Aug. 10, 1937. V. H. POLACHEK 2,089,225

PROCESS OF PRINTING AND SCORING AND PRODUCT

Filed March 11, 1933

Fig. 1.

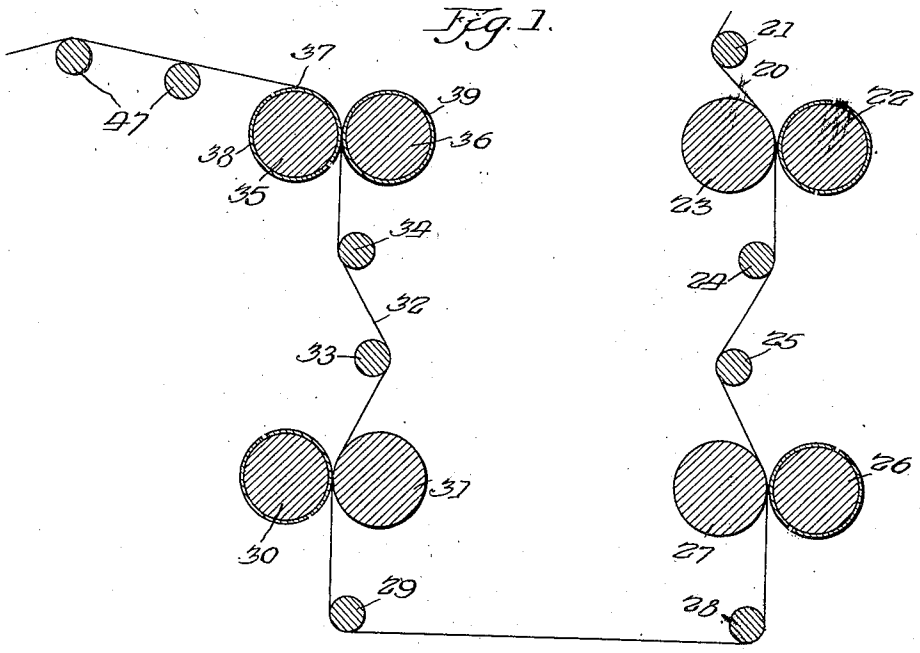


Fig. 2.

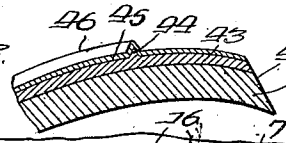


Fig. 3.

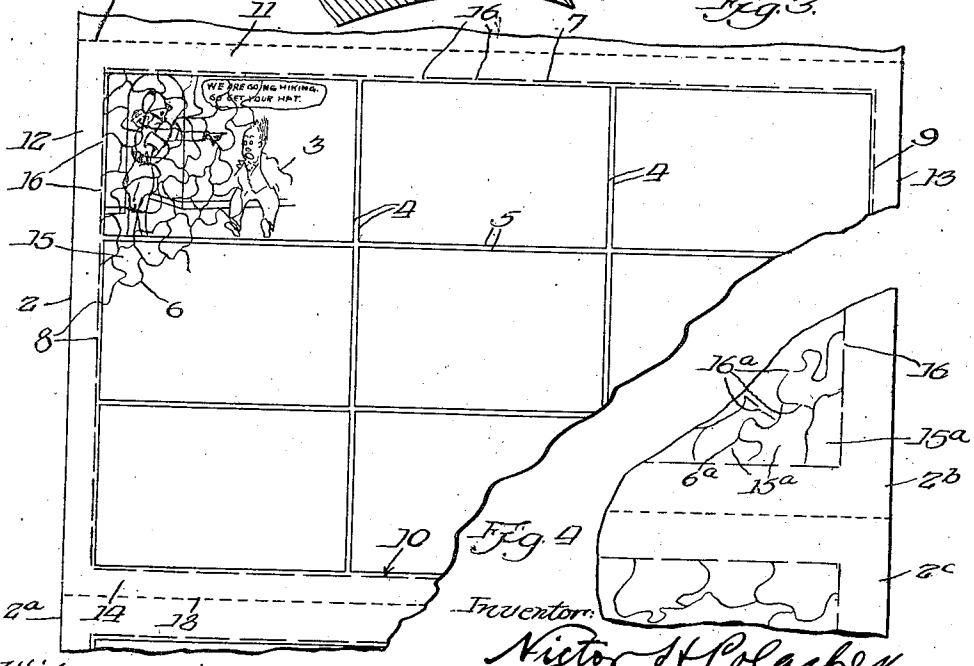


Fig. 4

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UNITED STATES PATENT OFFICE

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PROCESS OF PRINTING AND SCORING AND PRODUCT

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14 Claims. (Cl. 101—226)

This invention relates in general to cutting, stamping or scoring sheet materials, and more particularly to an improved method and apparatus for the manufacture of separable section sheets, and the product thereof, and while for convenience, the invention is illustrated and described as employed in producing so-called jig-saw sheets as part of the special feature sections of newspapers and the like, the invention is adaptable to other analogous purposes and thus finds a wide field of utility.

