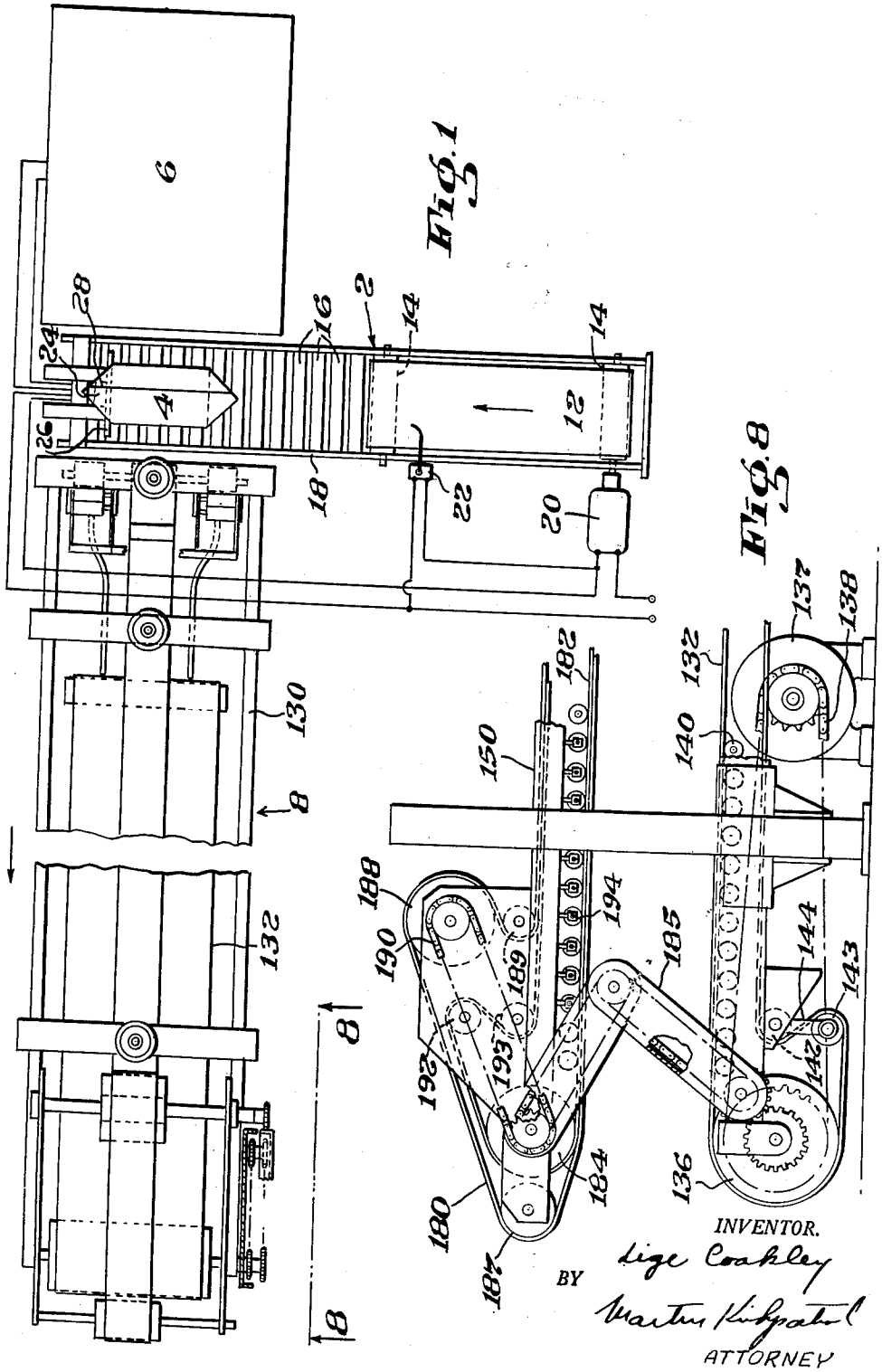
May 11, 1954 L. COAKLEY 2,677,924

BAG CLOSING AND SEALING MACHINE

Filed Oct. 25, 1951

7 Sheets-Sheet 1



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May 11, 1954 L. COAKLEY 2,677,924

