March 11, 1969 G. B. SMITH ETAL 3,431,847

PERFORATING PRINTING IMPROVEMENT

Filed March 31, 1967

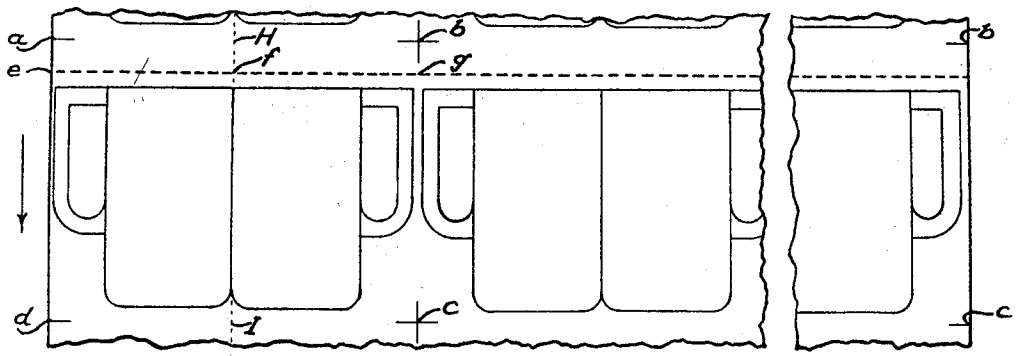


Fig. 1

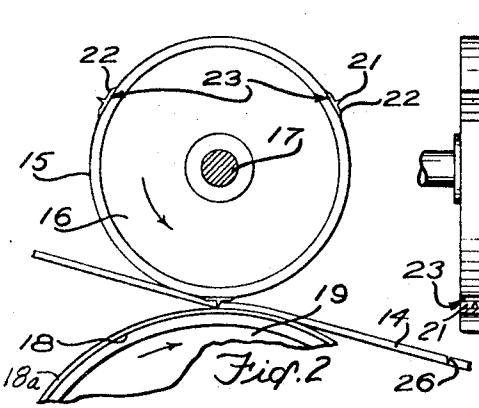


Fig. 2

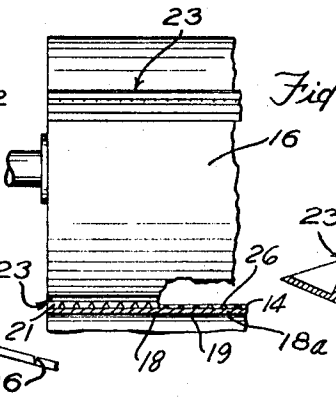


Fig. 3

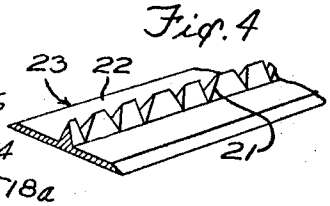


Fig. 4

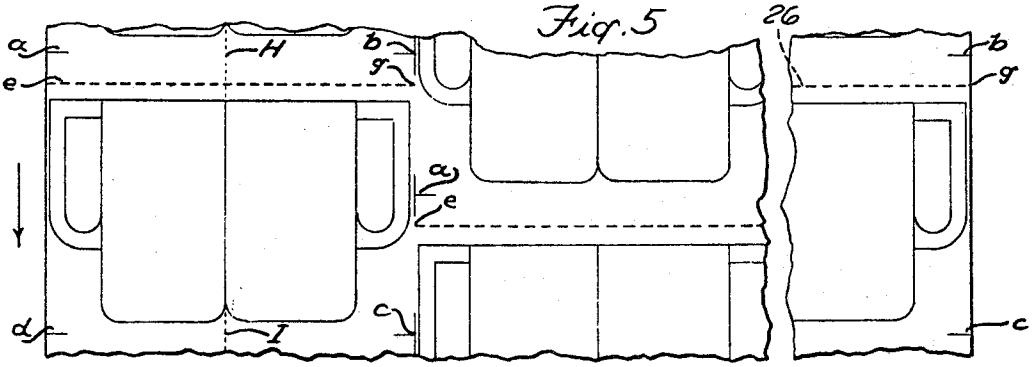


Fig. 5

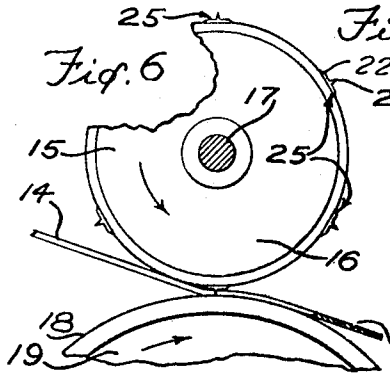


Fig. 6

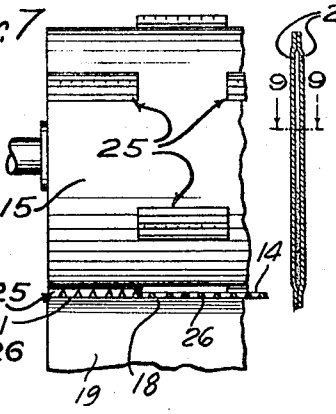


Fig. 7

Fig. 8



Fig. 9

INVENTORS
GEORGE B. SMITH
ROBERT A. VESTED

A. A. Orlinger.
ATTORNEY

United States Patent Office 3,431,847
Patented Mar. 11, 1969

3,431,847

PERFORATING PRINTING IMPROVEMENT

George B. Smith, 190 Linden Tree Road, Wilton, Conn. 06897, and Robert A. Vested, Weston, Conn., said Vested assignor to said Smith

Continuation-in-part of application Ser. No. 304,177, Aug. 23, 1963. This application Mar. 31, 1967, Ser. No. 627,391
U.S. Cl. 101—426 4 Claims
Int. Cl. B41c; B41m; B41n

ABSTRACT OF THE DISCLOSURE

The invention is a method of producing an extensive plurality of flexible packages having exposed perforations in registry with printed matter in an extensive lengthwise series of block units in lengthwise parallel rows of them, with each such block unit representing the printed matter for a single flexible package, by the combination of steps of rigidly securedly but detachably affixing to the cylindrical surface of a roll ordinarily used as a printing roll of a printing station of a flexographic or rotogravure printing press, a number of spaced apart in parallel relationship elongated flexible perforating strips and parallel to the axis of the resulting perforating roll, with the perforating means for each strip extending radially outwardly from its base; feeding through the press a web of stock and applying to the web the printed matter and then passing the web between the perforating roll and its impression roll (sheathed in a securedly affixed but detachable tympan) to apply to it perforations in registry with the printed matter and transverse to the web length.

This application is a continuation-in-part of our copending application Ser. No. 304,177, now abandoned, filed Aug. 23, 1963.

This invention relates to an improved method and apparatus for impressing perforations into a web of sheet material, and especially transversely to the direction of the web, during application by a flexographic or rotogravure printing press of printed material to the web in a long series of repeated separable block units, as the extensively elongated web is fed from a roll of it through the press and collected on a receiving roll for the perforated printed matter.

More particularly, the invention is that of a method and apparatus which enable making on a flexographic or rotogravure printing press and in register with printed matter applied by it, perforations that are to appear, for example, on a printed and completely closed flexible package with certain content within it, to enable opening such package by tearing off along the perforations a sealed portion extending beyond them.

A number of shortcomings and various disadvantages exist in the means tried prior to this invention, for applying such perforations transversely to the run of the web and in registry with printed matter. For example, for this purpose heretofore it was tried to include on a flexographic press at least one heavy roll having cut through and along the entire axially parallel length of its peripheral surface a wide and deep rectangular slot having inserted in it a perforating blade or rule with perforating teeth extending outwardly above the outer peripheral surface of the roll, with the rule held tightly clamped against one wall of that slot by a perforating-blade-anchoring bar.

