Sept. 8, 1970 A. C. FORMO 3,527,337

ARTICLE PUSHER MECHANISM FOR BAGGING MACHINES

Filed April 26, 1967 4 Sheets-Sheet 1

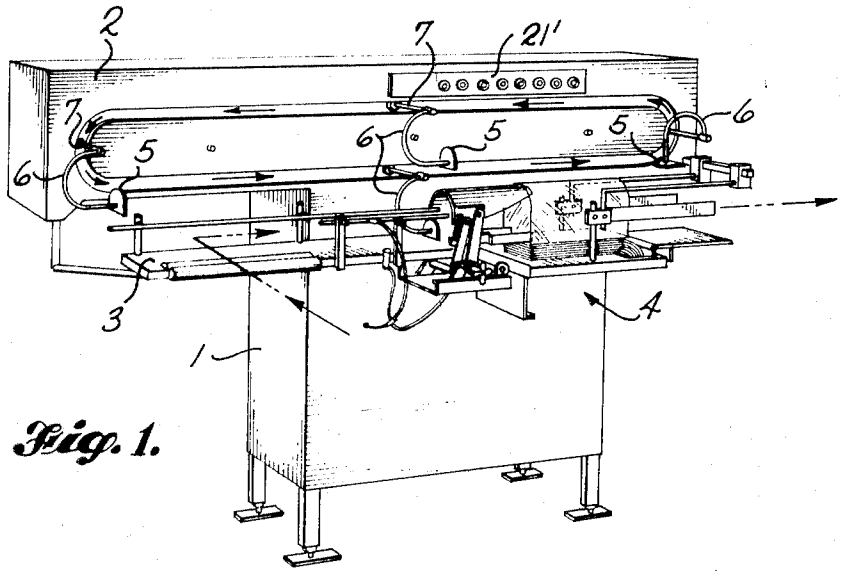


Fig. 1.

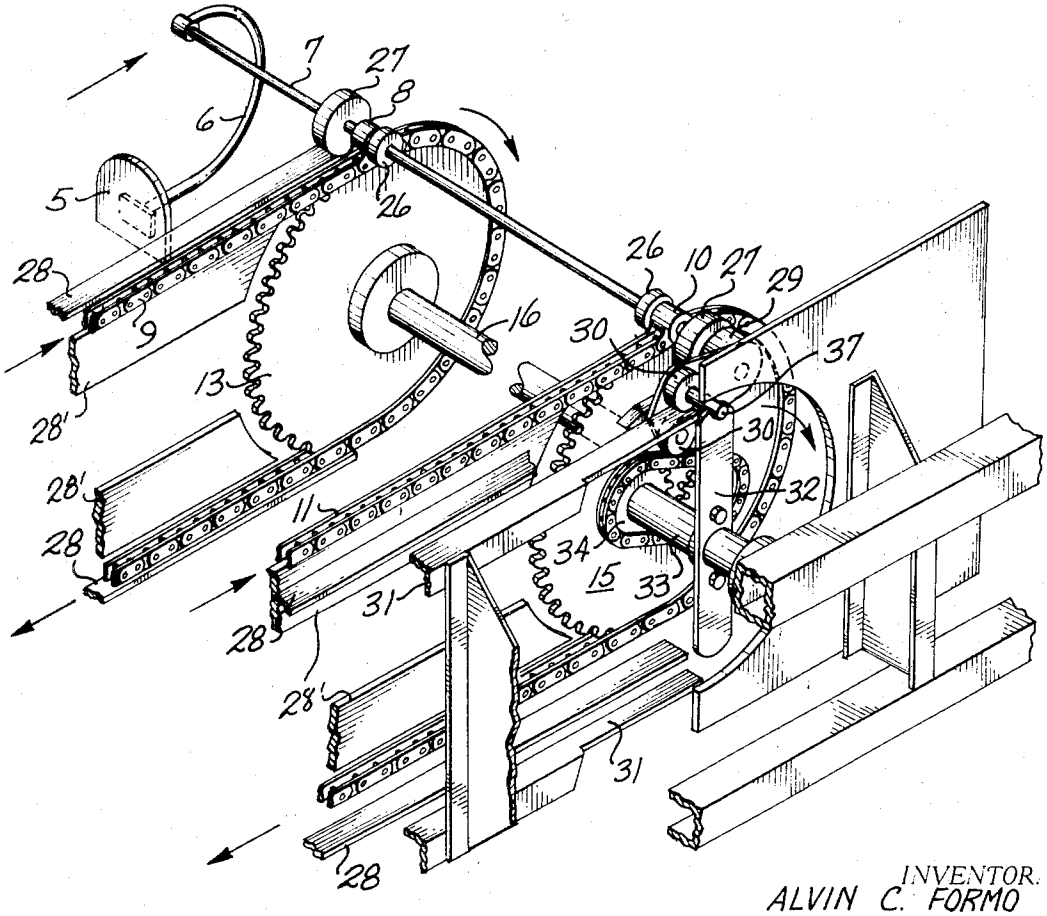


Fig. 4.