BAG CLOSING AND SEALING MACHINE

Filed Oct. 25, 1951

7 Sheets-Sheet 2

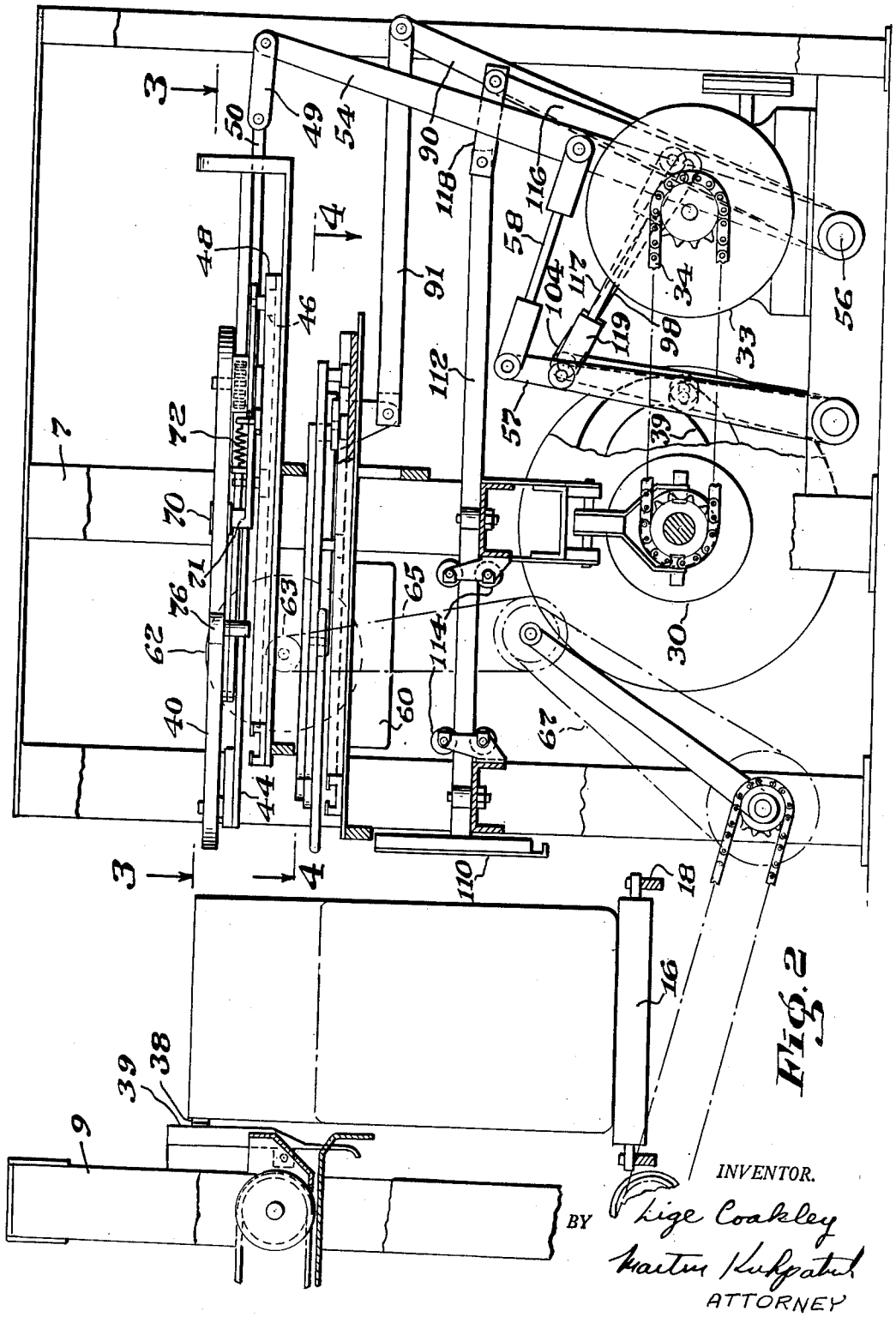


Fig. 2

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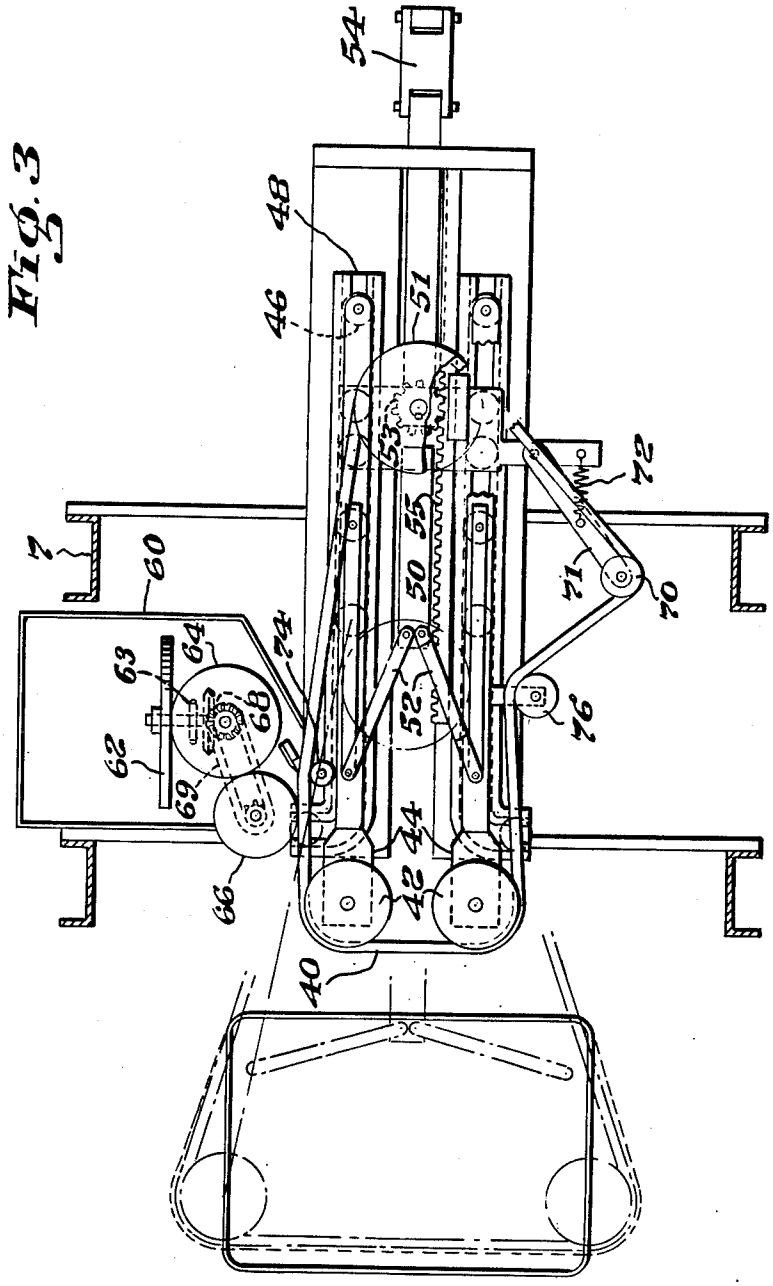
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BAG CLOSING AND SEALING MACHINE

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Fig. 3



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BAG CLOSING AND SEALING MACHINE

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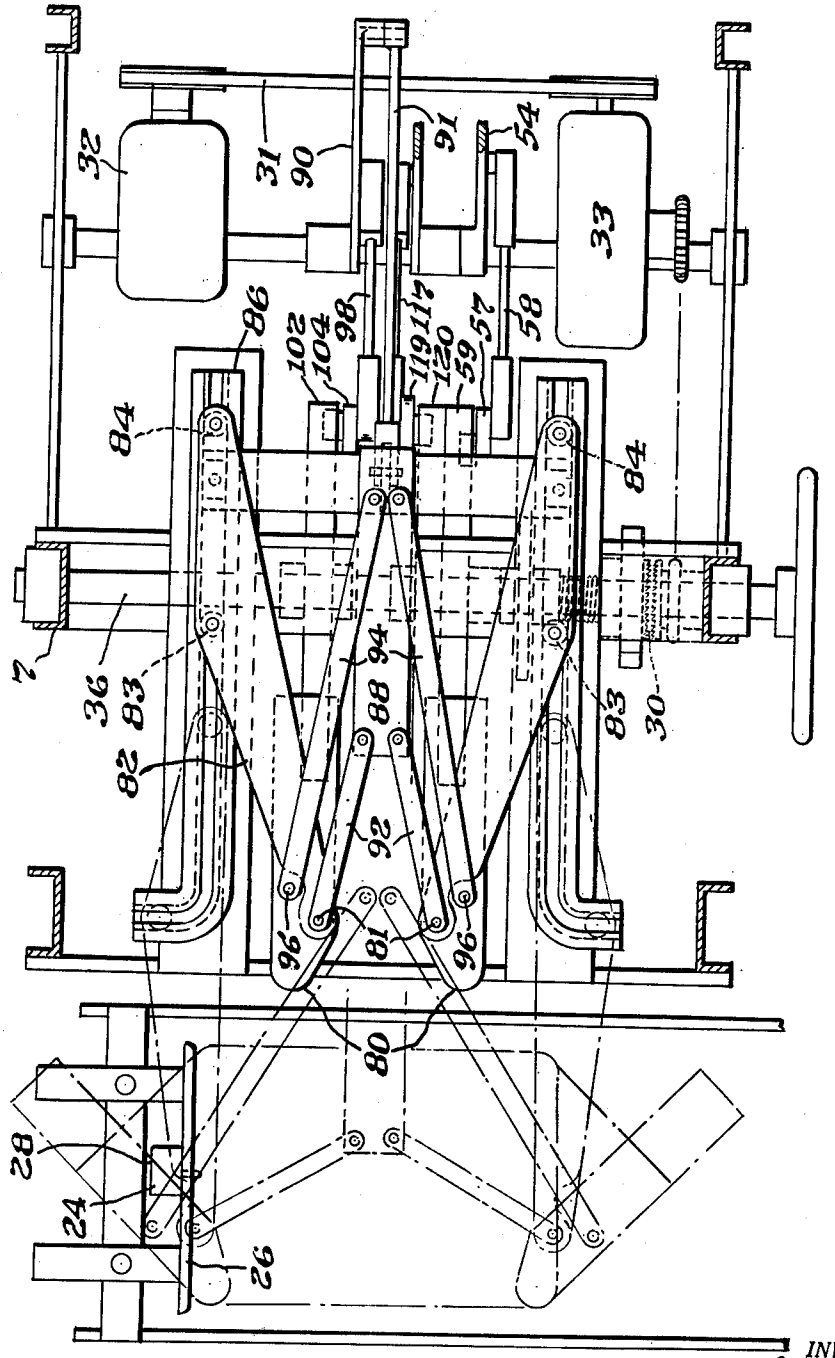


