ABSTRACT: Stack support members of two sets are positioned alternately, each set being separately movable and all being movable in a continuous path downwardly through a stacking region. Each set is stopped as one of its support members reaches the stacking region upper end while the other set continues to move a support member downwardly through the stacking region receiving publications into a stack thereon. A releasable latch engages free ends of the support members during stopping at the stacking region upper end co-operating with particular guides to tilt the support members upwardly and pretension the same for snap entrance into the stacking region upon movement thereof being resumed. The guides always control the angle of extension of the support members throughout movement and withdraw the support members in a general horizontal direction from beneath the publication stacks above and depositing the same on a receiving surface at the stacking region lower end.
AUTOMATIC STACKING DEVICE FOR PUBLICATION CONVEYOR

BACKGROUND OF THE INVENTION

This invention relates to an automatic stacking device for publication conveyors and, more particularly, to a stacking device having a series of stack support members movable downwardly through a stacking region intercepting a continuous stream of publications fed thereto for building a stack of said publications thereon and depositing said stack on a generally horizontal receiving surface at the stacking region lower end.

Even more particularly, this invention relates to a stacking device of the foregoing character incorporating a unique concept in stack support member movement and an improved control of said movement for more perfectly building stacks of publications thereon perfectly arranged and of a predetermined size. Furthermore, the invention incorporates novel preloading or pretensioning of the support members ready for snap entrance into the stacking region to more positively intercept the publication stream, and a novel arrangement of withdrawal of the support members from a finished publication stack for depositing said stack on a receiving surface at the lower end of the stacking region.

Various prior forms of stacking devices for publication conveyors have heretofore been provided, all of which have included certain inherent difficulties and disadvantages creating a long felt want and need for improvement thereof. One of the more common forms of prior stacking devices has included a series of generally L-shaped stack support members mounted at spaced intervals on continuous conveyor chains or belts for movement successively downwardly through a stacking region and then rearwardly and upwardly for return to the stacking region upper end ready for repassage downwardly therethrough.

During the movement of the support members downwardly through the stacking region, a continuous stream of imbricated publications is intercepted to build a stack thereof on the particular support member, the finished stack being deposited at the stacking region lower end by passage of the support members downwardly through a stack receiving surface.

One of the major difficulties with these prior stacking devices has resulted from the fact that it has been necessary to move the stack supporting members through the stacking region in an irregular stopping and starting pattern, said pattern being regulated and determined by the size or thickness of an individual publication in the final publication stack being built, as well as the number of said publications intended in said final stack. In other words, the stack support members are uniform and preset distances apart on their driving conveyor chains and the publication stacks being built must necessarily be smaller than the preset size of the individual stack support members, the major portion of the time considerably smaller.

For instance, keeping in mind that the continuous stream of imbricated publications being fed to the stacking device is moving at a relatively high rate of speed, a particular stack support member will enter downwardly into the stacking region to intercept said publication stream and begin to receive a stack of said publications being built thereon, while at the same time the next stack support member will be moving toward the stacking region upper end or entrance. Ultimately, this next stack support member will reach its position at the stacking region upper end ready for entrance downwardly into said stacking region, at which time movement of all of the stack support members will be stopped awaiting completion of the stack building on the stack support member then immediately the stacking region and intercepting the publication stream.

Although the speed of movement of the stack support members may be regulated within certain limits in an attempt to more nearly conform the same to the thickness of publication of a particular publication run and the resulting stack size, assuming the number of publications in each stack is intended to be the same, the rate of feed of the publications from the continuous stream to the stacking device is constantly varying, at least by small amounts, due to slight differences in downstreamly of publication overlap in the continuous stream, as well as gaps therein occurring at previous stations along the conveyor system. Thus, with the stack support members all being required to move and stop simultaneously, the only possible practical manner of control for building publication stacks thereon is to regulate the stopping and starting of the stack support members by counting the publications as they leave the infeed section of the conveyor system and enter the stacking region of the stacking device.

As a result, it is absolutely necessary that the movement of the stack support members will be of a stop and start pattern, as previously described, the particular stack support member entering the stacking region moving quickly downwardly well ahead of the publication stack being built thereon and stopping when the next stack support member reaches the stacking region upper end. This, therefore, requires that the individual publications leaving the continuous publication stream at the stacking region must drop an appreciable distance downwardly onto the stack being built on the particular stack support member now within the stacking region.

Considerable problems and difficulties are thereby encountered in improperly publication stacking, said difficulties including the stack support members being extremely irregular and disarranged, requiring constant attention to the stacks leaving the stacking device.

A further consideration requiring that the simultaneously movable stack support members must be movable in the previously described stop and start pattern is occasioned by the desirability of providing some means associated with the stack support members for preloading or pretensioning of them moving into a rapid or snap movement into the stacking region for quickly moving into a position intercepting the continuous publication stream at the correct instant when a stack has been completed on the preceding stack support member then within the stacking region. This snap entrance of the stack support members into the stacking region has been accomplished in certain of the prior stacking devices by mounting the stack support members on the driving conveyor chains thereon through spring loaded slides which are operated with a latch at the stacking region upper end to stop the stack support members shortly prior to complete stopping of the driving conveyor chains and resulting in a spring loading of the stack support members for snap entrance into the stacking region when the latch is released. This not only multiplies the necessity of providing the stack support members with independent movement and the various difficulties connected therewith, but also presents further difficulties through still relatively slow publication stream interception due to the required size and bulk of the L-shaped stack support members and the fact that the publication stream must move at a relatively high rate of speed in order to accomplish the publication conveying and stacking operations in a minimum of time.

Still further difficulties and disadvantages have been occasioned by the prior stacking devices resulting from the particular manner of removal of the finished publication stacks from the stack support members at the lower end of the stacking region. As previously alluded to, such stack removal has been accomplished by moving the stack support members with the finished publication stacks supported thereon downwardly through a generally horizontal stack receiving surface. The generally horizontally extending portions of the stack support members upon which the publication stacks are supported have been formed by a series of spaced, cantilever mounted times which move downwardly through spaced rollers forming the stack receiving surface at the stacking region lower end, thereby depositing the finished stacks on the roller-formed stack receiving surface.

Occasionally, as the stack support members snap into position originally intercepting the publication stream and starting the building of the publication stack thereon, the times of the
particular stack support member will horizontally impale the first publication of the stack thereon, said tines actually penetrating the publication through the leading edge thereof and positioning a portion of said publication both above and below said tines. Thus, when this particular stack support member reaches the stacking region lower end with a finished publication stack thereon and is ready for the tines thereof to pass downwardly through the rollers forming the stack receiving surface in order to remove said finished stack therefrom, it is impossible to remove the stack from the stack support member in this vertical pattern of movement in view of the engagement of the first publication by the support member tines, as previously described. Movement of the stacking device is, therefore, stalled and the entire conveying system stops until the difficulty can be corrected, causing time consuming delays.

Still further difficulties have been presented with the prior stacking devices inherent in the fact that the stack support members have been required to be formed generally L-shaped in configuration. In order to properly build a stack of publications quickly on the stack support members while still maintaining the same in a reasonable vertical alignment, it is necessary that said publications be supported not only vertically, but also on at least one edge horizontally, thus, the L-shaped configuration of the stack support members. In view of this required L-shaped configuration, however, the stack support members are relatively bulky and heavy, requiring greater forces for moving the same, as well as stopping and starting the same. The result has been great difficulty in controlling the movement of the stack support members so as to contribute to many of the foregoing difficulties.

