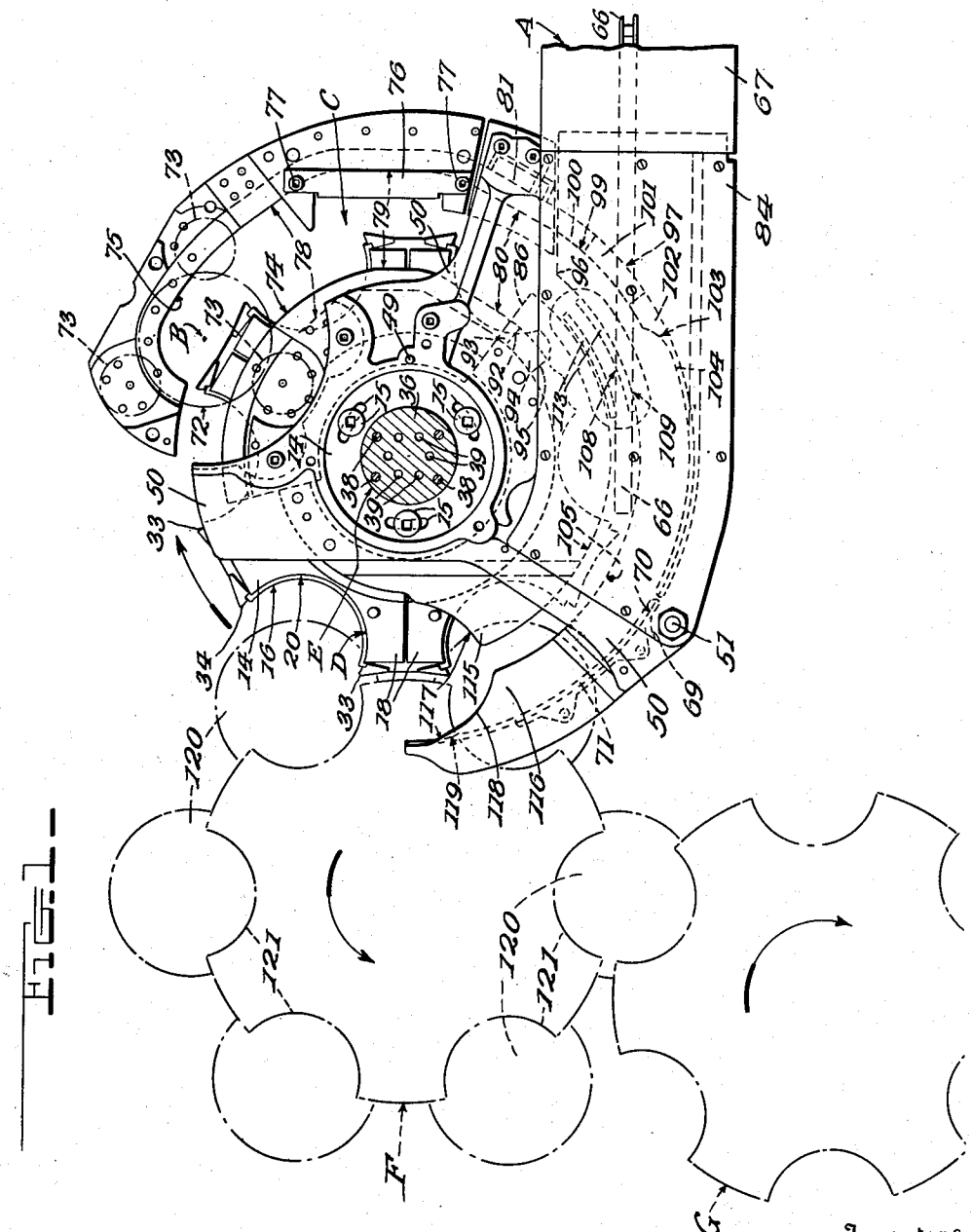
Nov. 2, 1954 J. M. BOYD ET AL 2,693,305

APPARATUS FOR REMOVING AIR FROM THE HEAD SPACES OF FILLED CANS

Filed Feb. 17, 1949 6 Sheets-Sheet 1



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APPARATUS FOR REMOVING AIR FROM THE HEAD SPACES OF FILLED CANS

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6 Sheets-Sheet 2

FIG. 2

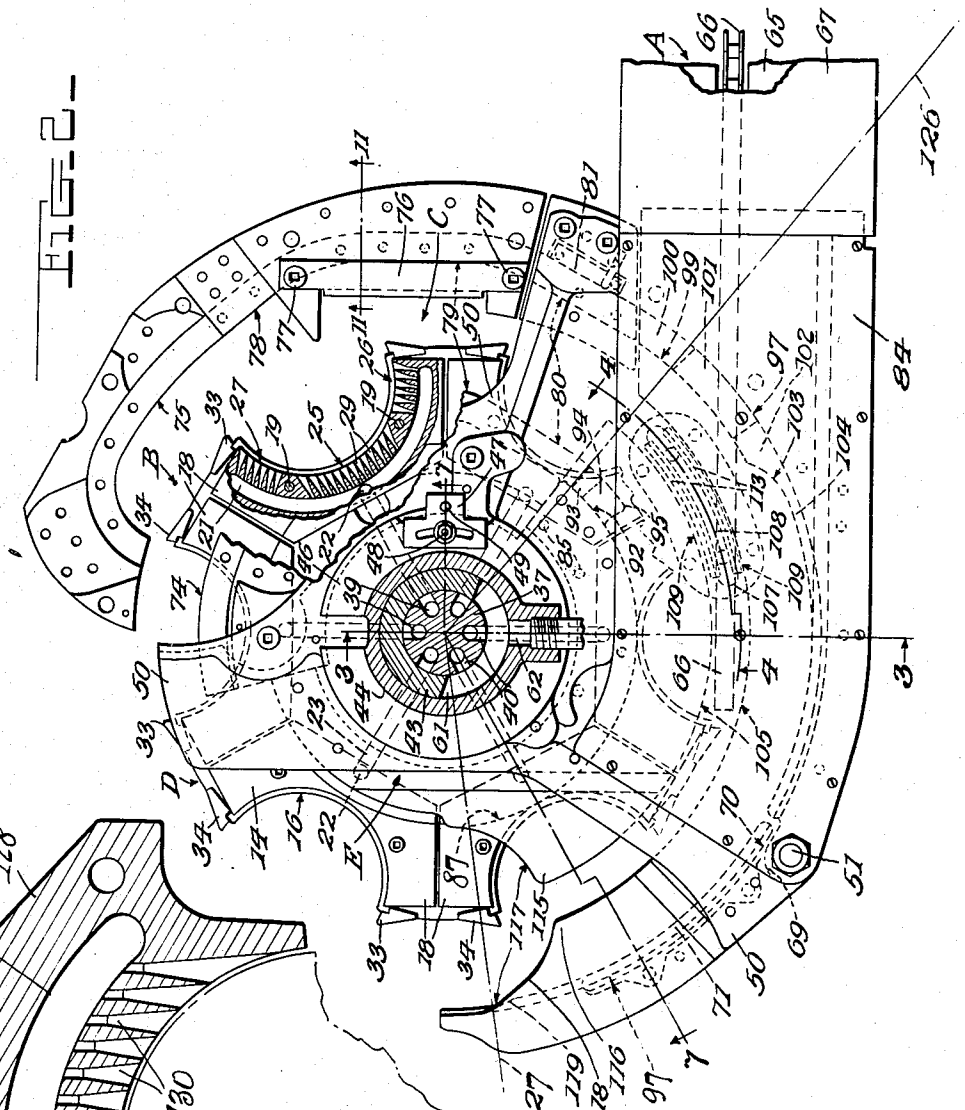
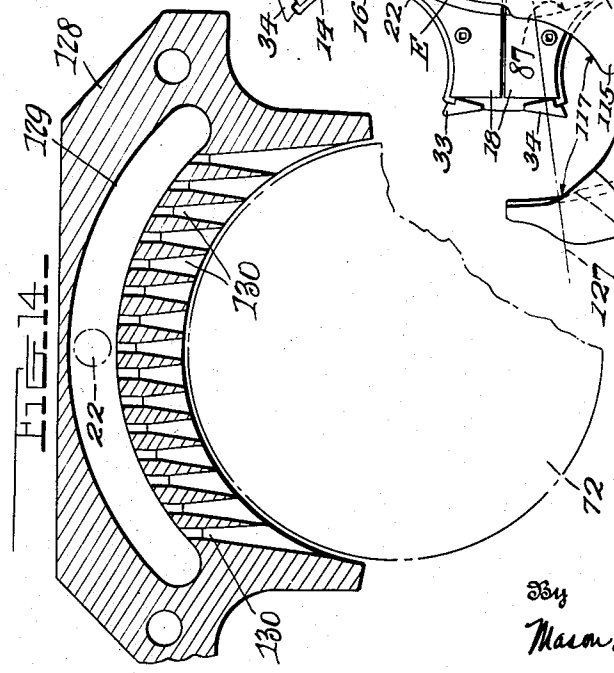