The latter holds the perforating blade tightly clamped by a plurality of bolts individually screwed into a series of horizontally spaced apart threaded bolt holes along a radial side of the bar and with the bolt shanks extended

so far toward the opposite wall of the slot that the outer faces of the bolt threads press tightly against that wall.

That is a very costly means, running to about two thousand dollars, for the slotted roll, the blade and its anchoring bar and accompanying bolts, with the labor cost in cutting the long, wide and deep slot in the roll as well as for boring and threading the large number of bolt holes needed. Involved also is the shut down time and labor cost for assembling and disassembling for removal or replacement of the blades.

The foregoing old means presents another seriously limiting disadvantage in that it can be used only for one single individual size of finished printed block unit. In other words, for a printed block unit of longer length along the web, a different slotted roll of larger diameter is needed for holding the perforation blade and its anchoring bar, and for a shorter printed block unit, a slotted roll of shorter diameter is needed.

Another limitation of that prior means and method of perforating is that it is restricted to making perforations solely in a straight line and entirely across the peripheral surface parallel to the axis of the roll.

A feature of the present invention is its eliminating the need for (i) any special roll with a slot in it and across its peripheral surface, and (ii) any perforating blade and the accompanying heavy anchoring bar and bulky means and labor for fixing it tightly in the slot.

Another feature of the invention is that it permits using an ordinary printing roll (omitting its printing use) at some one of the printing stations, for example, of a flexographic press with only securely affixing along its outer peripheral surface, at a selected location to provide the desired register with the printed matter, a very light, narrow and thin metal strip with perforating teeth exending from it outwardly of the peripheral surface of the roll and in substantially radially extended alignment from it.

A further feature of the invention is that more than one such perforating-teeth-bearing perforating strip can be so affixed, e.g., in parallel spaced apart array over an individual roll to permit making consecutive lines of perforations in register with printed matter in consecutive block units lengthwise of the web.

Yet another feature of the invention is that it enables using a number of individual smaller portions of such perforating-teeth-bearing perforating strip with each one of them of such length parallel to the axis of the roll equivalent to that of an individual block unit of printed matter, and with each such shorter portion of perforating strip staggered in relation to other similar portions of the strip across the peripheral surface of the roll parallel to its axis.

Thus, a remarkably attractive feature of the invention is its great ease and flexibility of arrangement, for the perforating strip or strips also can be removed readily and replaced by affixing similarly a suitable length of such strip along any other line whether or not parallel to the axis of the printing roll; and all of that along with extremely low cost and without restriction as to layout and direction of placing of the perforations to be made in register with any portion of the printed matter to be applied to the web of paper or other suitable web material.

Other features of the invention will be seen from the following more detailed description of a merely illustrative, and not at all intended to be restricting, embodiment of the invention shown in the accompanying drawings, wherein:

FIG. 1 is a fragmentary portion of a web of paper having perforations made according to the invention in registry with an array of block units of printed matter repeated several times alongside of one another across the web, over each of a plurality of successive rows of such block unit imprints;

FIG. 2 is an end view of perforating roll prepared from a printing roll of a printing press such as a flexographic press, rigidly affixed by suitable pressure sensitive adhesive to said roll at separate spaced apart locations, and showing a fragment of a paper web held between the perforating roll and a so-called impression roll sheathed in a tympan as if they were a combination at a printing station in such a press;

FIG. 3 is a fragmentary side elevational view of the combination shown in FIG. 2;

FIG. 4 is a fragmentary perspective view of a portion of the perforating-teeth-bearing perforating strip, several times enlarged;

FIG. 5 is a fragmentary portion of a finished printed web similar to that in FIG. 1, but showing the block units of printed matter in staggered array across the web and yet in elongated columns lengthwise along the web;

FIG. 6 is an end view of a perforating roll with accompanying fragmentary portion of an impression roll and fragment of the web between them, with individual small portions of perforating strip affixed in staggered array over the surface of the perforating roll and parallel to its axis;

FIG. 7 is a side view of the modification of FIG. 6;

FIG. 8 is a transverse vertical section intermediate the sides of a completed flexible package such as mentioned in the third paragraph of this specification and obtained as more fully described further below; and

FIG. 9 is a horizontal section along the line 9—9 in FIG. 8, viewed as directed by the arrows.

