United States Patent

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[73] Assignee **Quality Food Machinery, Inc.**

[54] **FEED-REGULATING SYSTEM**
8 Claims, 7 Drawing Figs.

[52] **U.S. Cl.** **198/37**
[51] **Int. Cl.** **B65g 43/08**
[50] **Field of Search** ..... 198/37; 93/93 (.3); 53/64

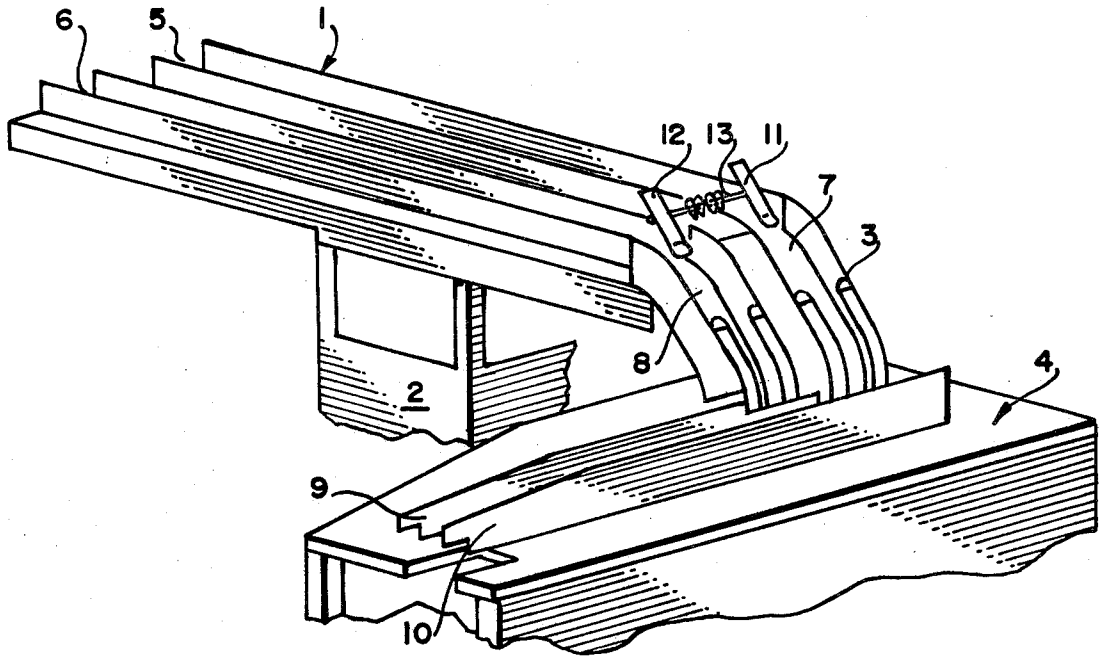
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ABSTRACT: For feeding confectionery items such as plain or filled wafers and the like into a wrapping machine in a predetermined orientation, a feed-regulating system is provided wherein relatively flat items are arranged in flat face contacting relation to each other on the working reach of a conveyor and wherein feeler means responsive to the angle of tilt of the items is arranged to effect a desired control operation. By this means a control operation to speed up the conveyor is effected due to the tilt of the items to be fed when the outfeed from the conveyor is in excess of the infeed thereto. Conversely an increase in the rate of input relative to the rate of output causes the items to be fed to assume positions of substantially normal or perpendicular disposition relative to the conveyor and such a condition causes the feeler means to reduce or stop the motive means driving the conveyor.