By the employment of the expression "jig-saw" or "puzzle" herein will be understood that type of sheeted material which is provided with irregularly shaped scorings which affords sections which are severable but complemental and may be delivered connected together in sheet form to be broken up and then later assembled, and which may or may not have one surface provided with a design, pictorial representation or the like.

The principal objects and advantages of this invention reside in the provision of an improved method of cutting or scoring sheeted material for the purpose of producing sectionalized areas therein composed of variegated sections which are complemental and associable but which may be readily separated as desired; the provision of an improved process for applying a design, such, for example, by printing, to a sheet of material and thereupon scoring the sheet into a plurality of sections which may be separable to form a so-called jig-saw puzzle or the like; the provision of an improved process of manufacturing a sheeted material having sectionalized areas on a standard newspaper web printing press, and to deliver the scored sheet with its scored sections integral and of such size and shape as to be readily incorporated in the standard newspaper as a supplemental or special feature section thereof; the provision of an improved method of printing and/or coloring a sheet and then scoring the same to form a sectionalized area having an integral border affording a support for the sections; the provision of an improved apparatus for carrying out the method herein described, together with an improved form of cutting plate or cylinder for forming the scorings or impression in the sheeted material.

Further objects and advantages of this invention reside in the provision of an improved form of sectionalized sheet suitable by the formation of the sections thereof to conform in general design to that known as a jig-saw puzzle wherein the sectionalized areas are held intact when printing and scoring and folding for insertion in a newspaper by the provision of margins which are substantially uninterrupted and serve as supporting means for the sectionalized areas; and the invention further contemplates improvements in a scoring or cutting cylinder wherein the cutting or scoring knives are formed as projecting ribs suitably hardened to afford relatively sharp cutting edges.

The foregoing and such other objects and advantages as may appear or be pointed out as this description proceeds are attained in the structural embodiment of the invention illustrated in the accompanying drawing in which—

Figure 1 is a schematic view of the cylinders or rolls of a colored printing press showing the path of the paper or other fabric web as it is formed according to the method of this invention.

Figure 2 is an enlarged fragmental sectional view of one of the cutting or scoring elements.

Figure 3 is an elevational view of the product of the method herein disclosed and

Figure 4 is an enlarged fragmentary view of an alternative form of the invention shown in Figure 3.

It will be understood that the present invention is capable in certain of its phases for uses other than that described specifically and illustrated in the drawing herein, the invention in one of these phases residing particularly in the provision of a novel form of the sectionalized sheet, commonly called a jig-saw puzzle, wherein the scored and separable sections as delivered for use are not only held together by the thin film of material left by the scoring between sections but in addition are held together by a marginal reinforcement in the nature of a frame.

One of the principal purposes of the invention is to provide a method of and means for producing a sectionalized sheet of material with a suitable printed or otherwise applied design thereon which may be conveniently produced for incorporation in a standard newspaper, and in order to facilitate the production of the article within reasonable costs it is desirable to make the article on a standard newspaper web printing press, though it will be clear to those skilled in the art that the article itself may be produced by a method and by apparatus other than that disclosed herein.

Referring now more particularly to the drawing, and first to Figure 3 in which the finished product of the method and apparatus of this invention is disclosed, there is provided a sheet from a web of paper or other suitable fabric, usually of the class of paper employed for newsprint, but of a so-called light cardboard type about four or five times the thickness of newsprint paper. This sheet is shown at **2**, and in the particular form disclosed contains the printed design **3** in panels defined by the printed lines **4**, **4** and **5**, **5**. Thus the printed design of the sheet may be divided into the usual sections of pictures such as appear in the conventional comic section of a newspaper. It will be understood that other designs such as reproductions of

famous paintings and the like may be substituted. Preferably after the printing or other applied design is on the sheet the latter is scored with a plurality of scorings 6, over an area defined substantially by the interrupted scoring lines 7, 8, 9, and 10. This arrangement of scorings is such that it leaves margins 11, 12, 13, and 14 surrounding the substantially longitudinal scored area.

The scorings in the sheet are of sufficient depth to permit of ready separation of the individual complemental sections 15 formed by the scoring 6. Those of the sections 15 which are adjacent to the scorings 7, 8, 9, and 10 have the additional reinforcement of the unscored portions 16 along the marginal scorings 7, 8, 9, and 10, thus serving to reinforce the entire so-called jig-saw puzzle area, so that in normal handling of the sheet as it is run through the folding and collecting apparatus of a standard newspaper web printing press the unity of the jig-saw area is not disturbed and when presented to the customer the sections of the jig-saw area are substantially intact.

