Oct. 22, 1935. G. A. BARDET ET AL 2,018,113

CAN VACUUMIZING AND SEAMING MACHINE

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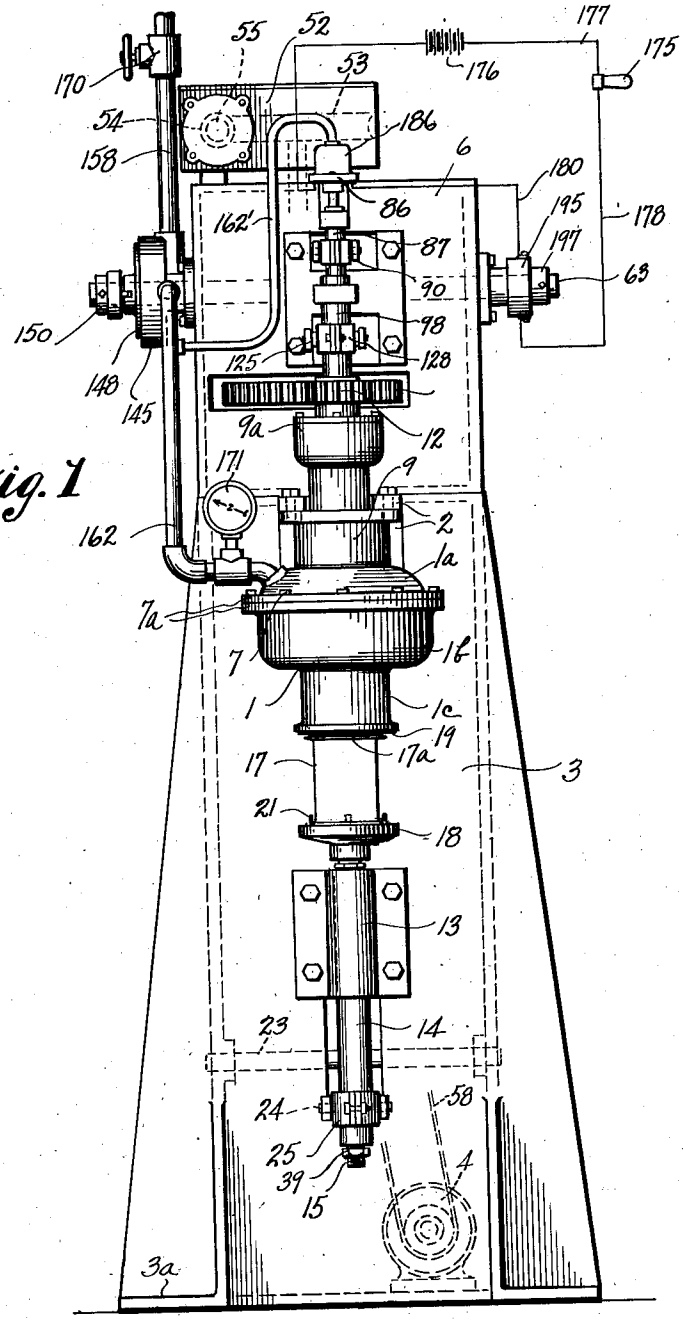


Fig. 1

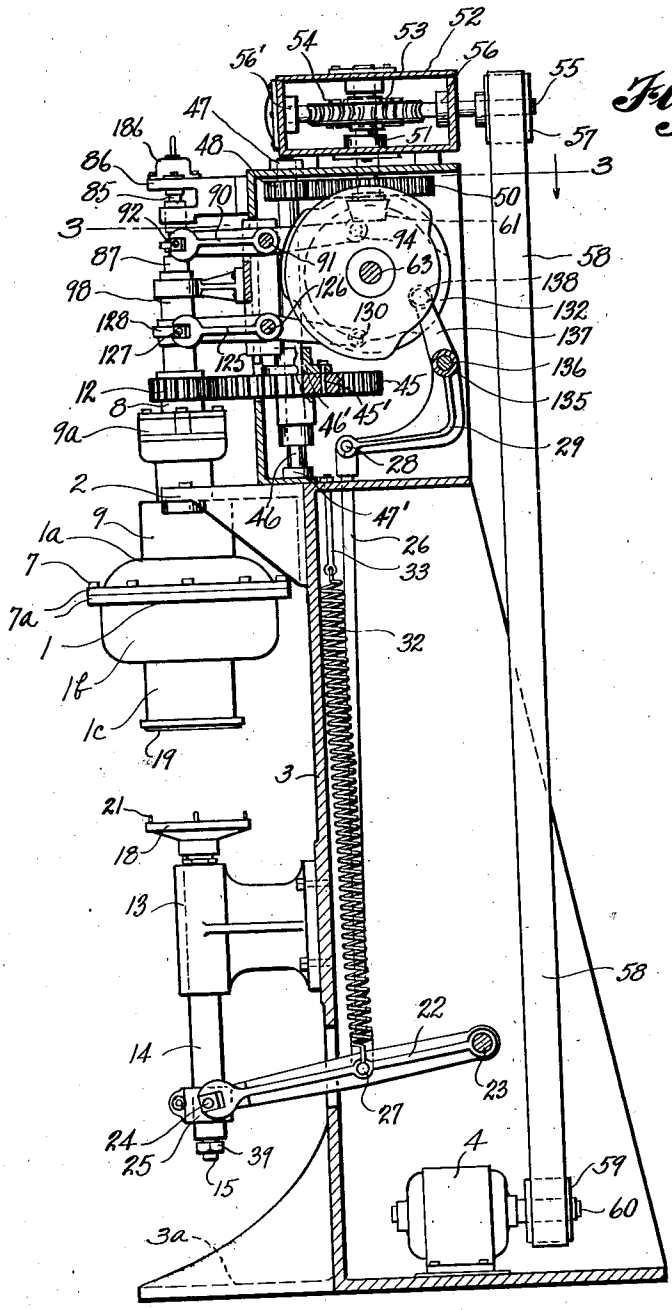
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CAN VACUUMIZING AND SEAMING MACHINE

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Fig. 2



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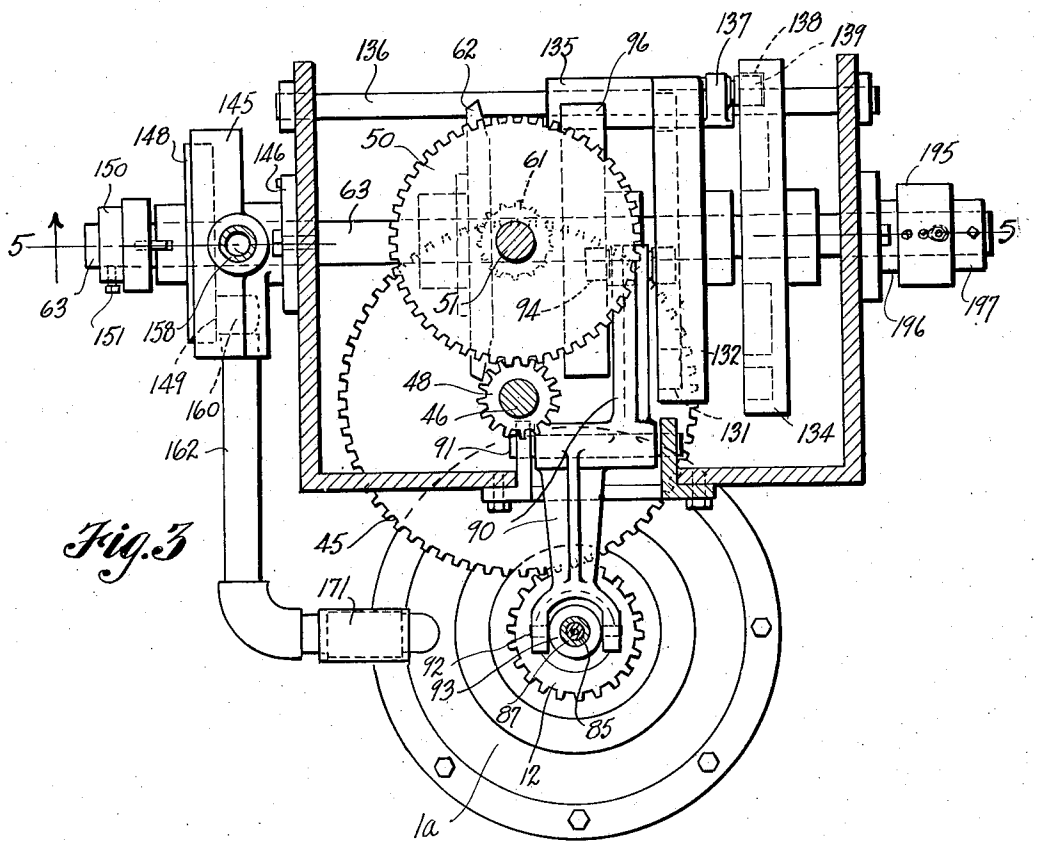
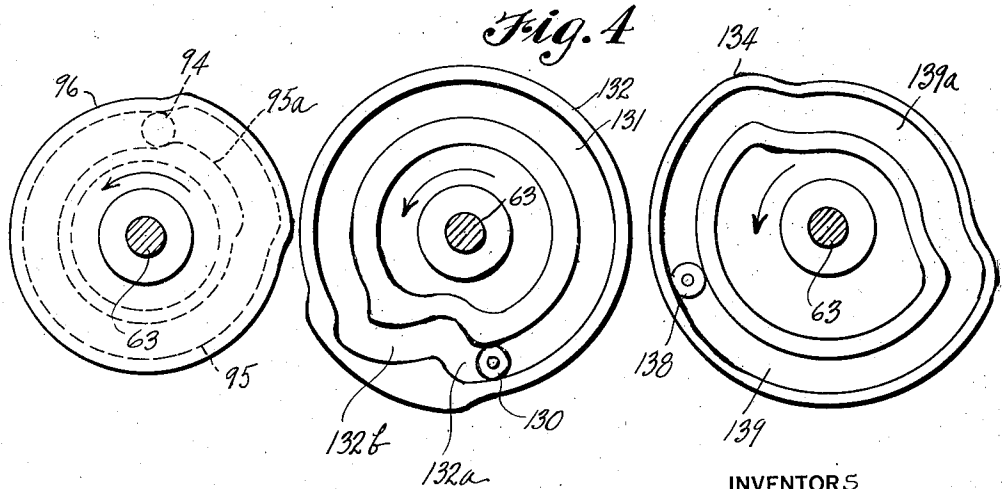


