

Nov. 17, 1959

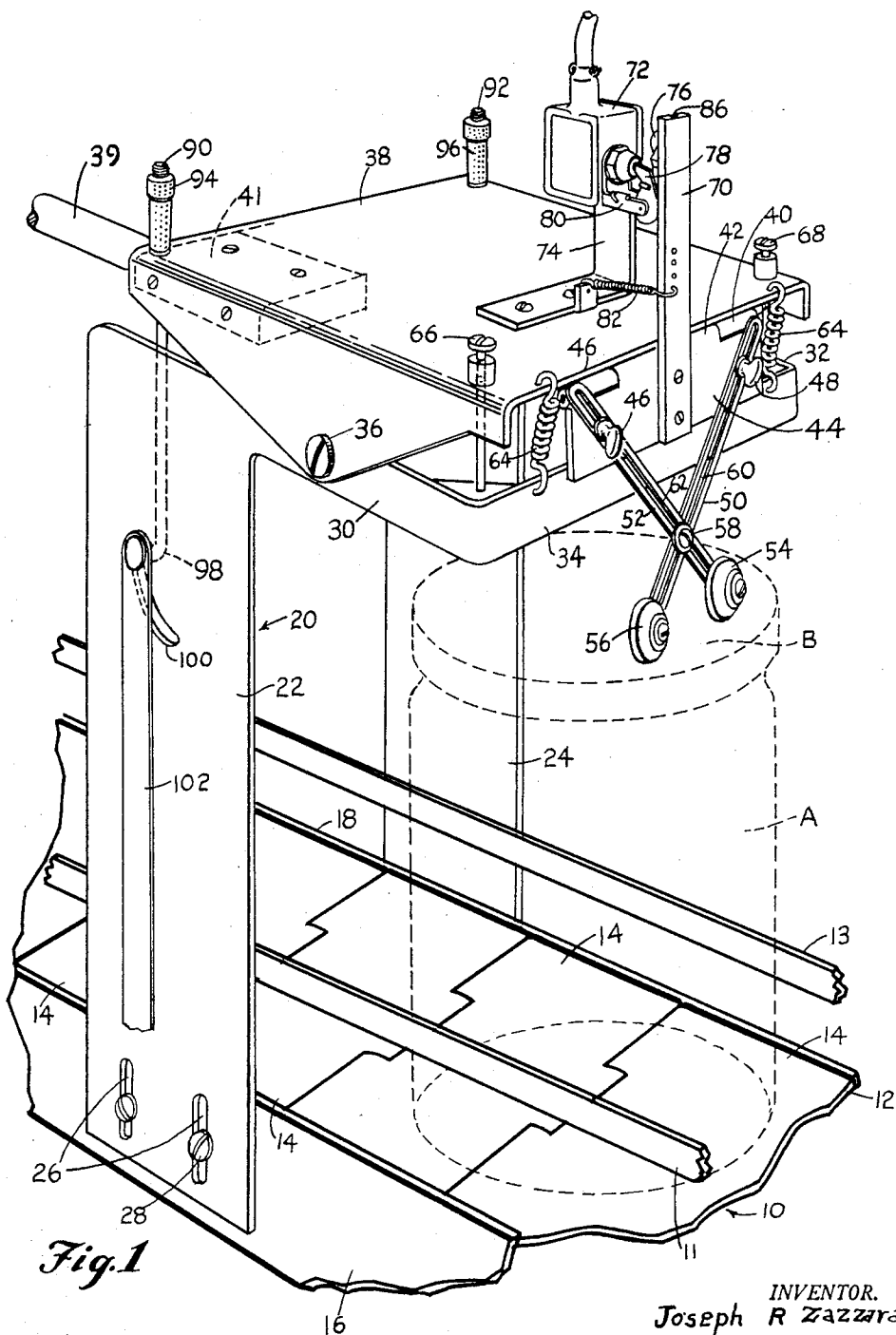
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2,913,547

