

Oct. 19, 1965

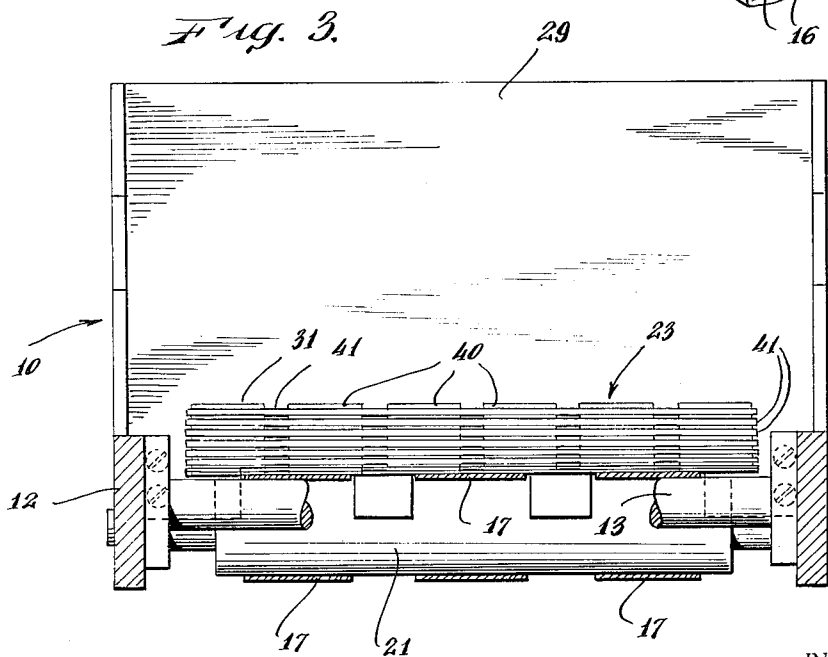
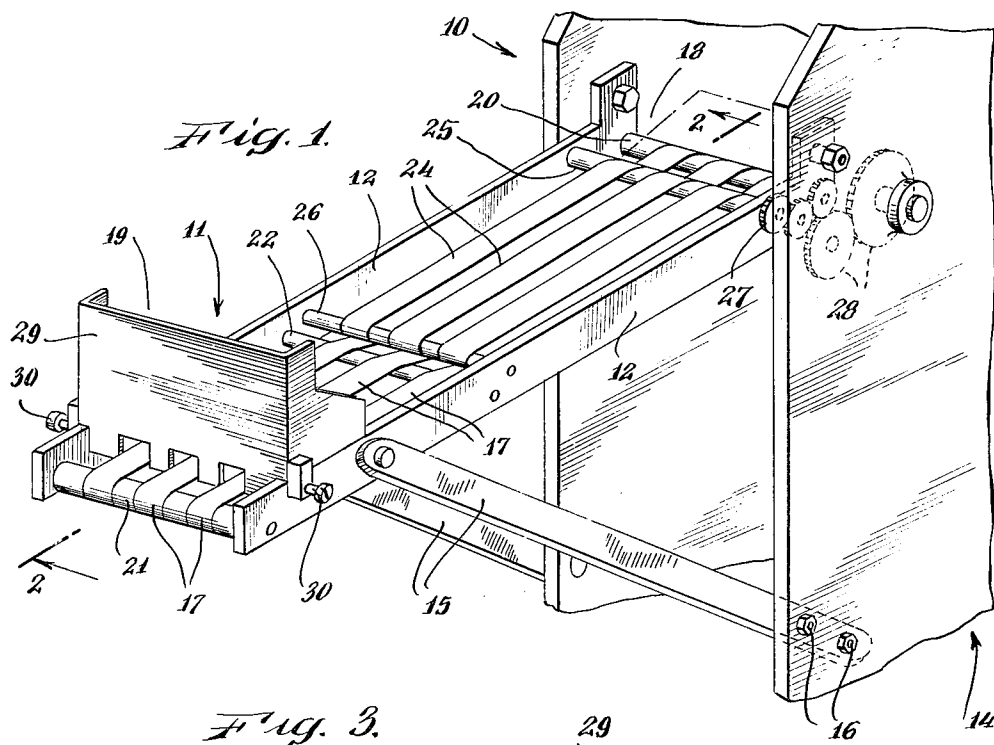
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3,212,774

