May 27, 1958 M. F. JOHNS ET AL 2,836,239

APPARATUS FOR THE PROCESSING OF SLIDE FASTENERS

Filed June 2, 1955 3 Sheets-Sheet 1

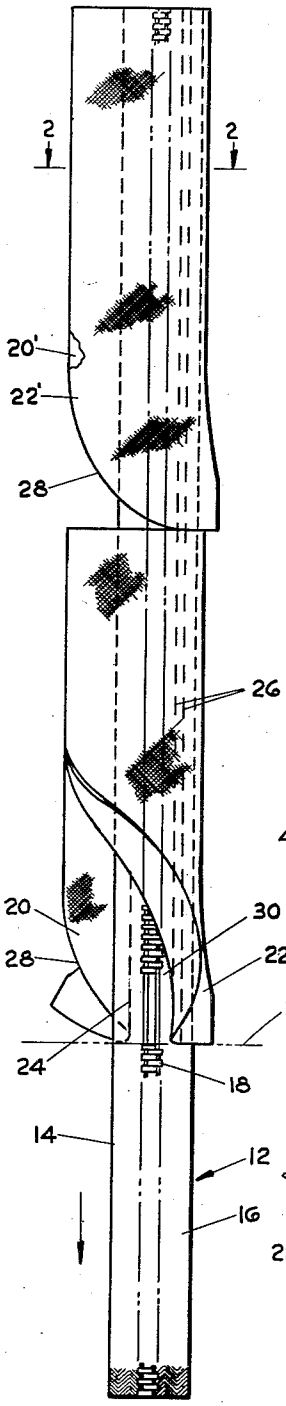


FIG. 1

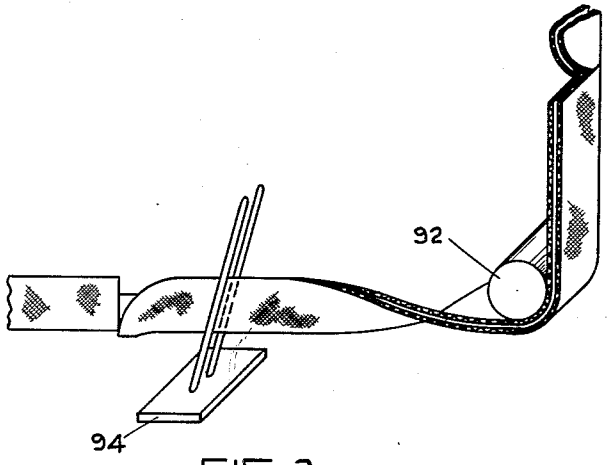


FIG. 3

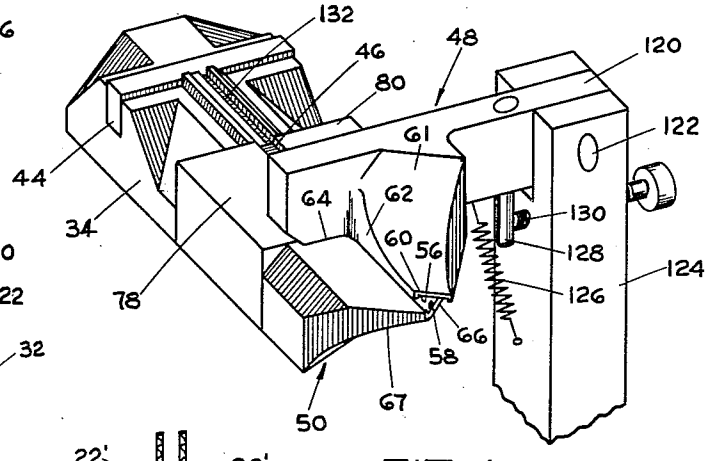


