Jan. 21, 1941. C. F. ALLISON 2,229,542

BAG FOLDING MECHANISM

Filed July 15, 1938 5 Sheets-Sheet 1

Fig. 1.

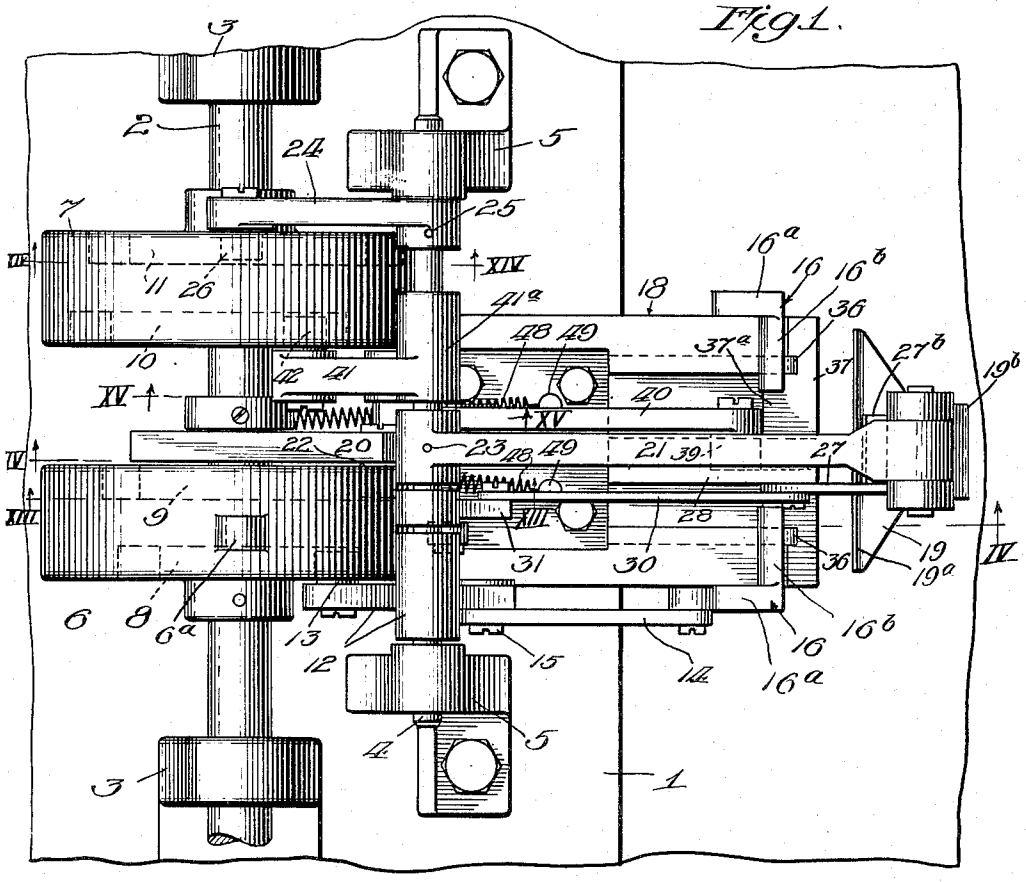
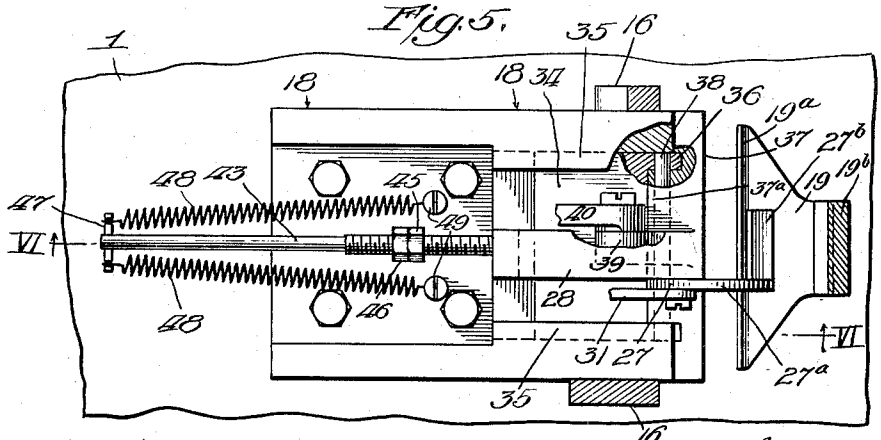


Fig. 5.



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BAG FOLDING MECHANISM

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Fig. 2.

