

[54] WRAPPING APPARATUS

[75] Inventor: Leon Revaz, Bienne, Switzerland

[73] Assignee: Otto Hansel GmbH, Hannover, Germany

[22] Filed: Oct. 3, 1973

[21] Appl. No.: 403,336

[52] U.S. Cl. 53/234; 53/225; 53/227; 53/370

[51] Int. Cl.² B65B 11/34

[58] Field of Search 53/225, 227, 230, 232, 53/233, 234, 236, 370

[56] References Cited

UNITED STATES PATENTS

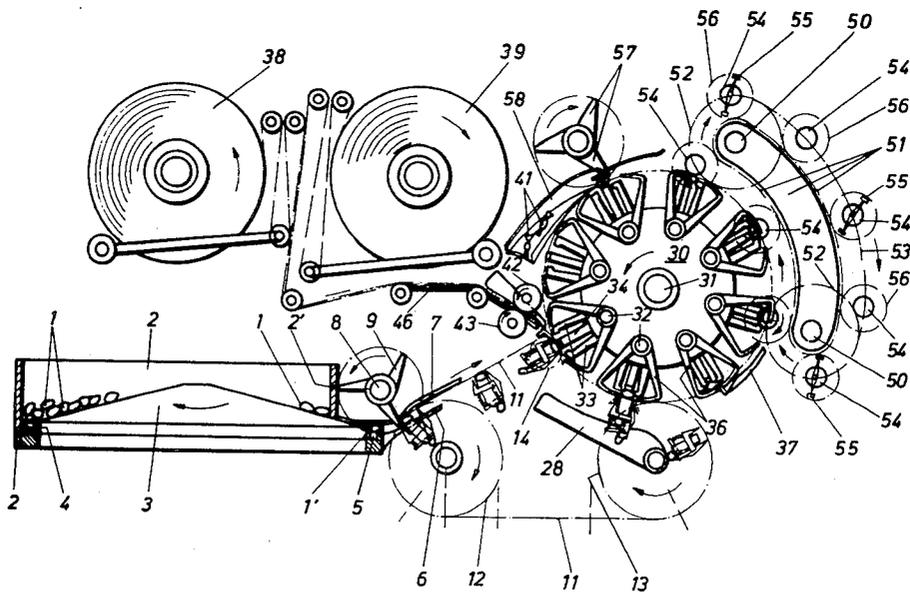
852,961	5/1907	Keyes.....	53/234 X
1,885,543	11/1932	Grover.....	53/227 X
2,243,633	5/1941	Jones.....	53/233 X
2,744,370	5/1956	Seragnoli.....	53/227 X
3,136,104	6/1964	Geer.....	53/234
3,545,172	12/1970	Osterdahl.....	53/236 X
3,797,198	3/1974	Fukuzaki.....	53/227 X

Primary Examiner—Travis S. McGehee
 Assistant Examiner—John Sipos
 Attorney, Agent, or Firm—Roland I. Griffin

[57] ABSTRACT

A feed conveyor carries a plurality of transport devices for transporting sweets from a sweet receiving station to a continuously revolving wrapping head, which in turn carries a plurality of peripheral gripping and folding devices for wrapping the sweets transported to the wrapping head. This feed conveyor is guided around part of the periphery of the wrapping head and travels in synchronism with the wrapping head so that each sweet transported on one of the transport devices may be transferred to a corresponding one of the gripping and folding devices. Another feed conveyor and a deflector are positioned to feed a wrapper between each sweet transported on one of the transport devices and the corresponding one of the gripping and folding devices.