The invention, both as to method and apparatus, is applicable to any of the various modifications of flexographic and rotogravure printing presses especially the different multi-color, i.e., multi-station, flexographic presses, whether of the stacked or in-line type, having two or more printing stations. Examples of such flexographic presses are illustrated in the January 1959 issue of the journal, Flexography, at its pp. 20–21, 27, 31, and 43.

As is known, in operating a flexographic printing press, an extensively elongated web (such as an elongated sheet or film) of paper or of a synthetic film such as cellophane or polyethylene or other cellulosic or synthetic plastic printing stock, to be printed upon, is fed from a suitable size feed roll thereof to each of the plurality of printing stations in sequence, with or without necessary provisions after each station for intermediate drying of the specific color impression applied to the web at each color station respectively.

As the invention does not involve any change in the overall construction of a flexographic or rotogravure printing press, but rather merely a change at a single station which otherwise would be a printing station, the drawings omit details of the other known overall features of such a press as well as certain known details at any specific printing station. The drawings then relate essentially solely to the changes which the invention provides to be made with respect to the modified printing roll at a single printing station of such press, which roll is to serve as the perforating roll, along with its relationship to the stock to be printed on and fed between that perforating roll and its respective accompanying impression roll, for the perforating roll to impress into said stock perforations in register with the printed block units.

As thus set forth, the invention requires no change in the overall customary construction of a flexographic or rotogravure printing press, but rather merely modifies the printing roll at one printing station by detachably affixing to the peripheral surface of the roll which otherwise would carry a printing face, elongated perforating strips (as elsewhere herein described) thereby to enable that roll to serve instead as a perforating roll.

Accordingly, at that particular station which thus is to serve as a perforating station no change is made in its customary operationally cooperating operation-synchronizing mechanisms (of the press) in operating association with and serving to have its customary color printing rolls operate in synchrony with one another to apply their respective printing impressions in register onto the web of stock to be printed on as it is fed through the press.

Thereby, as those operationally cooperating operation-synchronizing mechanisms are not removed from that station when merely by such affixing of these perforating strips it is made to serve as a perforating station, said station still has such operationaly cooperating operation-synchronizing mechanisms in operating association with the thus provided perforating roll to enable it similarly to operate in synchrony with the remaining printing rolls so as to impress perforations on said web in register with the printing matter to be printed thereon.

The invention is applicable particularly to imprinting of printed matter and impressing of perforations in register with the printing and generally aligned tranversely to the web of the stock fed through an applicable press such as a flexographic printing press. The invention thus is described in detail more specifically as to such a press, for example, to produce the long series of repeated rows of transversely aligned repeated block units (each bounded by the lines running through the points as *a, b, c* and *d* in FIG. 1).

Each of said block units thereafter is to be folded along its medial (vertical as in FIGS. 1 and 5) line H–I so that each "miror image" half of a block unit thereby is turned backward of the plane of the drawings against the underside of the other half of said unit at a later stage in the formation of, and filling content into, a then to be finished closed, flexible package. Each such finished package then has its respective halves *e* to *f* and *f* to *g* of the line *e* to *g* of perforations in back to back register with one another. That thereby enables later opening the package to make its contents available for use, by pulling along these back to back perforations its sealed portion extending outwardly from them and tearing it off along those back to back perforations.

FIG. 8 then is a front to rear vertical section through such completely sealed flexible package, taken along a line approximately midway between its folded closed vertical edge and its opposite sealed vertical edge as such package is held upright.

Accordingly, some features of the detailed description of the invention relate specifically to printing and perforating in register therewith in the series of steps in preparing such a flexible package. However, it is understood that the invention, in any of its broader applicability, is not limited to the production solely of such a flexible package. That is so because the features of the invention need not necessarily be limited solely to application of its features in the preparation of such flexible package.

