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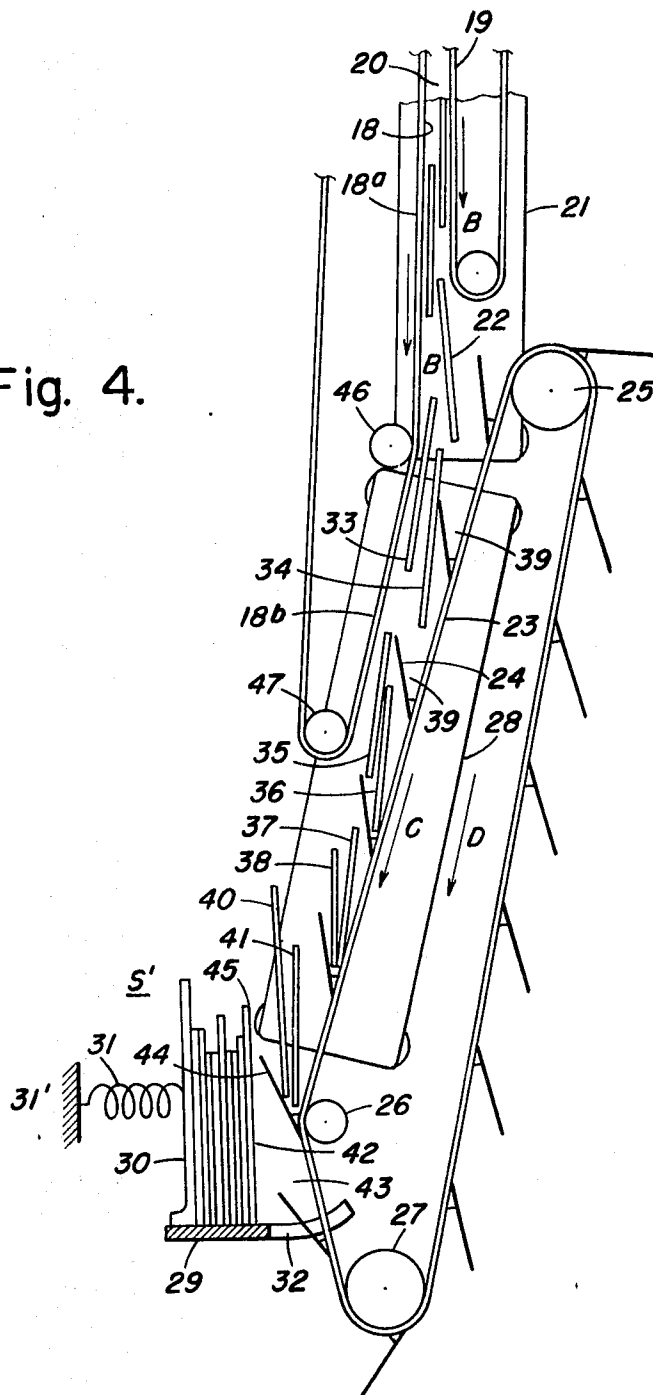
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STACKING APPARATUS FOR CARD LIKE ITEMS

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2 Sheets-Sheet 2

Fig. 4.



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STACKING APPARATUS FOR CARD LIKE ITEMS
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6 Claims

ABSTRACT OF THE DISCLOSURE

Stacking apparatus for card like items is provided in accordance with this invention for use in conjunction with card handling systems. According to an exemplary embodiment of the present invention, stacking apparatus including conveyor means and stacking chamber means is provided wherein such conveyor means is positioned intermediate a path of incoming card like items and said stacking chamber means. The conveyor means is adapted to be driven at a speed which is less than the velocity of the incoming card like items presented thereto, and in addition, said conveyor means is provided with projecting fin means fixedly mounted thereto so as to form discrete pockets thereon. As thus provided, said conveyor means acts upon an incoming stream of card like items to divide such incoming card like items into small subgroups which are each inserted and conveyed toward said stacking chamber means in one of the discrete pockets formed on said conveyor means. Thus, in spite of an overlapping relationship between some of the card like items present in the incoming stream of card like items, small subgroups of said card like items are individually and separately conveyed to said stacking chamber means so that accurate and orderly stacking may take place.

This invention relates to card handling systems designed to act upon large quantities of card like items and more particularly to stacking apparatus therefor.

