

[54] MACHINE FOR PACKAGING ELONGATED ARTICLE

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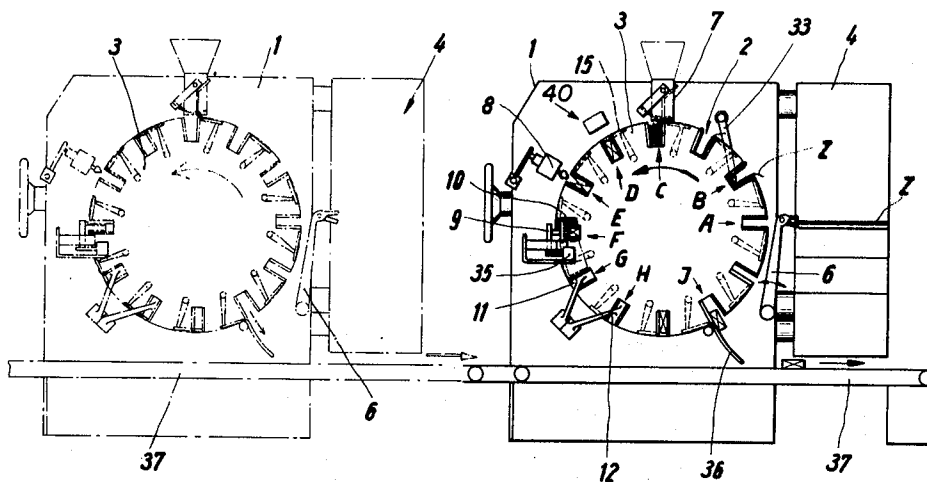
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[57] ABSTRACT

An automatic packaging machine for macaroni, or the like, in which the machine includes a vertically disposed, rotatable conveyor wheel with adjacently arranged stations for filling, weighting, sealing and closing. The wheel has pockets in the periphery for receiving packaging material and the articles to be packed. Associated with the wheel are folding and closing mechanisms for effecting individual steps of the operation. A parallel disposed conveyor feeds blanks to the wheel.