The respective individual block units *a–b–c–d* (as in FIG. 1), each bearing the side by side imprint of the "mirror image" opposite faces of a cup (to enable each such block unit to end up as the front and rear outer faces of an above-mentioned finished closed flexible package), are prepared, for example, by providing on a printing roll of the first printing station of a flexographic printing press a number of, say, three peripherally consecutive rows of printing ink receiving surface arrangements, each of which can print in the one color used at that printing station the outlines for a series of a number, such as seven, side by side in each row, individual block units *a–b–c–d* (as of FIG. 1).

Thus, as the web of paper **14** (FIG. 2) passes through said first printing station of the rest of the flexographic press (not shown), its printing roll imprints on the paper web row after row of seven each of the outlines of the cup faces in the side by side block units *a–b–c–d*. The printing ink receiving surfaces of the printing roll of a succeeding printing station similarly is prepared to imprint over each of those rows as the web of paper passes between its printing and impression rolls whatever second color is to be

imprinted on each of these block units seven in each of the consecutive rows of seven side by side block units each.

After the web **14** leaves the printing station where the last of the several selected colors is imprinted, the web continues to the perforations impressing station, as in FIGS. 2 and 3 or 6 and 7. There web **14** passes from left to right between the outer peripheral surface **15** of perforating roll **16** rotating counter-clockwise about its shaft **17** and the other peripheral surface **18** (as in FIGS. 6 and 7) of the impression roll **19** (of that station of the press), or of a tympan (e.g. chipboard) sheath (as in FIGS. 2 and 3) encircling roll **19**, as the latter rotates clockwise about its respective shaft (not shown).

As is known, the respective printing roll at each separate printing station of a flexographic printing press is so set and linked up by is setting and rotating elements that the imprint it imparts to the web of stock to be printed on as fed through the press, is made in precise register with the corresponding imprint made by the printing roll of each successive printing station used to apply another color.

Accordingly, the setting of perforating roll **16** at its perforating (imprinting) station is so adjusted that as web **14** passes between the peripheral surfaces of perforating roll **16** and its accompanying impression roll **19**, web **14** is perforated transversely to its length and with each resulting line of perforation *e–g* in precise set register with the printing (as seen in FIGS 1 and 5), by each line of perforating teeth **21**. The latter extend radially outwardly (in this embodiment) from substantially the middle of base **22** of perforating strip **23**.

The diameter of the perforating roll and diameters of the printing rolls and the distance between the respective rows of printing surfaces on the latter to impart printing impressions for each two consecutive rows of block units, and the distances by which the perforating strips are spaced apart from one another on the peripheral surface of the perforating roll, are so related that each perforating strip impresses its perforations into the web in register with the printed matter of the respective block unit.

Particularly when working with an extensively long web of a material about which there might need to be some concern as to its continuously holding up against tearing along any line of perforations during the long continued printing and perforating operations with many thousands of perforation lines and under the customary high speeds of flexographic printing presses, it is advantageous to avoid using perforating strips **23** in a continuous line over the entire width (e.g., 32 to 42 inches) of the printing roll parallel to its axis. In such case the perforating strips then can be used in considerably shorter lengths, for example, equal to the width *a* to *b* (transverse to the web) of a printing block *a–b–c–d*, and in staggered array (such as are the shorter perforating strips **25** shown in FIGS. 6 and 7).

Then also, in such case the ink-receiving elements on the respective printing rolls are so arranged that the portions corresponding to the respective individual printing blocks *a–b–c–d* are staggered similarly, but still to be in continuous alignment along the length of the web. That yields a finished printed and perforated web as illustrated by FIG. 5, with its lines *e* to *g* of perforations **26** produced by perforating teeth **21** (like those in FIG. 6).

For clarity of illustration, each perforating strip **23** and **25** (with its respective base **22** and teeth **21**) is shown (in FIGS. 2, 3, 6 and 7) in larger relative proportion to the perforating roll **16**.

Such perforation strips **23**, more fully described in U.S. Patent 2,842,202, can be made of a good quality strip steel or even of a good quality, sufficiently firmly rigid when set plastic, i.e. which can maintain rigid firmness during extensively long continued service in preforation impressions required in impressing the many thousands of perforations in register with the printing in operations on flexographic and rotogravure printing presses.