Fig. 3

Fig. 4



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Fig. 5

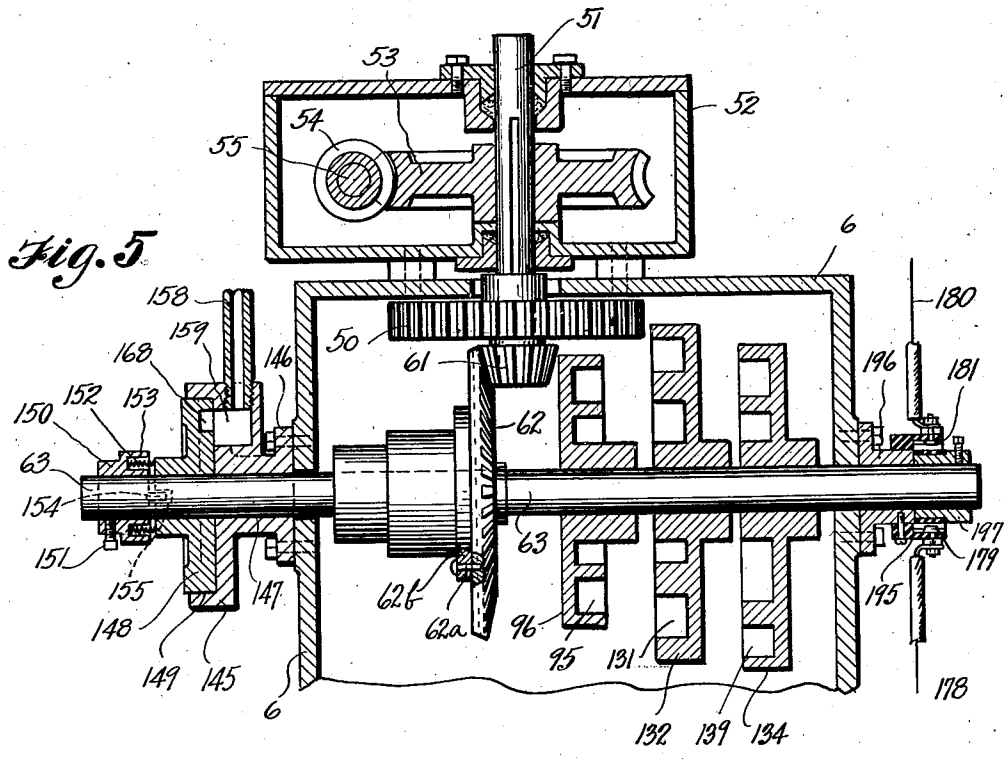


Fig. 6

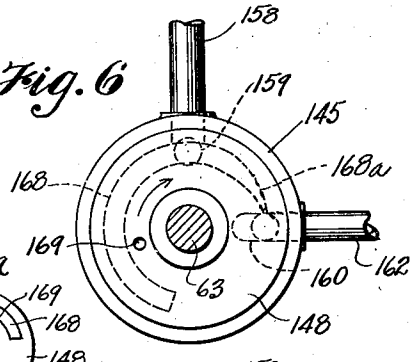


Fig. 7a

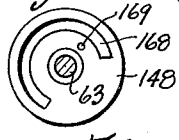


Fig. 7

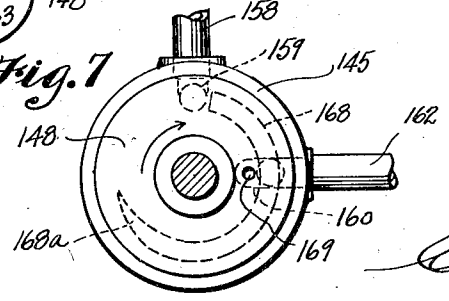
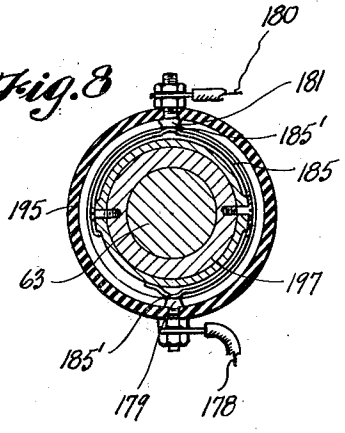


Fig. 8



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Fig. 9

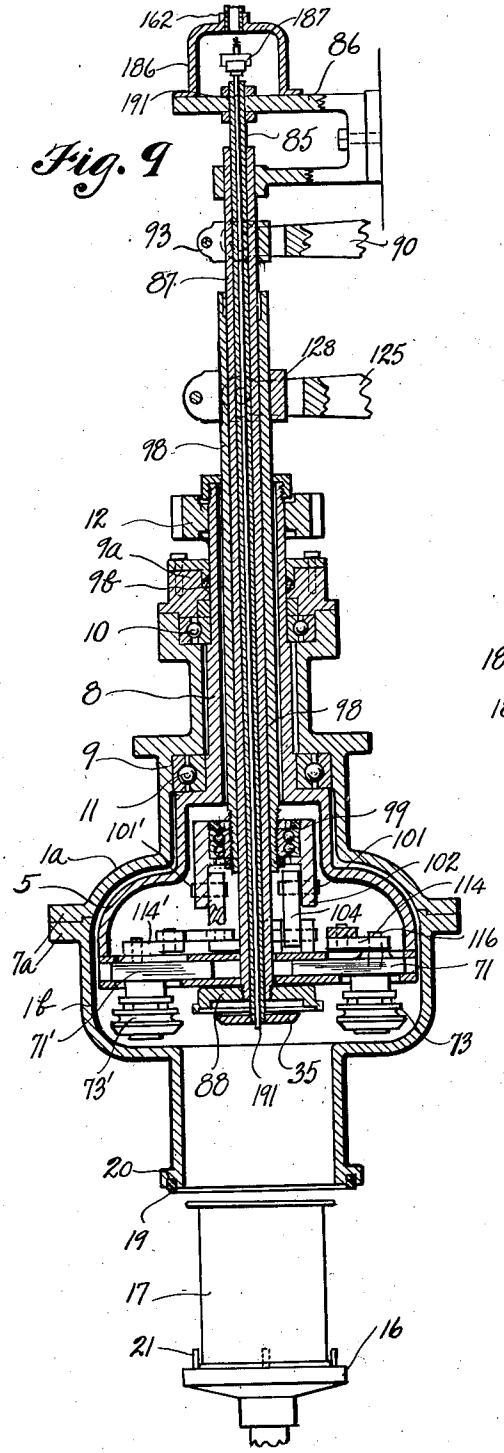
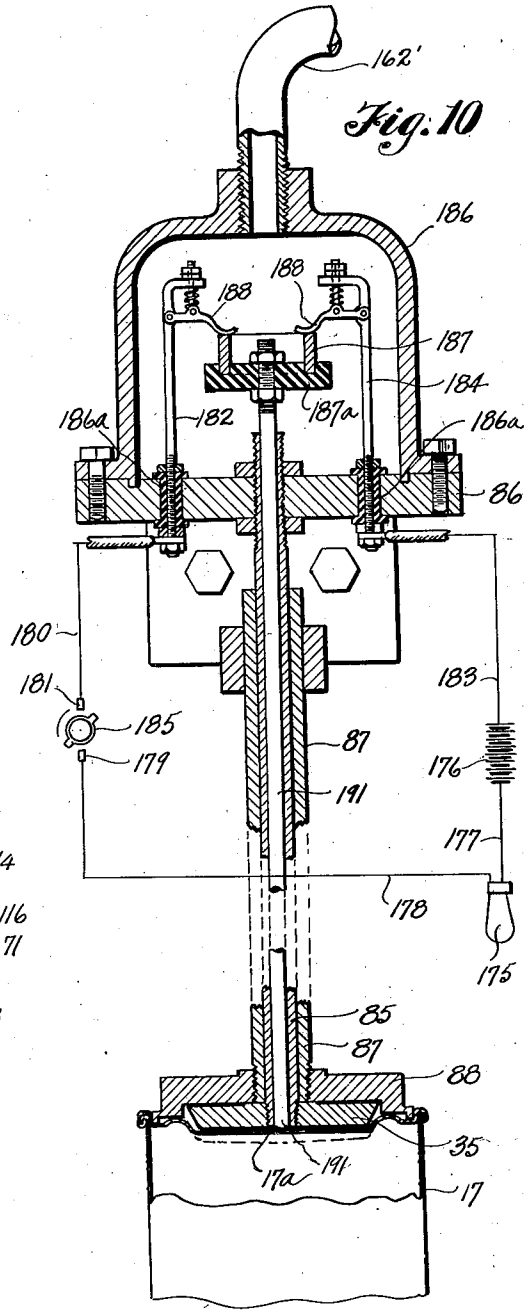