FIG. 4

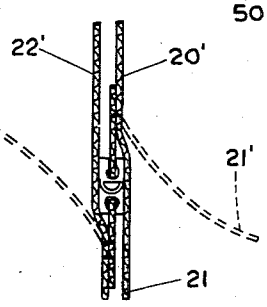


FIG. 2

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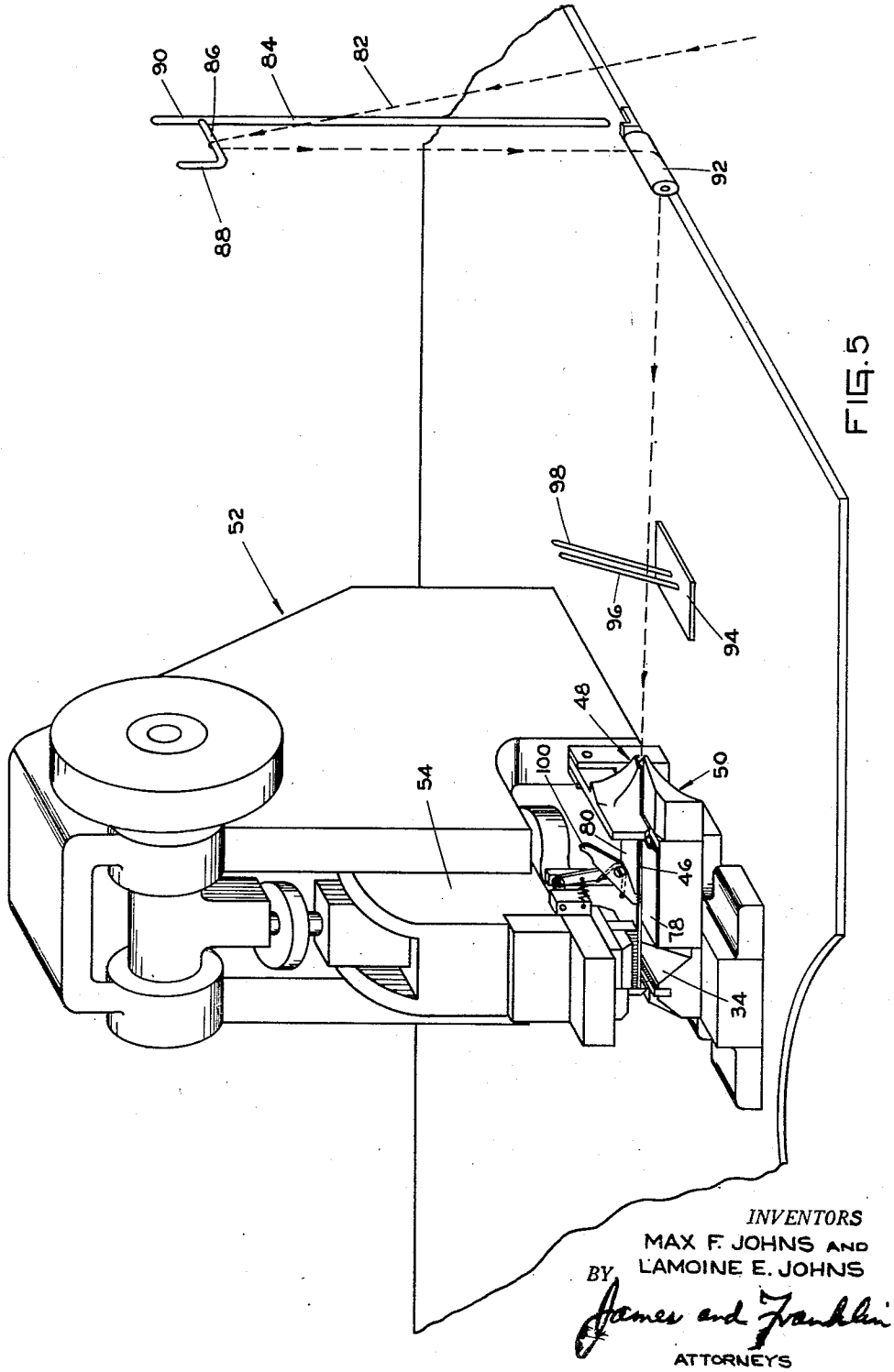


FIG. 5

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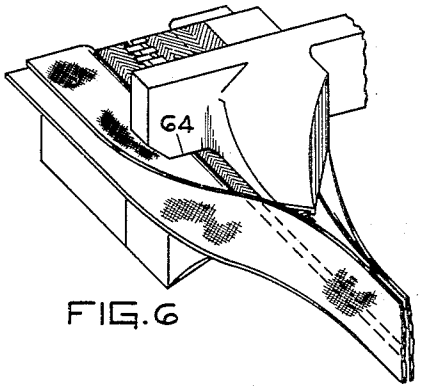


