The present application discloses apparatus for combining two sheets, by use of an adhesive, in a desired relation. One sheet, which may have the adhesive applied thereto, is transported by an intermittently operable conveyor to a nominal location where combining with the other sheet occurs. Where such combining occurs, a positioning mechanism, controlled by light transmitting and receiving units, positions the other sheet with respect to the transported sheet such that the combined sheets define a desired positional relationship.

8 Claims, 9 Drawing Figures
1 SHEET POSITION DETECTOR

BACKGROUND OF THE INVENTION

Apparatus for adhesively combining or unifying two sheets of flexible material such as paper, plastics, leather, etc., has, up until recent years involved a fair degree of hand labor which, to respond to competitive conditions, has been continually diminished by various innovations.

One field of activity which has provoked many of such innovations is the rigid box making industry. In recent years the use of rigid boxes has experienced a continual decline mainly as a result of cost advantages resulting from use of erectable cartons. Cartons can be produced in great quantities at a minimum unit labor charge that is significantly less than rigid boxes. Of equal importance is the fact that cartons can be shipped to the user in a collapsed condition. Cartons, however, have not been accepted for packaging quality products such as candles, perfumes and various toiletries.

To produce the typical rigid box various types of machinery is used and for purposes of illustration reference should be made to U.S. Pat. No. 3,045,561 which is assigned to the assignee of the present invention and by reference thereto it is intended that its disclosure be incorporated herein.

Briefly, rectangular blanks of any desired dimensions, having a small square slug removed from each corner, and provided with score lines weakening the blank to facilitate bending, is erected by a quad stayer. Erection is accomplished by applying small strips of tape to each corner. The erected boxes may then be transported to a conveyor supporting and conveying glued covering material, referred to in the art as wraps, and positioned thereon by prior art registering devices (designated as R in U.S. Pat. No. 3,045,561) or applied to the wrap by hand which requires the operator to visually register an erected box with each wrap. Oftimes hand registration is inaccurate resulting in a scrapped box part.

A significant improvement in registration devices is shown and described in U.S. Pat. No. 3,400,031 which discloses the typical intermittent motion wrap conveyor locating a series of glued spaced wraps successively at a registration station located thereabove. The registration station comprises an articulated frame for releasably retaining a second sheet which will be applied to the glued sheet located on the wrap conveyor. Light emitting and light receiving elements, generally characterized as photocell units, are mounted on the frame and are operable to detect a selected edge of the sheet supported on the conveyor. These photocell units are operably connected to a hydraulic servo system which is arranged to adjust the articulated frame so that the sheet retained thereby is vertically aligned with the sheet located on the conveyor. Once alignment is achieved a plunger is actuated transferring the sheet from the articulated frame to the sheet on the conveyor.

The above briefly described automatic registration unit, relies, for its operation, on the principle of reflected light. More particularly the photocell units emit a beam of light that intercepts an edge of the sheet on the conveyor. The light is reflected back to the photocell unit and picked up by a receptor associated with each photocell unit. In brief, operation of the automatic spotter shown in U.S. Pat. No. 3,400,031 is as follows. After the sheet transporting conveyor has stopped at a nominal location the articulated frame supporting the photocell units commences to hunt until one photocell unit detects a portion of the edge of the sheet on the conveyor. Once a particular photocell unit locates the edge of the sheet operation of the actuator associated therewith is interrupted. The other photocell will continue to operate the actuator associated therewith until it also detects another portion of the leading edge of the wrap and at such time operation of the actuator, associated therewith is terminated. With registration complete all sheets are then combined.

Experience with the automatic spotting system of the above described patent revealed that proper operation will occur whenever the color differences between the transporting conveyor belt and the sheet are within the range of discrimination of the photocell units. While some efforts have been made to determine the necessary color differences within the range of discrimination of the photocell units in practice this is determined by experimentation. In the event the color differences are not within a range of discrimination of the photocell units registration cannot be accomplished. The problem of color differences can obviously be solved by providing different colors of conveyor belts but operators are reluctant to incur the added cost involved in purchasing conveyor belts of various colors and the attendant costs of time and labor for changing the belts.