12 Claims, 15 Drawing Figures



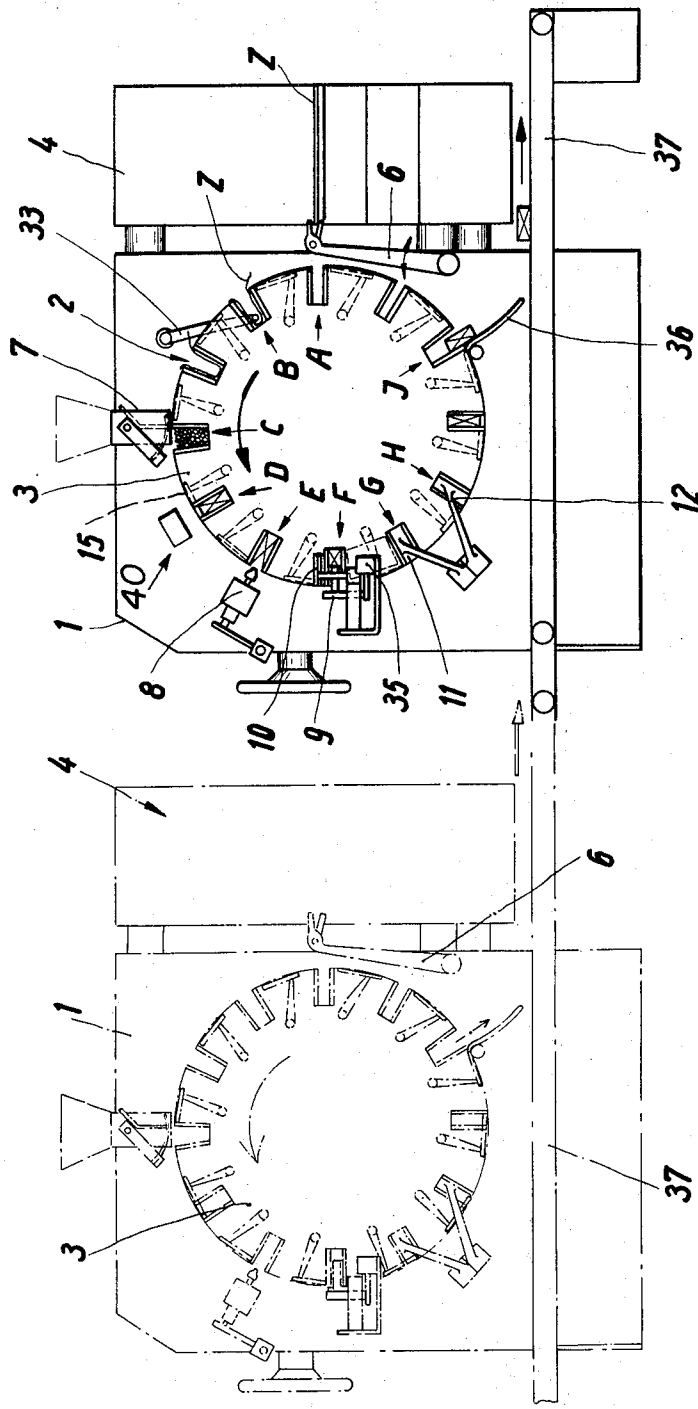
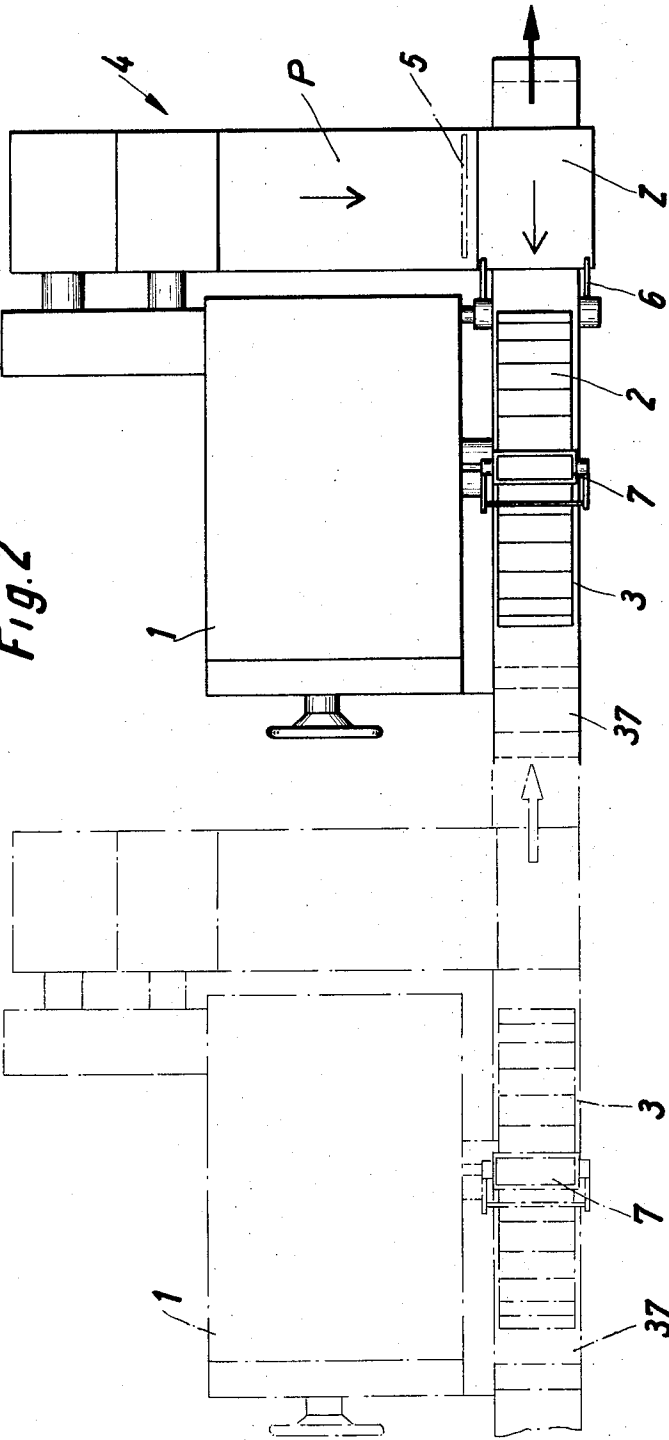
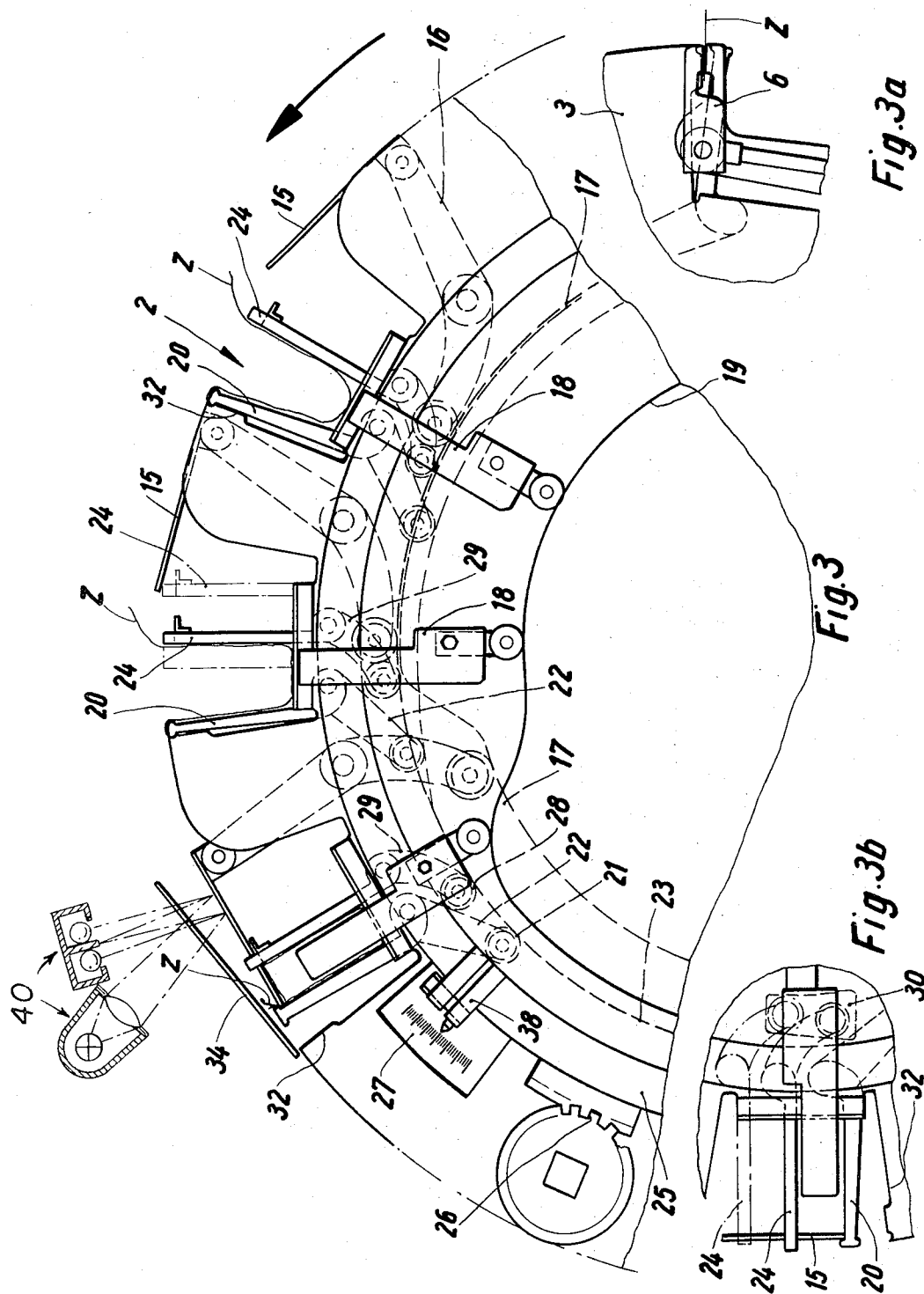
