

July 1, 1958

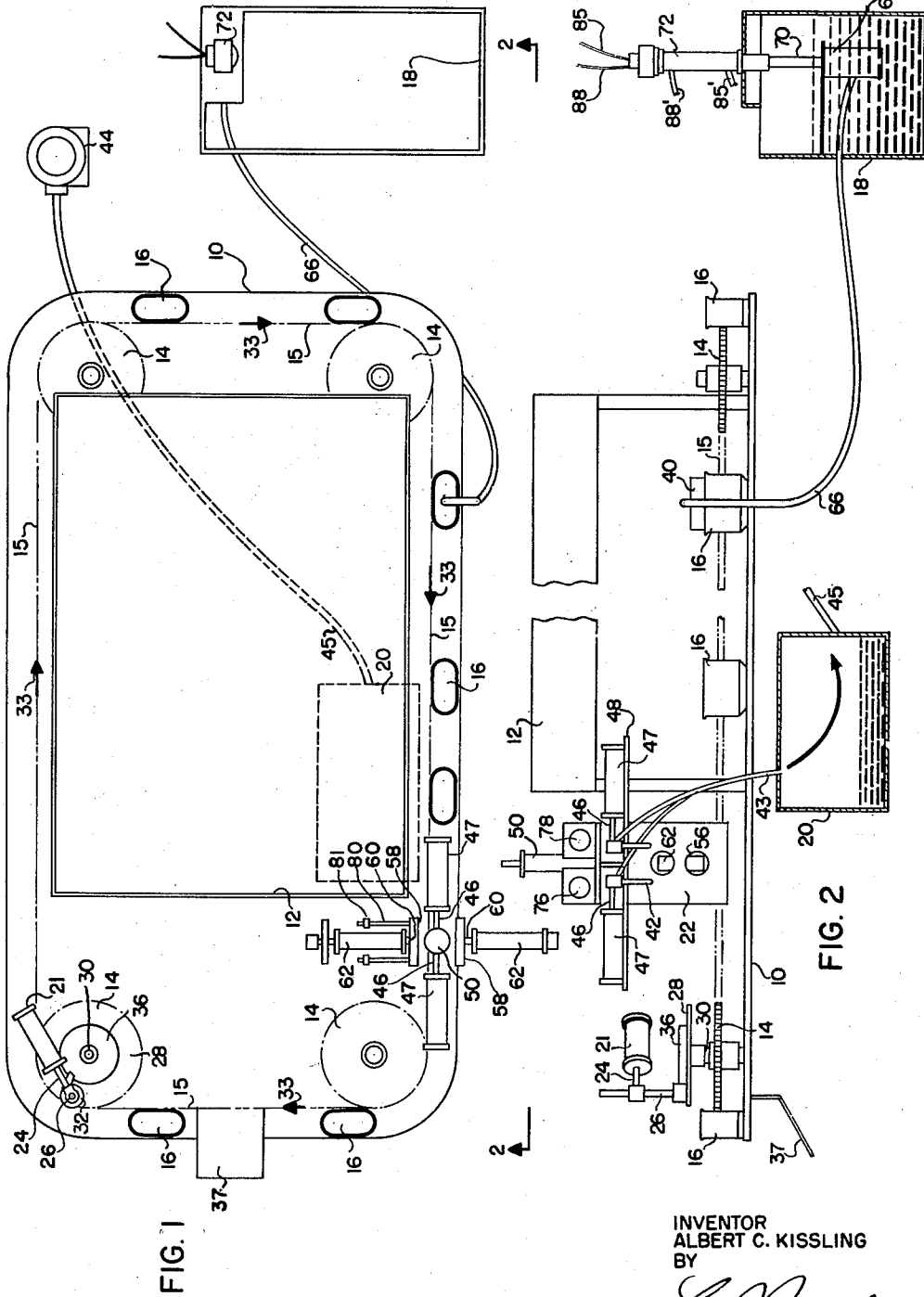
A. C. KISSLING

2,840,964

EVACUATING AND SEALING APPARATUS

Filed May 14, 1954

4 Sheets-Sheet 1



INVENTOR
ALBERT C. KISSLING
BY

Louis Neohs

ATTORNEY

July 1, 1958

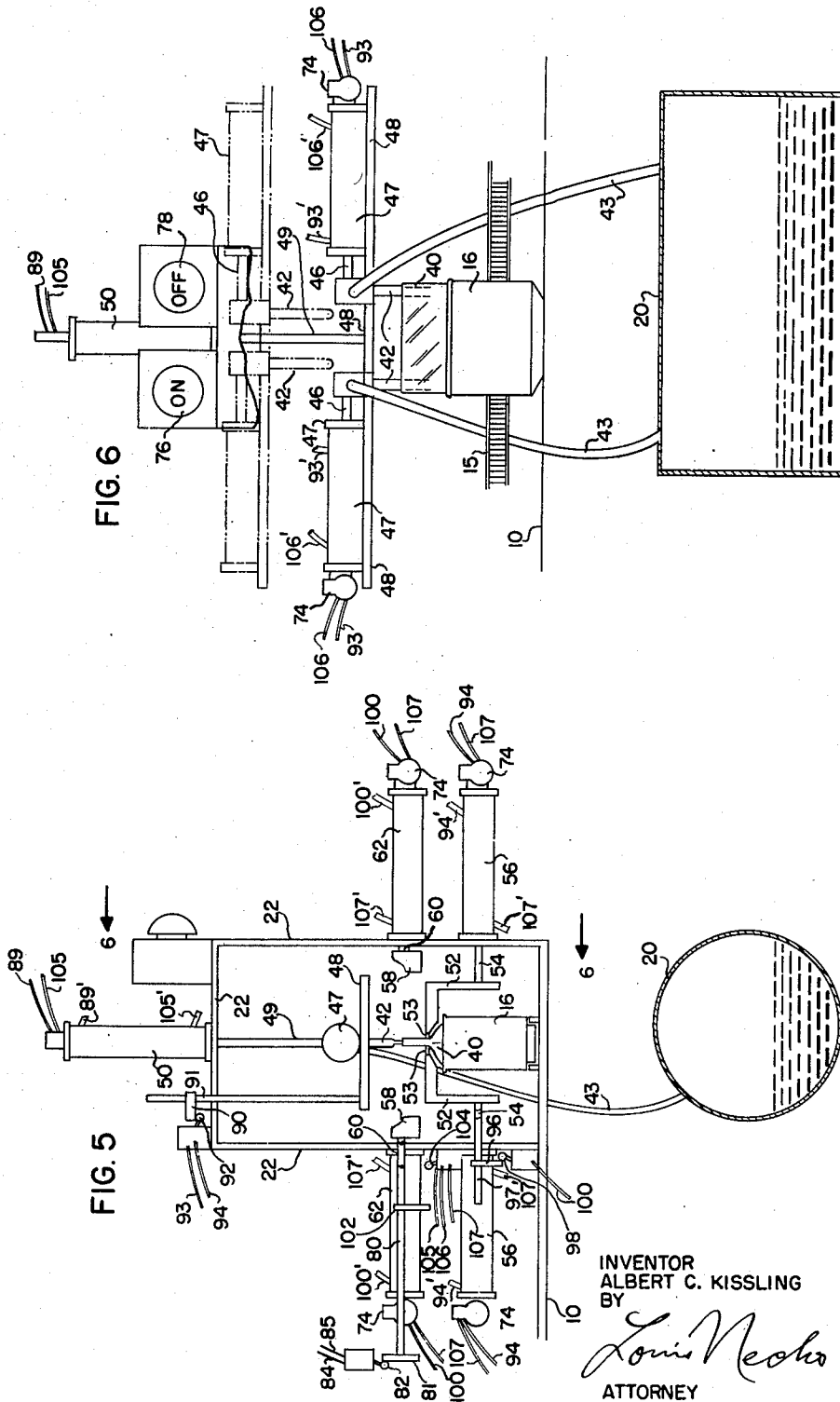
A. C. KISSLING

2,840,964

EVACUATING AND SEALING APPARATUS

Filed May 14, 1954

4 Sheets-Sheet 2



July 1, 1958

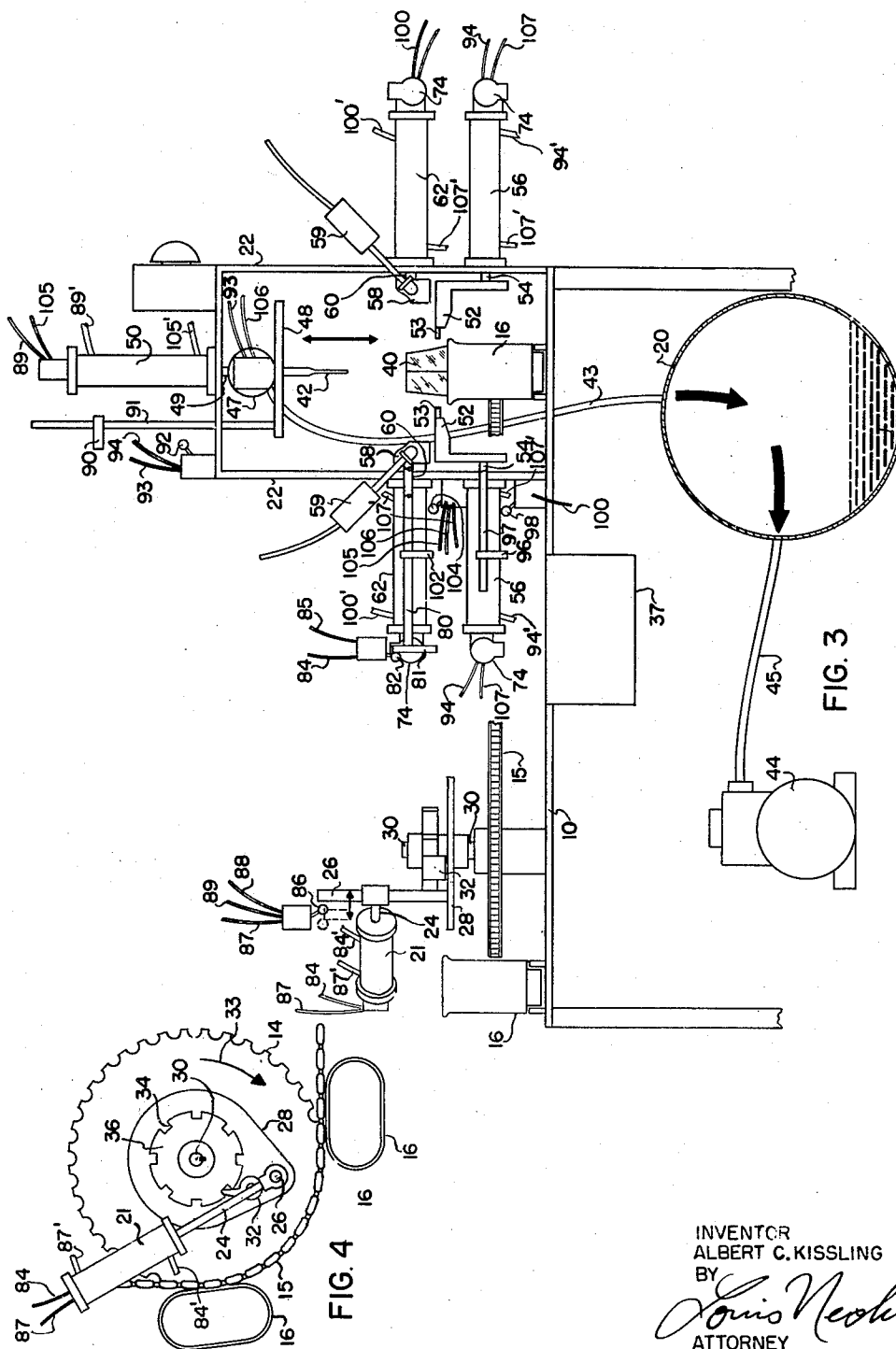
A. C. KISSLING

2,840,964

EVACUATING AND SEALING APPARATUS

Filed May 14, 1954

4 Sheets-Sheet 3



INVENTOR
ALBERT C. KISSLING
BY
Louis Neeks
ATTORNEY

1

2,840,964

EVACUATING AND SEALING APPARATUS

Albert C. Kissling, Philadelphia, Pa.

Application May 14, 1954, Serial No. 429,866

8 Claims. (Cl. 53—74)

It is increasingly the practice to package food products in bags or containers made of synthetic thermoplastic sheet materials and machines for sealing the mouths of such bags, with or without first evacuating air from said containers, have heretofore been made and used.

The object of this invention is to produce an improved machine of the type set forth.

Certain food products, such as sauerkraut, pickles and the like, are best packed with some of their brine and air should be excluded from the sealed bag.

