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 [21] Appl. No. **859,306**
 [22] Filed **Sept. 19, 1969**
 [45] Patented **May 4, 1971**
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[54] **PIVOT ASSEMBLY FOR MOUNTING SWINGABLE OPERATING MECHANISMS OF A PACKAGING MACHINE**
 5 Claims, 6 Drawing Figs.

[52] U.S. Cl..... 53/386,
 53/187
 [51] Int. Cl..... B65b 43/30
 [50] Field of Search..... 53/386, 187

ABSTRACT: The bag openers of a packaging machine are mounted for in and out swinging relative to the bag path by a pivot assembly which may be adjusted quickly and easily to change the length of the swinging stroke of each opener independently of the stroke length of the other opener and without changing the home positions to which the openers swing at the inner ends of their strokes.

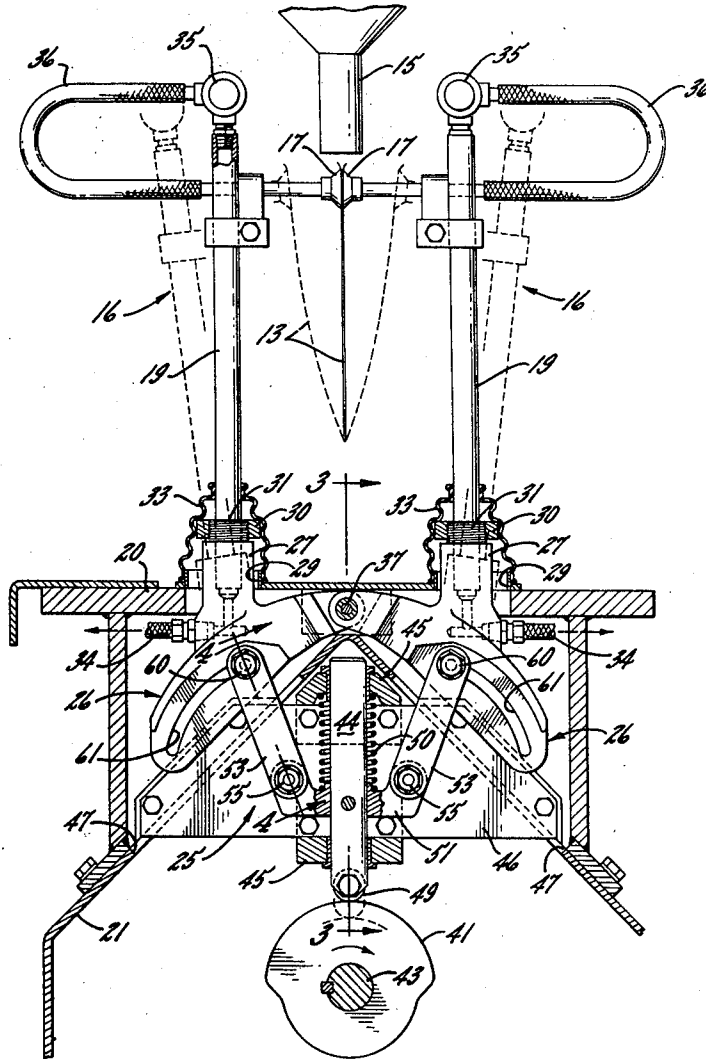
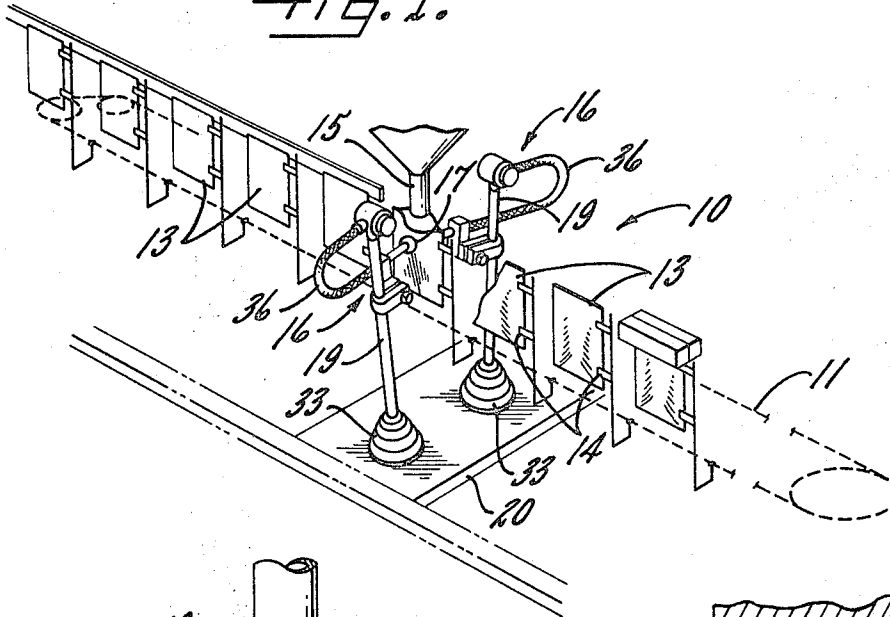
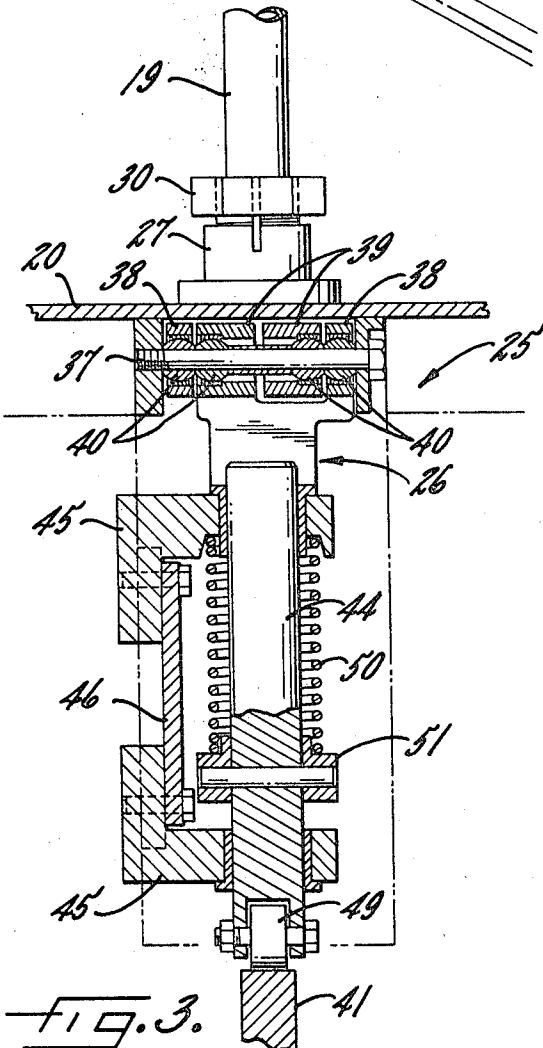
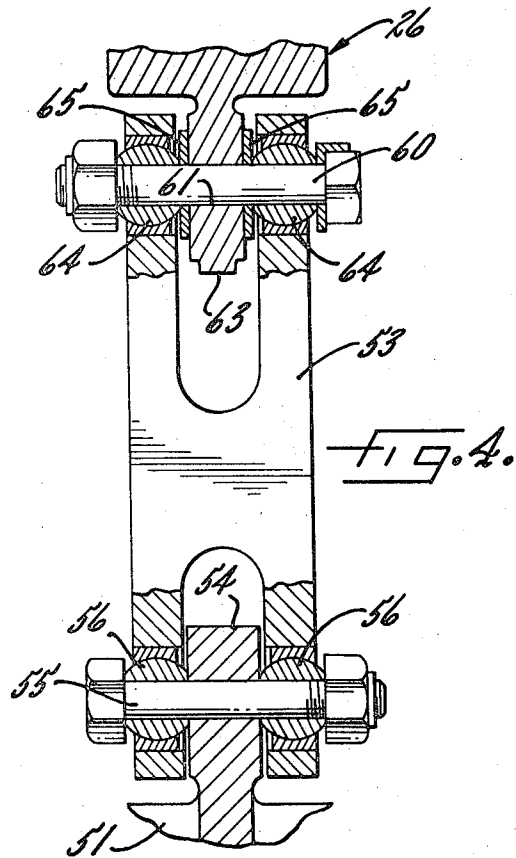


Fig. 1.



