical movement.

Secured vertically and axially aligned to the top housing member 95 is an air cylinder 100. Within the air cylinder 100 is the piston 101, having a depending piston rod 102. The outer end of the piston rod 102, is attached to a pressure plate 78 which is rectangular in form and is substantially equal in area and plan to the inner dimensions of the box or carton 42. To assure a satisfactory and even pressure by the piston rod 102, guide rods 103 are provided, which guide rods are attached at the top to a lateral spider 104, having a collar 105 which loosely surrounds the piston 100 and guides in a vertical movement on the outer surface thereof. The spider 104 has lateral arms 106 which extend horizontally. At their outer extremities are attached to the adjustable wedge rods 107. The wedge rods 107 are secured to the lateral arms 106 of the spider in any suitable manner as indicated at 108 so that they may be moved upwardly or downwardly to adjust the wedges 96 to which they are attached. It will be seen, therefore, as the piston rod 102 moves upwardly or downwardly, the upper full pressure plate 78 moves with it and because of the attachment of the guide rods 103 there is no twisting or turning. The spider 104 also moves, equally raising and lowering with the piston rod 102 and in turn equally raising and lowering the wedges 96, guiding in the uprights 93. Suitable air inlets to the cylinder 100 are provided, one for the upward movement of the piston which is 110 and one for the downward movement of the piston which is 111.

Attached to the outer sides of the vertical frame members 93, are brackets 112 which carry a stub shaft 114. The stub shaft carries a rotatable cam 115 which engages the face of the wedge member 96. At each end of the stub shaft 114, a pair of arms 116 are fixedly attached for rotation therewith. Each pair of arms 116 carries a bottom pressure plate which generally describes the area and dimension of each of the side bottom flaps. (See FIGURES 5 and 6.) These plates are numbered 117. In order to exert sufficient resilient pressure in an upwardly direction against the downward force of the top pressure plate 78, the plate 117 may be provided with pads 118, mounted resiliently at intervals with springs 120. These pads will accommodate any irregularities which may be encountered, so that an even pressure is exerted regardless of such irregularities as may be involved in either the positioning or thickness or character of the carton going through the station at the particular moment. It is apparent by reference to FIGURE 4 that the bottom pressure arms 116 exert their maximum upward pressure when the piston rod 102 is in its maximum downward position. To make certain of this last feature, in actual operation the bottom pressure arms 116 reach their position shown in FIGURE 4 and in effect set up a table just prior to the full stroke of the piston 102 and the upper pressure plate 78.

Operation

The operation of the folding station has already been described in connection with the description of the structure and will not be repeated. The box with its end flaps 46*a* and 46 correctly folded, and with its side flaps 45 straddling the rails 20, is presented to the gluing station.

The glue roll 27 is constantly rotated by motor 121, belt 119 and pulley 31, in the direction of travel of the boxes, which would be clockwise shown in FIGURES 9 and 1. The reason for rotating the glue roll continuously is primarily to keep the glue itself in constant liquidity and consistency. Obviously, it is important to keep the motor rotating continuously because it is extremely difficult from the standpoint of maintenance and control to have a motor start and stop as often as would be required in this instance, for each separate box.

The gluing station is of particular interest and importance because of the nature of the gluing apparatus. Referring particularly to FIGURES 2 and 12, the glue pot 26 is partially filled with cold glue. The glue used in the operation is a fast setting adhesive with a strong bond. It is to be realized that the gluing of the end flaps and the setting of the bond must take place in the few seconds of dwell in the sealing station so that the carton may be used immediately thereafter. The use of cold glue has many advantages in that it requires no temperature control and is not affected by either changes in the weather or the humidity. Accordingly, it is particularly suitable for field use. Furthermore, cold glue requires little maintenance of the glue pot. Experience with the cleaning of hot glue pots after the glue has set even for a minute, teaches the difficulty if not the impossibility of keeping the equipment clean and this problem is completely eliminated.

The operation of the gluing roller 27 is continuous during the operation of the machine. This continuous rotation keeps the glue from scumming, keeps it in a liquid state and keeps it always in readiness for application by the roller. If desired, a doctor roll 140 may be used in conjunction with the glue roller 27 in order to keep a film of glue ready for even, uniform application on the carton end flaps.