It is therefore the object of the present invention to produce an improved machine which will add the desired amount of brine or other liquid to a bag containing a given amount of sauerkraut, or the like; which will effectively evacuate air from the bag, and which will heat-seal the mouth of the bag.

A still further object is to produce an improved machine of the type set forth which will perform the foregoing operations, rapidly, automatically and efficiently.

The structure and operation of the machine are set forth in the following specification and the accompanying drawings in which:

Fig. 1 is a fragmentary and diagrammatic top plan view of a machine embodying my invention with various parts omitted for clarity of illustration.

Fig. 2 is a side elevational view looking in the direction of line 2—2 on Fig. 1.

Fig. 3 is a front, or left hand, elevational enlargement of the left hand portion of Fig. 2, showing details of construction.

Fig. 4 is a top plan enlargement of the upper left hand corner of Fig. 1 showing details of construction.

Fig. 5 is similar to Fig. 3 but showing the step of evacuating air from the bag.

Fig. 6 is a fragmentary elevational view looking in the direction of line 6—6 on Fig. 5.

Fig. 7 is similar to Fig. 5 but showing the step of heat-sealing the mouth of the bag.

Fig. 8 is similar to Fig. 6 looking in the direction of line 8—8 on Fig. 7.

Fig. 9 is an enlarged fragmentary view showing one of the jaws for holding the mouth of the bag during the evacuating and sealing operations.

In the drawings, only so much of the machine construction is shown as is necessary for an understanding of the invention. With that in mind, reference is had to Figs. 1 and 2 from which it can be seen that the machine includes a suitable frame or housing for supporting a platform 10 which in turn supports a hopper 12 adapted to contain the sauerkraut or other product to be packaged. The platform also supports a number of sprocket wheels 14 which are engaged by a sprocket chain 15 which carries a number of cups or buckets 16. The machine further includes a brine tank 18 and a combined suction and liquid collection tank 20 which will

2

be further referred to. The platform 10 also supports the necessary superstructure 22 for carrying the parts which effect the evacuating and the heat-sealing of the bags.

The machine embodying my invention is controlled and operated by a series of solenoid operated double acting air cylinders and a series of electric circuits operatively connected to the various air cylinders, and means for energizing said circuits in a predetermined order so as to carry on the operation automatically.

In order intermittently to propel the sprocket chain 15 and the cups 16 carried thereby, I provide a double acting air cylinder 21 the piston rod 24 of which is reciprocable in the direction of its axis. The direction of movement of the piston depends on whether air is supplied to one end of cylinder 21 or to the other. The outer end of piston rod 24 engages a stud 26 which is carried by a plate 28 which is freely rotatable on a stub shaft 30. Plate 28 carries a spring-loaded pawl 32 which is adapted to engage one of the notches 34 of a ratchet 36 to rotate the latter in clockwise direction, as viewed in Fig. 4, every time piston rod 24 is retracted into cylinder 21. Ratchet 36 is keyed to shaft 30 which is also keyed to sprocket wheel 14 so that every time piston rod 24 is retracted, ratchet 36 and sprocket 14 are moved, in clockwise direction, a distance equal to one of the notches 34. As piston rod 24 moves outwardly of cylinder 21, pawl 32 rides over the periphery of ratchet 36 so that when piston rod 24 reaches its extreme outer position, pawl 32 will be in a position to engage a notch 34 as soon as the retracting or reverse movement of piston rod 24 is begun. By this means, cups 16 are moved intermittently and endlessly over platform 10, as shown by arrows 33 in Fig. 1.

Platform 10 also carries a chute 37 which is located just beyond the bag evacuating and sealing station so that bags which have been evacuated and heat-sealed may drop down this chute and onto a movable conveyor not shown.

In order to evacuate air from the upper portion of a bag 40 placed in cup 16, I provide two hollow suction fingers 42 which are flattened to a very thin cross section, as shown in Fig. 7 and which are connected by pipes 43 to tank 20 which is placed under constant negative pressure by means of a suction pump 44 which is connected to tank 20 by pipe 45. By this arrangement, whenever fingers 42 enter the mouth of a bag 40 the air will be removed and such liquid as may be sucked up incidental to the removal of air will be collected in tank 20.

