June 2, 1959 X. DAMBACHER 2,888,859

DEVICE FOR FOLDING PAPER SO AS TO FORM THE BLOCK BOTTOM OF A PAPER BAG

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Fig. 1

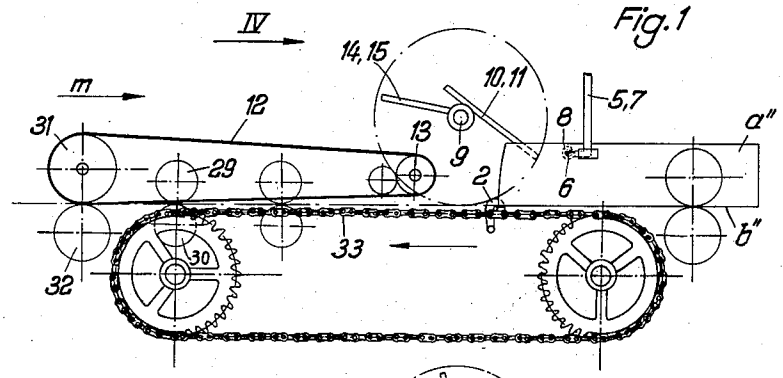


Fig. 2

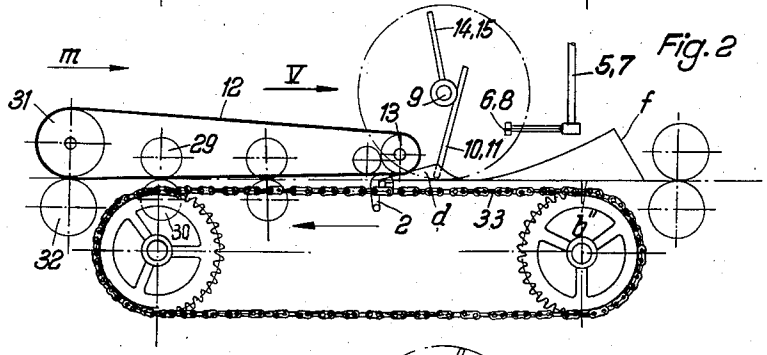


Fig. 3

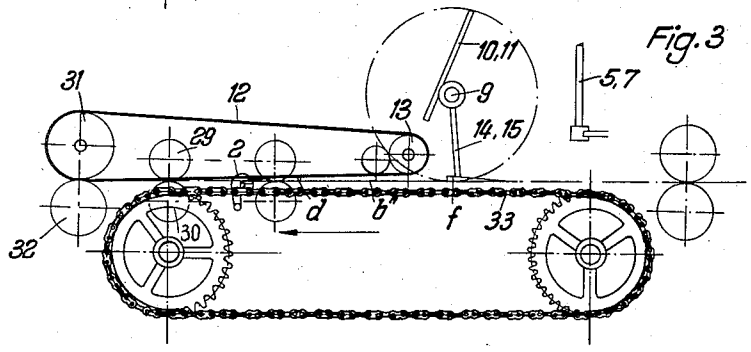
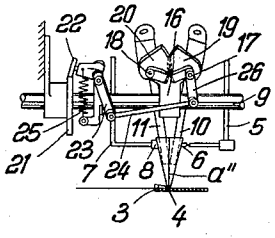


