

Feb. 28, 1939.

G. H. HARTMAN ET AL

2,149,173

FORMING MACHINE

Filed March 18, 1937

4 Sheets-Sheet 1

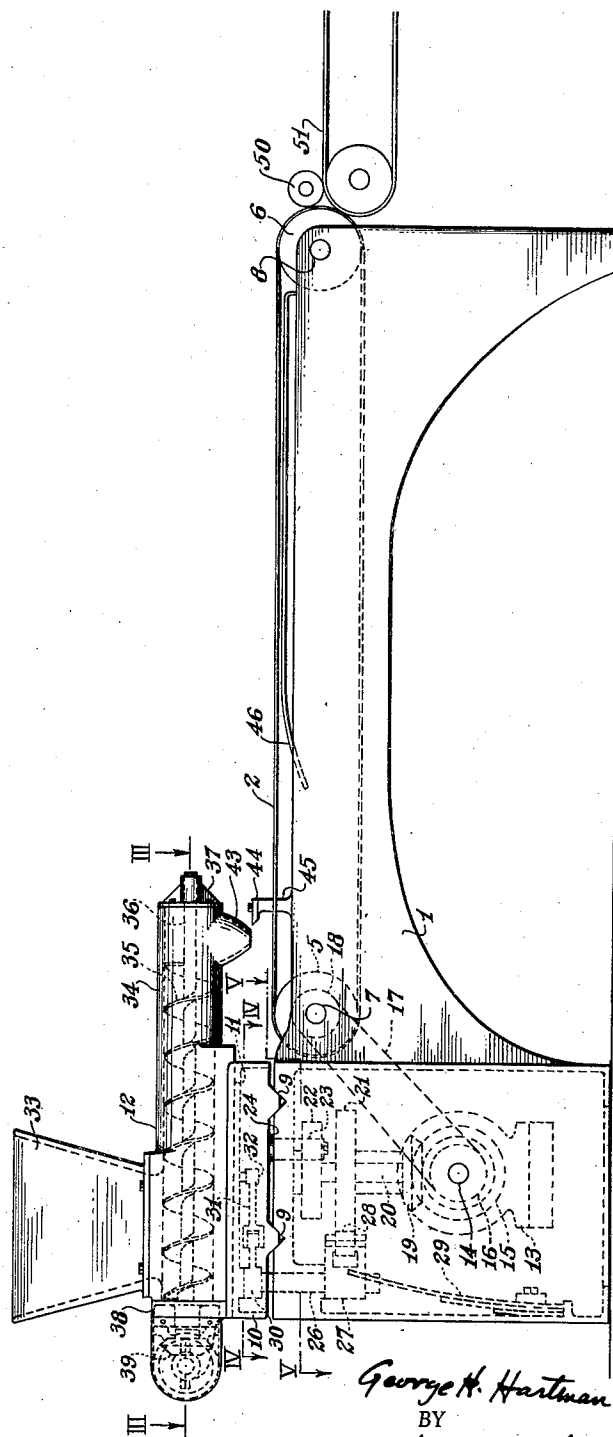


Fig. 1

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4 Sheets-Sheet 2

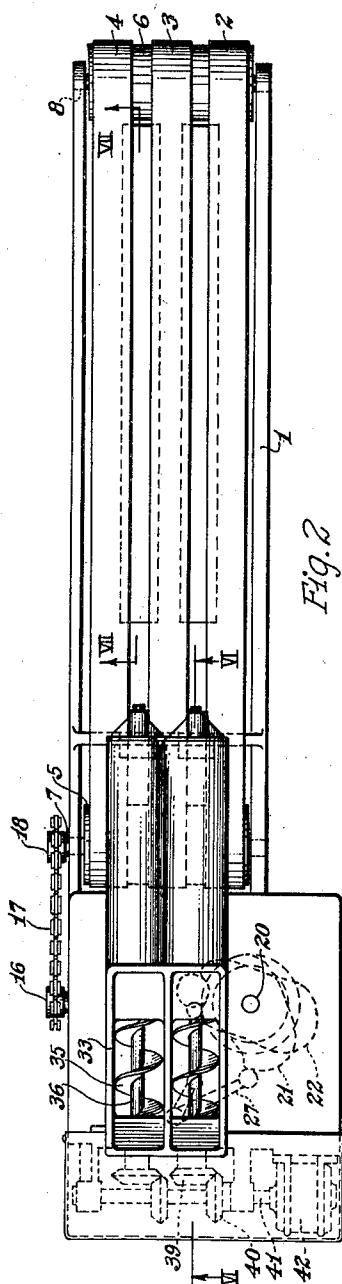


Fig. 2

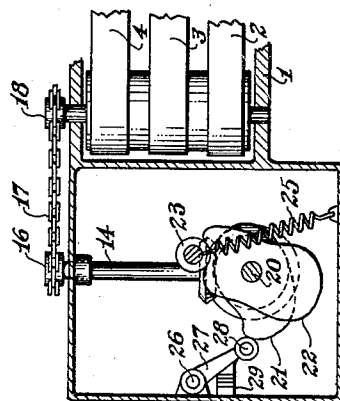


