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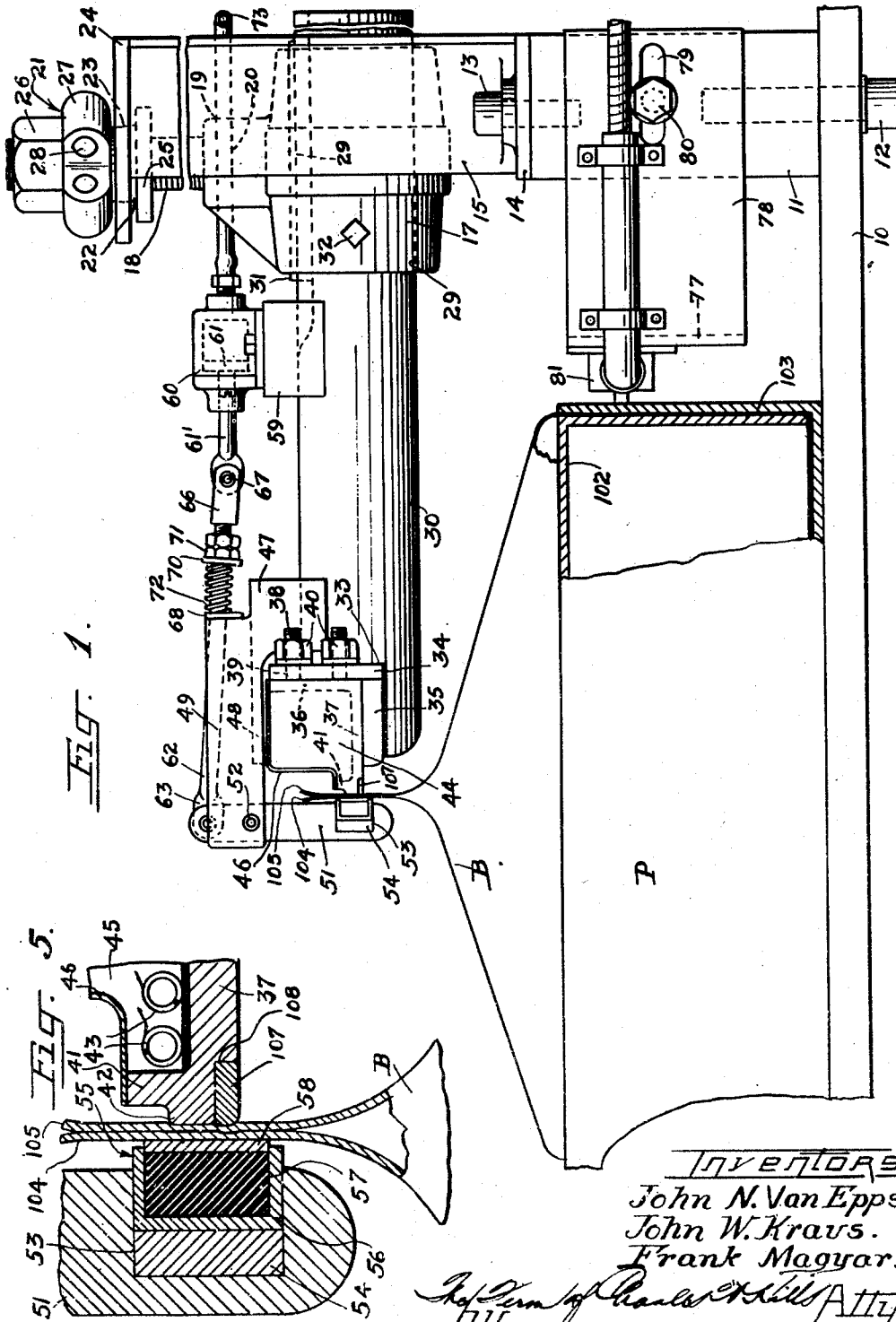
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2,433,176

