March 10, 1959 D. F. BREMNER, JR 2,876,929

FEEDING MECHANISM FOR CRACKERS OR THE LIKE

Filed Dec. 7, 1955

5 Sheets-Sheet 1

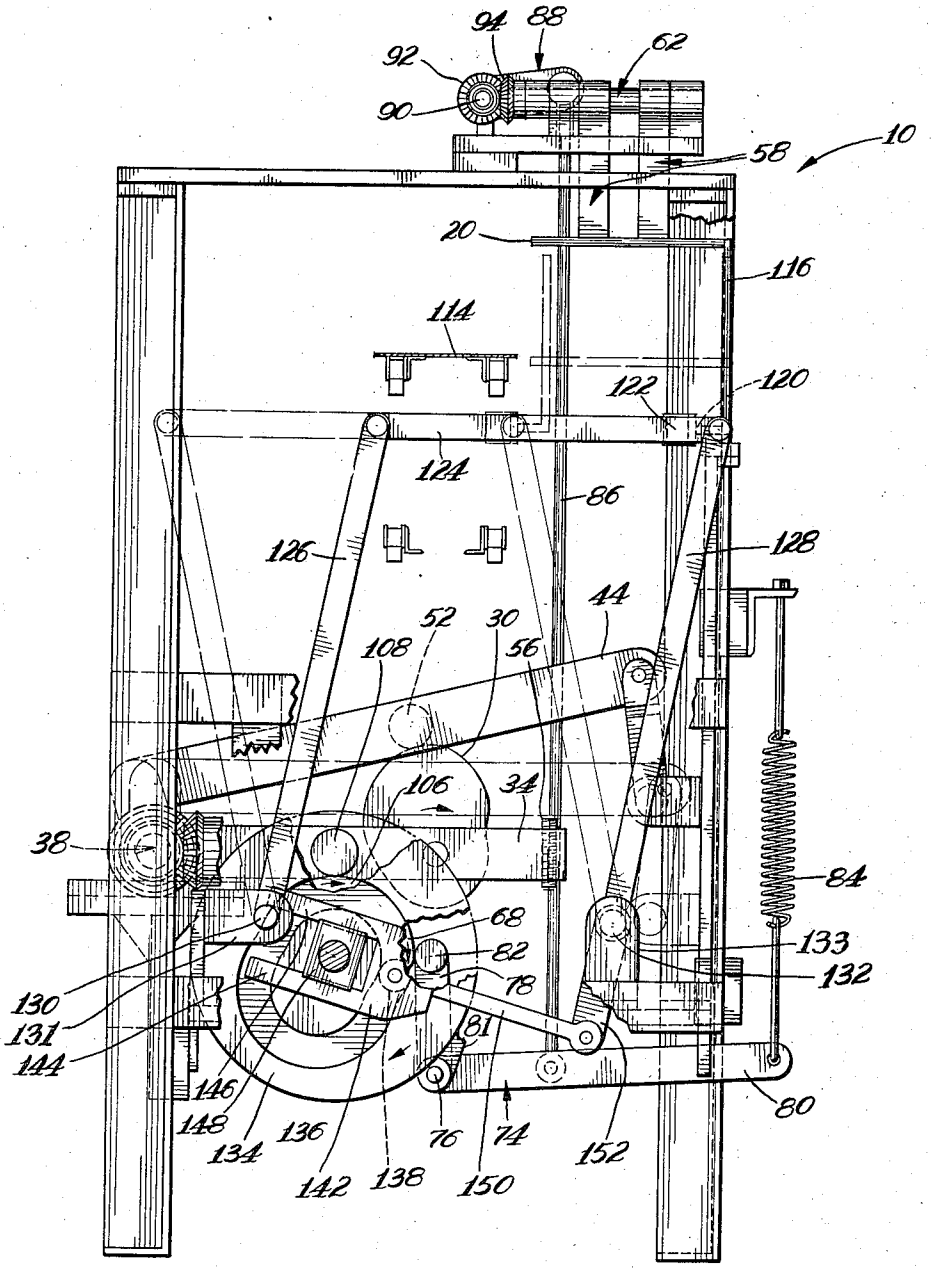


FIG. 1

INVENTOR

DAVID F. BREMNER, JR.