Fig. 10



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CAN VACUUMIZING AND SEAMING MACHINE

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Fig. 11

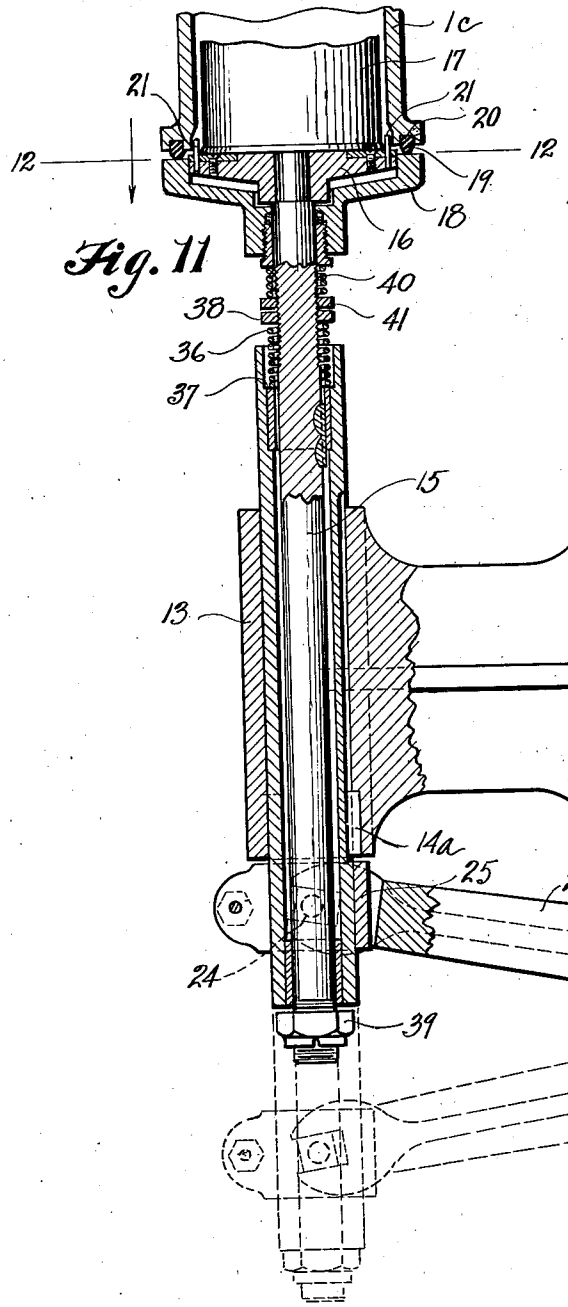
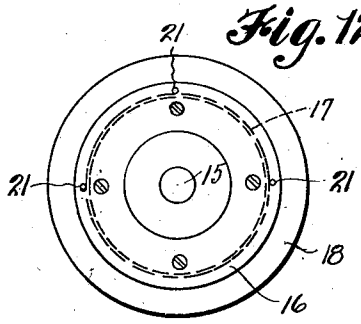