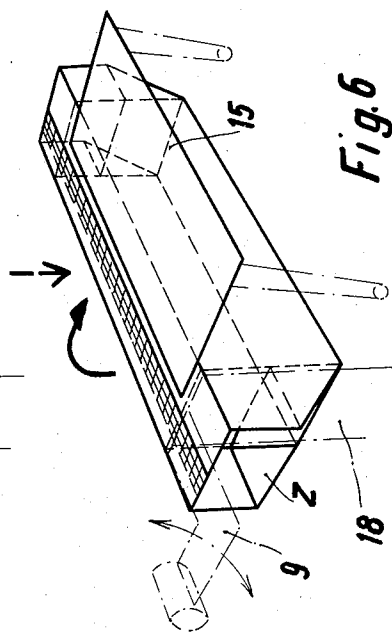
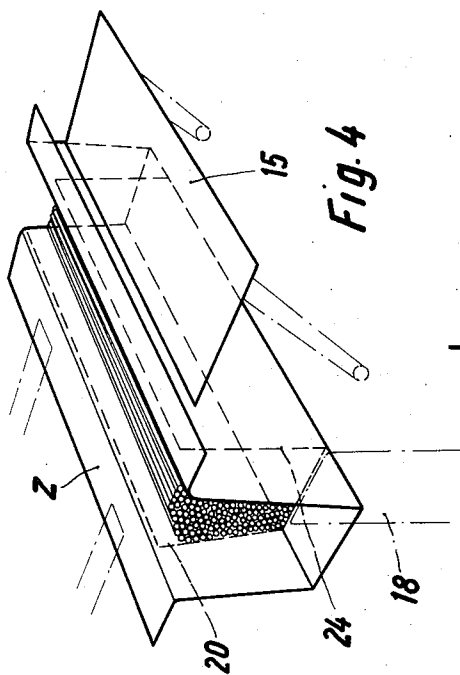
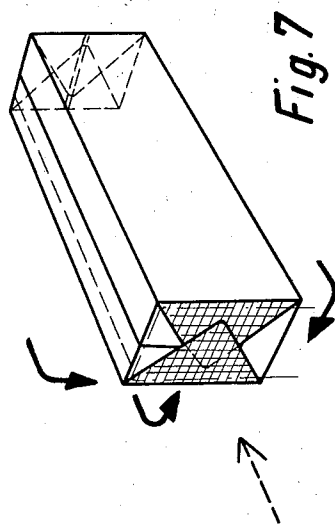
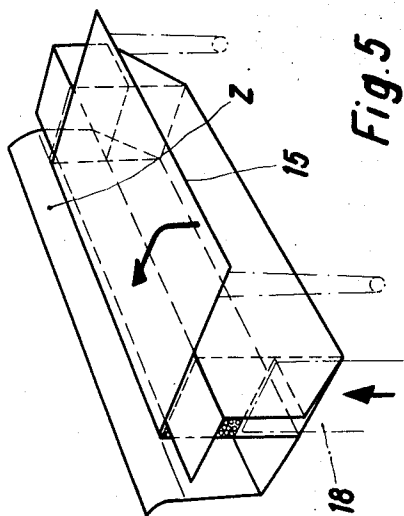