Fig. 4



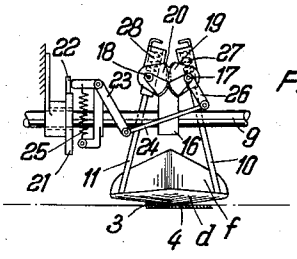


Fig. 5

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Fig. 6

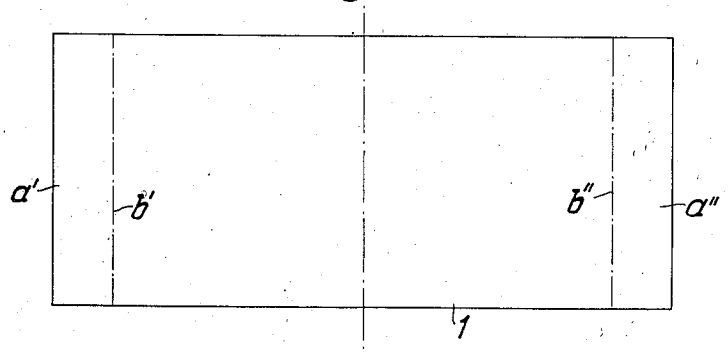


Fig. 7

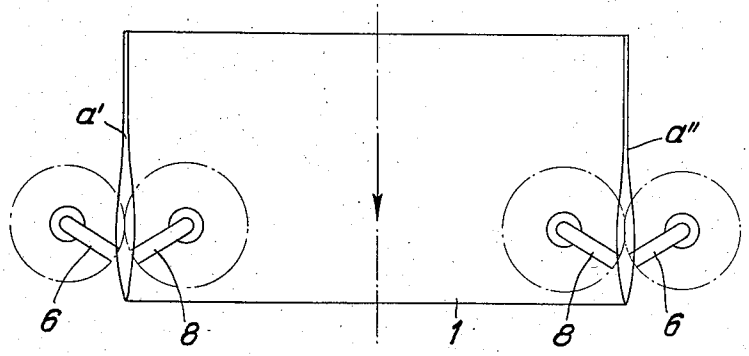
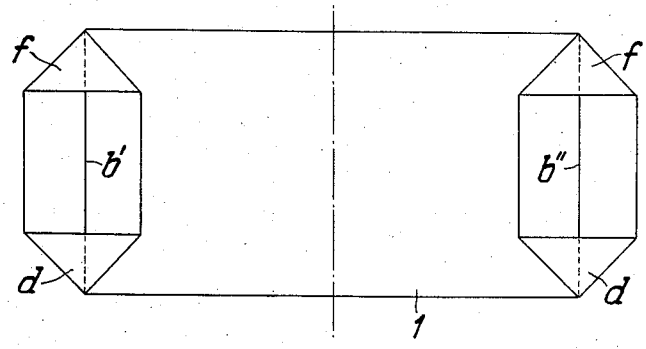


Fig. 8



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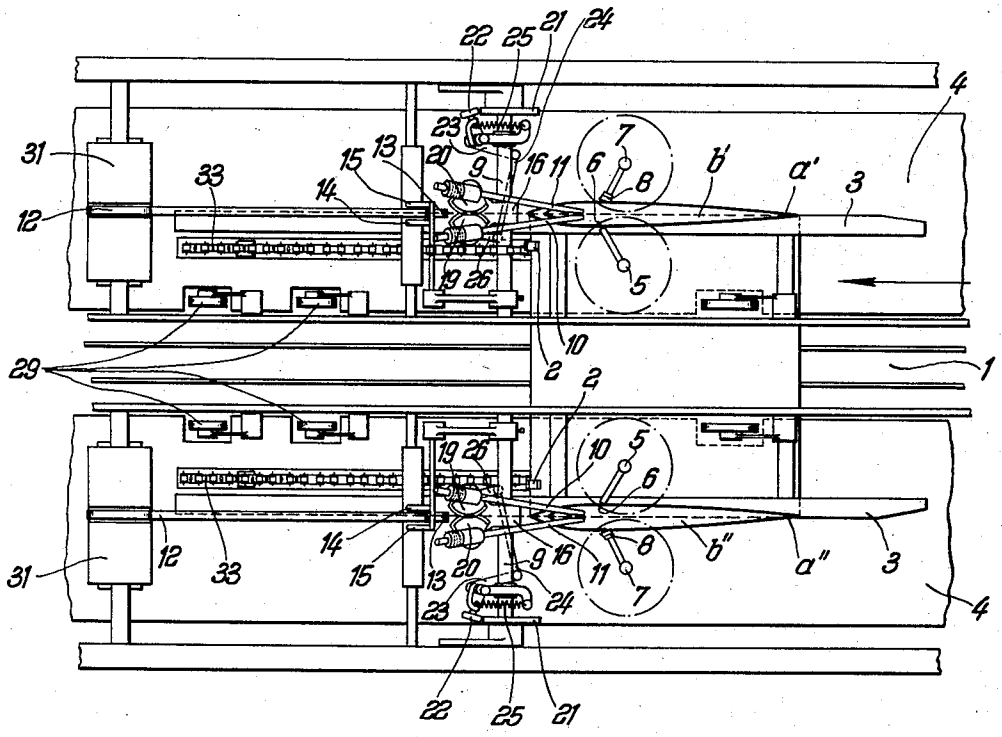
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DEVICE FOR FOLDING PAPER SO AS TO FORM THE BLOCK BOTTOM OF A PAPER BAG

