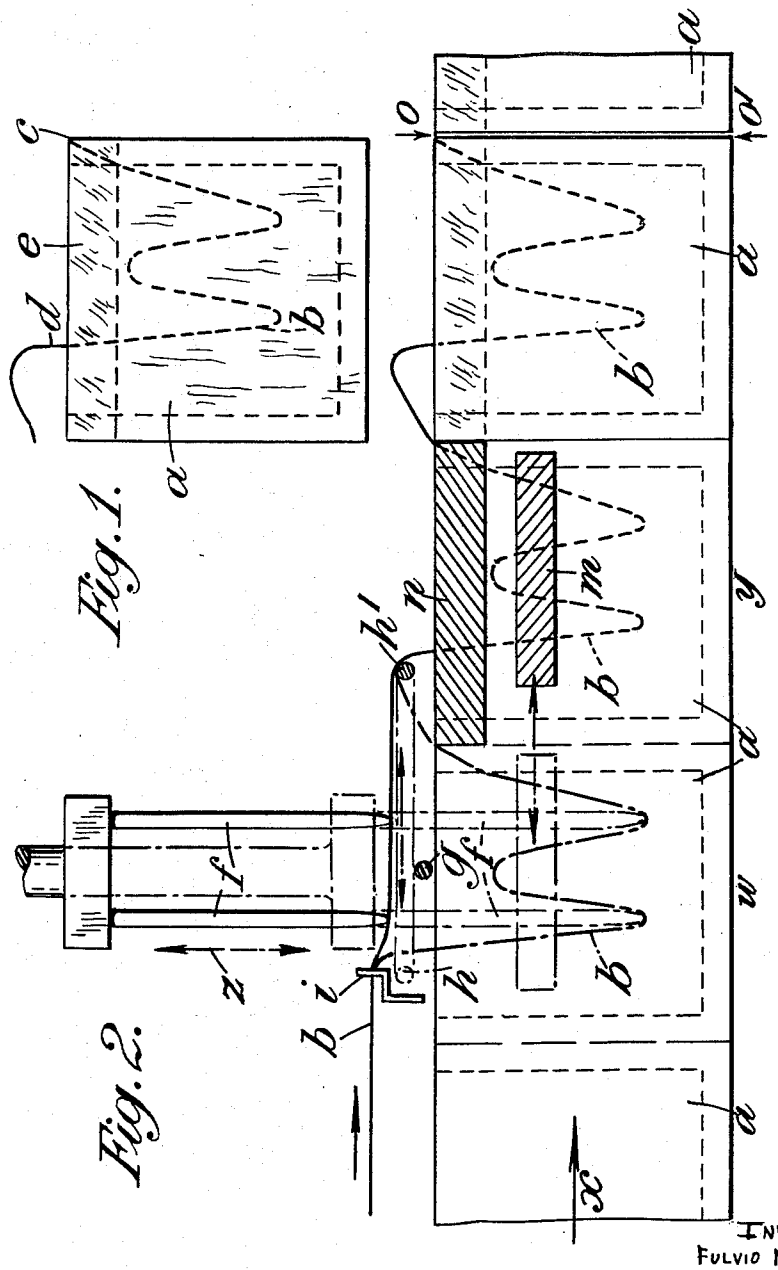
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TEA BAGS AND APPARATUS FOR USE IN THEIR MANUFACTURE

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TEA BAGS AND APPARATUS FOR USE IN THEIR MANUFACTURE

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This invention comprises improvements in or relating to tea bags and apparatus for use in their manufacture.

In this specification the expression "tea bags" is intended to cover bags for the infusion of not only tea, but other aromatic herbs and products which are commonly infused in filter bags. Tea and like products are commonly sold at the present time in porous bags of paper or plastic film material, each of which contains a measured quantity of the tea or the like which is to be infused and to which is attached a suspension string by means of which the bag can readily be held clear of the bottom of the vessel in which infusion is taking place and by means of which withdrawal from the hot infusion can readily be effected.

Packing of tea bags mechanically is not in itself difficult but the fixing of the string, which tends to trail from the bag in a loose length, offers difficulties in mechanical handling both during and after its attachment. It is an object of the present invention to facilitate the mechanical handling of strung tea bags.

According to the present invention a tea bag having a suspension string is characterised by the fact that the greater part of the length of the suspension string is packed inside the bag, with one end passed slidably through the seal of the bag and a sufficient amount protruding to enable it to be pulled out. In the preferred form the string is formed within the bag into a zig-zag loop and the other end of the string from that which passes slidably through the seal, is fixed to the material of the bag.