FIG. 14



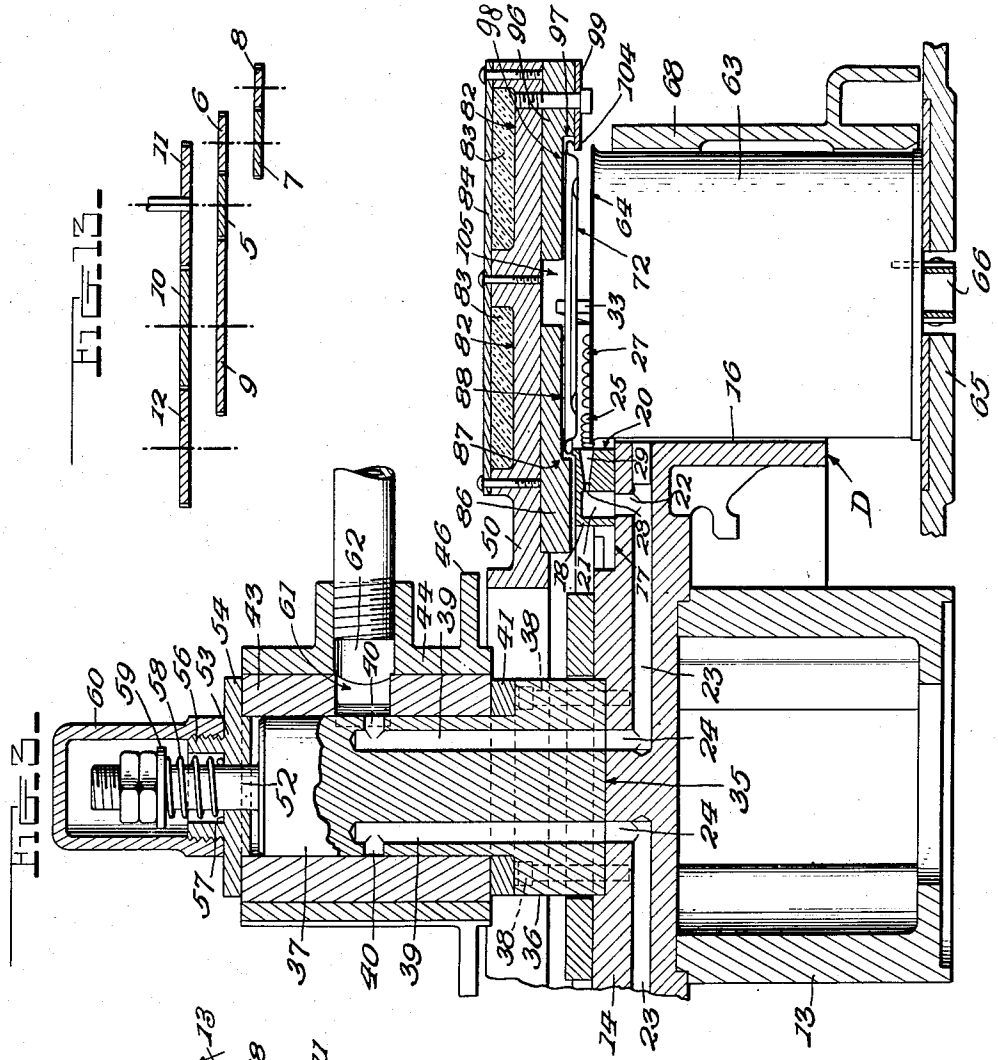
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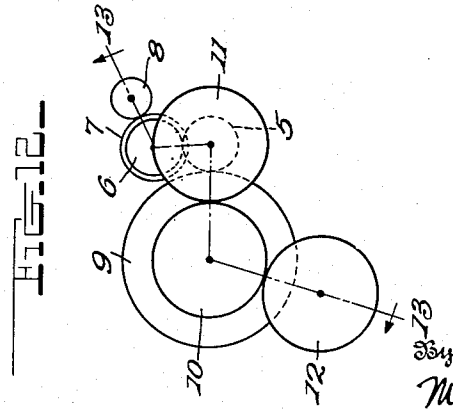
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APPARATUS FOR REMOVING AIR FROM THE HEAD SPACES OF FILLED CANS

Filed Feb. 17, 1949 6 Sheets-Sheet 3





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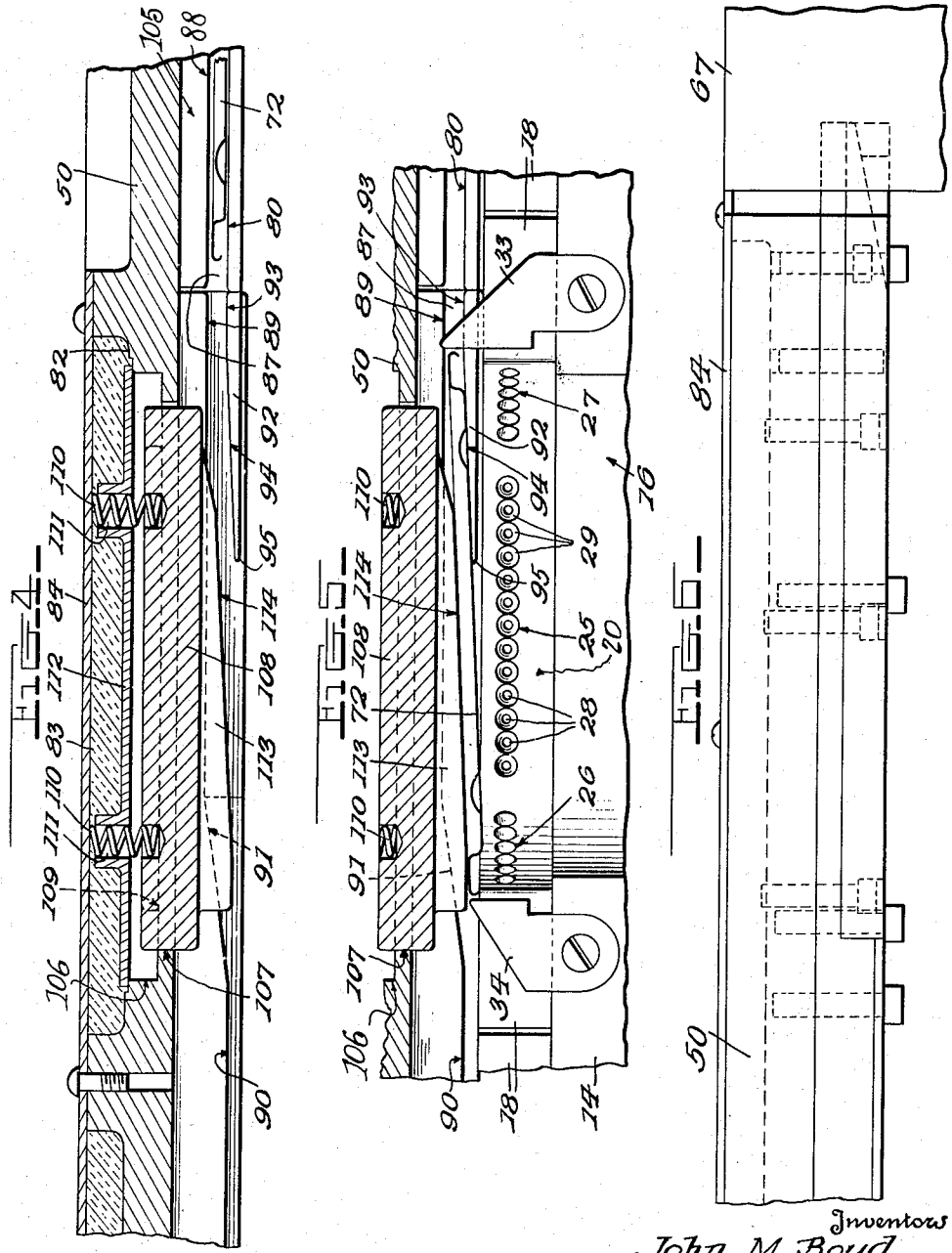
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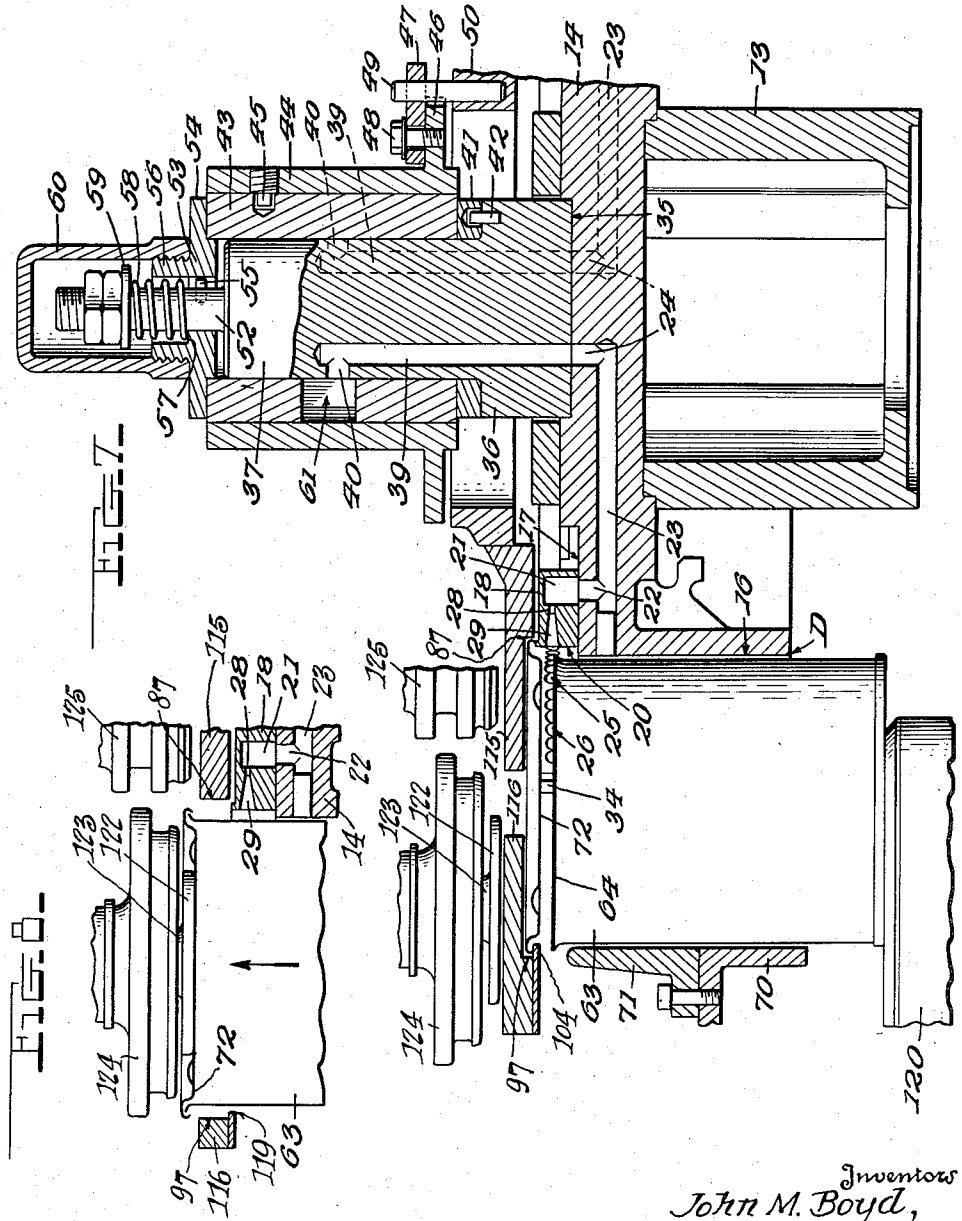
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APPARATUS FOR REMOVING AIR FROM THE HEAD SPACES OF FILLED CANS

