

[54] **GUSSET REFORMER**  
[75] Inventor: **Doyle R. Hudson**, West Monroe, La.  
[73] Assignee: **Olinkraft, Inc.**, West Monroe, La.  
[22] Filed: **Sept. 30, 1971**  
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[52] U.S. Cl. .... **53/378**  
[51] Int. Cl. .... **B65b 7/08**  
[58] Field of Search..... 53/378, 379, 187,  
53/139, 188, 190, 186, 371; 93/32, 77 R, 77  
CL

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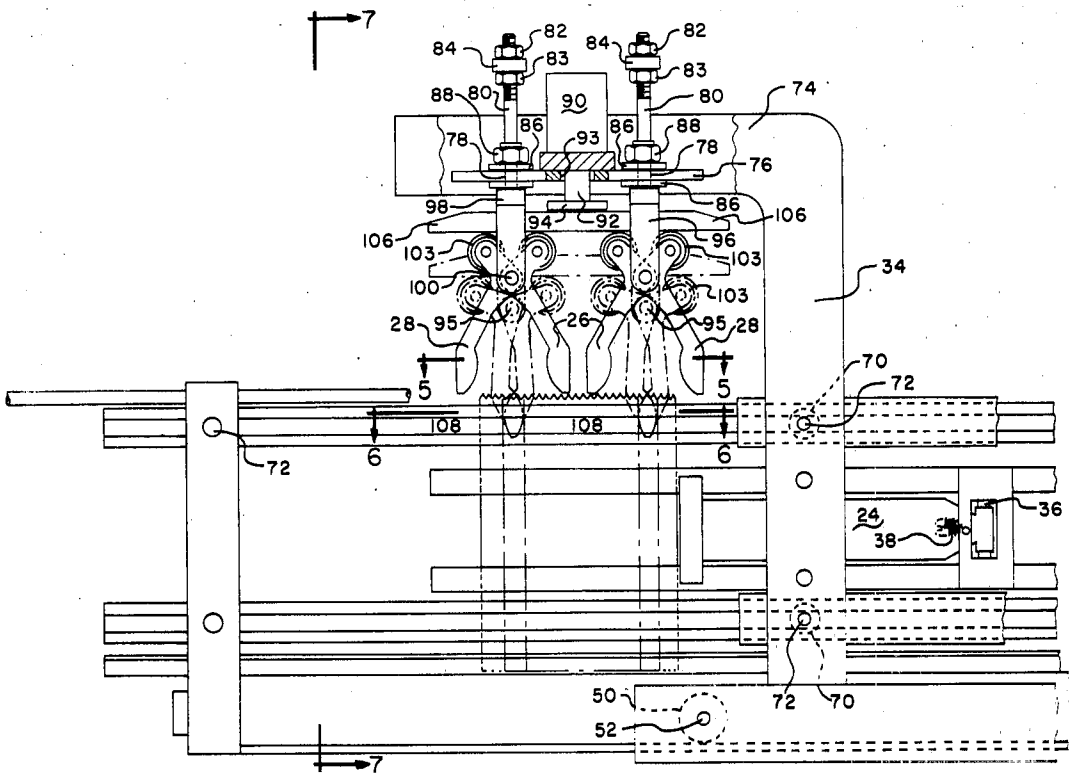
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Primary Examiner—Travis S. McGehee  
Assistant Examiner—Horace M. Culver  
Attorney—N. E. Von Behren

[57] **ABSTRACT**

An improved gusset reformer for reforming the open portion of a bag after the bag has been completely filled with a plurality of loose objects. The improved gusset reformer machine reforms the bag gussets while conveying the fully filled bag of objects from a filling station to a sewing station where the upper edges of the bag may be sewn shut. The reforming portion of the machine comprises a movable carriage mounted on a stationary frame with means carried by the carriage for manipulating the gussets of the bag. The movable carriage contains a pusher member which pushes the filled bag along a stationary trough fixedly attached to a stationary frame. Also contained on the machine are means for holding the reformed gussets in a reformed position prior to the sewing operation and after the manipulating means have been removed from the bag.

