United States Patent

[111] 3,581,876

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[21] Appl. No. **839,296**
[22] Filed **July 7, 1969**
[45] Patented **June 1, 1971**

[54] **BAG FLATTENING CONVEYORS**
6 Claims, 8 Drawing Figs.

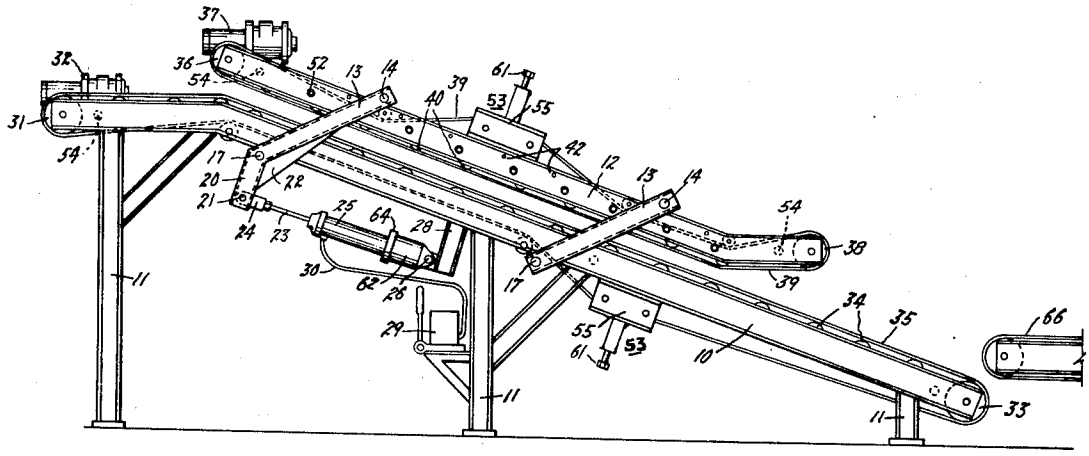
[52] **U.S. Cl.** **198/165,** 53/124, 100/151
[51] **Int. Cl.** **B65g 15/14**
[50] **Field of Search** ..... 198/165; 53/111, 124 A; 100/151, 153

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ABSTRACT: An inclined main belt conveyor having a floating belt conveyor maintained parallel thereover by means of parallel links, the floating conveyor being provided with a plurality of individually sprung press rolls which individually and successively knead the bags as they pass upwardly between the two conveyors.



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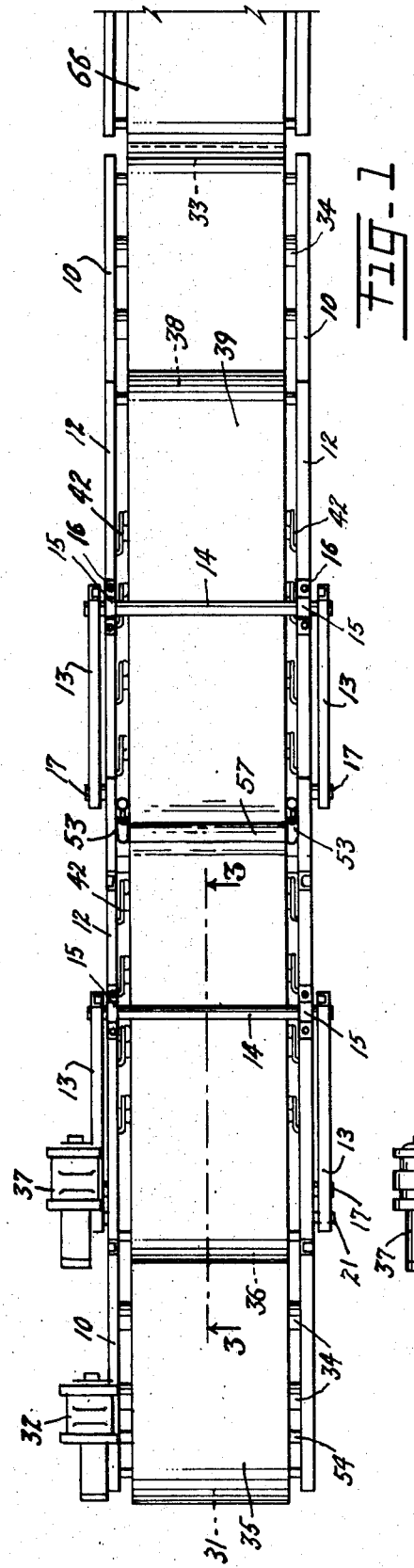