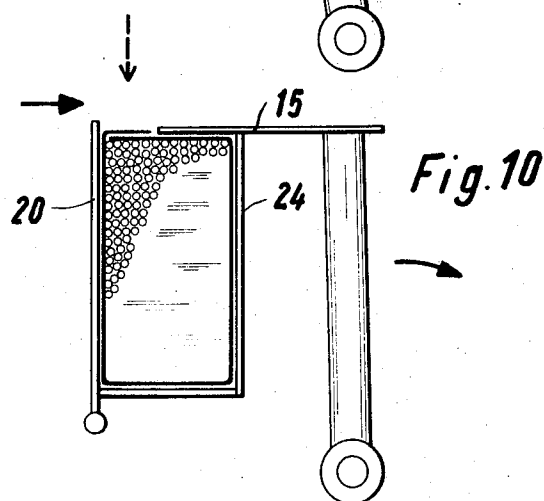
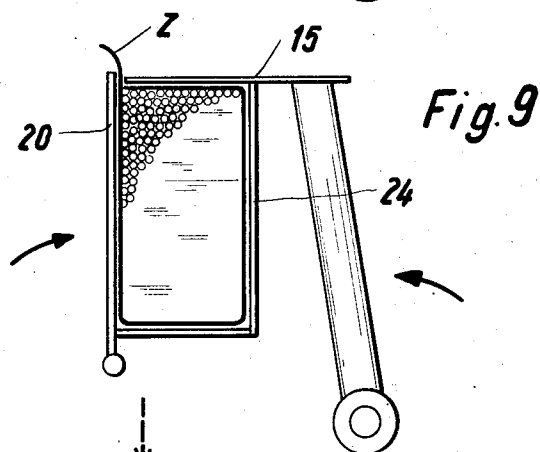
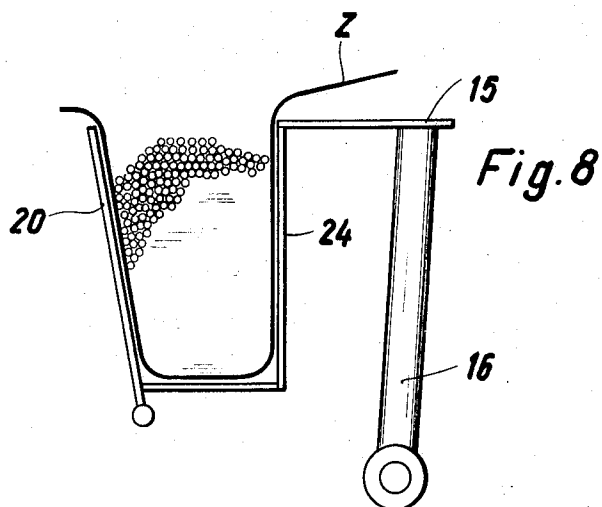
Fig.1

