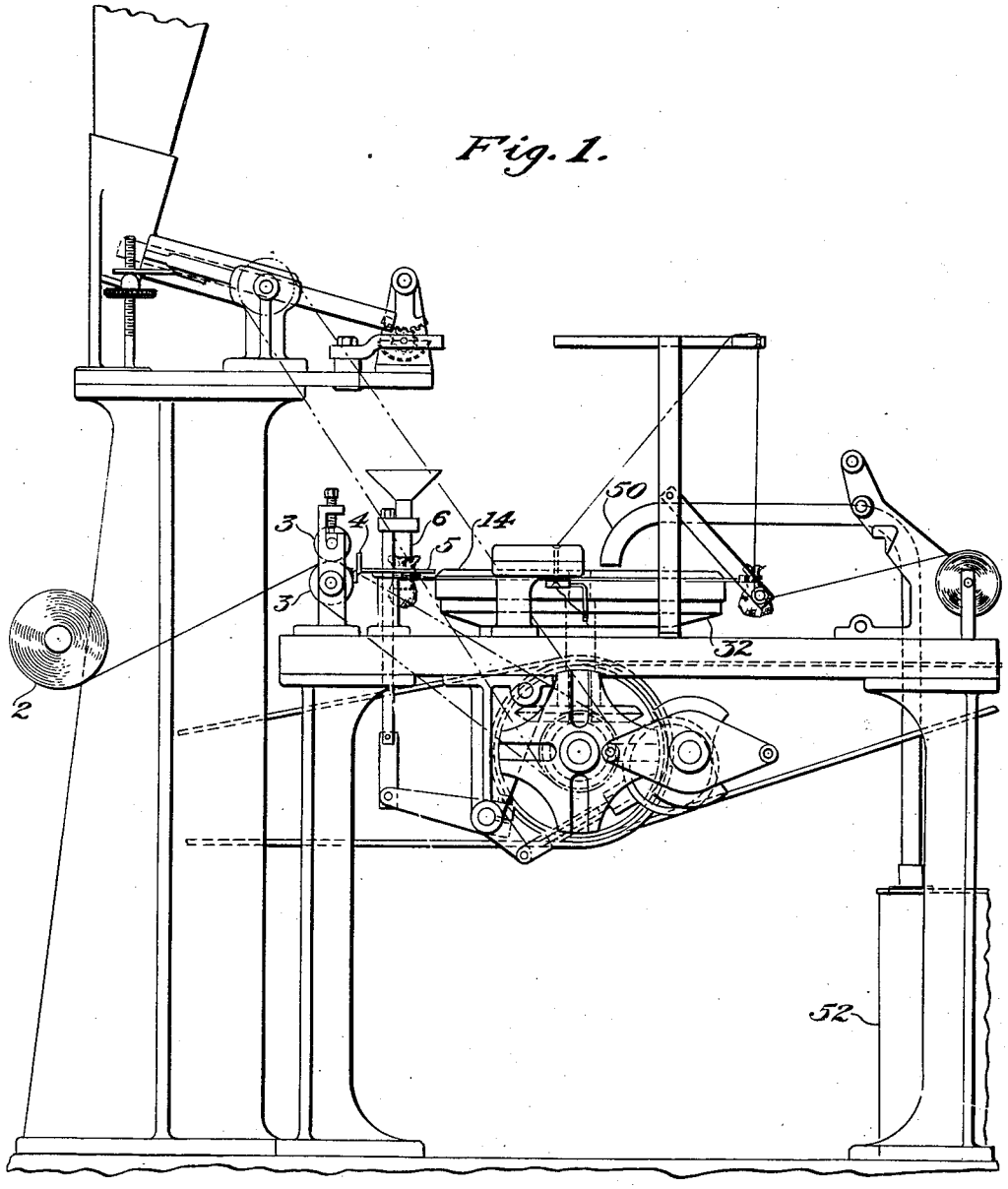
May 30, 1933. W. S. CLEAVES 1,911,805

PACKAGING MACHINE

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Fig. 1.



