Aug. 26, 1969 R. A. HEISLER 3,462,823

EARED CONTAINERS METERING FEED AND ACCUMULATING APPARATUS

Filed Nov. 8, 1967 2 Sheets-Sheet 1

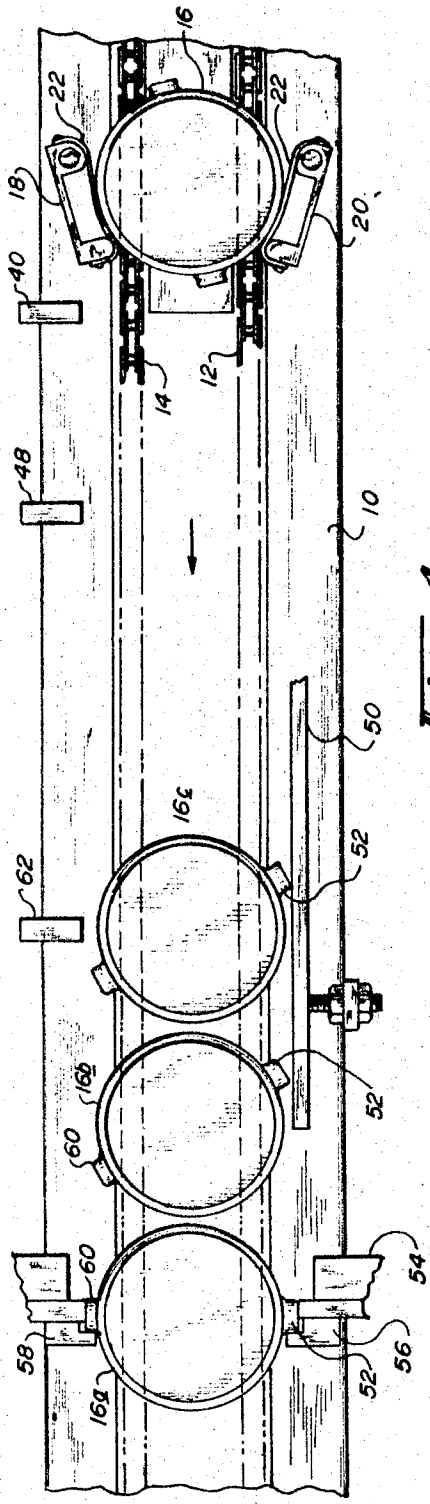


Fig. 1.

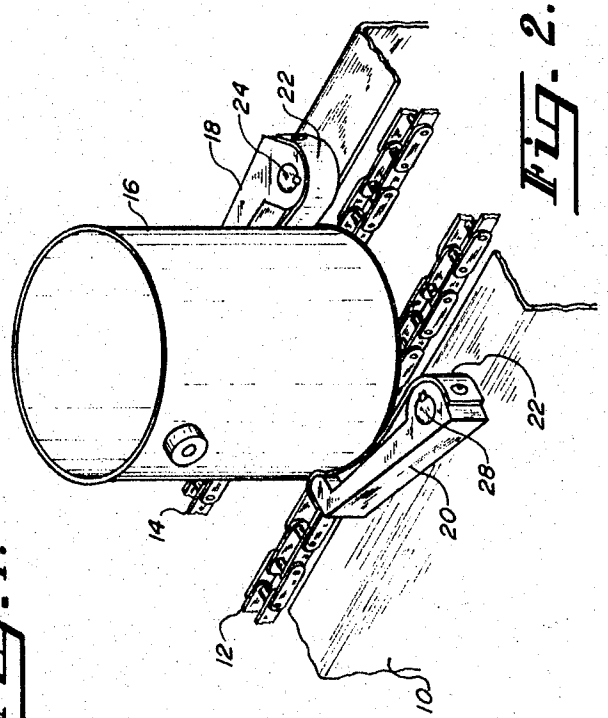


Fig. 2.