OBJECTS AND SUMMARY OF THE INVENTION

It is, therefore, an object of the present invention to provide an automatic stacking device for publication conveyors in which the successive stack support members entering the stacking region of the stacking device are independently movable so that one stack support member may move continuously downwardly through the stacking region in any desired pattern of movement while the next succeeding stack support member may be stopped ready for entrance into the stacking region upper end. According to certain of the principles of the present invention, at least two separate conveying drives are provided, each separately driving alternate stack support members. Thus, the movement of a stack support member downwardly through the stacking region is not dependent on nor in any way involved with movement of the succeeding stack support member and the movement of each stack support member may be individually regulated as to speed and as to the size of publication stack ultimately built thereon.

It is a further object of the invention to provide an automatic stacking device for publication conveyors wherein the stack support members are preloaded or tensioned in position for snap entrance into the stacking region upper end in a new and unique manner supplying more efficient and greater speed of interception of the continuous publication stream resulting in the publication conveyor being permitted to operate at a higher speed. Rather than the slidable preloading and snap entrance of the stack support members into the stacking region upper end, according to certain of the principles of the present invention, the stack support members are preloaded in a pivotal upward tilt by releasable latch means engaging free ends of cantilever mounted supporting portions thereof. Upon release for snap entrance into the stacking region upper end, therefore, the entrance is pivotal rather than slidable, requiring much less force for accomplishing the same and permitting more positive, higher speed publication stream interception.

It is still a further object of the invention to provide an automatic stacking device for publication conveyors wherein the stack support members may be withdrawn in a general horizontal direction from beneath the finished publication stacks at the stacking region lower end for depositing said stacks directly on a generally horizontal stack receiving surface so as to eliminate the difficulties encountered with the prior devices when a publication becomes accidentally impaled on a stack support member. Preferably, the stack support members are formed with cantilever mounted supporting portions which are horizontally withdrawn totally above the stack receiving surface at the stacking region lower end, the terminal phase of supporting portion withdrawal being immediately above said stack receiving surface so as to smoothly deposit the finished publication stack in virtually perfect, prearranged and aligned order. Furthermore, the stack receiving surface, due to the complete withdrawal of the stack support members totally thereafter, may be formed by a conventional continuous conveyor member, rather than the previously required spaced conveyor rollers.

It is also an object of the invention to provide an automatic stacking device for publication conveyors wherein the stack support members may be formed with merely cantilever mounted supporting portions and without the requirement for attached vertically extending back portions resulting in a greatly simplified and advantageous accomplishment of properly arranged and aligned publication stacks.

The stack support members are preferably formed essentially of cantilever mounted, spaced tines projecting forward into the stacking region during movement of the stack support members downwardly through said stacking region. The rear support providing the horizontal alignment for the publication stack being built is supplied by spaced, stationary supporting surfaces on the main frame of the stacking device through which the support member tines project, move downward along and are preferably generally horizontally withdrawn from the stacking region lower end. Thus, not only are the stack support members greatly simplified and more easily controlled due to less weight and bulkiness thereof, but the angle of cantilevered extension of the support member tines is free of any dependence or connection with the co-operating, stationary back supporting surfaces permitting independent angular control and change of angular extension of the support member tines. Also, the independent support member tines may withdraw generally horizontally rearwardly through the stationary back supporting surfaces for deposit of the publication stacks on the stack receiving surface at the stacking region lower end, the stationary back supporting surfaces virtually wiping the stacks from the support member tines while retaining said stacks in orderly stacked position.

It is still an additional object of the invention to provide an automatic stacking device for publication conveyors of the foregoing general character wherein special guide means is provided for the stack support members during movement thereof downwardly through the stacking region so as to constantly change and always position the cantilever mounted supporting portions of the support members extending at the most efficient angles for properly receiving and building thereon the publication stacks. The stack supporting members are preferably pivotally mounted on their respective conveyor drive means, with guide members being in pivot connection and movable downwardly through guide track means for controlling pivotal movement of the stack support members resulting in changing angular extension thereof as desired. Also, the co-operation of the pivotal connections, the guide means and the guide track means permits the upward angular tilting of the stack supporting member engaging free ends of cantilever mounted supporting portions or pretensioning the same for snap entrance into the stacking region upper end, and also permits the unique generally horizontal withdrawal of the support members from beneath the publication stacks at the stacking region lower end in a predetermined and perfectly controlled manner.

Other objects and advantages of the invention will be apparent from the following specification and the accompanying drawings which are for the purpose of illustration only.
BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a fragmentary, side elevational view of an embodiment of the stack device incorporating the principles of the present invention having an infed portion thereof connected to the terminal end of an infed conveyor;

FIG. 2 is a vertical sectional view looking in the direction of the arrows 2–2 in FIG. 1;

FIG. 3 is an enlarged, fragmentary, vertical sectional view looking in the direction of the arrows 3–3 in FIG. 2;

FIG. 4 is an enlarged, fragmentary, horizontal sectional view looking in the direction of the arrows 4–4 in FIG. 1;

FIG. 5 is an enlarged, fragmentary, horizontal sectional view looking in the direction of the arrows 5–5 in FIG. 1;

FIG. 6 is an enlarged, fragmentary, vertical sectional view looking in the direction of the arrows 6–6 in FIG. 2;

FIG. 7 is a fragmentary, vertical sectional view looking in the direction of the arrows 7–7 in FIG. 6;

FIG. 8 is an enlarged, fragmentary, vertical sectional view looking in the direction of the arrows 8–8 in FIG. 2, but with a stack support member just released for snap entrance into the stack region and the commencement of movement downwardly through said stack region; and

FIGS. 9, 10, 11 and 12 are vertical sectional views similar to FIG. 3, but with various parts removed for clarity, illustrating various positioning of the stack support members during movement thereof downwardly through the stack region and about their continuous paths of movement on the stacking device.

DESCRIPTION OF THE BEST EMBODIMENT CONTEMPLATED

Referring to the drawings, and particularly FIGS. 1 through 8 thereof, the illustrated embodiment of the stacking device incorporating the principles of the present invention includes a main frame, generally indicated at 20, supporting an infed conveyor section, generally indicated at 22, a stacking section, generally indicated at 24, and an outfeed conveyor section, generally indicated at 26. The infed conveyor section 22 is connected to the terminus of a usual publication conveyor 28 for receiving the usual continuous stream of imprinted publications, such as newspapers, from said publication conveyor. Furthermore, the various sections of the stacking device are integrated such that the continuous stream of imprinted publications is fed by the infed conveyor section 22 angularly downwardly into the stacking section 24 for building a series of publication stacks in said stacking section 24 and depositing the same on the outfeed conveyor section 26 from which the publication stacks are immediately conveyed away from the stacking device.