In card handling systems designed to expedite the handling of mail, information cards for a data processing system or related materials and hence act upon large quantities of envelopes, postcards or items of similar nature, hereinafter referred to as card like items, incoming mail routes are generally established so that the various functions of said card handling systems, such as automatic facing, stamp affixing or sorting may be readily accomplished. Such incoming mail routes usually take the form of a pair of horizontally disposed belt conveyors, which may be endless in nature, and are adapted to operate at the same speed to thus convey the card like items therebetween along a predetermined path. In addition, in such card handling systems, stacking apparatus is often provided at the end of the incoming mail routes so that the card like items acted upon are conveyed into a stacking chamber and stacked into a bundle at high rates of speed upon the completion of the function carried out by the card handling system along that incoming mail route.

Although many forms of stacking apparatus for installation at the end of an incoming mail route are presently available, the majority of such forms of conventional stacking apparatus will only exhibit a stabilized stacking operation when the card like items provided thereto by the incoming mail route are not in an overlapping relationship. Thus, when the individual card like members present in the incoming mail route are properly spaced therealong so that they are received and acted upon singly by said conventional stacking apparatus, stacking will be accomplished in an arcuate manner at the required rate of speed. However, when such card like items are re-

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ceived by said conventional stacking apparatus from an incoming mail route in an overlapping or partially overlapping relationship, the operation of said conventional stacking apparatus will not usually proceed in an accurate manner and the stacked card like items provided thereby will not be appropriate for subsequent handling in the most expeditious manner. Thus, as the card like items present in an incoming mail route will often be in an overlapping relationship when large quantities of card like items are being processed by said card handling systems, the majority of forms of stacking apparatus currently available for use in conventional card handling systems will periodically cause the operation thereof to be unsatisfactory.

Therefore, it is a principal object of this invention to provide stacking apparatus for a card handling system, which stacking apparatus will function in an accurate and stable manner regardless of whether or not some of the card like items furnished thereto in a continuous stream are in an overlapping relationship. Other objects and advantages of the present invention will become clear from the following detailed description of an exemplary embodiment thereof, and the novel features will be particularly pointed out in conjunction with the appended claims.

In accordance with this invention, stacking apparatus including conveyor means and stacking chamber means is provided for a card handling system, said conveyor means being positioned intermediate a path of incoming card like items and said stacking chamber means and adapted to be driven at a velocity which is less than the velocity of the incoming card like items, in addition, projecting fin means are fixedly mounted on a surface of said conveyor means so as to form an acute angle therewith so that a stream of incoming card like items received at said conveyor means is broken up into small subgroups by said projecting fin means regardless of any overlapping relationship therebetween and each of said small subgroups is individually conveyed toward said stacking chamber means in a space defined on said conveyor means between a surface thereof and said projecting fin means, whereby said small subgroups are individually and separately conveyed to said stacking chamber means wherein accurate, high speed stacking may then take place. The invention will be more clearly understood by reference to the following detailed description of an embodiment thereof in conjunction with the accompanying drawings in which:

FIG. 1 is a plan view illustrative of conventional stacking apparatus;

FIG. 2 is a further showing of the conventional stacking apparatus depicted in FIG. 1, wherein conditions which may cause irregular stacking to take place are illustrated;

FIG. 3 is a plan view illustrating a form of the improper stacking which may take place in the conventional stacking apparatus shown in FIG. 1, due to the conditions illustrated in FIG. 2; and

FIG. 4 is a plan view of an exemplary embodiment of the stacking apparatus according to the present invention.

Referring now to the drawings and more particularly to FIG. 1 thereof, there is shown an exemplary form of conventional stacking apparatus often found in presently relied upon card handling systems. As shown in FIG. 1, the conventional form of stacking apparatus illustrated therein comprises first and second belt conveyor means 1 and 2, respectively, and a stacking chamber indicated generally at S. The first and second belt conveyor means 1 and 2 are disposed in a facing relationship in the manner illustrated in FIG. 1 and a sufficient clearance 3 is provided between the facing surfaces thereof such that card like items represented by 4 and 5 may be conveyed therebetween. The first and second conveyor means 1 and

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2 may be conventional devices which take the form of endless belts and each of said first and second belt conveyor means 1 and 2 are adapted to be driven in the usual manner in the direction indicated by the arrows A. In addition, the second belt conveyor means 2 is provided with roller means 11 and 12 so that a surface portion 13 is formed in said second belt conveyor means 2 which acts, as shall be seen hereinafter, to cause proper stacking to take place in the stacking chamber S due to the frictional engagement between said surface portion 13 and a card like item which is being conveyed into said stacking chamber S.

