

March 24, 1925.

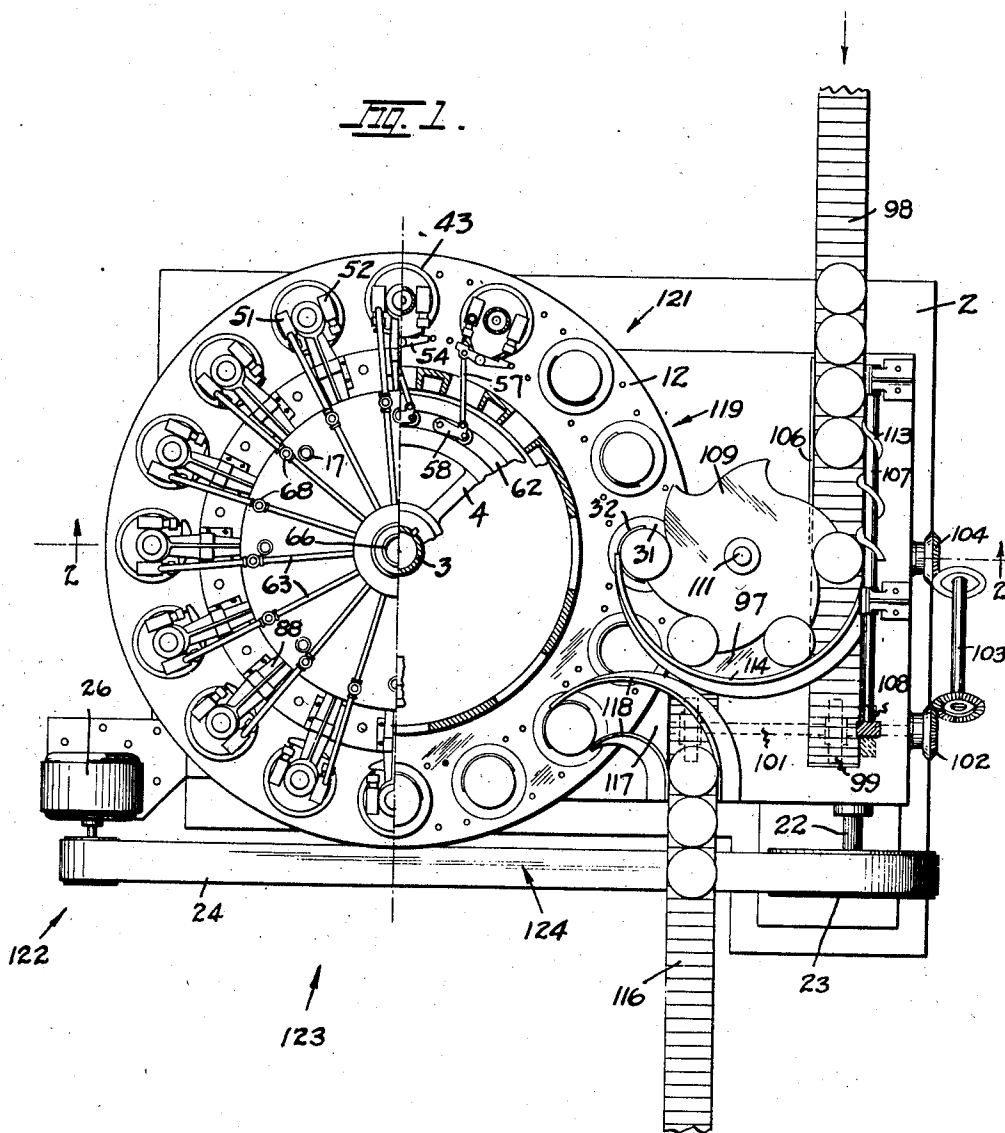
A. S. DONDERO ET AL

1,531,081

VACUUM SEALING MACHINE

Filed June 1, 1921

6 Sheets-Sheet 1



WITNESS
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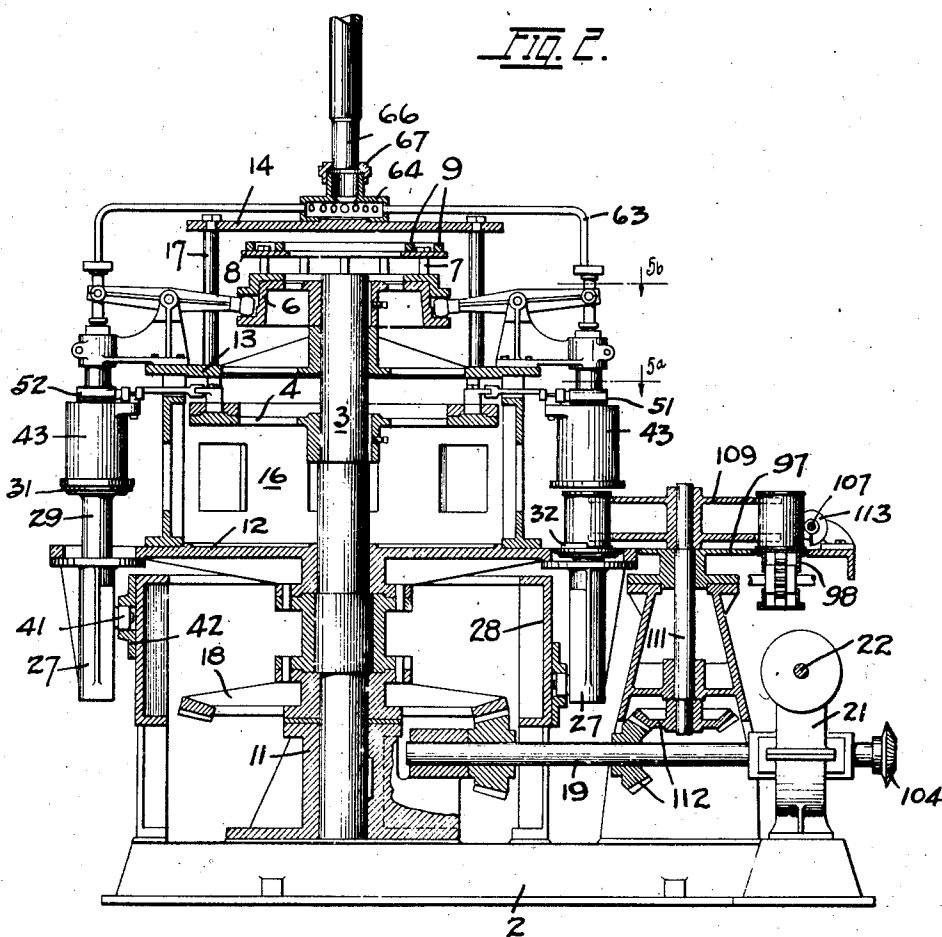