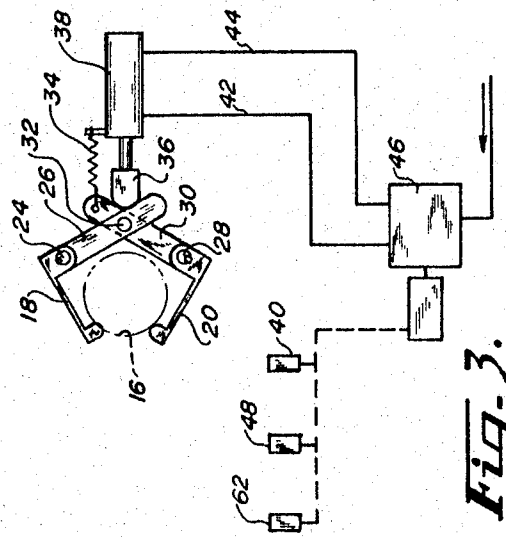


Fig. 3.

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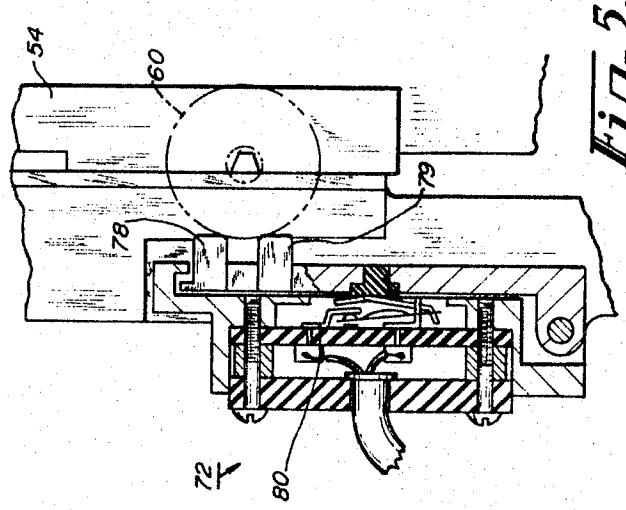


Fig-5.

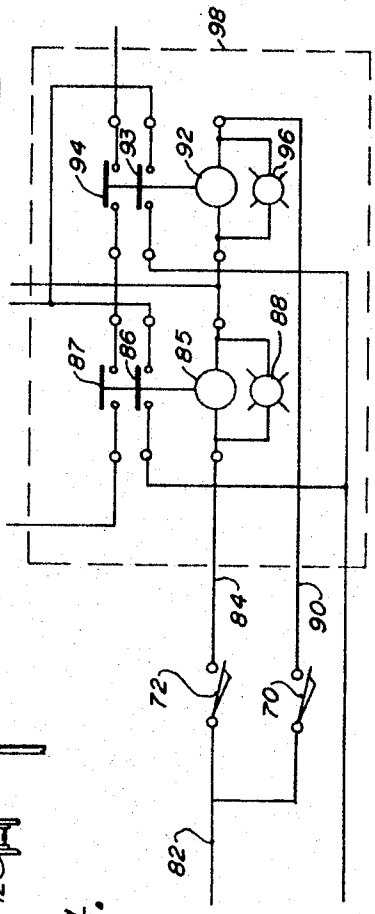


Fig-6.

