June 24, 1930. A. PODEL 1,767,475

VACUUM SEALING MACHINE

Filed Dec. 17, 1924 5 Sheets-Sheet 1

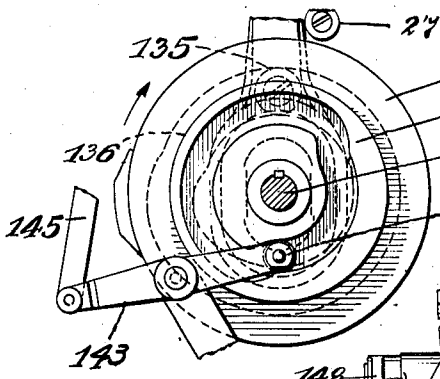


Fig. 10.

Fig. 1.

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June 24, 1930. A. PODEL 1,767,475

VACUUM SEALING MACHINE

Filed Dec. 17, 1924 5 Sheets-Sheet 2

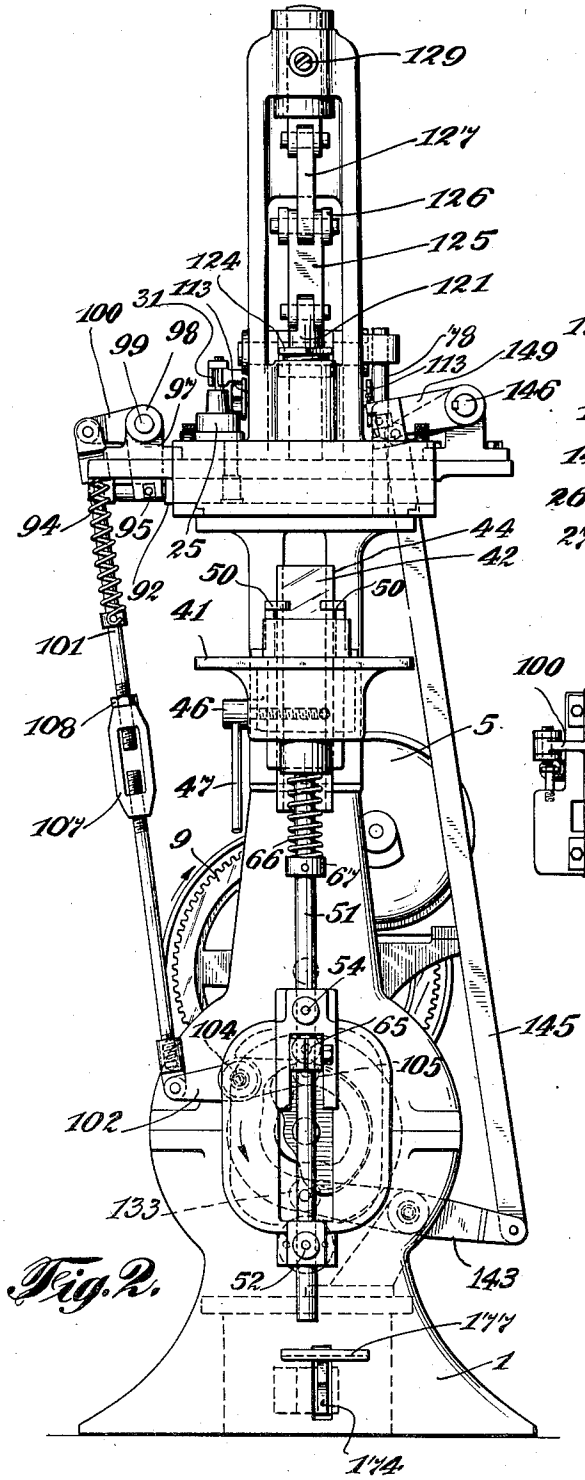


Fig. 2.

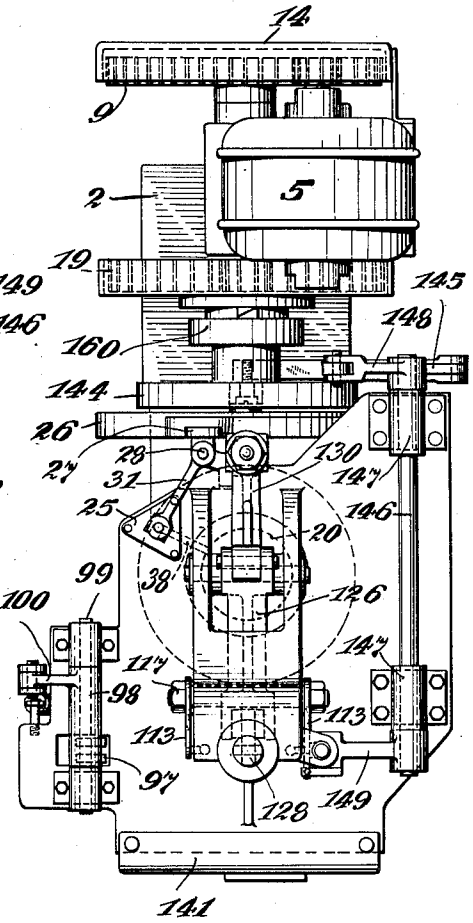


Fig. 3.

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VACUUM SEALING MACHINE

Filed Dec. 17, 1924 5 Sheets-Sheet 3

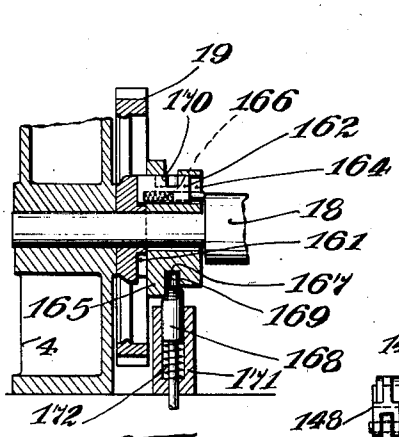


Fig. 9.

Fig. 4.