FIG-1

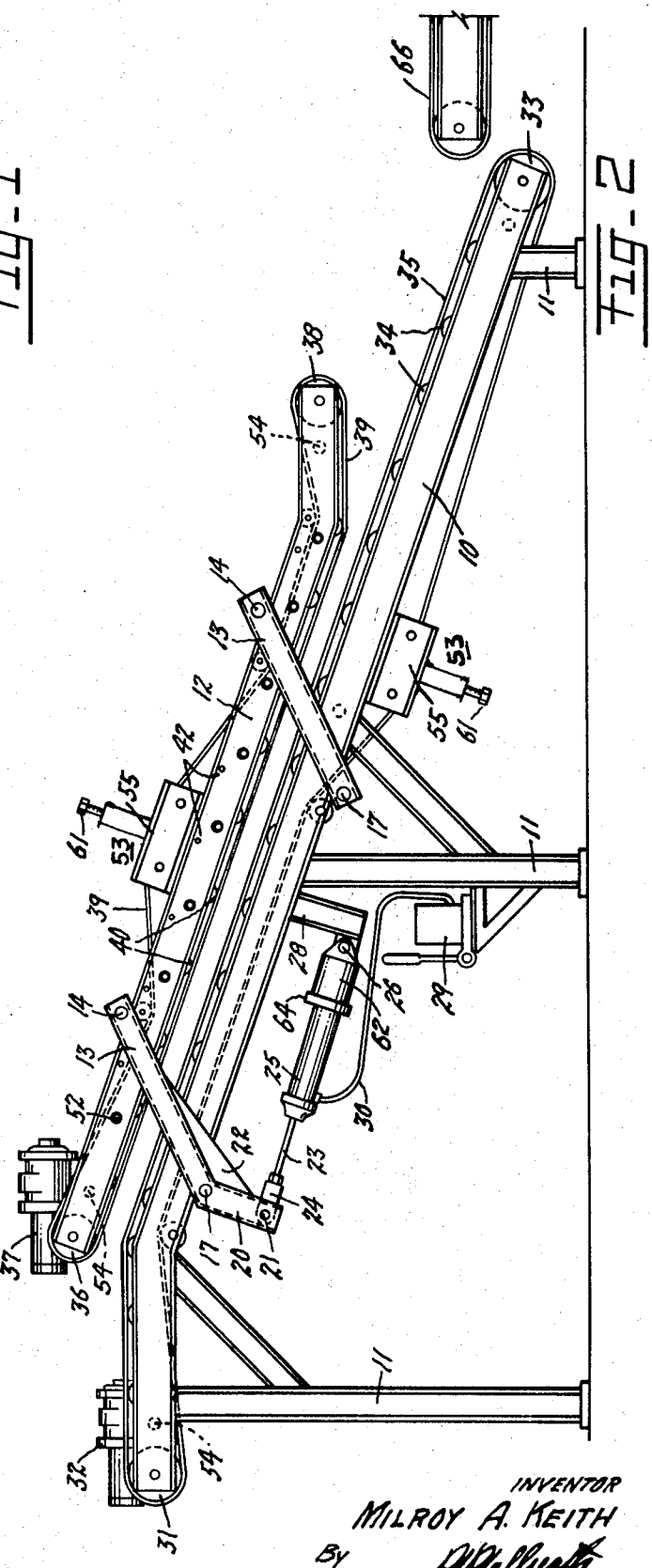


FIG-2

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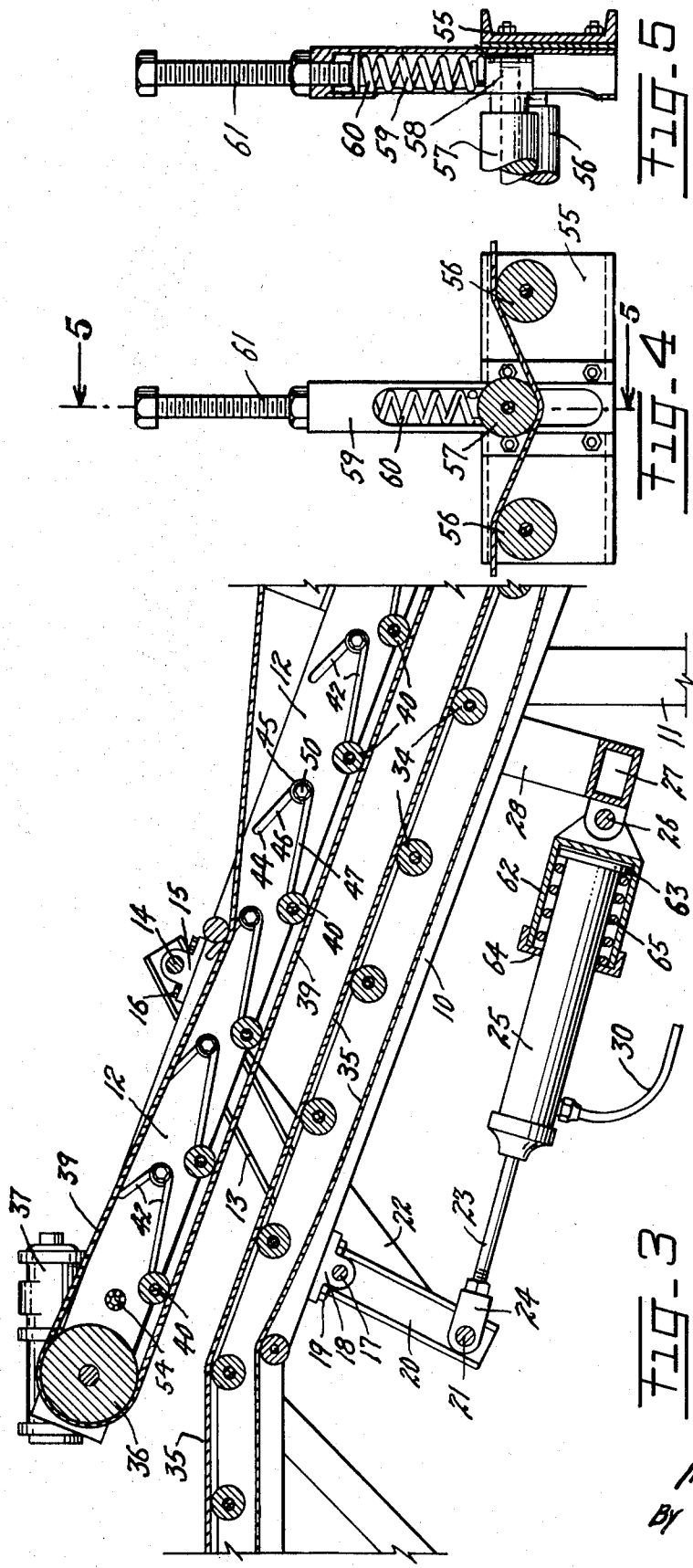


FIG-3

FIG-4

FIG-5

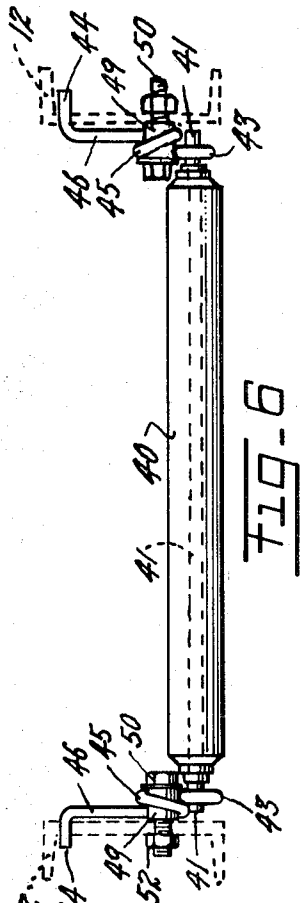


FIG-6

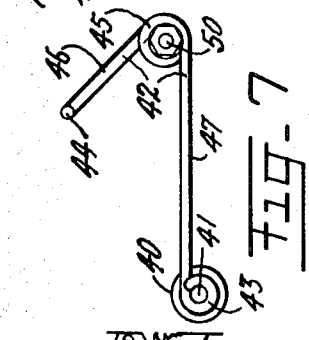


FIG-7

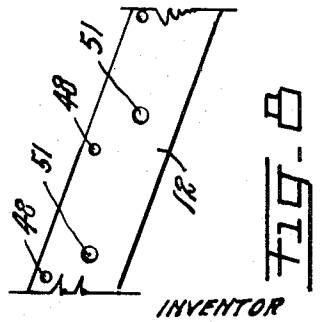


FIG-8

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BAG FLATTENING CONVEYORS

This invention relates to a bag-flattening conveyor for conveying bags of various commodities from bag-filling devices. Large bags of loose materials such as flour, sugar, salt, Portland cement, seeds, fertilizers and other bulk materials are exceedingly unwieldy and difficult to handle, when first filled, due to their bulging, rounded contours.

