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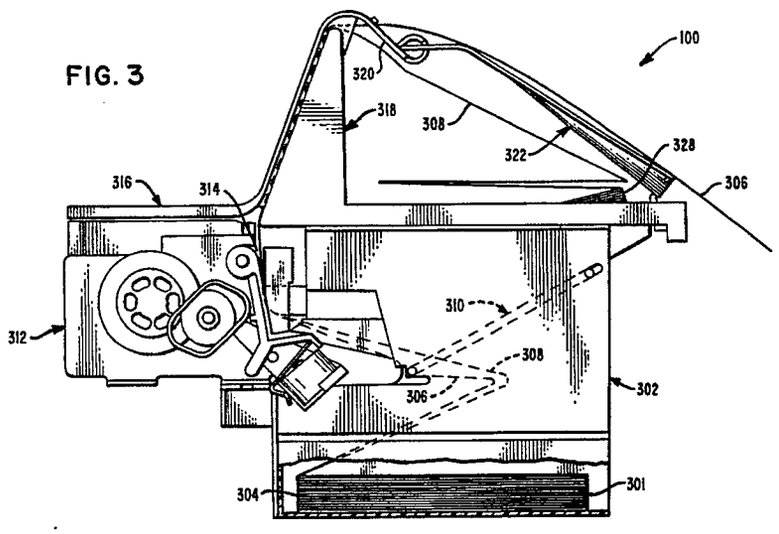
(54) Apparatus for handling and printing two-ply fanfold paper.

(57) In a printing and handling apparatus for printing and handling multiple-ply fanfold paper (306, 308) comprising at least first and second plies, a separator bar (310) is wedged between the first and second plies prior to feeding the paper through a printer (312), where the plies are merged together in their pre-separated relative positions. After leaving the printer (312), the first and second plies travel on separate paths, allowing a user to access one ply (306) for verification and checking, while the other ply (308) is automatically refolded and stacked neatly as a permanent copy in a retaining portion (318) of the apparatus.

FIG. 3



EP 0 407 208 A2

APPARATUS FOR PRINTING AND HANDLING MULTIPLE-PLY FANFOLD PAPER

The present invention generally relates to printing and paper handling, and more particularly to apparatus for printing and handling multiple-ply fanfold paper in which the plies are separated. Prior art printing and handling methods for multiple-ply fanfold paper involve printing in one machine and subsequently separating the plies in another machine, and do not recognize that the two processes can be combined in the same machine to increase efficiency and lower costs.

It is an object of the present invention to provide a new and improved method and apparatus for printing and handling multiple-ply paper.

According to the invention there is provided a printing and handling apparatus for printing and handling multiple-ply continuous paper comprising at least a first ply and a second ply, including print means for printing on said paper, and feeding means for feeding said paper past said print means, characterized by first separation means for separating said first and second plies prior to being printed on, merging means for bringing said first and second plies together at said print means, and second separator means for separating said first and second plies after being printed on.

It has been found that by virtue of the separation and subsequent merging of said first and second plies prior to printing, it is possible to combine the printing and subsequent separation processes in a single apparatus of simple construction. In this connection, it should be understood that, in the absence of separating and merging the plies prior to printing there is a tendency for the plies to stick together strongly after printing, thereby making it difficult to achieve printing and subsequent separation processes in a non-interrupted manner.

The invention will now be described, by way of example, with reference to the accompanying drawings, in which:

Figure 1 is a front isometric view of a fanfold paper printing and handling apparatus according to the present invention;

Figure 2 is a rear isometric view of the apparatus;

Figure 3 is a side view of the apparatus;

Figure 4 is a front isometric view of a lower tray of the apparatus;

Figure 5 is a rear isometric view of the lower tray;

Figure 6 is a front isometric view of a separator bar of the apparatus;

Figure 7 is a front isometric view of the lower tray with the separator bar locked in place;

Figure 8 is a front isometric view of a printing mechanism of the apparatus;

Figure 9 is a front isometric view of a deflector cover of the apparatus;

Figure 10 is a rear isometric view of the deflector cover;

Figure 11 is a front isometric view of an upper tray of the apparatus;

Figure 12 is a rear isometric view of a paper guide of the apparatus;

Figure 13 is a front isometric view of the combined deflector cover, upper tray and paper guide; and

Figure 14 is a rear isometric view of the combined deflector cover, upper tray and paper guide.

Figures 1 and 2 show front and rear isometric views of a printing and handling apparatus 100. Handling of paper by the apparatus 100 involves separating the plies of multiple-ply fanfold paper and (continuously) neatly refolding and stacking one of the plies in a tray after printing has occurred. The reference numbers in Figures 1 and 2 pertain to components which will be described later while referring to Figures 3 and 9.

The side view of the printing and handling apparatus 100 in Figure 3 is more illustrative of the process. The major components of the apparatus 100 are a lower tray 302, a separator bar (or ply separator) 310, a printer 312 (described more fully with reference to Figure 8), a deflection cover 318 an upper tray 318, and a paper guide 322, The fanfold paper 301, which is self-reprographic (eg carbon-less) and has two plies in the preferred embodiment, is introduced to the apparatus 100 in a supply stack 304 of the lower tray 302. The paper 301 is separated into two plies 306 and 308 by wedging a portion of the separator bar 310 therebetween, prior to the paper being printed upon. Although the plies are separated, the positioning of the plies relative to each other does not change.

The separated plies 306 and 308 are merged in a channel 314 for printing by the printer 312. The printer 312 simultaneously prints and advances the plies 306 and 308 through the channel 314, the result being the production of two identical plies.

The deflector cover 316 deflects the printed plies towards the upper tray 318, upon which the deflector cover 316 is mounted. In addition to being mounted upon the upper tray 318, the deflector cover 316 is also attached to the paper guide 322. A path 320 between the upper tray 318 and the paper guide 322 allows the second ply 308 to be deflected and neatly refolded and stacked into a stack 328. The first ply 306 advances over the top

of the paper guide 322 to exit the printing and handling apparatus 100.

The first ply 306 can either be viewed through a window 904 (seen best in Figures 1, 9 and 13) in the deflector cover 316 or by looking at that ply on the top of the paper guide and from the rear of the apparatus 100 (the view seen in Figure 2, for example), etc. After the user has verified and checked the information on the first ply 306, he may, for example, discard that ply and simply retain the neatly refolded second ply 308 (stacked in stack 328) in the upper tray 318.