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June 24, 1930. A. PODEL 1,767,475

VACUUM SEALING MACHINE

Filed Dec. 17, 1924 5 Sheets-Sheet 4

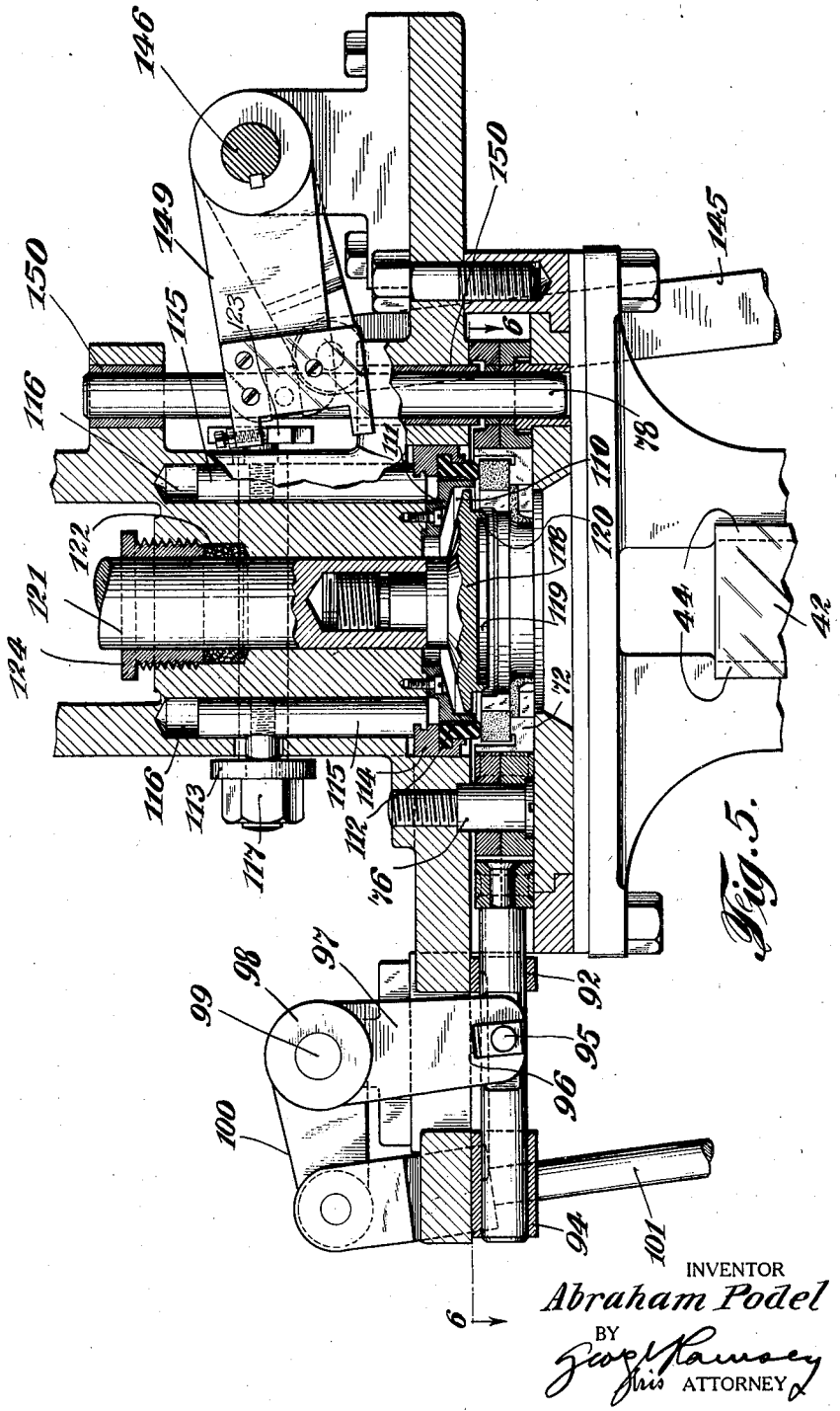


Fig. 5.

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VACUUM SEALING MACHINE

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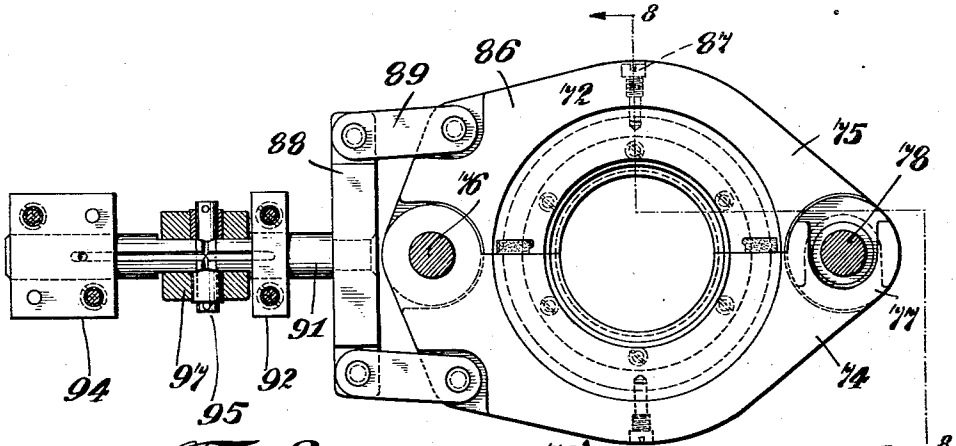


Fig. 6.

