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 (72) Inventor BERNARD SAMS



## (54) IMPROVEMENTS IN OR RELATING TO LABEL APPLICATORS

(71) We, NORPRINT LIMITED, a British Company, of Horncastle, Road, Boston, Lincolnshire, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to self-adhesive label printing and applying devices.

Such devices may serve to print and apply self-adhesive labels to articles, for example price and code labels applied to packets to be placed on sale in a retail shop. In simplified versions, the devices may serve simply to carry a supply of pre-printed labels and to dispense and apply them to articles. The devices may be hand held or otherwise, and for the sake of simplicity will be termed hereinafter, "applicators".

According to the present invention there is provided a label applicator for printing and dispensing labels from a label-carrying web incorporating a backing strip having regularly-spaced engagement means along its length, said applicator comprising a casing, at least one print head assembly pivotally mounted in the casing, and actuating means for moving operative facets of the or each print head assembly into contact with the label to be printed and for moving linearly a label to be printed by engagement with the engagement means of the backing strip, said actuating means including a device for detaching a printed label from the backing strip and dispensing said label from the applicator, said operative facets being movable over an arcuate path with an instantaneous linear velocity at the instant of printing identical to the linear velocity of the label which is being simultaneously moved by the actuating means and said actuating means further being arranged to deliver the printed label to the said detaching device thereof, the

printing, the detaching and the dispensing of a given label being effected in the same operational cycle of the or each print head assembly.

Further according to the present invention there is provided a label applicator comprising a casing, means for carrying a reel of self-adhesive labels supported on a backing strip having regularly spaced notches along its length, at least one print head assembly pivoted in the casing for printing successive labels, a dispensing edge member movably mounted within the casing and arranged to detach successive printed labels from the backing strip by passage of the latter over the edge thereof, a feed mechanism including a member movable within the casing and arranged to engage successive series of the notches by a first series of barbs on a face thereof and including a second series of barbs having a spacing equal to the spacing of the notches, and means common to the print head assembly or assemblies and the barbed member for actuating the barbed member so that the strip is disengaged from the second series of barbs by movement of the barbed member in one direction and engaged at a fresh set of notches on the second series of barbs during movement in the opposite direction of the barbed member whereby to draw a printed label over the dispensing edge member and to detach it, the arrangement being such that the dispensed label is that one which has been printed by the same operational cycle of the actuating means which has actuated the feed mechanism to dispense that label and that operative facets of the or each pivotal print head assembly are movable with an instantaneous linear velocity identical to the instantaneous linear velocity of a label at the instant of printing.

Still further according to the present invention there is provided a label applicator comprising at least one print head assembly

pivoted in a casing, and actuating means operative to actuate the print head assembly to print and operative to dispense, at a dispensing device forming a part of said actuating means, a given label in the same operational cycle, the arrangement being such that the moving operative print facets of the print head assembly have at the instant of printing an instantaneous linear velocity equal to the linear velocity of the moving label.

Yet further according to the present invention there is provided an applicator for self-adhesive labels mounted on a backing strip having a continuous series of regularly-spaced notches along both longitudinal edges, said applicator comprising a casing, a print head assembly pivotally mounted in the casing, ink pad means for inking operative type facets of the print head assembly, a label-support printing platen movable substantially rectilinearly at a linear velocity equal to the instantaneous linear velocity of the operative type facets at the instant of printing whereby to print a moving label carried on the platen, a label feed slide rigid with the platen, supporting the ink pad means and including means for pivoting the print head assembly to impart the said instantaneous linear velocity to the operative print facets, a platen carrier supporting the feed slide and platen, a label dispensing member adjacent the platen and carried by the feed slide, a pivotal trigger, a flexible elongate member connecting the trigger to the platen carrier, a return spring connecting the casing to the carrier, and means on the platen carrier for successively urging the ink pad and the platen towards the operative type facets, said feed slide comprising at least one series of regularly spaced barbs adapted to engage the backing strip during a first stroke of the slide and a barbed member fixed to the casing adapted to engage and hold the backing strip during the second, return stroke of the feed slide, said return stroke serving to draw the label printed during the first stroke over the dispensing member and to draw a fresh label from the supply on to the platen.

Three embodiments of applicators in accordance with the invention will now be described, by way of example, with reference to the accompanying diagrammatic drawings, in which:

Figure 1A is a side elevation, partly in section, of a first embodiment of label applicator;

Figures 1AA and 1AB are together a longitudinal section of a forward portion of the first embodiment;

Figures 1BA, 1BB and 1BC are together an exploded view of the first embodiment;

Figure 2 is a section on the line II—II of Figure 1A with certain parts omitted;

Figure 3 is a plan view of a unitary mem-

ber including a fixed handle and certain portions of the casing of the applicator;

Figure 4 is a section on the line IV—IV of Figure 3;

Figure 5 is an end elevation of one part of a side casing;

Figure 6 is a side elevation of the side casing of Figure 5 viewed from the interior;

Figure 7 is an end elevation of a second part of the side casing;

Figure 8 is a side elevation of the side casing of Figure 7 viewed from the interior;

Figure 9A is a plan view of a platen;

Figure 9B is a perspective view of a carrier for the platen of Figure 9A;

Figure 10 is a front elevation of the platen carrier;

Figure 11 is a plan view of a spring which, when *in situ* lies between the platen carrier and the platen;

Figure 12 is a side elevation of the spring;

Figure 13 is a longitudinal central section of the assembly formed by the parts of Figures 8 to 12;

Figure 14 is a side elevation illustrating the relationship between certain parts (ink pads) of the applicator;

Figure 15 is a front elevation of an ink pad;

Figure 16 is a front elevation of an ink pad carrier for use with the ink pad of a front one of two print head assemblies;

Figure 17 is a front elevation of an ink pad carrier for use with the ink pad of a rear one of two print head assemblies;

Figures 18 to 26 are fragmentary diagrammatic outline side views illustrating the operation of the first embodiment;

Figure 27 is an outline side view illustrating access to the working parts of the applicator;

Figure 28A is a side elevation, partly in section, of a second embodiment which includes only a single print head assembly;

Figure 28B is a fragmentary side elevation, to an enlarged scale illustrating working parts of the second embodiment;

Figure 28C is a fragmentary cross-section on the line AA—AA (right-hand half) of Fig. 28B and BB—BB (left-hand half) of Figure 28A;

Figure 29 is a plan view of a feed slide of the second embodiment;

Figure 30 is a longitudinal section of the feed slide of Figure 29 on the line A—A of Figure 29;

Figure 31 is a side elevation of the feed slide;

Figure 32 is a section on the line B—B of Figure 30;

Figure 33 is an end elevation of the feed slide;

Figure 34 is an inverted plan view of a part which forms one part of the casing of

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the second embodiment and a part of the feed mechanism;

Figure 35 is an end view of the part shown in Figure 34;

5 Figures 36A and 36B are together a perspective exploded view of the second embodiment;

Figure 37 is a diagrammatic outline of the second embodiment showing the working parts thereof in a rest position;

10 Figures 38 to 41 are outlines showing the working parts in positions when the platen has been drawn rearwardly through 3 mm. 9 mm. 15 mm. and 19 mm. (maximum) travel;

Figure 42 is an outline showing the working parts in positions when the platen has been partially moved to its forward position and a label is being dispensed;

20 Figure 43 is an outline at the instant of label dispensing;

Figure 44 is an outline showing the second embodiment in its open configuration;

25 Figure 45A is a side elevation, partly in section, of a third embodiment having two print head assemblies, and Figure 45B is a section of the unsectioned parts of Figure 45A, to an enlarged scale;

30 Figures 46A and 46B are together an exploded perspective view of the applicator of Figure 45; and

Figure 47 is an exploded perspective view of a part of a handle and trigger portion of the applicator of Figures 45 and 46;

35 Referring now to the drawings, all embodiments of applicator are intended for use with a band or web of self-adhesive labels having accurately regularly-spaced indents or notches along the whole of the length of the backing strip. Such webs of labels have been proposed in our co-pending application No. 11745/69 (Serial No. 1,289,126). Other bands, however, can also be used. The notches or indents may be provided either at both longitudinal edges of the backing strip; or centrally, or possibly, at one longitudinal edge only. It should be emphasized that the exact form of the web of labels is not critical provided that some form of accurately, regularly spaced indents, notches or other engagement means is provided which can be positively engaged by a part or parts of the mechanism of the applicator. All applicators hereinafter described serve to print data, such as prices and stock coding, on each label immediately prior to applying a label on to an article, the backing strip on which the labels are mounted being deflected away from the labels immediately adjacent to the point of application to an article, and the spent backing strip being discharged at a point remote from the point of application of the labels.

65 The applicator of the first embodiment has the facility of applying two separate impressions to each label and these impressions

may, if so desired, be in different colours. As will be apparent from the description given hereinafter the printing operation, for any given operational cycle, takes place on the same label as that dispensed during that cycle. This facility avoids label wastage when the print-out is changed.

70 Broadly, the first embodiment comprises a casing housing the working parts, and actuating means including a trigger arranged by a pivotal squeeze action to operate all the working parts in order to print and dispense successive labels and to feed the next label. The main working parts are a label feed mechanism, two pivotal print head assemblies, two inking assemblies, a member which serves to detach and dispense successive printed labels from the web and a pad or other application member adjacent to the detaching device which serves actually to apply the labels to articles.

75 The casing comprises two main portions 100, 101 which, as can be seen from Figures 5, 6, 7 and 8, serve substantially to enclose the working parts laterally and peripherally along the upper (as shown) edge only of the applicator. The main portion 100 (Figure 8) has an outline in side elevation including a generally rectilinear upper edge 102 which terminates at the front of the applicator in a curved edge 104 which itself continues in a rectilinear edge 106 inclined to the upper edge 102 at an angle of approximately 60°. As can be seen from Figures 1BC and 7 the edges 102, 104 and 106 have substantial transverse dimensions and thus constitute transverse wall portions. The outline continuing beyond the edge 106 is stepped inwardly at 108 and continues, parallel to the portion 106, as rectilinear edge 110. This edge 110 does not have a corresponding transverse wall portion although at its end remote from the step 108, it carries a rod-like transverse member 112, which has a countersunk bore 114 for a locating dowel 116 (Figure 1BA). The number 112 is of generally rounded section, but one corner, 118, is notched and not rounded at the other two. It receives an edge portion of a catch release button 314 (Figure 1AA) of the casing described hereinafter. The notched corner 118 lies at the end of the portion 110 and that rounded corner 120, lying inwardly of the other rounded corner 122, lies adjacent a further, short, rectilinear edge 124 which joins a lower edge 126 extending substantially parallel to the edge 102. The edges 110 and 124 are substantially at right angles to one another. The edge 126 extends over a length of the upper edge 102 and terminates at an arcuate edge 128 which again has transverse thickness and thus constitutes a further transverse wall portion. The arcuate edge 128 effectively continues as an internal arcuate wall 130 which extends back to the edge 126. The

wall corresponding to the edge 128 extends only part way across the width of the applicator as is apparent from Figure 7. The end of the wall 130 adjacent the edge 126 terminates in an elongate, hollow, boss 130A as is apparent from Figure 8 and this serves to receive a locating dowel. A boss 132 with an aperture 134 extends beyond the end of a short arcuate portion 136 itself forming a continuation of the upper edge 102 and also beyond the end of the wall 130. As seen in Figure 1A, the portion 136 and the end portion of the wall 130 receive an end portion of an internal part of the applicator to be described in detail hereinafter. A transverse step 131 in the end portion of the wall 130 serves to lock the end portion of the internal part in engagement. The wall 130 does not intersect the portion 136 and is spaced therefrom by a transverse projection 140 of the wall corresponding to the edge 102.