These sections 15 may be readily separated one from the other by exerting pressure in opposite directions on adjacent sections, these sections separating from each other at the scoring lines 6.

The sheet 2 shown in Figure 3 is a part of a web which is but fragmentarily illustrated in this figure, and this web is perforated in a conventional manner along the dotted lines 17 and 18, so that adjacent sheets such as the sheet 2 and the one below it shown at 2a may be separated as they issue from the press for folding and introduction into the rest of the newspaper.

It will thus be seen that the sheet 2 includes a sectionalized area produced by scorings which take the shape produced by either a plate or cylinder cutting die to be hereinafter described, and that the sectionalized area is bordered by substantially uninterrupted margins which serve to keep the sections held together until separated by the customer.

In Figure 4 an alternative form of the invention is illustrated, the sheets 2b and 2c there shown being in all respects substantially the same as the sheets 2 and 2a shown in Figure 3 with the exception that the scoring lines 6a forming the sections 15a are interrupted to form solid portions 16a as well as the solid portion 16 along the marginal scoring hereinabove described.

For some purposes this form of the invention shown in Figure 4 may be preferred, but with the type of paper which is readily available for use in newspaper work the form of the invention shown in Figure 3 is to be generally preferred; the reason for this preference is that owing to the fragile nature of the paper the unscored portions 16a tend to tear the rest of the section when an attempt is made to separate the sections. However, for some purposes the form shown in Figure 4 is more desirable.

The method of making the articles shown in Figures 3 and 4 which, for the purpose of incorporation of the article in a newspaper is to be preferred, involves first feeding a web or sheet of newspaper substantially four or five times the thickness of standard news-print paper through a printing press and then through a color printing press.

If the outline of the figures appearing on the surface of the sheet are to be defined then these outlines are first applied by an initial printing roller with black ink or the like and then the web continued on and supplied to the color rolls.

It is customary to employ four color cylinders but it will be obvious for purposes of this invention that one or any number of color cylinders may be resorted to as desired.

From the color cylinders the web is then fed to the scoring and cutting cylinder or roller, and the various sectionalized areas with their respective borders are then separated from each other either by cutting along the perforations 17 and 18 or by cutting, and are then collected in the newspaper folding and collecting apparatus.

The diagrammatic illustration in Figure 1 discloses a paper web 20 fed over an idler roller 21 between the color printing cylinder 22 and a plate or pressure cylinder 23, whereupon one surface of the web receives one of the colors of the design.

The web continues on over idler rollers 24 and 25 and then between a second color printing cylinder 26 and its complemental pressure or plate cylinder 27.

Thence the web passes under idler rollers 28 and 29 to the final color applying cylinder 30 and in contact with the complemental pressure or plate cylinder 31.

From the cylinders 30 and 31 the now completely printed web in an upward flight 32 passes over idler and tension rollers 33 and 34 to the cutting or scoring apparatus.

The cutting and scoring apparatus is usually incorporated in a pair of cylinders already on the printing press and it is not necessary to reconstruct the press or to apply any additional cylinders thereto for the purpose of this invention.

The cutting cylinder is indicated at 35 and a so-called impression cylinder at 36 between which cylinders the flight 32 of the web of paper is adapted to pass, the tension of the two cylinders 35 and 36 with respect to the sheet being regulated for controlling the depth of cut or score made in the sheet.

Where there are two areas to be scored it is convenient to apply the cutting or scoring plate in two separate sections indicated at 37 and 38 to the outer surface of the cylinder 35. These cutting or scoring plates are made to the conventional contour of the printing cylinders of a standard web newspaper printing press and are secured in position in the conventional way. For this reason no detailed construction of the cylinders themselves is shown.

The impression cylinder 36 is provided with an external lining 39 secured in the conventional way and composed of a relatively soft metal, such, for example, as sheet zinc or the like which serves to receive an impression of the knives of the cutting cylinder and thus facilitate the provision of a cutting background for the cutting knives of the cutting cylinder 35. Furthermore, this provides a surface which will not tend to dull the cutting edges of the cutting or scoring cylinder.

The scoring or cutting blades of the cutting cylinder 35 may be applied in any way desired but for my purposes I prefer to employ the conventional cylinder of the printing press to which semi-cylindrical sections of cutting plates 37 and 38 are applied.

In Figure 2 a portion of one of the cutting plates is shown. It will be understood that for some purposes the plate may be a flat plate and employed in a press other than a cylinder press if desired. This plate includes a metal backing

41 of a substantially rigid material such, for example, as lead or zinc of the desired thickness, the longitudinal edges being beveled off as indicated at 42 in order to clampingly retain the same on the cutting cylinder in the same manner as the usual printing plates are retained in conventional practice.