FIG. 6

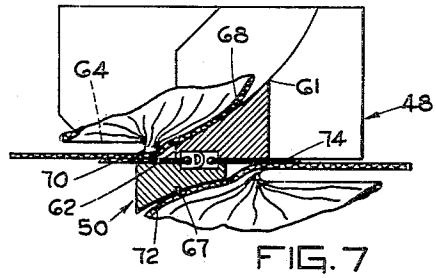


FIG. 7

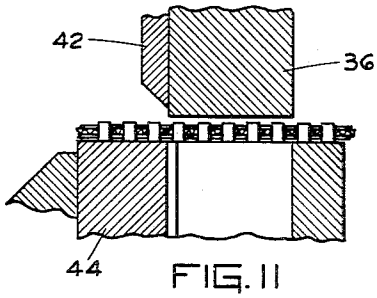


FIG. 11

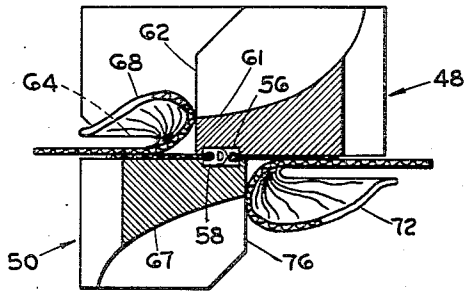


FIG. 8

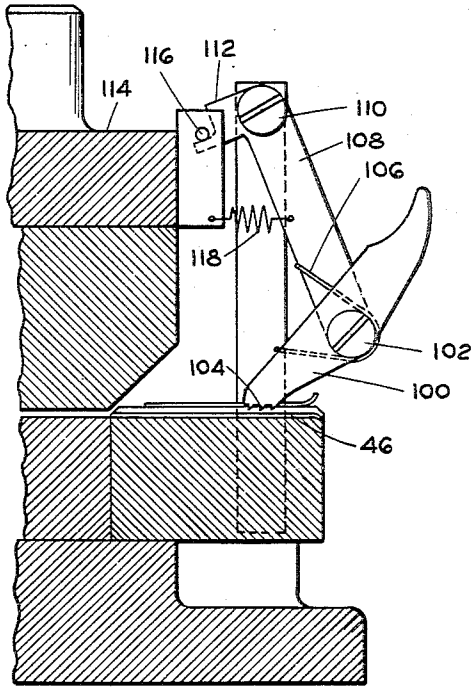


FIG. 12

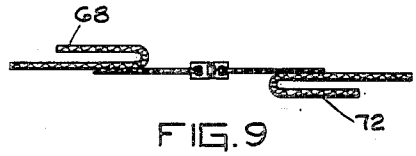


FIG. 9

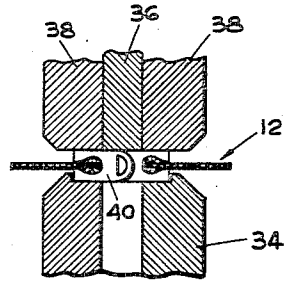


FIG. 10

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2,836,239

APPARATUS FOR THE PROCESSING OF SLIDE FASTENERS

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Application June 2, 1955, Serial No. 512,789

17 Claims. (Cl. 164—12)

This invention relates to the application of slide fasteners to garment closures, particularly trousers.

Instead of attaching pre-cut stringers to fly strips, it has already been suggested that a series of fly strips be sewn in succession to a continuous length of slide fastener "chain" (meaning meshed stringers). The fly strips are sewn end to end in substantially abutting relationship. The continuous length may be cut transversely between adjacent strips, so that the garment manufacturer need not stock many different pre-cut lengths of fastener. However, there is a need for tape ends devoid of fastener elements. When using continuous chain there are no such tape ends, and they are formed by removing fastener elements.