SEALING MACHINE

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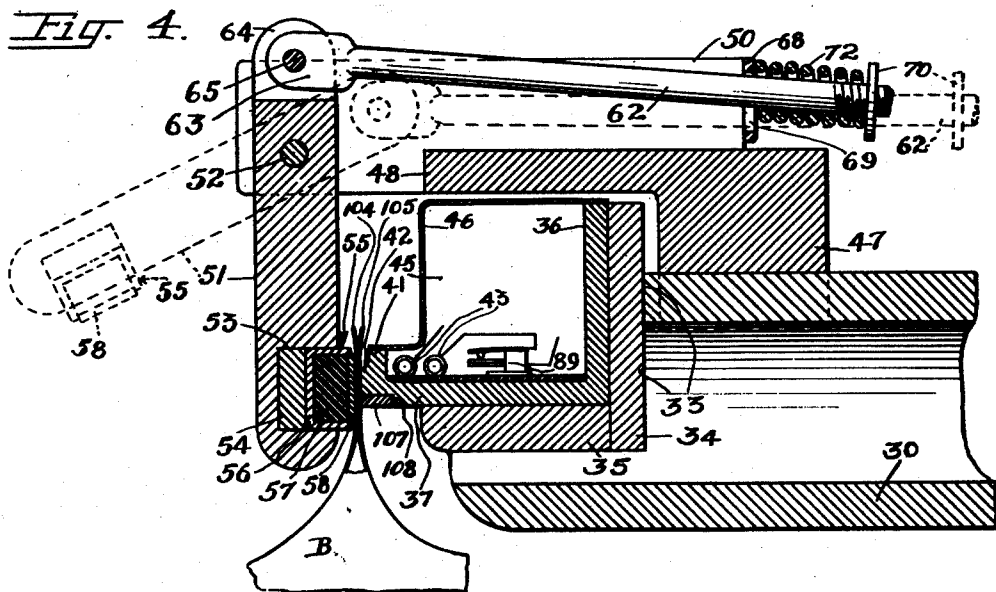
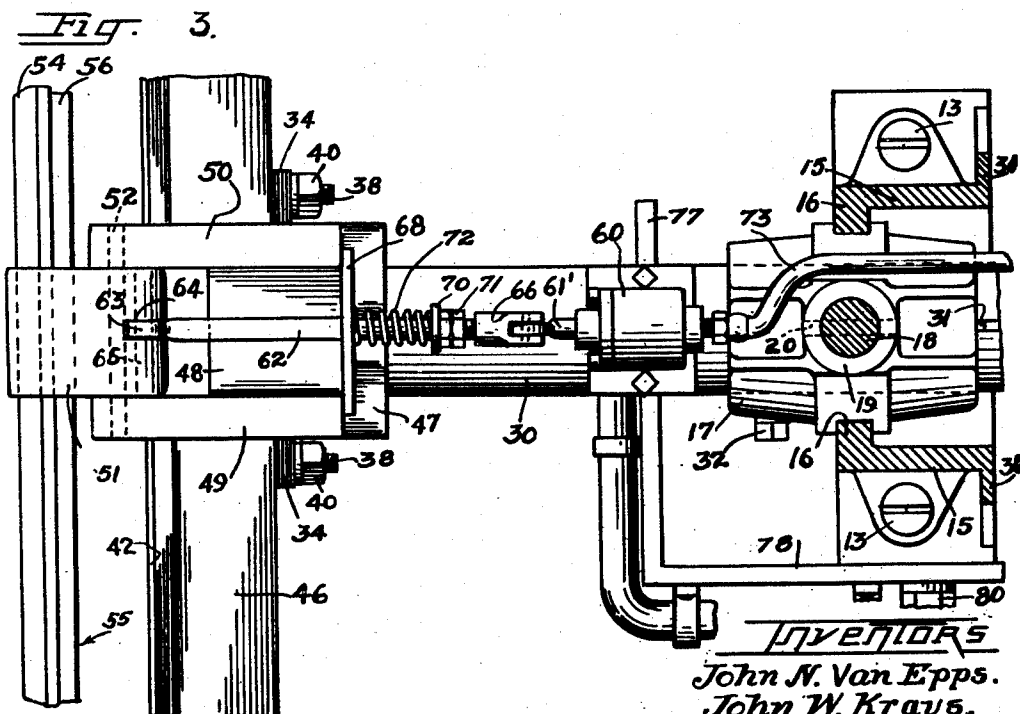
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UNITED STATES PATENT OFFICE

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SEALING MACHINE

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6 Claims. (Cl. 154-42)

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Our invention relates to the sealing of containers or packages, and particularly to the sealing of containers such as bags which contain material to be protected or form part of package or container assemblies in which the material or goods is contained. Bags for this purpose must be of air-tight and moisture- and vapor-proof material, and where the goods to be protected are of metal coated with grease or other substance, the material of the bags must be proof against grease or such other substance. Bags of pliofilm are being used quite extensively for sealed packaging but our invention would be applicable for sealing bags of other material, such as paper, metallic or textile material impregnated or coated with protective substances such as waxes, thermoplastics, or other suitable substances.