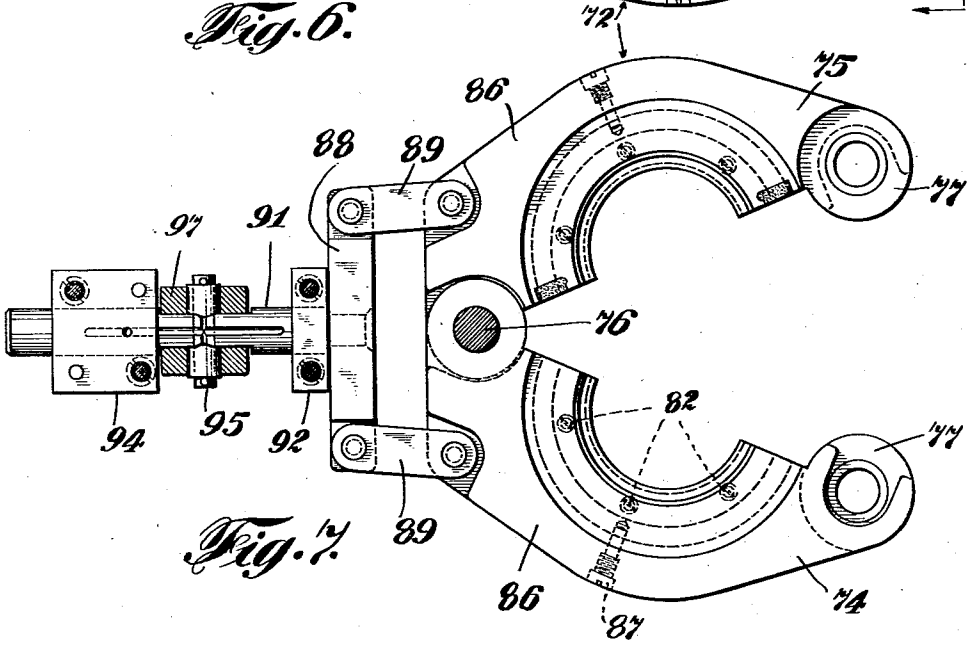


Fig. 7.

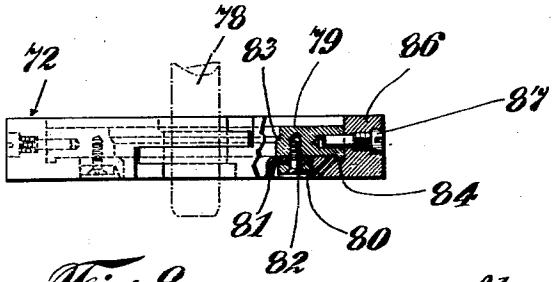


Fig. 8.

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Patented June 24, 1930 1,767,475

UNITED STATES PATENT OFFICE

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VACUUM SEALING MACHINE

Application filed December 17, 1924. Serial No. 756,416.

The present invention relates to sealing machines and more particularly to a combined sealing and exhausting machine.

An object of the present invention is to provide a combined sealing and exhausting machine in which the vacuum chamber is of minimum size to permit a maximum evacuation of air by a single stroke of a pump piston.

Anther object is to provide a die for the sealing operation which is adapted to encircle the vessel adjacent the sealing zone and form a closed chamber above the mouth of the vessel to permit the air to be evacuated from the space above the die, thereby minimizing the quantity to be exhausted.

Another object is to provide a vacuum chamber having a pair of dies therein for forming hermetic side seals on vessels with one of said dies cooperating with a vessel to form the bottom of said chamber whereby only a portion of the vessel is in the chamber during the exhausting and sealing operation.

A further object is the provision of a yoke to open and close a split die, said die being adapted to engage a vessel adjacent its sealing zone and to cooperate with another die adapted to move downwardly to engage and seal the vessel; the provision of a gasket attached to the split die to engage the vessel and prevent leakage between it and the die and to form a vacuum chamber above the die; and the provision of a conduit connecting said dies at all times with a pump cylinder to exhaust the air therefrom on the downward stroke of the piston and during the sealing operation.

A still further object is the provision of a die having a plurality of parts adapted to encircle the neck of a container to form one of a pair of opposed dies for the sealing thereof; the provision of gasket members on said parts to form an air tight joint between the die and the container; and the provision of a ring gasket engaging the upper part of said die and the housing of the vacuum chamber to prevent leakage therebetween.

A still further object is the provision of a vacuum sealing machine in which only the upper part of the vessel is inserted in the vacuum chamber, whereby the machine is adapted to effect seals on vessels having a mouth of a given diameter irrespective of the contour or size of the lower part of the vessel.

A still further object is to provide a unitary machine driven from a single shaft on which a crank is provided for operation of a vacuum pump and a plurality of cams are provided for operating the other elements of the machine, whereby the proper sequential operation of the various mechanisms is maintained at all times irrespective of the speed of the shaft, and the vacuum is likewise substantially independent of the speed.

Further objects of this invention contemplate a machine of the above characteristics which is of such strong and simple construction and such accurate operation as to insure its proper performance under all conditions commonly encountered in this class of work; and to provide a sealing machine adapted to exhaust air from a container in a single stroke without impairing the degree of vacuum which is ordinarily required in this class of work.

Other and further objects of the invention will be obvious upon an understanding of the illustrated embodiment about to be described or will be obvious from the accompanying drawings or indicated in the appended claims, and various advantages secured by the invention other than those hereinafter specifically referred to will occur to one skilled in the art or become evident upon the employment of the invention in practice.

A preferred form of the invention has been chosen for purposes of illustration and description and is shown in the accompanying drawings in which

Fig. 1 is a side elevational view of the machine;

Fig. 2 is an end elevational view of the machine taken from the sealing end thereof;

Fig. 3 is a top plan view of the machine;

Fig. 4 is a vertical cross-sectional view of the machine with certain parts shown in elevation for simplicity;

Fig. 5 is a cross-sectional view taken along

the line 5—5 of Fig. 4 showing details of the sealing mechanism;

Figs. 6 and 7 are detailed views of one of the sealing dies shown in closed and opened positions respectively;

Fig. 8 is a cross-sectional view of the sealing die shown in Figs. 6 and 7 taken along the line 8—8 of Fig. 6;

Fig. 9 is a detail view showing the operation of the clutch; and

Fig. 10 is a cross-sectional view along the line 10—10 of Fig. 1 showing certain of the cams in detail.

At the present time, practically all types of fruits and vegetables are cooked and sealed in packages to preserve them and to facilitate their distribution to various housewives in different localities. Certain types of canned goods are difficult to preserve for an indefinite period of time unless they are sealed in a vacuum; in fact, practically all canned goods keep much better when they are sealed in this manner.

Various types of machines have been used heretofore in the art for exhausting air from vessels and thereafter forming hermetic seals thereon. A familiar type of machine is one in which the vessel is placed in a closed chamber having a sealing mechanism therein and in which the air is exhausted from the chamber by connecting it to a source of vacuum maintained by independent machines. In many instances, several machines are connected to the same source of vacuum. One of the objections to this type of apparatus is that a very expensive vacuum producing machine is required even for the operation of a single sealing machine. The operator of the sealing machine seldom pays careful attention to the vacuum machines and frequently the speed of the sealing machine is brought up to a point where sufficient vacuum is not created and then the vessels have insufficient vacuum and their contents are ruined.

