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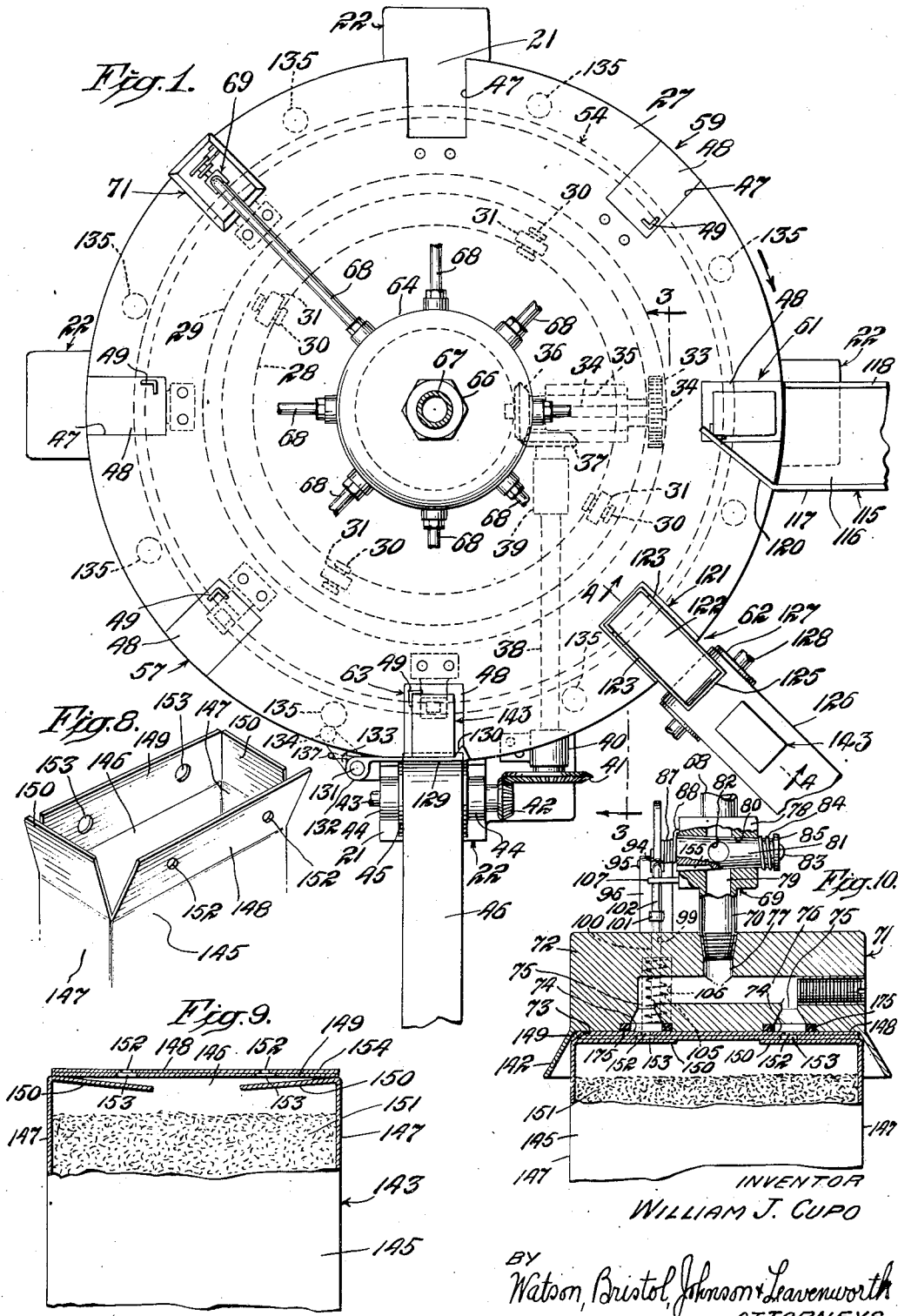
W. J. CUPO

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CARTON HANDLING APPARATUS

Filed May 5, 1945

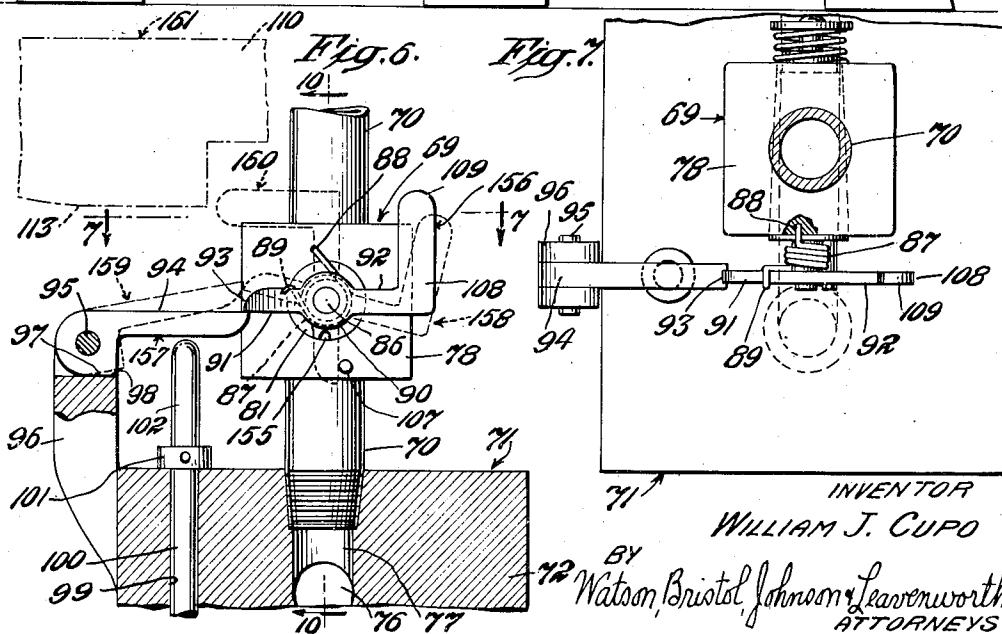
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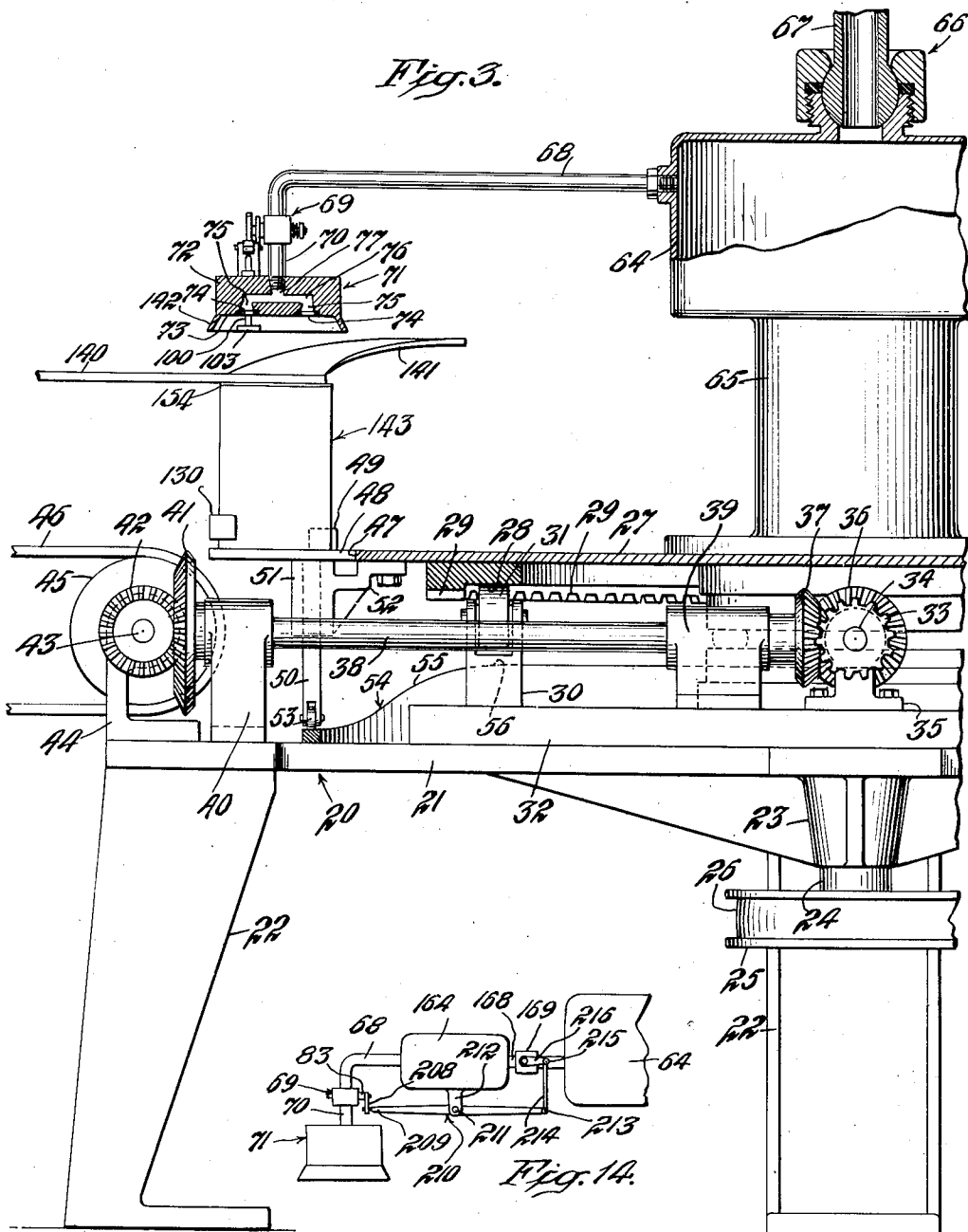
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CARTON HANDLING APPARATUS