JAR CAP DETECTOR

Filed April 20, 1959

4 Sheets-Sheet 1



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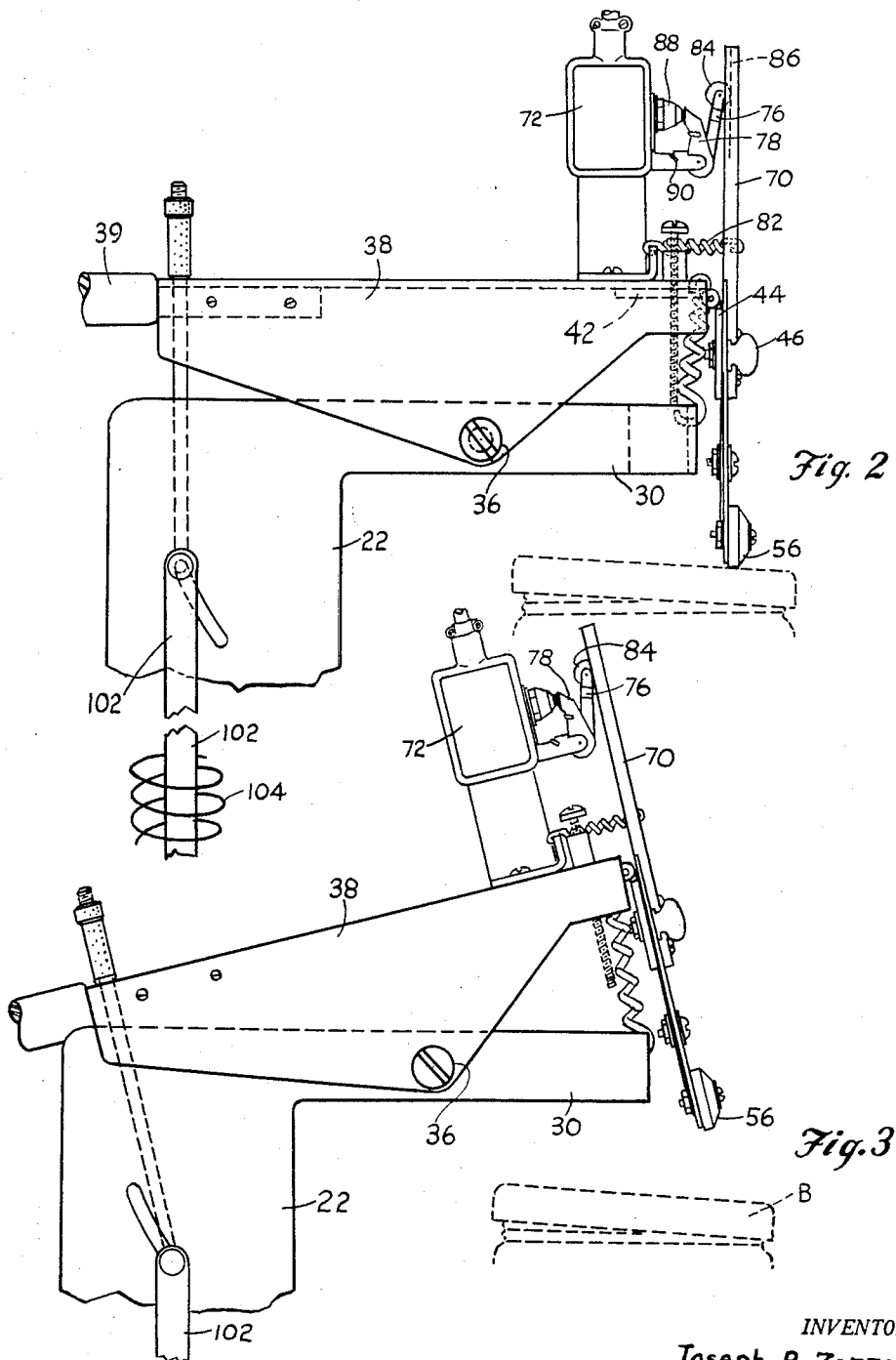
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4 Sheets-Sheet 2