Figure 4 shows a more detailed version of the lower tray 302 (front view). The lower tray 302 has an end wall 402, an open space area 404 approximately equal in area to the end wall 402, two side walls 406 and 408, a bottom surface 410, and an upper open space area 412 approximately equal in area to the area of the bottom surface 410. Two printer locators 414 and 416 locate and secure the printer 312 when the apparatus 100 is fully assembled. Two upper tray locator tabs 418 and 420 locate the correct positioning of the upper tray 318 when the apparatus is fully assembled. Two separator bar holes 422 and 424 serve both as separator bar 310 locators and as anchors for said bar. A horizontal bar member 426 serves as a convenient handle for grasping the lower tray 302, when it is assembled in the apparatus 100, for example. Also, a ledge 428 which impinges upon the paper as it leaves the lower tray 302 serves to align the paper with the channel 314.

The rear view of the lower tray 302 in Figure 5 contains the same elements as in Figure 4, except that Figure 5 additionally shows separator bar locators 502 and 504. The separator bar locators 502 and 504 are for locating and supporting the separator bar 310.

The separator bar 310 is detailed in Figure 6. The separator bar 310 contain a paper separator portion 602, two end bar portions 604 and 606, and two end posts 608 and 610 for positioning in the separator bar holes 422 and 424. Figure 7 shows the lower tray 302 with the separator bar 310 in place (stems 608 and 610 resting in holes 422 and 424, respectively, and the elbows 612 and 614 of the separator bar 310 resting upon the separator bar locators 502 and 504).

Figure 8 illustrates the printer 312, which is described in more detail in US-A-4,204,777.

The printer 312 has a printer mechanism 802 for printing onto the fanfold paper, and a feeder mechanism (or feeder) designated generally as 804, for advancing the paper past the printer mechanism 802. The printer mechanism 802 may be of the dot matrix pin variety, daisy wheel variety, or other variety, as will be appreciated by those skilled in the art.

The deflector cover 316 in Figure 9 has a base or frame 902, the open area 904, and a group of hooks 906-914. The rear view of the deflector cover 316 in Figure 10 additionally reveals a paper separation slot 1002 through which the first ply 306 of the paper 301 exits the deflector cover 316, two snap hooks 1004 and 1006 and two locator tabs 1008 and 1010 for attaching the deflector cover 316 to the upper tray 318.

The upper tray 318 in Figure 11 has a sloped surface 1102 with deflector cover holes 1104 and 1106 which receive snap hooks 1004 and 1006, respectively, and holes 1108 and 1110 which receive the locator tabs 1008 and 1010, respectively. The base 1112 includes a resting bar 1114 upon which the paper guide 322 rests, and a hollow 1116 which permits easy grasping of the stack 328 for removal. Two notches 1118 (seen in Figure 13) and 1120 fit over the upper tray locator tabs 418 and 420 (see Figure 4) to correctly position the upper tray 318 with respect to the lower tray 302 when the apparatus 100 is fully assembled.

The paper guide 322 in Figure 12 has two slightly angled surfaces 1202 and 1204 which merge into a relatively flat planar surface portion 1206 with cutouts 1208-1216. The cutouts 1208-1216 accept the hooks 906-914 of the deflector cover 316 to attach the paper guide 322 to the deflector cover 316, such as is shown in Figures 13 (front view of upper tray, deflector cover and paper guide) and 14 (rear view of upper tray, deflector cover and paper guide). In operation, the first ply 306 is fed through the opening 1002 over the top of the paper guide 322, while the second ply 308 continues on the path 320 under the paper guide 322 and is deflected thereby to cause the paper second ply to refold and stack neatly underneath the paper guide 322.

If single ply fanfold paper is used the printed paper can be made either to travel over the top of the apparatus 100, or underneath the paper guide 322 to form a neatly refolded stack. The same applies to two-ply fanfold paper where it is not desired to separate the plies.

In a modification, the fanfold paper need not be limited to having two plies. In the case where more than two plies are separated, the number of separator bars is equal to n-1, where n represents the number of plies. The other components can be appropriately modified.

Claims

1. A printing and handling apparatus (100) for printing and handling multiple-ply continuous paper comprising at least a first ply (306) and a second ply (308), including printing means (802) for print-

ing on said paper, and feeding means (804) for feeding said paper past said print means, characterized by first separator means (310) for separating said first and second plies (306, 308) prior to being printed on, merging means (314) for bringing said first and second plies together at said printing means (802), and second separator means (316, 1002) for separating said first and second plies after being printed on.

2. An apparatus according to claim 1, characterized in that said first separator means comprises a separator bar (310) wedged between said first and second plies (306, 308).

3. An apparatus according to claim 1 for printing and handling continuous paper comprising n plies, where n is greater than 2, characterized in that said first separator means (310) comprises (n-1) separator bars, each separator bar being wedged between adjacent plies.

4. An apparatus according to any one of the preceding claims, characterized in that said second separator means (316, 1002) served to define separate first and second paths for said first and second plies (306, 308), respectively.

5. An apparatus according to claim 4, characterized in that said feeding means (804) feeds said first ply (306) along said first feed path out of said apparatus, and feeds said second ply (308) along said second feed path to a retaining portion (318) of said apparatus wherein said second ply is folded and stacked.

6. An apparatus according to any one of the preceding claims, characterized by a paper store (302) for storing said multiple-ply paper in fanfold manner, said feeding means (804) serving to feed said paper from said paper store to said printing means (802).