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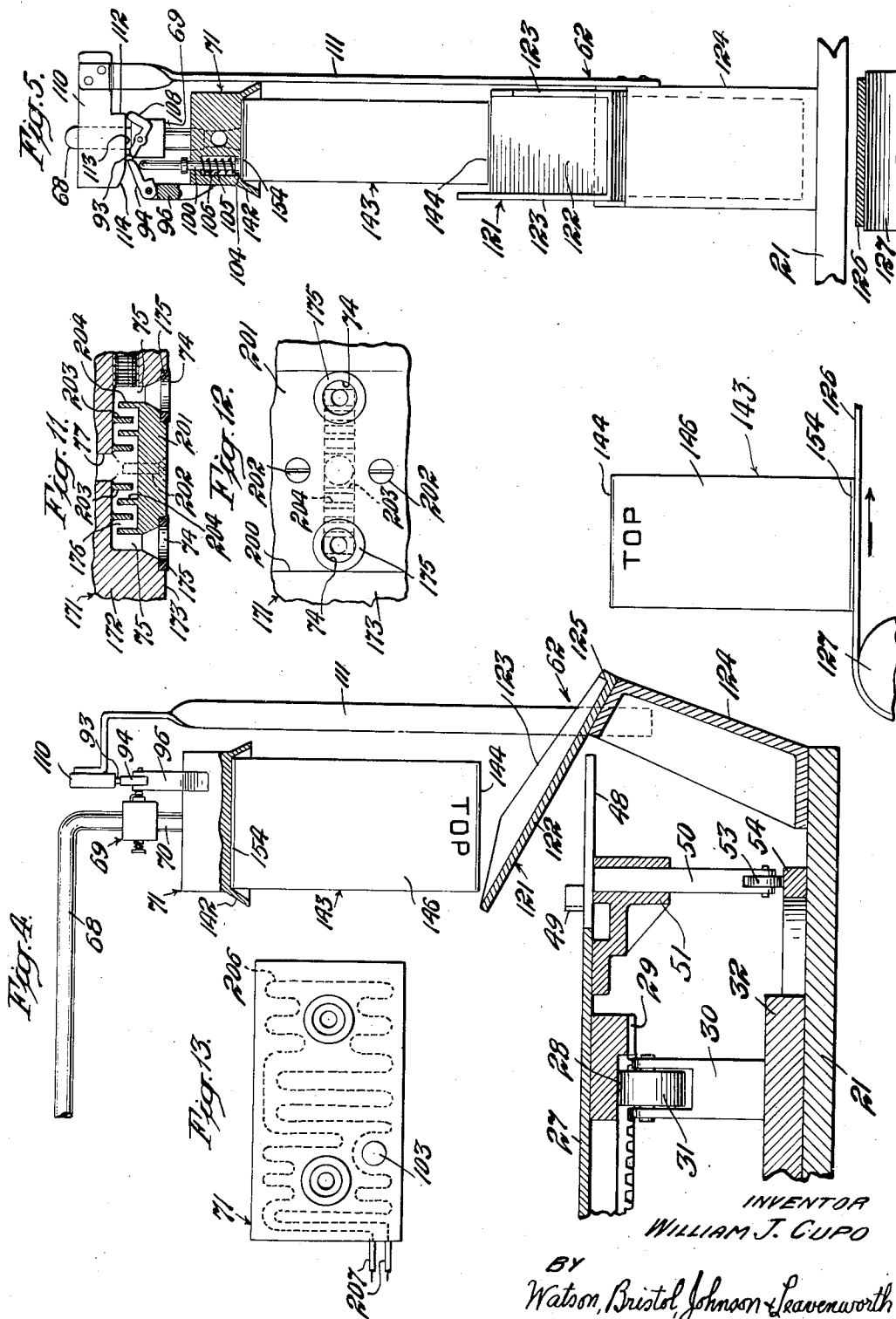
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CARTON HANDLING APPARATUS

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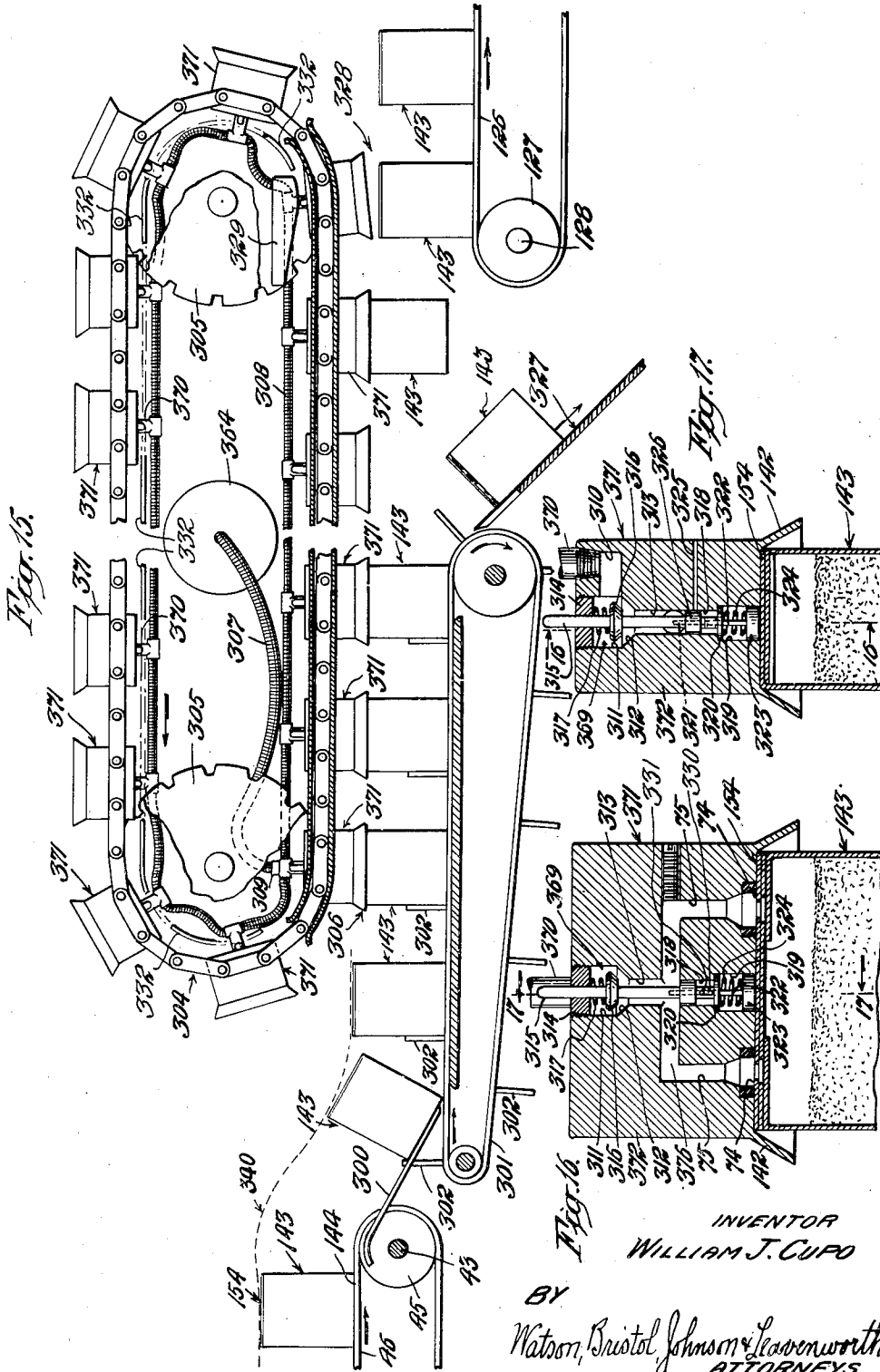
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CARTON HANDLING APPARATUS

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UNITED STATES PATENT OFFICE

2,485,040

CARTON HANDLING APPARATUS

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Application May 5, 1945, Serial No. 592,164

10 Claims. (Cl. 93—6)

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The present invention relates to carton handling apparatus and, more particularly, to such apparatus which is adapted to the handling of filled cartons in the anchorage of closure flaps thereof and the practice of the method disclosed in my copending application Serial No. 552,239, filed September 1, 1944, and the present application is a continuation-in-part thereof.