The principal object of this invention is to provide a power-driven conveyor which will receive a continuous stream of filled, stitched bags from bagging devices and efficiently, rapidly and successively flatten them to provide two opposed flat sides thereon to facilitate handling, and elevate and deliver the flattened bags for convenient piling, stacking and storing.

Another object of the invention is to provide conveying means which will gradually flatten the bags by subjecting each bag to a continuous succession of independent, resilient rollings each of which will increasingly flatten the bag as it passes until the desired contour is attained so as to lessen the possibility of damaging or bursting the bags during the flattening operation.

A further object is to provide accurately controllable means for adjusting the resilient pressure to which the bags are subjected during the flattening procedure to accommodate sizes and types of containers and various bagged products.

A still further object is to provide adjustable resilient tightening means for conveyor belts in general but which is particularly useful to increase the efficiency of conveyor belts employed in bag-flattening devices.

Other objects and advantages reside in the detail construction of the invention, which is designed for simplicity, economy, and efficiency. These will become more apparent from the following description.

In the following detailed description of the invention, reference is made to the accompanying drawing which forms a part hereof. Like numerals refer to like parts in all views of the drawing and throughout the description.

In the drawing:

FIG. 1 is a top plan view of the bag-flattening conveyor of this invention;

FIG. 2 is a side elevational view thereof;

FIG. 3 is an enlarged, fragmentary, longitudinal section thereof, taken on the line 3–3, FIG. 1;

FIG. 4 is a still further enlarged, detail, inside face view of an improved belt-tightening device employed herein;

FIG. 5 is a vertical section through the belt-tightening device, taken on the line 5–5, FIG. 4;

FIG. 6 is a detail view of a press roll and its resilient supporting springs which will be later described in detail;

FIG. 7 is a detail end view of the press roll and spring combination of FIG. 6; and

FIG. 8 is a fragmentary detail, side view of a portion of a conveyor side member showing the positions of holes formed therein for the purposes of this invention.

The bag-flattening conveyor of this invention employs a conventional, inclined, main conveyor frame 10, supported from the floor upon a plurality of suitable supporting columns 11 and floating conveyor frame 12 supported in vertically movable, parallel relation to the main conveyor frame upon two pairs of parallel links 13. The upper extremities of the links 13 of each pair of links are connected by an upper pivot bar 14 which extends across the top of the floating frame 12 through suitable upper bearings 15 bolted to the frame 12 as shown at 16. The lower extremities of the links of each pair of links are similarly connected by a similar lower pivot bar 17 which extends across the bottom of the main conveyor frame 10 through suitable lower bearings 18 bolted to the frame 10 as shown at 19.

The floating frame 12 can be caused to approach or move away from the frame 10 by swinging the pairs of links 13 about the axes of their pivot bars 14 and 17. As illustrated, the swinging is accomplished by means of actuating levers 20 which extend downwardly from the links of one pair of links, preferably the upper pair, to horizontally support an actuating bar 21 below the lower pivot bar 17. The levers 20 are preferably braced from the links 13 by suitable gusset plates 22.

A piston rod 23 is medially mounted on the actuating bar 21, as shown at 24, and extends to a conventional piston in a conventional hydraulic cylinder 25 which is pivotally supported from a hinge pin 26. The hinge pin is medially mounted on a fixed tubular crossbeam 27 which is fixedly supported between brackets 28 extending downwardly from the frame 10. Actuating pressure can be supplied to the hydraulic cylinder in any suitable manner such as by a conventional hand pump assembly 29 mounted on certain of the supporting columns 11 and connected to the head extremity of the cylinder by a suitable flexible hydraulic hose 30.

The main conveyor frame 10 is conventional, that is, it is provided with: an upper drive roller 31, driven by a conventional motor assembly 32; a lower return roller 33; and a plurality of spaced-apart belt-supporting idler rollers 34, around all of which an endless conveyor belt 35 is trained similarly to conventional belt conveyors.