13 Claims, 6 Drawing Figures



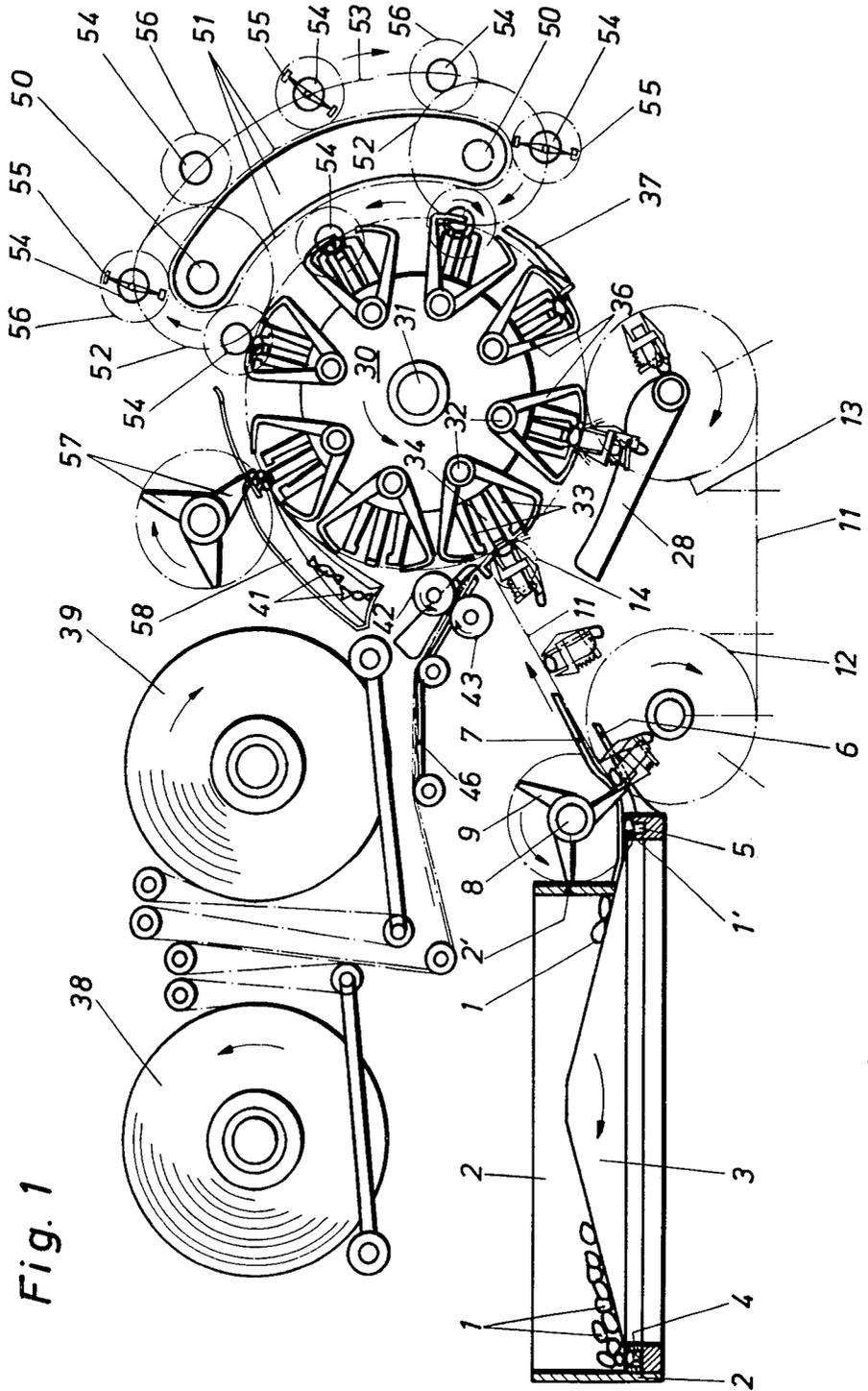


Fig. 1

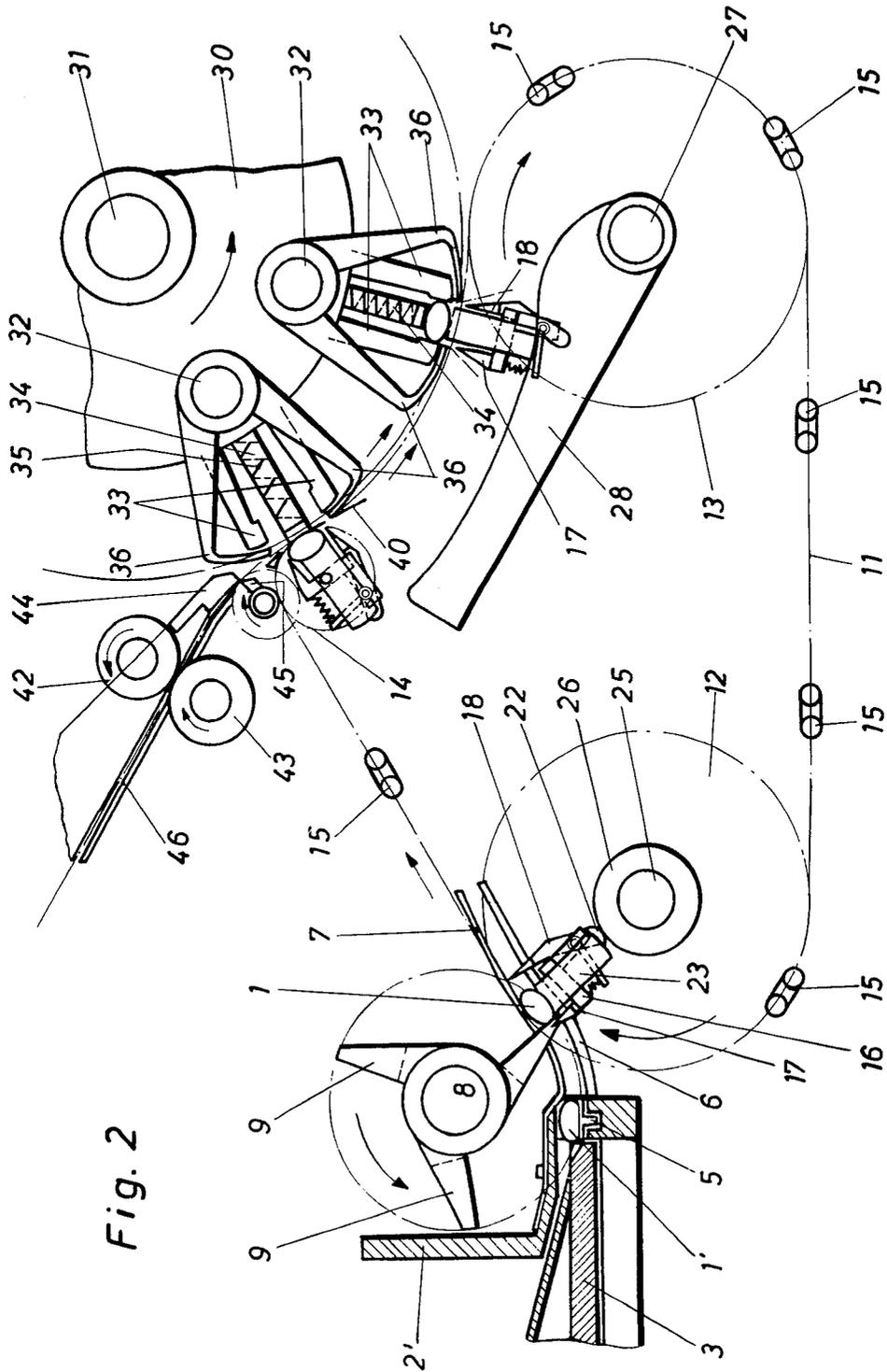


Fig. 2

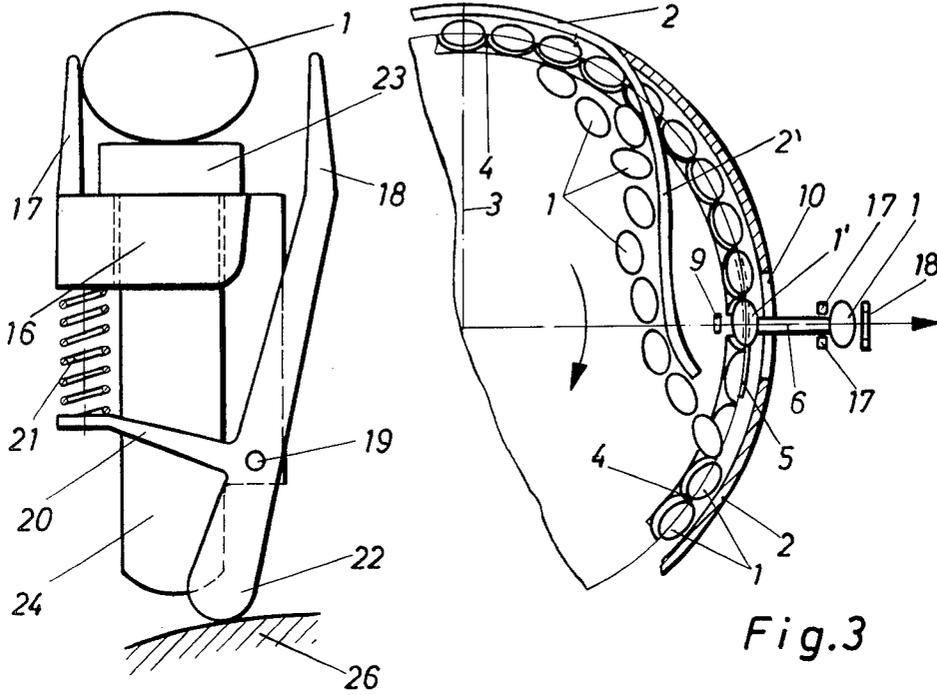


Fig.4

Fig.3

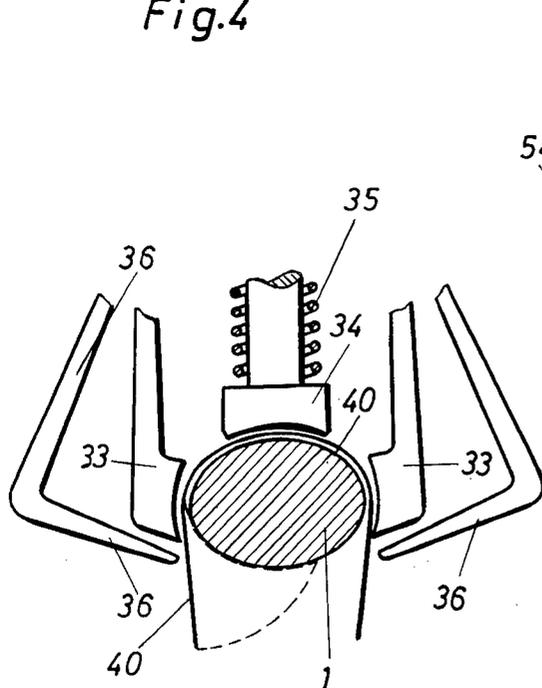


Fig.5

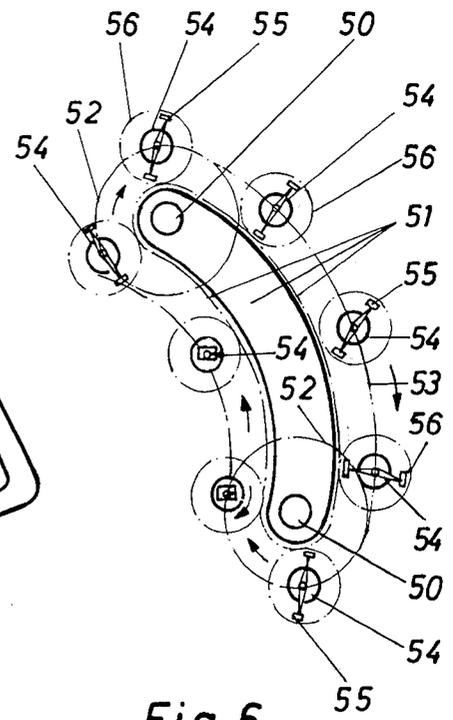


Fig.6

WRAPPING APPARATUS

BACKGROUND AND SUMMARY OF THE INVENTION

This invention relates to apparatus for wrapping sweets or like small objects. Conventional sweet wrapping machines work intermittently and comprise a rising and falling plunger, which pushes the sweets one by one, together with a wrapper placed over each sweet, through a folding or brush-lined shaft to fold the wrapper over each sweet into a U-shaped form that partially envelops the sweet. Each sweet and its wrapper is then engaged by grippers for permitting the wrapper to be fully closed with the aid of reciprocating folding and closing instruments. A defect of such machines is their relatively low performance and the high stress to which they subject the sweets or other objects during the wrapping operation, particularly in the case of so-called high speed machines. Another drawback is the considerable amount of noise and vibration generated by these machines during their operation due to the high acceleration and deceleration forces engendered by their reciprocating parts.

