Aug. 6, 1940. R. N. DOBLE 2,210,114

APPARATUS FOR MAKING TEA BAGS, COFFEE BAGS, AND THE LIKE

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Fig.1.

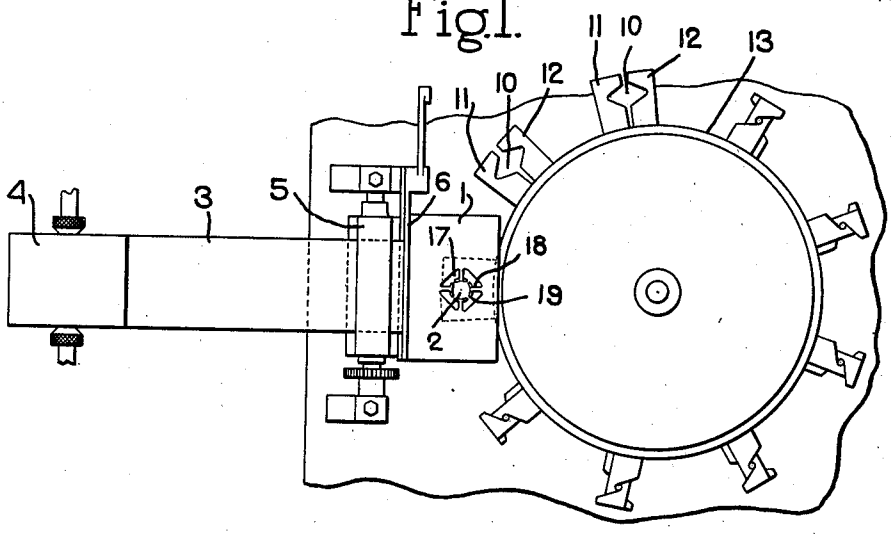
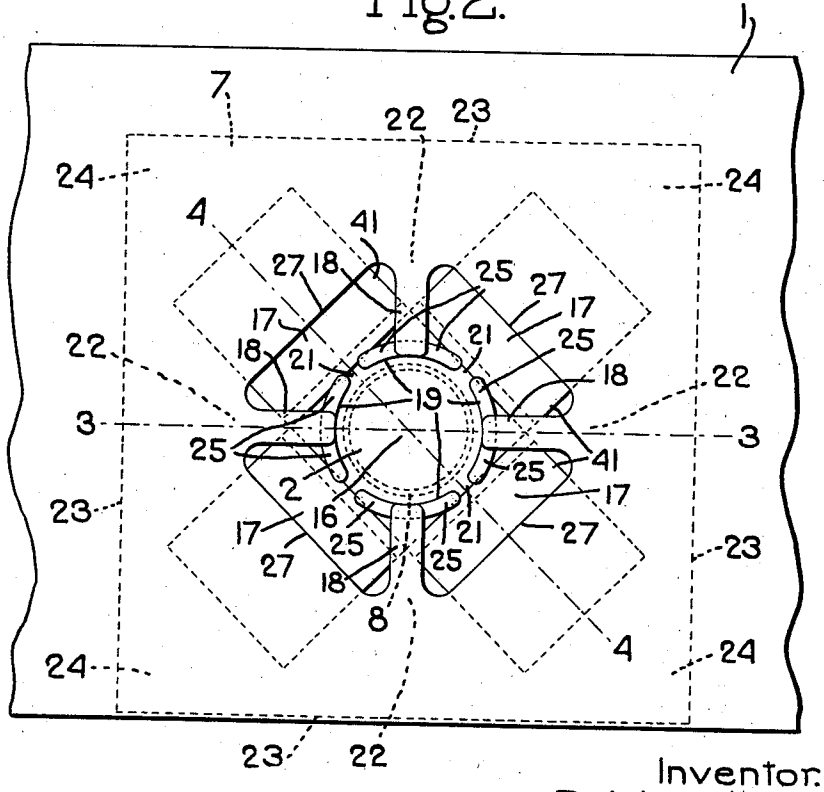


Fig.2.



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Fig.3.