Filed Feb. 17, 1949 6 Sheets-Sheet 5



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APPARATUS FOR REMOVING AIR FROM THE HEAD SPACES OF FILLED CANS

Filed Feb. 17, 1949 6 Sheets-Sheet 6

FIG. 10

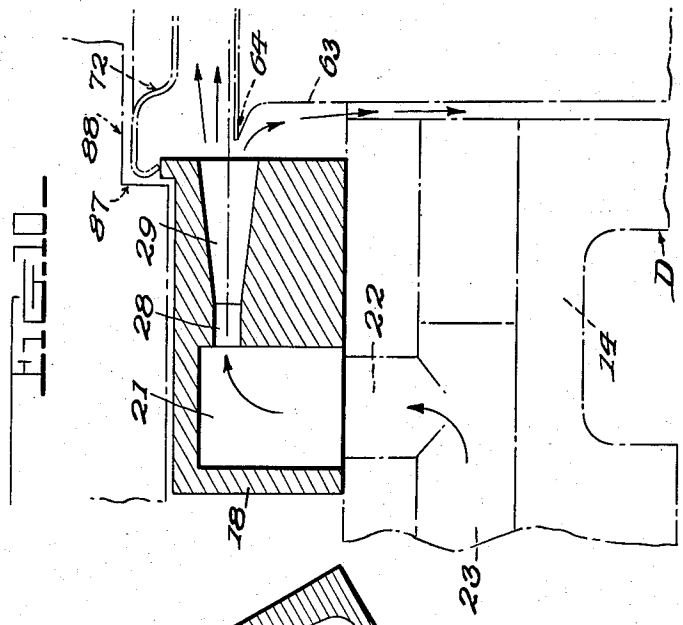


FIG. 11

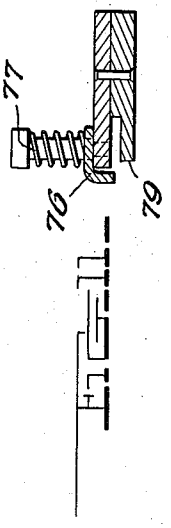
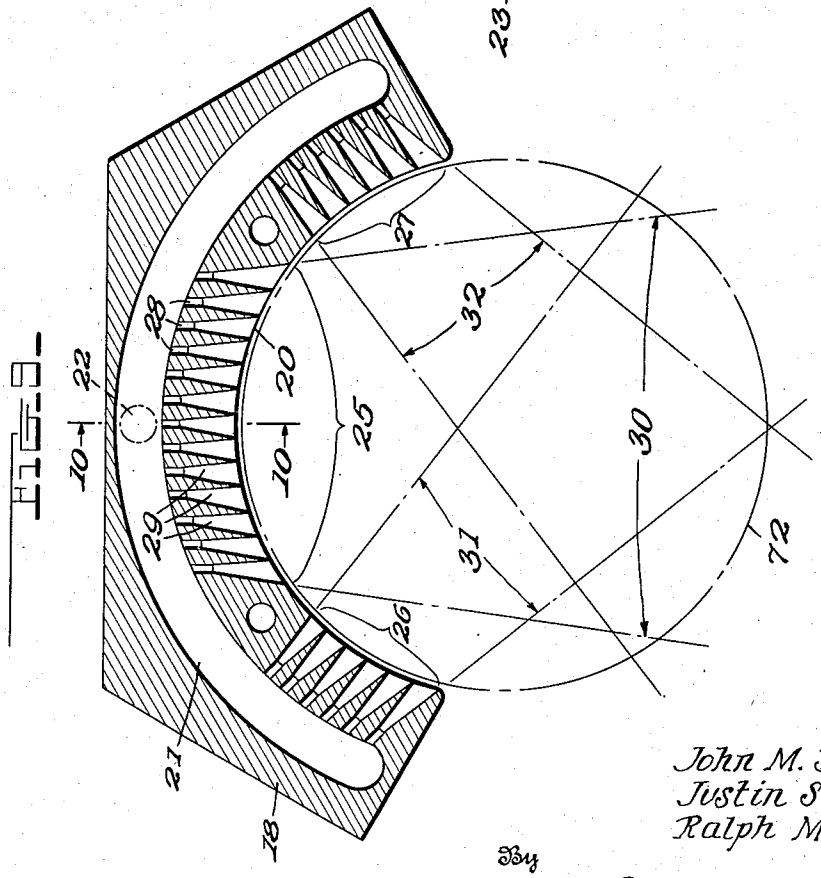


FIG. 9



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United States Patent Office 2,693,305 Patented Nov. 2, 1954

2,693,305

APPARATUS FOR REMOVING AIR FROM THE HEAD SPACES OF FILLED CANS

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Application February 17, 1949, Serial No. 76,862

22 Claims. (Cl. 226—68)

The invention relates generally to the art of canning and to machine structures wherein filled cans are closed and sealed, and it primarily seeks to provide a novel apparatus for driving air out of the head spaces above the product in filled cans just prior to the closing of such cans and by directing a gaseous medium such as steam or an inert gas into said head spaces in a manner for displacing the air therefrom.

It is well known in the canning industry that outward bulging of the ends of filled cans leads observers to assume there is spoilage of the canned products. For this reason, the food canner finds it desirable to provide a vacuum in the cans to keep the ends drawn in. It is also known that when air is sealed in cans containing certain beverages and food products, said air has a deleterious effect on the products during the shelf life of the sealed cans, and it is therefore desirable to remove the air from the container head spaces prior to the sealing of the containers. This is not an entirely new procedure. Attempts have been made to attain the stated end by various means, as by the drawing of a vacuum or by force jetting, and even by introduction of steam or gas. However, the success attending such efforts has been tempered by difficulties incidental to the handling of the covers and cans with acceptable speed and without objectionable baring of protective coatings, by unnecessary wastage of the gaseous medium, and by general inefficiency in the desired elimination of the air. It is a purpose of the present invention to provide an apparatus capable of functioning in a manner which will eliminate the difficulties referred to.