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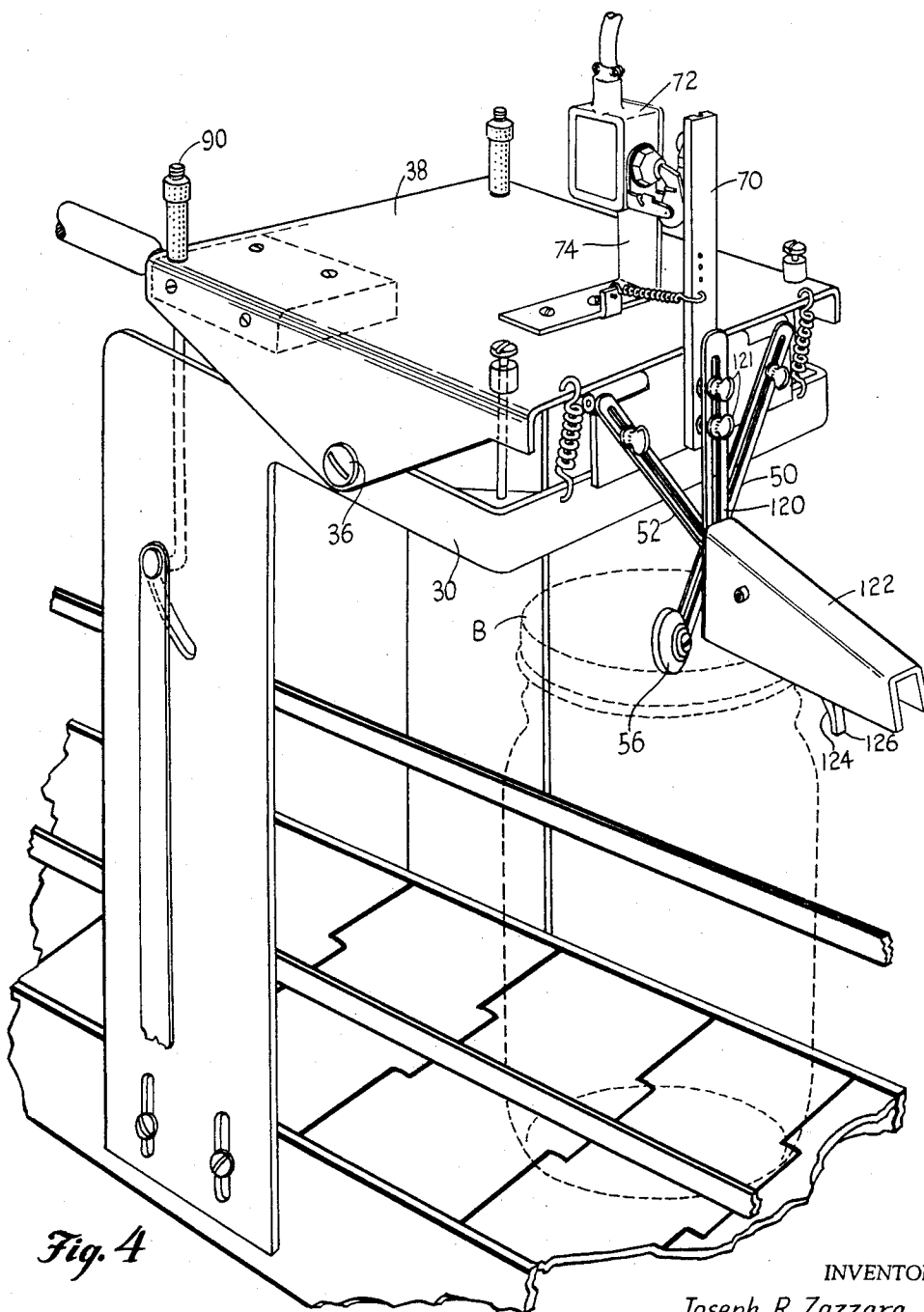
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4 Sheets-Sheet 3