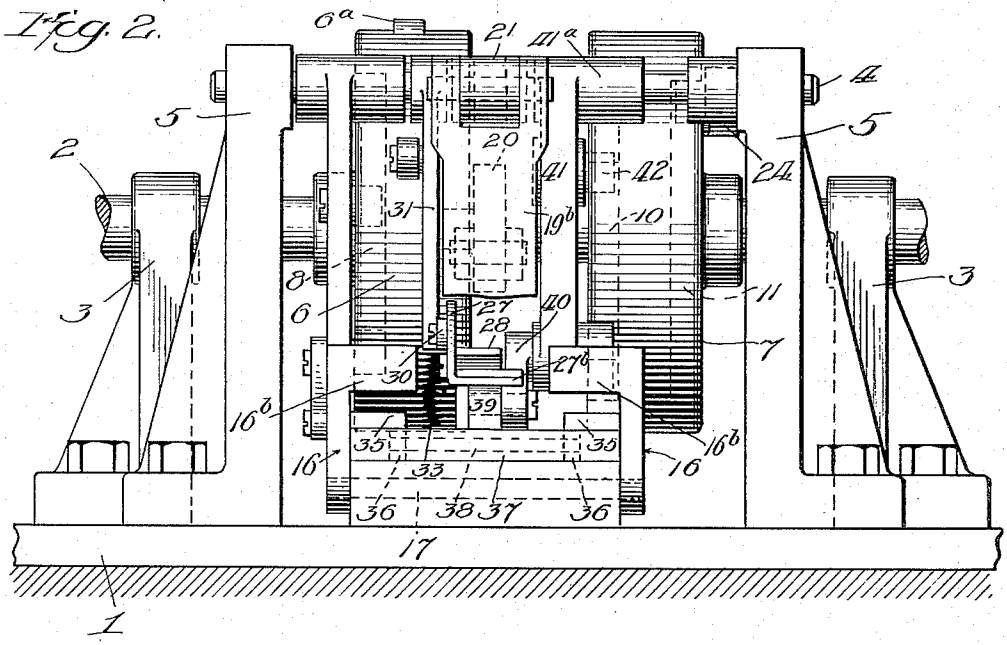
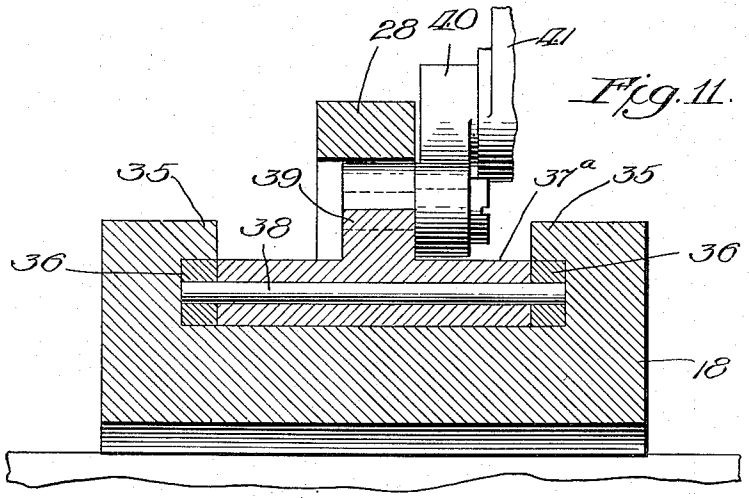


Fig. 11.



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BAG FOLDING MECHANISM

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Fig. 3.

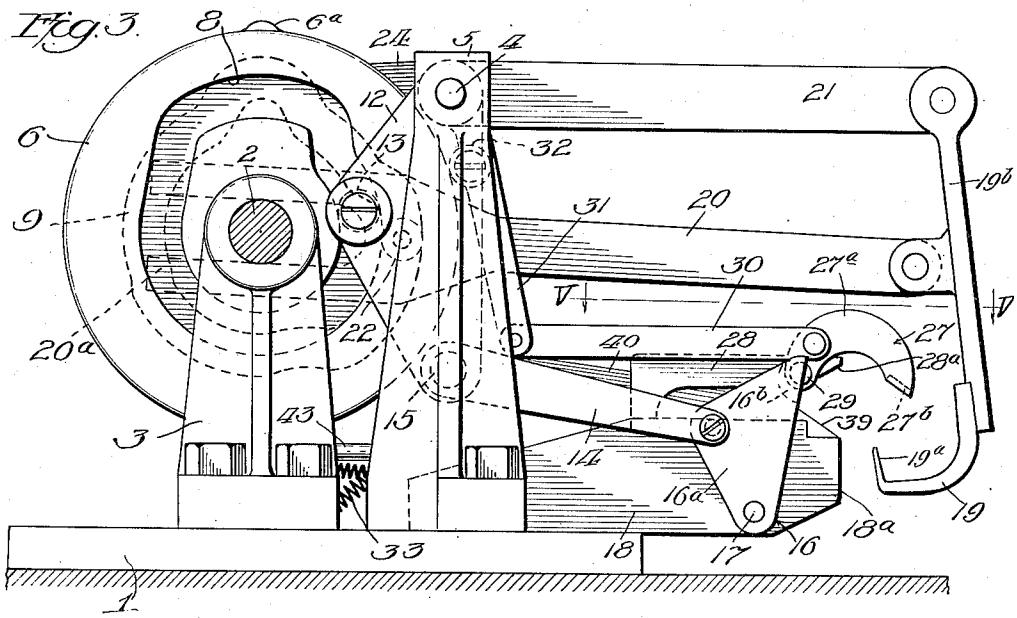
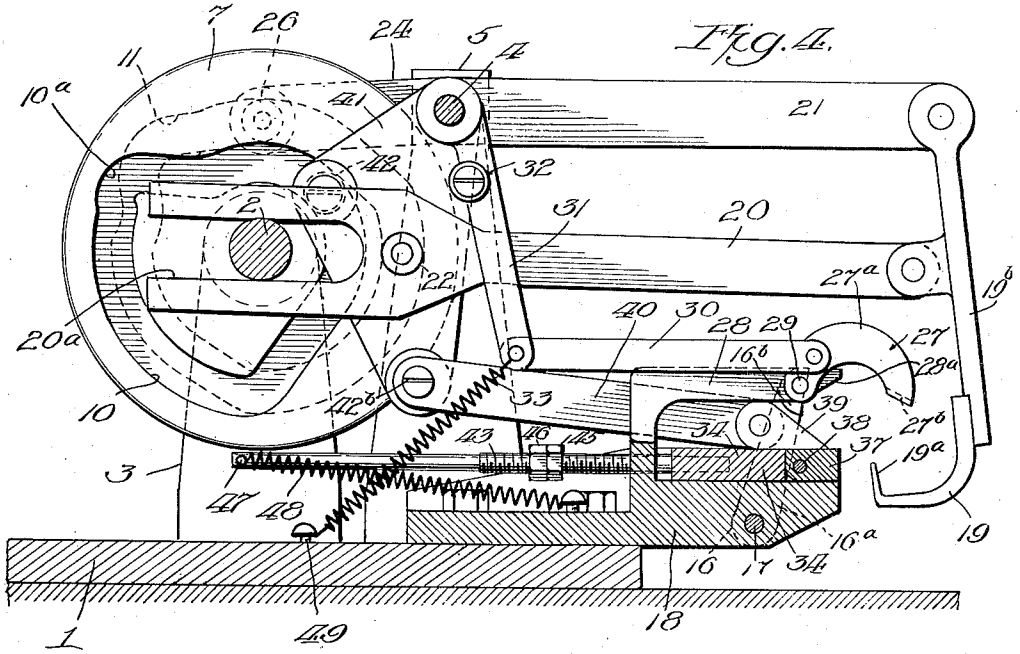