Suction fingers 42 are carried by piston rods 46 of a pair of horizontal double acting cylinders 47 which are carried by a vertically movable platform 48. Platform 48 is carried by piston rod 49 of a vertical double acting air cylinder 50 which is located above the evacuating and heat-sealing station so that when its piston rod 49 is extended, fingers 42 are moved down into the bag, as shown in solid lines in Fig. 6, and so that, when piston 49 is retracted into cylinder 50, fingers 42 are raised out of engagement with the mouth of the bag, as in Fig. 3.

To hold the mouth of the bag tightly closed during the evacuation of air and during the heat-sealing operation, I provide a pair of holding jaws 52 which are carried by the piston rods 54 of juxtaposed double acting air cylinders 56. When air is admitted into cylinders 56 in a direction to move piston rods 54 outwardly from their respective cylinders, jaws 52 move towards each other and clamp the upper portion of the bag therebetween, as shown in Figs. 5 and 7 and, when air is admitted into cylinders 56 in a manner to retract piston

3

rods 54, jaws 52 are disengaged from the mouth of the bag, as shown in Fig. 3. Jaws 52 are provided with yielding cushions or pads 53 which are adapted to hold the mouth of the bag tightly closed during the air removal operation and while suction fingers 42 are in, or are being withdrawn from the bag.

After withdrawal of suction fingers 42, and while lower holding jaws 52 continue to clamp the mouth of the bag, heat-sealing jaws 58 are brought together against the sides of the mouth of the bag to heat-seal the bag. Jaws 58 are carried by piston rods 60 of juxtaposed double acting air cylinders 62. The heat-sealing jaws are operated in the same manner as holding jaws 52 in that, when piston rods 60 are retracted, jaws 58 are disengaged from the mouth of the bag and when piston rods 60 move outwardly relative to their cylinders, the heat-sealing jaws clamp the mouth of the bag therebetween. Heating jaws 58 are heated by a suitable element 59.

Brine is supplied to each bag as it passes beneath the discharge end of a pipe 66 which leads from the discharge side of a pump 68 located in tank 18. The piston of pump 68 is reciprocated by the piston rod 70 of a double acting air cylinder 72 so that, when piston rod 70 is retracted a predetermined amount of brine is sucked into the pump and so that, when piston rod 70 is lowered, the brine sucked into the pump body is discharged through pipe 66 into a bag 40.

Each of the air cylinders referred to is provided with a two position, solenoid-operated valve 74 for admitting air to either end of the cylinder. For clarity of illustration, the solenoid controlled valves and the pipes for admitting air to the end of the cylinders remote from the solenoids are shown only partially and only diagrammatically.

The operation is as follows:

Let it be assumed that suction fingers 42 are in the upper "closed" position, as shown in broken lines in Fig. 6; that holding jaws 52 and sealing jaws 58 are in their bag-clamping position, as shown in Fig. 7; that piston 24 of cylinder 21 is in its extended position, as shown in Fig. 4, and that piston 70 of air cylinder 72 which operates brine pump 68 is in its lower extended position of Fig. 2, in which the pump is in a position to suck-up some brine. Let it be further assumed that all of the air cylinders are connected, through starting switch 76 of Fig. 8, to a source of compressed air not shown.

With the parts in the positions described, starting switch 76 is turned on to connect the entire system with the source of air and with a master control, not shown, which initiates the operations, it being understood the machine will then continue to cycle until stop switch 78 is actuated to disconnect the system from the source of air and from the master control referred to. The master control is not shown nor described because it consists of a number of electric circuits and delayed action relays the detailed illustration and description of which will encumber the application without any corresponding clarification of the disclosure, and because the master control referred to is available on the market and forms no part of the invention. It is sufficient to say that upon actuation of starting switch 76, air is admitted into cylinders 56 and 62 in a direction to retract their respective piston rods 54 and 60 to retract jaws 58 and 52, respectively. See Fig. 3.

The retraction of left hand sealing jaw 58 to the left, as viewed in Fig. 3, moves arm 80, which is carried by piston rod 60 of this jaw, (Fig. 1) until the end 81 of arm 80 closes a normally open switch 82 (Fig. 3) which is connected by a wire 84 to the valve which admits air, through pipe 84', to the inner end of cylinder 21, and by a wire 85 to the valve which admits air, through pipe 84', (Fig. 2) to the lower end of cylinder 72. The admission of air to the inner end of cylinder 21,

4

through pipe 84', retracts piston rod 24 and moves sprocket wheels 14, chain 15 and cups 16 one step in the direction of arrows 33, or in clockwise direction, as viewed in Figs. 1 and 4. Admission of air, through pipe 85', to the lower end of cylinder 72 raises piston rod 70 and charges pump 68 with some brine.