The infed conveyor section 22 is of somewhat usual construction, including upper and lower sets of conveyor belts 30 and 32 feeding the continuous stream of publications by a counter 34 which counts each individual publication immediately prior to it being fed to the stacking section 24. The counter 34 may be of usual construction, the connection thereof into the overall control system of the stacking device necessarily being novel due to the improvements of the present invention, all of which will be hereinafter described in detail. Furthermore, the publications leaving the infed conveyor section 22 pass angularly downwardly to the stacking section 24 beneath a novel latch mechanism, generally indicated at 36, likewise to be hereinafter described in detail. The outfeed conveyor section 26 is formed with a generally horizontal stack receiving surface 38 which, due to certain of the improvements of the present invention, may be provided by a continuous, flat conveyor belt 40. The conveyor belt 40 is driven in the usual manner through a drive motor 42 and common power transmission means including the sprocket chain 44. Also, the outfeed conveyor section 26 may include members forming a generally vertical stack guide surface 46 for guiding the publication stacks during deposit onto the stack receiving surface 38 and movement of said stacks from the outfeed conveyor section 26.

Referring more particularly to the stacking section 24, the main frame 20 mounts two sets of stack support members, generally indicated at 48 and 50, movable in a common continuous path generally vertically downwardly through a forward stacking region 52 from an upper to a lower end thereof, then rearwardly through a lower return region 54, then upwardly through a rearward return region 56, and finally downwardly through an upper return region 58 back to the upper end of the stacking region 52.

The stack support members 48 and 50 are alternately positioned and each set is separately movable substantially independent of the other so that one of the support members 48 may move downwardly through the stacking region 52 while one of the support members 50 is positioned stationary at the stacking region upper end, as shown, for instance, in FIG. 1, or one of the support members 50 may move downwardly through the stacking region while one of the support members 48 is positioned stationary at the stacking region upper end.

Each of the support members 48 and 50 are, however, guided in the same manner and in the same continuous path about the main frame 20.

As best seen in FIGS. 1, 2, 4 and 5, the stack support members 48 are pivotally secured movable on an inner set of conveyor chains 60 and the support members 50 on an outer set of conveyor chains 62, the inner conveyor chains 60 being engaged over appropriate, transversely spaced inner sprockets 64 and the outer conveyor chains 62 engaged over outer sprockets 66 of transversely extending upper and lower drive shafts 68 and 70. The inner sprockets 64 are secured to the upper drive shaft 68 in driving engagement therewith and journaled on the lower drive shaft 70, while the outer sprockets 66 are journaled on the upper drive shaft 68 and secured in driving engagement on the lower drive shaft 70.

Thus, driving rotation of the upper drive shaft 68 will move the continuous inner conveyor chains 60 to move the stack support members 48, and driving rotation of the lower drive shaft 70 will move the continuous outer conveyor chains 62 to move the stack support members 50, the movement of the stack support members 48 being independent of the movement of the stack support members 50.

The upper drive shaft 68 is driven by a preferably variable speed drive motor 72 through a series of drive chains 74 and the lower drive shaft 70 is driven by a similar drive motor 76 through a series of drive chains 78. As particularly shown in FIG. 5, within each of the systems of drive chains 74 connecting the drive motor 72 to the upper drive shaft 68 and the drive chains 78 connecting the drive motor 76 to the lower drive shaft 70 are a pair of axially, transversely aligned control shafts 80 and 82, the control shaft 80 being rotatably driven with the upper drive shaft 68 and the control shaft 82 being rotatably driven with the lower drive shaft 70.

The control shaft 80 mounts a control plate 84 and a series of control cams 86 engageable with a series of control switches 88, while the control shaft 82 similarly mounts a control plate 90 and a series of control cams 92 engageable with a series of control switches 94.

The control plates 84 and 90 are, for the main part, spaced axially apart for independent rotation, but the control plate 84 includes a segmental safety block 96 projecting axially into circumferential interference with a similar segmental safety block 98 of the control plate 90. In normal movement of the support members 48 and 50 in their continuous path of movement, consequently rotation of the control plates 84 and 90, the safety blocks 96 and 98 are spaced circumferentially apart, but if the support members 48 and 50 should move within a predetermined distance of each other, the safety blocks 96 and 98 will engage, forcing movement of both sets of support members so as to prevent one set from attempting to overrun the other. The purpose of the respective control cams 86 and 92 with the control switches 88 and 94 is for partial control of the drive motors 72 and 76, as will be hereinafter described.
As best seen in FIGS. 2 and 4, all of the support members 48 and 50 are substantially identical, with each including a transverse mounting plate 100 secured to mounting ends 102 of a series of transversely spaced tines 104 which terminate in free ends 106. The tines 104, therefore, are cantilever mounted on the mounting plate 100 and extend from said mounting plate, as well as the conveyer chains 60 only to which the particular mounting plate is pivotally connected. Furthermore, when the particular stack support member 48 or 50 is moving downwardly through the forward stacking region 52, the tines 104 project forwardly into the stacking region so as to constitute stack supporting portions for receiving stacks of publications being built on upper surfaces thereof.

Spaced inner and outer guide rollers 108 and 110 are mounted at each of the transversely spaced ends of the mounting plate 100, the guide rollers 108 and 110 of each set being transversely offset and being spaced apart in the forward and rearward direction, that is, in the same direction of cantilever extension of the stack supporting tines 104. Transversely opposed and spaced, generally U-shaped inner and outer guide tracks 112 and 114 are mounted on the main frame respectively. Consequently, inner and outer guide tracks 112 and 114 movable therethrough during movement of the support members 48 and 50 along their continuous paths of travel around the main frame. Thus, due to the rigid connection between the support member mounting plate 100 and tines 104, the inner and outer guide rollers 108 and 110 in movement along the inner and outer guide tracks 112 and 114 control the position or angle of extension of the tines, as determined by the extension and positioning of the inner and outer guide tracks in combination with the pivotal connection of the mounting plate 100 to the conveyor chains 60 or 62.

The inner guide tracks 112 are transversely aligned and extend substantially identically, as do the outer guide tracks 114, and as particularly shown in FIG. 3, the inner guide tracks 112 being attached at the end of the respective extending along the upper return region 58 and downwardly along the forward stacking region 52, while the outer guide tracks 114 begin along the upper end of the forward stacking region 52 extending downwardly therealong, rearwardly along the lower return region 54 and upwardly along the rearward return region 56 to near the upper end thereof.

As particularly shown in FIG. 4, the inner guide rollers 108 and 110 are controlled by the inner and outer guide tracks 112 and 114 substantially totally along the stacking region 52, merely the outer guide rollers 110 are controlled by the outer guide tracks 114 along the lower return region 54 and the rearward return region 56 due to the termination of the inner guide tracks 112, and merely the inner guide rollers 108 are controlled by the inner guide tracks 112 from the upper end of the rearward return region 56 through the upper return region 58 and into the upper end of the stacking region 52 due to the termination of the outer guide tracks 114 and the slightly overlapping commencement of the inner guide tracks 112, as shown.

Important to certain of the principles of the present invention is the fact that at least one or the other of the inner and outer guide rollers 108 and 110 are at all times controlled by one or the other of the inner and outer guide tracks 112 and 114 so that there is always guide roller and guide track control of the movement of the support members 48 throughout their continuous path of travel.

As is best seen in FIGS. 2, 3, 6, and 7, the entrance of the outer guide rollers 110 into the outer guide tracks 114 at the upper end of the stacking region 52 is along the pivotal gates 116 which are normally spring urged forwardly to closed position, but upon contact by the outer guide rollers 110 moving downwardly therealong, pivot rearwardly, as shown in FIG. 6, to expose the track offsets 118, permitting the outer guide rollers 110 to move rearwardly therein.

