A still further object is to provide such a dispenser in which the removal of said closed bag from said dispenser draws said strip into said dispenser to advance another closure to a position where it may be applied to a bag.

A yet further object of the invention is to provide such a dispenser which is relatively simple, inexpensive to manufacture, and free of maintenance problems.

In prior methods of manufacturing and dispensing "Kwik Lok" closures the columnized stacks of individual closures were disposed vertically for gravity feeding. A novel method of dispensing individual closures from such a stack is shown in the copending application Serial No. 73,115, filed December 1, 1960, now Patent No. 3,061,983, by Jere P. Irwin on Method and Apparatus for Applying Bag Closures. This method includes the steps of feeding closures horizontally from the lower end of the magazine and flexing the front or mouth end of the foremost closure downward from the balance of the closure to facilitate the introduction of the bunched open neck of a flexible bag into said mouth by flexing apart the jaws of said closure. This downward flexing of the leading portion of the leading closure in the Irwin dispenser, of itself tends to occasionally cause overlapping of closures and jamming of the dispenser.

It is another object of the invention to provide a method of manufacturing and dispensing closures of the "Kwik Lok" type in which the closures are formed in a strip and fed to the dispenser and through the latter in a single flat plane, said plane being inclined sharply downward from horizontal in the direction of travel of said closures, thereby facilitating the application of the leading closure to a bag without the necessity of flexing a leading portion of said closure from the plane of the balance thereof to attain this facility.

This application is a division carved out of copending application Serial No. 93,888, filed March 7, 1961, on Bag Closures United in Strip Form and Method and Apparatus for Making the Same and Dispensing Individual Bag Closures.

The manner of accomplishing the foregoing objects as well as further objects and advantages will be made manifest in the following description taken in connection with the accompanying drawings in which:

FIG. 1 is a diagrammatic plan view of the dispensing apparatus of the invention.
FIG. 2 is a side elevational view of FIG. 1 illustrating the manner in which the neck of a flexible bag is bunched and presented to said apparatus for inserting said neck into the mouth of the foremost bag closure in a strip of such closures being fed to said apparatus.
FIG. 3 is an enlarged front elevational view of the dispensing head of said apparatus taken in an upwardly inclined direction parallel with the plane in which said strip of closures is fed to and through said head.
FIG. 4 is an enlarged side front view taken on the line 4--4 of FIG. 1 and illustrates the manner in which the jaws of the leading closure embodied in the strip of closures being fed to and through said dispensing head, are deflected downwardly by the application of a bunched bag neck thereto so as to facilitate the passage of said neck between said jaws and into the mouth of the closure.
FIG. 5 is a plan view of FIG. 4 partially broken away to show the positions of parts in said dispensing head prior to the introduction of a bunched bag neck into said head as shown in FIG. 4.
FIG. 6 is a sectional view taken on the line 6--6 of FIG. 4 which illustrates the manner in which the foremost closure of said strip is held against reverse movement during the application thereof to the bunched neck of said bag and also how said bunched neck engages a release arm of said dispenser head which disengages the
lock of said head thereby permitting withdrawal of the foremost closure therefrom with the withdrawal of said bunching neck from said head.

FIG. 7 is a view similar to FIG. 6 and illustrates the start of the withdrawal of the foremost closure from the dispenser by withdrawing the bag, the neck of which is trapped in the mouth of said closure.

FIG. 8 is a cross-sectional view taken on the line 8—8 of FIG. 5.

FIG. 9 is a view similar to FIG. 7 and illustrating the separation of the foremost closure from the strip of closures with which it had therefore been integrally embodied.

FIG. 10 is a full scale view of a preferred form of the strip bag closures of the invention.

FIG. 11 is a fragmentary perspective view illustrating the preferred form of bag closure produced by the method of the present invention and illustrates this after it has been separated from the strip in which it is originally formed and applied to the neck of a plastic bag so as to close the latter.

Referring specifically to the drawings and particularly to FIG. 11, a bag closure 15 is here shown applied to the bunched neck 16 of a plastic bag 17 so as to close the latter. The closure 15 represents a preferred form of the "Kwik Lok" type of closure which is the primary object of the present invention to produce and effectively apply to plastic bags for closing the same as shown in FIG. 11.