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6 Sheets-Sheet 2



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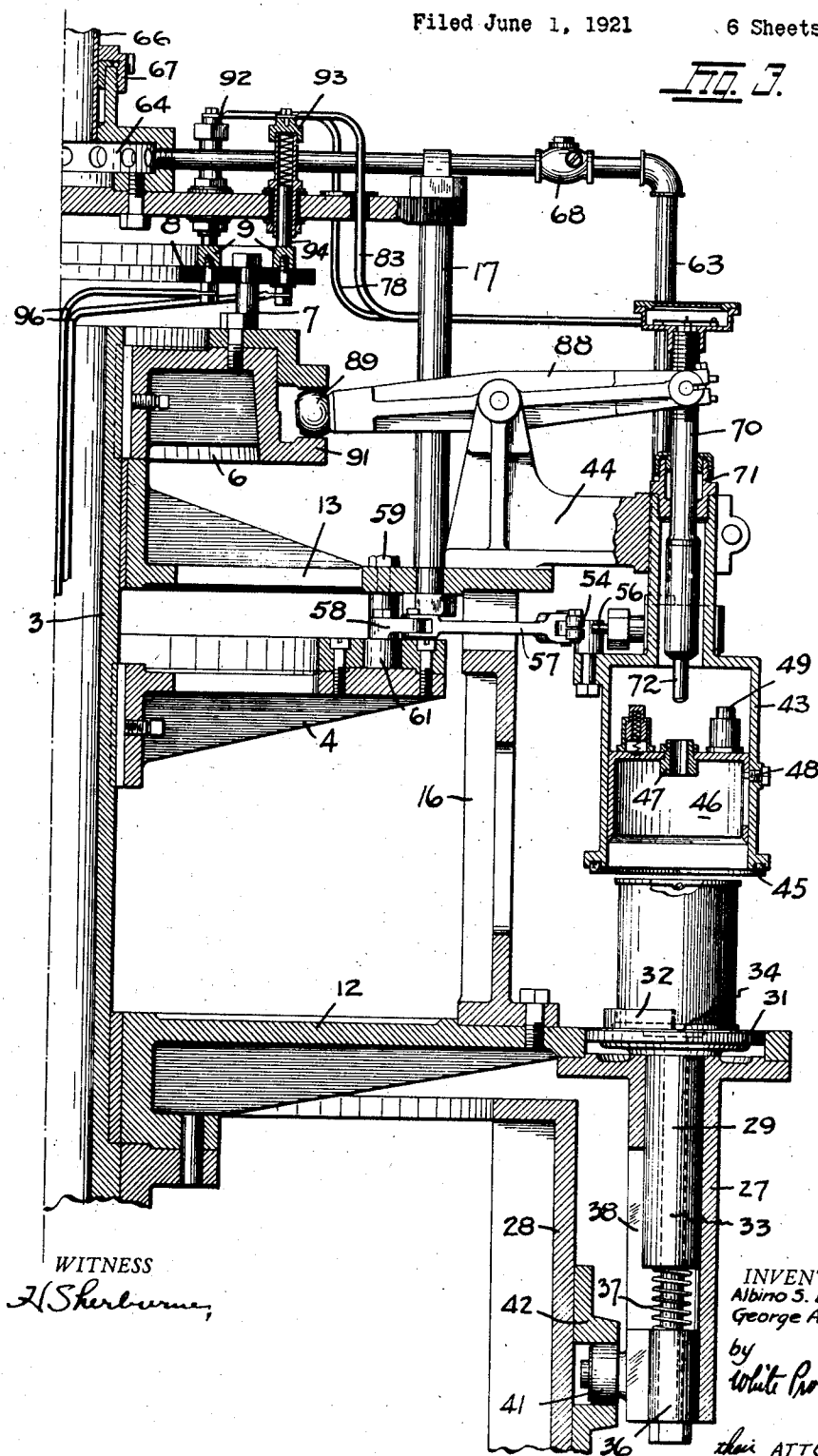
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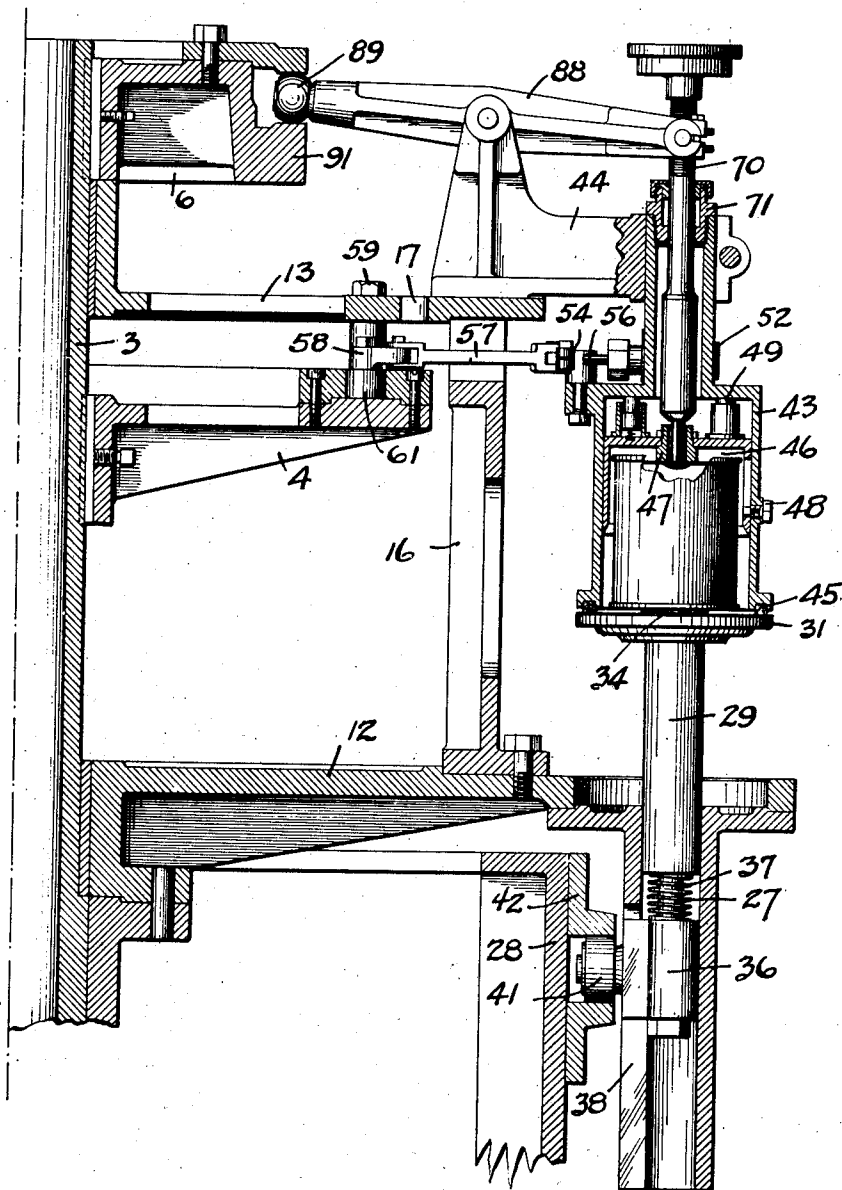
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FIG. 4.