The string may pass through and be fixed in the seal at one corner of the bag and then follow its zig-zag course within the bag and pass slidably through the seal near the mid-point of one side of the bag.

The invention includes apparatus for producing tea bags as above described. According to one feature of the invention apparatus for fixing a suspension string in tea bags comprises in combination means for passing a ribbon of partly formed and filled tea bags past a stringing station, with one side of the ribbon of bags open to form a mouth for each bag as it arrives at the station, string-feeding means for feeding string to a point in line with the mouth of the bag at the filling station, a string-guide for holding a bight of the string over the mouth, a pronged pusher movable to push part of the bight into a bag at the stringing station, a retaining member for keeping back an intermediate part of the bight between the prongs, means for releasing said intermediate part before the prongs have fully entered the bag and sealing means to seal the ends of the bight of string into the mouth of the bag after it has been positioned by the prongs.

The following is a description by way of example of one form of tea bag in accordance with the invention and of apparatus for its production:

In the accompanying drawings, FIGURE 1 is a representation of a tea bag in accordance with the invention and FIGURE 2 is a diagrammatic side elevation of apparatus for its production.

Referring to FIGURE 1 this shows a bag *a* in which the tea or other product is contained. The bag is formed of two pieces of heat-sealing filter paper, the side and bottom edges of which are sealed to constitute the bag. The width of the sealed margin is indicated by a dotted

line. The suspension string *b* is fixed between the two faces of the bag at the point *c* which appears at the top ringht-hand corner in the drawing; it forms a shape like the leter W within the bag and passes out between the two faces of the bag at *d* where there is a short free external length. The top or mouth of the bag *e* is sealed upon the string in the portion lying above the upper horizontal dotted line.

Such a bag, having only a short length of protruding string, is easily handled mechanically and can for example be packed by a machine in an outer envelope without difficulty, whereas the attachment of a long external string leads to difficulties not only in attachment but in subsequent handling when the string gets in the way. When the bag comes to be used, a pull on the protruding portion *d* of the string draws it longitudinally through the seal *e* and allows the string to be used for suspending the bag in the usual way. The essential parts of the apparatus for the production of bags as above described in connection with FIGURE 1, are shown in FIGURE 2. In relation to this figure it should be understood that means for producing a series of bags from two webs of heat-sealable filter paper by running them together, sealing bottom and side margins and filling them with measured quantities of tea, are well-known and form no part of this invention. In FIGURE 2 it is assumed that a series of bags *a* having side and bottom edges sealed and filled with tea, are coming from the filling apparatus in the direction of the arrow *x*, the bags forming, in effect, a continuous ribbon because they have not been sub-divided from one another. The known filling machine is provided with means for advancing the bags step by step and the advance is continued step by step through the apparatus in FIGURE 2, past a stringing station *w*, a sealing station *y* and a severing apparatus located upon the line *o, o'*. String *b* is fed from a reel not shown through an aperture in a string feeder *i* and then passes over a string guide *h*, which is movable horizontally between the positions *h* and *h'*. The string guide *h* moves in synchronism with the series of bags *a* when their feeding movement takes place and at the end of the feeding movement the string stretches from the feeder *i* to the guide *h'* in the position shown in full line in the drawing. In this position the bight of string between *i* and *h'* overlies a stationary retaining member *g*. Above the bight of string is a two-pronged pusher *f* which is capable of moving up and down along the line indicated by the two-headed arrow *z*.

With the parts in this position, the pusher *f* is moved down and presses the bight of string into the bag *a* which is at the stringing station and as the centre of the string is retained by the retaining member *g* between the prongs, the string assumes a W formation. During this operation string is drawn through the aperture in the string feeder *i* from the reel. A little before the prongs reach the bottom of their stroke the retaining member *g* is withdrawn endwise, releasing the midle part of the string which had been held back and during the remainder of the down stroke of the prongs the centre of the zig-zag bight of string is drawn into the bag and assumes the shape shown in chain lines in the figure.

As soon as the prongs *f* have brought the W shaped bight of string entirely within the bag, a pair of jaws *m* closes horizontally on the bag from opposite sides at the position shown in chain lines at the stringing station *w*. The pincer jaws *m* are recessed to avoid contact with the prongs *f* but they grip the sides of the bag on each side of the prongs and grip the string in its W formation tightly through the sides of the bag. It will be understood that the bulk of the tea which has been fed into the bag previously will be lying in the bottom of the

bag below the jaws *m*. As soon as the string is gripped by the jaws *m* the prongs *f* are withdrawn to their uppermost position, the loop of string remaining held in the shape into which it has been formed.