The stacking chamber S as illustrated in FIG. 1, comprises support plate means 6, pressure plate means 7, and biasing means 9. The support plate means 6 may comprise a flat planar surface which is adapted to receive the leading edges of the card like items supplied thereto by said first and second belt conveyor means 1 and 2, which here serve in the role of an incoming mail route. More particularly, as shall be seen below, each card like item conveyed to the stacking chamber S is adapted to intersect a surface of the preceding card like item already present in said stacking chamber S and be driven down into said stacking chamber S, due to the frictional engagement of the surface portion 13 of the second belt conveyor means 2, until the leading edge thereof intersects the support plate means 6 so that the card like items will be accurately stacked with all of the leading edges thereof aligned on the surface of the support plate means 6. The pressure plate means 7 is slidably mounted on the support plate means 6 so that a major surface thereof is perpendicular to the surface of the support plate means 6. The biasing means 9 is interposed between the pressure plate means 7 and the mounting portion 9' therefor so that the pressure plate means 7 continuously acts to maintain a bias on the stacked card like items present in the stacking chamber S in a direction toward the surface portion 13 of the second belt conveyor means 2. The biasing means 9 has been illustrated in FIG. 1 as comprising a helical spring 9 but, as will be readily apparent to those of ordinary skill in the art, any of the well known class of devices usually used in conjunction with pressure plate means may be readily substituted therefor.

In the operation of the conventional stacking apparatus illustrated in FIG. 1, if normal operating conditions are initially assumed, card like items 4 and 5 will be conveyed through the clearance 3 formed between the first and second belt conveyor means 1 and 2 toward the stacking chamber S due to the motion of said first and second belt conveyor means 1 and 2 in the direction indicated by arrows A. As normal operating conditions have here been assumed, the card like items 4 and 5 are conveyed by said first and second belt conveyor means 1 and 2 in the spaced apart manner illustrated in FIG. 1 so that each of the card like items 7-10 received in said stacking chamber S is properly stacked therein before the next card like item 5 being conveyed thereto is received thereby. When these conditions obtain, an incoming card like item 5 is appropriately spaced from the immediately preceding and succeeding card like items 10 and 4, respectively, and will be conveyed by said first and second belt conveyor means 1 and 2 toward said stacking chamber S until such incoming card like item 5 collides at the leading edge thereof with a major surface portion of the card like member 10 which preceded it, or if no card like member preceded it, into collision with the pressure plate means 7. When the leading edge of an incoming card like item 5 collides with a major surface of the card like item 10 which preceded it, the card like item 10 which is biased against the surface portion 13 by the urging of the pressure plate means 7 will be displaced in a direction away from the surface portion 13 so that the frictional force which said incoming card like item 5 receives from the surface portion 13 of the second belt conveyor means 2 and the surface of the card like item 10 will cause it to be pulled inward

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and into engagement with a greater area of said surface portion 13. The frictional engagement with surface portion 13 of the second belt conveyor means 2 will thereby cause the incoming card like item 5 to be conveyed downward into the stacking chamber S until the downward motion thereof is stopped by the engagement of the leading edge of said incoming card like member 5 with said support plate means 6. Thus, under these conditions, each of the incoming card like members will be received in said stacking chamber S and accurately stacked therein with the leading edges of each of said card like members properly aligned with the surface of the support plate means 6.