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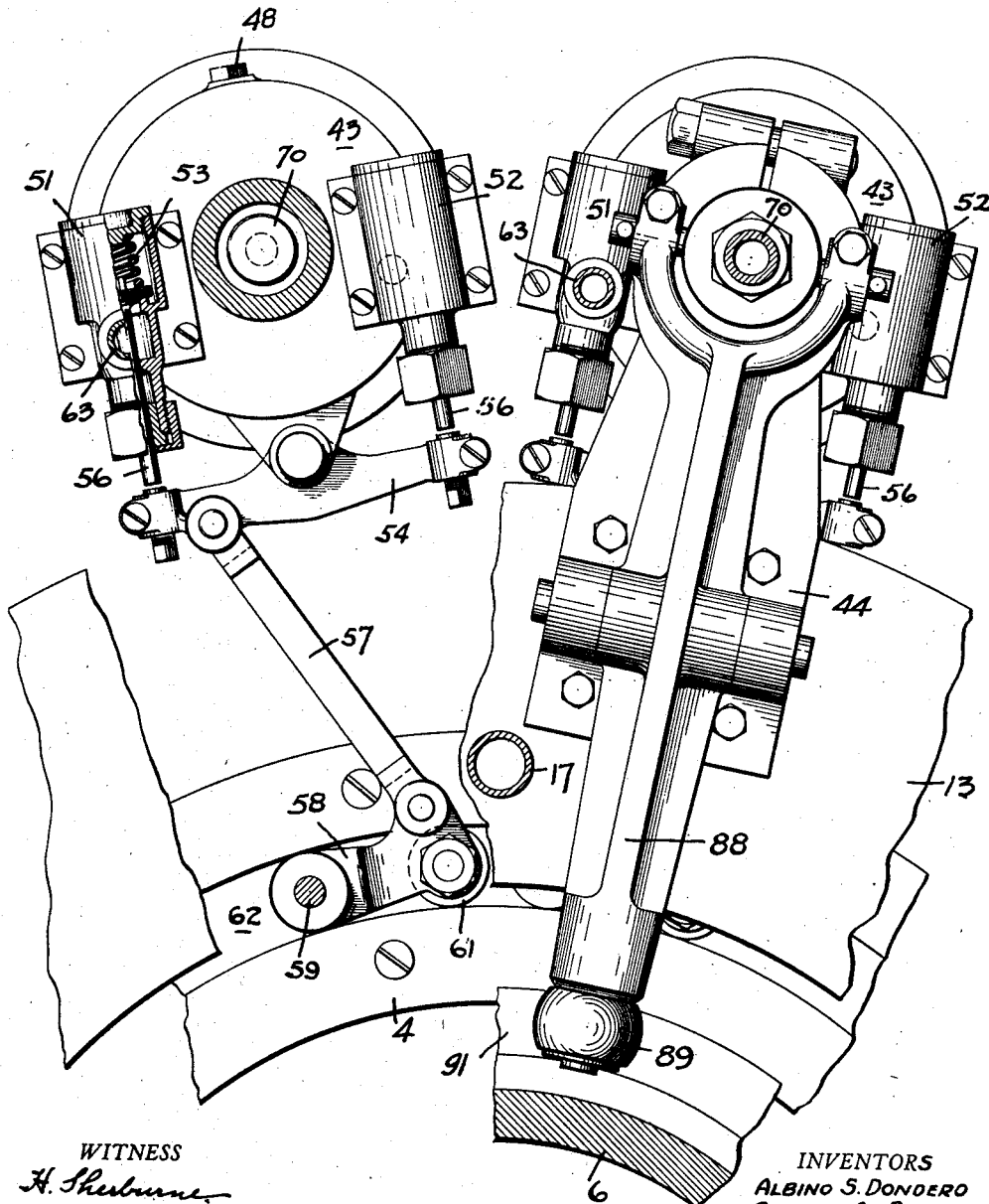
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FIG. 5.