Fig. 12



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Fig. 13

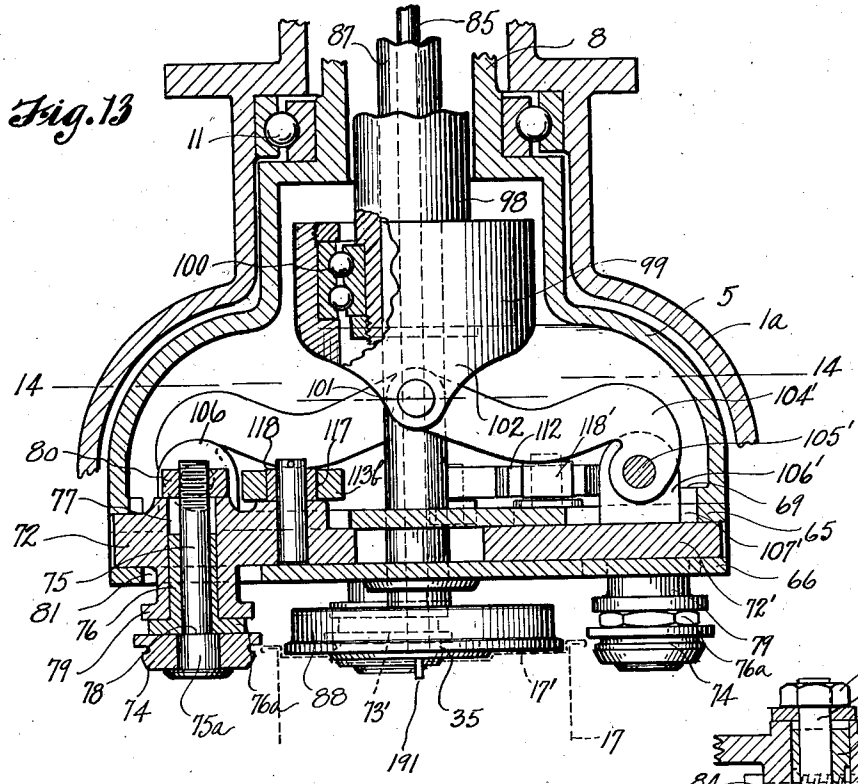


Fig. 14

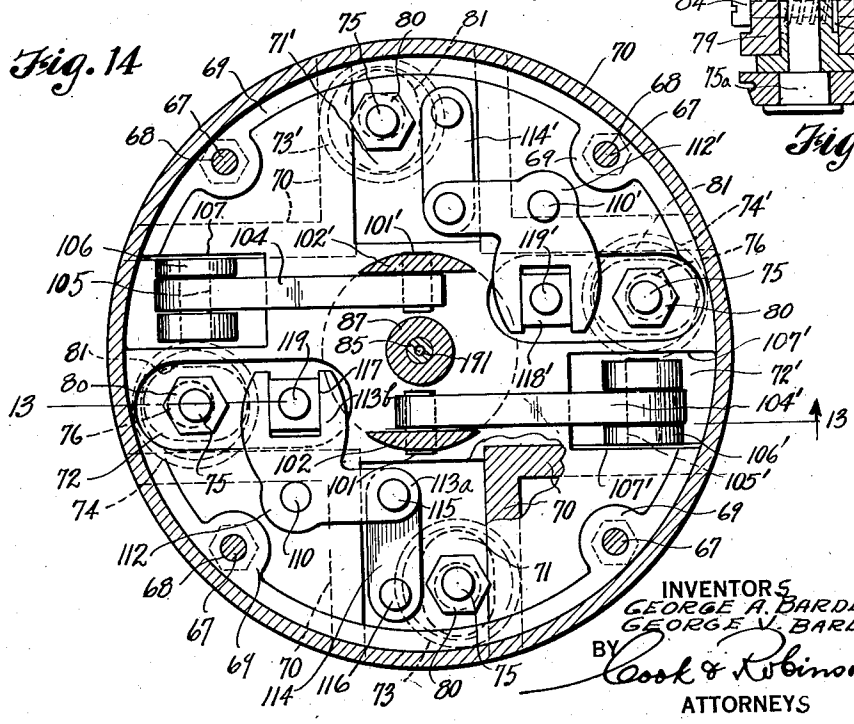


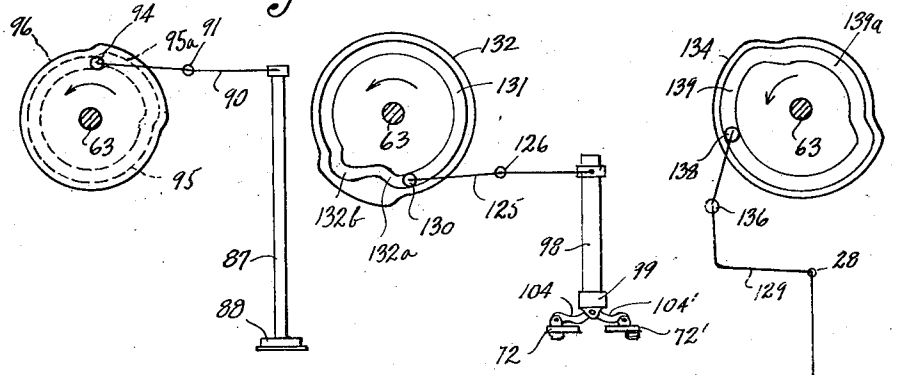
Fig. 14a

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Fig. 15



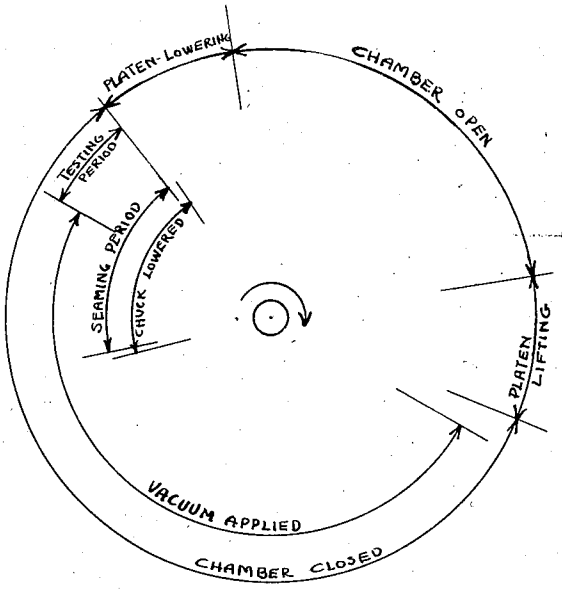


Fig. 16

Fig. 17

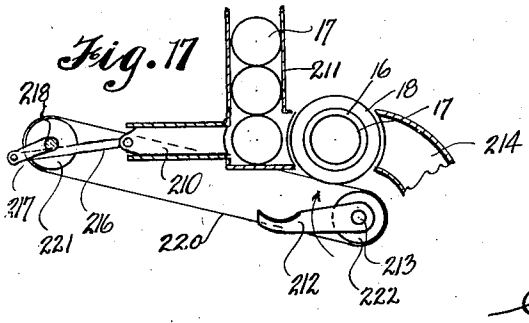
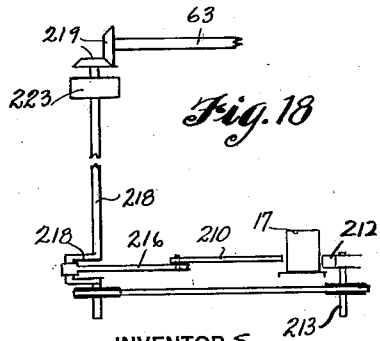


Fig. 18



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Fig. 19

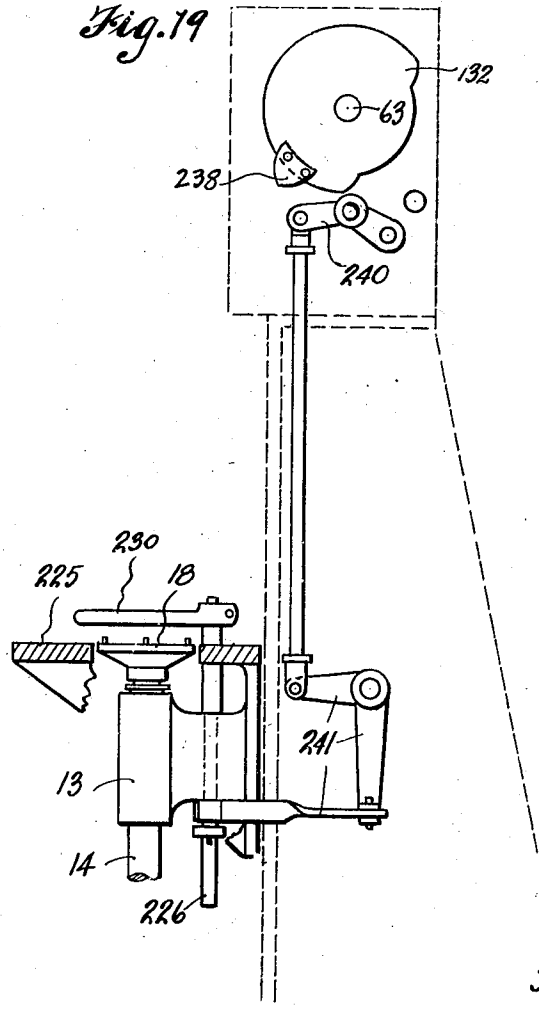


Fig. 20

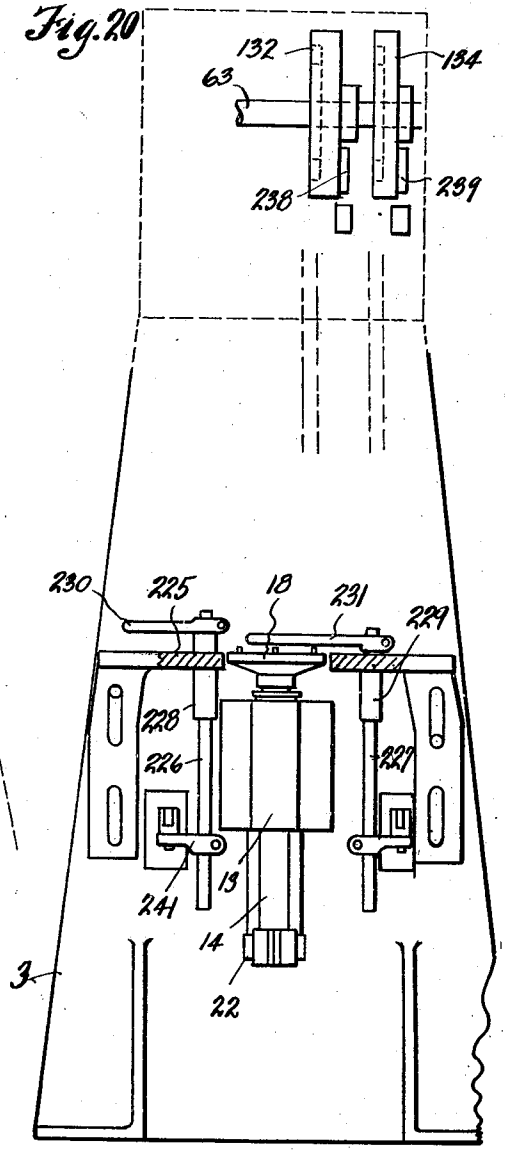
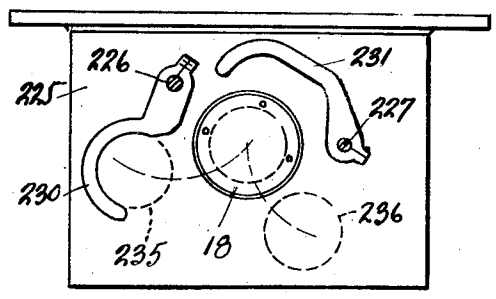


Fig. 21



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Patented Oct. 22, 1935 2,018,113

UNITED STATES PATENT OFFICE

2,018,113

CAN VACUUMIZING AND SEAMING MACHINE

George A. Bardet and George V. Bardet, Berkeley, Calif., assignors to M. J. B. Company, a corporation of Delaware

Application November 5, 1932, Serial No. 641,382

10 Claims. (Cl. 113—24)

This invention relates to can vacuumizing and seaming machines. More particularly it relates to machines of that character having a relatively small vacuumizing chamber adapted to receive one can at a time and containing a single spindle double seamer, and into which chamber cans, with covers loosely placed thereon, may be moved by means which automatically closes the chamber as it supports the can during vacuumizing and seaming; vacuum being applied from a source of supply through the medium of a rotary control valve synchronized in its opening and closing action with the timed operations of the can support and seamer mechanism.

The principal objects of the present invention are—

First, to provide a relatively inexpensive machine of the above character, adapted either to fully automatic or semi-automatic operation, and whereby cans, with ends unclinched and loosely applied thereto may be quickly and uniformly vacuumized and sealed by double seaming the covers or ends thereto.

Second, to provide a machine in which the vacuumizing chamber is only of such volume as required to contain the double seamer head and the can being seamed, thereby to reduce the time interval for vacuumizing to a minimum and to make possible the drawing of a very high degree vacuum in the can to be sealed.

Third, to provide an improved form of double seamer mechanism which eliminates the usual necessity of clinching the covers to the cans prior to their delivery into the vacuumizing chamber, thereby to insure a quick and uniform vacuumization of all cans.

Fourth, to provide means for automatically designating cans that are not fully or properly vacuumized at the end of the seaming operation thereon.

Fifth, to provide a novel form of rotary valve for controlling the application of vacuum to the vacuumizing chamber and whereby the application of vacuum to the can may be made gradually to preclude possible drawing out of contents therefrom incident to the extraction of air.

Sixth, to provide a support whereby the cans are lifted into the vacuumizing chamber and positioned for seaming and which accommodates itself to slight variations in height of cans, and to variations incident to depression or wear on the chamber sealing gasket.