The primary object of the present invention is to generally improve apparatus for the above purpose. A more particular object is to provide an apparatus for the processing of meshed slide fastener chain having both left and right trouser flies stitched thereto, instead of only one or the other. This forms a so-called "sausage" having both flies stitched to the continuous chain.

Further objects are to provide a desired length of tape end free of scoops, and to retain the beaded or corded edges of the tapes at these ends. A further object is to sever a complete fly front from the sausage as the tape ends are formed. Still another object is to provide an automatic feed means to feed some of the sausage out of the apparatus where it may be gripped to move the sausage along to the next fly end.

To accomplish the foregoing general objects, and other more specific objects which will hereinafter appear, our invention resides in the apparatus elements, and their relation one to another, as are hereinafter more particularly described in the following specification. The specification is accompanied by drawings, in which:

Fig. 1 is a plan view of a short length of sausage;

Fig. 2 is a transverse section through the sausage, taken in a transverse plane such as that indicated by the arrows 2—2 in Fig. 1;

Fig. 3 is a perspective view explanatory of a feature of the invention;

Fig. 4 is a perspective view showing the plows and the stationary die following the same;

Fig. 5 is a perspective view of a complete apparatus embodying features of our invention;

Fig. 6 is a perspective view showing the plows with a fragmentary length of sausage passing therethrough;

Fig. 7 is a transverse section through the plows, taken somewhat behind the leading ends thereof;

Fig. 8 is a similar transverse section taken still further from the leading ends thereof;

Fig. 9 is a transverse section through the sausage, showing the relation of the parts of the fly, with the free edges of the flies folded back away from the scoops by the plows;

Fig. 10 is a fragmentary transverse section showing the operative parts of the die, punch and pad;

Fig. 11 is a longitudinal section through the punch, die and cutter; and

Fig. 12 is a fragmentary longitudinal section through the guide track, and showing the feed finger located at said guide.

Referring to the drawings, and more particularly to Fig. 1, there is shown a continuous length of slide fastener chain 12. This is made up of meshed stringers 14 and 16, each having fastener elements or so-called "scoops" 18. The trouser flies 20 and 22 for a single pair of trousers are stitched to the stringers 14 and 16, respectively, by lines of stitching shown at 24 and 26. As viewed in Fig. 1, the righthand edges of the flies are substantially coincident with the righthand edge of the chain 12, but the flies are substantially wider than the chain, and the excess width is disposed at the left of the chain. The flies are curved at their lower end, as shown at 28.

Another pair of flies 20' and 22' is stitched at the end of the flies 20, 22, and additional flies are stitched to the chain to make up a continuous series of flies, here referred to as a "sausage."

When installed in a pair of trousers, the fly front may be opened downward to a point somewhat above the lower end, indicated at 30. Additional tape ends devoid of scoops are needed for conveniently sewing the fastener into the trousers, and also for receiving a suitable bottom stop, which may be of the "staple" type. In dealing with continuous chain this requires the removal of scoops in the region between the point 30 and the bottom of the fly, indicated by the broken line 32.

This is most conveniently done by means of a suitable punch press, such as that shown in Fig. 5. The press may be either power operated or foot operated. Referring now to Fig. 10, the meshed elements of the chain 12 are rested on a die 34, and are acted on by a punch 36 and a yieldable pad 38. The punch and pad are carried by the ram of the press, but the pad is spring pressed or otherwise yieldable. The parts come down together until they bear against the meshed fastener elements as shown in Fig. 10, whereupon the spaced parts 38 of the spring pad are arrested, while the punch continues moving down, thereby shearing away the heads 40 of the fastener elements. Punch 36 has a thickness sufficient to shear the heads as far as the jaws of the elements, thus freeing the jaws so that they subsequently fall from the tapes when the sausage is pulled from the die. Referring to Fig. 11, the length of the punch 36, in a direction longitudinal of the chain, corresponds to the desired length of tape ends, shown in Fig. 1 between the points 30 and 32.

The sausage is preferably severed on the line 32 (Fig. 1) simultaneously with the shearing of the scoops, and this may be done by the addition of a transverse cutter to the punch and pad assembly carried by the ram. This cutter is shown at 42 in Fig. 11, and it too may be spring pressed like the pad so that it can work against a solid part or block 44 in the die therebeneath.