To remedy these difficulties, vacuum pumps have been made an integral part of the sealing machine and as in other machines, the vessel is placed in the vacuum chamber and the pump makes several strokes to reduce the vacuum to the desired degree. This necessitates a loss of time and efficiency and frequently the operator shuts off the pump too soon, and many of the packages are spoiled.

Other attempts have been made to produce an independent unit in which the vacuum chamber is reduced in size to enable the pump to exhaust the air in a single stroke. In these machines, it is necessary to shape the vacuum chamber to fit about the vessel to minimize the free space for air. Considerable trouble is occasioned because for a different shaped vessel, the entire chamber has to be changed accordingly. Furthermore, the excess space about the side wall of the vessel increases, the amount of air to be exhausted and accordingly, the pump cannot produce a sufficient vacuum in a single stroke.

The present invention relates more particularly to the third type of machine, although certain features may be used to advantage with any type. Vessels ordinarily used for canning purposes may be round or square and of various diameters and size, but generally, the necks of the vessels are of substantially the same size and shape in all instances.

The present machine makes use of this feature and encircles the neck of a vessel with one of the sealing dies and interposes a gasket between the vessel and the die whereby an air tight joint is formed. Only the upper end of the vessel is in the vacuum chamber and accordingly, the air to be exhausted is reduced to a minimum.

The lower die closes about the neck of the vessel as soon as the piston of the air pump begins its downward stroke to exhaust the air from the vessel. At the completion of the stroke, an upper die moves downwardly into engagement with the lower die and the closure to form a hermetic seal between the vessel and the closure. In this way, a less expensive and more efficient machine is produced which will produce the desired vacuum for all vessels and seal them at a very rapid rate.

Referring generally to the machine, an electric motor is provided at one end to drive a shaft on which a number of cams are mounted and to which an exhausting piston is eccentrically attached. One of the cams controls a valve which opens the pump cylinder to atmosphere at the completion of the sealing operation to break the vacuum existing in the cylinder and vacuum chamber. Another cam controls the lower split die and opens it to permit the insertion of the upper portion of a vessel therebetween, thereafter closing it to form an air tight chamber above the die and about the mouth of the vessel. The die is held in closed position by a pin which passes through its free ends and which is operated by a cam on the main drive shaft. The down stroke of the piston exhausts the air above the split die. At substantially the termination of the stroke another cam through a toggle mechanism presses an upper die into engagement with the closure on the vessel and with the split die to form a hermetic side seal on the vessel. The vacuum chamber is made as small as possible by a housing therein, and by the shape of the various portions of the sealing dies. A ring gasket adjustable in position fits about the split die and the housing to form an air tight joint therebetween. A movable vessel support is cam controlled whereby the vessel placed upon the support is moved upwardly in coordination with the other mechanisms so that the upper part of the vessel is in-

serted through the split die at the proper instant. Other features of the machine will be evident from the more detailed description given hereinafter.

Referring to the drawings, there is shown a frame 1 of a vacuum sealing machine made in accordance with the present invention. At one side of the machine, the frame is extended outwardly to form a platform 2 upon which a casting 4 is mounted to seat an electric motor 5 at the top thereof. A suitable bearing 6 is formed on the upper side of the casting 4 beneath the motor seat to receive a shaft 7 having a small gear 8 at one end thereof and a large gear 9 and hand wheel 10 at the other end thereof. The gear 9 meshes with a gear 11 on the motor shaft 12. A suitable casing 14 extends from the casting 4 and encloses the gears 9 and 11. Suitable bearings 15, 16 and 17 are formed in the center of the casting 4 and in the sides of the hollow frame 1 respectively to accommodate a shaft 18 which is connected to the motor 5 by a gear 19 rigidly mounted thereon and meshing with gear 8 on shaft 7.

The hollow casting constituting the framework of the machine has its upper portion formed into a cylinder 20 having a piston 21 adapted to reciprocate therein. The piston is of the usual form having suitable piston rings and fittings to prevent air from escaping between it and the cylinder walls, and forms with the cylinder a suitable exhaust pump for producing a vacuum in the containers to be sealed as described hereinafter. The piston 21 is attached to a piston rod 22 mounted on a crank 24, formed intermediate of the two parts of the shaft 18 and adjacent bearings 16 and 17 in the framework of the machine.

A valve 25 (see Fig. 1) is formed in the head of cylinder 20 to open it to atmosphere upon completion of the sealing operation, which is substantially at the termination of the downward stroke of the piston, to break the existing vacuum. The valve is controlled by a cam 26, mounted on shaft 18, through a cam roller 27 and rod 28 mounted in bearings 29 and 30 attached to the framework of the machine, and through an extension 31 attached to a valve stem 32. The extension 31 is mounted between nuts 34 on the end of rod 28 and is held firmly in position thereby. A spring 35 is interposed between the bearing 30 and a seat 36 on rod 28 and tends to maintain the cam rod in its downward position. The cam 26 is so shaped that at the termination of the sealing operation the cam rod 28 is raised in opposition to the spring 35 to unseat a valve disc 37 integral with the valve stem 32. This opens the cylinder 20 to atmosphere through a conduit 38, extending through the cylinder head from the lower part of the valve 25 and opening into the cylinder, and apertures 39 in the upper part of the valve. Preferably the disc 37 remains unseated until the vacuum is broken and until the vacuum chamber is opened; thereafter air on the upward stroke of the piston may escape through the conduit leading to the vacuum chamber.