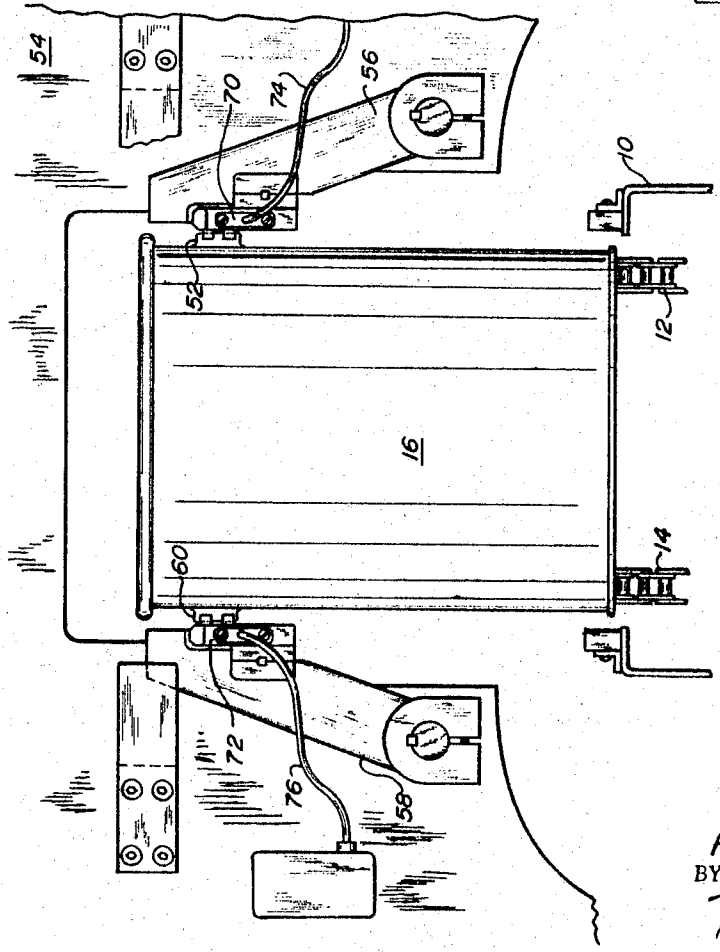


Fig-4.

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EARED CONTAINERS METERING FEED AND ACCUMULATING APPARATUS

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U.S. Cl. 29—208 11 Claims

ABSTRACT OF THE DISCLOSURE

A metering feed and accumulating apparatus adapted to receive eared containers from a conveyor and to precisely space these containers as they are fed onto an orienting conveyor. The containers as they are carried forwardly on their bottoms are also rotated by means of a differential in speed of two conveying strands. The metering gate includes two spacially positioned proximity switches adapted to regulate the flow of containers through the gate to provide a determined spacing. Subsequent to the gate an ear-engaging means is adapted to orient the container as it is advanced and in an oriented state the eared containers are fed past a third proximity switch positioned a determined distance from a bail-applying apparatus. This third proximity switch is spaced and is connected to actuating means of the bail-applying apparatus so that a determined quantity of eared containers are brought into contiguous relationship to each other and the apparatus before the bail-apparatus is actuated.

BACKGROUND OF THE INVENTION

Field of the invention

The field of art to which this invention pertains is in the general class of Wire Working and more particularly to the subclass of "applying wire" in which subclass is generally found the apparatus for forming and applying wire bails to eared containers. Another subclass also pertinent to this invention is the subclass of "making bails" under the general subclass of "article making or forming."

Another field of the art to which this patent pertains is to the class of Conveyors, Power-Driven and to the subclass thereunder of "article transfer, article controlled"; and to "circular articles," also "arranging articles on conveyors" by "orienting articles" and by "spacing."

Description of the prior art

In my U.S. Patent No. 3,241,578 issued on Mar. 22, 1966 there is shown apparatus for providing bails on eared containers, which apparatus includes means for orienting and stopping an eared container in a precise position during the forming and application of wire bail to an eared container.

In particular in this above-identified patent there is shown a sensing device which is disposed so as to engage an ear of an advancing container as this container is moved forwardly on a conveying means. In response to the activation of the sensing device the bail-forming and applying apparatus is activated so that as the container is brought in the way of said bail-forming and applying apparatus the ends of the bail are inserted into the ears of the container. In order to insure the proper orientation of the eared container in this apparatus there is shown in FIGS. 4 and 5 of said patent a gate feeding mechanism adapted to receive and space eared containers upon a conveyor in a determined manner. These containers as they are discharged from this gate feeding mechanism are propelled forwardly upon a plurality of strands of a conveyor. One of these strands is traveling at a faster rate than the other strands so as to cause the container to rotate as it is advanced forwardly. As the container is rotated, one of the ears of the container is brought in the way of an ear-engaging rail whereby the rotation of the container is stopped and the can is transported forwardly in a preselected oriented condition.

