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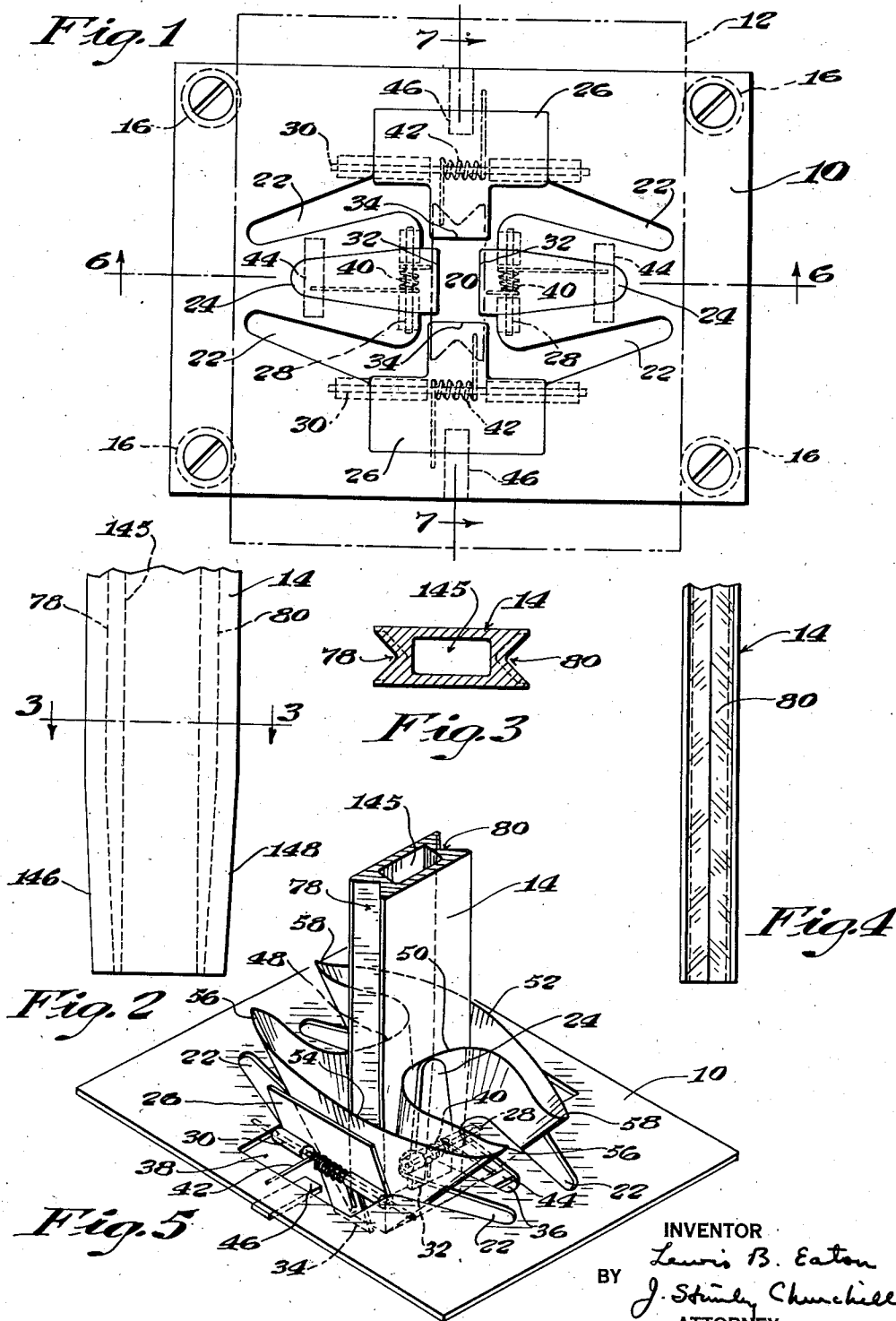
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BAG FORMING APPARATUS

Filed Nov. 16, 1939

4 Sheets-Sheet 1



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Dec. 9, 1941.

