

Sept. 20, 1960

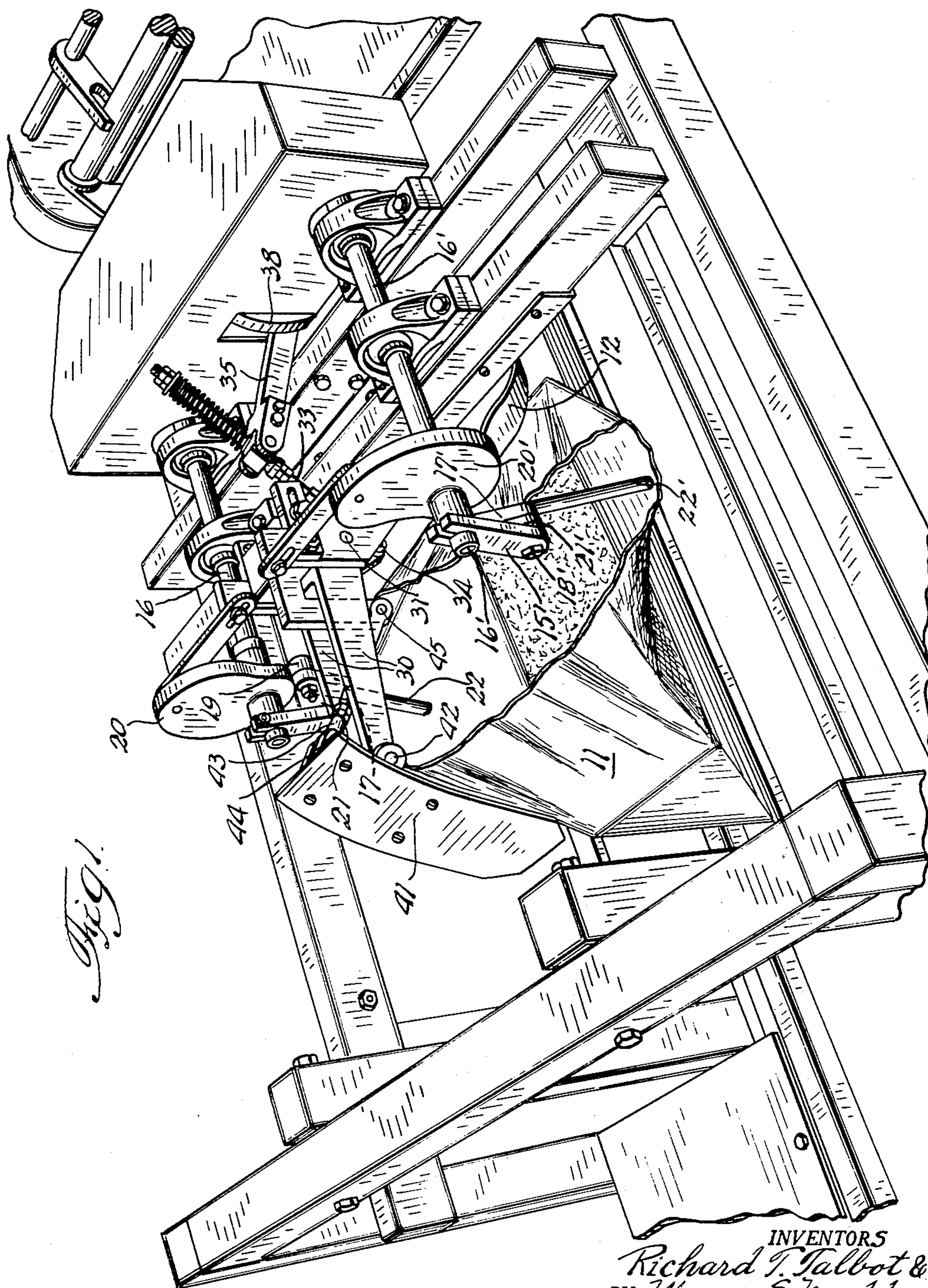
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PACKAGING MACHINE