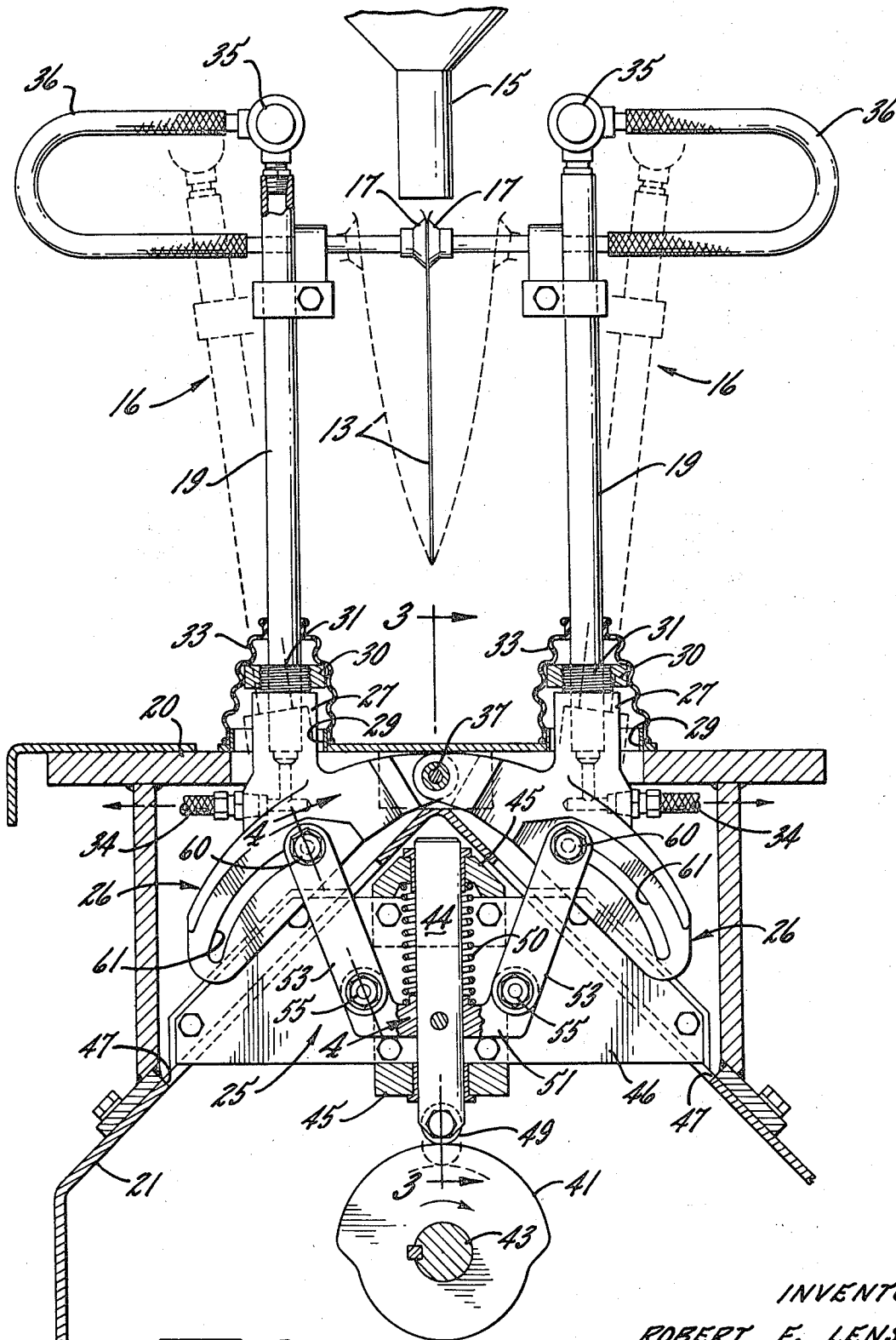
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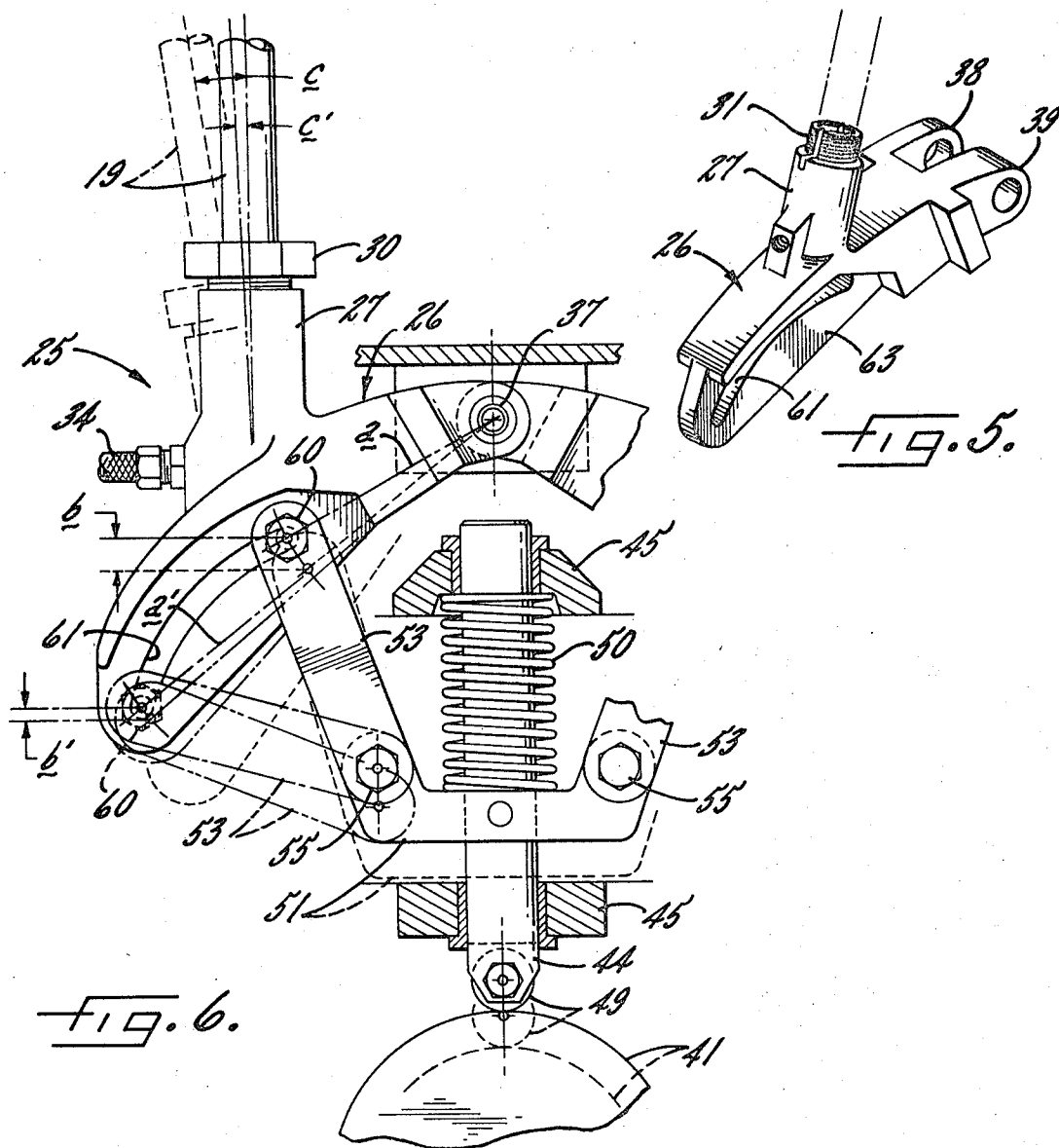
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PIVOT ASSEMBLY FOR MOUNTING SWINGABLE OPERATING MECHANISMS OF A PACKAGING MACHINE

