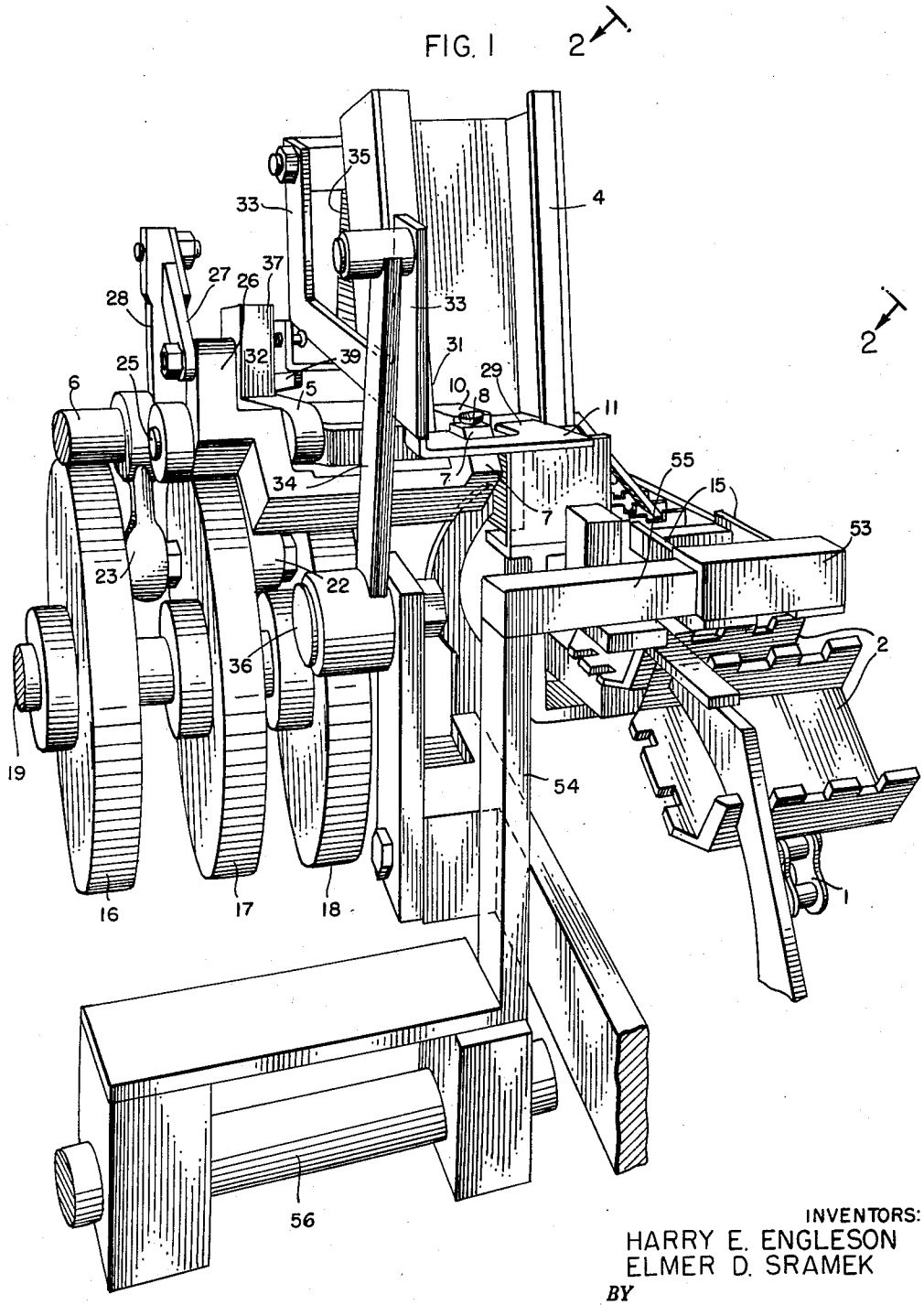
Nov. 24, 1959 H. E. ENGLESON ET AL 2,914,322