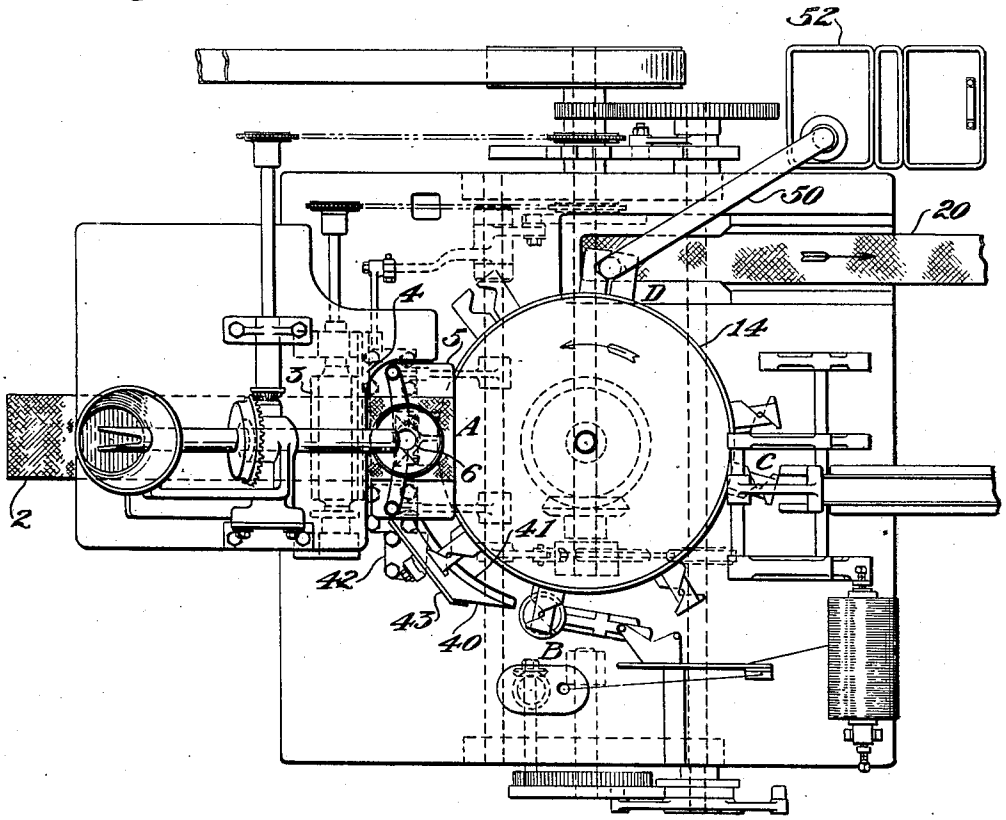
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Fig. 2.



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Fig. 3.

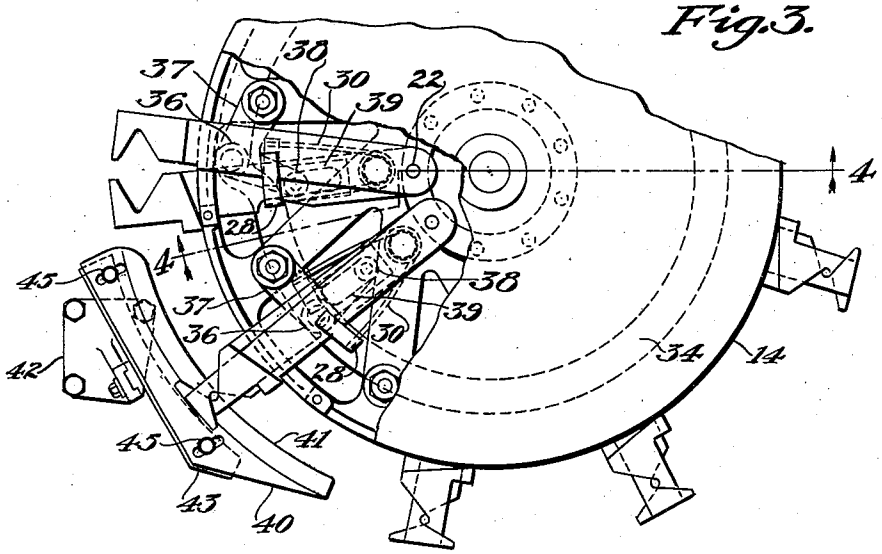
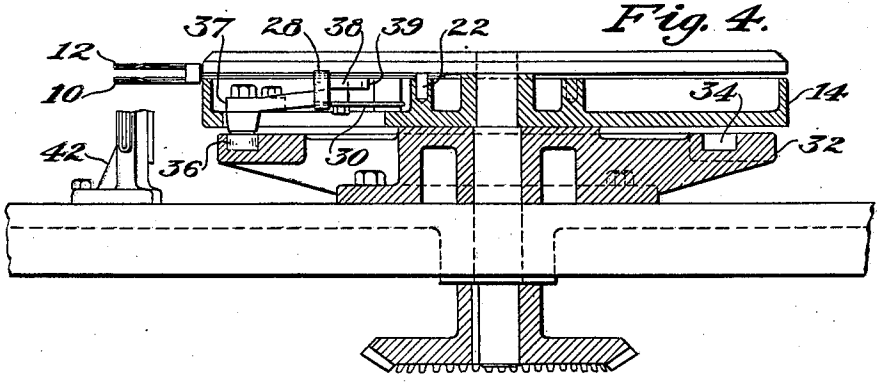