Continuously working machines have therefore already been proposed in which a sweet receiving means, a wrapper, and a wrapping head armed with gripping jaws and folding elements are consecutively provided along the path of a conveyor chain for the sweets. However, a defect of these machines is that they are excessively complicated, occupy much space, and are difficult to drive. More particularly, it is hardly possible to introduce the necessary wrappers for wrapping the sweets in a well ordered manner.

According to one aspect of the present invention, an apparatus for continuously wrapping sweets or like small objects is provided by employing a continuously revolving wrapping head carrying a plurality of gripping and folding devices at spaced positions about its circumference and by employing a feed conveyor carrying a plurality of sweet carrying devices for feeding sweets consecutively to the wrapping head. The feed conveyor is guided from a sweet receiving station towards the wrapping head and then around part of the circumference of the wrapping head where the feed conveyor travels in synchronism with the wrapping head and where each sweet carried by one of the sweet carrying devices is transferred therefrom to a corresponding one of the gripping and folding devices on the wrapping head.

DESCRIPTION OF THE DRAWINGS

FIG. 1 is a schematic side elevational view of a machine for wrapping sweets which is constructed according to the preferred embodiment of the present invention and which closes the wrapper by twisting its two open ends.

FIG. 2 is a fragmentary view of the machine of FIG. 1 on a larger scale.

FIG. 3 is a top view of the feed table of the machine of FIGS. 1 and 2.

FIG. 4 is an enlarged side view of one of the sweet carrying devices of FIGS. 1 and 2.

FIG. 5 is an enlarged side view of a portion of one of the gripping and folding devices of FIGS. 1 and 2.

FIG. 6 is a schematic representation of the twisting mechanism of FIGS. 1 and 2.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to FIGS. 1-3, sweets 1 to be wrapped are deposited on a conventional rotating feed table 3, which has peripherally open pockets 4 formed around its circumference, each of these pockets being adapted for receiving one of the sweets 1. Feed table 3 has a conical top and is surrounded by a cylindrical retaining ring 2 that defines a trough around the external periphery of the feed table. The sweets contained in the pockets 4 are carried around in this trough.

On the delivery side of feed table 3, a gap 10 (see FIG. 3) is formed in a lower portion of retaining ring 2, and, in addition, an inwardly projecting deflector 2' is formed from an upper portion of the retaining ring. The sweets 1 contained in pockets 4 can pass underneath deflector 2', but surplus sweets are deflected by it so as to by-pass the delivery point located at the gap 10 in retaining ring 2. At the delivery point the trough defined between feed table 3 and retaining ring 2 contains a greatly rising ramp 5. During rotation of feed table 3, the sweets 1 are forced to ride up this ramp, which lifts them by an amount equal to at least half their thickness out of their respective pockets 4 (see FIG. 2). In this position the sweets 1 are consecutively engaged by a finger 9 of an ejector, which rotates about a shaft 8 above the rim of feed table 3 and which operates to push the sweets radially outward along a guideway 6 where they are braked by a leaf spring 7.