INVENTOR.
ALVIN C. FORMO

BY
Robert W. Beach

ATTORNEY

Sept. 8, 1970 A. C. FORMO 3,527,337

ARTICLE PUSHER MECHANISM FOR BAGGING MACHINES

Filed April 26, 1967 4 Sheets-Sheet 2

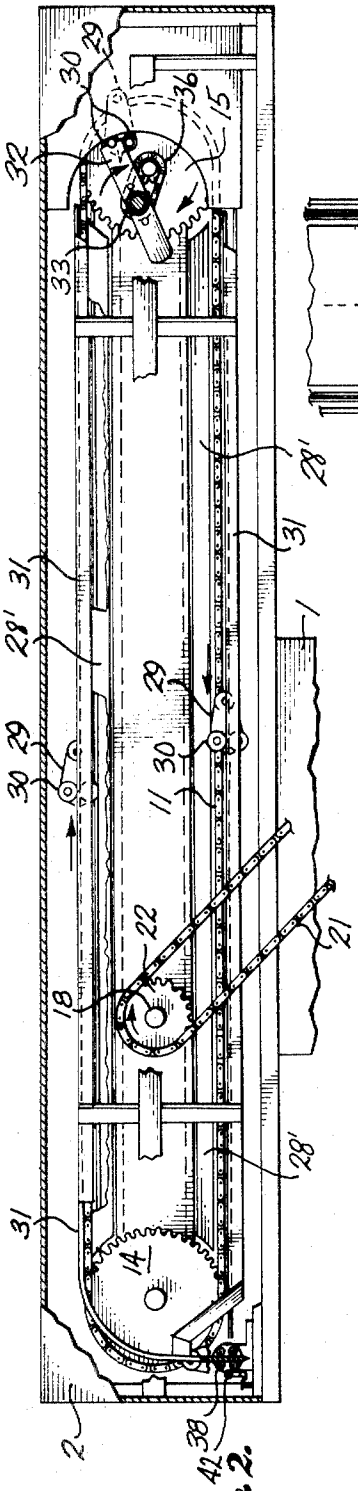


Fig. 2.

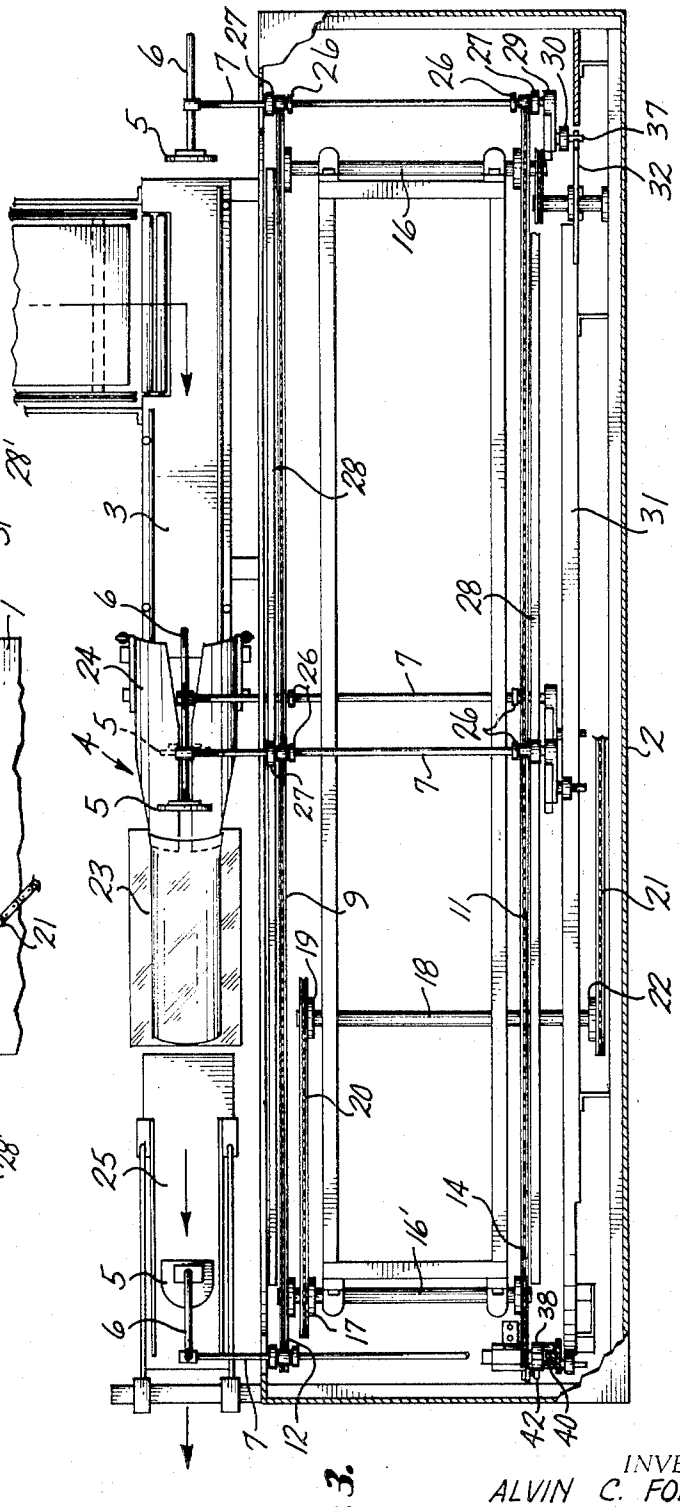


Fig. 3.