An object of the invention is to provide an apparatus of the character stated wherein the cover and can complements are moved rapidly toward the closing turret by a transfer turret with the covers accurately centered in spaced relation above the complementary cans, means being provided for directing the gaseous medium in a solid blast or ribbon outwardly across between the rapidly travelling covers and cans, contacting the undersurfaces of the covers and passing into the can head spaces so as to drive air therefrom, and means also being provided for continuing the gaseous medium treatment until each can is lifted into assembly contact with the complementary cover with said cover in horizontal position and backed up by the knockout pad of the particular closing turret unit which is to effect the final sealing of the particular can.

Another object of the invention is to provide an apparatus of the character stated wherein novel means is provided in combination with the cover and can transferring turret for accurately centering each cover over the complementary can through the use of inner and outer arcuate guide walls effective to radially confine said covers, and a set of high follower and low placer lugs associated with each turret pocket and effective to accurately place the cover in the direction of travel of the turret, thereby providing four point confinement for each travelling cover, means also being provided for receiving and initially feeding each cover at a high level where it can be contacted by the respective high follower lug but will be above the level of the cooperating low placer lug, and for retarding movement of said cover so as to accurately place and hold it against said high follower lug and gradually moving it down behind said low placer lug at a lower level at which it will be moved in said accurately centered and horizontal position throughout the gaseous treatment and until the initial assembly of can and cover is effected and said gaseous treatment is terminated.

Another object of the invention is to provide an apparatus of the character stated wherein the transfer turret has a gaseous medium directing orifice plate associated with each pocket and equipped with an arcuate ledge for receiving and supporting an inner edge portion of a cover, a hollow interior, and gaseous medium directing orifices opening outwardly from said interior to direct the gaseous medium outwardly beneath the respective supported cover and between it and the open top of the underlying filled can for driving air out of the head space of said can, said turret having a central valve core rotatable therewith and connected by individual ducts with the hollow interiors of the respective orifice plates, and a stationary valve body surrounding said core and having an arcuate duct connected with a source of gaseous medium supply and adapted to have said ducts serially communicate therewith for supplying the gaseous medium to the hollow interiors of the orifice plates and through the plate orifices and effective to determine the duration of the gaseous medium emission through the respective serially presented orifice plates.

Another object of the invention is to provide an apparatus of the character stated in which the orifices in each plate have their axes lying in a common horizontal plane and are flared outwardly in the direction of emission of the gaseous medium.

Another object of the invention is to provide an apparatus of the character stated in which the orifices arranged in a common horizontal plane are arranged in each orifice plate at such a level that the gaseous medium emitted therefrom is split on the flange at the open top of each filled can being treated so that a part of the emitted ribbon of gaseous medium will contact and pass downwardly against the can body wall in a manner assuring against any aspirating effect likely to draw air into the open top of the can.

With the above and other objects in view that will hereinafter appear, the nature of the invention will be more clearly understood by reference to the following detailed description, the appended claims, and the several views illustrated in the accompanying drawings.

In the drawings:

Figure 1 is a somewhat diagrammatic plan view illustrating the invention.

Figure 2 is an enlarged plan view illustrating the cover and can feeding turret structure and the steaming devices including the control valve mechanism.

Figure 3 is a fragmentary vertical section taken on the line 3—3 on Figure 2.

Figure 4 is an enlarged fragmentary longitudinal section taken on the line 4—4 on Figure 2.

Figure 5 is a diagrammatic longitudinal sectional view illustrating a cover held against the high lug by the retarder shoe and moving down into position behind the low lug of a cooperating pair of feeding and positioning turret lugs.

Figure 6 is a fragmentary side elevation illustrating the support and frame or turret guard plate structure at the position at which the cans come beneath the same.

Figure 7 is an enlarged fragmentary vertical cross sectional view, the section being taken on the line 7—7 on Figure 2.

Figure 8 is a fragmentary sectional view similar to Figure 7, a can being shown in process of being engaged in initial assembly relation with the complementary or overlying cover.

Figure 9 is an enlarged detail horizontal sectional view illustrating one of the orifice plates, the relation thereto of a can end and the direction of passage of the flared ribbons of steam issuing from the orifices being indicated in dot and dash lines.

Figure 10 is a vertical cross section through the orifice plate as shown in Figure 9.

Figure 11 is a fragmentary vertical cross sectional view, the section being taken on the line 11—11 on Figure 2.

Figure 12 is a diagrammatic plan view illustrating one acceptable means for driving the associated turret structures.

Figure 13 is a vertical cross section taken through the drive connections illustrated in Figure 12, the section being taken on the line 13—13 on said figure.

Figure 14 is a detail horizontal sectional view illustrating a modified form of orifice plate.

In the somewhat diagrammatic illustration in Figure 1, there is shown one practical development of the invention as a means for directing steam into the head spaces of cans for displacing air therefrom as the filled can and can end or cover complements are being rapidly fed to the closing machine, provision being made for holding the covers in horizontal position just above and perfectly centered over the open tops of the cans, and for directing the steam in a continuous band or sheet wholly across the open tops of the cans and in contact beneath the closely overlying covers until the initial assembly of each said complement is completed and immediately in advance of the commencement of the double seam sealing of the cans.

While the herein disclosed apparatus is designed especially for steam treating the cans, it is to be understood that said apparatus may be used in like manner for directing an inert gas into the cans for displacing air from the head spaces thereof. However when the unit is to be used with a fixed gas instead of steam, the turret should be equipped with no-can-no-gas valves in order to conserve gas.

In the illustration in Figure 1 a filled can feeding means is shown and generally designated A, the can ends are fed one-by-one from any suitable can end feeding means (not shown) located at the can end feeding station B, a marker of any approved form (not shown) may be employed at the marking station C for marking the can ends prior to assembly with the cans, the cans with the covers thereover are rapidly conveyed by the can and cover transferring turret generally designated D, the steam flow control valve means is generally designated E, and the closing and discharging turrets of a six-spindle closing machine are diagrammatically indicated, the closing turret being generally designated F and the closed can discharging turret being generally designated G.

While any suitable means may be provided for driving the cooperating parts in suitable timed relation, an acceptable drive arrangement is diagrammatically illustrated in Figures 12 and 13 wherein the main drive gear is indicated at **5**. It is to be understood that rotation may be imparted to the shaft on which the gear **5** is affixed in any approved manner (not shown). The drive gear **5** may serve to drive an idler gear **6** which is rotatable with an idler gear **7** disposed to mesh with and impart rotation to a gear **8** which may be connected in drive relation with the driver shaft (not shown) through which rotation is imparted to the cover feed devices at station B. The driver gear **5** also imparts rotation to the closing turret and drive gear **9** mounted to rotate with the driver gear **10** which meshes with and drives the transfer turret driver gear **11** and also the discharge turret driver gear **12**. The marker referred to generally herein is not absolutely essential and therefore a means for driving the same is not shown and may take any acceptable form.

The transfer turret D includes a central hub portion **13** whereon the turret plate **14** is circumferentially adjustably secured, as by the arcuate slot and cap screw equipment **15**. This turret has a plurality of peripheral pockets or half-molds **16**, six being shown, and these are disposed to receive the cans as they are fed along by the can feeding means generally designated A. See Figures 2 and 3. The turret D is equipped with a top face shelf or recess **17** at the position of each pocket whereon a steaming block or orifice plate **18** is removably secured as by cap screws **19**. See Figures 2, 3, 9 and 10. It will be noted that each of the orifice plates **18** includes an arcuate face **20** which bears concentric relation to the associated turret pocket and is stepped back from the pocket wall so as to provide a can flange clearance in the manner clearly illustrated in Figure 3. Each orifice plate also is equipped with an arcuate slot **21** which opens through the bottom face of the plate and communicates with the outer vertical leg **22** of a radial fluid duct 23 formed in the turret plate **14**. The turret plate is provided with six equidistantly spaced ducts **23**, one for serving each orifice plate **18** and pocket **16**, and each said duct includes an inner vertical leg **24** which opens through the top surface of the turret plate. All of the vertical legs **24** or inner duct terminals are arranged in a circle for a purpose that will become apparent as this description progresses.

It will be apparent by reference to Figure 9 of the drawings that each orifice plate **18** is equipped with three sets of orifices, a center set designated **25**, and two side sets designated **26** and **27** respectively. Each set of orifices is made up of a multiple of orifices arranged with their axes in parallel relation, six such orifices being herein illustrated in each of the side sets **26** and **27**, and the central set being made up of thirteen orifices arranged with their axes in parallel relation. Each orifice in each set preferably includes an entrance bore **28** one-sixteenth inch in diameter and one-eighth inch long and opening into a flared discharge orifice portion **29** discharging through the arcuate inner face **20** of the plate. It is preferred that the discharge portion of each orifice constructed in the manner stated, be formed with a seven degree flare. While the particular formation of the orifices thus described is preferred it is to be understood that the number and specific arrangement of the orifices may be varied in accordance with the particular installation, the size of can and product being processed. In the illustration in Figure 9 the dot and dash lines **30** indicate the spread of the sheet or ribbon of steam emanating from the central set of orifices **25**, the lines **31** indicate the similar spread of the steam emanating from the side set of orifices **26** and the lines **32** similarly indicate the spread of the steam emanating from the other side set of orifices **27**. It will be apparent by reference to Figures 3 and 10 of the drawings that the axes of all orifices of all sets lie in a common horizontal plane, and because of the novel arrangement of the orifices as shown in Figures 9 and 10, the steam emanating from the multiple orifices of each set merges in a continuous stream or ribbon as will be clearly apparent.