BY Cooms, McDougall, Williams & Hersh

ATTORNEYS

March 10, 1959 D. F. BREMNER, JR 2,876,929

FEEDING MECHANISM FOR CRACKERS OR THE LIKE

Filed Dec. 7, 1955

5 Sheets-Sheet 2

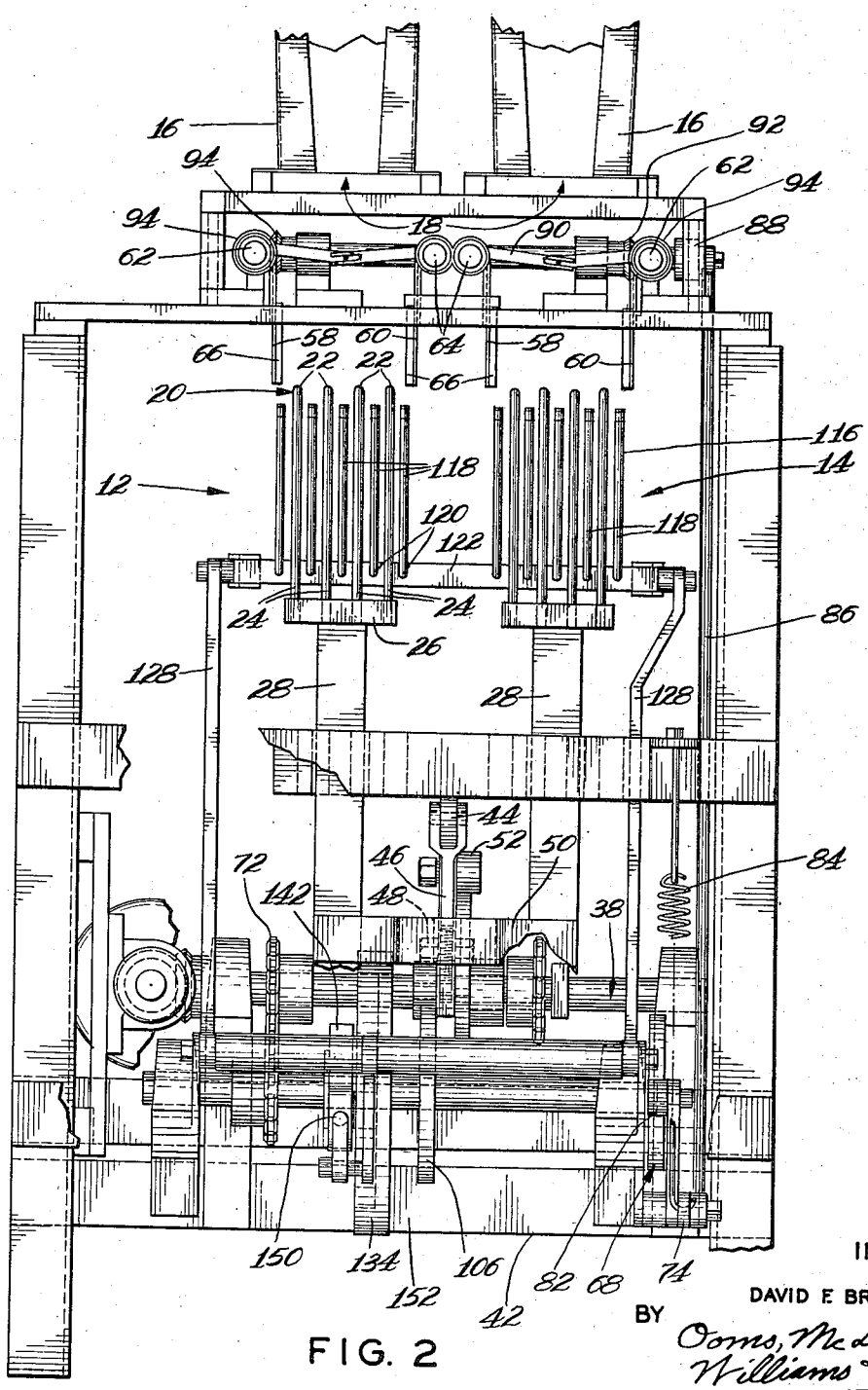


FIG. 2

INVENTOR

DAVID F. BREMNER, JR.