As has been indicated earlier, the glue roller 27 is inflated with air through the valve 41 so that the gluing is always against the resilient internal air pressure of the cylinder 27. The resilient sleeve 36 is air tight and its outer surface 32 is the actual gluing surface. It has been found upon occasion that if there is a tiny leak of air through the sleeve 36 that the air resiliency or resistance, is lost. Accordingly, an inner resilient sleeve 40 backing up the outer air tight sleeve 36 has been found desirable as a safety measure so that even if the air pressure escapes from the interior of the roller 27 the resiliency of the inner sleeve 40 is sufficient to provide continuous operation.

The movement of the box 42 over the glue roll 27 glues the exposed under surface of the end flaps 46*a* and 46. The continuous travel of the box 42 takes it into the sealing portion of the machine and to this area it is guided on the top edge of the central guide 92. In delivering the box to the pressure sealing or closing station, the bottom side flaps 45 will not engage the switch 125 unless and until the side flaps are in proper position for engagement by the lower pressure plates 117. When one of the side flaps 45 engages the limit switch 125 the air at the top of cylinder 100 is admitted to drive the piston 101 and the piston rod 102, in a downwardly direction (see FIGURE 10). In the downward movement of the upper full pressure plate 78, the spider 104 also moves downwardly, moving the wedges 96 in a downward path guided by the guide frame members 93. In the downward movement of the wedge members 96, their sloping inner faces 126 engage the cam followers 115, causing the stub shaft 114 to rotate on opposite sides uniformly in direction of the arrows 127. In this rotation it will be observed by reference to FIGURE 10, that the pads 118 of these lower pressure plates engage the bottom side flaps 45 at either side and move them in an arc directed toward the glued face of the bottom end flaps 46*a* and 46. It will be observed that the rotation or pivot point of these arms is the stub shaft 114 which is a little above the bottom of

the box 42. Accordingly, in the folding of the side flaps 45 inwardly, the box is raised in position a few inches above the central guide 92 against the downward pressure of the upper plate 78, so that there is nothing obstructing the full closure and sealing of the bottom. As stated earlier, the complete rotation and upward movement of the bottom pressure plates 117 and their pads 118, reach their full position to form jointly a horizontal table just prior to the full downward stroke of the piston shaft 102 and the upper pressure plate 78. Thus, when the full stroke is reached, the upper pressure plate has a firm and full surface against which it can bear, to secure the seal. In the operation of the valve or limit switch 125, a time delay is provided which may be regulated from zero to ten seconds to give time not only for pressing the bottom flaps against the glued surfaces, but to give set-up time for the glue. When this limit has been run, air is automatically supplied to the cylinder 100 through the entry port 110 to drive the piston 101 upwardly and return the pressure head 78 to its upward limit of ready position.

Since the switch or trip 70 for initiating the ram 75 is in series with the switch or valve 77, the ram mechanism will not be operable unless and until the upper pressure head engages and energizes the switch 77 to indicate to the ram that there is a ready position in the machine. This is indicated when a carton, with its end flaps glued is delivered to the closing station. In so doing, the bottom sealed carton is pushed ahead and delivered for use on a belt conveyor 128, for example.

The movement of the boxes is so synchronized that when the cycle for sealing the bottom of the boxes has been complete and the piston is being moved upwardly in the cylinder 100, the next box 42 in line cannot move forward to the gluing until the upper pressure plate 78 has been returned to its upward limit and actuates the control switch 77. When this is done, the next box moves in quickly, is glued, and placed in position below and aligned with the pressure plate 78 and the box which has been completed is delivered to the take-off conveyor 128, or the like.

It should further be stated that as the carton 42 is presented to the gluing station, the upper side flaps 44 thereof have to be guided so that they will not inadvertently assume a position which would either prevent the proper entry of the upper pressure plate 78 or jam against the vertical frame members 93. This is accomplished by two pairs of resiliently mounted longitudinal guides 130 and 131 placed oppositely to each other. Each of the guides is substantially an inverted U with a belled or flared entry as at 132 and 133. The guides 130 and 131 are supported from rigidly mounted angle members 134 and 135 which are in turn secured to the vertical frame members 93. The guides are resiliently suspended for vertical movement from the angle members 134 and 135 by means of rods 136 which are secured to the guides and pass upwardly through corresponding openings in the angle members where they are held in position by collars 137. The guides are required to move vertically upward some four inches or more, as will hereinafter be explained, and therefore work against the action of springs 138, which springs restore the guides appropriately to the operative position shown in FIGURE 3, when no longer subject to compression.