The floating frame 12 has the conventional longitudinal conveyor side members separated by suitable spacing braces 54 and is of less length than the main frame 10. The floating frame is also provided with: an upper drive roller 36; driven by a conventional motor assembly 37; a lower return roller 38; and an endless conveyor belt 39 which is trained therearound similarly to the main frame 10. The two motor assemblies 32 and 37 drive the adjacent reaches of the two belts 35 and 39 forwardly and upwardly at a common speed.

spaced apart frame 12 is provided with a row of similar, transversally extending press rolls 40 which are uniformly spaced apart throughout the length of its lower surface.

Each of the press rolls 40 is provided with an axis shaft 41 which protrudes from both extremities of the roll as shown in FIG. 6. Each protruding extremity of the axis shaft 41 of each press roll is rotatably journaled in a V-shaped torsion spring 42.

The springs 42 are similar and each is formed from a continuous spring rod, one extremity of which is formed into an annular bearing loop 43 which receives and forms a bearing for the extremity of the axis shaft 41 and the other extremity of which is turned outwardly at 90° to form a mounting hook 44 therein. The midportion of the spring rod is annularly wrapped to form an intermediate annular loop of one or more turns, which will be herein designated as a bolt loop 45. Between the hook 44 and the bolt loop 45, the rod forms a short straight portion 46 and between the bolt loop 45 and the bearing loop 43 the rod forms a long straight portion 47. In actual practice, the rod is of spring steel of 0.3125-inch diameter and the short straight portion 46 and the long straight portion 47 have lengths of 4 inches and 8 inches, respectively. The loops 43 and 45 have an internal diameter of approximately ¾ inch and 1¼ inch, respectively. When unloaded, the straight portions extend at an angle of substantially 45° from each other.

The press rolls 40 are assembled in the floating frame 12 by placing the V-shaped springs 42 on the extremities of the axis shafts 41, as shown in FIG. 6, and then hooking the mounting hooks 44 through aligned spring openings 48 formed in the side members of the floating frame 12 as shown in FIG. 8. A spacing pivot bushing 49 is then inserted in each of the bolt loops 45 of the springs and mounting bolts 50 are inserted outwardly through the bushings 48 and through aligned bolt holes 51 (also formed in the side members of the floating frame as also shown in FIG. 8) where they are fixedly secured by means of suitable clamp nuts 52 to provide fulcrums for the springs 42. Thus, each press roll 40 is independently and resiliently forced downwardly against the conveyor belt 39.

The tension in each of the conveyor belts 35 and 39 can be regulated to suit field conditions by means of belt tighteners designated in their entirety by the numeral 53 and shown in detail in FIGS. 4 and 5. The belt tighteners are similar and each comprises a pair of relatively short side channel irons 55

which are d3signed to be mounted on and attached to the side members of the conveyor frames. A pair of spaced-apart, idle-supporting rollers **56** are journaled in and extend between the channel irons **55** over which one side of the conveyor belt is trained. A tension roller **57** extends transversely across the other side of the belt between the supporting rollers **56** and bears against the opposite side of the belt.

The extremities of the shaft of the tension roller **57** are journaled in bearings **58** which are vertically movable in bearing guide tubes **59** extending upwardly from the channel irons **55** and provided with compression springs **60** which constantly urge the bearings **58** and the tension roller **57** toward the belt to maintain the proper tension therein. The compression bias of the springs **60** can be regulated by jackscrews **61** threadably mounted in the tops of the guide tubes **59** and acting against the upper extremities of the springs **60**. Thus, by tightening the jackscrews, the compression in the springs and the tension in the belt can be increased to suit bags and commodities of various types.

It can be seen that the minimum distance desired between the floating frame **12** and the main frame **10** can be preset to flatten the bags to a uniform thickness by pumping a desired quantity of hydraulic fluid into the head of the hydraulic cylinder **25** by means of the pump **29** so as to limit the outward travel of the piston **23**. The floating frame will be lifted by oversize bags or other obstructions entering between the frames **10** and **12** and sudden release of the lifted frame might result in damage to the equipment. To cushion accidental or sudden dropping of the floating frame, the rear extremity of the hydraulic cylinder is positioned in a cylindrical spring cup **62** which is pivotally mounted on the hinge pin **26**. The base of the cylinder is surrounded by an annular projecting flange **63** from which the cylinder projects outwardly through a cylinder head **64** on the spring cup. A relatively heavy cylindrical compression spring **65** surrounds the cylinder between the flange **63** and the head **64**. It can be seen that if the floating frame be suddenly dropped, such as due to the exit of the last bag, the lever members **20** will tend to jerk the piston rod **23** outwardly. Since the rod cannot move outwardly in the cylinder until the hydraulic pressure is relieved, the outward "jerk" will be transmitted to the cylinder **25** and will be absorbed by the spring **65**.

