Dec. 3, 1957 H. H. WEBER ET AL 2,815,210

APPARATUS FOR STACKING BAGS AND THE LIKE

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Fig. 1

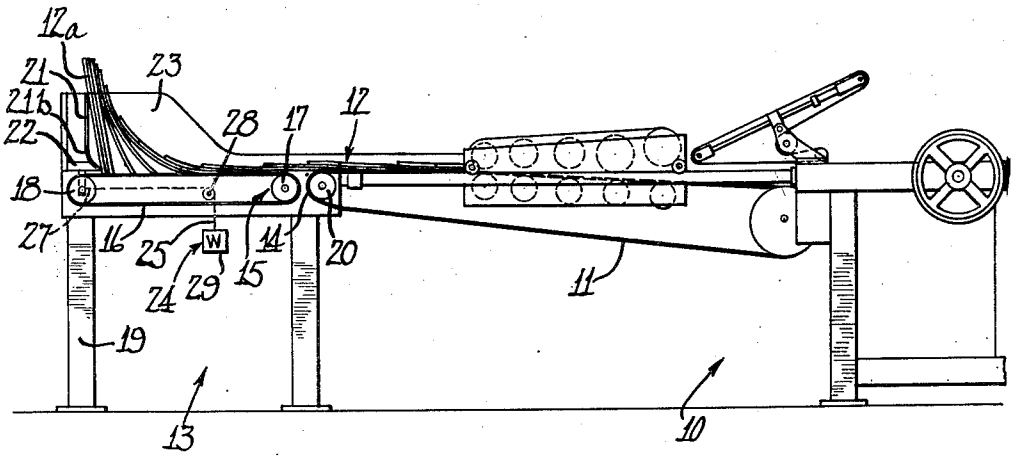
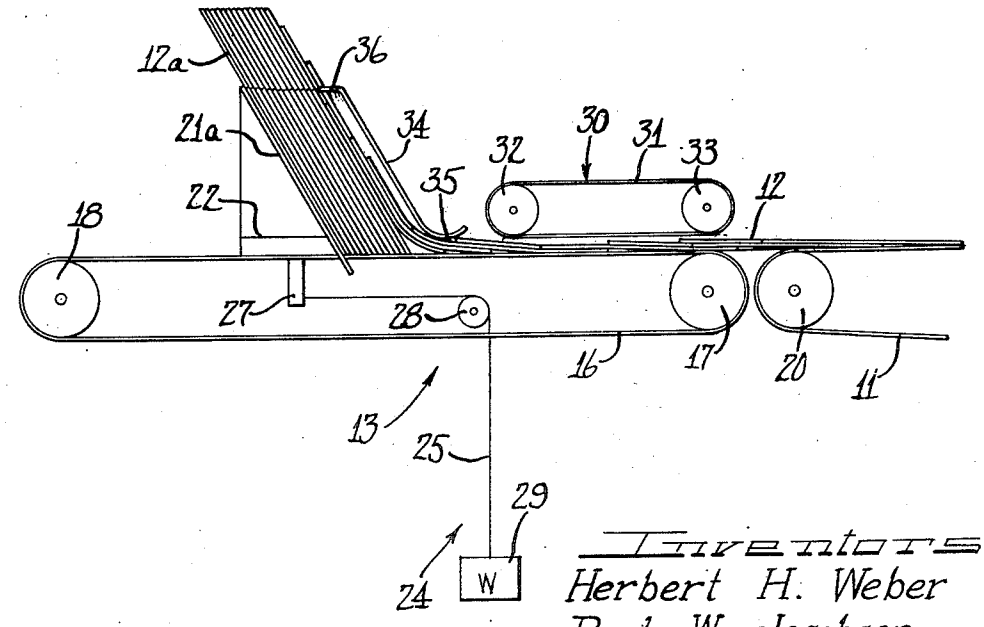


