

Sept. 7, 1937.

J. S. STOKES

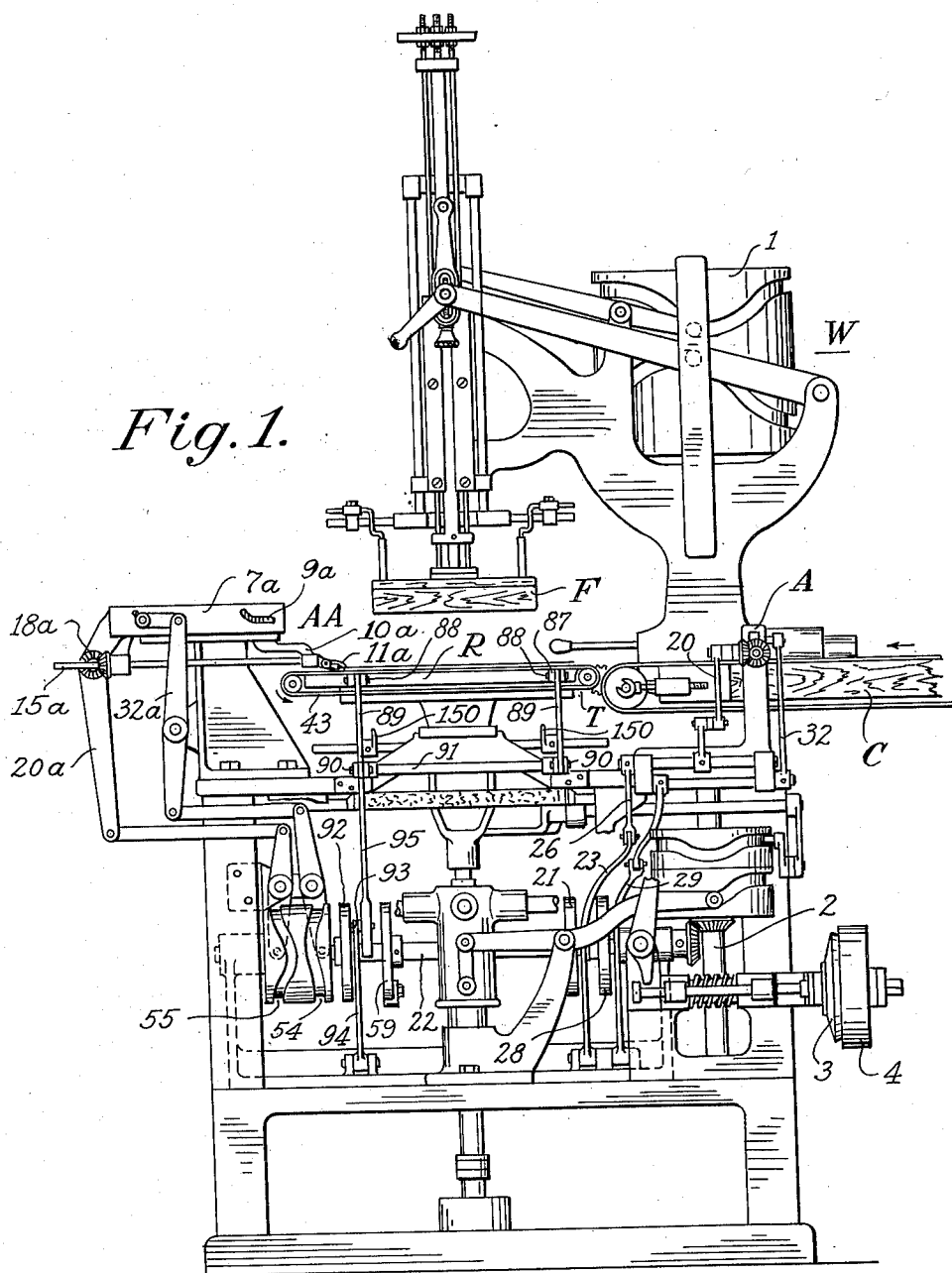
2,092,479

BOX WRAPPING SYSTEM

Filed April 18, 1935

10 Sheets-Sheet 1

Fig. 1.



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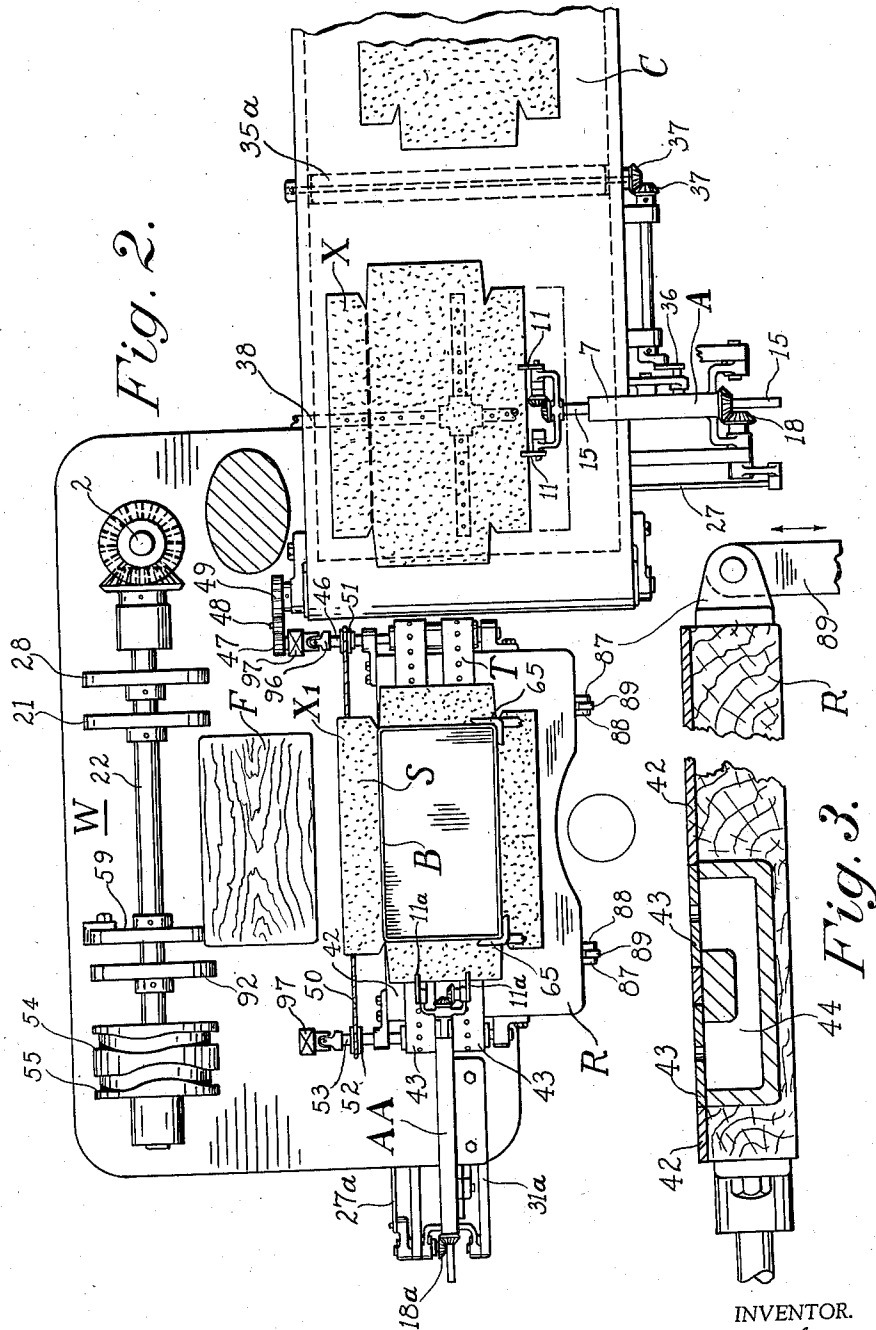
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BOX WRAPPING SYSTEM

