

Oct. 18, 1960

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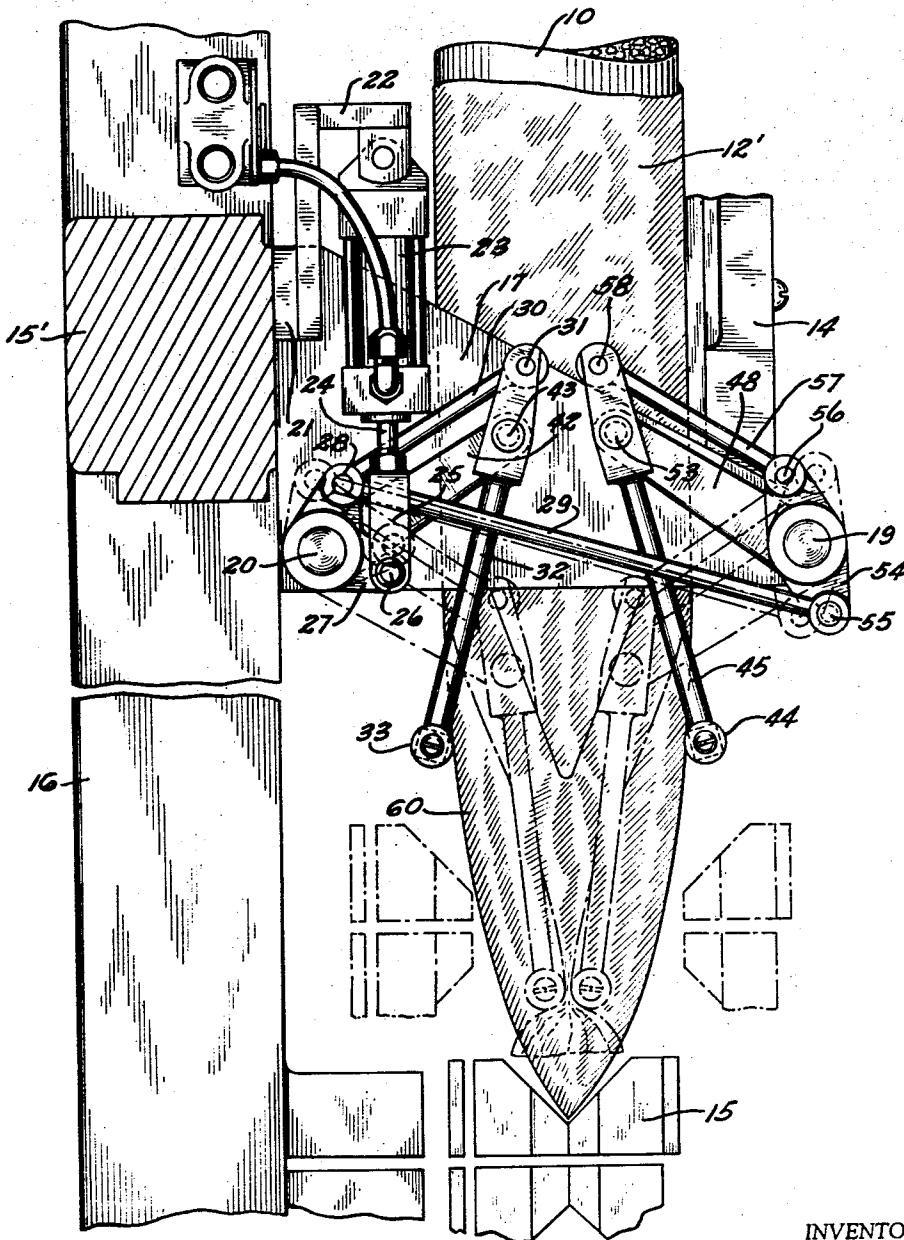
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PRODUCT SETTLING ATTACHMENTS FOR PACKAGING MACHINES