Fig. 4

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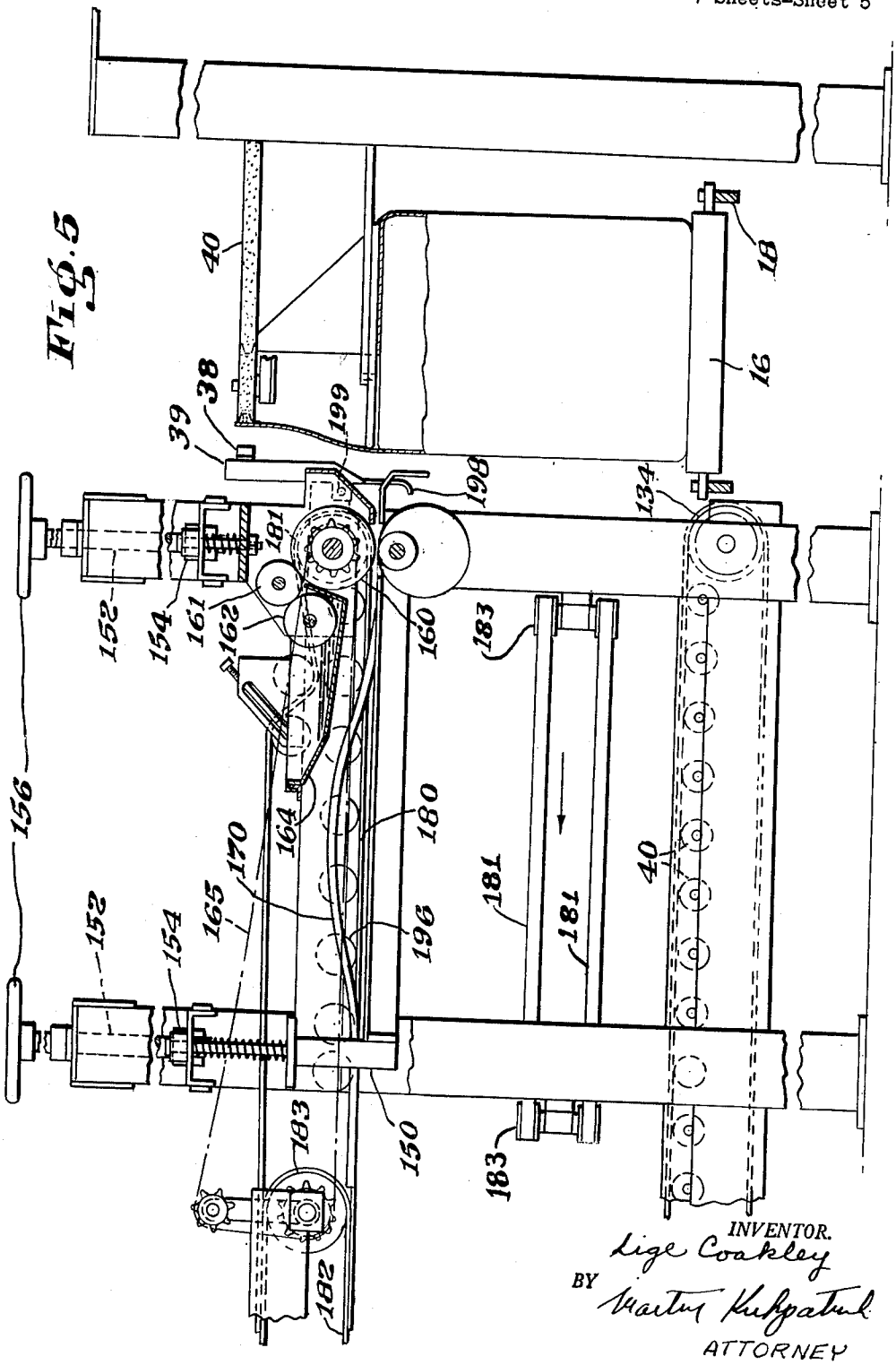
May 11, 1954 L. COAKLEY 2,677,924

BAG CLOSING AND SEALING MACHINE

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Fig. 5



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BAG CLOSING AND SEALING MACHINE

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Fig. 6

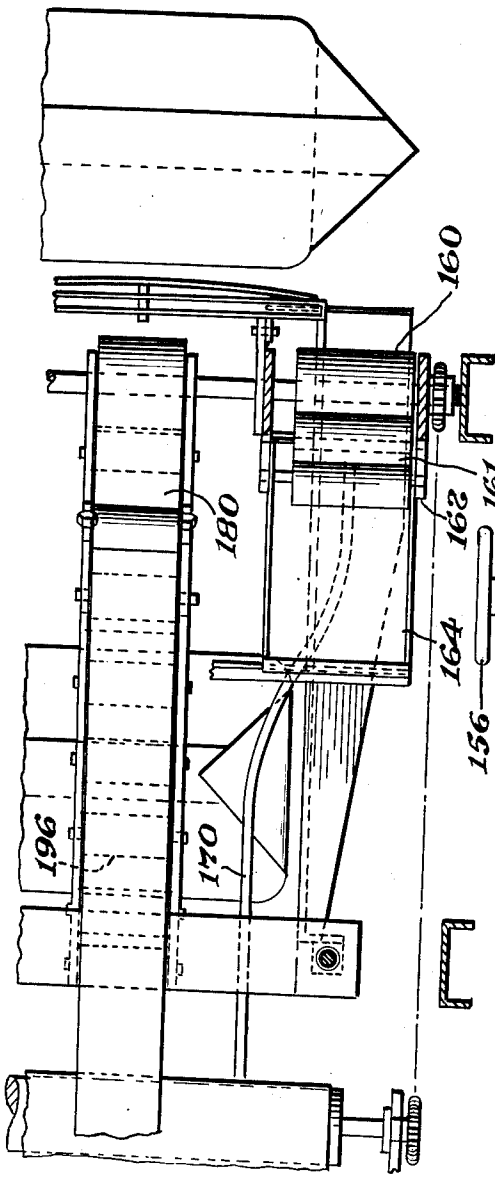
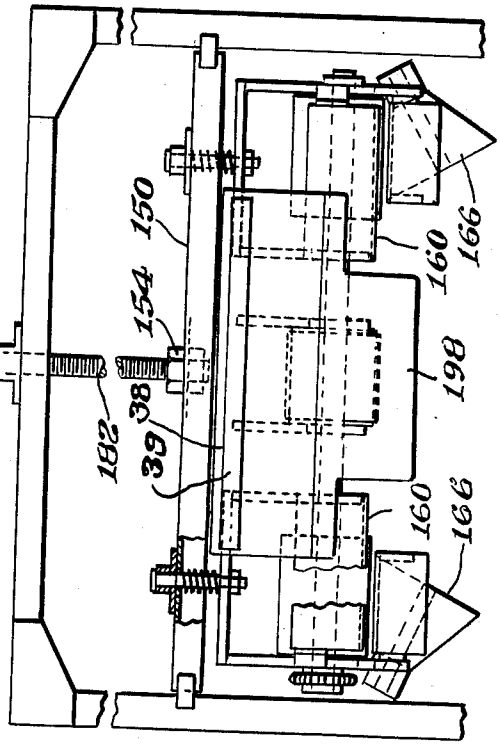


Fig. 7



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BAG CLOSING AND SEALING MACHINE