6 Claims, 7 Drawing Figures



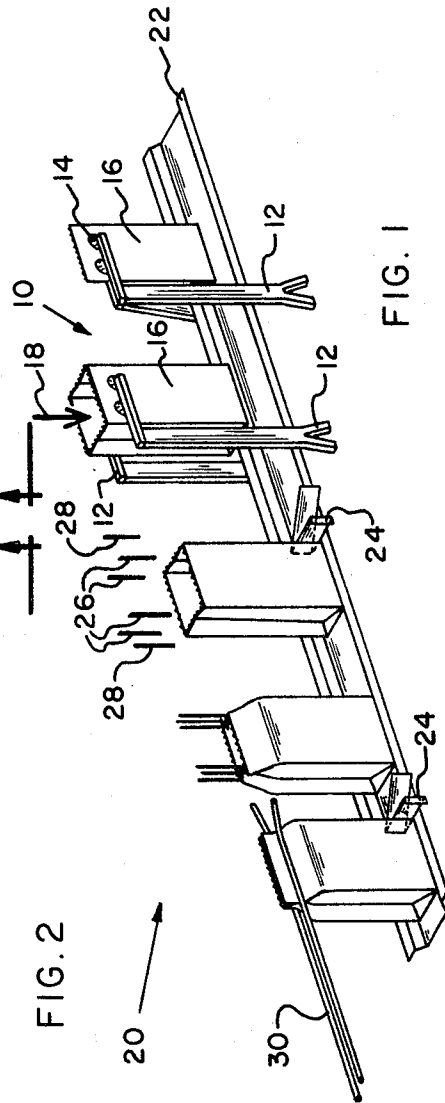
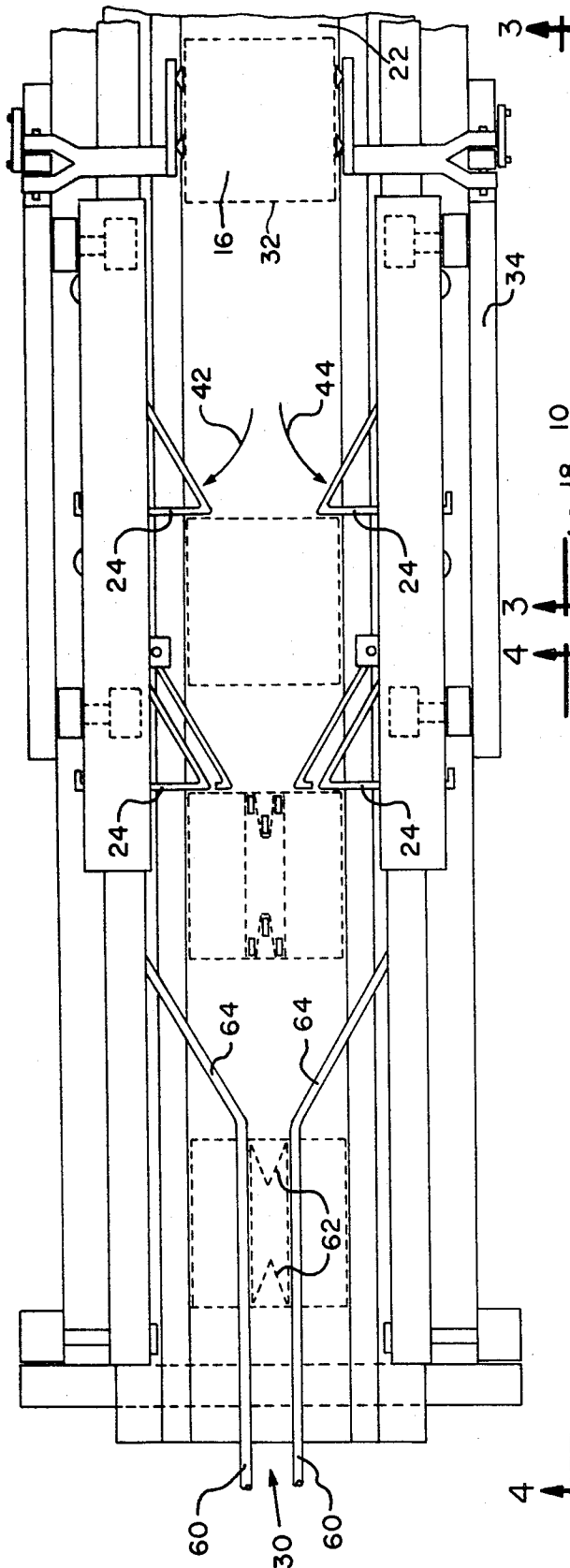