Fig. 2



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Fig-3

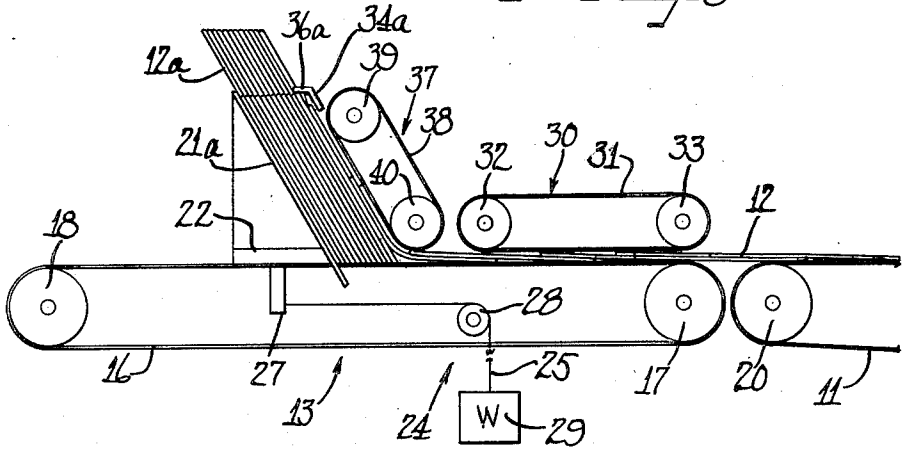


Fig-4

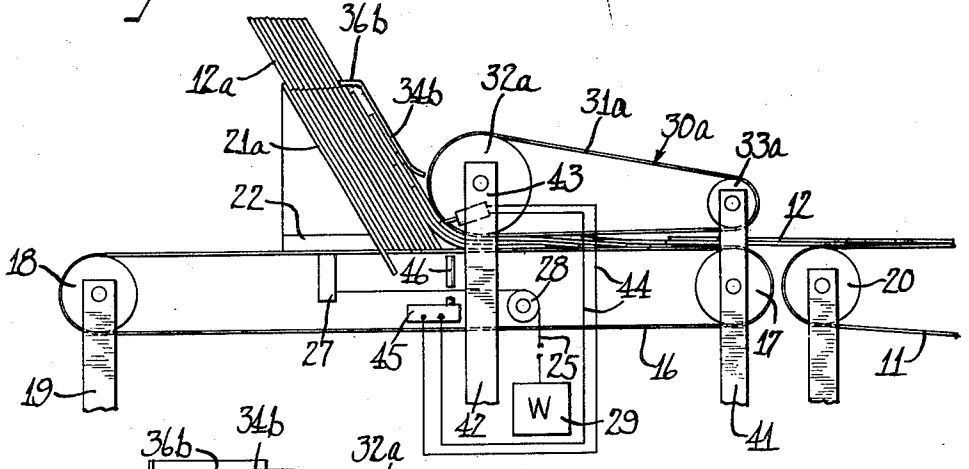
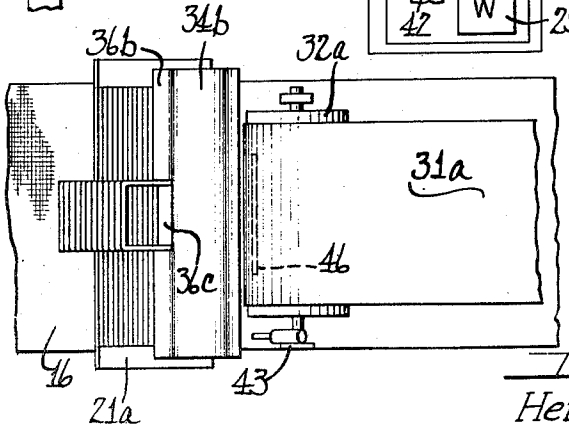


Fig-5



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APPARATUS FOR STACKING BAGS AND THE LIKE

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3 Claims. (Cl. 271—87)

The present invention relates to apparatus for stacking bags and the like and more particularly relates to apparatus for substantially vertically stacking bags or sheet material or the like to facilitate handling thereof.

When handling such articles as bags including, for example, ordinary paper bags or various types of shopping bags and the like, or such other materials as flexible sheet materials, it is necessary for high production rate techniques that the bags or sheet materials be evenly stacked in some manner whereby the handling time and counting and wrapping or tying or otherwise packaging thereof be reduced to a minimum. Heretofore, especially in the bag handling and making industry, the articles issuing from the output end of the bag-making machines have been stacked in a principally "by chance" manner with the result that handling, counting and packaging techniques therefor have been highly time-consuming and expensive. Usually, the "by chance" systems used included merely a stop plate against which the bags collided and fell to a horizontal position as between guides or the like such as, for example one might find on a mimeograph machine or other duplicating machine. The bags were thus stacked rather haphazardly and in a horizontal position so that it has been very difficult and expensive to prepare the bags for shipment.