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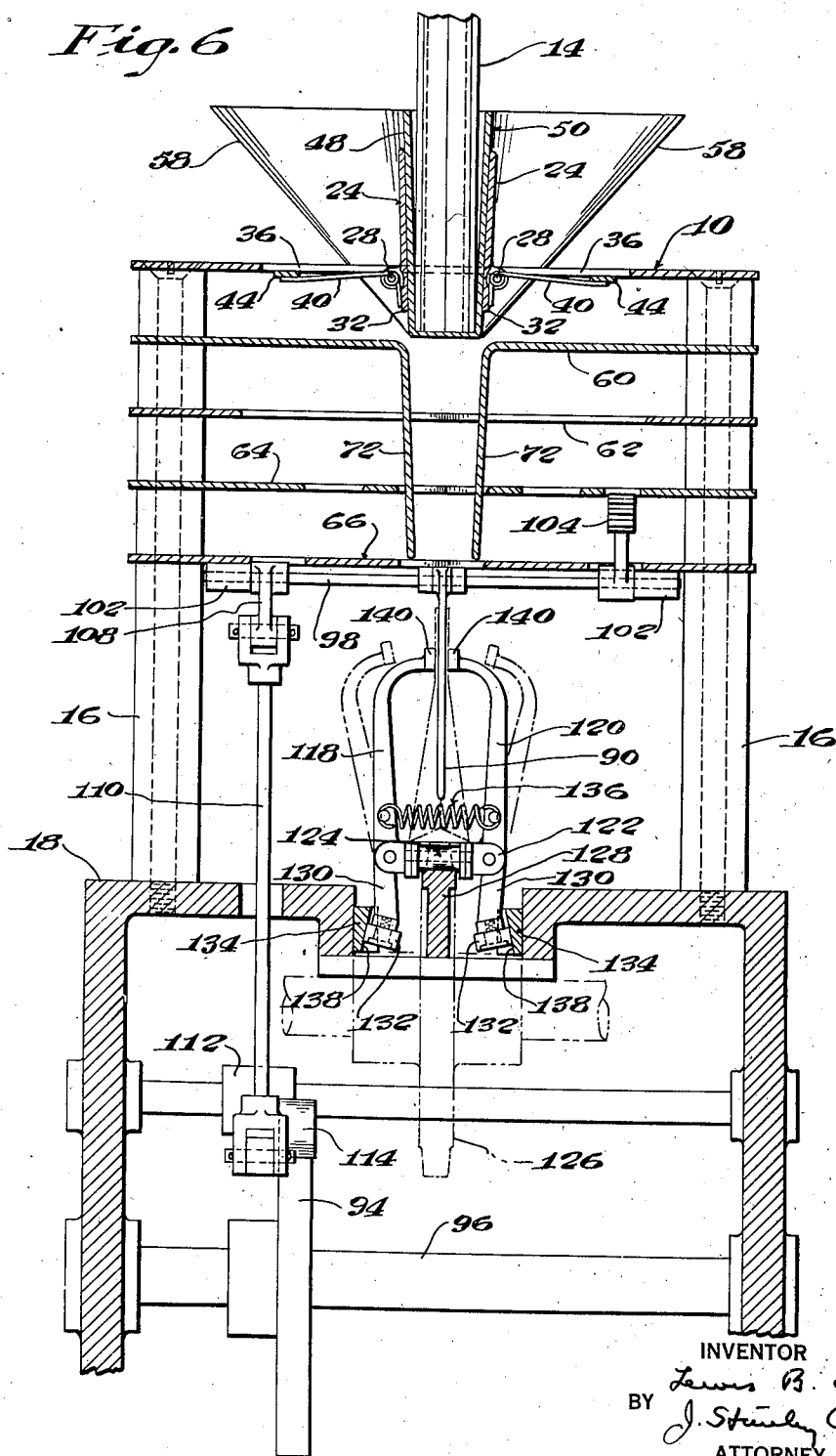
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Fig. 6