Fig. 5

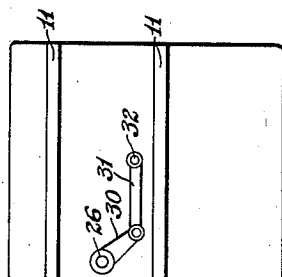


Fig. 4

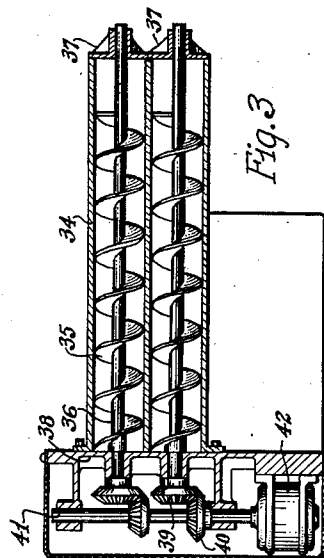


Fig. 3

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4 Sheets-Sheet 3

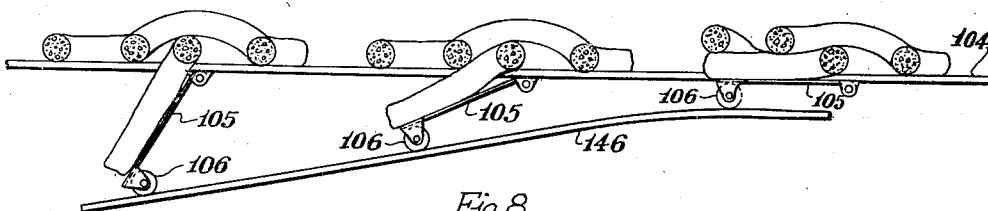
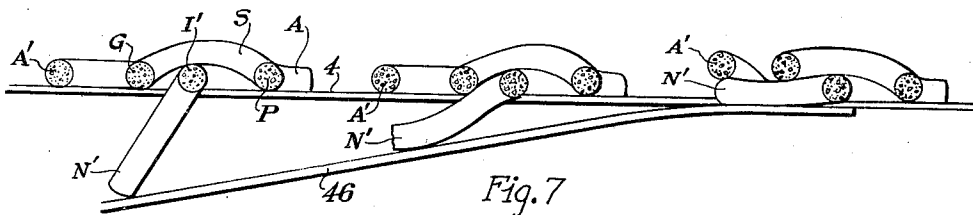
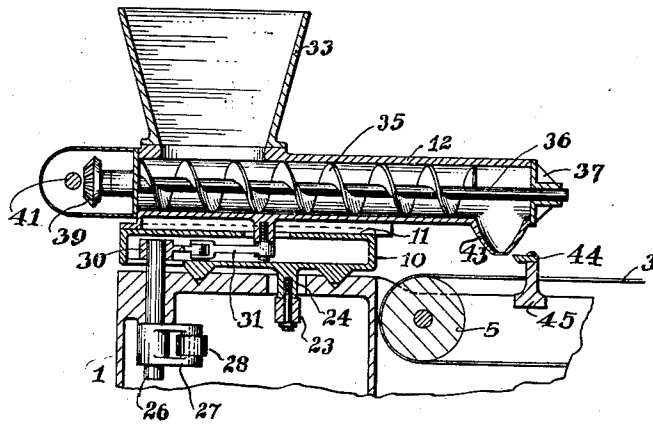