With reference to FIGURE 1, as the carton 42 enters the gluing station, the upper side flaps at either side enter the opening 132 of the guide 130. The vertical resistance provided by the springs 138 is sufficient to keep the carton body pressed downwardly against the glue roll 27, the gluing surface of which, 32, extends slightly above the horizontal level of the track 20. By this means continuous contact of the end flaps with the glue roll is established so that glue is applied over the entire surface of each end flap in turn.

As the carton moves on to the sealing stage, the upper side flaps are guided into the entry 133 of the guides 131. These guides make certain that the side flaps will not interfere with the downward movement of the upper pressure plate or mandrel 78 which is substantially the same dimension as the inner dimension of the carton or box. Because of the leverage and cam actions the carton during the sealing operation is raised some four inches above the central guide support 92 (see FIGURE 4). Thus during the sealing operation the carton is held solely between and by the pressure of the lower pressure plates 117 on the outside bottom of the carton, against the upper pressure plate 78 on the inside of the bottom. To accommodate this difference in height, the upper edges of the side flaps move upwardly against the compression of springs 138 still retaining their vertical position and keeping the carton properly squared during the sealing.

When the bottom sealing is completed, the carton with its bottom closed and sealed is returned to rest upon the central support 92 and then moved outwardly from the machine to the conveyor 128 or any suitable take-off means, by the next carton entering the sealing station.

It has been found in the operation of the machine that in order to provide a smooth operation of the cams and particularly the pressure arms 116 that positive means are desirable to restore the arms with their pressure plates 117 to the ready position shown in FIGURE 10 and to maintain the ready position without any slap or bounce which might interfere with the forward progress of the next carton to enter the sealing station. To accomplish this control, wires 140 are suitably attached at one end to the outer ends of the arms and pass over pulleys 141 secured to the vertical uprights 93 to springs 142 at the other, which are suitably anchored at 143 to the opposite side frame members. In the pressure position shown in FIGURE 4, the springs are extended so that when the cams return the arms 116 to the ready position, the springs 142 assist in this return and hold the arms in the proper ready position without any slap or bounce or other misalignment.

We claim:

1. A portable carton bottom folding and sealing unit for cartons having four body panels and upper and lower end and side flaps, comprising in combination a frame, a longitudinal parallel track on said frame, said track having curved portions in its course for automatically folding the bottom end flaps of a carton inwardly substantially perpendicular to the body panels, means for moving said carton along said track, gluing means including a glue pot and a resilient glue applying roller projecting slightly above the horizontal plane of said track for applying glue to substantially the entire area of said end flaps in the progress of said cartons along said track, a vertical frame transverse of the progress of said carton, said frame supporting the pressure sealing means, and pressure sealing means including an upper pressure plate engaging the inner bottom surface of said carton, and a pair of oppositely disposed bottom pressure plates engaging the carton bottom side flaps, folding the same against the glued end flaps, and holding the same against the pressure of the upper pressure plate.

2. A portable carton bottom folding and sealing unit for cartons having four body panels and upper and lower end and side flaps, comprising in combination a frame, a longitudinal parallel track on said frame, said track having curved positions in its course for automatically folding the bottom end flaps of a carton inwardly substantially perpendicular to the body panels when the carton is presented to said track, means for moving said carton along said track, control means for said movement responsive to and normally operated only when the pressure sealing means is clear and in the inoperative position, gluing means including a glue pot and a resilient glue applying roller projecting slightly above the horizontal plane of said track for applying glue to substantially the entire area of said end flaps in the progress of said cartons along saidt rack, a vertical frame transverse

of the progress of said carton, said frame supporting the pressure sealing means, and pressure sealing means including an upper pressure plate engaging the inner bottom surface of said carton, and a pair of oppositely disposed pressure plates engaging the carton bottom side flaps, folding the same against the glued end flaps, and holding the same against the pressure of the upper pressure plate.