Filed April 18, 1935

10 Sheets-Sheet 2



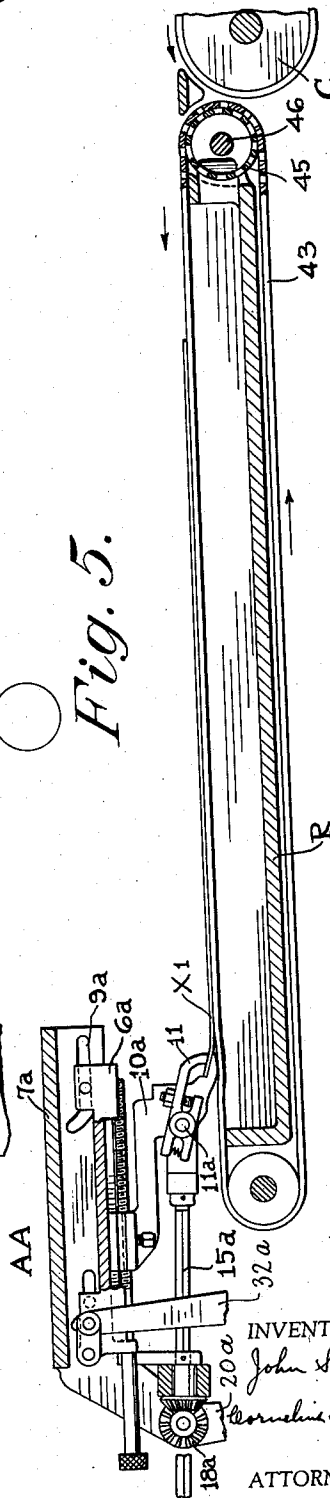
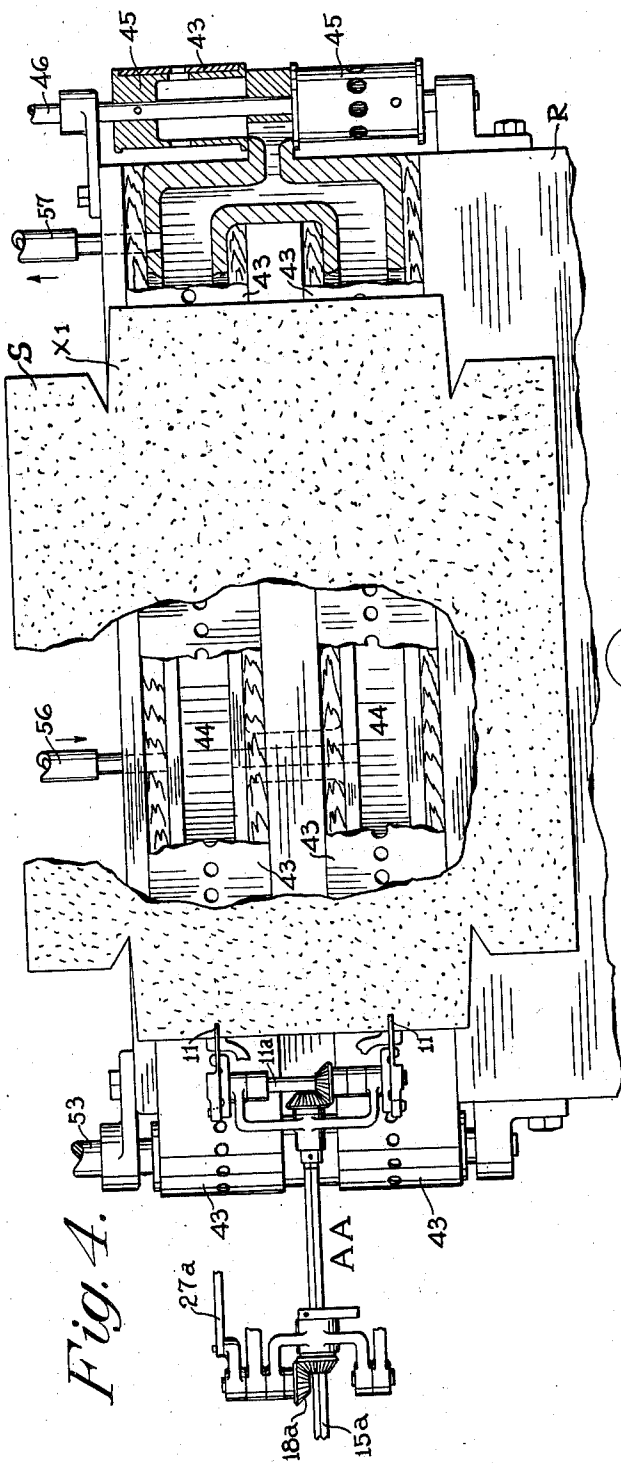
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2,092,479

10 Sheets-Sheet 3



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2,092,479

BOX WRAPPING SYSTEM

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10 Sheets-Sheet 4

Fig. 6.

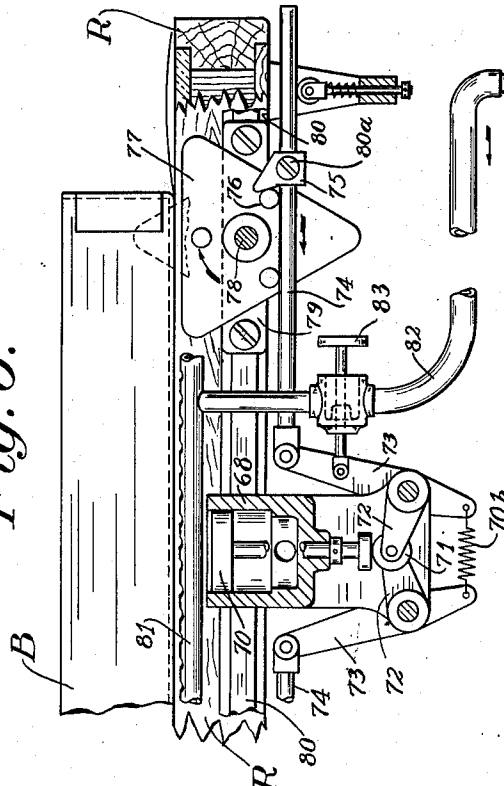


Fig. 7.

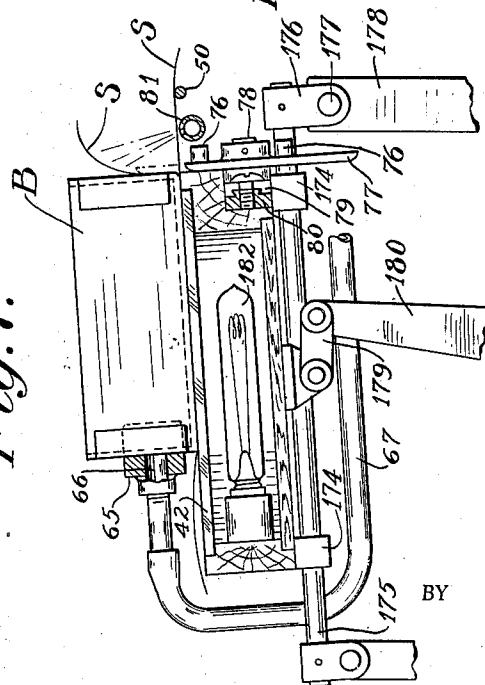


Fig. 10.

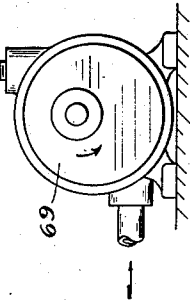


Fig. 9.

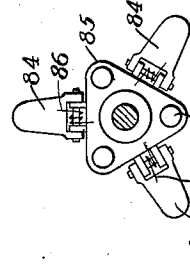
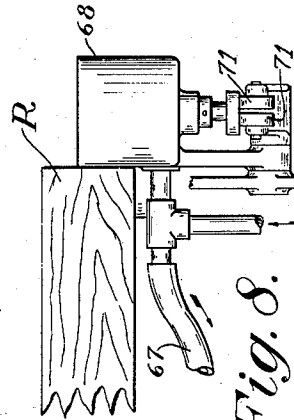


Fig. 8.



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BOX WRAPPING SYSTEM

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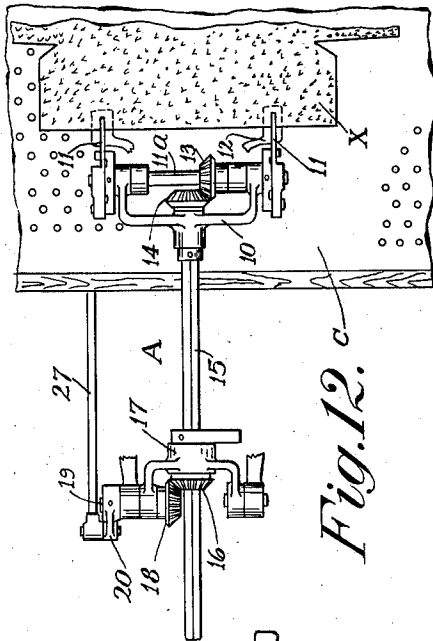


Fig. 12.

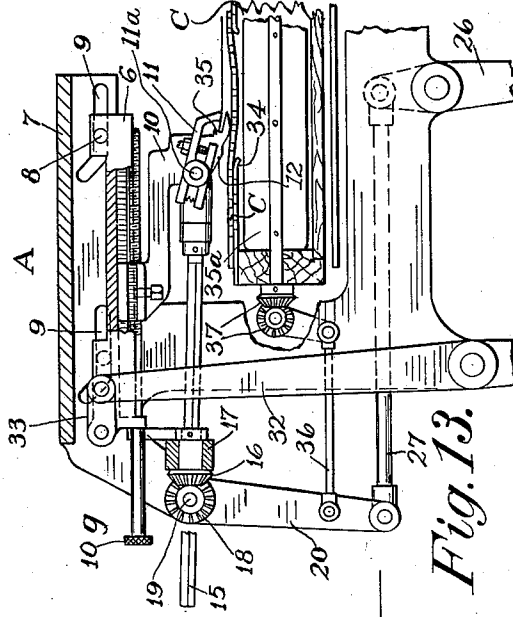


Fig. 13.

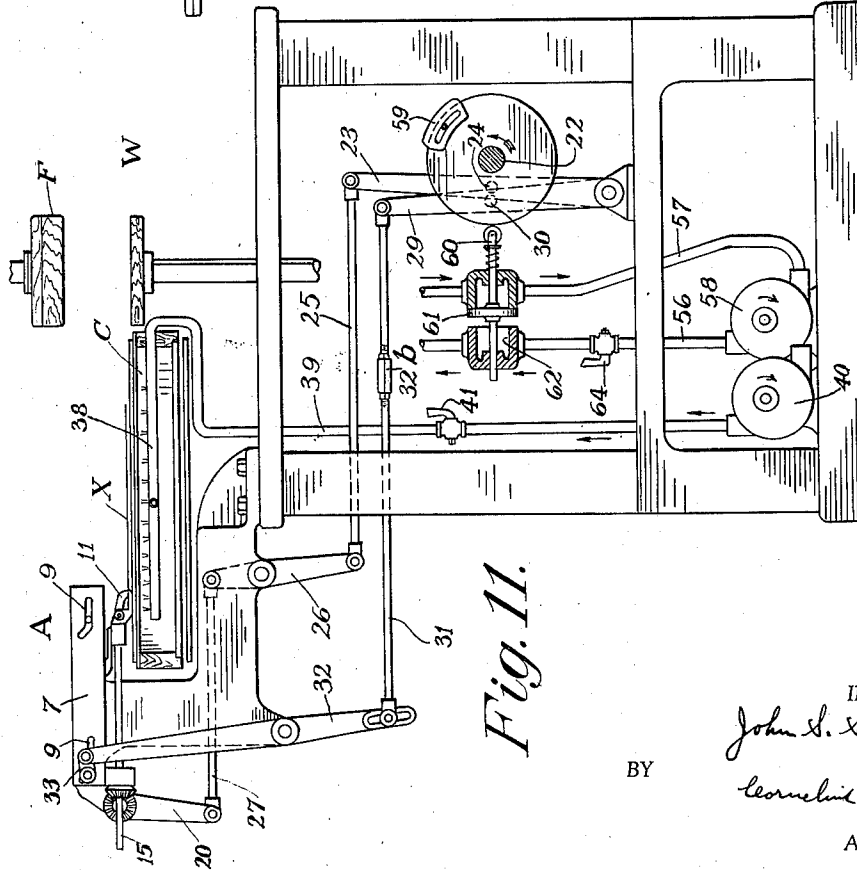


Fig. 11.