From inspection of the sausage shown in Fig. 1 it will be seen that a major problem in this operation is to safely and securely turn back and hold the flies away from the scoops during the punching operation, for otherwise the punch will pass through one or both flies, thereby spoiling the same.

Referring now to Fig. 4 of the drawing, the apparatus includes a guide track or groove 46 for receiving and guiding the meshed scoops of the chain, and it further comprises an upper plow generally designated 48, and a lower plow generally designated 50, preceding the guide track 46. The upper plow 48 is disposed over the sausage and serves to turn the upper fly away from the scoops, while the lower plow 50 is disposed under the sausage and serves to turn the lower fly away from the scoops.

Referring now to Fig. 5, the upper and lower plows

48 and 50 precede guide track 46, which itself precedes the die 34. The latter is mounted in a punch press generally designated 52, having a ram 54 disposed over the die 34, and carrying the pad, the punch, and preferably also the cutter previously referred to. As shown in Fig. 10, the pad has spaced collateral parts 38 dimensioned to bear against the jaws of the meshed scoops at the end of the fly front, and the punch is disposed between the spaced parts 38 and is dimensioned to punch away the heads of the fastener elements as far as the jaws. The cutter is disposed transversely of the sausage, as shown at 42 in Fig. 11, and is located at one end of the punch and pads.

Referring now to Fig. 4, plow 48 has a groove 56 on its lower surface, and plow 50 has a groove 58 on its upper surface. These grooves are superposed and together make up a track which receives the meshed scoops of the sausage. Plow 48 further has a biased transverse leading edge 60 which is thin enough to readily come between the top fly and the meshed scoops. This is followed by a sloping top surface 61 and an upright longitudinal surface 62 of growing thickness located at one side of the groove 56, in order to progressively turn back the top fly. Finally there is a horizontal surface 64 which folds the turned-back fly close to and substantially parallel to the sewn part of the fly.

It will be understood that the lower plow 50 has generally corresponding parts, there being a biased leading edge 66 and a sloping bottom surface 67 and an upright longitudinal surface of growing thickness, which is not visible in Fig. 4, but which will be seen by referring next to Figs. 7 and 8 of the drawing.

In Fig. 7 the fly 68 is being raised from the tape 70 by top surface 61, and fly 72 is being turned down from the tape 74 by bottom surface 67. Referring now to Fig. 8, which is a section taken further along the plows, fly 68 has been rolled fully back by the increasing height of the upright surface 62 of plow 48, and similarly the fly 72 has been turned back by the increasing height of the upright surface 76 of plow 50.

After the fly 68 has been turned all the way back it is held down by the horizontal surface 64 previously referred to, and better shown in Figs. 4 and 6. Similarly the fly 72, after being turned all the way back, is held in flat position because it passes over the side areas bordering track 46, shown at 78 and 80 in Figs. 4 and 5 of the drawing. The sausage leaves the plows in substantially the condition shown in Fig. 9, with the upper fly 68 and the lower fly 72 turned well back away from the scoops of the chain, so that the scoops may be sheared without damaging the flies.

We have found that successful operation of the plows is greatly aided by feeding the sausage to them in a particular way. Referring to Fig. 5, the sausage is indicated by the broken line 82, which is preliminarily passed upwardly and over a tangle prevention mast 84, having a horizontal support 86 (which may include a roller, if desired), and vertical guides 88 and 90. The sausage then runs downward to a horizontal roller 92, and is then given a half twist by means of a twist guide generally designated 94, and preferably disposed in the region about halfway between roller 92 and the plows.

The twist guide 94 comprises a pair of generally upright supports 96 and 98 disposed on opposite sides of the sausage, to hold the same generally edgewise. The guides 96 and 98 may be round rods, and in preferred form these rods may be tilted back toward the mast 84 at their upper ends, as shown.