In the operation of the conventional stacking apparatus illustrated in FIG. 1 and explained above, it was initially assumed that the card like items being conveyed by the first and second belt conveyor means 1 and 2 were clearly separated in the manner illustrated for the card like items 4 and 5 depicted in FIG. 1. If these conditions, however, do not uniformly obtain as often occurs in a mail route leading to the stacking chamber S, the edges of one or more of the card like items being conveyed by the first and second belt conveyor means 1 and 2 may be in an overlapping relationship. This condition is shown in FIG. 2 which illustrates the conventional stacking apparatus depicted in FIG. 1 wherein the card like items 15-17 being conveyed by the first and second belt conveyor means 1 and 2 toward the stacking chamber S have their edges in an overlapping relationship. Under the conditions illustrated in FIG. 2, as the card like item 16 is effectively wedged between the two preceding card like items 14 and 15 and the card like item 17 is effectively wedged between two preceding card like items 16 and 14, the surface portion 13 of the second belt conveyor means 2 will not come into contact with either of the card like items 16 or 17. Thus, neither the card like item 16 or 17 is brought into engagement with the surface portion 13 of the second belt conveyor means 2, neither of the card like items 16 or 17 will receive the inward pulling force due to a frictional engagement with the moving surface portion 13 and as a result thereof, the leading edges of each of the card like items 16 and 17 will not be made to abut and hence be brought into alignment with the surface of the support plate means 6. Accordingly, when one or more of the card like items 15-17 are conveyed toward said stacking chamber S under the conditions illustrated in FIG. 2, wherein the edges thereof are in an overlapping relationship, the accurate stacking thereof will not take place in the stacking chamber S because when the leading edges of such card like items 16 and 17 are not brought into alignment with the surface of the support plate means 6, due to a frictional engagement with the moving surface portion 13, a disarranged stacking state will result in said stacking chamber S. Such a disarranged stacking state which could result from the overlapping relationship between the card like items 15-17, as illustrated in FIG. 2, is shown in FIG. 3. Thus, it will be appreciated that the conventional stacking apparatus illustrated in FIG. 1 will not properly function to accurately stack card like items received thereby should one or more of such card like items be supplied thereto in an overlapping relationship.

FIG. 4 is a plan view of an exemplary embodiment of the stacking apparatus according to the present invention. As shown in FIG. 4, the exemplary embodiment of the stacking apparatus according to the present invention comprises first and second belt conveyor means 18 and 19, first and second item conveying means 21 and 28, finned conveyor means 23 and a stacking chamber indicated generally as S'. The first and second belt conveyor means 18 and 19, as shown in FIG. 4, may take the form of conventional devices of the endless loop type and each of said first and second belt conveyor means 18 and 19 is adapted to be driven in the conventional manner at a velocity V_1 in the direction indicated by the arrows B. The first and second belt conveyor means 18 and 19 are

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disposed in a facing relationship and a sufficient clearance 20 is maintained therebetween so that an incoming mail route is established for conveying card like items indicated at 22. The first belt conveyor means 18, as illustrated in FIG. 4, extends a further distance toward the stacking chamber S' than does the second belt conveyor means 19 and is formed by the rollers 46 and 47 into two portions wherein the first portion 18a thereof is substantially parallel to the second belt conveyor means 19, while the second portion 18b thereof is directed along a path indicated by the arrow D. The first item conveying means 21 is positioned beneath the incoming mail route established in the clearance 20 between the facing, spaced apart first and second belt conveyor means 18 and 19. The first item conveying means 21 is disposed horizontally in the same direction as the second belt conveyor means 19, but extends further in a direction toward said finned conveyor means 23 than does said second belt conveyor means 19. The first item conveying means 21 may take the form of a conventional flat belt surface as indicated in FIG. 1 or alternatively may comprise roller conveyor means or similar devices, well known to those of ordinary skill in the art, which enable items being conveyed thereon to be easily transported thereover. Furthermore, in embodiments of this invention wherein the first and second belt conveyor means are disposed at an inclined angle to the horizontal plane, the first item conveying means 21 may take the form of sliding board means or similar conveyor devices of this class. As the first item conveying means 21 is illustrated in FIG. 4 as a flat belt surface, the first item conveying means 21 here would be continuously driven at a velocity equal to the velocity of the first and second belt conveyor means 18 and 19 in the direction indicated by the arrow B. Accordingly, it will be seen that card like items such as 22 being conveyed in the incoming mail route established between the facing surfaces of the first and second belt conveyor means 18 and 19 will be sandwiched between the two facing surfaces of the first and second belt conveyor means 18 and 19 and be driven in a direction indicated by the arrows B in a manner such that their lower edges rest on the horizontally driven surface of the first item conveying means 21. Thus, the first and second belt conveyor means 18 and 19 and the first item conveying means 21 act in concert to drive the card like items 22 present in the incoming mail route at a velocity V_1 in the direction indicated by the arrows B.

