

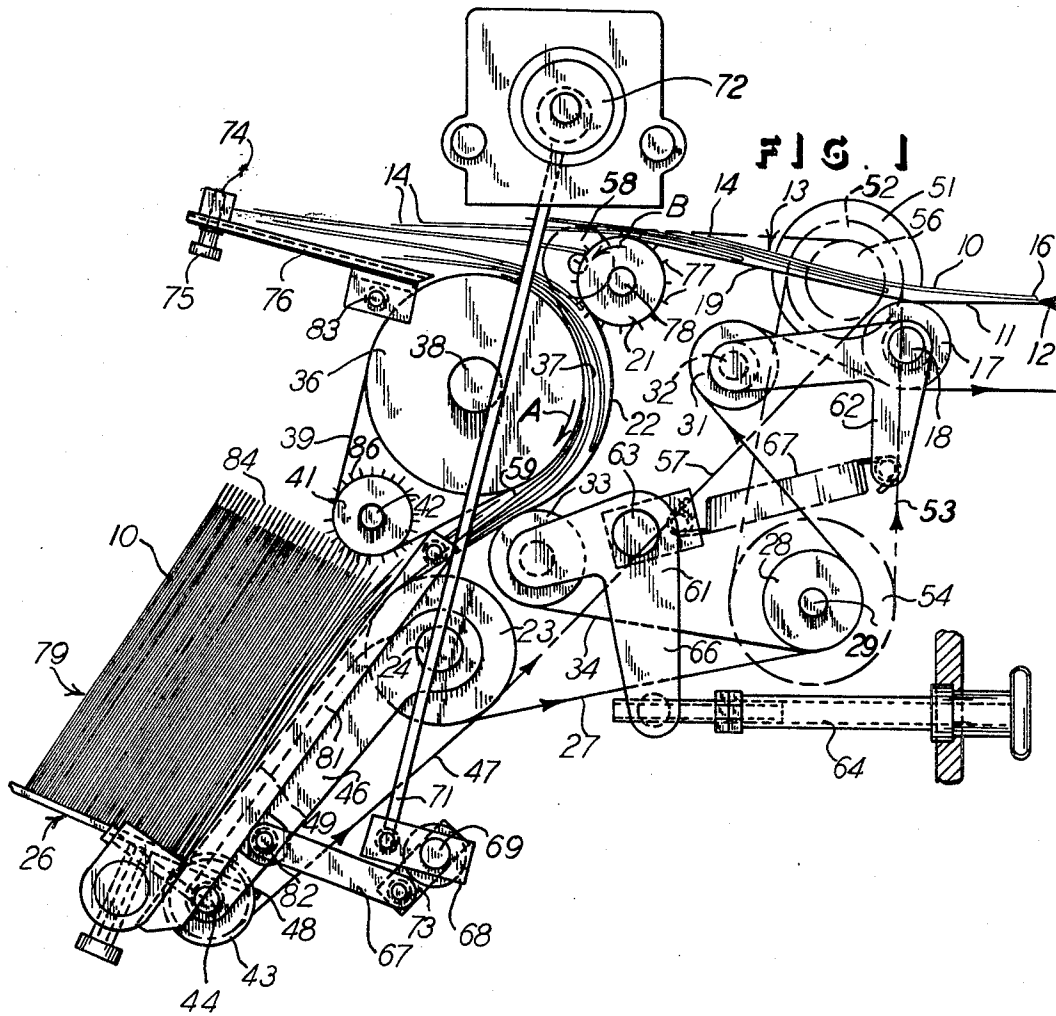
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METHOD AND MEANS FOR STACKING SIGNATURES

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**METHOD AND MEANS FOR STACKING
SIGNATURES**

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5 Claims

ABSTRACT OF THE DISCLOSURE

A method and means for stacking signatures through the use of means and a method for conveying signatures in a stream, and then having the signatures reversed in a stream, and then having the signatures reversed in their end-to-end relation so that the original trailing edge becomes the leading edge. The reversed stream of signatures is conveyed to a receiver where the signatures are stacked in alignment, and the receiver is jogged for final alignment of the signatures in the stack.

Background of the invention

This invention relates to a method and means for stacking signatures. The prior art is aware of forming and conveying an imbricated stream of signatures from a printing press, or folder or other machine, to a receiver or collector box, where the signatures are placed in an aligned stack. The prior art method and means are commonly concerned with positioning the signatures for entry into the receiver or collector box. Normally, the stream of signatures is led into the box so that the signatures are stopped or stripped off their stream form and are stacked toward the side of the stream where the trailing edge, rather than the leading edge, of the signatures is located. One such showing of the prior art is found in my U.S. Patent 2,841,394.

The prior art is also concerned with and directed at the method and means of placing signatures in imbricated form in a stream, and then directing the stream toward a receiver but doing so by altering the direction of the stream in its course to the receiver. This is commonly done to assure that the signatures enter the receiver in proper form with regard to the trailing and leading edges, as mentioned above. It is also done to assure that floor space is conserved, and that the apparatus is most convenient for both layout and handling of the stacked signatures in that the operator then has the receiver disposed at a convenient height without any apparatus above the receiver to interfere with removal of the stack. One such form of this type of prior art is found in my U.S. Patent 3,188,082.