SUMMARY OF THE INVENTION

It is the object and purpose of the present invention to provide a sheet registration unit that fulfills the requirements of most users while at the same time providing an arrangement which is significantly less expensive than automatic spotting equipment now in use. Its simplicity does not require maintenance skills that are not usually found in box manufacturing operations. Moreover, it is the object of the present invention to increase the cycle rate of registration equipment over that provided by known automatic spotting equipment and yet result in a degree of accuracy which is commercially acceptable for the great majority of requirements.

In accordance with the present invention a conventional intermittently operated wrap conveyor is provided associated with a glue that deposits regularly longitudinally spaced glued wrap on the conveyor. Associated with the wrap conveyor is a mechanism for transporting and registering a stayed box with a wrap located at a spotting station. After the box is applied to the glued wrap, the wrap conveyor is indexed to position a successive wrap at the spotting station.

It is a primary feature of the present invention to provide an automatic sheet registration device which is responsive to the interruption of sensing means which may consist of light, audio or a fluidic coupling. At present the preferred form involves use of light beams and photoelectric receptors which are in the path of the wrap supported on the conveyor. The registration device is operative to position a stayed box until one edge, preferably the trailing edge, of the wrap intercepts the light beam indicating the stayed box to be in proper alignment with the wrap. The stayed box is then lowered and applied to the glued surface of the wrap.
Further in accordance with the present invention the wrap transporting conveyor is provided with a series of apertures which are located relative to each other in effect provide a longitudinally continuous opening so that a reference edge of the wrap, regardless of its position relative to the openings, can be detected. Although it is recognized that the apertures in the conveyor belt can take various forms and located in various patterns the disclosure of the present invention shows two rows of staggered elongate apertures which are effective to provide, at any transverse line, an opening for detection of the wrap. By providing such an arrangement, which in effect is the equivalent to a continuous elongate slot which might be defined by two belts being slightly laterally spaced, there is no need to insure that successive wraps are located at a particular position on the transport conveyor.

In order to achieve fairly accurate registration by use of the principles of the present invention it is a condition that the longitudinal edges of the wrap (as distinguished from the leading and trailing edges) are parallel to the longitudinal medium of the conveyor and that the wrap is located a specified distance from one reference edge of the conveyor. The reason for locating the wrap in this manner, is because the registration device of the present invention is limited to achieving registration along one axis and such axis is parallel to the longitudinal medium of the wrap conveyor. Although this is recognized as a limitation as to the flexibility of the registration device of the present invention this would not constitute a factor against its commercial acceptability due to its simplicity resulting in a substantially less expensive registration device.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a plan view of the box spotting device made in accordance with the present invention shown with a fragmentary portion of a wrap conveyor cooperate therewith,

FIG. 2 is a transverse section of FIG. 1 taken substantially along the line 2—2 illustrating the relationship of the wrap conveyor, the registration device and the box supply and feed unit,

FIG. 3 is a section taken substantially along line 3—3 of FIG. 2,

FIGS. 4, 5 and 6 are plan views showing the operational sequence that takes place in registering a stayed box with the wrap,

FIG. 7 is a schematic of the hydro-pneumatic and electrical controls for controlling the sequence of operation of the wrap conveyor and the spotting device,

FIGS. 8 and 9 show, respectively, a sonic detector and a fluidic detector that can be substituted for the photocells of the preferred embodiment.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The overall arrangement of the preferred form of the sheet registering apparatus is shown in FIGS. 1, 2 and 3 and reference thereto will reveal a fragmentary upper portion of a frame structure 10 having connected thereto, in laterally opposed relation, a box feed and supply mechanism 12 and box spotting means 14 constructed in accordance with the principles of the present invention. Supported on the frame structure 10, in any selected manner, is a conveyor guide frame 16 slidably supporting an intermittently operable conveyor belt 18 on which is deposited, in a selected orientation and at longitudinally spaced intervals, wraps W. The supply mechanism 12 provides a single file of boxes B the leading one of which is transported laterally, relative to the conveyor 18, by a transport means 20, (FIG. 2) to a retaining device 22 which includes vacuum cups 24 that engage a longitudinal side wall of a box B. FIG. 2 shows a box engaged by the vacuum cup 24 and at this point of the cycle it will be observed that the box is a substantial distance above the wrap W.