The upper wall corresponding to the edge 102 has two transverse slots 150, 152 of dovetail cross-section and each serves to carry an elongate magnifying or plain lens 154, 156 (Figures 1AA, 1AB) respectively of complementary cross-section to the slots to facilitate reading the characters at any given time visible on the read-out of the respective print head assemblies in their locked positions (for example, as fully described in our co-pending application 32321/72 1409655). In a modification these slots 150, 152 and lenses 154, 156 may be angled so that the characters may be more conveniently read when the operator is viewing the characters from a position rearwards of the applicator.

The space lying between the edges 102, 104, 106, 108, 124, 126 and the wall 130 outlining the casing main portion 100 is occupied by a side wall 160 and this carries a number of internal projections serving to support working parts. A hollow boss 162 is substantially concentric with the wall 130 and serves to carry a reel of labels 164 (chain lines in Figures 18 to 27). The space lying between the edge portion 128 and the wall 130 is spanned by a further side wall 166 at the opposite side to the side wall 160 and the hollow boss 162 extends from this side wall 166 substantially across to the inner plane of the wall 160. The side wall 160 does not extend between the edge 128 and the wall 130 to enable access to the reel. A further transverse boss 170 extends eccentrically within the hollow boss 162 but concentrically with the edge 128 and continues to a plane just short of the inner plane of the side wall 166.

The purpose of the boss 170 is to accommodate a screw holding the parts 100, 101 together. The side wall 160 is integral with two large diameter annular locating spigots 172, 174 which serve to support, when the applicator is assembled, the assembly of read-

out wheels of the front and rear print label assemblies. These spigots 172, 174 lie adjacent the respective read-out slots 150 and 152. A hollow, elongate, sleeve 176 of smaller diameter lies between the two spigots 172 and 174 and this serves to accommodate a fixing screw 178 (Figure 1AB) and a dowel (not shown). Two smaller diameter spigots 180, 182 serve as pivot carriers for the front and rear print head assemblies 350, 352 and a cam track 184 extends from the lower edge portion 126 to a position adjacent the spigot 174. Details of the cam track will be given hereinafter. Finally, the side wall portion 100 includes a projection 186 depending below the edge portion 126 and extending forwardly of the boss 130A and a solid spigot 188 adjacent the edge portion 110. The projection 186 serves with a complementary part 186A of the portion 101 to locate the two portions relative to a further casing part 220. The spigot 188, in conjunction with a corresponding spigot of the casing portion 101 serves pivotally to support an ink carrier hereinafter described.

The side wall portion 101 (Figure 6) of the casing has a number of features common with those of the casing portion 100 and parts serving corresponding functions will be given the suffix "A" and will not be further described. The main differences between the portions 100 and 101 are that the transverse wall portions of the casing portion 101 are of only comparatively small extent measured transversely and the internal spigots 172 and 174 have complementary external annular bosses 200, 202 and apertures 204, 206 which accommodate adjusting knobs 208, 210 (Figures 1AA, 1AB and 1BA) of the front and rear print head assemblies 350, 352. The boss 162A again carries an internal eccentric boss 170A, and this has a countersunk bore 212 (Figure 5) arranged to receive a head and part of the shank of a firing screw (not shown). The boss 162A is disposed at and spans laterally one edge 214 of the casing portion 101 which extends substantially from the projection 186A to the boss 132A. The transverse extent of the boss 162A is slightly greater than that of the casing portion 101 as a whole, so that when assembled with the portion 100 it engages in a recess in the latter aligned with the boss 162. The side wall 216 itself is therefore not defined by the same outline as of the wall portion 160, but most of the edges are complementary.

A further part 220 of the casing which is integral with the fixed part 222 of the handle is illustrated in Figures 3 and 4 as well as in Figures 1A and 1BA. As will be apparent from Figure 1A, one peripheral wall portion 224 of the casing part 220 is arcuate in longitudinal section and is concentric with the eccentric bosses 170, 170A but is spaced

from the outer surface of the wall defined by the edge 128. This space defines, in part, a channel 225 for spent backing strip and will be referred to again hereinafter.

5 Adjacent a junction with the inner end of the fixed handle part 222 which extends outwardly and rearwardly from the casing as a whole, a rectilinear tongue 226 extends from the end of the arcuate part 224 parallel to the upper edge 102 but as will be apparent from Figure 4 the part 224 is not in tangential relationship with the tongue 226. A further rectilinear wall 228 lies parallel with the tongue 226 but is spaced therefrom both in a lateral and longitudinal sense so that a gap 230 is formed between adjacent edges of these walls. As will be apparent from Figures 1BA, and 3, the tongue 226 has a width less than the width of the casing part 220 as a whole, whilst the wall 228 extends across a greater proportion of the width and is integral at its longitudinal edges with side cheeks 232 through the intermediary of a riser 233 and a longitudinally extending horizontal step 235 as shown in Figure 2. Each of the side cheeks 232 extends from adjacent the upper edge (as shown in Figure 4) of the part 224 to a tip 234 lying forward of the front edge of the wall 228. Each horizontal step 235 is integral with a ramp 237 and this also lies alongside and is integral with the corresponding cheek 232. One part 236 of the free edge of each cheek is rectilinear and lies parallel to the wall 228 and another part 238 is inclined thereto by the same angle as the edge 214 (Figure 6) of the casing portion 101. The two edges are joined by a smooth curve and edges 236 and 238 are complementary to and form a good fit with the edges 126A and 214 when assembled. The wall 228 carries two inclined projections 239 symmetrically arranged about the longitudinal centre line, which extend effectively beyond the forward edge of the wall 228 and have a purpose described in detail hereinafter. The forward edge of each cheek is inclined at an angle of approximately 30° to the wall 228 and the centre line of each projection 239 is at approximately the same angle.

The fixed handle 222 is of channel section and is closed at the extremity remote from the tongue 226. Two integral cam tracks 250 (only one shown) are provided internally of and integral with each side limb of the channel and these tracks cooperate with rollers 252 provided on a link 254 of a movable trigger 256 (Figure 1A).

The movable trigger 256 (Figures 1A and 1BA) is of channel section and the external surface is suitably shaped to accommodate a user's fingers. A transverse indent or recess 258 is provided adjacent the free end to assist the gripping action. The trigger 256 is pivoted by a pin 260 engaged in the fixed

handle 222 and this pin also carries a roller 262 which acts as a guide for an elongate flexible strip 264 or other member connected between that end of the link 254 carrying the rollers 252 and a retainer member 266 connecting the flexible member with the working mechanism of the applicator. In a modification, the flexible strip takes the form of a continuous band. The end of the link 254 remote from the rollers 252 carries two lateral, opposed, circular section pegs 268 which snap into a corresponding pair of open socket members 270 which are integral with opposite side limbs of the channel-section trigger member 256. The rest position of the trigger is shown in full lines and retracted or rearmost position is reached when the trigger member is squeezed and the rollers 252 have travelled the maximum possible distance along the tracks 250 and the trigger member is substantially parallel to the fixed handle 222.

The casing is completed by a catch member 300 illustrated in Figures 1AA, 1BB and 1BC. This member is formed essentially of two integral portions 302, 304 disposed mutually at right angles to one another and the member serves the purpose of closing the gap between the wall 228 and the wall 106. As is best seen from Figures 1BB and 1BC the portion 302 is formed by two opposed angle sections 306 spanned over a part of their lengths by a bridge 308. At the junction between the free parts of the angles and the bridge 308 two semi-annular seats 310 are provided which serve partially to support pins 312 integral with a catch button 314 (see Figures 1AA and 1BC). At the end of the bridge 308 remote from the seats 310 two opposed lugs 316 are provided which together support a pressure pad 318 of semi-cylindrical shape which serves as the application member (for example, as described in our co-pending application 30660/72 Serial No. ). The preferred pad comprises

foam natural or synthetic rubber or a foam synthetic resin coated by adhered glass balls or tungsten carbide balls. The lugs 316 lie at the corner of the member 300 and the angles continue in the portion 304 defining an opening 320 (Figure 1AA) through which labels are dispensed. Below the opening a further bridge 322 is provided and this continues into a space lying between two lugs 324 forming continuations of the angles but spaced apart by a smaller distance. Each lug 324 has an aperture 326 carrying a pivot pin 328 of the catch member 300.

The catch member 300 can be released and pivoted from the position shown in Figure 1AA by the catch release button 314 which comprises a rectangular portion 330 with a part-spherical finger recess 332 on its external face and an inwardly off-set rectangular portion 334 interconnected by a

thickened portion 336 which carries the two lateral integral pins 312 partially supported in the part-annular seats 310 of the catch member 300. As shown in Figure 1AA the catch release button 314 is retained in the seats 310 by the action of a U-shaped spring 338 engaged between the bridge 308 and the portion 334 of the catch button. Two shallow opposed transverse ridges 339 on the bridge 308 and portion 334 serve to retain the spring in position. The rectangular portion 330 has two ridges (not shown) on its side edges which prevent the spring from forcing the catch release button outwardly beyond the plane of the outer face of the bridge 308.

The assembled parts are held together by screws 116, (Figure 1BA), 178 (Figure 1AB), 309 (Figure 1A) and 311 (Figure 1A), the corresponding apertures being countersunk to avoid the screw heads and the nuts interrupting the smooth outline of the casing.

The working parts of the applicator will now be described in the sequence in which the parts operate on the web of labels as the web 348 (Figures 18—26) is withdrawn from the reel 164 (Figure 27) mounted rotatably on the boss 162, 162A. The web passes from the reel beneath the rearward print head assembly 352, beneath the forward print head assembly 350 over and in contact with the upper surface of the label and backing strip support platen 354 and around a dispense edge roller 356 or other member which serves to detach and dispense the individual labels from the backing strip because of the relatively greater stiffness of the label in comparison with the backing strip. The labels then pass out through the opening 320 and are applied by the pad 318. The spent backing strip 349 then encounters the feed mechanism which draws the web through the applicator and finally passes out through the channel 225 and an opening 358 (Figure 27).