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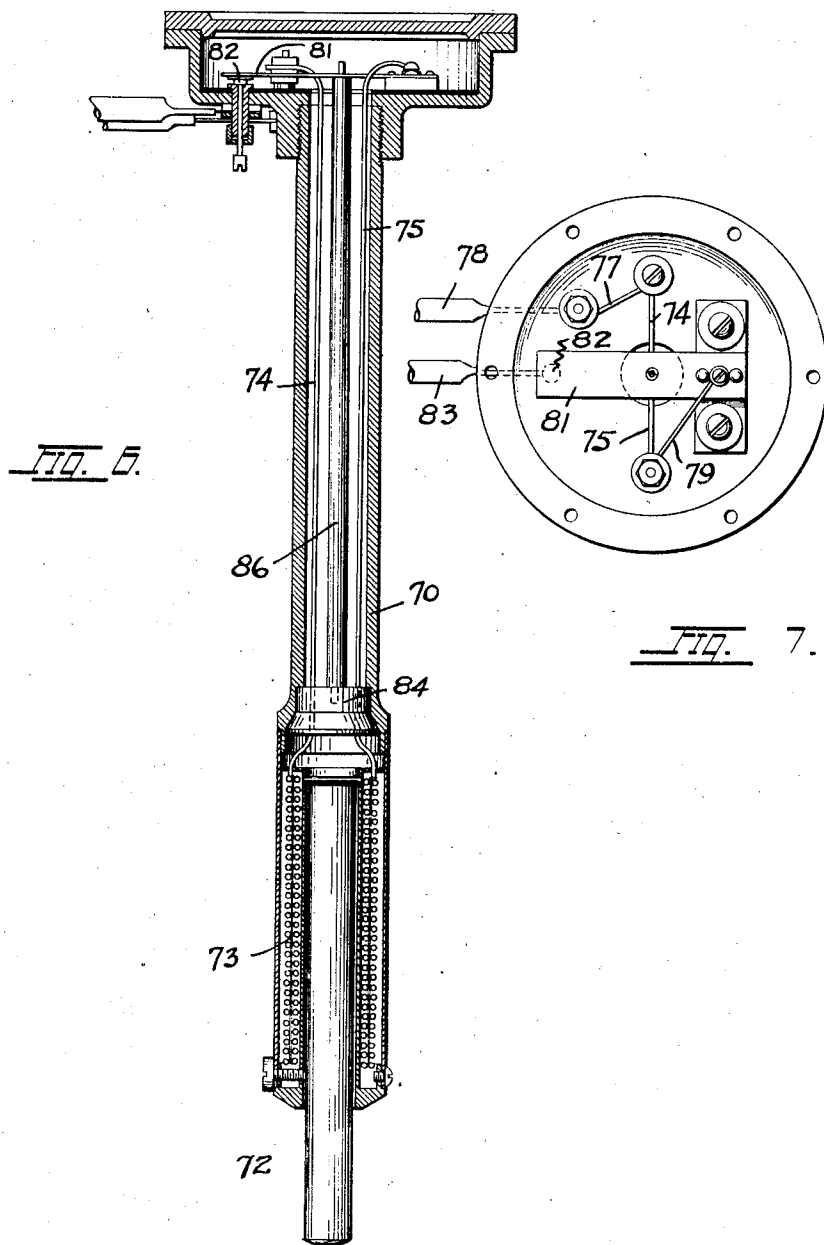
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VACUUM SEALING MACHINE

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6 Sheets-Sheet 6



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UNITED STATES PATENT OFFICE.