INVENTOR.
ALVIN C. FORMO

BY Robert W. Beach

ATTORNEY

Sept. 8, 1970 A. C. FORMO 3,527,337

ARTICLE PUSHER MECHANISM FOR BAGGING MACHINES

Filed April 26, 1967 4 Sheets-Sheet 3

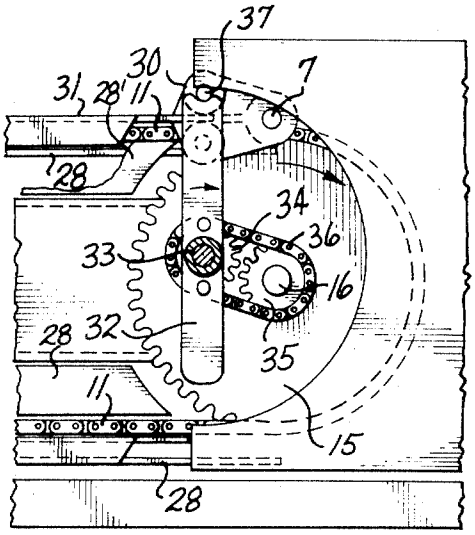


Fig. 5.

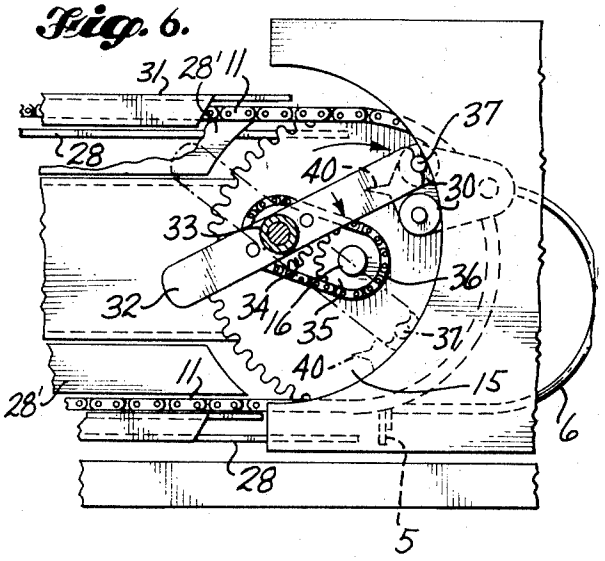


Fig. 6.

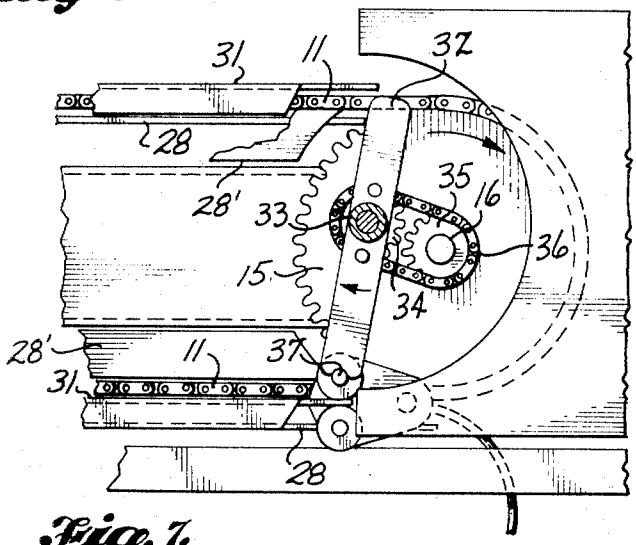


Fig. 7.

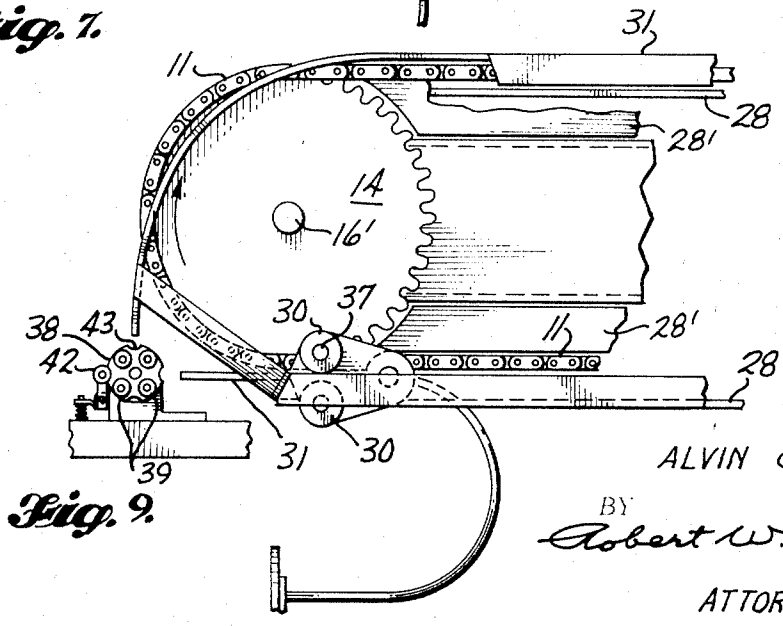


Fig. 9.

