Aug. 24, 1954 C. E. RICHENS 2,687,174

BAG CUTTING MEANS

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Fig. 1.

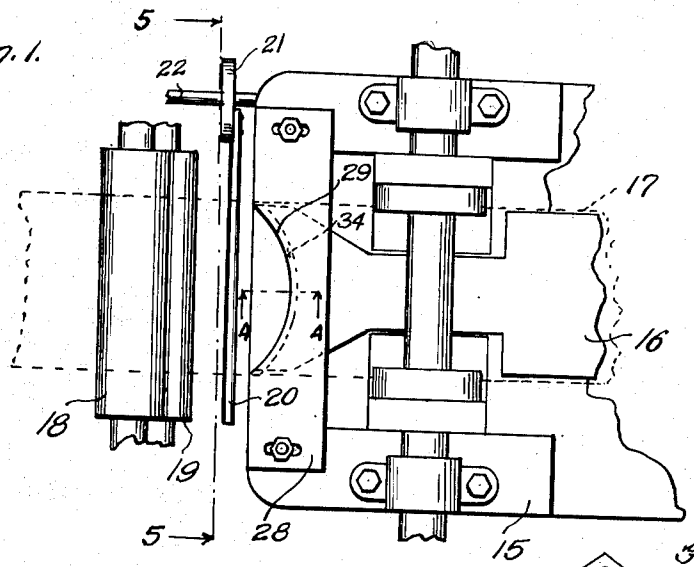


Fig. 18.

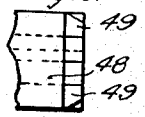


Fig. 19.

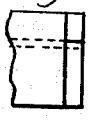


Fig. 20.

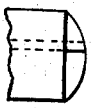


Fig. 21.



Fig. 22.

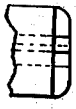


Fig. 2.

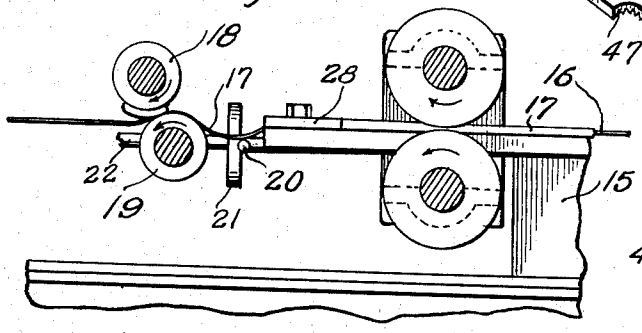


Fig. 16.

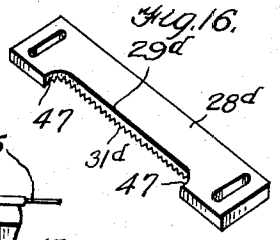


Fig. 23.



Fig. 3.

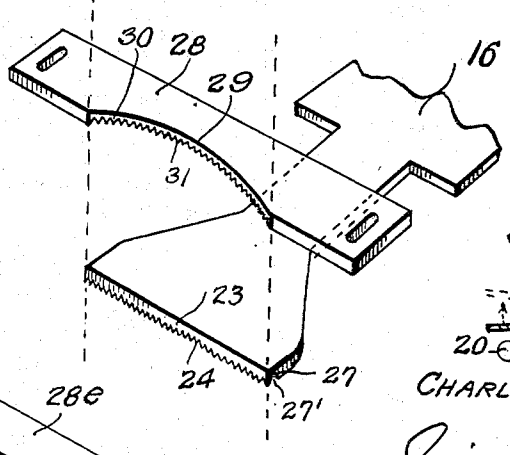


Fig. 17.