At the position of each turret pocket **16**, the turret plate **14** is equipped with two lugs, a high lug **33** at the trailing side of the pocket, and a low lug **34** at the advance side of the pocket. The lugs are cooperatively spaced in the manner illustrated in Figures 2 and 5 of the drawings so as to accurately center the cover between them in the direction in which the cover is being conveyed by the transfer turret D. It will be noted that the lugs of each set flank a pocket and are placed so that the relatively low height lug **34** is at the lead side of a respective pocket and the relatively high pusher lug **33** is at the trailing side of said pocket, said lugs being spaced apart approximately in the arc about which the centers of the covers are conveyed and a distance only slightly greater than the diameter of a cover so as to accurately center a cover over a can in said pocket. Other means for accurately confining the covers in the radial direction will be described hereinafter and these cooperating devices serve to very accurately center each cover over the complementary can which is being conveyed in the respective peripheral pocket **16** of the turret D. The relative heights of the lugs will be better undertsood when it is explained that in one acceptable installation the high lug **33** has a height of .718 as compared to a height of .516 of the cooperating low lug **34**.

It will also be apparent by reference to Figures 2 and 3 of the drawings that the turret plate **14** is centrally recessed as at **35** to receive the base boss **36** of an upstanding valve core **37**, said boss being secured in the recess by cap screws **38**. The core **37** is equipped with six equidistantly spaced, uprightly disposed duct bores **39** arranged in a circle so as to be registrable over the inner vertical legs **24** of the turret ducts **23**. At their upper ends the bores **39** open into radial bores **40** which pass outwardly through the periphery of the valve core **37**. A thrust ring **41**, preferably of bronze, surrounds the core **37** on the boss **36** and is pin and socket connected to said boss as at **42** to turn therewith. A bushing sleeve **43**, preferably of graphitar, snugly surrounds the core **37** and extends slightly thereabove in the manner clearly illustrated in Figure 3. The sleeve **43** is mounted within a housing **44**, preferably of bronze, being secured therein against turning by the pin and recess equipment **45**. A flange **46** extending outwardly from the housing **44** has a lug **47** adjustably secured thereto, as by the arcuate slot and screw equipment **48**, and said lug is in turn pin and recess secured as at **49** to the support and frame or turret guard plate **50** which is stationarily mounted in any approved manner as by a supporting bracket ex-

tending from the closing machine housing (not shown), and by supporting column means **51**.

The valve core **37** also is equipped with an upstanding center stem **52** which passes through a top plate or ring fitting within the bushing sleeve **43** and preferably formed of bronze. The ring **53** includes an outwardly extending flange **54** which rests upon the upper end extremity of the bushing sleeve **43**, and said ring is pin and slot connected as at **55** to the core **37** so as to be rotated therewith. The ring **53** also includes an upstanding, externally threaded neck portion **56** which is counterbored to provide a spring well surrounding the core stem **52** and also an abutment shoulder **57**. A compression spring surrounds the valve core stem **52** and engages at its lower end against the ring abutment shoulder **57** and at its upper end against an adjustable abutment means **59** mounted on said stem. A protective cap **60** may be threadably mounted on the ring neck portion **56** so as to protect the rotatable core stem **52** and the parts mounted thereon.

It will be apparent by reference to Figures 2 and 3 of the drawings that the bushing sleeve **43** is provided with an arcuate steam slot **61** which extends one hundred twenty degrees about the valve core **37**. This arcuate slot communicates with a steam supply port **62** formed in the housing **44**, and said port is suitably connected with the steam supply, or with an inert gas supply should the herein disclosed apparatus be employed in the gassing of containers as hereinbefore mentioned.

In passing to the pockets **16** of the transfer turret D the filled cans **63** with their conventional outwardly turned upper end flanges **64** are fed over a support or feedway **65** by a chain conveyor **66**, preferably through a steam tunnel **67** such as is shown in the patent 2,362,841, issued to H. L. Minaker on November 14, 1944. The cans are guided by an outside rail **68** which may be swingably mounted as at **69** in order to make the turret structure more readily accessible, and which may include a curved end section bearing concentric relation to the turret center and cooperating with a fixed rail section **70** and an attached upper extension **71** in outwardly confining the travel of the cans until they are delivered onto the receiving pads of the closing machine and into position for being cooperatively engaged by the pockets of the closing machine turret. See Figures 2 and 7.

As each cover **72** is dropped or fed downwardly by the diagrammatically illustrated screws **73** of the cover feed means at station B it falls upon inner and outer support tracks or rails respectively designated **74** and **75**, to be conveyed thereover by the oncoming high turret lug **33** through the marking station C whereat any approved form of marker may be mounted. It is to be understood that any suitable form of cover feed means and any suitable form of marking means may be employed, both being well known in the art. The conventional cover feed means include the rotating screws as diagrammatically illustrated at **73** in Figure 1, and the marking devices usually include rotatably cooperating marker dies between which the travelling covers engage and are marked, usually being moved rapidly in the process of the marking so as to be momentarily moved away from or in advance of the travelling high feeder lug **33**. While moving through the marking station each cover may engage a retarder bar **76** which is depressed by spring means **77** at each end thereof so as to hold the covers under control as they are passing through the marking devices. See Figures 2 and 11.

The cover supporting rails leading away from the cover feed station B include portions **78** which diverge or move outwardly with respect to lines struck concentrically from the center of the turret, and said rail portions merge into straight portions **79** passing through the marking station C, and then into converging portions **80** which return to concentric relation with the turret center and bring the covers **72** into position for aligning over the transfer turret pockets **16** and the complementary cans **63** therein. While being moved through the converging or inwardly directed portions **80** of the rails the covers engage a spring pressed brake shoe **81** designed to supplement the previously mentioned drag plate **76** in preventing the covers from running too far ahead of the high feeder lugs **33** as the covers are leaving the marking station.

At its top surface over the can feedway A the turret guard plate **50** is recessed as at **82** to receive an insulation fill **83** which is retained in place by a screw secured cover plate **84**. The undersurface of the turret guard plate has secured thereunder, by screws **85**, an inner cover guide rail **86** which is stepped to present an inner cover guiding and confining arcuate surface **87** which is concentric to the center of the transfer turret. The stepping of the rail **86** also provides a raised ceiling wall **88** which is shaped in the manner clearly illustrated in Figure 4 to provide a high level portion **89**, a low level portion **90** and a connecting downwardly inclined portion **91**. A plate section **92** secured beneath the guide rail **86** projects outwardly beyond said rail to provide a cover supporting ledge or shelf shaped to provide a high level portion **93** on the same plane with the inner rail **80**, and a downwardly inclined portion **94**, the discharge end **95** of which drops the covers fed successively thereover onto the underlying and aligned turret pocket orifice blocks **18**. An outer cover guide rail **96** is secured by screws like the rail **86** beneath the turret guard plate **50** in the manner clearly illustrated in Figures 2 and 3 of the drawings, and said rail is stepped to provide an outer cover guide confining arcuate surface which is concentric to the turret axis and depressed to cooperate with the previously mentioned rail guide surface **87** and the lugs **33** and **34** in accurately centering the cam ends in the manner previously described. The stepping of the outer guide rail **96** provides a raised ceiling portion **98** corresponding to the ceiling **88** of the inner rail, and a plate section **99** is secured beneath the outer rail **96**, and like the previously mentioned plate **92** provides a high level portion **100** on the same plane with and forming an extension of the outer rail **80**, and a downwardly inclined portion **101** merging into the low level portion **102** having an arcuate cut-out as at **103** effective to present a narrow edge curl supporting ledge **104** which continues on around to the point at which the cover and can are assembled. See Figures 2, 7 and 8. The inner and outer rails **86** and **96** are spaced apart as at **105** to provide a clearance through which the cover feeding and positioning lugs may pass.