Fig. 4.



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BAG FOLDING MECHANISM

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Fig. 6.

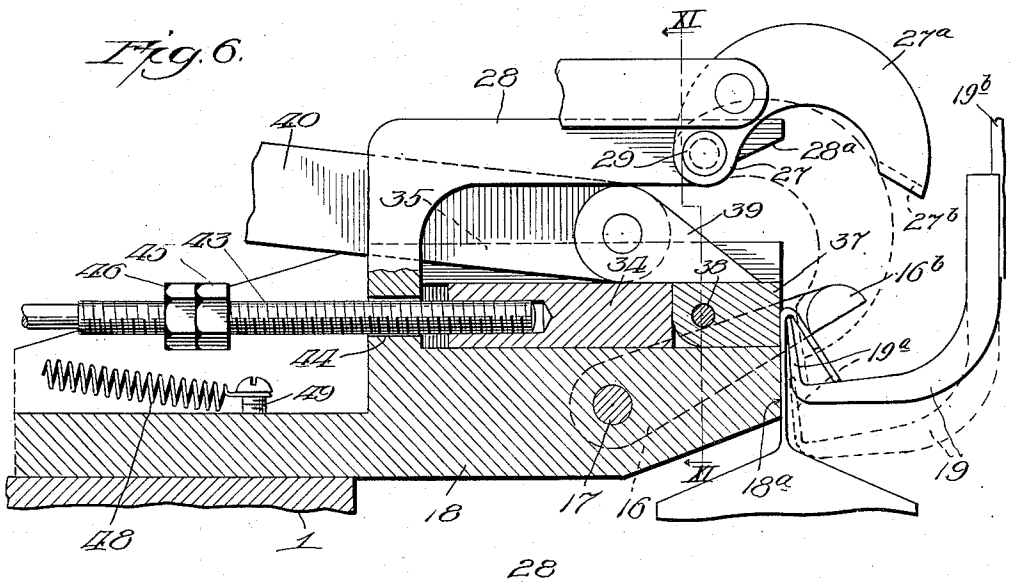


Fig. 7.

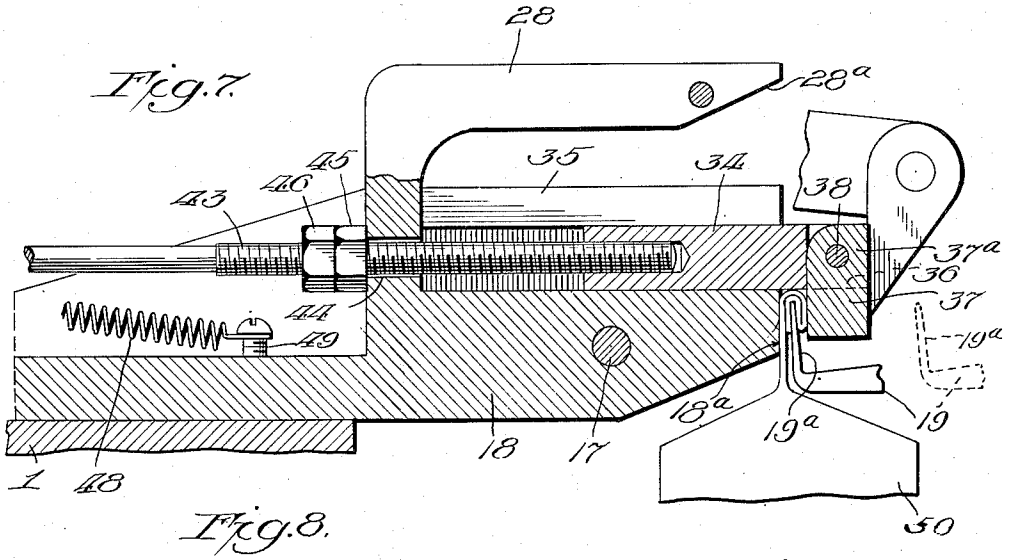


Fig. 8.