The finned conveyor means 23 may take the form of a conventional conveyor belt means of the endless type which has suitable fins or flaps 24 affixed rigidly thereon so that the fins or flaps 24 in combination with the surface of the finned conveyor means 23 form pockets 39. The fins or flaps 24 rigidly mounted on the surface of the finned conveyor means 23 are affixed to the surface thereof so that such fins 24 form an acute angle therewith. The acute angle thus formed is preferably in the range of twenty to forty degrees (20° - 40°) and is illustrated in FIG. 4 as approximately 25 degrees. The finned conveyor means 23 is disposed as indicated in FIG. 4 to receive card like items 22 and 33-38 from the incoming mail route established between the facing surface portions of the first and second belt conveyor means 18 and 19, and is maintained due to the positioning of roller means 25-27 at a predetermined angle therewith which is here shown as approximately fifteen degrees (15°). In addition, the finned conveyor means 23 is adapted to be driven in the direction of the arrow C at a velocity V_2 which is substantially less than the velocity V_1 at which the first and second belt conveyor means 18 and 19 and the first item conveying means 21 are driven. The finned conveyor means 23 together with the fins 24 mounted thereon are, according to the embodiment of this invention shown in FIG. 4, formed in a manner such that the width thereof is less than the width of any of the incoming card like items 22 and 33-38. This is done, as will be seen below,

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so that the finned conveyor means 23 will have free passage through the slotted stacking chamber S' described below. As aforesaid, the second portion 18b of the first belt conveyor means 18 is extended so that said first belt conveyor means 18 is in a partially overlapping relationship with the finned conveyor means 23. This overlapping relationship between the second portion 18b of the first belt conveyor means 18 and the finned conveyor means 23 is established, as shall become apparent to those of ordinary skill in the art hereinafter, to assure the smooth transition of card like items 22 and 33-38 from the direction of the incoming mail route, indicated by the arrows B, toward the direction indicated by the arrow C.

The second item conveying means 28, which may take precisely the same form as the first item conveying means 21, discussed above, is disposed beneath the finned conveyor means 23 and is adapted to be driven in the conventional manner at a velocity which substantially exceeds the velocity V_2 of the finned conveyor means 23. As indicated in FIG. 4, the second item conveying means 28 is driven in the direction indicated by the arrow D and constitutes a horizontally disposed belt surface. Thus, the edges of the incoming card like items 22 and 33-38 are adapted to rest on the surface of the second item conveying means 28 and in the embodiment of the invention illustrated in FIG. 4, to be driven thereby.

The finned conveyor means 23, the second item conveying means 28 and the second portion 18b of the first belt conveyor means 18, as illustrated in the embodiment of this invention shown in FIG. 4, act in combination to receive incoming card like items 22 and 33-38 from the incoming mail route established between the facing surfaces of the first and second belt conveyor means 18 and 19 and to further convey such card like items 22 and 33-38 toward stacking chamber S' at a reduced velocity V_2 , as determined by the velocity of the finned conveyor means 23. This occurs, as will be seen below, because incoming card like items 22 and 33-38, whose lower edges rest upon and are here driven by the surface of the first item conveying means 21, and transferred in succession to the surface of the second item conveying means 28. Due to the angle of inclination of the direction D of the second item conveying means 28 with respect to the direction B of the incoming mail route as established by the orientation of the first item conveying means 21 and the first and second belt conveyor means 18 and 19 and further, in the embodiment of the present invention illustrated in FIG. 4, due to the angle of inclination of the direction C of the finned conveyor means 23 with respect to the direction D of the second item conveying means 28; the card like items 22 and 33-38 present in said incoming mail route will be broken into small subgroups of individual card like items and forced into the pockets 39 present on the finned conveyor means 23 due to the frictional forces exerted on the edges thereof by the second item conveying means 28 and this action will take place regardless of whether or not such card like items 22 and 33-38 are individually spaced apart in the incoming mail route or in a partially overlapping relationship. Furthermore, since the velocity of the second item conveying means 28 substantially exceeds the velocity V_2 of finned belt conveyor means 23, the card like items 22 and 33-38 present in the incoming mail route are not only broken into small subgroups which are inserted in the pockets 39 on the finned conveyor means 23 but also such small subgroups of card like items 22 and 33-38 are deeply inserted into said pockets 39 due to the frictional force on the edges thereof as exerted by the second item conveying means 28 and the speed differential between said second item conveying means 28 and said finned conveyor means 23. In addition, due to such speed differential and the inertia of the card like items 22 and 33-38 inserted into the pockets 39 of the finned conveyor means 23, the leading edges of said card like items 22 and 33-38 will collide with the bottom of the pockets 39 when inserted