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4 Sheets-Sheet 1

*Fig. 1.*



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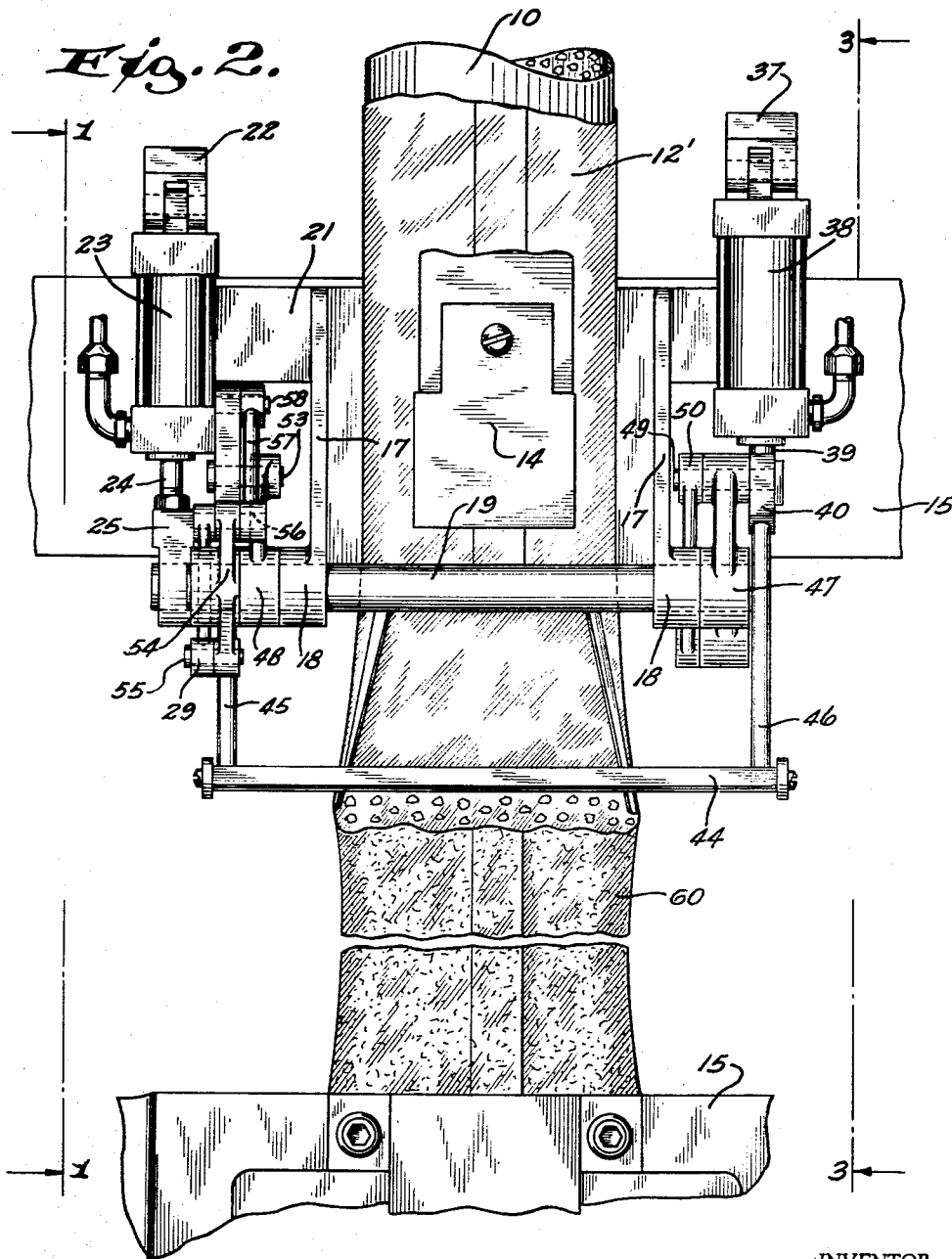
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