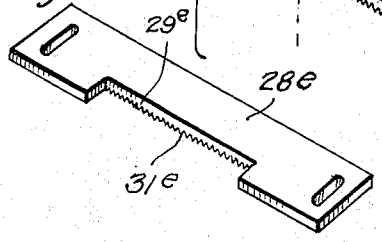
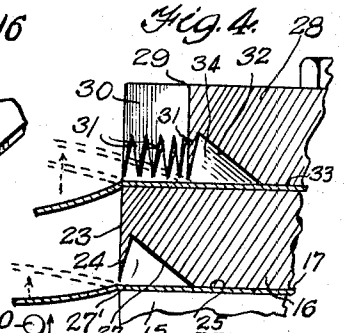


Fig. 4.



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Fig. 5.

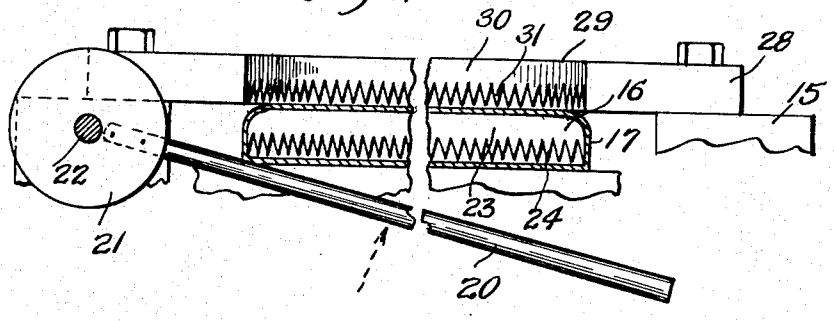


Fig. 6.

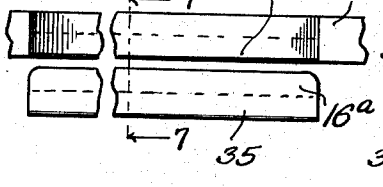


Fig. 7.

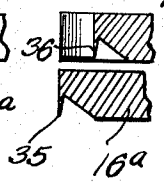


Fig. 8.

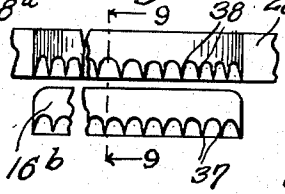


Fig. 9.

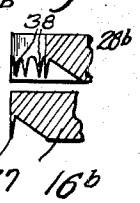


Fig. 10.

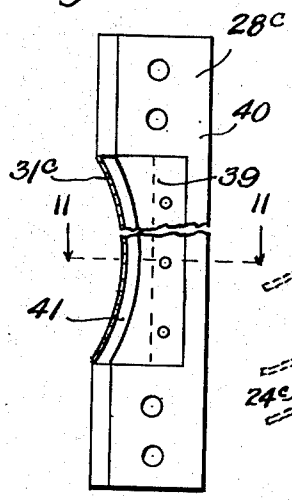


Fig. 11.

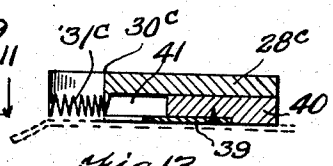


Fig. 12.

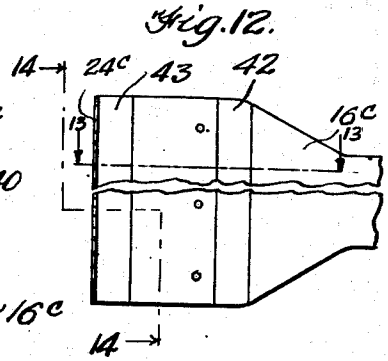


Fig. 13.

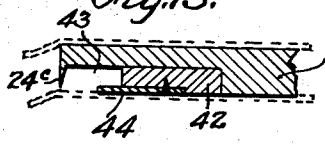


Fig. 14.