The closure 15 is formed of flat sheet material of relatively stiff but springy plastic and is about 3/8" of an inch wide, 1 1/2" inches long and about 0.032 inch thick with a bag-neck-receiving mouth 18 formed therein between two closely spaced co-planar jaws 19 with diverging lips 20 which diverge outwardly from a narrow passage 21 which separates the jaws 19 and affords entrance to the mouth 18.

Each closure 15 is formed symmetrically about its axis lengthwise with the mouth 18 and jaws 19 located at the right or forward end of each closure as these are illustrated in the drawings. Each closure 15 has parallel side edges 22 and 23, a transverse back edge 24 and the angled corner edges 25 which preferably are disposed at angles of 135° relative to the side edges 22 and 23.

The invention includes a novel method of economically producing closures 15 so that a multiple of these closures are unitly end to end in strip form, as in a strip S, a preferred form of which is shown in FIG. 10. The connection between contiguous closures 15 in strip S is temporary and intended to be pulled apart to separate the foremost closure in the strip from the balance of the closures therein when applying the foremost closure to a bag 47.

In this method the preferred manner of partly connecting contiguous closures in strip S is to die-cut the closures 15 out of a continuous plastic tape of the same width as the closures 15 so as to leave certain portions 30 of the tape integrally connecting adjacent closures. The par Bah portions 30 lie in transverse planes T which mark the front and back ends of contiguous closures. Each plane T contains the back edge 24 of the closure 15 which lies just in advance of that plane and this back edge forms the front boundary of a keyhole shaped hole 31 which forms the bag-neck-closing mouth 18 of the passage 21 and the diverging lips 20 of the jaws 19 of the closure 15 in which this hole is formed. Also formed in each die-cutting operation is a pair of like triangular notches 32 which are cut from side edges 22 and 23 symmetrically with the planes T. The apices of notches 32 thus lie in planes T and are directly adjacent the par Bah portions 30 of the strip S which unite contiguous closures 15. These notches also form the corner edges 25 of the closures 15. Successful die-cutting operations in forming the strip S are preferably performed in a punch press in which the blank tape from which the strip S is to be formed is fed automatically 1 1/2" inches at timed intervals, each of these movements taking place successive die-cutting operations.

The strip S travels intermittently, between die-cutting operations, in a direction from right to left as this strip is illustrated in FIG. 10. In other words, this movement is in a reverse direction to that in which the strip travels incidental to the application of individual closures 15 to flexible bags 17. As the strip S is discharged from the automatic die-cutting machine it is wound on suitable spools 33 from which the strip has previously been fed for dispensing closures 15 one at a time incidental to the application of such a closure to a flexible bag 17 as shown in FIG. 2. For attaining these objects, the invention embraces a closure dispenser 34 which includes a handle 35 which may be secured as by welds 36 to a bench 37.

Secured as by welding to base 35 a T-standard 38 which rotatably supports at its upper end a pair of flanged rollers 39 which are adapted to rotatably support one of the spools 33, upon which has been wound a coil 40 of closure strip S.

Also affixed to the base 35 as by welding is an inclined head standard 45 having a short arm 46 bent outwards from its upper end so as to decline downwardly at an angle of about 20° with horizontal. The upper end of standard 45 also has welded thereto a strip guide 47 the purpose of which will be seen hereinafter.

Fitted to the arm 46 by bolts 48 is a closure dispenser head 49. The dispenser head includes a bottom plate 50 which is relatively thick, and a top plate 51 which is relatively thin, these plates being identical in plan outline.

This plan is fairly well shown in FIG. 7, each plate being rectangularly shaped and having guide arms 52 at the side ends thereof. These arms have interior converging guide faces 53 which terminate at their inner ends at side walls of a slot 54 which extends a short distance longitudinally into the plate and terminates in an enlarged circular end portion 55. In addition to having the features above described in common with plate 51, plate 50 has its upper flat surface toolied away adjacent the slot 54 as shown in FIGS. 3, 4 and 5 to provide an elongated cup-shaped recess 56, the purpose of which will be made clear hereinafter.

Plates 50 and 51 are held in spaced relation by spacer plates 61 and 62 which are shaped in plan as shown in FIG. 6 all of the aforesaid plates being provided with suitable aligned holes for receiving the bolts 49 and four bolts 63 which hold these plates in rigidly assembled relation.