BY Dorns, McDougall, Williams & Hord

ATTORNEYS

March 10, 1959 D. F. BREMNER, JR 2,876,929

FEEDING MECHANISM FOR CRACKERS OR THE LIKE

Filed Dec. 7, 1955

5 Sheets-Sheet 3

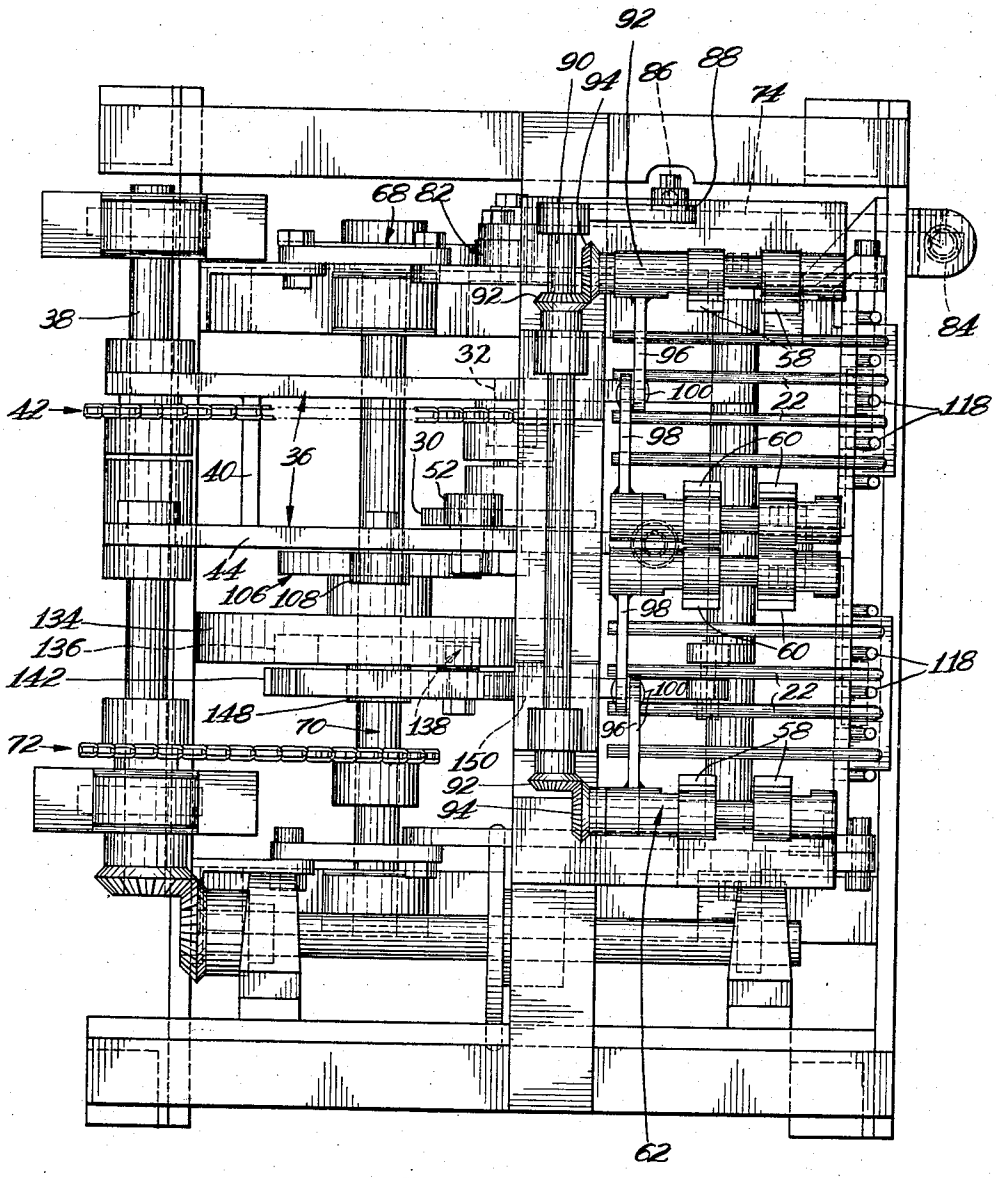


FIG. 3

INVENTOR

DAVID F. BREMNER, JR.

BY Ooms, McDougall, Williams & Hersh

ATTORNEYS

March 10, 1959 D. F. BREMNER, JR 2,876,929

FEEDING MECHANISM FOR CRACKERS OR THE LIKE

Filed Dec. 7, 1955

5 Sheets-Sheet 4

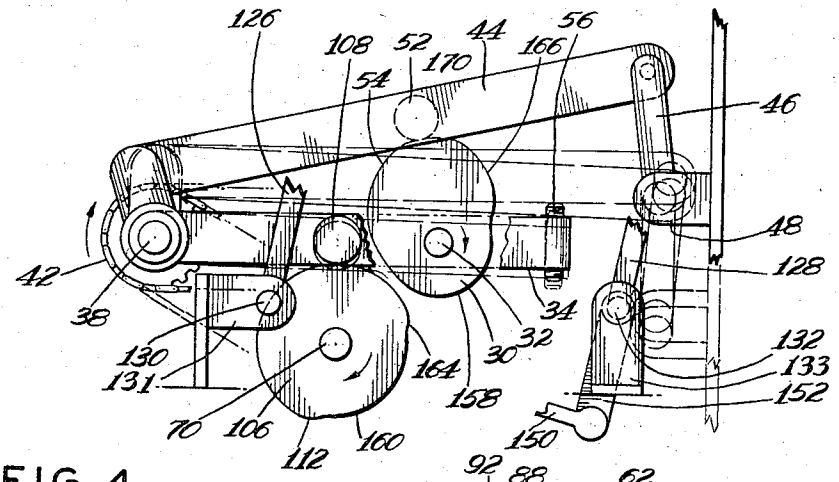


FIG. 4

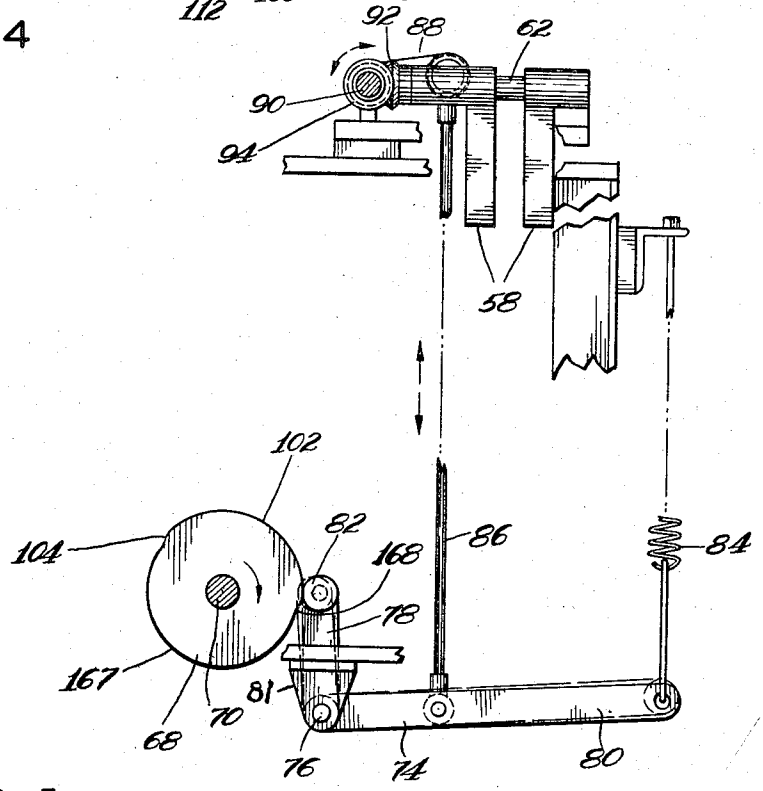


FIG. 5

INVENTOR

DAVID F. BREMNER, JR.