Fig. 8

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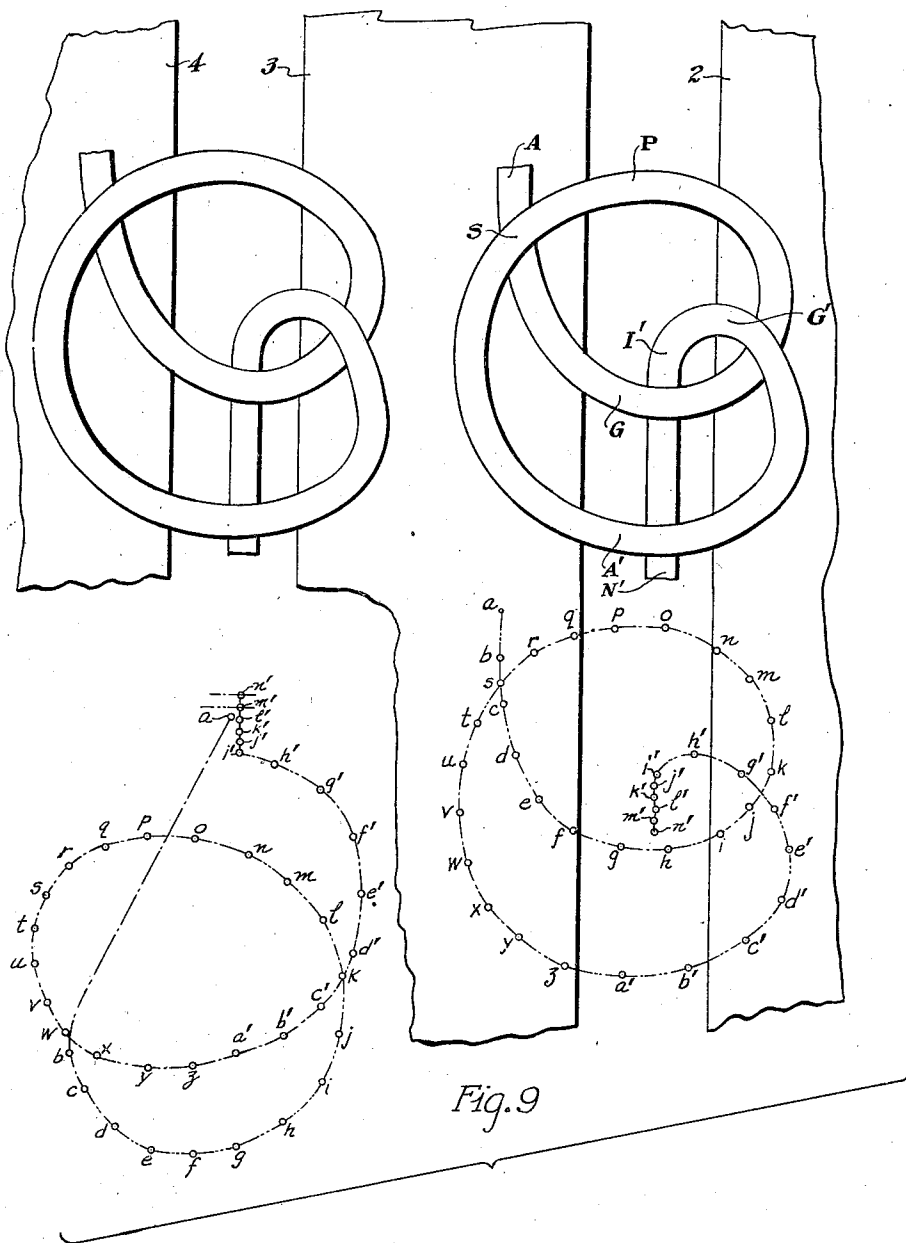
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FORMING MACHINE