As seen in FIGS. 4, 6, and 7, the guide rollers 110 are urged rearwardly for entrance into the track offsets 118 by upward angular tilting of the tines 104 of the support members 48 and 50 caused by the
the solenoid 138 is controlled by the counter 34, that is, when the counter 34 has determined that a desired publication stack has been received or built on the preceding support member 48 or 50 and is then passing downwardly through the stacking region 52 and it is time for release of the next support member 48 or 50 from the stacking region upper end, for downward entrance into the stacking region and interception of the continuous stream of publications from the infeed conveyor section 22, all of which will be subsequently explained in proper sequence.

In general, movement of the support members 48 and 50 around the main frame 20 in their continuous path of travel, the pattern of said movement being shown in FIG. 3 and the pattern of movement of the frame free ends 106 being indicated by the broken line 139, as one of said support members approaches the forward end of the upper return region 58 in the dot-dash position indicated at 140, the inner guide rollers 108 are controlled in the inner guide tracks 112 and the outer guide rollers 110 are still free, the support member mounting plate 100 pivoting about the particular of the conveyor chains 60 due to the pivotal connection thereto.

As the support member 104 pass through the tine of the support member 104 pass through the tine support plate 130 of the tine mechanism 36, the free end 106 of the center tines engage the tine bars 134, causing the tine to tilt upwardly in the forward direction and pivoting the support member mounting plate 100 about the conveyor chains 60 or 62. At the same time, the support member outer guide rollers 110 move along the gates 116 of the track offsets 118 pivoting said gates rearwardly and entering into the track offsets against the stop surfaces 120 of the switch bars 122, actuating the stop switch or switches 124.

The particular support member 48 or 50 is, therefore, not only tilted upwardly by the tine mechanism 36 and the outer guide rollers 110 thereof entering the track offsets 118 of the outer guide tracks 114, but the stop surfaces 120 in said track offsets in horizontal position with the cessation of switching, along with the stop switch or switches 124 brings the particular support member to a stopped position ready for entrance into the upper end of the stacking region 52.

Important to certain of the principles of the invention is the fact that the dimensioning of the various elements and the particular locations thereof are precalculated so that in said support member 48 or 50, the support member tines engaging the tine bars 134 of the tine mechanism 36 are resiliently bowed upwardly and thereby resiliently tensioned. At the same time and simultaneous with the resilient tensioning of the support member tines 104, the entrance of the support member outer guide rollers 110 into the track offsets 118 causes a slight rearward bowing of the particular conveyor chains 60 or 62 to which that particular support member 48 or 50 is connected which, along with lengthwise tensioning of said conveyor chains as a result of the abrupt stopping of the particular support member, further resiliently tensions the particular support member in the described upwardly tilted and stopped position.

Thus, upon the release of the support member tines 104 through the withdrawal of the conveyor bars 134 by actuation of the solenoid 138, combined with the simultaneous commencement of the drive of the particular support member 48 or 50 by the drive motor 72 or 76 thereof, the particular support member snaps downwardly to the dot-dash position indicated at 142, entering the upper end of the stacking region 52. During said snap entrance, the particular support member mounting plate 100 pivots about the particular conveyor chains 60 or 62, causing the outer guide rollers 110 of said support member to move forwardly out of the track offsets 118 and begin to move downwardly into the outer guide tracks 114, along with the downward movement of the support member and the inner guide rollers 108 in the inner guide tracks 112, as shown in FIG. 8.

Furthermore, in view of the fact that prior to the release of the particular support member 48 or 50, the publications from the continuous stream of publications entering the stacking region 52 from between the upper and lower conveyor belts 30 and 32 of the infeed conveyor section 22 have been passing beneath that particular support member and being positioned on a stack in process of building on the next preceding support member 48 or 50, the snap entrance of the particular support member into the stacking region into the position indicated at 142 causes said support member to instantaneously intercept the publication stream and start the building of a stack of publications thereon.

Still referring to FIG. 3, the support members 48 or 50, after release by the tine mechanism 36, or moved progressively downwardly through the stacking region 52 as guided by the inner and outer guide rollers 108 and 110 moving downwardly through the inner and outer guide tracks 112 and 114. Intermediate the downward movement of the support member 48 or 50 through the stacking region 52, the building of the stack of publications thereon is completed and the continuous stream of publications is intercepted by the next succeeding support member, the particular support member with the completed stack continuing to move progressively downwardly through the remainder of the stacking region. Also, during the entire operation of the support members 48 or 50 downwardly through the stacking region 52, the tines 104 thereof are progressively tilted or angled greater and greater degrees upwardly, as illustrated, due to the fact that the inner and outer guide tracks 112 and 114 which control the angle of extension of the tines move closer and closer together, as previously described.

As the particular support member 48 or 50 approaches the lower end of the stacking region 52, the outer guide rollers 110 thereof remain in the outer guide tracks 114 and guided thereby, but the inner guide rollers 108 begin to move from the lower termination of the inner guide tracks 112 in the manner illustrated in dot-dash lines and indicated at 144. At this time, the tines 104 of the particular support member 48 or 50 are still fully within the stacking region 52 and begin to withdraw from the stack guide bars 126 and the rear stack guide surfaces 128 formed thereby. Ultimately, the inner guide rollers 108 move downwardly free of the inner guide tracks 112, while the outer guide rollers 110 begin to enter the lower curved portions of the outer guide tracks 114 starting to move the particular support member rearwardly into the lower return region 54 and beginning to withdraw the support member tines 104 from the general horizontal direction from beneath the finished stack of publications, as illustrated by the dot-dash position indicated at 146.

As indicated by the offset or jog in the broken line 139 spaced above the stack receiving surface 38, as the guide of the support member 48 or 50 is taken over by the rearward curved portions of the outer guide member 110, said withdrawal does not affect the stack of publications, the support member 48 or 50 makes a sharp change of direction of movement from generally vertical to generally horizontal merely due to the inherent curvature of the outer guide tracks 114 and the fastening of the support members thereto. The result is that the support member 48 or 50 moves relatively rapidly downwardly during the stacking operation and begins to withdraw from the lower end of the stacking region 52, where, due to this sharp guided change of direction, it suddenly slows its vertical movement and begins part generally horizontal movement to more slowly and smoothly deposit its finished stack of publications on the horizontal stack receiving surface 38.

Continued rearward generally horizontal withdrawal of the tines 104 on the particular support member 48 or 50 from beneath the finished stack of publications finally releases said stack and deposits the same smoothly vertically onto the generally horizontal stack receiving surface 38 of the outfeed conveyor section 31 in the manner illustrated by the dot-dash position indicated at 148 and as guided by the rear stack guide surfaces 128 of the stack guide bars 126 through which the tines are being withdrawn. At the release of the finished stack of publications, the support member tines 104 withdraw completely through the stack guide bars 126 and it will be
noted that such time withdrawal is completely above, but closely adjacent to the stack receiving surface 38 of the outfeed conveyor section 26, as can be seen by a comparison of the dot-dash position 148 in which the times 104 are partially withdrawn and a subsequent dot-dash position indicated at 150 in which said times are fully withdrawn. It will also be noted that the rearward curved portions of the outer guide tracks 114 are appreciably broadened, that is, those portions of said outer guide tracks along the rearward portions of the lower return region 54, so that in the event of an obstruction on the stack receiving surface 38 of the outfeed conveyor section 26 being struck by the extreme free ends 106 of the particular support member times 104, said time free ends can raise the particular support member outer guide rollers 110 between the upper sides of the outer guide tracks 114, as best illustrated by a dot-dash position in FIG. 12 and indicated at 152.

