May 6, 1958 R. S. RANDALL 2,833,096

VACUUM BAG SEALING MACHINE

Filed Feb. 8, 1955 3 Sheets-Sheet 1

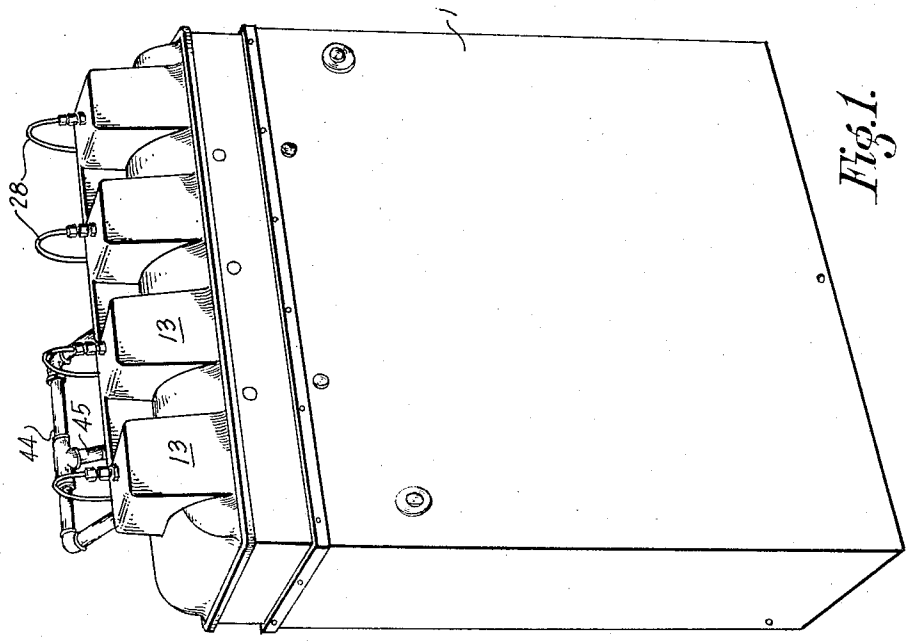


Fig. 1.

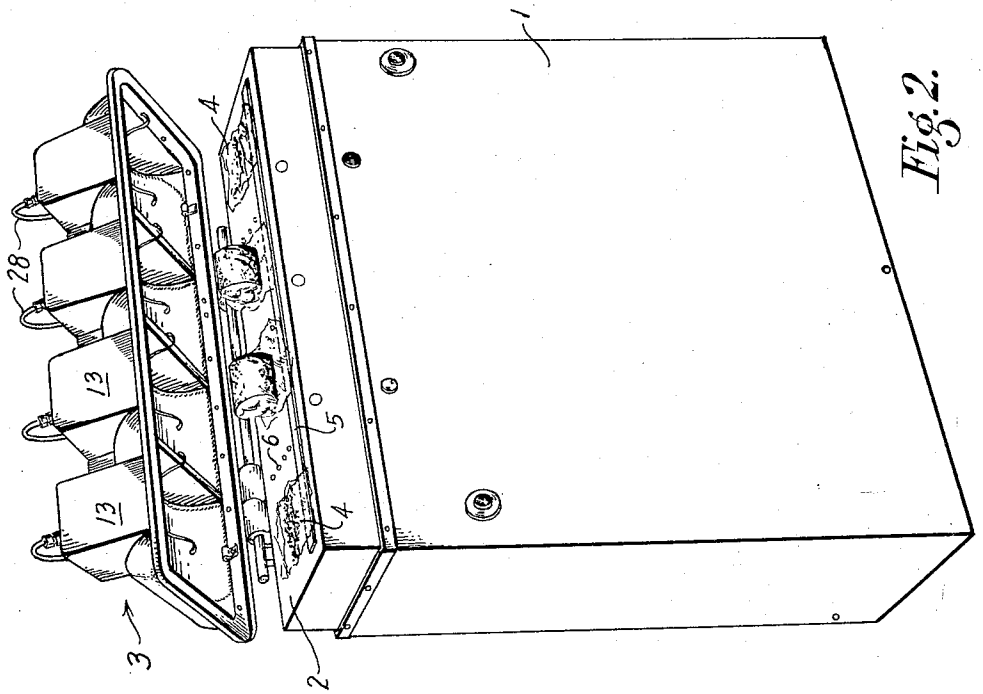


Fig. 2.