BACKGROUND OF THE INVENTION

This invention relates to a packaging machine of the type in which packages advanced along a predetermined path are periodically acted upon by a package operating device which is mounted by a pivot assembly for in and out swinging toward and away from the packages. Frequently, two of the operating devices are aligned with one another on opposite sides of the path and are swung in unison toward and away from the packages by a cam-type drive so as to simultaneously engage successive ones of the packages and perform a packaging operation thereon. Because of the physical construction of the packaging machine and because the same machine may be used to handle packages of different types and sizes, provision usually is made for selectively adjusting the length of the swinging stroke undertaken by the operating devices without need of changing or adjusting the cam drive.

SUMMARY OF THE INVENTION

The primary aim of the present invention is to provide a packaging machine of the above character with a new and improved pivot assembly of simplified construction which may be used to swingably mount either one or two package operating devices, which requires only a single cam to effect swinging of both operating devices and which, at the same time, may be adjusted to change the length of the swinging stroke of each operating device independently of the other operating device and in an easier and more troublefree manner and through a wider range than has been possible heretofore with prior pivot assemblies used for related purposes. A further object is to provide a pivot assembly which, even when adjusted to change the stroke length, automatically keeps each operating device swinging to the same home position at one end of its stroke without the need of making compensating adjustments to maintain such position and regardless of the particular position occupied by the operating device at the time the stroke length is adjusted.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a fragmentary perspective view schematically showing an exemplary packaging machine equipped with a new and improved pivot assembly embodying the novel features of the present invention.

FIG. 2 is an enlarged fragmentary cross section taken vertically through the machine shown in FIG. 1.

FIG. 3 is an enlarged fragmentary cross section taken substantially along the line 3-3 of FIG. 2.

FIG. 4 is an enlarged fragmentary cross section taken substantially along the line 4-4 of FIG. 2.

FIG. 5 is a perspective view of part of the pivot assembly shown in FIG. 2.

FIG. 6 is an enlarged fragmentary view of parts shown in FIG. 2.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

For purposes of illustration, the invention is shown in the drawings in conjunction with a packaging machine 10 (FIG. 1) in which a power-driven carrier chain 11 supports a series of spaced packages or bags 13 in upright positions by means of clamps 14 and intermittently advances the bags along a horizontal path through a filling station where a charge of product is deposited into the open upper end of each bag through a filling spout 15 as the bag dwells beneath the spout. While within and before and after being advanced through the filling station, the bags are acted upon by various types of package operating devices which swing laterally of the path and toward and away from the bags in timed relation with their advance to perform different functions necessary to the packaging operation.

Two typical package operating devices 16 are shown in FIGS. 1 and 2 and are in the form of bag openers which are located within the filling station on opposite sides of the bag path to grip and spread the sides of each bag 13 beneath the spout 15 and thereby open the bag widely to facilitate rapid dispensing of the product into the bag. Each bag opener 16 herein comprises a suction cup 17 (FIG. 2) mounted for vertical and lateral adjustment on the upper end portion of a generally upright tubular rod 19. The latter is mounted for inward and outward swinging relative to a stationary support formed by a generally horizontal bridge 20 which extends across the upper side of a peaked roof 21 fastened to the machine frame (not shown). As each bag dwells beneath the spout, the rods are swung inwardly to position the suction cups against the opposite sides of the bag as shown in full in FIG. 2. Thereafter, vacuum is applied to the suction cups to cause the cups to grip the sides of the bag, the rods are swung outwardly as shown in phantom in FIG. 2 to cause the cups to pull the bag open, and then a charge of product is delivered into the bag from the spout. The vacuum then is released from the cups to free the bag for advancement out of the filling station before the cups are swung inwardly.

In many instances, it is necessary or desirable to adjust the length of the stroke through which each bag opener 16 swings. For example, if the machine 10 is set up to run bags smaller than the bags 13, the swinging stroke of each bag opener must be shortened and, when the machine is running larger bags, the swinging stroke usually is lengthened so as to effect wider opening of the bags. Often, because of the particular nature of the material of the bags or because other parts of the machine are located closely adjacent one of the openers, it is necessary to adjust one of the openers to swing through a shorter stroke than the opposing opener.