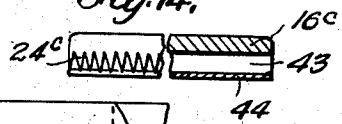
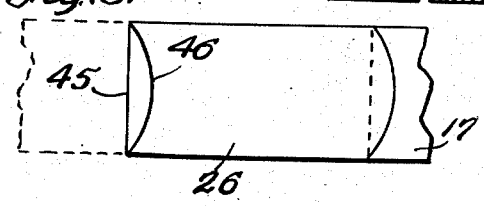


Fig. 15.



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BAG CUTTING MEANS

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Fig. 24.

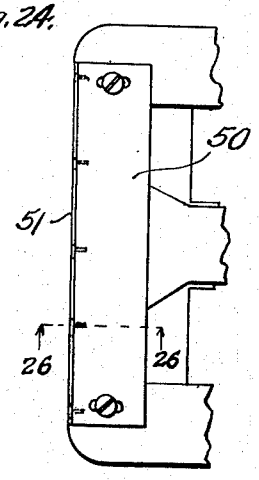


Fig. 25.

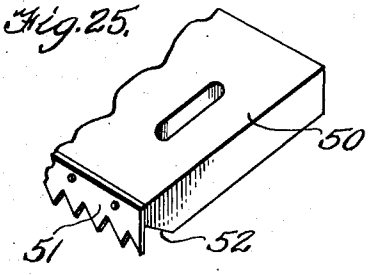


Fig. 26.

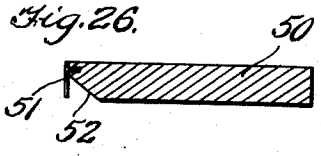


Fig. 27.

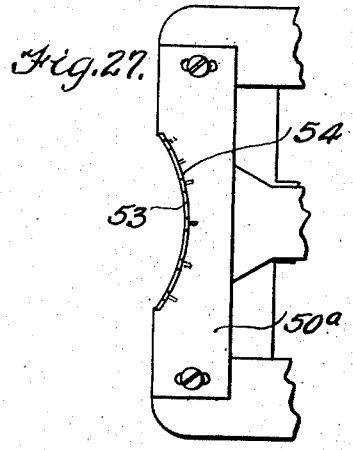


Fig. 29.

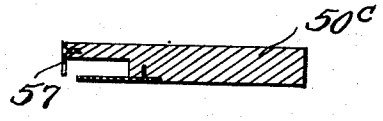


Fig. 28.

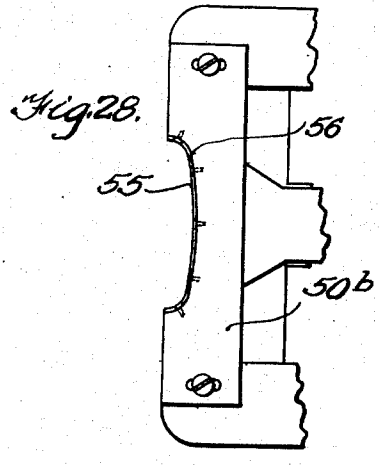
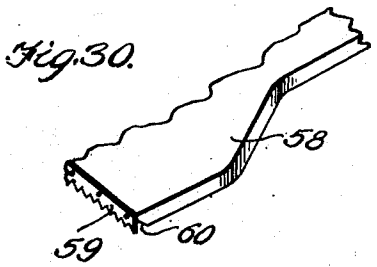


Fig. 30.



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HS ATTORNEY

Patented Aug. 24, 1954

2,687,174

UNITED STATES PATENT OFFICE

2,687,174

BAG CUTTING MEANS

Charles E. Richens, Richmond, Va.

Application June 8, 1951, Serial No. 230,463

2 Claims. (Cl. 164—58)

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This invention relates to a bag cutting means, and has for one of its objects the production of a paper bag cutting means for cutting bags without visible serrations, and without loss of speed due to choking or abutting of the bags against the cutting knives.

A further object of the present invention is the production of a simple and efficient bag cutting means comprising a pair of superimposed knives having cutting edges which extend at right-angles to the longitudinal axis of the tubed bag material, or at right-angles to the path of travel of the tubed bag material as said material passes through the bag making machine.