When the sausage is threaded through the guide it preferably is threaded with the chain down, that is, with the righthand edge as viewed in Fig. 1 down, or in the position shown in Fig. 2. This encourages the excess material of the fly 22 to fall downward, as shown at 22', which helps the upper plow in its operation of turning back the fly. The preferred half twist between roller 92 and its guide 94 is best shown in Fig. 3, that is the twist is clockwise. Of course, the sausage gradually turns another 90° between the twist guide 94 and the plows, and this twist continues in the same direction, that is clockwise, thus bringing the fly 22 on top, where the upper plow turns it back. It also brings fly 20 on bottom, which helps the edge 21 fall away, as shown at 21' in Fig. 2. The sausage is preferably fed with the flies bottom end foremost.

If the sausage were fed with the chain near the top edge, that is, with Fig. 2 inverted, the fly 21 would first fall away gravitationally, as shown at 21', and then after the sausage is turned 90°, the fly 22 would fall away gravitationally, as shown at 22'.

If the flies are cut apart as the scoops are punched, it is difficult to feed the sausage ahead for the next cutting operation. We accordingly provide automatic feed means, including a feed finger 100 (Fig. 5), preferably disposed between the plows and the die. Thus the feed finger 100 operates over the guide track 46 previously referred to. The feed finger is shown more clearly in Fig. 12. It is pivoted at 102, and its preferably serrated lower end 104 is normally urged downward by resilient means, in this case a torsion spring 106. The pivot 102 is carried at the lower end of the arm 108 of an angle lever, which is pivoted at 110, and the other arm 112 of which is operatively related to the movable part 114 of the die carried by the ram of the punch press.

More specifically, the die includes a transverse pin 116 which bears against arm 112 during downward movement of the ram, thus moving the feed finger back over the chain of the sausage. When the ram rises the feed finger is moved forward by a pull spring 118, thus feeding the sausage along the track 46 and over the die. This provides a free end of sausage beyond the die, which is readily gripped by the operator and pulled or moved toward the left until the lower end of the next fly comes beneath the cutter. Thus in the present apparatus the feed is partially automatic and partially manual.

We prefer such a feed because there is no concern then with trouser size. Flies of different length may be intermixed along the sausage, and the operator simply pulls the sausage the necessary distance. This distance is readily determined on sight by the die structure itself, for referring to Fig. 4, the die 34 includes a cutting block 44 against which the cutter works, and this preferably is long enough in transverse direction to project beyond the edge of the sausage, so that the operator need merely pull the sausage until the beginning of a fly is located at the edge of the block 44.

To aid in initially threading the sausage through the machine the upper plow 48 (Fig. 4) is preferably mounted so that it may be moved out of the way. In the present case the plow is integral with an arm 120 which is pivoted at 122 on a pedestal 124. The plow is normally pulled down to working position by a spring 126, and this position is accurately determined by means of a stop 128 which bears against a stop screw 130, the latter being threadedly received in pedestal 124. By turning the upper plow 48 upward out of the way it is an easy matter to thread the sausage along groove 58 in lower plow 50, track 46, and groove 132 of die 34, all of which are in end to end alignment and form a continuous guide groove or track. The overlying edge of the top fly is held back manually while the upper plow 48 is turned back down. As a further convenience it is customary for the first flies to be sewn on the chain a few inches back from the end of the chain, to provide a "leader," as shown at the lower end of Fig. 1 of the drawing. This aids the operator in properly adjusting the sausage for the first cut at the end of the first fly of the sausage.

It is believed that the construction, operation and method of use of our improved apparatus for processing a sausage of trouser flies, as well as the advantages there-

of, will be apparent from the foregoing detailed description. It will also be apparent that while we have shown and described our invention in a preferred form, changes may be made in the structure shown, without departing from the scope of the invention, as sought to be defined in the following claims.

We claim:

1. Apparatus for processing continuous slide fastener chain having meshed scoops and both left and right trouser flies stitched to the chain to form a so-called "sausage," said apparatus comprising a die including a guide track for receiving and guiding the meshed scoops of the chain, upper and lower plows disposed in predetermined relation with respect to said die in advance of the latter, the upper plow being disposed over the sausage and serving to turn back the upper fly away from the scoops, the lower plow being disposed beneath the sausage and serving to turn back the lower fly away from the scoops, a press having a ram disposed over said die, said ram carrying a yieldable pad, and a punch, said pad having spaced collateral parts dimensioned to bear against the jaws of the meshed scoops at the lower end of the fly front, said punch being disposed between the spaced parts of said yieldable pad and being dimensioned to punch away the heads of the scoops as far as the jaws, whereby the latter fall free from the tapes to provide a desired length of tape ends.