The problem has been particularly acute in conjunction with the stacking and handling of such bags as shopping bags and the like because the strap handles on the open end of the bag make is particularly difficult to properly stack the bags for handling and shipment. For this reason the present invention, while being applicable for stacking sheet material in bags, etc. generally, is described herein in particular reference to the stacking of shopping bags. As an example of the efficiency of apparatus and methods embodying the principles of this invention, and the exemplified form shown and described herein is not otherwise intended as any limitation on the present invention.

In accordance with the principles of the present invention an embodiment thereof is operative as a take-off from a bag strap machine such as one operable to apply strap handles to shopping bags as by stapling and/or gluing the strap handles on the bags, after which the take-off will operate to evenly and substantially vertically stack the bags for efficient, easy and economical handling of the bags in preparation thereof for shipment and/or use. From a bag strap machine, take-off in accordance with the principles of this invention receives the bags on a rough surface conveyor belt such as a high friction surface belt or a screen mesh belt or the like and transports the bags to a back stop which deflects the bags to a vertical or upright position as the same are fed towards the back stop on the rough top conveyor belt. The bags are received from the bag strap machine in a shingled relation to each other so that after deflection of the first bag all the remaining bags fed through follow the first bag as the first bag is deflected. Since a conveyor has a rough or relatively high friction conveying

surface, the shingled bags continue to feed forwardly, while those bags already stacked remain properly stacked against the back stop and the feeding shingled bags slide with respect to one another as they are stacked so that they are properly aligned and in a vertical position at the end of the take-off and stacking operation.

Thus, it is an important feature and object of the present invention to provide new and improved take-off method and apparatus for bags and sheet material and the like to properly substantially vertically stack the same for convenient and economical handling thereof.

Another important object of the present invention is to provide new and improved method and apparatus for take-off and stacking of bags and particularly bags having strap handles thereon by feeding the same on a relatively high friction conveyor to a deflector causing the bags to stack in a vertical position.

Yet another object of the present invention is to provide new and improved method and apparatus for bag stacking and stacking of sheet material wherein interruption of the flow of the bags or sheet material is accommodated by means operative to deflect the leading bag or sheet when flow of the bags or sheets is resumed whereby that leading sheet will not cause jamming of take-off mechanism by jamming against already stacked bags and sheets.

Still other objects, features and advantages of the present invention will become readily apparent from the following detailed description of the present invention and embodiments thereof, from the claims, and from the accompanying drawings in which each and every detail shown is fully and completely disclosed as a part of this specification, in which like reference numerals refer to like parts, and in which:

Figure 1 illustrates a take-off and stacking mechanism embodying the principles of this invention;

Figure 2 illustrates another embodiment of the invention;

Figure 3 illustrates still another embodiment of this invention;

Figure 4 illustrates yet another embodiment of the invention; and

Figure 5 is a fragmental plan view of a portion of the mechanism of the embodiment of the invention illustrated in Figure 4.

As shown on the drawings:

In the bag-working system illustrated in Figure 1, there is a bag strap machine **10** which is operative to apply strap-like handles to bags by such convenient means as stapling and/or gluing or the like. In the bag strap machine **10** the bags are fed forwardly therethrough on a conveyor **11** which further feeds the bags **12** forwardly to a stacking mechanism **13** operative in accordance with the principles of the present invention.

As the bags **12** are fed forwardly on the conveyor **11**, they reach the front end **14** thereof and are there received on the stacking conveyor **15** which further transports the bags for stacking the same in a substantially vertical position. In the stacking mechanism **13** the conveyor **15** includes a belt **16** carried on a pair of rolls **17** and **18** at least one of which is driven by any convenient motor means. Further, the rolls are supported on a base or stand structure **19** which also carries the lead roll or head end roll **20** of the conveyor **11** for the bag strap machine **10** so that the two conveyors have the upper surfaces thereof at substantially the same level and are sufficiently close together so that bags passing from one conveyor to the other will not fall between the conveyors.

When the bags leave the bag strap machine **10** they are disposed in a shingled relation with respect to each other. That is, the bags are substantially overlapped one

upon the other so that they have a shingle appearance with respect to each other with only the front end thereof or handle end thereof being exposed. As the shingled bags are fed onto the conveyor belt **16**, the relatively high friction or roughened exterior face of the belt **16**, which belt may be a high friction surface belt or a screen mesh belt or the like, the bags are continued to be fed forwardly until the leading bag **12***a* engages a deflection backstop **21**. As the leading bag **12***a* engages the deflection backstop **21**, the bag will be deflected upwardly to a substantially vertical position as shown; the roughened face of the belt **16** being effective to drive the bottom end of the bag forwardly and thus force the bag **12***a* upwardly to its erect vertical position. The remainder of the bags, since they are shingled, will follow the path of the bag **12***a* except that they will slide with respect to one another and thereby be stacked in the substantially vertical position as shown with the strap handles thereof at the top of the bag stack. In each instance the roughened upper surface or high friction upper surface of the belt **16** will continue to drive the bags forwardly and upwardly until they reach the vertical position defined theerfor by the deflection backstop **21**.