FIG. 2

FIG. 1

INVENTOR  
DOYLE R. HUDSON

BY *Nowell E. Van Behren*  
ATTORNEY

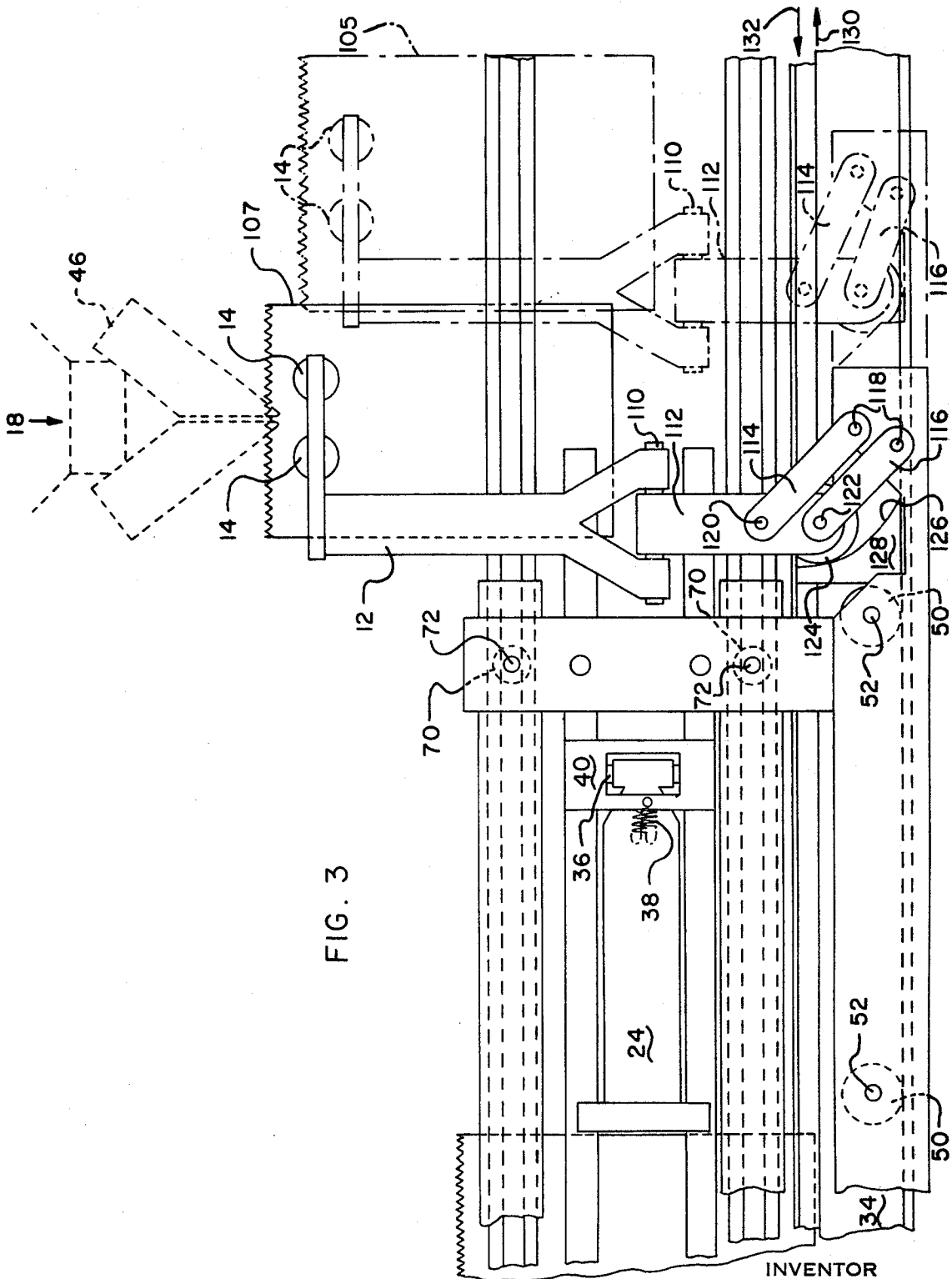
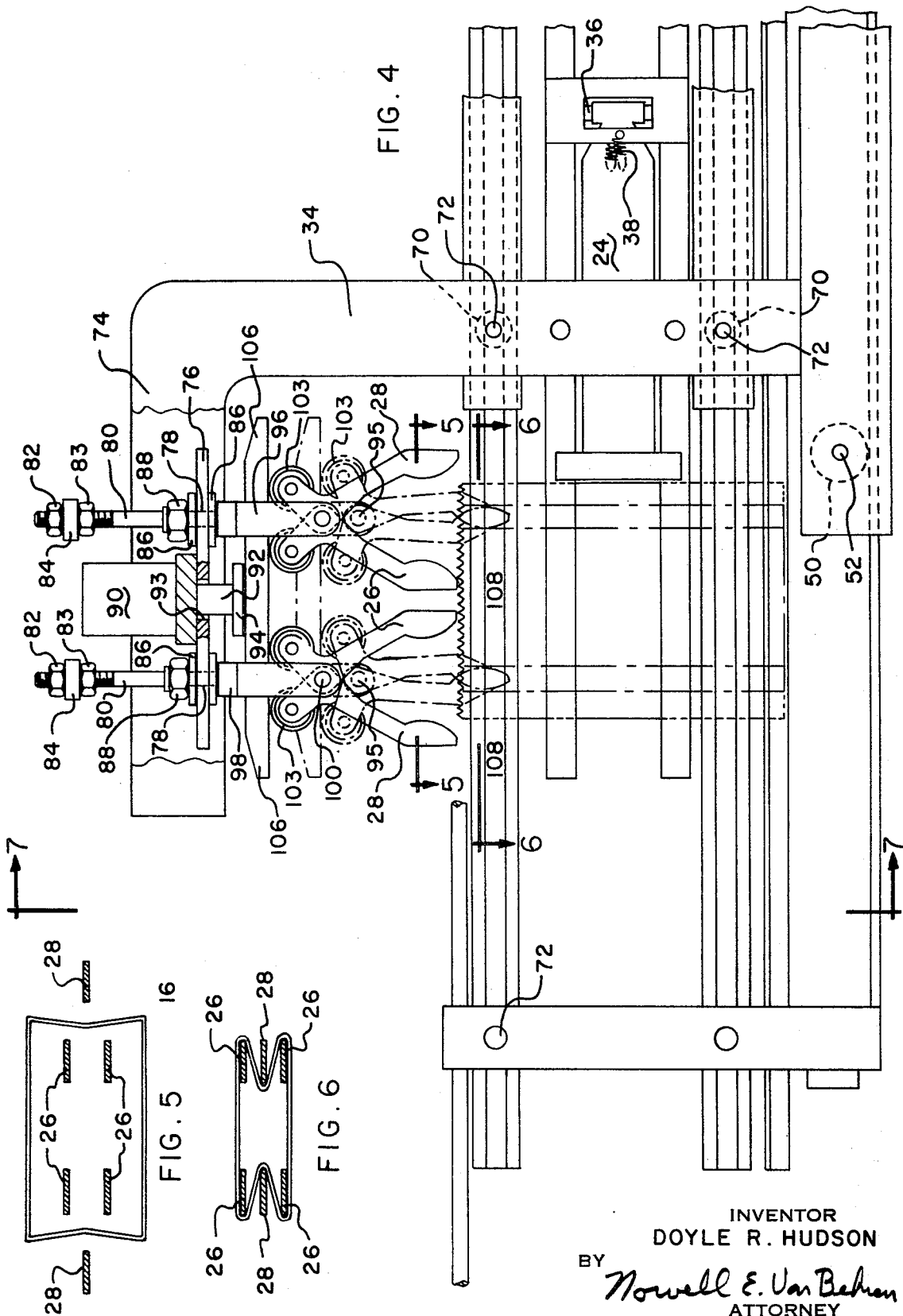