The present invention contemplates mounting the bag openers 16 for inward and outward swinging on a new and improved pivot assembly 25 (FIG. 2) with which the length of the swinging stroke of each opener may be changed through a comparatively wide range by making but a single simple adjustment. Moreover, the pivot assembly is arranged so as to keep each opener swinging to the same home position at one end of its stroke, herein the inner end, regardless of the length of the stroke and regardless of the angular positioning of the opener at the time the pivot assembly is adjusted.

More particularly and as shown most clearly in FIG. 2, the pivot assembly 25 of the invention comprises a pair of elongated pivot arms 26 which are mounted for up and down swinging beneath the bridge 20 and which carry the rods 19 of the bag openers 16 such that the latter are swung inwardly and outwardly as the arms swing upwardly and downwardly, respectively. Each arm is a metal casting formed with an upwardly extending tubular boss 27 (FIGS. 2 and 5), the boss being located intermediate the ends of the arm and projecting upwardly through the bridge 20 through an enlarged opening 29 formed therein. The rods 19 of the bag openers 16 are telescoped into the bosses and are anchored securely to the arms by clamping nuts 30 which are tightened onto externally threaded and diametrically split nipples 31 formed on the upper ends of the bosses. To prevent any product from falling through the openings 29, flexible boots 33 (FIG. 2) are telescoped over the lower end portions of the rods and the upper end portions of the bosses and are fastened to the upper side of the bridge to cover the openings.

The bosses 27 and the tubular rods 19 serve as manifolds for establishing communication between the suction cups 17 and a vacuum source (not shown). Thus, flexible hoses 34 (FIG. 2) extend into the bosses from the vacuum source and communicate with the suction cups 17 through the rods 19, automatically operated on-off valves 35 carried on the upper ends of the rods, and hoses 36 leading from the valves to the suction cups.

In order to mount the pivot arms 26 for up and down swinging beneath the bridge 20, a horizontal bolt 37 (FIGS. 2 and 3) is fastened to the underside of the bridge and defines a fulcrum extending below and centered on the path of the bags

13. The inner end of each arm is bifurcated and is formed with a pair of apertured ears 38 and 39 (FIG. 5) for receiving the bolt, the arms extending in opposite directions from the bolt with the ears of each arm interfitting with the ears of the other arm and being mounted pivotally on the bolt by so-called spherical bearings 40 (FIG. 3).

Up and down swinging of the arms is effected by a rotatable cam 41 (FIG. 2) on a power-driven cycle shaft 43 disposed beneath the roof 21 and extending along and below the bag path in centered relation therewith. The cycle shaft rotates in timed relation with the advance of the bags 13 and, as the latter dwell, the cam causes a reciprocally mounted driver 44 to shift first upwardly and then downwardly to pivot the arms 26 correspondingly and thus swing the suction cups 17 inwardly and outwardly to open the bag beneath the filling spout 15. Herein, the driver is an upright slide which is guided for up and down reciprocation in upper and lower bushed brackets 45 connected to a vertical plate 46 extending across and fastened to the roof, the ends of the plate projecting through openings 47 in the roof. A follower 49 is journaled on the lower end of the slide and rides on the cam to cause the slide to move upwardly and downwardly as the cam rotates. To keep the follower pressed against the cam and to effect downward shifting of the slide, a coil spring 50 is telescoped over the slide and is compressed between the upper bracket 45 and a collar 51 which is anchored rigidly to the slide intermediate the ends thereof.

To cause upward and downward swinging of the pivot arms 26 in response to the up and down reciprocating motion of the slide 44, links 53 (FIG. 2) are connected pivotally at their upper ends to the arms and at their lower ends to the collar 51 on the slide. As shown most clearly in FIG. 4, the lower end of each link is bifurcated and is connected pivotally to an ear 54 on the collar by a bolt 55 and a set of spherical bearings 56. The links extend generally upwardly through the openings 47 in the roof 21 for connection at their upper ends to the pivot arms 26.