BY Ooms, McDougall, Williams & Hersh

ATTORNEYS

March 10, 1959 D. F. BREMNER, JR 2,876,929

FEEDING MECHANISM FOR CRACKERS OR THE LIKE

Filed Dec. 7, 1955 5 Sheets-Sheet 5

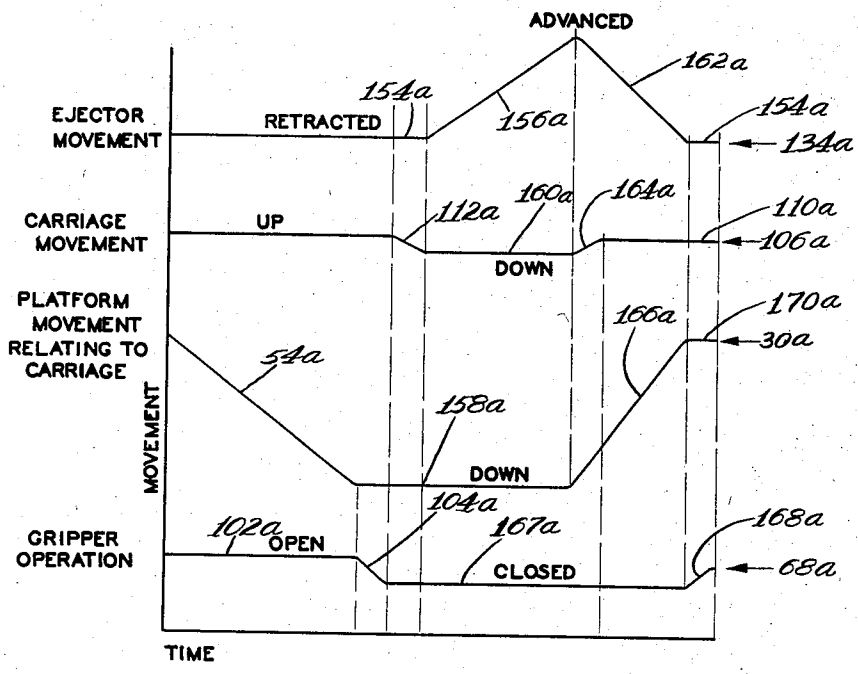


FIG. 6

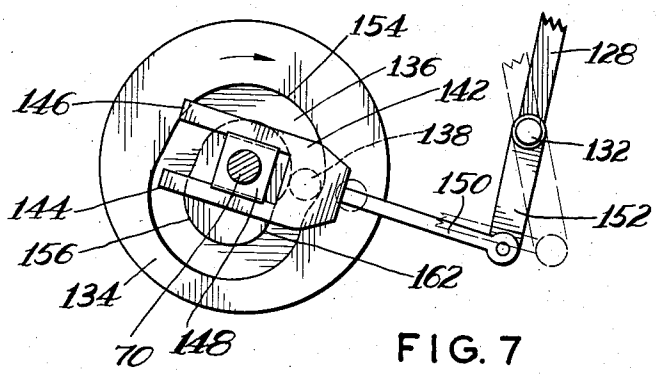


FIG. 7

INVENTOR
DAVID F. BREMNER, JR.
BY Dorns, McDougall, Williams & Hersh
ATTORNEYS

United States Patent Office

2,876,929

Patented Mar. 10, 1959

2,876,929

FEEDING MECHANISM FOR CRACKERS OR THE LIKE

David F. Bremner, Jr., Louisville, Ky.

Application December 7, 1955, Serial No. 551,641

3 Claims. (Cl. 221—207)

This invention relates to a mechanism for feeding flat articles, such as crackers, cookies or the like.

One principal object of the present invention is to provide a new and improved mechanism for feeding crackers or the like from a magazine or other source of supply in small stacks or batches, each of which will contain a predetermined number of the crackers.

Thus, it is an object of the present invention to provide a mechanism that will feed counted stacks of crackers or the like so that the stacks may subsequently be wrapped individually for packaging and shipment.

A further object is to provide a new and improved cracker feeding mechanism of the foregoing character which may be adjusted to insure accurate count and to vary the count in the stacks delivered by the mechanism.

It is another object to provide a new and improved cracker feeding mechanism of the foregoing character which may be operated at high speed yet will handle the crackers gently and without substantial breakage.

A further object is to provide such a new and improved cracker feeding mechanism which is dependable and effective in operation, yet is reasonably simple in construction and low in cost.

Further objects and advantages of the present invention will appear from the following description, taken with the accompanying drawings, in which:

Figure 1 is a front elevational view of a cracker feeding mechanism constituting an illustrative embodiment of the present invention.

Fig. 2 is a right side elevational view of the feeding mechanism shown in Fig. 1.

Fig. 3 is a plan view of the mechanism.

Figs. 4 and 5 are fragmentary, partly diagrammatic front elevational views showing portions of the feeding mechanism.