A general object of the present invention is the provision of such apparatus which is of unique construction, relatively compact and space-conserving, easily manufactured and readily and efficiently set up and operated in an automatic manner to receive previously filled cartons which may have had suitable anchoring means, such as an adhesive, applied to flaps thereof and such flaps folded into overlapping or stacked relation; move such cartons to a suitable discharge station; and, during movement of the cartons from a receiving station to such discharge station, provide for relative anchorage of stacked flaps, e. g., hold the flaps securely together while interposed adhesive is set for assuring the formation of effective substantially sift-proof closures tending to prevent passage of particles of material into or out of the packages.

A more specific object of the present invention is to provide such automatic apparatus which during movement to a delivery location of filled cartons having closure flaps thereof stacked will effectively apply pressure to opposite sides of stacks of flaps holding them in face-to-face engagement substantially throughout their entire areas of surface contact while adhesive adheres sufficiently to anchor them in their relative positions, and such operation being efficiently accomplished entirely from the exterior of the cartons without insertion of any means through or into the cartons.

Another object of the invention is the provision in such apparatus of means for efficiently and easily creating from the exterior of filled cartons a differential in pressure on opposite sides of stacks of closure flaps to hold them securely together while interposed adhesive is setting to flap-adhering condition.

An additional object of the invention is the provision in such apparatus of suction means which will draw inner, substantially physically inaccessible flap structure out against more permeable flap structure by suction of air through the latter to hold the flap structures together in face-to-face engagement while interposed adhesive forms a bond.

A further object of the invention is to provide

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such apparatus wherein defectiveness of carton structure or failure of suction means to perform intended operations resulting in improperly formed closures will be efficiently accommodated by means automatically discharging cartons having such defective closures at a station other than the normal discharge station which feeds to the commercial output of the machine.

Still another object of the invention is the provision of such apparatus which will automatically receive in timed relation successive filled cartons having closure flaps folded into overlapping relation with interposed adhesive, associate the successive cartons during progressive forward movement with suction-applying means, causing the latter during such carton movement to hold the overlapping flaps securely together in face-to-face engagement while adhesive sets to bond them together, releasing the suction from the moving cartons, causing the latter to be fed from the machine, and which may selectively remove from the machine such cartons as may have defective closures to prevent those cartons from being intermingled with properly closed cartons discharged from the machine.

A still further object of the invention is to provide structural embodiments of the apparatus which are readily constructed and allow efficient use and operation thereof.

Other objects of the invention will in part be obvious and will in part appear hereinafter.

The invention accordingly comprises the features of construction, combination of elements and arrangement of parts, which will be exemplified in the construction hereinafter set forth and the scope of the invention will be indicated in the claims.

For a fuller understanding of the nature and objects of the invention, reference should be had to the following detailed description taken in connection with the accompanying drawings, in which:

Fig. 1 is a top plan view (with parts in section, broken away, and omitted for clarity) of an embodiment of the apparatus of the present invention;

Fig. 2 is a front elevational view (with parts in section, broken away, and omitted for clarity) of the apparatus shown in Fig. 1;

Fig. 3 is an elevational section, taken along line 3—3 of Fig. 1, with parts broken away and omitted for clarity;

Fig. 4 is a sectional elevation, with parts broken away, taken along line 4—4 of Fig. 1;

Fig. 5 is an elevational front view of structure

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shown in Fig. 4, with parts in section and broken away;

Fig. 6 is an enlarged detailed elevation, with parts in section, of a portion of the suction head, air-exhausting conduit and suction control valve of the apparatus shown in Figs. 1 to 5 inclusive;

Fig. 7 is a plan view of structure shown in Fig. 6, with parts in section and broken away;

Fig. 8 is a perspective view of an open end of a typical carton structure which may be effectively vacuum-sealed with operation of the apparatus shown in Figs. 1 to 7 inclusive;

Fig. 9 is a front elevational view of the upper end of carton structure similar to that shown in Fig. 8, with the end flaps shown in overlapped relation prior to practice of the vacuum-sealing method to be performed by operation of apparatus of the present invention, and with parts of the carton structure broken away to show relative position of parts and typical contents;

Fig. 10 is a sectional view taken on line 10—10 of Fig. 6, with parts broken away, showing the carton structure of Fig. 9 in relation to the suction head after operation of the apparatus of Figs. 1 to 7 inclusive and at the moment of release of a resulting completed package from the suction head;

Fig. 11 is a sectional view, with parts broken away, of a modified form of suction head shown in Fig. 10;

Fig. 12 is a bottom view, with parts broken away, of the structure shown in Fig. 11;

Fig. 13 is a bottom view of a further modified form of suction head shown in Figs. 10, 11 and 12;

Fig. 14 is an elevational view, with parts broken away, of a modified form of vacuum tank, suction conduit and valving means;

Fig. 15 is a side elevational view, with parts in section and broken away, of another embodiment of apparatus of the present invention;

Fig. 16 is a detailed sectional view of suction head and valve structure associated with filled carton structure and as employed in the apparatus of Fig. 15, such sectional view being taken along line 16—16 of Fig. 17; and

Fig. 17 is a sectional view taken along line 17—17 of Fig. 16.

Referring to the drawings, like numerals identify like parts throughout. A preferred embodiment of the apparatus of the present invention, as shown in Figs. 1 to 10 inclusive, comprises a frame structure 20 including a top plate 21 supported by any suitable means, such as a plurality of legs 22—22. A bearing sleeve 23 through which a vertical shaft 24 rotatably extends is supported by the frame plate 21. The vertical shaft 24 is fitted with a drive pulley 25 about which is trained a drive belt 26 to be driven by any suitable motive means or power unit (not shown).

Above the frame top plate 21 is rotatably supported a turret structure preferably comprising a turret table 27 which has a circular track 28 and also a circular gear rack 29, both fixed to the bottom side thereof. The upper end of the shaft 24 extends above the frame top plate 21 and has the turret table 27 fixed or keyed thereto to be driven by that shaft. The turret table is rotatably supported by a plurality of posts 30—30 each of which carries a roller 31 on which the circular track 28 rests. The posts 30—30 are supported in any suitable manner upon the frame top plate 21, such as by means of an intervening plate 32.

A spur gear 33 is meshed with the circular rack

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29 and is keyed to or fixed upon a shaft 34 rotatably supported by a journal block 35 bolted upon plate 32. The shaft 34 also has fixed or keyed thereto a beveled gear 36 which is meshed with another beveled gear 37 fixed or keyed to a shaft 38 rotatably supported by journal blocks 39 and 40 supported by the frame structure 20. The shaft 38 extends toward the front or receiving side of the apparatus and is there provided with a beveled gear 41 meshed with a beveled gear 42 keyed to or fixed upon a cross shaft 43 suitably rotatably supported by journals 44, 44 supported upon the frame top plate 21.

The cross shaft 43 also has keyed thereto between the journals 44, 44 a pulley or roll 45 about which is trained an endless supply belt 46. Accordingly, as the turret table 27 is rotated, say in a clockwise direction, as viewed in Fig. 1, by means of the belt 26, the pulley 25 and the shaft 24, the supply belt 46 will be driven in synchronism therewith by the roll 45, shaft 43, beveled gears 42 and 41, shaft 38, beveled gears 37 and 36, shaft 34 and spur gear 33 meshed with the gear rack 29. However, it is believed to be obvious that other means of driving the turret table and supply belt in synchronism may be employed, such as any suitable motive means or power unit connected to the cross-shaft 43, or, if desired, separate power units may be employed for driving the turret table and the supply belt.