FIG. 1

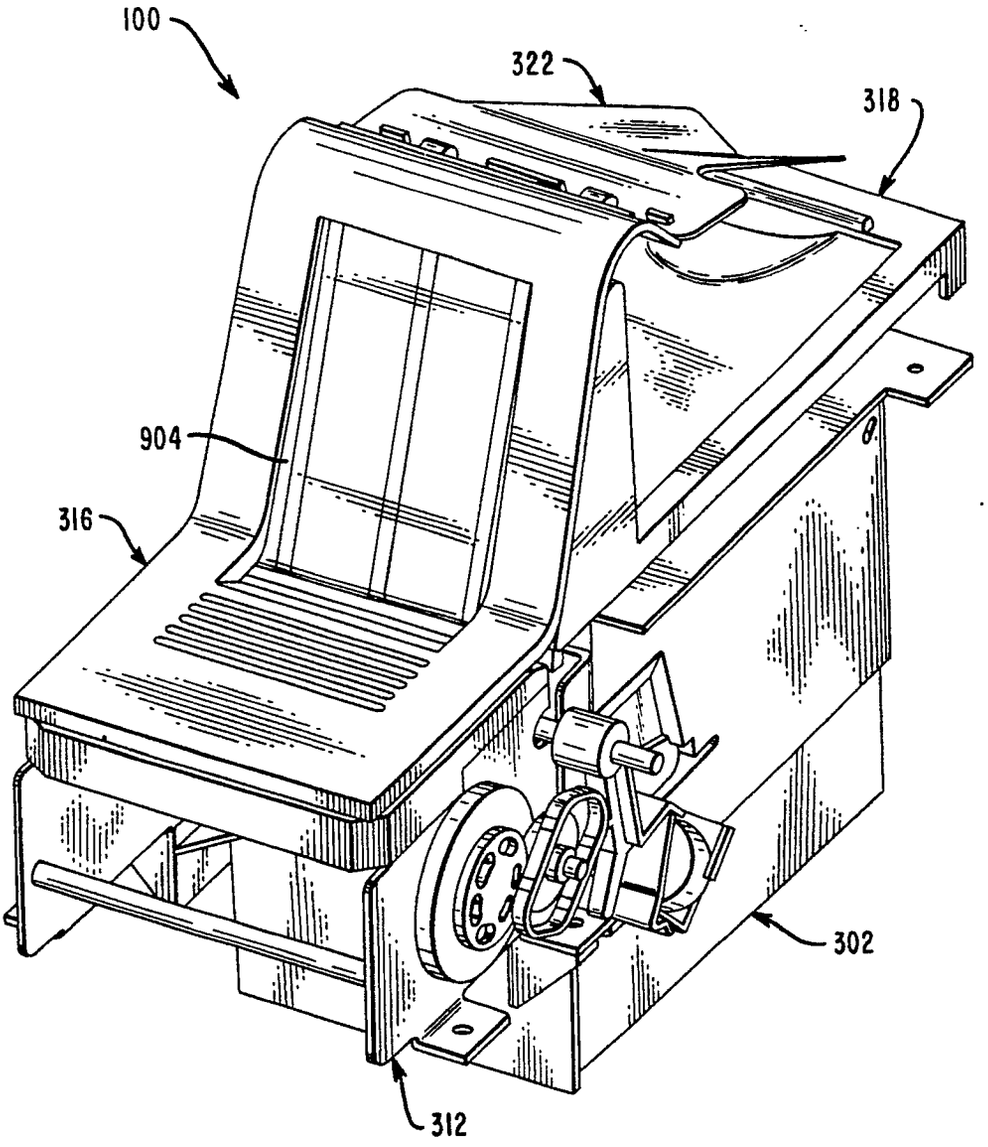
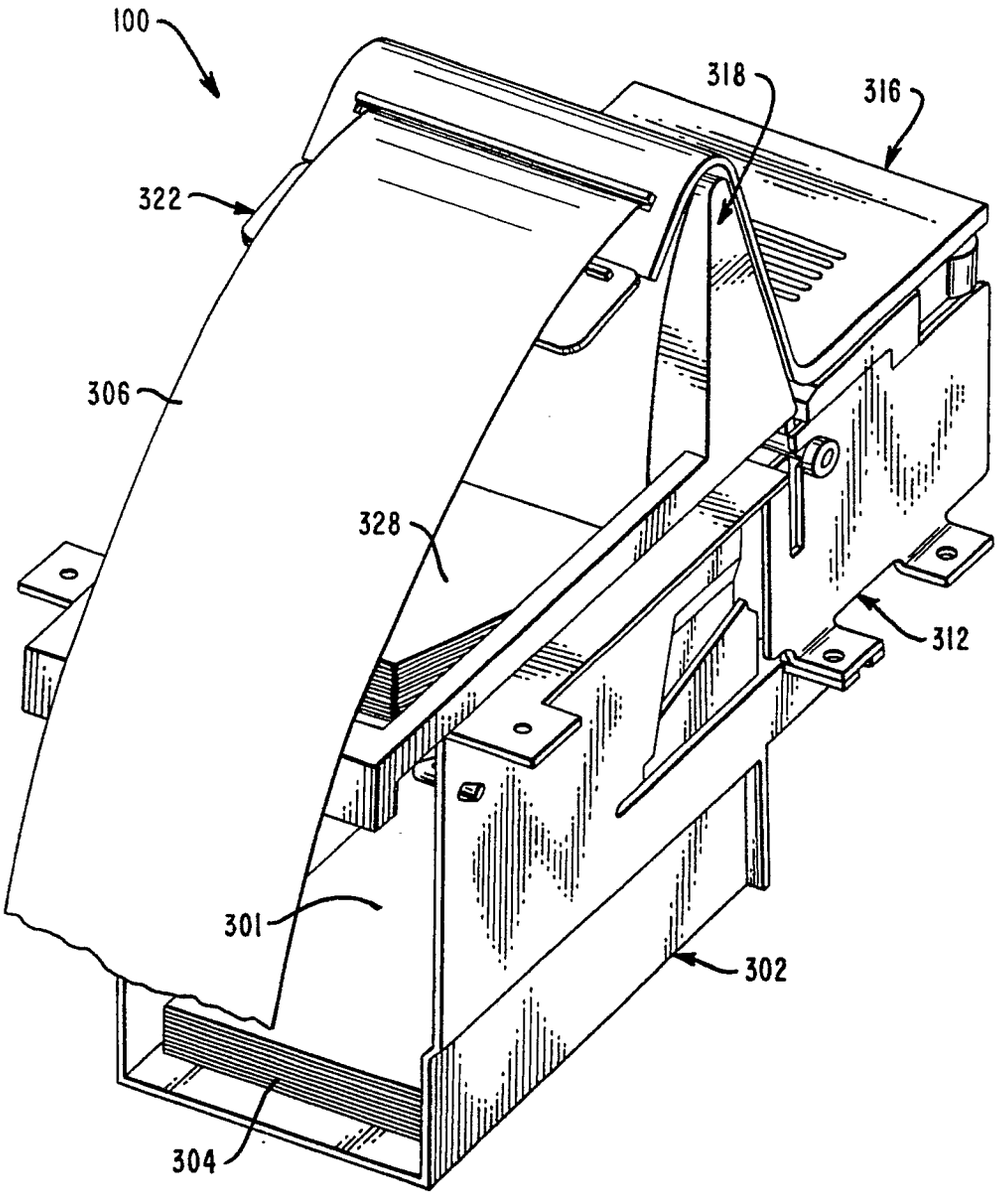