In carrying out the invention, the links 53 are connected to the pivot arms 26 in a manner enabling quick and easy adjustment of the swinging strokes of the bag openers 16 through a wide range without changing the length of the reciprocating stroke of the slide 44. For this purpose, the upper end of each link 53 is connected to its respective pivot arm for adjustment toward and away from the pivot bolt 37 while remaining pivotally coupled to the arm in all adjusted positions thereby to enable changing of the moment arm or distance between the bolt and the upper end of the link and to change the vectorial components of the force applied to the pivot arm through the link so that the arm will be swung through different angles when the position of the link is adjusted. As shown in FIGS. 2 and 4, the upper end of each link is bifurcated and is connected to its associated arm by a bolt 60 which extends through an arcuate slot 61 formed in a relatively narrow elongated fin 63 on the lower side of the arm. Spherical bearings 64 (FIG. 4) engage washers 65 encircling the bolt 60 on opposite sides of the fin and mount the upper end of the link for pivoting on the bolt while allowing the bolt and the link to be clamped in a fixed position along the slot. Thus, by loosening the bolt 60, the upper end of the link 53 may be adjusted along the slot and then may be fixed pivotally in its adjusted position by retightening the bolt.

With the foregoing arrangement, the bag openers 16 may be set to swing through their longest strokes by anchoring the upper ends of the links 53 to pivot in the upper ends of the slots 61 as shown in FIG. 2 and as shown in full lines in FIG. 6 so as to establish a relatively short moment arm a (FIG. 6) between the bolts 37 and 60. In this position, each link pivots only slightly about the bolts 55 and 60 as the slide 44 reciprocates, is displaced vertically through a relatively large distance b (FIG. 6), and causes its respective bag opener to swing through a comparatively large angle c between the full line position and the dashed line position shown in FIG. 6 to swing the suction cup 17 through approximately a 3 inch

stroke. If the upper ends of the links 53 are set in the lower ends of the slots 61 as shown by the single dashed line illustration of FIG. 6 to provide a long moment arm a' between the bolts 37 and 60, each link pivots greatly about the bolts 55 and 60 as the slide 44 reciprocates and acts much like a toggle link approaching and receding from center so that most of the vertical displacement of the slide is absorbed or lost in the pivoting motion of the link. Each link thus is displaced vertically through only a short distance b' (FIG. 6) and this, together with the increased length of the moment arm a' causes swinging of the associated bag opener 16 through only a small angle c' from the full line position to the double dashed line position shown in FIG. 6 to swing the suction cup 17 through a 1 inch stroke.

Accordingly, the length of the swinging stroke of each bag opener 16 may be reduced to one-third of its original value simply by adjusting the upper end of the respective link 53 from the upper end of the slot 61 to the lower end thereof. The stroke may be adjusted to any length between the maximum and minimum by adjusting the upper end of the link to various positions intermediate the upper and lower ends of the slots. In addition, the stroke of each bag opener may be adjusted independently of the other bag opener as may be required in a given machine or with bags of a given type simply by setting the two links in different positions in their respective slots. In all adjusted positions of the links, the cam follower 49 remains always against the cam 41 to eliminate wear on the follower and to avoid the rough operational characteristics resulting from certain types of prior adjustable arrangements in which the follower is lifted from and impacted back against the cam as the bag openers are swung inwardly and outwardly.

To advantage, the length of the stroke of each bag opener 16 can be adjusted without changing the home position of the opener, that is to say, the position to which the opener swings at the inner end of its stroke. This is accomplished by forming each slot 61 along an arc which curves about the bolt 55 of its respective link 53 when the bag opener is in its extreme inner or home position and when the slide 44 is in its extreme upper or home position. As a result of the slots being curved in such a manner, adjustment of the positions of the upper ends of the links in the slots does not change the positions to which the bag openers swing at the inner ends of their strokes and, accordingly, the suction cups 17 will always swing inwardly to the same positions to engage the bags 13. The curvature of the slots enables the home positions of the openers to be maintained automatically without need of making extra adjustments when the stroke length is changed and, in addition, the stroke length may be changed when either of the openers is in any angular position and yet the home position will remain the same. Thus, it is not necessary to swing the openers to their home positions before adjusting the stroke length.