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4 Sheets-Sheet 4



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UNITED STATES PATENT OFFICE

2,149,173

FORMING MACHINE

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Application March 18, 1937, Serial No. 131,622

16 Claims. (Cl. 107—8)

This invention relates to making of pretzels and similar articles which must be formed of soft, plastic material such as dough.

An object of the invention is to provide an improved means for forming articles of soft, relatively weak materials.

Another object is to provide an improved apparatus which will be extremely efficient in operation.

Another object is to provide an improved apparatus which will be simple in construction.

Another object is to provide an improved apparatus which may be easily kept clean.

Another object is to provide an improved apparatus which will be compact and economical of floor space.

Another object is to provide an improved apparatus which will be rapid in operation.

Other objects will hereinafter appear.

The invention will be better understood from the description of several practical embodiments thereof shown in the accompanying drawings, in which:

Figure 1 is a side elevational view of one form of machine for forming pretzels having twisted centers;

Figure 2 is a plan view thereof;

Figures 3, 4, and 5 are plan sections taken on the lines III—III, IV—IV, and V—V of Figure 1 respectively;

Figure 6 is a fragmentary vertical sectional view taken on the line VI—VI of Figure 2;

Figure 7 is a fragmentary vertical sectional view taken on the line VII—VII of Figure 2;

Figure 8 is a view corresponding to Figure 7, but showing a modified form of conveying apparatus; and

Figure 9 is a partly fragmentary plan view and partly diagrammatic representation showing the motions which are imparted to the parts of the machine in forming a pretzel having a twisted center.

The machine illustrated consists of a bed indicated generally at 1, carrying a conveyor consisting of a plurality of belts, passing over pulleys 5 and 6 carried by horizontal shafts 7 and 8 respectively, journaled in the bed, there being one more belt in number than the rows of pretzels which are to be formed, as will be hereinafter described.

Transversely slidable upon the upper surface of the bed on ways 9 is a slide 10, which, in turn, is provided on its upper surface with longitudinally extending ways 11, upon which may reciprocate one or more dough-delivering heads 12.

Within the base is shown positioned a source of power consisting of an electric motor 13 rotating a horizontal shaft 14 to which is secured a bevel gear 15 and a sprocket 16. A chain 17 passes over the sprocket 16 and over another sprocket 18 carried by the horizontal shaft 7 to which is fixed one of the rollers 5 supporting and driving the conveyor belts.

In mesh with the bevel gear 15 is a second bevel gear 19 fixed to a vertical shaft 20 journaled in the frame which carries adjacent its upper end two cams 21 and 22.

Arranged to engage the upper cam 22 is a roller 23 pivotally carried by a depending lug 24 formed on the underside of the slide. A spring 25 urges the slide in one direction to maintain the roller in contact with the cam at all times.

A vertical rock shaft 26 is journaled in the frame and extends into a hollow space within the slide. Secured to the lower portion of this rock shaft is an arm 27 provided with a roller 28 adapted to be maintained in engagement with the lower cam 21 by a spring 29.

The upper end of the rock shaft is provided with a crank arm 30 to which is pivoted a connecting rod 31 having its other end pivoted to a depending pivot 32 secured to a distributing head.

It will thus be seen that the two cams may cause the slide to reciprocate transversely on the top of the bed, and the distributing heads to reciprocate longitudinally on the carriage.