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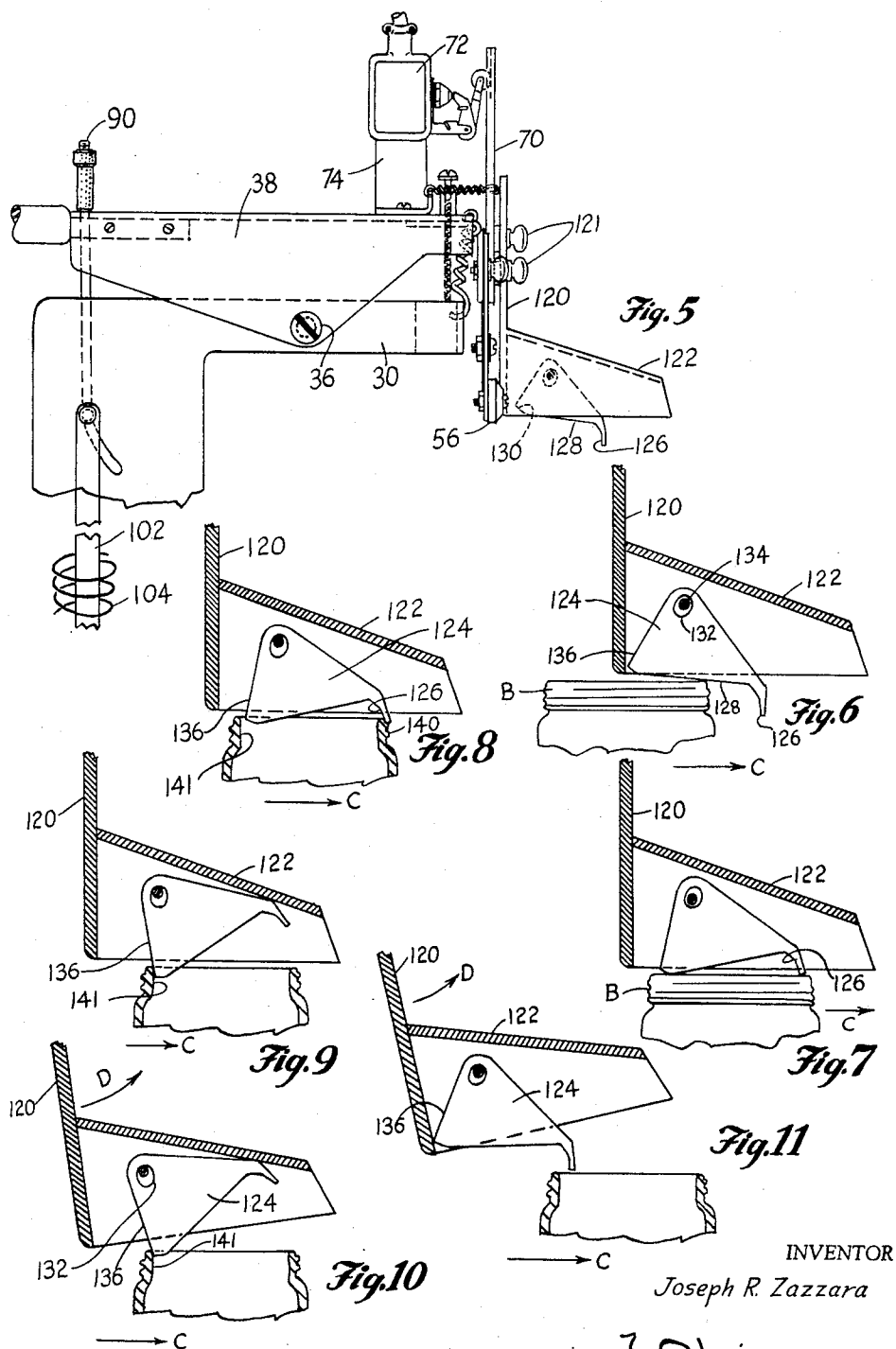
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JAR CAP DETECTOR

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2,913,547

JAR CAP DETECTOR

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Application April 20, 1959, Serial No. 807,719

10 Claims. (Cl. 200—61.41)

This invention relates to a jar cover detector, and more particularly to an apparatus adapted to detect improperly applied or the absence of jar covers in connection with jar filling apparatus.

In automatic apparatus for filling jars and applying covers, a perfect seal between cover and jar is essential, particularly in the canning industry where absence of a perfect seal would result in contamination and spoilage. Screw caps to be applied to corresponding jars are often defective, out of round, or bent, or may have defective threads. When such a cap is applied to a jar it cannot establish a seal, either by reason of the fact that it cannot be screwed to a sealing seat, or by reason of the fact the threads are crossed upon application. In the first case, the cover is "high," and in the other, the cover is tilted, and at least high on one side. In some instances, a jar or jars may pass through to which no cover has been applied.

When a jar having a defective seal is placed in a carton with other jars, spoiling due to the bad seal may develop pressure within the jar causing breakage, and spillage over the other jars with the carton. In respect to most canned foods, filling is effected at a temperature at the boiling point, so that when the cover is applied and steam vapor subsequently condenses within, the cover is subjected to vacuum, which enhances the seal. No vacuum can be established, however, in the absence of a perfect initial seal. Should a filled jar, with no cap at all be placed in a carton, the whole carton would be subject to spillage.