LEAFLET FEEDING MECHANISM

Filed Oct. 25, 1956 4 Sheets-Sheet 1

FIG. 1



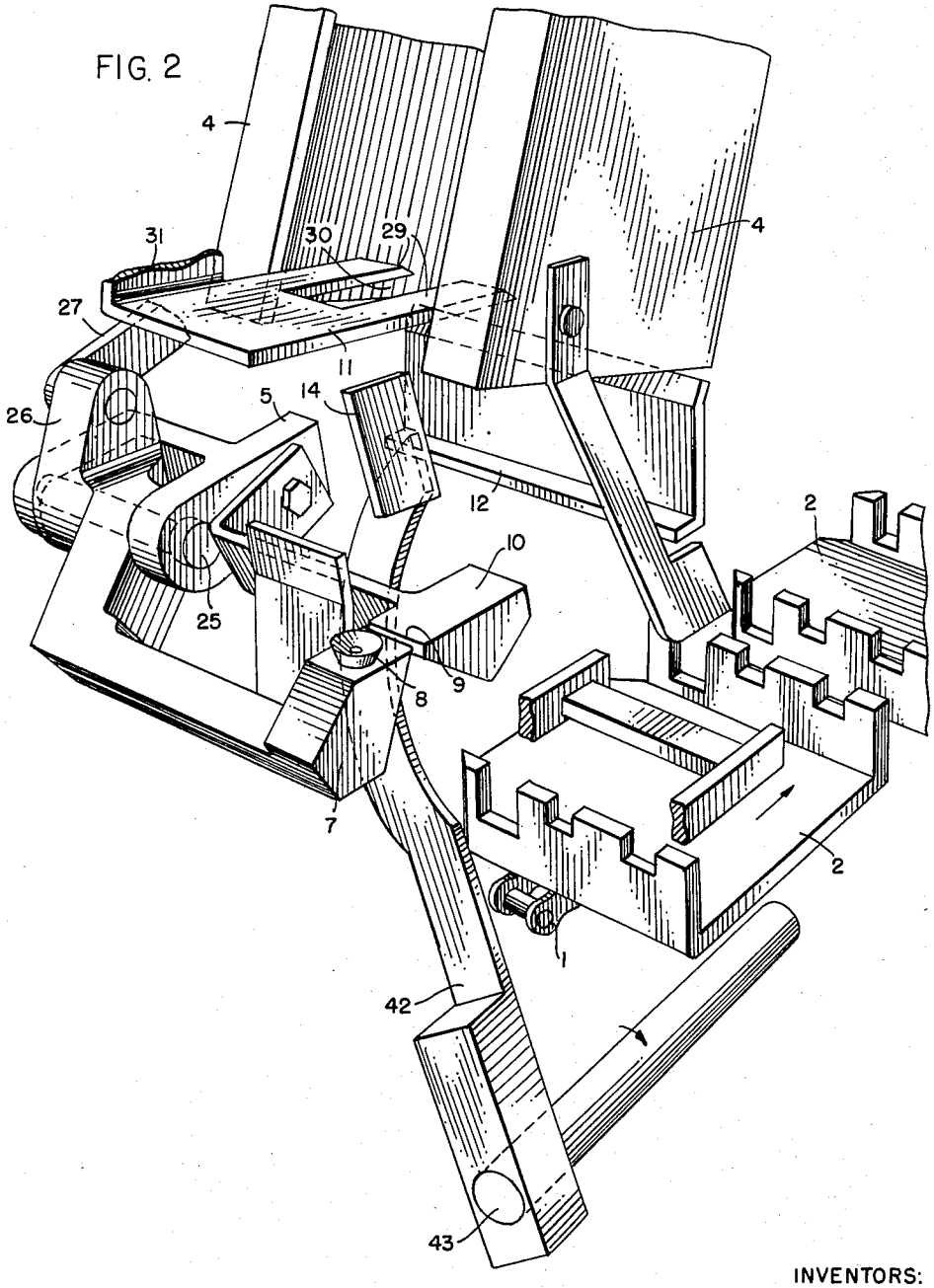
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LEAFLET FEEDING MECHANISM

