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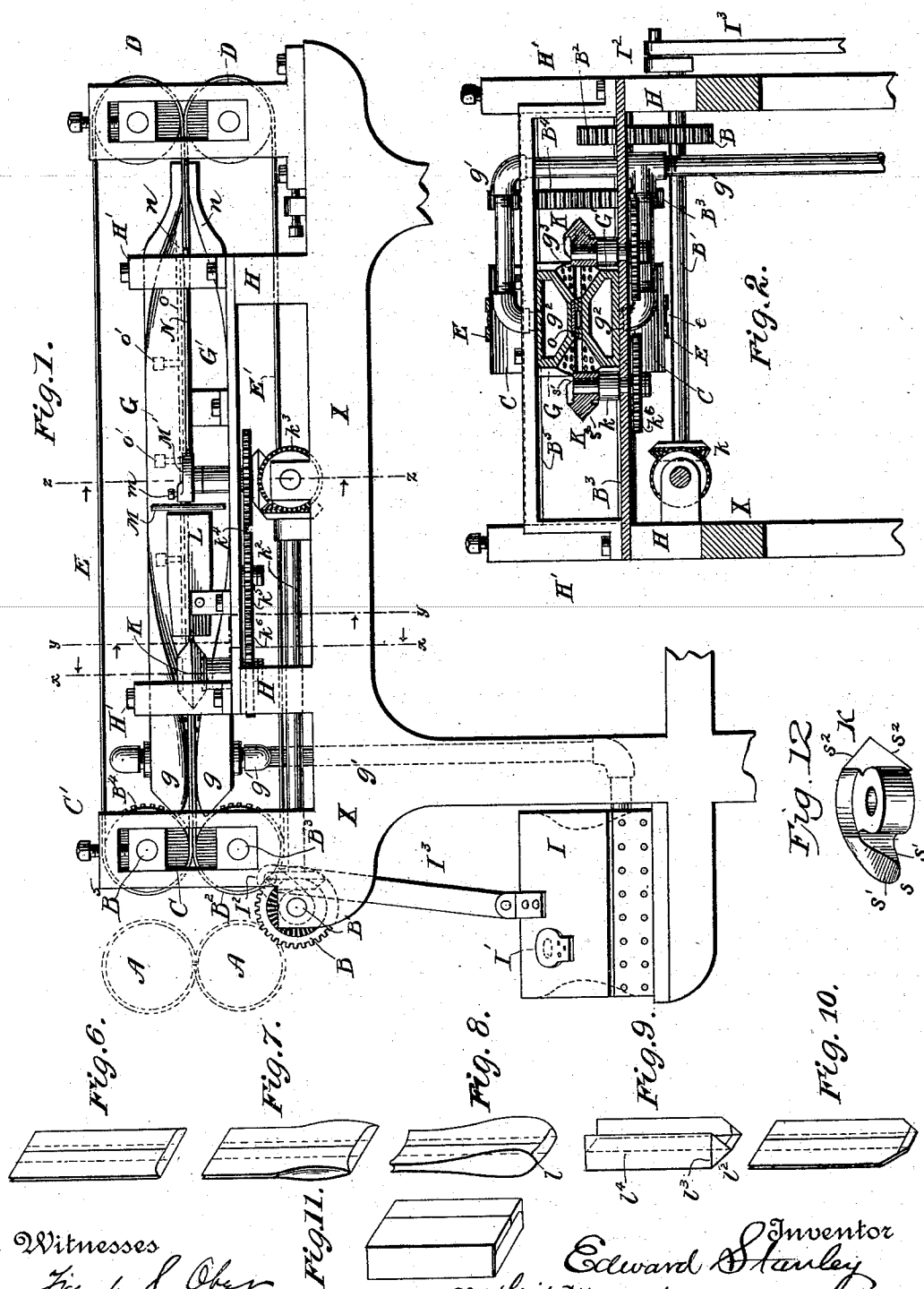
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E. STANLEY.

METHOD OF AND APPARATUS FOR FOLDING PAPER BAGS.

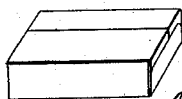
No. 503,810.

Patented Aug. 22, 1893.



Witnesses
Frank S. Ober.
W. J. Kelley.

Fig. 11.