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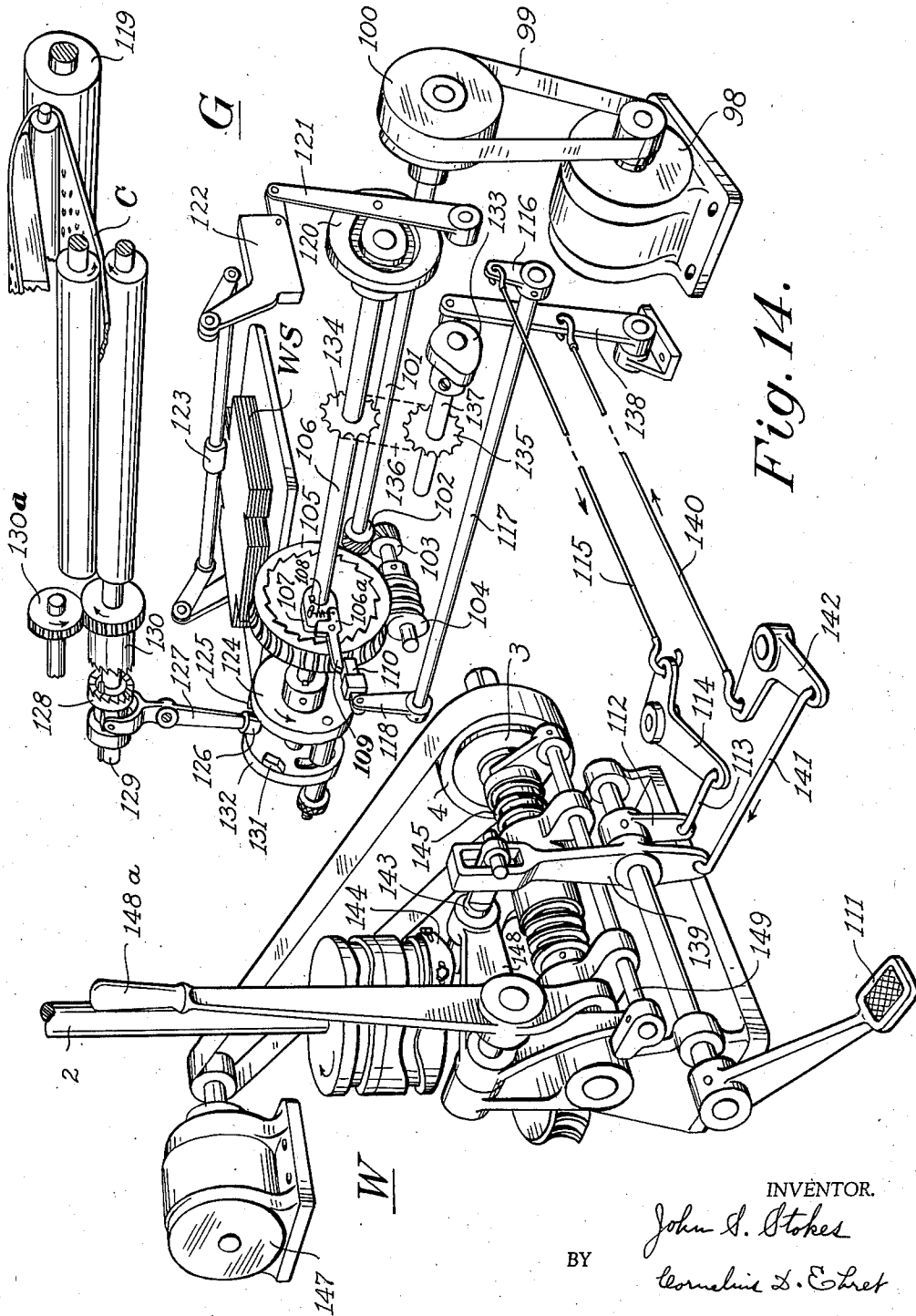
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BOX WRAPPING SYSTEM

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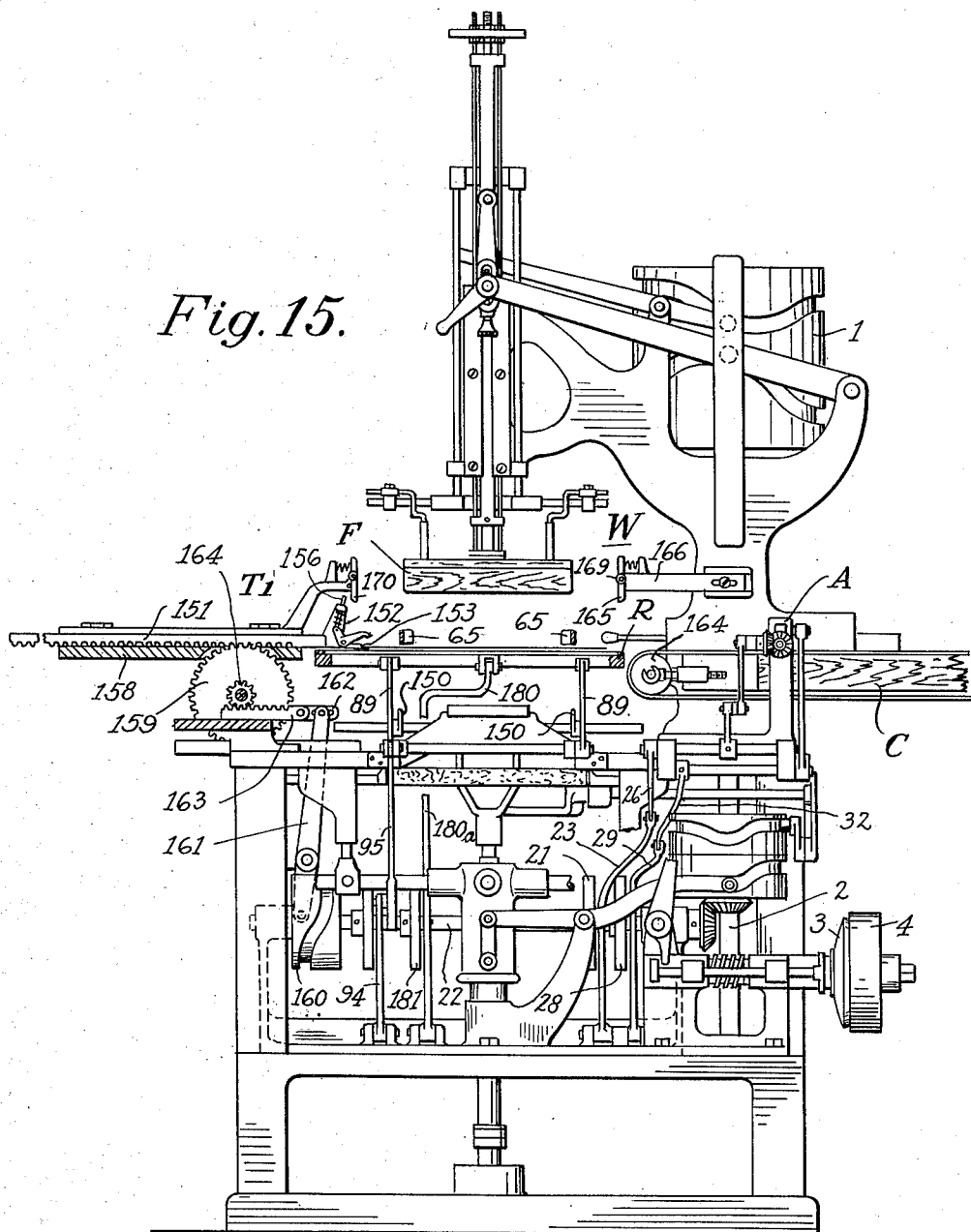
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BOX WRAPPING SYSTEM

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Fig. 15.