Filed March 29, 1956

3 Sheets-Sheet 1



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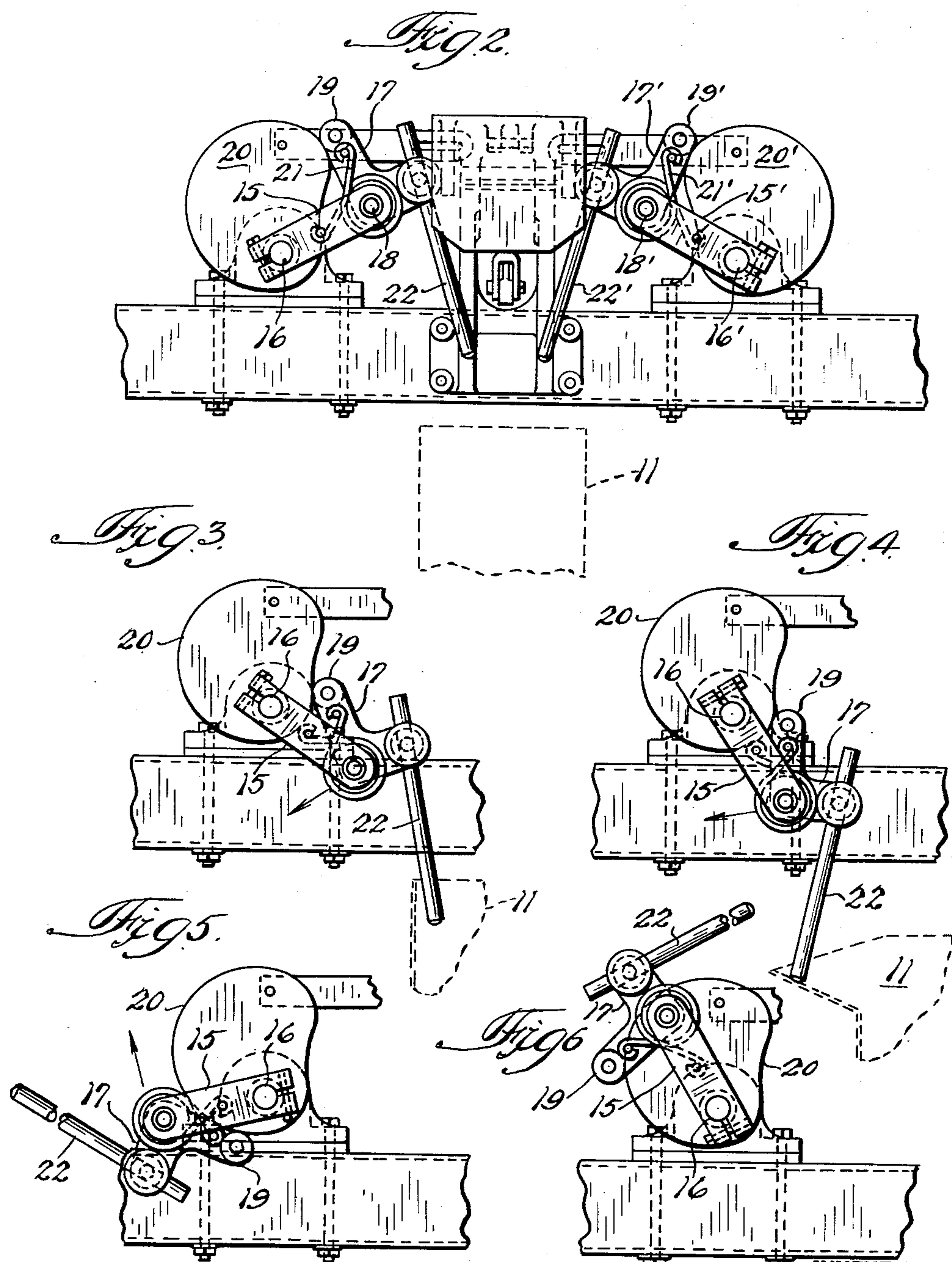
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Fig. 7.