An important object of our invention is to produce a simple, efficient sealing machine for sealing the mouths of bags after they have received the contents to be protected or after packages with which the sealing bags are associated, have been assembled.

A further object is to provide a sealing machine having jaws between which the closed mouth of a bag may be inserted for clamping by the jaws and heating of the sealing substance in the bag material, and pressure clamping together of the bag walls along a sealing zone for closure of the bag mouth.

A further object is to provide electrical means for producing the sealing heat, and power means for controlling the closure of the sealing jaws, together with means for automatically controlling the operation of the heating and clamping means when a container or package is brought into proper position for sealing of the bag.

A further object is to provide electrical control means for the heating means and the power clamping means with the circuits for said electrical controlling means automatically controlled by a switch which is actuated when a package and sealing bag therefor are moved into sealing position.

Another object is to provide time controlled means for automatically controlling the circuits for release of the clamping jaws from the bag after a predetermined period of heat application to a bag along the sealing line.

A further object is to produce an adjustable thermo sealing machine for sealing the mouths, openings or seams of various sizes or shapes of bags or containers, or package assemblies which include sealing bags.

The above referred to and other features of

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our invention are embodied in the structure shown on the drawings, in which drawings.

Figure 1 is a side elevation of the machine showing the sealing of a bag thereby;

5 Figure 2 is a front elevation of the machine;

Figure 3 is a plan view of the heating and clamping jaw structure showing the movable jaw in open position;

10 Figure 4 is an enlarged section on plane IV-IV of Figure 2; and

Figure 5 is an enlarged section showing more clearly the clamping of the bag mouth during heat application thereto.

The machine shown comprises the supporting 15 plate or table 10 on which a supporting block 11 is mounted and secured as by screws 12. Mounted on this block by screws 13 is a vertical rectangular guide frame 14 having opposed parallel vertically extending guide walls 15 with guide ways 16 thereon for a carrier head 17. The head 17 is vertically adjustable in the frame 14 by means of a screw shaft 18. The screw shaft at its lower end extends into a socket 19 formed on the top of the head 17 and the shaft is held against rotation 25 relative to the head by a pin 20.

The screw shaft receives a take-up nut structure 21 comprising a shank 22 extending through an aperture 23 in the top wall 24 which spans the upper ends of the guide walls 15 of the guide 30 frame 21. The shank terminates at its lower end in a flange 25 and at its upper end in a polygonal head 26 for receiving a wrench or other tool. Below the head the shank has arms 27 extending therefrom provided with holes 28 in which rods 35 or other tools may be inserted for turning of the nut structure. The flange 25 and the arms 27 form stops for holding the nut structure against axial movement. Upon turning of the nut structure the screw shaft will be axially shifted for vertical adjustment of the head 17 in the guide 40 frame 14.

The carrier head 17 has the bore 29 there-through for receiving a hollow or tubular arm 30. The head and the arm have opposed keyways for receiving a key 31 which holds the arm 30 against 45 rotation in the head 17 but permits axial adjustment of the arm in the head. A set screw 32 is provided for locking the arm in adjusted position.

50 At its outer end the arm 30 has the transverse slot 33 in its upper side in which is seated a supporting structure of right angular cross-section comprising the vertical back plate 34 in the rear end of the slot and the horizontal plate 35 seated in the bottom of the slot. These two plates are

rigidly secured to the arm 30, as by welding. A heater frame of right angular cross-section is supported by the plates 34 and 35 and comprises the vertical wall 36 engaging against the front of the plate 34, and the horizontal wall 37 seating on the plate 35. As shown on Figures 2 and 3, the heater frame extends laterally in horizontal direction beyond the supporting plates 34 and 35 and is secured in place by attachment of its wall 36 to the plate 34. Referring to Figure 1, threaded studs 38 are butt welded to the wall 36 to extend therefrom through holes 39 in the plate 34 to receive lock washers and nuts 40.

The base wall 37 of the heater frame extends a distance forwardly beyond the supporting plate 35 and has the upstanding flange or heating head 41 along whose outer side extends the heating nose or boss 42 whose front surface is in a vertical plane. In the corner between the wall 37 and its flange 41 extend electrical heating coils 43 from which heat is conducted to the heating head. The heating frame is closed at its ends by end walls 44 and 45, in order to maintain the temperature within the heater frame and avoid loss of heat, and a sheet metal cover 46 may be provided for the frame.