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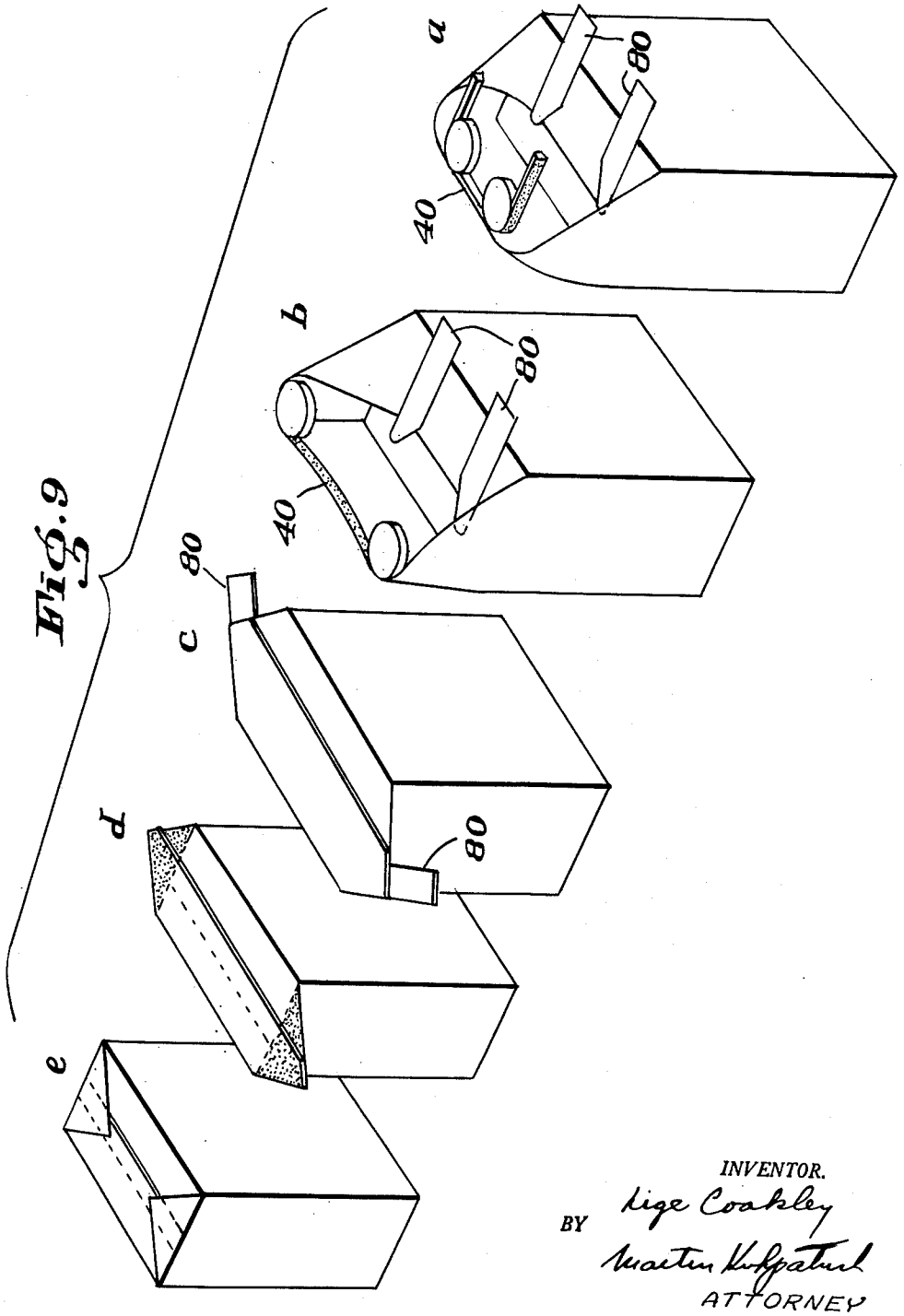


Fig. 9

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Patented May 11, 1954

2,677,924

UNITED STATES PATENT OFFICE

2,677,924

BAG CLOSING AND SEALING MACHINE

Lige Coakley, Pepperell, Mass., assignor to Bemis Bro. Bag Co., East Pepperell, Mass., a corporation of Missouri

Application October 25, 1951, Serial No. 253,086

13 Claims. (Cl. 53—148)

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This invention relates to packaging machinery and more particularly to a novel bag closing and sealing machine for operating upon relatively large bags of stiff paper.

For instance, in the sugar industry, it is common practice to distribute refined sugar in five or ten pound paper packages, such sugar being packed into large bags of stiff paper for distribution to the retailer, a bag usually containing either twelve five pound bags or six ten pound bags of sugar. Automatic machinery which will fill such a bag with the desired number of packages is available and in commercial use. Satisfactory automatic machinery for closing and sealing such bags has not, however, prior to my invention, been available, despite attempts to provide the same. Accordingly, it has been necessary to close and seal such filled bags by hand, which to some extent has prevented their use on a larger scale, since such hand closing and sealing, in addition to being expensive does not produce a uniformly neat and tight seal on all bags.

The well known types of closing and sealing machines for small packages, in which the package is generally in continuous motion, usually in a circular path, past folding and sealing elements, cannot be successfully employed for closing and sealing large bags, not only due to the weight and size of such bags, but because of the relatively stiff paper, frequently in more than one layer, of which the bag is constructed, as well as the variations in size of the volume of sugar due to atmospheric and other changes therein. Furthermore, the folding assembly used in such small machines is not suitable for operating upon large bags of stiff paper, even if enlarged to accommodate such bags, since the stiff paper employed requires a more positive folding action for a uniformly neat and air-tight fold.

I have found that to produce a successful, commercially practical, closing and sealing machine for large bags of stiff paper, it is necessary to perform the initial pasting and folding operations while the bag is maintained in stationary upright position at an operating station. Under such circumstances, however, the necessary and desirable pasting and folding mechanism is adjacent a broad side of a bag at the operating station, and, as a practical matter, prevents the straight line movement of a bag through said station if the bag is to be moved broad side foremost in upright position away from the operating station so that the final folding and sealing operations may be performed while the bag is

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in motion along a conveyor. Thus I have found that a bag is desirably moved to the operating station with a narrow side foremost and, after the initial pasting and folding operations, is moved broad side foremost away from said station, the paths of movement toward and away from said station being approximately at right angles to one another.

In accordance with the above mentioned requirements, I have provided a novel bag closing and sealing machine in which a bag with an open top in upright position is advanced with a narrow side foremost to an operating station where the initial pasting and folding operations are performed while the bag is maintained in stationary position, and is then moved with a broad side foremost away from said station past other pasting and folding elements, the pasted and folded portions at the top of said bag being positively held against one another for a sufficient time for the adhesive used thereon to dry. The machine thus provided enables the rapid and efficient sealing of the large paper bags used, for instance in the distribution of sugar, and will conform to the usual variations in size of said bags due to changes in the volume of sugar packed therein. In conjunction with such machine, I have further provided a novel folder assembly for performing the initial folding operation on a bag, said folder being automatically operated to perform the initial folding operations while the bag is in stationary position at the operating station.

For the purpose of fully disclosing a preferred embodiment of my invention reference is made to the following drawings, in which:

Fig. 1 is a somewhat diagrammatic plan view of the novel bag closing and sealing machine of my invention;

Fig. 2 is a cross-sectional side elevation of a portion of the machine of Fig. 1, showing my novel folder and the paster elements;

Fig. 3 is a plan view of the paster taken on line 3—3 of Fig. 2;

Fig. 4 is a plan view of my novel folder taken on the line 4—4 of Fig. 2;

Fig. 5 is a side elevation of another portion of the machine of Fig. 1;

Fig. 6 is a partial plan view of the portion of the machine shown in Fig. 5;

Fig. 7 is a partial end elevation of the portion of the machine shown in Fig. 5;

Fig. 8 is a side elevation of still another portion of the machine shown in Fig. 1; and

Figs. 9*a* to 9*e* illustrate the sequence of pasting

and folding operations performed on a bag by the machine of Figs. 1–8.