Any full length perforating strip **23** or shorter perforating strip **25** is affixed securely to its respectively required location along the outer peripheral surface of perforating roll **16** by any suitable rigidly holding adhesive applied between the underside of the perforating strip and the roll, which sets to hold the perforating strip secured against loosening during the extent of its intended use, i.e. for at least the full number of perforating operations it is to make in the length of run required or on the selected length of the web of stock to be printed on.

Such herein called "detachable rigidly cementing adhesive," or "detachable rigidly settable, organic-solvent-soluble organic adhesive," advantageously should be one which lets the perforating strip be removed from the perforating roll surface to which it is attached, when no longer needed at a particular location, and then leaves a relatively smooth surface where it was removed. As such cementing adhesive thus applicable is for the most part a pressure sensitive adhesive of settable organic polymer content, the applicable detachable rigidly cementing adhesive should be soluble in some available organic solvent, such as one of the liquid (lower) dialkyl ketones, for such settable polymeric resinous adhesive substances.

Such removable rigidly cementing adhesive is exemplified by the so-called dry removal adhesive transfer tapes 465 and 466 (made by Minnesota Mining and Manufacturing Company). These tapes, as is known, are available with settable pressure sensitive cementing adhesive on each side of the tape separately protected by an outer cleanly strippable (i.e. without adhesive) transparent tape.

The needed length of the removable rigidly cementing adhesive tape for the perforating strip is cut from its supply length. The covering transparent film is stripped from one side of it and the underside of the base **22** of the perforating strip **23** is seated on the thus exposed adhesive surface and pressed securely to it. Excess width of the cementing adhesive tape beyond the boundary of the base of the perforating strip is cut away. Then the second covering transparent film is removed from the other surface of the cementing adhesive tape to expose its remaining adhesive surface. The perforating strip then is placed along a guide line made for it on the surface of the perforating roll and rigidly affixed to the latter by applying suitable pressure to the upper surfaces of base **22** of perforating strip **23**.

When the perforating strip is to be removed from the perforating roll after its use at the particular location is over, an easily accessible end of the strip may be pried loose with a suitable tool such as the working end of a screw-driver. The loosened end of the strip then can be engaged, say, with pliers to permit pulling off the strip. When needed in thus removing the perforating strip, a suitably applicable solvent for the set adhesive, such as a (lower))dialkyl ketone as acetone or perferably methyl ethyl ketone, can be used to soften or dissolve it. When necessary, such solvent can be used around the starting edges to loosen the perforating strip, as well as at any other necessary location along its length. Such solvent also can be used to remove any of the set adhesive left on the perforating roll after such removal of the perforating strip.

The perforating roll used at any station for it, whether a prior printing station or an added similar station, ordinarily need not have any ink-receiving surfaces on it, and so could be merely a smooth surfaced roll. It can be a not-in-use printing roll such as any of the metal rolls used on a flexographic or rotogravure printing press, or other suitable roll whose peripheral surface would be inert to any solvent which would need to be used to loosen or dissolve a detachable rigidly cementing adhesive for any perforating strips that are to be removed from the roll.

Thus, the expression "perforating station" herein is intended to cover any usual color printing station which

is not being used for an imprinting step, which is taken, or an added station set up, for the perforating use herein. Such use thus is a so-called "dry perforating." Also applicable as a perforating roll is any type of roll otherwise useful as a printing roll on a rotogravure printing press which latter is used in essentially the same way as an actual flexographic printing press in any of its various types which include also the drum type along with the stacked or in-line type.

The term "perforations" is used herein broadly to include not only the slit type perforations that can be made by sharp teeth on a perforating strip such as that of FIG. 4, but also the punch type such as can be made by such perforating strip with similar teeth of lesser width along the strip and of a shape to provide perforations like a series of very small circular holes.