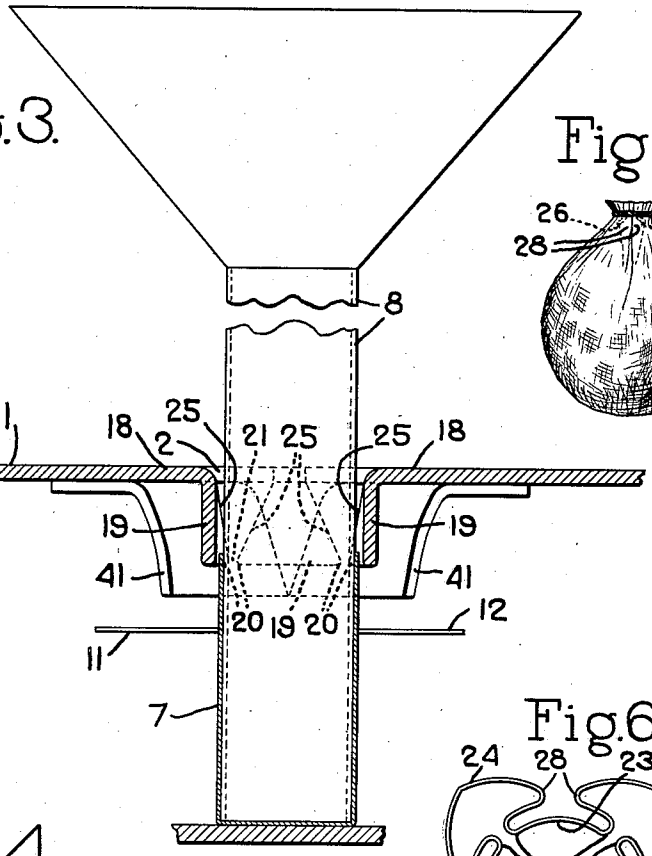


Fig.8.

Fig.4.

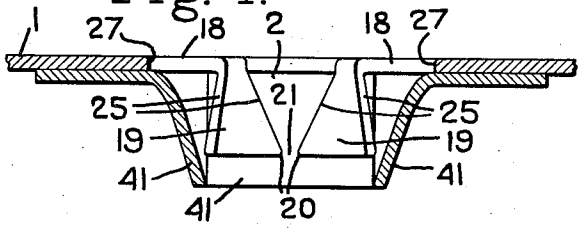


Fig.6.

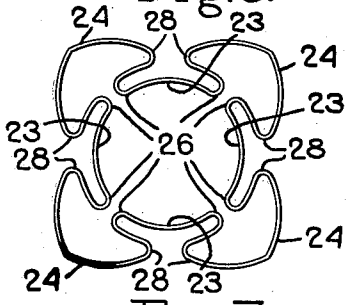


Fig.5.

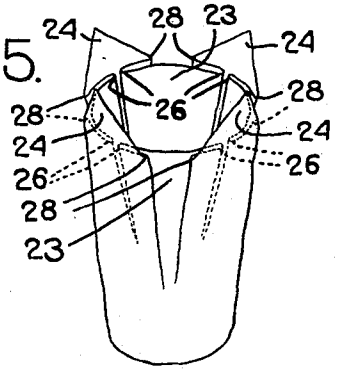
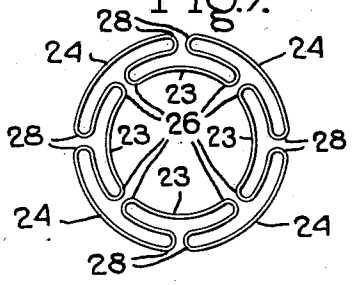


Fig.7.



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Fig. 9.