Fig. 4.



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PACKAGING MACHINE

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Fig. 5.

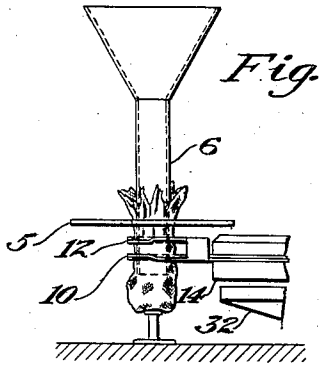


Fig. 6.

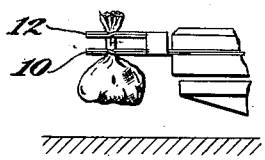


Fig. 7.

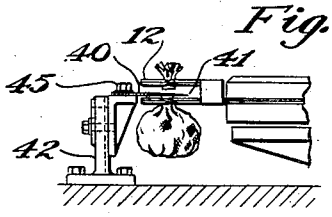


Fig. 8.

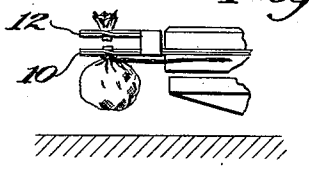


Fig. 9.

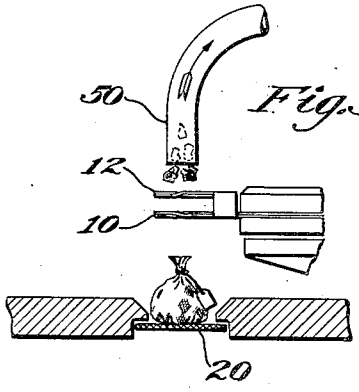
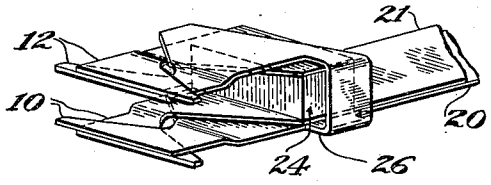


Fig. 10.



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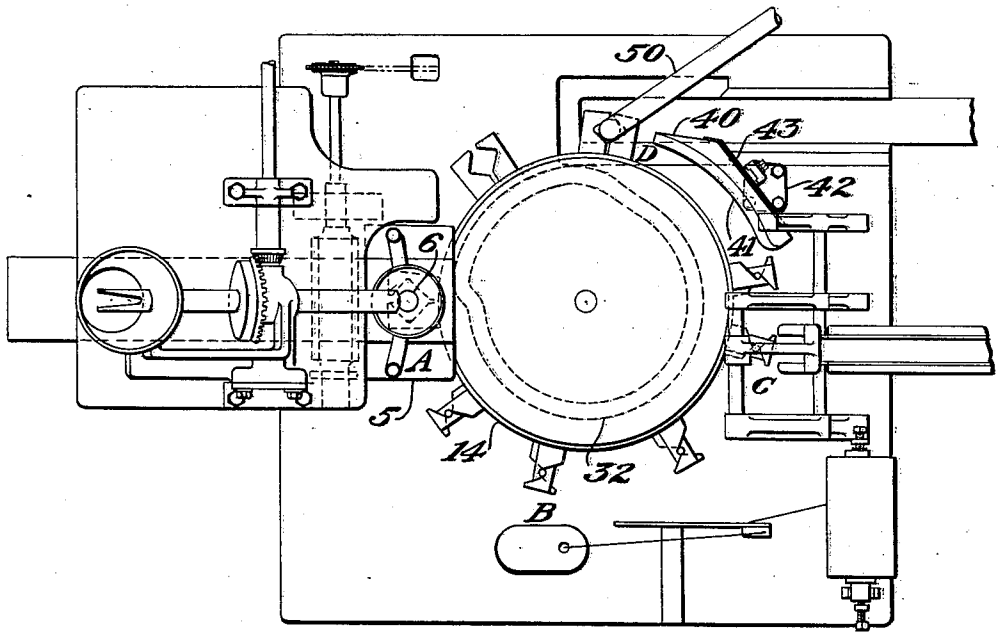
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Fig. 11.