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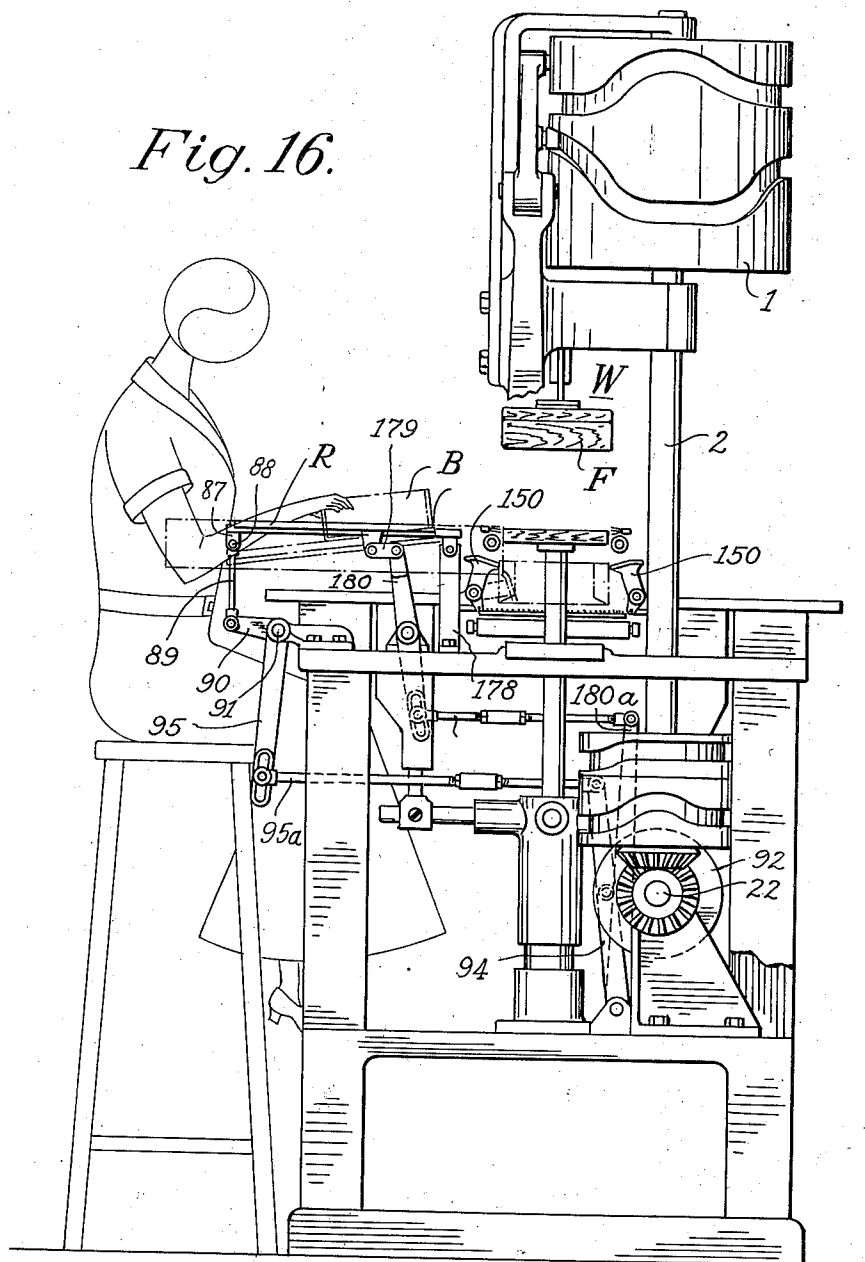
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BOX WRAPPING SYSTEM

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Fig. 16.



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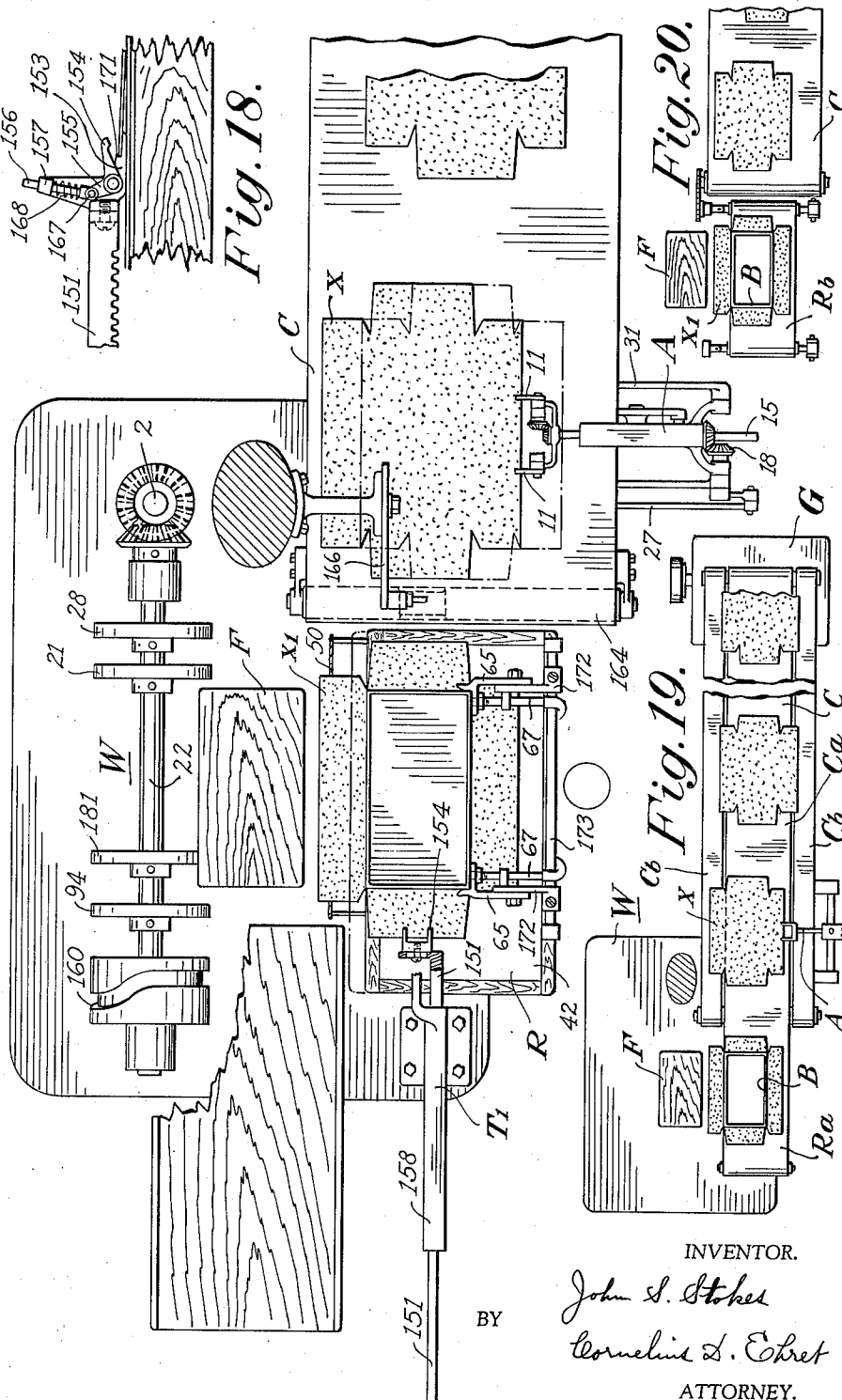
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BOX WRAPPING SYSTEM

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10 Sheets-Sheet 9

Fig. 17.



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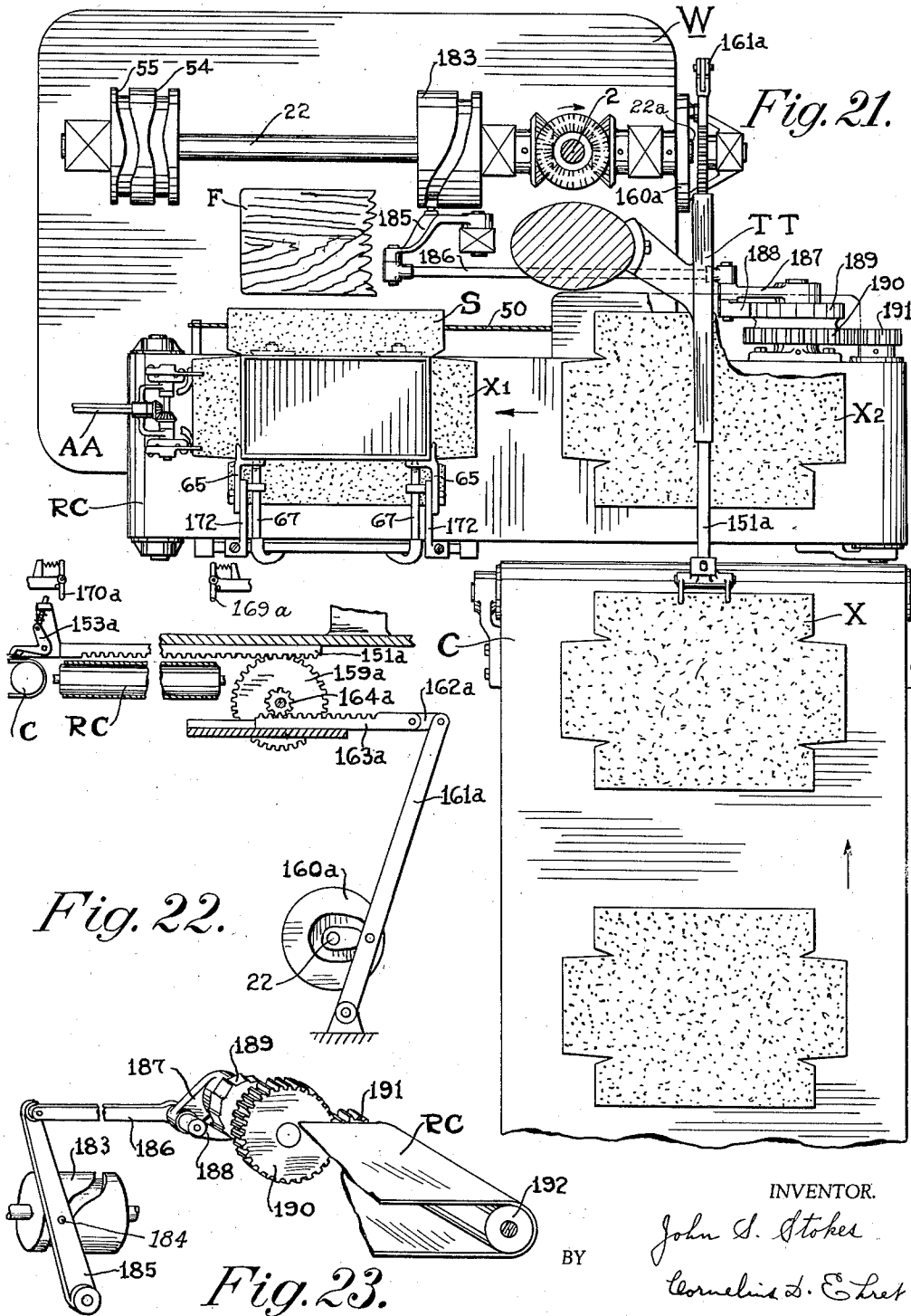
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BOX WRAPPING SYSTEM

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UNITED STATES PATENT OFFICE

2,092,479

BOX WRAPPING SYSTEM

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Application April 18, 1935, Serial No. 16,979

38 Claims. (Cl. 93—54.2)

My invention relates to systems and apparatus for making boxes, box covers, containers and the like, generically termed "boxes."