Returning to FIG. 3, after the passing of the particular support member 48 or 50 completely through the lower return region 54 and movement upwardly into the rearward return region 56, the outer guide rollers 110 remain engaged in the outer guide tracks 112 with the inner guide rollers 108 remaining free. The particular support member 48 or 50 is thereby, at this time, pivotally controlled by the pivotal connection thereof to the particular conveyor chains 60 or 62 and the outer guide rollers 110 which results in the times 104 thereof being vertically downward angled, as illustrated. During the continuation of upward movement of the particular support member 48 or 50 through the rearward return region 56, the path of continuous movement of the particular controlling conveyor chains 60 or 62 is angled a lesser amount from straight vertical than is the upward extension of the outer guide tracks 114 so that although the outer guide rollers 110 must remain in the outer guide tracks 114, the inner guide rollers 108, due to the inward urging by the conveyor chains, move progressively inwardly for ultimate alignment with the ends of the inner guide tracks 112, as illustrated by the dot-dash position indicated at 154.

The inner guide rollers 108 thereby finally enter and move along the inner guide tracks 112 as the particular support member 48 or 50 moves along the upper return region 58, with the outer guide rollers 110 leaving the outer guide tracks 114 and being free, as illustrated in the dot-dash position indicated at 156. Finally, the particular support member 48 or 50 moves through the upper return region 58, with the inner guide rollers 108 moving through the inner guide tracks 112 and the outer guide rollers 110 being free for again moving into the upper end of the stacking region 52 into the dot-dash position 140 and ready for downward movement into engagement with the latch mechanism 36, as previously described. The particular support member 48 or 50 having been considered, therefore, has completed one continuous path of travel about the main frame 20.

The sequential movement of the respective sets of support members 48 and 50 are illustrated in FIGS. 3 and 9 through 12 for showing the unique alternate movement of the respective sets of support members for carrying out sequential stack building operations on a continuous basis. Note in the lower portion of each of said figures the illustration of the particular positioning of the safety blocks 96 and 98 previously described as being positioned on the control plates 84 and 90 of the control shafts 80 and 82, as illustrated in FIG. 5. Such illustration in FIGS. 3 and 9 through 12 shows the movement of the safety blocks 96 and 98 with their particular sets of support members 48 and 50, said safety blocks normally being free of contact, but always being ready for contact to prevent one set of support members from attempting to contact and overrun the other.

Beginning with FIG. 3, the one of the alternate set of support members 48 is moving downwardly through the stacking region 52, receiving a stack of publications thereon from the publications stack conveyor section 22, while the other of said support members 48 is moving upwardly approximately midway of the rearward return region 56. The other alternate set of support members 50 is stationary, the one being engaged with the latch mechanism 36 and into the track offsets 118 pretensioned or preloaded for ultimate snap entrance into the upper end of the stacking region 52. The other of the support members 50 is stationary at the entrance into the rearward return region 56 and the safety block 98 being stationary with the support members 50 and the safety block 96 moving with the support members 48.

Next, referring to FIG. 9, a stack of publications has been completed on the support member 48 moving downwardly through the stacking region 52, and movement of the other set of support members 50 has commenced with release of the latch mechanism 36 at the rearward return region 56 for snap entrance into the upper end of the stacking region and the beginning of the building of the stack of publications thereon. The safety block 96 has continued to move with the set of support members 48, and the safety block 98 has just commenced movement with the set of support members 50.

As shown in FIG. 10, the one support member 48 carrying the finished stack of publications has just reached the horizontal position of the latch mechanism 36 without withdrawal from beneath said stack, the times 104 thereof withdrawing rearwardly through the stack guide bars 126, with the support member 48 initially entering the lower return region 54. The other support member 50 that has entered the stacking region 52 continues to receive publications thereon for building a stack of publications during continued downward movement of that support member. The safety block 96 is continuing to move with the set of support members 48 and the safety block 98 is continuing to move with the set of support members 50.

As shown in FIG. 11, the one of the support members 48 has nearly withdrawn generally horizontally from the stacking region 52 through the stack guide bars 126 above the stack receiving surface 38 of the outfeed conveyor section 26 and is depositing the finished stack of publications onto the stack receiving surface. The one of the support members 50 moving downwardly through the stacking region 52 continues said downward movement and continues to receive a stack of publications being built thereon. The safety blocks 96 and 98 continue to move with their respective set of support members 48 and 50.

Finally, as shown in FIG. 12, the one of the set of support members 48 has completely withdrawn from the stacking region 52, depositing the finished stack of publications onto the stack receiving surface 38 of the outfeed conveyor section 26, while the other of said support members 48 is approaching the upper end of the stacking region and approaching engagement by the latch mechanism 36 for the stopping of the set of support members 48. The one of the set of support members 50 continues its downward movement through the stacking region 52, receiving the stack of publications being built thereon, the safety blocks 96 and 98 still continuing their same movement with their respective sets of support members 48 and 50. It will be noted that the safety blocks 96 and 98 at this point are still spaced apart and also that the stopping of the approaching support member 48 by the latch mechanism 36 will not stop the safety block 96, but the safety block 98 can continue to move away from said safety block 96 for a substantial distance without contact between the two during continued movement of the set of support members 50.

During the sequential movement of the sets of support members 48 and 50, as just described, the switches 88 and 94 as controlled by the cams 86 and 92 on the control shafts 80 and 82, shown in FIG. 5 and previously described, may be used for changing the rate of movement of the sets of support members 48 and 50 during their movement in the continuous path of travel. For instance, if desired, once a particular of the support members 48 or 50 has moved downwardly through the stacking region 52 a sufficient distance that a stack of publications will have been completed at the rearward return region 56 of the set of the support members 48 or 50 may be switched to an increased rate of travel through the remainder of the stacking
registered on the other of that particular set of support members 48 or 50 has reached the latch mechanism 36. Also, said switches 88 and 94 may be used to control movement of the flat conveyor belt 40 forming the stack receiving surface 38. In section 26 of our invention we provide for a misalignment of the support members, all contemplated within the broad principles of the present invention.

According to the present invention, therefore, a stacking device is provided wherein the particular support member 48 or 50 entering into the stacking region 52 to receive publications thereon for the building of a publication stack is separately movable and separately controlled from the next successive of the support members 48 or 50 to move into said stacking region. In this manner, the movement of the particular support member 48 or 50 can be more nearly perfectly controlled to conform with the rate of deposit of the publications thereon resulting in a more orderly arranged stack of publications being built.

Furthermore, the foregoing unique separate movement of the successive support members 48 and 50 along with the unique preloading of said support members by the latch mechanism 36 and the guide track offsets 118, provides instantaneous snap entrance of the support members initially into the stacking region 52. Such snap entrance results in providing said continuous change of publications deposited thereon away from alignment with the path of movement of the support members, all contemplated within the broad principles of the present invention.

