Feb. 14, 1967 H. W. HUFFMAN 3,304,102

DATA CARD

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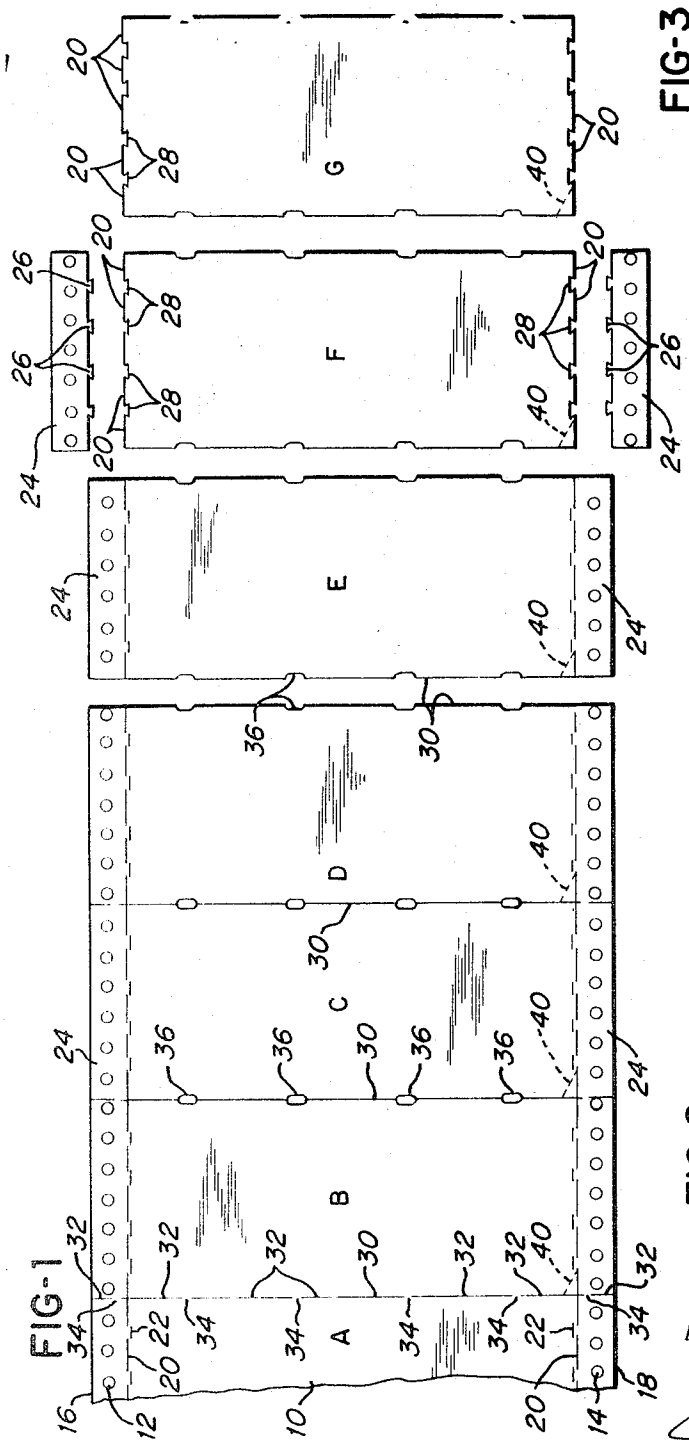