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SHEET 1 OF 3

FIG. 1a

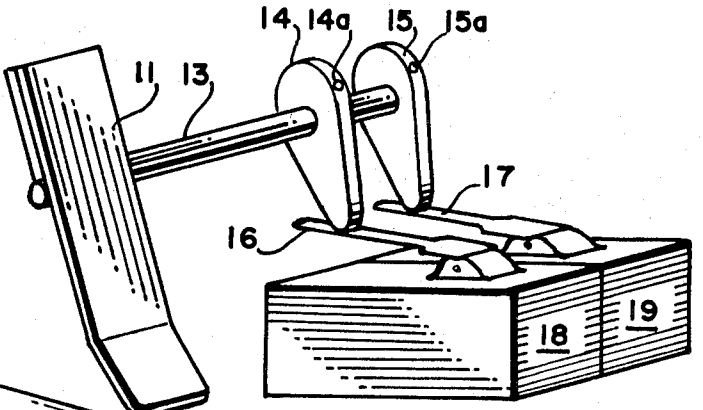


FIG. 1

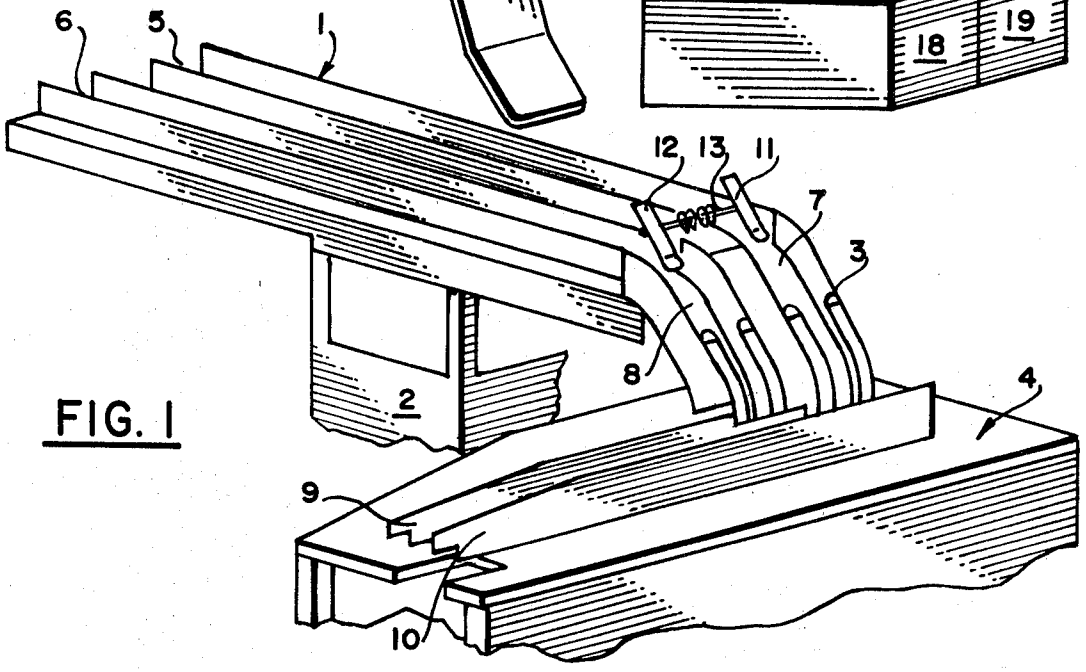
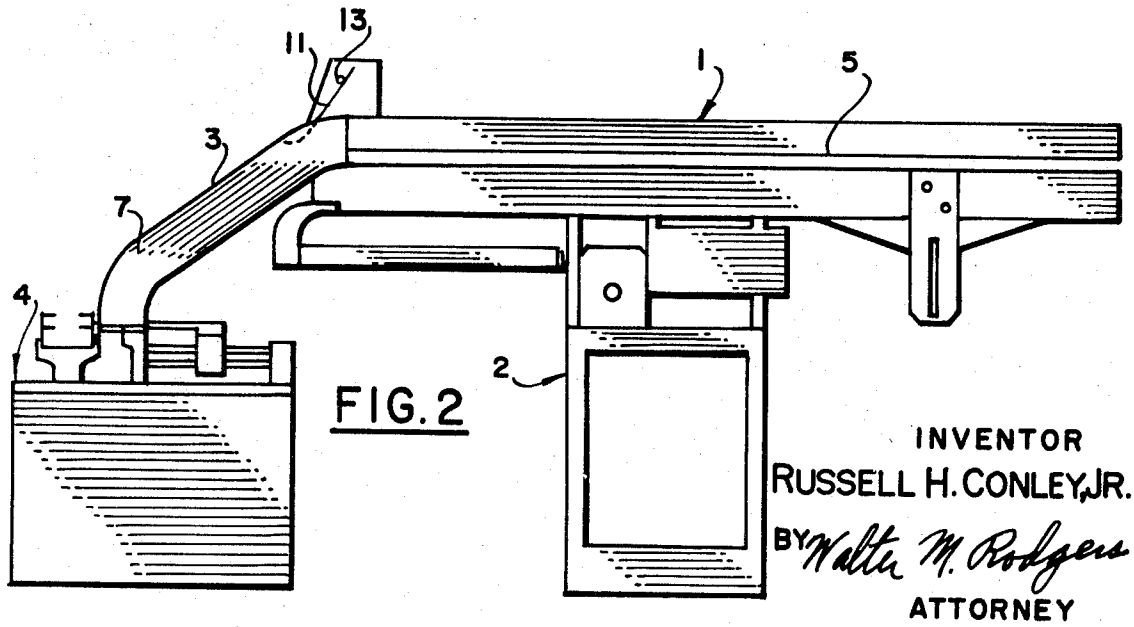