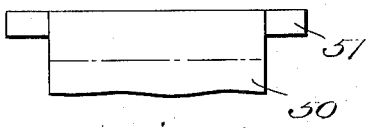


Fig. 9.

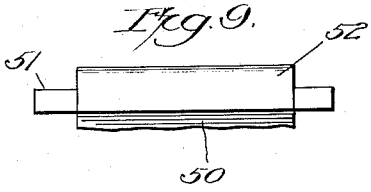
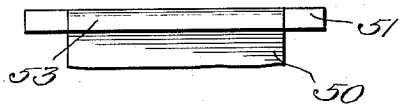


Fig. 10.



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BAG FOLDING MECHANISM

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Fig. 12.

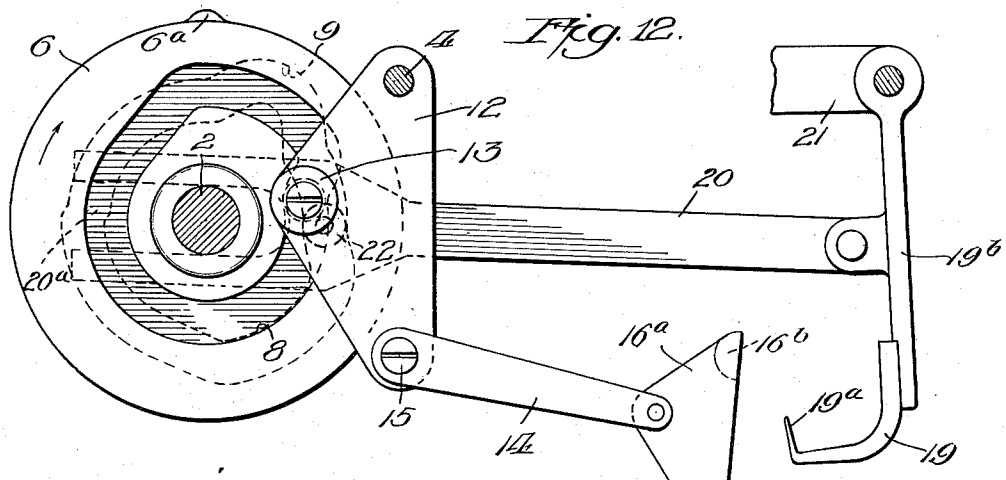


Fig. 13.

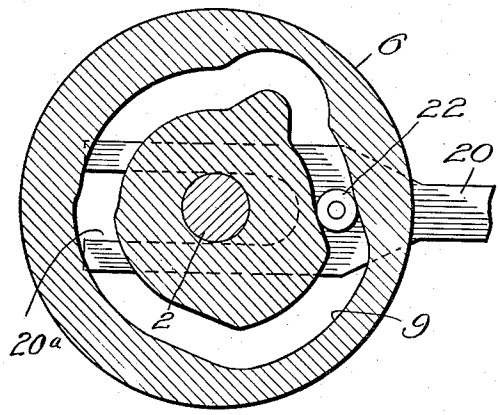
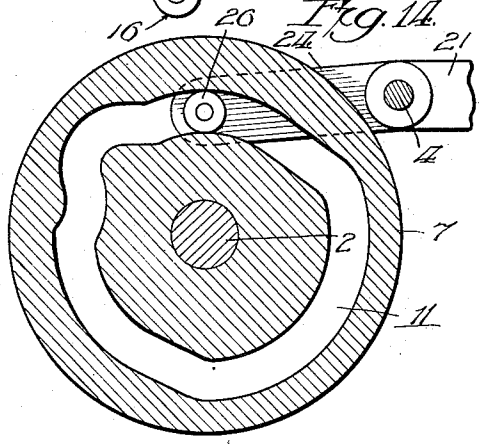


Fig. 14.



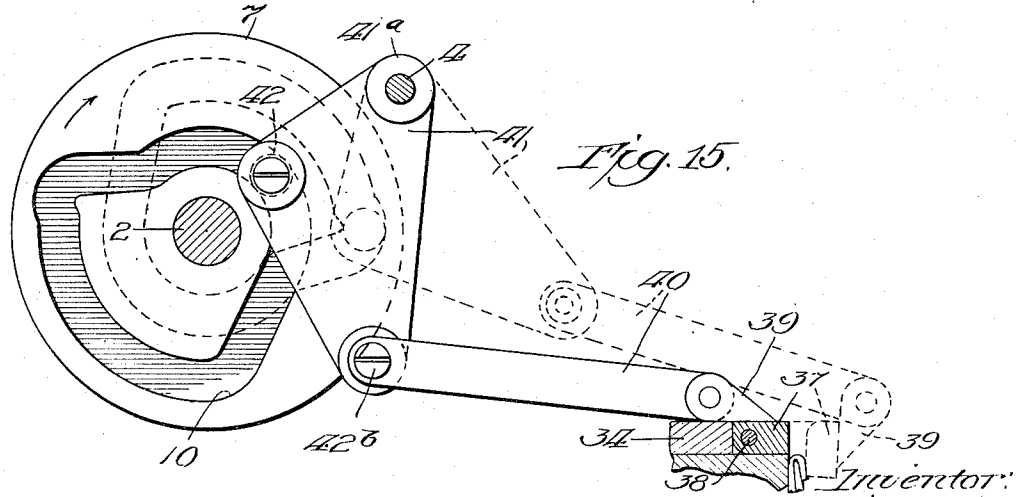


Fig. 15.