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Patented May 30, 1933 1,911,805

UNITED STATES PATENT OFFICE

WILLIAM S. CLEAVES, OF WOLLASTON, MASSACHUSETTS, ASSIGNOR TO PNEUMATIC SCALE CORPORATION, LIMITED, OF QUINCY, MASSACHUSETTS, A CORPORATION OF MASSACHUSETTS

PACKAGING MACHINE

Application filed September 18, 1929. Serial No. 393,352.

This invention relates to a packaging machine.

One object of the invention is to provide a novel and improved packaging machine designed to pack a commodity in a bag and in which provision is made for closing the mouth of the bag and trimming the surplus material from the closed mouth of the bag in a novel, economical and superior manner.

A further and more specific object of the invention is to provide a novel and efficient automatic bag forming and filling machine, and particularly a machine for producing tea bags, and in which provision is made for trimming and removing the surplus material from the mouth of the bags in a novel and highly efficient manner.

With these objects in view and such others as may hereinafter appear, the invention consists in the machine and in the structures, arrangements and combinations of parts hereinafter described, and particularly defined in the claims at the end of this specification.

In the drawings illustrating the preferred embodiments of the invention, Fig. 1 is a side elevation of a tea bagging machine embodying the present invention; Fig. 2 is a plan view of the machine shown in Fig. 1; Fig. 3 is a detail in plan with portions broken away illustrating the bag gripping mechanism and its relation to the stationary knife; Fig. 4 is a vertical sectional view on the line 4—4 of Fig. 3; and Figs. 5 to 9 illustrate diagrammatically the successive steps in the operations of filling and closing the bag and trimming the mouth thereof; Fig. 10 is a perspective illustrative of the preferred form of bag closing and gripping device; and Fig. 11 is a plan view similar to Fig. 2 illustrating a modified arrangement of the trimming knife and its relation to the bag closing mechanism and the suction device by which the trimmings are preferably removed.

In general, one feature of the present invention contemplates the provision of a packaging machine for packing a commodity in a bag, and in which provision is made for trimming the mouth of the bag in a novel, highly efficient, and positive manner. To this end the machine is preferably provided with mechanism for gripping and holding the mouth portion of the bag at two points spaced a short distance apart and for presenting the portion of the bag between such points to the operation of a cutter. The cutter may and preferably will comprise a stationary knife blade, having its cutting edge disposed in the path of travel of the portion of the mouth of the bag, and when the aforesaid double gripping jaws are used, the cutting edge of such stationary knife is disposed to enter between said gripping jaws. In its preferred embodiment, this feature of the invention is embodied in an automatic tea bagging machine having a plurality of sets of gripping members for holding successive bags as they are formed and filled in a position in which the neck of the bag is contracted and closed. In such machines the bag forming and filling operation may be performed at one station, and provision is made for intermittently moving the gripping members to present each bag to the stationary cutting knife by which the portion of the mouth of the bag between the double gripping members is severed, and then for moving both the bag and the portion thus trimmed off to a succeeding station where a fastening device, preferably a string, is secured around the mouth of the bag and a tag is attached to the string. Thereafter the bag and the trimming still held by one of the gripping jaws continue to an ejecting or discharging station. Provision is made at this time for operating the gripping members to release or open them and thereby release both the bag and the portion of the trimming which has been cut

off. In the preferred embodiment of the invention suction operated means are provided for automatically removing the trimming when released by the gripping jaw and for conveying it to a storage receptacle. In another modification of the invention the trimming operation may be performed after the string has been attached to the bag to close the mouth thereof and after the tag has been attached to the string.