A plate 45 is mounted on the framework of the machine and provided with a tongue 42 having flared edges 44 adapted to fit into a cooperating channel in a vessel support 41 to form a slidable dove-tail connection between the plate and the support. A slit (not shown) in the back of the support 41 extending longitudinally of the channel therein permits a set screw 46 having a handle 47 to draw the sides of the channel into clamped relation with the tongue 42 to fix the position of the support 41 with respect to the framework of the machine. A movable seat 49 is provided in the support 41 and adapted to accommodate a vessel. The position of the vessel on the seat is determined by the extensions 50 against which the vessel rests when placed upon the seat. A rod 51 is mounted in suitable bearings 55 and 56 in extensions 52 and 54 on the framework of the machine. A casing 57 is attached to the extensions by screws 58 to enclose the mechanisms mounted therebetween. A third bearing 59 is formed in the bottom of the support 41 likewise to receive the rod 51. A sleeve 60 is slidably mounted on the upper end of the rod and attached to the seat 49 to accommodate a spring 61 making a resilient connection between the rod and the seat. At the lower end of the rod, a cam follower 62 contacts with cam 64 and moves the rod 51 in a vertical direction through a sleeve 65 attached to the cam follower and the rod. A spring 66 is seated on the rod 51 between the enlargement 67 and the bearing 59 to maintain the follower in contact with the cam at all times. In order to prevent the seat 49 from descending too rapidly and jarring the contents of the vessel 68 or breaking the same, an air chamber 69 is provided in the support 41 and a conduit 70 connects it to atmosphere through the bleed valve 71 so that the rate of descent may be adjusted as desired independently of the cam 64.

A split die 72 shown in detail in Figs. 5, 6, 7, and 8 is adapted to encircle the neck of the vessel 68 to form an air tight joint therebetween so that a vacuum may be produced above the die. The die consists essentially of a pair of cooperating members 74 and 75 hinged at one end by means of a bolt 76 anchored to the framework. The other ends of the parts have apertures 77 therein adapted to fit over each other when the parts are closed to receive a locking bolt 78. As will be seen in Fig. 8, the inner die ring 79 of the members 74 and 75 has its inner circumference shaped at 83 to form one face of a die which engages the lower portion of a bead on the closure of a container. A metallic ring 80 fits over a gasket 81 and is bolted

to the die member 79 by screws 82. The inner edge of the gasket extends beyond the inner edge of the die member 79 and also extends downwardly to cover the ring 80 so that when the die member 72 is closed about a vessel, the gasket engages the vessel and prevents the metallic portions of the die from contacting therewith, and at the same time forms a very effective seal therebetween. The outer circumference of the die member 79 has a flange formed therein adapted to fit in a channel 84 of holding members 86, and is rigidly attached thereto by screws 87.

A yoke member 88 having arms 89 is eccentrically secured with respect to the bolt 76 to the hinged members 74 and 75. A small shaft 91 supported in bearings 92 and 94 is attached to the center of the yoke 88 and adapted to open and close the split die 72 when reciprocated in a horizontal direction. A pin 95 extends through the center of the shaft and has its respective ends in slots 96 formed in link 97 on sleeve 98 which is rotatably mounted on shaft 99. A second link 100 also mounted on said sleeve is attached to a cam rod 101 leading to a lever 102 fulcrumed on the frame of the machine at 104, and having a cam roller 105 engaging the cam 106 adjacent cam 64. The rod 101 is broken at its center and threaded to accommodate a sleeve 107 which adjusts the length of the rod as desired. An adjustment nut 108 locks the sleeve in position. A vacuum chamber 110 is formed above the split die 72 by means of a housing 111, the framework of the machine and a ring gasket 112. The ring gasket extends circumferentially about the housing and contacts with it and with the split die 72, to prevent the entrance of air therebetween. The ring gasket is inturned at its lower edge to provide a better contacting surface and to form a more secure joint. The upper edge is attached to a holding ring 114 which is in turn attached to a pair of bolts 115 slidably mounted in slots 116. The ring gasket 112 is movable vertically by means of the arms 113 keyed to the bolt 117 at one end and attached to the bolts 115 at the other end. One of the arms 113 has a projection 123 adapted to be engaged by a set screw 133 on the sleeve 149 to press the gasket against the split die when the shaft 146 is rocked to move the sleeve 149 downwardly. In this way, the ring gasket engages the lower die firmly prior to the sealing operation to form a closed chamber about the upper end of the vessel. An upper die 118 is hollowed at 119 to fit over the vessel closure and has a circumferential flange 120 to engage the bead thereon and press it against the lower split die 72, to form a side seal. A shaft 121 extends through the framework of the machine and into the vacuum chamber to engage the threaded stem of the die 118. Suitable packing 122 is held in position by a sleeve 124 to prevent leakage of air between the shaft and the framework. The upper end of the shaft is attached to a link 125 which in turn is attached to links 126 and 127 to form a toggle mechanism, the link 127 being attached to a bolt 128 adjustably mounted in the upper end of the framework of the machine, and held against rotation by screw 129. The link 126 is attached to an L shaped sleeve 130 on a shaft 131, the other leg of the sleeve engaging the upper end of a cam rod 132 which is attached to a slotted head 134 adapted to reciprocate upwardly and downwardly on the shaft 18. A cam roller 135 is bolted to the head 134 and slides in the cam channel 136 in cam 26. The cam rod 132 is mounted in bearings 137 and 138 formed in extensions from the framework of the machine. The upper end of the rod is screw threaded with a spring 139 mounted between a pair of nuts to hold the L-shaped sleeve 130 against the upper end of the rod so that the pressing die will be operated through the intermediation of a spring.

The split die 72 is held in position against the framework of the machine by means of member 141 bolted to the framework and engaging the lower side of the die. A bar 142 is placed intermediate the split die and plate 45 to hold the other edge of member 141 in position. The split die is locked in closed position by the pin 78 actuated by cam 144, through cam follower 133′, member 143, suitably mounted on the framework of the machine, rod 145, and shaft 146. The shaft 146, mounted in suitable bearings 147 on the framework of the machine, has on its respective ends, sleeves 148 and 149 adapted to engage the cam rod 145 and the pin 78 respectively. Suitable bearings 150 hold the pin in alignment while it is being actuated by sleeve 149.

When the movable seat 49 is raised by cam 64 to position the vessel between the parts of the split die 72, the cam 106 operates through the cam rod 101 to close the split die about the neck of the vessel and form an air tight joint therebetween, the upper edge of the split die engaging the ring gasket 112 to press it firmly against the vacuum chamber housing 111. The cams are so positioned on the shaft 18 that the piston 21 is substantially at its upper position when the split die is in closed position at which time the piston has started its downward stroke to exhaust the air from the vacuum chamber through the conduit 152. When the piston reaches substantially its lower position the cam 26 operates through cam rod 132 and its associated toggle mechanism to press the upper die into cooperation with the split die 72 to form a hermetic side seal between the closure and the vessel. The cams 26 and 106 then operate to return the dies to

their position and to lower the vessel to the support 41.

