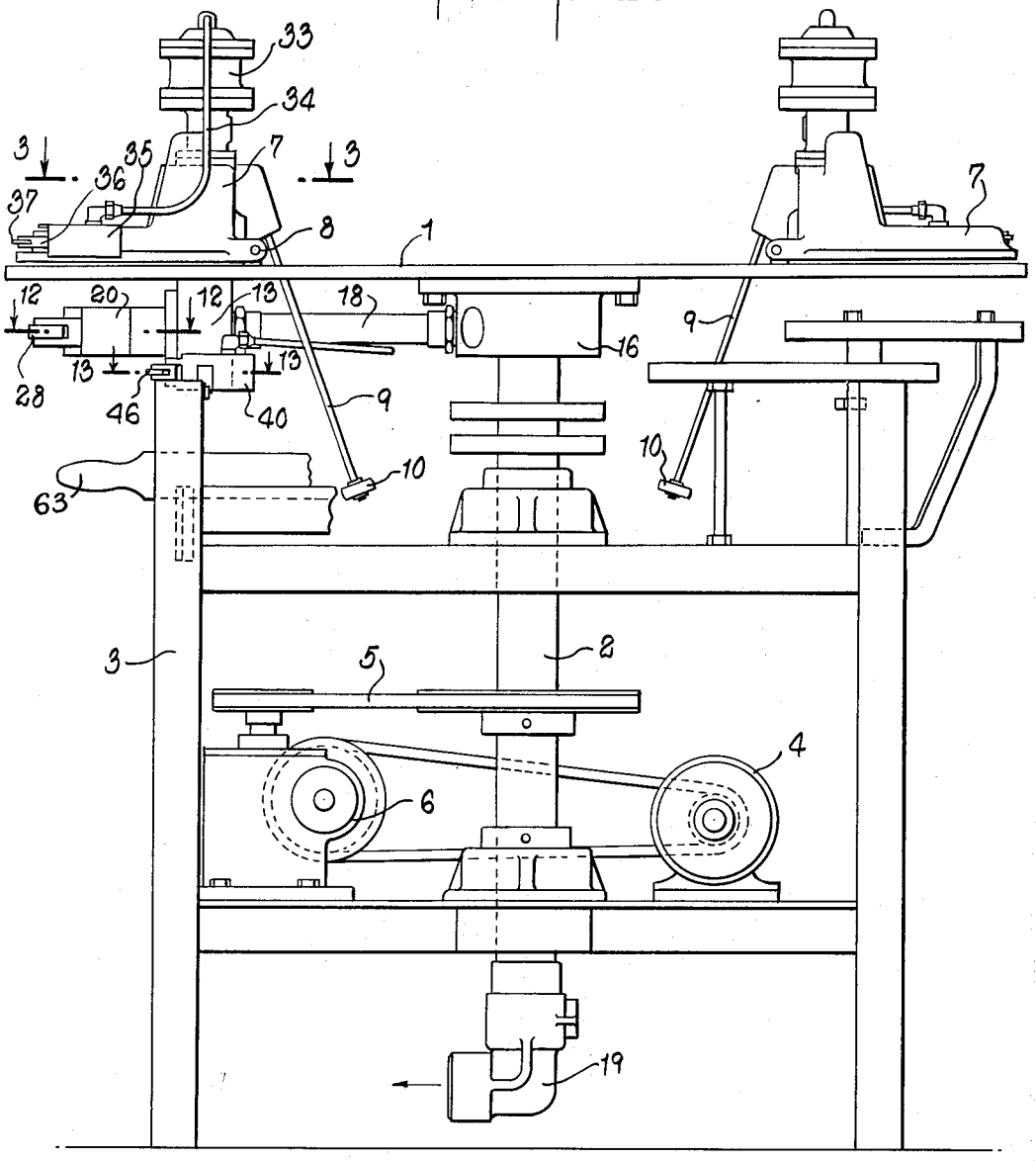
April 3, 1956 R. A. MAHAFFY 2,740,243

BAG SEALING MACHINE

Filed Sept. 15, 1951 7 Sheets-Sheet 1

Fig. 1.



INVENTOR.
REID A. MAHAFFY
BY
Kenyon & Kenyon
HIS ATTORNEYS

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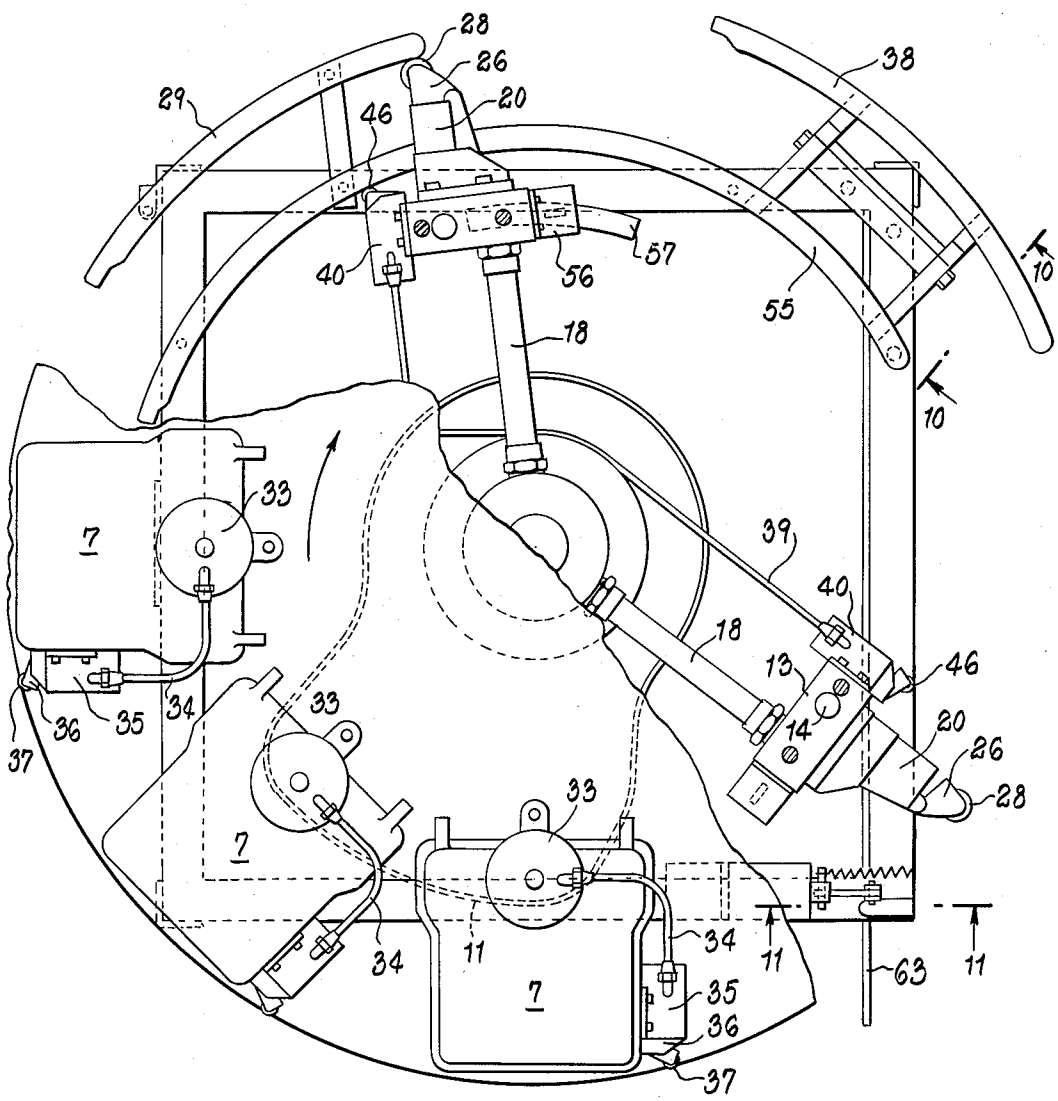


Fig. 2.