Other objects and advantages of the present invention will appear throughout the following specification and claims.

In the drawings:

Figure 1 is a fragmentary top plan view of a paper bag making machine, sufficient to illustrate the application of the present invention thereto;

Figure 2 is a longitudinal section therethrough, certain parts being shown in side elevation;

Figure 3 is a group perspective view of the upper and lower knives separated to show the relative construction of the knives;

Figure 4 is an enlarged fragmentary longitudinal sectional view taken on line 4—4 of Figure 1;

Figure 5 is an enlarged fragmentary transverse sectional view taken on line 5—5 of Figure 1, certain parts of the conventional machine being eliminated;

Figure 6 is a fragmentary front elevational view of a modified form of the upper and lower cutting blades;

Figure 7 is a fragmentary vertical sectional view taken on line 7—7 of Figure 6;

Figure 8 is a fragmentary front elevational view of a further modified form of the upper and lower knives;

Figure 9 is a fragmentary vertical sectional view taken on line 9—9 of Figure 8;

Figure 10 is a bottom plan view of a modified form of upper cutting knife;

Figure 11 is a transverse sectional view taken on line 11—11 of Figure 10;

Figure 12 is a fragmentary bottom plan view of the lower cutting knife;

Figure 13 is a fragmentary longitudinal sectional view taken on line 13—13 of Figure 12;

Figure 14 is a fragmentary transverse sectional view taken on line 14—14 of Figure 12;

Figure 15 is a fragmentary plan view of a portion of tubed bag material, illustrating a severed end thereof;

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Figure 16 is a perspective view of a further modified form of the upper cutting knife or stripper plate;

Figure 17 is a perspective view of a still further modified form of the upper cutting knife or stripper plate;

Figure 18 is a fragmentary top plan view of a square bag with a straight cut lip;

Figure 19 is a fragmentary top plan view of a flat bag with a straight cut lip;

Figure 20 is a fragmentary top plan view of a flat bag with a round lip;

Figure 21 is a fragmentary top plan view of a flat bag with a semi-round lip;

Figure 22 is a fragmentary top plan view of a square bag with a semi-round lip;

Figure 23 is an end view of a square type bag, such as is shown in Figures 18 and 22, having the longitudinally extending inwardly folded tucks;

Figure 24 is a fragmentary top plan view of a bag making machine and illustrating a modified type of an upper cutting knife;

Figure 25 is a fragmentary perspective view of the cutting knife shown in Figure 24;

Figure 26 is an enlarged transverse sectional view of the knife taken on line 26—26 of Figure 24;

Figure 27 is a top plan view similar to Figure 24, illustrating a further modified form of cutting blade;

Figure 28 is a top plan view similar to Figure 27 showing a still further modified form of cutting blade;

Figure 29 is a transverse sectional view illustrating another form of cutting blade;

Figure 30 is a fragmentary perspective view of a modified form of a lower cutting knife.

By referring to the drawings in detail, it will be seen that 15 designates the frame of a suitable bag making and forming machine, which is provided with a former plate 16. This former plate 16 extends in the direction of travel of the paper tube 17, which is formed thereon. The bag making or forming machine may be of the conventional type, and includes pinch rolls 18 and 19, which are suitably mounted on the machine. The function of these pinch rolls is to pinch the paper tube and firmly hold the tube 17 while the striker or breaker-bar 20 passes through the gap between the end of the former 16 and the pinch rolls, in order to separate the tube 17 into blanks from which the bags are formed. The striker or breaker-bar 20 is carried by a disc 21, which disc

21 is mounted upon a driving shaft 22. As the disc 21 is rotated the striker or breaker-bar 20 swings through the gap between the pinch rolls and the end of the former 16, as above described, and in the conventional manner as is common in paper bag machines.