Since considerable power is required to operate the entire machine including the vacuum pump, it is desirable to shut off the entire mechanism while the sealed jar is being removed from the seat 49 and an empty jar is being replaced. To do this, a suitable clutch 160 may be inserted to disconnect the gear 19 from the shaft 18. Preferably, the clutch is of the form shown in detail in Fig. 9, wherein the gear 19 has a projection 161 adapted to be engaged by a member 162. The member 162 is inserted in the aperture 164 extending through the sleeve 165 keyed to shaft 18. The member 162 is held against the gear 19 by a spring 166. A channel 167 is formed in the sleeve 165 to receive a clutch member 168 having a curved cam surface 169, adapted to engage a similar cam surface 170 formed in the member 162 to disengage the same from the gear 19. The clutch member 168 is seated in a barrel 171 and retained in its upper position by a spring 172. Its lower end is attached to a treadle 174 at 175, the treadle being fulcrumed at 176 so that a pressure upon its end 177 disengages the clutch member from the member 162 and permits it to engage the projection 161 and operate the entire machine.

In the operation of the machine, the operator places a filled jar on the seat 49 against the positioning member 50 and presses downwardly the treadle 174 to operate the clutch 160 and rotate the shaft 18. As soon as the clutch starts the rotation of shaft 18, the treadle 174 is permitted to return to its normal position, so that at the end of a single revolution, the shaft 18 will be stopped. During this single revolution, the cam 64 raises the jar to the sealing position shown in Fig. 4 and cam 106 through cam rod 101 operates the yoke 88 to close the split die about the upper end of the jar. Thereafter, the cam 144 through rod 145 and shaft 146 lowers the pin 78 to lock the die in closed position and at the same time presses gasket 112 downwardly to engage firmly the die and form an air tight joint therewith, whereby a vacuum chamber of minimum size is formed above the split die by the housing 111 and ring gasket 112. In the meantime, the piston 21 has moved substantially to the position shown in Fig. 4 and the cylinder 20 is connected through the conduit 152 to the vacuum chamber. The respective cams 26, 106 and 64 are so shaped that the parts controlled thereby remain substantially in position while the piston 21 makes its downward stroke to exhaust the air from the vessel. At the end of the downward stroke, the cam 26 operates through the lever 132 and its associated toggle mechanism to press downwardly the upper die to engage the lower split die 72 to form a hermetic side seal on the vessel. The cam 26 then operates valve 25 to break the vacuum in the cylinder and in the vacuum chamber. Thereafter, the cams 144 and 106 operate through their cam rods to unlock and open the split die 72. The cam 64 through cam rod 51 then lowers the seat 49 and sealed jar thereon to its original position, at which point shaft 18 has made a complete rotation and the clutch member 168 engages the member 162 to disengage it from the projection 161 and stop the shaft 18 while the sealed jar is removed and replaced by another to be sealed in similar manner.

It will be seen that the present invention provides a sealing machine completely automatic in all its operations, and one in which the human element is completely removed. All the vessels are sealed alike and have substantially the same vacuum therein. While the preferred embodiment is described with particular reference to a self contained unit, many of the features are equally applicable to machines utilizing independent sources of vacuum and therefore the description is to be taken as illustrative and not in a limiting sense as the scope of the invention is defined in the following claims:

Having thus described my invention, what I claim is:—

1. In a vacuum sealing machine the combination of a vacuum chamber adapted to receveive a vessel through the bottom thereof, oppositely disposed dies in said chamber for sealing a vessel, one of said dies being adapted to cooperate with the vessel to close the bottom of said chamber, a pump for exhausting the air therefrom, and driving means common to said pump and to said dies to operate them in sequence.

2. In a vacuum sealing machine, the combination of a vacuum chamber, a pump for exhausting air from said chamber, split members at the bottom of said chamber, means for raising the upper end of a vessel through said split members, devices for closing said split members about the wall of said vessel to close said chamber and to hold said vessel in position, a pin for locking said members in closed position, and a die adapted to cooperate with said split members for sealing said vessel in said chamber.

3. In a vacuum sealing machine, the combination of a vacuum chamber, a pump for exhausting air from said chamber, a pair of members at the bottom of said chamber pivoted together at one end and adapted to swing toward and away from each other about said pivot, means for raising the mouth of a vessel through said members, devices for closing said members about the wall of said vessel with the mouth of the vessel in the vacuum chamber to permit said pump to exhaust the air from said vessel, and mechanism for sealing said vessel in said chamber.

4. In a vacuum sealing machine, the combination of a vacuum chamber, a pump for exhausting air from said chamber, a pair of members at the bottom of said chamber pivoted together at one end and adapted to swing toward and away from each other about said pivot in a horizontal plane, means for raising the mouth of a vessel through said members, devices for closing said die members about the wall of said vessel with the mouth of the vessel in the vacuum chamber to permit said pump to exhaust the air from said vessel, a pin adapted to pass through the free ends of the members and lock them in closed position, and mechanism for sealing said vessel in said chamber.

5. In a vacuum sealing machine, the combination of a vacuum chamber, a pump for exhausting air from said chamber, a pair of members at the bottom of said chamber pivoted at one end, the other end of said members being adapted to swing toward and away from each other about said pivot, means for raising the mouth of a vessel having a closure thereon through said members, devices for closing said members about the wall of said vessel with the closure and the mouth of the vessel in the vacuum chamber to permit said pump to exhaust the air from said vessel, and mechanism for sealing said closure on said vessel in said chamber.

6. In a vacuum sealing machine, the combination of a shaft, means for driving said shaft, a plurality of cams on said shaft, a cylinder mounted above said shaft, a piston in said cylinder operatively connected to said shaft, means adapted to form an air tight chamber, said means comprising a pair of die members operated by one of said cams and adapted to encircle the side wall of a vessel, a conduit connecting the space above said members with said cylinder for exhausting air therefrom, and a valve controlled by another of said cams to open the upper end of said cylinder to atmosphere substantially at the termination of the exhausting stroke of the piston.