The turret table 27 is provided with a plurality of recesses or notches 47—47 in the peripheral edge thereof, suitably angularly spaced apart. Each recess is fitted with a carton elevating plate 48 preferably having its top surface lying in the plane of the top of the turret table 27 when the former is in its lowered position, as is indicated in Fig. 3. With the turret table 27 intended to be rotated in a clockwise direction, as viewed in Fig. 1, each elevating plate 48 is provided on its leading side, adjacent the back corner thereof, with a right angle flange 49 to aid in properly positioning a filled carton as will be more fully explained hereinafter. Each elevating plate 48 is supported upon a vertical rod 50 slidably mounted through a sleeve 51 fixed to the under side of the turret table 27, such as by means of a bracket 52. The lower end of each of the rods 50 is adapted to serve as a cam follower, and for this purpose may be provided with a roller 53. The rollers 53—53 rest upon and, in the rotation of the turret table 27, follow a circular cam track 54 supported on the frame top plate 21.

As shown in Figs. 2 and 3, the cam track 54 is suitably contoured so that at the receiving station opposite the end of the supply belt 46 each elevating plate 48 will have its top surface lying flush with the top surface of the turret table 27. As the turret table 27 rotates, the cam follower 53 (on the rod 50 supporting that elevating plate 48) will ride up an inclined portion 55 of the cam track 54 to a point 56 and will then travel around substantially in a horizontal plane from the elevated position, such as that indicated at 57 in Fig. 1, to a point 58 on the cam track (indicated in Fig. 2), which may be in the locality of the position 59 indicated in Fig. 1. Thereafter the cam follower 53 will ride down the decline 60 to arrive at the station 61, as indicated in Fig. 1, with the elevating plate 48 lowered to its initial position. The elevating plate 48 under discussion will then be rotated around from the station at 61, which may be termed the defective closure discharge station, past or through the

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position at 62, which is the normal discharge station; back to the receiving station at 63 opposite the end of the supply belt 46.

A vacuum tank 64, which is to be kept partially exhausted of air, is suitably supported upon the turret table, such as by means of a post 65. The top of the tank 64 is provided with a suitable fitting 66 which connects the end of an exhaust conduit 67 thereto while permitting the tank to rotate with the turret table. The exhaust conduit 67 may be connected at any remote point with any suitable gas-exhausting means, such as an air pump, operated by any suitable motive means, such as an electric motor which may have a starting switch in its electrical supply circuit suitably controlled by a pressure-responsive control which will close the circuit of the motor when the pressure in the tank rises above a predetermined value. It is believed to be obvious that, if desired, such exhausting means may be mounted directly upon the vacuum tank 64 or other parts of the rotating structure, thereby eliminating necessity of a fitting such as that suggested at 66.

A plurality of conduits 68—68 are connected to the vacuum tank 64 and radiate substantially horizontally therefrom toward the elevating plates 42—48. Each conduit 68 terminates in a valve unit 69; in turn connected by a conduit 70 to a suction head 71 arranged above one of the elevating plates 48.

Each suction head 71 preferably comprises a block or plate structure 72 having a lower carton-engaging face 73 provided with a pair of apertures or orifices 74, 74 each communicating with a passage 75 connected together by a cross-passage 76 in the suction head. The cross-passage 76 communicates via a passage 77 with the conduit 70.

Each of the apertures or holes 74, 74 is preferably surrounded by a resilient gasketing ring 75 seated within a circular rabbet about the aperture and of such dimension as to permit the outer edge of the gasketing ring to project slightly beyond the carton-receiving surface 73 so that when a portion of a carton is forced up into contact with the latter each gasketing ring will be somewhat compressed to prevent leakage of gaseous fluid, i. e., air, between the gasketing ring and the carton surface contacted thereby.

The valve unit 69 may be of any suitable construction and, as shown in Figs. 3, 6 and 10, may comprise a casing 78 having a through passage 79 providing communication between the conduits 68 and 70. Transverse of the passage 79 is provided a tapered hole 80 which rotatably receives a tapered valve element 81 traversed by a hole 82 to be aligned with the passage 79 when the valve is in one position. The tapered valve element 81 is preferably provided on one end externally of the casing with a headed pin 83 surrounded by a helical spring 84 held under compression between the casing 78 and a washer 85 beneath the head of the pin 83 to bias the tapered valve element into the tapered hole 80. The other end of the tapered valve element 81 is provided with an operating spindle 86 fixed thereto and extending beyond the other side of the casing 78. A coil spring 87 surrounds the spindle 86 and has one end fixed at 88 to the casing and the other end at 89 connected to a valve-operating means 90 fixed upon the spindle 86.

The valve-operating means 90 may comprise a pair of opposed arms 91 and 92. The arm 91 terminates in a nose 93 beneath which is normally

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engaged the end of a latch member 94 to hold the valve in closed position shown in Figs. 6 and 10. The latch member 94 is pivoted at 95 upon a bracket 96 preferably fixed to a side of the plate 72 of the suction head, and is so arranged as to be pivoted upwardly but is limited in its downward movement by a shoulder 97 which engages an abutment 98 on the bracket 96.

The plate 72 of the suction head 71 has a hole 99 formed therethrough slidably to receive a control plunger 100. The control plunger 100 has a collar 101 fixed thereon to limit downward movement and an upwardly projecting end 102 beyond the collar normally positioned beneath the latch 94 so as to raise the latter when the control plunger 100 is pushed upwardly. The control plunger 100 has a button 103 on the bottom end thereof extending below the carton-contacting face 73 of the suction head 71 which, when raised, is adapted to be received within a socket 104 in the suction head so that the bottom face of the button will lie flush with the carton-contacting face. The control plunger 100 may be biased by the force of gravity to its lowermost position, shown in Fig. 3, but, if desired, may be additionally biased by a helical spring 105 received within a socket in the suction head plate 72 provided, if desired, by more deeply counter-boring at 106 the hole 99 in the formation of the button-receiving socket 104.

The latch member 94 will provide a limiting stop with the valve arm 91 in one position, that is, the closed position of the valve. Another limiting stop is provided by any suitable means, such as a pin 107 fixed on the valve casing 78 within the path of the arm 91 when the latter is released from the latch 94. This stop pin 107 will hold the valve in its open position when rotated by the spring 87 through an angle of about ninety degrees (90°) after release from the latch 94, as will be more fully explained hereinafter.

The valve-operating means 90, as previously pointed out, includes another arm 92 which is adapted to return the valve from the open position to the closed position. The arm 92 is preferably provided with a cam follower 108 formed as a projection extending substantially at right angles thereto, with its end or nose rounded at 109 to cooperate with a valve recocking cam 110 supported in any suitable manner, such as by means of a supporting strap 111 at the normal discharge station 62, as shown in Figs. 2, 4 and 5. The valve recocking cam 110 preferably comprises an abutment 112 in the path of the cam follower 108 and a substantially arcuately arranged flat bottom surface 113 beneath which the nose 109 is adapted to ride during rotation of the suction head 71 and valve unit 69 through a small radial angle sufficient to assure return of the valve element 81 and its arms 91 and 92 to and past their initial positions while permitting the latch member 94 to drop to its locking position, as shown in Fig. 6. The flat surface 113 of fixed cam 110 merges with an upwardly sloping surface 114 to permit gradual return of arms 91 and 92 to their initial full line positions shown in Fig. 6 after the latch member 94 has been permitted to drop into locking position, all as will be more fully explained hereinafter.

At the defective closure discharge station 61, shown in Fig. 1 a discharge chute 115 is provided which comprises a bottom 116 and a pair of side flanges 117 and 118, all terminating closely adjacent the path of the peripheral edge of the turret table 27. Any suitable means, such as a bracket

119 fixed upon the frame plate 21, is employed for support of the chute 115. The side flange 117 is provided with a rakeoff shoe 120 in the path of a carton which may remain upon the elevating plate 48 after the latter is lowered. The rakeoff shoe 120 is so located as to permit the carton-locating flange 49 on the elevating plate 48 to pass therebeneath when the elevating plate is in its lowermost position, as shown in Fig. 2.

At the normal discharge station 62, as shown in Figs. 1, 2, 4 and 5, a discharge chute 121 is provided which comprises a bottom plate 122 having side flanges 123, 123 which, at the upper receiving end thereof, are arranged beneath the normal path of the lower end of the package when carried around to that point by any one of the suction heads 71 so that, as a package is released from the suction head, the former will be permitted to slide down the chute, to be discharged from the machine to any suitable delivery means. The discharge chute 121 is supported by any suitable means such as a bracket 124 mounted upon frame structure, such as the top plate 21 thereof, and the bracket 124 may, if desired, serve fixedly to mount the support bracket 111 for the fixed cam 110. The chute 121 is provided with a transversely extending trip bar 125 at the bottom thereof, for a purpose to be explained later, and the discharge end of that chute is arranged above a delivery belt 126 trained about a roller 127 rotatably supported by a shaft 128.