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Patented Jan. 21, 1941 2,229,542

UNITED STATES PATENT OFFICE

2,229,542

BAG FOLDING MECHANISM

Charles F. Allison, Chicago, Ill., assignor, by mesne assignments, to American Bag Closing Machine Company, Chicago, Ill., a corporation of Illinois

Application July 15, 1938, Serial No. 219,410

22 Claims. (Cl. 93—6)

This invention relates to mechanism designed for making a double fold upon the neck of a filled bag while the same is in a predetermined position on a bag closing machine.

The mechanism consists primarily of a fulcrum member with mechanism for folding the upper neck portion of the bag over the fulcrum member, for making the first fold, means for withdrawing the fulcrum member from beneath the fold and positioning the same at a different elevation against the folded portion, and mechanism for folding the upper portion of the folded portion of the bag over the fulcrum member in its new position.

The mechanism is exceedingly accurate in making the fold at the proper elevation and making the same exceedingly compact. A further advantage resides in the fact that a fold or narrow width can easily be made and that the folding operations are carried out while the bag is in a predetermined position.

It is hence possible to fold the neck of the bag even if it has been filled with material to a point where the neck portion of the bag is comparatively short.

The invention comprises the novel structure and combination of parts hereinafter described and more particularly pointed out and defined in the appended claims.

In the accompanying drawings which illustrate a preferred form of this invention and in which similar reference numerals refer to similar features in the different views:

Fig. 1 is a top plan view of a bag folding mechanism involving this invention.

Fig. 2 is an elevational view of the same with parts broken away.

Fig. 3 is an end elevational view of the mechanism with the cam shaft in section.

Fig. 4 is a part sectional and part elevational view taken upon the line IV—IV of 1 looking in the direction of the arrows.

Fig. 5 is a sectional view taken upon the line V—V of Fig. 3 looking in the direction of the arrows.

Fig. 6 is an enlarged sectional view taken substantially upon the line VI—VI of Fig. 5 looking in the direction of the arrows.

Fig. 7 is a view similar to Fig. 6 with parts omitted and showing parts in different positions.

Fig. 8 is a fragmentary elevational view of a bag with a metal tie before any folding operation.

Fig. 9 is a fragmentary elevational view of the bag after having received the first fold.

Fig. 10 is a fragmentary elevational view of the bag after it has received the second or final fold.

Fig. 11 is an enlarged sectional view taken upon the line XI—XI of Fig. 6.

Fig. 12 is an end elevational view of a cam and certain operating parts.

Fig. 13 is a fragmentary sectional view taken upon the line XIII—XIII of Fig. 1 looking in the direction of the arrows.

Fig. 14 is a sectional view (fragmentary) taken upon the line XIV—XIV of Fig. 1 looking in the direction of the arrows.

Fig. 15 is a sectional view taken upon the line XV—XV of Fig. 1 looking in the direction of the arrows illustrating certain operations.

In connection with this invention, there is shown a portion of a platform 1 of a machine for closing paper bags of which this mechanism may constitute a unit. A cam shaft 2 is supported upon this platform by means of suitable bearing standards 3. An auxiliary shaft or rod 4 above and forward of the shaft 2 is supported in suitable bearing standards 5 resting upon the platform 1. Upon the shaft 2 is secured a pair of cams 6 and 7. The cam 6 is provided with a groove 8 in one side and a groove 9 in the other side. The cam 7 is provided with a groove 10 in one side and a groove 11 in the other side.

A triangular casting 12 is journalled at one apex upon the shaft 4 adjacent the cam groove 8. This casting 12 carries a roller 13 at another apex located in the groove 8. A link 14 is pivoted at one end to the other apex of the casting 12 as indicated at 15 (Figs. 1 and 12). The other end of the link 14 is pivoted to one of the two folders 16. With reference to Figs. 1 and 2, it will be noted that each folder 16 consists of a side plate 16a by means of which the folder is mounted and an arcuate bag folding wing or member 16b extending at right angles thereto. The side plates 16a are secured upon the ends of a rod 17 which is journalled in an auxiliary platform 18 extending from the main platform 1. It will be noted that the folders 16 are located upon opposite sides of the auxiliary platform and that the wings 16b are directed toward each other with the arcuate sides thereof directed inwardly so as to move over the neck portion of the bag to be folded. It might be mentioned that the platform 18 has a square and straight outer end 18a against which the neck portion of the bag is adapted to be folded as shown in Figs. 6 and 7.

Before the folding members 16 are operated

for making the first or initial fold, a fulcrum member 19 is moved to compress the neck of the bag against the end of the platform 18. This fulcrum member consists of a lower hook shaped portion which embodies an upright flange 19a that has a slight slope toward the platform 18 and an upper operated arm 19b.

The arm 19b of the fulcrum member is pivoted at an intermediate point to a link 20 which imparts an oscillating movement thereto toward and from the platform 18. At its upper end, the arm 19b is pivoted to a crank arm 21 which is designed to raise and lower the fulcrum member 19.

The link 20 has a fork or bifurcation 20a at its rear end which straddles the cam shaft 2 for supporting the link. At an intermediate point the link 20 has attached thereto a cam roller 22 that is located in the groove 9 of cam 6 to which reference will later be made.

