April 3, 1951 E. J. WAY 2,547,068

INDEX STRIP AND METHOD OF MAKING THE SAME

Filed March 28, 1949

Fig. 1.

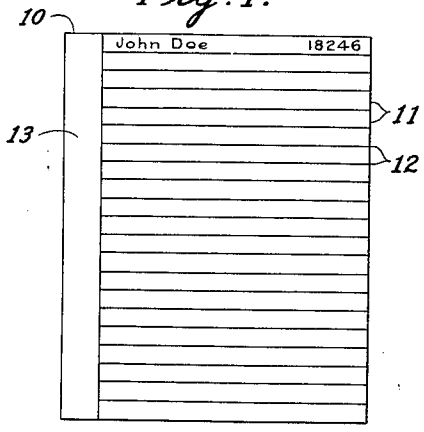


Fig. 2.

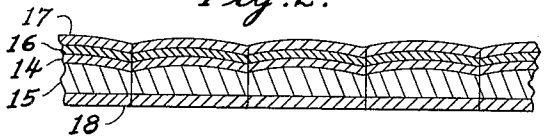


Fig. 4.

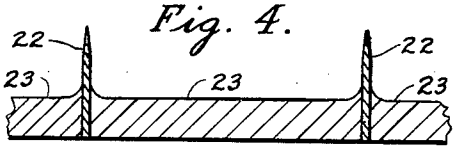


Fig. 3.

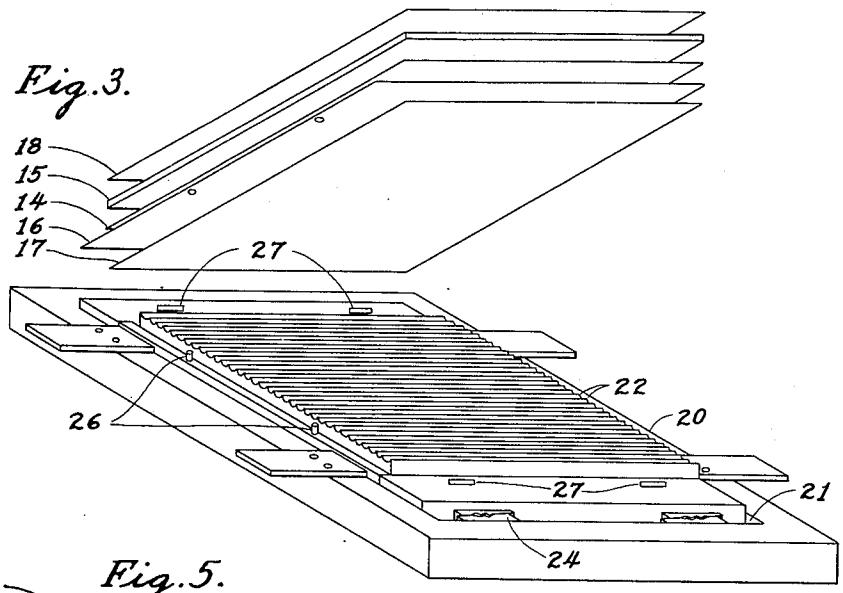


Fig. 5.

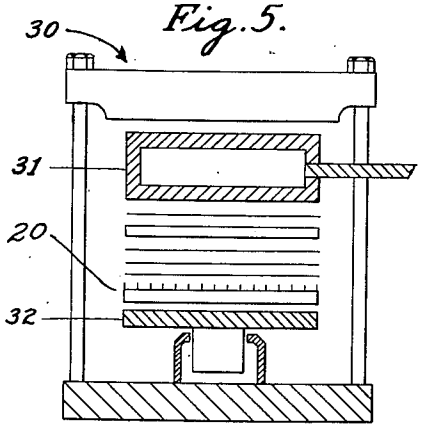
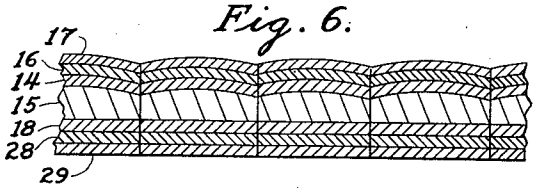


Fig. 6.