FIG. 2



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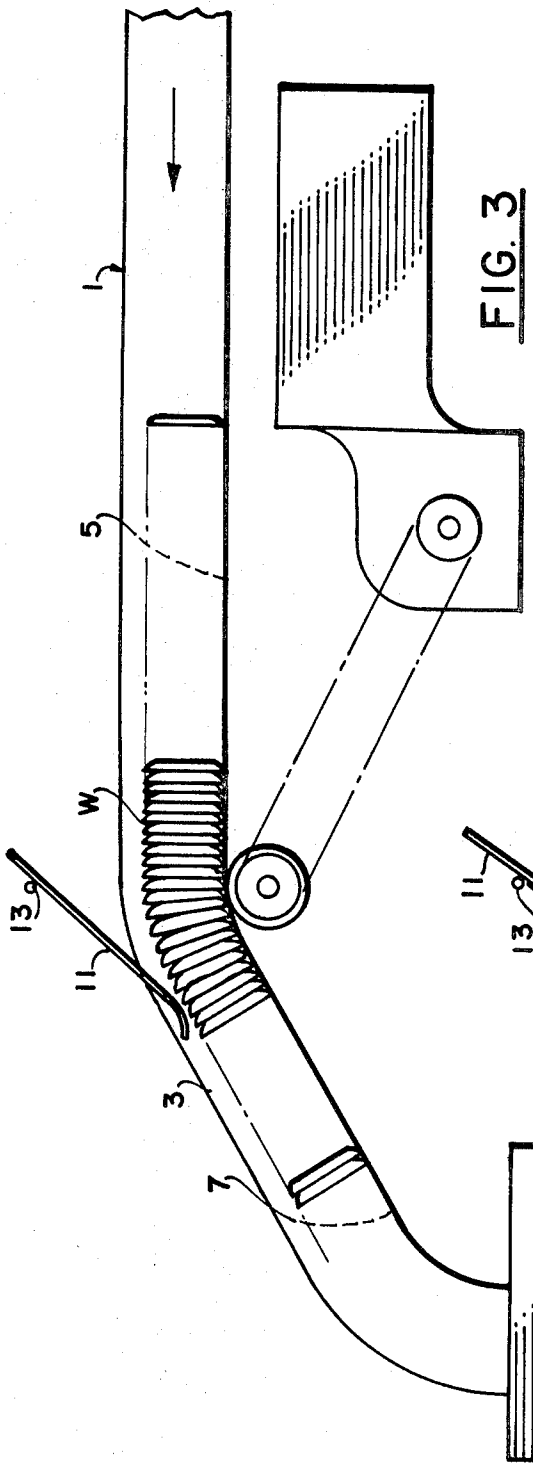