ALBINO S. DONDERO, OF OAKLAND, AND GEORGE A. BARDET, OF BERKELEY, CALIFORNIA.

VACUUM SEALING MACHINE.

Application filed June 1, 1921. Serial No. 474,239.

To all whom it may concern:

Be it known that we, ALBINO S. DONDERO and GEORGE A. BARDET, citizens of the United States of America, and residents of Oakland and Berkeley, respectively, county of Alameda, and State of California, have invented a new and useful Vacuum Sealing Machine, of which the following is a specification.

Our invention relates to machines for sealing vacuumized containers.

One of the objects of the invention is the provision of a vacuum sealing or tipping machine in which each can to be operated on is placed in an individual vacuumized chamber and there automatically tipped and then discharged. Another object of the invention is the provision of a vacuum sealing or tipping machine having individual vacuumizing chambers for the can to be operated upon, in which provision is made for preventing movement of the can head relative to the can body during the sealing or tipping process. Another object of the invention is the provision of a vacuum sealing or tipping machine having individual vacuumizing chambers, and in which means are provided for preventing variation in the degree of vacuum due to influx of air from any other chamber. Another object of the invention is the provision of a tipping iron, the heat of which is automatically maintained at substantially a constant point. Another object of the invention is the provision of improved means for feeding cans to be operated upon into the machine.

Our invention possesses other objects and features of advantage, some of which, with the foregoing, will be set forth in the following description of our invention. It is to be understood that we do not limit ourselves to the showing made by the said description, as we may adopt variant forms of the invention within the scope of the claims.

In the drawings Fig. 1 is a plan view of the machine, portions being shown in horizontal section. Fig. 2 is a vertical sectional view taken chiefly in a plane indicated by the line 2—2 of Fig. 1. Figs. 3 and 4 are vertical sectional views of a portion of the machine, Fig. 3 showing the can about to be introduced into the casing in which it is vacuumized, and Fig. 4 showing the can positioned within the casing and the tipping iron in operation. Fig. 5 is a horizontal

sectional view of a portion of the mechanism, taken in a plane indicated by the line 5^a for the left hand side of Fig. 5 and in a plane indicated by the line 5^b of Fig. 2 for the right hand side of Fig. 5. Fig. 6 is a vertical sectional view thru the tipping iron and heating and control mechanism. Fig. 7 is a plan view of the upper portion of the tipping iron with the cover plate removed.

In broadly descriptive terms our invention comprises a plurality of tables arranged upon a rotary frame. Automatically operating means are provided for positioning a can to be sealed or tipped upon each table during the rotation of the frame. Above each table is arranged a vacuumizing chamber adapted to receive the can on the table, and means are provided for raising the table during the rotation of the frame to position the can within the vacuumizing chamber, and then to exhaust the air from the chamber and from the can. Means are provided for preventing the air exhausted from any one chamber from lessening the degree of vacuum in any other chamber, and means are also provided for preventing movement of the can head relative to the can body during the sealing or tipping operation. When the cans enter the machine each bears upon its head adjacent to the vent therein a small portion of solder.

One of the great difficulties in tipping machines hitherto has been the flipping off of the solder by the sudden movement of the can head at the moment of vacuumization. Another grave difficulty which has hitherto barred success has been the puncturing of the fluid solder by the flow of air, either into or out of the can. Sudden variations in the vacuum in the vacuumizing chamber of course result in a current of air thru the vent in the can head. If this occurs while the solder is still in a melted condition, it is blown off the vent or sucked into the can and the vent remains open. Both of these difficulties have been overcome in our machine in which the vacuum in each chamber is maintained substantially constant until the solder has cooled, and the can heads are prevented from movement which will displace the solder before it is fused over the vent. Efficient means is also provided for carefully and closely regulating the heat of the tipping iron. This is entirely automatic, as is also the movement

of the tipping iron into engagement with the solder. After the tipping iron is withdrawn from the solder and the latter has cooled, a valve in the head of the casing is automatically opened to release the vacuum therein and, immediately thereafter the table falls to lower the can out of the vacuumizing chamber. Means are also provided for shunting the can out of the machine upon a suitable conveyor. The operation of the entire device is entirely automatic; the vented cans entering at one side, each bearing a particle of solder adjacent the vent, and a few seconds later emerging completely vacuumized and sealed. The operation of the machine is rapid and continuous. In a long test run just completed less than one per cent of the cans passed thru the machine were found by subsequent tests to be defective.

More particularly our device comprises a bed plate 2 on which is rigidly fixed the vertical hollow shaft 3 upon which are rigidly fixed the lower cam track plate 4 and the upper cam track plate 6. Supported on the upper cam track plate by suitable studs 7 is the insulator plate 8 upon which the contact rings 9 are mounted.