INVENTOR.
REID A. MAHAFFY
BY
Kenyon & Kenyon
HIS ATTORNEYS

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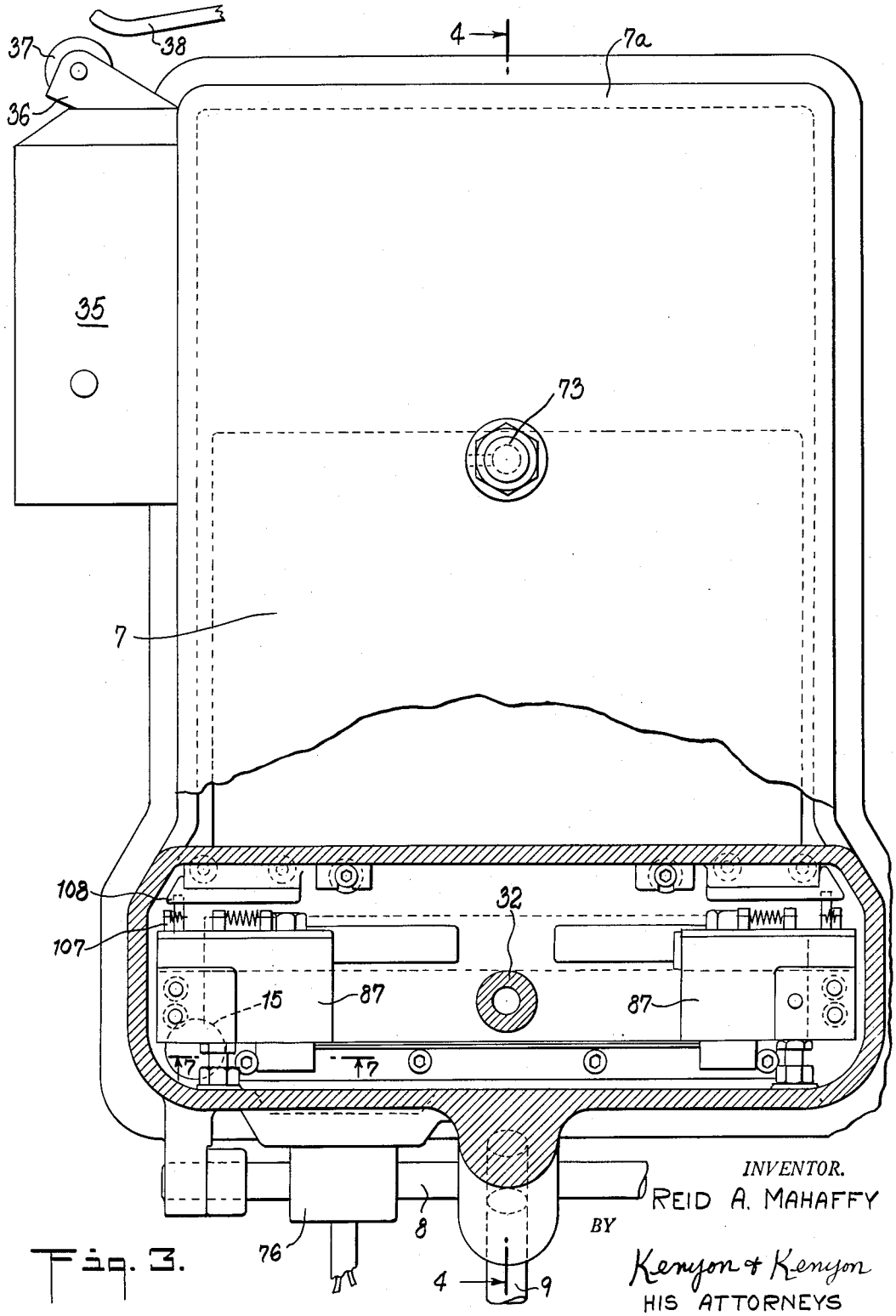


Fig. 3.

INVENTOR.
REID A. MAHAFFY
BY
Kenyon & Kenyon
HIS ATTORNEYS

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BAG SEALING MACHINE

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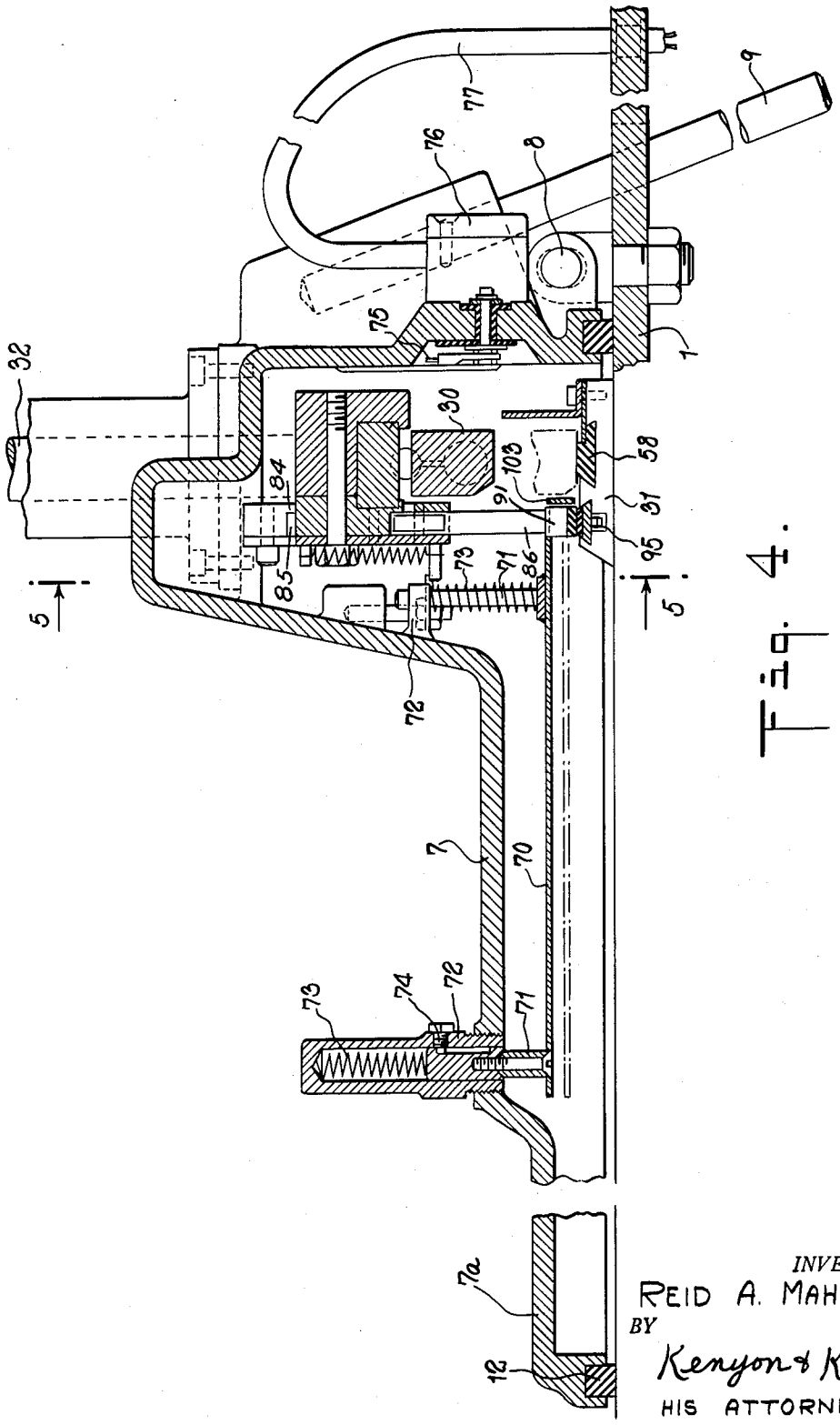


Fig. 4.

INVENTOR.
REID A. MAHAFFY
BY
Kenyon & Kenyon
HIS ATTORNEYS

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BAG SEALING MACHINE

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Fig. 5.

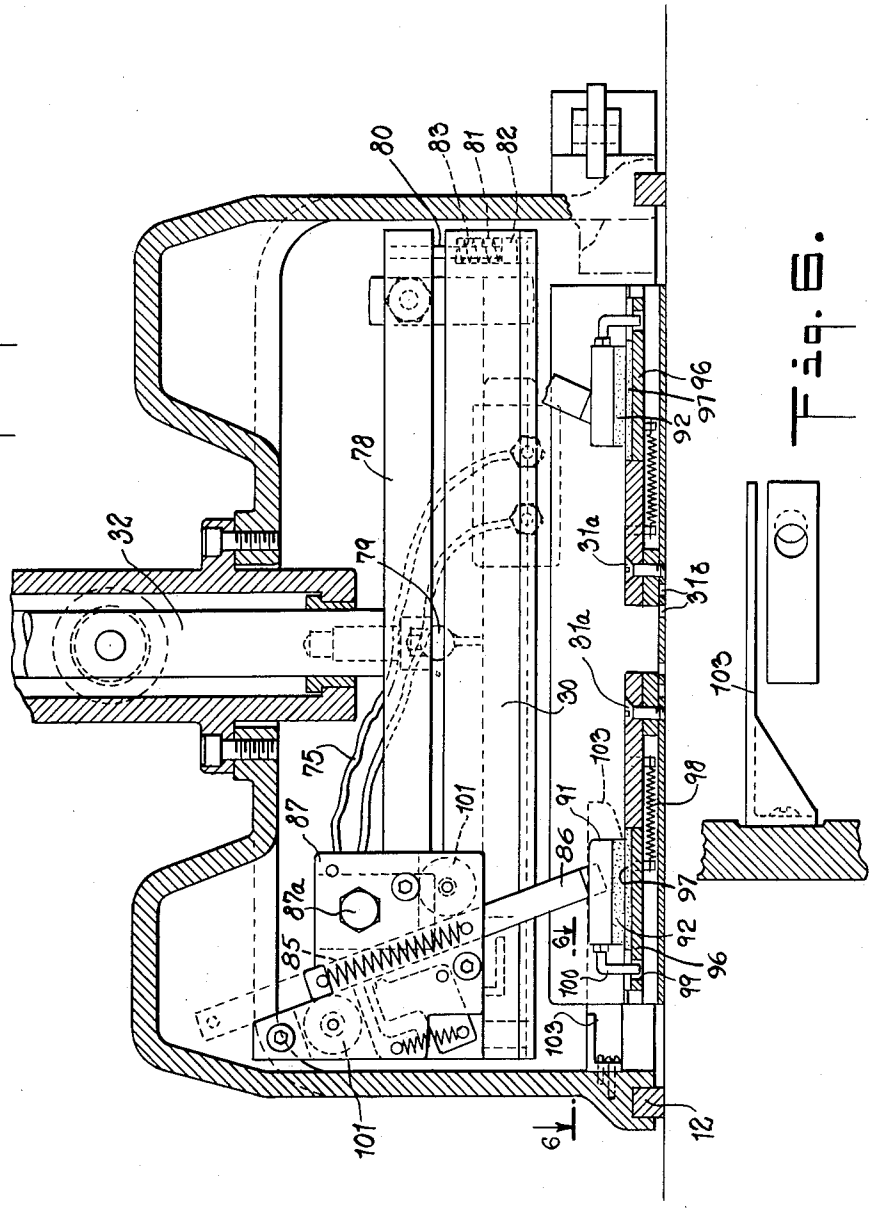


Fig. 6.