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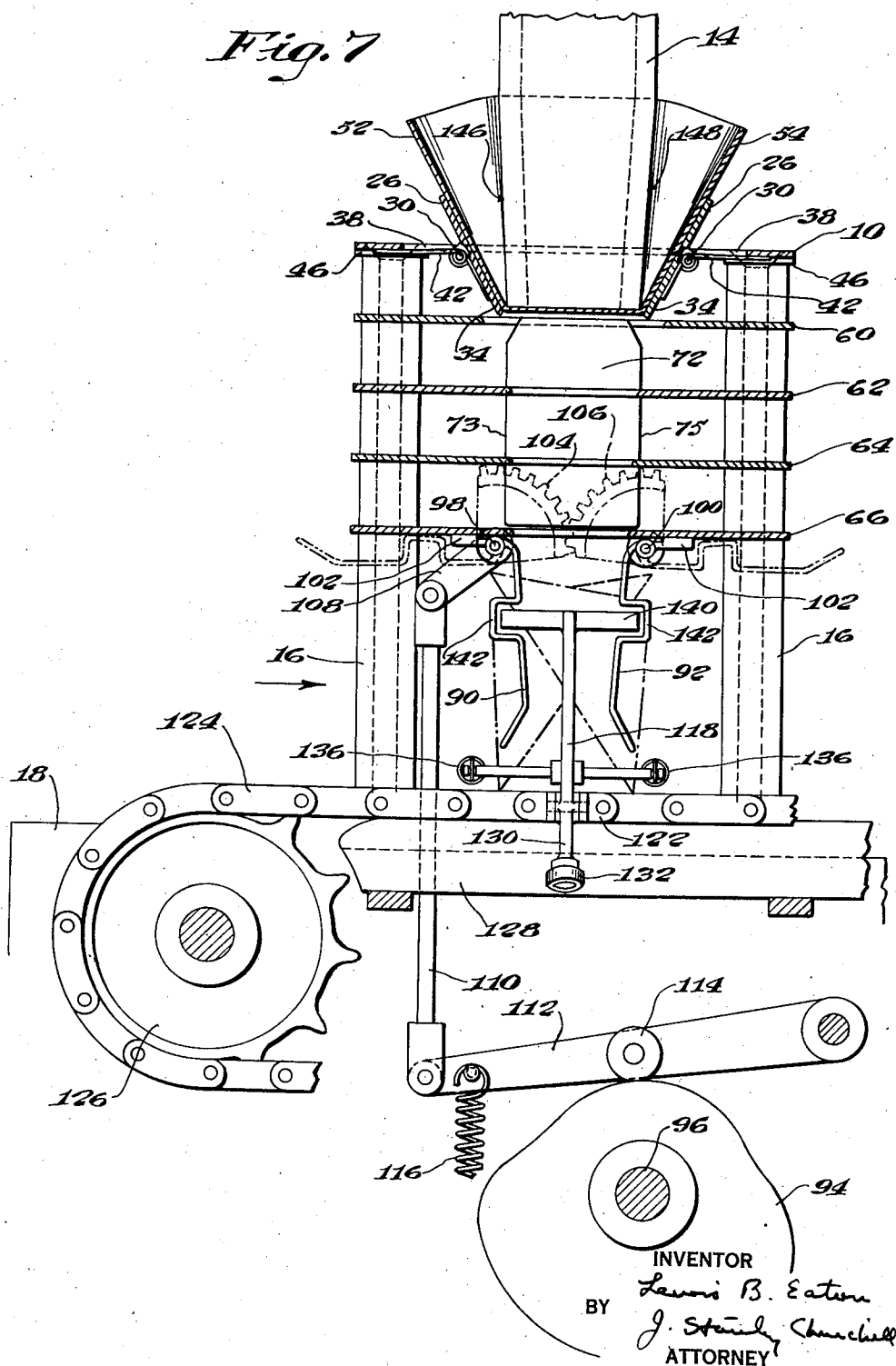
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Fig. 7