Referring now to Fig. 1, the novel bag closing and sealing machine of my invention in general includes a conventional intake conveyor system generally designated at 2 for supplying narrow side foremost, a previously filled bag with open top in upright position to an operating station. The bag is maintained in stationary position (after initial positioning) at said station as shown at 4 while the contour paster and folder (within enclosure 6 and adjacent a broad side of bag 4) perform the initial pasting and folding operations. After such operations, the bag is moved broad side foremost from the operating station by a ram mechanism projected from enclosure 6 onto a continuously moving discharge conveyor generally designated at 8, such conveyor being in a horizontal plane with and perpendicular to the intake conveyor 2. Suitable pasting and folding devices are mounted adjacent the path of travel of the bag over discharge conveyor 8 to perform the final pasting and folding operations on the ears formed on said bag at the operating station by the folder as it is moved past such devices, and means is provided overlying said conveyor to continuously press down upon the top of the folded portions of a bag as it passes along such conveyor to permit the paste or other adhesive to dry before the bag passes beyond the end of the conveyor as well as to provide extra pressure in the central portion of the bag, all as hereinafter more fully explained.

The intake conveyor portion of my novel bag closing and sealing machine, as best shown in Figs. 1, 2 and 4, includes adjacent the input end thereof, a conveyor belt 12 mounted on rollers 14, driven by any suitable means such as motor 20, and, at the operating station and thereof, a roller conveyor including a plurality of rollers 16 mounted for rotation in a frame 18, the plane of said rollers being inclined slightly downwardly from the delivery end of conveyor belt 14. A stop is provided at the end of the roller conveyor, said stop inculding a transverse positioning plate 26 which maintains a bag 4 in desired position at the operating station. The conveyor belt 14 is preferably continuously operated to deliver filled bags narrow side foremost to the roller conveyor. It is desirable, however, to prevent the delivery of more than one filled bag at a time to the roller conveyor and the operating station. I thus prefer that the input conveyor motor 20 be provided with two normally closed switches in parallel connection with the source of power for said motor, one of said switches 22 being mounted adjacent said belt conveyor to be actuated by the passage of a bag along said belt conveyor, and the other of said switches 24 being placed adjacent the operating station to be actuated by a bag in position at said operating station, for instance, plate 26 may be resiliently mounted, and switch 24 may be arranged to be actuated by the movement of said plate when a bag 4 is in position against said plate. If the switches 22 and 24 are then actuated simultaneously, as by a bag at the operating station against plate 26 and by a bag moving along conveyor belt 12, motor 20 will be disconnected from its source of power, stopping the movement of conveyor belt 12 and preventing the delivery of the bag thereon to the already occupied operating station. When the bag at the operating station has been moved therefrom, switch 24 will reconnect motor 20 to its source of power, starting conveyor belt 12 and delivering the bag thereon to the roller conveyor and the operating station.

Under some circumstances, the input conveyor system may be provided with a vibrator system to insure that the bags are tightly packed. Such vibrator systems for use with conveyor belts, for instance, are well known and will not herein be described.

It is also contemplated that the roller conveyor may be replaced with a continuously running belt conveyor in some instances, or that the entire input conveyor system have a single conveyor belt. In the latter case, the belt may be run either intermittently or continuously, although I prefer that such belt be normally run continuously and be provided with switches as described above to prevent the delivery of more than one bag at a time to the operating station. With a continuously running belt which extends through the operating station, plate 26 serves to position bag 4 at the operating station and to prevent its further movement along the intake conveyor system while the conveyor belt continues to move relatively to said bag.

The initial pasting and folding operations are performed on a bag 4 by the contour paster and swivel folder, as best shown in Figs. 2, 3, 4, and 5, while said bag is maintained in stationary position at the operating station with a narrow side against positioning plate 26 and a broad side adjacent the enclosure 6 provided for said paster and folder. After such initial pasting and folding operations, the bag 4 is moved broad side foremost from said operating station onto conveyor 8 by a ram mechanism operated from within enclosure 6. Said paster, folder and ram mechanism are operated in a timed cycle by means of a solenoid operated single revolution clutch 30. A normally open switch 28 for actuating said clutch is mounted adjacent the operating station and is adapted to be actuated by a bag 4 in position at said station, said switch 28, for instance, being mounted adjacent the resilient mounted backing plate 26 so that it will be actuated by the movement of said plate when a bag moves into position at said operating station. The clutch 30, driven by motor 32 through belt 31, speed reduction gear 33 and chain drive 35, is arranged when actuated by switch 28 to drive a shaft 36 mounted for rotation on the frame of enclosure 6, said shaft having mounted thereon three cams for operating in a timed cycle the paster, folder, and ram, through appropriate cam followers and levers, all as hereinafter more fully explained.

Referring now to Figs. 2, 3, and 5, the contour paster is mounted on frame 7 of enclosure 6 for movement toward and away from said operating station, so that when a bag 4 is in position at said operating station, the contour paster may be moved forward to apply a stripe of paste or other suitable adhesive to the inside surface of the upstanding portion of the wall of said bag opposite enclosure 6, a backing plate 39 being provided mounted in fixed position on the upper frame of conveyor 8 adjacent the outer surface of said wall to support said wall while paste is being applied thereto, said plate having resiliently mounted thereon a curved bar 38 to support the wall of said bag.

The contour paster assembly includes a paste applying endless V belt 40 mounted for movement around and extending between spaced sheaves 42 on the forward end of sliding arms 44, each of said arms 44 being guided for reciprocating

movement in a curved path by means of a pair of spaced cam followers, forward followers 45 and rear follower 46, on said arms operating in cam tracks 48. The tracks 48 are mounted in fixed position on frame 7 of enclosure 6 generally parallel and horizontally spaced from one another, the forward portion only of said tracks 48 being curved outwardly away from one another. A slide 50 is mounted on frame 7 on tracks 48 between arms 44 for reciprocating movement in a direction generally parallel to that of said arms, said slide serving to move arms 44 through a pair of links 52 connected between the forward end of slide 50 and each of arms 44. A paster belt driving sheave 51 is rotatably mounted on slide 50, said sheave having a pinion 53 engaging a rack 55 mounted on frame 7 adjacent the path of travel of said slide. The slide 50 is reciprocated by means of a lever 54 connected to said slide by link 49, said lever being pivotally mounted on frame 7 at 56. The lever 54 is adapted to be moved by the rotation of single revolution clutch 30 through a contour paster cam 59 on shaft 36 through cam follower lever 57 and link 58 between lever 54 and lever 57. Thus, when cam 59 is rotated by single revolution clutch 30, lever 54 will be moved to reciprocate slide 50 and move arms 44 along tracks 48, said cam tracks together with cam followers 45 and 46 on said arms serving to move the outer ends of said arms carrying sheaves 42 forward and outward away from one another to move belt 40 bodily forward and to press belt 40 against the inner wall of bag 4 to apply a stripe of paste to said bag as shown in the dotted line position of Fig. 3, as well as in Fig. 5, and then retract said arms to their starting point. At the same time as belt 40 is in contact with bag 4, sheave 51 is rotated by the movement of pinion 53 along stationary rack 55 to move belt 40 in a direction along its axis to wipe belt 40, which passes around sheave 51 as well as sheaves 42, across the surface of the inner wall of the bag 4.