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INDEX STRIP AND METHOD OF MAKING THE SAME

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18 Claims. (Cl. 154—125)

(Granted under the act of March 3, 1883, as amended April 30, 1928; 370 O. G. 757)

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The invention described herein may be manufactured and used by or for the Government of the United States for governmental purposes without the payment to me of any royalty thereon in accordance with the provisions of the act of April 30, 1928 (Ch. 460, 45 Stat. L. 467).

This invention relates to index strips, and more particularly to a flexible index strip protected by a transparent covering and to a method of making such a strip.

Heretofore flexible index strips have been constructed of paper bonded to a wood veneer supporting member. The strips have been made in sheets or rolls with the strips heavily scored to render the sheets more flexible and to allow easy separation of the individual strips. It has been customary for these sheets to be purchased by the user, who has then placed the sheet or roll in a conventional office machine, such as a typewriter, and has typed the indicia on the paper facing. After the typing operation, the strips are broken apart along the scoring and are filed in special frames.

This invention would be of particular interest to an organization preparing a large number of index strips. In such an organization some automatic listing machine would normally be used capable of preparing about 80 lines per minute, and any misfunctioning of the machine will spoil a considerable number of strips. Since any error in the indicia on these strips of the prior art results in the discarding of the composite paper-veneer strip, waste is relatively costly. Since the paper-veneer sheets are used in a machine such as the typewriter or tabulating machine having a cylindrical platen and must wrap around the platen, the width of the strip is limited to one-sixth inch or, at most, one-fourth inch. The paper face of these strips is subject to soilage and abrasion. When they are exposed to light and air for a long period the printed information becomes increasingly illegible. This might be termed fading but is more likely caused by the ink particles failing to adhere. Since neither paper nor the wood-veneer are impervious to moisture, a damp climate hastens the end of the useful life of the strips.

It is an object of this invention to provide an improved flexible index strip.

It is a further object of this invention to provide an index strip in which the indicia are protected by a transparent covering.

It is also an object of this invention to provide an index strip in which the hygroscopic wood-like backing member is protected from moisture by a relatively non-hygroscopic covering.

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It is also an object of this invention to provide a method for producing indicia-bearing flexible index strips in which the indicia are typed on ordinary paper, or imprinted by means of tabulating machines from punched cards.

Other objects will become apparent from the following specification taken in connection with the accompanying drawing, in which—

Fig. 1 is a plan view of an index sheet containing a plurality of index strips.

Fig. 2 is an enlarged partial side sectional view of the index sheet shown in Fig. 1.

Fig. 3 is an exploded view showing the individual sheets making up a composite index sheet and a die for forming and cutting said sheet.

Fig. 4 shows a partial side sectional view of the cutting and spacing elements used in the die of Fig. 3.

Fig. 5 shows a press adapted for producing the index sheets of this invention.

Fig. 6 is an enlarged partial side sectional view of an alternate form of index sheet.

In Fig. 1, the index sheet, indicated generally at 10, comprises a number of flexible index strips 11 arranged side by side and separated by slits 12. Strips 11 are joined at one edge to a stub member 13 which runs transversely along all of the strips 11.

As best seen in Fig. 2, the strips 11 are composed of a supporting sheet 15. Sheet 15 is preferably of thin wood-veneer of approximately $1/28$ inch in thickness. Other material could be used such as cardboard or a grainless fabricated sheet made of wood pulp having similar qualities. The supporting sheet 15, while relatively stiff compared to the other sheets making up the composite structure, is flexible enough so that the composite strips may be readily flexed and snapped into a supporting frame. On top of supporting sheet 15 is a bonding sheet 14 and on top of sheet 14 is a paper sheet 16 adapted to carry indicia. On top of paper sheet 16 and below supporting strip 15 are protecting sheets 17 and 18. Strips 14, 17 and 18 are of a thermoplastic material and are preferably of cellulose acetate or similar material that will form a bond under heat and pressure. The sheets 14, 17 and 18 may be very thin and in the order of magnitude of from .00088 inch to .002 inch. The sheets 14, 17 and 18 are preferably of a relatively non-hygroscopic material to protect the paper strip 16 and the backing strip 15 from moisture. The purpose of sheet 14 is to form a bond between veneer 15 and the indicia bearing paper 16. Sheet 17 is necessarily trans-

parent to allow viewing of the indicia on paper sheet 16.