A feed conveyor, which substantially comprises an endless articulated link chain 11 running over chain wheels 12, 13, and 14, is provided for the purpose of transferring the sweets 1 to a wrapping head 30 described below. In order to conduct link chain 11 along the path indicated in FIG. 2 lateral slideways (not shown) are provided for the link chain. This precisely guides link chain 11, which carries nine holders 15 for carrier members 16 at predetermined equidistant intervals.

As illustrated in greater detail and on a larger scale in FIG. 4, each carrier member 16 carries a fixed gripper arm 17 forming a trailing element and a movable gripper arm 18 mounted on a pivot 19 of the carrier member. Movable gripper arm 18 has a side arm 20, which is loaded by a compression spring 21 bearing against the underside of the head of carrier member 16. In addition, movable gripper arm 18 has a downward extension 22, which functions as a cam follower and controls the position of the movable gripper arm. A plunger 23 having a downward extension 24 is slidably mounted in carrier member 16 between the two gripper arms. A spring (not shown) keeps plunger 23 in its normal position shown in FIG. 4. In this position the head of plunger 23 rests on the top side of the head of carrier member 16.

A ring 26 is provided on the shaft 25 of chain wheel 12 for the purpose of opening the movable gripper arm 18. When the downward extension 22 of movable gripper arm 18 strikes this ring 26, the gripper arms 17 and 18 open against the resistance of the compression spring 21 so that the fixed gripper arm 17 can engage a sweet 1 presented to it between guideway 6 and leaf spring 7 by one of the ejector fingers 9. As soon as the downward extension 22 of movable gripper arm 18 rides off ring 26, spring 21 urges the movable gripper arm to close on the sweet 1 towards the fixed gripper

arm 17 and hold the sweet on the top of plunger 23. As the link chain 11 revolves in the direction of the arrowheads shown in FIG. 2 the sweet 1 is withdrawn from between guideway 6 and leaf spring 7 and conveyed towards the wrapping head 30.

Naturally, the speeds of travel and the working cycles of the ejector fingers 9 and of the carrier members 16 are suitably synchronized to ensure that each ejector finger 9 will push a sweet 1 onto the guideway 6 at the appropriate instant for the sweet to be engaged and gripped by the gripper arms of one of the carrier members. During the continuous revolution of link chain 11, the sweets 1 are consecutively conveyed at uniform speed to wrapping head 30 where they are wrapped into one or more wrappers 40.

Wrapping head 30 consists of a casing coaxially mounted on a shaft 31 for rotation about the central axis of the shaft and the casing. Pivot pins 32 for mounting gripping and folding devices, each of which includes a pair of gripping jaws 33 and a pair of folding arms 36, are mounted at spaced positions along the periphery of wrapping head 30. The wrapping head 30 shown in FIG. 1 is equipped with eight pairs of gripping jaws 33 and a corresponding number of folding arms 36. As best shown in FIGS. 2 and 5, a counter plunger 34 is radially slidably mounted between each pair of gripping jaws 33 and is loaded by a spring 35. Switch, control, and drive means (not shown) are provided inside the casing of wrapping head 30 to operate the gripping jaws 33 as well as the folding arms 36 in appropriate synchronism with the working cycle and ensure that the wrapping head 30 rotates continuously about its central axis. An important feature of this invention is that link chain 11 is arranged to run from chain wheel 14 to chain wheel 13 along a path that exactly conforms with the circular path of motion of the folding arms 36 of wrapping head 30 as shown in FIG. 2.

Supply bobbins 38 and 39 for wrapping material are mounted alongside wrapping head 30 (see FIG. 1). According to the type of wrapping that is to be produced one or more bands of wrapping material are continuously drawn off singly or in superposition from these supply bobbins over guide rollers and a feed track 46 by draw-off rollers 42 and 43. A knife 45 revolving at a constant speed and cooperating with a counter knife 44 cuts off lengths of the band or bands of wrapping material that have been drawn off the bobbin or bobbins 38 and 39 and thereby forms wrappers 40 of suitable size (see FIG. 2). The wrapping material is supplied at the speed of rotation of wrapping head 30 and of link chain 11.