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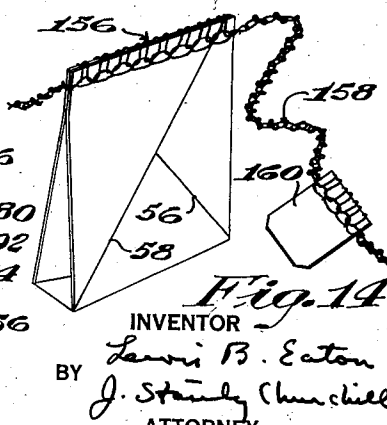
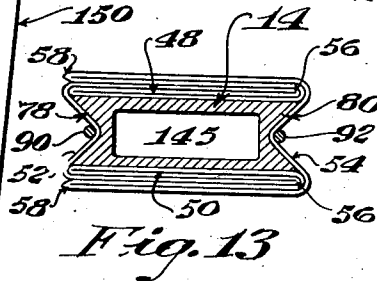
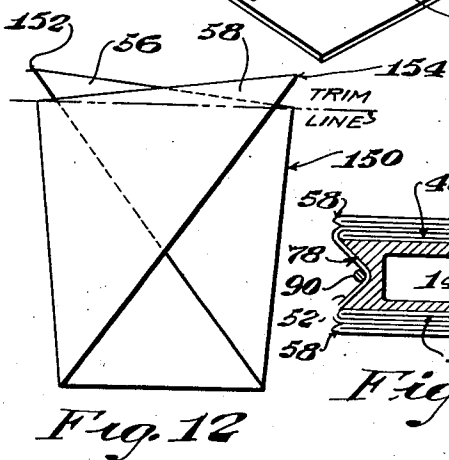
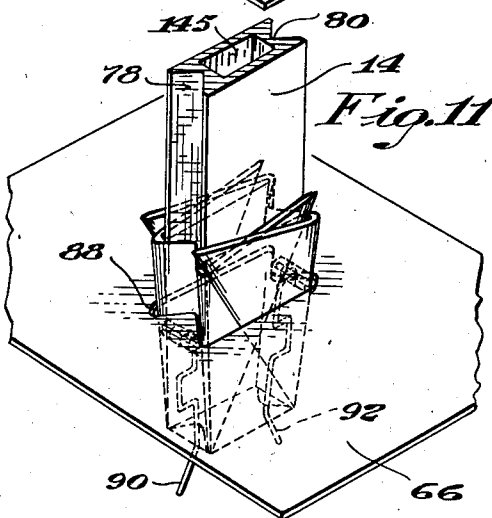
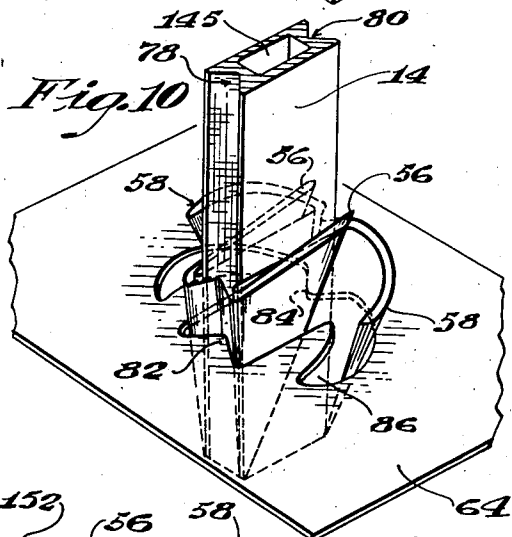
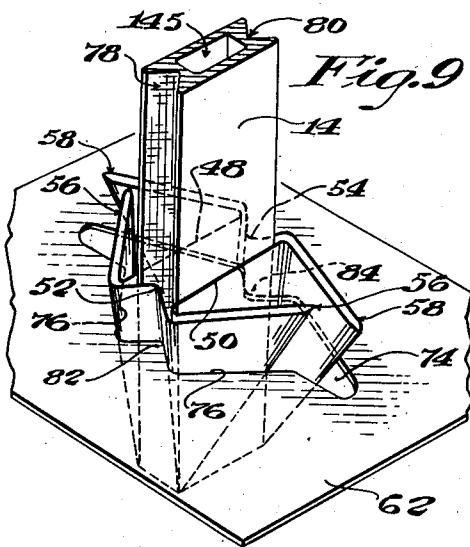
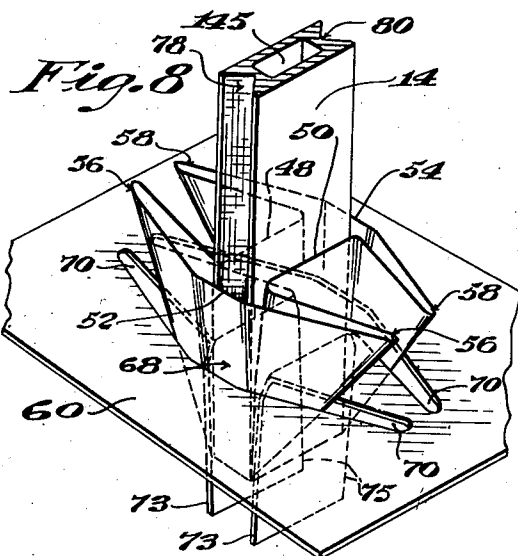
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BAG FORMING APPARATUS

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BAG FORMING APPARATUS

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Application November 16, 1939, Serial No. 304,652

8 Claims. (Cl. 93—12)

This invention relates to apparatus for producing a tea or similar bag.