FIG. 2



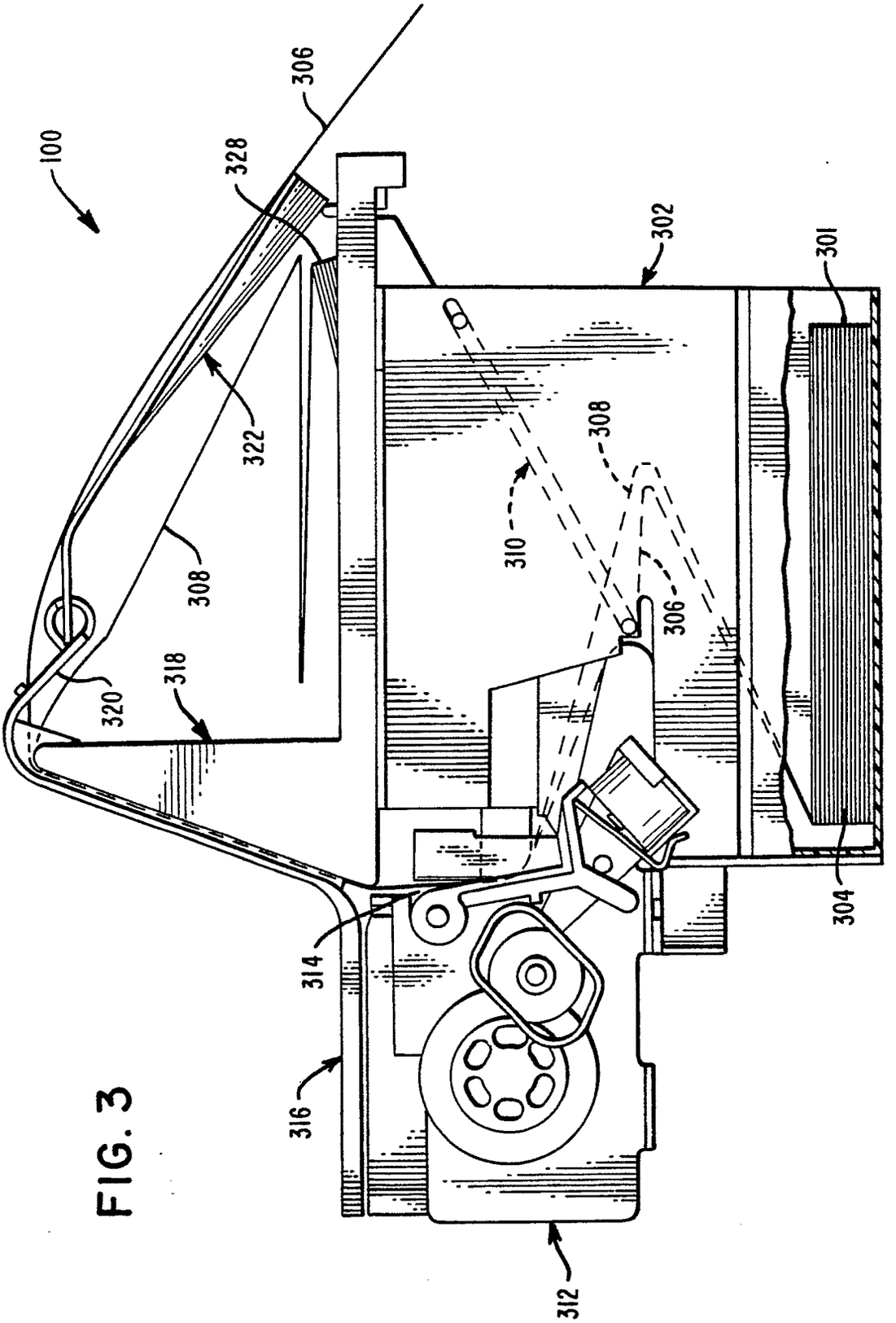


FIG. 3

FIG. 4

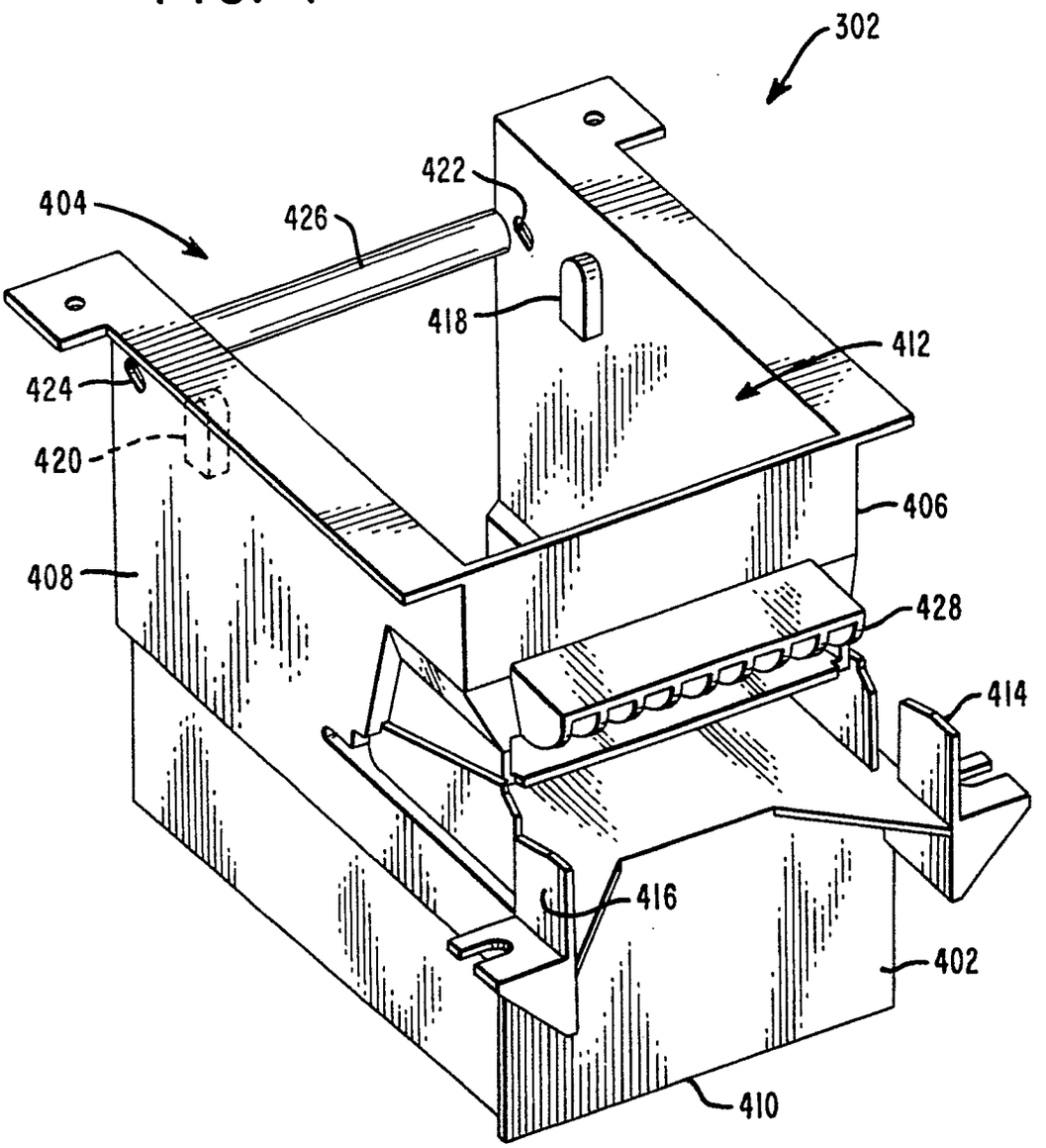