Saddled on the arm 30 rearwardly of the heater structure is a bracket block 47 secured to the arm as by welding and having the arm 48 extending forwardly therefrom across the top of the heater structure, side walls 49 and 50 extending up from the block and the arm and projecting forwardly beyond the heater structure. Extending downwardly between the front ends of the side walls 49 and 50 is a jaw bar 51 which is fulcrumed near its upper end by the pin 52 extending through the side walls. At its lower end this jaw bar has a transversely extending rectangular slot 53 in its rear side. In the inner end of the slot is a backing or spacer bar 54, and in the forward end of the slot is a pressure blade structure 55. This blade structure comprises a channel bar 56 in which is inserted a strip 57 of resilient material having the characteristics of rubber. A hard rubber or similar material face 58 is vulcanized to the outer face of the resilient strip 57. The bar 51 is fulcrumed to be swung down to bring the blade structure with its face plate 58 into parallelism with the flat face of the heating boss 42 to engage the mouth end of a bag inserted between the blade structure and the heating boss to be sealed.

Describing now the mechanism for operating the jaw bar 51, a supporting block 59 saddles on the arm 30 rearwardly of the block 47 and is secured to the arm as by welding. Mounted on the block 59 is a cylinder 60 having a piston 61 therein from which the piston rod 61' extends forwardly through the cylinder head. A connecting rod 62 has the flat outer end 63 engaging in a slot 64 in the upper end of the jaw bar 51 to which it is pivoted by the pin 65. At its rear end the connecting bar is threaded to receive a clevis 66 which is pivotally connected to the outer end of the piston rod as indicated at 67. A plate 68 extends between and is secured to the rear ends of the side walls 49 and 50 and has the opening 69 therethrough from which the connecting rod extends. An abutment washer 70 is adjustable axially on the connecting rod by means of nuts 71 engaging the threaded end of the rod, and a compression spring 72 encircles the rod and abuts the plate 68 and the washer 70, this spring being used for adjusting the pressure between the two sealing jaws and tending to shift the connect-

ing bar rearwardly for upward swing of the jaw bar 51, as indicated by the dotted lines on Figure 4.

The cylinder is connected to receive air under pressure through a pipe 73, this air pressure shifting the piston outwardly against the resistance of the spring 72 to swing the jaw bar 51 down into sealing position, as shown on Figure 1, and by full lines on Figure 4. As shown on Figure 2, the air flow to the cylinder is controlled by a rotary valve V which when open connects the pipe 73 with the air supply pipe 74. Figure 2 shows the valve in closed position with its port 75 connecting the cylinder pipe 73 with the exhaust outlet 76 so that the spring 72 may shift the piston to the rear end of the cylinder. Upon opening movement of the valve, the port 75 will connect the cylinder pipe 73 with the supply pipe 74 for flow of air to the cylinder for outward shift of the piston.

As shown on Figures 1 and 2, a switch mounting plate 77 is located in front of the supporting block 11 on the table 10 and this plate has the wall 78 extending rearwardly therefrom and secured to the side of the block. As shown, the wall 78 has the extended slot 79 for receiving a screw 80 which threads into the block so that the wall may be adjusted for location of the switch plate 77 to the desired position in front of the block. The plate 77 supports a switch 81 which may be a micro-switch, and this switch is normally open but is to be closed by the bag or bag container striking the micro-switch 81 after the mouth of a bag to be sealed is placed in sealing position in front of the sealing boss 42 when the sealing jaw bar 51 is in open position.

Referring to Figure 2, the valve V and various circuit controls are mounted on a panel board 82. These controls include a main switch 83, a timing or limit switch structure 84, an emergency or safety switch 85, a solenoid 86, and a manual switch 87 for the heater circuit. The main switch 83 and the heater switch 87 may be located within the switch box 88 on the panel board. As shown on Figures 2 and 4, the heating coil circuit includes a thermostat switch 89 which is located within the heater structure adjacent to the heater coils 43. Current flow is received from a suitable current supply circuit 90. The supply conductor 91 extends to the main switch 83 from which the conductor 92 extends to one terminal of the switch 85 whose other terminal is connected by a conductor 93 through the manual switch 87 with the conductor 94 extending to one terminal of the thermostat switch 89 whose other terminal 95 is connected with one terminal of the heating coil assembly. The other terminal of the heating coil assembly is connected by a conductor 96 with the supply conductor 97 extending from the supply circuit 90. The conductor 93 coming out of the safety switch 85 is connected by conductor 98 with one terminal of the timing switch structure 84 whose other terminal is connected by conductor 99 with one terminal of the winding of the solenoid 86 whose other terminal is connected by conductor 100 with one terminal of the micro-switch 81 whose other terminal connects with the conductor 97 extending from the supply circuit 90. The armature of the solenoid 86 connects with the valve lever 101. The micro-switch and the safety switch 85 are normally open, and the valve V is normally in exhaust position.