FIG. 3

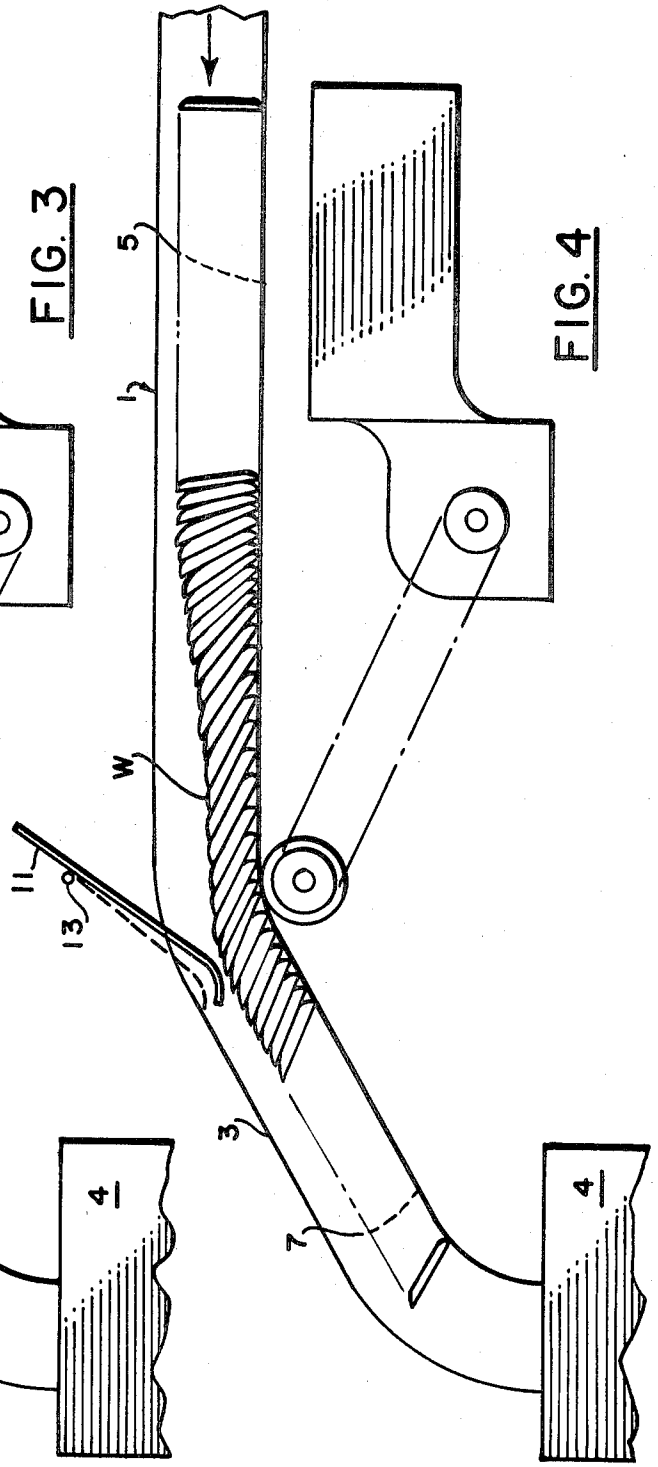


FIG. 4

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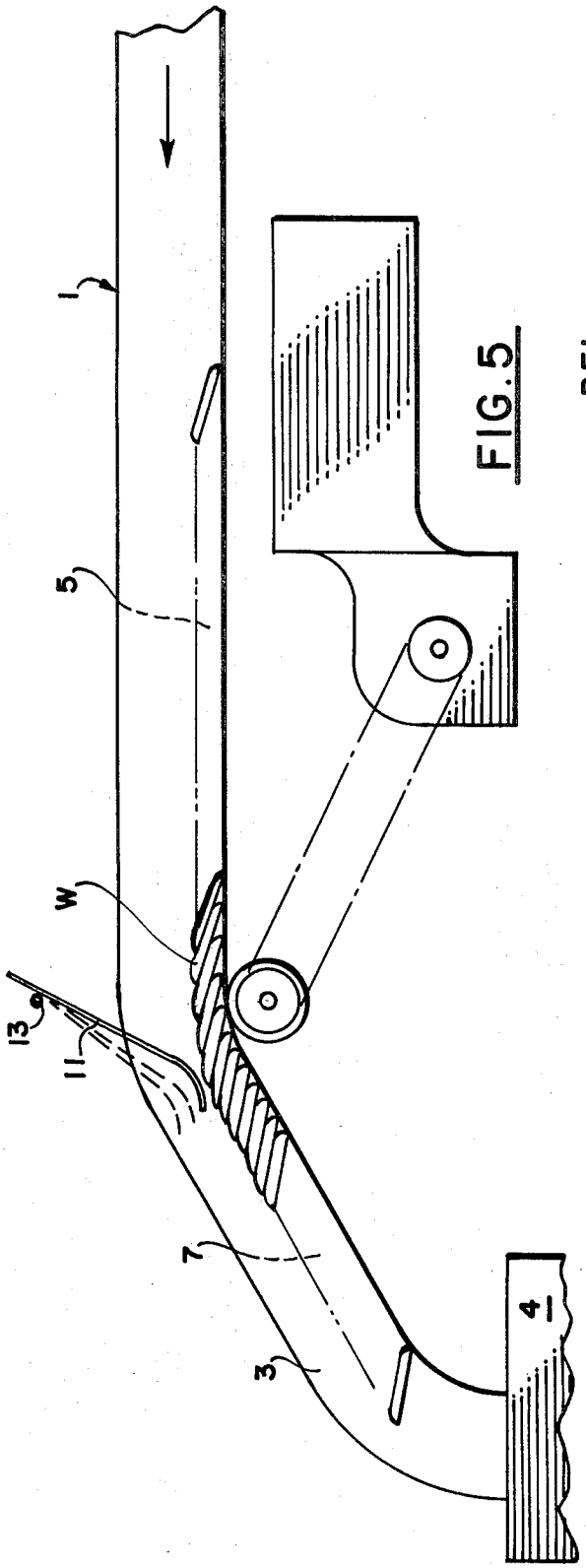