Seventh, to provide a double seamer head of novel construction including both first and second operation seaming rolls readily adjustable to cans of different diameters.

Other objects of the invention reside in the various details of construction, in the combination of parts and in their mode of operation as will hereinafter be fully described.

In accomplishing the above and other objects of the invention, we have provided the improved details of construction, the preferred forms of which are illustrated in the accompanying drawings, wherein—

Fig. 1 is a front elevation of a can vacuumizing and sealing machine embodied by the present invention.

Fig. 2 is a side view of the same; the supporting pedestal and gear housing being shown in vertical section for the purpose of better illustration.

Fig. 3 is an enlarged section, on a horizontal plane, taken substantially on the line 3—3 in Fig. 2.

Fig. 4 is a view illustrating the design of the three cams employed in the double seamer, and showing them as keyed on the cam shaft in their operating relationship.

Fig. 5 is an enlarged, vertical section through the driving gears and cams associated with the seamer, as seen on the line 5—5 in Fig. 3.

Fig. 6 is an outside elevation of the rotary valve mechanism which controls the application of vacuum to the vacuumizing chamber.

Fig. 7 is a similar view of the valve with the rotary member farther advanced. Fig. 7a discloses an alternative.

Fig. 8 is a sectional detail of a circuit closer used in the circuit of the signaling means for designating improperly vacuumized cans.

Fig. 9 is a sectional view of the seamer head mechanism in a plane through the axial line thereof.

Fig. 10 is an enlarged, sectional detail of the signaling means for indicating absence of proper vacuum within a sealed can.

Fig. 11 is an enlarged sectional detail of the can elevating and lowering post and its actuating lever.

Fig. 12 is a horizontal section on the line 12—12 in Fig. 11.

Fig. 13 is a cross section of the double seamer head taken in the vertical plane of the line 13—13 in Fig. 14.

Fig. 14 is a horizontal section taken on line 14—14 in Fig. 13 illustrating arrangement of the slides of the head.

Fig. 14a is a detail illustrating means for adjusting a seaming roll.

Fig. 15 is a diagrammatic view of the double seamer cams and parts actuated thereby.

Fig. 16 is a timing diagram for the seamer cams, valve and testing circuit switch.

Fig. 17 is a view illustrating a can feed device for a fully automatic machine. Fig. 18 is a detail of the same.

Fig. 19 is a view diagrammatically illustrating, in side elevation, an alternative automatic can feed mechanism as applied to the machine.

Fig. 20 is a front elevation of the same.

Fig. 21 is a plan view of the feed levers.

Briefly described, the present device is a stationary, single spindle machine adapted to the double seaming of cans, one at a time, after they have been placed manually or automatically in position upon a support and elevated thereby into a vacuumizing chamber. The chamber employed is open at the base to receive the cans as lifted thereinto by the support and it encloses a single head double seamer equipped with first and second operation rolls. A feature of this construction is that the vacuumizing chamber is only as large as is required to contain the can and double seamer head so that the volume to be vacuumized and the time for vacuumization is reduced to a minimum. Cans placed manually, or automatically, upon the support are lifted thereby into the vacuumizing chamber and retained in proper position for seaming. At the same time the entrance to the chamber is sealed by a platen associated with the support so that vacuum may be drawn therein. As soon as the chamber is closed, the vacuumization period begins and it continues substantially through the double seaming operation, which is somewhat delayed after the chamber is closed in order to permit complete vacuumization of the can before sealing takes place; the application and release of vacuum being under control of a rotary valve which is properly timed with the action of the seamer and can support.

Prior to the feeding of a can into the vacuumizing chamber, a cover is loosely placed thereon. Then, when the can is lifted into the chamber, the cover is caused to abut against a stationary pad associated with and coaxial of the seamer head. This pad retains the cover against displacement from the can during vacuumization prior to seaming. After the can has been vacuumized, the double seamer operates to seam the cover to the can then the support and platen are lowered to remove the can from the chamber and place the parts in position for the next can.

The double seamer is a single head machine with two first and two second operation seaming rolls mounted on individual slides radially adjustable in the head and each operatively connected to an adjustable sleeve coaxial of the head and which, by a cam controlled movement in one direction, will cause the first operation rolls to engage the can flange, then, by movement in an opposite direction, will cause the second operation rolls to finish the seaming operation.

The testing of each can takes place immediately following the seaming operation and in this test, the absence of inward deflection of the upper end wall of the can will bring about the energization of the signal which designates that the can is improperly vacuumized.

Referring more in detail to the drawings—

The vacuumizing chamber, in its entirety, is designated by reference numeral 1 and it is rigidly supported by a bracket 2 that is fixed to and extends forwardly from the upper end portion of a pedestal or frame 3. This pedestal has a base flange 3a through which bolts or the like may be extended if needed to anchor the machine firmly to a foundation. The pedestal also forms a sort of housing or enclosure within which an electric motor 4 is fixed for driving the machine, as presently will be described.

The double seamer mechanism 5 is contained within and is functionally supported by the chamber and the gearing whereby the seamer head is driven, and the several cams whereby its various operating parts are synchronized in their movements, are enclosed within a housing 6 that is fixed upon the upper end of the pedestal, or which may be formed as a part thereof.

The vacuumizing chamber, as seen best in Fig. 9, comprises upper and lower sections 1a and 1b, respectively, joined tightly together by bolts 7 extended through flanges 7a formed about these parts. These two sections form a circular enclosure or chamber within which the head portion of the double seamer mechanism is revolubly contained. The lower section 1b of the chamber has a cylindrical, downwardly extending portion 1c of reduced diameter coaxial of the chamber and also of the seamer head, and this extension is open at its lower end to receive the cans for vacuumization and seaming.

The double seamer head has a tubular, elongated mounting spindle 8 revolubly contained in a bearing portion 9 formed as an integral part of the upper chamber section 1a. The spindle is supported by upper and lower sets of ball bearings 10 and 11, respectively, that are fitted in the bearing portion 9, and it extends somewhat beyond the upper end of the bearing and has a gear wheel 12 fixed thereon for rotating the head, as will presently be described. A cap 9a is applied about the spindle and is attached to the upper end portion of the bearing 9 and this cap contains a packed gland 9b whereby leakage into the chamber past the spindle is prevented.

Fixed to the pedestal or frame 3, below the bracket 2, is a guide bearing bracket 13 and within this is contained a vertically sliding post 14. The post 14 is of tubular form and is slidably keyed as at 14a in the guide bearing and also is disposed in coaxial alinement with the vacuumizing chamber and seamer head. Slidably keyed in the tubular post and extending beyond the upper and lower ends thereof, is a shaft 15 which, at its upper end, mounts a horizontal pad 16 on which a can as designated at 17 is centered for movement into the vacuumizing chamber incident to an upward adjustment of the post.

Slidably fitted on the upper end of the shaft 15 about the pad 16 is a platen 18 and this is arranged to fit tightly against a sealing gasket 19 set within a groove 20 formed in the lower end of the chamber extension 1c, thus to close and seal the chamber during the vacuumizing and sealing period. The upper face of the platen is recessed to receive the pad 16 therein and when the post 14 is in lowered position, as seen in Fig. 1, the top surfaces of the pad and the platen will be even. With the post 14 fully lowered, a can may be centered on the pad, then when the mechanism shifts the post upwardly, the can will be lifted directly into the vacuumizing chamber and the platen 18 will engage tightly against the sealing gasket, as seen in Fig. 11, to seal the chamber while the pad 16 supports the can in

proper position to be acted on by the seaming rolls.

For the purpose of centering the can on the pad three pins 21 are fixed therein at distances from the center of the pad corresponding to the radius of the lower end of the can. Then when the can is placed against these pins, it will be accurately centered relative to the pad and axially alined with the seamer head and the vacuumizing chamber. The cylindrical extension 1c of the vacuumizing chamber as observed in Fig. 9 is just slightly larger than the can cover so that when the can is inserted therein, there will be a minimum amount of space to be vacuumized.

The raising and lowering of the post 14 is effected by means of a lever 22 that is pivotally supported at one end upon a cross shaft 23 mounted transversely within the lower end portion of the frame 3 and at its outer end has a sliding, pivoted connection as at 24 with a collar 25 that is clamped about the lower end of the post. A link 26 is pivotally connected at its lower end to the lever 22 at 27 and at its upper end has a pivoted connection at 28 with a lever 29 that is actuated in synchronism with the seamer mechanism, as will presently be described, to lower and raise the post 14. Also there is a coiled spring 32 attached to the lever at 27 and to the upper end of the pedestal by bolt 33 for pulling upwardly on the lever to yieldingly resist its downward movement.