The deflection backstop **21** is preferably a relatively movable backstop carried on a bracket assembly **22** which is slidable between side guide plates **23** and which is carried on a rail slide structure. In this construction it is also preferred that the backstop be biased against the force of the bags carried on the friction drive belt **16** and to this end the backstop **21** may be either spring-biased toward the bag strap machine **10** as by a spring or biased toward the bag strap machine **10** by a pulley and weight arrangement **24** wherein a flexible cable **25** has one end thereof secured to the support brackets **22**, as indicated at **27**, is trained over a pulley **28**, and has the other end thereof secured to a weight **29**. When relatively few bags are stacked against the backstop **21**, the friction forces are relatively small and the weight will hold the deflection backstop **21** in its position closest to the bag strap machine **10**. As the bags are stacked and accumulate on the belt **16**, and against the backstop **21**, however, the forces increase and tend to drive the backstop rearwardly to the position shown in Figure 1. At any particular time any desired number of bags may be removed from the take-off or stacking mechanism and the operation will continue in the manner described to thereby continue stacking the bags in a substantially vertical position where they are most convenient to handle for counting, packaging or tying and shipping.

A modified system embodying the principles of this invention is illustrated more or less diagrammatically in Figure 2 wherein the bags **12** are retained in engagement with the friction face belt **16** of the take-off **13** by a third conveyor **30** including a belt **31** and a pair of rolls **32** and **33** which are journaled on the take-off mechanism **13** and which may be either idler rolls or driven rolls for idling or driving the conveyor belt **31**. This supplementary conveyor is disposed above the high friction conveyor **16** and holds the bags **12** in close engagement with the high friction belt **16**. Close to the head roll **32** of the supplementary conveyor **30**, there is mounted on the take-off a relatively low friction polished guide plate **34** having a rearwardly and upwardly curved lower end **35** under which the bags pass for holding the bags in relatively firm engagement and in close shingled relation to each other yet permitting sliding thereof with respect to one another and upwardly along the under or inner surface of the polished plate **34**. At the upper end of the plate **34** a forwardly extending and forwardly bent portion **36** thereof operates as a stop for the top edge of the bags to maintain the same properly vertically aligned. This bent over portion **36** is also slotted, as will be explained in detail hereinbelow in conjunction with Figure 5, for the passage of the handles on the bags to a position above the bag stop **36**. Another feature of this modification is that the deflection backstop **21***a* is flat rather than having a curved portion such as the curved portion **21***b* of the backstop **21** in Figure 1, and is inclined at a slight angle from the vertical to enhance substantially vertical stacking of the bags. The biasing assembly **24** maintains the bags in the closest possible engagement with the plate **34** and yet permits sliding of the bracket and deflection backstop **21***a* assembly forwardly as the number of bags between the backstop **21***a* and the guide plate **34** increases.

Still another modification of this invention appears in Figure 3 wherein a portion of the polished face guide plate is removed to accommodate a further supplementary conveyor assembly **37** effective through operation of the belt **38** on the pulleys **39** and **40** thereof to aid in moving the bags **12** upwardly to their vertical position and toward the guide plate **34***a* having a stop portion **36***a* substantially like the stop **36** on the plate **34** in the embodiment of Figure 2.

The operation of the embodiment of Figure 1 is substantially the same as that of Figure 2 except that the further supplementary conveyor **37** rides over the bags **12** immediately following their release from the first supplementary conveyor **30** and the further supplementary conveyor system **37** may be either a driven-type conveyor or a supplementary conveyor as desired.

In the embodiment of Figures 4 and 5, the bags **12** moving onto the conveyor belt **16** are engaged by a supplementary conveyor **30***a* which has a belt **31***a* trained over a rear roller **33***a* journaled on a bracket **41** forming a part of the take-off assembly, and is further trained over a substantially larger diameter roller **32***a* journaled on another bracket **42** forming a part of the take-off mechanism.

