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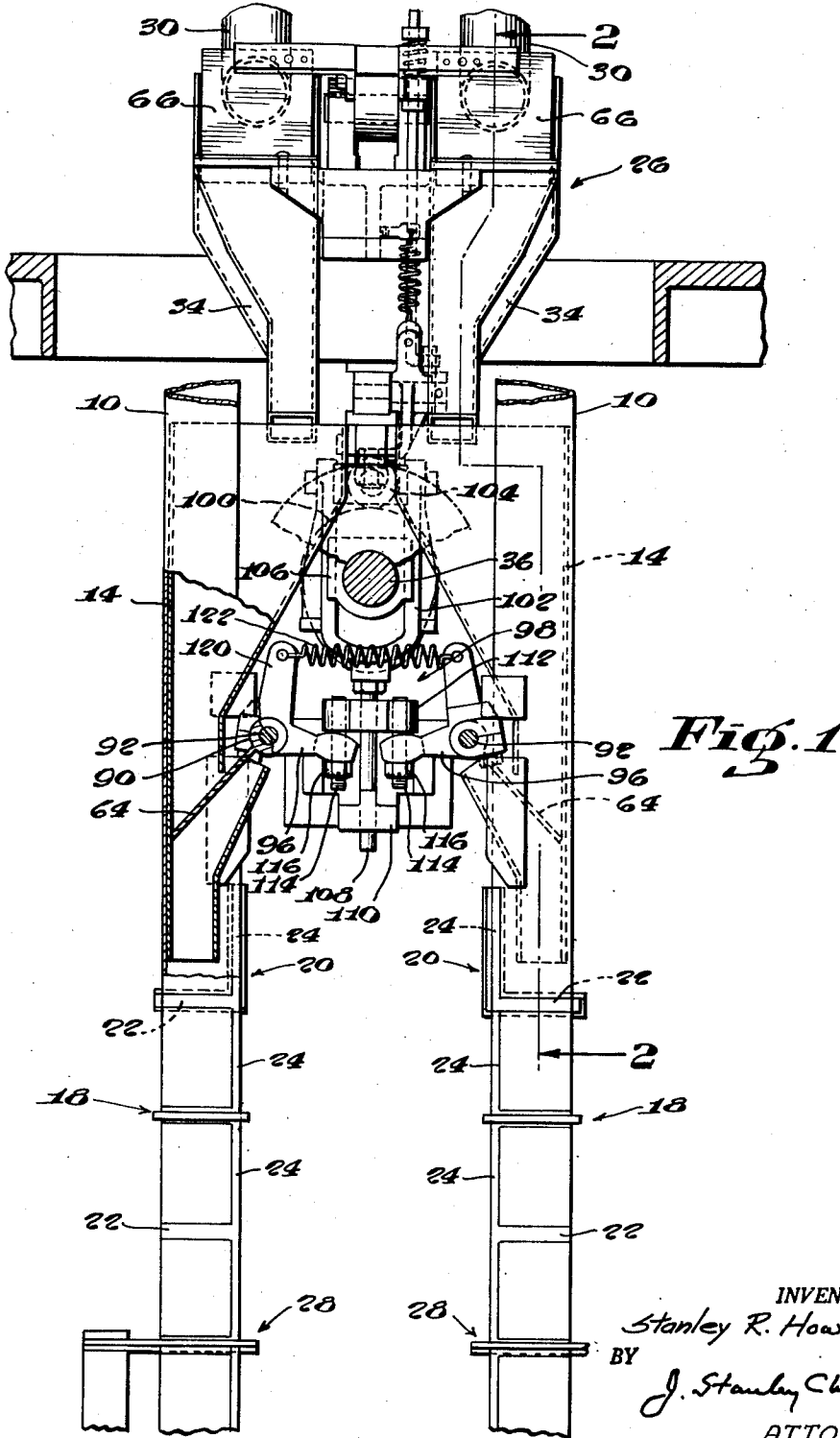
S. R. HOWARD

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CONTAINER FORMING AND FILLING MACHINE