Plates 61 and 62 have parallel inner edges 64 and 65 which cooperate with the inner surface of plate 51 and the upper surface of plate 50 to form a straignt-sided closed guideway 66 for closure strip S, entrance of strip S to said guideway being facilitated by chamfered end portions 67 of edges 64 and 65. The front end of plate 61 conforms to the adjacent guide face 53 and this plate and bottom plate 50 have aligned holes for receiving a pin 68 which extends downwardly a short distance below plate 50. Plate 62 has a short spring anchor arm on which one end of a contractile spring 69 is anchored.

The front or right end of plate 62 terminates to provide a flat open space between bottom and top plates 50 and 51 to accommodate a rockable latch 70 which is fixed to the upper end of a shaft 75 which journals in a suitable hole provided in bottom plate 50 and has fixed to the lower end thereof an arm 77 which is long enough to engage pin 68 when the latch 70 is rotated in a clockwise direction. Latch 70 extends laterally beyond the adjacent edge of bottom plate 50 and has the other edge 78 connected thereto which normally rocks latch 70 to swing arm 77 into contact with pin 68 as shown in FIGS. 5 and 9. When the latch is so positioned, a stop lug 78 provided on latch 70 extends inwardly past edge 65 of plate 62 into guideway 66 and in the path of a closure strip S being fed along said guideway. The upper end of shaft 75 may have a head 79 (FIG. 8) which may have a hole 80 provided in plate 51 to accommodate this. The
stop lug 78 is adapted to be swung laterally out of guide-way 66 by engagement of the arm 77 from the front as shown in FIG. 6 so as to swing said arm rearwardly out of contact with stop pin 68.

As shown in FIG. 4, guide-way 66 may be considerably deeper than the thickness of a closure strip S, but this guide-way is only slightly wider than said strip so as to confine the latter closely in a lateral direction to the straight path formed by said guide-way. The cup-shaped recess 60 is somewhat narrower than guide-way 66 so as to leave marginal areas 79 of the flat upper surface of plate 50 between recess 60 and lateral side faces 64 and 65 of passageway 66.

Provided centrally in top plate 51 is a hole 80 for receiving a backstop 81 mounted on the front end of a lightweight leaf spring 82, the rear end of which is secured to plate 51 by a screw 83. The spring 82 lightly urges the backstop 81 downwardly so that when this is not held up by engagement with an upper surface of a closure strip S it reposes on the flat upper surface of bottom plate 53 as shown in FIG. 4.

Operation

As above noted, the closure dispenser 34 receives one end of the closure strip S formed in a coil 40 on a spool 33 and provides a means for performing the final step of producing individual bag closures 15 and applying these to the necks 16 of flexible bags 17 for closing the latter. As shown in FIG. 2, the dispenser head 49 of the dispenser is mounted on the latter in a rigidly fixed position with the head lying in a plane inclined downwardly 20° from horizontal in the direction which the strip S is fed to the head. The head is also positioned so as to be approximately in alignment with the strip S as it is fed from the coil 40, and, as the outside diameter of this coil decreases with the feeding of the strip, the latter is supported on the way to the dispenser head 49 by the strip guide 47. Sharp bending of the strip which might cause the same to part at one of the planes 7′, is thus avoided.

FIG. 2 shows how a bag neck 16 is bunched when applied manually to a closure 15 at the time that the latter is the foremost closure in a strip S being fed to the dispenser head 49. Inasmuch as the neck 16 is held vertically and fed horizontally into the head 49 while the latter is inclined at an angle of 20° forwardly and downwardly relative to horizontal, the bunched bag neck 16 is, as it is guided by surfaces 53 and slots 54, engages the diverging faces of jaws 19 so as to flex these downwardly as shown in FIG. 4 thereby increasing the spacing of these jaws and permitting the bunched bag neck 16 to enter the closure mouth 18. As the bunched bag neck is thus manually advanced into the head 49 it engages arm 77 and rotates the rockable latch 70 as shown in FIG. 6 to stop the stop lug 78 from its normal position blocking withdrawal of the foremost closure 15. Completion of the delivery of the bunched bag neck 16 into the closure mouth 18 as shown in FIG. 6, thus forces the foremost closure 15 for withdrawal forwardly merely by pulling forward on the bag neck. This not only withdraws the foremost closure 15 from the dispensing head 49 but pulls the closure strip S further into said head so as to move the next closure to the foremost closure into the position of that as shown in FIG. 5.