Each distributing head consists of an upwardly flaring wall 33 constituting a hopper into which dough or similar material may be introduced.

Beneath this hopper and extending out to overhang the conveyor belts is a tubular extension 34 within which is positioned a helical screw or worm conveyor 35 carried by a shaft 36 having its inner end supported by a bearing formed within a detachable head 37, and its outer end journaled in a detachable cover plate 38 secured to the head proper, as by machine screws.

The protruding end of the shaft is provided with a gear 39 in mesh with a pinion 40 carried by a shaft 41 of a second electric motor 42 which is supported by the distributing head, and moves with it, receiving its power through flexible conductors.

Of course, the motor might be mounted in stationary position and a flexible or splined drive of any desired and well known kind used.

The ends of the distributing heads which overlie the conveyor terminate in downwardly projecting delivery spouts 43 or nozzles, and in

alignment with the apertures in these nozzles stationary knives 44 are carried by brackets 45 formed upon or secured to the top of the frame.

It may, at times, be desired to increase the speed of the knife 44 relative nozzle 43, and this may be readily accomplished by making the knife movable upon its support and providing means for moving it to the left, as seen in Figure 1, at the end of the cycle, so that the resultant motion of the spout moving to the right and that of the knife moving to the left will provide an almost instantaneous cut-off of the dough.

Positioned beneath each space between adjacent belts is a ramp-like plate or skid 46 for carrying upwardly the last end of the pretzel, as will be more fully described in connection with the diagrammatic illustrations of Figures 6 to 9.

The operation of the device is as follows:—Dough is supplied to the hoppers 33 and is conveyed thence by the screw conveyors 35 to the discharge nozzles 43 of the distributing head, the supply of dough being controlled by the regulation of the speed of electric motor 42 carried thereby in any desired and well known manner, as by the use of the multi-speed motor illustrated.

The rest of the parts are driven by the electric motor 13, mounted in the base, which, through bevel gears 15 and 19, rotates the cam shaft 20, and through the chain drive 16, 17, and 18 operates the conveying belts 2, 3, and 4.

The upper cam 22 reciprocates the slide 10 transversely on its ways on the top of the base, while the lower cam 21 reciprocates the distributing head longitudinally upon the slide, so that the motions applied to a nozzle of the distributing head relative the frame correspond to those indicated in the diagram at the lower left-hand part of Figure 9, in which successive positions at equal intervals of time are indicated by the lettered points.

However, while the distributing nozzle is making the motion shown in this part of the diagram, the belts are, of course, traveling at a uniform rate of speed from the left as seen in Figure 1, or toward the top, as seen in Figure 9, so that the relative motion between the distributing nozzles and the belts are indicated at the diagrammatic path at the lower right hand part of Figure 9.

The points on this path are marked with indicia corresponding to those in the left hand diagram of this figure, and show that, starting at point "a" the relative motions of the distributing nozzle and the belts is such that the nozzle lays first the end A then, in sequence, the parts indicated by the following letters of the alphabet; forming first the upper loop A to S, and next the lower loop S to G', finally reaching the point I', then as the distributing nozzle moves upward (as indicated in Figure 9) at only a slightly slower rate than the travel of the belts, the end I' to N' is allowed to drop through the first formed loop and hang beneath the belts in the space between them.

As the belts continue their motion as indicated in Figure 7, the depending end N' of the pretzel encounters the skid 46 and is dragged upwardly along the skid until it contacts the last formed loop A' of the pretzel.

At the time that the distributing nozzle has reached position N', this being the position to the extreme right, as seen in Figures 1 and 2, it passes over the stationary knife 44, cutting the strip of dough, so that when the head is quickly retracted from position N' to position b, the

dough extruded through the nozzle during this motion forms the end A of the next succeeding pretzel, as it is laid upon the traveling belts.