The successive glued wraps are located on the conveyor 18 so that their longitudinal edges LE are parallel to the longitudinal median of the conveyor belt 18 and further the wraps are at regularly spaced intervals and at a preselected transverse position such that the distance, indicated by the dimension line S, (FIG. 1) is constant or substantially constant. At each incremental advance of the conveyor 18 the leading wrap is located out of register with the overlying box and registration is always accomplished by moving the box in the direction of conveyor movement.

At this time the box spotting means 14 is rendered operative, as will be explained in detail hereinafter, to translate a bracket 28 (to the right as viewed in FIG. 1) until the box is in a prescribed orientation with respect to the wrap located therebelow. To achieve such alignment sensing means 30, mounted on the bracket 28 and responding to light sources 32, provides a signal for operating a linear actuator 34 having the end of its rod rigidly connected to the bracket 28 at 36. The linear actuator 34 is operated to translate the bracket 28 to the right (FIG. 1) until the trailing edge of the wrap located at the spotting position interrupts the light received from the sources 32. When this condition is attained the box is in alignment with the wrap directly therebelow providing a signal for operating a box lowering mechanism, generally indicated by the numeral 38, (FIG. 2) including an electric clutch brake device 40 which is intermittently operable to rotate a cam 42 arranged to reciprocate flexible shafts 44 and 46 which are rigidly connected to blocks 48 carrying the vacuum cups 24.

After the box held by the vacuum cups 24 is lowered onto the wrap, vacuum to the cups is interrupted and a slight over-pressure is applied to reliably release the box. Immediately thereafter the flexible shafts 44 and 46 are actuated raising the vacuum cups to the position shown in FIG. 2. The conveyor 18 may then be advanced to locate a subsequent wrap at the spotting station.

In accordance with one novel feature of the present invention the simplified box spotting means 14 depends for its operation on the fact that the successive wraps carried by the conveyor 18 are at regularly spaced intervals and the wrap has one of its longitudinal edges LS located parallel to and at a fixed distance from a reference line, with such distance being indicated by the dimension line S. Referring to FIG. 1 it will be seen that three successive wraps are shown and they are identified as W-1, W-2 and W-3. The wrap W-2 is located below the spotting means 14 and the condition is shown before the box overlying the wrap is brought in register therewith. The wraps are located on the conveyor 18 such that when the successive wraps arrive at the spotting station the trailing end of the wrap is always in advance of the sensing means 30 so that the light, originating from the light sources 32, is detected by photo-
cells 50 and 52 carried by a bracket structure 54 which is rigidly mounted on the bracket 28 and is adjusted by a screw 56.

As shown in FIGS. 2 and 3 the conveyor frame 16 is provided with a channel 58 in which are located a pair of light bulbs 60 and 62 radiating light through two rows of elongate staggered apertures 64 and 66 arranged in this manner so that light emitted from either one of the bulbs is always detected by one of the photocells 50 or 52 irrespective of the relative position of the wrap. As will be described hereinafter, the photocells 50 and 52 are connected in parallel to provide a signal at all times to operate the linear actuator 34 for alignment of the box with the wrap.

The box spotting means 14, which includes the bracket 28, is mounted on a longitudinal structural member 68 fixed to the frame structure 10. Rigidly secured to the member 68 are bored blocks 70 and 72 slidably receiving connecting rods 74 and 76. Any desired means, such as lock screws, can be provided to lock the blocks 70 and 72 in a desired lateral position. On respective ends of each rod 74 and 76 lugs 78 and 80 are rigidly mounted. Each lug is provided with a bore for slidably receiving a guide rod 82 having its ends fixed in the bracket 28. The lug 78, is made larger than the lug 80 for the purpose of mounting the linear actuator 34 in a depending saddle 84.

To provide linear guides for the flexible shafts 44 and 46 bearing blocks 86 and 88, slidably receiving the shafts 44 and 46, are rigidly mounted on the bracket 28 as shown in FIGS. 1 and 3. As mentioned previously, the ends of the flexible shafts 44 and 46 are rigidly connected to members 48 which mount the vacuum cups 24.

With the wrap W-2 (FIG. 1) in the illustrated position, light emanating from the bulbs 60 and 62 pass through the apertures located directly below the photocells 50 and 52. The light energy energizes one or both of the photocells, and through appropriate controls, later to be described in detail, the linear actuator 34 is retracted, shifting the bracket 28 and the parts carried thereby, to the right as viewed in FIG. 1 until the trailing edge of the wrap interrupts the light beam stopping movement of the actuator 34. As a consequence the box held by the vacuum cups 24 is in register with the wrap at this time.