STACKING APPARATUS

Filed Jan. 6, 1964

3 Sheets-Sheet 1



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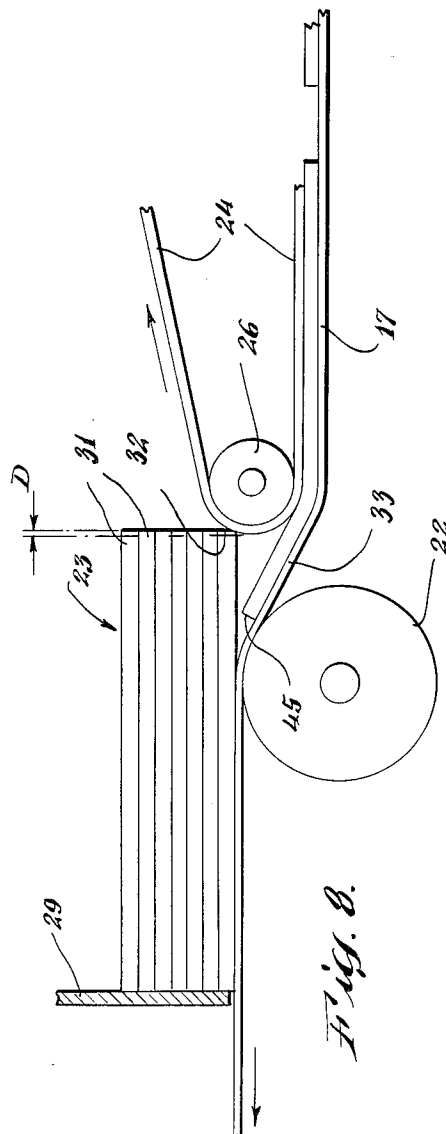
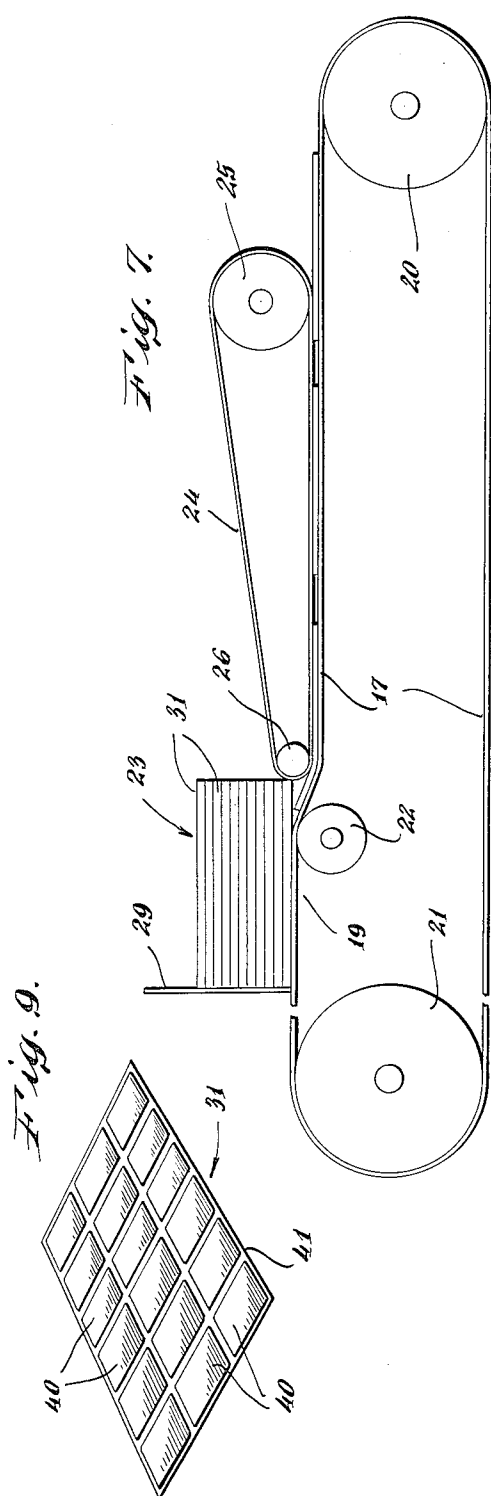
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STACKING APPARATUS

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3 Sheets-Sheet 3



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3,212,774

STACKING APPARATUS

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7 Claims. (Cl. 271—68)

This invention relates to a stacking apparatus and more particularly to a compact portable apparatus connectable to an automatic machine producing articles having a generally smooth side and at a high rate of speed.