INVENTOR.
ALVIN C. FORMO

BY
Robert W. Beach

ATTORNEY

Sept. 8, 1970 A. C. FORMO 3,527,337

ARTICLE PUSHER MECHANISM FOR BAGGING MACHINES

Filed April 26, 1967 4 Sheets-Sheet 4

Fig. 8.

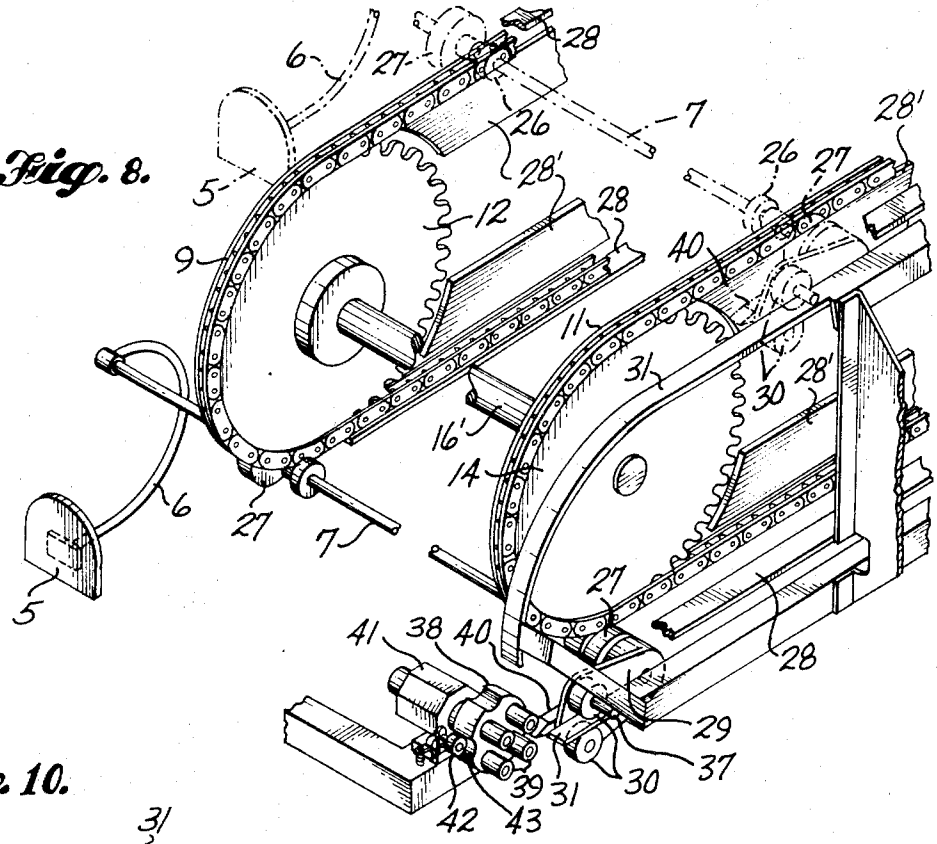


Fig. 10.

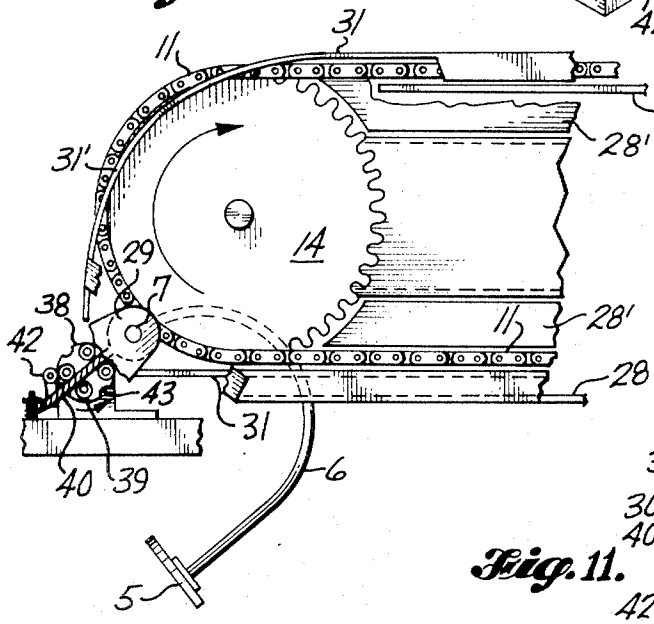
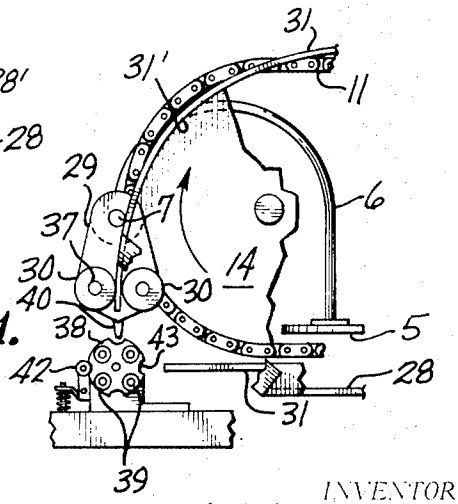


Fig. 11.