The crank arm 21 is rigidly secured to the shaft 4 by means of a pin 23 (Fig. 1). The shaft 4 is adapted to be rocked for raising and lowering the crank arm. To this end, a crank arm 24 as shown in Fig. 1 is rigidly secured at one end to the shaft 4 by means of a pin 25. The other end of the crank arm carries a cam roller 26 located in the cam groove 11 of cam 7 as shown in Figs. 1 and 14. This cam groove is designed to actuate arm 24 at the proper time as will later more fully appear.

In order to iron or press any bulge that may occur in the first fold of the bag between the folding wings 16b, there is provided a pressing member 27 best shown in Figs. 3, 4, 5, and 6. This pressing member 27 consists of an arcuate arm 27a pivoted to the base 18 as indicated at 29. This arm 27a has a laterally extending wing 27b at its forward end that is adapted for engaging the fold of the bag between the folding wings 16b.

The arm 27a is adapted to be operated at the proper time by a link 30 which is pivoted at its forward end to an intermediate portion of the arm 27a. The rear end of the link 30 is pivoted to a crank arm 31 which is pivoted at its upper end upon the shaft 4 and carries a roller 32 at an intermediate point that is held in engagement with the periphery of the cam 6 by means of a spring 33 secured at one end to the platform 1 and connected at its other end to the crank arm 31. The cam 6 is provided with a hump or swell 6a that is adapted to engage the roller 32 for actuating the arm 31.

After the initial fold has been made by the mechanism already described, the fulcrum member 19 is moved downwardly and outwardly to clear the fold; it is then in a lower position. In this lowered position, the fulcrum member is moved against the fold to flatten the same and form the fulcrum for the second fold. In its lowered position, the upper edge of the flange 19a of the fulcrum member is substantially midway between the upper and lower ends of the first fold as shown in Fig. 7. The second or final fold is adapted to be made at this point in the operation.

The second or final folding mechanism comprises a slide 34 mounted upon the auxiliary platform 18 which is formed with a suitable guide way for the slide as shown in Figure 5. This guide way is formed by ledges on flanges 35 that overhang the lateral edges of the slide 34. The front end of the slide 34 is bifurcated for forming ears 36. A folding member 37 has a reduced portion 37a fitting in the bifurcation of the slide and pivoted therein by a pivot rod 38. This folding member 37 is of such width forward of the reduced portion as to extend substantially the width of the platform 18.

Upon the folding member 37 there is an apertural ear or lug that is adapted to ride under the L shaped support or bracket 28. The forward end of the bracket 28 is bevelled as indicated at 28a to allow the ear 39 to swing in an arc as will later more fully appear. A link 40 is pivoted at its forward end to the ear 39. The rear end of the arm 40 is pivoted to the lower end or apex of a triangular casting 41 as indicated at 42b. The casting 41 is pivoted at its upper apex 41a upon the rod 4, while the other apex of said casting 41 carries a roller 42 that engages in the cam groove 10 of cam 7, as shown in Fig. 15. This cam groove has an outward offset 10a for a purpose that will later appear.

Referring now to Figs. 4, 6, and 7, it will be noted that a rod 43 is threaded in the rear end of the slide 34. This rod 43 extends through an aperture 44 in the upstanding leg of the L shaped bracket 28. A nut 45 backed up by a lock nut 46 is adjustable upon the rod 43 and forms an abutment for engaging the vertical leg of the bracket 28 and limiting the forward movement of the slide 34. The rear end of the rod 43 is provided with a cross head 47 (Fig. 5) to which a pair of tension springs 48 are anchored at their rear ends. The springs 48 extend in slightly diverging relation upon opposite sides of the rod 43 in a forward direction and are anchored to the platform 18 as indicated at 49. The tendency of the springs 48 is to urge the rod 43 to the right or in a forward direction until the nut 45 strikes the bracket 28. Of course the springs 48 are governed in their action by the rotation of the cam 7. When the slide 34 is arrested in its forward movement by the bracket 28, the continued force exerted by the link 40 will cause the folder 37 to turn on its pivot rod 38 in a downward direction for making the second fold on the bag as shown in Fig. 7.

In Figs. 8 to 10 are shown portions of a paper bag 50 equipped with the usual metal tie 51. The folding members 16 during their operation fold the neck of the bag to provide the fold 52 as shown in Fig. 9. The folded portion 52 is then folded upon itself by the folders 37 to produce the fold 53 shown in Fig. 10.

In the operation of the machine, rotation of the shaft 2 will rotate the cams 6 and 7 therewith whereby the different folding members will be operated in properly timed relation. During the sequence of operation in folding a bag, the fulcrum member 19 will first be moved into the position shown in Fig. 6 and will remain in such position until the initial fold is made. While the fulcrum member 19 is in such position, the first folding wings or members 16 will be actuated for making the first fold, similar to the fold shown in Figure 9. At about the time that the cam 6 begins to retract the folding members 16, the hump 6a on the cam 6 will actuate the link 30 for forcing the ironing member 27 downwardly and against the fold that was just formed on the bag.

About the time that the first fold has been completed, the cam 7 will become effective for actuating arm 24 for rocking shaft 4 for lowering the fulcrum member 19 below the formed fold. As soon as the fulcrum member 19 is thuswise lowered, the cam groove 9 in cam 6 will become

effective for moving the arm 20 in an outward direction, beyond the fold. The fulcrum member 19 will then be slightly elevated to bring the upper edge of the flange 19a at approximately the center line of the fold when the cam groove 9 becomes effective for drawing the arm 20 inwardly and pressing the fulcrum member against the formed fold as shown in Fig. 7.