It is an object of the present invention to provide apparatus which will detect an imperfect seal, between the jar and cover, whereby defective jars may be eliminated before causing damage or becoming contaminated from exposure to air. The invention is further directed to providing an apparatus that readily accommodates jars of different sizes, and which is capable of effectively detecting jars whose covers are improperly affixed or jars to which no cover has been applied.

The above and other novel features of the invention will appear more fully hereinafter from the following detailed description when taken in conjunction with the accompanying drawings. It is expressly understood that the drawings are employed for purposes of illustration only and are not designed as a definition of the limits of the invention, reference being had for this purpose to the appended claims.

In the drawings, wherein like reference characters indicate like parts:

Figure 1 is a perspective view of the detector apparatus;

Figure 2 is a fragmentary side elevation showing the apparatus in detecting position;

Figure 3 is a fragmentary side elevation showing the apparatus in clearance position after detection;

Figure 4 is a perspective view of the detector apparatus of Figure 1 to which has been added an uncapped jar sensing device;

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Figure 5 is a fragmentary side elevation of the device of Figure 4;

Figures 6 and 7 are schematic views showing a properly capped jar passing beneath the sensing device of Figures 4 and 5; and

Figures 8, 9, 10 and 11 are schematic views showing an uncapped jar passing beneath the sensing device of Figures 4 and 5.

Referring to Figure 1 there is shown a conveyor 10 having a conveyor belt 12 composed of a series of links 14. Guides 11 and 13 are provided to maintain jars centered on the conveyor. The conveyor belt is supported at a fixed height with respect to the conveyor side members 16 and 18. Adjustably secured to the side members 16 and 18 is an inverted U shape frame or bridge 20 through which a series of jars A having their caps B applied are conveyed. The side members 22 and 24 are slotted as at 26, and are secured to the side members by screws 28, so that the height of the frame 20 may be raised or lowered to facilitate the accommodation of jars of widely varying height. The frame 20 comprises a forward extending U loop 29 composed of side members 30 and 32 and a transverse member 34.

Pivoted to the side members 30 and 32 as at 36 is a rocking saddle member 38. The forward end of the saddle member has secured to it a hinge 40, one wing 42 of which is secured to the underside of the member 38, and the other wing 44 depends downwardly beyond the forward edge 46 of the member 38. Secured to said wing 44 by thumbscrews 46 and 48 are slotted cross links 50 and 52 having at their lower extremities rubber contact washers 54 and 56. The links are secured together by a screw 58, extending through both slots 60 and 62 to the links 50 and 52. Coil springs 64 urge the saddle member to tilt to a fixed position as determined by the adjustable stop screws 66 and 68, the ends of which abut the upper edge of the U loop 29.

An actuating arm 70, rigidly secured to the hinge wing 44 extends upwardly and is adapted to actuate a micro switch 72 mounted on an angle bracket 74, through a pair of members 76 and 78 pivotally mounted on a switch carried bracket arm 80. A spring 82 lightly holds the arm 70 in contact with the roller 84 of member 76, which roller rides in a channel 86 on the switch facing side of the arm 70. Member 76 is secured to the switch actuating arm 78, which bears against the switch plunger 88. A light spring 90 yieldingly urges the switch arm 78 away from the plunger 88, while the spring 82 is adjusted to overcome spring 90, to eliminate lost motion, but the tension of spring 82 is such as to not actuate the switch plunger 88.

Links 90 and 92 depend from the rear of the rocking member 38. Such links have threaded adjustable collars 94 and 96, and the links are bent at right angles at their lower ends as at 98 and extend through slots as at 100 in the side member 22 and 24. A link 102 extending to a solenoid 104 is provided.

The cross links are adjusted so that the contact washers just clear the top of a jar which has been correctly applied, and preferably are adjusted so that the washers would contact the jar cover at points 45° from the center of the leading edge, should such cover be too high, by reason of it having been loosely applied. When so adjusted, any jar travelling along the conveyor 10 having a cover which is loose, or which is applied with crossed threads so as to be tilted, in either case providing an imperfect seal, the cover will engage either one or the other or both of said washers 54 and 56. Such contact will tilt the wing 44, actuate the switch 72 and close a circuit. Such circuit may ring a bell, stop the conveyor and may energize the solenoid 104 so as to tilt the mem-

ber 38 as is shown in Figure 3 whereby the defective jar and cover may be quickly removed from the conveyor after which the conveyor may be again started. The member 38 may be manually tilted by the handle 39 affixed to the saddle by the block 41.