INVENTOR.
ALVIN C. FORMO

BY
Robert W. Beach

ATTORNEY

United States Patent Office

3,527,337

Patented Sept. 8, 1970

3,527,337

ARTICLE PUSHER MECHANISM FOR BAGGING MACHINES

Alvin C. Formo, Seattle, Wash., assignor to Formost Packaging Machines, Inc., Seattle, Wash., a corporation of Washington

Filed Apr. 26, 1967, Ser. No. 633,913
Int. Cl. B65g 19/02
U.S. Cl. 198—170 13 Claims

ABSTRACT OF THE DISCLOSURE

An article is pushed by a traveling paddle into the mouth of a bag held open by spreader fingers. A curved arm carrying the paddle is then swung backward withdrawing the paddle from the bag opening as its carrier moves upward around one end of a course having upper and lower straight stretches. A positioner rotatable unidirectionally is engaged by the arm carrier to swing the paddle arm into paddle-retracting position and to return it to its original attitude as the carrier is raised from the lower straight stretch of its orbit to its upper straight stretch. At the opposite end of its orbit a rotary arm synchronized with the travel of the paddle carrier engages such carrier to maintain the attitude of the paddle arm constant as it is lowered from the upper straight stretch of its orbit to its lower straight stretch for movement toward the bagging station.

A principal object of this invention is to provide a positive control over the movement of an article-pushing paddle as it moves around an orbit of a bagging machine for the purpose of pushing an article into a bag and then being retracted from the bag quickly without interruption of the movement of the paddle carrier around the orbit.

More specifically it is an object to provide mechanism which will guide a paddle carrier for retraction of a paddle from the mouth of a bag as the carrier is raised from a lower stretch of its orbit to its upper stretch at one end of the orbit and which will maintain the attitude of the paddle carrier constant as it is lowered from the upper stretch of its orbit to its lower stretch at the opposite end of the orbit.

It is a further object to provide such mechanism which will be of simple construction and effective in operation.

FIG. 1 is a top perspective of the bagging machine.

FIG. 2 is a side elevation of the upper portion of the bagging machine with parts broken away, and FIG. 3 is a plan of the bagging machine having parts broken away.

FIG. 4 is a top perspective of paddle-lowering mechanism of the bagging machine, and FIGS. 5, 6 and 7 are side elevations of such mechanism showing parts in different operative positions.

FIG. 8 is a top perspective of paddle-carrier-raising mechanism of the bagging machine, and FIGS. 9, 10 and 11 are side elevations of such mechanism with parts in different operative positions.

The present invention relates to a machine which is particularly useful for bagging sliced loaves of bread in polyethylene bags, but by modifying the machine in minor respects it can be used for bagging other articles singly or in groups, such as a cluster of bread rolls, or even a

plurality of separate articles which can be moved as a group by a pusher paddle into the open end of a bag suitably held open. In such a bagging machine it is important that the pusher paddle be moved rapidly and under positive control at all times so that it will engage the article or articles to be bagged properly and firmly during the bagging operation and will then be retracted quickly and reliably from the bag to be returned to a starting location for effecting another bagging operation.

The particular bagging machine illustrated in the drawings has a base **1** supporting a superstructure **2** located alongside a table **3** over which articles to be bagged are moved to the bagging station **4**. Such movement is effected by the pusher paddles **5** supported on the ends of curved arms **6** which are attached to carrier rods **7**. As shown in FIG. 3, each of these rods is supported by a collar **8** carried by a roller chain **9** and a second collar **10** spaced from collar **8** and carried by a roller chain **11** as shown in FIG. 4. The roller chain **9** is supported and guided for movement by sprockets **12** and **13** at opposite ends of its loop, as seen in FIGS. 4 and 8. Chain **11** is supported and guided by sprockets **14** and **15** at opposite ends of its loop. The loops of the two chains **9** and **11** are held in alignment by such sprockets and establish the orbit about which the paddle carrier rods **7** are moved. Sprockets **13** and **15** are rotatively carried by common shaft **16**.

Shaft **16'** carrying sprockets **12** and **14** also carries a drive sprocket **17** for rotating such shaft, as shown in FIG. 3. An intermediate shaft **18** carries a sprocket **19** which is connected to sprocket **17** by chain **20**. A powered chain **21** engages sprocket **22** mounted on shaft **18** to drive such shaft. Power supplied to the chain **21** will drive the two paddle-carrying chains **9** and **11** at a speed corresponding to the speed at which it is desired to move articles along the table **3** during the bagging operation. The mechanism for powering chain **21** can be controlled by suitable controls **21'** for the purpose of starting and stopping movement of the paddle-carrying rods **7** around their orbits.