FIG. 3

INVENTOR  
DOYLE R. HUDSON  
BY *Nowell E. Van Behren*  
ATTORNEY



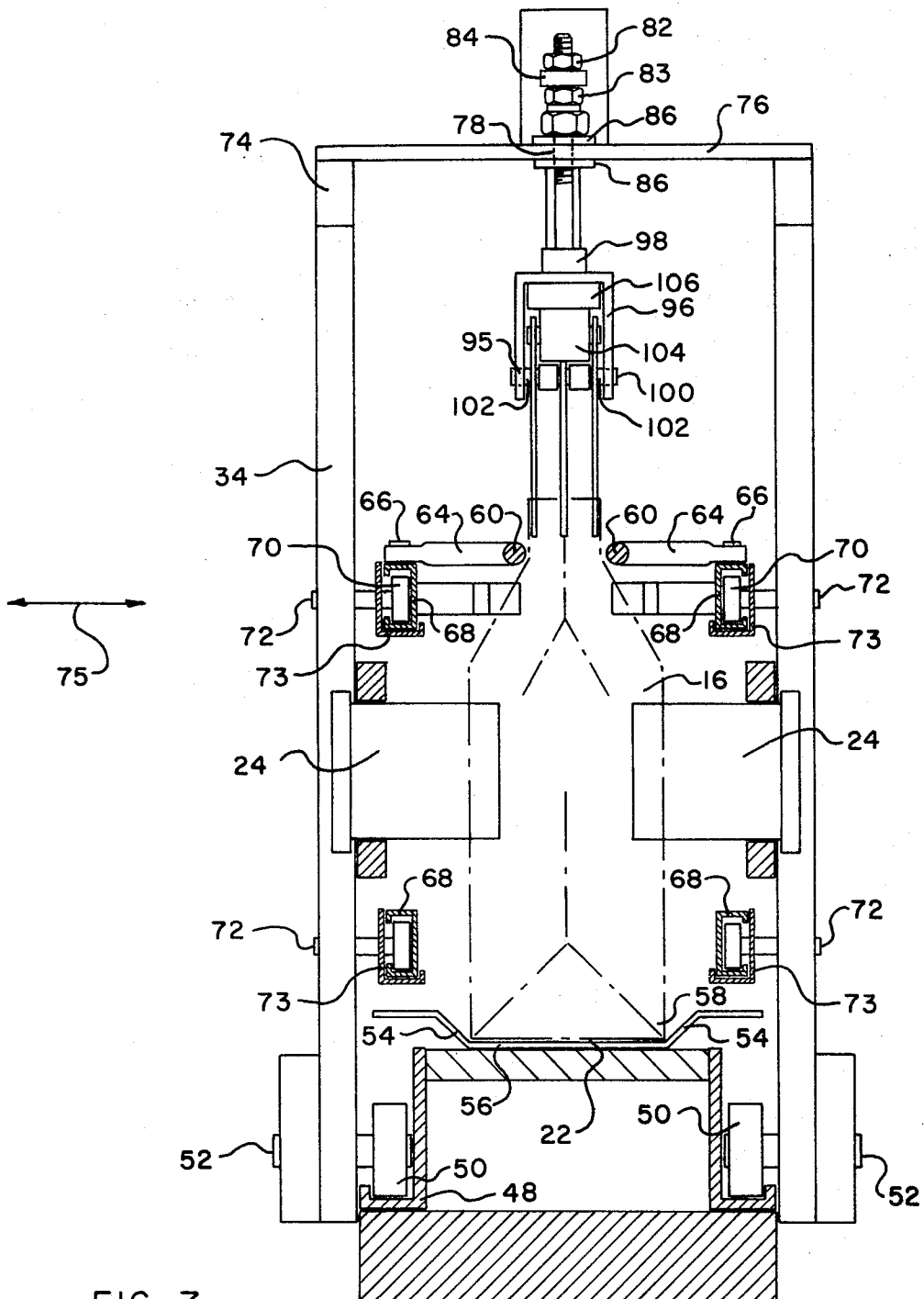


FIG. 7

INVENTOR  
DOYLE R. HUDSON  
BY *Nowell E. Van Behren*  
ATTORNEY

**GUSSET REFORMER****CROSS REFERENCES TO RELATED APPLICATIONS**

U. S. Ser. No. 172,688, filed Aug. 18, 1971 by Doyle R. Hudson and entitled "Expanding Fill Spout for Bag Filling Machine."

U. S. Pat. No. 3,698,451, issued Oct. 17, 1972 to Doyle R. Hudson and entitled "Automatic Bag Opening and Filling Apparatus."

U. S. Ser. No. 272,125, filed July 17, 1972 by Doyle R. Hudson and entitled "Multiple Finger Pushers."

**BACKGROUND OF THE INVENTION**

This invention relates generally to a bag filling machine and more particularly to that portion of a bag filling machine generally known as a reforming station wherein the gussets or upper edges of the bag that has been filled by the filling machine are reformed prior to being sealed for shipment to the customer.