Retraction of piston rod 24 into cylinder 22 causes stud 26 to close a normally open switch 86 which is connected by a wire 87 to the valve which admits air, through pipe 87', to the opposite, or outer, end of cylinder 21 to recock piston rod 24, that is, to move it back to the position of Fig. 4. Switch 86 is also connected by a wire 88 to the valve which admits air, through pipe 88' to the upper end of cylinder 72 in a direction to move piston rod 70 downwardly and thus cause pump 68 to deliver a charge of brine to the bag 40 in the particular cup 16 which happens to be below the discharge end of pipe 66 as shown in Figs. 1 and 2. Switch 86 is still further connected by a wire 89 to the valve which admits air through pipe 89', to the upper end of cylinder 50 in a direction to move piston rod 49 and suction fingers 42 downwardly into the mouth of a bag 40 which happens to be below it. When suction fingers 42 enter the mouth of the bag, as shown in solid lines in Fig. 6, lug 90 which is adjustable on arm 91 which is carried by platform 48 closes normally open switch 92. Switch 92 is connected, by wires 93 to the valves which admit air, through pipes 93', to the inner ends of cylinders 47 in a direction to pull fingers 42 apart, or to the position shown in solid lines in Fig. 8. This is for the purpose of stretching the mouth of the bag 40 and preventing wrinkling of the opposite walls thereof, during the evacuating and sealing operation. Switch 92 is also connected by wires 94 to the valves 74 which admit air through pipes 94' to the outer ends of cylinders 56 in a direction to close the holding jaws 52 against the stretched walls of the mouth of the bag which is stretched by the suction fingers 42 as shown in Figs. 5 and 6. Movement of piston rod 54 of left hand cylinder 56 to the right, as shown in Figs. 3 and 7, causes lug 96 on arm 97, which is carried by piston 54, to close a normally open switch 98. Switch 98 is connected by wires 100, through a delayed action relay not shown, to the valves 74 which admit air, through pipes 100', to the outer ends of cylinders 62 so as to admit air into these cylinders in a direction to move heat-sealing jaws 58 into engagement with the mouth of the bag immediately above holding jaws 52. Movement of left hand jaw 58 to the right, as viewed in Figs. 3 and 7, causes lug 102 on arm 80 to close a normally open switch 104. Switch 104 is connected by wire 105 to the valve which admits air, through pipe 105', into the lower end of cylinder 50 in a direction to raise suction fingers 42 out of the bag 40, the mouth of which is now clamped between the holding and between the sealing jaws. Switch 104 is also connected by wires 106 to the valves 74 which admit air through pipes 106' to the outer ends of cylinders 47 so as to admit air into these cylinders in a direction to move suction fingers 42 toward each other, or to the position shown in broken lines in Fig. 6. This places the fingers 42 in position for insertion into the mouth of the next bag to be evacuated. Switch 104 is also connected by wires 107, and through a delayed action relay, not shown, to the valves 74 which admit air through pipe 107' to the inner ends of both of cylinders 56 and 62 to admit air into these cylinders in a direction to open jaws 52 and 58. The retraction of the lower holding jaws 52 allows switch 98 to reopen and disengages the jaws from the mouth of the bag. Retraction of the upper sealing jaws 58 causes lug 81 to close switch 82 to start another cycle of operation.

In order to remove a sealed bag from its supporting cup 16, the bottom wall of each cup is hinged to one of its side or its end walls and a gap is provided in the

5

track or platform over which the cups travel. This gap is in registration with chute 37 so that, as each cup moves over the gap, its bottom wall drops and the bag contained in the cup will fall through chute 37 onto a conveyor, not shown.