By

Edward Stanley
his Attorneys
Baldwin, Davidson & Wright

(No Model.)

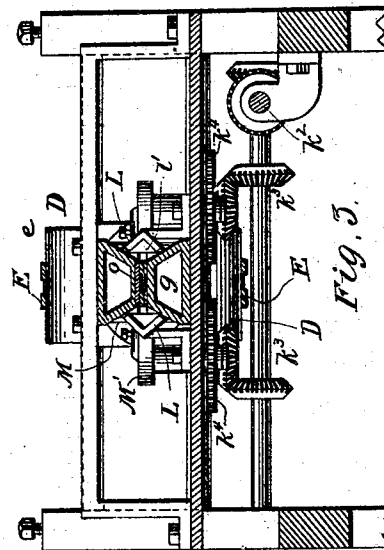
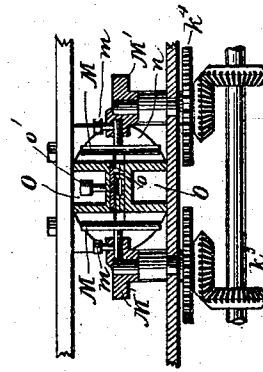
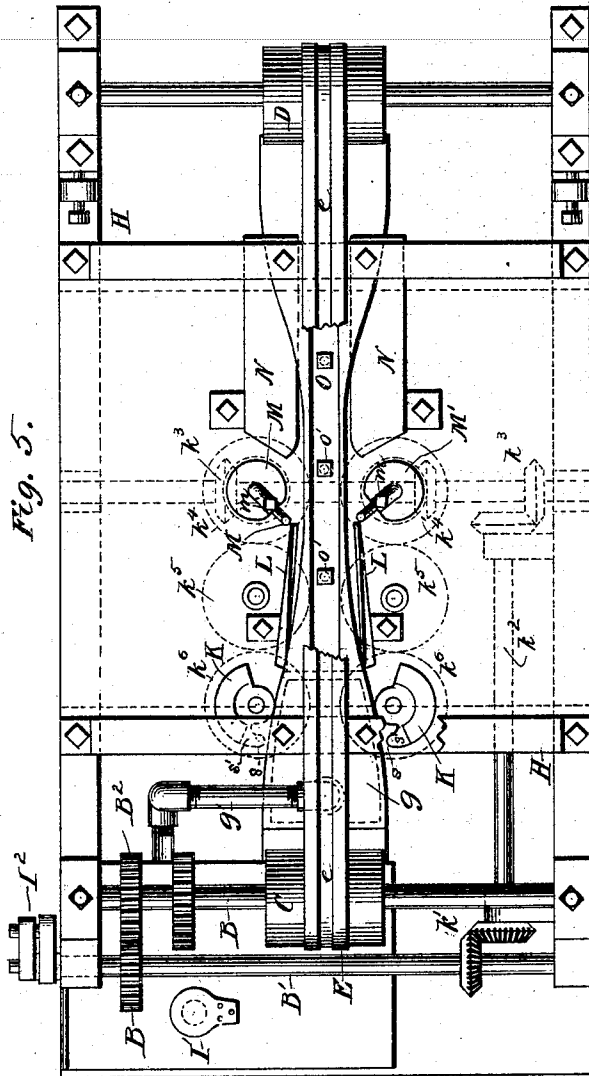
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UNITED STATES PATENT OFFICE.

EDWARD STANLEY, OF BRIDGEPORT, PENNSYLVANIA.

METHOD OF AND APPARATUS FOR FOLDING PAPER BAGS.

SPECIFICATION forming part of Letters Patent No. 503,810, dated August 22, 1893.

Application filed October 18, 1892. Serial No. 449,262. (No model.)

To all whom it may concern:

Be it known that I, EDWARD STANLEY, a citizen of the United States, residing at Bridgeport, in the county of Montgomery, State of Pennsylvania, have invented certain new and useful Improvements in Methods of and Apparatus for Folding Paper Bags, of which the following is a specification.

The invention relates more especially to what are known as "square" bags. Such bags have the bottoms formed by a single fold and their sides have bellows folds which are closed at one end by that portion of the bag forming the bottom. When properly opened they have square bottoms, the sides opening out square or straight by reason of the bellows folds. They are, however, open to the objection that it is necessary in order to insure the square formation of the bottom on opening to insert the hand, flatten out the bottom and press out the bellows folds.