As shown in FIGS. 2 and 3 the box lowering mechanism 38, which is rendered operative after the wrap has been aligned with the box, comprises an input shaft 90 driven by a belt 92 trained about a pulley 94 keyed on the shaft 90. The shaft 90 is keyed to the clutch-brake 40. The clutch-brake 40 includes a clutch portion 40c and a brake portion 40b. When the clutch portion 40c is energized and the brake portion 40b is deenergized, the shaft 90 is coupled to drive an output shaft 96. The shaft portions 90 and 96 are suitably rotatably supported in structural members 98 which form part of the frame structure 10. Upon rotation of the shaft 96, the cam 42, which is keyed thereon, also rotates, and through a cam follower roller 100 in a cam track 102, the flexible shafts 44 and 46 are reciprocated by virtue of their connection to a crosshead 104 on which the cam follower roller 100 is rotatably mounted.

After the flexible shafts 44 and 46 are actuated to raise the vacuum cups 24 to their starting position, a subsequent box from the box feed and supply mechanism 12 is fed laterally toward the conveyor 18 by a feed conveyor 105 to a position where it can be engaged and transported by the transport means 20. Although an exemplary transport means is shown it is to be understood that such means can take various forms as long as the requirement of sequentially feeding a box to the vacuum cups 24 is fulfilled.

With respect to FIGS. 4, 5 and 6 which show a wrap being transported to the spotting station (FIG. 4), located at the spotting station prior to registration (FIG. 5) and when registration of the box with the wrap has been attained (FIG. 6), it is noted that the sensing means 30 always has one of the photocells 50 and 52 exposed to the light emanating from one of the lights 60 or 62. For example, in FIG. 5 after the conveyor 18 has been stopped, locating the wrap at the registration station, light to one of the photocells is interrupted as that photocell passes over the belt portion between the apertures in a row. More particularly, when the linear actuator 34 is retracted from its extended position, the light which will be detected by the photocell 50 will be interrupted as it traverses the conveyor portion between the two adjacent apertures 64 in the row of apertures directly thereunder while the photocell 52 will be exposed to the light conditioning the control circuit to continue operation of the linear actuator 34. In FIG. 6 the same effect is experienced by the photocell 52 when it traverses the conveyor belt portion between adjacent apertures 66 in the row aligned therewith but at this time photocell 50 is conducting. FIG. 6 shows the sensing means 30 overlying the trailing edge of the wrap W at which point the light to both photocells is interrupted arresting movement of the linear actuator 34. As explained above under these conditions the box is in alignment with the wrap. Thus the two rows of elongate staggered apertures result in providing the equivalent to a continuous elongate slot much as would exist if two laterally spaced conveyor belts were substituted for the conveyor belt 18. It is, however, to be appreciated that it is entirely possible to provide a continuous signal by providing two rows of apertures of various configurations and various patterns other than that shown and described herein.

Since the box registration device of the present invention is used in combination with various other machinery coordinated to produce a wrapped box part, a signal to initiate and terminate operation of the spotting device is derived from such machinery. Reference to U.S. Pat. No. 3,045,561, mentioned hereinabove, illustrating a complete box line identifies the wrapper by the letter M. The wrapper operates to complete applying the wrapper to the vertical side walls of the box and when its cycle of operation is complete or substantially complete a signal is given to the gluer G and the wrapper conveyor belt 18 to index a prescribed amount and thus commences operation of the spotting device. With this brief explanation of the manner in which the box spotting device of the present invention may be integrated with other mechanisms reference is now made to FIG. 7 which shows a schematic diagram of the control devices for the spotting device.