An intermediate step in the withdrawal of the foremost closure is shown in FIG. 7, wherein it is noted that as the bunched bag neck 16 leaves contact with the arm 77 the stop lug 78 comes to rest on the right side edge 23 of the foremost closure 15 and rides on this edge during the balance of the movement of withdrawing the foremost closure from the dispenser head. As soon as this withdrawal brings the right hand notch 32, located between the foremost and next closures of the strip S, opposite the stop lug 78, the tension of the spring 69 swings the latch 70 to bring the arm against stop pin 68 and extend stop lug 78 into guide-way 66 and into the aforesaid notch 32 so as to be engaged by the adjacent corner edge 51 of the next closure 15 in said strip. This causes the next to the foremost closure 15 to be suddenly halted while the foremost closure 15 is still being withdrawn from the dispenser head by pulling on the bag neck 16 trapped in the mouth of said closure. The partible portions 30 of the strip S connecting the foremost closure with the closure next thereto are thus pulled apart (FIG. 9) thereby completing the production of a separate closure 15 after this has been applied to the bunched neck of a plastic bag 17 in closure relation with the latter.

The closure 15 formerly referred to as the next to the foremost closure is now the foremost closure in strip S and occupies the same position in head 49 as the closure just pulled from strip S formerly occupied. This new foremost closure is thus in readiness for a repetition of the steps just described for the application of a bunched bag neck 16 thereto and the subsequent separation of said closure from the balance of the multiple closure strip S.

In handling the strip S, of course, care must be taken not to bend this strip too sharply at an angle as this tends to cause the untimely parting of the portions 30 of the strip which unite adjacent closures. It is a particular advantage of the present invention therefore that means is provided for feeding the strip S along what is practically a straight path so as to give a minimum bending tendency to the strip as it is being fed to the point where the closures comprised in the strip are successively applied to a flexible bag and separated by pulling each successively from the balance of the strip.

It is another important advantage of the invention that the method used in the production of closures 15 eliminates the necessity of handling these closures individually as they are always comprised in the strip S up to the very moment that they are pulled individually therefrom and applied to a flexible bag.

A further advantage of the invention is found in the opportunity it affords of applying a bunched bag neck to an individual closure in a direction which will flex the jaws 19 out of the plane of the closure to readily admit the bag neck into the closure mouth 18, without involving any deflection of the entire forward portion of the closure relative to the balance thereof as in prior methods of applying individual parts of plastic bags.

This result is obtained by forming the closures in a strip S and then mounting the dispenser 49 at a relatively steep downward inclination and feeding the strip S to the dispenser along a relatively straight path thereby positioning each closure in the strip as it is applied to the foremost closure thereof in a downwardly angled relation to the bunched bag neck 16 when this is held vertically and advanced horizontally towards said foremost closure for applying the latter to the bag neck.

I claim:

1. A method of forming bag closures from a flat strip of thin, springy sheet plastic material and applying said bag closures to flexible bag necks which comprises the steps of uniformly die-cutting said strip at uniformly spaced intervals therealong to divide said strip into a series of closures each having a bunched neck portion with a narrow passage connecting said mouth with an external edge of said closure to provide opposed jaws on opposite sides of said passage, and with adjacent closures integrally united by partible portions of said strip, said mouth passage and jaws being at the front end of each closure and symmetrical with its longitudinal axis, holding the foremost closure in said strip against backward movement, introducing a bag neck through said passage into said mouth in said closure, pulling forwardly on said bag neck to advance said strip until the next closure has advanced to the position originally held by said foremost closure, holding said next closure in said strip against forward movement, pulling forwardly on said bag neck to pull apart said partible strip portions con-
necting said foremost and next closures and thus separate said foremost closure from said strip, and repeating successively on each of the closures remaining in said strip as it becomes the new foremost closure thereof, the steps aforesaid by which the first foremost closure was applied to a flexible bag neck and separated from said strip.

2. In a dispenser for dispensing individual bag closures of flat, stiff but flexible sheet material, each of which closures has bag neck closing means embodied therewith, a series of said closures being serially integrated in a strip with contiguous ends of adjacent closures partly connected together, said dispenser comprising: a body providing a guideway for receiving and guiding said strip along a fixed path and confining at least the foremost closure and the next closure thereto against substantial deflection from said path while exposing said bag closing means of said foremost closure for application of a bag neck thereto; means preventing reverse movement of said strip along said path during said application of said bag neck to said foremost closure; and means operative following the application of said bag neck to said foremost closure to resist said next closure being withdrawn from said dispenser by pulling on said foremost closure, thereby facilitating the ready parting of the means partly connecting said foremost closure to said next closure, by pulling said foremost closure from said dispenser.