Still further, the unique, generally horizontal withdrawal of the support members 48 or 50 from beneath the finished stack of publications to deposit said stack onto the stack receiving surface 38 in the reduced speed manner hereinafore described, said withdrawal being above said stack receiving surface, completely eliminates any possible difficulties with an improperly arranged publication stack. Despite the arrangement of said publication stack, the same will always be wiped from the support members 48 and 50 by the stack guide bars 126, so that no mechanism jam can result.

Still additionally, the described simplicity of construction of the support means 48 and 50 combined with the exact control thereof by the sets of inner and outer guide rollers 104 and 110 moving through the sets of inner and outer guide tracks 112 and 114, combined with their pivotal connections to the conveyor chains 60 and 62, makes possible exact controlled movement of the support members precisely as intended throughout the continuous path of travel thereof. At the same time, the angled extension of the inner and outer guide tracks 112 and 114 continuously changes the angle of extension of the support member tines 104 into the stacking region 52 during the building of publication stacks thereon so as to always provide proper positioning of said support members for receiving the publications thereon, giving maximum assurance of proper and orderly publication stacks being built.

We claim:

1. In a stacking device for a publication conveyor system, the combination of: a main frame; first and second stack building means on said main frame independently movable in a common continuous path generally vertically downwardly through a stacking region to a stacking region lower end and then upwardly through a return region displaced horizontally from said stacking region for return to an upper end of said stacking region, said first and second stack building means including alternate stack support members thereon positioned one at a time to intercept a continuous stream of publications from an infeed conveyor to build generally vertical publication stacks on each of said support members, during progressive movement of said support members with said stack building means movement downwardly through said stacking region, said support members during said movement depositing said stacks at said stacking region lower end; drive means operably connected to each of said first and second stack building means for separately and simultaneously moving said stack building means including said stack support members thereof; and control means operably connected to said drive means for actuating said drive means to separately and simultaneously move said stack building means, said control means being constructed and arranged to control said drive means for counting always stop one of said stack building means with a support member thereof poised in said stacking region upper end ready for downward entry into said stacking region during at least a part of the actuation of said drive means to move said other stack building means with a support member thereof moving downwardly through said stacking region, while a stack is being built therein by said drive means for counting each publication being fed to the particular support member upon which a stack of publications is built to constantly determine the size of stack of publications being built said stack building means automatically actuating said drive means for commencing movement of said support member of said one stack building means poised at said stacking region upper end upon a predetermined size of stack being determined.

2. A stacking device as defined in claim 1 in which said control means includes size determining means operably connected to said drive means for constantly determining the size of stack of publications being built said stack building means automatically actuating said drive means for commencing movement of said support member of said one stack building means poised at said stacking region upper end upon a predetermined size of stack being determined.

3. A stacking device as defined in claim 1 in which said control means includes a stop switch engaged by each of said support members upon movement of said support members to said stacking region upper end for stopping actuation of part of said one stack building means including said support member, counter means for counting each publication being fed to the particular support member upon which a stack of publications is built to constantly determine the size of stack of publications being built said stack building means automatically actuating said drive means for causing reactivation of said drive means after a predetermined size of stack building means being built.

4. A stacking device as defined in claim 1 in which each of said support members of the respective first and second stack building means includes a stack supporting portion projecting from the particular of the support members in cantilever fashion, and in which said control means includes releasable latch means engaged by said supporting portion of each of said support members upon said support members being moved to said stacking region upper end by the particular stack building means thereof causing said supporting portion of said support member to tilt upwardly a greater degree than prior to said latch means engagement, stop switch means engaged by each said support member immediately after engagement of said support member supporting portion by said latch means for stopping actuation of part of said drive means to stop the particular stack building means including said support member, stack size determining means operably connected for constantly determining the size of stack of publications being built on the particular support member moving progressively downwardly through said stacking region, said stack size determining means upon a predetermined size of stack being determined releasing said latch means to release engagement of a support member supporting portion and reactivate said drive means part to commence movement of the particular support member stopped poised at said stacking region upper end through commencing movement of its particular stack building means.

5. A stacking device as defined in claim 1 in which each of said first and second stack building means includes continuous conveyor chain means movable generally in said common continuous path, said stack support members being pivotally connected to said conveyor chain means of said stack building means projecting in cantilever fashion therefrom, said chain means on each of said stack building means spaced from the pivotal connection of said stack building means to said conveyor chain means; and in which guide track means is mounted on said main frame receiving said support member guide mem-
bers therein during movement of said support members downwardly through said stacking region and controlling the angle of projection of said support members from said conveyor chain means.

6. A stacking device as defined in claim 1 in which each of said first and second stack building means includes conveyer chain means generally movable in said common continuous path, each of said support members being pivotally connected to one of said conveyor chain means projecting therefrom in cantilever fashion and terminating from said conveyor chain means in a free end, a guide member on each of said support members spaced from said pivotal connection of said support member being operably connected at said main frame receiving said guide members of said support members moving downwardly therethrough upon approach of said support members to said stacking region upper end and during downward movement of said support members through said stacking region for controlling the angle of cantilever pro- jection of said stacking members during movement downwardly through said stacking region, said guide track means including an offset portion for receiving said guide members of said support members therein upon said support members arriving at said stacking region upper end to permit a temporary increased upward tilting of said stacking members; and in which said control means includes releasable latch means engaged by each of said support member free ends upwardly toward member arriving at said stacking region upper end causing said support members to move into said temporary increased upward tilting and said guide members of said support members to move into said offset portion of said guide track means, stop switch means engaged by each of said support members immediately after engagement of said support member free ends by said latch means stopping actuation of part of said drive means to stop the portion of said drive means including the particular support member at said stacking region upper end, the timing of said support member engagement with said stop switch means and said stacking member free end engagement with said latch means being predetermined to cause tensioning of said support members to tension urge said support members to move from said temporary upward tilting and said guide members of said support members movement portion of said guide offset track means upon said support member free ends being released by said latch means, counter means for counting each publication being fed to the particular support member moving downwardly through said stacking region and upon which a stack of publications is being built to constantly determine the size of publication stack on said particular support member, said sizeformed publication being operably connected releas- ing latch means to release engagement of said support member free ends and reactuate said drive means part upon a predetermined size of stack being determined to commence movement of the particular support member stopped poised at said stacking region upper end.

7. A stacking device as defined in claim 1 in which said stack supporting portions of said first and second stack building means include stack supporting portions receiving thereon the publications fed to said support members during movement of said support members downwardly through said stacking region permitting a publication stack to be built thereon; and in which said guide means is mounted on said main frame receiving a part of said support members movably downwardly therethrough during movement of said support members downwardly through said stacking region for positioning said supporting portions of said support members in proper position for receiving said publications thereon, said guide means withdrawing said supporting portions of said support members from said publication stack and causing said deposit of said stack at said stacking region lower end upon said support member being operably connected at said main frame receiving said publications thereon, said drive means operably connected to said drive means including stop switch means movable downwardly therethrough during movement of said support members downwardly through said stacking region and supporting said publication stack being built; and in which said main frame is mounted on said main frame receiving parts of said support members movably downwardly therethrough during movement of said support members downwardly through said stacking region and positioning said supporting portions of said stack members for receiving said publications thereon, said guide means guiding said support members to withdraw said supporting portions of said support members as a stack of publication stacks as said supporting portions of said support members approach said stack receiving surface on said main frame at said stacking region lower end and prior to said supporting portions of said support members reaching said stack receiving surface of said main frame dumping said publication stacks at said stack receiving surface.