Fig. 6 is a graphical diagram indicating the sequence of certain operations in the feeding mechanism.

Fig. 7 is another fragmentary front elevational sectional view showing another portion of the feeding mechanism.

The drawings illustrate a mechanism **10** adapted to feed flat articles, such as crackers or cookies, in individual stacks containing a predetermined number of the articles. The stacks of crackers or the like delivered by the mechanism **10** may subsequently be wrapped individually for packaging and shipment. The wrapping may be accomplished manually or by means of a suitable wrapping mechanism (not shown).

The cracker feeding mechanism **10** is actually dual in construction, in that it embodies twin feeders **12** and **14** for delivering two stacks of crackers simultaneously. In all material respects, the two feeders **12** and **14** are identical in construction. Accordingly, most of the following detailed description will be directed to the front feeder **12**.

To hold a supply of crackers or other flat articles, the feeder **12** is equipped with a magazine **16** adapted to receive the crackers in an elongated vertical stack.

It will be understood that the crackers are adapted to descend by gravity through the magazine **16** and to emerge from the lower end of the magazine through an opening **18**.

For the purpose of supporting the lower end of the elongated stack of crackers in the magazine **16**, the feeder **12** is provided with a supporting member or platform **20** located below the lower end of the magazine **16** and underneath the discharge opening **18** of the magazine. In this instance, the platform comprises a plurality of spaced, substantially parallel and horizontal rods **22** having downwardly bent rear portions **24** mounted rigidly on a supporting horizontal bar **26**. To provide for vertical reciprocating movement of the platform **20**, the bar **26** is mounted on a downwardly extending vertically slidable bar **28**.

Initially, the platform **20** is moved downwardly by an amount corresponding to the desired height of the individual stacks of crackers to be counted out and delivered by the feeding mechanism **10**. The downward movement of the platform **20** lowers the entire stack of crackers in the magazine **16** by a corresponding amount. Such downward movement of the platform **20** might be effected in various ways, but, in this instance, the downward movement is brought about by means of a cam **30** (Figs. 1 and 4). It will be seen that the cam **30** is rotatably mounted on a shaft **32** supported for bodily movement by a swingable carriage **34**. As illustrated, the carriage **34** simply comprises a pair of arms **36** which are pivoted on a shaft **38** and are connected rigidly together by means of a crossbar **40**. The cam shaft **32** is journalled between the arms **36**. In this instance, the shaft **38** constitutes the main drive shaft for the feeding mechanism **10**. The shaft **38** may be rotated continuously by means of any suitable motor or other source of power (not shown). A chain drive **42** is connected between the shafts **38** and **32** to provide for continuous rotation of the cam **30**.

The cam is operatively connected to the vertically movable platform **20** by means of suitable linkage, which, in this instance, comprises an L-shaped lever **44** pivoted on the main drive shaft **38**. The freely swingable outer end of the lever **44** is pivotally connected to a depending link **46** which, in turn, is pivoted to a lug **48** mounted on a horizontal bar **50** which extends between the vertical slide bars **28** of the twin feeders **12** and **14**. A roller **52** is rotatably mounted on the arm **44** to engage and follow the cam **30**. The weight of the platforms **20**, the arm **44** and the linkage connected therebetween is effective to bias the roller **52** against the cam **30**.

It will be seen from Fig. 4 that the cam **30** has a falling portion **54** of decreasing radius which is effective to lower the platform **20**. The general configuration of the cam **30** is indicated in Fig. 6 by a graph **30***a* having a downwardly sloping portion **54***a* representing the falling portion **54** of the cam.

After the desired amount of downward movement, the platform **20** is arrested. While this might be brought about in various ways, it is effected in the present instance by means of an adjustable stop **56** in the form of a screw stud threadedly mounted on the carriage **34**. The threaded stop **56** is disposed underneath the arm **44** so that the arm will engage the stop. In this way, the downward movement imparted to the arm **44** by the cam **30** will be arrested by the stop **56**. By adjusting the height of the stop **56**, the lowered position of the arm **44** may be varied. In this way, it is possible to adjust the amount by which the elongated stack of crackers is lowered by the initial downward movement of the platform **20**.

After the initial downward movement of the platform **20** has been completed, the crackers in the elongated

stack supplied by the magazine **16** are engaged at a point spaced above the position of the platform. In this way, the upper portion of the elongated stack is prevented from moving downwardly any farther, during the remainder of the cycle of operation, while the lower portion of the stack is left free for further downward movement. The upper portion of the stack might be engaged and supported in various ways, but, in this instance, the upper portion of the stack is supported by grippers **58** and **60** adapted to engage opposite sides of the stack just above the initial position of the platform **20**. In this instance, the grippers **58** and **60** take the form of depending swingable fingers which are carried on shafts **62** and **64**, two of the fingers being mounted on each shaft. A pad **66** of rubber or other soft, resilient material is mounted on each of the gripping fingers **58** and **60** to prevent breakage of the crackers.

It will be understood that the gripping fingers **58** and **60** are open during the initial downward movement of the platform **20**. After the platform **20** has been moved downwardly the desired distance below the lower ends of the grippers **58** and **60** the grippers are closed. Various means might be provided to open and close the grippers **58** and **60**, but, in this instance, the grippers are operated by means of a cam **68** (Fig. 5). It will be seen that the cam **68** is fixed on a rotatable shaft **70**. A chain drive **72** is connected between the shaft **70** and the main drive shaft **38**. In this way, the shaft **70** is rotated continuously.