The layout and speed of wrapping head 30 and the pitch of link chain 11 are so matched that in the region between the two chain wheels 14 and 13 (i.e. in the transfer region) each carrier member 16 on the link chain will exactly face and register with a pair of gripping jaws 33 on the wrapping head. The two plungers 23 and 34 will then be coaxial, enclosing a sweet 1 between them, with the counter plunger 34 bearing yieldingly on the sweet. Immediately before this position is reached, the leading end of the band or bands of wrapping material runs in between the sweet 1 and the counter plunger 34. At the appropriate instant, the rotating knife 45 then cuts off a wrapper 40 of the required length.

During the continued movement of the two cooperating units, the lower end of plunger 23 eventually rides

onto a cam 28 that displaces plunger 23 towards wrapping head 30 and thereby pushes the sweet 1 and the wrapper 40, which covers the sweet and is held in position thereon by the counter plunger 34, between the yielding gripping jaws 33. This operation causes the wrapper 40 to be folded over the sweet in the form of a U as shown in FIG. 5. Having thus delivered its sweet 1, the carrier member 16 then travels over the chain wheel 13 with the grippers 17 and 18 open and returns to the receiving station for the reception of another sweet 1.

The sweet 1 accepted by the gripping jaws 33 is completely wrapped as wrapping head 30 continues to rotate. First, the trailing folding arm 36, as viewed in the direction of travel, swings in a counterclockwise direction and folds the trailing projecting edge of the wrapper 40 over the sweet 1 as indicated by the dotted line in FIG. 5. When this has been done, the other folding arm 36 folds the other projecting edge of the wrapper 40 over the folded first edge. The sweet 1 is now completely enveloped by the wrapper in the form of a tube. A stationary folding blade 37 (see FIG. 1) assists the described enveloping operation and keeps the tubular wrapper closed during the further rotation of wrapping head 30. All that remains to be done is to close the open ends of the tube. According to the type of wrapping, diverse kinds of closing tools, such as folding, welding, pinching and twisting elements, can be used.

In the preferred embodiment of the wrapping machine illustrated in FIG. 1, the wrapping 40 is completed with the aid of a twisting assembly comprising twisting grippers 55 positioned on each side of wrapping head 30 to form two closures by twisting. The twisting grippers 55 perform this operation as they travel with wrapping head 30. As shown in both FIGS. 1 and 6, the twisting assembly further comprises a segment 51 that is provided with rack teeth around its circumference and that embraces about one quarter of the circumference of wrapping head 30. Axles 50 carrying chain wheels 52 are provided at the ends of this segment 51. A link chain 53 is guided in lateral ways over chain wheels 52 and travels at a speed that conforms with the peripheral speed of wrapping head 30. This link chain 53 carries eight pairs of twisting grippers 55 in holders 54 spaced at equidistant intervals therealong. Rotation is imparted to the twisting grippers 55 by gear wheels 56, which roll on the rack teeth of the segment 51. Control means (not shown) operate to close the grippers 55, which then grip the open tubular ends of the wrapper 40 projecting from both sides of wrapping head 30 and twist them together during the continuation of the described movements. The wrapper 40 is thus closed and the wrapping process completed, after which the grippers 55 are reopened by the control means. The completely wrapped sweets 41 can now be dislodged from the open grippers 55 and engaged from behind by an ejector 57, which ejects them into a chute 58 down which they slide into a bin (not shown).

The illustrated twisting assembly is exchangeable and can be replaced by a closing mechanism having tools of a different kind. According to the nature of the wrapping that is required (pinch or fold, single or double twist, etc.). It is important that the sweet should travel at continuously uniform speed from the time it leaves feed table 3 to the time it is fully wrapped and ejected and that all the operations needed to complete the

wrapping are performed during this period of uniform movement by synchronously controlled tools and instruments. Since accelerations and decelerations, as well as inertial forces, are avoided, the working speed and, hence, the performance of the wrapping machine can be considerably raised to provide throughputs easily exceeding 1,000 to 1,500 wrapped sweets per minute.