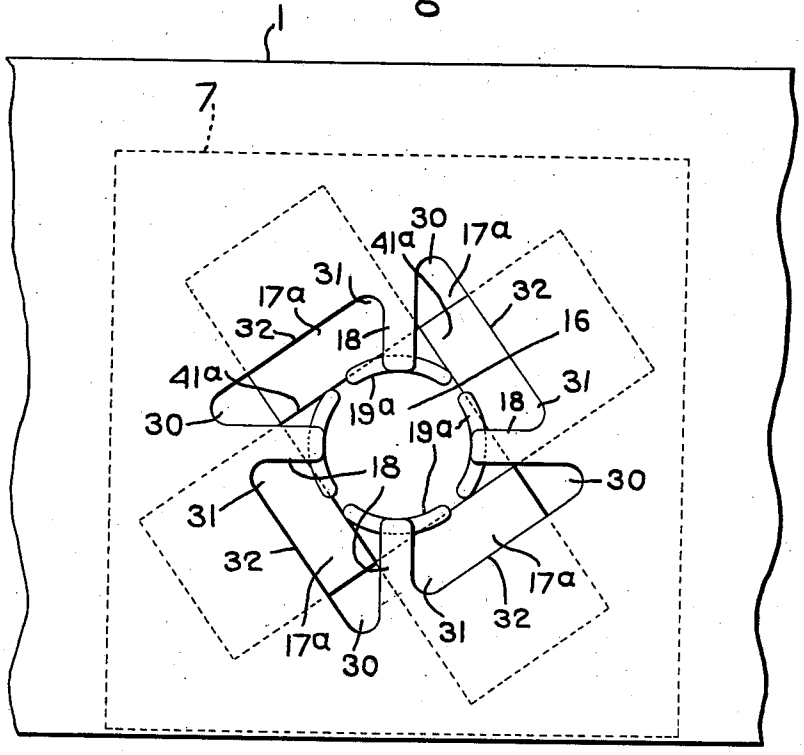
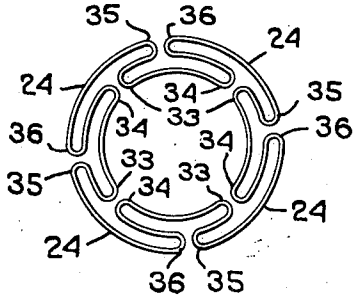


Fig. 10.



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UNITED STATES PATENT OFFICE

2,210,114

APPARATUS FOR MAKING TEA BAGS, COFFEE BAGS, AND THE LIKE

Ralph N. Doble, Hingham, Mass.

Application March 17, 1938, Serial No. 196,381

10 Claims. (Cl. 93—3)

This invention relates to the manufacture of tea bags, coffee bags and the like and particularly to bags of the so-called "pouch" type.

These "pouch" type coffee bags or tea bags are usually made from a blank of bag material, such as fabric, paper, etc., and one way of forming the blank is by placing the blank on a supporting table which has a bag-forming opening therein with the opening centrally situated beneath the blank, and then to force the blank of bag material through the opening by means of a combined bag-forming and filling tube, the result being that the bag material becomes folded up around the filling tube by the edges of the bag-forming opening. While the filling tube still remains within the partially formed bag, a charge of tea, coffee or other ingredient is delivered into the tube and is conveyed thereby into the bag. The tube is then withdrawn and the marginal portions of the blank are gathered together to close the mouth of the bag, said mouth being held permanently closed by a suitable string or other fastening device which is tied around the mouth.

In the present invention I have provided a supporting plate having a bag-forming opening of such a construction that when the bag material is forced through the bag-forming opening the portion of the blank which is folded up against the sides of the tube is formed into a plurality of pairs of inner folds having a predetermined arrangement and a corresponding number of pairs of outer folds also having a predetermined arrangement and which overlie the inner folds. If the bag is made from a rectangular blank, the inner folds will be formed from the center portions of the sides of the blank, while the outer folds will be formed from the corner portions of the blank.

Because the diametrical distance across a rectangular blank from the center of one side to the center of the opposite side is less than the diagonal distance across the blank from one corner to the opposite corner, the inner folds, which are formed from the central portions of the blank, will be somewhat shorter than the outer folds, which are formed from the corner portions of the blank, and in the completed bag these longer outer folds overlie the shorter inner folds, whereby a bag is produced in which the shorter folds are enclosed within and covered by the longer folds.