INVENTOR
Ralph S. Randall
BY
A. Schapp
ATTORNEY

May 6, 1958 R. S. RANDALL 2,833,096

VACUUM BAG SEALING MACHINE

Filed Feb. 8, 1955 3 Sheets-Sheet 2

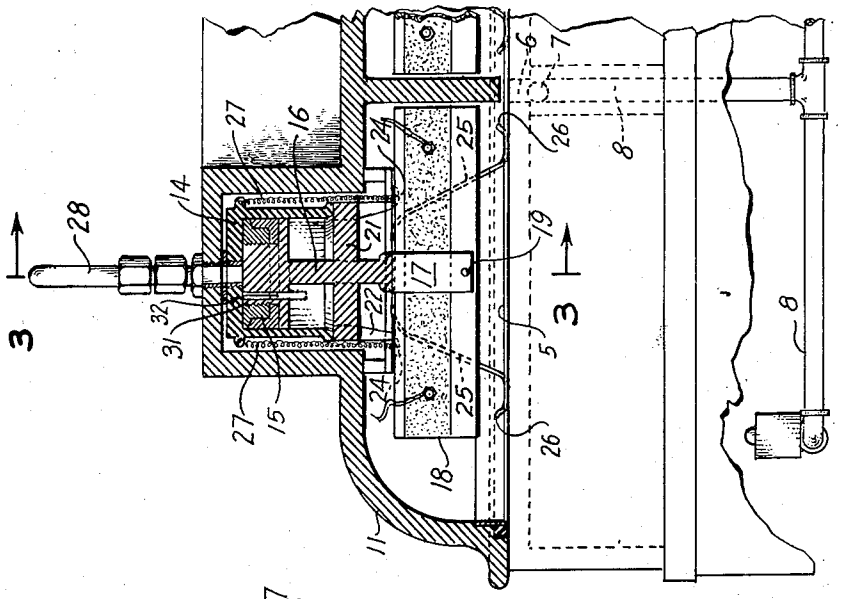


Fig. 4.