At the position of the inclined portions **94** and **101** of the cover supporting rails **92** and **99** and the inclined ceiling portions **101** the turret guard plate **50** is recessed at **106** and arcuately slotted at **107** to receive an arcuate retarder shoe **108**. See Figures 2, 3 and 4. The retarder shoe **108** is provided with radially projecting flanges **109** which are engageable at the bottom of the plate recess to limit the projection of the shoe below the plate as indicated in Figure 4. The shoe is yieldably depressed by compression springs **110** which engage the upper surface of the shoe and pass upwardly through clearances **111** in the recess cover **112** and engage the undersurface of the insulation recess cover **84**. The shoe has two depending retarder ribs **113** which are spaced apart to provide clearance for the cover feeding and positioning lugs **33** and **34**, and the lower edges of said ribs are inclined in the manner illustrated in Figure 4 to engage in retarding contact with the covers being fed therebeneath by the feeder lugs **33**. As each cover is fed along over the high level supporting way formed by the rail portions **80** and **93**, it comes against the yieldably depressed shoe **108**, or rather the depending retarder flanges **113**, **114** thereof and is retarded so as to be accurately placed against the respective feeder lug **33** and prevent such bouncing of the cover as might permit the advance edge of the cover to pass over the leading or low lug **34** rather than in accurate confining relation behind said low lug. In continuing through the downwardly inclined portions **94**, **101** and **91** of the supporting rails and guideway, the trailing edge of each cover is snugly held against the high feeding lug **33** while the leading edge is forced downwardly and accurately placed behind the leading or low level lug. Thus when each cover **72** drops off the discharge end **95** of the inner rail onto the underlying steaming block or orifice plate **18** and engages in guiding and supporting contact on the outer rail ledge **104** it will be in horizontal position and accurately centered over the underlying complementary can **63** between the before mentioned high and low lugs **33** and **34** and the inner and outer confining walls **87** and **97** of the inner and outer rails **86** and **96**.

It will be noted by reference to Figure 2 that the inner and outer cover guide rails **86** and **96** are extended as at **115** and **116** so as to present their cover guiding inner

and outer walls 87 and 97 beyond the point at which the can and cover are initially assembled, or in other words are brought into the initial friction assembly with the heel of the cover engaging down in the open top of the can within the outwardly extending flange 64 thereof, in the manner somewhat diagrammatically illustrated in Figure 8. Clearances are provided as at 117 in the rail extensions 115 and 116 to permit the cans 63 with the covers 73 thereon to rise into chucking position in the manner illustrated in Figure 8. A clearance 118 also is provided in the extension 116 so as to permit each depending knock-out pad to go down through the rail extension clearances 117 and engage with the covers on the rising cans in order to securely hold them on said cans in the manner illustrated in said Figure 8. It will be apparent by reference to Figure 2 that the outer cover edge supporting ledge 104 is cut away as at 119 to make the ledge narrower at the position at which the can and cover complements are lifted in the manner stated, thereby to provide clearance for the outwardly extending flanges 64 of the rising cans.

The pads of the closing turret onto which the cans are received as they are being moved about by the transfer turret pockets 16 in the manner illustrated in Figure 7 are designated 120, and the closing turret pockets or half-molds which receive the cans from the transfer turret pocket 16 are designated 121. A closing unit cooperates over each closing turret pad 120, the knock-out pad previously referred to being designated 122, the vertically reciprocable carrier stem thereof being designated 123, and the associated chuck through which the knock-out stem operates being designated 124. Fragments of a closing unit are shown in each of Figures 7 and 8, one of the usual complement of two seaming rolls being designated at 125.

As each end closure or cover 72 is dropped by the screws 73 of the cover feeding mechanism it falls onto the supporting tracks 74 and 75 and is picked up by the oncoming feeder lug 33 associated with the then advancing transfer turret pocket 16. The cover is conveyed by said lug through the marking station C, engaging under the spring pressed rail 76 as the marking progresses, and then engaging with the retarder member 81 as the marking is completed, in the manner and for the purposes previously described. As the cover passes beyond the spring pressed member 81 it will be riding on the high level trackway surface 89 in the manner illustrated at the right in Figure 4. Thereafter the cover is fed under the retarder shoe 108 in the manner clearly illustrated in Figure 5, and this spring depressed shoe serves to retard the progress of the cover so as to hold it against the feeding lug 33 in a manner for accurately positioning the same so that as the cover passes under the shoe flanges 114 and through the inclined portions 94, 101 and 91 of the guideways the advance edge thereof will be definitely depressed and placed behind the leading or placer lug 34 in the manner clearly illustrated in Figure 5. This manner of accurately placing each cover between the particular effective set of feeding and placer lugs 33 and 34 serves to very accurately place each cover in the direction in which it is being fed, and the comparable confinement of the lateral edges of each cover between the inner and outer guide wall surfaces 87 and 97 serves to accurately position each cover in the radial direction. In this manner each cover is very accurately aligned over the complementary and underlying can 63 being conveyed about in the respective pocket 16 of the transfer turret. It should be apparent also that as the inner edge portion of each cover falls from the discharge end 95 of the downwardly inclined track portion clearly illustrated in Figures 2, 4 and 5 of the drawings, it falls onto the arcuate supporting surface provided by the respective underlying orifice plate 18 in the manner clearly illustrated in Figures 3 and 5 of the drawings. It will be apparent by reference to Figure 3 that at this time each cover will be supported in horizontal position, spaced a slight distance above the flange 64 of the complementary underlying can 63. This relation of the can and cover complement will pertain until the can is transferred onto the receiving pad 120 of the closing machine turret F in the manner illustrated in Figure 7, and during this whole time the gaseous medium, preferably steam, will be directed outwardly across the space between the undersurface of the cover 72 and the can flange 64 in the manner clearly illustrated in Figures 9 and 10 of the drawings, effectively driving the air out of the head space in the can so that the gaseous medium alone will be contained in said head spaces when the cans are closed. The treatment with the gaseous medium commences at the line 126 as the respective turret porting 40, 39, 24, 23, 22 comes into registry with the arcuate slot 61, and continues slightly beyond the line 127 at which point said respective porting will move out of communication with the arcuate slot 61. The lifting of the pads 120 is so timed that each can flange 64 will have engaged in initial friction assembly contact with the heel of the respective cover 72 by the time the treatment with the gaseous medium is discontinued slightly beyond the line 127.

Attention is particularly directed to Figure 10 wherein the relation of the flanges 64 of the cans with the centers of the orifice through which the gaseous medium is delivered is shown. It will be noted that said flanges are disposed just below the plane in which the axis of the multiple orifices lie. By reason of this positioning of the parts the gaseous medium is caused to split at the can flanges in the manner illustrated by the arrows in Figure 10, some thereof being diverted downwardly about the exterior of the cans below the flanges. By causing the gaseous medium to pass downwardly over the external surfaces of the cans in the transfer turret pockets 16 the passing of the air upwardly about said cans and into the interior thereof is avoided. In other words, any aspirating effect of the continuous ribbons or sheets 30, 31 and 32 emanating from the orifice sets in the manner illustrated in Figures 9 and 10 which would tend to draw air upwardly and over the can flanges 64 into the interiors of the cans 63 is avoided.

By reason of the provision of the outwardly flared orifices in the orifice plate, the steam or other gaseous medium is permitted to spread and completely cover the gap between the cover and the flange of the can of each cover and can complement, and this flaring of the orifice also tends to minimize the possibility of aspiration of air under the side of the can and into the interiors thereof with the gaseous medium. It should also be apparent by reference to Figures 9 and 10 of the drawings that the provision of the multiple of small ports or orifices, flared in the manner shown and described, serve to provide substantially continuous sheets or ribbons of the gaseous medium which, directed in the manner illustrated, serve to provide uniform distribution over the entire head space of each can, at the same time holding the consumption of steam or other gaseous medium to a minimum. The particular arrangement of orifices in three sets as shown in Figure 9, or with their axes in the same horizontal plane, also serves another advantageous purpose. Should the gaseous medium be introduced in one direction only, any product protruding from the can might serve to block the gaseous medium over a substantial portion of the head space, but by having the gaseous medium enter from three directions, this possibility is substantially eliminated. It will be noted by reference to Figure 9 that the extension of the outer extremity of the gaseous medium ribbon or blast at each side of the pocket meet at or slightly beyond the outer edge of the can, thus giving a rather extensive coverage of the head space.

The particular formation of the orifices will, for the reasons stated, provide numerous advantages which may be summed up somewhat as follows: One, the small orifice 28 at the manifold 21 permits the control of the amount of steam or other gaseous medium used in its direction of flow. Two, by flaring the orifices the jet velocity of the steam or other gaseous medium is substantially reduced because part of the expansion can take place at the side rather than in the main direction of flow. Three, the slower moving steam or other gaseous medium on the outside of each expanding jet will have less tendency to cause turbulent mixing of the gaseous medium with the air, thus promoting the displacement of air with the least volume of the displaced gaseous medium. Four, the entire space between can and cover is filled by the ribbons of gaseous medium even though the actual orifice is of less diameter than the space between said cover and can. In other words, by expanding the individual jets of gaseous medium in a controlled manner, they are combined into a ribbon or sheet which is effective to cover the space between the undersurface of the cover

and a point well below the flange **64** of the can in the manner clearly illustrated in Figure 10.