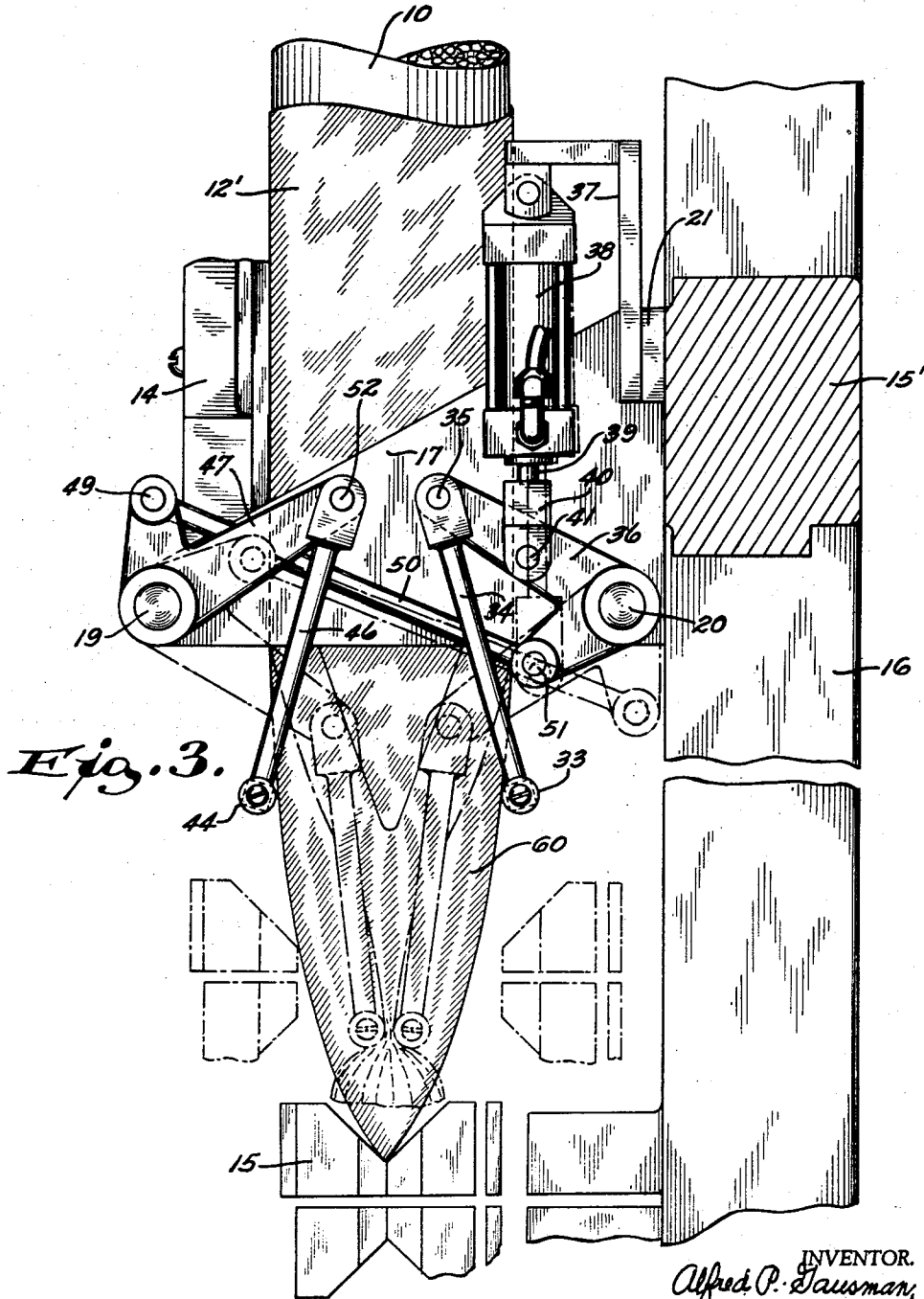
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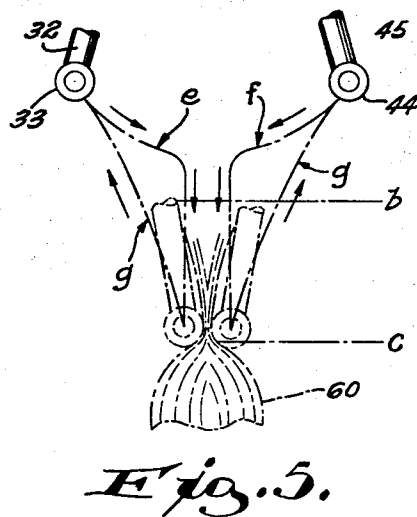
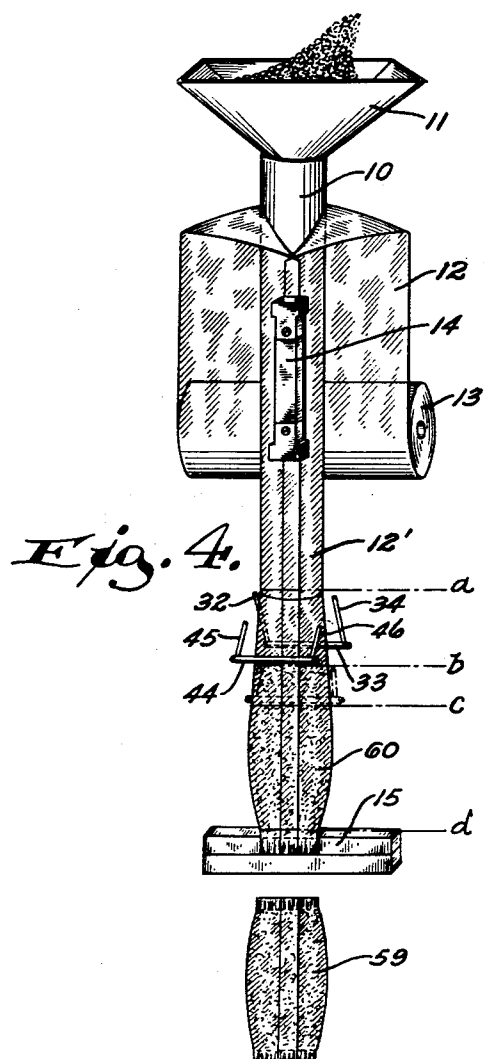
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2,956,383