In general the object of the invention is to provide a novel and efficient apparatus for use in the production of tea, coffee or similar bags and which is particularly adapted for operation at relatively high speeds whereby to enable the bags to be produced at minimum expense.

A further object of the invention is to provide novel and efficient apparatus which is particularly adapted to be incorporated in an automatic tea bagging machine to enable the tea or coffee bag forming the subject matter of my copending application filed April 29, 1939, and bearing Serial No. 270,836, to be produced in a rapid, economical and practical manner.

With these general objects in view and such others as may hereinafter appear, the invention consists in the apparatus for producing tea, coffee or similar bags hereinafter described and particularly defined in the claims at the end of this specification.

In the drawings illustrating the preferred embodiment of the invention, Fig. 1 is a plan view of the bag forming die; Fig. 2 is a front elevation of a forming block or plunger about which the bag is formed; Fig. 3 is a cross-sectional view on the line 3—3 of Fig. 2; Fig. 4 is a side elevation of the plunger; Fig. 5 is a perspective view of the die and plunger showing the bag partly formed; Figs. 6 and 7 are cross-sectional views taken on the line 6—6 and 7—7 of Fig. 1, respectively, and including the mechanism for tucking in the narrow sides of the bag and for clamping the mouth of the bag when the plunger is withdrawn; Figs. 8, 9, 10 and 11 are perspective views illustrating the folding plates through which the bag is passed for folding the corner flaps into overlapping relation on the bag; Fig. 12 is a front elevation of the bag as it looks after passing through the die; Fig. 13 is a cross-sectional view through the plunger showing the formation of the bag folded thereon; and Fig. 14 is a perspective view of the bag as completed by trimming the top of the bag, closing the mouth thereof and attaching a string and a tag thereto.

In general, the present invention contemplates the provision of apparatus for producing a tea, coffee or similar bag of the structure forming the subject matter of my copending application filed April 29, 1939, and bearing Serial No. 270,836, and which in general comprises a bag preferably of soft porous filter paper formed from a single sheet folded to provide an elongated narrow bottom portion, two relatively wide side walls of the

bag and two relatively narrow end walls of the bag and to provide corner flaps of general triangular shape connecting the side and end walls which are folded in overlapping relation upon and at the upper portion of the wide side walls of the bag. The narrow end walls of the bag are tucked or folded inwardly and provision is made for fastening the mouth of the bag preferably by a fastening device extended through the relatively large number of plies or thicknesses of the material forming the mouth of the bag.

In its preferred form, the present apparatus comprises in general, a bag forming die and a plunger adapted to be passed through the die to force therethrough a sheet or blank of the bag forming material supported on the die. The plunger is of elongated rectangular shape in section and the principal opening in the die plate conforms generally to the shape of the plunger and is further provided with elongated corner flap receiving openings arranged to project from the wider sides of the die opening to form a part thereof. Provision is made for folding the corner flaps which project from the wider sides of the plunger after the latter has passed through the die upon and into overlapping relation at the upper portion of the side walls of the bag. Provision is also made for tucking in the narrow end walls of the bag while the latter is supported upon the plunger and the plunger may and preferably will be of tapered form to produce a bag of a structure in which the top of the bag is wider than the bottom of the bag. The plunger is preferably hollow to facilitate the introduction of tea or other commodity into the bag prior to the complete withdrawal of the plunger from the bag after the formation thereof and in order to facilitate the subsequent operation of handling the filled bag and fastening the mouth thereof in its closed position, clamping means are provided, adapted to engage the mouth of the bag when the plunger has been withdrawn therefrom. The clamping means may and preferably will be mounted upon a conveying element by which the filled and closed bag may be conveyed to suitable instrumentalities for fastening the mouth of the bag and attaching the usual handle comprising a string and a tag thereto.

Referring now to the drawings, the present invention comprises, in general, novel and improved bag forming apparatus adapted to be incorporated in an automatic tea bagging machine of any usual or preferred form now upon the market, such tea bagging machines having provision for feeding the bag forming material into

operative position upon a bag forming die and for imparting vertical reciprocatory motion to a plunger operated in timed relation to the feed of the material and arranged to force the material through the die to form the bag. Such commercial tea bagging machines are also provided with bag holding devices arranged to grasp the bag and convey the latter to subsequent stations for closing the mouth of the bag and for attaching a string and tag thereto.