The present invention relates primarily to the formation and location of the bag severing cutting edge which is formed upon the lip knife and the cutter which is formed at the end of the former, in such a manner as to avoid and eliminate the saw tooth serrations which are formed at the end of each bag unit cut from the tubed bag material. By noting the drawings, it will be seen that the former 16 is provided with a straight perpendicular outer face 23, having depending teeth 24 defining a cutting edge formed in the outer face 23. These teeth 24 extend in a plane at right-angles to the longitudinal axis of the former 16, and at right-angles to the plane and direction of travel of the tubed bag material as the material passes longitudinally of the former 16, as shown clearly in detail in Figure 4. The teeth 24 are preferably quite narrow to define sharp penetrating points which terminate slightly above the plane of the bottom face 25 of the former 16, said teeth having inner faces which are inclined downwardly and toward the outer face 23, as shown in Figure 4, so as to eliminate the stubbing or choking of the bag material against the teeth, as the material or paper tube 17 moves toward the pinch rolls 18 and 19 after a bag unit, such as the unit 26, is cut therefrom. The end of the material cut by the cutting edge or teeth will be directed downwardly and under the edge or teeth by the inner inclined face of the cutting edge or inner faces of the teeth, should the end of the cut material abut thereagainst. The former 16 is undercut on an upward incline 27 which extends from the bottom face 25, upwardly toward the inner ends of the teeth 24 to define a substantially inverted V-shaped channel 27' transversely of the face 25 directly in the rear of the row of teeth 24. In Figure 4, this structure is shown on an enlarged scale and in actual practice the channel is approximately 1/16" across, 3/64" in depth, and the former is 3/32" in thickness. The present invention, however, is not limited as to size and dimensions and changes as to size and dimensions may be made within the spirit of the invention to suit the size and type of bag which is made upon the machine. However, the teeth 24, are preferably formed to extend vertically of the outer face 23 for approximately one-half of the heighth of the face 23.

The teeth 24 on the former constitute the lower severing element or knife, and the lip knife or upper severing element comprises a transversely extending stripper plate 28 which is adjustably secured in the conventional manner to the frame 15, as shown in Figure 1. This stripper plate 28 is provided with an inwardly curved notch 29, having a vertical outer face 30. A plurality of vertically arranged depending severing teeth 31 are formed in the face 30 and extend from the bottom face of the plate 28 upwardly for approximately one-half of the thickness of the plate 28, as shown in detail in Figure 4. The teeth 31 are relatively narrow and are similar to the teeth 24 of the former 16, except that the teeth are formed in the face of the inwardly curved notch 29. The plate 28 is undercut on an upward incline 32, which extends from the bottom face 33, upwardly toward the inner ends of the teeth 31, thereby defining a substantially inverted V-shaped channel 34 rearwardly of and conforming to the shape of the inwardly curved notch 29 and teeth 31. The teeth 31 terminate slightly inwardly of the plane of the bottom face 33 to prevent stubbing and choking of the bag material against the teeth 31, as the material 17 moves toward the pinch rolls 18 and 19 after a bag unit or section is cut from said material. The clearance between the points of the teeth 31 and the plane of the bottom face 33 may be very slight, such as .005 of an inch. This also may constitute the clearance between the points of the teeth 24 and the plane of the bottom face 25 of the former 16. The teeth 31 preferably are provided with sharpened points to facilitate the severance of the material 17 and to provide a clean cut without serrations, in this way avoiding the necessity for trimming the severed ends of the bag unit or section to provide such a clean cut.

As is shown in Figures 6 and 7, the former 16^a may be provided with a knife-like uninterrupted cutting or severing edge 35, in place of the teeth 24. The lip knife 28^a may be provided with a knife-like uninterrupted cutting or severing edge 36 in place of the teeth 31. This constitutes a modified form of severing edge, the remaining portion of the structure being similar to that previously described.