In the drawings wherein I have illustrated some selected embodiments of my invention;

Fig. 1 is a fragmentary plan view of a portion of a bag-forming machine embodying my invention;

Fig. 2 is an enlarged plan view of the supporting plate having a bag-forming opening of a shape to form a bag as above described;

Fig. 3 is a vertical fragmentary sectional view illustrating the operation of the combined bag-forming and filling tube in making the bag, the supporting plate being shown in section on substantially the line **3—3**, Fig. 2;

Fig. 4 is a section through the supporting plate on the line **4—4**, Fig. 2;

Fig. 5 is a perspective view of a partially formed bag made on the device illustrated in Figs. 1 to 4;

Fig. 6 shows a top plan view of the bag during the first stages of its formation;

Fig. 7 is a top plan view of the bag showing the arrangement of the folds before the bag is closed;

Fig. 8 is a view illustrating a completed bag;

Fig. 9 is a view similar to Fig. 2 but showing a supporting plate having a bag-forming opening of a slightly different shape from that shown in Fig. 2;

Fig. 10 is a top plan view showing a partially formed bag made on the supporting plate shown in Fig. 9;

Inasmuch as the present invention relates to the supporting plate and its bag-forming opening, I have not thought it necessary to illustrate herein a complete bag-forming machine but have only shown such portions thereof as may be necessary to give a proper understanding of the invention.

In Fig. 1, **1** indicates the supporting plate which has the bag-forming opening **2** therein. The bag material **3** is shown in the form of a web or strip which is taken from a supply roll **4** and is fed to the supporting plate by suitable intermittently operating feed rolls **5**. **6** indicates a cutter or shears device by which suitable lengths, each length constituting a blank of bag material, are cut from the strip or web **3**, each blank as it is severed from the web **3** being deposited or placed on the supporting plate **1** over the bag-forming opening **2** therein.

One such blank of bag material is shown in dotted lines at **7** in Fig. 2. After the blank **7** has thus been deposited on the supporting plate **1**, said blank is formed into a bag by means of the bag-forming and filling tube **8** which is forced downwardly against the blank **7** and through the opening **2**, thereby causing the outer portions of

the blank to be folded up around the tube by the edges of the bag-forming opening.

During the downward movement of the bag-forming tube 8 the bag material is not only forced through the opening 2 but is also forced into and partially through the opening 10 between two jaw members 11 and 12 that are mounted on a suitable turret 13.

After the bag has been thus formed a charge of tea, coffee or other ingredient is deposited into the tube 8 by which it is conducted into the partially formed bag. The tube 8 is then withdrawn, after which the jaws 10 and 11 are closed together thereby to close the mouth of the bag, and a string or fastening device 14 is then tied around the closed mouth of the bag thereby to hold the bag permanently closed. The upwardly projecting corners of the bag material are then trimmed off, thus producing a filled bag 15 as shown in Fig. 8. The parts thus far described, with the exception of the supporting plate 1, are such as are commonly used in bag-forming machines such as are exemplified by U. S. Patents No. 1,700,672, January 29, 1929, No. 1,857,662, May 10, 1932, and No. 1,911,805, May 30, 1933.

In the construction shown in Fig. 2 the bag-forming opening 2 in the supporting plate 1 has the central portion 16 of a size to receive the bag-forming and filling tube 8, and it also has four outer-fold-forming recesses 17 which function to form the outer folds in the corner portions of the blank. The supporting plate 1 is formed with inwardly directed arms 18 which separate the adjacent recesses 17 and the inner end of each arm 18 is provided with a downwardly directed folding flange or skirt 19 by which the inner folds are formed. Each downwardly directed flange 19 has a progressively increasing width from the top to the bottom, and the adjacent lower corners 20 of adjacent flanges are separated by a relatively narrow space 21.

Each arm 18 is shown as having substantially parallel sides, which will result in producing recesses 17 that are wider at their outer portion than at the inner portion where they open into the central part 16 of the bag-receiving opening.

These recesses 17 are so positioned in the supporting plate 1 that they have a diagonal arrangement with respect to the blank 7 when the latter is deposited on the plate, while the arms 8 have a diametrical relation relative to the blank.