In accordance with my invention, coated wrappers, labels, sheets, or the like, generically termed "wrappers", are conveyed to a registry table or equivalent, in front of an operator who registers box structures thereon to form assemblies which are removed from the registry table and placed upon the form block of a wrapping machine; preferably, mechanism is provided to tilt the table after delivery of a wrapper thereto to facilitate the register by the operator of a box or box blank thereon.

Further in accordance with my invention the registry of a box upon the wrapper initiates operation of mechanism which moves a panel of the wrapper into adhesive engagement with the corresponding wall of the box registered thereon.

Also in accordance with my invention the coated wrappers are delivered adjacent the assembly station by a conveyor from adhesive-applying mechanism, and prior to their transfer to the registry table, the wrappers are moved transversely of the conveyor into proper alignment with the aforesaid mechanism which moves a wrapper panel into adhesive engagement with the corresponding box wall.

My invention further resides in the features of combination, construction and arrangement hereafter described and claimed.

For an understanding of my invention and for illustration of various modifications thereof, reference is to be had to the accompanying drawings in which:

Fig. 1 is a front elevational view with parts omitted of a box wrapping machine;

Fig. 2 is a plan view of parts shown in Fig. 1;

Fig. 3 is a side elevational view on enlarged scale, in section, of the registry table shown in Figs. 1 and 2.

Fig. 4 is a plan view, partly in section, of the registry table and of wrapper registry mechanism.

Fig. 5 is a front elevation of Fig. 4 with parts in section.

Fig. 6 is a rear elevation, with parts in section, of Fig. 7 and shows mechanism for moving a wrapper panel.

Fig. 7 is a side elevation, partly in section, of Fig. 6.

Fig. 8 is a side elevation of pneumatic motor shown in Fig. 6.

Fig. 9 shows a front elevation illustrating a

modification of panel moving mechanism shown in Fig. 6.

Fig. 10 is a side elevation of Fig. 9.

Fig. 11 is a side elevation of wrapper aligning mechanism shown in Fig. 1.

Fig. 12 is a plan view, on enlarged scale, of the wrapper aligning mechanism.

Fig. 13 is a side elevational view, partly in section, of parts appearing in Fig. 12.

Fig. 14, in perspective, diagrammatically illustrates the control mechanism for the wrapping machine and the adhesive applying mechanism.

Fig. 15 is a front elevational view, generally similar to Fig. 1 but illustrating a modification of the invention.

Fig. 16 is a side elevation of Fig. 1 with parts omitted.

Fig. 17 is a plan view of the modification of Figs. 15 and 16.

Fig. 18 is a detailed view showing in side elevation gripper mechanism appearing in Figs. 15 to 17.

Figs. 19 and 20 are plan views of further modifications.

Fig. 21 is a plan view of a further modification.

Figs. 22 and 23 are side elevational views of parts appearing in Fig. 21.

Referring to Fig. 1 the wrapping machine W is generally of the type shown in Patents Nos. 691,329 and 1,646,563, having a form block F adapted to carry a box and wrapper assembly along a path to cooperate in a known manner with various tools which apply the wrapper to the box. The reciprocation of the form block is controlled by the cam 1 on the upper end of shaft 2 and driven by clutch 3 from a motor 147 (Fig. 14) suitably connected to the pulley 4.

Coated wrappers are delivered adjacent the wrapping machine W by the conveyor C, preferably of the suction type, which extends from a suitable adhesive applying mechanism such, for example, as disclosed in Rider Patent No. 1,857,260, Federwitz Patents 1,770,483, 1,772,344, Davis Patent 1,818,198, Stokes 1,701,317, Nitsch 1,684,741. The wrappers are fed intermittently, each in succession arriving at the position of the wrapper X Fig. 2. At this station each wrapper is moved transversely of the conveyor C by the aligning mechanism A whereupon the transfer device T moves the wrapper to an assembly station between the operator and the form block of the wrapping machine. The mechanism AA automatically registers the wrapper XI upon the registry table which preferably tilts downwardly

after it receives a wrapper to facilitate the registry of a box thereon by the operator. When the operator registers a box or box blank upon the wrapper, mechanism, hereinafter described, wipes up the side panel S of the wrapper into engagement with the corresponding box wall to avoid any possibility of this panel of the wrapper engaging the form block structure as the operator moves the assembly beneath and then upward onto the form block. Having briefly outlined the various steps, the mechanism for effecting them is now described in detail.

Referring to Figs. 2, 11, 12 and 13, the wrapper aligning mechanism A comprises the gripper supporting slide 6 which is reciprocable in the guide 7. The pins 8 extend from the slide through the slots 9 in the sides of the guide member 7. The bracket 10 suspended from the slide carries the shaft 11a to the opposite ends of which are secured the movable gripper jaws 11. The lower stationary gripper jaws 12 are carried by the bracket. The beveled gear 13 on shaft 11a engages the beveled gear 14 carried by the shaft 15 which is slidably received by the hub of gear 16 rotatable in the stationary bearing 17. The gear 16 is in mesh with the gear 18 fastened to the shaft 19 from which extends the lever 20.

Movement of the lever 20 to effect opening and closing of the gripper jaws is effected by the cam 21, Fig. 1, which is mounted on shaft 22 driven in synchronism with the main cam 1 of the wrapping machine. Mechanism for transmitting the motion of cam 21 to lever 20 comprises the lever 23 having the cam follower 24, link 25, lever 26 and link 27 connected to the lower end of lever 20.

Movement of the gripper slide transversely of conveyor C is controlled by the cam 28, Fig. 1, the mechanism for transmitting motion from the cam to the slide comprising the lever 29 which carries the cam follower 30, link 31, lever 32 and link 33 connected between the upper end of lever 32 and the slide 6.

When a wrapper arrives at the position of wrapper X, Fig. 2, the cam 28 effects movement of the gripper slide to the right as viewed in Figs. 11 to 13. As the slide moves forward it also moves downwardly due to the shape of the slots 9 in the guide member 7, to depress the conveyor belt into the cutaway section or opening 34 in the top of the suction chamber. The stationary gripper jaws therefore move under the edge of the sheet, and when the edge strikes the shoulder 35, the wrapper is moved slightly to the right as viewed in these figures. As the gripper slide reaches this position, the cam 21 operates the lever 20 to effect closure of the gripper jaws. The cam 28 thereupon effects the reverse movement of the slide 6 to move the wrapper transversely of the conveyor C to a predetermined position into alignment with mechanism hereinafter described. The cam 21 thereupon operates the lever 20 to effect release of the wrapper by the grippers.

To adapt the mechanism for various sizes of the wrappers, the position of the gripper bracket 10 may be adjusted with respect to the slide 6 by the knob 10g, Fig. 13. The stroke of the slide may be varied by shifting the point of connection between link 31 and arm 32, Fig. 11. The turnbuckle 32b provides for adjustment of the position of slide 6 at the ends of its stroke.

To facilitate this aligning operation, it is desirable to reduce or break the suction used to hold the wrapper flat on the conveyor belt to prevent curling. By the time a wrapper has arrived at

the aligning station, the adhesive has partially set and the tendency for the wrapper to curl has practically disappeared. As shown in Figs. 2 and 13, the butterfly valve 35a extending transversely of the suction chamber is operated concurrently with the grippers by the mechanism including lever 20, link 36 and beveled gears 37. As the gripper jaws close to engage the edge of the sheet to be aligned, the valve 35a is closed to isolate that portion of the chamber below wrapper X from the source of suction. After the aligning movement, the gripper jaws are opened and concurrently the valve 35a is opened to restore the suction at the delivery end of the conveyor.

As this system is used for a wide range of wrapper sizes including wrappers of large area, it is desirable not only to reduce or cut off the suction acting on the wrapper but also to provide a light air blast which in effect forms a cushion of air supporting the wrapper as it is pushed by the gripper mechanism towards the position of alignment.

The tubes 38 for providing the blast are disposed within the suction housing of conveyor C and are connected, as by the pipe 39, to the blower 40. A valve 41 disposed in the air line permits the desired intensity of blast to be obtained. Particularly as the blast is relatively small, it need not be cut off at any time in the operating cycle.

The registry table R is disposed adjacent the delivery end of the conveyor C. The top plate 42 of the table is grooved to receive the two endless belts 43 which comprise the transfer mechanism T for receiving wrappers from the conveyor C and moving them onto the registry table in front of the machine operator. As clearly appears in Figs. 3, 4, and 5 the registry table is hollow to provide a divided suction chamber 44 which at the receiving end of the transfer device is in communication with the interiors of the suction drums 45 whose peripheries closely approach the delivery end of the conveyor C. The shaft 46 to which the suction drums are secured is driven by the gearing 47, 48, 49 from the conveyor C. The belts 43 move concurrently with the conveyor C but at higher speed due to the ratio of the gears 47, 49. The cord 50 passing over the driving pulley 51 on shaft 46, and the pulley 52 on the idler shaft 53, supports the panel S of the wrapper which projects beyond the edge of the registry table R nearest the form block F. As thus far described, for each cycle of operation of the machine, a wrapper is moved from the aligning station to the registry table and another wrapper is moved to the aligning station and aligned.