The belt 40 is provided with a paste reservoir 60 for supplying paste to said belt and rollers for transferring said paste to belt 40, including a paste dip roller 62 mounted for rotation about a horizontal axis and partially immersed in the paste in reservoir 60, a paste transfer roller 64 mounted for rotation about a vertical axis for transferring paste from said paste reservoir roller to paste applicator roller 66, said paste applicator roller being rotatably mounted on a vertical axis and running in contact with belt 40. Thus movement of said belt 40 imparted by the rotation of sheave 51 moves belt 40 past roller 66 to apply paste to said belt and transfer it to bag 4.

In order to drive the various paste rollers, roller 62 is provided with a sheave 63, driven through a belt drive including belts 65 and 67 by any suitable means. A set of bevel gears 68 is provided between dip roller 62 and transfer roller 64 to drive said transfer roller, and a belt 69 is provided between said transfer roller and applicator roller 66 to drive said applicator roller. In addition, I prefer to provide a sheave 74 for belt 40 adjacent the paste applicator roller 66 to enable the applicator roller to more uniformly apply paste to said belt.

In order to properly guide and tighten V belt 40, I further provide a sheave 70 on arm 71, said arm 71 being pivotally mounted on slide 50 and biased by a spring 72 to keep belt 40 tight. A guide sheave 76 is preferred, mounted on arm 44 adjacent sheave 70 to uniformly guide the belt 40

to sheaves 42 in spite of the pivoted movement of arm 71 carrying sheave 70.

Referring now to Figs. 2, 4 and 5, the novel swivel folder of my invention is mounted beneath the contour paster assembly on frame 7 of enclosure 6 for movement toward and away from the operating station so that it may be moved forward to push down the broad wall of the bag 4 adjacent enclosure 6 and, immediately after a stripe of paste has been applied to the inner surface of the opposite wall of said bag by the contour paster, fold by toggle motion of the movable wings or folder blades of the arms said wall downwardly over the opposite wall and form the ends of said walls into triangular flaps extending horizontally outwardly beyond the narrow sides of the bag.

The swivel folder assembly includes a pair of folder blades 80, said folder blades being pivotally mounted at 81 on the forward end of a pair of arms 82, each of said arms being guided for reciprocating movement in a curved path by means of a pair of spaced cam followers, forward follower 83 and rear follower 84, on said arms, said cam followers operating in cam tracks 86. The tracks 86 are mounted in fixed position on frame 7 generally parallel to and spaced from one another, the forward portion only of said tracks being curved outwardly away from one another. A slide 88 is mounted between tracks 86 on frame 7 for reciprocating movement in a direction parallel to that of said arms, said slide serving to move arms 86 and swivel folder blades 80 through a pair of links 92 connected between the forward end of slide 88 and each of arms 82 at point 81. A second pair of links 94 is connected between the rear end of slide 88 and swivel folder blades 80 at points 96 spaced rearwardly on said blades of pivot points 81. The slide 88 is reciprocated by means of a lever 90 connected to said slide by a link 91, said lever being pivotally mounted on frame 7 at 56. The lever 90 is adapted to be moved by the rotation of single revolution clutch 30 through swivel folder cam 102 on shaft 32 and cam follower lever through link 98. Thus, when cam 102 is rotated by single revolution clutch 30, lever 90 will be moved to reciprocate slide 88 and move arms 82 along cam tracks 86, said tracks together with cam followers 83 and 84 on said arms serving to move the outer ends of said arms forward and outward. At the same time, links 94 move folder blades 80 about pivots 81 to swivel the rear ends of said blades 80 outwardly about pivot 81 as said folder blades are simultaneously moved bodily outward, thus the swivel folder blades 80 operate to fold the previously pasted wall of said bag downwardly over the opposite wall by pressing the sides of the upstanding portion of said bag outwardly and forwardly at the optimum angle to form a neat and uniform fold therein, the excess portions of the top of said bag at the same time being formed into triangular flaps extending horizontally outward from the narrow sides of said bag.

The ram mechanism for moving a bag 4 from the operating station onto conveyor 8 after the initial pasting and folding operations have been performed as well as for initially positioning said bag, as best shown in Fig. 2, includes a generally vertical face plate 110 adjacent and generally parallel to a broad wall of bag 4, said face plate 110 being mounted for reciprocating movement in a horizontal plane toward and away from conveyor 8. The cam face plate 110 is mounted on cam slide 112, said slide being guided for re-

ciprocating travel by rollers 114 rotatably mounted on frame 7 and moved by a lever 116 connected to said slide by a link 118. The lever 116 pivoted at 56 on frame 7, is adapted to be moved by the rotation of single revolution clutch 30 through ram mechanism cam 120 on shaft 36 and cam follower lever 119 through cam link 117. Thus, when cam 120 is rotated by single revolution clutch 30, lever 116 will be moved to reciprocate ram slide 112 and face plate 110 to move the initially pasted and folded bag broad side foremost in upright position from the operating station onto conveyor 8 for further pasting and folding, as well as sealing operations.

The contour paster, the swivel folder, and the ram mechanism are arranged to be operated in a timed cycle by means of their respective cams 59, 102 and 120. The cam surfaces of said cams are respectively formed and aligned so that, when the single revolution clutch 30 is actuated by switch 28 to revolve shaft 36, the ram 110 will first be moved forward to position a bag, then the swivel folder blades will move forward, immediately followed by the contour paster. After the contour paster has been moved to its most forward position, has applied paste to the bag and has been retracted, the swivel folder reaches its most forward position and the swivel folder blades 80 are opened outward. While the swivel folder blades are thus maintained, the ram mechanism operates to push the bag from the operating station onto conveyor 8, after which both the swivel folder and the ram mechanism are retracted to their inoperative position in readiness for the start of a new cycle.

Although I prefer to use the contour paster as above described to apply a stripe of paste to the inner surface of a wall of said bag, under some circumstances a simpler spray operated paster mechanism may be used. Such a mechanism includes a reservoir mounted adjacent the operation station, said reservoir having a supply tube extending vertically downwardly into the adhesive in said reservoir and a horizontal air tube pointed toward the upstanding portion of said bag and with its open end closely adjacent the upper open end of the supply tube. The air tube is provided with a valve operated by a link on lever 54 and is connected to any suitable source of air pressure, so that when lever 54 is reciprocated, the valve will be opened to blow air across the top of the supply tube and provide a spray of adhesive which will apply adhesive to the inner surface of the opposite wall of a bag in position at the operating station.

The discharge conveyor portion of my novel bag closing and sealing machine, as best shown in Figs. 1, 5, 6, 7, and 8, includes a relatively long main supporting frame 130 having a belt conveyor 132 therein which extends horizontally for substantially the entire length of said frame at the bottom thereof. The belt conveyor 132 is supported by a roller 134 rotatably mounted on frame 130 at the input end thereof adjacent the operating station and by a roller 136 rotatably mounted on frame 130 at the output end thereof, said roller 136 being continuously driven by motor 137 through chain drive 138. A number of small rollers 140 rotatably mounted on frame 130, support the upper flight of belt 132, while a means of tightening belt 132 is provided by rollers 142 and 143 mounted on arm 144 pivoted on frame 130.

An adjustable upper frame 150 is mounted for adjustable vertical movement at the upper part of main frame 130, a pair of adjusting screws 152 being provided. Screws 152 are mounted at the top of main frame 130 for rotation about a vertical axis and pass through nuts 154 mounted in fixed position on adjustable frame 150. Turning wheels 156 are preferably provided on screws 152 so that adjustable frame 150 may be moved vertically to adjust for the vertical height of the bags to be operated on by the apparatus.