When the blank is forced downwardly through the central portion of the opening 2 by the tube 8, the inner ends of the arms 18 cause the central portion 22 of each side 23 of the blank to fold up against the tube 8, while the corner portions 24 of the blank flow outwardly into the recesses 17. The arms 18 and the flanges 19 thus act on spaced portions of the blank of bag material and fold said spaced portions upwardly against the tube, the intermediate portions, that is, the corner portions 24, meanwhile flowing outwardly into the recesses 17.

Depending from the back wall 27 of each recess 17 is a folding plate or follower 41. These folding plates are situated opposite the spaces 21 between the folding flanges 19 and they preferably incline inwardly toward their lower end. As the tube 8 continues its downward movement the edges 25 of each inner folding flange 19 form the two inner folds 26 in the bag material which are directed away from each other, and the engagement of the corner portions 24 of the blank with the outer folding walls or flanges 41 flattens said corner portions and folds the bag material around the ends of the inner folding flanges 19 and at the same time causes the formation in each corner portion of the two outer folds 28 which are also directed away from each other. While the outer folds which are formed from each corner portion of the blank are directed away from each other, yet the outer fold 28 formed in one corner of the blank will be directed toward an adjacent outer fold formed in an adjacent corner of the blank. Similarly, while the two inner folds 26 which are formed from each side portion of the blank by the folding flange 19 are directed away from each other, yet the bag will have an inner fold 26 formed from one side of the blank which is directed toward and is closely adjacent an inner fold formed from an adjacent side of the blank.

For convenience I will regard any two adjacent folds which have their folded edges directed toward each other as a pair of folds, and the bag thus formed will have a plurality of pairs of inner folds 26 with the folds of each pair formed from adjacent sides 23 of the blank, and it will also have a plurality of pairs of outer folds 28 with the two folds of each pair formed from adjacent corner portions of the blank. By giving the bag-forming opening 2, together with its recesses 17, the proper shape and dimensions the bag will be formed with the inner folds of each pair closely adjacent and facing each other, and with such pair of inner folds underlying and covered by a corner portion 24 of the bag. Similarly, the two outer folds 28 of any pair which are formed from two adjacent corner portions 24 of the blank are situated closely together and face each other, and these outer folds overlie the part 23 of the bag which constitutes the central part of each side of the blank.

It will be observed that the inner folds 26 are formed from portions of the bag material relatively near the center of each side, while the outer folds 28 are formed from in the corner portions of the blank. These outer folds 28, therefore, will be somewhat longer than the inner folds, and as a result in the completed bag the shorter inner folds will be tucked within and will be overlapped by the longer outer folds 28.

When the tie string or fastening device 14 is applied to the bag to permanently close the mouth of the latter, said tie string will preferably be located just below the outer ends of the outer folds 28 so that said outer folds 28 will all be enclosed in the fastening device. It is not essential, however, that this tie string 14 should be located below the outer ends of the shorter inner folds 26 because the open ends of these folds are held closed by the overlapping outer folds and consequently a tight non-leaking bag will be produced even if the tie string is located slightly above the outer end of the inner folds, as shown in Fig. 8, so long as said tie string is located below the outer ends of the outer folds.

This makes it possible to form a bag having a predetermined size from a smaller blank than would be required if it were necessary to place the tie string below the outer ends of the inner folds, and, therefore, this invention has the advantage that it provides a considerable saving in the cost of the material required for making bags of a predetermined size.

In the construction shown in Figs. 1 and 2 the recesses 17 are symmetrical and this form of supporting plate produces a bag in which the inner folds are all of the same size and the outer folds are also all of the same size.

In Fig. 9 I have shown a slightly different embodiment of the invention wherein each recess is deeper at one side than at the other. In this embodiment of the invention these recesses, which are indicated at 17a, are made deeper at one end as shown at 30 than at the other end 31 and the back wall 32 of each recess and the corresponding outer folding flange 41a have an angular arrangement with reference to diametrical lines extending through opposed arms 18. With this construction the bag blank will be formed with the inner folds 33, 34 and the outer folds 35, 36 but of the outer folds which are formed from each corner portion 24 of the blank one of the folds 35 will be relatively narrow, while the other fold 36 will be relatively wide. Each pair of outer folds, therefore, is formed from one narrow fold 35 and a wide fold 36. These outer folds, however, overlie and close the inner folds so that in the completed bag the shorter inner folds are held closed by the encircling and overlapping outer folds.