With the fulcrum member 19 properly positioned against the fold, the cam 7 becomes effective for actuating the triangular casting 41 and with the aid of springs 48 urging slide 34 in a forward direction for initiating the second fold, or as it were, bending the upper part of the folded portion at a substantial right angle until the abutment 45 strikes the bracket 28, at which time the link 40 will cause the folding member 37 to swing downwards for completely folding the folded portion upon itself and making the second or final fold as shown in Fig. 7. Of course as the slide 34 and the folding member 37 are advanced in alignment, the front end of the folding member will initiate the second fold as it moves beyond the end of the platform and when the forward movement of the slide is arrested, the folding member 37 will be given the turning movement to complete the final fold.

In referring to Fig. 15, it will be noted that when the aforementioned offset 10a of cam groove 10 engages the roller 42, the folding member 37 will be given its maximum clamping effect against the folded bag and that as soon as the offset 10a passes the roller as it moves in a clockwise direction, there will be a slight release of the folding member 37 to allow the bag with its neck properly folded to be withdrawn and moved onwardly.

From the foregoing, it will be apparent that a very simple and novel bag folding mechanism has been provided that is effective for making a double compact fold on the neck of a bag while the same is in a predetermined position, and that is susceptible of making a narrow flat fold than can be superimposed upon the top of the bag.

I am aware that many changes may be made without departing from the principles of this invention and I do not propose limiting the patent granted thereon otherwise than necessitated by the prior art and appended claims.

I claim as my invention:

1. Mechanism for folding the neck portion of a bag comprising a lateral support for the neck portion of the bag, a fulcrum member adapted for movement against the neck portion of the bag, means for folding the neck portion of the bag over a portion of said fulcrum member, means for withdrawing said fulcrum member from beneath said fold and lowering the same and moving the same against the fold for forming the fulcrum for a second fold, and means for folding a portion of the folded portion of the bag over a part of said fulcrum member.

2. Mechanism for folding the neck portion of a bag comprising a lateral support, a fulcrum member swingable for engaging the neck portion of the bag against said support, a folding member for downwardly folding the upper portion of the neck portion of the bag over said fulcrum member and against a lateral side thereof, means for withdrawing the fulcrum member from beneath said fold and positioning the same against the formed fold, and a slidable and rotatable folding member for folding the upper portion of said formed fold downwardly over said fulcrum member.

3. Mechanism for folding the neck portion of a bag comprising a pair of successively operated folding members, a fulcrum member, and means for moving said fulcrum member for co-operating with each folding member and forming a fulcrum over which the neck portion of the bag is folded by each folding member.

4. Mechanism for folding the neck portion of a bag while in a predetermined position comprising a pair of successively operated folding members, a fulcrum member, means for moving said fulcrum member for co-operating with the first operated folding member for initially folding the neck portion of the bag, means for disassociating said fulcrum member from co-operative relation with said first folding member and moving the same to a different elevation and against the folded portion of the bag for co-operative relation with the second folding member, and means for operating said second folding member in timed relation to the movements of said fulcrum member.

5. In mechanism for folding the neck portion of a bag, an abutment for laterally supporting the neck portion of the bag, a swinging fulcrum member adapted for movement against said neck portion of the bag, a folding member and means for actuating said folding member in a substantially rectilinear line for a predetermined distance and then causing an arcuate turning movement thereof for folding the neck portion of the bag downwardly over a portion of said fulcrum member.

6. In mechanism for folding the neck portion of a bag, an abutment for laterally supporting the neck portion of the bag, a fulcrum member having a hooked shaped portion adapted to be positioned against the neck portion of the bag, a reciprocable slide, a folding member pivoted to the forward end of said slide, operating means connected to said folding member, and means for limiting the forward movement of said slide when it extends slightly beyond said abutment for causing said operating means to move said folding member in an arcuate downward path.

7. In mechanism for folding the neck portion of a bag, a pair of successively operated folding members, a fulcrum member, means for setting said fulcrum member, and operating one of said folding members, means for re-setting said fulcrum member at a different elevation and actuating the other folding member.

8. In mechanism for folding the neck portion of a bag, a pair of successively operable folding members, a fulcrum member, means for setting said fulcrum member against the neck portion of the bag and operating one of said folding members for folding a portion of the neck of the bag over a portion of said fulcrum member, means for withdrawing and re-setting said fulcrum member against the folded portion of the bag and means for operating the other folding member for folding a portion of the formed fold over a portion of said fulcrum member.

9. In mechanism for making a double fold in the neck portion of a bag, a platform having an end against which the neck of a bag is adapted to be positioned, a fulcrum member having vertical and longitudinal movement adapted for engaging the neck of the bag against the end of said platform, a folder member pivoted to said platform, means for actuating said folder member for folding the upper neck portion of the bag over a portion of said fulcrum member, means for withdrawing said fulcrum and folder

member and then re-setting said fulcrum member against the formed fold, a slide on said platform, a rod extending from the rear end of said slide, a member on said platform through which said rod passes, an adjustable abutment on said rod for engaging said member for limiting the forward movement of said slide, a folder member pivoted to the forward end of said slide, and operating means pivoted to the upper part of said last mentioned folder member for advancing the same and causing a turning movement when said slide is arrested.

10. Mechanism for folding the neck portion of a bag comprising a platform, a folding member pivoted to said platform, a folding member slidably mounted upon said platform and having a turning movement in a predetermined position, means forming a fulcrum for successively co-operating with said folding members and means for successively operating said folding members in timed relation.