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FIG. 2



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LEAFLET FEEDING MECHANISM

Filed Oct. 25, 1956 4 Sheets-Sheet 3

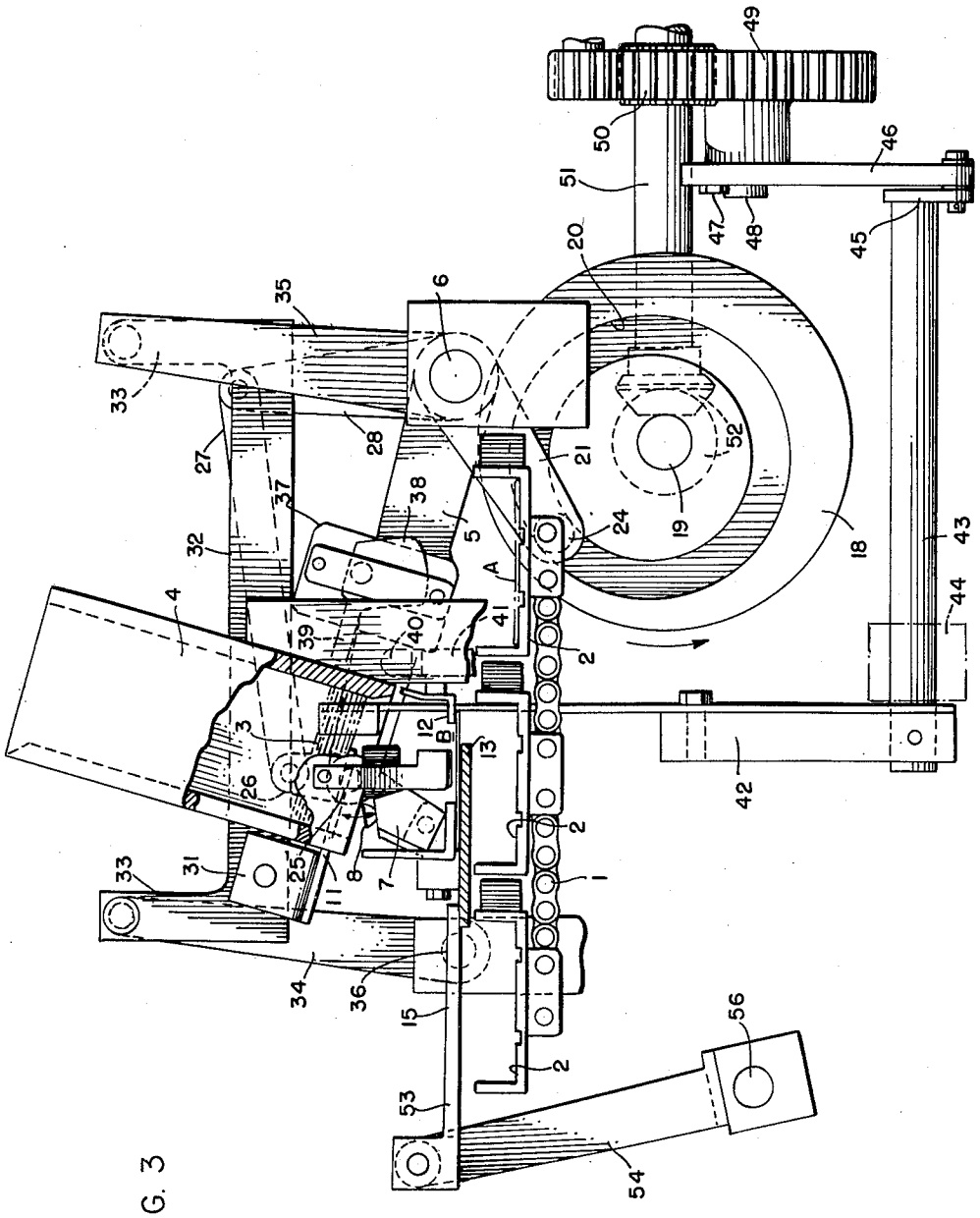


FIG. 3

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LEAFLET FEEDING MECHANISM

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FIG. 4

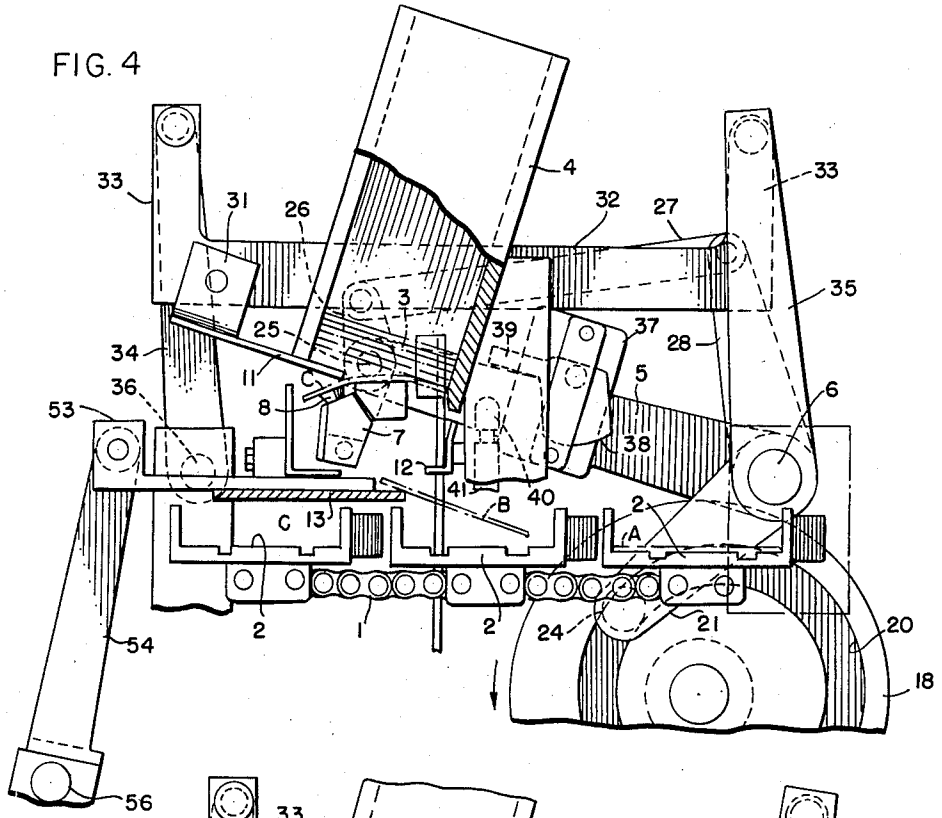
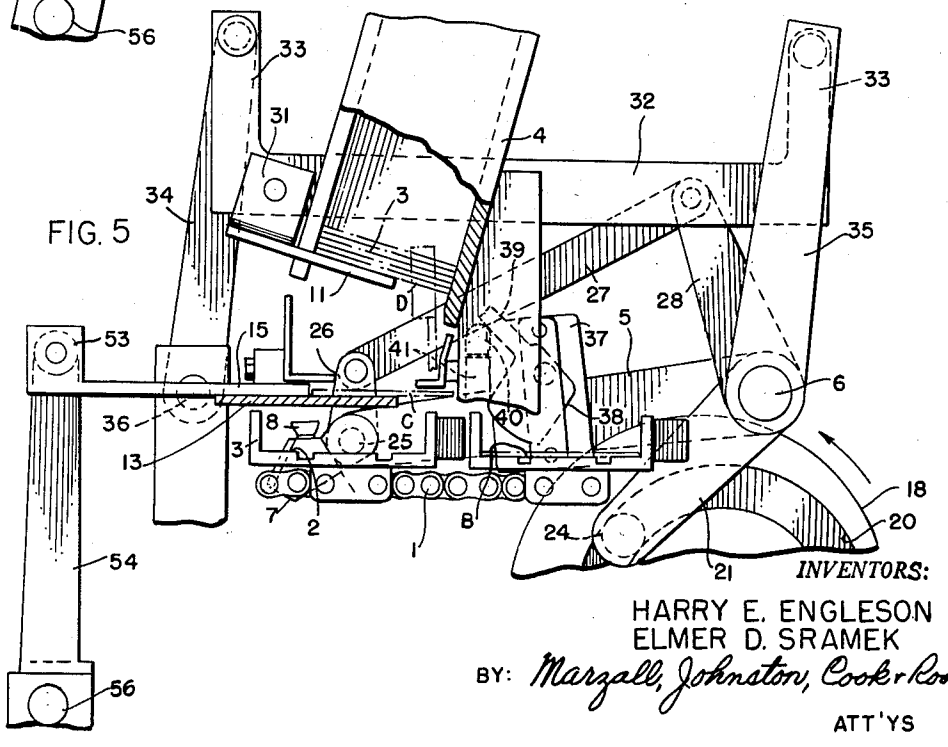


FIG. 5



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United States Patent Office 2,914,322 Patented Nov. 24, 1959

2,914,322

LEAFLET FEEDING MECHANISM

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Application October 25, 1956, Serial No. 618,361

6 Claims. (Cl. 271—32)

This invention relates to packaging or wrapping machines generally, and more particularly to mechanisms for feeding sheets of material, such as leaflets containing advertising, instructions, and the like, into a conveyer to be included with a packaged product.

This invention consists generally of a new and improved method and arrangement for separating and removing single sheets of paper or leaflets from a stack of such leaflets within a magazine and for transferring the leaflet to a pocket or bucket of a conveyer in which articles to be packaged will likewise be carried. This invention constitutes an improvement over a circular feeding mechanism described and claimed in United States Letters Patent No. 2,042,269 granted to Michael J. Milmoe on May 26, 1936.

An object of this invention is to provide an improved method for separating single leaflets from the bottom of a stack of such leaflets positioned in a magazine; one edge of the leaflet may be engaged and caused to bend downwardly by a suction head and thence a separating member may be moved between the downwardly turned edge of the leaflet and the remainder of the stack of leaflets.