A single revolution shaft 106, having keyed thereon a cam 108 and a sprocket 110, effects intermittent movement of the conveyor 18 through a chain 112 and sprocket 114 driving a shaft 116 on which is fixed a pulley 118. The cam 108 is provided with a cam 108a operating a linkage 120 for opening and closing switches SW-1 and SW-2, which, when closed, electric-
cally connect components of the electrical circuit across the supply lines L1 and L2. A relay 122, electrically connected to photocells 50 and 52, is connected across lines L1 and L2 through switch SW-1. Light sources 60 and 62 are connected across the lines L1 and L2 through branch lead 124. In a branch lead 126, connecting a solenoid 128 to the line L2 through the switch S-2, are normally closed contacts CR1 operated by the relay 122. Solenoid 128 is also connected to the line L1 through branch lead 130. The solenoid 128 operates a valve 132 that connects the header end of the actuator 34 through conduit 134, with a source of hydraulic fluid in an accumulator 136. The rod end of the actuator 34 is connected to another source of hydraulic fluid in an accumulator 138 through a conduit 140. The accumulators 136 and 138 are selectively connectible, through a source of pressure air, communicated thereto through a conduit 142 by a solenoid operated valve 144. The solenoid 156 is connected across the lines L1 and L2 through branch leads 130 and 126.

Vacuum is supplied to the vacuum cup 24 through a conduit 148 which is connected to a vacuum pump 146. In the conduit 148 is a vacuum switch 150 in series with the switch SW-2. A branch conduit 152 makes communication with the vacuum conduit 148 and is associated with a valve 154 which is operable to establish communication between the air pressure line 142 and the vacuum conduit 148 at that point in the cycle after the box has been applied to the wrap. In lines 134 and 140 hand valves 135 and 137 are provided for drawing make-up fluid from a source 139.

To explain the operation of the various components shown in FIG. 7 one cycle of operation will be described. On signal from the wrapper the shaft 106 rotates one revolution indexing the conveyor 18 to position a glued wrap at the registration station and switches SW-1 and SW-2 are closed by actuation of the linkage 120 by the rise portion 108a of the cam 105. Closing switch SW-1 electrically connects the relay 122 to the lines L1 and L2 and concurrently therewith the photocells 50 and 52 are rendered conducting. Since relay contacts CR1 in line 126 are closed the solenoid 128 is energized establishing communication between the head end of the linear actuator 34 with the fluid accumulator 136. The solenoid 156, of valve 144, is energized upon the closing of switch SW-2 to position the spool 144a connecting air line 142 with the accumulator 138. The head pressure communicated by line 142 expels fluid from the accumulator 138 into the conduit 140 to the rod end of the linear actuator 34. With the piston of the linear actuator 34 moving to the right, as viewed in FIG. 7, the bracket 28 which is rigidly connected to the piston rod translates the bracket, the sensing means 30, and the box carried by the vacuum cups 24, as a unit. Such movement continues until the trailing edge of the wrap interrupts the beam of light received by the photocells 50 and 52 deenergizing the relay 122 and opening contacts CR1 in line 126. Opening the contacts CR1 deenergizes the solenoid 128 shifting the spool of the valve 132 to block flow of fluid from the head end of the linear actuator 34. A check valve 158 in the loop 160 also serves to retain the fluid in the head end of the actuator 34.

Since a stayed box B is retained by the vacuum cups 24 and this condition must exist before the registration device can operate, it is necessary that the vacuum switch 150 in line 126 be closed, the electromagnetic clutch-brake 40, which may be connected in series with the vacuum switch 150, is actuated deenergizing the brake 40b and energizing the clutch 40c so that lowering of the box onto the registered wrap is effected. When the box has been applied to the wrap the valve 154 in line 152 is actuated by a stem 155 connecting pressure air from line 142 with the line 152 which communicates with the line 148. Such action not only interrupts vacuum to the cups 24 but also applies a slight over-pressure to the cups 24 from the box after it has been applied to the wrap.

As soon as the box is released by the vacuum cups 24, the vacuum switch 150 in line 126 opens deenergizing the solenoid 156 shifting the spool 144a to establish communication between the pressure air line 142 and the accumulator 136. The air admitted to the accumulator 136 forces fluid therefrom into the conduit 134 through the check valve 158 into loop 160 and to the head end of actuator 34 moving the piston of the actuator to the left as viewed in FIG. 7. Fluid from the rod end of the actuator is returned through line 140 to the accumulator 138. While the linear actuator assumes the condition shown in FIG. 7 the vacuum cups 24 are returned to their upper position effecting deenergization of the clutch 40c and energization of the brake 40b. Upon command from the wrapper (shown in U.S. Pat. No. 3,045,561 referred to above) shaft 106 is rotated one revolution positioning another wrap at the registration station during which time another box from the feed and supply mechanism 12 is transported to the vacuum cups by the transport means 120. Once these conditions have been fulfilled the registration device is prepared to repeat the above described operation.