Filed June 4, 1947

2 Sheets-Sheet 1



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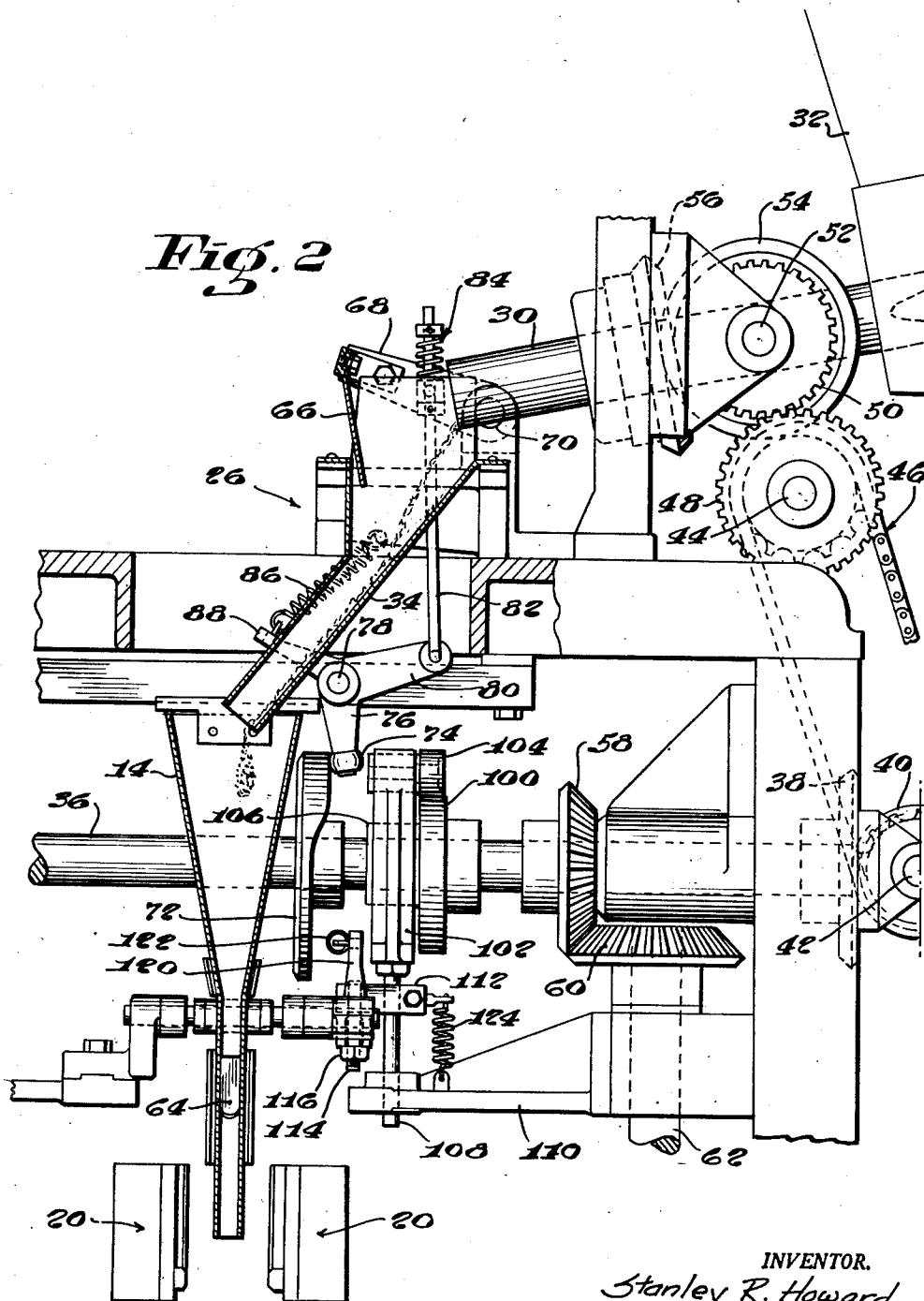
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CONTAINER FORMING AND FILLING
MACHINE

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1 Claim. (Cl. 53—89)

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This invention relates to a container forming and filling machine and particularly to a machine for forming and filling individual bags such as tea bags.