The pad associated with the double seamer against which the cans are lifted when moved into the vacuumizing chamber by the upward movement of the post 14, is designated at 35 in Figs. 9 and 10. This is a stationary abutment as will presently be understood, and in order that the cans when lifted within the chamber will be pressed tightly against this pad and thus properly positioned for seaming regardless of any slight variation in the heights of different cans, the shaft 15 is yieldingly supported in the post through the medium of a coiled spring 36 which surrounds the shaft and bears at its opposite ends, respectively, against a shoulder 37 in the upper end of the post and against a nut 38 threaded on the shaft, as seen in Fig. 11. A nut 39 threaded onto the lower end of the shaft 15 limits its upward adjustment relative to the post by engagement with the lower end of the post. Also, to compensate for any variation in the extent of the sealing gasket 19 and to insure tight and effective sealing of the chamber regardless of the final position of the pad or post 15 when the can is lifted thereby into the chamber, the platen 10 is slidably mounted on the shaft to engage against the hub of the pad and it is yieldingly supported against downward movement by a coiled spring 40 surrounding the shaft and bearing against the lower end of the platen and against a nut 41 threaded onto the shaft. By so mounting the platen and by thus providing the yieldable connection between the shaft and post, and by providing for a slight over travel of the post in its upward movement, this will cause the spring 36 to be compressed slightly after the can has engaged the stop pad 35 and the can will thus be held firmly in place. Also by causing the platen to engage the gasket before the post reaches its final upward travel, the spring 40 will be compressed after the platen engages the gasket to hold the latter firmly against the sealing gasket and will not require any additional adjustment to compensate for flattening out or wearing away the gasket. This feature is important for the reason that if the pad and platen were integral, flattening of the gasket would prevent tight sealing of the chamber, or if the gasket projected too far, this would prevent the pad lifting the can to proper position against pad 35.

While the machine is in operation, the head of the double seamer is rotated continuously through the medium of the gear wheel 12 fixed on the spindle 8. This gear 12, as seen in Figs. 2 and 3, is driven by a larger gear wheel 45 fixed on a vertical shaft 46 revolubly supported in bearings 47—47' in the housing 6. A pinion 48 is fixed to the upper end of shaft 46 and this meshes with a larger gear wheel 50 fixed on the lower end of the drive shaft 51 of a speed reduction mechanism contained within a gear housing 52 fixed upon the top wall of the housing 6. This speed reduction mechanism includes a worm gear 53 fixed on the shaft 51 and a driving gear 54 therefor fixed on a horizontal shaft 55 mounted by bearings 56—56' and extending from the housing at one end and equipped on that end with a belt pulley 57. A belt 58, as seen in Fig. 2, operates about the pulley 57 and about a pulley 59 on the drive shaft 60 of the motor 4.

For purpose of safety in operation, gear wheel 45 is driven from shaft 46 through the mediacy of a collar or hub 46' that is keyed or otherwise fastened to the shaft, and a shear pin 45' that extends through the hub flange and into the gear. In the event of a jam, the pin will shear before damage to mechanism results.

There is also a bevel gear 61 keyed on the lower end of the shaft 51 of the reduction mechanism and this, through the medium of a bevel gear 62 drives a cam shaft 63 mounted horizontally within the housing 6 and which mounts and drives the seamer mechanism control cams presently described.

It will here be stated that, as a safety factor, to protect the seamer mechanism in the event that a jam should occur, the driving gear 62 is free on the shaft 63 but is operatively attached thereto through the medium of a shear pin 62a that extends through the flange of a hub 62b keyed to the shaft and into the gear. In the event of excessive strain, the pin will shear off to automatically disrupt the driving connection.

The seamer head 5 is hollow and of circular form and substantially fills the enlarged upper bell of the chamber 1, as seen in Fig. 13. The lower end of the hollow head is closed by a base piece comprising horizontally spaced plates 65 and 66 secured together and to the head by a plurality of bolts 67 that extend upwardly therethrough and are threaded into openings 68 in an inwardly formed peripheral flange 69 about the lower end of the head.

The plate 65 is formed on its underside with flanges 70 in such relationship as to provide two pairs of guideways between the plates 65—66; the guideways being radial of the head and those of the same pair being alined with each other diametrically of the head and at right angles to the guideways of the other pair, as seen in Fig. 14. Slidably fitted in one pair of guideways are roll mounting slides 71—71' and slidably fitted in the other are slides 72 and 72'. The slides 71—71' respectively, mount the first operation seaming rolls 73—73' and the other slides likewise mount the second operation rolls 74—74'. These seaming rolls are located at the undersides and at the outer ends of their mounting slides, as seen in Fig. 13, and each roll is freely revoluble on a supporting stud 75 mounted eccentrically within a

bushing 76 which is rotatably fitted in a bore 77 through its mounting slide parallel with the axis of the seamer head. The stud is formed with a lower end enlargement 75a on which the seaming roll is mounted and this enlargement provides a shoulder 78 that seats against the lower end of the bushing. In the arrangement of Fig. 13 the bushing has a lower end wrench head 76a adapted to receive a wrench for turning the bushing to make any slight inward or outward adjustment of the roll, and this head rests against a bearing boss 79 integral with the slide and extending downwardly therefrom. At their upper ends the studs 75 have nuts 80 threaded thereonto against the upper faces of the slides to retain the adjustment of the roll that is made by rotative adjustment of the bushings.

The base plate 66 of the head is slotted radially as at 81, for passage of the slide bosses 79 and to permit the radial adjustment of the slides for actuating the rolls inwardly and outwardly relative to the can flange.

In an alternative construction, as seen in Fig. 14a the bushing 76 may be toothed as at 83 to fit the threads of an adjusting screw 84 rotatably mounted in the downwardly directed boss of the slide. This screw is accessible from the under face of the head and may be rotated to effect a turning adjustment of the bushing.

Disposed coaxially of the seamer head and its spindle and extending upwardly from the latter is a shaft 85 that is fixed rigidly at its upper end in a bracket 86 that is bolted to the housing 6. At its lower end this shaft mounts the pad 35 against which the cans are lifted for seaming, as previously stated. Surrounding the shaft 85 and slidable thereon is a sleeve 87 which, at its lower end, mounts a chuck 88 adapted to be moved down into the countersink of the can cover to back up the seaming rolls for the seaming operation. This sleeve is actuated upwardly and downwardly to move the chuck against and from the cover by means of a lever 90 pivotally mounted between its ends on a pivot shaft 91. At its outer end it has a pivoted connection, as at 92, with a collar 93 fixed on the sleeve, and at its inner end, it has a cam roller 94 adapted to follow within a cam groove 95 in a cam wheel 96 fixed on the shaft 63; the cam groove, as seen in Fig. 4, extending through an arc of approximately two hundred five degrees of the same radius, then merging into an arcuate portion 95a of greater radius. When the cam roller moves into this portion of greater radius, the lever 90 will be actuated to shift the sleeve 87 downwardly, thereby to seat the chuck 88 within the countersink of the can cover to back up the seaming rolls during the seam forming operation. When the cam follower passes into that portion of the groove of lesser radius, the lever is actuated to lift the chuck from the can cover.

Rotatably fitted about the sleeve 87 and shiftable vertically thereon, is a sleeve 98 which has a block 99 fixed to the lower end thereof within the seamer head. Preferably this block would be mounted through the mediacy of ball bearings, as indicated at 100, in Fig. 13 to rotate on sleeve 87. Pivotally attached by pivot pins 101—101' to ears 102—102' extending downwardly from the head 99 at opposite sides are links 104—104' which at their outer ends are pivotally attached by pins 105—105' respectively to ears 106—106' extending upwardly through slots 107—107' in plate 65. Thus, by an upward and then a downward shifting of the sleeve 87 from a neutral position, the slides 72—72' will be moved inwardly and then outwardly in their guideways.

Pivotally mounted just above the upper surface of the plate 65 within the head on vertical studs 110—110' fixed in the plate diametrically opposite the center of the head, are bell cranks 112 and 112'. The bell crank 112 has arms 113a and 113b at right angles to each other; the arm 113a overlying slide 71 while arm 113b overlies slide 72. A link 114 is connected pivotally at one end by a pin 115 to the arm 113a and at its other end is pivotally connected by pin 116 with the slide 71. The arm 113b has a longitudinal slot 117 slidably containing a block 118 that is mounted on a pivot pin 119 fixed in the slide 72. Likewise, the bell crank 112' has one arm connected by a link 114' with slide 71' and its other arm connected through a block 118' and pin 119' with slide 72'. By reason of this bell crank and link form of connection, a downward shifting of the sleeve 98 and block 99 will cause the slides 72—72' to be moved outwardly while the slides 71—71' will be moved inwardly. Likewise, when block 99 is shifted upwardly, the slides 72—72' will be moved inwardly and the other slides 71—71' will be moved outwardly. Thus, the seaming rolls for the first and second seam forming operations may alternately be brought into operation. By disposing the head in a neutral or intermediate position, all rolls will be held in a neutral position free of the can flange.