FIG. 5

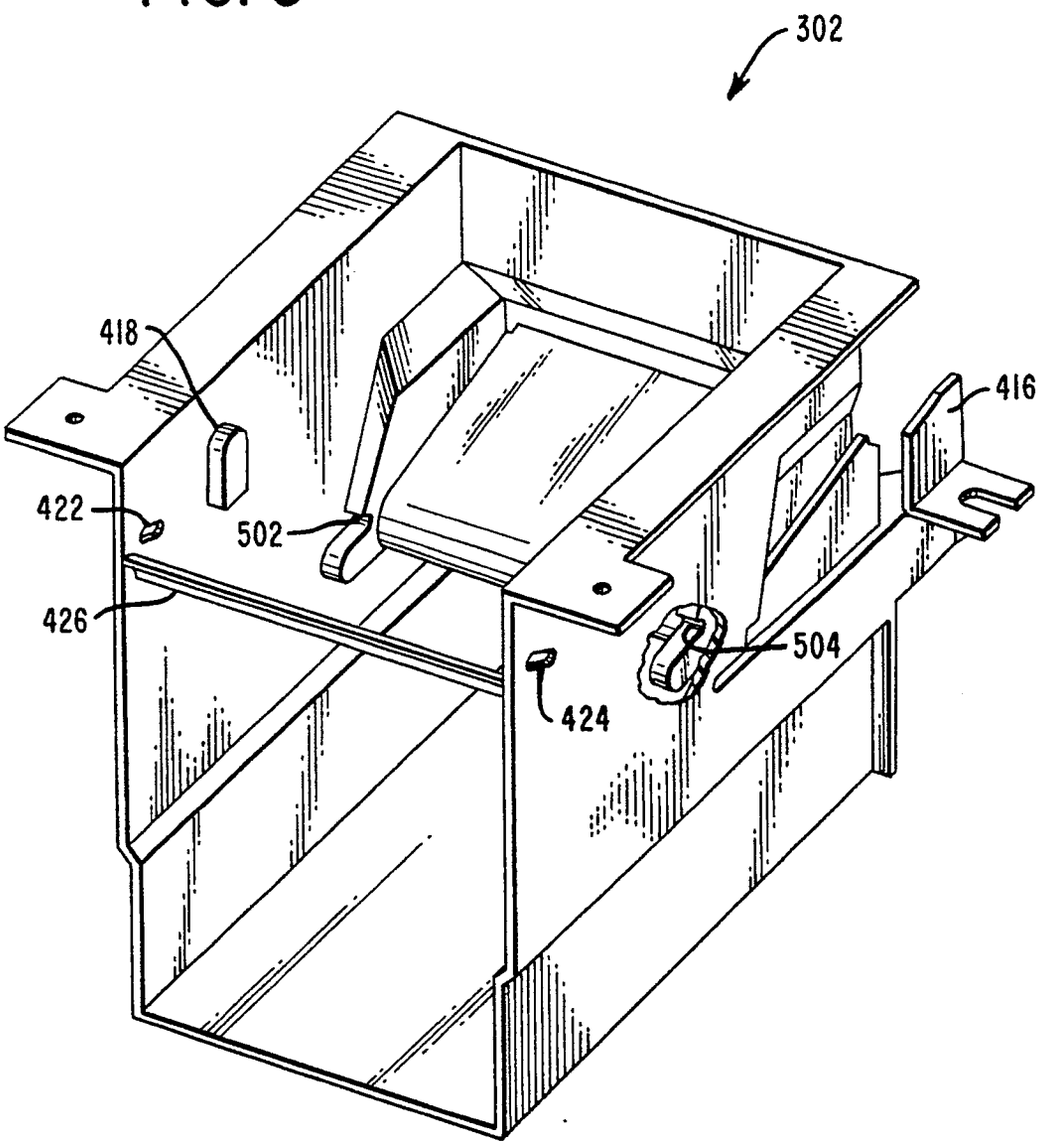


FIG. 6

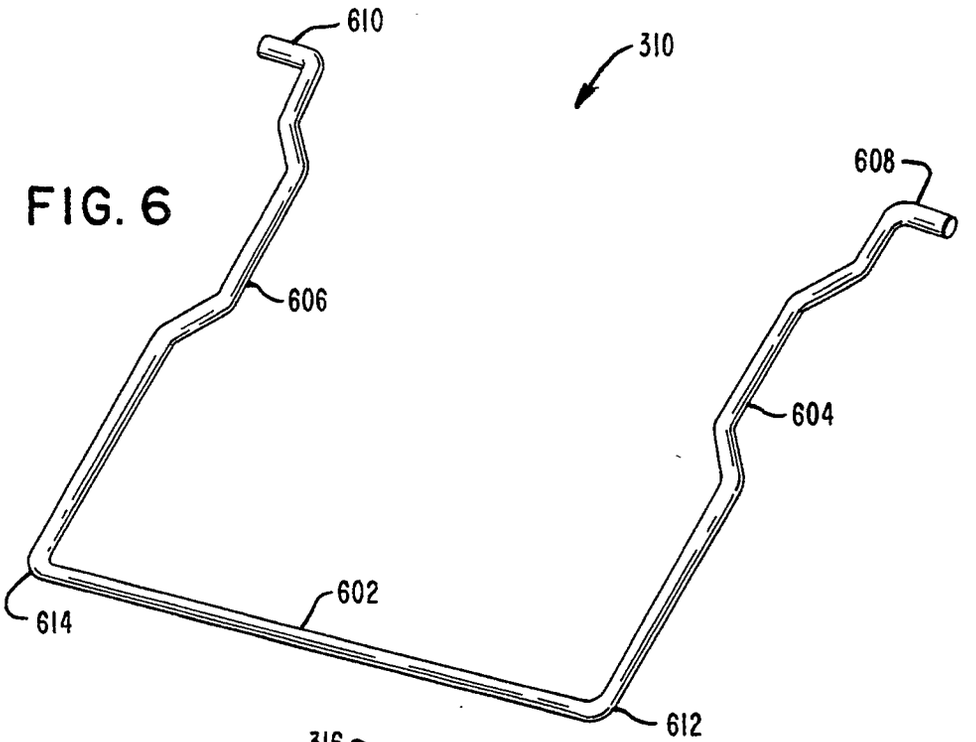

610
310
608