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Fig. 9



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United States Patent Office 2,888,859 Patented June 2, 1959

2,888,859

DEVICE FOR FOLDING PAPER SO AS TO FORM THE BLOCK BOTTOM OF A PAPER BAG

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Application May 20, 1955, Serial No. 509,970
In Germany October 1, 1948

Public Law 619, August 23, 1954
Patent expires October 1, 1968

6 Claims. (Cl. 93—28)

It is known that in order to form the block bottom of a paper bag one end of the paper tube is bent upwards by 90° about what is known as the bending line and the bent-up end of the tube is unfolded and pressed flat again. In order that this process may be readily understood, the Figs. 6, 7, 8 of the drawing show diagrammatically the formation of block bottoms at both ends of a paper tube.

As shown in Fig. 6 the paper tube 1 is pressed flat, its two ends are denoted by *a'* and *a''*. The ends *a'* and *a''* of the tube 1 are bent upwards by 90° about the two bending lines *b'* and *b''* shown chain-dotted. Fig. 7 shows the beginning of the operation of opening the bent-up ends *a'* and *a''* of the tube 1 and Fig. 8 shows the tube after the ends are fully opened, pulled apart and pressed flat in the plane of the tube. In this manner the so called triangular pockets are formed. The triangular pockets at the front are denoted in Fig. 8 by the letter *d*, those at the back by the letter *f*. The block bottoms thus formed from the ends of the tube are closed in further operations by folding and sticking.

Devices are known where the block bottoms are formed by several rotating fingers gripping successively into the bent-over and opened end of the tube. It has been found that the method of operation of these devices can be adapted only with difficulty to the varying sizes of the tubes. Also, the rotating tools keep the folded triangular pockets in the flat position only for a brief moment, so that the triangular pockets must be rolled in this position immediately. For this reason it is not possible to use folding blades along the folding lines when flattening the triangular pockets in the plane of the tube, although only folding blades guarantee a satisfactory folding process.

According to the present invention the block bottoms are folded on paper tubes by means of a device provided with a couple of rotating spreading fingers, controlled by eccentric cams. The fingers move into the end of the tube, bent upwards perpendicularly to the plane of the tube, and opened a little by means of suckers or needles. The fingers then spread so that the front triangular pocket is formed and is pushed flat in the plane of the tube. Owing to the method of controlling the spreading fingers by means of an eccentric cam, it is possible to keep the front triangular pocket over a fairly long distance in the spread position until it is taken over by a conveyor band. This enables a folding blade to be used during the entire folding process along the folding line of the end of the tube which is bent over by 90°, so that the triangular pockets have to be rolled only after they have left the folding blade, at the end of the transportation process effected by means of pincers.

The said and other objects of my invention will be more fully understood from the following specification when taken with the accompanying drawing in which one embodiment is illustrated. Figs. 1 to 3 show my

new device in three consecutive working positions, Fig. 4 shows a partial sectional view as seen in the direction of arrow IV in Fig. 1, Fig. 5 shows a partial sectional view as seen in the direction of arrow V in Fig. 2, Figs. 6, 7, 8 show diagrammatically three successive stages in the known formation of the triangular pockets in the bag bottoms, and Fig. 9 is a plan view of the device in the position shown in Fig. 1.