## PRODUCT SETTLING ATTACHMENTS FOR PACKAGING MACHINES

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This invention relates to improvements in product settling attachments for packaging machines.

The expired W. R. Zwoyer Patent No. 1,986,422 of January 1, 1935, illustrates and describes an automatic packaging machine in which individual articles of merchandise or foodstuffs of various kinds are automatically fed in carefully measured batches into a succession of formed flexible packages. The batches of articles or foodstuffs are fed into a vertical forming tube about which a strip of flexible packaging material is formed into tubular shape and each package or bag formed from the strip, while still attached thereto, has its bottom portion closed to prevent the escape of the product fed therinto for packaging. The bag, which is formed with a longitudinal seal while on the forming tube of the machine, is subsequently sealed at the top and detached from the machine containing a predetermined amount of the packaged product.

Standard automatic packaging machines of the type under consideration are limited in respect to the commodities with which they may be used. In the case of light fragile commodities such as potato chips, noodles, popcorn, corn curls and the like, it has heretofore been difficult to successfully package the same on flexible automatic packaging machines because the commodity articles are bulky and fragile and light, and do not gravitate or pack downwardly in the bag being formed with ease and speed and it is furthermore essential that the measured batch of the commodity being introduced into a bag being formed must be quickly removed from the top end seal zone of the bag so as not to interfere with the seal formed at the top end of the filled bag.

With the foregoing in mind, it is the primary object of the present invention to provide an attachment for a standard automatic packaging machine of the type under consideration, which includes articulated product settling fingers which close above the top end of a package immediately after it has received its charge of the commodity with which it is to be packed and push or "skin" down along the bag so as to settle the charge of the commodity into the full length of the bag without smashing or damaging the commodity with which the bag is packed, such articulated fingers then spreading relative to the bag and rising for the next sequence of operations and permitting the end seal dies to perform the combined seal at the top of the package just filled and at the bottom of the package being formed thereabove.

A further object of the invention is to provide a product settling attachment for automatic packaging machines which operates between operations of the end seal dies and does not interfere with their movements and which removes all of the product from the top end seal area of the bag being packed without in any way damaging the product.

A further object of the invention is to provide a product settling attachment for automatic packaging machines which can be incorporated in an automatic

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packaging machine irrespective of the type of feed device with which the machine is equipped.

A further object of the invention is to provide a product settling attachment for automatic packaging machines which permits the formation of a smaller bag for a given charge of the product to be packaged, whereby savings in the flexible film material used are effected.