The upper frame 150 is provided with pasting, folding and sealing devices for completing the closing and sealing of a bag delivered in upright position broad side foremost to belt conveyor 132 by the ram mechanism as above described, since the outwardly horizontally extending flaps formed at the operating station must be first pasted and then folded over across the top of the bag to complete the closing operations, and the so pasted and folded top must be held in position for a sufficient time to permit the paste or other adhesive to dry and thus complete the sealing of the bag.

I have thus provided a second pasting device to apply paste to the upper surfaces of said flaps, such device including, rotatably mounted on horizontal axes on each side of upper frame 150, an applicator roller 160, a transfer roller 161, and a dip roller 162 partially immersed in the paste in reservoir 164. The applicator roller 160 is suitably driven by chain drive 165, as hereinafter more fully explained, and itself drives dip roller 162 through transfer roller 161. Rotatably mounted on upper frame 150 beneath each applicator roller 160 is a backing roller 166, preferably having a conical shape with the cone surface substantially tangential to the surface of roller 160. Such backing roller serves properly to support the flap extending outwardly from each narrow side of a bag, so that paste will be supplied to the upper surface of said flap as it passes between the applicator roller 160 and the backing roller 166.

A flap folding device is mounted on each side of frame 150 immediately following the flap pasting device as above described, said flap folding device including a relatively thin and narrow folding element 170 curved inwardly in a horizontal plane and at the same time first upwardly and then downwardly in a vertical plane, so that as a bag is moved past such element 170 said element will progressively fold the pasted outwardly extending flap by pressing upon the unpasted surface thereof until the flap is rotated through approximately 180° about its inner edge and is pressed firmly against the previously folded portions at the top of the bag.

I have found that, in order properly to seal a pasted and folded bag, not only is it necessary to press the pasted and folded portions of said bag together until the adhesive thereon has had a chance to set up, but also to provide such pressure immediately after a pasting and folding operation and maintain it continuously until the adhesive has had time enough to set up, as well as to provide extra pressure for the central portion of the bag. I have thus provided, mounted on upper frame 150, a narrow belt 180 which extends for substantially the entire length of the upper frame 150 and is adapted to overlie and press down upon the central portion only of a bag as soon as said bag is delivered to conveyor to form the operating station, such belt 180 being narrow enough to permit the flap folding elements 170 to operate to fold the flaps inwardly upon the previously folded portions, as well as to

provide desirable extra pressure on the central portion of the bag during drying of the adhesive. In order to hold the pasted and folded flaps in position, I have provided a wide second overlying belt 182 within said belt 180, said wide belt 180 being wide enough to press down substantially the entire top of a bag and extending from immediately behind the rear portion of folder elements 170 for substantially the remaining length of upper frame 150. The narrow belt 180 and the wide belt 182 are supported at their forward ends by rollers 181 and 183 respectively, roller 183 further serving to drive the paste applicator chain drive 165. The rear end of belt 182 is supported and driven by roller 184 at the same speed as that of conveyor belt 132, said roller being driven by articulated chain drive 185 from conveyor belt roller 136, while the rear end of narrow belt 180, after being led around guiding rollers 187 and 189, is driven by roller 188 likewise at the same speed as that the conveyor belt 132 of said roller is being driven by roller 184 through chain drive 190. Rollers 192 and 193 adjustably mounted on upper frame 150 are provided to enable the tension of belt 182 to be adjusted, while roller 189, also adjustably mounted on upper frame 150, serves to adjust the tension of belt 180.

Belts 180 and 182 are pressed downwardly to provide suitable sealing pressure for the tops of bags passing along belt conveyor 132 by rollers 194, said rollers being mounted on upper frame 150 for limited vertical movement and, by their weight, serving to press downwardly upon the inner surfaces of belts 180 and 182. Shorter rollers 196 are similarly mounted to press down upon belt 189 at the forward end of frame 150 where belt 180 supplies the sealing pressure to the central portion only of a bag.

In some instances, it is desirable to provide side belts 181 mounted on pulleys 183 at the sides of the forward portion of the apparatus to support the sides of a bag.

To provide a smooth application of the sealing pressure, I prefer to employ a plate 198 pivoted on a shaft 199 which is mounted horizontally on frame 150 in front of the narrow belt 180, just below fixed backing plate 39. The plate 198 normally assumes a vertical position since its center of gravity is beneath the shaft 199, but when a bag is pushed from the operating station onto belt conveyor 132, the plate pivots to an approximately horizontal position, pressing down the previously pasted and folded top of the bag in position to be engaged by the narrow belt 180, as well as aligning the outwardly extending flaps with the paste applicator rolls 160.

In normal operation, the input conveyor system of my novel machine is supplied with a succession of filled bags with open tops in upright position, as from a bag filling machine (not shown) such bags being positioned on the intake belt conveyor 12 with their narrow sides foremost to the direction of travel of said conveyor belt. The bags thus supplied pass beyond the end of the belt conveyor 12 onto rollers 16 of the roller conveyor and move by gravity to the operating station against positioning plate 25, a suitable control being provided as above described to prevent the delivery of more than one bag at a time to said operating station.

The arrival of a bag at the operating station actuates switch 28 and engages single revolution clutch 30 to begin in a timed cycle the initial pasting and folding operation which are performed while the bag 4 remains in stationary

position at the operating station, as well as to perform the removal of a bag from the operating station onto conveyor 8 after the completion of such operations. As best seen in Fig. 9, the swivel folder blades 80 first push down one board wall of the bag and the contour paster belt 40 then engages the inner surface of the opposite board wall thereof, while swivel folder blades 80 fold said one wall firmly down upon the contents of the filled bag (Fig. 9a). The contour paster next opens to its full extent and wipes belt 40 across the inner surface to transfer paste from the belt to the bag, the wall of said bag being supported by fixed plate 39 and resilient bar 38, while the swivel folder blades 80 continue their forward movement (Fig. 9b). The contour paster is then retracted, and swivel folder blades 80, which have advanced to the forward wall of the bag, are pivoted to open them and fold the pasted forward wall of said bag downwardly on top of the previously folded wall and to form horizontal flaps extending outwardly beyond the narrow sides of said bag (9c). While said blades are thus momentarily held in position, pusher plate 110 moves the bag from the operating station onto belt conveyor 132, under pivoted plate 198 which pushes the pasted and folded top of the bag downwardly. The central portion only of the top of the bag is then engaged by the narrow overlying belt 180 to hold the previously pasted and folded portions of the bag in position, while the bag moves along belt conveyor 132 past paste applicator rolls 160 which apply paste to the upper surface of the outwardly extending flaps (Fig. 9d). The bag then moves past folder elements 170, such elements serving to fold the pasted flaps upwardly and over onto the previously folded portions (Fig. 9e). The top of the completely pasted and folded bag is then engaged by wide belt 182 to hold the pasted and folded portions in position and apply sealing pressure until the paste has dried, the discharge conveyor 8 being of a length sufficient to allow the necessary drying of the adhesive to provide a properly sealed bag.

The novel bag closing and sealing machine of my invention as above described has, as a practical commercial matter, permitted the automatic closing and sealing at the rate of ten bags per minute, containing either twelve five pound bags or six ten pound bags of sugar, whereas the previously used hand method could be carried on only at the rate of about 3 bags per minute per man, and in the latter case, the resulting closing and sealing was not uniform.

It will be understood by those skilled in the art that various modifications may be made of our bag closing and sealing machine within the spirit of my invention and the scope of the appended claims.