The invention has for an object to provide a novel and improved container forming and filling machine of the character specified, having provision for forming and releasing successive uniform charges of the commodity being packaged into successive bag sections in a simple and efficient and uniform manner.

With this general object in view, and such others as may hereinafter appear, the invention consists in the container forming and filling machine and in the various structures, arrangements and combinations of parts hereinafter described and particularly defined in the claim at the end of this specification.

In the drawings illustrating the preferred embodiment of the invention, Fig. 1 is front elevation, partly in cross section, of a container forming and filling machine embodying the present invention; and Fig. 2 is a cross sectional view taken on the line 2—2 of Fig. 1.

In general, the present invention contemplates a container forming and filling machine and particularly a machine for forming and filling tea bags in which provision is made for forming and releasing successive charges of the commodity being packaged into successive bag sections in a manner such as to assure a uniform charge in each bag section and particularly in the bag section which may comprise the last one filled upon discontinuing operation of the machine, or, the first bag section to be filled upon restarting the machine.

In the illustrated embodiment of the invention provision is made for producing individual bags from an elongated web of bag forming material impregnated or coated with a heat sealable thermoplastic material so that adjacent edges and spaced transverse portions of the folded web may be joined together by the application of heat and pressure to form a strip of connected bag sections. The tea bagging machine may and preferably will be, except as herein pointed out, of the same general type as that illustrated and described in the United States Patent to Patterson, No. 2,385,229, issued September 18, 1945. In practice, the web is folded longitudinally along a medial line by being drawn over an elongated hollow forming and filling member or funnel as the web is intermittently advanced into position to be sealed and to receive a charge of the material through the open top of the bag section.

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Prior to the present invention provision was made for feeding a continuous uniform stream of the material into the upper end of the elongated forming and filling funnel and for interrupting the stream at predetermined intervals by means of a shutter disposed at the lower end of the forming and filling funnel adjacent the bag section in order to accumulate successive predetermined charges of the commodity and to release the charges periodically into successive bag sections. In practice, such structure provided a relatively long distance for the stream to fall so that a relatively large amount of material was in suspension between the mouth of the feeding tube and the lower shutter or the bag section during the operation of the machine.

The provision of a shutter at the lower end of the forming and filling member for periodically interrupting the stream and releasing successive accumulated charges together with the material in suspension or containing to flow through the open shutter during the releasing operation was effective to produce substantially uniform charges so long as the machine was continuously operated. However, since in such structure the complete charge was dependent on a continuous stream of material it will be seen that upon starting the machine it will take a little time for the material to fall from the mouth of the feeding tube to the lower shutter so that the first bag section filled will lack the amount of material which would be normally supplied during continuous operation of the machine and hence produce a short weight or underfilled bag section. On the other hand, when the operation of the machine was discontinued, it will be seen that an additional amount of material was supplied to the last bag because of the material in suspension which would normally be cut off during continuous operation.

In accordance with the present invention provision is made for producing accurate uniform charges for successive bag sections including the bag sections filled upon starting or stopping the machine by the provision of a second shutter disposed at the upper end of the funnel adjacent the mouth of the feeding tube, the upper shutter operating to cut off the stream which would normally be suspended when the machine comes to rest, and, to accumulate a charge ready to be released upon subsequent operation of the machine.

In the drawings the invention has been illustrated as embodied in a duplex tea bagging machine and referring to the drawings, each unit of the duplex tea bagging ma-

chine, except as to details to be pointed out, may comprise the machine for forming and filling paper tea bags illustrated and described in the United States patent, No. 2,385,229 issued to Patterson, September 18, 1945, to which reference is made. In the operation of such a machine, a web of bag forming material 10 is withdrawn from a supply roll and advanced past bag forming mechanism comprising an elongated hollow funnel 14 which is shaped to fold the web longitudinally along a medial line to bring together the two half sections of the web preparatory to forming a strip of connected bag sections. The bag forming material is preferably drawn over the bag forming funnel 14 by intermittently operated gripping and advancing mechanism, diagrammatically indicated at 13 and operative to advance the strip one bag length each cycle of operation and to present the strip in operative relation to the bag sealing mechanism, indicated generally at 20 arranged to seal the strip simultaneously along a transverse zone 22 and an adjacent longitudinal zone 24 during each sealing operation to form a succession of connected bag sections closed on one side by a folded edge and heat sealed along successive zones as described and shown in said Patterson patent.