For example, the development of pressure sensitive adhesive material has fostered the manufacture in large quantities of labels having one side treated with this material. To facilitate the handling and the printing of these labels they are mounted in group on backing sheets. It is difficult to pile or stack the backing carrying the labels on top of each other due to the irregular surface presented by the mounted labels, as the sheets come from the press. I have found that by sliding a backing sheet having labels mounted on the top side thereof underneath a preceding backing sheet, which of course has a relatively smooth surface, that I can form a pile of these sheets without jamming and do so very fast.

Therefore, it is one object of my invention to provide a bottom stacking apparatus for handling such type of articles. Another object of my invention is to be able to rapidly stack limp materials such as polyethylene bags as they leave the automatic machine.

In connection with certain materials used today, I have found that for high speed stacking the leading edge of articles advancing to stack formation must constantly be supported and not be required to jump gaps or be picked up by other moving surfaces, hence another object of my invention is to provide an advancing surface with which the leading edge of the article to be stacked is always supported by being continuously in contact therewith.

Still another object of my invention is to provide a stacking apparatus to handle relatively thin articles which are not as flexible as heretofore mentioned, as for example, packages.

A further object of my invention is to provide a simple apparatus which can be easily carried about and connected to the outgoing side of automatic machines such as a printing press or packaging machine.

Other objects and a fuller understanding of my invention may be had by referring to the following description and claims, taken in connection with the accompanying drawings in which:

FIGURE 1 is a perspective view of my stacking apparatus connected to an automatic machine;

FIGURE 2 is a sectional elevation taken along line 2—2 of FIGURE 1;

FIGURE 3 is a sectional elevation taken along line 3—3 of FIGURE 2 and somewhat enlarged;

FIGURE 4 is a longitudinal sectional elevation of another embodiment of my invention;

FIGURE 5 is a top plan view of a portion of the apparatus shown in FIGURE 4;

FIGURE 6 is similar to FIGURE 4 showing an article having advanced from the position shown in FIGURE 4;

FIGURE 7 is a schematic view illustrating my invention;

FIGURE 8 is a schematic view illustrating another embodiment, and

FIGURE 9 illustrates one type of article to be stacked.

With reference to the drawings, the invention is generally designated by the numeral 10. A frame 11 composed of side bars 12 held together by cross bars 13 supports the essential components of this device as will be subsequently described in detail. Referring to FIG-

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URE 1 the device is illustrated as attached to an automatic machine 14 as for example a printing press by any suitable means such as a bracket 15 and bolting members 16.

The numeral 18 designates the end for receiving articles 31 as they leave the printing press 14 to be stacked at the opposite or stacking end 19. The article in this case comprises a backing sheet 41 having mounted thereon a gang of labels 40. A continuous conveyor belt 17 is supported at the receiving end 18 by a roller 20 journaled in opposite side bars 12 and supported at the stacking end 19 by a roller 21 also journaled in the side bars 12. The upper reach A of the belt spanning the distance between the rollers 20 and 21 is supported by an intermediate roller 22 also journaled in opposite side bars 12. The first section, B of this reach A between roller 20 and intermediate roller 22 receives the articles 41 from the printing press 14 at a high rate of speed and advances them to the second section C of reach A between intermediate roller 22 and roller 21 at the stacking end which second section C serves as a bottom for the stack pile 23. A crossbar 13 extending between the two side bars may be mounted against the lower surface of second section B to provide additional support for the stack pile if needed.

A back stop 29 is movably mounted on the side bars 12 and secured by clamping bolts 30 thereto to arrest the advance of articles reposing on the second section C of the conveyor belt at a desired position as will be subsequently explained.

Another continuous belt 24 is mounted above the first section B of the lower belt 17 between rollers 25 and 26 at the receiving and stacking ends respectively so that the lower reach thereof engages articles 31 reposing on the first section B of the lower belt 17, and also may engage the surface of first section B if the upper and lower belts are adjusted for thin articles.