The closure of the circuit may actuate an ejector to remove the jar having the defective cover from the conveyor. The slotted cross members 50 and 52 with the thumbscrews 46 and 48 are readily adjusted accurately to accommodate any height of jar, or cap diameter, whereby when a jar with an improperly applied cap passes beneath the detector members 54 and 56, tilting of the hinge wing 44 and actuation of the switch 70 results.

Referring to Figures 4 and 5, the arm 70 has affixed thereto a vertical slotted member 120, adjustably secured as by thumbscrews 121, which projects downwardly just forward of the links 50 and 52. On the lower end of the member or arm 120 is affixed a shoe housing 122, within which is pivoted a shoe or dog 124. Such dog has a depending arm or tongue 126, behind which is a flat can cover riding surface 128, rounded upwardly slightly at the other end as at 130. The dog has an enlarged elongated pivot aperture 132 through which the pin 134 projects, and the balance of the dog may be such as to cause it to hang normally in about the position shown in Figure 5. The dog has what may be termed a rear shoulder edge 136.

Referring to Figures 6 and 7, a jar having a cap B is shown at two successive stages in its passage in the direction of arrow C beneath the shoe housing 122, it being understood that the member 120 is adjusted to a height so as to clear a jar cap at about the height indicated in Figures 6 and 7. A jar having a cap thereon, which is properly positioned, will pass the feelers 54 and 56, engage the dog tongue 126 and ride under the dog 124, lifting the same slightly by reason of the lost motion provided by the enlarged aperture 132. Such action is substantially free of resistance, and gives rise to no angular movement of the arm 70, about the pivot of the hinge 40.

In Figures 8-11, the sequence of operation is shown, should a jar having no cap passing in the direction of arrow C beneath the shoe housing and dog. In such case, as shown in Figure 8, the tongue 126 rides upwardly on the jar rim 140, which tilts the dog counter-clockwise, lowering the shoulder 136 into the jar opening 141. As soon as the inside of the jar opening or rim contacts the shoulder 136, the dog is further tilted counter-clockwise as in Figure 9, the housing coacting with the arm end 126 of the dog to provide a stop. The length of the dog, between the tongue 126, and shoulder 136 will vary for different jar opening diameters, the length being such that the tongue 126, will not completely ride over the rim 140, prior to the engagement of the shoulder 136, with the inside of the rim, as can be seen by referring to Figures 8 and 9. Further movement of the jar along the conveyor tilts the arm 120 in the direction of arrow D as shown in Figure 10, actuating the switch 72 and thereby stopping the filling operation, or giving a warning signal, to call the attention of an operator to the coverless jar, or to actuate a jar ejecting device, to remove the jar from the line as will be understood. Continued movement of the jar will release the shoulder 136, from the inside of the jar rim, after urging the arm 120 somewhat further, following which the device returns to the normal position shown in Figures 4 and 5. The apparatus operates in response to actuation of switch 72, in the same manner, as when the switch is actuated by the feelers 54 and 56, the member 38 tilting to provide additional clearance for jar removal or ejection.

Although two embodiments of the invention have been illustrated and described, it is to be understood that the invention is not limited thereto. As various changes in

the construction and arrangement may be made without departing from the spirit of the invention, as will be apparent to those skilled in the art, reference will be had to the appended claims for a definition of the limits of the invention.

This application is a continuation in part of application Ser. No. 771,517, filed November 3, 1958.

What is claimed is:

1. A conveyor detector for determining improperly applied jar covers, comprising in combination a conveyor for jars having covers applied thereto, a bridge member extending across the conveyor at an elevation substantially above the height of jars travelling forwardly along the conveyor, a depending hinge member pivotally attached to the forward side of said bridge member on a transverse horizontal axis, a depending arm adjustably affixed to said hinge member having a feeler tip adapted to closely clear properly applied covers of jars travelling forward along said conveyor, and switch means actuated by the tilting of said hinge member in response to an improperly applied jar cover contacting said feeler tip on forward conveyor movement of said jar.