At the bagging station **4** a stack of bags **23** such as of polyethylene material is supported so that the open ends of these bags face articles moved toward them along the table **3** by the paddles **5**. The mouth of the uppermost bag can be opened by an air jet to enable the adjacent ends of spreader fingers **24** to be moved into the bag end. Such spreader fingers are reciprocated toward the bag stack and are spread apart to open the mounth of the bag to receive the article or articles to be bagged, such as a sliced loaf of bread. When the article to be bagged has been lodged in the bag by the paddle, continued movement of the paddle will separate the filled bag from the bag stack and carry it onto a discharge table **25**. The paddle-carrying mechanism then operates to withdraw the paddle from the mouth of the bag and to return the paddle around the orbit defined by the chains **9** and **11** to engage and bag another article.

Each pusher paddle **5** is supported by its arcuate arm **6** depending from its supporting rod **7** so that the carrier rod will be above the path of travel of the article to be bagged and consequently will not interfere with movement of such article. The paddle-supporting arm is curved rearwardly and upwardly from the paddle so that the paddle can be advanced a substantial distance into the mouth of the bag during the filling operation without the curved arm interferring with the bag mouth. The paddle

should be spaced far enough from the carrier rod **7** so that when the article has been bagged the paddle can be withdrawn from the mouth of the bag by rotation of the rod **7** about its axis even though such rod may still be moving in the same direction that the filled bag was moved by the paddle. The upper and lower straight stretches of the orbit traveled by the paddle-supporting rods must, however, be spaced apart a distance greater than the distance between such rod and the portion of the paddle carried by it which is farthest from such rod so that as a paddle-carrying rod is moved in one direction along the upper stretch of its orbit, its paddle can pass a paddle-supporting rod moving in the opposite direction along the lower stretch of the orbit.

It has been found to be desirable to control positively the attitude of the paddles **5** and their supporting arms **6** as they travel around the orbit defined by the chains **9** and **11**. Such attitude is controlled by controlling the rotation of the arm carrier rods **7** in their collars **8** and **10**. Such rods are freely rotatable in such collars but are held against lengthwise shifting relative to such collars by set collars **26** secured to the rod **7** adjacent to the respective collars **8** and **10**. The rods **7** are guided for movement in a linear path along the upper and lower stretches of the orbit by rollers **27** mounted on the shaft, which ride on tracks **28** alongside the upper and lower stretches of the chains **9** and **11**. The guiding engagement of the rollers with these tracks avoids the necessity of the chains **9** and **11** being held sufficiently tight to support the rods **7** and the paddles, so that sagging of stretches of chains **9** and **11** between adjacent rods **7** does not affect the course of movement of such rods. Plates **28'** hold chain stretches **9** and **11** straight.

It is preferred that the paddles **5** and their supporting arms be maintained in the same attitude while their supporting rods are being moved along both the top and bottom stretches of the orbits through which such rods move. The attitude of the paddles can be established by controlling the rotation of rods **7**, and such rotation can be controlled by controlling the swinging of a crank arm **29** attached to rod **7**. As shown best in FIG. 4 such crank arm carries upper and lower rollers **30** spaced apart slightly from each other and spaced a considerable distance from the axis of shaft **7**. These rollers straddle a straight guide track **31** extending along the upper and lower stretches of the carrier rod orbit between the chain-carrying sprockets. Because engagement of either roller **30** with the track **31** will hold the crank **29** against swinging the paddle-carrier rod **7** will correspondingly be prevented from turning so as to maintain the paddle **5** and its arcuate supporting arm **6** in a constant attitude.

At the opposite ends of the carrier rod orbit it is necessary to transfer the crank arm rollers **30** from engagement with one track **31** to engagement with the other track **31**. At the article-feeding end of the orbit such rollers and their crank must be lowered from the upper track **31** to the lower track **31**. At the filled-bag-discharging end of the orbit traced by the carrier rods **7** the rollers **30** and their cranks must be raised from the lower track **31** to the upper track **31**. To provide predetermined control of the attitude of the paddles **5** and their supporting arms **6** at opposite ends of the orbit, therefore, and to prevent indiscriminate change of attitude of such paddles and arms during the movement of their carrier rods around the orbit ends, mechanism is provided to control the swinging of the cranks **29** from the time the rollers **30** leave contact with one track **31** and engage the other track **31**. Controlling the swinging of the crank arms **29** during such transfer also enables the rollers to be engaged properly with the track at the end of each transfer operation.

To control swinging of the cranks **29** at each end of the orbit of carrier rods **7** during the transfer operation mentioned above, rotary control means rotatable unidirectionally are provided at each end of the rod orbit. Such unidirectionally rotatable control means at the article-feeding end of the orbit include an arm **32** secured to a stub shaft **33** which is rotated by a sprocket **34** shown best in FIGS. 5, 6 and 7. This sprocket is driven in synchronism with shaft **16**, carrying the sprockets **13** and **15** on which the paddle-driving chains **9** and **11** run, by a sprocket **35** connected to sprocket **34** by a short chain **36**. The spacing between the axes of shafts **16** and **33** corresponds to the spacing between the axis of a paddle-carrier rod **7** and the axis of one of the rollers **30** on crank **29** having a spindle **37** long enough to project into registry with the arm **32**. The end of such arm has in it a notch of a size and shape to engage the spindle **37**.