The plate 41 has affixed to it a design reproduced in electrotype or stereotype to form the plate 43 which latter is provided with one or more ridges 44 conforming to the design to be cut.

After the electrotype plate 43 is affixed to the carrier plate 41, the whole external surface of the plate 43 is electroplated with a steel lining 45, so that the cutting edges 46 of the ridges become hardened.

It will be understood that the relative thicknesses of the plating shown in Figure 2 are exaggerated in order to make the illustration clear.

From the foregoing it will be observed that the cutting plates which are in sections as described are then applied to the cutting cylinder 35 and as they rotate the knife edges 46 provided by the steel plating impinge upon the paper as it passes between the two rolls 35 and 36 and these edges strike into the paper a sufficient distance to weaken the same at portions to form scorings therein. The depth of the scoring in each instance can be regulated by the conventional adjusting means carried on the press for controlling the relative position of the rollers 35 and 36.

After the paper web has passed between the rollers 35 and 36, it is then ready to be cut into sections and may be drawn over idler rollers 47 to the folding, cutting and collecting apparatus of the newspaper press for insertion into the body of the newspaper.

Having thus described my invention and illustrated its use, what I claim as new and desire to secure by Letters Patent is:

1. In the manufacture of a sectionalized sheeted material, the steps which include applying a design to a flexible sheeted material, then scoring said sheeted material to form severable flexible connected sections of predetermined contour, and leaving a margin of said flexible sheeted material free of scoring to form a support for said flexible sections.

2. In the manufacture of a sectionalized sheeted material, the steps which include applying a design to a flexible sheeted material, then scoring said sheeted material to form severable flexible connected sections of predetermined contour, and leaving a margin of said sheeted material free of scoring to form a support for said flexible sections, the sections adjacent to said margin being connected thereto by unscored links.

3. In the manufacture of sectionalized flexible sheeted material, the step of applying scorings to a portion of the sheet to form severable flexible connected sections, leaving free of scoring a marginal portion forming a support for the flexible sections.

4. In the manufacture of a sectionalized flexible sheeted material, the step of applying scorings to a portion of the sheet to form severable flexible connected sections, leaving free of scoring a marginal portion forming a support for the flexible sections and providing interrupted scoring for attaching the marginal portion to the adjacent sections.

5. In the manufacture of a flexible sectionalized sheeted material, the steps which include feeding a flexible web substantially continuously, applying a design to said web, and then scoring the web in motion to form a plurality of severable sections but retaining certain portions intact so that complete separation does not occur in the process of scoring.

6. In the manufacture of a sectionalized sheeted material, the steps which include feeding a flexible web substantially continuously, applying a design to said web, and then scoring the web in motion to form a plurality of severable but unsevered sections leaving a margin of the web free of scoring to form supporting means for said sections so as to produce a substantially unitary group of severable sections.

7. As a new article of manufacture, a flexible sheet having a plurality of complemental severable connected sections enclosed by a flexible marginal portion which is substantially continuous and forms a carrier for said sections, said sections being partially severed from each other and said marginal portion by interrupted series of scorings.

8. In the process of printing and severing sheet material for forming a flexible puzzle, the steps of supplying a moving fabric web to a printing roll for applying a printed design thereto, then scoring the flexible sheet with a predetermined puzzle design to form a plurality of flexible separable sections, but leaving the same unsevered and leaving a margin of the sheet unscored to form a frame for supporting the scored flexible sections in unsevered form.

9. In a puzzle, a flexible sheet having its surface scored with a plurality of irregular lines to form a group of readily severable flexible connected sections, a margin of said sheet being intact and partially severed from adjacent flexible sections by interrupted scoring so as to form a readily severable support for the entire group of flexible sections until severed for use.

10. In the manufacture of a sectionalized sheeted material, the steps which include feeding a flexible web substantially continuously, applying a design to said web, and then scoring the web in motion to form a plurality of sections partially severed from each other and leaving a margin of web free of scoring to form a supporting means for said sections.

11. As a new article of manufacture, a flexible sheet having a design printed thereon and scored upon one face thereof to form a plurality of partially severed sections which are readily severable, a continuous margin of said sheet being left unscored.

12. As a new article of manufacture, a flexible sheet scored on one face thereof to form a plurality of complemental readily severable sections enclosed by a continuous unscored marginal portion, said sections being retained to each other and to said margin by the unsevered increment of said sheet.

13. A picture puzzle comprising a flexible sheet of material having one surface marked by scorings to form a plurality of partially severed and readily severable complemental portions retained each to the other by the unsevered increment of said sheet.

14. A picture puzzle comprising a flexible sheet of material having one surface marked by scorings to form a plurality of partially severed and readily severable complemental portions retained each to the other by the unsevered increment of each sheet, said sheet having unscored marginal portions.

VICTOR H. POLACHEK.