With respect to the receiving side of the machine described above, means are provided at the receiving station 63 to transfer filled cartons, with their upper ends unsealed, to the turret table 27 in properly timed relation so that each carton will be properly positioned upon one of the elevating plates 48. This means may comprise a star wheel or a pusher element, such as that proposed in Figs. 1, 2 and 3. Such pusher mechanism may comprise a swinging arm 129 having a tapered nose 130 and pivotally supported by a pin 131 for swinging movement about a vertical axis. The arm 129 terminates in a sleeve 132 rotatably supported on the pin 131 and having an arm 133 carrying a lug 134 normally disposed in the path of a plurality of lugs 135—135 fixed to the under side of the turret table 27. A helical spring 136 is arranged about the lower end of sleeve 132 and has one end at 137 bent upwardly to rest against the outside of arm 133. The other end of the helical spring 136 is fixed at 138 to a post 139 which carries pin 131 and is supported upon the top plate 21 of the frame structure. This feeding mechanism cooperates with the angle flange 49 on each of the elevating plates 48 in a manner fully indicated hereinafter.

There is also arranged at the receiving station 63 shoe means to hold carton flaps in properly folded or overlapping relation and to retain them in their relative positions until each filled carton can be raised into proper position with respect to a suction head. This means may comprise an elongated flat plate or shoe 140 arranged substantially parallel to the supply belt 46 and terminating above the position of each elevating plate at the receiving station 63. The overhead plate or shoe 140 is provided above the latter position with a laterally extending arcuately shaped wing 141 extending in the intended direction of rotation of the turret table 27 and sloped gradually upwardly, as shown in Figs. 2 and 3, to permit a filled carton to be gradually raised by the elevating table 48 as the latter moves upwardly due to rolling contact

between the roller 53 and the cam track 54 along the sloping portion 55 of the latter. The shoe wing 141 will retain the carton flaps in their overlapped positions while the upper end of the carton is being raised to the vicinity of the face 73 of the suction head. In order to assure accurate positioning of the overlapped flaps of the upper end of the carton with respect to the suction head, each of the latter is provided with a flared skirt 142 which guides the upper end of the carton to proper position as the latter is raised to contact with the suction head, immediately after being moved from beneath shoe wing 141.

The operation of the machine disclosed in Figs. 1 to 10 inclusive will be described in connection with a typical embodiment of carton structure which may be closed in an efficient manner by apparatus of the present invention. Such tubular carton structure 143, as shown in Figs. 8, 9 and 10, may have its lowermost end 144 (which eventually will be the top of the package) closed by a plurality of overlapping flaps in any suitable or desired manner and comprise a front wall panel 145, a back wall panel 146 and opposed side wall panels 147, 147 joining the panels 145 and 146 together. Each of these panels is provided at the upper end of the carton structure with an end flap, the edge of the front wall panel 145 being extended to provide an end flap 148, the back wall panel 146 being similarly provided with an end flap 149, and the opposed side wall panels 147, 147 being similarly provided with end flaps 150, 150. It will be noted that the side wall end flaps 150, 150 are of such dimension that when they are bent inwardly across the open end of the tubular carton structure they will not overlap, and that these end flaps are imperforate. The end flaps 148 and 149 preferably extend the complete width of the front and back wall panels 145 and 146 and are also preferably substantially as wide as the depth or distance between the front and back panels of the carton structure, so that as they are folded inwardly they will overlap to extend substantially completely across the end of the carton structure.

It will be noted that both the end flaps 148 and 149 are provided with a pair of apertures and that the pair in one end flap are preferably larger than those in the other end flap. For example, apertures 153, 153 in the intermediate end flap 149 may be made larger than apertures 152, 152 in the end flap 148. Whether these two pairs of apertures are of substantially equal dimensions or whether larger apertures are provided in the intermediate end flap or the outermost end flap, they should be so placed as to permit communication between the apertures in the two overlapped flaps to provide passageways therethrough to the underlying imperforate flaps. Making the apertures in one end flap larger than those in the other end flap assures the attainment of proper registry as to insure the desired communication between the apertures of the overlapping flaps. Of course, it will be understood that, for the purposes of employing apparatus of the present invention to seal such carton structures, other ways of providing passages through outer flap structure to inner imperforate flap structure may be practiced.

Such carton structure may be set up and handled in known manners by any suitable apparatus, with each being provided with a charge of commodity, such as that indicated at 151. Thereafter surfaces of end flaps may be provided with any suitable adhesive material by any suitable

ble apparatus as is well known. The side wall flaps 150, 150 are then folded inwardly by any suitable apparatus above the charge of commodity, and then the remaining pair of end flaps 148 and 149 are folded down upon the end flaps 150, 150, with the former overlapped with respect to each other to provide a stack of flaps 154 serving as a temporary closure for the carton structure. This carton structure will then be fed forward by the supply belt 46 to beneath the flat plate or shoe 140 toward the receiving station 63 of the turret table 27. As each carton structure 143 approaches the receiving station 63 one of the lugs 135 fixed to the under side of the turret table 27 will engage the lug 134 on the feeding mechanism, causing the arm 129 thereof to swing in behind the carton structure and push the latter onto the elevating plate 48 which is arriving at the receiving station. The tapered nose 130 on the arm 129 will cause the carton structure 143 to be pushed over into its proper position with its far corner on the leading side moved into the angle flange 49. Then as the turret table 27 is rotated further in a clockwise direction, as viewed in Fig. 1, the lug 135 will move past the lug 134, permitting the feeding mechanism arm 129 to be returned by the spring 136 to its original position substantially parallel to the edge of the supply belt 46 for subsequent engagement behind the next succeeding carton structure and feed thereof to the following elevating plate 48.

As the turret table 27 is rotated beyond the receiving station to a position such as that indicated at 57 in Fig. 1, the cam follower 53 will ride up the inclined portion 55 of the cam track to the point 56, causing the elevating plate 48 to raise the carton structure 143 with the sloped and arcuately shaped wing 141 of the shoe 140 serving to hold the end flaps in the stack 154 in overlapped relation as the carton structure is being raised toward the suction head 71 arranged above the elevating plate 48. In the vicinity of the position at 57 the closed upper end 154 of the carton structure will be moved from beneath the shoe wing 141, raised into the flared skirt 142 of the suction head 71, and finally brought up snugly into engagement with the lower face 73 of the suction head, compressing the gasketing rings 175, 175 and causing the apertures or orifices 74, 74 in the suction head to be brought into communication with the passages through the two outer end flaps 148 and 149 provided by the aligned apertures 152, 152 and 153, 153 therein. The elevating plate 48 will then be carried around by the turret table 27 in a transverse plane from the position at 57 to the position at 59 with the closed upper end 154 of the carton structure 143 being held up securely against the bottom face 73 of the suction head by virtue of the fact that the cam track 54 lies substantially in a horizontal plane through that radial angle.

As the closed upper end 154 of the carton structure 143 is raised up into the flared skirt 142 of the suction head and approaches the bottom face 73 thereof, the carton end engages the button 103 on the bottom end of the control plunger 100, causing the latter to be lifted so that its upper end 102 will lift the latch member 94 from its full line position shown at 157 in Fig. 6 to its dotted position shown at 159. This will cause the valve arm 91 to move from its full line position at 159 in Fig. 6 upwardly to a position permitting the nose 93 of the valve arm 91 to pass the end of the latch member 94, the position of arms 91 and 92 and follower 108 just after such action

being indicated in dotted lines at 158. The coil spring 87 will then rotate the valve arm 91 downwardly until it engages the stop pin 107, bringing the valve arms 91 and 92 and cam follower 108 of the latter to the dotted position shown at 160 in Fig. 6. The nose 109 of the cam follower 108 thereafter will be rotated about the axis of the turret table in a path intercepted by the fixed cam 110, shown in Fig. 6 in the dot-dash position at 161 to indicate its location relative to the path of travel of cam follower 108.