INVENTOR.
REID A. MAHAFFY
BY
Kenyon & Kenyon
HIS ATTORNEYS

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BAG SEALING MACHINE

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Fig. 7.

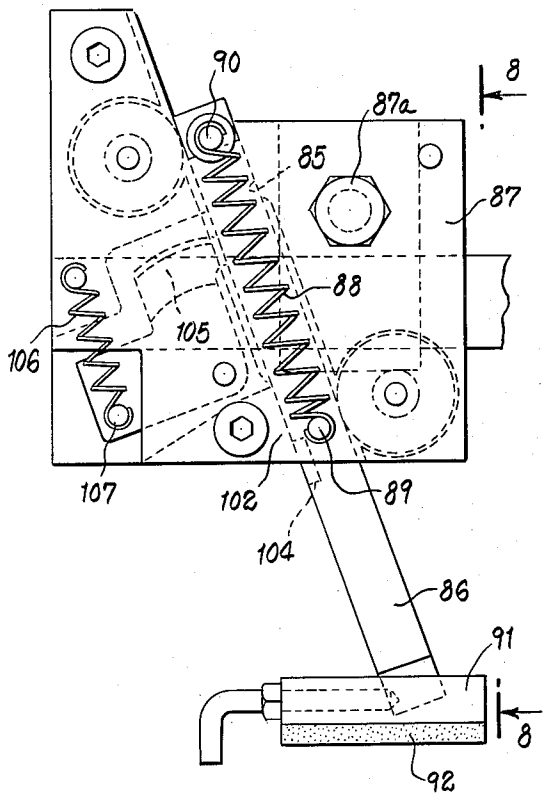
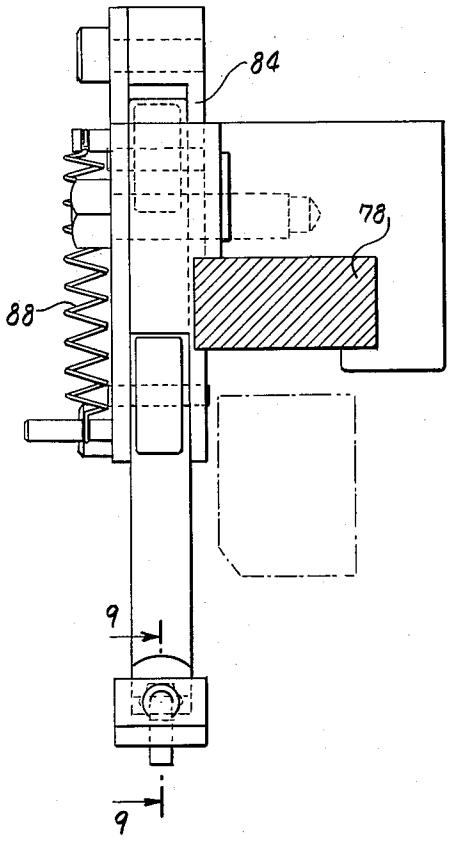


Fig. 8.



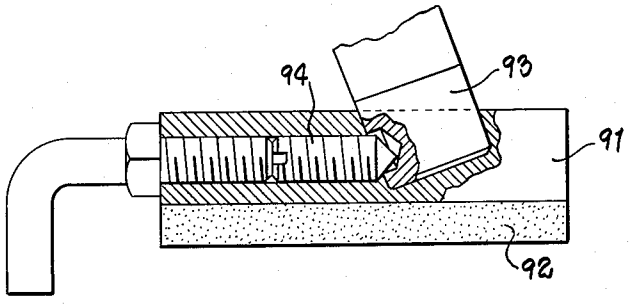


Fig. 9.

INVENTOR.
REID A. MAHAFFY
BY
Kenyon & Kenyon
HIS ATTORNEYS

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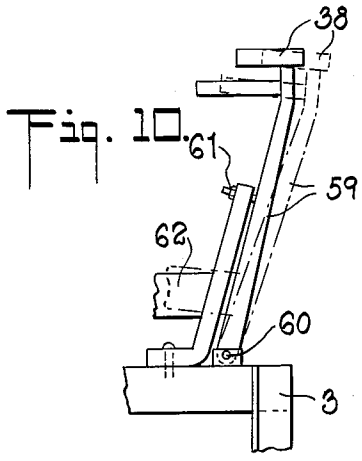


Fig. 10.

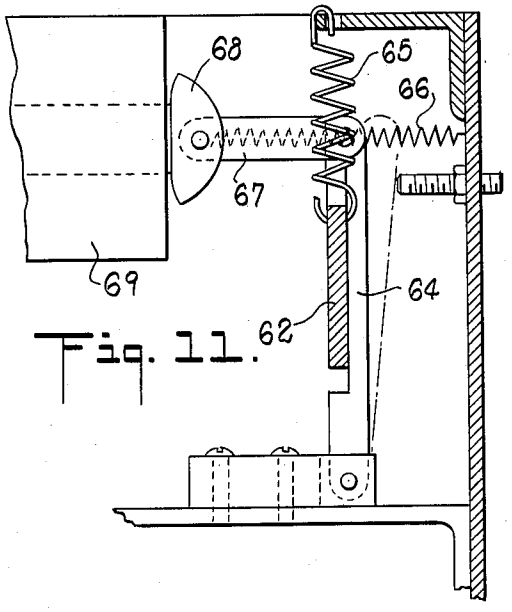


Fig. 11.

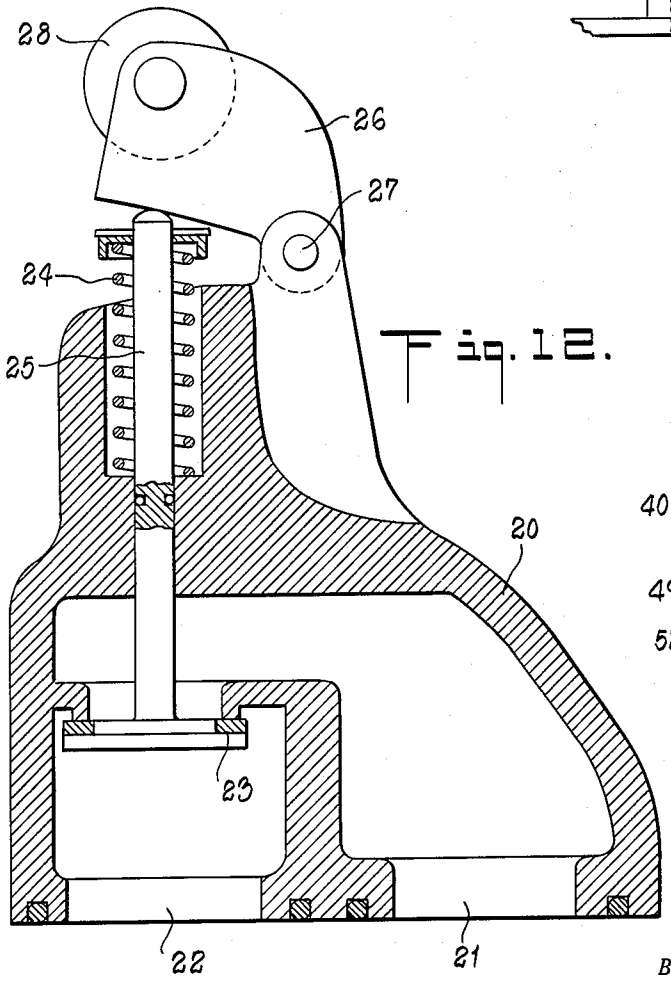


Fig. 12.