FIG-1

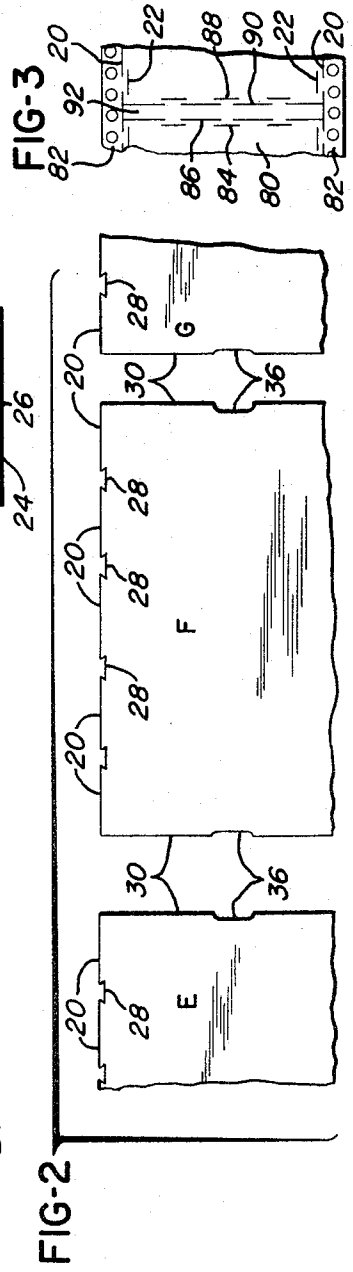


FIG-2

FIG-3

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DATA CARD

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Original application Jan. 14, 1965, Ser. No. 425,417, now Patent No. 3,268,136, dated Nov. 15, 1966. Divided and this application Feb. 18, 1966, Ser. No. 541,053

3 Claims. (Cl. 281—5)

This application is a division of application 425,417 filed Jan. 14, 1965 now Patent 3,268,136 issued Nov. 15, 1966.

This invention relates to data cards, such as business-machine cards or the like, and to an improved method of producing such cards with great precision and efficiency.

Common practice has been to produce data cards by subjecting a high-grade paper web traveling at high speed, to punching and slitting means which perforate both side margins of the web, and line-cut the web at specified locations both longitudinally and transversely, to establish the length and width dimensions of the cards without destroying the continuity of the moving web. The perforations were equally spaced apart in lines running parallel to the sides of the web, and inwardly of each line of perforations the web was pierced through, by means of two closely spaced lines of individual cuts, to define detachable trim strips at opposite sides of the web, substantially as shown in FIG. 1. By subsequently removing the trim strips, the final length dimension of a card was established.

The production of cards necessitated, of course, transverse cutting of the web at intervals, and this was done during high-speed travel of the web, in a manner illustrated by FIG. 3. Here, the cutters produced four lines of individual cuts extending transversely across the web, the cuts being in pairs spaced apart to define an intervening removable cross strip, this strip being repeated at spaced intervals along the web so that removal of the cross strips established the final height, or width, of the individual cards. Removal of the cross strips, and of the longitudinal trim strips, was effected by means of a process step commonly known as "bursting," whereby the paper remaining intermediate the lines of individual through cuts was torn or rent to produce the cards as individuals entirely separated from one another.

The bursting and disposal of the transverse cross strips during high-speed advancement of the web, have posed problems which were of great concern in the manufacturing procedure. If the mechanism for removing the detached cross strips failed to function properly, due to maladjustment or other causes, it sometimes became necessary to interrupt the web advancement, with resultant loss of production and added labor expense. Moreover, the cross strips represented waste, of considerable magnitude in high-grade expensive paper.

One object of the present invention is to minimize waste of high-grade paper in the manufacture of cards of the character mentioned above.

Another object of the invention is to enhance the efficiency of card production, with substantial savings of time and labor.

A further object is to produce with great efficiency, cards such as by way of example, I.B.M. mark-sensing cards or the like, with finished edges which are completely devoid of objectionable protrusions or irregular tufts of paper stock.

Another object of the invention is to produce individual cards from a continuous length of stock, wherein adjacent portions of adjoining cards have finished edges common to both such cards.

Another object is to teach a method of producing cards with finished upper and lower edges, without resorting to use of an intermediate cross strip, thereby to minimize waste and at the same time simplify and expedite the manufacturing procedure.

A further object of the invention is the production of cards having the hereinabove described characteristics and which permits the efficient use of conventional concepts in collators and other standard printing equipment with precise accuracy by initially partially severing opposite edges by means of a plurality of aligned cuts, the adjacent ends of said cuts being spaced apart to form an uncut tie or tab interconnecting the adjoining cards. The aforesaid cuts extend transversely of the length of stock from which the cards are made, said cuts accurately defining the finished side edges of the cards.

Having thus provided the cards with finished side edges while still interconnected at the uncut ties or tabs, the continuous web strip may be further processed if desired, or the individual cards may be separated from the strip without further processing.

According to the teachings of the present invention, the various ties or tabs between adjoining cards are completely removed or excised by being punched out in such manner as to locate the periphery of each punch-out astride the transversely disposed cuts, that is, within the confines of the finished side edges of the adjoining cards. In this manner, the cards are provided with finished edges which are entirely free of protruding ties or tufts of paper stock.

The foregoing and other objects are attained by means described herein and as disclosed in the accompanying drawing, in which:

FIG. 1 is a plan view of an indeterminate length of card stock, illustrating one manner in which the various steps of the method of the invention may be practiced in producing the card of the invention.