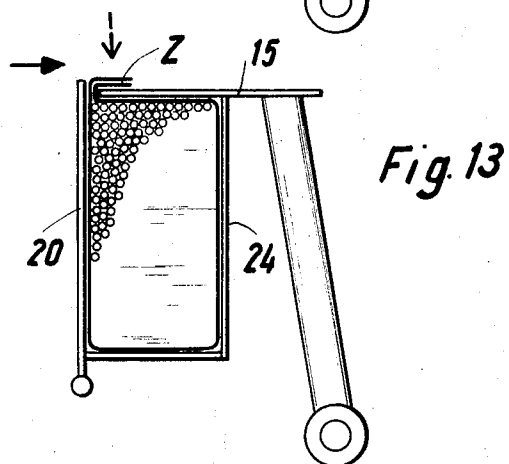
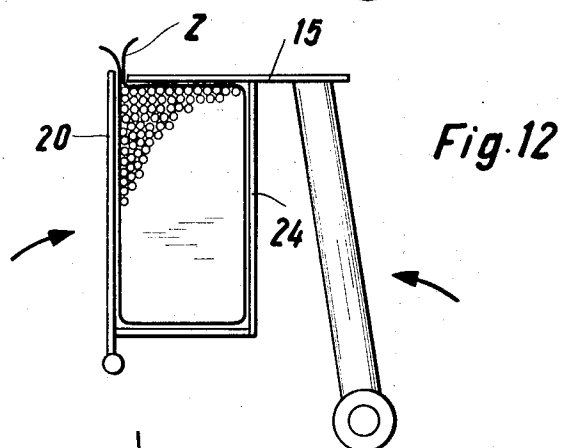
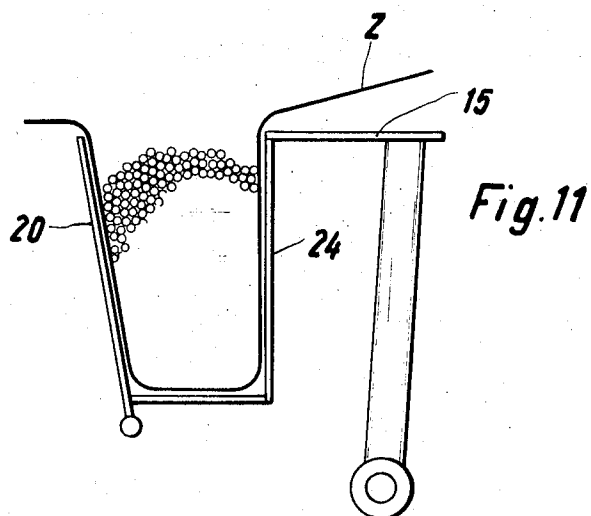
Fig. 2











MACHINE FOR PACKAGING ELONGATED ARTICLE

The invention relates generally to a machine for automatically packing elongated products, such as macaroni, spaghetti or the like, in flexible packaging materials.