The present state of the art of filling machines or that portion of the filling machine after the bag is filled is fairly represented by U. S. Pat. No. 3,167,897, issued Feb. 2, 1965, to F. L. Hopkins et al., and generally comprises a filling machine shown as the numeral 11 which fills the bag shown in FIG. 1 of the drawing and then positions or reforms the gussets of the bag into a condition to be sewn shut by the sewing machine contained within the automatic machine. After the bag is filled, it is positioned onto a moving conveyor belt which carries the bag to the gusset reforming station where the gussets are reformed prior to sewing. By reforming, it is meant that the upper portion of the bag is creased along the natural folds of the bag to a closed position. The use of a moving conveyor as such presented problems in keeping the bag vertical after it had been dropped from the filling station and as it traveled along the moving belt. Since the bag dropped vertically downward from the filling station and the traveling belt was moving horizontally, the energy applied to the bag to move it to the reforming station was applied at the bottom of the bag which often caused a rotational effect on the bag. This rotational effect has been found to be sufficient to sometimes tilt the bag backwards somewhat; thereby, throwing it out of its true vertical line. When this happens the bag may enter the gusset reforming station sufficiently out of line to cause a malfunction of the reforming section of the machine or to cause the gussets to be improperly reformed.

A typical reforming station can be best illustrated by referring to U. S. Pat. No. 3,115,736, issued Dec. 31, 1963, to A. F. Peterson, wherein a plurality of fingers are manipulated to reform the gussets of the bag. If the bag was tilted slightly backwards, as hereinbefore mentioned, it becomes obvious that use of a reforming mechanism as illustrated in FIG. 4 of the drawing would result either in the stationary finger 72 being positioned within the bag or else the bag would be sufficiently off center from the mechanism so that the reforming would not be accomplished in a proper manner; in either case the gussets would be improperly reformed.

Other variations for reforming the gussets of the bag have been attempted as evidenced by the U. S. Pat. No. 2,911,778, issued Nov. 10, 1959, and the U. S. Pat. No. 2,925,699, issued Feb. 23, 1960, both patents issued to L. Ozor. The methods of reforming taught in these pa-

tents were, for obvious reasons, not suited to the high speed packaging machinery necessary as a result of the heavy demand for consumer products.

**SUMMARY OF THE INVENTION**

In order to overcome the difficulties encountered in the beforementioned prior art machines there is provided by the present invention a new and novel combination machine or gusset reformer station wherein a fully filled bag of objects may be rapidly and accurately conveyed from a filling station to a sewing station where the upper edges of the bag are sewn shut. In conveying the bag from the filling station to the sewing station, the gussets of the bag are also automatically reformed and are retained in the reformed position prior to entry of the bag in the sewing station area.

The new and novel reforming station comprises a stationary frame having a trough-shaped upper surface which guides the lower portion of the bag as the bag is dropped from the filling station to the upper surface of the trough. The bag is then physically pushed along the trough by means of pusher members which are designed to exert a pushing force at the center of the inertia of the bag with the combination of the trough and the pushers serving to accurately position the bag underneath the means for reforming the gussets of the bag.

Contained on the stationary frame and movably mounted thereto is a carriage upon which is mounted the gusset reforming means or the means for manipulating the gussets of the bag to the reformed position suitable for sewing at the sewing station. After the gussets are reformed the bag is further moved towards the sewing station with the gussets being held in the reformed position so that the sewing machine positioned at the sewing station may quickly and accurately sew the bag shut.

Accordingly, it is an object of the invention to provide a new and novel combination machine which quickly and accurately conveys a plurality of bags filled with bulky objects from a filling station to a sewing station while at the same time quickly and accurately reforming the gussets of the bag and holding the gussets in a reformed position prior to sewing.

Another object of the invention is to provide a new and novel gusset reformer which comprises a plurality of inner and outer fingers which simultaneously reverse their position at the bag edge to quickly reform the bag gusset prior to the bag being carried to the sewing station.

Yet another object of the invention is to provide a new and novel reforming station for a bag filling machine which allows a large quantity of bulky objects such as charcoal or the like to be quickly filled and transported to a sewing station.

These objects and other advantages will become apparent from a reading of the complete specification and from a review of the drawings attached thereto.

**BRIEF DESCRIPTION OF THE DRAWINGS**

FIG. 1 is a side perspective view, in schematic form, showing the basic filling machine operations with the various stations represented having bags in position;

FIG. 2 is a partial top view showing the combination machine of the invention and the means for horizontally moving the bag from the filling station to the sewing station;

FIG. 3 is a partial side view of the combination machine taken along line 3—3 of FIG. 2;

FIG. 4 is another partial side view of the combination machine taken along line 4—4 of FIG. 2;

FIG. 5 is a top sectional view taken along line 5—13 5 of FIG. 4 showing the inner and outer finger means prior to entry into the bag for reforming the gussets;

FIG. 6 is a top sectional view taken along line 6—6 of FIG. 4 showing the plurality of finger means after they have simultaneously reversed their position at the bag edge to reform the bag gusset; and

FIG. 7 is an end view, partially in section, taken along line 7—7 of FIG. 4 showing the trough-like member, attached to the stationary frame, with the reformed bag being positioned within the trough.

#### DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawings in general and in particular to FIG. 1 of the drawing, there is shown a bag filling station generally by the numeral 10 which comprises a pair of movable arms 12 having a plurality of suction cups 14 fixed thereon for transporting a bag 16 from a bag holding stack (not shown in the drawing) to the filling device shown generally as the arrow 18. This invention is covered in my co-pending patent application USSN 172,688, filed Aug. 18, 1971 and entitled "Expanding Fill Spout for Bag Filling Machine."