Another object of this invention is to provide a packaging machine with a magazine for holding a stack of leaflets and an arrangement for removing the leaflets singly from the bottom of the stack; this arrangement may utilize the natural resilience of the sheet of fibrous material comprising the leaflet such that the lowermost leaflet adheres to a suction head and one edge thereof is folded downwardly, while the remaining leaflets not subjected to the adhering force of the suction head will remain substantially flat and straight in the magazine, thereby creating an opening between the lowermost leaflet and the remainder of the leaflets of the stack, such opening constituting an entry point into which a separator member may be inserted for completely separating the lowermost leaflet and removing it from the magazine.

A more complete understanding of the present invention, its mode of operation, and its advantages, may be gathered from further reading of this specification, together with an inspection of the accompanying drawings in which:

Fig. 1 is a perspective view of a part of the packaging machine employing the teachings of this invention and particularly showing the magazine for holding leaflets, a portion of a bucket conveyer for receiving the leaflets, and the apparatus for specifically removing leaflets singly from the magazine for insertion into successive buckets on the conveyer;

Fig. 2 is a perspective view looking along the line 2—2 of Fig. 1 and showing only certain elements of the leaflet transfer mechanism of this invention; and

Figs. 3, 4 and 5 are similar front elevational views of the leaflet transfer mechanism of this invention, but at different intervals in the operation of the machine to show the movement of various mechanical elements therein.

The packaging machine of this invention includes a conveyer 1 having pockets or buckets 2 mounted to move therewith. The buckets 2 are especially dimensioned and adapted to hold articles of manufacture to be packaged. A stack of leaflets 3, Figs. 3, 4 and 5, are held in a fixed magazine structure 4 which may be generally of rectilinear cross section dimensioned to contain the leaflets 3.

An arm 5 is mounted to pivot about an axis or shaft 6 and a suction head 7 is pivotally mounted at the end of the arm 5. In the operation of this invention, the arm 5 moves upwardly into spaced relation with the bottom of the magazine 4 and a suction cup 8 will engage one side of the bottom leaflet of the stack 3 in the magazine 4. With reduced pressure or vacuum applied to the suction cup 8, the bottom leaflet of the stack 3 will adhere thereto and the suction head 7 pivots downwardly about a fold line defined by a forward edge 9 of a leaflet holding member 10 attached to the arm 5, Fig. 2. A forward edge of the bottom leaflet 3, adhering to the suction cup 8, will bend or fold downwardly providing an opening between the forward edge of the leaflet and the remainder of the stack of leaflets in the magazine 4.

A separator member 11 is positioned to move between the folded or turned down edge of the leaflet 3 and the remainder of the stack of leaflets, as shown in Fig. 4. The separator member 11 then moves across the bottom of the stack of leaflets, as shown in Fig. 5, more completely separating or divorcing the bottom leaflet from the remainder of the stack. The arm 5 pivots downwardly carrying the suction head 7 and the bottom leaflet 3 therewith to a position C, as shown in Fig. 5, whereupon the vacuum is cut off from the suction cup 8 and the leaflet disengages from the suction head 7 and below a forwardly turned stationary flange 12 and upon a shelf member 13, as shown in Fig. 3. A pusher member 14, Fig. 2, thence pivots and pushes the leaflet along the shelf 13 into a position over the conveyer 1. A pair of pusher bars 15 thence engages the leaflet on the shelf 13 and move synchronously with the conveyer bucket 2 pushing the leaflet forwardly from the shelf 13, as shown in Fig. 4. The leaflet thence drops flat into the bucket of the conveyer and moves therewith, as shown in position B in Fig. 5, or in position A of Figs. 3 and 4. The buckets 2 of the conveyer containing the leaflet 3 continue to move to positions (not shown) wherein the articles of manufacture may be loaded therein and thence may be inserted into a carton together with a leaflet 3.

The drive means for the leaflet transfer apparatus of this invention includes generally a plurality of cams 16, 17 and 18, Fig. 1, driven from a shaft 19 which rotates synchronously with the movement of the conveyer 1. Each of the cams 16, 17 and 18 contains a raceway or camway 20, Figs. 3, 4 and 5. Rocker arms 21, 22 and 23 are each mounted to pivot freely on the shaft 6 and have attached thereto a cam roller or cam follower 24 for oscillating the arms 21, 22 and 23 as the shaft 19 and the cams thereon are rotated. The first cam 18 and the cooperating rocker arm 21 are illustrated in Figs. 3, 4 and 5, while the other cams 16 and 17 and rocker arms 22 and 23 are illustrated in Fig. 1, their mode of operation being similar to that of the first rocker arm 21. The pivotal arm 5 and the rock arm 22 may be integrally formed, thereby constituting a bell crank and, thus, the arm 5 is oscillated upwardly and downwardly in synchronism with the movement of the conveyer 1 as the cam 17 rotates. The suction head 7 is mounted to pivot about a point 25 at the extreme end of the arm 5, and an upwardly extending part 26, see Fig. 2, is formed integrally with the suction head 7 for a pivotal attachment with a link member 27. The drive means for the pivotal suction head 7 comprises the upwardly extending part