9. A stacking device as defined in claim 1 in which said main frame includes a generally horizontal stack receiving surface at said stacking region lower end; in which said support members of said first and second stack building means include stack supporting portions receiving said publications downwardly thereon during movement of said support members downwardly through said stacking region and supporting said publication stack being built; and in which said main frame is mounted on said main frame receiving parts of said support members movably downwardly therethrough during movement of said support members downwardly through said stacking region and positioning said supporting portions of said stack members for receiving said publications thereon, said guide means guiding said support members to withdraw said supporting portions of said support members as a stack of publication stacks as said supporting portions of said support members move movable downwardly therethrough during movement of said support members downwardly through said stacking region and positioning said supporting portions of said stack members for receiving said publications thereon, said guide means guiding said support members to withdraw said supporting portions of said support members as a stack of publication stacks as said supporting portions of said support members approach said stack receiving surface on said main frame at said stacking region lower end and prior to said supporting portions of said support members reaching said stack receiving surface of said main frame dumping said publication stacks at said stack receiving surface.

10. In a stacking device as a portion of a main frame, a first set of said stack supporting surfaces extending generally horizontally during support member movement downwardly through said stacking region receiving publications downwardly thereon into a publication stack from a continuous stream of publications fed thereto and depositing a finished publication stack on a surface at said stacking region lower end; and drive means for moving each of said support member sets separately in said continuous path with one set always being stationary and a support member thereof poised for entrance into said stacking region during a part of the movement of the other set, and said drive means further moving a preceding support member downwardly through said stacking region.

11. A stacking device as defined in claim 10 in which control means is operably connected to said drive means and includes stop switch means movable downwardly thereon through said stacking region upper end for stopping the particular set of support members of which that particular support member is a part,
stack size determining means operably connected to said drive means for determining when a predetermined size of publication stack has been built on each of said support members during movement of said support members downwardly through said stacking region and causing reactivation of said drive means to said particular set of support members upon said predetermined stack being determined to begin downward movement into said stacking region of that support member then stopped poised ready for entrance into said stacking region.

12. A stacking device as defined in claim 10 in which said guide means includes a guide member on each of said support members whereby said track means includes guide track means on said main frame receiving said support member guide members downwardly thereethrough during movement of said guide members downwardly through said stacking region and controlling the angularity of said stack supporting surfaces of said support members positioning said stack supporting surfaces extending generally horizontally for building a publication stack thereon.

13. A stacking device as defined in claim 10 in which said guide means includes a guide member on each of said support members, guide track means on said main frame receiving said support member guide members downwardly thereethrough during movement of said guide members downwardly through said stacking region and controlling the angularity of said stack supporting surfaces of said support members positioning said stack supporting surfaces extending generally horizontally for building a publication stack thereon, said guide track means includes guide track means through co-operation of said support member guide members at least partially withdrawn said stack supporting surfaces of said guide members from beneath said publication stacks above said stack receiving surface of said main frame at said stacking region lower end to deposit said stacks on said stack receiving surface.

14. A stacking device as defined in claim 10 in which said guide means includes a guide member on each of said support members, guide track means on said main frame receiving said support member guide members downwardly thereethrough during movement of said guide members downwardly through said stacking region and controlling the angularity of said stack supporting surfaces of said support members positioning said stack supporting surfaces extending generally horizontally for building a publication stack thereon, said guide track means includes guide track means with co-operation of said support member guide members totally withdrawn said support member supporting surfaces from beneath said publication stacks while said support member supporting surfaces are still extending in a generally horizontal direction and are still above a stack receiving surface of said main frame at said stacking region lower end to deposit said publication stacks on said stack receiving surface.

15. A stacking device as defined in claim 10 in which each of said support members includes a plurality of tines thereon forming said stack supporting surfaces and positioned extendingly generally horizontally during support member movement downwardly through said stacking region; and in which said main frame includes members forming a stationary surface extending generally vertically downwardly through said stacking region and adjacent end portions of said support member tines during movement of said support members downwardly through said stacking region, said main frame members and said support member tines co-operating to stack said publications during movement of said support members downwardly through said stacking region, said main frame members and said support member tines cooperating to stack said publications during movement of said support members downwardly through said stacking region; in which said main frame includes a generally horizontally extending stack receiving surface at said stacking region lower end; and in which said guide means includes guide track means on said main frame engaging said support member tines for at least partially generally horizontally withdrawing said support member tines from beneath said publication stacks above said main frame stack receiving surface while said main frame members retain said publication stacks in stacked position to deposit said publication stacks onto said main frame stack receiving surface.

16. A stacking device as defined in claim 10 in which each of said support members includes a plurality of tines thereon forming said stack supporting surfaces and positioned extendingly generally horizontally during support member movement downwardly through said stacking region; in which said main frame includes members forming a stationary surface extending generally vertically downwardly through said stacking region and adjacent end portions of said support member tines during movement of said support members downwardly through said stacking region, said main frame members and said support member tines cooperating to stack said publications during movement of said support members downwardly through said stacking region, said main frame members and said support member tines cooperating to stack said publications during movement of said support members downwardly through said stacking region, in which said main frame includes members forming a stationary surface extending generally vertically downwardly through said stacking region; in which said main frame includes members forming a stationary surface extending generally horizontally through said stacking region including said guide means thereon, and in which said guide means includes guide track means on said main frame engaging said support member tines for at least partially generally horizontally withdrawing said support member tines from beneath said publication stacks above said main frame stack receiving surface while said main frame members retain said publication stacks in stacked position to deposit said publication stacks onto said main frame stack receiving surface.

17. A stacking device as defined in claim 10 in which each of said support members includes a plurality of tines thereon forming said stack supporting surfaces and positioned extendingly generally horizontally through said stacking region and adjacent end portions of said support member tines during movement of said support members downwardly through said stacking region, in which said main frame includes a generally horizontally extending stack receiving surface at said stacking region lower end; and in which said guide means includes guide track means on said main frame engaging said support member tines for at least partially generally horizontally withdrawing said support member tines from beneath said publication stacks above said main frame stack receiving surface while said main frame members retain said publication stacks in stacked position to deposit said publication stacks onto said main frame stack receiving surface.

18. In a stacking device for a publication conveyor system, the combination of: a main frame; a plurality of spaced stack support members including supporting portions extending from mounting ends to normally free ends, a set of spaced guide members operably connected to each of said support member supporting portions; guide members operably connectingly said support members to said main frame movably in a continuous path downwardly through a stacking region to a stacking region lower end and then upwardly through a return region displaced from said stacking region, said return path extending from a stacking region upper end, said guide means including spaced guide track means on said main frame each receiving one of said guide members of said support member supporting portions movably downwardly thereethrough during movement of said support members downwardly through said stacking region retaining said support members with said supporting portions extending said guide members movably along said main frame stack conveyor to permiting said guide members of said support member supporting portions movably thereon.

19. A stacking device as defined in claim 18 in which said guide means includes conveyor chain means operably connected to said drive means and movable along said continuous path by said drive means, said conveyor chain means being pivotally connected to said support members immediately adjacent said support member guide members for moving said support members along said continuous path and permitting said guide member varying of said angle of extension of said support members.