As herein shown, the present bag forming apparatus may comprise a die plate 10 upon which a blank or sheet of bag forming material 12 is supported, and a reciprocable forming block or plunger 14 adapted to force the material through the die to form the bag. The die plate 10 is supported upon standards 16 extending from the machine frame 18 and the die plate is provided with a central opening 20 and four elongated corner flap receiving openings 22 communicating with the central opening 20 and forming a part thereof. The plunger 14 is of elongated rectangular shape in section and is arranged to be vertically reciprocated through the die by suitable mechanism, not shown.

Provision is made for folding the blank of bag forming material 12 against the sides of the plunger 14 to form the side and end walls of the bag as the plunger descends and, as herein shown, two pairs of opposed folding plates 24, 24 and 26, 26 are provided, disposed about the central opening 20 in the die. The folding plates are pivotally mounted upon pins 28, 30 carried in the die plate and are provided with extended portions 32, 34 respectively which are adapted to be engaged by the end of the plunger to rock the folding plates when the plunger is lowered through the die. The die plate 10 is provided with cut out portions 36, 38 arranged to receive the folding plates when the latter are in their normal or horizontal position to permit the folding plates to lie flush with the top of the die plate. The folding plates are normally retained in their horizontal position with the portions 32, 34 extended in the path of the reciprocal plunger, by coil springs 40, 42, respectively, and suitable stop members 44, 46 are provided upon the underside of the die plate against which the folding plates rest while in their horizontal position.

Referring now to Figs. 1 and 5, it will be observed that in the operation of the device, when the plunger 14 descends the opposed folding plates 24, 24 will be rocked to fold the opposed portions 48, 50 of the blank of material up against the wider sides of the plunger, and, likewise, the opposed folding plates 26, 26 will be rocked to fold the opposed portions 52, 54 of the blank up against the narrower sides of the plunger so as to form a bag of general H-shape in plan view, having extended corner flap portions 56, 58 which are received in the cut out portions 22 of the die, as clearly shown in Fig. 5. In the preferred embodiment of the invention, the movably mounted folding plates are arranged so that the opposed portions 48, 50 of the blank will be folded upwardly slightly in advance of the opposed portions 52, 54 and as herein shown, this may be accomplished by mounting the pivotal pins 28 of the folding plates 24 relatively closer to the central opening 20 than the pivotal pins 30 of the folding plates 26, see Figs. 6 and 7.

Provision is made for folding the extended corner flap portions 56, 58 into overlapping engagement against the wider sides 48, 50 of the bag 75

during the descent of the plunger and as herein shown, for this purpose, a plurality of auxiliary folding plates 60, 62, 64, 66 are disposed in spaced relation below the die plate 10. Each auxiliary plate is provided with an opening therein adapted to progressively fold the extended corner flap portions against the sides of the plunger to form the bag. As illustrated in Fig. 8, the first auxiliary plate 60 is provided with a central opening 68 and corner flap receiving openings 70 communicating therewith, the latter being narrower than the corresponding openings 22 in the die plate 10 and arranged to guide the corner flaps inwardly in a direction toward the wider sides of the bag. The first auxiliary plate is further provided with depending portions 72 which are arranged to engage the opposed sides 48, 50 of the bag and to hold the latter against the wider sides of the plunger as it is lowered therethrough. The longitudinal edges 73, 75 of the depending portions serve as creasing members about which the overlapping corner portions are folded by the supplemental plates 62, 64, 66 during the descent of the plunger.

Referring now to Fig. 9, the second auxiliary plate 62 is provided with an opening 74 having two edges 76 arranged to move the corner flap portions 56 inwardly toward the sides 48, 50 of the bag at an angle of approximately 45 degrees while retaining the corner flap portions 58 in their previously extended position, as clearly shown in Fig. 9. As herein shown, the plunger 14 is provided with longitudinal grooves 78, 80 into which the narrower sides 52, 54 of the bag are arranged to be folded. The opening 74 in the plate 62 is formed with inwardly extended portions 82, 84 which form the ends of the bag in preparation for reception in the grooves 78, 80, respectively. The remaining auxiliary plates 64, 66 provided with openings 86, 88, as illustrated in Figs. 10 and 11, respectively, are adapted to complete the corner flap folding operations, so that when the bag passes through the final plate 66, the flaps 58 will be folded in overlapping relation upon the flaps 56 and against the sides 48, 50 of the bag.