The individual working parts will now be described in detail, although the print head assemblies 350 and 352 will be described only in outline because a full description is given in co-pending application 32321/72 (Serial No. 1409655). However, it must be emphasized that other print head assemblies could be employed. Each print head assembly 350, 352 includes a plurality of flexible print bands 360 (Figure 1BB) mounted between end plates 362. Each end plate has a shaft 364 enabling the print band assembly to be pivotally mounted in the bosses 180, 180A and 182, 182A of the respective side walls 160, 216 of the casing. Each end plate 362 also carries a circular projection 366 adjacent the end thereof remote from the shaft 364 and a rectangular projection 368. As will appear hereinafter these projections serve a control purpose. Each end plate 362 also includes an arcuate flange 370 centred on

the shaft 364 and a radial lug 372 at one end of the arcuate flange, both these parts serving to control the locking of the front print head assembly, in a manner to be described hereinafter. The side wall 160 carries projections 371, (Figures 1AA and 1AB) which serve as stops for the print head assemblies by engaging at the desired respective ends of their pivotal movement, the respective ends remote from the lugs 372, of the flanges 370. The lugs 372 serve no purpose for the rear assembly and are incorporated merely for the sake of uniformity and interchangeability.

Each print head assembly 350, 352 (Figure 1BB) has a respective set of read-out wheels 374, 376 assembled on a shaft assembly (not shown) and mounted between flanges. The read-out wheel assemblies 374, 376 are coupled to respective knobs 208, 210 and, as described in our co-pending application 32321/72 (Serial No. 1409655) rotary motion of each knob selects a particular character of a given print band and read-out wheel whilst axial inwards motion of the knob enables the selected band and read-out wheel to be changed. The selected characters are read through the lenses 154, 156 only when the print head assemblies are locked in their rest position.

The front print head assembly 350 co-operates with a front ink pad holder 380 (Figure 1AA) mounted in an ink pad carrier 382, whilst a rear ink pad holder 384 and carrier 386 cooperates with the rear print head assembly 352. The ink pad holders 380 and 384 are identical and only one will be described in detail (Figure 15). Each comprises a reservoir portion 390 of elongate shape and rectangular cross-section, open at one end and communicating at the other end with a dish portion 392 which is open at one face 393 to enable contact of absorbent inking material with the type facets of the bands, the open face lying at approximately 110° to the reservoir portion 390. The edge 394 of the reservoir portion is chamfered. Both portions are filled with a conventional ink absorbent material (not shown). Externally the reservoir portion 390 has two opposed lugs 396 of circular section at the ends of the side walls remote from the dish portion 392. A further pair of opposed circular section lugs 398 is provided approximately half-way along the side walls. The lugs 398 are shorter than the lugs 396.

As is apparent from Figure 14, the front ink pad holder 380 is clipped into its carrier 382 by the lugs 398, the corresponding slots 400 in the carrier being of re-entrant form, whilst the lugs 396 merely rest in U-shaped slots 402. The rear ink pad 384 is clipped by the lugs 398 into re-entrant slots 404 and the lugs 396 merely rest in U-shaped slots 406 of the carrier 386.

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The front carrier 382 shown in Figures 1BC, 14 and 16 comprises a pair of side member 408 each with the slots 400, 402 in one edge and an upstanding lug 410 with an aperture 412 adjacent the slot 400. A transverse bar 414 interconnects the two side members 408 at the ends thereof remote from the lugs 410 and this bar carries at opposite ends teeth 416 arranged to engage the lug 372 (Figure 1AA) on the associated end plate of the print band assembly. A further connection 418 is provided between the side members 408 in the form of a plate connected at the opposite edges to the slots 400, 402 and a detent 420 extends away from each lateral edge of the connection 418. The ink pad holder 380 is held in fixed relationship with its carrier by contact with the connection 418. At the end remote from the bar 414 each side member has a narrow tapering extension 422 extending from the longitudinal edge remote from the lug 410 and inclined to that edge. As will be apparent from Figures 1AA, in one position the teeth 416 engage one face of the lugs 372 of the forward print head assembly whilst the detent 420 engages one face of a control member 430 (Figure 14) of the front print head assembly. That edge of the bar 414 facing towards the chamfered end edge 394 of the ink pad reservoir is of complementary shape to provide a seal.

The two control members 430 (one at each side) each include three arms 432, 434 and 436 each of differing shape and serving different purposes. The arm 432 is generally triangular with one side arranged to engage a convex face of the detent 420 in the locked position of the print head assembly. The arm 434 is generally rectangular and one side face is arranged to engage one of the projections 368 of the end plate as shown in Figures 14 and 1AA, in the locked configuration. The arm 436 has a part-circular tip and serves to rotate the head as will appear hereinafter. Each member 430 is pivotally mounted on a pin 366 of the respective end plate of the print head assembly.

The carrier 386 (Figures 1BA, 1BB, 14 and 17) of the rear print head assembly comprises a pair of side members 409 having the slots 404, 406 along one longitudinal edge. A lower portion 411 (Figure 14) is slightly inclined to the upper portion and generally tapers to a tip 413. The ends remote from the tip 413 are interconnected by a bridge 415 and each side member is connected integrally with an arm 417 which is thicker than the side member and tapers towards the pivot axis of the corresponding print head assembly. Each arm 417 terminates in a slotted ring 419, which when assembled on the corresponding print head serves to pivot the carrier. The slots in rings 419 assist initial assembly.

A corresponding control member 440 (Figure 14) of the rear print head assembly 352 comprises a bifurcated arm 442, an arm 444 with a part-circular tip and a semicircular lug 446. Each member is mounted by pin 366 on the corresponding end plate 362 and, it will be noted that the two arms are inclined to one another at an angle of approximately 145°. The lug 446 is thinner than the remainder of the member 440.

The web 348 next encounters the platen 354 which is shown in detail in Figure 9A as a plan view. The platen 354 takes the form of a generally rectangular plate having a pair of opposed edge portions 450 of reduced thickness. Each edge portion has a shallow recess 452 extending along a major proportion of its length, and one corner of each edge portion is chamfered to form a tooth 454. The transverse edges 456 of the platen are chamfered as can be seen from Figure 9A. The edge portions 450 serve to retain the platen in its carrier and the recesses 452 fit against inner faces of the carrier to be described hereinafter.

The platen 354 is directly supported by a spring 451 as illustrated in Figures 11 and 12. The spring comprises two elongate side strips 460 each having a relatively long straight limb 462 with a short arcuate tip portion 464, an intermediate double arcuate portion 466, the two parts joining at a cusp section portion 468, and a relatively short straight limb 469. Each portion 466 is continued inwardly by extensions 470 and these extensions are interconnected by a narrow bridge portion 472 forming a continuation of the cusp section portion 468.

The platen spring 451 rests on a bridge member 480 (Figure 13) of a platen carrier 482 with the cusp section portion 468 and portion 472 engaged in a transverse groove 484 (Figure 1BB) of the bridge member, the curved tip 464 resting on a shaft or other transverse member 486 interconnecting two rollers 488. The shorter limb 469 rests on a transverse spindle 490 which also serves to interconnect two side members 492 of a platen tooth member 493 (Figure 9B). The bridge member 480 has a ridge 494 (Figure 13) of semi-circular section at the rear edge and lies between two side cheeks 496, 498 (both shown in Figure 1BB) or identical outline and having similar functional parts. The ridge 494 continues forwardly as two fins 494A.

The platen tooth member 493 primarily illustrated in Figures 9B and 13 will now be described. Each side member 492 has an inwardly-directed tooth 495 vertically above the spindle 490. In cross-section each tooth 495 is generally rectangular but has a slight taper in a forward direction. As is apparent from Figure 9B each side member 492 has the shape of a highly irregular hexagon with

two parallel, but unequal horizontal sides (as shown), a rear vertical side and two sides extending forwardly from the parallel sides and meeting a second, very short vertical side, which effectively constitutes the forwardmost point of the platen tooth member. Two opposed inwardly extending teeth 497 lie immediately to the rear of these short vertical sides. Apertures 499 accommodate opposite ends of a slender rod 501 (Figures 1BB and 9B) which carries the label detaching roller 356 and also serves pivotally to support the member in noses 500 of the platen carrier.

15 The cheek 496 (identical to cheek 498) includes one of the rounded noses 500 and moving rearwardly a vertically-extending step 502 is encountered which provides an abutment to limit pivotal motion for the rear vertical edge of one of the side members 492 of the platen tooth member 493. A rectangular section projection 504 extends inwardly from the step 502 for a short distance and acts to restrain the forward edge of the platen 354 from rising excessively under the action of the platen spring. Rearwardly of the projection 504 a shallower vertically-extending step 505 is provided whilst the upper edge of the cheek is inclined upwardly and has an upper tooth 506. Rearwardly of this tooth 506 the edge 507 continues parallel to the plane of the bridge 480 and increases in breadth at a further vertically-extending step 508. The step 508 does not, however, extend to the upper surface of the bridge 480 and a lip 510 is formed which extends to a rear vertical edge 512. The edge 512 extends downwardly substantially to the level of the upper plane of the bridge 480 at approximately mid-length thereof. A prong 514 extends rearwardly and inwardly from the step 508 and is of elongate, generally wedge-like form with the taper rearwards. Adjacent the front edge of the prong a lower step 516 and corresponding recess are provided.

The upper surface of the prong 514 lies parallel to the upper plane of the bridge member 480. However, the bridge member itself is cut away immediately below the steps 508 and the prongs 514 to form transverse edges 518 (only one shown) and longitudinal edges 520 as will be apparent from Figure 9B. The bridge member 480 has further steps 522 so that the rearmost edge including the ridge 494 is formed effectively only on a central tongue 524. This ridge 494 is transversely aligned with the forward end of U-shaped slots 526 each formed in the cheeks 496 and 498, these slots being adapted to receive the shaft 486 of the pair of rollers 488. Each slot 526 extends to approximately one half of the local depth of the cheek and rearwardly of the slot the upper wall of the cheek is inclined

downwardly at 528 and the cheek terminates rearwardly in a vertical edge 530.

A further bridge member 532 has its forward edge 534 vertically below the rear edge of the ridge 494 and this bridge member 532 continues rearwardly. At a line substantially vertically below the front edge of the inclined portion 528 of the cheek 496 the leading edges of two dependent flanges 536 (Figures 10 and 13) meet the under surface of the bridge member 532. These flanges extend rearwardly from the leading edges as downwardly inclined ramps to the maximum depth of the flanges at approximately one quarter of their lengths where they continue with a lower edge parallel to planes of the bridge member 532. As can be seen in Figure 10 the flanges 536 lie inwardly of the longitudinal edges of the bridge member 532 and at the intersection of the inclined leading edge and the lower edge are two outwardly facing spigots 537. At a line just rearward of the spigots 537 the bridge member has a step 539 which extends transversely over a central portion of its width and rearwardly of the step there is a shallow longitudinal slot 540. The spigots 537 carry at each exposed end portion a roller 541 which rolls along the interior surface of a track member 642 (Figure 1BB). At approximately mid-length of the lower bridge member 532 two upstanding projections 544 (Figure 9B) are provided one being at each longitudinal edge and each having a vertically-extending ridge 546 at the rearward end and a circular section peg 548 at the upper forward corner. A slot 550 is provided in each flange 536 and these receive end portions of the member 266 (Figure 1AB). A pin 552 extends between rearward end portions of the flanges. A slot 554 extends only part way across the bridge member corresponding to the transverse dimension of the slot 540 but is symmetrical about the centre line. The end portion of the bridge member 532 remote from the bridge 480 is semi-circular in plan view.