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therein and hence said leading edges thereof will become substantially even in the pockets 39, as illustrated for the card like items 37 and 38, before such card like items 22 and 33-38 reach the stacking chamber S'. Therefore, it will be seen that the stream of card like items 22 and 33-38 conveyed in the incoming mail route established between the facing surfaces of the first and second belt conveyor means 18 and 19 is broken into small subgroups, regardless of whether or not said card like items are in a partially overlapping relationship in said incoming mail route, such small subgroups are deeply placed in the pockets 39 present on the finned conveyor means 23 and said card like items 22 and 33-38 are conveyed in said pockets 39 by said finned conveyor means 23 toward the stacking chamber S' at a velocity V_2 .

The stacking chamber S' is disposed near the end of the finned conveyor means 23 and acts to appropriately stack the card like items received thereby into a uniform bundle of card like items having a commonly positioned edge aligned along a single surface. The stacking chamber S' as illustrated in FIG. 4 comprises a partially closed chamber including support plate means 29, pressure plate means 30 and biasing means 31. The support plate means 29 may comprise, as illustrated in FIG. 4, a plate which includes a flat planar surface portion and a curvilinear end portion provided with a rectangular slot 32 therein. The rectangular slot 32 is dimensioned and provided in the curvilinear portion of the support plate means 29 so that free passage of the finned conveyor means 23 is assured and the removal of card like items from said finned conveyor means 23 is accomplished by the co-action of the card like items, which as stated above have a greater width than said finned conveyor means 23, and the section of the curvilinear portion of the support plate means 29 surrounding the rectangular slot 32. Thus, the support plate means 29 is adapted to receive the leading edges of the card like items 22 and 33-38 supplied thereto by said finned conveyor means 23 as the card like items contained in each pocket 39 of said finned conveyor means 23 are removed therefrom when said finned conveyor means 23 passes through the rectangular slot 32 and upon such passage portions of the leading edges of the card like items contained in each pocket 39 co-act with the segments of the support plate means 29 surrounding said rectangular slot 32 so that said card like items 22 and 33-38 are stopped and retained in the stacking chamber S' on the support plate means 29. Therefore, it will be seen that the card like items 22 and 33-38 contained in each pocket 39 of the finned conveyor means 23, are deposited in the stacking chamber S' so that the leading edges of each of said card like members 22 and 33-38 rest on and are aligned with the surface of the support plate means 29.

The pressure plate means 30 is slidably mounted on the support plate means 29 so that a major surface thereof is perpendicular to the surface of the support plate means 29 at the flat planar portion thereof. The biasing means 31 is interposed between the pressure plate means 30 and the mounting portion 31' thereof so that the pressure plate means 30 continuously acts to maintain a bias on the stacked card like items already present in the stacking chamber S' in a direction toward the finned conveyor means 23. The biasing means 31 has been illustrated in FIG. 4 as comprising a helical spring 31; however, it will be obvious to those of ordinary skill in the art that any of the well known class of devices usually used in conjunction with pressure plate means may be substituted therefor. Thus, the card like items already present and stacked within the stacking chamber S' are maintained in a biased condition to insure the maintenance of the requisite stacking position. However, the pressure plate means 30, acting under the urging of the biasing means 31, will not cause a rejection or the improper stacking of newly arrived card like items 22 and

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33-38 because, as the finned conveyor means acts to convey card like items 22 and 33-38 toward the stacking chamber S', the tip end 44 of each of the fins 24 mounted on said finned conveyor means 23, will, upon the initial entrance of a particular fin into the stacking chamber S' push back the card like members already present in the stacking chamber S' as maintained by the pressure plate means 31 so that newly arriving card like items such as 40 and 41 may be readily accommodated therein. Accordingly, newly arriving card like items are readily admitted to the stacking chamber S' and accurately stacked therein with their leading edges aligned on the surface of the support plate means 29.