606
604
602
614
612

FIG. 14

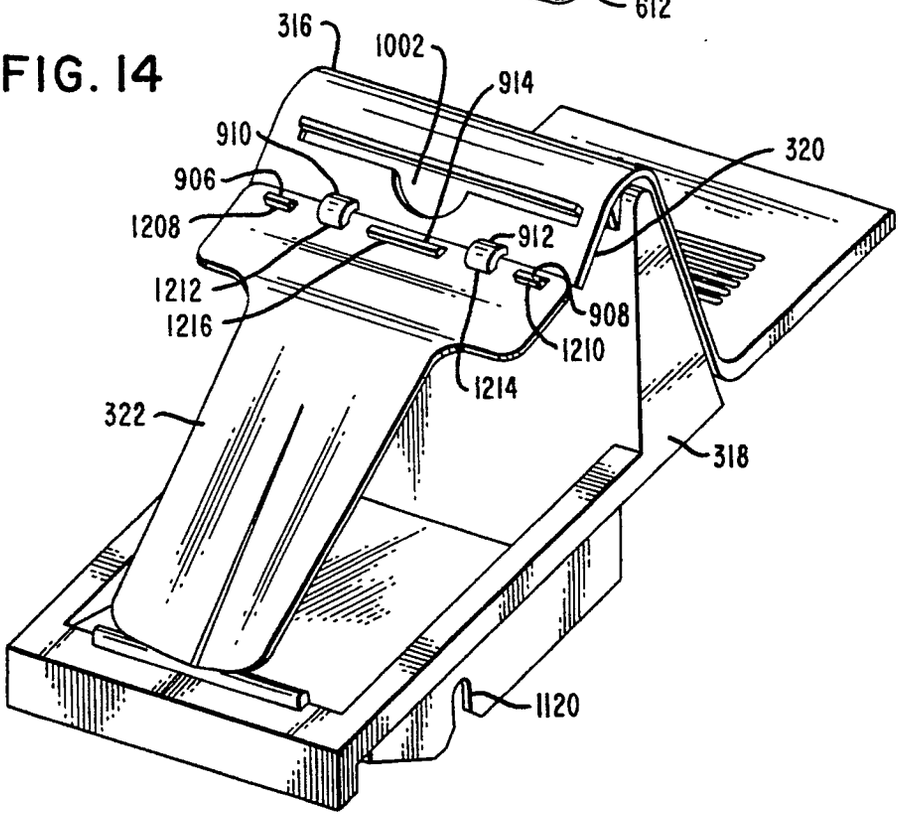
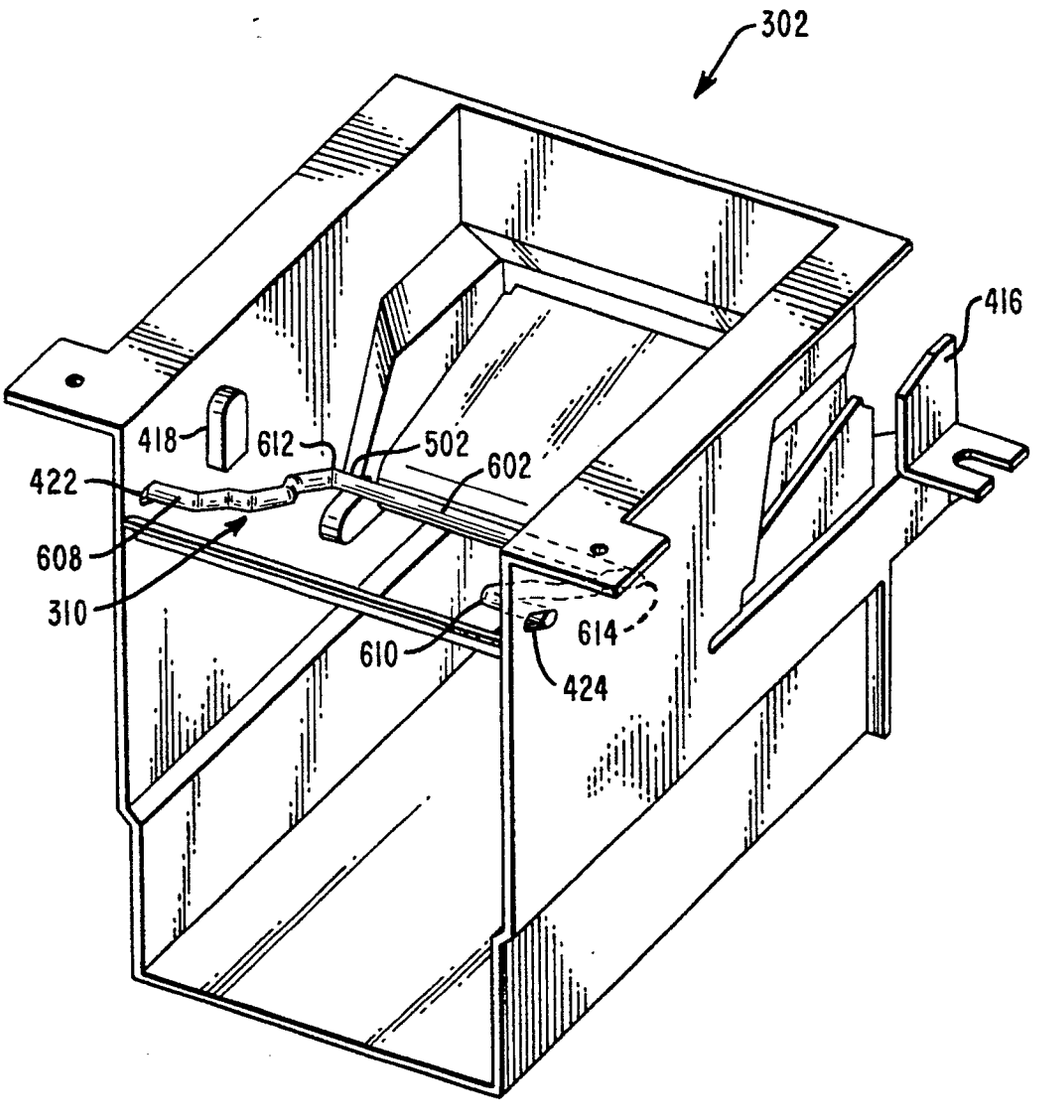