As is apparent from Figure 13, the platen carrier 482 also supports a part of the web feed mechanism, and this part takes the form of an elongate generally plane barbed member or feed slide 560 constituting a part of a lost motion drive. Considering its component parts from front to rear it includes an upturned lip 562 of arcuate cross-section, which as shown in Figure 13 abuts the ridge 494 of the tongue 524 with its upper edge. At each end the lip 562 is integral with a thin vertical web 564 which extends downwardly and lies in contact with the upper surface of the bridge member 532. A pair of ramps 566 is provided on the upper surface of the member 560 and these extend rearwardly from a line adjacent the rear face of the lip 562. The ramps are disposed symmetrically of

the centre line and terminate rearwardly at abutments 568. The lengths of the ramps correspond substantially to the free or lost motion of the platen before the feed mechanism is activated. At the end portion remote from the lip 562 the member 560 is bifurcated with the inner longitudinal edges 570 of the parts 572, chamfered at an angle of approximately 20° to the vertical. Adjacent the rear edge the parts 572 each has a tooth 574 and these taper towards the trailing edge. The lower surface of the member 560 is provided with two series of barbs 576 one disposed along each longitudinal edge, the barbs being regularly and accurately spaced longitudinally by a distance equal to the spaces between the notches of the web. Transversely the barbs have substantially the width of the depth of the notches in the web. The steps of the barbs are inclined at an angle of approximately 90° to the lower surface of the member 560. The outer longitudinal edges of the parts 572 each carry at the ends remote from the lip 562, a generally rectangular side plate 578 which extends both above and below the parts 572, the lower and vertical rear edges forming abutments being fore-shortened by an inclined edge 580.

In the assembled condition illustrated in Figure 13, the member 560 lies parallel to the bridge member 532 and the rearward vertical edge of each projection 544 is arranged, under certain conditions of operation, to abut the forward vertical edge of the corresponding side plate 578.

The platen carrier 532 (Figure 1AA) is connected to the casing part 220 by an elongate helical spring 600, one end of which is engaged over the pin 552 and the other end of which is engaged over a pin 602 which spans the projections 239 carried on the wall 228. The spring 600 lies between the two flanges 536. The retainer member 266 is secured to and span the lower edges of the flanges 536.

The web feed mechanism also comprises an arcuate section member 604 (Figure 1BA) arranged to nest between the arcuate part 224 of the casing and the arcuate edge wall 128 thereby defining the channel 225 (Figure 1A) in conjunction with the part 224. The wall although it extends only half way across the applicator provides sufficient support for the member 604. The outer surface is provided with two series of barbs 606, one series being disposed at and adjacent the outer longitudinal edges, these barbs being identical in configuration to and longitudinally forming a continuation of the barbs of the member 560. The end of the member 604 adjacent the member 560 is integral with a tongue 608 (Figure 1BA) and a terminal cross-piece 610. The rear edges of the tongue are arranged to engage the teeth 574 to limit

forward motion of the feed slide. The tongue 608 is aligned with the member 560 and as will be apparent neither tongue nor cross-piece carries any barbs. The end of the arcuate section member 604 remote from the tongue 608 is integral with a boss 612 of hollow cylindrical form, and a further, tapering tongue 614 extends beyond the boss, and when assembled, as shown in Figure 1A, the tongue 614 engages between the bifurcated end portions of the casing part 102. The boss accommodates a pin 616 about which the casing parts hinge when opened (see Figure 27).

A number of small, auxiliary parts will now be briefly mentioned. Referring to Figure 14, a leaf spring 620 includes an intermediate single coil 622 wrapped around the sleeve 176 and two limbs 624, 626 extending outwardly from the coil. A portion of the limb 624 is formed as a helical spring. The extremity 628 of the limb 624 is hooked and engages in a recess behind the tooth carrying part of the carrier 382 whilst the other limb is curved and its extremity engages in a side wall of the casing.

A helical spring 630 (Figures 1AA and 1AB) is anchored at one end in the aperture of the lug 446 of the control member 440 and is anchored at the other end on a projection 632 provided on one end plate 362 of the forward print head assembly 350. As shown in Figure 1AA the spring is partially wrapped around a rotatable bush mounted on the spigot 180 and as the print head swings rearwardly the wrapping action is increased (see Figures 18 to 26).

The rollers 541 are constrained vertically by side channels 640 provided on the track member 642 (Figure 1BB only).

The operation of the applicator will now be described primarily with reference to the sequence of Figures 18 to 26, but reference will also be necessary to certain details which are apparent only from Figures 1 to 17 and in particular Figure 14.

In Figure 18 all the working parts are in their respective rest positions and a reel 164 of self-adhesive labels has been loaded into the applicator. The two pivotal print head assemblies 350, 352 are locked in position, the front assembly being held stationary by engagement of the teeth 416 of the carrier 382 against one face of the lugs 372 (one each side) under the action of the spring 620 whilst the arms 434 of the control members 430 abut the projections 368 of the end plates 362. Simultaneously, the detents 420 abut the upper surfaces of the arms 432 of the control members 430, and the flanges 370 abut the stops 371, the arms 436 being spaced from the edges 512. The control members are thus effectively rigid with the print head assembly and the detents 420 and lugs 372 positively prevent pivotal motion

of the print head assembly 350 in both senses. The extensions 422 of the carrier 382 are spaced slightly from the teeth 506 of the cheeks 496, 498. The rear print head assembly 352 is similarly locked by engagement of the ends of the flanges 370 remote from the lugs 372 against stops 371 in conjunction with the action of the tension spring 630. When a fresh label is brought up to the platen 354 at the end of the previous cycle the web is guided by the under surfaces of the prongs 514 and the vertical edges 516 engage the rear edges of the web notches of the fresh label to prevent return of web. Because of the tension on the spent backing strip, the platen tooth member 493 is biased in an anti-clockwise sense (Figure 26) and the label instantly on the platen is locked thereon by the teeth 495 when the tension is relaxed and the member 493 carries out a small clockwise movement.

Squeezing the trigger 256 has the almost immediate (approximately two millimetres of motion necessary) action of unlocking the front print head assembly, the trigger motion being transmitted through the flexible strip 264, and the platen carrier to the platen 254 and other working parts. The extensions 422, initially slightly spaced from the teeth 506 come into contact with the teeth 506, and are immediately displaced rearwardly thus causing the ink pad carrier to pivot, disengaging the teeth 416 from the lugs 372 and the operative face 393 of the ink pad contacts the type facets. The extension 422 then clear the teeth 506 and come to rest on lands (not shown) so that the teeth 416 remain clear of the lugs 372 and the operative face of the ink pad clears the operative type face. The rounded arms 436 are engaged by the vertical edges 512 of the side walls 496, 498 and the motion (as in Figure 19) which results, represents the commencement of the swing of the operative type facets to the printing position. The platen tooth member 493, which is pivotally carried by the nose pieces 500 of the platen carrier, engages with the wider ends of the teeth 495 thereof, forward notches of the web of the fresh label on the platen as a result of the slight clockwise motion of the tooth member following slackening of the tension on the spent backing strip. The lower edges 516 of the prongs 514 already being in engagement with rear notches of the web, the label is firmly held on the platen ready for the two printing operations. The rear print head assembly 352 remains locked and the spent backing strip 349 downstream of the platen 354 is slightly slack.

The squeeze action continues and, is, indeed progressive throughout the whole operation as the spring 600 becomes tensioned and at a platen movement of 5.5 mm. (Figure 20), the control members 430 have

further pivoted the print head 350 under the action of the edges 512. The tips of the extensions 422 of the carrier 382 have overridden the teeth 506 and engage the land (not shown) so that the carrier pivots slightly clockwise and the teeth 416 engage the arcuate flange 370. The operative print facets are thus moving towards the label on the platen 354 which, of course, also continues to move rearwardly. The feed release rollers 488 are moving up their respective ramps 237 and the shaft 486 simultaneously moves up ramp 566. The shaft is also constrained to move within the vertical slots 526 in the carrier 482, the slide 560 remaining stationary. The spent backing strip 349 downstream of the platen has developed substantial slack. At the same time the platen carrier engages the rear ink pad holder carrier at the tips 413 thereof with the vertical edge 530 and the rear inking pad operative face 393 is moved against the operative type facets of the rear print head assembly by the action of the cam tracks 184, 184A now to be described in detail. The rear print head assembly remains stationary in the Figure 20 configuration.

As will be apparent from Figures 6 and 8 the cam tracks 184, 184A comprise a vertical rectilinear section 650 with an opposed inclined section 652. The divergence provided by these two sections is necessary only to facilitate assembly. Upwardly, beyond the sections 650, 652 there are two arcuate sections 654, 656 of complementary shape the radii of which are centred on the axis of the spigot 182. At the junction between the rectilinear and arcuate sections there is a pip 658 at the one side and a recess 660 at the other side. These cooperate to provide a slight movement of the ink pad towards the operative print facets thereby to ink the latter. Once the inking has been effected the face 393 of the ink pad moves away from the print facets and the pegs 396 move smoothly up the arcuate sections and the ink pad carrier moves correspondingly. The rear platen carrier and ink pad holder carrier have travelled as shown in Figure 21 so that the pegs 396 are near the upper ends of the arcuate sections 654, 656 of the cam tracks, the tips 413 of the ink pad holder carrier remaining engaged with the platen carrier edges 530, 528.

As seen in Figure 21, after the platen 354 has moved 21.5 mm. the label is about to be printed (0.75 mm. of travel before printing) as a result of movement of the operative print facets of the front print head assembly 350 with an instantaneous linear velocity at the instant of printing identical to the linear velocity of the label. In the meanwhile the feed slide release rollers 488 have reached the peaks of their respective ramps 237 the shaft 486 has reached peak of the ramp 566 and have dropped over the edges 568, and

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as motion rearwardly continues, the feed slide 560, which has been ineffective over a first portion of the operation cycle, is entrained to move rearwardly with the platen carrier by contact of the rear abutment edges 546 of the carrier with the forward abutment edges of the plates 578.

The front print head assembly continues its rearward swing, and the return springs 600 and 630 continue to be progressively stressed and stretched to store energy for return movements. The feed slide 560 engages the spent backing strip with the barbs 576 as it moves rearwardly, the strip already in the channel 225 overriding the barbs 606 thereof. The feed slide is restrained from tilting by the fins 494A remaining in contact with the tip 562.

After 35 mm. of travel, as shown in Figure 22, the forward print head has completed the printing action and the arms 436 of the control members trail on the top edges 507 of the side cheeks 496, 498. At this point the vertical edges 512 contact the arms 444 of the respective rear control members 440 whilst the ink pad holder carrier pegs 396 have substantially reached the upper ends of the cam tracks.

Continued rearward motion causes the control members to swing the rear print head assembly so that in the configuration of Figure 23 the label has just been printed for a second time (possibly in a different colour) and the operative print facets of the print head assembly 352 remain in contact with the label even in the overcentre position as shown. As for the forward print head assembly printing is effected by the pivotal movement of the assembly 352 so that at the instant of printing the instantaneous linear velocity of the operative print facets is equal to the linear velocity of the label. At the same time the forward print head assembly 350 is released so that it returns to its original position and re-locks automatically. At the Figure 23 configuration the platen has reached its maximum rearward travel of 47.5 mm. when the tips 413 of rear ink pad holder carrier 386 come into contact with stops (not shown) on casing portions 100, 101.

