April 14, 1964 A. C. VAN WITTELOOSTUYN 3,128,816

APPARATUS FOR FORMING LIPS IN STRIP-LIKE MATERIAL

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FIG. 1

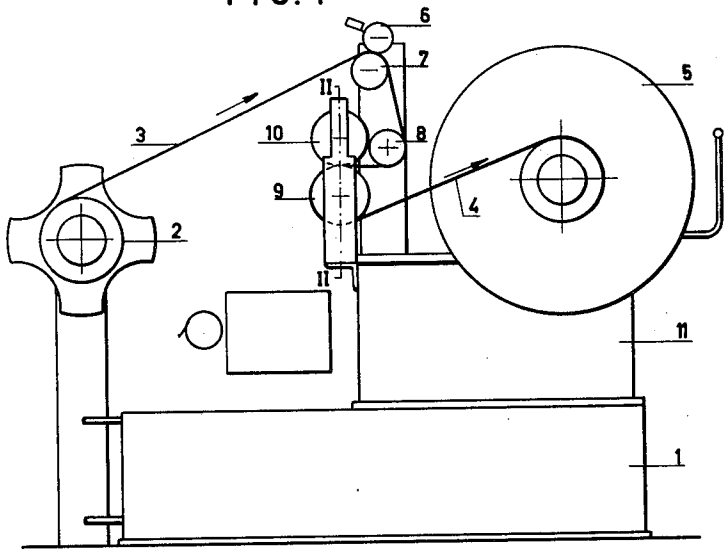


FIG. 4

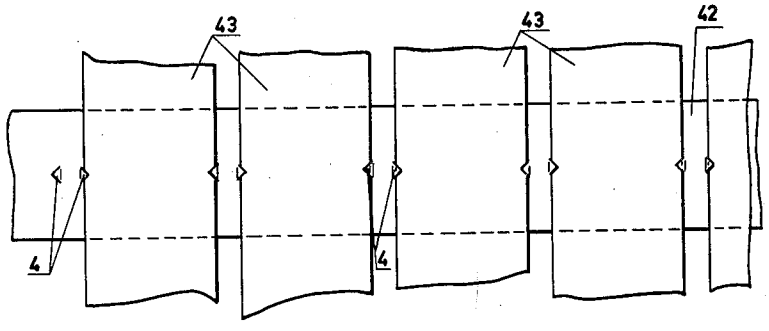
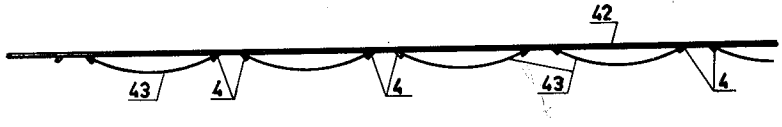


FIG. 5



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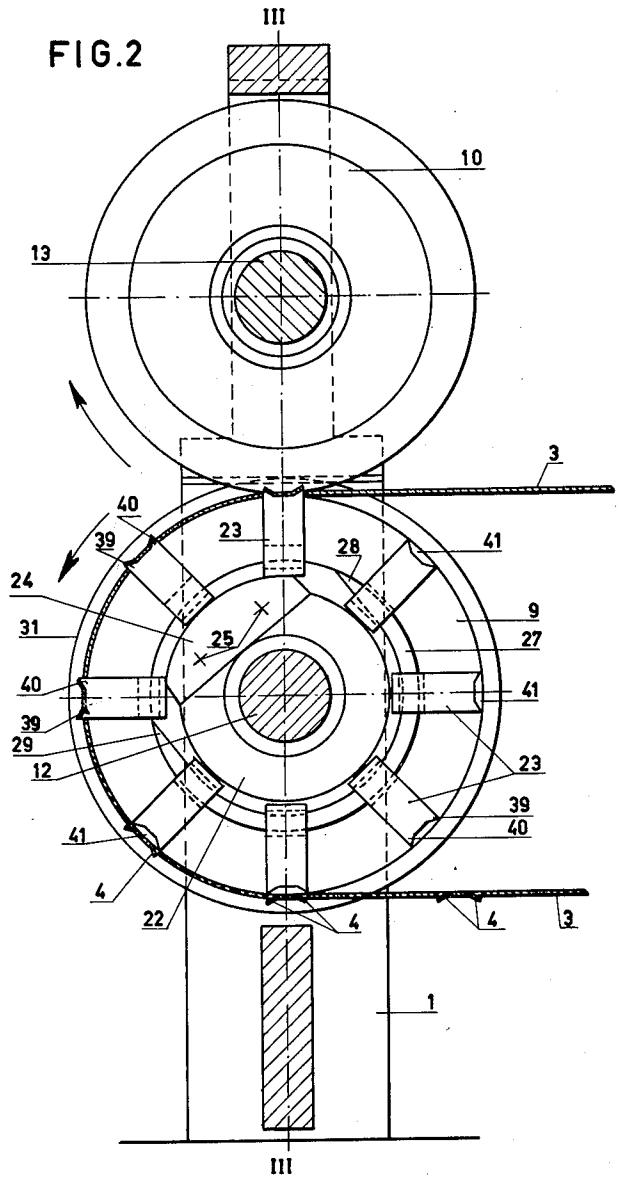
Attorneys