The different features of the present invention are herein illustrated as embodied in an automatic tea bagging machine for producing tea bags of the pouch type and which machine may and preferably will, except as to details to be hereinafter pointed out, be constructed and have the mode of operation of the automatic tea bagging machine forming the subject matter of the U. S. Patent to Ralph N. Doble, No. 1,726,060, granted August 27, 1929, to which reference is made and for an understanding of the present invention only sufficient portions thereof have been herein illustrated as will enable the features of the present invention to be understood.

Referring now to the drawings, the improved tea bagging machine illustrated therein is designed to withdraw a predetermined length of gauze from a supply roll 2 by means of a pair of driven feed rolls 3, and to cut off a definite length of the gauze thus withdrawn by means of shears 4. The gauze thus cut off is positioned upon a supporting plate indicated at 5, over an opening or die formed therein, and under a forming and filling tube 6. Provision is made for reciprocating the tube vertically to thereby force the gauze down through the die and form it into a pouch bag, and during such movement provision is made for depositing a predetermined quantity of the tea or other commodity down through the tube 6 and into the interior of the formed bag. The specific details of the parts thus far described and their mode of operation may and preferably will comprise those illustrated in said Patent No. 1,726,060 and those of the commercial automatic tea bagging machine at present being manufactured and sold by the Pneumatic Scale Corporation, Limited, of Norfolk Downs, Massachusetts, and which machines are well-known in the trade.

As the pouch bag is formed and filled in the manner described at the bag forming and filling station, provision is made for inserting it between one set of double gripping jaws 10, 12, which are automatically opened at this station. After the bag has been formed and filled, the double gripping jaws are closed, thus closing the mouth of the bag, gripping the mouth portion at two points spaced a short distance apart, and operatively supporting the bag during the succeeding operations performed thereon, including the trimming of the surplus material from the mouth portion of the bag, the application of a string or other fastening device for holding the mouth portion of the bag closed, and the application of a tag to the bag preferably by attaching the tag to the end of the string. The double set of gripping jaws 10, 12 serve to firmly hold the mouth portion of the bag in a manner such as to assist in the performance of the trimming operation, and I have experienced particularly good results utilizing a stationary elongated knife blade disposed in the path of travel of the bag, and arranged to enter between the double gripping jaws to sever the bag between the two points at which it is thus firmly engaged by the jaws. The contracted portion of the mouth of the bag thus held between the jaws is compact and relatively rigid and in a condition most suitable for being cut cleanly and with the formation of no ragged edges.

In the illustrated machine it will be understood that the plurality of sets of gripping members 10, 12 are operatively supported by a rotatable disk or turret 14, and provision is made for intermittently rotating the turret 14 through successive steps by known mechanism as illustrated in said patent above referred to and in the commercial automatic tea bagging machine above referred to, so that the bag is formed and filled at one station as A, and the gripping members 10, 12 are then operated to close the mouth of the bag and to operatively support it and convey it during the successive steps through which the turret 14 is rotated until the bag is presented to the mechanism for looping the string around the mouth of the bag, which is located at station B, see Fig. 2, and then to the mechanism for attaching the tag to the string at a succeeding station C, as shown in Fig. 2. After the tag has been thus attached, the turret is rotated to an ejecting station indicated at D, and thereupon the gripping jaws are opened to release the bag and the latter falls onto a discharge conveyor 20 and is conveyed from the machine.

As above set forth, the bag forming and filling mechanism for forming and filling the bag at the station A; the loop applying mechanism for looping the string around the mouth of the bag at the station B; and the tagging mechanism for attaching the tag to the string at the station C, may and preferably will comprise in details of construction and mode of operation, the corresponding mechanisms illustrated in said Patent No. 1,726,060 and which are embodied in the commercial automatic tea bagging machine above referred to with the exception of the construction of the double grippers 10, 12. For the purposes of understanding the present invention, it is thought

that the description thus far of such mechanism, together with reference to my said copending application, will be sufficient to enable the different features of the present invention to be understood.