In the method of fabricating the index strips of this invention, paper of a normal commercial grade, either sulfite or rag stock, may be used; however, rag stock is preferable. The paper is placed in a conventional office machine, such as a typewriter, or automatic listing machine, and the indicia to be placed on the index strip is placed on the paper. If an error is made in the tabulation of the information, only ordinary paper is wasted.

When the desired information has been placed on the paper sheet 16, this sheet is then assembled with the other necessary lamina preparatory to the operations of cutting and forming by a die indicated generally at 20, as seen in Fig. 3. Die 20 has a recess therein indicated at 21 which contains a number of knives 22 separated by separating members 23, best seen in the enlarged sectional view shown in Fig. 4. The knives 22 and the separating members 23 are held in place by means of wedges 24. This allows the cutting members 22 to be easily replaced when dulled by normal use.

In assembling the lamina in relation to die 20, acetate sheet 17 is placed on knives 22 of die 20. Paper 16 is placed on acetate sheet 17 with the side bearing the indicia down on sheet 17. The acetate bonding sheet 14 is then placed on the paper sheet 16 and the wood-veneer sheet 15 is placed on bonding sheet 14. Lastly, acetate sheet 18 is placed on veneer sheet 15.

As seen in Fig. 3, the acetate sheets may be of slightly less width than the wooden sheet 15 and the paper sheet 16. This causes the stub member 13 to be uncovered by acetate and facilitates the removal of the strips 11 as described hereinafter. Studs 26 may be employed to engage and position the printed paper by means of the marginal holes used to feed the paper through the typewriter or listing machine. Other positioning devices 27 may be used to position the backing strip 15 and the acetate sheets 14, 17 and 18. Wooden sheet 15 may be provided with holes to fit positioning studs 26 or studs 26 may punch the holes in sheet 15 during the pressing operation.

The die 20 and the sheets 14—18 are placed in a press indicated generally at 30. Press 30 has two platens 31 and 32. Platen 31 is shown hollow to permit the entry of steam so that heat may be applied during the pressing operation. Platen 32 is part of a hydraulic ram provided for the purpose of applying pressure and may also be heated. Successful lamination requires about 500 pounds of pressure per square inch of material and a temperature of about 300° F. When the pressure and heat are applied in the press 30, the five sheets 14—18 are integrally bonded together through the action of the heat and pressure on the cellulose acetate and cut into strips as shown in Fig. 1. After the bonding is complete, the platen 31 may be cooled by water circulation and the split, integral laminated sheet is removed.

The stub 13 now holds all of the separate strips 11 together for easy handling. When it is desired to place the index strips in frames the strips may be easily separated from the stub 13 by breaking them from the stub at the point of junction. The bottom acetate sheet 18 not only protects the veneer sheet 15 from moisture but also helps eliminate curling of the strips. When these features are not important, the acetate sheet 18 may be omitted. It will also be understood that if desired the side stub member 13 may be dispensed with and the strips 11 may be held together by partial severing only of the strips 11 at the slits 12. Alternatively, the strips 11 may be entirely severed and may be held temporarily together by backing strips of adhesive material.

In order to more thoroughly guard against warping or curling of the finished strips, they may be alternatively constructed as shown in Fig. 6. In Fig. 6, the wood-veneer sheet 15 forms the center ply of the strip. Acetate sheet 14, indicia bearing paper 16, and acetate sheet 17 are on top of veneer sheet 15 in the order named. Acetate sheet 18, paper sheet 28, and acetate sheet 29 are under veneer sheet 15 in the order named. These lamina are bonded integrally together as was the modification of Fig. 2, and it will be seen that the construction of Fig. 6 is symmetrical about the central lamina of wood veneer. The paper sheet 28 does not necessarily bear indicia but is of the same weight as the paper sheet 16 and is used only to obtain a symmetrical construction.