26 drivingly attached to the link 27 which is, in turn, pivotally attached to an upwardly extending arm 28 formed integrally with the rock arm 23. Thus, the arms 23 and 28 constitute a bell crank which is oscillated by the cam 16 and which transmits the oscillatory movement to the suction head 7 through the link 27 and the upstanding part 26 of the suction head. The suction head is therefore driven in synchronism with the movement of the arm 5 and with the movement of the conveyer 1.

The cam 16 causes the suction head to pivot upwardly into engagement with the bottom of the stack of leaflets 3 to initiate the leaflet transfer operation, thence to pivot downwardly for turning or folding the leaflet about a fold line defined by the edge 9 of the member 10 attached to the arm 5, and thence after the separator member has separated the bottom leaflet from the remainder of the stack, the arm 5 moves downwardly and, simultaneously, the suction head 7 may pivot to its initial horizontal position on the arm 5. The pivot point 25 is not stationary but moves with the arm 5 and, therefore, the design of the cam 16 is preferably such that proper movement of the suction head 7 is accomplished regardless of the oscillating movement of the pivot point 25.

The separator member 11 may have a fork shape with two prongs 29, Fig. 2, such that an opening 30 is provided to permit the operation of the suction head 7 between the prongs 29 without interference therewith, see Fig. 1. The separator member 11 is formed with an integral upturned bracket part 31 attached to a U-shaped member 32 which has upwardly extending arms 33 pivotally supported by two pivotal arms 34 and 35. The arms 34 and 35 are each mounted to pivot about the fixed points 36 and 6, respectively. It will be appreciated that the member 32, the arms 34 and 35, and the spacement between the fixed points 36 and 6, constitute a parallelogram and, therefore, the U-shaped member 32 is mounted to oscillate generally longitudinally of itself as the arms 34 and 35 are pivoted. The arm 35 and the arm 21 are integral and constitute a bell crank which is oscillated by the cam 18, and therefore as the shaft 19 and cams thereon rotate, the bell crank 21—35 rocks and oscillates the U-shaped member 32 which supports the separator member 11. The separator member therefore moves toward and away from the bottom portion of the magazine in synchronism with the respective movements of the arm 5, the suction head 7, and the conveyer 1.

A vacuum valve 37 is mounted on the arm 5 and oscillates upwardly and downwardly therewith, see Figs. 3, 4 and 5. Operation of the valve is accomplished by movement of a pivotal part 38 having an operating arm 39. In its normal position, the arm 39 is depressed with respect to the valve 37, as shown in Figs. 3 and 4, and in such position, vacuum from a pump, not shown, is applied to the suction cup 8. When the arm 5 moves into a downward position, a stop member 40 engages the arm 39 and pivots the part 38 thereby shutting off the vacuum from the suction cup 8. The stop 40 may be mounted on a stationary part 41 with resilient means such as a compression spring to cushion the shock which would result from sudden engagement between the arm 39. Thus, as seen in Figs. 3 and 4, the stop 40 is disengaged from the arm 39 and is extended upwardly somewhat from the base support 41 due to the urging of the resilient means; and in Fig. 5, with the arm 5 depressed and the valve operating arm 39 engaged with the stop 40, the stop 40 compresses downwardly against its support 41. Thus, it may be appreciated that the valve 37, cooperating with the stop 40, constitutes a means for applying reduced pressure or vacuum to the suction cup 8 when the arm 5 moves upwardly, and for shutting off the vacuum when the arm 5 moves downwardly into an extreme position. The bottom leaflet 3 from the magazine 4 will therefore adhere to the suction cup when the arm 5 moves upwardly and thence will be drawn downwardly as the suction cup descends, but will be released when the suction cup and the arm reach their extreme downward position.