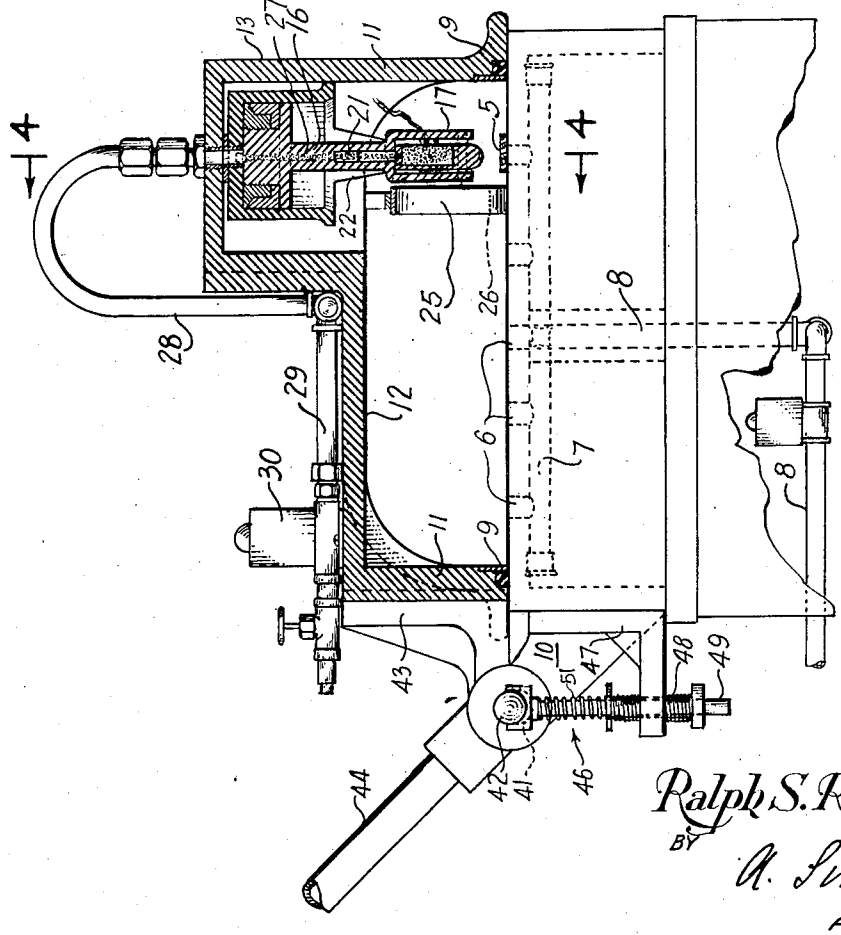


Fig. 3.

INVENTOR
Ralph S. Randall
BY
A. Shapp
ATTORNEY

May 6, 1958 R. S. RANDALL 2,833,096

VACUUM BAG SEALING MACHINE

Filed Feb. 8, 1955 3 Sheets-Sheet 3

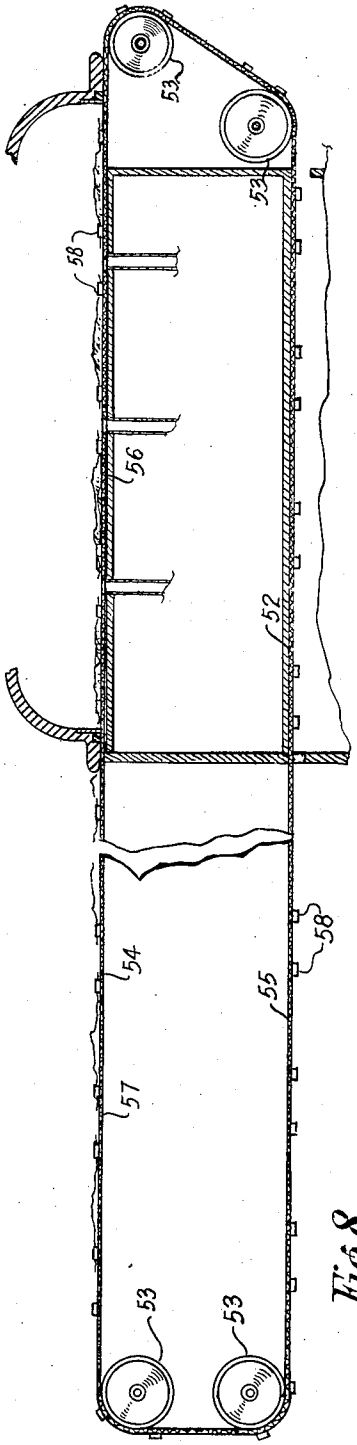


Fig 8.

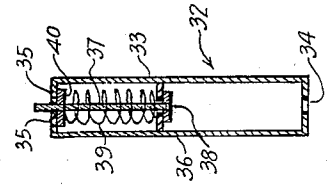


Fig. 7.

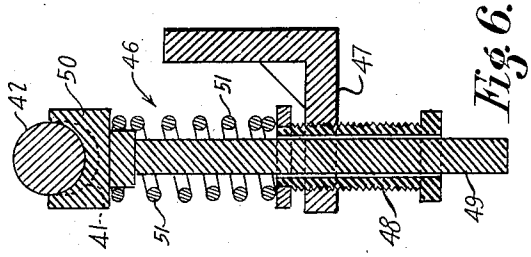


Fig. 6.

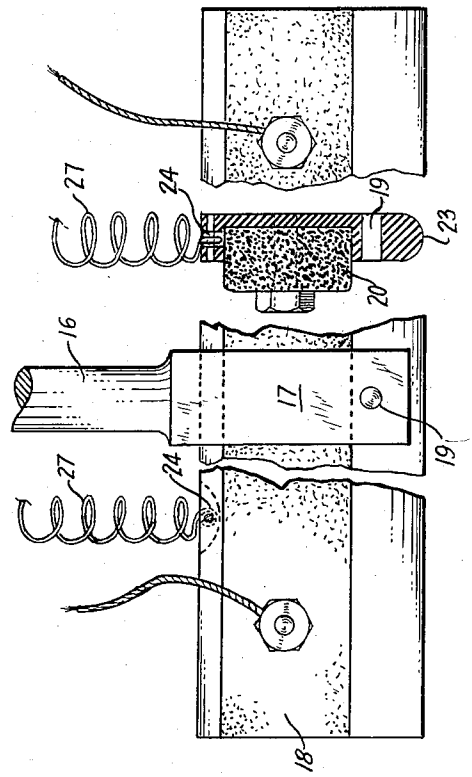


Fig. 5.