At the lower end of the shaft 3 a thrust bearing 11 is arranged and resting on the thrust bearing and rotatably mounted on the shaft is a rotary frame comprising horizontal elements 12, 13 and 14 connected by suitable vertical elements 16 and 17. Secured to the lower portion of the rotary frame and forming the bottom member thereof is the bevel gear 18 driven by a suitable pinion on the horizontal shaft 19 the outer end of which is provided with a worm wheel enclosed within the casing 21. A worm driven by the shaft 22 imparts motion to the worm wheel and in turn is driven by the pulley 23 fixed on the outer end of the shaft 22. The pulley 23 is connected by belt 24 to the motor 26 mounted on a suitable bracket arranged on the bed plate.

Fixed to the rotary frame are a plurality of tubular brackets 27 which extend downwardly on the outside of the stationary wall 28 mounted on the bed plate. Slidably mounted in each tubular bracket is a shank 29 on the top of which is fixed the table 31 upon which the can to be operated upon is placed, the fixed flange 32 serving to center the can on the table. A plunger 33 having the head 34 normally lying flush with the top of the table is slidably arranged within the table's shank and at the lower end is fitted with a fixed block 36, between which and the lower end of the shank 29 the coil spring 37 is interposed. The block 36 is formed with a side extension adapted to slide in the slot 38 formed on the inner side of the tubular bracket. Rotary movement of the plunger in the block and of the table on

the plunger is prevented by suitable splines interposed between the parts. A roller 41 mounted on the block 36 engages in the cam track 42 fixed on the circular wall 28, and thus by appropriate shape of the cam track vertical movement as desired may be imparted to the table and plunger.

Alined above each table 31 is an open bottom casing 43 rigidly mounted upon the rotary frame by means of the bracket 44. The lower edge of the casing is flanged and provided with a conformable gasket 45, and the proportions of the cam track 42 and related parts are such that at the desired time table 31 is raised into sealed engagement with the gasket thus tightly closing the casing. With the seating of the table 31 against the gasket, a small further advance of the cam raises the plunger a small amount thus lifting the can off of the table. The diameter of the plunger head is considerably smaller than that of the can so that the lower can head is pressed inwardly to hold it from flexing movement during the vacuumizing process.

Means are also provided for holding the upper can head from such movement. Arranged in the casing 43 is a slide 46 provided with a flange 47 adapted to engage the upper head of the can about the vent therein when the can is raised into the casing. A screw 48 which engages a suitably formed slot in the side of the slide prevents the slide from falling out of the casing. Spring pressed stops 49 are arranged to engage the end of the casing as the table 31 is seated against the gasket. Thus the weight of the slide 46, plus the pressure exerted by the spring pressed stops 49, tends to press inwardly the upper head of the can, preventing all flexure during the subsequent processes. It will be understood of course that the cans are uniform in size and that the parts of the mechanism are proportioned to tension the can head sufficiently to prevent movement without incurring danger of rupture. Arranged in the upper portion of each casing are two valves 51 and 52. As best shown in Fig. 5 each valve is normally closed by a spring 53 and opened by the pressure of the rocker arm 54 against the valve stem 56. The rocker arm 54 is pivotally mounted between the two valve stems and rocking motion thereof alternately opens and permits to close the valve in the head of the casing. The rocker arm is controlled by a link 57 pivoted to the rocker arm 58 mounted on the pivot pin 59 set in the rotary frame above the cam track plate 4. A roller 61 mounted on the rocker 58 and engaging in the cam track 62 fixed on the plate 4 imparts motion to the rocker 54 and alternately opens and closes each of the valves in the casing head.

Valve 52 opens into the atmosphere but

valve 51 controls the passage from the pipe 63 which at the upper end is connected into the chamber 64. Each of the casings on the machine is similarly connected by a pipe 63 with the chamber and this chamber is vacuumized to a high degree by suitable means of well known character connected thereto by means of the pipe 66 connected into the walls of the chamber 64 by a suitable slip coupling 67. A check valve 68 is inserted in each pipe 63 so that when air is drawn out of the casing it cannot flow back to the casing. This arrangement is effective in preventing variations in the vacuum in the various casings or vacuumizing chambers since in the operation of the machine cans are constantly being taken in and discharged and hence air is constantly flowing into the chamber 64 from the casings. If it were not for the check valve 68 in each passage, there would be a tendency for air sucked in from one vacuumizing chamber to reduce the vacuum in other chambers. This would give a fluctuating pressure in the vacuumizing chambers which would be disastrous to satisfactory work.

Means are also provided for automatically fusing the piece of solder with which each can is introduced into its casing. In forming the can heads the center of the upper head is slightly depressed and punctured. The puncture serves as a vent thru which the air may be drawn from the interior of the can before the can is sealed in the vacuumizing chamber and the depression serves as a recess to hold the particle of solder dropped thereon immediately prior to the entrance of the can into the machine. Referring particularly to Figs. 3, 6, and 7 the tipping or soldering iron comprises a shaft 70 slidably mounted in the stuffing box 71 in the head of the casing. The lower end of the shaft is provided with a copper point 72 which is surrounded by a heating element 73 energized thru conductors 74 and 75. Conductor 74 is connected by the usual means thru fuse wire 77 to the lead 78. Conductor 75 is similarly connected by fuse wire 79 to the spring 81 normally maintaining contact with the contact point 82 which is the terminal of lead 83. Interposed between the spring and a lava block 84 set some distance downwardly from the upper end of the shaft is a rod 86 which is of course affected by the temperature of the tipping iron. With an excessive rise in temperature of the tipping iron the expansion of the rod 86 breaks the circuit by lifting the spring out of engagement with the contact point 82. With a drop in the temperature of the tipping iron contraction of the rod 86 permits reestablishment of the circuit. A very close degree of regulation is thus secured and after adjustment the soldering or tipping iron is maintained at