It is believed that the operation of the improved flattening conveyor will be clearly understood from the above specification. Briefly, the filled and stitched bags will be deposited upon the conveyor belt **35**, such as from a conventional delivery conveyor **66**, and will be carried forwardly and upwardly into contact with the floating conveyor belt **29**. The lower extremity of the floating frame is preferably inclined upwardly as shown in FIG. **2** to facilitate entry of the bags between the frames **10** and **12**. The bags will be carried upwardly by the combined efforts of the two motor assemblies **32** and **37** and as they pass beneath the press rolls **40** they will successively be pressed and kneaded by the individually sprung press rolls **40** until the desired bag thickness, as preset by the pump assembly **29**, is attained. The flattened bag will then be conveyed to storage by the upper extremity of the main conveyor belt which is preferably flattened for this purpose as shown at the left in FIG. **2**. The kneading action can be varied and controlled to suit specific conditions by adjusting the pressure in the cylinder **25** and by adjusting the jackscrews **61** in the belt tighteners **53**.

While a specific form of the invention has been described and illustrated herein, it is to be understood that the same may be varied within the scope of the appended claims, without departing from the spirit of the invention.

Having thus described the invention what I claim and desire to be secured by Letters Patent is:

1. A bag-flattening conveyor comprising:

a. a main conveyor frame;

b. a floating conveyor frame positioned above and in substantially parallel relation to said main conveyor frame;

c. a first endless conveyor belt extending throughout the length of said main conveyor frame and a second conveyor belt extending throughout the length of said floating frame, the adjacent reaches of said belts travelling simultaneously in the same direction so as to receive, convey and flatten bags therebetween;

d. a plurality of parallel spaced-apart press rolls, each provided with an axially projecting axis shaft, transversally positioned in said floating frame in contact with the back of the adjacent reach of the second belt; and

e. an elongated, resilient, spring rod bent intermediate its extremities to a preformed V-shape, with two straight portions extending at an acute angle with each other, positioned between the projecting extremities of each axis shaft and said floating frame, acting to independently urge each press roll against the back of said second belt;

f. means for journaling an extremity of said axis shaft at one extremity of said rod; and

g. means for mounting the other extremity of said rod on said floating conveyor frame so that tension in said belt will tend to resiliently urge said straight portions toward each other.

2. A bag-flattening conveyor as described in claim **1** in which the means for journaling comprises:

a. an integrally formed, annular bearing loop formed in said one extremity of said rod which encircles and forms a bearing for the extremity of said axis shaft.

3. A bag-flattening conveyor as described in claim **2** in which the means for mounting the other extremity of said rod comprises:

a. an integral mounting hook formed on the other extremity of said rod and hookedly engaging said floating frame.

4. A bag-flattening conveyor as described in claim **3** having:

a. an integral, annular, bolt loop formed in said rod at the apex of the "V" formation therein; and

b. a bolt passing through said bolt loop into said floating frame so as to secure said preformed spring rod to said frame.

5. A bag-flattening conveyor as described in claim **3** having:

a. a tubular spacing bushing inserted in the bolt loop of each spring rod said bolt passing through said bushing.

6. A bag-flattening conveyor as described in claim **1** having:

a. a plurality of parallel links pivotally mounted at their upper extremities on said floating conveyor frame and similarly mounted at their lower extremities on said main conveyor frame so as to maintain said frames in parallel relation;

b. an actuating lever projecting from certain of said links;

c. a hydraulic cylinder and piston assembly connected with said actuating lever for swinging the latter to adjust the distance between said two frames;

d. a pivotally mounted cylindrical spring cup in which the base of said hydraulic cylinder is seated;

e. a head formed in said cup and surrounding said cylinder;

f. a projecting flange formed on the base of said cylinder; and

g. a compression spring surrounding said cylinder within said cup, said spring being compressed between said head and said flange so that sudden tension stresses on said hydraulic cylinder will be absorbed by compression of said spring.