INVENTOR
Ralph S. Randall
BY
A. Schapp
ATTORNEY

United States Patent Office

2,833,096

Patented May 6, 1958

2,833,096

VACUUM BAG SEALING MACHINE

Ralph S. Randall, San Francisco, Calif., assignor to Vac-U-Pak Corporation, San Francisco, Calif., a corporation of California

Application February 8, 1955, Serial No. 486,797

10 Claims. (Cl. 53—86)

The present invention relates to improvements in a vacuum bag sealing machine, and its principal object is to provide a machine for evacuating and sealing bags containing articles of food, such as sliced meats or sausages, in a single operation and with a minimum of labor.

It is a further object of my invention to provide a machine of the character described which is entirely automatic, except for the positioning and the removal of the bags.

Further objects and advantages of my invention will appear as the specification proceeds, and the new and useful features of same will be fully defined in the claims hereto attached.

The preferred forms of my invention are illustrated in the accompanying drawings, forming part of this application, in which:

Figure 1 shows a perspective view of my machine, with the cover forming the vacuum chamber in closed position;

Figure 2, a similar perspective view with the cover in open position;

Figure 3, a transverse section through the machine, taken along line 3—3 of Figure 4.

Figure 4, a partial longitudinal section through the machine, taken along line 4—4 of Figure 3;

Figure 5, a fragmentary front view of a sealing placket used in my invention, with cooperative parts, a portion being shown in cross-section;

Figure 6, a vertical section through a main shaft support, used in my invention;

Figure 7, a detail sectional view illustrating a piston valve used in my machine; and

Figure 8, a schematic view illustrating a modified form of the invention.

While I have shown only the preferred forms of my invention, I wish to have it understood that various changes or modifications may be made within the scope of the claims hereto attached, without departing from the spirit of the invention.

Referring to the drawings in detail, my machine comprises in its principal features, a cabinet 1, preferably rectangular in form and designed to bring the operating portion of the machine to a convenient height, a horizontal platform 2 on top of the cabinet, a hollow cover 3 pivoted to the cabinet to form a vacuum chamber with the platform when lowered upon the latter, and various operating parts to be described in detail as the specification proceeds.

The platform 2 is preferably rectangular in shape, perfectly flat and of a width and length to accommodate a plurality of bags 4 thereon, the bags being preferably rectangular in form, and having been previously filled with a desired article of food, such as sliced meats or sausages. The bags are made of well-known transparent material, such as waxed paper or Cellophane, which yields to heat-sealing.

The platform has arranged thereon, along the front edge, but well spaced therefrom, a strip 5 of suitable yielding material, such as cork, and the bags are arranged on the platform with their open ends overlying the strip, this operation being performed manually.

In the present instance, the platform is shown as accommodating four bags in spaced relation, the two outer ones being relatively flat and containing sliced meats, and the two inner ones being more bulky and containing pieces of sausage, the machine being adapted to handle both kinds with equal facility as long as they present open ends which may be flattened on the cork strip 5.

The platform is formed with a number of holes 6 between the bags and these holes communicate with a manifold 7 arranged underneath the platform, the manifold connecting, through suitable piping 8, with a vacuum pump (not shown).

The cover 3 is hollow, substantially commensurate with the platform, and is designed to form a vacuum chamber therewith when lowered upon the platform. The lower edge of the cover carries an all-around gasket 9 adapted to bear on the edge of the platform so as to form a seal therewith. The cover is hinged to brackets 10 mounted upon the rear wall of the cabinet for swinging movement between the positions shown in Figures 1 and 2.