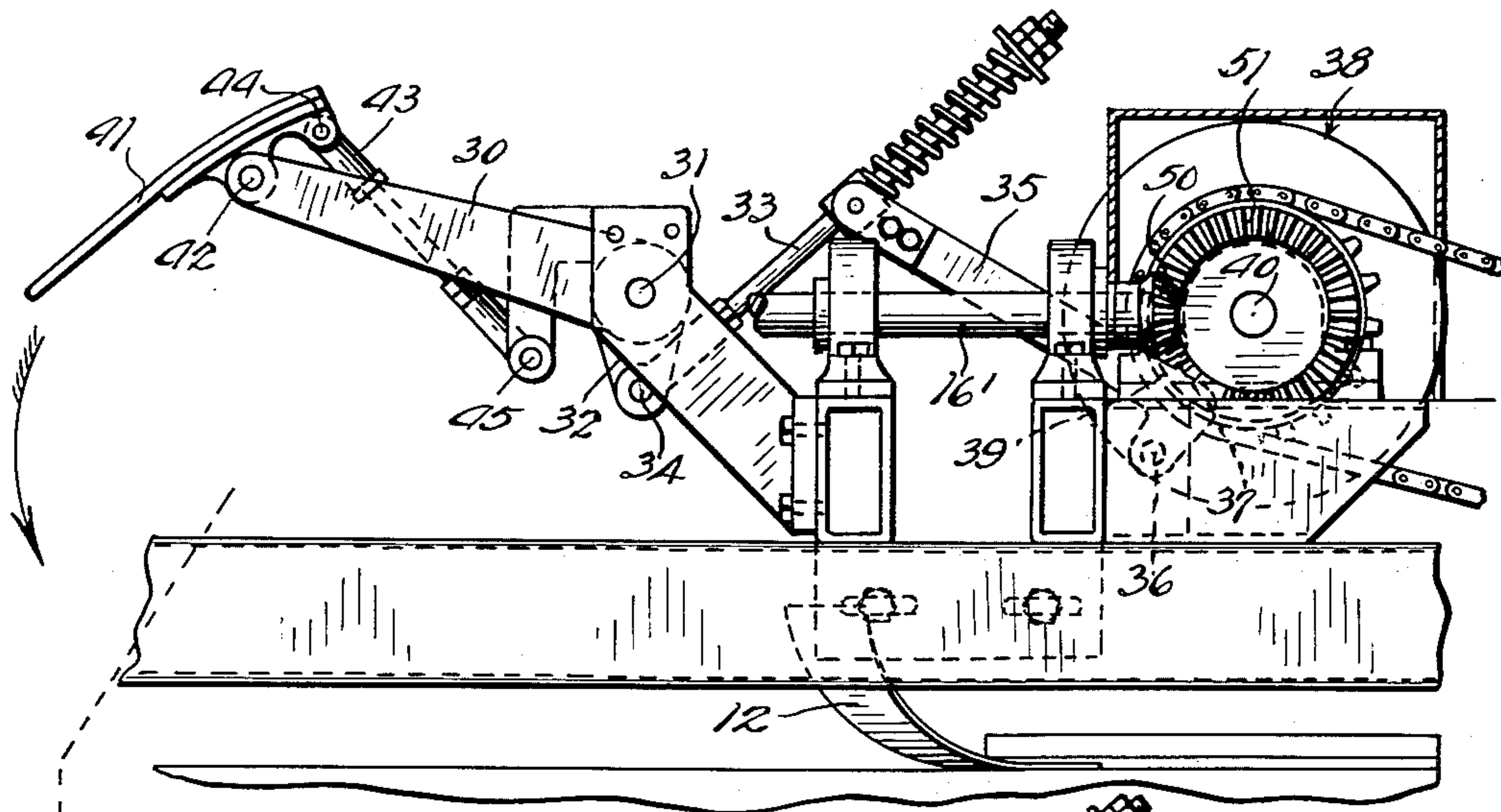