Provision is made for folding the narrow end walls 52, 54 of the bag while the latter is disposed upon the plunger 14 and as herein shown, a pair of pivotally mounted folding arms 90, 92 are disposed beneath the final plate 66. In the preferred embodiment of the invention, the folding arms are arranged to be rocked into position to fold the narrow end walls 52, 54 into the grooved portions 78, 80 of the plunger in timed relation to the movement of the plunger, as it descends, and as herein shown, this may be accomplished through the medium of a cam 94 mounted upon a cam shaft 96 forming a part of and driven through connections from the tea bagging machine. The folding arms 90, 92 are mounted upon pins 98, 100 journaled in suitable bearings 102 secured to the underside of the plate 66. The arms are connected to operate in unison by the cooperating gear segments 104, 106. One of the pins 98, is provided with a lever 108 which is connected by a link 110 to a cam lever 112 provided with a cam roller 114 which is held in cooperative engagement with its cam 94 by a spring 116.

Provision is made for clamping together the mouth portion of the bag and for conveying the bag into subsequent stations of the tea bagging machine for trimming the top of the bag, for applying a closure thereto and for attaching a

tag. As herein shown, the clamping device may comprise a pair of clamping arms 118, 120 pivotally mounted in suitable fittings 122 carried by an intermittently operated chain conveyer 124. One end of the conveyer chain runs over an idler sprocket 126 and the upper run of the chain is supported upon a guide rail 128. Provision is made for closing the arms 118, 120 into engagement with the mouth of the bag when the arms arrive at the bag forming station and, as herein shown, each arm 118, 120 is provided with a roll carrying arm 130 having a roller 132 arranged to engage with a stationary cam member 134 secured to the machine frame. The arms are normally urged into clamping position by springs 136 and each cam member 134 is provided with a cam surface 138 arranged to hold the arms apart, as shown in dotted lines in Fig. 6, until the chain arrives in operative position with relation to the bag. In operation, the clamping arms may be yieldingly closed upon the sides of the bag while the latter is still upon the plunger and will operate to strip the bag from the plunger as the latter is withdrawn and will thereafter close upon the bag to support the latter. The clamping surfaces 140 may be faced with rubber or a similar material in order to obtain a firm grasp upon the bag. As shown in Fig. 7, the end folding arms 90, 92 may be bent, as at 142, in order to permit the clamping surfaces 140 to extend across the mouth of the bag. Before the chain conveyer is started on its way to present the bag to the next station of operation, the folding arms 90, 92 are rocked up out of the way of the position shown in dotted lines in Fig. 7.

In the operation of the machine, during the bag forming operation, a charge of tea or coffee is introduced through an opening 145 in the plunger, so that when the latter is withdrawn, a charge of the commodity being packed will be deposited in the bag.

Referring now to Figs. 2 and 7, it will be observed that the end of the plunger is tapered along at least two of its sides as at 146, 148. The tapered form of the plunger is of particular advantage in the production of a folded bag of the present type because it facilitates the withdrawal of the plunger, particularly when operating at relatively high speeds. The resulting bag 150, as shown in Fig. 12, is of a structure in which the top of the bag is wider than the bottom of the bag. As a result of this construction, the overlapping folded portions 56, 58 are folded at a slight angle so that the extreme ends 152, 154 of the triangular flaps do not extend beyond the width of the bag as clearly shown in Fig. 12. After the bag has been formed and filled, it may be conveyed to a subsequent station where the top of the bag is trimmed along the dotted line indicated in Fig. 12. Thereafter the bag may be closed in any usual manner such as by running the bag past a stitching head, not shown, to provide a sewn top 156 as shown in Fig. 14, and a chain 158 of the thread may be extended beyond the bag to which the usual tag 160 may be attached.

While the preferred embodiment of the invention has been herein illustrated and described, it will be understood that the invention may be embodied in other forms within the scope of the following claims.

Having thus described the invention, what is claimed is:

1. In apparatus for producing a tea or similar bag in combination, a die plate having an opening therein, a plunger of elongated rectangular

shape in section having grooves in its narrower sides and adapted to pass through said opening to force a bag forming blank supported upon the die plate through the opening, said die plate being provided with two sets of corner flap receiving slots forming part of the opening in the die plate and extending in a direction to cause the corner flaps to project outwardly from the wider sides of the plunger, auxiliary means cooperating with the plunger and the partially formed bag supported thereon for folding the projecting corner flaps into overlapping relation upon the wider sides of the plunger, and means cooperating with said grooves for folding in the narrow ends of the formed bag for substantially the full length of the bag.