A further object of the invention is to provide a product settling attachment for automatic packaging machines which enhances the utility of such machines, which does not interfere with the normal functioning of all of the components of the packaging machine on which it is installed, which is automatic and rapid in its operation, which is relatively inexpensive, and which is well adapted for the purposes described.

With the above and other objects in view, the invention consists of the improved product settling attachment for automatic packaging machines, and its parts and combinations as set forth in the claims, and all equivalents thereof.

In the accompanying drawings, in which the same reference characters indicate the same parts in all of the views:

Fig. 1 is a fragmentary side view, with parts broken away and in section, of the frame and forming tube portions of a flexible automatic packaging machine equipped with the improved product settling attachment, said view being indicated generally on line 1—1 of Fig. 2;

Fig. 2 is a fragmentary front view of the forming tube and drawbar portion of an automatic packaging machine and equipped with the improved product settling attachment;

Fig. 3 is a fragmentary side view of that portion of the machine which is equipped with the product settling attachment taken approximately along the line 3—3 of Fig. 2;

Fig. 4 is a schematic perspective view of the forming tube of an automatic packaging machine showing the location of the articulated product settling fingers with relation to a filled bag formed by flexible packaging material wrapped about the forming tube; and

Fig. 5 is a schematic view showing the operation and ranges of movement of the product settling fingers with relation to a filled bag.

As was heretofore mentioned, the improved product settling attachment is adapted to be operatively mounted on the frame portion of an automatic packaging machine of the type, for instance, shown in the Zwoyer Patent No. 1,986,422, which includes a vertical hollow forming tube 10 which is in communication at its upper end with a suitable type of feeding device. The particular type of feeding device for the product to be packaged may be a net weight scale feed, a volumetric feed, or any of the other conventional feed devices well known in the art for measuring and delivering a predetermined quantity of the product to be packed. The improved product settling attachment is particularly intended to adapt the packaging machine for the handling of difficult light, bulky and fragile products such as potato chips, noodles, popcorn, corn curls and the like.

As is conventional, the material to be packaged is supplied from a source into the particular type of feeding device with which the machine is equipped, and from the latter a predetermined amount of the commodity reaches an upper end portion of the forming tube 10 via a funnel 11 (see Fig. 4) or other conventional means. The bags or packages are in the process of being formed below the head of the machine and the flexible sheet material 12 from which the bags or packages are formed is fed from a roll 13 over certain forming bars (not shown) and is wrapped about the forming tube 10, as is best shown in Fig. 4, and is provided thereon with

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a longitudinal seal by a longitudinal heat sealing device 14.

As is conventional in automatic packaging machines of the type under consideration, movable end seal dies 15 operate to close and seal the lower end of the tube which is forming a bag so as to retain the batch of the material with which the bag is packed, and said end seal dies reciprocate downwardly to pull a predetermined extent of the bag forming tube downwardly, whereupon the end seal dies release the tube and move upwardly in open position to again close and engage the filled bag forming tube at its upper end to close and seal the same with the batch of commodity therein and to simultaneously seal the lower end of the tube portion thereabove. It is also conventional to incorporate with the end seal dies a cut-off knife (not shown) which operates to sever a lower filled bag from the bottom of the bag being formed thereabove and which had its lower end operated on by the end seal dies.

The automatic packaging machine equipped with the improved product settling attachment is adapted for use with any suitable type of flexible packaging material having thermo-plastic qualities which is susceptible of heat sealing as, for instance, cellophane, glasseine, pouch papers, laminated material, etc.