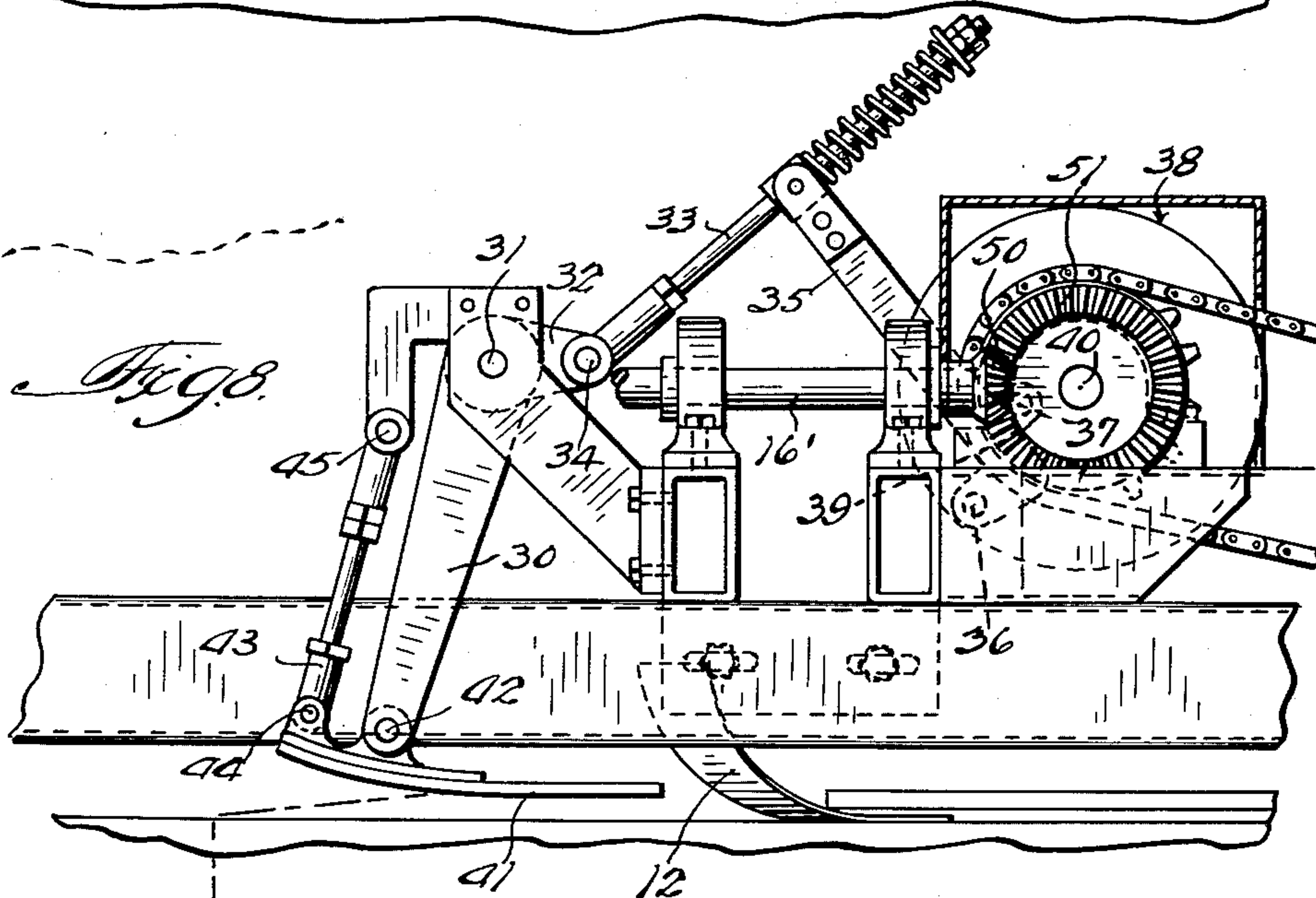