substantially a constant temperature. At the proper time in the sequence of operation the tipping iron is lowered thru the annular flange 47 into contact with the solder on the can fusing it over the vent and is then immediately withdrawn. This is accomplished by means of a lever 88 pivotally mounted on the bracket 44 and pivotally connected to the shaft 70 of the tipping iron at one end, and mounting a roller 89 at the other end. A cam track 91 fixed on the cam track plate 6 provides means for moving the lever at the proper time.

The leads 78 and 83 are connected to binding posts 92 and 93 respectively. The lower portions of the binding posts are provided with brushes 94 which form contacts with the rings 9. Heavily insulated conductors 96 passing upwardly thru the hollow central shaft supply the rings with current.

Means are provided for automatically seating cans upon the can tables during the rotation of the rotary frame. Adjacent the peripheral edge of the rotary frame element 12 is a stationary platform 97 along the outer edge of which the conveyor 98 is arranged. The conveyor runs over a sprocket 99 mounted on the shaft 101 which on the outer end is provided with a bevel gear 102 driven by a similar gear on the shaft 103 which in turn is driven by a gear 104 on the end of shaft 19. A guide bar 106 is fixed along the inner edge of the conveyor to retain the cans thereon and on the opposite side a shaft 107 performs a similar function. The shaft is driven by a worm engaging a worm wheel 108 fixed on the shaft 101. The conveyor carries the cans into the star wheel 109 mounted on the shaft 111 and driven by the gears 112 from the shaft 19. In order to insure presenting a can to the star wheel in position to be properly engaged thereby, we provide means on the shaft 107 for synchronizing the movement of the cans on the conveyor so that a can is always in the proper position to be caught by the star wheel without injury. This is accomplished by a helical vane or thread 113 arranged on the shaft. The movement of the conveyor 98 is considerably faster than the peripheral speed of the star wheel and as the can enters between the guide rail 106 on one side and the shaft 107 on the other side it encounters the helical vane and is thereafter retarded in its movement on the conveyor by the speed permitted by the helical vane. The position of the helical vane on the shaft and its speed of rotation are carefully arranged in respect of the proportions and speed of the star wheel. Even though the cans are placed on the conveyor 98 at irregular intervals, they will bunch up as they approach the star wheel and be fed, one at a time, into the recesses thereof. As the can is caught by the star

wheel it is moved off of the conveyor onto the platform 97 and carried around in contact with the guard rail 114 upon the rotary frame and finally seated against the flange 32 on the table, all of the speeds being of course synchronized to permit of this result.

Means are provided for removing the can from the machine upon the completion of the tipping operation. An outgoing conveyor 116 is driven by a sprocket mounted on the shaft 101 and a table or platform 117 bridges the space between the edge of the rotary frame 12 and the conveyor 116.

Guide rails 118 intercept the cans and deflect them off of the table onto the platform 117 and onto the outgoing conveyor.

Operation.—The incoming cans, which it will be understood have been packed, the heads seamed on, and with a vent in the center of the upper head, are supplied by any desired means with a small quantity of solder and flux before they reach the star wheel 109. The star wheel deposits a can on each table 31 as the rotary frame revolves and as the can reaches the point 119 the table is raised into contact with the lower edge of the casing by the cam track 42. The entrance of the can into the casing engages it with the slide 46 which is therefore carried into the upper part of the casing and upon the completion of the movement of the plunger, the casing is tightly sealed and the can is firmly held, between the plunger head and the flange 47 on the slide, with a pressure sufficient to make relative movement of the can head impossible. This condition obtains by the time the rotation of the frame has carried the can to the position 121 at which point the valve 51 is opened and the air sucked out of the casing and the can thru the pipe 63. With the vacuumization of the chamber surrounding the can the pressure of the air within the can would normally, before it could escape thru the vent, throw the heads outwardly and dislodge the solder. This movement is however prevented by the means described and the can is vacuumized without disturbance of the solder. Vacuumization continues for about one-half a revolution of the rotary frame and as the can reaches the position 122 the soldering iron is moved downwardly for a moment into contact with the solder and then raised, only the briefest period being required to fuse the solder over the vent. The fused solder is then given an opportunity to cool without fluctuation in the degree of vacuum and when the can has progressed to the position 123 movement of the rocker 54 closes the valve 51 and opens the release valve 52 which permits air to rush into the vacuumized chamber. Almost immediately thereafter the table begins its return to the lower position and at position

124 the tipped can is free of the casing in which it was vacuumized and immediately thereafter is caught by the guide rails 118 and diverted upon the outgoing conveyor.

We claim:

1. In a machine for tipping cans having vented heads, the combination of a casing for the can, means for vacuumizing said casing, and means for preventing flexure of the can head around the vent during the sealing operation.