As the arm 5 moves to its extreme downwardly position and the vacuum is shut off from the suction cup 8, the leaflet 3 will rest upon the stationary shelf 13, Fig. 5, and thence the pusher member 14 pushes the leaflet to the position over the conveyer 1. The pusher member 14 is formed as an end of an upwardly extending arm 42, Fig. 2, which is mounted on and pivoted by a shaft 43. As shown in Fig. 3, the shaft 43 is rotatably mounted in a journal 44 and has an operating arm 45 at one end thereof. The arm 45 is pivotally connected to a link 46 operated by a crank pin 47 which is rotatable about a stub shaft 48. The stub shaft 48 carriers a drive gear 49 engaged with a pinion 50 on a main drive shaft 51 of the packaging machine. The drive shaft 51 is coupled to the cam shaft 19 by a pair of bevel gears 52, and therefore the pusher member 14, driven through means coupled to the drive means of the cam 16, 17 and 18, will move synchronously with the other elements of the leaflet transfer mechanism and the conveyer 1.

A final pusher member 15 is positioned over the conveyer 1 and the shelf 13 for sliding each successive leaflet from the shelf into successive buckets 2 of the conveyer. As shown in Fig. 1, the pusher member comprises a pair of forwardly projecting bars 15 rigidly attached to a support bracket 53. The bracket 53 is pivotally mounted on an upwardly extending arm 54 having a horizontally extending part 55, Fig. 1. Thus, the weight of the forwardly extending bars 15 will rest upon the shelf 13 by their own weight. Oscillatory movement of the pusher member 15 is accomplished as the arm 54 rocks on a shaft 56. The rock motion of the arm 54 may be accomplished by linkage of a crank or cam in a manner similar to the method of oscillating the arm 5 or the pusher member 14.

In the patent granted to Michael J. Milmoe, No. 2,042,269, a bottom leaflet was removed from a magazine by applying vacuum to a suction head positioned slightly angularly of the leaflet. The leaflet would be pulled downwardly by the force of the vacuum and thence a separator member would be inserted into the space thus created. With such an arrangement wherein the force of the vacuum by itself was used to turn down and fold a leaflet from the bottom of the stack, the angle through which the suction head and suction cup thereon must be positioned, is limited since, if such angle were too great, the force of the vacuum would be materially lessened. Therefore, the amount of folding or bending of the bottom leaflet is limited by the maximum possible angular positioning of the suction head, and the separator member must be inserted into a rather small space with considerable accuracy. The present invention is substantially different from that of the Milmoe Patent No. 2,042,269, since the suction head initially engages the bottom leaflet 3 in the magazine 4 in a flat position to give maximum adherence between that bottom leaflet and the suction cup 8, and thence the suction head 7 pivots in the end of this arm 5 and turns down the edge of the bottom leaflet. The angle through which the edge of the leaflet is folded, or turned down, is not limited by the suction of the vacuum against the leaflet and, therefore, the edge may be turned through a relatively great angle giving a wide opening such that the separator member will have considerable tolerance in its spacement as it moves into the opening.

Since the primary function of the suction head 7 is to separate an edge of the bottom leaflet from the remainder of the stack, the suction head is arranged on the arm 5 to move into engagement at one side of the leaflet rather than in the center thereof. When the vacuum is applied to the suction cup 8 and the suction head pivots, the initial opening is created only at an extreme side and there is less tendency for the bottom leaflet to adhere to

the second leaflet such that two leaflets would be fed from the magazine simultaneously, as might occur were the suction head centrally positioned to withdraw a leaflet downwardly in a more direct manner. The natural resiliency of the fibrous material of the leaflets will tend to maintain the second leaflet relatively straight while the leaflet is being folded at the edge thereof and since the two leaflets are being pulled apart only at their mutual edges, the natural adherence therebetween, due to air pressure and due to static changes, is virtually eliminated.

Changes may be made in the form, construction and arrangement of the parts without departing from the spirit of the invention or sacrificing any of its advantages, and the right is hereby reserved to make all such changes as fall fairly within the scope of the following claims.

The invention is claimed as follows:

1. In a packaging machine, apparatus for separating single leaflets from a stack of leaflets in a magazine, said apparatus comprising a movable member, a suction head pivotally mounted on the movable member, means operatively associated with the movable member for moving the movable member into spaced relation with the magazine whereupon the suction head will engage a first bottom leaflet of the stack, means operatively associated with the suction head for applying vacuum thereto whereby the first bottom leaflet will adhere to the suction head, further means operatively associated with the suction head for pivoting the suction head and causing one edge of the bottom leaflet to be turned downwardly away from the stack along a fold line, and a separator member positioned to move between the downwardly turned away edge of the bottom leaflet and the next succeeding leaflet of the remainder of the stack of leaflets whereby the first leaflet is separated from the stack supporting means for maintaining said bottom leaflet at a rest position, a movable conveyer for receiving said bottom leaflet, and means to transport the bottom leaflet from said supporting means and deposit the same on the conveyer.