Fig. 8.



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PACKAGING MACHINE

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6 Claims. (Cl. 53—381)

This invention relates to a packaging machine and in particular to apparatus for folding the open end of a bag-like container. It is an object of the invention to provide improved apparatus of this character.

Where packages are arranged in a bag-like container certain problems arise in folding the open end of the container after it has been filled to a predetermined level. In particular, it is desirable that two opposed sides of the open end of the container be folded toward each other, after which the resulting flaps formed by the two intermediate sides may be folded toward each other and on top of the previously folded sides. In this manner, the end of the container is made trim and square and maximum area of contact is provided between the two last-folded sides and the two underlying, previously folded sides. Adhesive applied to the inner surfaces of the two last-folded sides is thereby given maximum opportunity to seal the end of the container. However, because of the fact that the material of a bag-like container is relatively soft and flexible, when two opposed sides are first folded inwardly portions of one or both of the intermediate sides may be caught under these first-folded sides. This produces an irregular and bulky fold and reduces or eliminates the flaps which are otherwise formed by the intermediate sides.

It is another object of the invention to provide improved means for folding the open end of a bag-like container such that the fold is neat and square.

It is another object of the invention to provide improved apparatus for folding the open end of a bag-like container which provides the maximum area of contact between two opposed first-folded sides and the two later-folded intermediate sides.

It is another object of the invention to provide improved apparatus for folding the open end of a bag-like container which has one or more of the characteristics described above, while being efficient and reliable in operation and simple and economical to produce.

This invention, together with further objects and advantages thereof, will best be understood by reference to the following description taken in connection with the accompanying drawings, and its scope will be pointed out in the appended claims.

In the drawings, in which like parts are designated by like reference numerals,

Figure 1 is a perspective view of a machine incorporating one embodiment of the invention;

Fig. 2 is an elevational view of dual apparatus, constructed in accordance with one embodiment of the invention, for performing one step in the folding of the open end of a bag-like container;

Figs. 3, 4, 5 and 6 are partial views of the apparatus shown in Fig. 3 and illustrating different operating positions thereof;

Fig. 7 is an elevational view of apparatus, constructed in accordance with one embodiment of the invention for performing another operation in the folding of the open end of a bag-like container, and

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Fig. 8 is a view similar to Fig. 7 but illustrating the apparatus in a different operating position.

The machine shown in Fig. 1 is a complete machine for closing and sealing the open end of a bag-like container, apparatus being provided for applying adhesive and for pressing the folds at the open end of the container in their closed positions to effect a seal. The present invention, however, is concerned only with the forward part of the machine, which serves to fold the lateral sides of the open end of the container outwardly and fold the forward and rearward sides of the open end of the container inwardly. After this has been accomplished, adhesive can readily be applied to the inner surfaces of the side flaps thus formed and to fold these flaps inwardly to seal the container.

Bag-like containers 11 may be fed to and through the machine proper by any suitable conveyor means having discrete positions for receiving and conveying such containers. Since such conveyor means do not, of themselves, constitute a feature of the present invention, they are not shown in the drawings or described in detail herein. All operations of the machine described below, may be performed on the successive containers 11 as they are carried continuously along by the conveyor means.

As may be seen in Figs. 1, 7 and 8, blade 12 is fixedly arranged in the path of the containers 11 and in position to engage the forward side of the open end of the containers immediately above the level to which the containers have previously been filled. As the containers are carried under and past the blade 12, the blade presses the leading side of the open end of the container back and down against the contents of the container. However, if no preventive steps are taken, the lateral sides of the open end of the container may fold inwardly and be trapped under the leading side of the open end of the container. This results in a bulky fold and leaves no side flap formations to which adhesive may be applied and which may subsequently be folded in and pressed against the forward and trailing portions of the open end of the container to effect a seal. An important feature of the present invention is that portion of the apparatus which draws the lateral sides of the open end of the container outwardly prior to the inward folding of the leading side of the open end of the container.

This apparatus may best be understood by reference to Fig. 2. Two similar arms 15 and 15' are shown connected to and rotatably driven by respective power-driven shafts 16 and 16'. These shafts are rotated continuously to the effect that the arms 15 and 15' swing continuously and individually about the axes of the shafts. The arm 15 rotates in a clockwise direction while the arm 15' rotates in a counterclockwise direction. Since the two arms and their associated parts are symmetrical about the center line of the machine, only the left-hand side is described in detail herein, corresponding parts of the right-hand side being given like reference numerals with a prime mark.

The arm 15 pivotally supports a bell crank 17 through a pin 18. On one arm of the bell crank 17 is a roller 19 engageable with a fixed cam 20. A spring 21 which encircles the pin 18 and engages the bell crank 17 and the arm 15 at its opposite ends urges the cam roller 19 against the cam 20 such that the roller follows the contour of the cam as the arm 15 rotates about the shaft 16.

Rigidly connected to the other arm of the bell crank 17 is a finger 22, the two fingers 22 and 22' being shown in Fig. 2 poised above a bag-like container 11.