The impression roll **19** advantageously can be free running. It can be a bare steel roll, e.g. as in FIGS. 6 and 7. Advantageously, it can be sheathed in a tympan **18***a* (as in FIGS. 2 and 3) which beneficially can be a good quality chipboard affixed to the impression roll **19** with a suitable binder, and with its ends meeting butt to butt. The binder can be any which a person of ordinary skill in the art finds suitable for the particular operation, such as one used to affix the perforating strips **23** or **25** to the perforating roll **16**.

The impression roll sheathed in such tympan and particularly chipboard, enhances the sharpness and effectiveness of the perforations, reduces vibration and wear on, with concomitant extended dependable use of, the perforating teeth, and extends the life of the perforating roll itself, among other advantages.

The perforation impressing method and printing press of the invention are especially effective in two ways for preparing completely closed flexible packages, particularly those that are laminated to protect their enclosed contents from loss of flavor or moisture or against ill effects of absorbed moisture from without.

Such laminated completely closed and filled flexible packages are prepared by a series of steps from the roll of the web completed with the printing and perforations in register as shown in FIGS. 1 and 5. These steps subject the web, and thus the thousands of perforations in it, to strenuous re-handling. For example, the printed web next is unwound as it is run through the step of laminating its unprinted side with aluminum foil and then wound up again in a roll. This foil-laminated web then normally is unwound as it is run through the further step of coating the foil with an extruded layer of an extrudable, adhesively setting, heat-sealable polymer, such as polyethylene, over the aluminum, unless the polyethylene or other polymer can be extruded simultaneously as the foil is applied, and is wound up as a new roll.

The roll then is slit and with its core, or unwound as it is run through a slitter which slits the overall width of the web, into a number of narrow rolls, e.g. seven, equal to the number of repeat block units in a transverse row. These narrower webs from the run through a slitter are collected as adjacent rolls on a single core which is slit to give seven separate web rolls. Each of these separately is unwound as it is run over a folding plow, advantageously as a station of the packaging machine, to fold the two "mirror-image" halves of each repeat block unit back to back along line H–I (FIGS. 1 and 5).

The web of seriatim folded individual block units then passes through opposed sealing bars (one having a cutting knife intermediate its sides), which engage the web between each two succeeding folded over block units and simultaneously heat seals (due to the polyethylene innermost layer) and severs the two adjoining ends, that extend normal to the folded edge, of each two consecutive folded block units in sequence, to form a series of separated one-side open packets from the initial weeb of joined folded block units. The packets then pass to a filler where opposed sides of the open edge of each packet are drawn apart to allow filling it with material it is to enclose. Each so filled packet then is heat sealed along the open edge (opposite the fold), and is collected with the others as the finished filled and completely closed separate flexible packages.

Thus, it is an advantage in the better appearance and stability of closure of the final package, in face of all of the just described multiple re-handling at the various speeds and concomitantly repeated straining under the speeds involved, that the method and improved printing press of the invention produces the perforations directed from the outer printed side toward the underside. That serves from the beginning to direct away from the exposed printed faces of the finished flexible package and so hide the roughness of the frayed edges about the perforations. Such roughness by frayed edges otherwise would have been worsened by the repeated handling after the initial impressing of the perforations (or scorings), if these had not been impressed from the printed side of the web.

The method and improved printing press of the invention also enables perforating the adjoining halves of the individual block units and also printing a line of dashes at the line of perforations, before or after cutting them, to emphasize their location, and without smearing.

A separate valuable operating (and so also cost) advantage stems from the modification which uses the greatly shortened perforating strips **25** together with staggered array of them to provide perforations only as long as one repeat block unit transverse to the web. Such so shortened perforations then would be, for example, as little as one-seventh of the length of a single continuous perforation transverse to the web and along an entire row of seven repeat block units in a single straight row. This modification contributes least attack on the cross-wise strength of the web with resulting extensive reduction to complete elimination of any breaking of the web under the high speeds and accompanying lengthwise strains on it.

Such reduction in the strain on the web by the staggered array of perforations similarly avoids excessive breakage or tearing of the web in the extensive handling in the steps involving the cutting into the separate narrow webs and through the lamination and extrusion of the plastic (e.g. polyethylene) film onto the foil.