2. A conveyor detector for determining improperly applied jar covers, comprising in combination a conveyor for jars having covers applied thereto, a bridge member extending across the conveyor at an elevation substantially above the height of jars travelling forwardly along the conveyor, a depending hinge member pivotally attached to the forward side of said bridge member on a transverse horizontal axis, a depending arm adjustably affixed to said hinge member having a feeler tip disposed to one side of the conveyor centerline adapted to closely clear properly applied covers of jars travelling forward along said conveyor, and switch means actuated by the tilting of said hinge member in response to an improperly applied jar cover contacting said feeler tip on forward conveyor movement of said jar.

3. A conveyor detector for determining improperly applied jar covers, comprising in combination a conveyor for jars having covers applied thereto, a bridge member extending across the conveyor at an elevation substantially above the height of jars travelling forwardly along the conveyor, a depending hinge member pivotally attached to the forward side of said bridge member on a transverse horizontal axis, a pair of depending arms adjustably affixed to said hinge member each having a feeler tip adapted to closely clear opposite sides of properly applied covers of jars travelling forward along said conveyor, and switch means actuated by the tilting of said hinge member in response to an improperly applied jar cover contacting one or both of said feeler tips on forward conveyor movement of said jar.

4. A conveyor detector for determining improperly applied jar covers, comprising in combination a conveyor for jars having covers applied thereto, a bridge member extending across the conveyor at an elevation substantially above the height of jars travelling forwardly along the conveyor, a depending hinge member pivotally attached to the forward side of said bridge member on a transverse horizontal axis, a pair of depending arms adjustably affixed to said hinge member each having a feeler tip laterally disposed with respect to each other and adapted to closely clear opposite sides of properly applied covers of jars travelling forward along said conveyor, and switch means actuated by the tilting of said hinge member in response to an improperly applied jar cover contacting one or both of said feeler tips on forward conveyor movement of said jar.

5. A conveyor detector for determining improperly applied jar covers, comprising in combination a conveyor for jars having covers applied thereto, a bridge member extending across the conveyor at an elevation substantially above the height of jars travelling forwardly along the conveyor, a depending hinge member pivotally at-

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tached to the forward side of said bridge member on a transverse horizontal axis, crossed lengthwise slotted members adjustably affixed to the opposite sides of said hinge member at their upper ends, and having laterally spaced feeler tips on their lower ends, each adapted to

6. A detector apparatus for ascertaining defective application of jar covers in a conveyor type jar filling apparatus comprising in combination: a conveyor frame, a conveyor mounted in said frame for moving jars forwardly therealong and operating in a fixed plane, a bridge structure mounted on the frame and overlying the conveyor at a height substantially greater than the height of jars with covers applied thereto, a normally horizontal plate pivotally supported centrally thereof on said bridge member on a horizontal axis extending transversely of the conveyor, stop means acting between said plate and bridge member on the forward side of said pivot, including yielding means interconnecting said plate and bridge member for yieldingly fixing said plate in relation to the bridge member, a hinge having one wing thereof affixed to the forward portion of said plate, and the other wing pivotally depending from the forward edge of said plate normally in a vertical plane transverse of said conveyor, a pair of elongated feeler members having lengthwise slots disposed in crossed relation, and having their upper ends adjustably fixed to said depending wing, said feeler members having rubber-like jar cover contacting elements on their respective lower ends, a switch mounted on the upper side of said plate, a switch actuating arm affixed to said depending wing, and extending upwardly therefrom, lever means mounted on said switch and contacting said arm for actuating said switch upon pivotal movement of said depending wing resulting from contact of one or both of said jar cover contacting elements with the cover of a jar moving forwardly upon said conveyor, and means adapted to act in response to actuation of said switch for tilting said plate against said yielding means to lift the depending feeler members clear of the path of movement of the cover of jars moving along said conveyor.