The cover comprises an all-around wall structure shown at 11, and a substantially flat top 12 spaced from the platform sufficiently to provide ample space for the bags to be accommodated. Along the front portion the cover is formed with a series of domes 13, one for each bag to be accommodated in the vacuum chamber, each dome being centered substantially over the strip 5 and the projecting end of a properly positioned bag.

Each dome has an inverted cylinder 14 mounted therein, the closed upper end of the cylinder being fixed with respect to the top of the dome. Each cylinder has a piston 15 reciprocable therein, each piston having a depending rod 16. The lower end of each rod is forked, as at 17, to receive the heating and sealing element 18 which is pivotally held in the fork by a pivot 19.

The heating and sealing element is in the form of a rectangular plate (see Figure 5) disposed on edge and of sufficient length to fully cover the width of the bag to be sealed. The plate is formed with a deep groove in one of the sides thereof to receive the heating pad 20, which is heated electrically.

The heat-sealing element is naturally intended to run parallel to the front wall of the cover so as to overlie the open end of the bag to be sealed, and, in order to maintain it in this position, the piston is held against turning movement by two arms 21 extending sidewise from the piston rod and engaging in vertical guides 22 depending from the cylinder.

The bottom edge of the heating element is rounded, as at 23, to bear down on the bag beginning with a fairly well-defined central impression.

Each dome portion of the housing has a bracket 24 depending therefrom so as to just clear the piston rod connections, and the bracket carries a V-type leaf spring 25 having downwardly spreading legs with upwardly curved ends, as at 26.

The springs are mounted parallel to and slightly to the rear of the heating elements, and in their free state the bottom ends of the springs extend below the bottom plane of the cover. Due to this construction the curved bottom ends of the springs engage over the open ends of the positioned bags as the cover is lowered upon the platform, and in the final stage of the lowering operation, they spread and flatten the end of the bag prior to the sealing operation.

Each piston, with its depending heat-sealing element, is normally forced upward by a pair of coiled springs 27 attached, at their lower ends, to the outside of the cylinder.

The pistons are forced down for the sealing operation by atmospheric pressure working against the vacuum in the chamber. But it is desirable to time the application of atmospheric pressure so as to prevent the latter from becoming active before a desired vacuum has been obtained in the vacuum chamber.

For this purpose, I have designed the following arrangement:

Atmospheric pressure is admitted to each cylinder above the piston through a tube **28**, the four tubes being connected to a single tube **29** having a solenoid-operated valve **30**, which is normally closed.

Each piston has a port **31** extending clear through the same, so as to establish communication between the vacuum chamber and the tubes **28—29**.

The port **31** has a valve **32** (see Figure 7) mounted therein, the valve comprising a tubular wall **33** fitting in the port and having a perforated bottom **34** and a perforated top **35**. Intermediate the length of the tube, I provide a valve seat **36** having a valve stem **37** slidable, the valve stem carrying a head **38** which is normally crowded upon the seat from below by a spring **39** bearing on the valve seat and pressing upward on a disc **40** fixed to the stem above the spring.

The spring thus tends to normally close the valve. But, when the valve is thus closed, its stem projects upward beyond the top **35** (which is flush with the top of the piston) so that when the piston rises to its uppermost position in the cylinder, the upper end of the stem strikes the cylinder and opens the valve, thus establishing communication between the vacuum chamber and the conduits **28—29**.

The sequence of operations in my machine, thus far described, is as follows:

Assuming that the bags have been positioned, as in Figure 2, and the cover is being made to descend upon the platform, the solenoid valve **30** being closed and the valve **32** (Figure 7) being held open by impact with the top wall of the cylinder:

As the cover approaches the platform **2**, the spring fingers **25** first contact the open ends of the bags and spread the same during the final part of the closing movement. Next air is exhausted from the vacuum chamber, and in this process, since the valve **33** in the piston is held open, air is also exhausted from the tubes from the tubes **28—29** up to the location of the solenoid valve **30**.

Thus, the pressures will remain equalized on opposite ends of the pistons, and the latter will remain unaffected by the evacuating process which, of course, also sucks the air out of the bags through their open ends.

When the vacuum reaches a predetermined degree, short of the maximum obtainable, say about twenty-five inches, it operates a pressure-responsive switch (not shown), which in turn, operates a solenoid to open the valve **30**, with the result that air from the atmosphere rushes into the conduits **28—29** to bear upon the upper end of the piston which is crowded downward.