7. In a vacuum sealing machine, the combination of a shaft, means for driving said shaft, a plurality of cams on said shaft, a cylinder mounted above said shaft, a piston in said cylinder operatively connected to said shaft, means adapted to form an air tight chamber, said means comprising a pair of members operated by one of said cams and adapted to encircle the side wall of a vessel and form an air tight joint therewith, a conduit connecting the space above said members with said cylinder for exhausting the air therefrom, a valve controlled by another of said cams to open said cylinder to atmosphere substantially at the termination of the downward stroke of the piston, and sealing means for sealing said vessel when said piston has reached substantially its downward position.

8. In a vacuum sealing machine, the combination of a vacuum chamber adapted to receive a vessel through the bottom thereof, a split member at the bottom of said chamber adapted to cooperate with the side wall of a vessel to close the chamber, a pump having its cylinder adjacent said chamber for exhausting air therefrom, an open conduit to connect said chamber with said cylinder at all times, a positively operated valve in said cylinder for connecting it to atmosphere to break the vacuum therein and for closing it during a substantial portion of the downward stroke of the piston and driving means for said pump.

9. In a vacuum sealing machine, the combination of a vacuum chamber adapted to receive a vessel through the bottom thereof, a split die at the bottom of said chamber adapted to cooperate with the side wall of a vessel to close the chamber, a pump having its cylinder adjacent said chamber for exhausting air therefrom, an open conduit to connect said chamber with said cylinder at all times, a positively operated valve in said cylinder for connecting it to atmosphere while the piston is in predetermined positions and for closing it during the downward stroke thereof, a die in said chamber adapted to cooperate with said split die to seal said vessel, and mechanism for operating said pump, said split die, and said cooperating die in sequence.

10. In a vacuum sealing machine, the combination of oppositely disposed sealing dies adapted to seal a closure on a vessel, one of said dies being formed of a pair of members adapted to open to receive a vessel therebetween and to close about the side wall of the vessel to form an air tight joint between the vessel and said members prior to the sealing of the closure on the vessel, means for enclosing the space above said die member, a pump for exhausting the air in the space above said pair of members, and means for operating said dies.

11. In a vacuum sealing machine, the combination of an upper sealing die member adapted to move downwardly to engage a closure on a vessel, a second die member formed of a plurality of parts adapted to move relatively to each other to encircle the side wall of a vessel, means on said second die member to form a substantially hermetic seal with the side wall of the vessel, means for moving said parts, and means to move said upper die downwardly to press a closure against said second die member to seal it on a vessel.

12. In a vessel sealing machine, the combination of an upper sealing die adapted to move downwardly to engage a closure on a vessel, a second die formed of a plurality of parts adapted to move relatively to each other

to encircle the side wall of a vessel, resilient means attached to said parts to contact with the side wall of the vessel to form a hermetic seal thereabout, means for moving said parts, and means to move said upper die downwardly to press a closure against said second die to seal it on a vessel.

13. In a vacuum sealing machine, the combination of an upper sealing die adapted to move downwardly to engage a closure on a vessel, a second die formed of a plurality of parts adapted to move relatively to each other to encircle the side wall of a vessel, gaskets attached to the inner edges of said parts to contact with the side wall of the vessel to form a substantially hermetic seal thereabout, means for moving said parts, means to move said upper die downwardly to press a closure against said second die to seal it therebetween, means forming an enclosed chamber above said second die and means for exhausting air from the said chamber prior to the sealing operation.

14. In a vacuum sealing machine, the combination of an upper sealing die adapted to engage a closure on a vessel, a second die formed of a pair of members hinged at one end, a yoke attached to said members eccentrically with respect to said hinge, means forming an enclosed chamber above said second die, means for moving said yoke relative to said hinge to open and close said members to engage and disengage the side wall of a vessel, a pump for exhausting the air from the space above said members, devices for bringing said upper die into cooperation with said members to seal a vessel, and means for locking said members in closed position during the sealing operation.

15. In a vacuum sealing machine, the combination of an upper sealing die, a second die formed of a pair of members having apertures at their respective ends, a bolt anchored in said machine and extending through the apertures at one end of said members to form a hinged structure, a yoke attached to said members to open and close them about said bolt, means for inserting a vessel, having a closure thereon, between said members with the closure in engagement therewith, means forming an enclosed space above said members, a pump to exhaust the air from the space above said members, and devices for moving said upper sealing die into engagement with the closure to seal same on vessel.

16. In a vacuum sealing machine, the combination of an upper sealing die, a second die formed of a pair of members having apertures at their respective ends, a bolt anchored in said machine and extending through the apertures at one end of said members to form a hinge structure, a yoke attached to said members to open and close them about said bolt, means for inserting a vessel, having a closure thereon, between said members whereby a hermetic seal is formed between said vessel and said members, locking means adaped to engage the apertures in the free ends of said members to lock them in closed position, means forming an enclosed space above said members, a pump to exhaust the air from said space, and devices for moving said upper sealing die into engagement with the closure to seal same on vessel.

17. In a vacuum sealing machine for hermetically sealing beaded closures on vessels, the combination of an upper sealing die adapted to fit over a closure and engage the bead thereon, a second die formed of a plurality of members movable relative to each other, means for inserting a vessel between said members, devices for closing said second die members about said vessel with the die engaging the bead on the closure, locking means to hold said members in closed position, gaskets fixed to said die members to contact with the side wall of the vessel to prevent air from leaking therebetween, an enclosed chamber formed about said die members, a pump to exhaust air from the space above said members, and mechanism for advancing said upper die into engagement with the closure and said second die to form a side seal on said vessel.

18. In a vacuum sealing machine for hermetically sealing beaded closures on vessels, the combination of an upper sealing die adapted to fit over a closure and engage the bead thereon, a second die formed of a plurality of members movable relative to each other, means for inserting a vessel between said members, devices for closing said second die members about said vessel with the die engaging the bead on the closure, locking means to hold said members in closed position, gaskets fixed beneath said die members and extending inwardly beyond the edge thereof to contact with the side wall of the vessel and prevent air from leaking therebetween, means for enclosing the space about said die members comprising a ring gasket engaging the upper surface of said members, a pump to exhaust air from the space above said members, and mechanism for advancing said upper die into engagement with the closure and said second die to form a side seal on said vessel.