While the prongs *f* are being withdrawn the string guide *h* is withdrawn endwise from beneath the string and returned from the position *h'* to the position *h* close beneath the string feeder *i*. With the parts in this position and the jaws *m* closed the ribbon of bags is fed forward one step so that the bag from the stringing station *w* reaches the sealing station *y*. The string guide *h* moves forward to the position *h'* during this operation. The retaining member *g* now moves forward into operative position again and the operations at the stringing station are repeated. Meanwhile, heated sealing jaws advance upon the upper margin of the bag at the sealing station and press upon the bag in the shaded area indicated at *n*. The jaws then retreat to permit the next feeding movement of the bags and the clamping jaws *m* are opened and returned to the position shown in chain lines at the stringing station.

While the bag is being sealed at the sealing station *y* the cutters operating upon a line *o, o'* sever the next bag but one from the ribbon.

It should be noted that during all the operations up to that of severing the bag the string remains continuous. The short length of string required to be left free of the bag is automatically provided by the loop of string which stands up above the line of the bags from bag to bag, which loop was originally formed by string feeding means *h*.

It will be noted that the string is attached to the bag without using any metal staples or other metal means of attachment which might spoil the flavour of the tea. It is for this reason that the material used for the bags is preferably heat-sealing filter paper.

I claim:

1. In a tea bag filling and sealing apparatus of the class in which a continuous ribbon of interconnected tea bags of heat sealable flexible sheet material, all having mouths opening through a single mouth defining edge of the ribbon, is moved intermittently in the direction of its length past relatively spaced heat sealing and cutting stations in uniform increments such that each bag dwells at a predetermined location in advance of said heat sealing station, the combination with said filling and sealing apparatus of apparatus for inserting suspension strings in the respective bags in succession comprising, string guiding means for guiding string to a point in line with the mouth of the bag at said location, a string guide for holding a bight of the string over the mouth, a pronged pusher movable to push part of the bight into the bag at the said location, a retaining member for keeping back an intermediate part of the bight between the prongs of said pusher, said retaining member being retractable to release said intermediate part before the prongs have fully entered the bag, clamping means being provided to grip the string in the zig-zag formation upon withdrawal of the said prongs, said clamping means being movable with the feed movement of the bags to hold the string while the ribbon of bags is fed to bring a fresh bag to said location.

2. Apparatus as claimed in claim 1 wherein the string guide for holding the bight over the mouth of the bag is movable from a string-receiving position close to the string feeding means at one side of the mouth of the bag to a holding position at the other side of said mouth.

3. Apparatus as claimed in claim 2 wherein the movement of the string guide is simultaneous with the feed movement of the string of bags.

4. Apparatus as claimed in claim 1 wherein the pusher has two prongs, so that in conjunction with the retaining member the string is formed into a W shape in the bag.

5. In a tea bag filling and sealing apparatus of the class in which a continuous ribbon of interconnected tea bags of heat sealable sheet material all having mouths opening through a single mouth defining edge of the ribbon, is moved intermittently in the direction of its length past relatively spaced heat sealing and cutting stations in uniform increments such that each bag dwells at a predetermined location in advance of said heat sealing station, the combination with said apparatus of apparatus for inserting suspension strings in the respective bags comprising:

(a) string guiding means for guiding string from a source of supply in the plane of the mouth of each bag, said guiding means being fixedly located adjacent said mouth defining edge of the ribbon and at said predetermined location,

(b) a string guide disposed for reciprocating movement along a path parallel to the movement of said ribbon adjacent the said mouth defining edge thereof to carry a bight of the string from said guide means in the direction of advance movement of the ribbon,

(c) a retaining member positioned adjacent said mouth defining edge of the ribbon at said predetermined location and between said ribbon and the path of movement of said string guide,

(d) a bifurcated pusher disposed for movement into and from the mouths of the respective bags, said movement being normal to movement of said string guide and said ribbon and in the plane of the latter, the furcations of said pusher projecting toward said ribbon and spaced apart on opposite sides of said retaining member for free movement past said member to carry loops of string into each mouth around and on opposite sides of said retainer member,

(e) said retainer member being movable for disengagement from said string during the projection movement of said pusher,

(f) clamp jaws mounted on opposite sides of the said ribbon at said predetermined location for movement into clamping engagement with the ribbon and the string therein, to retain the string in place during withdrawal of said furcations of the pusher,

(g) said jaws and said string guide being disposed for movement with said ribbon from said predetermined location to said sealing station.

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