In the illustrated embodiment of the invention, provision is made for forming successive charges of the commodity and depositing the charges into successive bag sections by apparatus indicated generally at 26, operating in timed relation to the operation of the strip advancing and heat sealing mechanism 13, 20 respectively. In the operation of the machine, the open top of a bag section which has been provided with a charge of the commodity during one cycle of operation is closed during a succeeding cycle. Thereupon, the strip is intermittently advanced to bag severing mechanism, indicated generally at 28, which operates to sever the strip through successive transverse sealed portions to form individual filled and sealed bags, as fully illustrated and described in the Patterson patent above referred to.

The present tea feeding apparatus 26 may include feeding mechanism of any usual or preferred design arranged to feed a continuous uniform stream of the tea, such mechanism being herein illustrated as comprising an inclined rotary feeding tube 30, one end of which is arranged to extend within a supply hopper 32 to effect withdrawal of a continuous uniform stream of the commodity and to discharge the stream from the mouth of the tube into a guide chute 34 which directs the material into the hollow forming and filling member 14.

The feeding tube 30 is arranged to be rotated through connections from a horizontal shaft 36, the latter being provided with a bevel gear 38 at one end thereof cooperating with a pinion 40 fast on a horizontal shaft 42. The shaft 42 is connected to an intermediate shaft 44 by a chain and sprocket connection 46 to effect continuous rotation thereof. The rotary tube 30 may be driven from the shaft 44 through cooperating spur gears 48, 50, the latter being rotatably mounted on a shaft 52. The shaft 44 may also be provided with a bevel gear 54 which meshes with a bevel gear 56 mounted on and arranged to effect rotation of the feeding tube 30. The horizontal shaft 36 is arranged to be rotated through bevel gears 58, 60 from a vertical shaft 62 forming a part of the driving connections of the tea bagging machine.

It will be observed that the above described

construction necessitates in a commercial machine, a substantial distance between the mouth of the feeding tube and the bag section to be filled so that in operation a relatively long stream is suspended in the air therebetween. Prior to the present invention, it has been the practice to interrupt the stream at predetermined intervals to accumulate uniform charges of the material by means of a shutter 64 disposed at the lower end of the forming and filling member 14, the shutter 64 operating to form the charges and also to release them into the bag sections in timed relation to the strip advancing means. As above stated, this structure effected non-uniform charges in the first bag section filled upon starting the operation of the machine and in the last bag section filled upon discontinuing operation of the machine because of the lack of material in suspension at the start and because of the additional material in suspension upon termination of operation. Thus, if the lower shutter was open when the machine was stopped, the material in suspension, which would normally be cut off during continuous operation, would instead be added to the bag section being filled or, if the shutter was closed, and about ready to be opened, the suspended material would be added to the already accumulated charge.

To overcome these irregularities in accordance with the present invention, an additional shutter 66 is provided adjacent the mouth of the feeding tube 30, which is arranged to accumulate successive charges during the operation of the machine and to release them periodically into the forming and filling member 14, the lower shutter 64 being retained for receiving and releasing the charges into successive bag sections in timed relation to the machine operation. In practice, the upper shutter 66 is arranged to be closed to accumulate a charge while the lower shutter is open to release the previously formed charge into the bag section, and, conversely, the upper shutter is arranged to be open to release the formed charge to the lower shutter while the latter is closed, thus providing successive accurately formed charges of the commodity avoiding the influence of the material which would otherwise be in suspension between the mouth of the feeding tube 30 and the bag section being filled when the machine was stopped.