What I claim is:

1. An evacuating and heat-sealing apparatus comprising a support sprocket wheels rotatable on said support, a sprocket chain carried by said sprocket wheels, spaced cups carried by said chain and adapted to receive thermoplastic bags to be evacuated and sealed, a force pump adapted to inject a predetermined amount of liquid into a bag as the bag reaches a first station, a suction pump, a pair of hollow fingers connected to said suction pump and movable into and out of the mouth of the bag when the bag is in a second station to evacuate air from said bag, a first horizontal double acting air cylinder, means connecting the piston rod of said first cylinder to one of said sprocket wheels in such a manner that retraction of said piston rod into said first cylinder rotates said sprocket wheel to move said chain, said cups and the bags therein a predetermined distance, a first, normally open switch so located as to be closed by retraction of said piston rod, a first electrically controlled valve associated with said first cylinder and adapted to be energized by the closing of said first switch to admit air into said first cylinder in a direction to move said piston rod outwardly of said first cylinder, a second vertical air cylinder, means connecting the piston rod of said second air cylinder to said suction fingers, a second electrically controlled valve associated with said second cylinder and adapted to be energized by the closing of said first switch to admit air to said second cylinder in a direction to move its piston rod downwardly to insert said fingers into the mouth of a bag in said second station, a third vertical air cylinder, means connecting the piston rod of said third cylinder to the piston of said force pump, a third electrically controlled valve associated with said third cylinder and adapted to be energized by the closing of said first switch to admit air to said third cylinder in a direction to lower its piston rod to cause said force pump to inject a predetermined amount of liquid into a bag in said first position, a second normally open switch adapted to be closed by the downward movement of the piston rod of said second cylinder, a first pair of juxtaposed, horizontal, double acting air cylinders, means connecting the piston rods of said first pair of cylinders to said suction fingers respectively, a first pair of electrically controlled valves associated with said first pair of cylinders respectively and adapted to be energized by the closing of said second switch to retract the piston rods of said first pair of cylinders to move said fingers apart to stretch the mouth of the bag, a second pair of horizontal double acting air cylinders, holding jaws carried by the piston rods of said cylinders and movable toward each other into a bag clamping position, a second pair of electrically controlled valves associated respectively with said second pair of cylinders and adapted to be energized by the closing of said second switch to admit air into said second pair of cylinders in a direction to move their pistons outwardly of said cylinders to bring said jaws into bag-clamping position, a third normally open switch adapted to be closed by the outward movement of the piston of one of said second pair of air cylinders, a third pair of double acting air cylinders, heated jaws carried by the piston rods of said third pair of cylinders, a third pair of electrically controlled valves associated respectively with said third pair of air cylinders and adapted to be energized by the closing of said third switch to admit air into said third pair of air cylinders in a direction to move their pistons outwardly of said cylinders to bring said heated jaws into bag-clamping position to seal the mouth of the bag, a fourth normally open switch adapted to be closed by

6

the outward movement of one of the piston rods of said third pair of cylinders, means electrically connecting said fourth switch to said second valve and operative to energize said second valve to admit air into said second cylinder in a direction to retract the piston rod of said second cylinder to raise said suction fingers out of the bag, means electrically connecting said fourth switch to said first pair of valves to energize said valves to admit air to said first pair of cylinders in a direction to move their piston rods outwardly to bring said suction fingers close together, means electrically connecting said fourth switch to said second and third pair of valves and operative to energize said valves to admit air to said second and third pairs of cylinders in a direction to retract the piston rods of said cylinders and disengage said holding jaws and said sealing the jaws from the bag, a fifth normally open switch adapted to be closed by the outward movement of the piston rod of one of the third pair of cylinders, means electrically connecting said fifth switch to said first valve and operative to energize said valve to admit air into said first cylinder in a direction to retract the piston rod of said first cylinder to move said chain another predetermined distance, and means electrically connecting said fifth switch to said third valve and operative to energize said valve to admit air to said third cylinder in a direction to retract the piston rod of said third cylinder to recharge said force pump.