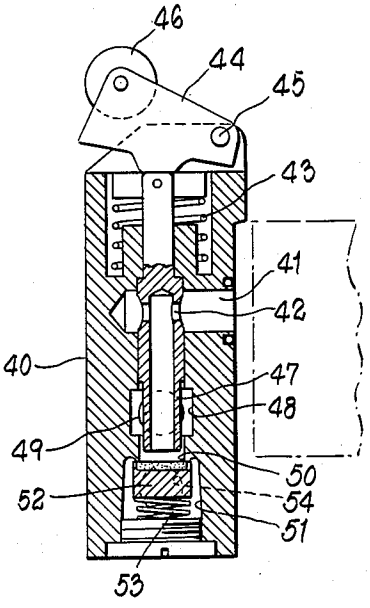


Fig. 13.

INVENTOR.
REID A. MAHAFFY
BY
Kenyon & Kenyon
HIS ATTORNEYS

United States Patent Office 2,740,243 Patented Apr. 3, 1956

2,740,243

BAG SEALING MACHINE

Reid A. Mahaffy, Cedar Grove, N. J., assignor to Standard Packaging Corporation, New York, N. Y., a corporation of Virginia

Application September 15, 1951, Serial No. 246,848

23 Claims. (Cl. 53—95)

This invention relates to a bag sealing machine adapted to successively receive unsealed bags containing merchandise and to successively deliver the bags completely sealed and, if desired, either evacuated or gassed.

As a general description the machine includes a horizontal turntable carrying a plurality of open-bottomed heads positioned over the table for movement down into contact therewith. The table is constructed to support the bags horizontally thereon beneath the heads and the latter are constructed to each embrace and thus enclose the bag beneath it when the head is moved down onto the table. The bags used with the machine have plain flat heat sealing mouths and are filled with the merchandise before being placed on the turntable. Each head contains a heat sealing sealer positioned therein for movement toward and from the mouth of the bag when the head is down on the table and enclosing the bag. The machine is provided with means for evacuating the heads when they are down and for thereafter actuating the sealer.

Provision is made for the injection of any desired gas into the head after its evacuation and prior to the actuation of the sealer. The heads successively move upwardly and then downwardly at one location where the bags are fed onto and from the table. The table supports the bags in an annular series arrangement and the heads are correspondingly arranged so that there is a circular working travel passing the feeding position.

Since the bags are customarily merely laid on the turntable horizontally with their mouths horizontally positioned more or less flatly for operation of the sealers, certain troubles are possible. One possible trouble is dislocation of a bag prior to actuation of the sealer, and one of the objects of the present invention is to provide for positively holding each bag substantially immovably when the head lowers down over it. Another possible trouble is the formation of a fold or folds in a bag mouth which become ironed in by the sealer so as to result in an incompletely airtight bag. Another object is to overcome this trouble by positively stretching or ironing out each bag mouth until it is completely flat, without interfering with the evacuation of the bag or subsequent operation of the sealer. In further connection with this last objective it is a further object to hold the bag mouth tightly stretched substantially flatly during the actual operation of the sealer so as to prevent the reoccurrence of folds after the bag mouth has once been stretched flatly.

The bags are made of flexible material but since this material must be air-tight so as to retain the evacuation or gassed condition, the material necessarily has some stiffness. This stiffness is sufficient sometimes to prevent at least the top side of the bag from gravitationally hugging the merchandise in the bag. Therefore, it is possible for a bag to fit the merchandise somewhat loosely during evacuation and sealing. When atmospheric pressure reaches such a bag it presses the bag against the merchandise but since it is commercially impossible to provide for a perfect vacuum it follows that some air is left in

the bag to become densified when compressed by the atmospheric pressure acting on the bag. Still another object, therefore, is to provide an arrangement which reduces the tendency of the bag walls to space themselves from the merchandise contained by the bags, whereby to permit the production of more highly evacuated packages.

The foregoing and other objects will become more apparent from the following description, aided by the accompanying drawings, of the details of the machine embodying the principles and operation of the present invention.

Referring to these accompanying drawings:

Fig. 1 is a side view of the machine;

Fig. 2 is a top view of the machine;

Fig. 3 is a partly sectional top view of one of the heads taken on the line 3—3 in Fig. 1;

Fig. 4 is a longitudinal section of the head on a vertical plane taken on the line 4—4 in Fig. 3;

Fig. 5 is a vertical cross-section of the head taken on the line 5—5 in Fig. 4;

Fig. 6 is a top view taken on the line 6—6 in Fig. 5;

Fig. 7 is a front view taken on the line 7—7 in Fig. 3;

Fig. 8 is a side view of Fig. 7 as indicated by the line 8—8 in Fig. 7;

Fig. 9 is a vertical section taken on the line 9—9 in Fig. 8;

Fig. 10 is a vertical view taken on the line 10—10 in Fig. 2;

Fig. 11 is a vertical section taken on the line 11—11 in Fig. 2;

Fig. 12 is a horizontal longitudinal section of a detail that is taken on the line 12—12 in Fig. 1; and

Fig. 13 is a horizontal longitudinal section of a detail and is taken on the line 13—13 in Fig. 1.

Referring to these drawings the turntable 1 is circular and is horizontally mounted about waist high by a rotative vertical column 2 journaled by a supporting framework 3. The column 2 is rotatively driven by a motor 4 through a belt and pulley system 5 in which is interposed a reduction gear box 6. The motor and gear box are supported by the framework 3. The annular series of heads 7 are individually hinged or pivoted at their backs at 8 to the top of the table 1 so that the heads may be raised and lowered by rocking them about the pivots 8. Each head is provided with a rocking bar 9 that extends from its rear end downwardly through the table 1. The lower end of each bar 9 has a roller cam follower 10 which is engaged by a cam 11 positioned by the framework 3 beneath the table 1. This cam 11 is positioned at the feeding location for engagement by the various followers 10 and it is contoured to rock outwardly each bar 9 with consequent upward tilting of the associated head 7 so as to open the latter at the feeding position. The various heads 7 open in the fashion of clam shells.

Each of the heads 7 is in the form of an open-bottomed shell or enclosure and is provided with a gasket or seal 12 for its bottom edge. When a head's follower 10 leaves the cam 11 the head lowers gravitationally onto the top of the turntable 1 with the seal 12 rendering the resulting enclosure substantially air-tight. Evacuation of the head tightens the seal and results in practically complete air-tightness. The cam 11 has a length causing a following head to begin to open or raise at about the time a preceding head is starting to close or lower.

A vacuum terminal block 13 is fastened to the bottom of the turntable 1 in substantial registration with each of the heads 7. Each block has a vertical port 14 registering with a hole 15 formed through the table and opening into the space enclosed by the head thereabove. The column 2 is tubular and has an annular manifold 16 at its upper end directly beneath the table 1, and this manifold 16 connects with each of the vacuum terminal blocks 13

through a radial pipe 18. Each of the blocks 13 is provided with one of these pipes 18. The bottom of the column 2 rotatively connects with a fixed elbow 19 which is connected with any suitable evacuating means.

Each terminal block 13 connects its associated pipe 18 with its vertical port 14 through a valve 20, and each valve is cam actuated to time the evacuation of the head above the block. A suitable valve is shown by Fig. 12 as having a port 21 which through the block 13 connects with the associated one of the pipes 18, and a port 22 which connects the pipe 18 with the port 14 leading to the inside of the head through the hole 15. Flow between the ports 21 and 22 of the valve 20 is controlled by a poppet valve 23 which is normally closed by a compression coil spring 24 which encircles the stem 25 of this poppet valve. The stem 25 may be thrust inwardly to open the poppet valve 23 by inward swinging of a rocker 26 pivoted at 27 to the casing of the valve 20. This rocker 26 has a roller cam follower 28 through which it is operated by a cam.

As the turntable revolves a head reaching the rear end of the cam portion 11 lowers onto the turntable. A relatively short cam 29 is positioned by the framework so that it is radially engaged by the roller cam follower 28 to open the poppet valve 23 and thus evacuate the head. This cam 29 has a length proportion so that it can cause the operation of only one of the valves 20 at a time, this being to prevent the pressure in the heads from being subjected to pneumatic pulsating effects while their valves 23 are open. In case such a pulsating effect is desired the cam 29 may be made longer so that it operates two or more of the valves 20 at the same time with the starting and terminating points staggered and with the terminating point timed to close each valve 23 when the minimum possible pressure is obtained in the associated head.

A heat sealing bar 30 is horizontally mounted in each head in a vertically reciprocative manner. At each head the top of the table 1 has a flat-topped platform 31 fastened to it and on top of which the flat bag mouth of the bag is positioned for heat sealing by the bar 30. This bar 30 is mounted by a vertical reciprocative connecting rod 32 which extends upwardly into a cylinder 33 carried by the top of the head 7 above the bar 30. This cylinder 33 contains a piston fastened to the rod 32 and normally forced upwardly by a spring. The bottom of the cylinder 33 communicates with the interior of the head 7 and its top connects with the interior of the head 7 through a pipe 34 and a valve 35 carried by the head 7 near its front or outer end. This valve 35 is a three-way valve having one port connecting with the pipe 34 and another port connecting with the interior of the head 7, the valve being biased by a spring so that communication between these two ports is normally open. The valve 35 has an actuator 36 which when pushed inwardly closes the port connected with the head and establishes connection between the pipe 34 and a third port which opens to the atmosphere. When the head is evacuated the atmospheric pressure may then flow through the pipe 34 to the top of the piston in the cylinder 33 so as to push the connecting rod 32 and the heat sealing bar 30 downwardly to effect the heat sealing action.