As soon as the valve stem of valve **32** loses contact with the upper end of the cylinder, the valve **32** closes, with the result that the full impact of the atmosphere is made to operate against the vacuum in the chamber for forcing the heat-sealing element upon the open end of the bag.

It will be understood that some little time will elapse between the opening of the solenoid valve and the actual descent of the sealing element upon the bag, and that this time period will be utilized to bring the vacuum in the chamber to a desired maximum.

Thus, by proper setting of the pressure-responsive switch, the actual beginning of the sealing action may be timed to exact coincide with the moment when the maximum vacuum has been obtained.

The cover may be operated in any suitable manner. In the form which I use at the present time, I hinge the cover with respect to the understructure by means of the brackets **10** projecting rearwardly from the cabinet.

The brackets have alined holes **41** for rotatably supporting a hinge pin or shaft **42**. Brackets **43** fixed to the cover are supported by the shaft **42** and have a yoke **44** projecting rearwardly therefrom, which latter is operated by any suitable means, as by a vacuum-operated piston **45**, to raise and lower the cover.

Since this operation involves an angular approach of the cover with respect to the platform, with an excess wear on the inner gasket, I provide means for easing the approach by making the holes **41** in the brackets **10** somewhat larger than the shaft **42**, so as to allow of a certain amount of play and by providing a spring support for the shaft tending to crowd the latter upward, as shown at **46** and in detail in Figure 6.

The spring support comprises a bracket **47** projecting rearwardly from the cabinet to a point underneath the shaft, a bushing **48** threaded into the bracket, a post **49** slidable in the bushing and having a cradle **50** for supporting the shaft at its upper end, and a spring **51** resting on the bushing and supporting the cradle.

The tension of the spring may be adjusted by up and down adjustment of the bushing. The spring support allows the cover, in the final phase of its downward movement, to assume a position parallel to the platform before being clamped upon the same.

It is apparent that, if a straight up and down movement for the cover be substituted for the hinge movement, the same result would be obtained.

In the machine thus far described, the machine has to be loaded while the same remains inactive, with the cover raised, and the loading time, depending upon the skill of the operator may almost be equal to that of the time consumed in the sealing operation.

The output of the machine may be greatly increased by providing a loading zone separate from the sealing zone, whereby both operations may be carried out at the same time.

One way of accomplishing this is illustrated in Figure 8, in which an endless belt **52** is substituted for the fixed platform **2** of the first machine.

The belt is mounted on four rollers **53** to present a horizontal upper stretch **54** and a horizontal lower stretch **55**.

The upper stretch is disposed in the horizontal plane of the platform previously described, is of substantially the same width as the platform and of at least twice the length, so as to present one section **56** within the machine and a second section **57** outside the machine, thus allowing the operator to load the outside section while the sealing operation takes place on the inside section.

After each sealing operation, it is only necessary to suitably advance the belt to discharge the finished bags over the far edge of the machine and to bring a new loaded section into the machine.

Suitable means, such as clips **58** may be used for holding the bags in position during the operation.

In this case the cover is preferably raised and lowered vertically, but otherwise the principles of the first form of my invention may be readily applied by a person skilled in the art.

I claim:

1. In a vacuum bag sealing machine, a platform adapted to receive an open-ended bag thereon, and a hollow cover mounted for movement upon the platform to form a sealed chamber therewith, the cover having spreadable spring fingers adapted for engaging over the open end of the bag when the cover moves upon the platform for smoothing out said open end.

2. In a vacuum bag sealing machine, a platform adapted to receive an open end bag thereon, a hollow cover mounted for movement upon the platform to form a sealed chamber therewith, means for evacuating the

chamber and the bag, a piston reciprocable in the chamber above the bag, a sealing element carried by the piston, and means operable in response to a predetermined vacuum in the chamber for operating the piston.

3. In a vacuum bag sealing machine, a platform adapted to receive an open end bag thereon, a hollow cover mounted for movement upon the platform to form a sealed chamber therewith, means for evacuating the chamber and the bag, a piston reciprocable in the chamber above the bag, a sealing element carried by the piston, and means operable in response to a predetermined vacuum in the chamber for operating the piston, the latter means comprising an air conduit leading to the driving end of the piston, means normally closing the conduit, and means controlled by the vacuum in the chamber for opening the conduit.