On Figure 1 a package P is shown which includes a bag B which is to be sealed. The package shown comprises a rectangular container or

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box 102 which receives the goods to be protected. This box with the goods therein is inserted into the bag B with its open end against the bottom of the bag, and the outer box 103 is then slipped up around the bottom portion of the bag to receive the box 102. The box contents are now entirely within the bag and the cover 103 forms a protection covering for the bottom portion of the bag.

To put the machine in service condition, the heater circuit is closed by closing the main switch 83 and the manual switch 87 and setting the safety switch 85 to "on," the thermostat switch 89 being already closed as the heater frame is cold. Current will now flow through the heater coils for heating of the heater head 41 and the heater boss 42 thereon, the thermostat switch functioning to open the heater circuit to prevent abnormal heating of the heating boss.

The machine is now ready for operation to seal the package P. The package is placed on the table 10 in front of the micro-switch 81 but without engaging the switch. The mouth of the bag is then closed to bring the mouth walls or lips 104 and 105 into engagement, and this mouth end of the bag is brought into position in front of the heating boss 42, the jaw bar 51 being still in open position. The package is then shifted rearwardly against the button of the micro-switch 81 to close this switch for the sealing operation. Upon closure of the micro-switch the circuit through the timing switch structure 84 and the valve solenoid will be closed and the valve V will be operated by the solenoid to bring its port 75 into position for connection of the air supply pipe 74 with the cylinder pipe 73, and the air flow into the cylinder 60 will then move the piston 61 and the connecting rod 62 outwardly against the resistance of the spring 72 for downswing of the jaw bar 51 to bring the face plate 58 of the blade structure 55 against the closed mouth of the bag to clamp the mouth walls 104 and 105 between the face plate and the face of the heater boss 42, the bag closing walls being then heated along a narrow zone for softening or melting of the sealing substance in the bag material and pressure sealing together of the bag walls or lips 104 and 105. The timing switch structure 84, which was set for a predetermined time period of closure of the sealing circuit, will at the end of such period open the sealing circuit for deenergizing of the solenoid 86 and return of the valve V to shut off the air flow to the cylinder and to connect the cylinder with the exhaust outlet 76 of the valve. Return of the solenoid to valve shut-off position may be assisted by a spring 106. As the air is being exhausted from the cylinder, the spring 72 will quickly shift the piston and the connecting rod for upswing of the jaw bar 51. Thus, for each setting of the timing switch structure 84, all the bags sealed by the machine will be subjected to the same heating and sealing pressure for the same length of time. Should the automatic controls fail to function at any time, the operator need only to press the "off" button of the safety switch 85 for immediate disconnection of the electrical circuits and setting the valve into exhaust position.

A strip 107 of heat resistant and insulating material is preferably applied at the underside of the heating head 41, the strip being secured in a recess 108 in the front end of the wall 37, with its front edge projecting a slight distance forwardly of the face of the heating boss 42. The purpose of this strip is to clamp the walls

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104, 105 at the bag mouth below the heating and sealing zone during the sealing operation to prevent running down along the bag below the sealing zone of melted sealing substance, and the strip will also function to confine the sealing heat to the heater head 41 and the boss 42. After a sealing operation the package is withdrawn from the machine, the micro-switch 81 then opening ready for the next sealing operation.

The machine is adjustable for sealing of various sizes and shapes of packages. The micro-switch 78 is adjustable on the support block 11, and the carrier head 17 is vertically adjustable in the frame 14 by operation of the nut structure 21. Furthermore, the arm 30 may be adjusted axially in the head 17. Thus packages of different widths and heights may be readily sealed by the machine. The various current conductors and the air piping are of sufficient length and flexible to readily permit the adjustment of the machines for different types of packages.