By continuing the steaming or other gaseous medium treatment right up to the point when the pad **120** of the closing turret lifts the can into contact with the overlying cover held in horizontal position and being contacted by the knock-out pad as it is being raised with the can, and by directing the steam or other gaseous medium into the space between the cover and can in the manner previously described, the possibility of drawing air into the interior of the cans just prior to the final closing thereof is substantially eliminated. By this vertical movement of the can into contact with a horizontally disposed cover, both the can and cover being perfectly centered one with relation to the other as previously described, the can and cover are brought together with the least possible amount of abrasive surface contact therebetween, and any tendency of the cover to turn on the can due to the rotation of the knock-out pad and base plate is eliminated because of the frictional grip between the can and cover produced by reason of the cooperative contact and elevation of the supporting and lifting pad **120** and overlying knock-out pad **122**.

In Figure 14 of the drawings there is illustrated a modified form of orifice plate. This plate **128** is equipped with an arcuate chamber **129** extending through the bottom face thereof as in the case of the previously described orifice plate, and a single set of orifices **130** is provided, the centers of all of which lie in a common horizontal plane. It will be apparent by reference to Figure 14 that a single ribbon or sheet of steam or other gaseous medium will be delivered from the multiple orifices **130** in position for effectively sweeping over the whole of each can head space.

While one form of the invention has been shown for purposes of illustration, it is to be clearly understood that various changes in the details of construction and arrangement of parts may be made without departing from the spirit and scope of the invention as defined in the appended claims.

We claim:

1. In apparatus of the character described, the combination of a peripherally pocketed rotary cover and can conveying turret having thereon a set of cover pushing and placing lugs flanking each pocket and comprising a relatively low height placer lug at the lead side of each pocket and a relatively high pusher lug at the trailing side of each pocket, the lugs of each set being spaced apart approximately in the arc about which the centers of the covers are conveyed and a distance only slightly greater than the diameter of a cover so as to accurately center a cover over a can in the respective pocket in the direction of movement of said cover, means for feeding cans to said pockets, means for supporting each cover in horizontal position as it is being conveyed and including inner and outer guide walls effective to confine the conveyed covers radially in said centered relation and feedway rails presenting a high level portion placed at a level higher than that of the tops of the placer lugs but lower than the tops of the pusher lugs, a low level portion wherein covers will travel in confinement centered between the placer and pusher lugs of the respective sets, and a downwardly inclined portion connecting said high and low level portions and which is effective as covers pass therethrough to cause said covers to move down behind the placer lugs while being pushed by the pusher lugs, means for directing a gaseous medium outwardly under the cover and over the open top of the can of each cover and can complement as they are being conveyed by said turret, means for lifting each can against the overlying horizontally disposed cover and said cover with it to effect initial assembly of the cover and can complements, and means for controlling the directing of the gaseous medium to cause the same to be continued until the initial assembly of each cover and can complement is completed.

2. Apparatus as defined in claim 1 in which are included sealing devices comprising seaming roll and chuck means against which the cover and can complements are lifted to be finally sealed thereby, and knock-out pad means vertically reciprocable centrally of the chuck means and timed to engage each cover and move up with it and the underlying can in a manner for holding the initial assembly during said lifting and before the gaseous medium treatment is terminated.

3. Apparatus as defined in claim 1 in which the means for directing the gaseous medium is shaped to direct the gaseous medium in the form of a continuous ribbon and is so located with relation to the conveyed cans and the conventional outwardly turned flanges at the open tops thereof that the directed ribbon of the gaseous medium splits on each can flange so that a portion thereof is directed downwardly over the can wall in a manner for preventing movement of air upwardly over the can wall and into the open top of the can.

4. Apparatus as defined in claim 1 in which the means for directing the gaseous medium includes ducts passing through the turret to the individual pockets through orifice means so formed that the gaseous medium is directed through the orifices in the form of a continuous ribbon, said orifice means being located at the individual pockets in such relation to the conveyed cans and the conventional outwardly turned flanges at the open tops thereof that the directed ribbon of the gaseous medium splits on each can flange so that a portion thereof is directed downwardly over the can wall in a manner for preventing movement of air upwardly over the can wall and into the open top of the can.

5. Apparatus as defined in claim 1 in which the means for directing the gaseous medium includes an orifice plate on the turret at each pocket and having an interior chamber and a multiple of closely spaced orifices receiving gaseous medium from said chamber through small entrance bores and delivering it through flared outlets as a continuous ribbon, ducts passing through the turret to the individual orifice plate chambers, and valve means for controlling the flow of gaseous medium into said ducts.

6. Apparatus as defined in claim 1 in which the means for directing the gaseous medium includes an orifice plate on the turret at each pocket and having an interior chamber and a multiple of closely spaced orifices receiving gaseous medium from said chamber through small entrance bores and delivering it through flared outlets as a continuous ribbon, ducts passing through the turret to the individual orifice plate chambers, and valve means for controlling the flow of gaseous medium into said ducts, said orifices being disposed with their axes in a common horizontal plane at such level with relation to the conveyed cans and the conventional outwardly turned flanges at the open tops thereof that the directed gaseous medium splits on each can flange so that a portion thereof is directed downwardly over the can wall in a manner for preventing movement of air upwardly over the can wall and into the open top of the can.

7. Apparatus as defined in claim 1 in which the means for directing the gaseous medium includes an orifice plate on the turret at each pocket and having an interior chamber and a multiple of closely spaced orifices receiving gaseous medium from said chamber through small entrance bores and delivering it through flared outlets as a continuous ribbon, ducts passing through the turret to the individual orifice plate chambers, and valve means for controlling the flow of gaseous medium into said ducts and including, a rotor movable with the turret and having individual ducts communicating with the turret ducts and opening through an external surface of the rotor, a stator having an arcuate slot therein of a length for and disposed to control the duration of the gaseous medium treatment and with which the rotor ducts serially communicate, and a gaseous medium supply opening into said slot.

8. In apparatus of the character described, means for conveying cover and can complements toward a closing means with each cover disposed over the open top of the complementary can in spaced relation, and means for horizontally directing a gaseous medium in the form of a single substantially continuous horizontal ribbon into the space between each cover and can complement as they are being conveyed for driving air out of the can head spaces, said directing means being disposed at such a level with relation to the conveyed cans and the conventional outwardly turned flanges at the open tops thereof that the directed ribbon of gaseous medium splits on each can flange so that a portion thereof is directed downwardly over the can wall in a manner for preventing movement of air upwardly over the can wall and into the open top of the can.

9. In apparatus of the character described, means for conveying cover and can complements toward a closing means with each cover disposed horizontally over the open top of the complementary can in spaced relation, means for directing a gaseous medium in the form of a

continuous ribbon into the space between each cover and can complement as they are being conveyed for driving air out of the can head spaces, said directing means being disposed at such a level with relation to the conveyed cans and the conventional outwardly turned flanges at the open tops thereof that the directed ribbon of gaseous medium splits on each can flange so that a portion thereof is directed downwardly over the can wall in a manner for preventing movement of air upwardly over the can wall and into the open top of the can, sealing devices comprising seaming roll and chuck means against which the cover and can complements are lifted to be finally sealed thereby, and knock-out pad means vertically reciprocable centrally of the chuck means and timed to engage each cover and move up with it and the underlying can in a manner for holding the initial assembly during said lifting and before the gaseous medium treatment is terminated.

10. Apparatus as defined in claim 8 in which the conveying means comprises a peripherally pocketed rotary cover and can conveying turret and in which the gaseous medium directing means includes ducts passing through the turret to the individual pockets through orifices located at the individual pockets and arranged with their axes in a common horizontal plane substantially at the level of the outwardly turned flanges of the cans being conveyed by said can conveying turret.

11. Apparatus as defined in claim 8 in which the conveying means comprises a peripherally pocketed rotary cover and can conveying turret and in which the gaseous medium directing means includes an orifice plate on the turret at each pocket and having an interior chamber and a multiple of closely spaced orifices all having their axes arranged in a common horizontal plane and receiving gaseous medium from said chamber through small entrance bores and delivering it through flared outlets as a continuous horizontal ribbon, ducts passing through the turret to the individual orifice plate chambers, and valve means for controlling the flow of gaseous medium into said ducts and including, a rotor movable with the turret and having individual ducts communicating with the turret ducts and opening through an external surface of the rotor, a stator having an arcuate slot therein of a length for and disposed to control the duration of the gaseous medium treatment and with which the rotor ducts serially communicate, and a gaseous medium supply opening into said slot.

12. Apparatus as defined in claim 1 in which the means for directing the gaseous medium includes an orifice plate on the turret at each pocket and having an interior chamber and a multiple of closely spaced orifices receiving gaseous medium from said chamber through small entrance bores and delivering it through flared outlets as a continuous ribbon, said multiple of orifices being arranged in three groups each having a multiple of orifices therein with their axes arranged in parallel spaced relation one a central set directed radially outwardly a second side set directed rearwardly and outwardly and the third a side set directed forwardly and outwardly, ducts passing through the turret to the individual orifice plate chambers, and valve means for controlling the flow of gaseous medium into said ducts.