I claim:

1. Apparatus for continuously wrapping sweets or like small objects, said apparatus comprising a continuously revolving wrapping head carrying a plurality of gripping and folding devices positioned about its circumference, a feed conveyor carrying a plurality of sweet carrying devices for feeding sweets consecutively to the wrapping head, feed means for feeding wrappers to the wrapping head, means for guiding the feed conveyor from a sweet receiving station towards the wrapping head and then around part of the circumference of the wrapping head where the feed conveyor travels in synchronism with the wrapping head and where each sweet carried by a sweet carrying device is transferred therefrom to a corresponding gripping and folding device for holding and partially wrapping each sweet transferred thereto in a wrapper from the feed means, and closure means positioned adjacent to the wrapping head for closing each partially wrapped sweet held by the gripping and folding devices on the wrapping head within its wrapper.

2. Apparatus according to claim 1 including deflection means positioned adjacent to the feed conveyor and said part of the circumference of the wrapping head for successively deflecting each sweet carrying device on the feed conveyor towards the corresponding gripping and folding device on the wrapping head, the feed means for feeding wrappers to the wrapping head being positioned adjacent to the circumference of the wrapping head before the deflection means so that each wrapper enters a gap between a sweet held by a sweet carrying device on the feed conveyor and a corresponding gripping and folding device on the wrapping head just before the sweet held by the sweet carrying device is moved into contact with the corresponding gripping and folding device.

3. Apparatus according to claim 2 wherein wrapping material is continuously supplied to the feed means for feeding wrappers to the wrapping head and wherein the wrapping material is fed over a rotating knife at a speed adjusted to the desired length of the individual wrappers.

4. Apparatus according to claim 1 wherein each sweet carrying device includes a base and a pair of grip-

ping jaws mounted on the base and biased to a closed gripping position.

5. Apparatus according to claim 4 wherein one of the gripping jaws is fixedly secured to the base and the other gripping jaw is pivotally connected to the base.

6. Apparatus according to claim 5 wherein each sweet carrying device also includes a plunger for supporting a sweet, the plunger being axially slidably housed in the base and positioned between the gripping jaws.

7. Apparatus according to claim 6 wherein the plunger projects from the base for engaging a cam comprising the deflection means to move the plunger and a sweet supported thereby axially towards the corresponding gripping and folding device, and wherein the pivotally mounted gripping jaw projects from the base for engaging a cam to open the gripping jaws.

8. Apparatus according to claim 1 wherein the feed conveyor is a continuous link chain precisely guided between lateral slideways and chain wheels.

9. Apparatus according to claim 8 wherein the pitch circles of at least two of the chain wheels are directly tangent to the circular path of travel of the gripping and folding devices on the wrapping head and the intervening portions of the slideways coincide with this circular path of travel.

10. Apparatus according to claim 1 wherein the gripping and folding devices are spaced equidistantly about the circumference of the wrapping head, the spacing between adjacent gripping and folding devices on the wrapping head being the same as that between adjacent sweet carrying devices on the feed conveyor.

11. Apparatus according to claim 1 wherein each gripping and folding device on the wrapping head includes a pair of gripping jaws, an associated pair of folding arms, and a plunger located between the gripping jaws and movable radially of the wrapping head to cooperate with a plunger of a corresponding sweet carrying device on the feed conveyor during the transfer of a sweet to the gripping and folding device.

12. Apparatus according to claim 11 wherein the folding arms act upon a wrapper engaged with a sweet by the gripping jaws to partially wrap the sweet in the wrapper after the sweet is transferred to the gripping and folding device.

13. Apparatus according to claim 12 wherein the closure means is a twisting assembly including a link chain that travels in slideways around an arcuately-curved, rack-toothed segment and that carries a plurality of twisting grippers spaced at the same intervals as the pairs of gripping jaws on the wrapping head.

* * * * *

55

60

65