When the coil spring 87 is permitted to rotate the valve element 91 in a counter-clockwise direction until the valve arm 91 strikes the pin 107, the hole 32 in the valve element is brought into alignment with the passage 79 in the valve casing 72, thereby bringing the passageways in the suction head 71 into communication with the vacuum tank 64, or auxiliary vacuum tank 164, as the case may be. This will cause the open orifices 74, 74 of the ducts or passages 75, 75 in the suction head 71 to withdraw air from the interior of the carton through the passages provided in the intermediate and outermost flaps 149 and 148 by the aligned apertures 153, 153 and 152, 152, to cause the imperforate end flaps 150, 150 to be quickly drawn and snapped up into tight face engagement with the under surface of the intermediate end flap 149 by passing currents of air with a resulting creation of a differential in pressure on opposite sides of the imperforate end flaps.

The under surface 73 of the suction head 71 is of such dimension as to overlie the outermost end flap 148 substantially throughout its entire area beyond the circumferential edges of the gaskets 175, 175 so as effectively to bias a major portion of that outermost flap. The outermost flap 148 being biased by the suction head 71, all of the end flaps in the stack 154 are caused to be tightly drawn together and suitably there held in position by this differential in pressure until the interposed adhesive has set sufficiently to anchor the end flaps together. This is accomplished while the carton structure 143 is being carried around by the turret table 27 during travel from the position in the vicinity of that indicated at 57 to the vicinity of the position indicated at 59. At the latter position the cam track 54 is sloped downwardly at 60 to permit the elevating plate 48 to be lowered to its initial elevation in the vicinity of the station at 61. If such suction has been properly applied to the closed upper end 154 of the carton structure 143 the carton structure will be held up by the suction against the suction head as the latter is moved from station 61 to the normal discharge station at 62.

However, if no suction, or improper suction, has been applied to the carton end 154, due to defective carton structure or structural failure of apparatus parts or lack of partial vacuum in the vacuum tank, the carton structure 143 will remain on the elevating plate 48 as the latter is being lowered. This will indicate the probable presence of a defective closure, and means are provided at the defective closure discharge station at 61 to remove such carton for segregation from the normal output of the machine. This is accomplished by the rakeoff shoe 120 in the path of cartons remaining on the elevating plates 48—48, which will cause those cartons to be swept off from the elevating plates and turret table 27 into the discharge chute 115.

When the suction has been effective to hold the

stack of end flaps at 154 securely together while interposed adhesive is setting during travel of a carton 143 from the position at 57 to the station at 61, the resultant package with its upper end flaps at least temporarily anchored together by the set adhesive will be held against the suction head 71 by the suction until the package is moved to the normal discharge station at 62. There, since the valve recocking cam 110 is arranged in the path of the cam follower 108, the nose 109 of the cam follower 108 is moved up against the abutment 112 in further rotation of the suction head 71 and associated valve unit 69 and then forced to rotate in a clockwise direction until the nose 109 can ride beneath the flat bottom surface 113 of the recocking cam, carrying with it the valve arms 91 and 92 to the dot-dash position at 158. This will cause the nose 93 of the arm 91 to be moved up past the end of the latch member 94, with the latter being moved to its dot-dash position at 159. Thereafter the latch member 94 will fall down to its full line position at 157 and the upwardly sloping surface 114 of the recocking cam 110 will permit gradual return of the cam follower 108 and valve arms 91 and 92 to their initial full line positions shown at 156 in Fig. 6. This return of the valve parts to their initial positions shuts off communication between the vacuum tank 64, or auxiliary vacuum tank 164, and the suction head 71.

To assure release of the package from the suction head 71 the passages in the latter are vented to the atmosphere when the valve is rotated to the closed position. For this purpose the valve element 81 is provided with a passage or groove 155 which, in the closed position of the valve, provides communication between the atmosphere and the interior of the conduit 70 connected to the suction head 71. Breaking of the vacuum in the suction head 71 releases the package, permitting it at the normal discharge station 62 to fall down into the discharge chute 121. The package will then slide down that chute until its lower end 144 (which is intended to be the top of the package) strikes against the transversely extending trip bar 125. This will cause the package to tumble over, with its vacuum-sealed end 154 falling over onto the delivery belt 126.

The suction head 71 and the elevating plate 48 associated therewith, under discussion, will then be carried around by the turret table 27 from the normal discharge station 62 back to the receiving station at 63 for repeating the operation on another filled carton structure. Obviously, all of the other of the plurality of elevating plates 48-48 and suction heads 71-71 operate in a similar manner during their rotation by the turret table 27.

It is desirable to provide each of the suction heads 71-71 with a contact face or lower surface 73 of greater area than the area of the end 154 of the carton structure 143, so that the suction head may be employed to apply pressure to the major portion of the stack of end flaps at 154, including the parts thereof which are in the vicinity of the side walls of the carton where there may be less tendency for the differential in pressure to force the lapped end flaps together toward the suction head. It has been found that a secure bonding of adjacent surfaces of lapped end flaps is attained by the maintenance of suction for a relatively short period of time (depending somewhat, of course, upon the nature of the adhesive employed). Such period

of time may be about from three to ten seconds, during which the adhesive may form at least a temporary bond while each carton is being carried around from the station at 57 to the normal discharge station at 62. When suction is discontinued at the latter station and the package is inverted during its travel down to the delivery belt 126, the weight of the package and its contents upon the stack of flaps at 154 will continue to hold them in face engagement as the adhesive takes its final set. Obviously, the suction may be maintained throughout the period of complete setting of the adhesive by proper dimensioning of the apparatus or adjustment of the speed with which it carries the cartons forward, but such time consuming procedure has been found to be unnecessary since any tendency of the moistened innermost end flaps to curl out of face contact with the adjacent flap structure is eliminated by the weight of the contents when the carton is inverted. Application of heat may speed up the setting of the adhesive or bring about that setting due to the nature of the adhesive should the latter, for example, be of a type as to be set-responsive to heat, such as a thermosetting resin. Such heat source may be incorporated in the suction head as proposed hereinafter in connection with Fig. 13, or may be provided by employment of a fixed heat source arranged along the path of travel of the cartons as they are carried forward by the apparatus.

The suction head may be modified, if desired, to accommodate baffle structure which will operate to prevent passage from the face of the suction head or from carton structure and/or carton contents up into the suction conduit structure and valve units with which the latter may be equipped. For this purpose, as proposed in Figs. 11 and 12, suction head structure 171 may comprise a plate element 172 having its face 173 provided with a transversely extending groove 200 removably receiving a block insert 201 held by screws 202, 202 in the position indicated. The plate element 172 and insert 201 are so shaped as to provide, when secured together by screws 202, 202, the apertures 74, 74 in the carton-engaging face 173 each communicating via passage 75 with a transverse passage 176, in turn communicating with passage 77 leading to the exhausting conduit and valve unit therein.

The transverse passage 176 in the suction head of Figs. 11 and 12 is made tortuous by means of a plurality of baffle plates with those in one set staggered with respect to those in another set. One set of baffle plates 203-203 may be secured to the head plate 172 in any suitable manner, such as by welding, and another set of baffle plates 204-204 may be secured to the insert 201 in any suitable manner, such as by being made integral therewith. As a result, foreign material which may tend to be entrained by air being drawn through the passages in the suction head from the apertures 74, 74 will be baffled out by the plates 203-203 and 204-204. Accumulations of such foreign material may be readily removed by dismounting insert 201 after removal of screws 202, 202.

It will be understood that apparatus of the present invention may be employed in so-called "vacuum sealing" of carton ends with the employment of any suitable adhesive such as that which will set by ageing after a period of time, or which, during such time period, will give up a contained solvent. For example, a thermoplastic adhesive may be employed which will set on cool-

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ing as the carton flaps are held together during their travel through apparatus of the present invention. Also, thermosetting adhesive may be employed when suitable means are provided for applying heat as the carton flaps are held together during the passage of the cartons through apparatus herein described. Heating means to drive off solvent from the adhesive or cause such adhesive thermally to set up may be provided in any suitable manner, such as by the employment of a heat source in each suction head. Such heat source, as proposed in Fig. 13, may comprise an electrical heating element 205 embedded therein and provided with terminal elements 207, 207 projecting from the suction head 71, to be connected into an electrical circuit. With the provision of such electrical circuit the latter may be employed to operate an electromagnetic valve unit, which may be substituted for the valve structure 69, and in such case switch means in the circuit of the winding of the electromagnetic valve may be closed by the control plunger 192, and that switch means or additional switch means in the winding circuit may be opened by suitable trip means located in the position of cam 110.