Since the roller **32***a* is of substantially larger diameter than the roller **32** in either Figure 2 or Figure 3, the bags will follow the roller in turning into a substantially upward direction whereupon they will be engaged by a polished guide plate **34***b* to be guided upwardly into the stacked relation shown and against the backstop **21***a*. The upper bent over portion **36***b* of the guide plate **34***b* stops the bags and aligns the same vertically while permitting the handles of the bags to pass through a slot **36***c* in the upper surface of the guide plate, note particularly Figure 5. Otherwise, the operation of the device illustrated in Figures 4 and 5 is substantially like that described hereinbefore in conjunction with Figures 1, 2 and 3, and the construction thereof is very similar to that of Figures 1, 2 and 3.

There occasionally occurs in the operation of the bag strap machine a stoppage or delay so that there is a gap between successive bags. When the operation of the machine is resumed a leading bag will, as usual, lie flat on the rough top conveyor **16** and upon leaving the roll **32***a* will encounter the bottom edge of the rearwardmost stacked bag and jam and thereby possibly jam the machine. To avoid this difficulty, and to maintain efficient operation of the machine in accordance with the principles of the present invention, there is mounted on the mechanism, as on the roll support bracket **42**, a microswitch **43** which is connected through leads **44**—**44** to solenoid-controlled air valve and supply means **45** having an outlet tube **46** disposed slightly forwardly of the center of the roll **32***a* and beneath the upper run of the belt **16**. Under normal operating conditions the bags will engage the microswitch **43** thereby holding the valve mechanism for the air supply **45** closed and thereby conserving compressed air restraining the same from passing through the outlet nozzle **46**. A lapse in the flow of the bags **12**, however, will release the microswitch **43** thereby opening the valve and permitting air to pass through the mechanism to the nozzle **46** and upwardly therefrom. The nozzle **46** preferably has a knife-like relatively long and narrow outlet as illustrated in dashed lines in Figure 5 and, in this embodiment of the invention, the conveyor

16 may be made of two or more straps to allow the air to blow between these straps to raise the leading edge of the bags or the conveyor can be a screen mesh conveyor so that the air exhausting through the knife nozzle **46** will blast through the upper run of the conveyor **16**. Thus, when the leading bag of a new group of bags **12** flows past the nozzle **46** it will be deflected upwardly and thereby be prevented from jamming against the bottom of the rearwardmost bag in the stack. Thereafter the runs of bags will close the microswitch **43** and thereby close the normally closed solenoid valve in the air supply control mechanism **45**.

From the foregoing it will be readily observed that in accordance with the principles of the present invention there is provided a new and improved method and apparatus for handling sheet material and bags and the like and that numerous variations and modifications may be effected without departing from the spirit and scope of the novel concepts and principles of this invention. We, therefore, intend to cover all such modifications and variations as fall within the true spirit and scope of the novel concepts and principles of this invention.

We claim as our invention:

1. A take-off and stacking mechanism for sheet articles and bags and the like comprising a support structure, a conveyor on said support structure, a belt included in said conveyor, said belt having a relatively high friction outer surface and a plurality of apertures therethrough, and a deflection backstop supported over said belt whereby articles passing onto said conveyor in a shingled relation to each other will move to the deflection backstop and be guided to a substantially vertical stacked position, and means to sense gaps between said articles and to deflect the first article after each gap therebetween.

2. A take-off and stacking mechanism for sheet articles and bags and the like comprising a support structure, a conveyor on said support structure, a belt included in said conveyor, said belt having a relatively high friction outer surface and a plurality of apertures therethrough, and a deflection backstop supported over said belt whereby articles passing onto said conveyor in a shingled relation to each other will move to the deflection backstop and be guided to a substantially vertical stacked position, and means to sense gaps between the articles, said means including further air pressure mechanism to air blast deflect the leading article after each gap to a position to be guided to a stacked position against the deflection backstop.

3. A take-off and stacking mechanism for sheet articles and bags and the like comprising a support structure, a conveyor on said support structure, a belt included in said conveyor, said belt having a relatively high friction outer surface and a plurality of apertures therethrough, and a deflection backstop supported over said belt whereby articles passing onto said conveyor in a shingled relation to each other will move to the deflection backstop and be guided to a substantially vertical stacked position, microswitch means disposed over said conveyor to sense gaps between the articles, and air pressure supply means controlled by said microswitch means to air blast deflect the leading article following gaps between said articles to a deflected position to be guided to a vertical stacked position by the deflection backstop, said microswitch means deenergizing the air pressure mechanism during normal passage of the articles and normal operation of the take-off and stacking mechanism.

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