Preferably the wrapper upon the registry table is moved to a registered position as a preliminary to the disposition thereon of a box by the operator. The registering mechanism AA shown in Figs. 1, 4 and 5 is identical with the mechanism A used for moving the wrappers conversely to the conveyor C. Therefore, for brevity, its construction is not further specifically discussed. Like reference characters with suitable subscript have been used to identify the corresponding parts. In brief, after a wrapper has been delivered upon the registry table, the gripper slide 10a is moved downwardly into the right as viewed in Figs. 1 and 5 by the cam 54. After the gripper jaws have been closed by operation of cam 55, the wrapper is moved to the left to a predetermined position. The gripper jaws are then opened by operation of cam 55. In both the wrapper registering mechanism and wrapping aligning mechanism, it is

to be noted that the two grippers are substantially separated transversely of the wrapper edge they are to engage with the result that if the wrapper is askew, one or the other of the shoulders of the grippers will first engage the edge of the wrapper and swing it to proper position.

The adjustments for the registering mechanism to accommodate wrappers of different sizes are substantially the same as those for the aligning mechanism.

Preferably, during the reregistering operation the wrapper is relieved of suction and subjected to a light air blast. To that end, the chamber 44 is connected by the pipes 56, 57 to the exhaust and intake, respectively, of the pump 58. When the grippers 11 close to move the wrapper to registered position, the cam 59 secured to the shaft 22 engages and moves the rod 60 to the left as viewed in Fig. 11, so that the valve member 61 by-passes the suction pipe 57 to atmosphere and substantially concurrently closes the orifice 62 of pipe 56 so that the air blast is transmitted to the suction chamber 44 of the registry table. The intensity of the blast may be adjusted by the valve 64.

The guides 65 for assisting the operator in registering a box upon the wrapper are suitably held or supported from the registry table and when the wrapper has been registered as above described, these guides define the proper position for the box. Since the wrapper has been automatically registered, the operator need only move a box against the guides to effect registered engagement with the wrapper.

As shown in Fig. 7, the guides 65 are each provided with a port 66 connected by pipe 67 to the pneumatic motor 68, Fig. 6, which is connected to the intake side of the suction pump 69. The piston 70 of the motor 68 is biased to the upper position shown in Fig. 6 by the spring 70b. With the ports 66 open, the pressure acting on the piston is insufficient to effect its movement and the piston remains in the position shown in Fig. 6. When, however, the operator registers a box B on the wrapper, the box serves as a valve closing the ports 66 (Fig. 7) whereupon the suction is effective to move the piston 70 downwardly. The piston rod as shown in Fig. 6 bears against the rollers 71 which are carried by arms 72 of a pair of bell crank levers whose other arms are pivotally connected to reciprocable rods 74. When the piston moves downwardly, the rods 74 move toward each other so that the abutments 75 carried by each of them engages a pin 76 extending from a plate 77 pivotally mounted upon a stud 78 extending rearwardly of the registry table. As these plates rotate, they lift the panel S of the wrapper, which extends beyond the edge of the table, and wipe it into engagement with the corresponding box wall as shown in Fig. 7. To accommodate boxes of different length, the wiper plates 77 are carried by slides 79 which are adjustable on the guide 80 secured to the rear face of the registry table. The abutments 75 can be adjusted along the rods 74 simply by loosening the clamping screws 80a. The plates as shown in Fig. 6 may be substantially triangular and the relation of the pins 76 and the action of abutment 75 thereon is such that the plate rotates from the position shown to an angle of approximately 120° each time the piston 70 is operated. These wiping plates are normally out of the path of movement of the wrapper so as to afford no obstruction to its movement by the conveyor belts 43 or the reregistering mechanism AA. They are also out of the path of movement of the box and wrapper assembly when the operator

moves it from the registry table onto the form block.

As an alternative, or preferably in addition to the wiping plates, there may be provided an air blast for moving the wrapper panel S. The pipe 81, provided with a series of apertures, is connected by a pipe 82 to the exhaust side of pump 69. When the piston 70 moves downwardly in response to registry of a box upon a wrapper the valve 83 included in the pipe 82 is moved to closed position so that the blast is effective to move the panel S into engagement with the box.

As more clearly shown in Fig. 17, subsequently described, the box guides are adjustable longitudinally and transversely of the registry table to suit different sizes of boxes.

In the modification shown in Fig. 9, the panel wiping plate instead of being a single member as in Fig. 6 comprises three pivoted plates 84 carried by and extending radially of the supporting member 85 from which the abutments 76a project. A spring 86 biases each of the plates to the position shown in Fig. 10. With this arrangement each wiping tip 84 yields as it presses a wrapper panel into engagement with the box wall. With this arrangement, the box guides 65 may be set so that the box may be flush with the edge of the table or extend slightly beyond.

Preferably after a wrapper has been delivered to and registered upon the table R, the table is automatically tilted towards the operator to facilitate registering of a box upon the wrapper. The table at or near the front edge is provided with lugs 87 for the pins 88 to which the depending levers 89 are pivoted. The lower ends of the levers 89 are pivoted at the ends of the arms 90 secured to shaft 91. The cam 92 on shaft 22 engages the cam follower 93 at the end of arm 94, Fig. 1. The lever 94 is connected to lever 95 by the link 95a to effect the tilting movement of the table at proper time in the operation of the wrapping machine.

As shown in Fig. 2, the shaft 46 for driving the transfer conveyors 43 is driven through a universal joint 96 which also serves as a hinged rear mounting for the table. Similarly, the rear end of shaft 53 terminates in a universal joint supported from the fixed bracket 97 extending from the frame of the machine.

The control system for the wrapping and gluing mechanisms is diagrammatically shown in Fig. 14. The motor 98 through belt 99, pulley 100, shaft 101 and gears 102, 103 and 104, continuously drives the gear 105 which is loose upon the shaft 106. The gear 105 also serves as a driving clutch member. The driven clutch member 106a is mounted upon the element 107 which is secured to shaft 106. The driven clutch member is biased toward engagement with the driving clutch member by the spring 108. With the parts in the position shown, the extension 109 of the driving clutch member is restrained by the latch 110 so that the gear 105 rotates without imparting motion to shaft 106. When the pedal 111 is depressed by the operator, the motion is transmitted through the linkage comprising arm 112, link 113, bell crank lever 114, link 115, arm 116, shaft 117 and lever 118 to withdraw the latch member 110 out of the path of the extension 109 of the driven clutch member so that spring 108 effects driving engagement between the two clutch members. The resultant rotation of shaft 106 effects feeding movement of a wrapper from the stack WS toward the adhesive applying roll 119. The wrapper-feeding

mechanism, which is diagrammatically shown, may be of the type shown in the aforesaid Rider patent. Briefly, the cam 120 on shaft 106 through the lever 121 effects reciprocation of the slide 122 to move the suction head 123 downwardly and into engagement with the wrapper. The return movement of the slide effects lifting of the top sheet of the stack for engagement with feeding rolls not shown which transfer it to and beyond the adhesive applying roll 119 onto the receiving end of the conveyor C. Upon the shaft 106 is also mounted the disc 124 carrying a cam 125 which upon engagement with the roll 126 at the lower end of the pivoted lever 127 effects engagement of the driven clutch member 128, slidably carried by the shaft 129, with the driven clutch member 130 which is loosely mounted on shaft 129 and driven by the gear 130a which is connected through suitable gearing to the shaft 106. After the shaft 106 has rotated to a predetermined extent the cam 131 carried by disc 132 swings the lever 127 in the reverse direction to separate the clutch members 128, 130 and thus stop the conveyor. The two cam discs 124 and 132 may be adjusted angularly with respect to one another to determine the extent of movement of conveyor for each revolution of shaft 106 and to ensure that the wrappers when they arrive at the position X, Fig. 2, are in the proper position with respect to the aligning mechanism.

Rotation of shaft 106 also effects movement of the cam 133 which controls the operation of the wrapping machine W. The cam is driven by any suitable mechanism, for example, by sprockets 134 and 135 connected by chain 136. When the cam 133 is of the construction shown, its shaft 137 makes one revolution for each revolution of shaft 106. When the high part of cam 133 engages and rocks the lever 138, the motion is transmitted to the lever 139 through the linkage 140, 141 and bell crank lever 142 to withdraw the latch member 143 from engagement with the cam member 144 rotatable with shaft 2 of the wrapping machine. The spring 145 is thereupon effective to move the driven clutch member 3 into driving engagement with the pulley 4 which serves as a driving clutch member. The motor 147 which is continuously running is, therefore, effective to drive the main shaft 2 of the wrapping machine which controls the operation of the form block, the wrapper aligning mechanism, the reregister mechanism AA and the table tilting mechanism, all above described. When shaft 2 completes a revolution the cam 144 depresses the latch member 143 which, in the meantime, has been released by cam 133 of the gluing mechanism, to rock the bell crank lever 148, moving the bar 149 to the left, Fig. 14, to separate the clutch members 3, 4. So long as the operator holds the pedal 111 in its depressed position the gluing mechanism intermittently coats wrappers with adhesive and feeds them adjacent to the assembly station and for each step of the conveyor, trips the wrapping machine to effect its cycle of operation which includes wrapping of a box, register of a wrapper upon the table R, tilting of the table, and alignment of the wrapper at the delivery end of the conveyor C. The operator may stop the wrapping machine or prevent it from being tripped by the gluing machine by moving handle 148a in clockwise direction as viewed in Fig. 14.

With the arrangement described, the operator need perform only the two simple operations of registering a box blank upon the wrapper reg-

istered upon the registry table and of transferring the assembly so formed to the form block structure of the wrapping machine. The number of boxes produced in the given time is, therefore, substantially increased as compared to present arrangements, and is substantially equal to the output of automatic machines whose use is not always justified, particularly when the box maker has short runs of different sizes of boxes.

Preferably, the wrapping machine W is of the type shown in copending application, Serial No. 17,018, filed April 18, 1935, of which it is characteristic that the form block structure does not pause in its downward travel while the corner lap tools 150 are turning in the corner laps of the side panels of the wrapper. With this modified construction, the time for each cycle of the wrapping machine may be substantially reduced but in practice the machine could not be operated continuously since there was not sufficient time for the operator to perform all of the necessary manual operations. With the arrangement above described, the advantages of "non-stop" corner lap operation can be utilized to advantage and the machine continuously operated, since there is sufficient time in each cycle for the operator to perform the two simple manual operations of registering the box upon the register and of transferring the assembly to the form block.