FIG. 2 is an enlarged fragmentary plan view showing portions of three cards which embody the present invention, and illustrating the location of notches produced by punching.

FIG. 3 is a fragmentary plan view of a web perforated and slitted in accordance with a prior art procedure, over which the present invention is an improvement.

With reference to FIG. 1, the numeral **10** indicates generally an indeterminate web or length of card stock, which may be considered rapidly moving continuously from left to right through a punching and slitting machine. Such machine will incorporate rotary punch rolls of known design, effective to form two lines of perforations **12** and **14** marginally of the opposite edges **16** and **18** of the web, the lines of perforations being parallel to the line of travel of the web.

The same rotary roll, or another roll similarly rotated, may be provided with knives or cutters operative to slit the web alongside and inwardly of both lines of perforations, to provide a line of spaced cuts **20**, and a second line of spaced cuts **22**, extending in parallelism with the lines of perforations **12** and **14**. The line of cuts **20** may be referred to as the primary cuts, as they establish the exact length of the succession of cards A, B, C, D, E, F and G, when the cards are separated from the web as are the cards E, F, and G.

The remaining lines of cuts **22—22** may be referred to as the secondary line of cuts, and these are disposed closely adjacent to but spaced from the primary cuts throughout the length of the web. Each secondary cut **22** spans the space which separates two successive primary cuts; and similarly, any primary cut spans the space

which separates two successive secondary cuts. In either case, the length of a cut may preferably slightly exceed the length of a span, as the drawing indicates. Accordingly, when a longitudinal trim strip **24** of card E, for example, is "bursted" or torn from the card (see F), the trim strip will carry with it some of the paper of the card intermediate the ends of successive primary cuts **20**. The trim strip tears off, therefore, carrying small keystone-shaped tabs or ties **26**, leaving notches or voids **28** in the end edge of the card.

The formation of notches or voids **28** assures that the edges of primary cuts **20** will collectively constitute an end of the card, which end will be completely free of any objectionable protrusions or tufts of paper stock resulting from tearing off the trim strip. The effective length of a card such as F, therefore, may be very accurately dimensioned for precision high-speed data collation in business machines, it being understood that the lines of primary cuts **20** are very accurately applied to the web.

Card G of FIG. 1 is a completely finished card, separated from the preceding and succeeding cards of the web, and having been end-trimmed according to the procedure above described in connection with card F.

Reverting to the left portion of FIG. 1 wherein cards A, B, and C are connected along their major edges, and are therefore still constituents of the traveling web, it should be pointed out that the web in the course of advancement is subjected to knives or cutters which slit the web through, along transverse lines of cut **30**. Each transverse line of cut **30** is constituted of several slits **32** disposed end to end in single straight line formation, with solid stock remaining intermediate successive slits as at **34**. These solid portions may be considered connecting tabs or ties, and are quite limited in extent, though sufficient to hold one card to another as the web advances. The lines of transverse cut **30**, which may extend across the full width of the web, establish very accurately the width, or height, of all cards to be struck from the web.

When the cards as defined by the interrupted lines of transverse cut **30** reach a predetermined state of web advancement, the cards may be separated one from another in rapid succession, by punching holes **36** through the web, with clean removal of small pads of stock, to excise completely the connecting ties or tabs **34**. If desired, the punching may be directed to certain ties only, for example as suggested between cards B and C, where all but the endmost ties of line **30** are shown punched out. If the punching be thusly restricted, cards B and C will remain connected at the endmost ties, within the limits of the trim strips **24**, until such time as the trim strips are bursted from the web, whereupon card C will lose its connection with card B through the trim strip.

As an alternative to the foregoing procedure, excision of ties **34** by punching may be performed simultaneously upon all the ties of a line **30**, thereby to completely and instantly achieve card separation in a single operation. Such punching may be performed either before or after bursting of the trim strips **24—24** from the web. The punching may be performed by means of conventional punch roll apparatus.

It should be noted here that punching out the ties **34** with excision of stock at the ties, results in clean side edges on the cards formed by the very accurately applied slits **32**, so that the cards will have uniformly spaced side edges established with such precision as is required in the operation of modern high speed collators or business machines. Important also is the fact that the punch-outs are easily disposed of during rapid advancement of the web, and a maximum number of cards is obtainable from the web because there is no waste deductible from the length of the web.