In Figures 8 and 9 there is shown a further modified type of cutting or severing edge, wherein the former 16^b is provided with scalloped teeth 37, and the lip knife 28^b also is provided with scalloped teeth 38. Otherwise, the structure is the same as above described relative to the form shown in detail in Figure 4.

As is shown in Figures 3 and 4, the lip knife 28 is just above the former 16, and the ends of the front face 23, in which the teeth 24 are formed, are directly in vertical alignment with the ends of the inwardly curved face 29 in which the teeth 31 are formed to insure a complete severance of the bag sections when the tubed bag material is forced upwardly against the teeth 24 and 31 by the striker or breaker-bar 20. This alignment is indicated by the vertical dotted lines shown in Figure 3.

As is shown in the modified form in Figures 10 and 11, the lip knife 28^c is provided with depending teeth 31^c similar to the teeth 31 shown in Figures 3 and 4. In the present form, a flat spring shield plate 39 is fixed to the bottom face of the filler plate 40 thereof. The plate 40 is spaced rearwardly of the teeth 31^c, thereby defining a recess 41. The bottom face of the spring shield plate 39 extends partly across the recess 41 and is in a plane slightly below the bottom edge of the teeth 31^c, and the plate 39 is adapted to flex inwardly of the recess 41, as the bag material is forced against the teeth 31^c for cutting and to then immediately return to its normal position. The bottom face of the plate 39 normally lies .005 of an inch below the bottom ends of the teeth 31^c to prevent stubbing and choking.

In Figures 12 and 13, a modified form of the former 16^c is shown, wherein teeth 24^c are carried by the outer end thereof and extend at right-angles to the longitudinal axis of the former 16^c in a similar manner to the teeth 24. A filler plate 42 is carried by the former and is spaced rearwardly from the teeth 24^c to define a recess 43 rearwardly of the teeth 24^c, as shown in Figure 13. A flat spring shield plate 44 is carried by the filler plate 42 and projects into the recess 43. The bottom face of the plate 44 is in a plane slightly below the bottom ends of the teeth 24^c

such as .005 of an inch to avoid stubbing or choking of the bag material against the teeth, the plate **44** acting in the same manner as that described relative to the plate **39**.

It is important to note that in each form the teeth or cutting edges extend at right-angles to the direction of travel of the bag material and that the striker or breaker bar strikes the material against fixed cutting edges in a manner to provide clean uninterrupted cuts, the straight edge **45** of the bag section **26** being cut by the fixed teeth on the former, and the curved edge **46** being cut by the fixed teeth on the lip knife or stripper plate. The structure set forth herein provides a bag cutting means which will cut bags from tubed bag material without visible serrations and without loss of speed due to choking and stubbing of the material against the cutting elements. In this way the production output of the machine is greatly increased. It is well known that customers object to serrated edges at the mouth of a bag, since during the filling operation there is a tendency to tear the bag, particularly when filling automatically. By means of the clean cut ends which are possible with the present invention, this difficulty is avoided. The fact that the teeth point downwardly and at right-angles to the material to be cut, makes this cut possible.

It should be understood that while the present invention is particularly adapted for cutting paper bags, it is not intended to limit the invention in this respect, since the invention is adapted for cutting other material having similar characteristics.

As shown in Figure 16, the stripper plate **28d** may be provided with an inset notch **29d** having a straight cutting toothed edge **31d** similar to the teeth **31** shown in Figure 4, the ends of the straight cutting toothed edge terminating in outwardly curved terminals **47**. With this form of stripper plate **28d**, a square bag may be cut with a semi-round lip, as is shown in Figure 22.

In Figure 17, the stripper plate **28e** is provided with an inset notch **29e** having a straight cutting toothed edge **31e** similar to the teeth **31** shown in Figure 4. The bags shown in Figures 18 and 19 may be cut by using this form of plate **28e**.