The means provided for actuating the sleeve 98 upwardly and downwardly to adjust the position of the seaming rolls, comprises a lever 125 that is pivotally mounted on a pivot shaft 126. At its outer end the lever 125 has a sliding pivoted connection as at 127, with a collar 128 clamped on the sleeve. At its inner end, the lever has a cam roller, or follower, 130 arranged to follow within a cam groove 131, in a cam wheel 132 keyed on shaft 63. The cam groove 131 of cam 132 is concentric of the shaft 63 and is of uniform radius for approximately three hundred degrees and while the follower is in this portion, the lever 125 holds the seaming rolls in neutral position. Then just after the chuck has been actuated into the countersink of the can end by cam 96, the follower 130 passes into an inwardly directed portion 132a of the cam groove and this causes the block 99 to be shifted to bring the first operation rolls inwardly against the can cover flange to thus perform the first seam forming operation. Immediately following this, the follower moves into an outwardly inclined portion 132b of the cam groove and this causes the slides to be shifted to displace the first operation rolls and to bring the second operation rolls into operation to complete the formation of the seam. The follower then moves along a portion 132c of the groove back into the neutral position.

The movement of the chuck 88 and the action of the seaming rolls are synchronized by reason of both cam wheels 96 and 132 being keyed on the same shaft 63. Also, the action of the can supporting pad 16 which lifts the cans into position for seaming, is synchronized in its action with the inward and outward shifting of the seamer rolls by means of a cam wheel 134 keyed on shaft 63, as was previously described. The lever 29, whereby the can support is actuated, is formed on one end of a sleeve 135 revoluble on a shaft 136 fixed transversely within the housing 6. On the sleeve is a lever arm 137 carrying a cam roller 138 at its end adapted to follow within a cam groove 139 of the cam wheel 134

which is keyed on shaft 63. The cam groove 139 is of uniform radius through approximately two hundred fifteen degrees and while the cam follower is contained in this portion, the parts controlled by the cam retain the vacuum chamber closed. Then the follower passes into a portion 139a of smaller radius and the cam lever operates to lower the pad for withdrawing the seamed can and to place the pad 16 in position for receiving another can for seaming.

By reference to Fig. 4, the relationship of the cam wheels will be noted, and it will be observed also, with reference to diagram of Fig. 16 that the cam 134 actuates the lever 22 to lift the can into the sealing chamber and to seal the latter an appreciable interval before the seaming operation takes place. Also, the relative location of the cams indicates that the chuck will be actuated into the can end just ahead of the seaming operation and brought out coincident with finishing the operation.

The application of vacuum to the vacuumizing chamber is under control of a valve operating in synchronism with the seamer. This valve, as seen best in Figs. 1, 5, 6 and 7, comprises a casing 145 formed with a base flange 146 through which bolts are extended to secure it to the side of the housing 6. This casing is formed with a bore 147 through which the shaft 63 extends. Mounted on the shaft at the outside of the housing is a valve disk 148 that fits snugly within a circular recess 149 in the outer face of the housing. A disk holding nut 150 is adjustably locked on the shaft at the outside of the disk by a set screw 151 therethrough and coiled springs 152 contained in sockets 153 in the nut press inwardly against the hub of the disk to retain the disk seated within the recess. This disk is caused to rotate with the nut by means of pins 154 that are fixed in the nut and which extend into slots 155 formed in the hub portion of the disk.

Entering the top of the valve casing 145 is a pipe 158 leading from a source of vacuum. This connects with a chamber 159 opening directly to the face of the recess 149 in which the disk is rotatably fitted. There is also a chamber 160 formed in the face of the recess at the same distance from the axis of the valve as the chamber 159, but at an interval of ninety degrees advanced therefrom and from this chamber a pipe 162 extends into the top of the vacuumizing chamber 1.

The inner face of the valve disk 148 fits revolubly against the base of the recess 149 in an air tight joint, and formed in the inner face of the disk is an arcuate slot 168, the forward end portion 168a of which is gradually tapered in width and depth to a point. This groove is adapted to pass in registration with both chambers 159 and 160 and it is of such length that as the disk rotates it will overlap both chambers while the disk rotates through an interval of approximately one hundred eighty degrees to provide a connection whereby vacuum will be applied from pipe 158 through pipe 162 to the chamber 1. The length of the slot 168 determines the period of vacuumization and in this instance this period begins practically coincident with the closing of the chamber by the platen 18 when a can is lifted into the chamber for seaming.

There is also a port 169 directly through the valve disk and this is so located that it will pass into registration with the chamber 160 at the termination of each vacuum applying period, as seen in Fig. 7, thus to break the vacuum in chamber 1 to make possible the easy lowering of the chamber sealing platen.

Action of the vacuum applying valve may be properly synchronized with the action of the seamer and chamber sealing platen by properly adjusting and then locking the valve driving nut 150 on the shaft 63, which in this instance, mounts the various cams that time the operation of the seamer mechanism, and also the action of the chamber sealing platen and can positioning pad.

It will be mentioned here that the shaft 63 rotates but once for each complete vacuumizing and can seaming operation; therefore with the various cams which control the action of the platen, can lifting pad, chuck, seamer slides, and also the rotary member of the valve mounted on this shaft, it is possible to maintain them in accurate timing.

In Fig. 7a we have illustrated the valve slot as being square cut at both ends, and this is satisfactory when some heavy products are being packed, but a special feature of this valve resides in the details of construction of the groove in the inner face of the disk, particularly with reference to the tapered forward end portion 168a as seen in Figs. 6 and 7. It is apparent that as the valve disk rotates, this restricted end portion 168a first comes into communication with the chamber 160 and initially makes a very slight application of vacuum, the vacuum in the chamber 1 thereby being gradually applied so that the undesirable drawing out of contents of a can by reason of too sudden an application of high vacuum is avoided.

A hand valve 170 is located in pipe 158 to shut off the application of vacuum to the machine and a pressure gauge 171 is located in pipe 162 to indicate the degree of vacuum in the chamber 1.

For the purpose of indicating cans that are not properly vacuumized at the close of the seaming operation, we use an electrically actuated signal device, 175, such as a buzzer, bell or light, and connect this in an electric circuit, as seen in Figs. 1 and 10. The circuit includes a source of electricity 176 one side of which is connected by a wire 177 with one side of the signal 175, a wire 178 leading from the other side of the signal to a switch contact 179, a wire 180 leading from a switch contact 181 to a binding post 182 of a circuit closer, a wire 183 leading from the other side of the source of electricity to a binding post 184 of the circuit closer, a circuit closing element 185 rotatably mounted on shaft 63 and adapted to momentarily close a circuit between the contacts 179 and 181 for each rotation of shaft 63 and a connector 187 adapted to make or break an electrical connection between the binding posts 182 and 184.

Each of the binding posts has a finger 188 yieldingly mounted at its upper end and disposed to be engaged by the connector 187. The connector is mounted by an insulated block 190 fixed on the upper end of a small rod 191 that extends coaxially of and slidably within shaft 85 and which at its lower end extends slightly below the face of the pad 35. When a can is in position to be seamed, this rod rests upon the can end, or cover, as seen in Fig. 10.

The binding posts 182 and 184 are mounted within an air tight casing 186 that is supported upon the bracket 86. These posts are supported through the medium of insulating bushings 186a. Also the connector 187 mounted on rod 191 by insulating block 190 is contained in the casing

186 which is connected at its top by a pipe 162a with the pipe 162 so that the tendency of shifting the rod 191 downwardly by reason of application of vacuum to chamber 1 will be balanced by the application of vacuum to casing 186.

The can cover, or end 17a, is of a flexible character and after vacuum has been drawn in the chamber 1 and the can has been sealed, the opening of the chamber to outside air will cause the end to be depressed as to the dotted line position of Fig. 10. Therefore, the length of the rod 191 has been accurately determined, so that when the can end is not depressed, the connector 187 will be held in a lifted position and will effect a circuit connection between finger 188—188', but if the can end wall is inwardly depressed by reason of drawing the vacuum in the can this permits the rod to drop downwardly a slight distance so that the connection is not made and a circuit will not be closed to the signal device 175 incident to the closing of the circuit between contacts 179 and 181, which is timed to take place immediately following the breaking of vacuum in the chamber 1 by the valve mechanism, but before the can is lowered.

The contacts 179 and 181, as seen in Figs. 5 and 8 are fixed within an insulated ring 195 fixed about one end of shaft 63 on a supporting hub 196 that is bolted to the casing 6. A nut 197 is adjustably fixed on the extended end of shaft 63 and about this is fastened the contact member 185 which is a segment of a metallic ring and it is provided diametrically of the shaft with outwardly formed portions 185'—185' adapted to simultaneously engage with the contacts 179 and 181 once for each rotation of the shaft 63 to close a circuit between them. With the signal device so constructed, and with the circuit closer 185 properly adjusted on the shaft 63 so as to close a circuit between the contacts 171 and 181 at the end of each seaming operation just after vacuum in the chamber has been broken but before the can is lowered, it is readily apparent that if a can is properly vacuumized the can cover will be depressed by the outside pressure and the connector 187 will drop away from the fingers 188—188' so that the signal circuit cannot be completed. However, if the can is not vacuumized, the cover will not be depressed and the connector will be supported thereby in contact with the fingers and the circuit will be completed through the signal to give a visible or audible indication of this fact.