Providing perforations in "register with the printing" as used herein intends making them in regularly repeated substantially the same spatial relationship to the printing, for example, as shown in FIGS. 1 and 5, and thus avoiding undesirable interference with, and marring of, the printing.

In many cases it may be desirable that the perforating station follow the last color applying station. However, that is not a critical or essential requirement of the invention for the perforating station may precede the first or any later color station. In any of these arrangements, however, it is essential that the location of the perforating strip or strips on the peripheral surface of the perforating roll and the rotation of the perforating roll be so arranged, the latter (i.e. its rotation) by the pertinent mechanisms customarily provided on flexographic printing presses (i.e. including rotogravure presses) for operating their printing or color rolls in synchrony, to operate the perforating roll in synchrony with the respective printing or plate rolls of the various printing stations that the resulting perforations are impressed in register with the printing.

While the various aspects of the invention have been explained by detailed description of certain specific embodiments of it, it is understood that various modifications and substitutions may be made in any of the different parts of any such embodiment within the scope of the appended claims which are intended also to embrace equivalents thereof.

What is claimed is:

1. A method of producing an extensive plurality of

flexible packages with exposed perforations in register with printed matter on the outer faces thereof, as an extensive series of lengthwise consecutive block units of repeated block units of said printed matter with each such unit representing the printed matter for a single said flexible package, to enable subsequent readily tearing off the portion of such a package when finished, between said perforations and its edge nearer them, which method comprises the combination of steps of

(a) rigidly securedly but detachably affixing to the cylindrical peripheral surface of a roll ordinarily used as a printing roll of a printing station of a printing press selected from a flexographic printing press and a rotogravure printing press, a plurality of elongated flexible perforating strips in spaced apart from one another parallel relationship with each of them being in a separate location on said surface and transverse to the periphery of each of its ends, and having a relatively narrow elongated base over substantially the entire strip length and perforating means extending substantially radially outwardly from said base relative to the axis of said roll, by a strongly adherent organic-solvent-soluble organic adhesive coated over the underside of said base and thus applied over the selected area for locating said perforating means on said peripheral surface of said roll; and said strips being so located on said surface as to impress perforations in the same location in each lengthwise consecutive block unit in sequence and in register with said printed matter and transverse to the length of said web as it is fed through said press;

(b) securedly but detachably sheathing the cylindrical surface of the impression roll of said station with a tympan;

(c) feeding through said printing press a web of stock to receive such printed matter and perforations in register with it, and applying on said web at at least one printing station thereof, in a plurality of columns, block units of said printed matter; and

(d) passing said web between said perforating roll and its impression roll at said perforating station thereby to puncture said web by the ends of the respective perforating means of said perforating strip and apply to the web a line of perforations in substantially the same location in each such block unit whereby said perforations appear in register with the applied printed matter.

2. The method of producing flexible packages as claimed in claim **1**, wherein said tympan is chipboard.

3. The method of producing flexible packages as claimed in claim **1**, wherein said perforating strips are rigidly detachably affixed to said surface of said perforating roll by one adhesive surface of a dry removal adhesive transfer tape being affixed to said underside of the base of said strip and the other adhesive surface of said tape being affixed to said peripheral surface of said roll.

4. The method as claimed in claim **3**, wherein the tympan is chipboard.

References Cited

UNITED STATES PATENTS

353,555	11/1886	Goss et al.	101—226 XR
1,855,212	4/1932	Adsit et al.	101—226
2,007544	7/1935	Meisel	101—226
2,089,225	8/1937	Polachek	101—226
2,127,246	8/1938	Christman	101—226 XR
2,842,202	7/1958	Boyd	101—226 XR
2,946,281	7/1960	Sohn	101—227
3,099,212	7/1963	Sohn	101—226
3,138,097	6/1964	Harris et al.	101—216

EDGAR S. BURR, *Primary Examiner.*

U.S. Cl. X.R.

53—131; 101—226