2. In apparatus for producing a tea or similar bag, in combination, a die plate having an opening therein, a plunger of elongated rectangular shape in section having grooves in its narrower sides and adapted to pass through said opening to force a bag forming blank supported upon the die plate through the opening, said die plate being provided with two sets of corner flap receiving slots forming part of the opening in the die plate and extending in a direction to cause the corner flaps to project outwardly from the wider sides of the plunger, auxiliary means cooperating with the plunger and the partially formed bag supported thereon for folding the projecting corner flaps into overlapping relation upon the wider sides of the plunger, means cooperating with said grooves for folding in the narrow ends of the formed bag for substantially the full length of the bag, and clamping means engaging the mouth of the bag to close the mouth thereof.

3. In apparatus for producing a tea or similar bag, in combination, a die plate having an opening therein, a plunger of elongated rectangular shape in section having grooves in its narrower sides and adapted to pass through said opening to force a bag forming blank supported upon the die plate through the opening, said die plate being provided with two sets of corner flap receiving slots forming part of the opening in the die plate and extending in a direction to cause the corner flaps to project outwardly from the wider sides of the plunger, auxiliary means cooperating with the plunger and the partially formed bag supported thereon after the latter has passed through the die plate for folding the projecting corner flaps into overlapping relation upon the wider sides of the plunger, means cooperating with said grooves for folding in the narrow ends of the formed bag for substantially the full length of the bag, a conveyor, and clamping means mounted upon the conveyor and arranged to engage and clamp together the mouth of the bag to operatively support the bag upon the conveyor.

4. In apparatus of the character described, in combination, bag forming means including a die, and a plunger of an elongated sectional shape adapted to be reciprocated therethrough, said die being so shaped as to fold a fibrous sheet positioned thereon directly around the plunger to form a bag having an elongated relatively narrow bottom, relatively wide side and relatively narrow end walls when the plunger is reciprocated through the die, said plunger being tapered along at least two of its sides whereby the bag is formed with at least two tapering walls, and being also provided with grooves in its narrower sides, and means for folding said end

walls inwardly into said grooves while the bag is still supported on the plunger.

5. In apparatus of the character described, in combination, bag forming means including a die, a plunger of unequal sectional dimensions adapted to be reciprocated therethrough, said die being so shaped as to fold a fibrous sheet positioned thereon directly around the plunger to form a bag having bottom, side and end walls when said plunger is reciprocated through said die, said plunger being provided with longitudinal grooves in its narrow end walls against which the end walls of the bag are disposed, and means disposed beneath said die for folding in said end walls of the bag into said grooves.

6. In apparatus of the character described, in combination, bag forming means comprising a die and a plunger adapted to be reciprocated therethrough, said die including an upper plate having an opening therein, hinged members disposed adjacent said opening and having portions thereof normally disposed in the path of said plunger, said hinged members being operative to swing upwardly to fold a fibrous sheet against the sides of said plunger when engaged by the latter during its downward movement and a plurality of spaced apart supplemental plates disposed beneath said upper plate, each plate being provided with an opening therein adapted to progressively fold said fibrous sheet around said plunger to form a bag having bottom, side and end walls, said plunger being provided with longitudinal grooves in the sides adjacent said

end walls, and means for folding said end walls inwardly into said grooves for substantially the full length of the bag.

7. In apparatus of the character described, in combination, bag forming means comprising a die and a plunger provided with elongated grooves in two opposed sides thereof and adapted to be reciprocated therethrough to force a sheet of bag forming material through the die, said die plate being provided with two sets of corner flap receiving slots extending in the direction to cause the corner flaps to project outwardly on opposite sides of the plunger, and means disposed beneath the die plate for completing the bag formation by folding said corner flaps in overlapping relation against the aforesaid sides of said plunger and means cooperating with said grooves for forming a bellows fold in the remaining sides of the bag for substantially the full length of the bag.

8. In apparatus of the character described, in combination, a forming member of unequal dimensions having longitudinal grooves in two opposed sides thereof, means for folding a fibrous sheet about the forming member to provide a bag having corner flaps, means for subsequently folding the corner flaps into overlapping relation upon the wider sides of the bag, and means cooperating with said grooves for forming a bellows fold in the remaining sides of the bag for substantially the full length of the bag.

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