Referring now more particularly to Figs. 3, 4 and 10, each set of clamping jaws 10, 12 preferably comprise two bars 20, 21, mounted upon a common pivot 22, the latter removably extending into a hole in the turret 14. This manner of mounting the bars 20, 21 upon the turret 14 is that now employed in the commercial tea bagging machines forming the subject matter of said Patent No. 1,726,060 and of the commercial machines being manufactured as above referred to, so that existing machines may be readily converted to provide them with the present double clamping jaws by the substitution of the double jaws for the single jaws now in the machines. The lower set of clamping jaws 10 are formed directly upon the ends of the bars 20, 21 as illustrated in detail in Fig. 10, and one of the upper set of clamping jaws 12 is formed by welding or otherwise secured to a block or metal piece 24 affixed to the upper surface of the upper bar 21, while the remaining one of the upper set of clamping jaws 12 is formed to be supported from the lower of the lower set of clamping jaws by a U-shaped bracket 26 secured to the lower bar 20 and extending outwardly and upwardly around the side of the metal block or piece 24, as illustrated in Fig. 10. From an inspection of Fig. 10 and the description thus far, it will be apparent that the corresponding members of each set of clamping jaws are mounted upon one of the bars 20, 21. The bars 20, 21 are provided with hook portions or lugs 28 between which the ends of a heavy coiled spring 30 are positioned, the latter functioning to move and maintain the jaws carried by the lower or movable bar 20 in a closed position, while the movement of such jaws into open position is effected by means of a cam 32 having a cam path 34 in which a cam roll 36 rides, the latter being secured to the underside of an operating arm 37 connected by a roll 38 and a slot 39 in the under side of the bar 20.

In the preferred embodiment of the invention, as illustrated in Figs. 1 to 3, after the bag has been formed and filled, with the clamping jaws in the open position corresponding to that shown at Station A in Fig. 3, and in detail in Fig. 5, the turret commences to move and the cam 32 is arranged to permit the heavy coiled spring 30 to close the movable set of jaws, thus contracting the neck of the bag and clamping it between the jaws at two points, in a manner such as is illustrated in Fig. 6.

After the jaws have been closed to effect the clamping of the neck of the bag between the upper and lower set of clamping jaws, provision is made as above described for trimming the surplus material from the mouth of the bag, and as illustrated in Figs. 1, 2 and 3, the trimming operation is effected by means of a stationary elongated knife 40 whose cutting edge 41 is curved and arranged to extend in between the upper and lower set of stationary jaws as the turret moves the bag held by the gripping jaws from the filling station A toward a succeeding station B where the fastening device such as a string is to be applied to the neck of the bag to maintain the same closed. The stationary knife 40 is herein shown as adjustably mounted upon a stationary bracket 42 bolted to the machine frame, and after an initial adjustment has been made to bring the cutting edge of the knife into a position where it will engage and cut the contracted portion of the neck of the bag positioned between the upper and lower set of clamping jaws, the adjusting bolts 45 are screwed down to securely hold the stationary knife to the bracket 43 in its most efficient operating position. From an inspection of Figs. 2 and 3 and the description thus far, it will be observed that the elongated stationary knife 40 provides a relatively long cutting edge 41. The cutting edge 41 of the knife is preferably of a length of from 10 to 12 inches and is arranged to progress toward the turret 14 gradually for a sufficient distance to effect the cutting through of the contracted neck portion of the bag. The turret 14 and the gripping jaws mounted thereon revolves at relatively slow speeds, such for example as at the rate of from five to ten revolutions per minute, corresponding to a delivery of from thirty to sixty bags per minute from the machine, and in order to successfully cut the contracted neck of the bag by drawing the bag across the cutting edge of the knife, it has been found extremely essential that a long gradual sweeping action should be provided between the neck of the bag and the knife in order to avoid difficulties in the cutting instead of bending of the very last portions of the neck of the bag. Experimental work in connection with the attempt to utilize a short knife has demonstrated that in a majority of cases the very last part of the cut would be incomplete and a result would detract considerably from the commercial value of the machine. Utilizing a long stationary knife in combination with the slowly rotating gripping jaws has operated to produce very satisfactory trimming and enables the trimming operation to be performed in a practical and safe manner.