The object of this invention is to provide a means and method of so folding the bottom of the bag that it shall be self-opening, that is to say, that it will open out square when the material it is to contain is poured into it. This I accomplish by folding in those portions of the bag that form the corners at the bottom when the bag is flat, to conform to the bellows fold, and then the bellows fold on each side is open at this end and not closed by the bottom portion of the bag as before stated. The bag thus folded appears as if the corners were cut off at an angle. This folding of a square bag is not broadly new with me, but so far as I am aware, the method of operation by which it is produced as well as the apparatus for carrying out the operation are new.

In practicing my invention I proceed as follows: The completed square bag, preferably as it leaves the bag machine, is run directly into my improved folding machine. By means of oppositely arranged suction boxes the sides of the bag forming the bellows folds and preferably near the bottom end of the bag are momentarily partially opened while the central portions of the sides are held flat. When the folds are thus partly opened a spreader enters the opening and completes the opening movement, so that the two portions on one side of a bag that forms

the bellows fold are pressed in opposite directions until they assume a position more nearly approaching that of a right angle to the flat central portion of the bag. By this action the corner of the bag tends to draw down against the opened side and this behavior of the corner is assisted by a device that presses the corner in against the faces of the open folds. I then by preference and in order to insure uniformly perfect work apply to the vertical edge of the inwardly folded corner a finger that straightens the edge so that its line is at right angles or thereabout with the plane of the central part of the bag. The inwardly folded corner is then preferably creased centrally and the bellows folds again pressed together with the inwardly folded corner between them. In carrying out this operation I employ intermittently acting suction boxes; that is to say there is an impulse of exhaustion which opens the bellows folds to permit of the entrance of the spreader. Then the exhaust ceases to act until the next bag has arrived in position to be similarly treated. This is a desirable operation since there is no continuous drag upon the apparatus as would be the case were continuous exhausts used.

Having thus outlined the general method of procedure I will describe in detail the operation and the mechanism employed.

In the accompanying drawings—Figure 1 is a side elevation; Fig. 2 a transverse section on the line X X looking in the direction of the arrows; Fig. 3 a similar section on the line Y Y looking in the opposite direction; Fig. 4 a detail transverse section on the line Z Z, looking in the direction of the arrows; Fig. 5 a plan view with the upper part of the upper belt partly broken away; Fig. 6 a view of an ordinary square bag pressed flat. Figs. 7, 8, 9 and 10 are views illustrating the successive steps in folding the bag. Fig. 11 shows the bag opened, and Fig. 12 is a detailed view showing the spreader for opening the side folds of the bag.

A, A, represent the delivery rolls of a machine for making square bags, for instances such a machine as that shown in my Patent No. 432,742, dated July 22, 1890. One of the rolls, from a suitable gear thereon, drives a gear wheel B on a shaft B'. The gear B meshes with a gear

B² on the shaft B³ carrying a gear that drives a similar gear B⁴ on a shaft B⁵. These two shafts carry the feed rolls C C of the folding machine. As shown the shafts have their bearings in blocks fitting in slots in uprights C' of the main frame X of the machine. Similar rolls D, D, are arranged at the opposite end of the machine and endless belts E, E', pass over the corresponding rolls. These belts are formed with a central longitudinal, channel *e* on their working faces so that the freshly pasted bags that are fed between them will not have the paste squeezed out of the longitudinal seam along the side of the bag. Between the two sets of rolls C D are arranged two parallel frame pieces or castings G G'. The upper one G lies inside the belt E and the lower one G' inside the belt E'. The frame pieces or castings are supported in any suitable manner by brackets H and yokes H'. One end of each frame piece or casting G G' is formed with a suction box *g* and each box is connected by a pipe *g'* with a bellows suction box I of which I' is the air inlet valve, and which is operated from the crank I² on the shaft B' by means of a pitman I³. The adjacent faces of the two suction boxes between which the belts pass are flat, parallel and unperforated as seen at *g*², Fig. 2. On each side of these central portions their faces are perforated and each perforated face is preferably curved reversely to the opposite perforated face and in the direction in which the belt travels, and the perforated faces are inclined from the outer edge inwardly toward each other. This may be seen clearly at *g*³, Fig. 2. The completed bag such as shown in Fig. 6 is delivered from the bag machine between the belts on the rolls C C, by which it is gripped with sufficient pressure, the freshly pasted side seam not being subjected to pressure because of the longitudinal channels *e* in the belts. The operation of the machine is so timed with reference to the entrance of the bags thereinto that as the bag comes between the suction boxes the bellows exhaust is actuated by its pitman I³ and the bellows folds forming the sides of the bags are drawn apart as seen in Fig. 7, while the central part of the bag between the bellows folds on each side is held flat between the belts. At this moment the openers or spreaders K enter between the open bellows folds and further open them. The spreaders are each mounted upon a short vertical stud axle *k* driven from the shaft B, through the bevel wheels *k'*, counter shaft *k*², bevel gears *k*³ and gears *k*⁴, *k*⁵, *k*⁶, the latter being upon the stud axle of the spreader. Each spreader K is shown as consisting of a segmental piece having a beveled or wedge shaped peripheral edge as shown at *s*² Fig. 2. One end *s* is comparatively thin so that it readily enters between the open folds, but the thickness increases by a steep bevel *s'* *s'* on each side, about an inch and one half in length more or less, to the maximum thickness. Only a slight extent of movement is,