Each valve 35 has its actuator 36 provided with a roller cam follower 37, and the framework mounts a cam 38 positioned to engage this follower 37 and to push in the actuator 36 and effect the heat sealing. This cam 38 is positioned beyond the cam 29 so that heat sealing occurs after there has been sufficient time for adequate bag evacuation. The cam 38 is made long enough to provide a proper heat sealing action and when the follower 37 rides off the cam 38 the pipe 34 is again connected with the inside of the head 7 so that the pressure is equal above and below the piston working the rod 32, whereby the upwardly biasing spring can push up the heat sealing bar 30.

It is necessary to break the vacuum in each head in order to open it. The necessary venting for this is done by first connecting the evacuated head to be opened with a freshly closed head which has not yet been evacuated. The resulting cross venting causes the pressures of the two heads to equalize with consequent partial evacuation of the freshly closed head, the latter being thereafter closed off and the previously fully evacuated head then completely vented to the atmosphere.

With the above in mind the various terminal blocks 13 are appropriately interconnected to form pairs by pipes 39, there being a separate pipe for each pair. These pipes 39 each connect to the two terminal blocks 13 of the pairs through valves 40 of which one is shown in detail by Fig. 13. Each is a three-way valve and the previously described valves 35 may have the same construction. It is for this reason that the details of construction of the valves 35 were not previously described.

As shown by Fig. 13 each of the valves 40, this including the valves 35, has a port 41 which registers with the port 42 of a reciprocative valve spindle. A compression coil spring 43 biases the spindle 42 normally to an outermost position, the spindle being shiftable inwardly therefrom by operation of a rocker 44 pivoted at 45 to the casing of the valve 40 and adapted to be rocked by a roller cam follower 46. The spindle 42 has a reduced portion 47 which projects through a chamber 48 connected with a port 49 and which portion 47 continues onwardly through a passage 50 which is larger than the spindle 47 so as to provide a space therearound. This passage 50 opens into an enlarged chamber 51 from which it is closed by a combination valve and valve seal element 52 which is biased by a compression coil spring 53 to normally close the passage 50. The spindle 42 is tubular and when it is shifted inwardly the chamber 48 is opened to the chamber 51 by the spindle forcing open the element 52, this action simultaneously closing the end of the tubular spindle 47 so as to shut off the port 41. When the spindle is shifted outwardly to its normal position by the spring 43 there is a free flow between the ports 41 and 49. The chamber 51 connects with the atmosphere through a port 54. Thus the valve comprises a three-way valve of the character described in connection with the valve 35.

Each of the valves 40 is connected with each of the terminal blocks 13 so that the port 41 is open to the port 14 of the block. The port 49 connects in each instance with one of the cross vent pipes 39. The port 54 is open to the atmosphere.

The framework 3 mounts a relatively long cam 55 for registration with the various followers 46 of the cross vent valves 40. This cam 55 is of such a length that, as to any of the described pairs of heads, just shortly before the cross vent valve 40 of a freshly closed and unevacuated head reaches the beginning of the cam 55 the follower 46 of the corresponding valve of the pair rides off of the rear end of the cam 55 so that its port 41 is placed in communication with its port 49 which connects with the corresponding port 49 of the unevacuated head, thus establishing the cross venting condition. Shortly thereafter the follower 46 of the now partially evacuated head rides over the beginning of the cam 55 so that its spindle 42 is forced inwardly to close off its port 41 by the open spindle end sealing against the element 52. This action also unseats the element 52 so that the cross vent pipe is opened to the port 54 connecting with the atmosphere. Therefore, the previously evacuated head containing the sealed bag is completely vented so that it may be opened in the fashion previously described.

To accommodate gassing practice, when this is desired, each of the block 13 may be provided with valves 56 which may be duplicates of the valves 40 and 35. These valves are only generally indicated by the drawings. They are shown vertically arranged, all the others being horizontal, and as adapted for actuation by an arcuate verti-

cal acting cam 57 which is relatively short and interposed in the gap between the cams 29 and 38. Although not illustrated in detail each valve 56 may be connected with a source of gas which it injects through the port 14 upon actuation of its follower by the cam 57. This is made to occur in each instance after the closing of the valve 20 and prior to actuation of the valve 35 by the cam 38. Then when heat sealing occurs the bags will be filled with gas instead of being in an evacuated condition. It is to be understood that the valves 56 may be provided with gas through suitable piping and that they connect the gas with the port 14 of the various blocks when actuated, with the gas flow being shut off when the valve is in its normal or unactuated condition.

In operating the machine an operator may stand opposite to the cam portion 11 and manually feed and remove the bags loaded with the merchandise. Flat cellophane bags internally coated with rubber hydrochloride may be used. The merchandise may comprise sliced and stacked meat products for example. The bags should be long enough to leave their mouths free for heat sealing thereof. The operator places each bag horizontally on the table with its bag mouth resting on one of the platforms 31. The turntable is continuously revolving. The other head forming a pair with the just loaded head has at this time been evacuated and, if desired, gassed, and its cam follower 37 is engaged by the cam 38 so that its heat sealing bar is down. Also its cam follower 46 is engaged by the cam 55 so that the head is sealed off from the atmosphere, the other valve 40 being unactuated or normal at this time.

As the turntable continues to revolve the cam follower 10 of the just loaded head rides off of the cam 11 so that the head lowers or closes onto the table top. Almost immediately the cam follower 46 of the previously loaded head runs off of the cam 55 so that the valve 40 opens this head to the cross vent pipe so as to equalize the pressure in the two heads and thus partially evacuate the just loaded head. Almost immediately following this the cam follower 46 of the just loaded head rides onto the start of the cam 55 and seals off the just loaded head from the cross vent pipe while at the same time venting this cross vent pipe to the atmosphere. This fully vents the fully loaded head and raises its pressure to fully atmospheric pressure. During all this time the cam follower 37 of the previously loaded head has been riding the cam 38 so that the heat sealing bar of this previously loaded head has remained down. This is of advantage during the raising of the pressure since it tends to avoid the formation of blisters within the heat sealed bag mouth, the rubber hydrochloride being soft at this time. After atmospheric pressure is attained this follower 37 of the previously loaded head leaves the cam 38, the heat sealing bar lifting free from the bag mouth when atmospheric pressure is attained, and, in due time, this previously loaded head opens as its follower 10 is operated by the cam 11. At that time the finished package may be manually or mechanically removed from the turntable to leave the latter free for immediate reloading with an unsealed bag.

The freshly loaded head has been continuously traveling during the above and its cam follower 28 causes evacuation of this head upon coaction with the cam 29. The cam 29 is long enough to reduce the pressure within the head as much as is possible with the available vacuum and the operating speed of the machine. Thereafter the follower 28 leaves the cam 29 under this low pressure which is sealed or captured in the head. The cam 29 may be longer when higher operating speeds are used. If gassing is desired the follower of the valve 56 is next actuated by the cam 57 so as to flood the head with the desired gas, but to a pressure low enough to permit actuation of the heat sealing bar, the gas being sealed in when the follower of the valve 56 leaves the end of the cam 57. At this time the follower 37 of this head reaches the beginning of the cam 38 so that it goes into its heat sealing phase.

In some instances a high and quick vacuum followed rapidly by a relatively high subatmospheric pressure of air or gas may be desirable, as for example when packing frankfurters from which juices might be extracted undesirably by prolonged high vacuum. Also, a higher subatmospheric pressure may be desired to prevent the bag from clinging or pressing too tightly onto the packaged product. Therefore, note that even a pressure just slightly below atmospheric is sufficient to hold the heads closed tightly because of their large areas. In such instances the pneumatic heat sealing motors may be supplied above their pistons by a separate means providing a pressure above atmospheric, this requiring but slight modification of the arrangements shown.

In the foregoing fashion the machine continuously evacuates, gases if desired, and seals the bags containing the merchandise. If gassing is not desired the valves 56 may be eliminated along with their associated equipment along with their associated equipment including the cam 57.

Should the machine be stopped for any reason any head whose cam follower 37 is actuated by the cam 38 is stopped with its heat sealing bar down. Heat sealing involves not only heat but pressure so the heat sealing bar 30 of this head is then pressing tightly down on the bag mouth. Obviously overheating conditions may result. Almost since the beginning of any type of sealing operations involving pressure an elastic pad made of rubber or the like has been customarily used beneath the article receiving the sealing pressure. Such a pad is shown at 58 in Fig. 4. Overheating of this pad may result in its destruction.