It should be understood that changes in shape and design of the cutting edge of the stripper plate may be made to cut bags which are common to the trade, such as:

1. Square—with straight cut lip, shown in Figure 18.
2. Flat—with straight cut lip, shown in Figure 19.
3. Flat—with round lip, shown in Figure 20.
4. Flat—with semi-round lip, shown in Figure 21.
5. Square—with semi-round lip, shown in Figure 22.

The stripper plate therefore is formed to cut the desired shape of lip uopn the square or flat bag. An important feature of the invention, however, is the fact that the cutting edge extends at right-angles to the plane of the stripper plate and the cutting edge of the former extends at right-angles to the plane of the former.

In Figure 23, there is illustrated an end view of a square type of bag **48** having longitudinally extending inwardly folded tucks **49**.

In Figure 24 an upper cutting knife or stripper plate of a modified type is shown, wherein the knife **50** is provided with a removable or replaceable cutting blade **51**. The blade is preferably held in place upon the front face of the knife **50** by means of suitable securing elements such as screws or other suitable means. The knife **50** is provided with a bevelled forward under face **52** similar to the face **27** shown in Figure 4 to define an inverted V-shaped channel similar to the channel **34**.

In Figure 27 the stripper plate or knife **50a** carries a removable or replaceable bowed cutting blade **53** which is flexed to fit in the curved inset recess **54** to cut a lip on a bag of the type shown in Figure 20.

In Figure 28 the stripper plate or knife **50b** carries a removable or replaceable cutting blade **55** preferably flexible to fit into the curved or shaped inset recess **56**, to cut a lip on a bag of the type shown in Figure 21. Any suitable shape may be provided within the spirit of the invention.

In Figure 29, a stripper plate or knife **50c** is illustrated similar to the form shown in Figure 11, but being provided with a removable or replaceable blade **57**.

In Figure 30, the lower cutting knife or former plate **58**, similar to the knife **16**, carries a removable or replaceable cutting blade **59**. The knife is provided with an inverted V-shaped channel **60**.

It should be understood that the removable cutting blade is preferably of flexible metal and the cutting edge of the removable cutting blades shown may be of any desired shape or type, that is toothed, scalloped, or straight, such for instance as is shown in Figures 6 to 9, inclusive. Furthermore, the inset recess of the stripper plate or knife may be of any desired shape, and since the cutting blade is flexible, the blade will easily conform to the shape of the recess of the preshaped inset recess of the knife or stripper plate.

Having described this invention, what is claimed as new is:

1. In a machine for making paper-like bags, the combination of a cutting element over which a piece of paper-like material in the nature of a paper-like tube is adapted to pass, said cutting element having a straight perpendicular outer face and a flat bottom face, a cutting edge formed along the bottom of said outer face, the cutting edge being at right-angles to the longitudinal axis of said cutting element and to the direction of movement of material to be cut, the cutting edge being formed by a plane intersecting said perpendicular outer face at a small acute angle thus defining a sharp penetrating cutting edge terminating slightly above the plane of the bottom face of said cutting element to eliminate the stubbing and choking of material against the cutting edge as the material moves in the direction at right angles to the cutting edge and in the plane of said flat bottom face and longitudinally of the cutting element, said cutting element being undercut to provide a channel transversely of said bottom face and directly in the rear of the cutting edge to permit the material to flex in the direction of the cutting edge while cutting, the cutting edge having as a rear face said intersecting plane which is inclined downwardly and toward said straight perpendicular outer face to direct the end of the cut material downwardly and under the cutting edge should the end of the cut material abut against the inner downwardly inclined face of said cutting edge, said intersecting plane being one of two planes that intersect to form said channel, and a means for forcing said piece of material against said cutting edge at periodic intervals for severing said material into bags.

2. A structure as defined in claim 1, with the addition that said cutting edge comprising a plurality of depending teeth terminating inwardly in spaced relation to the plane of the bottom face of the cutting element.

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