therefore, required of the spreaders to further open the folds, substantially as indicated in Fig. 8, the central part of the bag being still held flat between the belts. As the bag in this condition passes forward the corner on each side comes against a folding plate L. The end of the folder nearest the approaching bag is V-shaped in crosssection, as seen in Fig. 3, and the edge or corner *l* of the bag, Fig. 8, fits therein. The inner face of the folder, however, gradually changes in conformation until it becomes flat as shown at *l'*, Fig. 4, and consequently as the bag is carried along the corner *l* is folded in flat against the faces of the open bellows fold as seen at *l'*, Fig. 9; the bellows folds being also further opened out as seen in this figure. At this time in order to insure the perfect formation of the bag, I apply a straightening finger to the vertical edge *l*³ Fig. 9, of the inwardly folded corner. This finger may consist as shown of a vertical rod M, having a shank projecting at right angles and seated in a socket in a head M' mounted on a stud axle driven by the gear *k*⁴ and the rod M may be adjusted radially with reference to the axle by means of a set screw *m*. The machinery is so timed that just after the forward or bottom end of the bag leaves the folding plate L the vertical straightening finger M comes into position behind and against the vertical edge *l*³ of the inwardly folded corner and straightens up that edge if any straightening is required, and insures the uniform and perfect folding of the bags. As the bag is carried forward from this point its central portion is still held flat between the two belts running between the adjacent parallel faces of the two frame pieces or castings G G' and the bag passes between folding or creaser blades N N one on each side, that lie parallel against the bag on the line *l*⁴ Fig. 9, which is the line of the crease of the inner angle of the bellows fold. At this point the opposite edges of the frame pieces G G' on each side begin to converge as seen at *n*, Fig. 1, and the bellows folds at the sides of the bag are gradually pressed together with the inwardly folded corners between them as seen in the completely folded bag, Fig. 10. From thence the bags are carried by the belts between the rolls D D and are delivered into any suitable receptacle as may be desired. The two frame pieces G G' are preferably castings and in order that they may be light and strong are respectively channeled on their upper and lower faces as seen at O O. To regulate the pressure of the belts upon the bags I provide the following construction: A plate *o* seen in dotted lines in Fig. 1 and in section in Figs. 2, 3, and 4 is secured in the under face of the upper casting G. The upper belt E runs in contact with it and the plate may be pressed downwardly against the belt by means of adjusting screws *o'* passing through the bottom of the channel in the casting G and pressing against the plate.

The details of the method of operation are obvious from the foregoing description. The details of construction of the apparatus may of course be varied by those skilled in the art without departing from the substance of the invention. The particular machine illustrated, however as an embodiment of the invention, has been shown by practical operation to be an efficient one and shows the invention in the form now best known to me.

I claim as my invention—

1. The herein described method of folding previously completed "square bags" so that they will be self opening, which consists in partially opening the bellows-folds on each side, while the center of the bag remains flat, then further spreading or opening the bellows-folds, then pressing the corners of the bag inwardly against the open bellows-folds, then straightening the edge of the inwardly folded corners and finally pressing the bellows-folds together with the inwardly folded corners of the bag between them.