With the above in mind the cam 38 is positioned by arms 59 which extend upwardly from the framework 3 and which are pivoted at 60 so that they can swing outwardly and release the cam 38 from any of the followers 37 which might be in engagement therewith. When the arms 59 are swung inwardly they engage one or more abutments 61 positioned to stop the arms 59 with the cam 38 properly positioned in its active location. Such swinging of the arms 59 is effected by an operating lever system 62 which is connected with these arms to form a swinging means therefor. This system is made so that it provides a handle 63 convenient to the operator of the machine. When this handle 63 is pushed downwardly it rocks the arms 59 to move the cam 38 to its active position.

When the handle 63 is moved downwardly it is locked against return movement by a latching bar 64, a coil tension spring 65 strongly biasing the handle 63 to normally swing upwardly. This latching bar 64 is biased to its releasing position by a coil tension spring 66, the bar 64 being connected through a link 67 with the armature 68 of an electric solenoid 69. This solenoid is placed in circuit with the motor 4, which may be in any suitable manner, so that whenever the motor 4 is de-energized the solenoid 69 is simultaneously de-energized. This results in unlatching of the handle 63 so that the cam 38 promptly moves to its inactive position and thus prevents the described overheating trouble. When the machine is restarted the operator can recock the arrangement by pushing down on the handle 63.

Each of the heads 7 is constructed in the same fashion as the others. The details of one of the heads are illustrated by Figures 3 through 9 and these details will now be described.

As previously explained each head is in the form of an enclosure which opens and shuts in the fashion of a clam shell with the table 1 forming a fixed bottom wall. Excepting for the hole 15 the table top provides a smooth, continuous and air-tight upper surface for the head to work against. The platform 31 is fastened to this surface and provides an indication aiding the operator in locating the position of the bag on the table. The projecting bag

mouth portion of the bag is laid over the top of this platform 31 with the portion of the bag bulged by the merchandise more or less butting against the front end of this platform. The illustrated head is adapted to handle a flat bag containing stacked slices of food such as luncheon meat and the like.

The head 7 has a forwardly projecting extension 7a of reduced height. This is so that the head may accommodate either short or long bags loaded with different volumes of merchandise.

A flat smooth plate 70 is horizontally positioned inside of the head 7. This plate 70 has an area and contour substantially coinciding with the area and contour of the side of the bag. If desired this plate may be extended into the head portion 7a with the latter made approximately higher. This plate 70 may be considered as an element replaceable by others of various sizes. This plate 70 is positioned in an elastic manner so that when the head lowers on the bag the plate gently but firmly presses the top side wall of the bag down against the merchandise in the bag so as to fully collapse the bag. This reduces the space existing between the inside of the bag and the merchandise and in some instances eliminates such space substantially completely.

As illustrated the plate 70 is positioned by suspension studs 71 which are vertically guided reciprocatively by the head through the medium of bracket members 72, coil compression springs 73 providing elastic downward pressure on the plate 70. The arrangement is sufficiently sturdy to properly position the plate 70 during the maneuvering of the head 7. Stops 74 serve to limit the downward motion of the plate 70 relative to the head 7 but the downward motion should always be sufficient to collapse the bag to the extent desired.

The heat sealing bar 30 is electrically powered through flexible leads 75 which extend air-tightly through the head 7 and through a terminal box 76 from which a flexible electric power cord 77 extends for connection with a suitable source of electric power.

The heat sealing bar is carried by a cross head 78 which is rigidly supported by the previously mentioned connecting rod 32. The bottom of the cross head 78 and the top of the heat sealing bar have mutually registered recesses forming seats for a ball 79 that spaces the two parts apart and acts as a universal joint. Connecting rods 80 extend downwardly from the ends of the cross head 78 into bores 81 formed in the ends of the heat sealing bar 30, the lower ends of these rods 80 having enlarged heads 82 and compression springs 83 being positioned between these heads and the upper end portions of the bores 83. Thus the cross head 78 and heat sealing bar 30 are pulled together elastically so as to confine the ball 79 and provide the bar 30 with an elastically restrained universal rocking action. The heads 82 fit the bores 81 sufficiently loosely to permit this universal action to the limited degree required to permit the heat sealing bar 30 to equalize its position relative to bag mouths having oppositely facing outer surfaces which may not be accurately parallel throughout the width of the bag mouth.

At each end the cross head 78 mounts a plate 84 having a declining guideway 85. In Fig. 5 only the left-hand plate is shown with its associated parts about to be described, the assembly on the right-hand side being a duplicate excepting that the angularity of the declining guideway and the positioning of the various parts are reversed. Each of the guideways 85 declines longitudinally respecting the platform 31 and transversely respecting the bag mouth on this platform, the declinations of the two guideways being mutually opposite and at angles toward each other. A vertically reciprocative arm 86 is retained in each guideway 85 by a cover plate 87 which fastens to the plate 84 in each instance. A coil tension spring 88 is in each instance anchored at its lower end to the plate 87, at 89, and the upper end of this spring is fastened at 90 to the top of the arm 86. Therefore, each arm is biased to slide downwardly. A finger pad 91 is mounted on the bottom end of each of the arms 86. Each of the finger pads 91 has a smooth flat bottomed surface 92 which may comprise relatively soft rubber or the like. Each arm 86 has a rectangular contour to fit the passageway 85 while its lower end 93 is cylindrical so as to fit a hole of corresponding size and angularity formed in the finger member 91, a set screw 94 firmly anchoring this lower end 93 to the finger element 91. Thus a rigid interrelation of these parts is effected. The just described parts are arranged so that the arms 86 are slightly moved upwardly when the surfaces 92 engage a bag mouth when the head is fully down and the cross head 78 is at its up position.

The platform 31 has a guideway 95 extending longitudinally thereof and registered beneath each of the finger elements 91. A carriage 96 rides in each of these guideways 95 beneath each of the finger pads 91, the tops of these carriages having surfaces 97 like the surfaces 92 of the finger pads. These carriages can slide longitudinally respecting the platform 31 and, therefore, transversely respecting the bag mouth. Each carriage is biased toward the other, or centrally, by a coil tension spring 98 and each carriage has a hole 99 positioned so that it may be entered by an extension 100 formed on each finger pad 91.

Going back to the operation, when the head 7 first lowers on an unsealed bag the surfaces 92 press relatively lightly against the mouth of the bag and lightly pinch the outer surfaces of the two walls or opposite sides of the bag mouth between the surfaces 92 and 97 which are aligned transversely to the bag mouth. This serves to prevent the bag from shifting around excessively during the rotation of the turntable. At the same time it does not materially flatten out the bag mouth so as to interfere with the evacuation phase or with the gassing phase when gassing is resorted to.

During the heat sealing phase when the cross head 78 is forced down the cam action exerted on the arms 86 by the declined guideways 85 causes the finger pads 91 to be forced apart. At this time the opposite outer surfaces of the bag mouth are tightly pinched between the surfaces 92 and 97 so the bag mouth is stretched or ironed tightly and tautly into a completely flat condition. The extensions 100 cause the carriages 96 to move positively with the finger pads 91. These extensions 100 may be eliminated in which case the carriages 97 will normally ride outwardly so as to permit the stretching of the bag mouth. It is also possible to make the top of the platform 31 smooth and shiny beneath the finger elements 91 so that the bag mouth can slide outwardly under the outward force of the finger elements 91 so as to effect the described stretching action.

As shown by Fig. 4 the finger pads are offset from the heat sealing bar 30 and free therefrom so as not to interfere with the action of the heat sealing bar. The bag mouth is long enough to lie over the platform 31 and permit the pinching action at a location free from the heat sealing bar. Since the action involves elements which pinch the outer faces or surfaces of the two flat bag walls forming the bag mouth it is unnecessary to have elements inside of the bag mouth to effect the described stretching. The finger pads move apart and then the sealing bar contacts the bag mouth, due to the described interassociation of these elements.

The guideways 85 include rollers 101 placed on opposite sides of the guideway where the bearing pressure is high during the camming action exerted on the arms 86. Sliding bearing surfaces 102 are provided opposite to the rollers to complete the guideway effect. During the outward camming action the surfaces 92 remain parallel to the bag mouth and are pressed against the outer surface of the top wall of the bag mouth by the tension of the springs 88. The surfaces 92 slip relative to the outer surface of the bag mouth after the latter reaches the limit of its tautness, thereby preventing tearing of the bag

mouth. This action is further advantageous in that it serves to iron out any wrinkles which may be present in the bag mouth walls.

When the heat sealing bar is lifted from the bag mouth there may be a tendency for the bag to lift up with the bar. Therefore, relatively thin arms or fingers **103** project inwardly from each side of the head **7** between the heat sealing bar and the finger pads. These can be seen in Fig. 4. These fingers are immovable relative to the head and their bottom edges overlie the bag mouth and act to smooth any end puckers therein and to strip the bag mouth from the heat sealing bar when the latter rises in the event the bag and bar tend to stick together.