From Figs. 1, 2 and 3 it will be apparent that the improved product settling attachment is mounted on a transverse frame bar 15' which is supported by a pair of laterally spaced-apart frame upright members 16. Extending forwardly from the transverse frame bar 15' on opposite sides of the forming tube 10 are a pair of bearing plates 17. The lower front and rear portions of the bearing plates 17 are formed as bearings 18 to rotatably support front and rear horizontal oscillatory shafts 19 and 20 respectively, the rear bearings 18 being aligned with the front bearings 18. The upper rear end portions of the bearing plates 17 are joined by a transverse plate 21 which extends laterally outwardly on each side, and on one side, as the left-hand side in Fig. 2, it carries an angular bracket 22 on which is mounted an air motor 23 which ultimately imparts horizontal or in and out motion to the product settling fingers, to be described hereinafter. Said air motor 23 has a vertically reciprocal piston 24 which is attached at its lower end to a clevis 25 and the latter is pivotally secured, as at 26, to one end portion of a triangular lever 27. The other end portion of said triangular lever 27 is pivotally attached, as at 28, to one end portion of a connecting link 29. The intermediate portion of the triangular lever 27 is journaled for rotation on one end portion of the rear shaft 20. The lower end portion of an angularly extended connecting rod 30 is also pivotally connected to the upper end portion of the triangular lever 27, at 28. The other end portion of said connecting rod 30 is pivotally connected, as at 31, to the upper end portion of a settling finger operating bar 32, whose lower end portion is rigidly attached to a transverse product settling finger 33 for the rear side of the bag. The opposite end of said transverse rear side settling finger 33 is carried by the lower end portion of a settling finger supporting bar 34 (see Fig. 3) which is pivotally attached at its upper end, as at 35, to an angular lever 36 which is intermediately affixed to the rear transverse shaft 20 and which will be described in more detail hereinafter. Therefore, the bag rear side settling finger 33 derives its in and out horizontal motion from the air motor 23 through the lever 27 and the link 30 and the settling finger operating bar 32 previously described.

Referring to Fig. 2, it will be noted that there is supported from the plate 21 by means of an angular bracket 37 on the side of the forming tube opposite the air motor 23, a second air motor 38. The depending piston 39 of said second air motor 38 carries a depending clevis 40 which is pivotally secured, as at 41, to the intermediate portion of one arm of the angular lever 36 (see Fig. 3).

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It was heretofore noted that the outer end of one arm of the angular lever 36 is pivotally connected to the settling finger supporting bar 34 and through the vertical reciprocation of the piston 39 of the air motor 38 the lever 36 will be rocked in a vertical plane to thereby transmit, through the supporting bar 34, up and down movement to the bag rear side settling finger 33. The opposite end of the bag rear side settling finger 33 is carried by the previously mentioned operating bar 32 and the vertical motion for said settling finger 33 is derived from a lever 42 (see Fig. 1) which is pivotally attached at its upper end, as at 43, to the settling finger operating bar 32. The lower end of the lever 42 is carried fast by the oscillatory shaft 20 so that when said shaft is caused to oscillate by means of the air motor 38 operating the angular lever 36, the oscillatory movement of the shaft 20 will impart up and down swinging movement to the lever 42.

The description thus far given pertains to the in and out (horizontal) and up and down (vertical) movements imparted to the bag rear side product settling finger 33. It will be observed from the drawings, however, and clearly from Fig. 4, that there is a companion front side product settling finger 44. Said bag front side product settling finger 44 is depended from the lower ends of a pair of operating or supporting bars 45 and 46. For the operating bars 45 and 46 for the front product settling finger 44 there are operatively mounted levers 47 and 48 of which the lever 47 is pivotally connected at one end, as at 49, to one end portion of a connecting rod 50 which is pivotally connected at its other end, as at 51, to the outer end of the lower arm of the lever 36 which is rocked by the piston 39 of the up and down motion air motor 38. The upper end portion of the operating bar 46 is pivotally connected, as at 52, to the other end portion of the lever 37, which lever is intermediately mounted fast on the oscillatory front transverse shaft 19. The lever 48 (see Fig. 1), which is mounted fast at one end on the oscillatory shaft 19, is pivotally connected at its other end, as at 53, to the upper end portion of the bag front product settling finger supporting bar 45.