I claim:

1. A bag closing and sealing machine including a first conveyor for supplying a bag narrow side foremost with an open top in upright position to an operating station, a first adhesive applying means for applying adhesive to the inner portion of one wall of said bag while it remains in stationary position at said station, a folder element for forcing the opposite wall of the top inwardly and folding said one wall over and upon the said opposite wall and forming the laterally adjacent walls into flaps while said bag remains in stationary position at said operating station, ram means for moving said bag from said operating station in a direction perpendicular to the direc-

tion of travel of said first conveyor, a second conveyor adapted to move in a direction parallel to the movement of said ram means for receiving said bag from said ram means and moving it broad side foremost away from said operating station, a second adhesive applying means adapted to apply adhesive to said flaps, means for folding said flaps against the previously infolded parts, and overlying bag contacting means including a belt moving in the same direction and at substantially the same speed as the second conveyor belt adapted to press upon the top of said bag to hold the infolded parts in position during the setting of the adhesive.

2. In a bag closing and sealing machine, a folder element having in combination a pair of folder blades, means for together moving said folder blades bodily in a plane forwardly and outwardly way from one another, said means including a slide adapted to move said blades forward, a link connecting said slide and each of said blades, and an arm connected to each of said blades, said arm having a pair of spaced cam followers movable in an outwardly curved cam track to cause said blades when moved forwardly by said slide to move outwardly away from one another, and a link for swinging each of said blades relative to said arms and about an axis perpendicular to said plane to swing said blades outwardly to open position, whereby said folding element forces one wall of the top of a bag inwardly, folds the opposite wall over and upon said one wall, and forms the laterally adjacent walls with flaps.

3. In a bag closing and sealing machine, a folder element having in combination a pair of folder blades, means for together moving said folder blades bodily in a plane forwardly and outwardly away from one another, said means including a slide adapted to move said blades forward, a first link connecting a first point on said slide and a first pivot point on each of said blades, and an arm connected to each of said blades at said first pivot point, said arm having a pair of spaced cam followers movable in an outwardly curved cam track to cause said blades when moved forward by said slides to move outwardly away from one another, and means for swinging each of said blades relative to said arms and about said first pivot point, said means including a second link connecting a second pivot point on each of said blades and a second pivot point on said slide spaced from said first pivot point on said slide, whereby said folding element forces one wall of the top of a bag inwardly, folds the opposite wall over and upon said one wall, and forms the laterally adjacent walls with flaps.

4. A machine for closing and sealing the open tops of bags, including conveyor means for supplying a bag narrow side foremost with an open top in upright position to an operating station, a first adhesive applying means for applying adhesive to the inner portion of one wall of said bag while it remains in stationary position at said station, a folder element for forcing the opposite wall of the top inwardly and folding said one wall over and upon the said opposite wall and forming the laterally adjacent walls into flaps while said bag remains in stationary position at said operating station, conveyor means for moving said bag broad side foremost from said operating station, a second adhesive applying means adapted to apply adhesive to said flaps, means for folding said flaps against the previously infolded parts, and overlying bag contacting means adapted to press upon the top of said bag to hold the infolded parts in position during the setting of the adhesive, said overlying bag contacting means including a first belt means overlying the central portion only of said bag to hold the previously infolded parts in position while said flaps are being folded, and a second belt means overlying the flaps after said flaps have been infolded to hold said flaps in position, said second belt means extending for a sufficient distance to permit substantial setting of the adhesive.

5. A machine for closing and sealing the open tops of bags, including conveyor means for supplying a bag narrow side foremost with an open top in upright position to an operating station, a first adhesive applying means for applying adhesive to the inner portion of one wall of said bag while it remains in stationary position at said station, a folder element for forcing the opposite wall of the top inwardly and folding said one wall over and upon the said opposite wall and forming the laterally adjacent walls into flaps while said bag remains in stationary position at said operating station, conveyor means for moving said bag broad side foremost from said operating station, a second adhesive applying means adapted to apply adhesive to said flaps, means for folding said flaps against the previously infolded parts, and overlying bag contacting means adapted to press upon the top of said bag to hold the infolded parts in position during the setting of the adhesive, said overlying bag contacting means including a first belt means overlying the central portion only of said bag, and a second belt means overlying the flaps after said flaps have been infolded to hold said flaps in position, both of said belt means extending for a sufficient distance to permit substantial setting of the adhesive.

6. A bag closing and sealing machine including conveyor means for supplying a bag narrow side foremost with an open top in upright position to an operating station, a first adhesive applying means for applying adhesive to the inner portion of one wall of said bag while it remains in stationary position at said station, said adhesive applying means including an adhesive applying belt movably mounted on a pair of arms, said arms being operable to move forwardly and outwardly to press said belt against the inner surfaces of the said one wall of said bag, means for supplying adhesive to said belt, and plate means for supporting said one wall of said bag while adhesive is being applied thereto, a folder element for forcing the opposite wall of the top of said bag inwardly and folding said one wall over and upon the said opposite wall and forming the laterally adjacent walls with flaps while said bag remains in stationary position at said operating station, conveyor means for moving said bag broad side foremost from said operating station, a second adhesive applying means adapted to apply adhesive to said flaps, and means for folding said flaps against the previously infolded parts.

7. A bag closing and sealing machine as claimed in claim 6, further including overlying bag contacting means adapted to press upon the top of said bag to hold the infolded parts in position during the setting of the adhesive.

8. A bag closing and sealing machine including conveyor means for supplying a bag narrow side foremost with an open top in upright posi-

tion to an operating station, adhesive applying means for applying adhesive to the inner portion of one wall of said bag while it remains in stationary position at said station, a folder element mounted rearwardly of a broad side of said bag for forcing the opposite wall of the top of said bag inwardly and folding said one wall over and upon the said opposite wall and forming the laterally adjacent walls with flaps while said bag remains in stationary position at said operating station, said folder element comprising a pair of folder blades and operating means mounted rearwardly of a broad side of said bag for together moving both of said folder blades bodily in a plane forwardly and outwardly away from one another, said operating means including a centrally mounted slide for moving both of said blades forward and camming means adapted and arranged to cause said blades when moved forward by said centrally mounted slide to move outwardly away from one another, and means for moving said bag broad side foremost from said operating station.

9. A bag closing and sealing machine as claimed in claim 8 in which said means for moving said bag broad side foremost from said operating station includes ram means centrally mounted rearwardly of a broad side of said bag.

10. A bag closing and sealing machine as claimed in claim 8 further including a second adhesive applying means adapted to apply adhesive to said flaps, and means for folding said flaps against the previously infolded parts.

11. A bag closing and sealing machine as claimed in claim 10 further including overlying bag contacting means adapted to press upon the top of said bag to hold the infolded parts in position during the setting of the adhesive.

12. In a bag closing and sealing machine, a folder element having in combination a pair of folder blades mounted respectively on a pair of arms, means for together moving said folder blades bodily in a plane forwardly and outwardly away from one another, said means including slide means adapted to move said blades forward, and a link connecting said slide means and each of said blade and arm assemblies, said arm having a pair of spaced cam followers movable in an outwardly curved cam track to cause said blades when moved forward by said slide to move outwardly away from one another, whereby said folder element forces one wall of the top of a bag inwardly, folds the opposite wall over and upon said one wall, and forms the laterally adjacent walls with flaps.

13. In a bag closing and sealing machine, a folder element having in combination a pair of folder blades pivoted respectively on a pair of arms, means for together moving said folder blades bodily in a plane forwardly and outwardly away from one another, said means including a central slide adapted to move both of said blades forward, and a link connecting said slide and each of said blade and arm assemblies, said arm having a pair of spaced cam followers movable in an outwardly curved cam track to cause said blades when moved forward by said slides to move outwardly away from one another, whereby said folder element forces one wall of the top of a bag inwardly, folds the opposite wall over and upon said one wall, and forms the laterally adjacent walls with flaps.

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