The cam **68** is operatively connected to the grippers **58** and **60** by a suitable linkage, illustrated as including an L-shaped bell crank lever **74** swingable about a pivot **76** and having a relatively short, generally vertical arm **78** and a relatively long, generally horizontal arm **80**. The pivot **76** is mounted on a stationary frame bracket **81**, as shown to best advantage in Fig. 5. A roller **82** is mounted on the shorter arm **78** and is adapted to engage and follow the cam **68**. A spring **84** is connected to the longer arm **80** in such a manner as to bias the lever **74** in a counterclockwise direction, as seen in Fig. 5, and thereby hold the follower roller **82** against the cam **68**.

It will be seen that a substantially vertical linkage rod **86** is pivotally connected at its lower end to the generally horizontal arm **80**. The upper end of the rod **86** is pivotally connected to a generally horizontal arm **88** mounted on a shaft **90**. Bevel gears **92** and **94** are employed to connect the shaft **90** to the gripper shaft **62**. It will be seen from Fig. 3 that the shaft **90** extends forwardly from the arm **88** and is arranged to actuate both of the twin feeders **12** and **14**. Thus, twin sets of the bevel gears **92** and **94** are employed to connect the shaft **90** to the gripper shafts **62** of the respective feeders **12** and **14**.

For each of the twin feeders **12** and **14**, the grippers **58** and **60** are interconnected by means of arms **96** and **98** mounted on the respective gripper shafts **62** and **64**. A pin-and-slot connection **100** is provided between the ends of the arms **96** and **98** so that swinging movement of the arm **96** will result in corresponding but oppositely directed swinging movement of the arm **98**. In this way the grippers **58** and **60** will move inwardly and outwardly in unison.

The action of the spring **84** is such as to bias the grippers **58** and **60** inwardly, toward their closed positions. Thus, the spring **84** tends to move the grippers against the lower end of the stack of crackers held in the magazine **16**.

During the initial downward movement of the platform **20**, the cam follower roller **82** engages a substantially circular, relatively high portion **102** of the cam **68**. Thus, the cam **68** holds the grippers **58** and **60** away from the stack, against the biasing action of the spring **84**. After completion of the initial downward movement of the stack, the follower roller **82** traverses a falling portion **104** of the cam **68**. Thus, the cam **68** presents a decreasing radius to the roller **82** so as to permit the spring **84** to close the grippers **58** and **60**. In Fig. 6, the action of the cam **68** is represented by a graph **68***a*. A horizontal portion **102***a* of the graph **68***a* represents the circular portion **102** of the cam **68**. In like manner, a downwardly sloping portion **104***a* of the graph represents the falling portion **104** of the cam.

After the grippers **58** and **60** have closed upon the stack of crackers in the magazine **16**, the platform **20** is moved downwardly an additional distance to separate the portion of the stack below the grippers from the remainder of the stack supported by the grippers. This additional movement of the platform might be effected in various ways, but, in the present case, the additional downward movement is brought about by swinging the carriage **34** downwardly so as to shift the cam **30** bodily by a corresponding amount. The downward movement is imparted to the carriage **34** by means of a cam **106**, which is mounted on the shaft **70**. A roller **108** is mounted on the carriage **34** to engage and follow the cam **106**. The weight of the carriage **34** and the platform **20** is utilized to bias the roller **108** against the cam **106**.

During the initial downward movement of the platform **20** and the subsequent closing movement of the grippers **58** and **60**, the carriage **34** is held in a raised position by means of a substantially circular, relatively high portion **110** of the cam **106**. After the grippers **58** and **60** have closed upon the stack, the roller **108** encounters a falling portion **112** of the cam, with the result that the carriage **34** is lowered. Corresponding lowering movement is imparted to the platform **20**. Accordingly, the lower portion of the stack, below the grippers **58** and **60** is moved downwardly from the upper portion of the stack, supported by the grippers. Due to the adjustment of the threaded stop **56**, the small stack supported by the platform **20** contains the desired number of crackers to be fed by the mechanism **10**.

The counted stack of crackers on the platform **20** is next removed from the platform. This might be done in various ways, but in this instance, the crackers are pushed off the platform **20** onto a conveyor **114** (Fig. 1) by means of an ejector **116**. As illustrated, the ejector **116** comprises a plurality of substantially parallel and vertical rods **118** which are arranged to mesh with the horizontal rods **22** of the platform **20**. The ejector rods **118** have forwardly bent lower end portions **120** which are fixedly mounted on a horizontal bar **122** extending across the twin feeders **12** and **14**. Thus, the ejectors **116** of both feeders **12** and **14** are actuated in common by the bar **122**.

To support the ejectors **116** for substantially horizontal movement, the bar **122** is connected rigidly between a pair of horizontal linkage bars **124**, constituting elements of twin parallelogram linkages. Each of the linkages also comprises a pair of generally vertical arms **126** and **128** having their upper ends pivotally connected to the opposite ends of the bar **124**. The parallel bars **126** and **128** are supported adjacent their lower ends on pivots **130** and **132**. As shown to best advantage in Figs. 1 and 4, the pivots **130** and **132**, are mounted on stationary frame brackets **131** and **133**.