FIG. 5

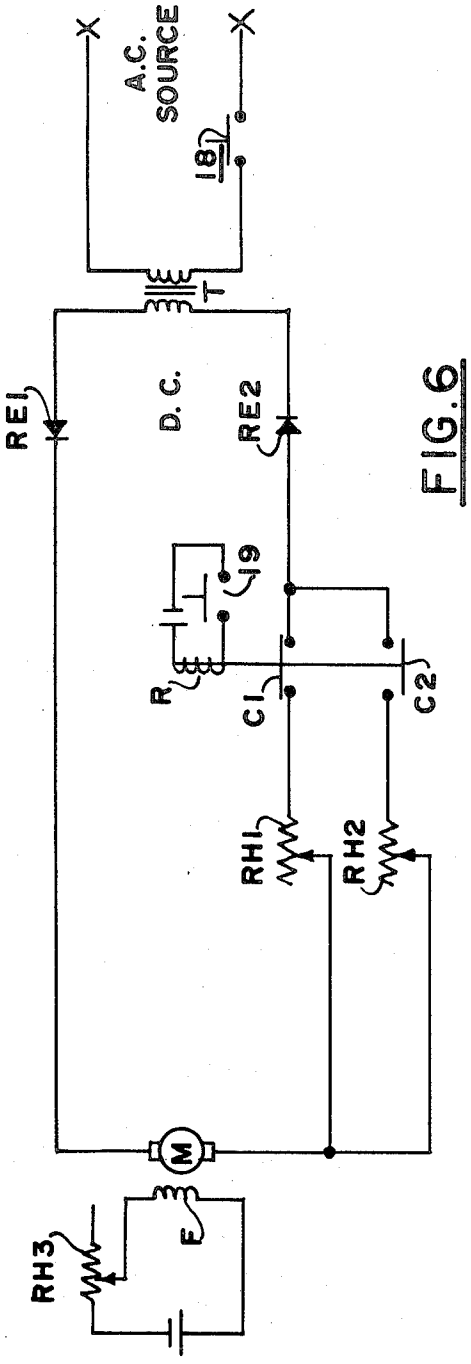


FIG. 6

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FEED-REGULATING SYSTEM

Where items such as filled or plain confectionery items are to be stacked one atop another and then fed in groups to a wrapping machine to be wrapped, it is difficult if not impossible to operate the feeding conveyor for the stacking machine at a speed which synchronizes directly and correctly with the speed of operation of the wrapping machine. Thus according to this invention, variations in the speeds of input feed and output feed of a conveyor which cause changes in the bodily disposition of the items which are fed relative to the conveyor means are sensed by delicate feeler means which in turn effects the desired changes in operating speed of the conveyor so that a balanced operating condition can be substantially maintained.