3. In a dispenser for dispensing individual bag closures of flat, stiff but flexible sheet material, each closure having a bag neck confining mouth with a narrow passage connecting said mouth with an external edge of said closure to provide opposed jaws on opposite sides of said passage, a series of said closures being serially integrated in a strip with contiguous ends of adjacent closures partly connected together, said dispenser comprising: a body providing a guideway for receiving and guiding said strip along a fixed path and confining at least the foremost closure and the next closure thereto against substantial deflection from said path while exposing said external edge of said foremost closure for reception of a bag neck through said passage and into said mouth of said closure; means preventing reverse movement of said strip along said path during said introduction of said bag neck into said mouth of said foremost closure; and means operative following the application of said bag neck to said foremost closure to resist said next closure being withdrawn from said dispenser by pulling on said bag neck, thereby facilitating the ready parting of the means partly connecting said foremost closure to said next closure, by pulling said foremost closure from said dispenser by pulling on said bag neck.

4. In a dispenser for dispensing individual bag closures of flat, stiff but flexible sheet material each of which closures has a bag-neck-confining mouth with a narrow passage connecting said mouth with a forward external edge of said closure to provide opposed jaws on opposite sides of said passage, a series of said closures being serially integrated in a strip with contiguous ends of adjacent closures partly connected together, said dispenser comprising: a body providing a guideway for receiving and guiding said strip along a fixed path and confining at least the foremost closure and the next closure thereto against substantial deflection from said path while exposing the front end of said foremost closure for the introduction of a bag neck through said passage into said mouth of said foremost closure; means preventing reverse movement of said strip along said path during said application of said bag neck to said foremost closure and means operative following the application of said bag neck to said foremost closure to resist said next closure being withdrawn from said dispenser by pulling on said foremost closure, thereby facilitating the ready parting of the means partly connecting said foremost closure to said next closure, by pulling said foremost closure from said dispenser by pulling on said bag neck.

5. In a dispenser for dispensing individual bag closures of flat, stiff but flexible sheet material each of which closures has bag-neck-closing means embodied therewith, a series of said closures being serially integrated in a strip with contiguous ends of adjacent closures partly connected together, and with notches formed in at least one side edge of said strip in the transverse planes in which said contiguous closure ends are partly connected, said dispenser comprising: a body providing a guideway for receiving and guiding said strip along a fixed path and confining at least the foremost closure and the next closure thereto against substantial deflection from said path while exposing said bag closing means of said foremost closure for application of a bag neck thereto; means preventing reverse movement of said strip along said path during said application of said bag neck to said foremost closure; and means preventing forward movement of one of said closures along said path while said closure is in the position of said foremost closure; and means actuated by the application of said bag neck to said foremost closure to displace said locking means from locking relation with said closure to permit the latter to be withdrawn from said dispenser by pulling on said bag neck, said locking means then automatically entering a notch at the front end of said next closure when the latter arrives in the original position of said foremost closure thereby locking said next closure against forward movement along said path and permitting said foremost closure to be separated from said next closure by pulling on said bag neck.

6. A method of forming bag closures from a flat strip of thin, springy sheet plastic material which comprises the steps of moving said strip lengthwise in a given direction and repeatedly dividing said strip into desired lengths at timed intervals during each of which said strip travels a distance equal to the length of a single closure, to produce in said strip with each die cutting operation a partial severing of the strip along a transverse line to produce the rear end edge of a closure on the following side of said line and the front end edge of a closure on the advance side of said line, said front end edge so formed including a mouth for confining a bag neck, said mouth being connected with said front end edge by a narrow passage to provide opposed jaws on opposite sides of said passage, and with the closures following said line and in advance of said transverse line integrally connected by partible portions of said strip, moving said strip lengthwise in the opposite direction from the direction aforesaid, whereby the mouths of all of the closures in said strip will be facing in said new direction, feeding the neck of a flexible plastic bag through the passage and into the mouth of the foremost closure in said strip, parting said foremost closure from said strip, and applying other plastic bags in the same manner to successive closures in said strip as said closures respectively reach the foremost position therein.

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