It may be desired to equip each conduit means extending from the common vacuum tank 64 to the valve unit 69 and/or suction head 71 with an auxiliary vacuum tank the capacity of which is sufficient to provide one suction operation on a carton. This may be advantageous when operating with cartons any one of which may be of such faulty construction as to prevent proper suction being applied to the stack of flaps to be adhered together by the vacuum-sealing procedure. This would make unnecessary the employment of evacuating means of large capacity to keep the pressure in the main tank 64 below a certain predetermined value, although it is possible to employ a pressure responsive control associated with the main tank 64 and an exhausting pump of sufficient capacity to assure maintenance of a partial vacuum below a certain predetermined pressure therein. Such auxiliary vacuum tank structure is shown, by way of example, at 164 in Fig. 14. With the employment of such auxiliary vacuum tanks 164—164 connected between conduits 68—68 and the main vacuum tank 64 by means of auxiliary conduits 166—166, additional valve means 163 should be used in each auxiliary conduit 166 so that when the valve 69 is opened the valve 163 will be closed. This may be accomplished by mounting on the pin 83 fixed to the valve element of the valve unit 69 a crank arm 208 connected to one end 209 of a lever arm 210 pivotally supported at 211 on a bracket 212 which may be fixed on the auxiliary vacuum tank 164. The lever arm 210 may have its other end connected at 213 to a link 214 pivotally connected at 215 to a crank arm 216 adapted to rotate the valve element of valve unit 169. The pivotal connections at 209, 211, 213 and 215 should be of such nature as to permit some lateral movement of the lever 210 and link 214 to accommodate the swinging of the end of the lever arm 209 upwardly through an arc as the crank arm 208 is rotated upwardly. Loose connections or ball and socket joints, or other suitable structure, may be employed at such points as needed. With the use of such dual valve structure and auxiliary vacuum tanks it will be seen that when valve 69 is closed the auxiliary valve 163 will be open, and that the partial vacuum in the main tank 64 will obtain in the auxiliary tank 164. Upon opening

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of the valve 69 to permit suction through the suction head 71, the auxiliary valve 163 will be closed and the partial vacuum in the auxiliary tank 164 will alone provide the necessary suction to accomplish the vacuum sealing when the conditions are such as to permit the obtaining of the latter.

The present invention may be embodied in apparatus featured by straight line movement of the filled cartons as distinguished from movement of the filled cartons through a circular path by the turret mechanism disclosed in Figs. 1 to 10 inclusive. Such an apparatus is proposed in Figs. 15, 16 and 17. The cartons 143—143 may be supplied by the supply belt 145, which feeds to an inclined slide 350 terminating above an endless belt 301 carrying a plurality of spaced apart pusher plates 302—302 operated in timed relation to an overhead endless belt or linkage 304 trained about rotatable rolls or wheels 305, 305. The endless linkage 304 supports a plurality of suction heads 371—371 to be carried therewith, and the movement of the endless linkage is synchronized with the movement of the belt 301, such as by being driven from a common source of power, so that as each pusher plate moves a filled carton to the position indicated at 306 a suction head 371 will be brought down over such carton and forward therewith to initiate operation of valve means in conduit structure for application of partial vacuum. For the latter purpose a vacuum tank 364 may be provided which is connected by a flexible conduit 307 to a continuous flexible conduit 308 at 309. The flexible conduit 308 is suitably connected to each of the plurality of suction heads 371—371 by means of a conduit 370 and the body 372 of the suction head is fitted with suitable valve means 369.

As shown in Figs. 16 and 17, the suction head structure and valve means therein may comprise the body or plate 372 provided with a passage 310 leading to a valve chamber 311 having a valve seat 312 from which a passage 313 leads to a transverse passage 376 communicating via passages 75, 75 with apertures or orifices 74, 74 adapted to apply suction to the upper end of a carton.

The passage 313 and valve chamber 311 are provided by a through bore counterbored to form the valve chamber 311 closed by a suitable plug 314 through which a valve stem 315 is slidably mounted. The valve stem 315 carries a valve element 316 adapted to cooperate with the seat 312. The valve element 316 may be biased to its seat by the weight of the parts, i. e., by force of gravity, or by that force and an additional biasing force of a helical spring 317 interposed between the plug 314 and the valve element 316 in the valve chamber. The through bore provides a hole 318 below the cross-passage 376 which is counterbored at 319. The valve stem 315 extends down through the hole 318 into the counterbore 319 and terminates in an enlarged head 320 in the latter, and a socket 321 is formed in the bottom of the valve stem slidably to receive a stem 322 carrying a control button 323 adapted to be pushed upwardly by contact with the upper end of a carton. A helical spring 324 is preferably provided about the pin 322 between its control button 323 and the head 320 of the valve stem 315.

A venting hole 325 is provided in the suction head communicating with the hole 313 and is

suitably valved by a cylindrical element 326 on the valve stem 315.

In the apparatus proposed in Figs. 15, 16 and 17, the filled cartons 143—143 are successively supplied by the supply belt 46 to the inclined slide 300 beneath any suitable structure, such as suitable shoe means arranged such as indicated in dotted lines at 340, to maintain the overlapped flaps at the upper end of each carton in properly folded positions until they can be engaged by a suction head 371 as each carton is moved forward by the endless belt 301. One of the pusher plates 302 on the belt 301 moves a carton forward to beneath a suction head 371, which will move downwardly with the endless linkage 304 to engagement with the stack of flaps 154 at the upper end of the carton at the position indicated at 306. As the suction head 371 is brought down upon the upper end of the carton, the control button 323 is pushed upwardly to align its lower face with the bottom face of the suction head. The force biasing downwardly the valve stem 315 and the parts carried thereby, such as that provided by the weight of the parts and biasing force of helical spring 317, may be just slightly greater than the upward force upon that structure due to suction in the valve chamber 311. Upward movement of the control button 323 will cause the relatively weak helical spring 324 to provide the small amount of additional force necessary to lift the valve parts, thereby opening up communication between the orifices 74, 74 and the vacuum tank 364. Suction will then be maintained upon the stack of flaps at the upper end 154 of the carton structure 143 as the latter is moved forward to the normal discharge end of the apparatus.

However, if there has been defective closure of the carton, such as by failure of partial vacuum or suction, the termination of the upper run of endless belt 301 before the normal discharge position is reached will permit the carton to fall away from the suction head down a defective closure discharge chute 327. If the suction has been effective, the carton will be carried beyond the end of the upper run of the belt 301 and the chute 327 to the position at 328 where a fixed cam 329 is located in the path of the upper end of the valve stem 315. The latter, in moving beneath the fixed cam, is pushed downwardly to seat the valve element 316 against its seat 312, thus shutting off communication between the vacuum tank 364 and the suction orifices 74, 74. The spring 324 permits telescoping of stem 322 and valve stem 315 to avoid damage to the end of the carton by control button 323 as the valve is being closed and the suction head vented. The valve stem 315 moves the cylindrical element 326 downwardly to uncover the venting hole 325 so as to bring about communication between the atmosphere and the passages in the suction head. This releases the package from the suction head onto the delivery belt 126.

With the release of the package from the suction head the control button 323 and its stem 322 will be permitted to drop by force of gravity and action of the helical spring 324. In order to prevent that control button and its stem entirely separating from the suction head structure, the hollow bottom end of the valve stem 315 may be provided with a slot 330 receiving a projection 331 on the stem 322 to limit movement of the latter with respect to the valve stem.

Simplicity of construction and proper position-

ing of the suction heads 371—371 in their movement to the receiving station at 306 and from there to the normal discharge station 328 is assured by having them fixed to the linkage 304 as shown. However, in such construction as each suction head 371 is carried up and around the roller or wheel 305 at the normal discharge station 328, it will be turned over to an inverted position and carried in such inverted position back to the other roller or wheel 305 at the receiving station 306, and at the latter again be turned over back to its normal or proper position for applying suction to carton ends as the former is brought down into engagement with the latter. This action, of course, will reverse the direction of the force of gravity on the valve parts and, accordingly, suitable provision may be made for keeping each valve closed as the suction head is moved back from the normal discharge station 328 to the receiving station 306. This may be accomplished by shoe means or a cam track 332 against which the projecting ends of the valve stems 315—315 may ride during return travel of the suction heads 371—371.

It will thus be seen that the objects set forth above and those made apparent in the preceding description are efficiently attained by apparatus of the present invention and, since certain changes may be made in the above construction and different embodiments of the invention could be made without departing from the scope thereof, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

It is also to be understood that the following claims are intended to cover all of the generic and specific features of the invention herein described, and all statements of the scope of the invention which, as a matter of language, might be said to fall therebetween.