After the bag 16 is filled with a plurality of objects, such as charcoal or the like, it is conveyed to a sewing station (not shown in the drawings) after it passes through a gusset reforming station, shown generally by the numeral 20. The bag 16 drops onto a trough-shaped plate 22 and is conveyed along the trough-shaped plate by means of a pusher member 24 to be positioned beneath a plurality of inner finger means 26 and a plurality of outer finger means 28. These finger means, which will be described in more detail hereinafter, are the new and novel gusset reformer which quickly and accurately reforms the gussets of the bag.

After the gussets have been reformed, the bag 16 is pushed by means of the pusher member 24 into a holding means 30 which functions to hold the reformed gussets in their reformed position prior to the bag being passed to a sewing station. The interaction of the pusher members 24 and the inner and outer finger means 26 and 28 will be more fully described hereinafter, and the references to FIG. 1 are for illustrative purposes only.

Referring now to FIG. 2 of the drawing, there is shown a top view of the combination machine showing the filled bag 16 being represented at various stages of its travel from the filling station 18 to the sewing station (not shown in the drawing). The filled bag 16, as shown and represented by the dashed lines 32 is conveyed along the trough-shaped plate 22 by means of a plurality of pusher members 24 which are pivotally attached to a moving carriage 34 as shown in greater detail in FIGS. 3, 4 and 7 of the drawings. The pusher member 24 is pivotally mounted to the carriage 34 by means of a shaft 36 and is biased by a spring 38. The shaft 36 is carried by a frame 40 which is in turn rigidly attached to the moving carriage 34. The spring 38 may be formed of a compression spring bent into a U-shaped configuration with one end thereof fixedly attached to the frame 40 and the other end thereof fixedly attached to the pusher member 24. In this manner the pusher

member 24 is able to pivot about the shaft 36 in the directions shown by the arrows 42 and the arrows 44 as will be more fully explained hereinafter.

Referring now to FIG. 7 of the drawing, there is shown an end view, partially in section, taken along line 7—7 of FIG. 4 of the drawings. The carriage 34 is mounted for horizontal travel on a stationary frame 48 which has an up-turned end flange which carries a plurality of wheels 50. The wheels 50 are rotatably mounted by means well known in the art, to the carriage 34 by means of the plurality of axles 52. Rigidly attached to the upper portion of the stationary frame 48 by means well known in the art and forming no part of the invention, is the trough-shaped plate 22 comprising a pair of angled sides 54 formed on a bottom section 56. The trough-shaped plate 22, with its bottom section 56, is sized to receive a specific bag based upon the open bottom filled width of the bag as it is positioned on the bottom 56. As the bag 16 is dropped from the filling station 18 to the trough shape plate 22, the inclined sides 54 guide the bottom portion 58 of the bag into the trough, thereby, always accurately positioning the bag 16 within the trough and in a proper position within the carriage structure to have its gussets accurately reformed.

Referring now to FIGS. 2 and 7 of the drawings, there is shown the holding means 30 for holding the reformed gussets in a reformed position prior to sewing and after the manipulating means have been removed from the bag. The holding means 30 comprises a pair of elongated rods 60 which are positioned in a close relationship to each other so that whenever the bag 16 leaves the reforming means, it is held closely in its reformed position such as shown by the dashed lines 62 shown in the figure. The elongated rods 60 have outwardly inclined portions 64 which are rigidly fastened by means of a fastener 66 to a channel member 68 which is rigidly fastened to the stationary frame 48 by means well known in the art and not detailed in the drawings for purposes of clarity. The channel members 68 also serve as guide rails for a plurality of wheels 70 which are rotatably mounted to the axles 72 which are in turn fixedly mounted to the moving carriage 34. The axles 72 also carry an angle 73 having an up-turned end portion which prevents sideward motion of the carriage 34 in the direction shown by arrow 75. The upper portion 74 of the frame 34 is thereby structurally stabilized to assure that the inner and outer finger members 26 and 28 are always positioned at their proper position in respect to the trough-shaped plate 22 during horizontal travel of the moving carriage 34.

Referring now to FIGS. 4, 5 and 6, there is shown in detail the improved gusset reforming means of the invention and comprises the upper portion 74 of the moving carriage 34 which serves as a frame upon which the inner and outer fingers 26 and 28 are carried. Fixedly attached to the upper portion 74 is an elongated plate 76 having a plurality of holes 78 formed therein to receive the rods 80 which are treaded to receive a plurality of adjusting nuts 82 and 83 spaced apart by means of the washers 84.

Fixedly attached to the plate 76 and located above and below the holes 78 are a plurality of spacers 86. The rods 80 have positioned thereon, but not threaded to, on their lower portion thereof a plurality of stop nuts 88 which serve as stops for the lower adjusting nuts 83 whenever the inner and outer fingers 26 and 28

are lowered into their reforming positions as will be more fully described hereinafter. Also contained on the central portion of the plate 76 are the means for lowering the inner and outer fingers into and out of the bag, said means being in the form of an air power cylinder 90 fixedly attached by means well known in the art to the plate 76. The power cylinder 90 contains a cylinder rod 92 which is positioned in a hole 93 contained in the plate 76 and is fixedly attached at the end of the rod to a pusher plate 94 by means well known in the art.