As the shaft 16 rotates, the arm 15, the bell crank 17, and the finger 22 follow paths which are suggested by the successive operating positions illustrated in Figs. 2-6. In Fig. 3, it will be seen that the lower end of the finger 22 has entered the open end of the container 11 and that the

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finger remains oriented substantially as in Fig. 2. This results from the fact that as the cam roller 19 is carried along the cam 20 by clockwise rotation of the arm 15, it bears against a recessed portion of the cam. This produces counterclockwise pivotal movement of the bell crank 17 and hence of the finger 22 with respect to the arm 15. This substantially compensates for the change in angle of the arm 15, whereby the bell crank 17 and the finger 22 remain at substantially their original orientations. Accordingly, it will be seen that the fingers 22 and 22' are driven substantially endwise into the open end of the container 11.

In Fig. 4 the finger 22 is shown being drawn to the left and pulling the left side of the open end of the container outwardly. At this point the associated cam roller 19 is riding on a portion of the cam 20 which is substantially centered about the axis of the shaft 16 whereby the finger 22 is turning in a clockwise direction with the arm 15.

In Fig. 5 the finger 22 is shown after it has snapped free of the container. Continued rotation of the shaft 16 carries the operating parts through the position illustrated in Fig. 6 and back to the original position illustrated in Fig. 2 wherein the fingers 22 and 22' are again poised above the next succeeding container.

When the fingers 22 and 22' move from their positions in Fig. 3 to the positions in Fig. 4, the lateral sides of the upper end of the container are drawn outwardly. The timing of the machine is such that the container 11 reaches and passes under the blade 12 while the fingers 22 and 22' are so spreading the lateral sides of the container. It will thus be seen that the leading side of the container is folded back and inwardly at a time when the sides of the open end of the container are pulled outwardly and hence cannot be caught under the inwardly folded leading side of the container.

Immediately prior to the inward folding of the leading edge of the container, but during the time that the sides of the container are drawn outwardly by the finger 22, the trailing side of the open end of the container is folded forwardly and inwardly by the apparatus illustrated in Figs. 7 and 8.

In Fig. 7 there is shown an arm 30 pivotally mounted on a shaft 31. Also secured to the shaft 31 is a shorter arm 32, and a link 33 is pivotally connected at one end to the arm 32 by a pin 34. Pivotally connected to the other end of the link 33 is a cam operated arm 35 which is pivotally mounted on a pin 36. The cam operated arm 35 carries a cam roller 37 which cooperates with a rotating cam 38. This cam is in the form of a disc having a track 39 formed in one side thereof for receiving the cam roller 37.

The shape of the cam track 39 is such that the cam roller is moved inwardly and outwardly of the axis 40 of the cam 38 as the cam rotates. This pivots the cam-operated arm 35 alternately in a clockwise and a counterclockwise direction whereby the link 33 is carried back and forth substantially longitudinally of itself. This movement of the link 33 causes the arm 32 and hence the arm 30 to oscillate about the shaft 31.

The extent of this movement is such that the arm 30 is caused to swing back and forth between the two positions illustrated in Figs. 7 and 8.

A shoe-like member 41 is pivotally connected to the free end of the arm 30 through a pin 42 at a point intermediate the ends of the member 41. The right-hand end of the member 41 as viewed in Fig. 7 is pivotally connected to a link 43 through a pin 44, the link 43 also being pivotally connected through a pin 45 to the frame of the machine. It will be noted that the link 43 is of adjustable length for reasons which will subsequently become apparent.

It will now be seen that as the arm 30 pivots from the position shown in Fig. 7 to the position shown in Fig. 8, it carries the shoe 41 with it. By virtue of the fact that

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one end of the shoe is maintained at a fixed distance from the fixed pin 45 by the link 43, it will be seen that as the shoe approaches the position of Fig. 8, it will be brought to a substantially horizontal orientation and will remain substantially horizontal as it completes its movement to the position of Fig. 8.