20. In a stacking device for a publication conveyor system, the combination of: a main frame; a plurality of spaced stack support members including supporting portions extending from mounting ends to normally free ends, a set of spaced guide members operably connected to each of said support member supporting portions; said main frame including means operably connected to said drive means operably connected to said drive means and movable along said continuous path by said drive means, said conveyor chain means being pivotally connected to said support members immediately adjacent said support member guide members for moving said support members along said continuous path and permitting said guide member varying of said angle of extension of said support members.
member supporting portions; guide means operably connect-
ing said support members to said main frame movable in a continuous path downwardly through a stacking region to a stacking region lower end and then upwardly through a return region displaced from said stacking region for return to a stacking region upper end, said guide means including spaced guide track means on said main frame each receiving one of said guide members of said support member supporting portions movable downwardly therethrough during movement of said support members downwardly through said stacking region retaining said support members with said supporting portions extending cantilevered for receiving publications downwardly therein into a publication stack from a continuous stream of publications fed thereto and depositing a finished publication stack at said stacking region lower end, at least one of said guide track means extending from said stacking region lower end toward said return region guiding its respective support member guide member for withdrawing said support members from said finished publication stacks while maintaining said support member supporting portions extending in a general horizontal direction substantially throughout said withdrawal; and drive means for moving said support members along said continuous path.

21. A stacking device as defined in claim 20 in which said main frame includes a generally horizontal stack receiving surface at said stacking region lower end receiving said finished publication stacks deposited thereon by said support members; and in which said guide track means has guide track tension thereof and engagement by said support member guide member withdraws each of said support members from said finished publication stacks totally above said stack receiving surface while maintaining said support member supporting portion extending in a general horizontal direction during the entire of said withdrawal.

22. A stacking device as defined in claim 20 in which stop switch means is operably associated with said drive means for stopping movement of each of said support members upon said support members being moved to said stacking region upper end; in which releasable latch means is operably connected to said main frame at said stacking region upper end for engagement by said support member free ends upon said support member stoppages at said stacking region upper end; in which means is operably connected to said drive means and said releasable latch means for restarting movement of each of said support members and releasing said latch means therefrom after stopping by said stop switch means; and in which at least one of said spaced guide track means of said guide means includes a track offset receiving the support member guide member of said guide track means of each support member therein upon said support members being engaged by said releasable latch means permitting upward tilting of said support members during the stopping of said support members and the engagement by said releasable latch means, said support member guide member received in said track offset of said guide track means moving from said truck offset upon movement of said support members from said stacking region upper end being commenced and said releasable latch means being released.

23. A stacking device as defined in claim 20 in which said guide means includes conveyor chain means operably connected to said drive means and pivotally connected to each of said support members intermediate said support member guide members for moving said support members along said continuous path and permitting pivotal movement of said support members by said support member guide members; in which stop control means is operably connected to said drive means for stopping movement of each of said support members upon said support members being moved to said stacking region upper end, in which a track offset is formed on at least one of said guide track means of said stacking region upper end adapted for receiving the support member guide member of that guide track means therein for each support member permitting upward pivotal tilting of said support members upon stopping at said stacking region upper end; in which releasable latch means is operably connected to said main frame at said stacking region upper end engageable by said supporting portion free ends of said support members and pivotally upwardly tilting said support members during stopping of said support members at said stacking region upper end, timing between said stop control means stopping and said latch means engagement creating a predetermined overrun of said conveyor chain means of said guide means for each of said support members causing tensioning of said support members in said stopped upward tilted position normally tending to urge said support members downwardly from said upwardly tilted position; and in which stack size determining means therefor determines a predetermined size stack of publications has been built on said support members during positioning thereof within said stacking region and causing release of the particular support member stopped at said stacking region upper end by release of said latch means and movement of said support member guide member from said track offset of said guide track means by actuation of said drive means.

24. A stacking device as defined in claim 20 in which cer-
tain parts of said guide track means of said guide means extend entirely along said continuous path at all times con-
trolling at least one of said guide members on each of said sup-
port members to at all times control said extension of said sup-
port member supporting portions throughout movement along said continuous path.

25. In a stacking device for a publication conveyor system, the combination of: a main frame including a forward, generally vertical stacking region terminating downwardly in a generally horizontal stack receiving surface at a stacking region lower end; a plurality of spaced stack support members, each of said support members including a stack supporting portion; guide means operably connecting said support member to said main frame movable in a continuous path downwardly through said forward stacking region to said stacking region lower end adjacent said stack receiving surface and then rearwardly and then upwardly through a return region spaced rearwardly from said stacking region and then forwardly back to a stacking region upper end, said guide means including positioning means between said support members and main frame said positioning means extending portions of said support members extending in general horizontal directions forwardly into said stacking region during support member movement downwardly through said stacking region for receiving publications downwardly thereon into publication stacks from a continuous stream of publications fed thereto and at least partially withdrawing said support member supporting portions from beneath said publication stacks in a generally horizontal direction while said support member supporting portions are still above said stack receiving surface and said support member supporting portions are still extending in a general horizontal direction to deposit finished publication stacks on said stack receiving surface; and drive means for moving said support members in said continu-
ous path.

26. A stacking device as defined in claim 25 in which said guide means positioning means is constructed and arranged for totally withdrawing said support member supporting portions from beneath said publication stacks in a generally horizontal direction and while said support member supporting portions are still totally above said stack receiving surface and said support member supporting portions are still extend-
ing in a general horizontal direction.

27. A stacking device as defined in claim 25 in which sta-
tionary stack supporting surfaces are formed on said main frame extending generally vertically downwardly along said stacking region co-operating with said support member sup-
porting portions to support publication stacks on said support members, said publication stacks sliding along said main frame stack supporting surfaces during movement of said sup-
port members downwardly through said stacking region.
28. A stacking device as defined in claim 25 in which said supporting portions of said support members include spaced tines maintained by said positioning means extending forwardly in cantilevered fashion into said stacking region during movement of said support members downwardly through said stacking region.

29. A stacking device as defined in claim 25 in which said main frame includes spaced stack positioning surfaces thereon extending vertically downwardly along said stacking region; in which said supporting portions of said support members include a series of spaced tines extending forwardly through said main frame supporting surfaces and forwardly into said stacking region in cantilevered fashion during movement of said support members downwardly through said stacking region; and in which said positioning means of said guide means is constructed and arranged for withdrawing said support member tines rearwardly through said main frame supporting surfaces adjacent said stacking region lower end and said stack receiving surface of said main frame.

30. A stacking device as defined in claim 25 in which stationary stack supporting surfaces are formed on said main frame extending generally vertically downwardly along said stacking region, said supporting surfaces extending downwardly at least substantially to said stack receiving surface of said main frame; and in which said positioning means of said guide means is constructed and arranged for maintaining said supporting portions of said support members extending forwardly from said main frame supporting surfaces in cantilevered fashion during positioning of said support members within said stacking region, said main frame supporting surfaces and said support member supporting portions cooperating to support publication stacks on said support members during positioning of said support members in said stacking region, said publication stacks sliding downwardly along said main frame supporting surfaces during downward movement of said support members through said stacking region.