In the prior art, there is already shown (see French Patent No. 1,283,982) a machine in which buckets arranged on an endless moving conveyor chain are provided with packaging material and then loaded in sequence with premeasured quantities of spaghetti. The packaging material is then formed into an envelope around the bundle of spaghetti at subsequent work stations, the ends of the envelope being closed by folding and sealing.

Machines of this type have the following disadvantages: Since the work stations are arranged along the conveyor chain, the machine takes up a relatively large amount of space. Converting the operation to a package of a different size is a rather laborious and time consuming project, and the strength and freedom from wrinkles of the finished package, which depends upon the type of packaging material used, are not always satisfactory.

It is, therefore, the primary object of the present invention to overcome these disadvantages and to provide a high productivity machine which is of compact design, readily convertible for different sizes of packages, and which is effective to produce strong, wrinkle-free or fold-free packages.

An aspect of the present invention resides in the provision of a machine for packaging elongated articles, such as macaroni or the like, when the package is formed from a blank which is automatically folded and closed. The installation includes a rotatably disposed conveyor wheel arranged in a vertical plane perpendicular to its axis of rotation. The wheel is provided with a plurality of radially extended pockets arranged along the periphery thereof. A plurality of circumferentially spaced work stations are provided adjacent to the periphery of the wheel. These stations are adapted for filling, weighing, measuring and sealing the packages. Each pocket of the wheel is, in part, defined by a forward and a rear wall, as seen, in the direction of wheel rotation, with at least one of the walls being pivotably mounted. The installation further includes a plurality of folding and blank closing tools operably associated with the conveyor wheel and radially movable slides operably associated with the wheel to rotate therewith and arranged adjacent to one or more of the pockets. A packaging material feeder is disposed parallel to the axis of rotation of the wheel and includes means to sequentially cut the blanks from a continuous web of packaging material. A pair of tongs are pivotally mounted between the wheel and the feeder for transferring the blanks at right angles to the conveying direction.

The machine, according to the present invention, occupies relatively little space when assembled. The cooperative relationship between the pivotal wall of each pocket and the slide which closes the pocket makes it possible to compress the material to be packaged, thus producing firm packages. Arranging the feed of the packing material parallel to the axis of rotation of the conveyor wheel and the withdrawing of the blanks transverse from the feed results in a so-called "orienta-

tion" of the plastic foil in a longitudinal direction of the package, thus making a fold-free sealing of the longitudinal seam of the package possible. The unique arrangement of the packing material feed and the rotation of the conveyor wheel in a vertical plane provide a substantial advantage in that two or more of these machines may be arranged very compactly side by side and, thus, may operate with a common discharge conveyor. The machine, in accordance with the present invention, provides a very high output packaging installation occupying relatively little space.

For a better understanding of the present invention, together with other and further objects thereof, reference is had to the following description taken in connection with the accompanying drawings, and its scope will be pointed out in the appended claims.

In the drawings:

FIG. 1 is a schematic front elevational view of an installation of two packaging machines;

FIG. 2 is a plan view of the installation shown in FIG. 1;

FIG. 3 is an enlarged but fragmentary front view of the machine's conveyor wheel;

FIG. 3a is a view similar to FIG. 3 showing in detail the blank transfer device;

FIG. 3b is a view similar to FIG. 3a showing a device for adjusting the rear lateral wall;

FIGS. 4 to 7 are perspective views illustrating the wrapping and closing operations used in producing the package;

FIGS. 8 to 10 are generally schematic views illustrating the compression of the material to be packaged and the forming of the envelope; and

FIGS. 11 to 13 are views similar to FIGS. 8 to 10 illustrating the forming of a "fin-seal" longitudinal seal.