2. The herein described method of folding previously completed "square bags" so that they will be self opening, which consists in partially opening the bellows folds on each side while the central portion of the bag remains flat, then further opening the folds, then folding the corners of the bag inwardly against the opened bellows-folds and finally pressing the bellows-folds together again with the inwardly folded corners of the bag between them.

3. The combination, substantially as set forth, of the rolls C, C, D, D, and endless belts E, E', the suction boxes arranged inside of the belts, the intermittently acting exhaust apparatus for briefly opening the bellows-folds of the bag on each side, means for then mechanically further opening the bellows-folds, means for folding the corners of the bags inwardly against the open bellows-folds, and means for again pressing the bellows-folds together with the inwardly turned corners between them.

4. The combination, substantially as set forth, of the rolls, C, C, D, D, and endless belts E, E', the suction boxes arranged inside of the belts, the intermittently acting exhaust apparatus for briefly opening the bellows-folds of the bag on each side, means for then mechanically further opening the bellows-folds, means for folding the corners of the bags inwardly against the open bellows-folds, means for straightening the edges of the inwardly fold corners, and means for again pressing the bellows-folds together with the inwardly turned corners between them.

5. The combination, substantially as set forth of the carrying belts, the suction boxes, the spreader arranged on each side opposite the edges of the adjacent faces of the belts and each consisting of a segmental piece decreasing in thickness from the center outwardly and beveled at its forward end, the corner folding plates each V-shaped in cross

section at the end toward which the bag approaches, and gradually changing to a flat face or substantially so at the opposite end, the straighteners for the inwardly folded edges of the bag, each of which consists of a vertical rod or bar arranged at right angles to the horizontal plane of the belts and adapted to be pressed against the edge of the inwardly folded corner to straighten it, the plates for creasing the inwardly folded corners and means for pressing the bellows fold of the bag together with the inwardly folded corners between them.

6. The combination, substantially as set forth, with means for partly opening the bellows-folds of a square bag, of spreaders for further opening them, each spreader consisting of a segmental piece having a wedge shaped peripheral edge as at s^2 , and a beveled end as at s' .

7. The combination, substantially as set forth, with means for partly opening the bellows-folds of a square bag, of devices for further opening said folds and folding plates for folding in the corners of the bag, each folding plate being V-shaped in cross section at that end toward which the bag approaches and gradually changing to a flat form or substantially so at the opposite end.

8. The combination, substantially as set forth, of means for opening the bellows-folds of a square bag, of the folding plate for folding in the corners, and straightening devices acting upon the edges of the inwardly folded corners to straighten them.

9. The combination, substantially as set forth, of the belts between which the bags are carried, each belt being formed on its outer face with a longitudinal groove to protect the freshly pasted side seam of the bag, means for opening the bellows-folds of a bag while its central part is held between the belts, means for folding in the corners against the open bellows-folds and means for pressing the bellows-folds together with the inwardly folded corners between them.

10. The combination, substantially as set forth, with the carrying belts, and exhaust apparatus, of the suction boxes arranged opposite each other between the belts, the opposite faces of the suction boxes at the center between which the belts pass, being parallel and not perforated, and the sides being perforated, their opposite faces reversely curved in the line of motion of the belts and tapering from the outward edge inwardly.

11. The combination, substantially as set forth, of carrying belts, the opposite frame pieces or castings G, G', located inside of the belts, the friction plate carried by one of the castings, means for adjusting it to vary the pressure of one belt upon the other and means for opening the bellows-folds of a square bag, folding in the corners thereof and pressing the bellows folds together with the corners between them, while the bag is carried forward by the belts.

12. The combination, substantially as set forth, of the varying belts adapted to hold the center of a square bag, suction boxes, exhaust apparatus consisting of an intermittently acting bellow-exhaust, for opening the bellows-folds of the bag, and means for folding in the corners of the bag against the open bellows-folds and again pressing the folds to-

gether with the inwardly folded corners between them. 10

In testimony whereof I have hereunto subscribed my name.

EDWARD STANLEY.

Witnesses:

A. D. HALLMAN,
NORMAN EGBERT.