When the head rises the arms **86** would naturally tend to operate reversely so as to move the finger pads **91** together and rumple the sealed bag mouth. To prevent this each of the arms **86** has a latch notch **104** engaged by a latch **105** carried by the plate **84** and which is urged to latching position by a coil tension spring **106**. The latch and the notch are positioned so that when the heat sealing bar is fully down the latch moves into the notch **104**. As the cross head **78** goes up to lift the heat sealing bar **30** and, of course, the plates **84** and the associated parts mounted thereby, the arms **86** are held immovable in the guideways **85** so as to prevent rumpling of the bag mouth. Each latch is provided with a latch release pin **107** which engages an actuator **108**, mounted inside of the head, these parts being positioned to effect the release of the latches just as the cross head closely approaches the limit of its upward motion. When the latches are released the two arms **86** are returned to their downward position.

Thus it can be seen that as the cross head **78** is moved from its up position to its down position that the bag mouth is first tightly stretched or ironed flatly and then heat sealed. When the cross head is moved to its up position to lift the heat sealing bar the finger pads are lifted in their latched condition and then released as the cross head closely approaches to its up position. These operations occur as each head goes through the various previously described phases of a complete bag evacuating and bag mouth sealing cycle.

The cross heads are, of course, moved up and down by the pistons in the cylinders **33**. These pistons have not been illustrated because the cylinders **33** may be each considered as a conventional single-acting pneumatic motor.

The finger assembly including the plates **84** and **87** are adjustable along the cross head **78**, screw fastenings **87*a*** locking the plates releasably at any desired position. Therefore, bags of different widths may be accommodated by the machine. The necessary corresponding adjustment of the parts against which the fingers work is effected by making the platform **31** in two sections which are held by screws **31*a*** provided with a series of tapped holes **31*b*** formed in the turntable top. Thus the sections may be shifted as required to effect registration with the fingers.

Note that a bag mouth is in effect a seam and that certain of the principles of this invention may be used for seaming and the like in general.

I claim:

1. A bag mouth closing machine including a revolving table constructed to support a plurality of bags horizontally thereon, a plurality of open-bottomed enclosures positioned over said table for movement down into contact therewith and constructed to enclose and embrace said bags when said enclosures are down, a sealer positioned in each of said enclosures for movement toward and from the mouth of the bag within said enclosure when said enclosure is down, a plurality of fingers supported by and positioned in said enclosure, said fingers engaging said mouth at positions spaced transversely thereof and free from interference with said sealer when said enclosure is down, and means for moving said fingers apart to stretch said bag mouth therebetween for sealing of said mouth by said sealer.

2. A bag mouth closing machine including a table constructed to support a bag thereon, an open-bottomed enclosure positioned over said table for movement down into contact therewith and constructed to enclose and to embrace said bag when said enclosure is down, a sealer positioned in said enclosure for movement toward and from the mouth of said bag when said enclosure is down, fingers positioned in said enclosure to engage the outer wall of said mouth at positions spaced transversely thereof and free from interference with said sealer when said enclosure is down, at each of said positions said table cooperating with said fingers to engage the opposite face of said bag in clamping relationship, and means for moving said fingers apart to stretch said bag mouth therebetween for sealing of said mouth by said sealer, said table having carriages thereon positioned so as to be opposite to said fingers and beneath said bag mouth when said enclosure is down, said carriages being movable with said fingers when the latter are moved apart to stretch said bag mouth.

3. A bag mouth closing machine including a revolving table constructed to support a plurality of bags arranged horizontally thereon, a plurality of open-bottomed enclosures positioned over said table for movement down into contact therewith and constructed to enclose and embrace said bags when said enclosures are down, each of said enclosures having a sealer positioned in said enclosure for movement toward and from the mouth of a bag when said enclosure is down, fingers positioned in said enclosure to engage said mouth at positions spaced transversely thereof and free from interference with said sealer when said enclosure is down, and means for moving said fingers apart to stretch said bag mouth therebetween for sealing of said mouth by said sealer, said table having carriages thereon positioned so as to be opposite to said fingers when said enclosure is down, said carriages being movable with said fingers when the latter are moved apart, said fingers and carriages having cooperating elements which separably interconnect when said enclosure is down and cause positive movement of said carriages with said fingers.

4. A bag mouth closing machine including a table constructed to support a bag thereon, an open-bottomed enclosure positioned over said table for movement down into contact therewith and constructed to embrace said bag when said enclosure is down, a sealer positioned in said enclosure for movement toward and from the mouth of said bag when said enclosure is down, and pressers positioned in said enclosure to engage said mouth and press it towards said table to position said mouth for sealing thereof by said sealer, said pressers being mounted by upstanding arms which diverge from each other upwardly and said sealer having corresponding diverging guideways in which said arms are positioned so that movement of said sealer down towards the bag mouth causes said fingers to move apart and stretch said bag mouth.

5. A bag mouth closing machine including a table constructed to support a bag thereon, an open-bottomed enclosure positioned over said table for movement down into contact therewith and constructed to embrace said bag when said enclosure is down, a sealer positioned in said enclosure for movement toward and from the mouth of said bag when said enclosure is down, and pressers positioned in said enclosure to engage said mouth and press it towards said table to position said mouth for sealing thereof by said sealer, said pressers being mounted by upstanding arms which diverge from each other upwardly and said sealer having corresponding diverging guideways in which said arms are positioned so that movement of said sealer down towards the bag mouth causes said fingers to move apart and stretch said bag mouth, said arms having means biasing them downwardly, latches for holding them against the bias of said biasing means

after down movement of said sealer, and trippers positioned in said head to release said latches when said sealer moves up a predetermined amount.

6. A bag mouth closing machine including a table constructed to support a bag thereon, an open-bottomed enclosure positioned over said table for movement down into contact therewith and constructed to embrace said bag when said enclosure is down, a sealer positioned in said enclosure for movement toward and from the mouth of said bag when said enclosure is down, resiliently mounted pressers positioned in said enclosure to engage said mouth and press it toward said table to position said mouth for sealing thereof by said sealer, and a plate positioned in said head to press against and flatten said bag, said plate having a shape at least approximately coinciding with that of the side of said bag.

7. A bag mouth closing machine including a table constructed to support a bag thereon, an open-bottomed enclosure positioned over said table for movement down into contact therewith and constructed to embrace said bag when said enclosure is down, a sealer positioned in said enclosure for movement toward and from the mouth of said bag when said enclosure is down, resiliently mounted pressers positioned in said enclosure to engage said mouth and press it toward said table to position said mouth for sealing thereof by said sealer, said sealer comprising a bar shape and said shape being moved by a reciprocative part and having a pivotal joint centrally connecting said shape with said part so that said shape can rock respecting said bag mouth.

8. A bag mouth sealing device for operation on a bag supported on a table, said device comprising an open-bottomed hollow head constructed to enclose said bag when lowered thereover onto said table, a cross head positioned in said head to reciprocate over the mouth of said bag between up and down positions in said head, guideways slanting down towards each other and mounted by said cross head adjacent to its ends, arms reciprocatively arranged in said guideways and having finger ends engaging said bag mouth and moving apart to stretch said mouth upon motion of said cross head toward its down position, springs biasing said arms downwardly, and a sealing bar mounted by said cross head and positioned offset from said arms and finger ends to engage the mouth of said bag upon full motion of said cross head to its down position.

9. A bag mouth sealing device for operation on a bag supported on a table, said device comprising an open-bottomed hollow head constructed to enclose said bag when lowered thereover onto said table, a cross head positioned in said head to reciprocate over the mouth of said bag between up and down positions in said head, guideways slanting down towards each other and mounted by said cross head adjacent to its ends, arms reciprocatively arranged in said guideways and having finger ends engaging said bag mouth and moving apart to stretch said mouth upon motion of said cross head toward its down position, springs biasing said arms downwardly, and a sealing bar mounted by said cross head and positioned offset from said arms and finger ends to engage the mouth of said bag upon full motion of said cross head to its down position, said arms having latches which engage and hold said arms when said cross head moves upwardly away from its down position and latch release elements being positioned in said head for engagement by said latches when said arms approach closely toward their up position.

10. A machine for heat sealing flexible bags including a revolving table type conveyer, a plurality of open bottom enclosures positioned over said table type conveyor, a plurality of heat sealing elements carried in series by said revolving conveyor and individually movable to and from heat sealing position, a pad for each of said elements, said pads being carried by said conveyor and each being positioned to hold a bag for heat sealing by one of said elements for which it is provided, a plurality of fingers positioned in each of said enclosures to engage the outer wall of said bag positioned for heat sealing, said fingers arranged free from interference with said sealing elements, said fingers to stretch said bag before sealing of said bag, each of said elements being biased away from its heat sealing position and having means provided with a controller for moving the element to said heat sealing position and into contact with a bag or with its said pad in the absence of a bag, said means and controller being carried by said revolving conveyor and traveling therewith when moved by said conveyer, an actuator past which said elements and pads travel when moved by said revolving conveyer, said actuator being positioned to successively actuate said controllers as they travel therepast so as to cause said means to move said elements successively to their heat sealing positions and being retractable to an inoperative position, means for moving said revolving table type conveyer, means for retracting said actuator, and means for actuating said retracting means when said revolving table type conveyer moving means is deactivated.