The horizontal or in and out motion for the rear side product settling finger 33 has previously been described. To transmit that motion to the front side product settling finger 44 there is the previously mentioned connecting rod 29 which is pivotally connected at its outer end to the lower end portion of a lever 54, as at 55. The lever 54 is intermediately pivotally mounted on the oscillatory shaft 19. The opposite end portion of the lever 54 is pivotally attached as at 56 to a connecting rod 57 whose other end portion is pivotally connected, as at 58, to the upper end portion of the bag front settling finger operating bar 45. Hence, by virtue of the connections described and operated through the air motor 23 the operating bars 32 and 45 and their companion bars 34 and 46 are caused to pivot at their upper ends so that the lower ends of the operating bars 32 and 45, which carry the fingers 33 and 44, will swing toward and away from each other to squeeze that portion of the bag with which they are in contact, and in the inwardly swung squeezing positions said operating fingers are then caused to move vertically downwardly so as to force the product in the bag into a settled compact position.

The operation of the improved product settling attachment for the packaging machine can best be understood by reference to the schematic views, Figs. 4 and 5. It will be observed from Fig. 4 that predetermined charges of the product to be packaged are intermittently gravitated through the forming tube 10 into the upper end of the tube of flexible packaging material 12' which, during the operation of the machine, forms a succession of bags. Each bag being filled is at that period open at its upper end and is attached to the web of packaging material but the bag being filled has, by virtue of the operation of the end seal dies 15 and cut-off knife incorporated there-

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with, severed the lowermost filled and sealed bag 59 (see Fig. 4). The original charge of the product for the bag 60 being formed, because of its loose and flaky character, occupies more height in the tube 60 than is allotted therefor as per the desired overall length of the finished packed bag. The original charge of the product in the bag 60 being packed will extend in very loose, uncompacted condition from the bottom of the bag 60 up to about the line *b* in Figs. 4 and 5. When the open top bag 60 is thus filled the product settling fingers 33 and 44, which are initially in the raised spread condition shown in full lines in Figs. 4 and 5 will, by virtue of the operation of the air motor 23, be caused to move horizontally inwardly on the bag at a point somewhat above line *b* which is the top line of the loose uncompacted product in the bag 60. The settling fingers 33 and 44 swing toward one another through the arcs *e* and *f* in Fig. 5 to a point where they are relatively closely adjacent and squeezingly contact opposite sides of the top portion of the flexible bag 60. Then, through the operation of the air cylinder 38 and associated levers and connections, a downward stripping or "skinning" movement is imparted to the closed fingers 33 and 44 and the same move in their inner positions downwardly to about the line designated *c* in Figs. 4 and 5. In so moving the transverse product settling fingers push downwardly on the stack of the product within the bag 60 without damaging the product, but this movement causes the product to settle and to be compacted within a lesser height of the bag 60. When the product is thus settled and packed into the bag 60 immediately below the line *c* the end seal dies 15 through mechanism common in automatic packaging machines, are caused to open and move upwardly from the full line positions shown in Figs. 1, 3 and 4 to the broken line position of Figs. 1 and 3 along the bag 60 but, in advance of the upward movement of the end seal dies 15, the product settling fingers 33 and 44 are, through the simultaneous action of the air cylinders 23 and 38 and the associated levers and linkages, caused to gradually spread and move upwardly along the arcs of movement *g* in Fig. 5 until the full raised and spread condition of the fingers 33 and 44 depicted in full lines in Figs. 4 and 5 is attained. At this point the end seal dies 15, in open condition, will have moved slightly above the ultimate packed product line *c* and are then, through conventional mechanism, from their raised broken line position of Figs. 1 and 3, caused to close on the filled bag 60 immediately above the line *c* to form the top end seal in the filled and product settled bag 60 and the lower end seal in the tube or bag portion being formed thereabove. Such end sealing operation takes place in a zone in the tube completely devoid of any of the product because it has been compacted downwardly in the bag by the previous operation of the fingers 33 and 44 as described.

The limited zone of operation of the product settling fingers 33 and 44 has been described but it should be mentioned, with reference to Fig. 4, that when the product is originally introduced into the tube in its loose uncompacted condition it will fill the bag 60 from about the line *b* to line *d* and the extent between the lines *a* and *b* will be clear of the product to permit the operation of the fingers 33 and 44 upon the thermoplastic bag material to skin downwardly therealong without squeezing any of the fragile product. It will be obvious that by causing light fragile products to be efficiently compacted and packed down into the bag 60, the ultimate bag can be of considerably less length than would be the case if the bag were filled with the product in uncompacted or settled condition and this results in a substantial over-all saving in the flexible film material used.