In Figure 8 the belts 104 are shown as provided with hinged flaps or elevators 105 which span the space between them and are provided at the lower ends with rollers 106 arranged to engage the skid 146 so that the dough itself does not come in contact with the latter, but is elevated by the cam-like action of the skid upon the rollers as the belts move to the right in this figure.

The use of these elevators prevents friction between the ends of the dough strip and the skid from tending to elongate the dough, particularly if a relatively thin mixture is used, while the operation is in all other respects the same as with the elevator skid above described.

As indicated at the extreme right hand end of Figure 1, a transfer roll 50 may be provided at the end of the belt conveyors, to remove the rows of pretzels therefrom, and to transfer them to a conveyor 51 of a cooking device or the like.

Gearing may be interposed between the roller 6 of the forming machine and that 51 of the second conveyor to synchronize the speed of the two conveyor belts, and if desired, to drive one or the other of them.

It will be apparent that while two screw conveyors and distributing nozzles are shown, more than one nozzle may be supplied with each conveyor, and any number of hoppers and belts may be included in a single machine, so that one or more rows of pretzels may be formed simultaneously. In practice it is believed that a considerably larger number of distributing nozzles and belts would be more efficient than the apparatus illustrated for forming only two rows of pretzels. However, more have not been illustrated because the parts would be duplication of those illustrated, and the manner in which these may be added, it is believed, will be readily understood by those skilled in the art.

It will be noted that the interior of the dough distributing heads may be easily reached by removing the caps at the one end, and the motor and screw conveyors at the other, leaving the interior accessible from both ends. The conveyor screws, also, when removed may be easily cleaned and maintained in sanitary condition.

The belts likewise are readily accessible and the skids largely exposed between the same and so arranged that if the upper surfaces of the belts are raised, the entire skid may be readily reached.

The frame itself is open from top to bottom and provides no surfaces for dough to lodge throughout the length of the conveyor.

The operating mechanism is all compactly arranged under the slides and effectively housed against the entrance of dust and the like.

While we have described the illustrated embodiment of our invention in some particularity, obviously many others will readily occur to those skilled in this art, and we do not, therefore, limit ourselves to the precise details shown and described, but claim as our invention all embodiments, variations, and modifications thereof coming within the scope of the appended claims.

We claim:

1. A machine of the character described comprising an extruding head movable in a plurality of directions, conveying mechanism adapted to be moved continuously substantially in a given plane, and means moving said head in directions

both longitudinally and transversely to the motion of said conveying means, the motion being such that some material supplied by the extruding head passes through the above mentioned given plane.

2. A machine of the character described comprising an extruding head movable in a plurality of directions, spaced conveying mechanism adapted to be moved continuously substantially in a given plane, means moving said head in directions both longitudinally and transversely to the motion of said spaced conveying means, the motion being such that some material supplied by the extruding head passes through the above mentioned given plane, and driving means moving said spaced conveying means in synchronism.

3. A machine of the character described comprising an extruding head movable in a plurality of directions, spaced conveying mechanism adapted to be moved continuously substantially in a given plane, means moving said head in directions both longitudinally and transversely to the motion of said spaced conveying means, the motion being such that some material supplied by the extruding head passes through the above mentioned given plane, and driving means moving said spaced conveying means in synchronism, and cutting means arranged to cooperate with said extruding means at a definite position.

4. A machine of the character described comprising an extruding head movable in a plurality of directions, spaced conveying mechanism adapted to be moved continuously substantially in a given plane, means moving said head in directions both longitudinally and transversely to the motion of said spaced conveying means, and driving means moving said spaced conveying means in synchronism, and cutting means arranged to cooperate with said extruding means at a definite position, supporting means spanning the space between said spaced conveying means and converging toward the plane of said conveying means in the direction of the travel thereof.

5. A machine of the character described comprising an extruding head movable in a plurality of directions, conveying mechanism adapted to be moved continuously substantially in a given plane, and means moving said head in directions both longitudinally and transversely to the motion of said conveying means, the motion being such that some material supplied by the extruding head passes through the above mentioned given plane, said extruding means comprising continuously operating conveying means.