In the operation of the embodiment of the stacking apparatus according to the present invention as illustrated in FIG. 4, card like items such as 22 are conveyed in the mail route established in the clearance 20 maintained between the first and second belt conveyor means 18 and 19 with the edges of such card like items resting on the horizontally disposed first item conveying means 21. The first and second belt conveyor means 18 and 19 and the first item conveying means 21 are each driven at a velocity V_1 in the direction indicated by the arrows B and accordingly each card like item such as 22 present in the incoming mail route is conveyed in the direction indicated by the arrows B at a velocity V_1 , regardless of whether or not such card like items are in an overlapping relationship. Accordingly, card like items such as 22 are conveyed by the first item conveying means 21 and the first and second belt conveyor means 18 and 19 toward the finned conveyor means 23 which is angularly disposed, at an angle shown in FIG. 4 as approximately fifteen degrees (15°) as indicated by the arrow C, to the direction of travel, shown by the arrows B, of the card like items such as 22 present in the incoming mail route. As the second belt conveyor means 19 terminates prior to the first item conveying means 21 and the first portion 18a of the first belt conveyor means 18, the card like items such as 22 present in the incoming mail route will be received in a portion of the item conveying path opposite to the finned conveyor means 23. Thereafter, such card like items as illustrated by 22 will be received by the portion of the item conveying path opposite to the second portion 18b of the first belt conveyor means 18 and will be transferred at the end portions thereof from the first item conveying means 21 to the second item conveying means 28 in succession. As was stated above, the finned conveyor means 23 is driven in the direction indicated by the arrow C at a velocity V_2 which is substantially less than the velocity V_1 at which the first and second belt conveyor means 18 and 19 and the first item conveying means 21 are driven, while the second item conveying means 28 is driven in the direction indicated by the arrow D at a velocity which substantially exceeds the velocity V_2 of the finned conveyor means 23 and which may be similar to the velocity V_1 . Thus, incoming card like items 22 and 33-38 whose lower edges rest on and are here driven in the direction indicated by the arrow D by frictional force between the lower edges of said card like items 22 and 33-38 and the surface of the horizontally disposed second item conveying means 28 are forced into the pockets 39 present on the finned conveyor means 23 which is angularly disposed, as indicated by the arrow C, to said second item conveying means 28. Thus, regardless of whether or not some of the card like items 22 and 33-38 originally present in the incoming mail route are in an overlapping or partially overlapping relationship, such card like items 22 and 33-38 will be forced into the pockets 39 present on the finned conveyor means 23 and hence be divided into small subgroups formed of one or more card like items by the rigid fins 24 affixed to said finned conveyor means 23. Accordingly, due to the speed differential which exists between said second item conveying means 28 and the finned conveyor means 23, such small subgroups of card like items will

be deeply inserted into each of the pockets 39 on the finned conveyor means 23 and thereafter be conveyed in such pockets in the direction indicated by the arrow C at a velocity V_2 toward the stacking chamber S'. Furthermore, due to the speed differential between the second item conveying means 28 and the finned conveyor means 23, and the inertia of the card like items 22 and 33-38, the leading edges of each of the card like items 22 and 33-38 inserted into a given one of the pockets 39 of the finned conveyor means 23 will be drawn even, as shown by card like items 37 and 38, with the pocket bottom before said given pocket 39 approaches the stacking chamber S'. Therefore, it will be seen that the card like items present in the incoming mail route are divided into small subgroups and conveyed in a direction and at a speed determined by said finned conveyor means 23 toward said stacking chamber S'.