Somewhat of further interest with regard to the prior art, is found in my U.S. Patent 3,188,082 which also shows an engaging rotating member for individually engaging and moving the trailing edges of the signatures. These trailing edges are engaged as they move into the receiver, and the engaging means is arranged so that it assists the removal of the signatures from the conveyor which leads the signatures into the receiver.

The problem which is the concern of the present invention, and the limitation of the prior art, is that the stream of signatures is led in one continuous path to the receiver, with the original leading edge of the signatures being the first and leading edge which enters the receiver. In many types of stackers, this is no real problems, and

it may be an acceptable practice. However, there are instances where it is desired that the original trailing edge of the signatures in stream form, becomes the leading edge at the time that the stream of signatures enters the receiver.

Reversing the signatures in their end-to-end relation during the course of movement to the receiver, is particularly important where the signatures are folded at their trailing edges in the original or initial position in the stream. In that instance, it is desirable to move the signatures into a position where the initial trailing edge, which is folded, will become the leading edge in entering the receiver. This permits the signatures to be better aligned in the stack in the receiver, and also facilitates jogging the stack since the folded edges are down.

Brief description of the drawing

FIG. 1 is a side elevational view of a preferred embodiment of the means utilized in this invention.

Detailed description of the preferred method and means

Signatures 10 are disposed on a conveyor belt 11 in an overlapped or imbricated form. These signatures 10 may come from a printing press, a folder, or other machinery which drops the signatures onto the belt 11 moving in the direction indicated by arrow 12. That is, the signatures in the stream shown in that first section generally designated 13 are moving to the left in FIG. 1, and the printing press, folder, or the like is not shown. These signatures 10 are therefore shown to have a leading edge 14, which is of free or unfolded ends, and a trailing edge 16, which is a folded edge. The conveyor 11 is trained about a pulley 17 which may be rotatably mounted on a shaft 18.

Another conveyor or belt 19 is disposed below the stream section 13, and it is also trained about the pulley 17, or one like it on the shaft 18. The belt 19 is further trained about a pulley 21, and a section 22 of the belt 19 continues about a pulley 23 which is rotatably mounted on a shaft 24 which becomes a pivot point and fixed shaft for mounting a receiver 26, as described later. The belt 19 then continues through a section 27, and around a pulley 28 on a shaft 29, and it continues around a pulley 31 on a shaft 32, and then back to being trained over the pulley 17.

Another section of the belt 19 is trained about a pulley 33, and then the belt section 34 continues from the pulley 33 to the pulley 28. This permits a doubling of the belt 19 through its section 22 and adjacent a large drum 36 which supports one side of the second section designated 37 of the stream of signatures.

The drum 36 is rotatably mounted on a shaft 38, and it carries a belt 39 trained about a pulley 41 rotatable on a shaft 42.

Finally, a lower pulley 43 is rotatably mounted on a shaft 44 supported on an arm 46. A belt 47 is trained between the pulleys 43 and 23, and this belt carries the stream of signatures downwardly and into the receiver or box 26. Actually, the box 26 has a floor 48 which extends through the length 49 of the belt 47 to intercept the leading edges of the signatures 10 and to strip them from their stream and imbricated relation to cause them to stack in aligned form along the floor 48.

Various and conventional means can be used for driving the conveyor means of belts 11, 19, and 47. One

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means indicated is a motor 51 which drives a pulley 52 carrying a drive chain 53 leading to a pulley 54 for rotating the shaft 29 and therefore the pulley 28 is rotated. Another pulley 56 is shown driven by the motor 51, and it carries a chain 57 leading to a pulley 58 and to the pulley 23. By driving the pulley 23, the belt 47 is driven in the direction required to move the belt section 49 downwardly to bring the signatures 10 into the box 26, as mentioned.

Also, a drive chain extends from the pulley 58 through a chain section 59 which is therefore partially wrapped or trained around the drum 37, to rotate the latter. The chain section 59 continues around the pulley 23 for the drive of the pulley 23 as mentioned above. Of course the pulley 36 is therefore moving in the direction of the arrow designated A, and it brings the stream section 37 downwardly and into the receiver 26, as desired.

Two bell-cranks 61 and 62 are shown mounted on the shafts 63 and 18. An arm of each of the respective cranks 61 and 62 carries the pulley 33 and 31, respectively. The other arms of the cranks 61 and 62 are movable for adjustment of the tensioning of the conveyor means or belts trained on the pulleys 31 and 33. Thus, a screw adjusting means 64 will displace the bell-crank arm 66, and a tension spring 67 extends between the cranks 61 and 62 to urge the crank 62 into an adjusted position also.

The receiver 26 is shown to be vibrated by movement of the arm 46 about its pivot mounting 24. Thus linkage 67 and 68 are suitably mounted on a fixed pin 69. A rod 71 connected to the arm 68 and extends upwardly to an eccentric 72 which is suitably rotated for axial displacement of the rod 71 in substantially an up-and-down direction. Such displacement causes a rocking motion of the arm 68 which in turn rocks an arm 73 and which in turn moves the link 67 to jog or vibrate the signatures 10 in the receiver 26.