Relocking takes place automatically by the teeth 416 riding over lugs 372. In the meanwhile the feed slide 560 has moved the spent backing strip web rearwardly so that the fixed barbs 606 are overridden by 7 mm. the spent backing strip having been moved rearwardly by a total of 26 mm. (i.e. 7 mm. more than the label pitch). The spring 600 has reached maximum extension.

It will be appreciated that by virtue of the construction of the print head assemblies, the read-out wheels 374 swing as the print bands swing and thus no indication of the

instantaneous print-out is given at the lenses 154, 156.

On initially releasing the trigger 356, under the action of the spring 600, the platen carrier commences its return motion and the feed slide is entrained by the rollers 488 and shaft 486, whilst the spent strip is partially drawn back to engage on the fixed barbs 606 of the channel 225. Over a short initial portion of the return motion the label remains in contact with the print facets of the rear print assembly 352. The feed slide rollers 488 mount, after a total of 21.5 mm. release travel, inclined rear faces of the ramps 237 (Figures 1BB and 4) so that the shaft 486 is released from engagement with abutments 568 of the ramps 566 and the feed slide is no longer driven forwardly. The forward motion of the slide is only 26 mm. and is limited by contact with the teeth 574 of the cross-member 610. The rear ink pad holder carrier is at the same time rotated clockwise by contact of the tips 413 of its carrier with the pegs 548 of the projections 544 of the platen carrier. These operations are illustrated in Figure 24.

After the feed slide has stopped, the rollers 488 continue to move down the ramps 237 and 566 as shown in Figure 25, the rear ink pad carrier continues to swing forwardly and the type facets are again inked as the pegs 396 of the carrier pass over the pips 658, 658A of the cam tracks. The spent backing strip remains locked on the fixed and movable barbs. When the noses 500 encounter the arms 436 of the control members 430 the front ink pad holder carrier is rotated slightly anti-clockwise through inter-action of the arms 432 and the detent 420 thus causing the ink pad to ink the operative facets ready for the next printing operation.

The teeth 495 are caused to disengage from the label which has just been printed by the tension now applied to the spent backing strip (Figure 25). The dispensed label is indicated immediately after detachment by the roller 356, in broken lines at 670 in Figure 25. A fresh length of web is simultaneously drawn from the reel as the platen carrier continues to move forward.

Finally at the end of the cycle, illustrated in Figure 26, the label 670 is fully dispensed and is applied by means of the pad 318 onto an article, the passage out of the applicator of the label being guided by the teeth 497 of the platen tooth member 493. The arm 436 has dropped rearwardly over the edge 512 of the platen carrier, thereby allowing the teeth 416 of the front ink pad holder carrier to engage the lugs 372. By the end of the cycle a full length of web equivalent to one label has been drawn from the reel 164 and guided on to the platen by the prongs 514.

If it is desired to gain access to the in-

terior of the casing it is only necessary to press the catch release member 314 at the recess 332 and the lower edge of the portion 334 will disengage from the step in the transverse member 112 so that the casing parts 100, 101 can pivot upwards about the pin 616 which passes through the apertures 134, 134A in the bosses 132, 132A (Figures 6 and 8), thus exposing some of the working parts of the applicator. The open position is illustrated in Figure 27.

A second embodiment will now be described with reference to Figures 28 to 43. The principle of construction remains the same as in the first embodiment but substantial simplification results from the omission of one complete print head assembly. To avoid undue repetition similar, but not necessarily dimensionally identical parts have been given the same references as in Figure 1 but with the addition of a prime. Such parts will not be further described.

As is apparent from Figure 28A, the casing portion 220' corresponds generally to the casing portion 220 of the first embodiment. It differs, however, in that two springs 600' (only one shown) are provided and thus the arrangement for securing the springs 600' includes a pair of forked peg members 700 over which one end of each spring 600' is hooked. The forward end of this casing portion 220' includes an upwardly inclined lip 704 with a transverse downwardly-facing ridge 706 at its extremity. The lip 704 and ridge 706 lie beyond the forward edges 708 of the cheeks 232' (Figure 36B) of the casing portion 220' and the lip 704 spans only a proportion of the total distance between the cheeks 232' so that end portions of a front catch 712 can engage over the lip 704.

The catch 712 includes a pair side cheeks 714 which are spaced further apart than end portions 710 thereof adjacent the lip 704. The end portions 710 are spanned by a member 716 adjacent their extremities and also by a transverse member 718 lying substantially at the junction of the end portions 710 and the main parts of the cheeks 714. The space 720 between these transverse portions receives the ridge 706 of the lip 704 when the applicator is in its assembled and closed condition. The other ends of the cheeks 714 are spanned by a bridge member 722 including two apertured lugs 724 lying inwardly of, but not spaced from, the inner faces of the cheeks 714. These lugs serve to support the label applicator member 318'.

The casing is completed by a portion 730 (Figure 36A) and a side wall 732. The casing portion 730 includes an upper wall 734 (Figure 44) which is inclined forwardly towards the plane of the wall 228' of the casing portion 220'. Adjacent the front of the applicator this upper wall has an increased slope at a portion 736. The portion 730 also

includes an internal transverse wall 738 (Figure 36A) which extends arcuately from a line approximately one third of the distance from the rear edge of the transverse wall to the front of the applicator. This internal wall 738 has a lip 740 at the edge remote from the wall 734 and lying closely adjacent a lower edge 742 of this casing portion. The rear edge of the casing portion 730 carries a transverse boss 744 (Figures 36A only) having a transverse aperture 746 and an edge 748 extends from the boss 744 in an inclined direction substantially through the axis of the boss 162' to meet the lower edge 742 adjacent the lip 740. The forward end of the edge 742 meets an inclined edge 750 (Figures 37-43) which extends to the front edge of the wall portion 736. These edges 734, 736, 748, 742 and 750 define boundaries of the side wall portion 730.

The side wall 732 has an upper edge 752, 754 corresponding to the edges 734, 736 of the casing portion 730. A front inclined edge 758 corresponds to the catch 712 and has an integral eye for the purpose of securing the casing portions together and for mounting the catch. A lower edge 762 corresponds to the edge 742 of the portion 730 and a concave edge 764 conforms substantially with the arcuate shape of the wall portion 738. Both the side wall 732 and the wall portion 730 have projections which receive shafts of the print head assembly.

An eye 760 forms a part of a member which extends transversely of the casing and includes a flange 761 extending rearwardly from the eye 760 which is chamfered at its rear edge.

In this embodiment, the boss 162' is carried by a side wall 605 (Figure 36B) also forming a part 604' of the feed mechanism pivotal about the pin 616'. The tongue 608' (Figure 28C) has, in this embodiment grooves 607 along its longitudinal edges.

In this embodiment, the platen carrier comprises an elongate member 770 (Figure 36A) with an upturned inclined end portion 772, the end portion 772 carrying two projections 774 at its free edge.

The platen carrier 770 (Figure 28C) has a cross-section over its length, apart from the end portion 772, of shallow channel section with downwardly-inclined sides 771 (Figure 28C) and horizontal flanges 773 which are slidable on longitudinal steps 775 of the wall portion 228' of the casing. A rear end portion 777 (Figure 28A) is guided by three members 779 integral with the casing portion 220'. Each spring 600' is mounted on a peg 781 extending downwardly from the central portion of the carrier 770. Cam surfaces 766, 768 (Figure 28B) on the underside of the central portion serve respectively, in co-operation with a roller 767 carried by a pin 769, to impart an upwards movement

to the carrier to effect printing of a label and inking of the operative print facets.

A feed slide 780 (Figures 29—33) corresponds in its function to the feed slide 560 of the first embodiment but differs substantially in detail. It includes two side walls 782, 783 (Figures 30—32) and a transverse wall 784, the side wall 782 extending below the level of the transverse wall 784 and inwardly thereof two series of barbs 786, 788 (Figure 34) are provided. The outer series of barbs 786 having a larger pitch than the inner series of barbs 788. The pitch of the outer barbs 786 corresponds with the pitch of the barbs 706' of the member 604', and the member 604' also carries an inner series of barbs 790 (Figure 36B) corresponding in pitch to the barbs 788.

The upper edge (Figures 29 and 30) of the side wall 782 includes a forward portion 792 which extends parallel to the casing wall 228' and progressing rearwardly the edge 792 meets a vertical edge 794 which is chamfered vertically with the chamfered edge facing outwardly and which in turn intersects an edge 796 at a lower level also extending parallel to the wall 228' of the casing portion 220'. The edge 796 terminates in a further chamfered edge 798 which, at the upper end meets a further edge 800 parallel to the plane of the wall 228' and lies at a level corresponding to that of the edge 792. The edge 800 terminates rearwardly in a radiussed vertical edge 802 and just to the rear of the edge 798 an inwardly extending part-circular projection 803 is provided and this a radiussed at its rearward edge. The edge 802 is arranged to abut, at the end of the stroke of the feed slide a corresponding vertical edge 808 (Figure 36B) of the member 608'. The vertical edges 802, 808 thus act as stops. An ear 810 having an aperture 812 which serves to receive the spindle 501' of the dispense edge roller 356' is carried on each of the side walls 782, 783.

The upper edge (Figure 31) of the side wall 783 differs from that of the side wall 782 and from front to rear has a forward rectilinear edge 785 running parallel with the wall 228', a short convex edge 787 extending downwardly from the rear end of edge 785, and a rectilinear inclined edge 789 which meets a rectilinear edge 791 extending parallel to and slightly below the edge 785. The edge 791 has a lengthwise extent somewhat greater than edge 796 of the side wall 782 and at its rearward end intersects an upwardly inclined edge 793 which terminates at an edge 795 aligned with edge 785. The edge 795 terminates rearwardly in a vertical radiussed edge 797 corresponding to radiussed edge 802. Inwardly of the edge 793 a semi-circular projection 799 is provided which corresponds to and lies directly opposite the projection 803. The projections 799 and 803

serve as guides for narrower webs of labels as they are unwound from the reel.

The lower edges of both side walls 782 and 783 are similar and each includes a downwardly-inclined forward portion 801 and a lower edge 805 interrupted by opposed downwardly-extending tongues 789.

The transverse wall 784 (see Figure 30) includes a forward portion 807 which acts as the printing platen in this embodiment, a downwardly inclined portion 809 and further portion 811 lying parallel to the portion 807. The wall 784 terminates in a bifurcated portion 813, the inner longitudinal edges of which are formed with guide ridges 815 (Figure 32) adapted to receive corresponding grooves 607 of the tongue 608' of the part 604' (Figure 28C).

Return action of the print head assembly 350' is effected by a helical tension spring (not shown) connected to an end plate of the print band assembly and an internal projection (not shown) of the side wall of the casing.