13. Apparatus as defined in claim 1 in which the means for directing the gaseous medium includes an orifice plate on the turret at each pocket and having an interior chamber and a multiple of closely spaced orifices receiving gaseous medium from said chamber through small entrance bores and delivering it through flared outlets as a continuous ribbon, said multiple of orifices being arranged in three groups each having a multiple of orifices therein with their axes arranged in parallel spaced relation one a central set directed radially outwardly a second a side set directed rearwardly and outwardly and the third a side set directed forwardly and outwardly, all of said orifices in all said sets being disposed with their axes in a common horizontal plane which is at a level slightly above the level at which the conventional outwardly turned flanges at the open tops of the cans travel, ducts passing through the turret to the individual orifice plate chambers, and valve means for controlling the flow of gaseous medium into said ducts.

14. An orifice plate for use in apparatus of the character described, said plate comprising a body equipped with a concave arcuate face adapted to be directed toward the open top of a can and a gaseous medium receiving chamber behind said face, and a multiple of orifices arranged closely side by side in said body with their axes in parallel spaced relation and having small diameter entrant bores opening into the chamber and flared outlet bores communicating with the entrant bores and opening through said face and so closely spaced as to be effective to deliver a gaseous medium from said chamber in the form of a continuous ribbon substantially as said gaseous medium leaves said flared bores.

15. An orifice plate for use in apparatus of the character described, said plate comprising a body equipped with a face adapted to be directed toward the open top of a can and a gaseous medium receiving chamber behind said face, and a multiple of orifices arranged closely side by side in said body with their axes in parallel spaced relation and having small diameter entrant ends opening into the chamber and flared outlet ends opening through said face and effective to deliver a gaseous medium from said chamber in the form of a continuous ribbon, said face conforming in curvature to the curvature at one side of the open top of a can and providing a ledge whereon an edge portion of a cover overlying said can side may rest, and said multiple of orifices being arranged in three groups each group having a multiple of orifices therein with their axes arranged in parallel spaced relation one a central group and the other two groups being disposed at opposite sides of said central group with their axes disposed to converge across the axes of said central group, and all of said orifices being disposed in a common plane.

16. An orifice plate for use in apparatus of the character described, said plate comprising a body equipped with a face adapted to be directed toward the open top of a can and a gaseous medium receiving chamber behind said face, and a multiple of orifices arranged closely side by side in said body with their axes in parallel spaced relation and having small diameter entrant ends opening into the chamber and flared outlet ends opening through said face and effective to deliver a gaseous medium from said chamber in the form of a continuous ribbon, said face conforming in curvature to the curvature at one side of the open top of a can and providing a ledge whereon an edge portion of a cover overlying said can side may rest, and said multiple of orifices being arranged in a single group extending full width across said curved face with the orifice axes arranged in parallel spaced relation and in a common plane.

17. In apparatus of the character described, means for conveying cover and can complements toward a closing means with each cover disposed over the open top of the complementary can in spaced relation, and means for directing a gaseous medium into the space between each cover and can complement as they are being conveyed for driving air out of the can head spaces, said directing means being disposed at such a level with relation to the conveyed cans and the conventional outwardly turned flanges at the open tops thereof that the directed gaseous medium splits on each can flange so that a portion thereof is directed downwardly over the can wall in a manner for preventing movement of air upwardly over the can wall and into the open top of the can, said conveying means comprising a peripherally pocketed rotary cover and can conveying turret, and said gaseous medium directing means including an orifice plate on the turret at each pocket and having an interior chamber and a multiple of closely spaced orifices receiving gaseous medium from said chamber through small entrance bores and delivering it through flared outlets as a continuous ribbon, ducts passing through the turret to the individual orifice plate chambers, and valve means for controlling the flow of gaseous medium into said ducts.

18. In apparatus of the character described, means for conveying cover and can complements toward a closing means with each cover disposed over the open top of the complementary can in spaced relation, and means for directing a gaseous medium into the space between each cover and can complement as they are being conveyed for driving air out of the can head spaces, said directing means being disposed at such a level with relation to the conveyed cans and the conventional outwardly turned flanges at the open tops thereof that the directed gaseous medium splits on each can flange so that a portion thereof is directed downwardly over the can wall in a manner for preventing movement of air

upwardly over the can wall and into the open top of the can, said conveying means comprising a peripherally pocketed rotary cover and can conveying turret, and said gaseous medium directing means including an orifice plate on the turret at each pocket and having an interior chamber and a multiple of closely spaced orifices receiving gaseous medium from said chamber through small entrance bores and delivering it through flared outlets as a continuous ribbon, ducts passing through the turret to the individual orifice plate chambers, and valve means for controlling the flow of gaseous medium into said ducts, said orifices being disposed with their axes in a common horizontal plane which is at a level slightly above the level at which the flanges at the open tops of the cans travel.

19. In apparatus of the character described, means for conveying cover and can complements toward a closing means with each cover disposed over the open top of the complementary can in spaced relation, and means for directing a gaesous medium in the form of a continuous ribbon into the space between each cover and can complement as they are being conveyed for driving air out of the can head spaces, said directing means being disposed at such a level with relation to the conveyed cans and the conventional outwardly turned flanges at the open tops thereof that the directed ribbon of gaseous medium splits on each can flange so that a portion thereof is directed downwardly over the can wall in a manner for preventing movement of air upwardly over the can wall and into the open top of the can and said gaseous medium means comprising an orifice plate on the turret at each pocket and having an interior chamber and a multiple of closely spaced orifices receiving gaseous medium from said chamber through small entrance bores and delivering it through flared outlets as a continuous ribbon, said multiple of orifices being arranged in three groups each having a multiple of orifices therein with their axes arranged in parallel spaced relation one a central set directed radially outwardly a second a side set directed rearwardly and outwardly and the third a side set directed forwardly and outwardly, ducts passing through the turret to the individual orifice plate chambers, and valve means for controlling the flow of gaseous medium into said ducts.

20. In apparatus of the character described, means for conveying cover and can complements toward a closing means with each cover disposed over the open top of the complementary can in spaced relation, and means for directing a gaseous medium in the form of a continuous ribbon into the space between each cover and can complement as they are being conveyed for driving air out of the can head spaces, said directing means being disposed at such a level with relation to the conveyed cans and the conventional outwardly turned flanges at the open tops thereof that the directed ribbon of gaseous medium splits on each can flange so that a portion thereof is directed downwardly over the can wall in a manner for preventing movement of air upwardly over the can wall and into the open top of the can, and said gaseous medium directing means comprising an orifice plate on the turret at each pocket and having an interior chamber and a multiple of closely spaced orifices receiving gaseous medium from said chamber through small entrance bores and delivering it through flared outlets as a continuous ribbon, said multiple of orifices being arranged in three groups each having a multiple of orifices therein with their axes arranged in parallel spaced relation one a central set directed radially outwardly a second a side set directed rearwardly and outwardly and the third a side set directed forwardly and outwardly, all of said orifices in all said sets being disposed with their axes in a common horizontal plane which is at a level slightly above the level at which the conventional outwardly turned flanges at the open tops of the cans travel, ducts passing through the turret to the individual orifice plate chambers, and valve means for controlling the flow of gaseous medium into said ducts.

21. In apparatus of the character described, means for conveying cover and can complements toward a closing means with each cover disposed over the open top of the complementary can in spaced relation, and means for horizontally directing a gaseous medium in the form of a single substantially continuous horizontal ribbon into the space between each cover and can complement as they are being conveyed for driving air out of the can head spaces, said directing means including an orifice plate having a gaseous medium receiving chamber therein and an arcuate face shaped to at least partially conform in curvature to the external surface of a can and placed to extend a considerable distance about a can and having a plurality of gaseous medium directing openings discharging from said chamber and through said arcuate face and so closely spaced that the gaseous medium directed therethrough will expand and merge in the form of a continuous ribbon, said gaseous medium directing openings being disposed at such a level with relation to the conveyed cans and the conventional outwardly turned flanges at the open tops thereof that the directed ribbon of gaseous medium splits on each can flange so that a portion thereof is directed downwardly over the can wall in a manner for preventing movement of air upwardly over the can wall and into the open top of the can.

22. In apparatus of the character described, means for conveying cover and can complements toward a closing means with each cover disposed over the open top of the complementary can in spaced relation, and means for horizontally directing a gaseous medium in the form of a single substantially continuous horizontal ribbon into the space between each cover and can complement as they are being conveyed for driving air out of the can head spaces, said directing means including an orifice plate having a gaseous medium receiving chamber therein and an arcuate face shaped to at least partially conform in curvature to the external surface of a can and placed to extend a considerable distance about a can and having a plurality of gaseous medium directing openings having flared outlets and discharging from said chamber and through said arcuate face and so closely spaced that the gaseous medium directed therethrough will expand and merge in the form of a continuous ribbon, the flared outlets of said gaseous medium directing openings being disposed at such a level with relation to the conveyed cans and the conventional outwardly turned flanges at the open tops thereof that the directed ribbon of gaseous medium splits on each can flange so that a portion thereof is directed downwardly over the can wall in a manner for preventing movement of air upwardly over the can wall and into the open top of the can.

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