Modified forms of the wrap sensing means 30 are shown in FIGS. 8 and 9, which, for the purposes of simplicity, only a portion of the subject matter of FIG. 7 is repeated. It is to be understood that the common elements shown in FIGS. 8 and 9 will be assigned the same numerals as FIG. 7 but the particular sensing means will be assigned distinguishing numerals.

Referring first to FIG. 8 the sensing means 30a in this particular modification comprise sonic receiving units 50a and 52a located in vertical alignment with sonic sending units 60a and 62a. As in the case of the photocell units, the sonic sending and receiving units are in alignment with the apertures in the conveyor belt 18 and are connected in parallel by lines 70a and 70b to a relay-amplifier 122a so that one of the receiving units 50a or 52a is at all times receiving a signal from the sending unit 60a or 62a also connected in parallel to relay-amplifier 122a. Only when the trailing edge of the wrap shields both receiving units, indicating the box to be in register with the wrap, will a signal be sent to the relay-amplifier 122a which will cause the amplifier 122a to open the contacts CR1 in line 126. As in the previous case, opening contacts CR1 shifts the spool of the valve 132 blocking the line 134 thereby preventing retraction of the linear actuator 34. Sonic detecting devices which are suitable for the described purpose are manufactured by Delavan Manufacturing Company of West Des Moines, Iowa, which in addition to the sonic senders and receivers manufactures appropriate controls including amplifiers and relays for fulfilling various control functions.

The wrap detecting arrangement shown in FIG. 9 schematically discloses a preferred arrangement in the event it is desired to use fluidic detecting devices. Such
an arrangement includes an OR/NOR gate 122b which is connected, by means of a conduit 170, to a source of air under pressure flowing through the gate 122b and discharging from 170a or 170b depending on the absence or the presence of a diverting stream of air. Air under pressure supplied through a line 51 flows to receivers 50b and 52b but the value of pressure to the receivers is controlled by adjustable throttles 50c and 52c in lines 53 and 55 which communicate with supply lines 51. Air at line pressure from the line 51 is discharged through emitters 60b and 62b, which, as shown in FIG. 9, are located directly below the receivers 50b and 52b respectively. The small quantity of air continually discharged through the receivers 50b and 52b by virtue of the throttles 50c and 52c is for the purpose of preventing contamination of the receivers but the value of pressure is such that control function of the OR/NOR gate 122b is not affected.

Since the fluidic receivers 50b and 52b, as well as the fluidic emitters 60b and 62b, are connected in parallel, air discharged by the emitters 60b and 62b will always be received by one of the receivers 50b or 52b. Under these conditions control pressure will be communicated to the OR/NOR gate 122b through lines 50d or 52d providing a biasing air stream to insure that air derived from the line 170 is directed to the branch line 170a whose output operates the pressure switch 172 connecting a relay coil 174 across the supply lines L1 and L2. With the relay coil 174 energized the relay contacts CR1 in line 126 are closed allowing pressure fluid from the head end of actuator 34 to return to the accumulator 126.

When the edge of the wrap interrupts the stream of air from both of the emitters 60b and 62b, occurring when the box has been aligned with the wrap, biasing pressure fluid in line 50d and 52d is interrupted and the air stream from line 170 is diverted to branch line 170b. This occurrence opens the pressure switch 172 which deenergizes the relay coil 174 opening the normally closed contacts CR1 in line 126. With the relay contacts CR1 open the solenoid 128 is deenergized shifting the spool of the valve 132 to block flow of fluid in line 134. Movement of the bracket 28 is instantaneously arrested, conditioning the circuit to lower the box onto the wrap registered therewith.

Fluidic controls to perform the above described functions are provided by Corning Fluidic Products Department, Corning Glass Works, Corning, New York and are identified by Part Number 191453.

It is to be realized that operation of the clutch-brake proceeds as described in the preferred embodiment.

Although the best mode contemplated for carrying out the present invention has been herein shown and described, it will be apparent that modification and variation may be made without departing from what is regarded to be the subject matter of the invention.