2. In a packaging machine, apparatus for separating single leaflets successively from a stack of leaflets held in a magazine, said apparatus comprising a pivotally mounted arm, a suction head pivotally mounted on the arm, a drive means operatively associated with the arm for pivoting the arm into spaced relation with the bottom of the magazine, means operatively associated with the suction head for applying vacuum thereto whereby the lowermost leaflet of the stack will adhere to the suction head, another drive means operatively associated with the suction head for pivoting the suction head downwardly about a fold line and thereby causing one edge of the lowermost leaflet to turn downwardly about the fold line, and a separator member positioned for insertion between the turned down edge of the leaflet and the remainder of the stack of leaflets, said separator member being operable to move across the bottom of the stack of leaflets and to thereby separate the bottom leaflet from the next succeeding leaflet of the remainder of the stack below said magazine for receiving said bottom leaflet removed from the magazine at a rest position, and means for transferring the leaflet from the rest position to a predetermined position.

3. In a packaging machine, apparatus for inserting leaflets singly into buckets on a conveyer, said apparatus comprising a magazine for holding a stack of the leaflets, an arm mounted to pivot into spaced relation with the bottom of the magazine, a suction head pivotally mounted on the end of the arm, said suction head being positioned to engage one side of the bottom leaflet of the stack, means on said arm defining a fold line, vacuum means operatively associated with said suction head for applying vacuum to suction head and for causing the side of the bottom leaflet to adhere thereto, cam means operatively associated with suction head for pivoting the suction head downwardly and for causing the side of the leaflet to turn downwardly about the fold line, a movable separator member positioned to be inserted between the turned down side of the bottom leaflet and the remainder of the stack of leaflets, means for moving the separator member across the bottom of the stack to divorce the bottom leaflet from the stack, said arm being operable to carry the bottom leaflet downwardly to a rest position whereupon said vacuum means being further operable to cut off the vacuum to the suction head and to release the leaflet therefrom, and pusher means movable in spaced relation to the rest position and to the conveyer for moving the leaflet from the rest position into a bucket on the conveyer.

4. The apparatus according to claim 3 wherein the vacuum means comprises a valve mounted on the arm and movable therewith, said valve having an operating finger for control thereof, and a stop positioned in spaced relation with the arm for engaging the finger and closing the valve when the arm descends to a predetermined position.

5. The apparatus according to claim 3 wherein is included a shelf member for supporting the leaflet in the rest position, and wherein the pusher means includes a first pusher member for moving the leaflet on the shelf member from the rest position to a position over the conveyer, and a second pusher member for moving the leaflet from the shelf member into a bucket moving on the conveyer.

6. In a packaging machine, apparatus for inserting leaflets singly into buckets on a conveyer, said apparatus comprising a magazine for holding a stack of leaflets, an arm mounted to pivot upwardly into spaced relation with the bottom of the magazine, a suction head pivotally mounted on the end of the arm, said suction head being positioned to engage one side of the bottom leaflet of the stack, a leaflet holding member on said arm having an edge over which the bottom leaflet is folded by the suction head, vacuum means operatively associated with the suction head for applying vacuum to the suction head for causing the side of the bottom leaflet to adhere thereto, a first cam drivingly coupled to the arm for oscillating the arm downwardly, a second cam drivingly coupled to the suction head for pivoting the suction head and for bending the side of the bottom leaflet away from the stack, a separator member positioned to move between the bent away side of the bottom leaflet and the remainder of the stack, a third cam drivingly coupled to the separator member for moving the separator member across the bottom of the stack and divorcing the bottom leaflet therefrom, and a common drive means coupled to the cams and to the conveyer for moving the arm, the suction head, the separator member and the conveyer synchronously with each other.

References Cited in the file of this patent

UNITED STATES PATENTS

2,052,632	Klemm	Sept. 1, 1936
2,796,256	Robertson	June 18, 1957

FOREIGN PATENTS

358,660	Great Britain	Oct. 15, 1931

UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 2,914,322 November 24, 1959

Harry E. Englesson et al.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 4, line 22, after "and" insert -- with --; column 5, line 34, after "stack" insert a comma, line 58, after "magazine" insert -- , a movable conveyor --; column 6, lines 3 and 5, before "suction", each occurrence, insert -- said --.

Signed and sealed this 24th day of May 1960.

(SEAL)

Attest:

KARL H. AXLINE
Attesting Officer

ROBERT C. WATSON
Commissioner of Patents