An ink pad holder 822 has shallow ridges 824 (only one shown in Figure 28B) on its under surface which act as guides for the label web 832 and an upstanding projection 823. The holder 822 is supported on the side wall 782 by a projection (not shown) of dove tail section which engages on the chamfered edges 794, 798 of that wall. Because of the arrangement of this embodiment it is not necessary to have a separate ink pad carrier, but as in the first embodiment each ink pad holder includes a reservoir portion 828 and an operative portion 830 with an exposed face.

As in the first embodiment, the individual labels are detached from the backing strip by a roller 356' carried on a pin 501'. After passage around the roller 356' the spent backing strip 349' passes below the feed slide 780 and, according to the pitch of the notches in the web engages, when appropriate, either the series of barbs 786 or 788. Again, as in the first embodiment the spent backing strip leaves the applicator via a channel 225 (Figure 44) leading to the discharge opening 358'.

As shown in Figure 37, the applicator is in a rest position with the operative face of the ink pad 822 opposite to but spaced from the operative print facets of the print band assembly and a label ready to be printed is disposed on the platen 816. The print head assembly is locked in position by the projection 823 on the ink pad holder 822 which co-operates with the control member 440' (Figure 36A) and a projection 834 on the inside of the casing (broken lines in Figures 37 to 43) to hold the assembly in the configuration of Figure 37. The projection 834 co-operates with that end of the arcuate flange

370' remote from the lug 372'. The lug 372' serves no purpose in this embodiment.

5 Squeezing of the trigger 256' causes tension to be applied to the flexible strip member 264' and the platen carrier 770 is drawn rearwardly against the action of the spring 600'. At a position 3 mm. from the rest position (Figure 38) the cam 768 engages the roller 767 and as the cam traverses the roller the platen carrier rises about 1.5 mm. forcing the ink pad into contact with the operative type facets of the print band assembly. In this embodiment there is no platen tooth member so that the spent backing strip does not go slack downstream of the platen, but the web carrying labels is fed to the platen effectively through a labyrinth formed by the various guides and slack develops in the first turn or two on the reel.

20 As shown in Figure 39, the operative print facets have, after a rearward motion of approximately 9 mm. cleared the operative face of the ink pad and are now approaching the label. A control edge 785 of the feed slide (Figure 31) then rotates the control member 440' (only one provided in this embodiment) through a small angle in an anti-clockwise sense and the cam 766 raises the platen carrier and platen into contact with the operative print facets, the relative motion being tangential. Throughout the rearward movement described up to this position the spent backing strip is fed back by the barb series 786 or 788 and overrides the fixed barbs in the channel 225'.

35 In the last part of the arcuate movement of the print head assembly, up to a maximum pull of 19 mm. (Figure 41) the label is moved in relation to the operative type facets and the necessary printing action is completed. The print head assembly swings through only a small angle during this printing action and in the meanwhile feed of the web through the channel 225' has been completed and, as shown in Figure 42 immediately the trigger is released the spent backing strip moves forwards slightly and engages in the fixed barbs 606' or 790 in the channel 225' so that the feed of fresh web can take place as the label which has just been printed is moved forward over the dispensing roller 356' (Figure 43). The web notches then override the barbs 786 or 788 of the feed slide.

55 In the meanwhile the roller 767 has come off the cam 766 thus allowing the platen 816 itself to fall, the control member 440' is moved forwardly and the print head assembly under the action of the helical spring (not shown) returns to its forward position and the print facets are reinked as the cam 768 passes over the roller 767. As in the first embodiment the pad 318' is used to apply

the self-adhesive label to the article in question.

In a modification the operational part of the control member 440' is made integral with the corresponding end plate of the print head assembly.

70 The second embodiment enables a label to be printed only once and dispensed in the same operational cycle, but has the advantage that it can accommodate without modification at least two label sizes.

75 Figure 44 illustrates the manner in which the applicator of the second embodiment can be opened up. The two main casing portions being pivoted by the pin 616'. Release is effected by unclipping the catch 712 from the ridge 706.

80 In an unillustrated modification of the second embodiment, ink from the ink pad or other ink reservoir is transferred to the operative ink facets by means of an offset member of hard rubber or other suitable material, instead of direct inking by the pad itself. This member is carried by and moves with the platen carrier. In operation the offset member is inked when the printing action is occurring, that is at the rearwardmost position of the platen carrier, the member being raised to the reservoir dispensing face by the cam 766. Since the offset member can be very thin, the sharp change in direction of the label web can be avoided as it passes out from beneath the ink pad holder of the second embodiment.

85 Referring now to the third embodiment illustrated in Figures 45A-47 it will be apparent that the casing of the applicator comprises a body portion 910 and a handle and trigger portion 911 which bear a general resemblance to the corresponding parts of the first and second embodiments. However, because these and other corresponding parts are generally of different construction to those of the first and second embodiments, different reference numerals have been assigned. The body portion 910 has a width sufficient to incorporate a reel of unused self-adhesive labels 912 mounted on a boss 912' and also to accommodate print band assemblies 913 hereinafter to be described in greater detail. Such assemblies may also be as described in co-pending application 32321/72 (Serial No. 1409655). The handle and trigger portion 911 bears, externally, a general resemblance to the handle and trigger portion of a pistol (as do those of the first and second embodiments) and is shaped to ensure ease of handling by operators and, indeed, the applicator may be housed, when not in active use, in a holster mounted on a belt worn by an operator.

120 The handle and trigger portion 911 is made up of two parts; a rearward part 914 integral with a part 916 of the main casing portion 910 and a trigger part 915. As shown

in Figures 45A, 46A, 46B and 47, the part 914 includes an elongate dependent channel-section member which so tapers over its length that the shallowest portion thereof is remote from the main portion. The part 916 is of very shallow channel cross-section and is arcuate in longitudinal section as is apparent from Figure 45A. The tip 917 of the part 916 remote from the trigger portion is of rectangular cross-section and tapers to a sharp edge for tearing the spent backing strip at a discharge opening, as required. At the other end of the arcuate section, the base of the channel extends rectilinearly to an edge 918 whilst the shallow limbs of the channel extend away from the base to form cheeks 919 (Figure 46B). These cheeks extend beyond the edge 918 and are cut back obliquely at their end portions. The edge 918 is chamfered as indicated at 918' in Figure 45A. It will be noted from Figure 46B that the cheeks 919 are spaced apart further than the opposite limbs of the channel section member 914 which forms part of the handle, this increased dimension being necessary to accommodate the thickness of the reel 912.

The other or forward part 915 of the handle and trigger portion 911 is movable relatively to the part 914 and as will be apparent from Figure 47, the two parts overlap along respective contiguous curved edges 921 and 922, and these edges have generally complementary shapes in the longitudinal sense. The required relative movement (which is substantially of a sliding nature) between the parts 914 and 915 can take place without a gap appearing between them, because the opposite walls of the part 915 are provided with inward steps 923, 924 (Figure 47), the tread of the steps being spaced by a distance corresponding substantially to the spacing between the internal faces of the limbs of the channel-section member of the part 914.

A projection 925 extends from the inner surface of the base of the channel section member of the part 914 and is preferably bifurcated for lightness and reduction of the amount of material necessary. The projection 925 carries an extension 926 extending approximately parallel to the base of the channel. The main part of the projection 925 does not extend normally from the base, but is so inclined that its rearward face lies substantially parallel to the end face of the trigger part 915. At the free end the extension 926 has an aperture which receives a pivot pin 927. The pivot pin 927 also carries two spaced plates 928 interconnected by a transverse web or webs 929 (only one shown) and each plate is of generally irregular quadrilateral form. Each plate 928 has a second aperture 930 and a third aperture 931. The second apertures 930 are, when the applica-

tor is assembled, aligned with apertures 932 in the limbs of the channel-section trigger part 915. These apertures 930 receive a pivot pin 933 so that the trigger part 915 is effectively pivotally connected to the part 914 through the intermediary of the plates 928. The third apertures 931 of the plates 928 serve to connect the plates to a further plate assembly 934 by means of a pivot pin 935. The plates 934 are of elongate form and are, like the plates 928, interconnected by one or more transverse webs 934'. The ends of the plates 934 remote from the pin 935 each have an aperture 936 which together serve with the aid of a pin 937 to pivot the plates 934 to an aperture 937' of a feed slide and platen carrier 938, to be described in detail hereinafter.

The part 914 of the handle also carries within it an elongate helical spring 940 supported at one end by a peg 941 rigid with the part 914 of the handle and is also supported by a peg 942 rigid with and extending between the plates 934. The spring 940 thus exerts a force biasing the two parts 914 and 915 towards one another.

The trigger part 915 of the handle portion is bifurcated at the end thereof adjacent the body portion to enable the passage of the carrier 938. In other words the base of the channel is omitted whilst the limbs remain. As will be seen in Figure 46B the extremities 942 extend parallel to the underfaces of the cheeks 919 and are radiused at 943 along the edges.

As best shown in Figure 46A, the feed slide and platen carrier 938 comprises a hollow wedge-shaped portion 945, rigid, at the shallower end thereof, with a transverse member 946 which carries along its edges, flanges 947 each of which includes a truncated wedge shape portion 948, a U-shaped notch 949 and an upstanding projection 950. Each of the flanges 947 has an aperture 951 and together these apertures carry a transversely-extending pin 952 (broken lines).

The carrier 938 carries between its flanges 947 and the upstanding projection 950 one part of a feed slide 960 which serves to engage and draw on the adhesive-label web at a position downstream of the position of application and this feed slide includes a part 961 of arcuate longitudinal section carrying a series of equally spaced barbs 962 at each of its longitudinal edges. The part 961 has integral therewith a pair of laterally spaced rearward extensions 963 also carrying similarly regularly spaced barbs 962 along their outer edges. The spacing between the barbs of both series corresponds exactly with the spacing between the notches of the adhesive-label band. Two side plates 964 are included in this feed slide and each side plate 964 has an elongate slot 965, and notches 966' the purpose which will appear

hereinafter. Opposite end portions of the pin 952 of the carrier 938, engage in the slots 965 thus pivotally securing the two parts together and permitting limited relative axial motion, and also limited pivotal motion. It will, however, be immediately apparent that the degree of pivotal movement is strictly limited. A pin 967 of small diameter extends between projecting end portions 968 of the two side plates 964, and serves as a device for detaching labels from the backing strips. The pin 967 could be replaced by an extrusion of a platen 969 defining an edge at the same position as the pin. The side plates 964 are secured together by a transverse bridge piece 969 (Figure 45B) which piece serves as the platen for the label to be printed by the operative type facets.

Gripping of the exhausted backing strip is also performed by a further member 970 (Figures 45A and 46A), forming part of the web feed mechanism one part 971 of which is of arcuate section and nests within the arcuate part 916. A further part 972 of this member 970 is in the form of a rectilinear plate and both parts 971 and 972 have series of barbs 973 along their longitudinal edges. The spacing corresponds exactly with the spacing of the notches of the spent backing strip. A narrow tongue 974 engages in the space formed between the two lateral extensions 963 of the backing strip gripping member 960. The member 970 has, beyond the part thereof which has barbs 973 along its edges, a thickened transverse boss 975 (Figure 45A) having an aperture for the reception of a pin 976 by means of which the member 970 is pivoted to the extremity of the arcuate part 916. Both the barbs series 962 and 973 are formed so that the generally upright riser of the barb is inclined forwardly, that is in the direction of travel of the backing strip, so that, in effect the riser overhangs the tread of the barb. The join between riser and tread is radiused.