Bail-applying apparatus as shown and described receive and space eared containers upon the conveyor in such spaced array that oftentimes the clutch mechanism of the bail-applying apparatus may be activated for each or nearly each container as it is brought in the way of the apparatus. As for example, if the apparatus is adapted to bail sixty containers a minute and the feeding rate from the supply is ten to twenty containers per minute the clutch will be actuated substantially ten to twenty times per minute. Such clutch actuation reduces the life expectancy of the clutch and may require frequent shut-downs for the necessary repairs. Particularly in the case of apparatus providing bails to five-gallon eared containers the clutch mechanism necessary to operate this apparatus may couple a five horsepower motor to the apparatus and is a short-cycle load each time the apparatus is started and stopped. Where these starts are multi-times per minute the clutch must be overdesigned or has a short life.

When the containers are brought to the apparatus at a constant or fixed rate corresponding to the operating speed of the bail-applying apparatus it is possible and practical to operate the apparatus for continuous periods without stopping the bail-applying apparatus for the receipt of individual containers. It is therefore an object of this invention to provide a metering gate adapted to release eared containers with a predetermined spacing onto an orienting conveyor so that the ears of the container may be brought to a predetermined oriented position and, after the container has been oriented, to feed this container to the bail-applying apparatus where the containers are accumulated until a determined number of containers is contiguously arrayed on the conveyor, after which the bail-applying apparatus is activated.

SUMMARY OF THE INVENTION

In the detailed description of the drawings to be hereinafter more fully described there is shown a container metering gate adapted to space eared containers a determined distance apart as they are delivered to an orienting conveyor. After orientation there is provided a determined length of conveyor adapted to receive the oriented containers and accumulate a determined number of containers before the bail-applying apparatus is actuated. At the receiving end of this orienting conveyor system there is provided a metering gate which is adapted to receive an eared container and to pass this eared container by a first proximity switch placed at a determined distance from a container retaining and releasing mechanism. A short determined distance downstream from this first proximity switch there is disposed a second proximity switch which is programmed with the first proximity switch. These two switches operate in concert with the metering gate so that an established determined spacing is provided between containers so as to insure unimpeded orientation of a leading container and all subsequent containers as they are fed onto the conveyor.

The programmed or actuation cycle of the first of the two proximity switches is such that with the "power on" the metering gate is caused to be open as the first or leading container enters and passes through the gate. As the container passes by this first proximity switch, a valve or solenoid is actuated to close the gate. As this container continues downstream on the conveyor and by the second proximity switch, the valve or solenoid is reversed so that the gate is again opened, whereby a second container is permitted to pass through the gate. If the second container has already entered with the gate closed,

the second container is now released to pass by the first and second proximity switches.

At a later position downstream on the conveyor, a third proximity switch is disposed at a determined distance upstream from the bail-applying position in the bail-applying apparatus. This determined distance, as exemplified, is the distance of three containers in side-to-side engagement on the conveyor. The third proximity switch is so spaced and interconnetced with a time-delay relay so that a container traveling past this third proximity switch does not influence the metering gate and does not actuate the bail-applying apparatus until containers two and three to follow are in position. With the bail-applying apparatus stopped, the leading container is held in the apparatus and container two is on the conveyor and is in engagement with container one. When the third container arrives it remains in a stop position opposite the third proximity switch for a determined period of time, which is longer than a time delay programmer adapted to permit a container to pass without actuation of the proximity switch. Upon actuation of the proximity switch the bail-applying mechanism is started and continues to run without declutching as long as an adequate supply of containers is fed to the apparatus. The actuation of the apparatus is by means of an ear sensing switch on the cover stop arms of the bail-applying mechanism.

It is an object of this invention to provide a metering gate adapted for receiving and feeding eared containers in spaced array on and to an orienting conveyor, whereupon said spaced containers are rotated in a determined manner for the orientation by engagement of their ears by a stop rail and after their orientation a determined number of containers is accumulated before they are fed to and through a bail-applying apparatus.