From the foregoing, it will be apparent that the present invention brings to the art a new and improved pivot assembly 25 by which the stroke of each of a pair of bag openers 16 may be independently changed through a wide range by making but a single simple adjustment in the position of the pivot bolt 60 of each opener. As well as facilitating quick and easy adjustment of the stroke length, the pivot assembly is simpler in construction and more trouble-free in service use than prior arrangements used for the same general purpose.

I claim:

1. In a machine for operating on packages advanced along a predetermined path, the combination of, a support, a pivot arm swingably mounted on said support, a package operating device carried on said pivot arm and swingable with the latter laterally of said path from a home position and back, a power actuated driver mounted on said support for reciprocation through a stroke of preselected length from a home position and back, a link pivotally connected at one end to said driver to swing about a predetermined axis, a pivot connection pivotally coupling the other end of said link to said pivot arm to swing said operating device from its home position and back in response to reciprocation of said driver from its home

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position and back, and means mounting said pivot connection and said other end of said link for angular adjustment to different set positions on said arm along an arc which curves about said axis when said operating device and said driver are in their home positions thereby to enable adjustment of the length of the swinging stroke of said operating device without changing the length of the reciprocating stroke of said driver and while keeping the operating device swinging to its same home position during reciprocation of the driver.

2. A machine as defined in claim 1 in which said means comprise a slot formed in said pivot arm and curving arcuately about said axis when said operating device and said driver are in their home positions.

3. A machine as defined in claim 2 in which said pivot connection extends through said slot and is coupled pivotally to the other end of said link, and means for releasably anchoring said pivot connection to said arm in various set positions along said slot while enabling pivoting of said link relative to said arm.

4. In a machine for operating on packages advanced along a predetermined path, the combination of, a support, first and second generally oppositely extending pivot arms mounted on said support to swing about a fulcrum, first and second package operating devices carried on said pivot arms and spaced laterally of said fulcrum, said operating devices being disposed on opposite sides of said path and each being swingable with its respective arm and laterally of the path from a home position and back in unison with the other operating device, a power actuated driver mounted on said support for reciprocation through a stroke of preselected length from a home position and back, first and second links each having one end connected to said driver to swing about a pivot axis, pivot connections coupling the other ends of said links to said pivot arms to swing each operating device from its home position and back upon reciprocation of said driver from its home position and back, and means mounting each pivot connection for angular adjustment to different set positions on its respective arm along an arc which curves about the pivot axis of the respective link when the driver and the respective operating device are in their home positions thereby to enable changing

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of the distance between said fulcrum and each pivot connection and thus permit adjustment of the length of the swinging stroke of each operating device independently of the stroke of the other operating device without changing the length of the reciprocating stroke of said driver and while keeping the operating devices swinging to their same home positions during reciprocation of the driver.

5. In a machine for operating on packages advanced in an upright plane along a predetermined path, the combination of, a support, first and second pivot arms extending laterally of said path in opposite directions therefrom and mounted on said support to swing about a horizontal fulcrum centered on and extending parallel to said path, first and second package operating devices carried on said pivot arms and spaced laterally from said fulcrum, said operating devices being disposed on opposite sides of said path and each being swingable with its respective arm and laterally of the path from a home position and back in unison with the other operating device, a power driven cam rotatable about a horizontal axis centered on and extending parallel to said path, an upright driver operably connected to said cam for vertical reciprocation through a stroke of preselected length from a home position and back in response to rotation of said cam, first and second links each having one end pivotally connected to said driver to swing about a pivot axis, pivot connections pivotally coupling the other ends of said links to said pivot arms to swing each operating device from its home position and back upon reciprocation of said driver from its home position and back, and means mounting each pivot connection for angular adjustment to different set positions on its respective arm along an arc which curves about the pivot axis of the respective link when the driver and the respective operating device are in their home positions thereby to enable changing of the distance between said fulcrum and each pivot connection and thus permit adjustment of the length of the swinging stroke of each operating device independently of the stroke of the other operating device without changing the length of the reciprocating stroke of said driver and while keeping the operating devices swinging to their same home positions during reciprocation of the driver.

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