While we have illustrated and described the machine as being of a semi-automatic character, it is readily apparent that its action could be made fully automatic by use of a feed mechanism similar to or like that illustrated in Fig. 17, wherein 210 designates a reciprocally actuated feed slide whereby cans are successively delivered from a feed chute 211 onto the pad 16 when it is in lowered position and a rotary arm 212 driven by a shaft 213 advances the seamed cans from the pad to a delivery chute 214. The feed slide is actuated by a link 216 connecting it with a crank 217 on the lower end of a drive shaft 218 connected by gearing 219 to rotate with the shaft 63, while the arm 212 is rotated by a sprocket chain belt 220 operating about sprockets 221 and 222 on the shafts 218 and 213 respectively. Intermittent drive mechanism of a suitable character, as designated at 223 would be utilized in connection with the gearing 219 to give the parts 210 and 212 the proper action.

In Figs. 19, 20 and 21 we have shown in a diagrammatic manner an alternative means for feeding cans to and from the pad 18. In this arrangement a table 225 is attached to the main frame with its horizontal top surface level with the pad when it was lowered. This table mounts two rotatably movable shafts 226—227 at opposite sides of the pad in bearings 228, 229. At the upper end of shaft 228 is a can feed arm 230. At the upper end of shaft 229 is an arm 231; these arms being so positioned that the first may, by rotative action of its shaft, operate to move a can placed on the table at the position 235, onto the pad. Likewise, the arm 231 may operate to remove the can from the pad to the position 236.

These two shafts are actuated in synchronism with the seamer mechanism by cams 238 and 239 fixed, respectively, on the outer faces of the cam wheels 132 and 134. The cam 238, actuates a lever 240 which, through suitable levers and linkage as at 241 actuates the arm 230 while cam 239, through similar mechanism, actuates the lever arm 231. This mechanism is simply illustrative of one means for automatically feeding cans onto and from the pad.

It is to be understood also that fully automatic machines employing a plurality of units of the type described are anticipated. In this multiple unit type of machine the individual units would be mounted upon a rotary turret similar to design and mode of operation to that of the machine illustrated in United States patent issued to us on August 30, 1932, under Number 1,874,854, in which the cans are automatically fed to the vacuum chambers and also automatically removed. It also is contemplated in such a machine to employ the master valve which is the subject matter of the above patent, for controlling the application of vacuum to the various chambers instead of equipping each unit with an individual control valve.

With the machine constructed as herein illustrated its operation, briefly described, is as follows:

With the platen 18 and pad 16 in lowered position, a can 17 with cover 17a loosely placed thereon, is centered on the pad. Rotation of shaft 63, through the cam 134, link 26, lever 22 and post 14 causes the pad to be lifted to place the can inside the chamber 1 and the platen to close the chamber. Coincident with closing the chamber, the valve disk 148 moves into position to connect pipes 158 and 162 for applying vacuum to the chamber. By reason of the looseness of the cover on the can and by reason of the chuck not yet being seated in the cover, the can will be quickly vacuumized. Following the initial vacuumizing period, the chuck is actuated down into the countersink of the cover and then the first and second operation rolls of the double seamer take effect in succession to seam the cover to the can. Then, the chuck is lifted and the platen and pad are lowered to remove the can, but just prior to lowering the pad, the valve operates to break the vacuum in the chamber and the test is made through the signal device to indicate whether or not the can is properly vacuumized.

An important feature of this invention is in the setting of the pad 35 so that when a can is lifted against it, the pad merely acts as an abutment to hold the can end in place during the vacuumizing period, thus doing away with the clinching of the covers on the cans prior to

vacuumizing, as is ordinarily done. Also, it is to be noted that the chuck 38 is not seated in the cover until after a long period of vacuumization, and thus the possibility of improper or insufficient vacuumization resultant to the chuck holding the cover seated too tightly, is avoided.

Furthermore, the pad 35 retains the can against upward lifting with the chuck when the latter is withdrawn and in this way the usual knock out pad is eliminated. It is intended also that the pad 35 shall be so located relative to the supporting pad 16 that it will depress the cover slightly in the center when the can is in seaming position thereby to cause the cover flange to be deflected upwardly. This produces only a line contact between the cover flange and can body flange instead of the usual flat surface to surface contact, thus to make the vacuumization of the can easier and quicker.

This type of machine is relatively simple in construction, and relatively inexpensive. However, it is very desirable for use as it produces a very high and uniform vacuumization of cans.

To adapt it to cans of different diameters it is only necessary to make proper adjustment of the seamer slides, change the lower section 15 of the chamber to one of proper size and to adjust the movement of post 14 by use of parts of proper form.

Having thus described our invention, what we claim as new therein and desire to secure by Letters-Patent is—

1. A can vacuumizing and seaming machine comprising a vacuumizing chamber having a base opening, a revolving double seamer head in the chamber, a can support, means for locating a can, with cover loosely applied thereto, on the support for seaming and means for actuating the support to lift the can into the chamber for vacuumizing and seaming; said seamer head comprising a central, stationary abutment pad against which the can cover is pressed to retain it against displacement during vacuumization of the can, a chuck movable against the can cover to seat it after vacuumization of the can, and seaming rolls operable against the cover flange to seam it to the can body.

2. In a can vacuumizing and closing machine, a vacuumizing chamber, and a valve for controlling application of vacuum to said chamber comprising a housing having spaced pockets opening to a face of the housing and connected respectively with a source of vacuum and with the chamber and a rotary valve plate overlying that face and normally closing the pockets and having a slot therein adapted to overlap the pockets simultaneously during a certain interval of rotation of the plate thereby to provide a connection between the source of vacuum and chamber; said slot being gradually retricted in size toward its forward end, thereby to provide for a gradual enlargement of the connecting passage as the vacuum is applied.

3. In a can vacuumizing and seaming machine, a vacuumizing chamber, means for vacuumizing and sealing a can while disposed in the chamber, means for releasing the vacuum after sealing the can whereby external air pressure will cause inward deflection of a flexible wall of the can and a signal device rendered active or inactive by movement of said wall.

4. In a machine of the character described, a vacuumizing chamber, means for vacuumizing and sealing a can therein, means for admitting atmospheric pressure to said chamber after the can has been sealed thereby to cause a flexible wall of the can to be depressed by external pressure, a signal device and a control element supported by said can wall and adapted to be moved incident to said depression to render the signal inactive.

5. In a can vacuumizing and sealing machine, a vacuumizing chamber, means in the chamber for vacuumizing and sealing a can, means for admitting atmospheric pressure to the chamber after the can has been seamed, an electrically energized signal device, a circuit therefor, a control switch in the circuit, and an actuating means therefor resting against a flexible wall of the can and adapted to move therewith to open incident to deflection of the can end wall by reason of atmospheric pressure thereagainst.

6. In a machine of the character described, a vacuumizing chamber, a seamer in the chamber, for sealing a can under vacuo therein, a valve operable to control the application of vacuum to the chamber for vacuumizing the can prior to seaming, and whereby the chamber is opened to atmospheric pressure after seaming, a rotatably driven shaft synchronizing the valve and seamer in their functional operations, an electrically energized signal device, a circuit therefor, a switch in the circuit rotating in synchronism with the operations of seamer and valve for momentarily closing the circuit once for each cycle of operation, and a circuit breaker having a support engaging a flexible wall of the can and normally held in circuit closing position thereby but movable to open the circuit by reason of inward deflection of the wall incident to application of atmospheric pressure thereagainst.

7. In a can vacuumizing machine, said can having a flexible wall, an indicator, an actuating member for the indicator resting against the said wall of the can and adapted to be moved therewith between active and inactive positions incident to movement of the wall effected by vacuumizing the can.

8. In a can closing machine, a revolvable seamer head, a pair of slides radially movable in the head, each mounting a seaming roll at its outer end for one seaming operation, another pair of slides mounted radially of the head and having seaming rolls at their outer ends for another seaming operation, a member axially movable in the head, toggle links connecting the member with the slides of the first pair whereby movement of the member upwardly and downwardly from a neutral position will effect an inward and an outward adjustment of the slides, and means interconnecting the slides of the first pair with those of the second pair, whereby the latter will be adjusted with the first pair but in an opposite direction.

9. A device as in claim 8 wherein the paired slides are diametrical of the head and those of the first pair at a right angle to those of the second pair, and wherein bell crank levers are pivotally mounted in the head and connected at their end with slides of the different pairs whereby an adjustment of those of one pair will effect an opposite adjustment of those of the other pair.

10. In a can seaming machine, a seamer head, means for supporting a can axially thereof for seaming, a pad fixed centrally of the head against which the can end is supported, a seaming chuck movable into and from the can cover, a pair of slides radially movable in the head, each mount-

ing a seaming roll at its outer end for one seaming operation, another pair of slides mounted radially of the head and having seaming rolls at their outer ends for another seaming operation, a member axially movable in the head, toggle links connecting the member with the slides of the first pair whereby movement of the member upwardly and downwardly from a neutral position will effect an inward and an outward adjustment of the slides, and means interconnecting the slides of the first pair with those of the second pair, whereby the latter will be adjusted with the first pair but in an opposite direction, and means coaxial of the head for rotating the head, for actuating the chuck and for shifting the slide adjusting member.

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