Referring now to FIGS. 1 to 3, there is shown a packaging machine having a machine frame 1 supporting drive and main control elements, a conveyor wheel 3 equipped with a plurality of radially extending pockets 2, each having separate lateral walls 20, 24. The conveyor wheel is adapted to rotate intermittently and is arranged in a vertical plane. A conventional packing material feeder 4 is disposed parallel to the axis of rotation of conveyor wheel 3 and delivers the packing material in that direction. A conventional cutting or parting device 5 (not shown in greater detail) is provided adjacent to the feeder 4 and a stationary pair of tongs 6 are mounted pivotably on the frame 1 of the machine to feed blanks Z cut from a strip of packing material P to pockets 2 in the conveyor wheel 3.

Arranged in sequence around the periphery of conveyor wheel 3 are a measuring device or station 7, a sealing or welding device or station 8, the latter being adapted for producing a longitudinal seam in the package, a radially movable pair of slides 9 for folding the blades, a pair of folders 10 oscillating in the direction of rotation of the conveyor wheel, as well as stationary folder means 35, arranged on each side of the conveyor wheel. Also provided are a pair of sealing or welding tools 11, a pair of post-pressure plungers 13, and a chute 14, all of the devices mentioned being arranged stationarily on the frame of the machine.

Located directly on conveyor wheel 3 are a plurality of tangentially positioned slides 15 associated with pockets 2, the slides being seated resiliently on double levers 16 (see FIG. 3a) mounted on wheel 3, and being

controlled by means of a stationary cam 17, in such a manner that, after feeding device 7 has passed, they slide yielding and resiliently over pockets 2 and cover them. Also mounted on conveyor wheel 3 are a plurality of radially movable slides 18 which are also associated with conveyor pockets 2, the radial movement of the slides being controlled by means of a stationary cam disc 19.

The forward lateral wall 20 of each pocket, as seen in the direction of rotation of the conveyor wheel, is mounted pivotably on the conveyor wheel and its movement is controlled by a stationary cam disc 23 through a lever 22 equipped with rollers 21. The rear lateral wall 24 of each pocket is pivotably attached to a ring 25. This ring may be rotated within certain limits on conveyor wheel 3 by means of a gearwheel drive 26, and it may be locked, after it has been adjusted, by means of a clamping device 38. The extent of the rotation may be read off a scale 27. This arrangement provides a simple and rapid way of centrally adjusting the width of the opening of the conveyor pockets. In making this adjustment to rear lateral walls 24, however, these walls must move parallel with each other so that the cross section at all times remains a rectangle. To this end, these walls 24 are also connected to levers 29 carrying guide rollers of cam followers 28, the rollers engaging with one of several cam members 30 rigidly connected to conveyor wheel 3. The cam members 30 ensure that, when the rear lateral walls are displaced, they are also pivoted to some extent, thus fulfilling the condition mentioned above. FIG. 3b shows two adjustments of the rear lateral walls.

The packaging machine operates as follows:

The parting device 5 separates a blank Z from strip P of the packing material, the blank being removed radially of conveyor wheel 3 by means of tongs 6 and being inserted, as shown in FIG. 3a, between lateral wall 20 and wall 32 defining the pocket, where it is clamped into position. As the conveyor wheel continues to rotate from this station A, blank Z lies over the pocket and is inserted therein by a bar 33 mounted to oscillate on the frame of the machine at station B. The pocket, lined with the blank, is then filled at station C by means of a measuring device. As the conveyor wheel continues to turn, lateral radial slides 18 slide outwardly and fold the laterally projecting parts of the blank over the ends of material being packaged (FIG. 5). Tangential slide 15 also swings over the pocket, thus folding the projecting longitudinal flaps of the blank over the top of the material being packaged (see FIGS. 8 and 9).

The forward side wall 20 now swings away from the position in which it was clamping the blank and moves towards rear side wall 24. This compresses the material being packaged in the pocket which is now closed at the top by tangential slide 15. A stationary folding plate or member 34 located at station D now causes to fold the projecting longitudinal side flaps of the blank around the material being packaged.

The overlapping longitudinal edges of the package are sealed or welded by sealing tool 8 at the next station E.

The end closures are completed at subsequent station F by means of oscillating folders 10, slides 9 moving radially, and folding members 35. This method of closing is quite common and will, therefore, not be described in detail.