While the product settling fingers are operating and pushing down on the bag to "skin" and compact the material into a lesser extent of the bag 60, the film ma-

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terial is held against progression by an auxiliary brake (not shown) conventional in the art, as shown and described in the Zwayer Patent No. 2,869,298.

From the foregoing description it will appear that the product settling attachment of the present invention is adaptable to standard automatic packaging machines and especially adapts such machines to the efficient and compact packaging of light and fragile products. The compact settling of the light fragile product within the bag being formed is accomplished efficiently and expeditiously without smashing or damaging the product and the product settling fingers are caused to operate between movements of the end seal dies of the packaging machine without interfering with any of the machine operations. All of the light fragile product being introduced into the tube of film material is removed from the top end seal area. The product settling attachment for automatic packaging machines is relatively simple and inexpensive and is well adapted for the purposes described.

What is claimed as the invention is:

1. In a machine for successively packaging measured charges of a light, fragile and bulky product, a vertical former about which a continuous web of flexible sheet material drawn from a roll is formed into a tube from which sections may be transversely sealed and severed by an end seal die to provide a succession of packages with each package being open at its upper end while it is receiving its charge of the product originally occupying a greater length of the tube portion before it is compacted therein; an articulated product settling mechanism operatively mounted on the machine on opposite sides of the tube and having transverse fingers; operating means to cause said product settling mechanism to close upon opposite sides of the tube with the fingers traversing opposite sides of the tube above the column of product therein; and means for moving the fingers longitudinally downwardly on the tube a predetermined distance to force the product therein downwardly in compact condition while the leading end of the tube is engaged by the end seal die.

2. In a machine for successively packaging measured charges of a light, fragile and bulky product, a vertical former about which a continuous web of flexible sheet material drawn from a roll is formed into a tube from which sections may be transversely sealed and severed to provide a succession of packages with each package being open at its upper end while it is receiving its charge of the product and having a top end closure zone with the charge of the product originally extending substantially to said top end closure zone of the tube before it is compacted, and vertically reciprocal end seal dies to operate on said tube; an articulated product settling mechanism operatively mounted on the machine on opposite sides of the tube independently of the end seal dies; operating means to close said product settling mechanism upon opposite sides of the tube adjacent said end closure zone while said end seal dies are at the bottom of their stroke and in clamping engagement with the lead end of the tube, means to move said product settling mechanism longitudinally downwardly on said tube a predetermined distance while in closed condition to force the product downwardly into the tube in compact condition substantially below the closure zone; and means to thereafter open and raise said product settling mechanism in advance of the release and upward reciprocation of the end seal dies.

3. In a packaging machine wherein web packaging material is formed as a tube which is transversely sealed to form packages, the packaging machine including a vertical former tube for receiving the web packaging material and shaping it into the tube, means for feeding measured charges of a bulk product into the tube and vertically reciprocal end seal dies to operate on the tube; a product settling mechanism mounted on the ma-

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chine on opposite sides of the tube independently of the end seal dies and comprising a clamp having transverse fingers, means to close the transverse fingers of said clamp upon the tube immediately above the column of the product therein, means to move the closed clamp downwardly on the tube a predetermined distance to compact the column of product therein while the leading end of the tube is engaged by the end seal dies, and means to thereafter open the clamp and raise it to its original position in advance of the release and upward reciprocation of the end seal dies.

4. In a packaging machine wherein web packaging material is formed as a tube which is transversely sealed to form packages, the packaging machine including a vertical former for receiving the web packaging material and shaping it into the tube, means for feeding measured charges of a bulk product into the tube and vertically reciprocal end seal dies to operate on spaced-apart portions of the tube; a product settling mechanism op-

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eratively mounted on the machine independently of the end seal dies and comprising a clamp having transverse fingers straddling the tube, power operated means to close the transverse fingers of said clamp upon the tube immediately above the column of the product therein, and power operated means to move the closed clamp downwardly on the tube a predetermined distance to compact the column of product therein while the leading end of the tube is engaged by the end seal dies, said power means thereafter opening the clamp and raising it to its original position in advance of the release and return movement of the end seal dies.

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