The length of arm **32** between the axis of shaft **33** and spindle **37** corresponds to the distance between the axis of shaft **16** and the axis of rod **7** during movement of the rod around sprocket **15**. Thus the arc travelled by such spindle is parallel to the arc travelled by rod **7** but is offset from it. The sprockets **34** and **35** and chain **36** are then timed so that the notched end of arm **32** will be in a position to engage the roller spindle **37** as the crank **29** is moved to the article-feed end of the orbit as shown in FIG. 4. Moreover, the carrier rods **7** are spaced along chains **9** and **11** distances corresponding to one or more complete rotations of arm **32**, so that the notched end of such arm will be in a position to pick up the projecting spindle **37** of each crank as its carrier rod **7** approaches the sprockets **13** and **15**, as shown in FIG. 4.

As each crank **29** is carried around the sprocket **15**, the arc traversed by the crank pivot axis coinciding with the axis of carrier rod **7** will be equal to the radius of the arc traversed by the notch in the end of control arm **32**. This notch will be sufficiently deep to prevent the projecting spindle **37** from swinging downward out of such notch before the rollers **30** of the crank arm can engage the lower track **31**. As the arm **32** continues to be rotated, however, the notch will be raised from the projecting spindle so that the crank arm **29** will be released for travel of its rollers along the lower track **31**. Because of the relationship of the arcs traversed by the carrier rod **7** and the notched end of the arm **32** and the synchronization of rotation of sprocket **15** and arm **32**, the crank arm **29** and consequently the associated paddle **5** and supporting arm **6** will be maintained in a substantially constant attitude as the paddle arm and rod **7** supporting them are lowered from the upper stretch of the rod orbit to its lower stretch.

At the filled-bag-discharging end of the orbit of carrier rods **7**, the control means rotatable unidirectionally to control the attitude of the paddle **5** and its supporting arm **6** take the form of a rotor **38** carrying a square cluster of guide rollers **39**. These rollers are spaced apart sufficiently to leave between them passages for receiving a blade **40** carried by the crank **29**. Such blade preferably has a double-beveled end to facilitate its entrance into a passage between guide rollers **39**. The rotor **38** is rotatively mounted in a bearing block **41** located at the discharge end of the lower track **31** as shown best in FIG. 8.

A spring-pressed detent roller **42** mounted near block **41** will engage a recess in the periphery of rotor **38** located to hold the rotor in a position such that one of its passages between opposite rollers **39** will be disposed in alignment with the crank arm blade **40** while the rollers **30** of such crank arm are still engaged with the lower track **31**. By the time that the paddle-carrier rod **7** begins to move upward around sprockets **12** and **14** the blade **40** will have penetrated sufficiently deeply into the passage between the opposite pairs of rollers **39** so as to span between the rollers along such passage. As the paddle-supporting rod **7** moves upward around the sprockets **12** and **14**, therefore, as shown in FIG. 10, the lever action of blade **40** will rotate the rotor **38** from the position shown in FIG. 9 through the position of FIG. 10 to the position of FIG. 11. Continued upward movement of the

carrier rod 7 will then withdraw the blade 40 from between the rollers 39.

As shown in FIG. 11 the blade 40 is not withdrawn from between the rollers 30 until the crank arm rollers 30 can engage the downwardly curved end portion 31' of the upper track 31, so that during further movement of the paddle carrier rod 7 the attitude of the crank arm 29 will be controlled by engagement of its rollers 30 with such curved track portion. By such lever action of the blade 40 the rotor 38 will have been turned through an angle of approximately 90°, so that the detent roller 42 will be in at least partial engagement with another recess 43, such recesses being located at 90° circumferentially of the rotor 38. When the blade 40 is released from the rollers 39, therefore, the detent roller 42 will engage fully in a recess 43 to position the rotor with another passage between rollers 39 in alignment with an approaching blade 40 of another crank arm 29.

It will be seen that during upward movement of the carrier rod 7 from the position of FIGS. 8 and 9 to that of FIG. 11 such carrier rod will have been rotated by crank 29 in a counterclockwise direction through an angle of approximately 90° as seen in FIGS. 9 and 11, because of the cooperation between the crank arm blade 40 and the rollers 39 of rotor 38. Such rotary movement of carrier rod 7 will swing the paddle-supporting arm 6 from the positions shown in FIGS. 8 and 9 through the position of FIG. 10 to the position of FIG. 11. Such swinging of arm 6 will withdraw paddle 5 from the open end of the bag during the initial upward movement of the rod 7 around the lower quadrant of sprockets 12 and 14 even though such rod during such travel still has a component of movement in the direction of movement of the article to be bagged. Such movement also has raised the paddle above the path of movement of the bagged article as shown in FIG. 11.