A single belt or a plurality of belts may be used depending on the nature of articles to be handled. As illustrated in the drawing I have used three spaced lower belts and three spaced upper belts, each upper belt is arranged to cooperate with a companion lower belt for a given distance as will be subsequently described. In this description a single lower belt and a companion single upper belt will be referred to but if a plurality of companion belts are used they will be identical.

Roller 20 at the receiving end of lower belt 17 is driven by a suitable gear train 27 connected to a companion train 28 on the printing press 14. However, if so desired, the roller 20 may be driven by an electric motor or other independent source of power. In the preferred embodiment of this invention I drive the roller 25 and hence upper belt 24 by a gear train 27 connected with the gear train 28 of the lower belt 17 so that both belts 17 and 24 are moving at the same lineal rate of speed and to advance articles 31 to the left as viewed in the drawings.

As shown clearly in FIGURES 2 and 7 roller 26 at the delivery end of upper belt 24 is mounted adjacent intermediate roller 22 with its lower surface below the upper surface of intermediate roller 22 so that the lower reach of upper belt in engaging the first section B of lower belt reach A or an article 31 reposing on section B as they approach intermediate roller 22 deflects the portion adjacent the intermediate roller 22 to form an upwardly directed ramp or slope 33 in section B terminating at the top of intermediate roller 22.

An article 31 reposing on first section B is advanced up this ramp and enters the stack 23 underneath a preceding article 31 at the bottom of the stack 23 which has been arrested by back stop 29 when its trailing edge 32 is just short of intermediate roller 22.

As the leading edge 45 of article 31 is always reposing on the continuous surface of reach A from first being deposited thereon at receiving end 18 to completion of its travel in the stack end 19 a smooth uninterrupted advance is always assured even at high speed.

In another embodiment shown clearly in FIGURE 8 delivery roller 26 may in addition to being located in reference to intermediate roller 22 may be located in reference to stack 23 by a distance D so that the trailing edge 32 of the lowermost article 31 in the stack pile is engaged by upper belt 24 as it passes over roller 26 and is thus continually urging trailing edge 32 away from slope 33 to insure that the leading edge 45 of article 31 will enter stack pile 23 between the lowermost article 31 and the second section C.

In another embodiment shown in FIGURES 4 and 6 I mount intermediate roller 122 in a pair of journal boxes 34 which can be adjusted in longitudinal slots 36 as may be desired.

In still another embodiment as also shown in FIGURES 4 and 6 I mount delivery roller 126 in a pair of journal boxes 35 which are vertically adjustable in slots 37. In this latter embodiment I may mount the journal boxes 147 so that they are free to move and rely on their weight to bias the upper belt 24 against the first section B of the lower belt or in the preferred form I may use resilient means as for example helical springs 51 to effect the desired bias force.

This construction provides for thick or nonflexible articles 131 to be stacked as shown in FIGURES 4 and 6.

In addition to providing a uniform bias force this construction provides a sort of relief valve for rigid or semi rigid articles as they are advanced past the roller 126 as shown for example, in FIGURE 6.

The operation of the apparatus described up to this joint will now be explained.

The articles 31 to be stacked, as for example a backing sheet containing a gang of labels mounted on the top side thereof, leave the automatic machine, which in this case may be a printing press, with the smooth side of backing sheet toward the lower belt 17 and are fed on to the top surface of the belt 17. As the articles 31 are advanced by the moving belt 17 they enter the space between both of the belts 17 and 24 and subsequently become engaged by the companion surfaces both belts 17 and 24 as they advance toward the stack 23.

Assuming, for descriptive purposes, no articles 31 have advanced to stack position and the course of the first article 31 to be deposited on the belt 17 from the printing press is now described. This first article 31 is engaged by both belts 17 and 24 as it advances to the delivery roll 26 whence it is carried by first section B of belt 17 upwardly on slope 33, as viewed in FIGURE 2, and at an angle to the plane of the second section C between rolls 21 and 22 and continues to advance until it is arrested by the back stop 29 with the trailing edge of article 31 stopping just short and to the right (as also viewed in FIGURE 2) of roll 22.

The second or next following article 31 advances and continues up the ramp or slope 33 of section B between rolls 26 and 32 and is directed by the extended trailing edge 32 of the first article resting at the base of the stack to advance beneath or between the first article 31 and the belt section C at the base of the stack 23 and continues to advance until arrested by back stop 29.