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FIG.2



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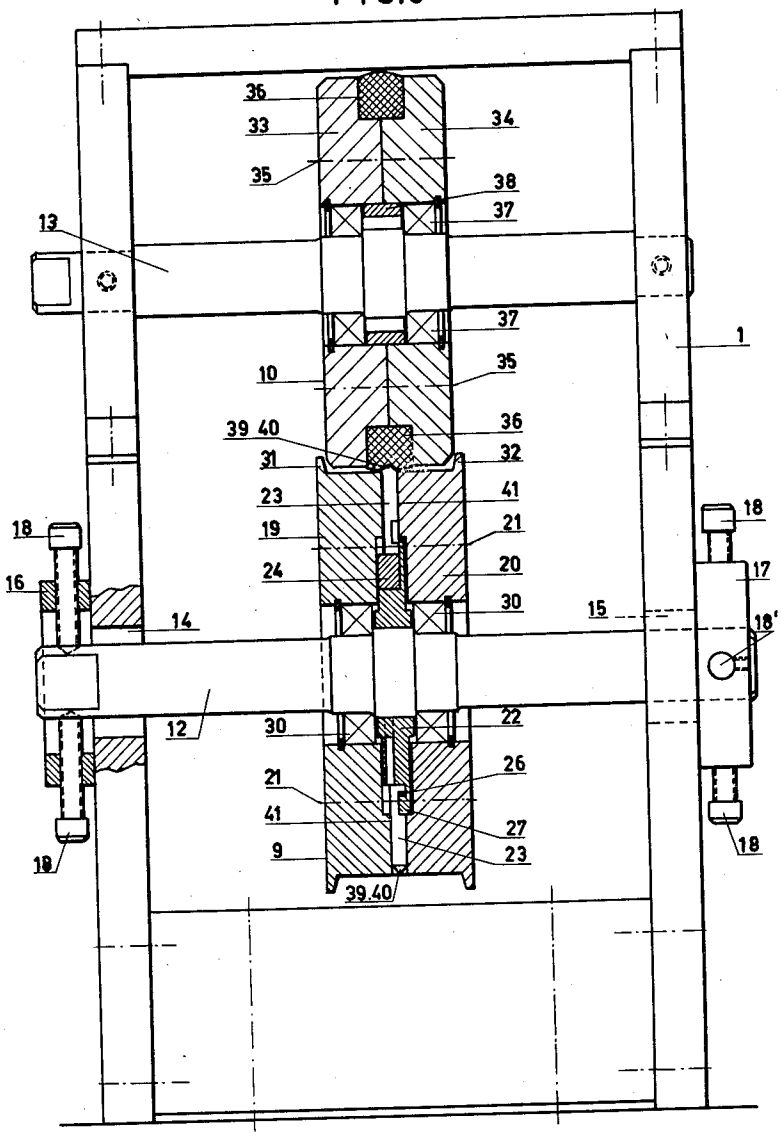
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APPARATUS FOR FORMING LIPS IN STRIP-LIKE MATERIAL

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FIG.3



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3,128,816
APPARATUS FOR FORMING LIPS IN STRIP-LIKE MATERIAL

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5 Claims. (Cl. 153—2)

This invention relates to an apparatus for forming lips in strip-like material, in particular in thin strip-like metal, with which apparatus this strip-like material can be quickly provided with lips.

This is accomplished with the apparatus according to the invention in that said apparatus comprises a frame in which two co-operating rollers are provided on parallel shafts, between which the strip-like material, which is to be provided with lips is passed, and of which one roller is constructed as a punch roller and is provided for this purpose with a plurality of radially displaceable punches for the punching of the lips and the other roller is constructed as a counter roller, a driving mechanism being provided for driving said rollers. With this apparatus it is possible to obtain a production of 100 m. per hour and more. In this apparatus the rollers may be driven by the strip-like material so that the apparatus is of simple construction.