316
1002
914
910
320
906
1208
912
1212
908
1216
1210
1214
322
318
1120

FIG. 7



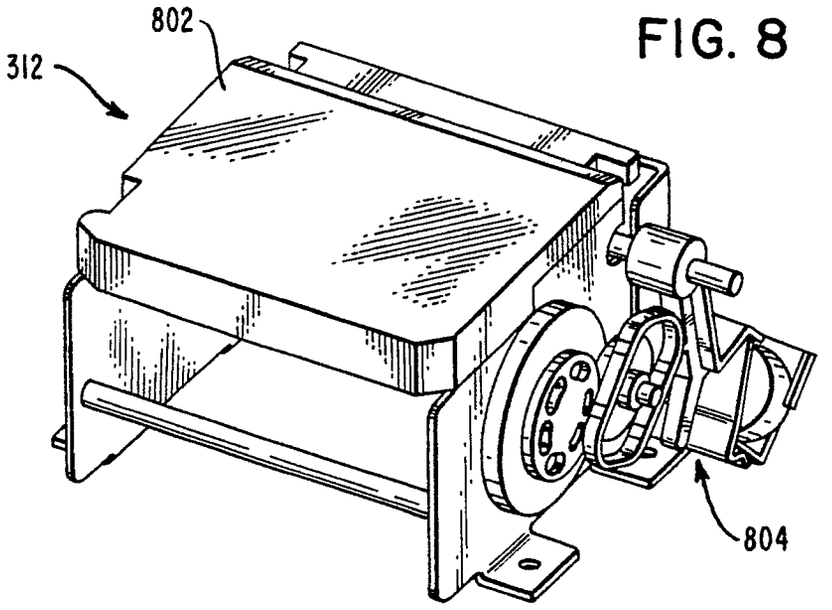


FIG. 8

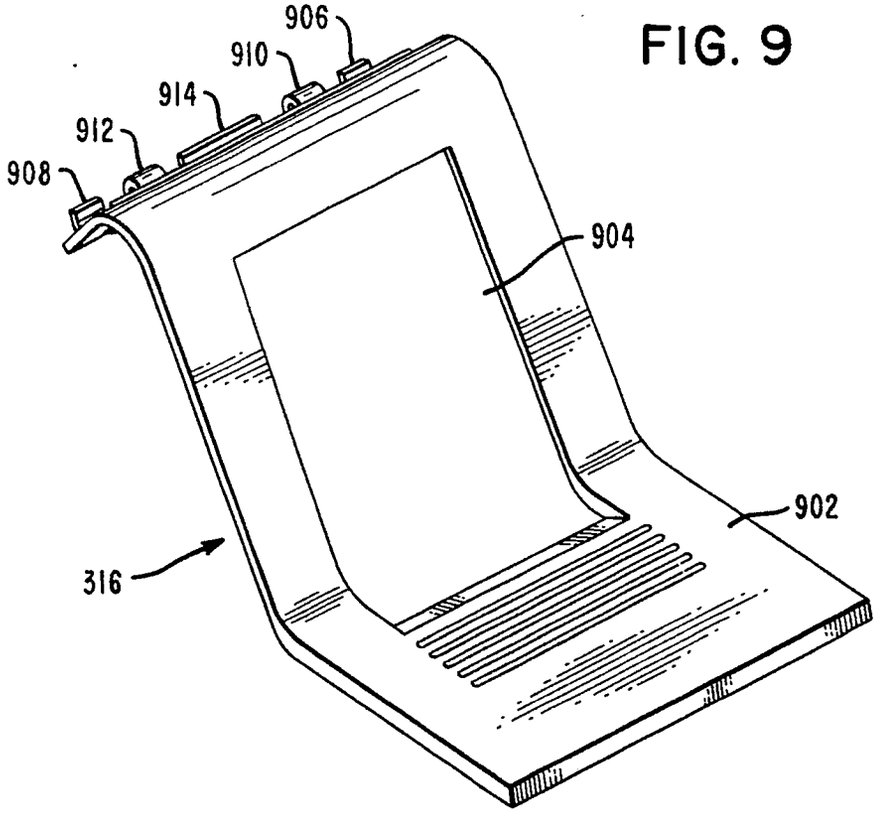


FIG. 9

FIG. 10

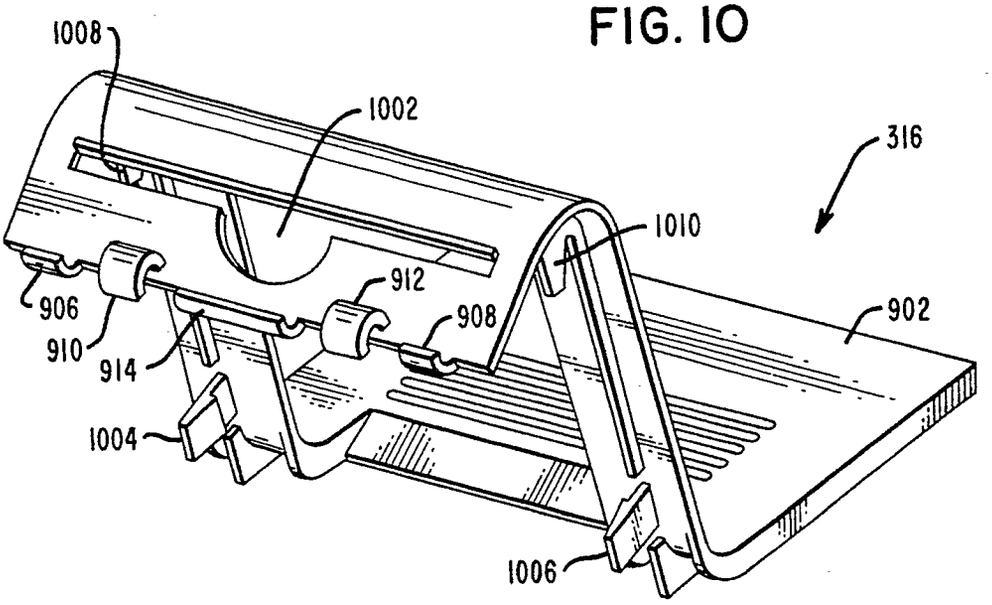

1008
1002
316
1010
912
906
908
902
910
914
1004