The timing of this operation is such that the shoe 41 engages the trailing side of the open end of a container 11 after the sides of the container have been drawn out by the fingers 22 and 22' and prior to the time that the leading side of the open end of the container is folded back by the blade 12. Thus it will be seen that both the leading side and the trailing side of the open end of the container are folded inwardly while the sides of the container are drawn outwardly by the fingers. The trailing side of the open end of the container must be folded forward and inwardly sufficiently ahead of inward folding of the leading side such that there is no interference between the leading and trailing sides as they are folded inwardly. The generally planar configuration of the shoe-like member 41 makes it permissible that it remain in the position of Fig. 8 while the leading container side is folded back over it.

The bag-like container 11 at this point has its leading and trailing sides of the open end thereof folded inwardly with the leading side overlying the trailing side. Accordingly, as the container continues to advance under the blade 12, both the leading and trailing sides are maintained in inwardly folded position by the blade 12. The resulting, generally triangular shaped, side flaps extend outwardly of the container, the leading edges thereof having been caught in this position by passage of the container under suitable retaining runners. While such runners and other apparatus incorporated in the over-all machine for the purpose of sealing the end of the container are not shown in the drawings, nor described in detail herein, it will be seen that the outwardly folded side flaps formed by the inward folding of the leading and trailing sides may readily be retained in an outwardly folded position whereby adhesive may readily be applied to the inner surfaces thereof and such that they may subsequently be folded over against the inwardly folded leading and trailing sides to seal the container.

It will be apparent that various operating parts of the machine must be locked in synchronism and in proper phase relationship. While the basic drive means for the various operating parts of the machine do not constitute a feature of the present invention and are not disclosed in the drawings or described in detail herein, it may be noted that in the specific embodiment of the invention disclosed herein, the fingers 22 and 22' are mechanically locked in synchronism with the member 41. In Figs. 7 and 8 the shaft 16' may be seen to have a bevel gear 50 at the right-hand end thereof. This engages a gear 51 which rotates with the cam 38. The shaft 16 is also driven by the same power source through similar gears, not seen in the drawings. The container conveyor means should also be locked in synchronism with the fingers 22 and 22' and the member 41 such that the successive containers 11 will be in proper position to be operated upon by the fingers and the member 41. This is preferably accomplished by driving the conveyor means from the same power source as drives the cam 38 and the shafts 16 and 16'.

It will now be seen that the apparatus shown in the drawings and described above folds two opposed sides of the open end of a bag-like container inwardly and assures that the intermediate sides thereof are folded outwardly to form a pair of closing flaps. More particularly, it is assured that the intermediate sides will not be folded under the first two sides such that there are no resulting side flaps with which to seal the container.

It will be apparent that the invention may be varied in its physical embodiment without departing from the spirit of the invention, and it is desired, therefore, that

the invention be limited only by the prior art and the scope of the appended claims.

While the present description sets forth a preferred embodiment of the invention, numerous changes may be made in the construction without deviating from the spirit of the invention and it is therefore desired that the present embodiment be considered in all respects as illustrative and not restrictive, reference being had to the appended claims rather than to the foregoing description to indicate the scope of the invention.

We claim:

1. In a machine for folding the open end of a bag-like container in preparation for sealing said open end, such container being filled to a predetermined level and being mechanically advanced to and past such machine; a pair of elongated fingers for drawing outwardly those opposed sides of the open container end which face laterally of the direction of movement of said container, fixed means for engaging and folding closed the leading side of the open end of said container as said container moves therepast, and a reciprocating member movable in the direction of movement of said container and at a speed greater than that of said container for folding closed the trailing side of said open end of said container and movable in the direction substantially opposite the movement of said container for withdrawal from said container after the trailing side thereof has been folded closed.

2. In a machine for folding the open end of a bag-like container in preparation for sealing said open end, such container being filled to a predetermined level and being mechanically advanced to and past such machine; a pair of elongated fingers for drawing outwardly those opposed sides of the open container end which face laterally of the direction of movement of said container, fixed means for engaging and folding closed the leading side of the open end of said container as said container moves therepast, a reciprocating member movable in the direction of movement of said container and at a speed greater than that of said container for folding closed the trailing side of said open end of said container and movable in the direction substantially opposite the movement of said container for withdrawal from said container after the trailing side thereof has been folded closed, and means for driving said fingers first substantially longitudinally into said open end of said container and then substantially laterally of said container.