I claim:

1. A bag-forming machine comprising a supporting plate having a bag-forming opening presenting a central portion and a plurality of recesses outside of but communicating with said central portion, said recesses being separated by arms, an inner folding flange depending from the inner end of each arm and extending circumferentially of the central portion of the bag-forming opening, an outer folding flange depending from the back edge of each recess, said inner folding flanges and outer folding flanges having an overlapping relation, and a bag-forming tube adapted to be inserted through the central portion of said opening thereby to force a blank of bag material through said opening, whereby said arms and inner folding flanges fold spaced portions of the bag material up around the tube, intermediate portions of the bag material meanwhile entering the recesses, and said outer folding flanges folding the bag material around the ends of the inner folding flanges thereby to form oppositely-disposed pairs of inner folds which are overlapped by oppositely-disposed pairs of outer folds.

2. A bag-forming machine comprising a supporting plate having a bag-forming opening presenting a central portion and a plurality of recesses outside the central portion but communicating therewith, said recesses being equally spaced from each other and being separated by inwardly extending arms, an inner folding flange depending from the inner end of each arm, each inner flange having a progressively increasing width from top to bottom, an outer folding flange depending from the back edge of each recess, said outer flanges inclining inwardly from the top to the bottom, and a bag-forming tube adapted to be inserted through the central portion of said opening thereby to force a rectangular blank of bag material through said opening, the inner folding flanges forming in each side of said blank a pair of inner folds and the outer folding flanges forming in each corner portion of the blank a pair of outer folds which overlie the inner folds.

3. A bag-forming machine comprising a supporting plate having a bag-forming opening presenting a central portion and a plurality of recesses outside of but communicating with said central portion, each recess being wider at the end thereof remote from said central portion than at the end which communicates with said central portion, inner folding flanges depending from said plate at the periphery of the central portion of the opening, there being an inner folding flange between each two adjacent recesses and each inner folding flange extending circumferentially of said central portion, a bag-forming tube adapted to be inserted through the central portion of said opening thereby to force a blank of bag material through said opening, said inner folding flanges folding spaced portions of the bag material up around the tube, intermediate portions of the bag material meanwhile entering said recesses, and means depending from the plate and acting on said portions of the bag material which enter the recesses, thereby to fold the bag material around the ends of the inner folding flanges and to form oppositely-disposed pairs of inner folds which are overlapped by oppositely-disposed pairs of outer folds.

4. A bag-forming machine comprising a supporting plate having a bag-forming opening presenting a central portion and a plurality of recesses outside of but communicating with said central portion, the outer end of each recess being relatively wide, inner folding flanges depending from said plate at the periphery of the central portion of the opening, there being an inner folding flange between each two adjacent recesses and each inner folding flange extending circumferentially of said central portion, a bag-forming tube adapted to be inserted through the central portion of said opening thereby to force a blank of bag material through said opening, said inner folding flanges folding spaced portions of bag material up around the tube, the intermediate portions of the bag material meanwhile entering the recesses, and an outer folding flange depending from the plate at the outer end of each recess and overlapping the adjacent end of the two inner folding flanges either side of said recess, whereby each outer folding flange folds the portion of the bag material entering the corresponding recess about the adjacent ends of the two adjacent inner folding flanges thereby to form in the bag material pairs of oppositely-disposed inner folds and pairs of oppositely-disposed outer folds which overlie the inner folds.

5. A bag-forming machine comprising a supporting plate having a bag-forming opening presenting a central portion and a plurality of recesses outside of but communicating with said central portion, said recesses being separated by arms, an inner folding flange depending from the inner end of each arm, each inner folding flange being wider than its arm, a bag-forming tube adapted to be inserted through the central portion of said opening thereby to force a blank of bag material through said opening, each inner folding flange acting on the bag material to fold spaced portions thereof up around the tube, the intermediate portions of said bag material meanwhile entering the recesses, and means acting on such intermediate portions of the bag material to fold the bag material around the ends of the inner folding flanges thereby to form oppositely-disposed pairs of inner folds which overlie oppositely-disposed pairs of outer folds.