Referring now particularly to FIG. 7 and FIG. 4 of the drawings, there is shown the means whereby the inner and outer fingers are carried by the moving carriage and are fixedly attached to the rods 80. A generally U-shaped member 96, having an upper block 98 formed thereon, is carried by the lower portion of the rods 80 which are threaded and received in a tapped hole (not shown in the drawing) which is formed in the upper block 98. The U-shaped member 96 has formed in the bottom portion thereof a plurality of holes 95 to receive a pin 100 which carries the inner and outer fingers at 102. The U-shaped member 96 also carries a generally T-shaped elongated bar 104 having formed on the upper portion thereof an elongated bar 106 which is fixed to the pusher plate 94 by means well known in the art. The bottom portion of the elongated bar 104 is designed to be positioned on the cam surfaces in the form of the rollers 103 which are rotatably mounted on the upper portion of the inner and outer fingers. Whenever the elongated bar 106 is positioned as shown in FIG. 4 by the solid lines, the inner and outer fingers 26 and 28 are positioned outside of the bag prior to entering the bag. When the inner and outer fingers are in the bag and have simultaneously reversed their position, then they are in the position shown by the dashed lines 108, also shown in FIG. 4.

Whenever the power cylinder 90 is activated and the pusher plate 94 travels downwardly, the entire unit of inner and outer fingers 26 and 28, along with the U-shaped member 96 and its respective components, will travel downwardly as a unit with the inner fingers being positioned within the bag and the outer fingers 28 being positioned outside of the bag as more clearly shown in FIG. 5 of the drawings. The travel of the fingers will continue until the adjusting nut 83 strikes the stop nut 88 (as illustrated in FIG. 7) after which a continued travel by the pusher plate 94 will exert a force on the elongated bar 106 which will in turn force the rollers 103 downwardly pivoting the inner and outer fingers about the pins 100 in such a manner that they will simultaneously reverse their positions to the position shown in FIG. 6 of the drawings. As a result, the gussets of the bag will quickly and automatically be reformed. While the gussets are being reformed, the bag 16 is also being moved along the trough-shaped plate 22 by means of the carriage 34 traversing and moving the pusher members 24 to a position where the bag can enter the holding means 30. Whenever the bag 16 is positioned within the elongated rod 60, the power cylinder 90 will reverse and retract the inner and outer fingers from the bag, whereupon the carriage 34 will reverse its direction and return to pick up another bag and to repeat the process. The means for reversing and returning the carriage have been omitted from the drawing for purposes of clarity but may take the form of a reversing motor driving the carriage by an endless chain, as is well known in the art. The bag 16 is then

transported through the holding means 30 to the sewing station by means well known in the art and forming no part of this application.

Referring now to Fig. 3 of the drawings, there is shown the carriage 34 after it has reversed its position and after it has picked up another bag from a bag stacker. This position is shown by the dashed lines 105. When the carriage 34 has traversed to a position under the filling station and as shown by the solid lines 107, the arms 12 will position the bag on the filling station. The arms 12, having the plurality of suction cups 14 fixed thereto, are pivotally mounted by means of a pin 110 which is rigidly fastened to an elongated member 112 which is in turn carried for vertical movement by a pair of parallel bars 114 and 116. These bars are fixed to the moving carriage 34 by means of a plurality of pins 118 at their lower end and are pinned to the elongated member for rotational movement thereabout at their upper end by a pair of pins 120 and 122. The pin 122 also carries a roller 125 which rides on a cam surface 126 of a cam 128 which is fixedly attached to the stationary frame 48 by means well known in the art and not shown in the drawings. The cam 128 is positioned on the stationary frame 48 in such a manner that whenever the carriage 34 is moved horizontally the roller 124 will engage the cam surface 126 and drive the arms 12 vertically upward, thereby, positioning the bag 16 beneath the filling station 18.

When the arms 12 have positioned the bag 16 on the bag filling station 18, the bag will be rapidly filled and will drop into the trough-shaped plate 22 ready to be horizontally moved by the pusher members 24. Thereupon the carriage 34 will travel horizontally in the direction shown by the arrow 130 a sufficient amount to enable the arms 12 with suction cups 14 attached to pick up an empty bag from a bag stacker. Since the pusher members 24 are pivotally mounted for movement in the direction shown by the arrows 42 and 44, as the carriage 34 moves in the direction shown by arrow 130, the pusher members 24 will contact the sides of the filled bag standing in the trough 22 and will be forced outwardly until the pusher members 24 have traveled past the bag; whereupon, they will be biased inwardly by means of the spring 38. As the carriage 34 reverses direction to that shown by the arrow 132, the pusher members 24 will have passed the filled bag and be in a position to push the filled bag along the trough-shaped plate 22 out from underneath the filling station 18, from which it has dropped, and towards the sewing station. After the bag has cleared the filling station 18, the gusset reforming section containing the inner and outer fingers is activated and reforms the gussets as hereinbefore detailed. Thereafter the pusher members 24, moving in the direction shown by the arrow 132, continue to push the bag 16 into the holding means 30 with the rods 60 holding the reformed gussets until the bag is finally transported to the sewing station by means well known in the art and forming no part of this invention.