2. Apparatus for processing continuous slide fastener chain having meshed scoops and both left and right trouser flies stitched to the chain to form a so-called "sausage," said apparatus comprising a die including a guide track for receiving and guiding the meshed scoops of the chain, upper and lower plows disposed in predetermined relation with respect to said die in advance of the latter, the upper plow being disposed over the sausage and serving to turn back the upper fly away from the scoops, the lower plow being disposed beneath the sausage and serving to turn back the lower fly away from the scoops, a press having a ram disposed over said die, said ram carrying a yieldable pad, a punch, and a cutter, said pad having spaced collateral parts dimensioned to bear against the jaws of the meshed scoops at the lower end of the fly front, said punch being disposed between the spaced parts of said yieldable pad and being dimensioned to punch away the heads of the scoops as far as the jaws, whereby the latter fall free from the tapes to provide a desired length of tape ends, and said cutter being disposed transversely of the punch and pads at one end thereof in order to sever the tapes and thereby provide a fly front separated the sausage.

3. Apparatus as defined in claim 1, in which a feed finger is disposed over said guide track between the plows and the punch, said feed finger and ram being operatively connected in such manner that lifting of the ram is accompanied by forward movement of the feed finger sufficient to provide a free sausage end beyond the die, which end may be gripped and moved forward to bring the next fly end to the punch.

4. Apparatus as defined in claim 1, in which there is a twist guide disposed ahead of the plows, said twist guide comprising a pair of generally upright supports disposed on opposite sides of the sausage to hold the sausage generally edgewise.

5. Apparatus as defined in claim 2, in which there is a twist guide disposed ahead of the plows, said twist guide comprising a pair of generally upright supports disposed on opposite sides of the sausage to hold the sausage generally edgewise with the chain near the lower edge of the sausage, said sausage being turned to flat position at the plows, with that fly on bottom the edge of which is yet to be turned away gravitationally.

6. Apparatus as defined in claim 1, in which there is a tangle prevention mast followed by a horizontal guide roller well ahead of the plows, and a twist guide disposed between the roller and the plows, said twist guide comprising a pair of generally upright supports disposed on opposite sides of the sausage to hold the sausage generally edgewise.

7. Apparatus as defined in claim 2, in which there is a tangle prevention mast followed by a horizontal guide roller well ahead of the plows, and a twist guide disposed between the roller and the plows, said twist guide comprising a pair of generally upright rods disposed on opposite sides of the sausage to hold the sausage generally edgewise, the rods of said twist guide being tilted back toward the mast at their upper ends.

8. Apparatus as defined in claim 1, in which there is a twist guide disposed ahead of the plows, said twist guide comprising a pair of generally upright supports disposed on opposite sides of the sausage to hold the sausage generally edgewise, and in which a feed finger is disposed over the guide between the plows and the punch, said feed finger and ram being operatively connected in such manner that lifting of the ram is accompanied by forward movement of the feed finger sufficient to provide a free sausage end beyond the die, which end may be gripped and moved forward to bring the next fly end to the punch.

9. Apparatus as defined in claim 2, in which there is a twist guide disposed ahead of the plows, said twist guide comprising a pair of generally upright supports disposed on opposite sides of the sausage to hold the sausage generally edgewise, and in which a feed finger is disposed over the guide between the plows and the punch, said feed finger and ram being operatively connected in such manner that lifting of the ram is accompanied by forward movement of the feed finger sufficient to provide a free sausage end beyond the die, which end may be gripped and moved forward to bring the next fly end to the punch and cutter.

10. Apparatus as defined in claim 1, in which there is a tangle prevention mast followed by a horizontal guide roller well ahead of the plows, and a twist guide disposed between the roller and the plows, said twist guide comprising a pair of generally upright supports disposed on opposite sides of the sausage to hold the sausage generally edgewise, and in which a feed finger is disposed over the guide between the plows and the punch, said feed finger and ram being operatively connected in such manner that lifting of the ram is accompanied by forward movement of the feed finger sufficient to provide a free sausage end beyond the die, which end may be gripped and moved forward to bring the next fly end to the punch.