The ejectors **116** are actuated by means of a cam **134**, which, in this instance, is provided with a cam groove or track **136** so that the cam will be double acting. A roller **138** is received in the groove **136** and is mounted on a yoke **142** having arms **144** and **146** which straddle the cam shaft **70**. A pivot block **148** is pivotally mounted on the shaft **70** and is received between the arms **144** and **146** of the yoke. In this way, the yoke **142** is mounted for a combination of swinging and sliding movement with respect to the shaft **70**.

It will be seen that a rod **150** is fixed at one end on

the yoke 142 and is pivotally connected at its other end to the lower end of an arm 152 which is swingable about the pivot 132 and is rigidly connected to the linkage arm 128. Thus, the cam 134 is effective to swing the linkage arm 128 and thereby impart substantially horizontal reciprocating movement to the ejector 116. It will be understood that the ejector rods 118 move between the platform rods 22 so that there is never any interference between the movement of the platform and the ejector.

During the downward movement of the platform 20, the follower roller 138 rides along a substantially circular portion 154 of the cam groove 136. After the cam 106 has lowered the carriage 34 to bring the platform 20 to its lowermost position, the follower roller 138 encounters a rising portion 156 of the cam groove 136. Accordingly, the ejector 116 is advanced to the dotted line position shown in Fig. 1, so as to discharge the crackers from the platform 20 onto the conveyor 114. It will be understood that the conveyor 114 is effective to carry the counted stacks of crackers to a wrapping mechanism or the like.

During the intervals in which the carriage 34 is being lowered and the ejector 116 is being advanced, the roller 52 is opposite a circular, relatively high portion 158 of the cam 30 with the result that the arm 44 remains against the stop 56. In Fig. 6, a horizontal portion 158*a* of the graph 30*a* corresponds to the circular portion 138 of the cam 30.

During the interval in which the ejector 116 is being advanced, the cam roller 108 rides along a substantially circular portion 160 of the cam 106. Accordingly, the carriage 34 remains in its lowermost position. In Fig. 6, the movement of the carriage 34 is represented by a graph 106*a*, having portions 110*a*, 112*a* and 160*a* corresponding to the portions 110, 112 and 160 of the cam 106.

After the counted stack of crackers has been ejected from the platform 20, the ejector 116 is retracted by a falling portion 162 of the cam groove 136. In Fig. 6, the movement of the ejector 116 is represented by a graph 134*a* having portions 154*a*, 156*a* and 162*a* corresponding to the portions 154, 156 and 162 of the cam 134.

Simultaneously with the retraction of the ejector 116, the carriage 34 is returned upwardly to its initial position by a rising portion 164 of the cam 106. This portion is represented by a portion 164*a* of the graph 106*a* in Fig. 6. At the same time, the platform 120 is raised to its initial position by a rising portion 166 on the cam 30. In the graph 30*a* of Fig. 6, the rising portion 166 of the cam 30 is represented by a portion 166*a*.

While the carriage 34 is being lowered and the ejector 116 is being advanced and retracted, the roller 82 rides along a circular portion 167 on the cam 68, represented at 167*a* in Fig. 6. After the platform 20 has been raised to its initial position and the ejector 116 has been retracted fully, the grippers 158 and 160 are opened by a rising portion 168 on the cam 68. This portion of the cam 68 is represented by a portion 168*a* of the graph 68*a* in Fig. 6. While the grippers are being opened, the cam roller 52 rides along a substantially circular, relatively high portion 170 of the cam 30, this portion being represented by a horizontal line 170*a* in the graph 30*a* of Fig. 6. During this interval, the rollers 108 and 138 ride along the circular portions 110 and 154 of the cams 106 and 134.

While the operation of the cracker feeding mechanism 10 has already been fully described, it may be helpful to review the cycle of operation. Initially, the platform 20 is fully raised and is supporting the lower end of the stack in the magazine 16, inasmuch as the grippers 58 and 60 are open. In the first stage of the cycle, the cam 30 is effective to lower the platform 20 until the platform-actuating arm 44 engages the threaded stop 56 mounted on the cariage 34. Thus, the position of the stop 56 determines the amount by which the platform 20 is lowered in the initial stage of operation.

After its initial downward movement, the platform 20 pauses while the cam 68 permits the grippers 58 and 60 to close against the stack of crackers held in the magazine 16. It will be recalled that the grippers engage the stack immediately above the initial position of the platform 20. Thus, the lower portion of the stack, corresponding in height to the distance through which the platform is moved downwardly in the initial stage of the operation, is not supported by the grippers. After the grippers have been closed on the stack of crackers, the cam 106 is effective to lower the carriage 34 and thereby shift the cam 30 bodily in a downward direction. Accordingly, the platform 20 and the small stack of crackers carried thereby are lowered an additional amount.

Next, the cam 134 advances the ejector 116 and thereby pushes the crackers off the platform 20 and onto the conveyor 114. The ejector 116 is then retracted to its initial position. At the same time, the platform 20 is raised to its initial elevation, just below the grippers 158 and 160. Finally, the grippers 158 and 160 are opened to release the stack for downward movement with the platform 20 in the next cycle of operations.

It will be recognized that the position of the adjustable stop 56 determines the exact height of the stacks of crackers counted out and delivered by the mechanism. Thus, the stop may be adjusted to insure accurate count or to vary the count.