In the modification shown in Figs. 15 to 18, elements having the same function as those in the modification previously described are identified by like reference characters. As in the previous modification, the wrappers upon the conveyor C are moved transversely so that the corner notches between the panel S of the wrapper and the bottom panel are in alignment with the edge of the registry table. In this modification the wrappers are transferred from the conveyor C to the registry table R by the transfer mechanism T1 which consists of the slide 151 having at its forward end the gripper mechanism 152. The lower jaws 153 are stationary and secured to the slide. The movable jaws 154, as more clearly shown in Fig. 18, are connected to the arm 155 to which is pivotally connected the rod 156 slidable in the pivoted block 157. The rod 156 and arm 155 form a toggle. The slide 151 guided by the member 158 is provided with a rack engaged by the gear 159 which is driven from cam 160 through the mechanism comprising the lever 161, link 162, rack 63 and gear 164. After a wrapper has been aligned upon the conveyor C, the slide 151 moves to the right as viewed in Fig. 15 so that the stationary gripper jaw 153 passes beneath the forward edge of the wrapper. Preferably the roll 164 at the delivery end of the conveyor is provided with a depression or cutout into which the flexible conveyor belt may be depressed to allow the lower gripper jaw to pass under the edge of the wrapper. As the gripper approaches this position the upper end of the rod 156 is engaged by the stop 165 carried by the bracket 166 adjustably secured to the frame of the machine. The center pivot 167 of the toggle is thus swung to the right beyond the line of centers to close the grippers, the spring 168 holding the jaws closed. As the slide 151 moves in the reverse direction the stop 165 swings about its pivot 169 without effect upon the grippers. Immediately before the wrapper approaches its proper position upon the registry table the stop 170 engages the upper end of the rod 156 to open the gripper jaw, the shoulders 171 of the stationary gripper members defining

the registered position of the wrapper with respect to the box guides 65.

The mechanism for tilting the table and for wiping the panel S of the wrapper into engagement with the corresponding box wall is the same as in the first modification and its construction is not therefore repeated. As shown in Fig. 17 the box guides 65 are adjustably mounted upon the brackets 172 which are adjustably mounted upon the bar 173.

In this modification the table is not only tilted, but is also moved toward and from the form block to facilitate the movements of the operator in transferring the assemblies from the registry table to the form block. As shown in Fig. 7, the table is provided with blocks 174 which are slidably received by the rods 175 which are secured at one end to the brackets 176 hinged at 177 to the stationary member 178. The table is connected by link 179 to the arm 180 provided with a cam follower which engages the cam 181 on shaft 22. The cam is so shaped that after a wrapper has been delivered to the table it moves towards the form block structure and returns to its original position prior to delivery of the next wrapper thereto by the transfer slide T1. As indicated in Fig. 7 the registry table may be hollow and provided with a transparent top plate 42. A light 182 within the table is of assistance to the operator in obtaining rapid and accurate register.

In the modification shown in Fig. 19, the registry table Ra is formed by the center belt of conveyor C from the gluing machine. In this modification the wrapper conveyor consists of a wide center belt Ca and two narrow belts Cb on either side thereof. At the station corresponding to the delivery station of the conveyor C of the prior modifications, the wrapper is moved transversely by the mechanism A. By the next step of the conveyor the aligned wrapper is carried by the center belt Ca to the assembly station in front of the operator.

The combined width of the three belts is great enough to accommodate the largest wrapper to be used. However, it is necessary in this as in the other modifications, not to extend a conveyor of such width between the operator and the form block since it would then be practically impossible for the operator to reach the form block. In all modifications, the wrapper is delivered in front of the operator on a surface which is sufficiently narrow to enable the operator conveniently to reach the form block in putting the assemblies thereon.

The modification shown in Fig. 20 is similar to the first modification described except that instead of using two narrow belts 43, a single wide belt Rb is used. In both the modifications of Figs. 19 and 20 it is of course understood that suitable supporting structure may be disposed beneath the belts and, if desired, the supporting surface may be the transparent upper wall of a housing such as shown in Fig. 7.

These modifications may also be provided with box guides such as guides 65 of the previous modifications, and may include side panel wiping mechanism similar to that shown in Figs. 6 and 7.

In the modification shown in Fig. 21, the wrappers instead of being disposed lengthwise on the conveyor C are disposed thereon in the more usual crosswise position. With this modification, the aligning mechanism A of previously described modifications is not necessary.

The wrappers in turn arrive at the position X on

conveyor C from which they are transferred in succession on to the conveyor RC by the transfer device TT substantially similar to the transfer device T1 shown in Figs. 15 and 17. When the conveyor C is at rest, the cam 160a on shaft 22a of the wrapping machine, Figs. 21 and 22, operates the gripper slide 151a to move a wrapper from conveyor C onto conveyor RC extending at substantially right angles thereto. As fully appears in Fig. 22 the mechanism for transmitting the motion from the cam to the gripper slide 151a includes the lever 161a which carries a cam follower for cam 160a, the link 162a which connects lever 161a to the rack, 163a, and the gears 164a and 159a which engage respectively the rack 163a and the rack portion of the gripper slide 151a. The gripper jaws are closed by the stop 170a when the grippers are in position to clamp the edge of a wrapper upon the conveyor C, and the jaws are opened to release the wrapper after it has been delivered to the conveyor RC by the stop 169a.

As appears in Fig. 21, the wrapper at X2 is in alignment with the mechanism at the assembly station for wiping up the panel S, so that mechanism TT performs the functions of both the aligning and the transfer mechanisms of previously described modifications.

The conveyor RC for moving the wrappers from the position X2 into approximate register with the box guides 65 is, in this modification, driven from the shaft 22 of the wrapping machine. The driving mechanism as shown in Figs. 21 and 23 includes a cam 183 rotatable with the shaft 22. The cam groove receives the cam follower 184 on arm 185 which is connected by link 186 to arm 187 which carries the pawl 188. The ratchet 189 driven by pawl 188 is connected to the gear 190 which is in mesh with gear 191 on the shaft of the conveyor driving roll 192. The ratio of gears 190 and 191 is suitably high so that a wrapper is moved from position X2 to X1 in an interval which is short compared to the cycle of operation of the wrapping machine so as to afford sufficient time for the aligning mechanism AA to align a wrapper with the box guides 65, and for the operator to register a box on the wrapper and to transfer the assembly to the form block. After the conveyor has moved a wrapper from the position X2 to X1, the transfer mechanism TT, while both of the conveyors are stationary, moves a wrapper from conveyor C to conveyor RC as above described. Thus, for each complete cycle of operation of the wrapping machine and the gluing machine, a box and wrapper assembly is moved from the registry table onto the form block, a wrapper is moved from the position X2 in front of the operator and registered by the mechanism AA with respect to the box guides, a wrapper is moved by the transfer mechanism TT from conveyor C onto conveyor RC and another wrapper is moved to the position X1 on conveyor C, and to the receiving end of the conveyor is delivered another freshly coated wrapper.

The mechanism for aligning the wrapper with respect to the box guides 65 is the same as that shown in Figs. 1, 4 and 5, or equivalent. At the assembly station there is preferably provided mechanism similar to that shown in Figs. 6 to 8 for wiping the panel S of the wrapper into engagement with the corresponding box wall and this mechanism may, as described, be responsive to engagement of a box with the box guides. Specifically, as in the arrangement shown in Figs. 6 to 8, a box, as it is moved into register with a

wrapper below the box guides, serves as a valve to close ports in the box guides to effect operation of a pneumatic motor controlling the wiping tools.

5 What I claim is:

1. A wrapping machine comprising form block structure and sheet-applying mechanism associated therewith, structure for supporting a wrapper for registry with a box to form an assembly to be disposed on said form block structure, and means for intermittently tilting said supporting structure in timed relation to said mechanism to facilitate registry of a box on the wrapper disposed on said supporting structure.

15 2. A wrapping machine comprising form block structure and sheet-applying mechanism associated therewith, structure for supporting a wrapper for registry with a box to form an assembly to be disposed on said form block structure, and means for moving said structure toward and from said form block structure in timed relation to said mechanism to facilitate movement of an operator in placing the assembly on said form block structure.

25 3. A wrapping machine comprising form block structure and sheet-applying mechanism associated therewith, structure for supporting a wrapper for registry with a box to form an assembly to be disposed on said form block structure, and means for tilting said structure and moving it toward and away from said form block structure in timed relation to said mechanism to facilitate registry by an operator of a box upon a wrapper supported by said structure to form an assembly and transfer by the operator of the assembly to said form block structure.

30 4. In a box wrapping system, structure for supporting a wrapper for registry of a box thereon, and means responsive to registry of the box upon the wrapper for effecting adhesive engagement of a panel of the wrapper with the corresponding box wall.

35 5. A wrapping machine having form block structure, structure for supporting a wrapper for registry of a box thereon to form an assembly to be moved onto said form block structure, means for effecting adhesive engagement of the forward panel of the wrapper and the corresponding box wall, and means controlling operation of said first means responsive to registry of the box.

40 6. In a box wrapping system, box guide structure, means for registering a wrapper with said box guide structure, and means, responsive to positioning of a box for guidance by said structure onto a registered wrapper, to effect adhesive engagement of a panel of the wrapper with the corresponding wall of the box.

45 7. In a box wrapping system, box guide structure at an assembly station, a conveyor for transporting wrappers toward said assembly station, mechanism for moving the wrappers transversely of said conveyor into alignment with said guide structure, and means for moving the aligned wrappers in succession into register with said box guide structure.