19. In a vacuum sealing machine, devices for moving a vessel to sealing position, a split die adapted to engage said vessel about its upper end below the closure thereon, a gasket on said split die engaging said vessel and forming an air tight joint therewith, an upper die adapted to engage said closure and cooperate with said split die to form a hermetic seal on said vessel, a housing extending about said upper die, a ring gasket engaging said housing and said split die to prevent entry of air therebetween, said hous-

ing, said gaskets and said split die forming with the vessel and the frame of the machine an air tight chamber above said vessel, means for exhausting the air from said chamber, and means for operating said dies for sealing said vessel.

20. In a vacuum sealing machine, devices for moving a vessel to sealing position, a split die adapted to engage said vessel about its upper end below the closure thereon, devices for locking said split die in position about said container, gaskets on said split die engaging said vessel and forming an air tight joint therewith, an upper die adapted to engage said closure and cooperate with said split die to form a hermetic seal on said vessel, a housing extending about said upper die, a ring gasket engaging said housing and said split die to prevent entry of air therebetween, said housing, said gaskets and said split die forming with the vessel and the frame of the machine an air tight chamber above said vessel, means for exhausting the air from said chamber, and means for operating said dies for sealing said vessel.

21. In a vacuum sealing machine, devices for raising a vessel to sealing position, a split die adapted to engage said raised vessel about its upper end below the closure thereon, a gasket on said split die engaging said vessel and forming an air tight joint therewith, an upper die adapted to engage said closure and cooperate with said split die to form a hermetic seal on said vessel, a housing extending about said upper die, a ring gasket engaging firmly said housing and said split die to prevent entry of air therebetween, means for adjusting the position of said ring gasket, said housing, said gaskets and said split die to form with the vessel and the frame of the machine an air tight chamber above said vessel, a pump for exhausting the air from said chamber, and means for operating said dies for sealing said vessel.

22. In a machine for forming side seals on vessels, the combination of oppositely disposed sealing dies, one of said dies comprising a pair of members hinged at one end, whereby their free ends may open and close about the upper part of a vessel, the inner surface of said die members being shaped to accommodate the bead of a closure, means cooperating with said pair of members to form a seal between said members and the side wall of the vessel, means to press said other die downwardly to engage the bead and press it against the lower die to expel the gasket therefrom and to seal the vessel.

23. In a machine for forming side seals on vessels, the combination of oppositely disposed sealing dies, one of said dies comprising a pair of members hinged at one end, a yoke eccentrically attached to each of said members and adapted to open and close the die about the upper side wall of a vessel, the inner surface of said members being shaped to accommodate the bead of a closure, means to press said other die downwardly to engage the bead and press it against the lower die to expel the gasket therefrom and to seal the vessel.

24. In a sealing machine, the combination of a chamber open at its bottom portion, a pair of cooperating members hinged to each other and adapted to encircle the upper portion of a vessel to substantially enclose said chamber with the upper end of the vessel therein, and a ring gasket adapted to engage said means and said chamber to form an air tight connection therebetween.

25. In a vacuum sealing machine, the combination of a chamber open at its bottom portion, a pair of cooperating members hinged to each other and adapted to encircle the upper portion of a vessel to substantially enclose said chamber with the mouth of the vessel therein, a ring gasket adapted to move downwardly to engage said members to form an air tight connection with said chamber, and devices for moving said gasket when said members have closed about a vessel.

26. In a vacuum sealing machine, the combination of a vacuum chamber adapted to receive a vessel through the bottom thereof, oppositely disposed sealing dies in said chamber for sealing a vessel, one of said dies being adapted to cooperate with the vessel to close the bottom of said chamber by forming an air-tight seal between said die and a container, and means for exhausting the air from said chamber.

27. In a vacuum sealing machine, the combination of a vacuum chamber adapted to receive a vessel through an open portion thereof, sealing dies in said chamber for forming a side seal on a vessel, one of said dies hermetically closing the open portion of said chamber by encircling the side wall of the vessel, and means for exhausting the air from said chamber prior to the sealing operation.

28. In a vacuum sealing machine, the combination of oppositely disposed sealing dies adapted to seal a closure on a vessel, one of said dies comprising a plurality of members adapted to open to receive a vessel and to close about the side wall of the vessel to form an air tight joint between the vessel and said members prior to the sealing of the closure on the vessel, a chamber about said plurality of members adapted to enclose the upper end of the container, and means for operating said dies to form a side seal between said closure and the side wall of said vessel.

29. In a vacuum sealing machine, a vacuum chamber comprising an upper portion attached to the framework of the machine, a die adapted to encircle the side wall of a vessel and to form therewith the bottom of said chamber, means to form a seal between

said die and the vessel, a ring gasket forming a part of the side wall of the chamber and closing the space between said upper portion and said die, means to cooperate with said die to effect a seal on said vessel, and means to move said ring gasket downwardly to engage said die.

30. In a vacuum sealing machine, the combination of a vacuum chamber comprising an upper portion attached to the framework of the machine, a die adapted to encircle the side wall of a vessel and to form therewith the bottom of said chamber, means to form a seal between said die and the vessel, a ring gasket forming a part of the side walls of the chamber and adapted to close the space between said upper portion and said die, and means for moving said gasket downwardly into engagement with said die.

31. In a vacuum sealing machine, the combination of a vacuum chamber, a pump for exhausting air from said chamber, a split member at the bottom of said chamber, means for raising the upper end of a vessel through said split member, devices for closing said split member about the wall of said vessel to close said chamber and to hold said vessel in position, a pin for locking said split member in closed position, and mechanism for sealing said vessel in said chamber.

32. In a vacuum sealing machine for hermetically sealing beaded closures on vessels, a vacuum chamber comprising an upper portion, means movable with respect to said upper portion of the vacuum chamber to encircle the sidewall of a vessel and to form therewith the bottom of said chamber, means for forming a seal between said movable means and said vessel, and a ring gasket forming a part of the sidewall of the chamber and closing the space between said upper portion and said movable means.

33. In a vacuum sealing machine, the combination of a vacuum chamber adapted to receive a vessel through the bottom thereof, die members adapted to close about the vessel to form an air-tight seal therewith and to form the bottom of said vacuum chamber with the vessel extending partially therethrough, means for exhausting the air from said chamber, and devices adapted to cooperate with said die members to seal a closure to the vessel.

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