It will be apparent that the mechanism may be operated at high speed without damaging the crackers. The meshing arrangement of the platform and ejector rods provides for simultaneous movement of the platform and the ejector without interference. Thus, both the platform and the ejector may be returned to their initial positions simultaneously.

It will be recognized that the mechanism is simple and inexpensive in construction, yet is effective and dependable in operation. A wide variety of flat articles, such as crackers, cookies and the like may be handled by the feeding mechanism.

Various modifications, alternative constructions and equivalents may be employed without departing from the true spirit and scope of the invention as exemplified in the foregoing description and defined in the following claims.

I claim:

1. In a mechanism for feeding crackers or the like in stacked groups of predetermined height, the combination comprising a magazine for receiving a supply of crackers or the like in an elongated stack therein, said magazine having a discharge opening for the crackers at its lower end, a platform movable vertically below said discharge opening for receiving the crackers therefrom, said platform comprising a plurality of spaced generally parallel and horizontal rods, a vertically movable carriage, a rotatable cam mounted on said carriage, a cam follower engaging said cam and connected to said platform, said cam having a portion for lowering said platform a predetermined distance to lower the elongated stack of crackers a corresponding amount, an adjustable stop on said carriage for arresting downward movement of said platform at a first elevation, gripper means disposed adjacent the lower end of said magazine and above said first elevation for engaging the crackers to prevent further downward movement of the portion of the elongated stack opposite and above said gripper means, means for opening said gripper means prior to lowering movement of said platform, means for closing said gripper means subsequent to movement of said platform to said first elevation, second rotatable cam means operatively connected to said carriage and having a portion for lowering said carriage a predetermined distance to lower said platform to a second lower elevation and thereby separate the portion of said elongated stack below said gripper means from the

portion of said stack supported by said gripper means, an ejector for pushing the crackers off the platform, said ejector comprising a plurality of spaced generally parallel and vertical rods meshing with and movable between said horizontal platform rods, means for advancing said ejector subsequent to lowering of said platform to said second elevation, said first cam, second cam means and last mentioned means having respective portions for simultaneously raising said platform relative to said carriage, raising said carriage and said platform to their initial elevations, and retracting said ejector to its initial position.

2. In a mechanism for feeding articles such as crackers or the like, the combination comprising a magazine for receiving a supply of the articles in an elongated stack therein, a platform movable generally vertically below said magazine for receiving the crackers therefrom, a a vertically movable carriage, a cam mounted on said carriage and operatively connected to said platform, said cam having a portion for lowering said platform a predetermined distance to lower the elongated stack of articles a corresponding amount, an adjustable stop on said carriage for arresting downward movement of said platform at a first elevation, gripper means disposed adjacent the lower end of said magazine and above said first elevation for engaging the articles to prevent further downward movement of the portion of the elongated stack opposite and above said gripper means, means for opening said gripper means prior to lowering movement of said platform, means for closing said gripper means subsequent to movement of said platform to said first elevation, second cam means operatively connected to said carriage and having a portion for lowering said carriage a predetermined distance to lower said platform to a second lower elevation and thereby separate the portion of said elongated stack below said gripper means from the portion of said stack supported by said gripper means, an ejector for pushing the articles off the platform, means for advancing said ejector subsequent to lowering of said platform to said second elevation, said first cam, second cam means and last mentioned means having respective portions for simultaneously raising said platform relative to said carriage, raising said carriage and said platform to their initial elevations, and retracting said ejector to its initial position.

3. In a mechanism for feeding articles such as crackers or the like, the combination comprising a magazine for receiving a supply of the articles in an elongated stack

therein, a platform movable generally vertically below said magazine for receiving the crackers therefrom, a vertically movable carriage, means to actuate said platform including a cam mounted on said carriage, and means for operatively connecting said cam to said platform, said cam having a portion for lowering said platform a predetermined distance to lower the elongated stack of articles a corresponding amount, an adjustable stop on said carriage for arresting downward movement of said platform at a first elevation, holding means disposed adjacent the lower end of said magazine and above said first elevation for engaging the articles to prevent further downward movement of the portion of the elongated stack above said holding means, holder actuating means for releasing said holding means prior to lowering movement of said platform, said holder actuating means including means for activating said holding means subsequent to movement of said platform to said first elevation, means to actuate said carriage including second cam means, and means for operatively connecting said second cam means to said carriage, said second cam means having a portion for lowering said carriage a predetermined distance to lower said platform to a second lower elevation and thereby separate the portion of said elongated stack below said holding means from the portion of said stack supported by said holding means, an ejector for pushing the articles off the platform, ejector actuating means for advancing said ejector subsequent to lowering of said platform to said second elevation, and means for simultaneously operating said first mentioned cam, said holder actuating means, said second cam means, and said ejector actuating means, said first cam, second cam means and ejector actuating means having respective portions for simultaneously raising said platform relative to said carriage, raising said carriage and said platform to their initial elevations, and retracting said ejector to its initial position.

References Cited in the file of this patent

UNITED STATES PATENTS

1,330,639	Leumann	Feb. 10, 1920
2,629,503	Neja	Feb. 24, 1953
2,655,271	Cole et al.	Oct. 13, 1953
2,770,392	Roberts	Nov. 13, 1956

FOREIGN PATENTS

572,991	Germany	Mar. 24, 1933