2. In a machine for tipping cans having vented heads, the combination of a casing for the can, means for vacuumizing said casing, means for preventing flexure of the can head around the vent, and means for sealing the can while said flexure is prevented.

3. In a vacuum sealing machine, the combination of a casing, means for introducing a can into said casing, means for vacuumizing said casing, means for sealing the can, and means for preventing flexure of the can head around the vent during the sealing operation.

4. In a machine for tipping cans having vented heads, the combination of automatically operated means for fusing solder over the vent, and means for preventing flexure of the can head around the vent during the tipping.

5. In a machine for tipping cans having vented heads, the combination of a casing for the can, means for vacuumizing said casing, automatically operated means for fusing solder over the vent, and means for preventing flexure of the can head during the tipping.

6. In a machine for tipping cans having vented heads, the combination of a casing for the can, means for automatically introducing a can into said casing, means for vacuumizing said casing, automatically operated means for fusing solder over the vent, and means for preventing movement of the can head relative to the can body during the tipping.

7. In a machine for tipping cans having vented heads, the combination of a casing for the can, means for automatically introducing a can into said casing, means for vacuumizing said casing, automatically operated means for fusing solder over the vent, means for preventing movement of the can head relative to the can body during the tipping, and means for automatically removing the can from said casing.

8. In a vacuum can-sealing machine, the combination of a plurality of casings for the cans, means for vacuumizing said casings, and means for preventing a change in the degree of vacuum in one of the casings effecting a change in the degree of vacuum in any other casing.

9. In a vacuum can-sealing machine, the combination of a plurality of casings for the

cans, a vacuumized chamber, a passage connecting the chamber to each casing, and a check valve in each passage for preventing the flow of fluid to the casing.

5 10. In a machine for tipping cans, the combination of a casing for the can, a stop in said casing for engaging the upper head of the can, means for moving said can into
10 said casing against said stop, and means for pressing the lower head of the can whereby flexure of the can heads is prevented.

11. In a machine for tipping cans, the combination of a casing for the can, a spring-pressed stop in said casing for
15 engaging the upper head of the can, means for moving said can into the casing against said stop, means for resiliently pressing the lower head of the can, and means for tipping the can while the heads are so held.

20 12. In a machine for tipping cans, the combination of a frame, a plurality of casings arranged on said frame, a can table on said frame below each casing, means for
25 raising each table to position the can thereon within its casing, means for vacuumizing the casings, means in each casing for preventing movement of the can heads relative to the can body, and means for tipping the can while the heads are so held.

30 13. In a machine for tipping cans, the combination of a frame, a plurality of casings arranged on said frame, a can table on said frame below each casing, means for
35 raising each table to position the can thereon within its casing, means for vacuumizing the casings, means in each casing for preventing movement of the can heads relative to the can body, means for tipping the can while the heads are so held, means for
40 releasing the vacuum in each casing, and means for lowering each table to remove the can thereon from its casing.

45 14. In a machine for tipping cans, the combination of a frame, a plurality of casings arranged on said frame, a can table on said frame below each casing, means for rotating said frame, a vacuum chamber on said
50 frame, a passage connecting the vacuum chamber to each casing, a valve controlling each of said passages, a release valve on each casing, a tipping iron slidably mounted in each casing, and means operative by the
55 rotation of said frame for successively performing the following functions in respect of each casing, raise the table to position the can thereon within its casing, open the passage valve to vacuumize the casing, move the tipping iron to operative position and return, close the passage valve, open the release valve to release the vacuum, and lower
60 the table to remove the can from its casing.

15. In a machine for tipping cans, the combination of a frame, a plurality of open-bottom casings arranged on said frame, means on said frame below each casing for supporting a can and closing the casing, means for positioning a can on each supporting means, means for raising each supporting means to position the can thereon within the associated casing and seal the bottom opening thereof, means for vacuumizing the casing, and means for tipping the
75 can.

16. In a machine for tipping cans, the combination of a frame, a plurality of open-bottom casings arranged on said frame, means on said frame below each casing for supporting a can and closing the casing, means for positioning a can on each supporting means, means for raising each supporting means to position the can thereon within the associated casing and seal the
85 bottom opening thereof, means in each casing for preventing flexure of the heads of the can therein, means for vacuumizing the casing, and means for tipping the can.

17. In a machine for tipping cans, the combination of a rotary frame, a plurality of open-bottom casings arranged on said frame, a table slidably mounted on said frame below each casing for supporting a can and closing the casing, a plunger slidable in each table and adapted to engage the lower head of the can thereon, a spring interposed between each table and the associated plunger, means operative by the rotation of said frame for raising each plunger to resiliently seat the associated table against its casing and position the can in the casing on the plunger, a resilient stop against which the upper can head presses, means for vacuumizing the casing, and
105 means for tipping the can.

18. In a machine for tipping cans, the combination of a rotary frame, a plurality of vacuumizing chambers arranged on said frame, means for sealing a can in each of said chambers, a vacuum chamber on said frame, a passage connecting the vacuum chamber with each of said vacuumizing chambers, a check valve and a control valve in each passage, a release valve for each vacuumizing chamber, means operative by the rotation of said frame for operating the control and release valves, and means for tipping the can in each vacuumizing
120 chamber.

In testimony whereof, we have hereunto set our hands.

ALBINO S. DONDERO.
GEORGE A. BARDET.