It is a further object of this invention to provide means for receiving a supply of eared containers from a source and by means of a metering gate to feed these containers in a spaced array to an orienting conveyor, said metering gate actuated in response to a pair of spaced proximity switches downstream of the gate and, programmed so that a container must pass the second switch before the gate is opened for a succeeding container to feed to the conveyor; and after orientation the eared containers are accumulated so that at least a determined number of oriented containers are adapted for sequential feeding at a determined rate of speed to a bail-applying apparatus absent the declutching of the apparatus.

INTENT OF THE DISCLOSURE

Although the following disclosure offered for public dissemination is detailed to insure adequacy and aid in the understanding of the invention, this is not intended to prejudice that purpose of a patent which is to cover each new inventive concept therein no matter how it may later be disguised by variations in form or additions of further improvements. The claims at the end hereof are intended as the chief aid toward this purpose, as it is these that meet the requirements of pointing out the parts, improvements, combinations or methods in which the inventive concepts are found.

There has been chosen a specific embodiment of the metering gate and orienting conveyor for eared containers as adapted for programmed use therewith and showing a preferred means for feeding an accumulation of eared containers to a bail-applying mechanism. This specific embodiment has been chosen for the purposes of illustration and description as shown in the accompanying drawings wherein:

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 represents a fragmentary plan view of the conveyor of this invention and showing in particular the metering gate and the arrangement of the proximity switches programmed to actuate the gate in relation to the movement of an eared container to a bail-applying apparatus;

FIG. 2 represents in a slightly enlarged scale a fragmentary isometric view showing an eared container as it rests upon the conveyor and as engaged and retained by the metering gate of this invention;

FIG. 3 represents a schematic circuit diagram showing a preferred operational control of the metering gate of this invention;

FIG. 4 represents in a slightly enlarged view a container as it rests upon the conveyor and as the container is brought in the way of the cover stop arms of the bail-applying apparatus;

FIG. 5 represents in a greatly enlarged view a fragmentary sectional view of the switch or the signal actuating system operated in conjunction with the cover stop arms, and

FIG. 6 represents a partly fragmentary schematic circuit diagram showing the circuit as actuated by the sensing switches in the cover stop arms of the bail-applying apparatus.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawings in which like numbers refer to like members throughout the several drawings and in particular to FIG. 1 wherein on a base **10** there are provided conveying chains **12** and **14** upon which an eared container **16** is adapted for transportation. At the right end of this figure there is seen a metering gate in which arms **18** and **20** may be pivotally swung toward and away from the chains **12** and **14**. In this particular embodiment there is shown flexible strapping **22** carried on the inner portions of both arms **18** and **20**. This flexible strapping is adapted to provide a conventional means for grasping the sides of a container without marking the exterior surface of the container, which may have been freshly lithographed. As seen particularly in FIG. 2, the arms **18** and **20** are disposed just above the conveyor chains **12** and **14** and engage and retain the container at or near its bottom so that in stopping the eared container the container may be retained upon the chains with a minimum of tendency for the container to tip.

The mechanism to move the arms **18** and **20** is diagrammatically shown in FIG. 3 wherein arm **18** is represented as being carried on a shaft **24**. This shaft is rotatably carried in a bearing or bearings not shown and retained in the frame **10**. In the preferred embodiment shown, the lower end of shaft **24** is fixedly connected to an arm **26**. In like manner, arm **20** is carried by shaft **28**, which is carried in a bearing or bearings not shown and retained in the frame **10**. An arm **30** is fixedly attached to the lower end of shaft **28** and as the arm **30** is moved the shaft is rotated. A pivot pin **32** joins arms **26** and **30** with a tension spring **34** adapted to urge arms **26** and **30** to a "gate closed" position as shown in FIG. 3. A pusher **36** which may be carried by and actuated by a solenoid or a pneumatic cylinder **38** is exemplified as the gate actuator or motive power **38**. As the pusher **36** is moved forwardly the arms **18** and **20** are caused to swing outwardly to release an eared container **16**. As seen in both FIGS. 1 and 3, a first proximity switch **40** is mounted just to the left of the metering gate so that as container **16** passes by said first proximity switch **40**, a first signal is sent by means of conductors **42** and **44** and sent from a program station **46** to the motor unit **38**. Further to the left in FIG. 1 and downstream from the first proximity switch **40** is a second proximity switch **48** which is also connected, as shown in FIG. 3, to the switch programmer **46**.