What is claimed is:

1. A box machine for registering glued wraps with boxes and placing the boxes on the wrap, said machine comprising a frame, an indexed conveyor on said frame for transporting longitudinally spaced and glued wraps through a predetermined distance, means defining a registration station for registering a box with and applying it to a wrap, said registration station including a bracket member mounting a box gripper for initially holding a box above a wrap, means mounting said bracket member on said frame for shifting motion parallel to the motion of said conveyor, a wrap sensor on said bracket member for sensing a transverse edge of a wrap, an actuator for shifting said bracket member and wrap sensor, control means for said actuator including means for causing said actuator to position said bracket member in an initial position wherein a transverse edge of a wrap is adjacent to said sensor on completion of each indexing of said conveyor, said control means including means controlled by said sensor for causing said actuator to shift said bracket member longitudinally to a registration position where the sensor detects said transverse edge of the wrap, means for thereupon holding said bracket member in said registration position, and means for lowering the box gripper on said bracket member for applying the registered box onto said wrap.

2. The box machine of claim 1, wherein said gripper comprises suction cups for engaging an upstanding wall of said box, means for lowering said cups to place a box on said wrap, and means connected to said bracket member and operable when said box is applied to said wrap for connecting said suction cups to a source of air at above atmospheric pressure air to release said box.

3. In a box machine including a longitudinally running conveyor belt for transporting wraps, a registration station including longitudinally shiftable means for gripping a box and applying it to a wrap, means to index said conveyor belt to locate successive wraps at said registration station, sensor means on said box gripping means and controlling an actuator for causing shifting of said box gripping means until a transverse edge of the wrap is detected by said sensor means whereupon the box is registered with the wrap, said sensor means comprising two laterally spaced but longitudinally aligned sensors disposed above said conveyor, said conveyor being formed with laterally spaced, longitudinal rows of longitudinally spaced individual apertures, the apertures in one row being staggered relative to those in the other row, the apertures in each row having a longitudinal extent greater than the spacing between adjacent pairs of apertures in the other row, each of said sensors being aligned with one of said rows of apertures, and circuit means connected to said sensors so that if either sensor overlies a conveyor belt aperture after indexing of said conveyor a shift signal is provided for shifting said box gripping means to bring said sensors toward a transverse edge of the wrap, said circuit means providing a stop signal when said transverse edge of the wrap is brought under either sensor to thereby stop the shifting movement of said box gripping means.

4. The box machine of claim 3, wherein each of said sensors comprises light emitting sources below said conveyor and photocells on said box gripping means.

5. The box machine of claim 3, wherein said sensor means comprises sonic sending and receiving units mounted, respectively, below said conveyor and on said box gripping means.

6. The box machine of claim 3, wherein said sensor means comprises fluid discharge and fluid receiving units mounted, respectively, below said conveyor and on said box gripping means.

7. The box machine of claim 1, wherein said actuator for moving said box gripping bracket member comprises a hydraulic linear actuator including a piston de-
fining a rod-end liquid chamber and a head-end liquid chamber, means for simultaneously supplying liquid under pressure to one chamber while allowing liquid to be discharged from the other chamber for shifting said bracket member, and control means responsive to detection of the edge of said wrap for blocking flow of liquid from said other chamber for arresting the shifting of said bracket member.

8. A machine for assembling boxes with registered sheets including a conveyor for transporting longitudinally spaced glued sheets, a registration station associated with said conveyor, means at said registration station for retaining boxes and applying them to successive glued sheets, means for indexing said conveyor to locate successive glued sheets at said registration station, means for shifting said box retaining means in a plane parallel to said conveyor to center the box over the glued sheet, means on said box retaining means for detecting an edge of the glued sheet, and means for lowering the box onto said sheet; the improvement wherein said box retaining means is mounted for said shifting motion in a plane parallel to the conveyor only in a direction parallel to the direction of said conveyor motion, said detecting means sensing a transverse edge only of said glued sheet, said box shifting means comprising a control means responsive to said edge detecting means for shifting said box retaining means linearly and parallel to the direction of motion of said conveyor until said glued sheet edge is detected, said control means including means for thereupon arresting motion of said box retaining means to leave the box centered over the glued sheet.

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