During continued movement of the rod 7 around the upper quadrants of sprockets 12 and 14 such rod will be turned progressively through approximately 90° in the clockwise direction from the position of FIGS. 1, 3 and 11 to the position shown in broken lines in the upper portion of FIG. 8 by the coaction of crank arm rollers 30 with the curved end portion 31' of the upper track 31. Such turning of carrier rod 7 will swing paddle-supporting arm 6 and its paddle back to the attitude of the paddles shown at the center and left of FIG. 1, which attitude will then be maintained by the mechanism described above until the carrier rod again has reached the filled-bag-discharging end of its orbit.

The control means rotatable unidirectionally for controlling the attitude of the paddles and their supporting arms will function effectively irrespective of the number of paddles moved by chains 9 and 11, as long as the timing is synchronized with rotation of an arm 32 as described above. While ordinarily such spacing will not be sufficiently close to require more than one arm 32 opposite ends of such arm could be notched or additional arms could be provided as may be necessary to synchronize a notched arm with the location of each paddle attitude-controlling crank arm. The single assembly of rotor 38 can control the attitude of all the paddles and arms as long as the carrier rods 7 are spaced lengthwise of chains 9 and 11 a distance at least as great as the circumferential extent of one quadrant of sprockets 12 and 14.

I claim:

1. A bagging machine including a bagging station, article-supporting means in advance of the bagging station supporting articles to be bagged for movement to the bagging station, a pusher paddle engageable with an article to be bagged on the article-supporting means for moving such article to the bagging station, and drive means for moving the pusher paddle in an orbit successively along a lower stretch toward the bagging station, an arcuate stretch, an upper stretch and a second arcuate stretch from such upper stretch back to the lower stretch, wherein the improvement comprises attitude-control means connected to the pusher paddle, orienting means adjacent to an arcuate stretch of the pusher paddle orbit, engageable with said attitude-control means independently of the drive means and rotatable to orient said attitude-control means and, consequently, to govern the attitude of the pusher paddle relative to the drive means during movement thereof around such arcuate stretch of the pusher paddle orbit between the upper and lower stretches of such orbit, means mounting said orienting means for rotation substantially about a horizontal axis, and means restricting rotation of said orienting means to unidirectional rotation.

2. The bagging machine defined in claim 1, in which the attitude-control means includes a crank swingable relative to the drive means to alter the attitude of the pusher paddle, and the orienting means includes a member rotatable in synchronism with movement of the drive means around an arcuate stretch of the pusher paddle orbit and engageable with said crank to govern movement thereof relative to the drive means during travel of the pusher paddle around such arcuate stretch.

3. The bagging machine defined in claim 2, in which the orienting means includes an arm rotatable in synchronism with movement of the drive means around the arcuate stretch of the pusher paddle orbit but rotatable about an axis offset from the center of curvature of such arcuate stretch.

4. The bagging machine defined in claim 3, in which the crank has an arm-engageable member spaced from its axis of swing which is engageable by the orienting means arm.

5. The bagging machine defined in claim 4, in which the distance between the axis of swing of the crank and its arm-engageable member is substantially equal to the distance between the axis of rotation of the orienting means arm and the center of curvature of the arcuate stretch of the pusher paddle orbit adjacent to the orienting means.

6. The bagging machine defined in claim 2, in which the orienting means is located adjacent to the arcuate stretch of the pusher paddle orbit around which the pusher paddle descends from its upper orbit stretch to its lower orbit stretch.

7. The bagging machine defined in claim 1, in which the attitude-control means includes a crank swingable relative to the drive means and carrying a blade, and the orienting means includes a rotor adjacent to an arcuate stretch of the pusher paddle orbit and engageable by said blade as said crank is moved by the drive means for swinging said blade and its crank relative to the drive means and rotating said rotor incrementally as the drive means moves around such arcuate stretch.

8. The bagging machine defined in claim 7, in which the engagement of the blade with the rotor effects swinging of the crank relative to the drive means through an angle of approximately 90 degrees.

9. The bagging machine defined in claim 7, in which the engagement of the blade with the rotor effects swinging of the crank relative to the drive means through an angle of approximately 90 degrees in one direction, and track means engageable by the crank for swinging the crank relative to the drive means in the opposite direction through substantially an equal angle relative to the drive means as the drive means moves around one arcuate stretch of the pusher paddle orbit.

10. The bagging machine defined in claim 7, and detent means engageable with the rotor for deterring rotation thereof, but releasable for rotation of the rotor by engagement of the crank blade therewith.

11. The bagging machine defined in claim 7, in which the rotor is located adjacent to the arcuate stretch of the pusher paddle orbit around which the pusher paddle is

raised from its lower orbit stretch to its upper orbit stretch.

12. The bagging machine defined in claim **7**, and a square cluster of four projections carried by the rotor between pairs of which projections the crank blade is engageable.

13. The bagging machine defined in claim **12**, in which each of the projections is a roller.

References Cited

UNITED STATES PATENTS

2,760,621	8/1956	Crescenzo	198—170
2,817,933	12/1957	Bell et al.	198—170 X
3,217,464	11/1965	Feingold	53—259 X
3,228,171	1/1966	Cory	53—187

TRAVIS S. McGEHEE, Primary Examiner

R. L. SPRUILL, Assistant Examiner

U.S. Cl. X.R.

53—187, 259