11. Mechanism for folding the neck portion of a bag comprising a platform having an end for laterally supporting the neck of a bag, a folding member pivoted to said platform, a slide upon said platform, a folding member pivoted to said slide, means defining a fulcrum for successively co-operating with said folding members and means for successively operating said folding member in timed relation.

12. In mechanism for folding a bag, an abutment for the neck of said bag, an initial folding member pivoted to said abutment, fulcrum means to position the neck of said bag against the said abutment, means to swing the said folding member downwardly over the neck of said bag to effect an initial fold, a slide mounted on said abutment, means to limit the forward movement of said slide, a secondary folding member pivoted to the forward end of said slide, and means to swing said secondary folding member downwardly to form a second fold.

13. A mechanism for folding the neck of a bag, comprising an abutment for said bag, a hook-shaped fulcrum member adapted to hold said neck of the bag against said abutment, a support to maintain the bag in a stationary position during the complete fold, a folding member positioned to fold said neck downwardly over said fulcrum member, means to withdraw said fulcrum member and re-position the same against said fold in a lower position on said neck and means to form a second fold over said fulcrum member.

14. A mechanism for folding the neck of a bag comprising a support for said bag, a vertical abutment for the neck of said bag, a hook-shaped fulcrum member adapted for positioning against the neck of said bag to press the same against said abutment, a folding member positioned to fold the protruding portion of said neck over the said fulcrum member, means to withdraw and re-position the said fulcrum member in a lower relative position against said neck and positively operated means to effect a second fold of the said neck over the said fulcrum member.

15. A mechanism for folding the neck of a bag comprising a vertical support for said neck, a hooked fulcrum member adapted to position said neck against the said vertical support, an initial folding member pivoted to the said support, means to operate said initial folding member to fold the neck of said bag downward over said fulcrum member, a second folding member slidably mounted on said support and limited in its forward movement, means to withdraw the said fulcrum member from the initial fold and reposition the same against the said initial fold, means to operate the said second folding member to effect a final fold and means to support the said bag in one position during the folding operations.

16. In mechanism for folding the neck portion of a bag, comprising a platform having an end abutment for laterally supporting the neck of the bag, a slide positioned on the upper surface of said platform, a folding member at the forward extremity of said slide and pivoted thereto, means to limit the travel of said slide, a hook-shaped swingable fulcrum member, means to position said fulcrum member against the neck of said bag and means to advance said folding member and swing the same over the neck portion of said bag, and press the same against said fulcrum member.

17. Mechanism for folding the neck portion of a bag comprising an abutment member for laterally supporting the neck of said bag, a swinging fulcrum member adapted to hold the neck portion of said bag against said abutment member, a folding member pivoted to the said abutment member and adapted to fold the neck of said bag over said fulcrum member, means to reposition said fulcrum member at a lower level against the folded neck of said bag, a slide on said abutment member, a folding member hinged to the forward end of said slide and means to swing said latter folding member downward to form a second fold of said neck over the said repositioned fulcrum member.

18. In mechanism for folding the neck portion of a bag, a platform having an end abutment for laterally supporting the neck portion of the bag, a hook-shaped fulcrum member adapted for pressing the neck portion of the bag against said abutment, means for folding the neck portion of the bag over said fulcrum member, means for withdrawing said fulcrum member and repositioning the same at a lower elevation against the folded neck portion of the bag, a slide mounted upon said platform, means for limiting the forward movement of said slide, a folding member pivoted on the forward end of said slide, and operating means connected to said folding member for advancing the same to first turn the folded neck portion of the bag over said fulcrum member and for swinging the same downwardly when the said slide is arrested, for pressing the turned down portion against the fulcrum member, and means for withdrawing the said fulcrum member.

19. In a mechanism for folding the neck portion of a bag, a platform having an end abutment for laterally supporting the neck portion of the bag, a hook-shaped fulcrum member adapted for confining the neck portion of the bag against said abutment, a slide upon said platform, a folding member pivoted to the forward end of said slide, and normally in alignment therewith, operating means connected to the top of said folding member for moving said slide and folding member to cause the end of said folding member to turn over the neck portion of the bag and then to swing downwardly to fold the turner over portion against the fulcrum member, and means to then move the fulcrum member and folding member clear of the bag.

20. A mechanism for folding the neck portion of a bag, comprising a platform having an end abutment against which the neck portion of the

bag is adapted to be positioned, a slide on said platform, a folding member at the forward end of said slide and in alignment therewith, and pivoted thereto, operating means pivoted to the upper surface of said folding member, means for limiting the forward movement of said slide when the same extends slightly beyond said abutment, whereby said operating means will swing said folding member downwardly to fold the neck portion of said bag.

21. In a bag folding mechanism, a longitudinally traveling folding member adapted for turning the neck portion of a bag, means for arresting said folding member at a predetermined point for swinging downwardly against the turned over portion of the bag and folding the same against the neck portion of the bag, and a hook-shaped fulcrum member for supporting the neck of said bag during the folding operation.

22. In a bag folding mechanism, a platform having an end abutment, a slide mounted upon said platform, a folding member pivoted to the forward end of said slide and normally in alignment therewith, operating mechanism connected to the top of said folding member and effective for longitudinally moving the same upon the platform and then swinging the same downwardly when said folding member is advanced beyond said platform, and a fulcrum member movable in timed relation with said folding member.

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