The foregoing advantages and savings may be compared with the prior art practice depicted by FIG. 3, wherein web **80** is shown to include the same type of side

trim strips **82—82**, formed in substantial accordance with the FIG. 1 structure as previously described, but wherein the transverse lines of cutting are quite different. Whereas the FIG. 1 improved structure employs but a single transverse line of cut **30**, and requires a punching operation for separating successive cards, the web structure of FIG. 3 employs four parallel lines of transverse cuts **84, 86, 88, 90**, arranged in pairs, to define a transverse waste strip **92** that must be bodily torn out and disposed of with certainty during rapid advancement of the web.

Detachment and disposal of waste strip **92** involves an operation which is awkward and difficult of performance, because of the relatively large size of the waste strip as compared with the punch-outs of FIG. 1, and because of the fact that displacement of the relatively large waste strip must be performed in a direction transverse to the direction of web advancement. Moreover, the production of waste strips **92** in great numbers, during the course of a run, decreases materially the number of cards that may be struck from a given yardage of web stock. The resulting waste is quite expensive when card stock of high-quality grade is used.

In practicing the improved method of the present invention, cards with precision dimensions may be produced at a high rate of speed, and with no waste whatever taken from the length of the web. The ease with which the small punch-outs may be disposed of by air movement or otherwise during advancement of the web, assures trouble-free continuous production without expensive waste and machinery shut-downs.

The oblique short lines indicated at **40** upon FIG. 1, indicate scores, cuts, or markings, not pertinent to the present invention, defining small corners of stock which may or may not be removed from the individual cards, as preferred.

It is to be understood that various modifications and changes may be made in the article and in the process disclosed, within the scope of the appended claims, without departing from the spirit of the invention.

What is claimed is:

1. A precision data card which is struck from a traveling web of card stock having opposite side marginal portions perforated, and slitted along primary and secondary parallel lines extending in the direction of web travel, the slits of the primary line being longer than the slits of the secondary line, and spaced end to end for defining a series of connecting ties between a perforated marginal portion and the main body of the web, and the slits of the secondary line being in subtending overspanning relation to the ties at locations in the web inwardly of the primary line of slits, whereby bursting of the marginal portion from the web at the slits results in the formation of notches in the main portion of the web at all of the ties aforesaid, to define a notched end edge of the card to be struck from the web, and opposite side edges on said card formed by slitting the web through at intervals from side to side with a single line of individual elongate cross slits disposed end to end, leaving connecting ties of stock between the ends of successive cross slits, which ties, upon excision by punching with removal of stock including the ties, severs the web transversely leaving the individual cross slits intact, to define a side edge of the card and a complemental side edge for a succeeding card to be struck from the web.

2. A precision data card which is struck from a traveling web of card stock having opposite side margins perforated along straight lines extending in the direction of web travel; said data card defined by opposite end edges in parallelism, and opposite side edges in parallelism, arranged to encompass a rectangle; the end edges each comprising two adjacent straight parallel lines of slits in the web spaced inwardly of and in parallelism with a line of the marginal perforations, the slits of each line of slits having opposite ends spaced from one another to provide uncut connecting ties of card stock therebetween, with the

slits of one line of slits overspanning the ends of the slits of the other line of slits; the slits of one line of slits defining an end edge of the card, being longer than the slits of the adjacent line of slits defining the same end edge; said short slits being inwardly of the longer slits and slightly longer than the ties between the longer slits, the opposite side edges of the card being each defined by a single straight line of transverse slits in the web, having opposite ends of successive transverse slits spaced from one another, with certain ones of the transverse slits intersecting a slit in one of the lines of slits defining an end edge of the card.

3. A precision data card which is struck from a traveling web of card stock having opposite side margins perforated along straight lines extending in the direction of web travel; said data card defined by opposite end edges in parallelism, and opposite side edges in parallelism, arranged to encompass a rectangle; the end edges each comprising two adjacent straight parallel lines of slits in the web spaced inwardly of and in parallelism with a line of the marginal perforations, the slits of each line of slits having opposite ends spaced from one another to provide

uncut connecting ties of card stock therebetween, with the slits of one line of slits overspanning the ends of the slits of the other line of slits; the opposite side edges of the card being each defined by a single straight line of transverse slits in the web, having opposite ends of successive transverse slits spaced from one another to provide uncut connecting ties of card stock therebetween, and spaced slits inwardly of and parallel to said transverse slits and each overspanning the adjacent ends of said transverse slits, said spaced slits being shorter in length than said transverse slits, with certain ones of the transverse slits intersecting a slit in one of the lines of slits defining an end edge of the card.

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