3. In a machine for folding the open end of a bag-like container in preparation for sealing said open end, such container being filled to a predetermined level and being mechanically advanced to and past such machine; a pair of elongated fingers for drawing outwardly those opposed sides of the open container end which face laterally of the direction of movement of said container, fixed means for engaging and folding closed the leading side of the open end of said container as said container moves therepast, a reciprocating member movable in the direction of movement of said container and at a speed greater than that of said container for folding closed the trailing side of said open end of said container and movable in the direction substantially opposite the movement of said container for withdrawal from said container after the trailing side thereof has been folded closed, and means for driving said fingers first substantially longitudinally into said open end of said container and then substantially laterally of said container, said driving means for each of said fingers including a rotating shaft, an arm secured at one end to said shaft, means pivotally supporting said finger at the free end of said arm, and cam means associated with said finger for varying the orientation of said finger with respect to said arm.

4. In a machine for folding the open end of a bag-like container in preparation for sealing said open end, such container being filled to a predetermined level and being mechanically advanced to and past such machine; a

pair of elongated fingers for drawing outwardly those opposed sides of the open container end which face laterally of the direction of movement of said container, fixed means for engaging and folding closed the leading side of the open end of said container as said container moves therepast, a member movable in the direction of movement of said container and at a speed greater than that of said container for folding closed the trailing side of said open end of said container, and means for driving said fingers first substantially longitudinally into said open end of said container and then substantially laterally of said container, said driving means for each of said fingers including a rotating shaft, an arm secured at one end to said shaft, a bell crank pivotally supported at the free end of said arm, said finger being fixed to one arm of said bell crank, a cam roller rotatably mounted on the other arm of said bell crank, a fixed cam continuously engageable by said cam roller, and means urging said cam roller into engagement with said fixed cam, said cam being of such shape that said bell crank and said finger pivot with respect to said arm, and in the opposite direction, as said arm carries said finger into the open end of said container.

5. In a machine for folding the open end of a bag-like container in preparation for sealing said open end, such container being filled to a predetermined level and being mechanically advanced to and past such machine; a pair of elongated fingers for drawing outwardly those opposed sides of the open container end which face laterally of the direction of movement of said container, fixed means for engaging and folding closed the leading side of the open end of said container as said container moves therepast, a shoe-like member movable in the direction of movement of said container and at a speed greater than that of said container for folding closed the trailing side of said open end of said container, drive means for said shoe-like member including an oscillating shaft, an arm secured at one end to said shaft, means pivotally connecting one point on said member to the free end of said arm, and a link pivotally connected at one end to said member at a point spaced from said one point and pivotally connected at its other end to a fixed point spaced from said oscillating shaft, whereby said shoe-like member is arranged substantially perpendicular to the sides of said container throughout the folding closed of the trailing side of said open end of said container, and means for driving said fingers first substantially longitudinally into said open end of said container and then substantially laterally of said container, said driving means for each of said fingers including a rotating shaft, an arm secured at one end to said shaft, a bell crank pivotally supported at the free end of said arm, said fingers being fixed to one arm of said bell crank, a cam roller rotatably mounted on the other arm of said bell crank, a fixed cam continuously engageable by said cam roller, and means urging said cam roller into engagement with said fixed cam, said cam being of such shape that said bell crank and said finger pivot with respect to said arm, and in the opposite direction, as said arm carries said finger into the open end of said container.

6. In a machine for folding the open end of a bag-like container in preparation for sealing said open end, such container being filled to a predetermined level and being mechanically advanced to and past such machine; a pair of elongated fingers for drawing outwardly those opposed sides of the open container end which face laterally of the direction of movement of said container, fixed means for engaging and folding closed the leading side of the open end of said container as said container moves therepast, and a shoe-like member movable in the direction of movement of said container and at a speed greater than that of said container for folding closed the trailing side of said open end of said container, drive means for said shoe-like member including an oscillating shaft, an arm

secured at one end to said shaft, means pivotally connecting one point on said member to the free end of said arm, and a link pivotally connected at one end to said member at a point spaced from said one point and pivotally connected at its other end to a fixed point spaced 5 from said oscillating shaft, whereby said shoe-like member is arranged substantially perpendicular to the sides of said container throughout the folding closed of the trailing side of said open end of said container.

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