50 8. A box wrapping machine comprising a form block, structure for supporting a wrapper for registry of a box thereon to form an assembly, mechanism operative to move a panel of a wrapper supported by said structure into adhesive engagement with the corresponding wall of a box registered thereon, conveying means for delivering wrappers to said supporting structure, and means for moving the wrappers transversely

of their direction of feed by said conveying means into alignment with said mechanism.

9. A box wrapping machine comprising means for delivering wrappers in succession upon structure in front of an operator for registry of boxes thereon to form assemblies, mechanism operative to move a panel of a wrapper supported by said structure into adhesive engagement with the corresponding wall of a box registered thereon, and means for aligning the wrappers with said mechanism prior to their arrival in front of the operator.

10. In a box wrapping system, reciprocating means for engaging an individual, unattached wrapper and moving it with respect to a supporting surface, and means for providing a slight air blast to provide a cushion of air between said surface and a wrapper during movement by said first means.

11. In a box wrapping system, permeable conveyor belt structure for transporting wrappers, a suction chamber beneath said belt structure, means for moving the wrappers with respect to the conveyor surface, and means operative during movement of a wrapper by said first means to produce a positive pressure in said suction chamber.

12. A box wrapping machine comprising a form block and wrapper-applying mechanism, a registry table adjacent said form block, box guide structure associated with said table, means operating in timed relation to said mechanism for delivering wrappers in succession into register with said box guide structure to facilitate manual registry of boxes upon wrappers to form assemblies to be placed on said form block, and means responsive to positioning of a box with respect to said guide structure for effecting adhesive engagement between a wrapper panel and a box wall.

13. A box wrapping machine comprising a form block and wrapper-applying mechanism, a registry table adjacent said form block, box guide structure associated with said table, and means operating in timed relation to said mechanism for delivering wrappers in succession into register with said box guide structure and means operating in timed relation to said mechanism for tilting said table to facilitate registry of the boxes upon the wrappers.

14. A box wrapping machine comprising a form block and wrapper-applying mechanism, a registry table adjacent said form block, box guide structure associated with said table, and means, operating in timed relation to said mechanism, for delivering wrappers in succession into register with said box guide structure, means operating in timed relation to said mechanism for tilting the table after each delivery of a wrapper thereon, and means responsive to positioning of a box against said guide structure for effecting adhesive engagement of a panel of a wrapper with the corresponding box wall.

15. A box wrapping machine having a form block and associated wrapper-applying mechanism, a registry table adjacent said form block, a conveyor for delivering wrappers adjacent said table, conveyor belt structure for transferring boxes from said conveyor to said table, box guide structure associated with said table, and mechanism for registering the transferred wrappers with said box guide structure.

16. A box wrapping machine having a form block and associated wrapper-applying mechanism, a registry table adjacent said form block, a

conveyor for delivering wrappers adjacent said table, and conveyor belt structure for transferring the wrappers in succession from said conveyor to said registry table, and driven at a speed higher than the speed of said conveyor.

17. A box wrapping machine having a form block and associated wrapper-applying mechanism, a registry table adjacent said form block, a conveyor for delivering wrappers adjacent said table, conveyor belt structure for transferring the wrappers in succession from said conveyor to said registry table and driven at a speed higher than the speed of said conveyor, and means operative to move the wrappers transversely of said conveyor into alignment with said conveyor belt structure.

18. A box wrapping machine having a form block and associated wrapper-applying mechanism, a registry table adjacent said form block, a box guide structure associated therewith, conveyor belt structure operating in timed relation to said mechanism for transporting wrappers to said table, and reciprocating structure operable while said conveyor belt structure is at rest for registering the wrappers on said table.

19. In a box wrapping system, a registry table, means for delivering a wrapper to said table with a panel extending beyond an edge of the table, rotatable structure out of the path of said panel during delivery by said means, and mechanism responsive to movement of a box into register with the wrapper for moving said structure to effect engagement of said panel with the corresponding box wall.

20. In a box wrapping system, a wrapping machine having a form block, a registry table adjacent said form block adapted to support a wrapper having a panel extending beyond an edge of said table, and mechanism operative while the wrapper is on said table to wipe said panel into engagement with a box registered on the wrapper by the wrapping-machine operator.

21. In a box wrapping system, a wrapping machine having a form block, a registry table adjacent said form block adapted to support a wrapper having a panel extending beyond an edge of said table, box guide structure having ports therein, and pneumatic means controlled by said ports for moving said panel into engagement with a box registered on the wrapper.

22. In a box wrapping system, a wrapping machine having a form block, a registry table adjacent said form block adapted to support a wrapper having a panel extending beyond an edge of said table, box guide structure having ports therein, and means, controlled by said ports, providing a blast for moving said panel into engagement with a box registered on the wrapper.

23. In a box wrapping system, a wrapping machine having a form block, a registry table adjacent said form block adapted to support a wrapper having a panel extending beyond an edge of said table, box guide structure having ports therein, structure for wiping said panel into engagement with a box registered on the wrapper, and pneumatic means controlled by said ports for operating said structure.

24. A box wrapping system comprising a box wrapping machine and mechanism for conveying wrappers toward said wrapping machine, means for automatically interrupting operation of said machine at the end of its cycle, and mechanism operated in timed relation to said conveying mechanism for automatically tripping said interrupting means.

25. A box wrapping system comprising a box wrapping machine, means for interrupting operation of said machine at the end of its cycle, a conveyor for transporting wrappers toward said wrapping machine, means for coating wrappers and delivering them to said conveyor, and means, normally continuously operated, effective periodically to trip said interrupting means and to effect operation of said conveyor and said wrapper coating and delivery means.

26. A box wrapping system comprising a box-wrapping machine, means for interrupting the operation of said machine at the end of each cycle, a conveyor for transporting wrappers toward said wrapping machine, means for coating and delivering wrappers to said conveyor, and means, normally continuously operated, for effecting intermittent operation of said conveyor and of said wrapper coating and delivery means, and for tripping said interrupting means once for each operation of said conveyor and said wrapper coating and delivery means.

27. A box wrapping system comprising a box-wrapping machine having a one-time clutch, mechanism for coating and conveying wrappers toward said box-wrapping machine, means controlled by said coating and conveying mechanism periodically to trip said clutch, and manual control means for starting said mechanism.

28. A box wrapping system comprising a box-wrapping machine having a one-time clutch, mechanism for coating and conveying wrappers toward said box-wrapping machine, means controlled by said coating and conveying mechanism periodically to trip said one-time clutch, manual control means for starting said mechanism, and manual control means for rendering said first means inoperative.

29. A box wrapping system comprising a wrapping machine having a form block, a registry table adjacent said form block, an intermittently operated conveyor for transporting wrappers toward said wrapping machine, and mechanism operative while said conveyor is at rest to transfer wrappers from said conveyor onto said registry table.

30. A box wrapping system comprising a wrapping machine having a form block, a registry table adjacent said form block, an intermittently operated conveyor for transporting wrappers toward said wrapping machine, means operative while said conveyor is at rest to align a wrapper with said registry table, and mechanism operative while said conveyor is at rest to transfer the aligned wrapper from said conveyor onto said registry table.

31. A box wrapping system comprising a wrapping machine having a form block, a conveyor for transporting wrappers from adhesive applying mechanism toward said wrapping machine, an assembly station adjacent said form block at which the wrapping-machine operator registers boxes with wrappers, a conveyor driven by said wrapping machine for delivering wrappers to said assembly station, and transfer means operated by said wrapping machine to transfer wrappers from said first conveyor to said second conveyor.

32. A box wrapping system comprising a wrapping machine having a form block, an intermittently operated conveyor for transporting wrappers from adhesive applying mechanism toward said wrapping machine, a conveyor operable while said first conveyor is at rest to transport wrappers to an assembly station adjacent said form block, and transfer means operable while both of

said conveyors are at rest to transfer wrappers from said first conveyor to said second conveyor.

33. A box wrapping system comprising a wrapping machine having a form block, box guide structure adjacent said form block, conveyor means driven by said wrapping machine for delivering wrappers in substantial register with said box guide structure, and mechanism driven by said wrapping machine for accurately registering the delivered wrappers with said box guide structure by effecting their movement relative to said conveyor means.

34. A box-wrapping machine comprising a form-block and wrapper-applying mechanism operating in timed relation with respect to each other, a box and wrapper assembly station and said form-block structure within reach of an operator, means operating in timed relation to said wrapping machine for delivering wrappers in succession to said assembly station, for manual registry thereof of boxes upon wrappers to form assemblies to be fed to said form-block structure, and means responsive to each registration of a box upon a wrapper for effecting attachment of a wrapper panel to a wall of the associated box.

35. A box-wrapping machine comprising form-block and wrapper-applying mechanism operating in timed relation with respect to each other, a registry table and said form-block structure within reach of an operator, means operating in timed relation to said wrapping machine for delivering wrappers in succession to said table for manual registry of boxes with wrappers on said table to form assemblies to be fed to said form-

block, and means responsive to registration of a box upon a wrapper upon said table for effecting attachment between a panel of the wrapper and a wall of the associated box.

36. A box-wrapping machine comprising a form-block and wrapper-applying mechanism operating in timed relation with respect to each other, a registry table and said form-block within reach of an operator, an intermittently operated conveyor transporting wrappers toward said table, and mechanism transferring the wrappers in succession from said conveyor to said table.

37. The combination with a box-wrapping machine comprising form-block structure, wrapper-applying mechanism operating in timed relation therewith, and a one-time clutch controlling operation of said form-block structure and said wrapper-applying mechanism, of mechanism for conveying wrappers toward said wrapping machine, a one-time clutch controlling said conveying mechanism, mechanism operated in timed relation with respect to said conveying mechanism for tripping said first-named one-time clutch, and manual means controlling said second-named one-time clutch.

38. A box-wrapping machine having a form-block, a box and wrapper assembly station and said form-block within reach of an operator, box guide structure, having ports therein, disposed at said assembly station, and pneumatic means controlled by said ports for moving a panel of a wrapper at said station into attachment with a wall of a box registered on said wrapper.

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