A further arcuate part 977 (Figure 46A) of the member 970 has no barbs at its edges and form merely a part of a housing for the unused reel 912 of labels. Another end portion of the member 970 takes the form of two elongate parallel arms 978 which are spaced laterally and have sufficient depth to allow the formation of an aperture 979 which receives a pin 980 rigid with a swingable, circular cover 981 of the reel casing. The ends of the arms 978 remote from these apertures are interconnected by a transverse pad 982 similar to the pads 318, 318' of the first and second embodiments.

The casing further comprises two side walls 990 and an outer peripheral member (not shown) joining these side plates.

Two print heads 991, 991' (Figure 45B) are housed and supported within the side walls 990 and each head comprises a plural-

ity of bands 992, 992' which bands are guided around separately rotatable individual adjusting wheels 993, 993' which are spaced from elongate rotatable members 994, 994' each having flat or concave faces 995, 995' extending in a direction parallel to a tangent to the wheels 993, 993' so that when correctly oriented each character of the respective print band 992, 992' has an adequate flat or slightly concave support surface. Each of these rotatable members 994, 994' is mounted co-axially with a plate 996, 996' carrying a projection 997, 997' which serves a purpose to be described hereinafter. Each wheel 993, 993' and the corresponding rotatable member 994, 994' is pivotal about a respective spindle 993A, 993B extending between the side plates 990.

Each print head comprises means for adjusting the bands to give a selected print impression as required. As indicated in outline only in Figure 45B, the adjustment means comprises a toothed wheel 998 associated with a respective one of the wheels 993, 993' and a jockey wheel 999 movable over an arcuate path to engage selectively one or other of the wheels 998. The jockey wheel 999 is mounted on a spindle (not shown) which carries externally of the casing an adjusting knob (likewise not shown). Each wheel 998 is fast for rotation with a display or read-out wheel (not shown) which shows through a transparent window of the casing, the characters selected for printing similarly to the slots and lens of the first embodiment.

An inking assembly 1010, 1010' is provided for each print head 991, 991' one such inking assembly 1010 being fixedly mounted between the side plates 990 of the housing of the print mechanism. Each assembly includes an ink reservoir 1011, 1011' and a roller 1012, 1012' rotatably mounted so that a part thereof lies in an elongate transverse aperture thereof. The other inking assembly is carried on an arm 1013 pivotal about the axis of rotation of the wheel 993'. The inking assembly 1010' only carries for a purpose to be described hereinafter a pair of side plates (not shown).

To load the applicator, the reel 912 consisting of a backing strip and self-adhesive labels applied to one face thereof is mounted in the body portion for rotation on the boss 912' by pivoting the cover 981 and the pin 980. With the label side uppermost the strip passes below the operative facets of the bands of both print heads 991, 991', the right-hand head 991' (as shown in Figure 45B) being encountered first. At the extremity of the platen 969, the band is deflected around the pin 967 (or edge) which serves to peel off the labels from the backing strip. The pad 982 serves to guide the detached labels and apply them to an article being labelled.

After the labels have become detached

from the backing strips, the strip passes beneath the platen 969 where it engages the barbs 962 of the part 960 and is guided along a channel formed between the part 960 on the one hand and the carrier 938 on the other. The channel continues between the member 970 and the arcuate part 916 of the fixed portion of the handle. Forward motion of the strip is effected by engagement of the barbs 962 with the notches of the strips and labels. The barbs 973 serve only to retain the spent strip when it is not being fed forward. The spent backing strip is finally discharged from the applicator through a gap between the free end of the part 916 and the boss 975 of the part 971. For convenience the edge 917 is made sharp enough to cut the spent strip as required.

The action of squeezing the trigger part 915 causes the pair of plates 928 to entrain the pair of plates 934 through the pivot pin 931 and in turn the pivot pin 937 at the ends of the plates 934 causes the platen carrier 938 to move rearwardly with a rectilinear motion. The path of movement of the trigger part 915 towards the fixed handle part 914 is actually arcuate in nature because the parts are interconnected through the pivot pins 927 and 930, the projection 925 and the plates 928. It will, of course be apparent that the mechanical advantage of the trigger part 915 depends on the spacing of the pivot pins 927, 930 and 931. The upstanding projection 950 (Figure 45B) of the carrier 938 initially engages the projection 997 which is fast for pivotal movement with the print head 991 and this causes the operative print facets of the bands 992 to be wiped over the roller 1012 and, subsequently, as the pivotal movement continues when the imaginary radial line passing through the centre of the operative print facets is approximately  $22^\circ$  from the vertical at the  $22^\circ$  position of the print facets the platen 969 is entrained by engagement of the pin 952 with the end of the slot 965 remote from the pin 967. The operative print facets and the platen 969 thus move with the same velocity throughout the print operation. The wheels 993 move through an angle of approximately  $30^\circ$  from the retracted position as shown in Figure 45B with the operative facets opposite the reservoir 1011 to the position in which printing is initiated, and printing terminates when the wheels 993 have moved through a total of approximately  $76^\circ$ . The actual printing takes place over a range of movement of the said imaginary line of approximately  $15^\circ$  before the vertical to  $15^\circ$  after the vertical.

When the print head has travelled to a position in which the imaginary line is  $22^\circ$  after the vertical, the operative facets have ceased contact with the label. The projection 997 then moves along the upper flat edge of the projection 950 and after disengagement

the print head, under the action of a light spring, drops downwards behind the moving platen 969. Simultaneously, pegs (not shown) depending from and rigid with the second inking assembly 1010' engage the notches 966' (Figure 46A) in the side plates 964 and the inking assembly 1010' swings on an arc so that the roller 1012' inks the operative facets of the print head 991'. Just as the roller 1012' disengages from the print facets, one side of the projection 997' of the print assembly 991' is engaged by the upstanding projection 950 and thus entrains the operative facets of the print bands to move over a label at that instant carried on the platen 969 and moving at the same speed. Entrainment of the print assembly 991' by the swinging motion of the inking assembly 1010' is prevented by the side plates (not shown), which engage the surface of the platen 969 positively to prevent such entrainment. However, when the upstanding projection 950 strikes the projection 997, the notches 966 in the side plates of the platen member allow the print head assembly 997' to swing through a small angle by engagement of one of the side plates (not shown) in the notches 966. This arrangement ensures that the platen 969 is retained together with the print head 991'.

The print operation by the print head assembly 991' involves a total angular travel of the assembly of approximately  $27^\circ$ , the distance travelled by the assembly rearwardly beyond the vertical position being only of the order of  $5^\circ$ .

As the trigger part is moved rearwardly a degree of slag is generated in the label band and because of the stiffness of the latter, any surplus is accommodated by a slight slackening of the outer turn or turns of the reel, the slack being accommodated in the space between the outer turn of the reel and the part 916. Release of the trigger results in the spring 940 returning the trigger part 915 and the stationary handle portion to their initial relative positions as shown in Figure 45A.

The notches 966' in the side plates 964 return the inking assembly 1010' to the forward position, as this reverse motion takes place, the corners of the projections 950 which were inoperative during the rearwards motion of the trigger part 915 serving to restore to the initial or forward position the print head 991. As the forward movement continues, the print assembly 991' is also returned to its initial position. Continued forward motion results in the projection 997 becoming engaged so that the print head 991 is returned to the position shown in Figure 45B.

The motions of the platen described also serve to index the band forward. The rearwards movement of the platen, initiated when

the pin 952 engages the right-hand end of the slots 965, and with the barbs 962 thereof engaged in the notches of the backing strip pushes backing paper over the rear fixed barbs 973. The spent backing strip disengages from the barbs 973 of the fixed part 970 and a corresponding length of strip is discharged from the gap between the part 916 and the boss 975. As soon as the spring-energized return motion is initiated the notches of the backing strip engage the barbs 973. The label to be applied is thus drawn around the pin 967 by the forward motion of the platen 969 and draws a length of band from the reel equal to the length of one label and because of the sharp angle through which the backing strip is thereby turned over the pin, the label becomes detached. The carrier 938 moves further forward and assists the pad 982 in guiding the detached label during the actual dispensing operation. A fresh label is simultaneously drawn on to the platen 969. The cycle is drawing forward and printing is repeated each time the trigger is squeezed, and as will be apparent from the foregoing description, the label is printed twice during each cycle, the label actually applied having been printed during the immediate cycle.

Briefly, the actual applying of a label is as follows.

The pad 982 is positioned on or immediately adjacent the article to be labelled and as a printed label is discharged from the backing strip at the pin 967 by releasing the trigger part 915, the applicator is drawn rearwardly with a wiping motion.

With the exception of the springs and certain parts of the print head assemblies, the applicators hereinbefore described are manufactured from synthetic resin of appropriate strength.

This application contains subject matter common with that of co-pending application No. 12817/75 (Serial No. 1408756).

#### WHAT WE CLAIM IS:—

1. A label applicator for printing and dispensing labels from a label-carrying web incorporating a backing strip having regularly-spaced engagement means along its length, said applicator comprising a casing, at least one print head assembly pivotally mounted in the casing, and actuating means for moving operative facets of the or each print head assembly into contact with the label to be printed and for moving linearly a label to be printed by engagement with the engagement means of the backing strip, said actuating means including a device for detaching a printed label from the backing strip and dispensing said label from the applicator, said operative facets being movable over an arcuate path with an instantaneous linear velocity at the instant of printing

identical to the linear velocity of the label which is being simultaneously moved by the actuating means and said actuating means further being arranged to deliver the printed label to the said detaching device thereof, the printing, the detaching and the dispensing of a given label being effected in the same operational cycle of the or each print head assembly.

2. An applicator according to claim 1, comprising two said print head assemblies operable to make two separate print impressions on a given label, both said print head assemblies being operable during one operational cycle of the actuating means to print the same label as that dispensed by the detaching device during that cycle.

3. An applicator according to claim 1 or claim 2, wherein the actuating means comprises a slide carrying a plurality of barbs and also comprises a series of barbs which are fixed relative to the casing, movement of the slide in one direction causing the label-carrying web to move past the fixed barbs and movement of the slide in the opposite direction causing the web to engage the fixed barbs and thereby draw a fresh length of web so that the next label is brought forward for printing and a printed label is detached at the detaching device.