6. A machine of the character described comprising an extruding head movable in a plurality of directions, conveying mechanism adapted to be moved continuously substantially in a given plane, and means moving said head in directions both longitudinally and transversely to the motion of said conveying means, the motion being such that some material supplied by the extruding head passes through the above mentioned given plane, said extruding means comprising a conveying screw, a casing closely surrounding said screw, a hopper communicating with said casing adjacent one end thereof, and a depending nozzle adjacent the other end thereof.

7. A machine of the character described comprising a base, conveying means carried thereby, a slide movable upon said base, and a material supplying head movably carried by said slide,

and to said slide and head.

8. A machine of the character described comprising a base, horizontal conveying means carried thereby, a slide movable upon said base, and a material supplying head movably carried by said slide, driving means connected to said conveying means and to said slide and head.

9. A machine of the character described comprising a base, conveying means carried thereby, a horizontally movable slide and a horizontally movable head, the motion of the slide and head being angularly disposed relative each other, driving means connected to said conveying means and to said slide and head.

10. A machine of the character described comprising a base, conveying means carried thereby, a horizontally movable slide and a horizontally movable head, the motion of the slide and head being angularly disposed relative each other, driving means connected to said conveying means and to said slide and head, a cam operated by said driving means and controlling the slide, and a second cam operated by said driving means controlling the head.

11. A machine of the character described comprising a base, transversely extending rollers carried thereby, a plurality of flexible conveyor elements passing over said rollers, transverse ways formed on said base, a slide movably carried by said ways and having longitudinally arranged ways, an extruding head carried by said longitudinally extending ways, driving means for moving said slide on said base, and said head on said slide, and operative connections between said slide and head and said driving means.

12. A machine of the character described comprising a base, transversely extending rollers carried thereby, a plurality of flexible conveyor elements passing over said rollers, transverse ways formed on said base, a slide movably carried by said ways and having longitudinally arranged ways, an extruding head carried by said longitudinally extending ways, driving means for moving said slide on said base, and said head on said slide, and operative connections between said slide and head and said driving means, said connections comprising cams.

13. A machine of the character described comprising a base, transversely extending rollers carried thereby, a plurality of flexible conveyor elements passing over said rollers, transverse ways formed on said base, a slide movably carried by said ways and having longitudinally arranged ways, an extruding head carried by said longitudinally extending ways, driving means for moving said slide on said base, and said head on said slide, and operative connections between said slide and head and said driving means, said connections comprising cams, and a stationary knife carried by said base in the path of movement of the head.

14. A machine of the character described comprising a base, transversely extending rollers carried thereby, a plurality of spaced flexible conveyor elements passing over said rollers, transverse ways formed on said base, a slide movably carried by said ways and having longitudinally arranged ways, an extruding head carried by said longitudinally extending ways, driving means for moving said slide on said base, and said head on said slide, and operative connections between said slide and head and said driving means, said connections comprising cams, an elevating mechanism comprising an element spanning the space

between said flexible elements and converging toward the surface of said elements in a direction away from said head.

15 5 15. A machine of the character described comprising an extruding head movable in a plurality of directions, spaced conveying elements movable substantially in a given plane below said extruding head, driving means arranged to continuously move said conveying elements in one direction relative the extruding head, and driving means arranged to move said head in a plurality of directions relative said conveying elements and causing the same to pass across the space between the conveying means and over each of said
15 conveying means.

16. A machine of the character described comprising an extruding head having a plurality of outlets and movable in a plurality of directions, parallel spaced conveying elements movable substantially in a given plane below said extruding head, driving means arranged to continuously move said conveying elements in one direction relative the extruding head, and driving means arranged to move said head in a plurality of directions relative said conveying elements causing each outlet to pass over one space between two conveying elements and over parts of two adjacent conveying elements. 5 10

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