Having described my invention, what I claim as new and desire to secure by Letters Patent is:

1. Carton handling apparatus comprising, in combination, means to receive filled cartons having their closure flaps folded in overlapping relation with outer flap structure being more pervious to air than inner flap structure, means to move said cartons progressively forward, suction means to apply suction to the outer flap structure of each carton from the exterior of the latter, means to bring each carton and said suction means together and thereafter cause the latter to draw and hold the inner flap structure tightly against the outer flap structure to permit adhesive bonding thereof, means preceding a normal discharge station to remove defectively closed cartons, means to release the completed packages from said suction means after bonding of the flap structures, and means at a normal discharge station to discharge the completed packages.

2. Carton handling apparatus for handling cartons having their closure flaps folded in overlapping relation with outer flap structure being more pervious to air than inner flap structure, the apparatus comprising, in combination, a receiving station, a defective-closure discharge station, a normal discharge station, means progressively to move the cartons forward from the receiving station to the other two stations, means engageable with the cartons between said receiving station and the others of said stations to apply suction to outer more pervious flap structure to cause inner less pervious flap structure of each

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carton to be drawn and held against the outer flap structure, means to bring each carton and said suction means together after the former has arrived at the receiving station, means to cause said suction-applying means to apply suction to the overlapping flap structures and maintain the same for an adhesive bonding period, means at the defective-closure discharge station selectively to remove cartons having defective closures, means in the vicinity of the normal discharge station to release the completed packages from said suction-applying means after bonding of the flap structures, and means at the normal discharge station to discharge the completed packages.

3. Carton handling apparatus comprising, in combination, means to receive filled cartons having their closure flaps folded in overlapping relation with outer flap structure being more pervious to air than inner flap structure, means to move said cartons progressively forward, suction means to apply suction to the outer flap structure of each carton from the exterior of the latter, means to bring each carton and said suction means together and thereafter cause the latter to draw and hold the inner flap structure tightly against the outer flap structure to permit adhesive bonding thereof, means to release the completed packages from said suction means after bonding of the flap structures, means to discharge the completed packages, and means to invert the completed packages during discharge thereof to cause them to rest upon the adhesively-bonded flap structures.

4. Carton handling apparatus for handling cartons having their closure flaps folded in overlapping relation with outer flap structure being more pervious to air than inner flap structure, the apparatus comprising, in combination, a receiving station, a defective-closure discharge station, a normal discharge station, means progressively to move the cartons forward from the receiving station to the other two stations, means engageable with the cartons between said receiving station and the others of said stations to apply suction to outer more pervious flap structure to cause inner less pervious flap structure of each carton to be drawn and held against the outer flap structure, means to bring each carton and said suction means together after the former has arrived at the receiving station, means to cause said suction-applying means to apply suction to the overlapping flap structures and maintain the same for an adhesive bonding period, means at the defective-closure discharge station selectively to remove cartons having defective closures, means in the vicinity of the normal discharge station to release the completed packages from said suction-applying means after bonding of the flap structures, means at the normal discharge station to discharge the completed packages, and means to invert the completed packages during discharge thereof to cause them to rest upon the adhesively-bonded flap structures.

5. Carton handling apparatus for handling cartons having their closure flaps folded in overlapping relation with outer flap structure, being more pervious to air than inner flap structure, the apparatus comprising, in combination, a receiving station, a defective-closure discharge station, a normal discharge station, means progressively and continuously to move the cartons forward from the receiving station to the normal discharge station along a path passing by the defective-closure discharge station, means engageable with

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the cartons between said receiving station and the others of said stations to apply suction to outer more pervious flap structure to cause inner less pervious flap structure of each carton to be drawn and held against the outer flap structure, means to bring each carton and said suction means together after the former has arrived at the receiving station, means to move said suction-applying means forward with the cartons, means to cause said suction-applying means to apply suction to the overlapping flap structures and maintain the same for an adhesive bonding period while the cartons are being moved forward, means at the defective-closure discharge station selectively to remove cartons having defective closures, means in the vicinity of the normal discharge station to release the completed packages from said suction-applying means after bonding of the flap structures, and means at the normal discharge station to discharge the completed packages.

6. Carton handling apparatus for handling cartons having their closure flaps folded in overlapping relation with outer flap structure being more pervious to air than inner flap structure, the apparatus comprising, in combination, a receiving station, a normal discharge station, a plurality of successively arranged means each adapted to receive a carton at said receiving station and move it forward to said normal discharge station and then return to said receiving station for reception of another filled carton, means successively to feed the cartons to each of said receiving means, a plurality of means each adapted to apply suction to outer more pervious flap structure of one of the cartons to cause inner less pervious flap structure thereof to be drawn up and held against the outer flap structure, means associating each of said suction-applying means with one of said receiving means and moving them together from said receiving station to said normal discharge station and back to said receiving station, means to bring each carton and one of said suction-applying means together after reception of the former by the one receiving means associated with that suction-applying means, valve means to cause said suction-applying means to apply suction to the overlapping flap structures as the cartons are being moved between said receiving and normal discharge stations, means to close said valve means as each receiving means is moved to the vicinity of said normal discharge station thereby releasing each completed package from the suction-applying means operative thereon, and means at the normal discharge station to discharge the completed packages.

7. Carton handling apparatus for handling cartons having their closure flaps folded in overlapping relation with outer flap structure being more pervious to air than inner flap structure, the apparatus comprising, in combination, a receiving station, a defective-closure discharge station, a normal discharge station, a plurality of successively arranged means each adapted to receive a carton at said receiving station and move it forward along a path extending beyond said defective-closure discharge station to said normal discharge station and then return to said receiving station for reception of another filled carton, means successively to feed the cartons to each of said receiving means, a plurality of means each adapted to apply suction to outer more pervious flap structure of one of the cartons to cause inner less pervious flap structure thereof to be drawn up and held against the outer

flap structure, means associating each of said suction-applying means with one of said receiving means and moving them together from said receiving station to said normal discharge station and back to said receiving station, means to bring each carton and one of said suction-applying means together after reception of the former by the one receiving means associated with that suction-applying means, valve means to cause said suction-applying means to apply suction to the overlapping flap structures as the cartons are being moved between said receiving and normal discharge stations, means at said defective-closure discharge station to remove from said receiving means such cartons as may have defective closures, means to close said valve means as each receiving means is moved to the vicinity of said normal discharge station thereby releasing each completed package from the suction-applying means operative thereon, and means at the normal discharge station to discharge the completed packages.

8. A carton end flap sealing machine comprising fixed supporting means, a turntable rotatably mounted on said supporting means and carrying a plurality of carton-receiving means spaced about its periphery, each of said means being adapted to receive and carry filled cartons for sealing, a plurality of suction heads each having a carton flap-engaging suction face, each of said suction heads cooperating with one of said carton-receiving means and rotating therewith, cam means fixed in relation to said supporting means for moving each carton-receiving means to a position with a carton thereon having end flap structure thereof brought into contact with the suction face of the cooperating suction head and maintaining the end flap structure in such contact for a predetermined time interval, a source of suction, valve means controlling communication between each of said suction heads and said source of suction, means to open said valve means with a carton in such suction face contact, other cam means fixed in relation to said supporting means, and means controlled by said last cam means for closing said valve means at a predetermined position of each carton-receiving means.

9. A carton end flap sealing machine comprising fixed supporting means, a turntable rotatably mounted on said supporting means and carrying a plurality of carton-receiving means spaced about its periphery, each of said means being adapted to receive and carry filled cartons for sealing, a plurality of suction heads each having a carton flap-engaging suction face, each of said

suction heads cooperating with one of said carton-receiving means and rotating therewith, cam means fixed in relation to said supporting means, a plurality of cam followers with one thereof associated with each carton-receiving means and riding on said cam means during rotation of said turntable to move its carton-receiving means to a position with a carton thereon having end flap structure thereof brought into contact with the suction face of the cooperating suction head and maintaining the end flap structure in such contact for a predetermined time interval, a source of suction, a plurality of valve means rotatable with said turntable each controlling communication between each of said suction heads and said source of suction, means to open each of said valve means with a carton in such suction face contact, other cam means fixed in relation to said supporting means, and means controlled by said last cam means for closing each of said valve means at a predetermined position of each carton-receiving means.

10. Carton handling apparatus comprising, in combination, means to receive filled cartons having their closure flaps folded in overlapping relation with outer flap structure being more pervious to air than inner flap structure, means to move said cartons progressively and continuously forward, individual suction means for each carton to apply suction to the outer flap structure of each carton from the exterior of the latter, means to bring each carton and its individual suction means together and thereafter cause the latter to draw and hold the inner flap structure tightly against the outer flap structure to permit adhesive bonding thereof, means to move said individual suction means forward with said cartons while suction is being applied to flap structure of the latter by the former, means to release the completed packages from said suction means after bonding of the flap structures, and means to discharge the completed packages.

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