4. A label applicator comprising a casing, means for carrying a reel of self-adhesive labels supported on a backing strip having regularly-spaced notches along its length, at least one print head assembly pivoted in the casing for printing successive labels, a dispensing edge member movably mounted within the casing and arranged to detach successive printed labels from the backing strip by passage of the latter over the edge thereof, a feed mechanism including a member movable within the casing and arranged to engage successive series of the notches by a first series of barbs on a face thereof and including a second series of barbs fixed relative to the casing, both said series of barbs having a spacing equal to the spacing of the notches, and means common to the print head assembly or assemblies and the barbed member for actuating the barbed member so that the strip is disengaged from the second series of barbs by movement of the barbed member in one direction and engaged at a fresh set of notches on the second series of barbs during movement in the opposite direction of the barbed member whereby to draw a printed label over the dispensing edge member and to detach it, the arrangement being such that the dispensed label is that one which has been printed by the same operational cycle of the actuating means which has actuated the feed mechanism to dispense that label and that operative facets of the or each pivotal print head assembly are movable with an instantaneous linear velocity



the pin 952 engages the right-hand end of the slots 965, and with the barbs 962 thereof engaged in the notches of the backing strip pushes backing paper over the rear fixed barbs 973. The spent backing strip disengages from the barbs 973 of the fixed part 970 and a corresponding length of strip is discharged from the gap between the part 916 and the boss 975. As soon as the spring-energized return motion is initiated the notches of the backing strip engage the barbs 973. The label to be applied is thus drawn around the pin 967 by the forward motion of the platen 969 and draws a length of band from the reel equal to the length of one label and because of the sharp angle through which the backing strip is thereby turned over the pin, the label becomes detached. The carrier 938 moves further forward and assists the pad 982 in guiding the detached label during the actual dispensing operation. A fresh label is simultaneously drawn on to the platen 969. The cycle is drawing forward and printing is repeated each time the trigger is squeezed, and as will be apparent from the foregoing description, the label is printed twice during each cycle, the label actually applied having been printed during the immediate cycle.

Briefly, the actual applying of a label is as follows.

The pad 982 is positioned on or immediately adjacent the article to be labelled and as a printed label is discharged from the backing strip at the pin 967 by releasing the trigger part 915, the applicator is drawn rearwardly with a wiping motion.

With the exception of the springs and certain parts of the print head assemblies, the applicators hereinbefore described are manufactured from synthetic resin of appropriate strength.

This application contains subject matter common with that of co-pending application No. 12817/75 (Serial No. 1408756).

#### WHAT WE CLAIM IS:—

1. A label applicator for printing and dispensing labels from a label-carrying web incorporating a backing strip having regularly-spaced engagement means along its length, said applicator comprising a casing, at least one print head assembly pivotally mounted in the casing, and actuating means for moving operative facets of the or each print head assembly into contact with the label to be printed and for moving linearly a label to be printed by engagement with the engagement means of the backing strip, said actuating means including a device for detaching a printed label from the backing strip and dispensing said label from the applicator, said operative facets being movable over an arcuate path with an instantaneous linear velocity at the instant of printing

identical to the linear velocity of the label which is being simultaneously moved by the actuating means and said actuating means further being arranged to deliver the printed label to the said detaching device thereof, the printing, the detaching and the dispensing of a given label being effected in the same operational cycle of the or each print head assembly.

2. An applicator according to claim 1, comprising two said print head assemblies operable to make two separate print impressions on a given label, both said print head assemblies being operable during one operational cycle of the actuating means to print the same label as that dispensed by the detaching device during that cycle.

3. An applicator according to claim 1 or claim 2, wherein the actuating means comprises a slide carrying a plurality of barbs and also comprises a series of barbs which are fixed relative to the casing, movement of the slide in one direction causing the label-carrying web to move past the fixed barbs and movement of the slide in the opposite direction causing the web to engage the fixed barbs and thereby draw a fresh length of web so that the next label is brought forward for printing and a printed label is detached at the detaching device.

4. A label applicator comprising a casing, means for carrying a reel of self-adhesive labels supported on a backing strip having regularly-spaced notches along its length, at least one print head assembly pivoted in the casing for printing successive labels, a dispensing edge member movably mounted within the casing and arranged to detach successive printed labels from the backing strip by passage of the latter over the edge thereof, a feed mechanism including a member movable within the casing and arranged to engage successive series of the notches by a first series of barbs on a face thereof and including a second series of barbs fixed relative to the casing, both said series of barbs having a spacing equal to the spacing of the notches, and means common to the print head assembly or assemblies and the barbed member for actuating the barbed member so that the strip is disengaged from the second series of barbs by movement of the barbed member in one direction and engaged at a fresh set of notches on the second series of barbs during movement in the opposite direction of the barbed member whereby to draw a printed label over the dispensing edge member and to detach it, the arrangement being such that the dispensed label is that one which has been printed by the same operational cycle of the actuating means which has actuated the feed mechanism to dispense that label and that operative facets of the or each pivotal print head assembly are movable with an instantaneous linear velocity



identical to the instantaneous linear velocity of a moving label at the instant of printing.

5 5. An applicator according to claim 4, comprising two said pivotal print head assemblies operable successively on the said label.

10 6. An applicator according to claim 5, wherein said actuating means comprises a lost-motion drive whereby the first barbed member is inoperative to move the backing strip over a first portion of the movement in said one direction.

15 7. An applicator according to claim 6, wherein the lost-motion drive comprises an abutment on one member of the actuating means and an abutment on the first barbed member, said abutments being initially spaced by an amount substantially greater than one half of the advance required for the backing strip to index one label to the print position.

20 8. An applicator according to claim 7, wherein the lost-motion drive further comprises a transverse member carried by slots in said one member of the actuating means and a further abutment on the first barbed member, said transverse member and further abutment on the barbed member being operative to move the barbed member only during a first portion of movement in said other direction of the said one member, the further abutment being rendered inoperative by a ramp rigid with the casing which serves to lift the transverse member above said further abutment at the end of the first portion of the movement in said other direction.

35 9. An applicator according to any one of claims 4 to 7 comprising a platen serving to support for printing said label and a corresponding portion of the backing strip, and a platen tooth member operative to lock said label on the platen immediately the actuating means are operated at the commencement of the operating cycle.

40 10. An applicator according to claim 9, wherein the platen tooth member is pivoted on said one member of the actuating means which serves to carry the platen, the locking action being effected by pivoting the platen tooth member to engage teeth thereof on corresponding notches of the backing strip.

50 11. An applicator according to any one of the claims 5 to 10 comprising means for locking each print head assembly in a predetermined orientation when the actuating means is inoperative.

55 12. An applicator according to claim 11, wherein the locking means comprises at least one abutment on one of the print head assemblies and at least one tooth on a carrier serving to carry an ink pad of the corresponding print head assembly, initial actuation of the actuating means serving to disengage the abutment and the tooth to release the print head assembly.

65 13. An applicator according to claim 12

further comprising for said one print head assembly a control member in engagement with a projection of the one print head assembly, said control member also being in engagement with a detent of said ink pad carrier when in the locked position.

14. An applicator according to claim 12 or 13, wherein the said one print head assembly is spring-biased towards the locked position.

15. An applicator according to claim 5 and claim 12, claim 13 or claim 14 wherein the locking means of the second print head assembly comprises a projection on the internal surface of the casing and an arcuate flange carried on an end plate of the second assembly and a spring biasing the one end of the flange into engagement with the projection.

16. An applicator according to any preceding claim comprising a pad arranged adjacent the detaching device in order to press labels on to articles.

17. An applicator according to claim 16, wherein the pad is of natural or synthetic sponge rubber and has adhered thereto a plurality of glass or tungsten carbide balls.

18. An applicator according to any one of claims 1 to 7, comprising a platen for supporting a said label during printing and a platen carrier, said carrier also serving as a part of the actuating means and including projections which co-operate with surfaces on the printing head assembly to move the latter into printing contact with the label on the platen.

19. An applicator according to claim 18, comprising a spring interposed between the platen carrier and the platen.

20. An applicator according to claim 19, wherein the spring comprises two elongate side strips and a bridge portion, the latter having in longitudinal section a downwardly directed cusp portion engaged in a transverse groove of the carrier.

21. An applicator according to any one of the preceding claims 3 to 20, wherein the or each pivoted print head assembly includes an ink pad holder supported for limited pivotal movement in a carrier, each carrier being itself pivotally mounted on a pivot axis of the corresponding print head assembly and being operable by the actuating means to swing into and out of operative contact with the operative facets of the corresponding print head assembly.

22. An applicator according to claim 18 and 21 wherein each ink pad carrier includes a pair of side members, tips of these members being operable to swing the carriers by contact with projections of the platen carrier.

23. An applicator according to claim 21 or claim 22, wherein the ink pad holder of one said print head assembly has pegs engaged in respective cam tracks of the casing,

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said cam tracks including portions arranged to bring the ink pad into operative contact with the operative print facets of the print head assembly.

- 5 24. An applicator according to any one of the preceding claims wherein each said print head assembly comprises a read-out device, operative facets of which read-out devices are visible through lenses provided in the casing of the applicator and angled rearwardly to facilitate reading the operative facets by an operator disposed rearwardly of the applicator.

- 10 25. An applicator according to any one of claims 3 to 24, wherein the barbs of the barbed member are arranged as two sets adjacent each longitudinal edge of the member to accommodate webs carrying different sized labels and the fixed barbs are arranged as two corresponding sets.

- 15 26. An applicator according to claim 4, wherein each print head assembly comprises a projecting member movable therewith, forming a part of the actuating means, and adapted to engage leading and trailing edges of a label-support and printing platen in order to swing successively the operative type facets of the respective print heads into engagement with a label on the platen, said platen being rigid with the barbed member.

- 20 27. An applicator according to claim 1, 2 or 4, wherein a label-support and printing platen is integral with the barbed member with the first series of barbs.

- 25 28. An applicator according to claim 27 wherein the dispensing member is carried by the platen.

- 30 29. A label applicator comprising at least one print head assembly pivoted in a casing, and actuating means operative to actuate the print head assembly to print and operative to dispense, at a dispensing device forming a part of said actuating means, a given label in the same operational cycle, the arrangement being such that the moving operative print facets of the print head assembly have at the instant of printing an instantaneous linear velocity equal to the linear velocity of the moving label.

30. An applicator for self-adhesive labels mounted on a backing strip having a continuous series of regularly-spaced notches along both longitudinal edges, said applicator comprising a casing, a print head assembly pivotally mounted in the casing, ink pad means for inking operative type facets of the print head assembly, a label-support printing platen movable substantially rectilinearly at a linear velocity equal to the instantaneous linear velocity of the operative type facets at the instant of printing whereby to print a moving label carried on the platen, a label feed slide rigid with the platen, supporting the ink pad means and including means for pivoting the print head assembly to impart the said instantaneous linear velocity to the operative print facets, a platen carrier supporting the feed slide and platen, a label dispensing member adjacent the platen and carried by the feed slide, a pivotal trigger, a flexible elongate member connecting the trigger to the platen carrier, a return spring connecting the casing to the carrier, and means on the platen carrier for successively urging the ink pad and the platen towards the operative type facets, said feed slide comprising at least one series of regularly spaced barbs adapted to engage the backing strip during a first stroke of the slide and a barbed member fixed to the casing adapted to engage and hold the backing strip during the second, return stroke serving to draw the label printed during the first stroke over the dispensing member and to draw a fresh label from the supply on to the platen.

31. A label applicator substantially as hereinbefore described with reference to Figures 1A to 27; Figures 28A to 44; or Figures 45A to 47 of the accompanying drawings.

MATHISEN & MACARA,  
Chartered Patent Agents,  
Lyon House, Lyon Road,  
Harrow, Middlesex, HA1 2ET.  
Agents for the Applicants.