In the preferred embodiment of the invention, the upper shutter 66 is carried by an arm 68 fast on a rocker shaft 70, and, the arm is arranged to be rocked to present the shutter into and out of engagement with the guide chute 34 to periodically release the accumulated charges of tea and to cut off the continuously flowing stream at predetermined intervals, through connections from the horizontal shaft 36. As herein shown, a cam 72 fast on the shaft 36 is arranged to cooperate with a roller 74 carried by one arm 76 of a bell-crank pivotally mounted at 78, the second arm, 80, being connected to the shutter arm 68 by a rod 82 having a yieldable connection 84 to permit yieldable engagement of the shutter with the guide chute 34. A spring 86 connected to an extension 88 of the bell-crank is arranged to hold the cam roll 74 against its cam.

The lower shutter 64 of each unit is likewise arranged to be operated to periodically release the charges of tea accumulated by and released from the upper shutter through connections from the horizontal shaft 36, and, as herein shown, each shutter 64 is secured to a hub 90 fast on a rocker shaft 92 mounted in suitable bearings

in a bracket secured to the machine frame. One end of each shaft 92 is provided with an arm 96 fast thereon and arranged to be rocked to effect opening and closing of its shutter through engagement with the lower end of a vertically movable unit indicated generally at 98 arranged to be reciprocated by a cam 100 fast on the shaft 36. The upper end of the unit 98 comprises a U-shaped member 102 provided with a roller 104 cooperating with the cam 100. As herein shown, the U-shaped member 102 is supported for vertical reciprocation in a block 106 loosely mounted on the shaft 36 and slidably engageable with the two arms of the U-shaped member 102. The lower end of the member 102 is provided with a rod 108 slidably supported at its lower end in a bracket 110. The rod 108 is provided with a cross piece 112 having a stud 114 depending from either end thereof, each stud 114 being provided with a nut 116 at its lower end. As illustrated in Fig. 1, the arms 96 of each shutter extend between the cross piece 112 and its respective nut 116 so that in operation the cam 100 will effect simultaneous opening of the shutters 64 by engagement of the nuts 116 with the extended ends of the arms 96 when the reciprocatory unit 98 is elevated. The arms 96 are provided with ears 120 connected by a common spring 122 which normally urges each shutter into its closed position when permitted to do so by the cam 100. A spring 124, as shown in Fig. 2, may also be provided to hold the roller 104 of the reciprocatory unit 98 against its cam.

From the above description it will be observed that the present container forming and filling machine is provided with feeding apparatus capable of forming and releasing successive charges of the commodity being packaged to provide uniform charges in successive bag sections including the first and last bag sections filled respectively, at the start and termination of the operation of the machine without being influenced by a stream of the commodity in suspension between the mouth of the feeding tube and the bag section being filled.

The invention is highly useful in single as well as multi unit machines, having been herein shown as embodied in a duplex tea bagging machine.

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 claim.

Having thus described the invention, what is claimed is:

In a bag forming and filling machine; bag forming means including means for advancing a strip of connected bag sections a predetermined distance into filling position at each cycle of operation, material feeding means arranged a substantial distance above a bag in position to be filled for feeding a continuous stream of bag filling material at a predetermined rate, guiding means for guiding said stream as it descends by gravity into said bag, a first shutter adjacent said bag and movable into a closed position to interrupt said stream and accumulate material in said guide means, a second shutter adjacent said material feeding means and movable into a closed position to interrupt said stream, and means for alternately moving said shutters to and from their closed positions, said last named means being so constructed and arranged as to operate in timed relation to said strip advancing means to position said first shutter in said stream interrupting position while a bag section is being moved into said filling position and to move said shutter from said position before it accumulates a bag-filling charge of material to thereby dump accumulated material in said bag section and permit said stream to resume flowing into said bag until a bag-filling charge flows therepast, said last-named means being further constructed and arranged to move said second shutter to and from said stream interrupting position and to hold the same out of said position while a bag-filling charge of material flows therepast.

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