The diameter of the delivery roller 26 is preferably of small diameter as for example $\frac{1}{2}$ inch in order that the upper belt 24 may be positioned very close to the trailing edges 32 of articles 31 in the stack 23 position to enable the upper belt 24 to apply its advancing influence as long as possible when so desired.

Although I have described my invention with a certain degree of particularity, it is understood that the present disclosure has been made only by way of example and

that numerous changes in the details of construction or use and the combination and arrangement of parts may be resorted to without departing from the spirit and scope of the invention as hereinafter claimed.

5 What is claimed is:

1. In an apparatus for accumulating articles in stack formation, a driven conveyor first belt mounted between a first roller and a second roller having a continuous upper reach therebetween supported by an intermediate roller; said reach having a first section between said first roller and said intermediate roller for receiving an article to be stacked and advanced to a second section between said intermediate roller and said second roller forming a side of a stack formation; stop means located adjacent said side to engage an advancing article reposing on said second section to arrest its advance when its trailing edge is short of said intermediate roller; a second belt mounted between a third roller and a fourth roller in proximity to said first section having a portion thereof moving along generally parallel with said first section to engage an article being advanced by said first section; said third roller so located relative to said intermediate roller that a portion of said second belt adjacent thereto exerts a force against an article engaged by said first section as its approaches said intermediate roller to deflect a portion of said first section so that said approaching article is directed to enter said stack formation between said trailing edge and said second section and continue to be advanced there between until arrested by said back stop.

2. In an apparatus for stacking articles having a generally smooth side as received from an automatic machine, a driven conveyor first belt mounted between a first pair of rollers having a generally horizontal continuous upper span supported by an intermediate roller; said span having a first section extending from one of said rollers to said intermediate roller for receiving and advancing an article to be stacked and a second section extending from said intermediate roller to the other of said first pair of rollers forming a bottom side for supporting a stack formation; stop means adjacent said side to engage an advancing article reposing on said second section to arrest its advance when its trailing edge is short of and overhangs said intermediate roller; a second belt mounted between a second pair of rollers above and in proximity to said first section having a lower portion moving along generally parallel with said first section to engage an article reposing on said first section; one of said second pair of rollers located adjacent and relative to said intermediate roller so that a portion of said second belt adjacent thereto exerts a downward force on an article reposing on said first section as it approaches said intermediate roller to deflect a portion of said first section to form a ramp approaching said bottom side whereby said approaching article reposing on said ramp is directed to enter said stack formation and advance therein underneath said trailing edge until arrested by said back stop.

3. In the apparatus of claim 1, said second belt being driven at the same lineal rate of speed as said first belt is driven.

4. In the apparatus of claim 3 said second belt so located relative to said stack formation that the trailing edge of at least the lowermost article in completed position in said stack formation is engaged by said second belt as it passes over one of its supporting rollers to maintain said trailing edge in a sufficiently raised position to guide the leading edge of an article approaching said trailing edge into said stack formation.

5. In the apparatus of claim 1 said third roller mounted in a pair of journal boxes movable transversely to the plane of said first section and biased to urge said third roller and second belt supported therein toward said first section and against an article engaged by said first section as it approaches said intermediate roller.

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6. In the apparatus of claim 1, said intermediate roller mounted in a pair of journal boxes movably adjustable parallel to the plane of said second section.

7. In an apparatus for stacking articles received from a production machine, an elongated frame comprising a pair of spaced parallel longitudinal supporting members having means at one end of said frame to connect with said machine, a first pair of transverse rollers mounted between said members adjacent ends thereof, one of which rollers is driven; a conveyor belt connected between said rollers having its upper reach supported by an idle intermediate roller mounted between said members; said intermediate roller dividing said reach into a first section for receiving and advancing articles to be stacked and into a second section of said reach on which said articles are stacked; a back stop adjustably mounted on said frame adjacent said second section to engage an advancing article reposing on said second section and arrest its advance when its trailing edge is short of said intermediate roller; a second belt supported in generally

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parallel proximity above said first section on a second pair of rollers mounted between said members so that a portion of said second belt engages articles reposing on said first section; one of said second pair of rollers positioned adjacent and relative to said intermediate roller such that said second belt in engaging an article on said first section exerts a downward force to deflect said first section in its immediate approach to said intermediate roller forming a ramp to said second section so that an article reposing on said ramp is directed to enter and advance into stack formation under said trailing edge.

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