We claim as our invention:

1. A sealing machine for sealing the mouth of a bag forming part of a package whose contents are to be protected by the bag, comprising a heater structure having a heating head presenting a comparatively long and narrow heating surface, a pressure applying structure presenting a pressure surface for cooperation with said heating surface, a support for said pressure applying structure, means tending to move said support to hold said pressure applying structure away from said heating surface to permit the mouth of the bag to be aligned between said surfaces ready for the sealing operation, power means effective when energized to move said support to carry said pressure applying structure for cooperation with said heater structure, electrical control means for said power means, an electrical circuit for said electrical control means, a normally open switch for said circuit positioned to be closed by the application thereto of the package after the mouth of the bag for said package is aligned in front of said heating surface, closure of said electrical circuit causing energization of said power means whereby the mouth of the bag will be clamped between said pressure surface and said heating surface for heating and pressure sealing thereof, and electrical timing means included in said circuit to function after a predetermined time interval to open said circuit for release of said power means from said electrical control means for withdrawal of said pressure applying structure from said heating element whereby each bag to be sealed will be subjected for the same length of time to the heating and pressure sealing operation.

2. A sealing machine for sealing the mouth of a bag forming part of a package whose contents are to be protected by the bag, comprising a heater structure having a heating head presenting a comparatively long and narrow heating surface, a pressure applying structure presenting a pressure surface for cooperation with said heating surface, a support for said pressure applying structure, means tending to move said support to hold said pressure applying structure away from said heating surface to permit the mouth of the bag to be aligned between said surfaces ready for the sealing operation, pneumatic power means effective when energized to move said support to carry said pressure applying structure into a sealing position relative to said heater structure, a control valve for said pneumatic power means, electrical control means for said valve, an electrical

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circuit for said electrical control means, a normally open switch positioned to be closed by application thereto of the package after the mouth of the sealing bag for the package has been aligned in front of said heating surface, closure of said switch closing said circuit for operation of said electrical control means to set said valve for energizing of said pneumatic power means to move said pressure applying structure for clamping engagement between its pressure surface and said heating surface of the mouth of the bag for sealing thereof, and timing means included in said circuit for controlling said electrical control means for setting of said valve for release of said support from said power means and movement thereof away from the heater structure.

3. In a sealing machine for the purpose described, a package supporting table, a guide standard thereon, a head supported on said standard, an arm extending from said head over the table, a heater structure mounted on the outer end of said arm and presenting a comparatively long and narrow heating surface, a comparatively long and narrow pressure applying structure for cooperating with said heater structure, power means mounted on said arm for controlling the movement of said pressure applying structure whereby the mouth of a package sealing bag aligned in front of said heating surface will be engaged by said pressure applying structure for clamping therebetween and said heating surface for heating and pressure sealing thereof, and means for controlling the operation of said power means, screw means for vertically adjusting said head on said standard, and said arm being axially adjustable in said head whereby said machine may be adjusted for the accommodation of various sizes and shapes of packages on said table, and means for securing said arm in adjusted position.

4. In a sealing machine for the purpose described, a heater structure presenting a comparatively long and narrow heating surface, a jaw member having a slot, a comparatively long and narrow pressure applying structure comprising a channel shaped backing bar secured in said slot and a rubber-like strip seated in said channel bar and having a comparatively rigid facing strip secured to its outer side for cooperation with said heating surface, power means for moving said jaw member to carry said pressure applying structure into the sealing field in front of said heating surface, whereby the mouth of a bag to be sealed

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aligned in front of said heating surface will be clamped between said facing strip and said heating surface for sealing thereof, and control means for said power means.

5. In a sealing machine for the purpose described, a heater frame presenting a heating head terminating in a comparatively long and narrow heating surface, an electrical heating element in said heater frame adjacent to said heating head, a strip of heat insulating and resistant material on said heater frame below said heating head having its forward edge terminating a short distance in advance of said heating surface, a jaw member, a comparatively long and narrow pressure applying structure carried by said jaw member and comprising a channel shape backing bar and a strip of rubber-like material seated therein and having a facing secured to its outer side for cooperation with said heating surface, power means for moving said jaw member to carry said pressure applying structure for clamping of the mouth of a bag between said facing plate and said heating surface for sealing thereof, and control means for said power means.

6. A sealing machine comprising a heater frame, a jaw member having a pressure surface swingable toward and away from said frame, fluid pressure means for swinging said jaw member toward said heater frame, spring means for swinging said jaw member away from said frame, a valve for controlling fluid flow to and from said fluid pressure means, and actuating means for said valve controlled by the work to be heat sealed for operating said valve.

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