6. A bag-forming machine comprising a supporting plate having a bag-forming opening presenting a central portion and a plurality of separate recesses outside of but communicating with said central portion, a bag-forming tube adapted to be inserted through the central portion of the opening, thereby to force a blank of bag material through said opening, an inner fold-forming element depending from said plate between each

two adjacent recesses and acting on bag material as it is forced through the opening to fold spaced portions of the bag material up around the tube, portions of the bag material intermediate said spaced portions meanwhile entering the recesses, and means acting on said intermediate portions and cooperating with the inner fold-forming elements to form in the bag material oppositely-disposed pairs of inner folds which are overlapped by oppositely-disposed pairs of outer folds.

7. A bag-forming machine comprising a supporting plate having a bag-forming opening presenting a central portion and a plurality of separate recesses outside of but communicating with said central portion, a bag-forming tube adapted to be inserted through the central portion of the opening, thereby to force a blank of bag material through said opening, an inner fold-forming flange depending from said plate between each two adjacent recesses, the adjacent flanges being spaced apart a distance less than the width of the recesses, said flanges acting to fold spaced portions of the bag material up around the tube, portions of the bag material intermediate said spaced portions meanwhile entering the recesses, the back walls of the recesses acting on such intermediate portions of bag material to fold them around the ends of the inner fold-forming flanges, thereby to form oppositely-disposed pairs of inner folds which are overlapped by oppositely-disposed pairs of outer folds.

8. A bag-forming machine comprising a supporting plate having a bag-forming opening presenting a central portion and a plurality of recesses outside of but communicating with said central portion, an inner folding flange depending from the inner end of each of the portions of the plate which separate adjacent recesses, each flange being wider than the portion of the plate from which it depends, a bag-forming tube adapted to be inserted through the central portion of said opening thereby to force a blank of bag material through said opening, said inner folding flanges acting on spaced portions of the bag material to fold them up around the tube, intermediate portions of the bag material meanwhile entering the recesses, and means acting on such intermediate portions of the bag material to fold them around the ends of the inner folding flanges, thereby to form oppositely-disposed pairs of inner folds which are overlapped by oppositely-disposed pairs of outer folds.

9. A bag-forming machine comprising a supporting plate having a bag-forming opening presenting a central portion and a plurality of recesses outside of but communicating with said central portion, said recesses being separated by arms and each recess being at least as wide at its outer end as it is at its inner end where it communicates with the central portion, an inner plural fold-forming flange depending from the inner end of each arm and having a greater width than said arm, an outer plural fold-forming flange depending from the back edge of each recess and a bag-forming tube adapted to be inserted through the central portion of said opening, thereby to force a blank of bag material through said opening whereby said arms and the inner plural fold-forming flanges fold spaced portions of the bag material up around the tube, intermediate portions of the bag material meanwhile entering the recesses, and the outer plural fold-forming flanges fold the bag material around the ends of the inner fold-forming flanges, thereby to produce pairs of oppositely-disposed inner folds which are overlapped by pairs of oppositely-disposed outer folds.

10. A bag-forming machine comprising a supporting plate having a bag-forming opening presenting a central portion and a plurality of recesses outside of but communicating with said central portion, said recesses being relatively wide at their outer ends and being separated by inwardly directed arms, an inner two-fold folding flange depending from the inner end of each arm and extending peripherally of said central portion, an outer two-fold folding flange depending from the back edge of each recess, the outer folding flanges having an overlapping relation with respect to the inner folding flanges, and a bag-forming tube adapted to be inserted through the central portion of said opening, thereby to force a blank of bag material through said opening, whereby the arms and inner two-fold folding flanges fold spaced portions of the bag material up around the tube, intermediate portions of the bag material meanwhile entering the recesses, and the outer two-fold folding flanges folding the said intermediate portions of bag material around the ends of the inner folding flanges, thereby forming oppositely-disposed pairs of inner folds which are overlapped by oppositely-disposed pairs of outer folds.

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