By the use of the new and novel trough-shaped plate 22, in combination with the pusher means 24, there is obtained a true and accurate positioning of the filled bag underneath the gusset reforming station, thereby allowing the gusset reformers to quickly and accurately reform the gussets of the bag. The pusher members 24 are positioned and carried by the moving carriage 34 in such a manner that they exert their horizontal force



close to the center of the inertia of the package being filled. For example, when the package being filled consists of a 20-pound charcoal bag, it is estimated that the center of the inertia of the bag would be in the range approximately 8 inches from the bottom of the bag and also the bottom plate 56 of the trough-shaped plate 22. When the bag being filled is a 10-pound charcoal bag, the center of the inertia would be approximately 5 inches from the bottom plate 56, and the pusher members 24 would be positioned to exert a horizontal force at this point. When the bag being filled is a 5-pound charcoal bag, then the center of the inertia would lie approximately 3 inches from the bottom plate 56, and the pusher members would be adjusted accordingly.

From the prior art bag filling machines, it has been learned that the use of a horizontal moving belt to transport the filled bags in combination with the dropping of the filled bag to the moving belt has a tendency to tilt the upper portion of the bag backwards as the force of the moving belt is applied to the bottom of the bag. As a result, whenever the tilted bag enters the gusset reforming station jamming of the bag filling machine can occur whenever the gussets are not properly reformed, thereby causing lost man-hours to straighten out the jammed filling machine. As a result of the heavy demand for filled bags, like the before mentioned charcoal bag, everything that can be done to prevent jamming of the bag filling machine in a high speed operation becomes extremely important to an economical operation of the filling facilities.

From the foregoing, it should become apparent that there has been provided by the subject invention a new and novel combination machine which can convey a fully filled bag of objects from a filling station to a sewing station with the machine comprising a stationary frame having a trough-shaped upper surface for guiding the bag and a movable carriage mounted on the frame for moving the bag over the trough-shaped surface from the filling station, through the gusset reforming station, to the means for holding the reformed gussets in position prior to the arrival of the bag at the sewing station.

In addition, there is provided by the subject invention a new and novel means for reforming the gussets of the bag after the bag has left the filling station and while it is traveling to the sewing station with the new and novel means being in the form of a plurality of inner and outer fingers which simultaneously reverse their position at the bag edge, thereby quickly reforming the bag gusset and allowing the bag to be transported to the sewing station with its gussets properly reformed. It should now become obvious that the objects and advantages of the invention have been accomplished by the new and novel means herein taught. Nevertheless, it is apparent that many changes may be made in the relative parts and in the arrangement of the parts of the invention without departing from the spirit and scope of the invention, and the invention is not to be limited to the preferred embodiment which has been given by way of illustration only.

Having described the invention, I claim:

1. An improved gusset reformer for reforming the open portion of a varying size of self-opening style bags having a plurality of preformed vertical scores formed thereon forming the gusset for the bag, comprising:

- a. a frame;
- b. inner finger means, carried by and positioned on said frame, for vertical movement into and out of the bag in proximity to the gussets;
- c. outer finger means, carried by and positioned on said frame, for vertical movement downwardly and upwardly along the outer edge of the bag in proximity to the gussets and simultaneously with the movement of the inner finger means;
- d. means, carried by said frame, for lowering said inner and outer fingers into and out of the bag in proximity to the gussets, said means for lowering serving also to manipulate said inner and outer finger means, after lowering, so that said inner and outer finger means simultaneously reverse their position in a longitudinal direction at the bag edge thereby quickly reforming the bag gusset to its original closed position along the plurality of preformed vertical scores.

2. The gusset reformer as defined in claim 1 wherein said inner finger means comprise at least four fingers and said outer finger means comprise at least two fingers.

3. The gusset reformer as defined in claim 1 wherein each of said inner and outer fingers have formed on the upper portion thereof a cam surface and said means for lowering and manipulating comprises an elongated bar carried by said frame and positioned against said cam surfaces, said elongated bar being fixedly attached to said lower and manipulating means so that movement of said elongated bar downwardly a predetermined distance will cause said elongated bar to react with said cam surfaces thereby causing said inner and outer finger means to simultaneously reverse their positions and reform the bag gusset.

4. A combination machine for conveying a fully filled bag of objects that have been dropped from a filling station and are to be conveyed to a sewing station whereby the upper edges of the bag are sewn shut, said machine also serving to reform the gussets of the bag prior to and while delivering the bag to the sewing station comprising:

- a. a stationary frame having a trough shaped upper surface for receiving and for guiding the lower portion of the bag as it drops from the filling station;
- b. a carriage, moveably mounted on said frame, for horizontal movement of the lower portion of the bag along the trough shaped upper surface from the filling station to the sewing station;
- c. means, carried by said carriage, for manipulating the gussets of the bag to a reformed position suitable for sewing at the sewing station while simultaneously moving the bag to the sewing station; and
- d. means for holding the reformed gussets in a reformed position prior to sewing after said manipulating means have been removed.

5. The machine as defined in claim 4 wherein said means for holding the reformed gussets prior to sewing comprises a pair of guide rails fixedly attached to the frame.

6. The machine as defined in claim 5 wherein said means for moving the bag comprises a pusher member, pivotally mounted on said moving carriage.

\* \* \* \* \*

UNITED STATES PATENT OFFICE  
CERTIFICATE OF CORRECTION

Patent No. 3,755,986 Dated September 4, 1973

Inventor(s) Doyle R. Hudson

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 3, lines 5 and 6, change "5-13-5" to -- 5-5 --.

Column 6, line 20, change "125" to -- 124 --.

Signed and sealed this 1st day of January 1974.

(SEAL)

Attest:

EDWARD M. FLETCHER, JR.  
Attesting Officer

RENE D. TEGTMEYER  
Acting Commissioner of Patents