For a better understanding of the invention, reference may be had to the following detailed description taken in conjunction with the accompanying drawing in which:

FIG. 1 is a perspective view of a conveyor means including an outfeed chute connected therewith and an associated stacking conveyor to which the invention is applied;

FIG. 1*a* is an enlarged portion of the mechanism shown in FIG. 1;

FIG. 2 is a side view of the arrangement shown in FIG. 1 as viewed generally from the right side thereof;

FIG. 3 is a side view of a conveyor mechanism to which the invention has been applied and which shows a condition which obtains when the items to be fed are disposed in substantially normal or perpendicular relationship to the working reach of the conveyor and representing a condition wherein the conveyor means may be stopped to allow the stacking and wrapper means to receive from the conveyor means a number of items to be wrapped;

FIG. 4 is a view similar to FIG. 3 but which depicts a condition wherein the outflow toward the left of the items is substantially at the desired rate relative to the infeed thereof;

FIG. 5 is a view similar to FIGS. 3 and 4 and which depicts a condition wherein the outfeed of items toward the left is excessive relative to the infeed from the right; and wherein

FIG. 6 is a schematic wiring diagram of a control system embodying the invention.

With reference to FIGS. 1, 1*a* and 2, the numeral 1 generally designates a belt-type conveyor mounted atop a supporting base generally designated by the numeral 2 and to which a downwardly extending chute 3 is connected. The chute 3 receives items from the horizontal portions of conveyor 1 and constitutes therewith the conveyor means of this invention. The outfeed of items to be fed from the chute 3 is supplied to a stacking conveyor generally designated by the numeral 4.

More specifically the conveyor belts generally designated at 1 comprise a pair of parallel troughs designated by the numerals 5 and 6 which are interconnected with downwardly extending chutes 7 and 8 respectively. The conveyors which are disposed within chutes 5 and 6 preferably are of the endless belt type with the working reaches thereof extending from the left end toward the right end as indicated in FIG. 1 and from right to left as indicated in FIG. 2. Items to be fed such as flat confectionery wafers of the plain or filled type are fed from the left as viewed in FIG. 1 and are mounted on their edges in face-contacting relation so as to move on the conveyor disposed within passageway 5 and are supplied by that conveyor to the chute 7. Such items are discharged from the lower end of chute 7 to a conveyor of the endless belt type which is mounted so that its working reach moves from right to left between the sidewalls 9 and 10 of the stacking conveyor 4. Since the conveyor disposed between sidewalls 9 and 10 moves from right to left, a wafer, for example, discharged from the lower end of chute 7 falls on to the conveyor disposed between sidewalls 9 and 10 and hence moves toward the left. When a particular item from chute 7 arrives below chute 8, another wafer from chute 8 is ordinarily stacked atop the wafer discharged from chute 7 so as to form a stack of items. Thereafter such stacks of wafers are supplied to a wrapping machine which is of conventional construction and which is not shown in the drawings.

FIG. 3 is a side view of the conveyor means of this invention and shows the conveyor belts schematically as well as a sidewall of the conveyor means 5 together with the associated chute 7 and the items which are conveyed are indicated at W. As is apparent from FIG. 3 items W are disposed in flat face contacting relation and such items are of a flat construction and may constitute wafers or other similar items, for example. Changes in the outfeed rate from the conveyor means such as 5, 7 relative to the input rate to the conveyor means from left to right result in changes in the angular disposition of items W relative to the conveyor 5, 7. Such changes are sensed by feeler means such as is represented by the arm 11 in FIGS. 1 and 3, 4 and 5. A feeler arm 12 is associated with the conveyor means comprising conveyor 6 and chute 8.

As is best shown in FIG. 1*a*, feeler means 11 is pivotally mounted on shaft 13 provided with a pair of cams 14 and 15 which are adjustably mounted in fixed relation on shaft 13. Cams 14 and 15 are arranged to engage the operating arms 16 and 17 of switches 18 and 19 respectively to perform desired control operations.

With the items W arranged as shown in FIG. 3 in substantially normal or perpendicular relationship to the working reach of the conveyor means 5 and to the supporting surface of chute 3, a condition is indicated wherein the outfeed of items from the left-hand end of chute 3 is at a rate less than the supply rate of infeed items from the right. Under these conditions it is desirable to stop the conveyor means 5, which is driven by motor M.

Thus as is apparent from FIGS. 1*a* and 6, feeler element 11 occupies a position indicating a substantial height of items W and cams 14 and 15 occupy positions such that both switches 18 and 19 are opened. Since switch 18 controls the flow of current to the motor M, the motor stops when switch 18 opens, thus stopping conveyor 5.