OPERATION OF THE METERING GATE

The function of this gate is as follows: with the power off, the spring **34** urges pusher **36** backwardly or to the right (FIG. 3) so that the gate is closed and a container may enter the gate as shown in FIG. 1. The container is retained by the closed gate and may not proceed downstream on the conveyor chains **12** and **14** until re-

leased by the gate. When the power comes on, the gate is actuated by the moving of the pusher **36** forwardly, the gate arms **18** and **20** are swung outwardly and the container **16** passes therethrough. When the container passes proximity switch **40**, the switch **46** is actuated to cause the motor means **38** to be cut off, whence the spring **34** moves the gate to the position seen in FIGS. 1 and 3. In this condition or position any container following the first container is engaged and detained by the metering gate. As the first container passes the second proximity switch **48**, the switch or valve programmer **46** is again reversed, causing the motive power **38** to move the pusher **36** forward to cause the gate to open. The opening of the gate releases the second container which thereupon follows the same procedure in that as it passes the proximity switch **40** causes the gate to close, and when it passes proximity switch **48** it causes the gate to open. As this process is repeated, each succeeding container is spaced apart a distance equal to the distance between the proximity switches **40** and **48**. This distance is a determined distance ascertained as necessary to permit the container to make a maximum degree of rotation for orientation of the container by moving the ear to and against an ear-engaging rail **50** as shown in FIG. 1.

After the container **16** has passed the ear-engaging rail **50**, it enters the bail-applying apparatus as indicated by a portion of the main plate **54** upon which is mounted cover stop arms **56** and **58**, which stop arms are adapted to engage ears **52** and **60** of container **16***a*. When these ears engage the stop arms, the forward progress of the container, of course, is stopped until such time as the bail-applying apparatus inserts a bail into the ears **52** and **60**. In order to prevent actuation of the apparatus upon the receipt of the first container **16***a*, a third proximity switch **62** operatively connected into the bail-applying actuation circuit is spaced a determined distance back from the ear-engaging main plate **54**. This distance upstream from the apparatus is equal to a determined number of containers, which in this particular case, as illustrated, is three. The eared containers oriented in a predetermined position as they are propelled to a stop position are brought substantially contiguous to each other. The proximity switch **62** is interconnected with a time-delay relay so that as container **16***a* passes by at a normal rate of travel the proximity switch **62** is not actuated. So also does the second container **16***b* pass by switch **62** without actuation of the switch. When container **16***c* is stopped opposite switch **62**, it remains there. The proximity switch **62** is connected into a time-delay relay and is positioned so that three containers must be in position before the bail-applying apparatus is actuated. After the container **16***c* has come in the way of the proximity switch **62** and is caused to remain there for determined short length of time, the time delay is expired, whence the bail-applying apparatus is started and runs without declutching as long as containers **16** are brought into the apparatus to actuate a signalling device mounted in the cover stop arms **56** and **58**.

Referring next to FIG. 4, it is to be noted that the main frame **54** of the bail-applying apparatus of my above-identified patent is shown as looking upstream from the downstream side of the apparatus. Upon each of the cover stop arms **56** and **58** as carried by the main frame **54**, there are mounted switch devices **70** and **72** which are connected by wires **74** and **76** to an operating circuit to be hereinafter described.

Referring next to FIG. 5, it is to be noted that ear **60** is positioned on the container so that as it moves forwardly the ear engages contacts **78** and **79** to actuate a switch mechanism **80**. Switch mechanism **80** is a normally "open" switch which is adapted to be closed by the ear **60** as it engages and moves the contacts **78** and **79** leftward. When the switch is closed, it closes one part of a bail-applying actuating circuit. The switch construction shown in FIG. 5 is only merely one exemplification of a switch mechanism, as many types of switch arrangements may be used. This switch provides ear-engaging contacts **78** and **79** which are disposed to engage and receive the ear **60** as the container is moved forwardly. This switch is also adapted to stop the forward motion of the ear **60** as well as to close the contacts of the switch for actuation of the bail-applying apparatus.