The folded closure thus produced is heat-sealed at station G by means of plunger 11. Up to the station G the radial slides 18 have remained in their extended position and at this station are used as supports for the sealing operation. Compression plungers 12 provided at station H may be used to strengthen the end sealing.

Finally, tangential slide 15 is withdrawn at station J, and the finished package is ejected, passed down a chute 36 to a discharge conveyor belt 37.

As already mentioned, form adjustment is effected by means of a gearwheel drive 26 which displaced ring 25, and rear walls 24 attached thereto, relatively to conveyor wheel 3. This arrangement avoids any difficulty in automatically matching, either manually or mechanically, the bulk weight of the material to the volume of the conveyor pockets, should this fluctuate to any marked degree. To this end, a pressure sensor 40 of a known type may be provided on the resilient tangential slide 15, in the lever mechanism controlling forward lateral wall 20, or at some other point in the region of the lateral walls or the tangential slide. This sensor measures the pressure in the pocket, with the tangential slide closed and with forward lateral wall 20 pivoted to its terminal position and, in the event of an upward or downward deviation from a predetermined tolerance, it starts an adjusting motor or the like, not shown, connected to the gearwheel drive 26, thus altering the volume of the pockets accordingly.

As shown in FIG. 1, two or more of the machines described may be operated in a particularly satisfactory and space saving manner in conjunction with a joint discharge conveyor belt.

The packages thus produced may be provided without any difficulty with so-called "fin-seal" seams instead of overlap seams, as shown in FIGS. 11 to 13. This necessitates only minor changes to the relevant folding and sealing tools.

While there have been described what are at present considered to be the preferred embodiments of this invention, it will be obvious to those skilled in the art that various changes and modifications may be made therein without departing from the invention, and it is aimed, therefore, in the appended claims to cover all such changes and modifications as fall within the true spirit and scope of the invention.

We claim:

1. In a machine for packaging elongated articles having a plurality of work stations, wherein a package is formed from a blank which is automatically folded, filled and closed, comprising in combination:

a rotatably disposed conveyor wheel arranged in a vertical plane perpendicular to its axis of rotation, said wheel having a plurality of radially extending pockets provided along the periphery thereof; each said pocket being defined in part by a forward and a rear wall, at least one of said walls being pivotably arranged within said pocket and effective to temporarily hold the blank in a clamping position;

a plurality of folding and blank closing tools operably associated with said conveyor wheel; radially movable slides operably associated with said wheel to rotate therewith and arranged adjacent to a pocket; a packaging material feeder disposed parallel to the axis of rotation of said wheel and including means

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to sequentially cut the blanks from a continuous web; and

a pair of tongs pivotably mounted between said wheel and said feeder for transferring the blanks at right angles to the conveying direction.

2. A machine according to claim 1 and stationary cam means for engagement with a pivotable wall to control the movements thereof.

3. A machine according to claim 1 wherein one of said tools is a slide pivotably mounted on said wheel extending generally tangentially relative to the wheel periphery, stationary cam means for controlling the movement of said tangentially arranged slide and effective to move the slide over the pocket to close the latter.

4. A machine according to claim 2 wherein said cam means is effective to move the forward wall for clamping the forward edge of the blank between itself and another wall of said pocket at the initial work station.

5. A machine according to claim 2 and ring means separately mounting said rear wall; and drive means for rotating said ring means concentrically with said wheel.

6. A machine according to claim 5 wherein said drive

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means includes a gear drive and clamping means for securing said ring means to said wheel.

7. A machine according to claim 5 wherein said rear wall is pivotably mounted on said ring means.

8. A machine according to claim 7 wherein said ring means includes a lever arm and a cam follower associated therewith and wherein said cam means is engaged by said follower to rotate said ring means and pivot said rear wall.

9. A machine according to claim 1, wherein said radially movable slides are arranged parallel on each of the two axial end faces of the wheel, and cam means engaging said slides for moving the slides over the pockets.

10. A machine according to claim 1 and pressure sensing responsive means associated with at least one of said walls.

11. A machine according to claim 9 and pressure sensing responsive means associated with at least one of the slides.

12. A machine according to claim 1 and a discharge conveyor belt below said wheel and an ejecting chute connecting thereto.

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