According to the invention the shaft of the punch roller can be fixedly mounted in the frame and on said shaft a guide can be secured for guiding the radially displaceable punches, the punch roller itself being mounted on the shaft for free rotation. Each of the punches may thereby be provided with a recess adapted to co-operate with a projection of the guide, said projection extending over at least part of said guide. It is preferred to use an adjustable construction for the guide. However, it is also possible for this guide to consist of two or more parts. In that case only part of said guide is made adjustable.

According to the invention the counter roller may comprise an annular insert of rubber or some elastic material or some material into which the punches can penetrate, said insert facing the punches.

In order that the punches and the insert may be easily mounted it is possible according to the invention to divide the punch roller and the counter roller each into two parts according to a plane extending transversely to the centre line of the corresponding roller.

According to the invention the shafts of the punch roller and the counter roller are preferably fixedly arranged in the frame and are mounted for free rotation on the corresponding shafts. In that case the rollers can be mounted on the shafts by means of roller bearings. At least one of the shafts can be adjustably mounted in the frame so that the apparatus can be adjusted to the strip-like material to be processed.

A preferred embodiment of the apparatus according to the invention is characterized in that after the punch roller and the counter roller a winding reel provided with a drive is rotatably mounted for winding the strip-like material provided with lips.

The invention will be explained below with reference to the accompanying drawings showing by way of example an embodiment of the apparatus according to the invention as well as of a piece of strip-like material provided with lips by means of the apparatus according to the invention.

FIG. 1 shows diagrammatically a side view of said apparatus.

FIG. 2 is a section on an enlarged scale according to the line II—II of FIG. 1.

FIG. 3 is a section according to the line III of FIG. 2.

FIG. 4 shows a bottom view of a strip provided with lips.

FIG. 5 is a side view thereof.

The apparatus shown in the drawings comprises a frame 1, in which a supply roller 2 is rotatably supported, on which supply roller a metal band 3 has been wound, said metal band being guided through the apparatus and after having been provided with lips therein being wound again on a reel 5. It is preferred to wind thereby simultaneously a strip of corrugated board or some other material (not shown) in order to prevent the lips 4 from being bent or deformed.

As is apparent from FIG. 1 the metal band 3 is guided via a number of rollers 6, 7, 8, as a result of which the band is kept taut, to a punch roller 9 and a counter roller 10 co-operating therewith from which said band moves to the winding reel 5. This winding reel is driven by a driving mechanism 11 in a manner not shown. The punch roller 9 and the counter roller 10 are rotatably mounted on two parallel shafts 12 and 13 respectively, said shafts being mounted in the frame 1. Of these shafts the shaft 12 is adjustably mounted in the frame 1. For this purpose said shaft is passed through slotlike openings 14, 15 of frame 1, which on both sides is provided with a projection 16, 17. In each of these projections two adjusting screws 18 are provided by means of which it is possible to adjust the shaft 12 of the punch roller 9 in the required manner relative to the shaft 13 of a counter roller 10, the latter shaft being fixedly mounted in the frame 1. If required the shaft 12 of the punch roller 9 may be fixed by means of two bolts 18'. These bolts may likewise be embodied as adjusting screws.

The punch roller 9 comprises two parts 19, 20 interconnected by a number of bolts shown by the centre lines 21 thereof. The surfaces of both parts facing each other are provided with recesses in which a guide 22 fixedly mounted on the shaft 12 and a plurality of punches 23 are accommodated. On this guide there is provided a cam-like part 24 which may be adjusted and secured against displacement by means of bolts shown by their centre lines 25. When the apparatus is in operation the punches 23 move along the outer surface of said cam 24, which outer surface extends co-axially with respect to the punch roller 9. Each punch 23 is provided with a groove 26 which co-operates with a marginal portion 27 of the guide 22, said marginal portion having the shape of a circular arch. This marginal portion 27 terminates at one end in a declined running-off end 28 and at its other end in an inclined running-on end 29 for the punches 23. The punching roller 9 is rotatably mounted on the shaft 12 by means of bearings 30 and comprises at both sides circular rims 31, 32 which prevent the metal band 3 from running off the punching roller 9.

The counter roller 10 consists likewise of two parts 33, 34 which are fixedly interconnected by bolts 35 and between which there is provided a ring 36 of rubber or some other material into which the punches 23 with the lips 4 formed in the metal band 3 by these punches may be pressed. The counter roller 10 is rotatably mounted on the shaft 13 by means of bearings 37 with a ring 38 therein between.

Each punch 23 comprises two knives 39, 40 and is slidable in a radially disposed recess 41. The knives 39 and 40 are oppositely inclined so that each punch always punches two oppositely directed lips 4 out of the metal band 3. FIGS. 4 and 5 show in bottom view and in side view respectively a metal band constructed as a carrying lamella 42 for a ceiling construction and provided with lips 4, said metal band being curved in transverse direction, the lips 4 supporting curved metal strips 43 of the ceiling.