Referring finally to FIG. 6, it is to be noted that this fragmentary portion of the schematic circuit of the bail-applying apparatus is shown only to provide the relation of switches **70** and **72** to the circuit. As seen, the switches **70** and **72** are normally open and are fed from one leg **82** of a one hundred ten volt service. From closed switch **72**, current is fed through conductor **84** to one side of a solenoid **85** adapted to actuate a dual switch having a pair of normally open contacts **86** and **87**. In combination with solenoid **85** there is an indicator light **88** which is contemplated as being panel mounted so that the operator may ascertain that the circuit is working as the ear of the container is brought in the way of the switch **72** carried by the cover arm.

From closed switch **70** current is fed through line **90** to one side of a solenoid **92** also adapted to actuate a dual switch having a pair of normally open contacts **93** and **94**. In combination with solenoid **92** there is provided another indicator light **96** which is preferably panel mounted so that the operator may ascertain that the circuit is working as the ear of the container engages and actuates switch **70**.

This portion of the circuit and other apparatus may be included in a control box **98** indicated in phantom outline. It is only important that the switches **70** and **72** must both be closed before the circuit feeding current to bail-applying mechanism can be actuated and in addition the third proximity switch must be actuated to cause the bail-applying apparatus to be activated.

This circuit also includes a holding circuit which in effect "holds" the bail-applying clutch in engaged position irrespective of proximity switch **62** as long as eared containers are continued to be fed to and through the bail-applying apparatus and at the contemplated operating rate of the apparatus. As soon as the apparatus has applied bails to all those containers that have been oriented and presented to the apparatus and the bail-applying apparatus has declutched, the "hold" on the circuit ceases and the proximity switch **62** again becomes effective so that an accumulation of oriented containers must be made before the apparatus is again activated for bail-application.

The proximity switch **62** is also preferably connected to a timer circuit which is adapted to shut down the bail-applying apparatus and to shut off the power to the metering gate to close the gate. This actuation of the "shut-down" is provided when a container **16***c* remains adjacent the proximity switch for a determined long period of time, which "long time" may be the amount of time necessary to fill the conveyor with stalled eared containers extending substantially to the metering gate.

OPERATION OF THE METERING AND ACCUMULATING APPARATUS

The eared container metering gate and accumulating feed of this invention above-described provides that, with the "power off" to the bail-applying apparatus, the metering gate is closed, with spring **34** moving the arms **18** and **20** to the closed position. With "power on" the gate is open for the passage of the leading eared container and the gate operates to meter containers as described above. The spaced eared containers, as fed by said metering gate, are rotated and advanced by chains **12** and **14** and one of the ears of the container **16** engages rail **50**, whence the rotation ceases and the containers are advanced toward and to the bail-applying mechanism. When the ears of the leading container **16***a* are engaged by the cover stop arms **56** and **58**, the container is stopped and the

succeeding containers **16***b* and **16***c* are stopped as they come in engagement with the preceding container.

As each container passes the third proximity switch **62** it actuates the switch and a time delay which blocks the completing of a bail-applying operation until a determined "short" period of time elapses. Absent the presence of a preceding can the actuating container passes by the proximity switch before the time delay is completed. When the container **16***c* is blocked by the preceding container the proximity switch is actuated when the primary time delay is exhausted. A second time delay may be included, which time is computed on the probable minimum time to completely fill the conveyor from switch three to the metering gate. This second time delay preferably shuts off both the gate and bail-applying apparatus as well as causing an alarm signal to be actuated.

The metering gate and means for accumulation above-described provide means for the bail-applying apparatus to receive eared containers in an oriented array and in groups having a determined minimum quantity. The modifications to the bail-applying apparatus as identified in my U.S. Patent 3,241,578 insures that the improved bail-applying apparatus will function more efficiently and with a reduced amount of wear.