7. A conveyor detector for determining improperly applied jar covers, comprising in combination a conveyor for jars having covers applied thereto, a bridge member extending across the conveyor at an elevation substantially above the height of jars travelling forwardly along the conveyor, a depending hinge member pivotally attached to the forward side of said bridge member on a transverse horizontal axis, a depending arm adjustably affixed to said hinge member having a feeler tip adapted to closely clear properly applied covers of jars travelling forward along said conveyor, said switch means actuated by the tilting of said hinge member in response to an improperly applied jar cover contacting said feeler tip on forward conveyor movement of said jar, said arm having a second depending arm having a forwardly extending open bottom shoe housing disposed above the level of a jar having a cap applied thereto, said shoe housing having a dog loosely pivoted within the housing and depending below the housing, said dog having a depending forward tongue adapted to engage the outside of a jar rim, and a shoulder adapted to engage the inside of a jar rim of a jar having no cap thereon, upon pivotal rotation of said dog by jar rim engagement with said tongue.

8. A conveyor detector for determining improperly applied jar covers or the absence thereof, comprising in combination a conveyor for jars normally having covers applied thereto, a bridge member extending across the conveyor at an elevation substantially above the height

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of jars travelling forwardly along the conveyor, a depending hinge member pivotally attached to the forward side of said bridge member on a transverse horizontal axis, crossed lengthwise slotted members adjustably affixed to the opposite sides of said hinge member at their upper ends, and having laterally spaced feeler tips on their lower ends, each adapted to closely clear properly applied covers of jars traveling forward along said conveyor, a depending arm adjustably secured to said hinge member having a forwardly extending open bottom shoe housing disposed above the level of a jar having a cap applied thereto, said shoe housing having a dog loosely pivoted within the housing and depending below the housing, said dog having a depending forward tongue adapted to engage the outside of a jar rim, and a shoulder adapted to engage the inside of a jar rim of a jar having no cap thereon, upon pivotal rotation of said dog by jar rim engagement with said tongue, and switch means actuated by tilting of said hinge member in response to an improperly applied jar cover contacting either one or both of said tips or a coverless jar rim engaging said shoulder on forward conveyor movement of the jar.

9. A detector apparatus for ascertaining defective application of jar covers or the absence thereof in a conveyor type jar filling apparatus comprising in combination: a conveyor frame, a conveyor mounted in said frame for moving jars forwardly therealong and operating in a fixed plane, a bridge structure mounted on the frame and overlying the conveyor at a height substantially greater than the height of jars with covers applied thereto, a normally horizontal plate pivotally supported centrally thereof on said bridge member on a horizontal axis extending transversely of the conveyor, stop means acting between said plate and bridge member on the forward side of said pivot, including yielding means interconnecting said plate and bridge member for yieldingly fixing said plate in relation to the bridge member, a hinge having one wing thereof affixed to the forward portion of said plate, and the other wing pivotally depending from the forward edge of said plate normally in a vertical plane transverse of said conveyor, a pair of elongated feeler members having lengthwise slots disposed in crossed relation, and having their upper ends adjustably fixed to said depending wing, said feeler members having rubber-like jar cover contacting elements on their respective lower ends, a depending arm adjustably secured to said hinge member having a forwardly extending open bottom shoe housing disposed above the level of a jar having a cap applied thereto, said shoe housing having a dog loosely pivoted within the housing and depending below the housing, said dog having a depending forward tongue adapted to engage the outside of a jar rim, and a shoulder adapted to engage the inside of a jar rim of a jar having no cap thereon, upon pivotal rotation of said dog by jar rim engagement with said tongue, a switch mounted on the upper side of said plate, a switch actuating arm affixed to said depending wing, and extending upwardly therefrom, lever means mounted on said switch and contacting said arm for actuating said switch upon pivotal movement of said depending wing resulting from contact of one or both of said jar cover contacting elements with the cover of a jar moving forwardly upon said conveyor or a coverless jar rim engaging said shoulder, and means adapted to act in response to actuation of said switch for tilting said plate against said yielding means to lift the depending feeler members clear of the path of movement of the jars moving along said conveyor.

10. In a detector apparatus for conveyor type jar filling apparatus for detecting filled jars having no cap, comprising a conveyor for jars normally having covers applied thereto, transversely pivoted switch operating means disposed above said conveyor, said switch opening means having a depending arm, a dog pivotally suspended from

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said arm, having a tongue for engaging the outside rim of a coverless jar moving on said conveyor, and a shoulder for engaging the opposite inside rim of said jar, upon pivotal movement of said dog in response to conveyor movement of said jar in engagement with said tongue, whereby conveyor movement of said jar with its rim in

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engagement with said shoulder moves said arm and rocks said switch operating means.

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