The above-described apparatus operates as follows:

When the winding reel 5 is driven, the metal band 3 is drawn off from the supply roller 2 via the rollers 6, 7, 8, 9 and 10, these rollers being driven by the metal band. When a punch 23 meets the metal band 3, the knives 39, 40 thereof punch a lip 4 out of the band, said knives being pressed into the ring 36. As is apparent from the drawings the end of the punch 23 in question remote from the knives glides along the curved surface of the cam 24. In the apparatus shown in the drawings there are always at least two punches with this end contacting the cam 24 so that, when the winding reel 5 moves the band 3 through the apparatus, the band drives the roller 9 without running the risk of the knives 39, 40 deforming the holes or lips punched in the band. At the end of the cam 24, the punch 23 arrives in the area of the running-on end 29 of the marginal portion 27 of the guide 22 so that consequently this marginal portion enters the recess of the punch in question and said punch is so far radially displaced that the knives 39, 40 are withdrawn from the openings made in the metal band so that the band is released by said knives and can run off the punching roller 9. At the end of the marginal portion 27 the punch leaves said marginal portion via the running-off end 28 whereupon it arrives on the arcuate surface of the cam 24 and punches lips out of the metal band. This operation is repeated successively for each punch at each rotation of the punch roller.

It is obvious that the invention is not restricted to the embodiment of the apparatus according to the invention as described above by way of example and shown in the drawings, but that it may be modified in many ways without departing from the scope of the invention. The forced radial displacement of the punches may also be accomplished with the aid of other means known per se, for example by means or springs instead of a guide. The lips 4 may have instead of the triangular shape shown also another shape, for example that of a semi-circle. The counter roller 10 can also be fixedly mounted on its shaft 13, which shaft must then be supported in the frame for free rotation etc. Also, the punch roller may consist of one single part. In that case the punches 23 are passed through holes provided in the punch roller. Since during the operation the strip-like material moves over the punch roller, there is no risk of the punches dropping out of the punching roller.

I claim:

1. In an apparatus for forming lips in strip-like material and having a frame, the combination with a rotary punch roller and a rotary counter roller, said rollers being rotatably mounted in the frame about parallel axes and with their surfaces closely adjacent but separated by a sufficient amount to receive between them the strip-like material to be provided with lips, said punch roller being provided with a plurality of punches, means for radially displacing said punches into their operative position and guiding means for radially displacing said punches out of engagement with the strip-like material, all said means being constructed and arranged in such a way that always at least two punches are at the same time in engagement with the strip-like material and no punches are in engagement with the strip-like material at the point where said strip-like material leaves the rotary punch roller, said rollers being free to turn as said strip-like material passes therebetween.

2. An apparatus according to claim 1, characterised in that driving means for the punch roller consist of a driven winding reel for receiving the strip-like material after being provided with lips, the shaft of the punch roller being fixedly mounted in the frame, guides secured to said shaft in the interior of the punch roller for guiding the radially displaceably punches, the punch roller itself being mounted on the said shaft for free rotation.

3. An apparatus according to claim 1, characterised in that driving means for the punch roller consist of a driven winding reel for receiving the strip-like material after being provided with lips, the shaft of the punch roller being fixedly mounted in the frame, guides secured to said shaft in the interior of the punch roller for guiding the radially displaceably punches, the punch roller itself being mounted on the said shaft for free rotation, each of the punches being provided with a recess adapted to co-operate with a projection of said guide, said projection extending over at least part of said guide.

4. An apparatus according to claim 1, characterized in that each punch is provided with two oppositely directed knives arranged at a distance from each other, said knives simultaneously punching two oppositely directed lips out of the material, the counter roller comprising an annular insert of elastic material facing the punches.

5. An apparatus for forming lips in strip-like material, the combination with a rotary punch roller and a rotary counter roller, said rollers being mounted in a frame about parallel axes and with their surfaces closely adjacent but separated by a sufficient amount to receive between them strip-like material to be provided with lips, at least the shaft of said punch roller being fixedly mounted in the frame, the said punch roller being provided with a plurality of radially slidable punches, in the said punch roller a cam and a guide being fixedly secured onto the said shaft, said cam being provided for radially displacing said punches into their operative position and said guide being provided for radially displacing said punches out of engagement with the strip-like material, the cam keeping at least two punches simultaneously in engagement with the strip-like material and the guide being provided in such a way that no punch is in engagement with the strip-like material at the point where said strip-like material leaves the punch roller, at least the punch roller being driven by a driven winding reel for receiving the winding strip-like material after being provided with lips.

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