4. In a vacuum bag sealing machine, a platform adapted to receive an open end bag thereon, a hollow cover mounted for movement upon the platform to form a sealed chamber therewith, means for evacuating the chamber and the bag, a cylinder depending from the top of the cover and having a piston reciprocable therein, a sealing element carried by the piston, and means operable in response to a predetermined vacuum in the chamber for operating the piston, the latter means comprising an air conduit leading to the driving end of the piston, means normally closing the conduit, and means controlled by the vacuum in the chamber for opening the conduit, the piston having a port normally equalizing pressures in the chamber and the conduit, with a valve operative for closing the port at the initiation of the piston movement.

5. In a vacuum bag sealing machine, a vacuum chamber having a top wall and a cylinder depending from said wall, a piston reciprocable in said cylinder, an air conduit communicating with the upper end of the cylinder, a port in the piston establishing communication between the vacuum chamber and the conduit, a valve in the port having means impinging on the cylinder when the piston is in its uppermost position for maintaining the port open, and a spring means operative on the valve for closing the same upon initiation of the downward movement of the piston.

6. In a vacuum bag sealing machine, a vacuum chamber having a top wall and a cylinder depending from said wall, a piston reciprocable in said cylinder, an air conduit communicating with the upper end of the cylinder and having a normally closed valve therein, means for establishing communication between the conduit and the chamber when the piston is in its uppermost position for equalizing pressures in the chamber and the conduit, means operable in response to a predetermined vacuum in the chamber for opening the conduit valve to admit air above the piston for urging the latter downward, and means operable upon initiation of the downward movement of the piston for closing communication between the chamber and the conduit.

7. In a machine of the character described, a cylinder having a closed end, a piston reciprocable in the cylinder toward and away from the closed end, a longitudinal port in the piston, and a valve for the port having means for impinging upon the closed end of the cylinder for opening the valve when the piston approaches said end, the valve having spring means automatically opening the same as the piston recedes from the closed end.

8. In a vacuum bag sealing machine, a platform adapted to receive an open end bag thereon, a hollow cover mounted for movement upon the platform to form a sealed chamber therewith, means for evacuating the chamber and the bag, a piston reciprocable in the chamber above the bag, a sealing element carried by the piston for sealing the bag as the piston descends, and means operable in response to a predetermined vacuum in the chamber for operating the piston, the predetermined pressure being calculated to allow the vacuum in the chamber to reach a maximum during the delay incident to the operation of the piston.

9. In a vacuum bag sealing machine, a platform adapted to receive an open end bag thereon, a hollow cover mounted for movement upon the platform to form a sealed chamber therewith, means for evacuating the chamber and the bag, a piston reciprocable in the chamber above the bag, a sealing element carried by the piston for sealing the bag as the piston descends, and means operable in response to a predetermined vacuum in the chamber for operating the piston, the latter means comprising an air conduit leading to the driving end of the piston, a solenoid valve normally closing the conduit, and means controlled by the vacuum in the chamber for opening the solenoid valve and the conduit.

10. In a vacuum bag sealing machine, a platform adapted to receive an open end bag thereon, a hollow cover mounted for movement upon the platform to form a sealed chamber therewith, means for evacuating the chamber and the bag, a piston reciprocable in the chamber above the bag, a sealing element carried by the piston for sealing the bag as the piston descends, and means operable in response to a predetermined vacuum in the chamber for operating the piston, the latter means comprising an air conduit leading to the driving end of the piston, a solenoid valve normally closing the conduit, and means controlled by the vacuum in the chamber for opening the solenoid valve and the conduit, the predetermined pressure being calculated to reach a maximum during the delay incident to the operation of the piston.

References Cited in the file of this patent

UNITED STATES PATENTS

1,557,436	Dix	Oct. 13, 1925
1,628,203	Stein	May 10, 1927
2,496,609	Van Antwerpen	Feb. 7, 1950
2,630,955	Moses et al.	Mar. 10, 1953
2,700,790	Johnson	Feb. 1, 1955