After the trimming operation has been thus performed by the stationary knife 40, it will be observed by reference to Figs. 7 and 8 that the bag itself is gripped by the lower

set of clamping jaws while the trimming is gripped by the upper set of clamping jaws, and in the preferred machine, as illustrated in Figs. 1, 2 and 3, the cam 32 for controlling the operation, and the opening and closing of both sets of clamping jaws in a closed positioned during the subsequent operations which may be performed upon the bag, including the application of the fastening device around the neck of the bag to hold it in a closed position and the attachment of a handle to the neck of the bag herein shown as comprising a tag and a substantial length of twine connecting the tag and the neck of the bag. After such operations have been performed at stations B and C, see Fig. 2, then the turret moves to an ejecting station D where the control cam 32 effects the opening of both sets of clamping jaws, permitting the bag to fall upon the discharge conveyor by which it is carried from the machine. At the same time the trimming held by the upper clamping jaw is released in a position ready to be removed from the machine. In order to remove the trimming it is preferred to locate a suction pipe or conduit 50 immediately over the upper jaws at this discharge station D so as to permit the trimming, when the jaws are released, to be immediately sucked up through the pipe 50 by operation of suction created within the pipe in any suitable or convenient manner as by a blower, the suction side of which is connected to the pipe in the manner illustrated in Fig. 9. As the trimmings are conveyed through the pipe 50 they are preferably conducted to a storage receptacle 52 so as to prevent their accumulation in the operating parts of the machine, and to enable the trimmings to be collected in the single receptacle in a convenient and efficient manner.

From the description thus far, it will be understood that the operating parts of the machine including the twine applying mechanism and the tagging mechanism, together with the driving mechanism for intermittently revolving the turret and for operating the various mechanisms of the machine, may and preferably will comprise those of the machine forming the subject matter of said Patent No. 1,726,060 and inasmuch as the present features of the invention are not concerned with such mechanisms per se, it is thought that a sufficient description has been made which together with reference to the aforesaid application enables the operation of the machine to be clearly understood.

It will also be observed that the stationary cutting knife for trimming surplus material from the mouth or neck of the bag enables the trimming operation to be performed by an exceedingly simple and yet highly efficient device. The knife blade itself may be renewed when it becomes dull by the mere removal of the clamping bolts 45 by which it is held to its supporting bracket. The stationary knife lends itself particularly to use with the illustrated form of double gripping jaws and both contribute to the efficiency and certainty of the trimming operation. While in some instances it may be preferred to utilize the stationary knife in connection with other types of bag holding devices, nevertheless it is preferred to employ the knife in connection with the illustrated double gripper for the reason that the bag being held at two points in the manner illustrated in Figs. 6 to 8 presents the contracted neck portion of the bag included between the jaws in a rigid and firm condition which contributes to the efficiency of the cutting effect of the knife as the turret moves the bag past the cutting edge of the knife.

In order to avoid any liability of the bag becoming disengaged from the bag holding device during the operation in which the fastening device, preferably twine, is secured around the neck of the bag, and in which the tag is attached to the bag, preferably by being attached to a substantial length of the twine, the trimming mechanism may be arranged with respect to the other operating parts of the machine so that the filled bag held by the gripping jaws is trimmed after the fastening device and tag have been applied thereto.

Referring now to Fig. 11, it will be observed that the stationary knife 40 is secured to the machine frame at a point such that the cutting edge of the knife will engage a bag to perform the trimming operation after the bag has been filled and closed, and after the twine has been looped around the neck of the bag and a tag has been attached to the twine. The operating cam 32 functions to maintain the double gripping jaws closed during the movement of the bag after it has been filled through stations B and C, where the twine is secured around the neck of the bag and the tag is attached to the end of the twine. Then the bag with the length of twine attached to the bag and the tag attached to the twine is moved past the stationary knife 40 and the trimming operation is performed immediately after which the jaws are opened by the cam 32, releasing the bag and the trimming. The bag falls onto the discharge conveyor by which it is carried from the machine and the trimming may be removed through the suction pipe 50 in the manner above described.