1006

FIG. 11

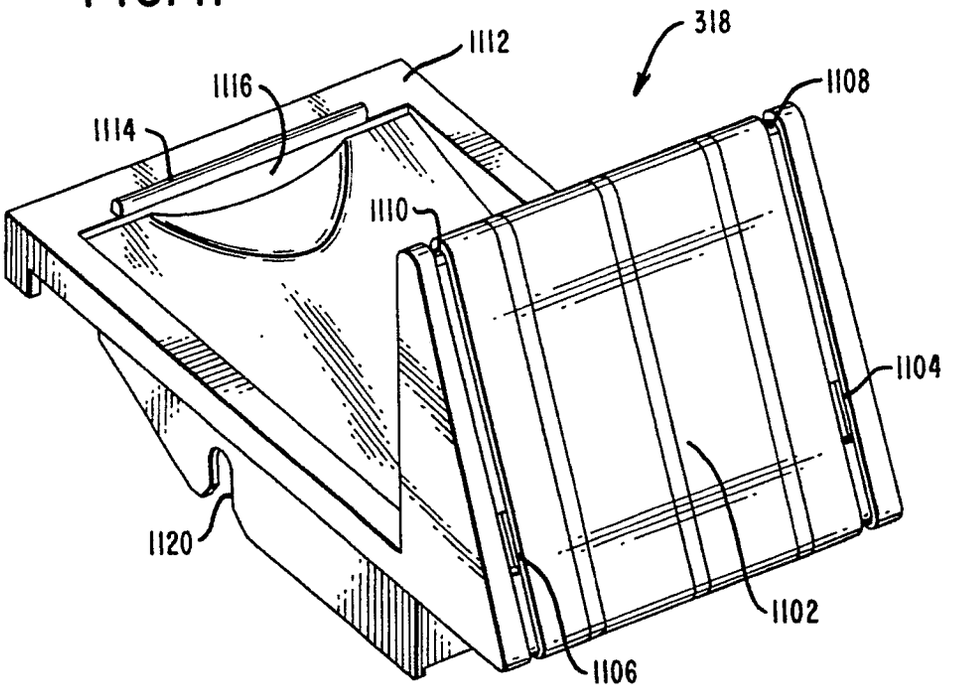

1112
318
1116
1108
1114
1110
1104
1120
1102
1106

FIG. 12

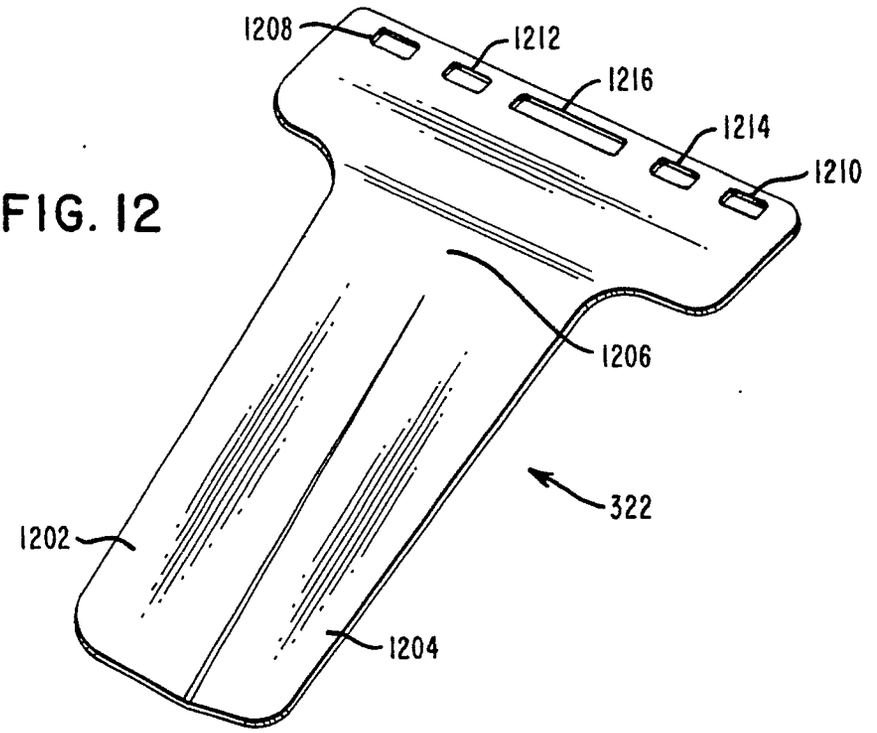
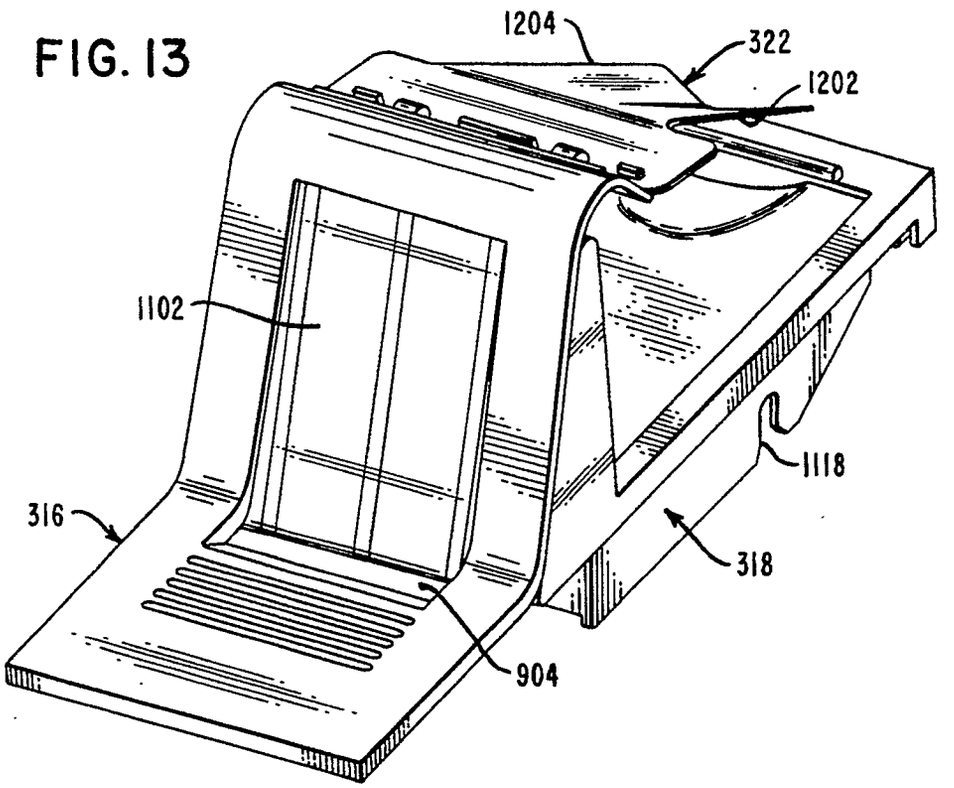

1208
1212
1216
1214
1210
1206
322
1202
1204

FIG. 13


1204
322
1202
1102
1118
316
318
904