If the outflow of items to the wrapper machine 4 increases relative to the inflow of items to the conveyor, the items W shift bodily relative to the conveyor means comprising the conveyor 5 and chute 3 as shown in FIG. 4. This action allows feeler 11 to rotate in a counterclockwise direction about its shaft 13 to occupy the position depicted in FIG. 4. Under these conditions, operation of conveyor 5 is initiated. Cam 14 is so adjusted by means of its set screw 14*a* as to close switch 18. This action, as is apparent from FIG. 6, energizes the primary winding of transformer T and supplies through rectifiers RE1 and RE2 a unidirectional current to the armature of motor M through preset rheostat RH1 and normally closed contacts C1 of relay R. Under these conditions, motor M runs at a normal speed as determined by the setting of rheostat RH1 and the field rheostat for the motor designated at RH3. Under these conditions the conveyor runs at normal speed.

If the condition depicted in FIG. 4 progresses to that depicted in FIG. 5 wherein the items W are tilted forwardly by an angle even greater than the angle of tilt depicted in FIG. 4, an increase in the supply of items W from the right is indicated. Toward this end, it is necessary to increase the speed of motor M. Accordingly, cam 15 by means of its setscrew 15*a* is adjusted so that feeler arm 11 rotates about its shaft 13 in a counterclockwise direction through an angle even greater than that depicted in FIG. 4. This action causes cam 15 to close switch 19. As is apparent from FIG. 6, closing switch 19 energizes the coil of relay R and opens normally closed contacts C1 and closes normally open contacts C2 of relay R. This action causes current to the armature of motor M to flow through contacts C2 and rheostat RH2 rather than through contacts C1 and rheostat RH1. Rheostat RH2 is preadjusted to a value of resistance less than the resistance of rheostat RH1 so that under these conditions a higher voltage is supplied to the armature of motor M than is the case when relay R is deenergized as when the switch 19 is open. The increased voltage to the armature of motor M causes the motor to increase in speed and in turn increases the rate of inflow of items to conveyor 5 from the right. Adjustments are made such that the conditions depicted in FIG. 5 approach that depicted in FIG. 4. If desired, the angle of tilt of items W is of a magnitude

between the normal positions depicted in FIG. 3 and the tilted disposition depicted in FIG. 4.

From the above description it is apparent that by the invention, the flow of items along one or more conveyor means may be easily and precisely regulated so as to obtain a desired balance between items flowing into the conveyor means and items flowing from the conveyor means into another system such as a stacking and wrapping means.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

I claim:

1. A feeding regulating system for flat items, said system comprising a series of flat items disposed on their edges and conveyor means having a working reach arranged to receive and convey a substantially continuous supply of said flat items, the items being disposed in a row in flat face contacting relation with each other and with the working reach of said conveyor in contact with an edge portion of each item, the items changing bodily positions relative to said conveyor means in coordination with relative changes in the rate at which items are supplied to and discharged by said conveyor means, feeler means in continuous engagement with edges of the items remote from said conveyor means and responsive to said changes in bodily position of the items relative to said conveyor means and performing a control operation, and means operable in coordination with said operation of said feeler means effecting changes in the operation of the speed of said conveyor means.

2. A system according to claim 1 wherein said feeler means is responsive to changes in the angle of tilt of the items relative to the conveyor means for performing a control operation.

3. A system according to claim 1 wherein the working reach of said conveyor means is generally horizontal and wherein the outfeed end of the working reach of the conveyor is arranged to supply items into a downwardly extending chute constituting the outfeed end of said conveyor means.

4. A system according to claim 1 wherein an increase in the outfeed rate relative to the infeed rate of items leaving and entering the conveyor means respectively causes the items to tilt forward bodily in the direction of feeding movement.

5. A system according to claim 4 wherein said feeler means is responsive to predetermined tilting of the items to initiate operation of said conveyor means at normal speed.

6. A system according to claim 5 wherein said feeler means is responsive to tilting of the items through an angle of tilt greater than that required to initiate normal speed of said conveyor means to cause said conveyor means to operate at abnormal speed, said feeler means being effective to cause said conveyor means to operate at normal speed upon a predetermined reduction of the angle of tilt of the items.

7. A system according to claim 1 wherein said feeler means responds to predetermined tilting of the items forwardly in the direction of movement thereof along the working reach of the conveyor to cause an increase in conveyor speed.

8. A system according to claim 1 wherein said feeler means is responsive to a generally normal disposition of the items relative to said conveyor means to effect a stoppage of said conveyor means.