Fig. 1 shows the end *a''* of the paper tube 1 bent upwards by 90° while it is running into the device. Grippers 2 mounted on conveyor drums 33 grip the tube at its front edge near the folding line *b''* and pull it through the space between a folding blade 3 (see Fig. 9) and a table surface 4 (see Figs. 4 and 5). The folding blade 3 and the table surface 4 have not been shown in Figs. 1 to 3 in order not to impede the clarity of the illustration. The said folding blade 3 is a stationary metal strip sharpened at one edge and located close above the table surface 4 to form the bending lines *b'* and *b''* shown in Fig. 6. A needle 6 is provided on a shaft 5 and a sucker 8 on a shaft 7, which open a little the bent end *a''* of the tube as they rotate during the passage of the tube, after which rotary spreading fingers 10 and 11, which can rotate about a shaft 9 across the direction of motion of the tube 1, enter in their closed position the end of tube (see Fig. 4).

Figs. 2 and 5 show the device with the fingers 10 and 11 in the spread position. The triangular pocket *b* is spread out and folded in the plane of the tube; it is now gripped by a conveyor band 12 and a band roller 13.

Fig. 3 shows the device after the front triangular pocket *d* has been received by a conveyor band 12 and the rear triangular pocket *f* has been pressed flat by means of the rods 14 and 15 and is also moved underneath the conveyor band 12. Just before the pincers 2 open, the rollers 29 and 30 ensure the transportation of the tube. The two triangular pockets *d* and *f* are now rolled flat by rollers 31 and 32.

The spreading fingers 10 and 11 are pivoted at the points 17 and 18 of an arm 16 and connected by means of toothed segments 19 and 20 so that they can rotate in opposite directions about the points 17 and 18. The arm 16 is fixed on the shaft 9. The spreading fingers 10 and 11 are given lateral swinging motions by the eccentric cam 21 and the roller 22 and a linkage composed of a two-armed lever 23 under the action of a spring 25, with a link 24 and a lever 26. The spreading fingers 10 and 11 are supported by means of springs 27 and 28 elastically in all directions. The eccentric cam 21 is fixed to the frame of the device and the shaft 9 rotates in its hub. The eccentric cam 21 is exchangeable, which is important if block bottoms are to be folded on tubes of different sizes on the same device.

I claim:

1. In an automatic bag bottom forming apparatus including a conveyor consecutively moving bag tubes, having at least one of their open ends perpendicularly bent up, in a direction perpendicular to the longitudinal axes of the tubes, the improvement comprising a rotatable shaft mounted above the moving bag tubes transversely to their movement; at least one pair of spreading fingers radially extending from said shaft and rotating therewith; each pair of said rotating spreading fingers adapted to enter in unspread relation into one of said bent up ends of the bag tubes; each finger of each pair pivotably mounted upon said shaft to permit the fingers to spread transversely in the bent up end of the bag tube in a plane parallel to the axis of said shaft; and means effecting such spreading of the fingers after the same entered the respective bent up end of the bag tube.

2. An automatic bag bottom forming apparatus ac-

cording to claim 1 wherein the means to effect the spreading of said fingers comprise a pair of cooperating toothed segments each holding one finger and each rotatably mounted upon said shaft, a stationary cam, and a spring loaded linkage actuated by said cam and operating said segments.

3. An automatic bag bottom forming apparatus according to claim 1 wherein each spreading finger is elastically supported in longitudinal direction.

4. An automatic bag bottom forming apparatus according to claim 1 comprising rodlike means radially extending from and rotating with said shaft and adapted to flatten the rear triangular pocket of the opened tube end.

5. An automatic bag bottom forming apparatus according to claim 1 comprising a stationary folding blade located above the moving bag tubes and engaging the bend of each tube end.

6. An automatic bag bottom forming apparatus according to claim 1 comprising a stationary folding blade located above the moving bag tubes and engaging the bend of each tube end, and roller means beyond each folding blade to depress the forward and rear triangular pocket of the tube end.

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