Terms such as "in," "out," "up," "down," "upstream," "downstream," "open," "closed" and the like are applied to the metering gate and eared container accumulating means as shown and described in conjunction with the drawings. These terms are used above merely for the purposes of description and do not necessarily apply to a particular position in which the apparatus may be constructed or used.

The conception of the metering gate and accumulating means above-described and their application is not limited to the embodiment above-described but departures therefrom may be made within the scope of the accompanying claims and protection is sought to the broadest extent the prior art allows.

What is claimed is:

1. A metering gate feed for eared containers and the like wherein said containers may be delivered from a source and in an irregularly spaced and oriented array, and from the gate the containers are fed to an orienting conveyor in response to the movement of the containers thereon, the gate providing a minimum determined spacing between succeeding containers as they are delivered to the orienting conveyor, the metering gate and feed including: (a) a support frame; (b) an infeeding conveyor means adapted to receive in a randomly spaced and oriented array a succession of eared containers and to transport these containers forwardly in a single file; (c) a metering gate adapted to receive the single filed eared containers and to regulate the discharge of these containers one-at-a-time, the gate including a pair of arms at least one of which is movable toward the other arm and into the path of the container so as to engage and stop the forward progress of the container, said arm movable from the path of the container to permit the container to be transported forwardly on the conveyor; (d) means to move at least one arm to the limits of movement defining the open and closed positions of the gate; (e) a first switch means disposed downstream of the gate arm, the switch actuated in response to the passing of a container thereby, the switch adapted to cause an actuation of the gate arm to a gate-closed position, and (f) a second switch means disposed a determined distance from the first switch and further downstream on the conveyor, the second switch in response to the passing of the container causing the arm to be moved to the gate-open position.

2. A metering gate feed as in claim **1** in which there are two gate arms, both arms movable and in substantially equal amounts, the arms adapted to engage the container near its bottom as the container is transported forwardly on its bottom.

3. A metering gate feed as in claim **1** in which the first and second switch means are proximity switches adapted to be actuated by metal containers as they are moved forwardly on the conveyor.

4. A metering gate feed as in claim **2** in which the orienting conveyor includes at least two strands of chain and the like, the strands adapted to engage the bottom of and support the container, one of the strands advancing at a more rapid rate than the other to cause the eared container to rotate as it is advanced.

5. A metering gate feed as in claim **2** in which the arms are provided with a flexible facing means so disposed and adapted as to engage the side of the container as it is brought in the way of the arms, the flexible facings adapted to engage the side of the container without damage to the exterior surface of the container which may be a label, lithographing and the like.

6. A metering gate feed as in claim **2** in which the container engaging arms of the gate are actuated by the motion of a pair of lower lever arms, these lever arms actuated by motor means including a pusher adapted to engage and move the lever arms to open the gate, and biasing means adapted to urge the lever arms to a gate-closed position.

7. A metering gate feed as in claim **6** in which the motor means is a pneumatic cylinder.

8. A metering gate feed as in claim **6** in which the motor means is a solenoid.

9. A metering gate feed as in claim **2** in which the orienting conveyor includes a container orienting means and a third switch means, said third switch disposed a determined distance upstream from a bail-applying apparatus and the like, the switch operatively connected to said apparatus to actuate the apparatus, the switch adapted to be activated by containers as they are moved on the conveyor, the third switch cooperatively connected to a time delay means adapted to nullify the actuation of the switch for the determined time period so a container passing the switch at the speed of the conveyor does not result in the actuation of the applying apparatus, and whereby a container that does not pass the switch within said time delay period causes the applying apparatus to be actuated.

10. A metering gate feed as in claim **9** in which the third switch is a proximity switch and the determined distance upstream from the apparatus is at least the distance of three containers in contiguous engagement with each other when in the stopped position.

11. A metering gate feed as in claim **9** in which the third switch is cooperatively connected to a second time delay means adapted to be actuated after a longer determined time period and in response to said actuation the gate mechanism is moved so as to close the gate to a further feeding of containers.

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EDWARD A. SROKA, Primary Examiner

U.S. Cl. X.R.

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