3. A portable carton bottom folding and sealing unit for cartons having four body panels and upper and lower end and side flaps, comprising in combination a frame, a longitudinal parallel track on said frame, said track having curved portions in its course for automatically folding the bottom end flaps of a carton inwardly substantially perpendicular to the body panels when the carton is presented to said track, means for moving said carton along said track, control means for said movement responsive to and normally operative when the pressure sealing means is clear and in the inoperative position, gluing means including a glue pot and continuously rotating resilient and pneumatic glue applying roller projecting slightly above the horizontal plane of said track for applying glue to substantially the entire area of said end flaps in the progress of said cartons along said track, a vertical frame transverse of the progress of said carton, said frame supporting the pressure sealing means, and pressure sealing means mounted for vertical movement on said vertical frame including an upper pressure plate engaging the inner bottom surface of said carton, and a pair of oppositely disposed bottom pressure plates pivotally mounted on said vertical frame, cam means mounted for vertical movement with said upper pressure plate, for engaging and rotating said bottom pressure plates to engage said carton bottom side flaps, folding the same against the glued end flaps and momentarily holding the same against the pressure of the upper pressure plate.

4. A portable carton bottom folding and sealing unit for cartons having four body panels and upper and lower end and side flaps, comprising in combination a frame, a longitudinal parallel track on said frame, said track having curved portions in its course for automatically folding the bottom end flaps of a carton inwardly substantially perpendicular to the body panels when the carton is presented to said track, means for moving said carton along said track, control means for said movement responsive to and normally operative only when the pressure sealing means is clear and in the inoperative position, gluing means including a glue pot and a continuously rotating resilient and pneumatic glue applying roller projecting slightly above the horizontal plane of said track for applying glue to substantially the entire area of said end flaps in the progress of said cartons along said track, a vertical frame transverse of the progress of said carton, said frame supporting the pressure sealing means, and pressure sealing means mounted for vertical movement on said vertical frame including an upper pressure plate engaging the inner bottom surface of said carton, and a pair of oppositely disposed bottom pressure plates pivotally mounted on said vertical frame, cam means mounted for vertical movement with said upper pressure plate, for engaging and rotating said bottom pressure plates to engage said carton bottom side flaps, folding the same against the pressure of the upper pressure plate, and guides resiliently mounted on said vertical frame for guiding the upper side flaps of said carton and resiliently holding the carton against the glue applying roller and resiliently positioning the carton for sealing.

5. A portable carton bottom folding and sealing unit for cartons having four body panels and upper and lower end and side flaps, comprising in combination a frame, a longitudinal parallel track on said frame, said track having curved portions in its course for automatically folding the bottom end flaps of a carton inwardly substantially perpendicular to the body panels when the carton is presented to the track, means including a carriage and a ram for moving said carton along said track, control means for said movement responsive to and normally operative only when the pressure sealing means is clear and in the inoperative position, gluing means including a glue pot and a continuously rotating resilient and pneumatic glue applying roller projecting slightly above the horizontal plane of said track for applying glue to substantially the entire area of said end flaps in the progress of said cartons along said track, a vertical frame transverse of the progress of said carton, said frame supporting the pressure sealing means, and pressure sealing means mounted for vertical movement on said vertical frame including an upper pressure plate engaging the inner bottom surface of said carton, and a pair of oppositely disposed bottom pressure plates pivotally mounted on said vertical frame, cam means mounted for vertical movement with said upper pressure plate, for engaging and rotating said pressure plates to engage said carton bottom side flaps, folding the same against the glued end flaps and momentarily holding the same against the pressure of the upper pressure plate, guides resiliently mounted on said vertical frame for guiding the upper side flaps of said carton and resiliently holding the carton against the glue applying roller and resiliently positioning the carton for sealing, and spring release means for disengaging the ram from said carriage upon resistance of a carton to forward movement on the said track.

6. A portable carton setup and bottom sealing machine for cartons having four body panels and top and bottom end and side flaps comprising three continuous linear stations in combination, a carton setup station including a longitudinal feed track of parallel members having depressed wells for contact with the bottom end flaps of a carton, automatically folding the same inwardly and delivering the same folded to the gluing station, gluing station including soft and resilient rotary means for applying glue over a substantial area of each bottom end flap as the carton passes through said station, and a sealing station having synchronized pressure plates comprising an upper pressure plate for engaging the inner bottom surface of said carton and an oppositely disposed pair of bottom pressure plates, for engaging the bottom side flaps, folding, and holding said flaps against said glued surfaces and the pressure of the upper pressure plate, to bottom seal said carton.