11. Apparatus as defined in claim 2, in which there is a tangle prevention mast followed by a horizontal guide roller well ahead of the plows, and a twist guide disposed between the roller and the plows, said twist guide comprising a pair of generally upright rods disposed on opposite sides of the sausage to hold the sausage generally edgewise, the rods of said twist guide being tilted back toward the mast at their upper ends, and in which a feed finger is disposed over the guide between the plows and the punch, said feed finger and ram being operatively connected in such manner that lifting of the ram is accompanied by forward movement of the feed finger sufficient to provide a free sausage end beyond the die, which end may be gripped and moved forward to bring the next fly end to the punch and cutter.

12. Apparatus as defined in claim 1, in which the plows each comprise a groove portion to receive the meshed scoops, a transverse leading edge fitting between the fly and meshed scoops, an upright longitudinal surface of growing thickness at one side of the groove to turn back the fly, and a horizontal surface to fold the turned back fly close to the sewn part of the fly.

13. Apparatus as defined in claim 2, in which the plows each comprise a groove portion to receive the meshed scoops, a biased transverse leading edge fitting

between the fly and meshed scoops, a sloping top surface and an upright longitudinal surface of growing thickness at one side of the groove to turn back the fly, and a horizontal surface to fold the turned back fly close to the sewn part of the fly.

14. Apparatus for processing continuous slide fastener chain having meshed scoops and both left and right trouser flies stitched to the chain to form a so-called "sausage," said apparatus comprising a punch press for the removal of meshed scoops from the chain, plows disposed at one side of the punch of said press to turn back the flies away from the scoops in advance of the punch press operation, a horizontal guide roller for guiding the sausage disposed in advance of said plows, and a twist guide disposed between said roller and said plows, said twist guide comprising a pair of generally upright supports disposed on opposite sides of the sausage to hold the sausage generally edgewise.

15. Apparatus for processing continuous slide fastener chain having meshed scoops and both left and right trouser flies stitched to the chain to form a so-called "sausage," said apparatus comprising a die including means to locate the meshed scoops of the chain, upper and lower plows disposed in predetermined relation with respect to said die in advance of the latter, the upper plow being disposed over the sausage and serving to turn back the upper fly away from the scoops, the lower plow being disposed beneath the sausage and serving to turn back the lower fly away from the scoops, a press having a ram disposed over said die, said ram carrying die means to eliminate scoops at one end of a fly assembly, and a cutter carried by the ram at one end of the die means in order to sever the tapes and thereby provide a fly front separated from the sausage.

16. Apparatus for processing continuous slide fastener chain having meshed scoops and both left and right trouser flies stitched to the chain to form a so-called "sausage," comprising a die including a guide track

for receiving and guiding the meshed scoops of the chain for a punch press operation in which meshed scoops are removed from the chain, and a companion pair of plows disposed in predetermined relation with respect to said die in advance of the latter to turn back the flies away from the scoops during the punch press operation, said plows comprising grooved portions which collectively define a track for the meshed scoops of the chain, leading edge portions fitting between the flys and meshed scoops, upright longitudinally extending surfaces of progressively increasing thickness at one side and said grooved portions to turn back the flies, and horizontal surfaces rearwardly of said longitudinally extending surfaces to fold the turned back flies adjacent to the sewn parts of the flies.

17. Apparatus for processing continuous slide fastener chain having meshed scoops and both left and right trouser flies stitched to the chain to form a so-called "sausage," comprising a punch press for removing meshed scoops from the chain, and a companion pair of plows disposed in predetermined relation with respect to said press in advance of the latter to turn back the flies away from the scoops during the punch press operation, said plows each comprising a groove portion to receive the meshed scoops, a biased transverse leading edge fitting between the fly and meshed scoops, a sloping top surface, an upright longitudinal surface of growing thickness at one side of the groove to turn back the fly, and a horizontal surface to fold the turned back fly close to the sewn part of the fly said groove portions collectively defining a track for guiding the meshed scoops to said punch press.

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