As each pocket present on the finned conveyor means 23 reaches the vicinity of the roller means 26, the angular orientation of the fin 24 mounted on said finned conveyor means 23 and forming that pocket is changed with respect to the direction indicated by the arrow C since the direction of the finned conveyor means 23 between the roller means 26 and 27 is markedly different, as indicated in FIG. 4, from the direction of the finned conveyor means 23 between the roller means 25 and 26. When this change in the angular orientation of a particular fin 24 occurs, the tip end 44 of the fin 24 forming that pocket engages the surface of a card like item such as 45 previously inserted into the stacking chamber S' and thus appropriately stacked therein. The tip 44 of the fin 24 thus brought into engagement with the surface of a card like item 45 previously inserted into the stacking chamber S' acts to overcome the bias of the pressure plate means 30 and thus provides appropriate space in the stacking chamber S' so that the card like item or items associated with that pocket may be inserted into said stacking chamber S' without causing irregular stacking or other inaccuracies in the stacking process. Thereafter, as that pocket 39 on the finned conveyor means 23 proceeds downward between the roller means 26 and 27 and through the rectangular cut out 32 in the support plate 32, the leading edges of the card like item or items present in a given pocket 39, which as aforesaid have a greater width than the finned conveyor means 23, will not pass through the rectangular cut out 32 so that such card like item or items there present will be lifted out of said given pocket 39 and retained in said stacking chamber S' with their leading edge aligned with the surface of the support plate means 29. The card like items thus lifted out of a given pocket 39 on the finned conveyor means 23 and retained in the stacking chamber S' with their leading edges aligned on the surface of the support plate means 29, are subjected to the pressure of the pressure plate means 30 and hence accurately stacked in said chamber S'. Thus, it will be seen that regardless of whether or not card like items to be stacked are present in the incoming mail route in an overlapping relationship, such card like items will, in the stacking apparatus according to the present invention, be divided into small subgroups containing only a small number of such card like items and thereafter said small subgroups of card like items are individually conveyed to a stacking chamber so that stacking may be accurately and rapidly accomplished therein. Therefore, the stacking apparatus according to the present invention will act appropriately in spite of an overlapping relationship in the card like items supplied thereto to accurately and rapidly stack such card like items in a stacking chamber with the leading edges of such card like items neatly aligned along a prescribed surface.

While this invention has been described in connection with an exemplary embodiment thereof, it will be understood that many modifications and variations of the foregoing teachings will be readily apparent to those of ordinary skill in the art; and that this application is intended to cover any adaptations or variations thereof.

What is claimed is:

1. Stacking apparatus for card like items comprising: belt conveyor means disposed to receive a stream of incoming card like items, said belt conveyor means being adapted to be driven at a velocity which is less than the velocity of the stream of card like items adapted to be received thereby;

a plurality of projecting fin means fixedly mounted on said conveying surface of said belt conveyor means, each of said plurality of projecting fin means being fixedly mounted at predetermined intervals on said conveying surface so as to form a selected acute angle therewith;

at least one additional conveyor means disposed beneath said belt conveyor means and adapted to be driven at a velocity substantially greater than the velocity at which the belt conveyor means is adapted to be driven, for assisting in the insertion of small subgroups of said card like items into spaces on said belt conveyor means defined by said conveying surface of said belt conveyor means and said projecting fin means mounted thereon, said at least one additional conveyor means being adapted to support said card like items received by said belt conveyor means and to frictionally drive said small subgroups of card like items into said spaces in a manner so that the leading edges of each of the card like items in a subgroup are substantially even in the space associated therewith; and

stacking chamber means for stacking card like items received thereby in a neat and orderly manner, said stacking chamber means being disposed in relation to said belt conveyor means to receive successively the subgroups of card like items inserted into said spaces on said belt conveyor means.

2. The stacking apparatus according to claim 1 wherein said stacking chamber means includes means to apply a pressure bias to the card like items stacked therein, said stacking chamber means being further disposed in relation to said belt conveyor means so that just prior to the receipt of a given subgroup of card like items inserted in a space on said belt conveyor means, the projecting fin means associated with said space is operative to substantially overcome said means to apply a pressure bias whereby the card like items contained in said given subgroup of card like items may be readily accommodated in said stacking chamber means.

3. The stacking apparatus according to claim 2 wherein said at least one additional conveyor means is angularly disposed to the direction of conveyance of said stream of incoming card like items.

4. The stacking apparatus according to claim 3 wherein said at least one additional conveyor means is angularly disposed to the direction of conveyance of said belt conveyor means whereby the insertion of small subgroups of said card like items into spaces on said belt conveyor means is assured.

5. The stacking apparatus according to claim 4 wherein said belt conveyor means and said plurality of projecting fin means are dimensional so that the widths thereof are less than that of the card like items adapted to be received thereby.

6. The stacking apparatus according to claim 5 wherein said stacking chamber means includes an apertured portion of appropriate dimensions to allow said belt conveyor means having said plurality of projecting fin means fixedly mounted thereon to pass therethrough but of insufficient dimensions to allow said subgroups inserted in said spaces on said belt conveyor means to pass therethrough, said stacking chamber means being further disposed with respect to said belt conveyor means so that said belt conveyor means passes through said apertured portion thereof, whereby, upon the passage of said belt conveyor means through said apertured portion of said stacking chamber means, said subgroups of card like

items inserted in each space thereon will be removed from said spaces by said apertured portion and retained in said stacking chamber means.

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