2. Apparatus for evacuating and heat-sealing a bag made of thermoplastic material, said apparatus including an endless conveyor for supporting bags to be evacuated and heat-sealed, a propelling mechanism for successively and intermittently moving said bags to a first station and to a second station, means for activating said propelling mechanism, a force pump, a first actuating means operated by the activation of said propelling mechanism for moving the piston of said force pump in liquid discharging direction to inject liquid into a bag at rest in said first station; a pair of suction fingers at said second station, a constant suction pump connected to said suction fingers, means mounting said fingers for vertical and horizontal reciprocation, a second actuating means also operated by activation of said propelling mechanism for lowering said suction fingers into a bag at rest in said second station, a third actuating means operated by the downward movement of said fingers for moving said fingers horizontally away from each other to stretch the mouth of the bag, a pair of holding jaws at said second station, a fourth actuating means also operated by the downward movement of said fingers for moving said holding jaws into bag-clamping position, a pair of heated sealing jaws at said second station, a fifth actuating means operated by movement of said holding jaws to bag-clamping position for moving said sealing jaws into bag-clamping position, a sixth actuating means operated by movement of said sealing jaws into bag-clamping position, for raising said fingers out of the bag, a seventh actuating means also operated by movement of said sealing jaws into bag-clamping position to move said fingers toward each other, an eighth actuating means, including a time delay, also operated by movement of said sealing jaws into bag-clamping position for disengaging and moving the sealing and the holding jaws away from the bag, a ninth actuating means operated by movement of said sealing jaws away from the bag for recharging said force pump, and a tenth actuating means for reactivating said propelling mechanism to begin a new cycle of operation.

3. An apparatus of the type described including a conveyor adapted to support a number of spaced bags and to move the same intermittently to bring said bags successively into position to receive a charge of liquid and to be evacuated of air, a constant suction pump, means connecting said suction pump to a sump, hollow fingers insertable into said bag, means connecting said fingers to

said sump whereby any liquid withdrawn from the bag will be deposited in said sump, jaws adapted to clamp the mouth of the bag, and means for moving said fingers into and out of said bag, and means operated by movement of said fingers into said bag for moving said fingers apart to spread the mouth of the bag preparatory to engagement of the mouth of the bag by said jaws.

4. An apparatus for heat-sealing the mouth of a bag formed of a thermoplastic material, said apparatus including a pair of holding jaws, a first actuating means for moving said holding jaws into and out of engagement with the mouth of the bag, a pair of heat-sealing jaws, a second actuating means for moving said heat-sealing jaws into and out of engagement with the opposite sides of the mouth of the bag, and a first activating means in the path of movement of one of said holding jaws and operable by movement of said jaw into engagement with said bag to activate said second actuating means to move said heat-sealing jaws into engagement with the bag.

5. The structure recited in claim 4 and a second activating means located in the path of movement of one of said heat-sealing jaws and operable by movement of said jaw into engagement with the bag to activate said first and second actuating means to move said holding and said heat-sealing jaws out of engagement with the bag.

6. An apparatus of the type described for evacuating air from, and for heat-sealing the mouth of a bag made of a thermoplastic material, said apparatus including a support for the bag, a pair of suction fingers, a first actuating means for moving said fingers into the bag, a second actuating means for moving said fingers apart to stretch the bag, a pair of holding jaws, a third actuating means for moving said holding jaws into and out of engagement with the mouth of the bag, a pair of heat-sealing jaws, a fourth actuating means for moving said heat-sealing jaws into and out of engagement with the mouth of the bag, a first activating means in the path of movement of one of said holding jaws and operable by movement of said jaw into engagement with said bag to

activate said third activating means to bring said heat-sealing jaws into engagement with the bag, and a second activating means in the path of movement of one of said heat-sealing jaws and operable upon movement of said jaw into engagement with the bag to activate said second actuating means to move said fingers close together preparatory to withdrawal of said fingers from the bag.

7. The structure recited in claim 6 and means also operable by said second activating means to move said fingers out of said bag.

8. An apparatus of the type described including a conveyor adapted to carry a number of spaced bags, actuating means for intermittently moving said conveyor, a pump connected to a source of liquid and adapted to discharge a measured quantity of liquid into one of said bags, a first activating device operable to activate said actuating means to bring said bags successively into position to receive a liquid charge from said pump, a second activating device for charging said pump with liquid, a third activating device for resetting said actuating means preparatory to further movement of said conveyor, a fourth activating means for discharging liquid from said pump into a bag in said position, and a pair of holding jaws adapted to clamp the mouth of a bag therebetween, means for moving said jaws into and out of engagement with said bag, and means movable with one of said jaws and operable upon movement of said jaw out of engagement with said bag to energize said activating devices.

References Cited in the file of this patent

UNITED STATES PATENTS

1,482,467	Harrington	Feb. 5, 1924
2,145,941	Maxfield	Feb. 7, 1939
2,608,333	Marziani	Aug. 26, 1952
2,634,562	Mueller et al.	Apr. 14, 1953
2,732,988	Feinstein	Jan. 31, 1956
2,733,564	Russell et al.	Feb. 7, 1956