7. A portable carton setup and bottom sealing machine for cartons having four body panels and top and bottom end and side flaps comprising three continuous linear stations in combination, a carton setup station including a longitudinal feed track of parallel members having depressed wells, resistant arms bridging said wells for contact with the bottom end flaps of a carton, automatically folding the same inwardly and delivering the same folded to the gluing station, ram means for moving the cartons from the setup station to the gluing station, gluing station including soft and resilient rotary means for applying glue over a substantial area of each bottom end flap as the carton passes through said station, a sealing station having synchronized pressure plates comprising an upper pressure plate for engaging the inner bottom surface of said carton and an oppositely disposed pair of bottom pressure plates, for engaging the bottom side flaps, folding, and holding said flaps against said glued surfaces and the pressure of the upper pressure plate, to bottom seal said carton, and synchronized adjustable timing means for controlling the dwell time of the pressure in the sealing station.

8. A portable carton setup and bottom sealing machine for cartons having four body panels and top and bottom end and side flaps comprising three continuous linear stations in combination, a carton setup station including a longitudinal feed track of parallel members having depressed wells, resistant arms bridging said wells for contact with the bottom end flaps of a carton, automatically folding the same inwardly and delivering the same folded to the gluing station, ram means for moving the cartons from the setup station to the gluing station, gluing station including soft and resilient rotary means for apply-

ing glue over a substantial area of each bottom end flap as the carton passes through said station, a sealing station having synchronized pressure plates comprising an upper pressure plate for engaging the inner bottom surface of said carton and an oppositely disposed pair of bottom pressure plates, for engaging the bottom side flaps, folding, and holding said flaps against said glued surfaces and the pressure of the upper pressure plate, to bottom seal said carton, synchronized adjustable timing means for controlling the dwell time of the pressure in the sealing station, and automatic control means synchronized with the movement of said upper pressure plate to operate said ram means only when the said upper pressure plate is returned to its inoperative position.

9. A portable carton setup and bottom sealing machine for cartons having four body panels and top and bottom end and side flaps comprising three continuous linear stations in combination, a carton setup station including a longitudinal feed track of parallel members having depressed wells, resistent arms bridging said wells for contact with the bottom end flaps of a carton, automatically folding the same inwardly and delivering the same folded to the gluing station, ram means for moving the cartons from the setup station to the gluing station, gluing station including soft and resilient rotary means for applying glue over a substantial area of each bottom end flap as the carton passes through said station, a sealing station having synchronized pressure plates comprising an upper pressure plate for engaging the inner bottom surface of said carton and an oppositely disposed pair of bottom pressure plates, for engaging the bottom side flaps, folding, and holding said flaps against said glued surfaces and the pressure of the upper pressure plate, to bottom seal said carton, synchronized adjustable timing means for controlling the dwell time of the pressure in the sealing station, automatic control means synchronized with the movement of said upper pressure plate to operate said ram means only when the said upper pressure plate is returned to its inoperative position, and resiliently mounted guide means at said sealing station for engaging the top side flaps of said cartons for holding them against the rotary gluing means and guiding as well as holding them squarely in the sealing station.

10. A portable carton setup and bottom sealing machine for cartons having four body panels and top and bottom end and side flaps comprising three continuous linear stations in combination, a carton setup station including a longitudinal feed track of parallel members having depressed wells, resistant arms bridging said wells for contact with the bottom end flaps of a carton, automatically folding the same inwardly and delivering the same folded to the gluing station, rams means for moving the cartons from the setup station to the gluing station, gluing station including pneumatic roller means projecting slightly above the horizontal plane of the said feed track for applying glue over a substantial area of each bottom end flap as the carton passes through said station, a sealing station having synchronized pressure plates comprising an upper pressure plate for engaging the inner bottom surface of said carton and an oppositely disposed pair of bottom pressure plates, for engaging the bottom side flaps, folding, and holding said flaps against said glued surfaces and the pressure of the upper pressure plate, to bottom seal said carton, synchronized adjustable timing means for controlling the dwell time of the pressure in the sealing station, automatic control means synchronized with the movement of said upper pressure plate to operate said ram means only when the said upper pressure plate is returned to its inoperative position, and resiliently mounted guide means at said sealing station for engaging the top side flaps of said cartons for holding them against the rotary gluing means and guiding as well as holding them squarely in the sealing station.

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