11. A bag mouth closing device having a hollow head, said hollow head constructed to enclose a bag, said device embodying a table to support a bag, a stretcher including elements providing a plurality of surfaces positioned to press against the outer face of one side of the bag mouth at locations mutually aligned transversely to said mouth, means for moving said surfaces apart while they press against said outer face, and said table for supporting the outer face of the other side of said mouth while permitting transverse movement thereof.

12. A heat sealing bag mouth closing device having a hollow head, said hollow head constructed to entirely enclose a bag, said device embodying a table to support a bag, said device including elements providing a plurality of laterally movable surfaces positioned to press against the outer face of one side of the bag mouth at locations mutually aligned transversely to said mouth and spaced away from the outer end edge of said mouth, a bag mouth heat sealing member positioned to move to press against the bag mouth portion of said outer face between said locations and said outer end edge, means for moving said surfaces apart while they press against said outer face and moving said member to press said member against said portion of said outer face, and said table for supporting the outer face of the other side of said mouth while permitting transverse movement thereof.

13. A heat sealing bag mouth closing device having a hollow head, said hollow head constructed to enclose a bag, said device embodying a table to support a bag, said device including elements providing a plurality of laterally movable surfaces positioned to press against the outer face of one side of the bag mouth at locations mutually aligned transversely to said mouth, a bag mouth heat sealing member positioned to move to press against the outer face of said one side of said mouth adjacent to said surfaces, means for moving said surfaces apart while they press against said outer face and moving said member to press said member against said outer face of said mouth, and said table for supporting the outer face of the other side of said mouth while permitting transverse movement thereof.

14. A bag mouth closing machine of the character disclosed, including a turntable, means to rotate said turntable, said turntable constructed to support a bag horizontally thereon, an open-bottomed enclosure positioned over said turntable for movement down into contact therewith and constructed to embrace said bag when said enclosure is down, a sealer positioned in said enclosure for movement toward and from the mouth of said bag when said enclosure is down, and a plurality of pressers supported by and positioned in said enclosure to engage said mouth and press it toward said table to position said mouth for sealing thereof by said sealer, and brackets

mounted in said head and positioned to overlie said bag mouth and hold it from following said sealer when the latter is moved from said mouth.

15. A machine for evacuating and closing a flexible bag containing material and having a heat sealing mouth, said machine including a table and a hollow head type enclosure, said table to support the bag below said enclosure, said enclosure constructed to enclose said bag, a plurality of fingers supported by and within said enclosure, said fingers having surfaces for pressing the uppermost bag wall closely against the material contained by the bag and pressing the lowermost wall against said table, means for moving said surfaces apart while they press against said uppermost bag wall and the lowermost wall against the table thereby stretching the bag transversely.

16. Apparatus comprising a revolving turntable, said turntable supporting a plurality of enclosures, said enclosures supporting means for flattening flexible bags having two sides, each of said enclosures supporting finger pads providing friction surfaces for frictionally and slidably engaging spaced portions of one top layer side, means for pressing said friction surfaces against said side, and for moving said surfaces in opposite directions to frictionally pull the layer flat, said turntable supporting the other side opposite to said top side and permitting movement of the supported layer by said surfaces.

17. In a machine of the character disclosed, a turntable, means for rotating said turntable, a plurality of housings radially positioned on the turntable top, each housing having an open base, a fixed cam independent of and positioned beneath said turntable, means adapted to engage said cam during rotation to said turntable top, a source of sub-atmospheric pressure, valves secured to said turntable, pipes interconnecting said valves with said source of sub-atmospheric pressure and each of said housings, each of said housings constructed to enclose a flexible bag, said turntable to support said bag, a stretcher including a plurality of laterally movable elements providing a plurality of surfaces positioned to press against the outer face of one of the mouths of said bag at locations mutually aligned transversely to said mouth, means for moving said surfaces apart while they press against said outer face, and said table supporting the outer face of the other side of said bag while permitting transverse movement thereof.

18. In a machine for exhausting the air from and sealing the mouths of bags, the combination with an exhaust, of a continuously moving conveyor having a plurality of hollow heads to enclose individual bags supported upon the conveyor, each hollow head being constructed to enclose a bag and containing a sealer for sealing the mouth of a bag adjacent to its outer end, the combination with said head and sealer of a plurality of movable elements inside of said head and providing mutually opposed surfaces at a plurality of locations spaced transversely respecting said mouth and spaced inwardly from said outer end thereof, resilient means inside of said head for pressing said surfaces together with the outer faces of the sides of said mouth pinched therebetween, and means correlated with said sealer for moving at least one of said surfaces in a direction stretching said mouth prior to actuation of said sealer.

19. A machine for exhausting the air from and sealing the mouths of bags, the combination of an exhaust, a revolving table constructed to support a plurality of bags horizontally thereon, a plurality of open-bottomed enclosures positioned over said table for movement down into contact therewith and constructed to enclose and embrace said bags when said enclosures are down, a sealer positioned in each of said enclosures for movement toward and from the mouth of a bag within each of said enclosures when said enclosures are down, and a plurality of movable elements positioned in each of said enclosures to engage the mouth portion of said bag, means for moving said movable elements in opposite directions to stretch said mouth and press it towards said table to position said mouth for sealing thereof by said sealer.

20. A machine for evacuating and sealing a container having upper and lower flexible walls defining a flat mouth, said machine including a table structure on which said container may be located with said mouth's lower wall supported thereby, a hollow head having an open-bottomed base and constructed to cover said container when it is located on said table structure, means for mounting said head so that it may be closed on said table structure with its said base resting thereon and said head covering said container and so that said head may be opened from said table structure for the placement and removal of said container on said table structure, means for evacuating said head after it is closed and covering said container, a sealing bar for contacting and pressing transversely said mouth's upper wall downwardly on its lower wall to seal said walls together within said head while it is closed and evacuated, finger members for engaging said mouth's upper wall on opposite sides of its central portion and offset longitudinally with respect to said bag from the contacting location of said sealing means with said upper wall, and means for causing said finger members to move downwardly and engage said mouth's upper wall and press it downwardly so that said upper wall engages and presses said mouth's lower wall downwardly against said table structure to hold said mouth for each closing of said head and to move upwardly to release said container's mouth for each opening of said head, the last-named means including a mounting within said head and movable therewith, and elastically displaceable arms connecting said finger members to said mount so that when said table structure prevents further downward movement of said finger members said arms elastically displace away from each other and move said finger members away from each other while they press downwardly on said bag mouth's walls.

21. A machine for evacuating and sealing a container having upper and lower flexible walls defining a flat mouth, said machine including a table structure on which said container may be located with said mouth's lower wall supported thereby, a hollow head having an open-bottomed base and constructed to cover said container when it is located on said table structure, means for mounting said head so that it may be closed on said table structure with its said base resting thereon and said head covering said container and so that said head may be opened from said table structure for the placement and removal of said container on said table structure, means for evacuating said head after it is closed and covering said container, a sealing bar for contacting and pressing transversely said mouth's upper wall downwardly on its lower wall to seal said walls together within said head while it is closed and evacuated, finger members for engaging said mouth's upper wall on opposite sides of its central portion and offset longitudinally with respect to said bag from the contacting location of said sealing means with said upper wall, and means for causing said finger members to move downwardly and engage said mouth's upper wall and press it downwardly so that said upper wall engages and presses said mouth's lower wall downwardly against said table structure to hold said mouth for each closing of said head and to move upwardly to release said container's mouth for each opening of said head, the last-named means including a mounting within said head and movable therewith, and elastically displaceable arms connecting said finger members to said mount so that when said table structure prevents further downward movement of said finger member said arms elastically displace away from each other and move said finger members away from each other while they press downwardly on said bag mouth's walls, said table structure including an elastically deformable surface located for registration by said sealing means and free from

registration by said finger members, and said table structure in registration with said finger members being constructed to support said container mouth's lower wall so that it is free to move in the direction said finger members move.

22. A machine for evacuating and sealing a container having flatly superimposed flexible walls defining a transversely open mouth at the terminal edges of said walls, said machine including the combination of means for air-tightly enclosing a space within which said container is located, means located within said space for engaging the corner portions of said mouth and holding the latter transversely stretched therebetween, the portions of said walls located between said corner portions being flatly superimposed but free to separate and pass a fluid flow therebetween, means for evacuating said space while said mouth is thusly held by said holding means, and means for sealing said mouth transversely while said mouth is held by said holding means.

23. A machine for evacuating and sealing a container having a body and having upper and lower flexible walls defining a flat mouth having corner portions formed by said walls, said machine including a table on which said container may be placed loosely with its said mouth arranged flatly thereon, a hollow head having an open-bottomed base and constructed to cover said container completely when said head is closed thereover with said base resting on said table, means for evacuating said head when it is closed over said container with its said base resting on said table, whereby atmosphere drawn from said container's body through its said mouth tends to disarrange said flexible walls, interspaced finger members located within said closed head and constructed and arranged to releasably engage and hold said corner portions of said container's mouth with the latter's said walls stretched flatly therebetween and thus held against being disarranged while being free to separate from each other so that said atmosphere may flow therebetween, and a sealing bar located within said closed head for sealing said flexible walls flatly together, said finger members being operative prior to, and during, operation of said means for evacuating said head.

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