In the modified machine illustrated in Fig. 11, the arrangement of the knife near the discharge conveyor and between the tagging station and the discharge station reduces to a minimum the liability of either the bag or the trimming becoming disen-

gaged from the clamping jaws. The looping of the twine over the bag and the attachment of the tag upon the bag held by the gripping jaws before the trimming operation is performed may therefore be accomplished without liability of disengagement of the bag from the jaws.

While the preferred embodiments of the invention have 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 a packaging machine, in combination, a rotatable member, a gripping member mounted upon the rotatable member and arranged to engage and hold the mouth portion of the bag at two points spaced apart, and an elongated stationary knife arranged with relation to the gripping member so as to present the portion of the bag, between which it is thus held, to the knife during the rotation of the gripping member.

2. In a packaging machine, in combination, bag forming mechanism including a rotatable turret, a plurality of sets of gripping members mounted thereon, each provided with two gripping jaws spaced apart and adapted to engage and grip the mouth portion of the bag at two points spaced apart, and an elongated stationary knife blade arranged with respect to the rotatable turret and gripping jaws so as to enter the space between each pair of gripping jaws during the rotation of the turret and to progressively cut completely through the neck of the bag.

3. In a packaging machine, in combination, bag forming mechanism including a movable bag gripping member provided with a double gripping jaw for holding the mouth of the bag at two spaced apart points, operating mechanism for opening and closing the gripping member, a stationary knife having its cutting edge disposed in the path of travel of the portion of the bag between the double gripping jaw, a discharge conveyor for conveying the completed bags from the machine, and means for removing the trimming held by one of the jaws, said operating mechanism being arranged to maintain both jaws closed until the bag is over the discharge conveyor, and then for opening the same.

4. In an automatic tea bagging machine, in combination, bag forming and filling mechanism including a rotatable turret member, a plurality of sets of double gripping jaws mounted thereon for closing and gripping the mouth portion of each formed and filled bag at two points spaced apart, means for cutting the bag between said points, closure applying mechanism, and pneumatically operated means for removing the trimmings after the operation of the closure applying mechanism.

5. In an automatic tea bagging machine, in combination, bag forming and filling mechanism including a rotatable turret member, a plurality of sets of double gripping jaws mounted thereon for closing and gripping the mouth portion of each formed and filled bag at two points spaced apart, means for cutting the bag between said points, closure applying mechanism, jaw operating mechanism, and means for removing the trimming held by the upper jaw of each set of gripping jaws at the point where the jaws are opened to release the bag therefrom.

6. In a packaging machine, in combination, a movable bag holding member provided with double gripping jaws for holding the contracted neck of a filled bag at two points spaced apart, and a stationary knife arranged to engage the portion of the neck between the points at which it is thus held to cut through the neck and thereby trim the surplus material from the mouth of the bag.

7. In a packaging machine, in combination, a bag holding member movable through a plurality of stations, means for applying a fastening device at one station, means for attaching a tag at a succeeding station, means for trimming the surplus material from the mouth of a bag held by the bag holding member, after the fastening device and tag have been attached to the bag, and operating mechanism for opening the bag holding member to thereafter release the bag.

8. In a packaging machine, in combination, a conveyor movable through a plurality of stations provided with a plurality of bag holding members, means for forming and filling a bag at one station, means for securing twine around the mouth of the bag at a succeeding station, means for thereafter attaching a tag to the twine, and trimming mechanism positioned to thereafter trim the mouth of the bag thus tied and tagged.

9. In a packaging machine, in combination, a plurality of movable gripping members each provided with double gripping jaws adapted to engage and grip the contracted neck portion of a filled bag at two points spaced apart, means for looping twine around the bag to secure twine about the mouth of the bag, means for thereafter attaching a tag to the twine to form a handle for the bag, and trimming mechanism arranged to cut through the contracted neck portion of the bag between the points at which it is thus held by the double gripping jaws after the bag has been thus tied and tagged.

10. In a packaging machine, in combina-

tion, a movable bag holding member for gripping the mouth portion of the bag, and an elongated stationary knife for trimming the top of the bag as the latter is held and moved by the gripping member, the cutting edge of said elongated knife being arranged to progress very gradually into a position to cut completely through the neck of the bag.

In testimony whereof I have signed my name to this specification.

WILLIAM S. CLEAVES.