The important feature of the method and means herein described is that the signatures 10 are brought through their initial stream section 13, and they are turned end-to-end so that their leading edges 14 in the original position become the trailing edges when the signatures enter the box 26. Thus a stop or abutment 74 is disposed in the path of the stream of signatures in section 13, and the signature leading edges 14 abut the stop 74. This causes the signatures to fall into a position on the conveyor means or drum 36 in a reversed position so that the folded edges 16 are now the leading edges as the signatures move into their stream section 37 around the drum 36. Guide means 76 are provided for guiding the signatures 10 as they are stopped and reversed in their stream direction. Also, the pulley 21 is shown to have projections or brushes 77 which engage the trailing edges or folded edges 16 of the signatures 10 and move them from their original stream section 13 and downwardly into contact with the belt section 22 extending partially around the drum 36 and one side of the stream section 37, as shown.

Thus the pulley 21 is mounted on a shaft 78 so that the pulley rotates in the direction of the arrow B to move the stream 13 as well as engage the folded signature ends or edges 16 as mentioned.

The stop 74 is adjustable along the guide or interceptor 76, disposed below the level of the conveyor 19, by adjusting screw 75, so that accommodation can be made for different lengths of signatures 10. The significance of reversing the direction of signatures 10 is to have folded edges 16 come into the receiver 26, and this provides the easiest means for alignment of the signatures. It is particularly important where the signature edges 14 are uneven, as shown. Such uneven lengths in the sheets of the signatures 10 is desired for other handling of the signatures 10, such as in engaging the longer sheet to open the signature for assembly with other signatures in the bindery. However, such uneven length is not wanted in the stacking in the box 26, so the signatures are reversed.

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The method and means of reversing are both described in the foregoing.

Any time folded signatures are to be stacked, even those with sheets of even length, reversing is desirable. Also, the speed of reciprocation of the box 26 is from one to two times the speed of gravity, which is the speed at which the stack 79 will fall. The stack is shown inclined upwardly, so the bottom signature is contacted by a wall 81 of the box 26. The link 67 is pivotally pinned to the wall 81 by a pin 82. Also, the shaft 69 is a rock shaft, rockable about its axis, to induce the joggling described. So the stack is not allowed to fall to a position of rest or permanent contact with the wall 81.

The guide 76 is pivotal about a mounting pin 83 to be angled as desired, and preferably downwardly, as shown. Then the signatures 10 can be engaged at their folded edges by the drum 36, and the brush 77, for conveyance into the second section described.

The pulley 41 may engage the signature top edges, designated 84, in the box 26 to move the top edges to the left in FIG. 1 and thereby clear the entrance to the box for following signatures. Brushes or bristles 86 are shown on pulley 41 to brush the sheet edges 84 to the left and away from the box entrance, in the manner indicated.

What is claimed is:

1. In a signature stacker including conveyor belt means for supporting signatures in an imbricated relation and for moving said signatures in a horizontal stream in their edgewise direction and with the trailing edges of said signatures in contact with said conveyor belt means and with the leading edges of said signatures disposed over said trailing edges, a stop disposed in the path of said leading edges of said signatures for abutting said leading edges and reversing the direction of said signatures to have said leading edges become trailing edges, the improvement comprising said conveyor belt means including a horizontally disposed first section and a vertically disposed second section with said two sections being one continuous conveyor belt, said second section including an additional conveyor belt movable with the first said continuous conveyor belt for positively holding said signatures between said second section and said additional conveyor belt, and receiver disposed adjacent said second section of said continuous conveyor belt for stripping said signatures off said continuous conveyor belt and stacking them in an aligned stack on said receiver.

2. The subject matter of claim 1, including a rotatable drum-type pulley supporting said additional conveyor belt and being disposed at the entrance of said signatures to said second section and being adapted to move said signatures from the horizontal direction to the vertical direction.

3. The subject matter of claim 1, including a pivot support for said receiver and adjacent the entrance thereof, oscillating means operatively connected to said pivot support for vibrating said receiver to jog said stack, a pulley rotatably mounted on said pivot support, and a stacker belt trained on said pulley for pulling said signatures into alignment in said receiver.

4. In a method of stacking signatures, the steps of arranging and horizontally moving said signatures edgewise in a first section of an imbricated stream and with the opposite faces of said signatures horizontally disposed, stopping said signatures in their stream movement, reversing said signatures in their end-to-end relation in said stream, moving said signatures into a second section of a reversed imbricated stream with the pre-reversed original trailing edges of said signatures being the leading edges, the improvement comprising the steps of engaging both opposite faces of said signatures after reversing said signatures into said second section, positively holding said signatures in said second section, moving said signatures vertically downwardly in said second section, and stripping said signatures out of said second section and stacking said

signatures into an aligned stack at the lower end of said second section.

5. The method of claim 4, including the steps of disposing said stack at an inclined angle from the entrance of signatures in said stack, and jogging said stack in an upward direction along said inclined angle and at a speed faster than said stack can fall to a position of rest.

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