It will be seen that this invention provides index strips in which the indicia bearing paper is covered by a protective transparent sheet to retard the absorption of moisture and to protect the printed material from soiling, abrasion, and the effect of sunlight and air. The use of the protecting covering on the back of the index strips protects the wood veneer from entry of moisture and curling. Since the index material is printed on ordinary paper, misfunctioning of the listing machine causes a waste only in the paper, which costs a small fraction of the cost of the conventional index strips.

By printing the index material, prior to fabrication of the strips, on paper which feeds well in the particular machine used, strips of any practical width can be prepared. These could be one-half inch, one inch, or even wider, if the need should arise.

It will be understood that the embodiments of this invention described above are exemplary only. Many changes and modifications will occur to those skilled in the art within the scope of the appended claims.

What is claimed is:

1. An index strip comprising a top lamina of cellulose acetate, a second lamina of paper, a third lamina of cellulose acetate, a fourth lamina of wood veneer and a bottom lamina of cellulose acetate, said five lamina being integrally bonded together.

2. An index sheet comprising a relatively stiff supporting member, a relatively flexible intermediate member adapted to bear indicia, and a relatively flexible transparent covering member, said backing, intermediate and covering members being integrally bonded together, a plurality of slits entirely through said supporting, intermediate and covering members, said slits being parallel, spaced and extending from a point near one edge of the sheet to the other edge, whereby the strips between said slits are joined to a stub and held in position.

3. The combination of claim 2 in which the strips at the end of said slits near said one edge are frangible to allow separation thereof.

4. An index sheet comprising a relatively stiff supporting member juxtaposed with a relatively flexible member adapted to bear indicia, two relatively flexible transparent members, one covering said relatively flexible member and the

other covering the bottom of said relatively stiff backing member, said supporting, flexible and two covering members being integrally bonded together, a plurality of slits extending through said supporting, flexible and covering members, said slits being parallel, spaced, and extending from a point near one edge of the sheet to the other edge, whereby the strips between said slits are joined and held in position at said one edge.

5. An index sheet comprising a thin sheet of wood-like material, a protective sheet of cellulose acetate on one side of said wood-like sheet, a bonding sheet of cellulose acetate with one side against the other side of said wood-like sheet, a paper sheet with one side against the other side of said bonding sheet, and a protective sheet of transparent cellulose acetate with one side against the other side of said paper sheet, said sheets being integrally bonded together and parallel slits extending through said composite integrally bonded sheet from a point near one edge to the other edge.

6. An index sheet comprising a bonding sheet of cellulose acetate between a sheet of thin wood-like material and a paper sheet, two additional sheets of transparent cellulose acetate, one placed over the paper sheet and one placed under the sheet of wood-like material, all of said sheets being integrally bonded together, a plurality of parallel spaced slits extending partially through said composite integrally bonded sheet to allow easy separation of the individual strips formed by said slits.

7. An index sheet comprising a plurality of relatively flat, long, and narrow index strips positioned side by side with their long edges juxtaposed, each strip comprising a relatively stiff supporting member bonded to a relatively flexible member adapted for receiving indicia, a covering, transparent, relatively flexible member bonded to said relatively flexible member, and frangible means for holding said strips in their juxtaposed position.

8. The combination of claim 7, in which the means for holding said strips in their juxtaposed position comprises a stub member running transversely of said strips and at one end thereof, said transverse strip being integrally bonded with said index strips, the junction between said index strips and said transverse strip being adapted for easy fracturing.

9. The combination of claim 7, in which there is a second member of relatively flexible, transparent material bonded to the bottom of said relatively stiff member and integrally bonded thereto.

10. The combination of claim 7, in which the relatively flexible member adapted for receiving indicia is bonded to the relatively stiff supporting member by an intervening sheet of cellulose acetate.

11. A method of making index strips comprising the steps of placing indica in rows on a paper sheet, placing said paper sheet between a relatively stiff supporting sheet and a relatively flexible, transparent covering sheet with the indicia on said paper sheet viewable through said transparent cover sheet, bonding said supporting sheet, paper sheet and covering sheet into one integral composite sheet, making slits between said rows of indicia, extending through said composite sheet from top to bottom and across from near one edge to the other edge.

12. The method of claim 11, in which a second relatively flexible, transparent covering is placed

under the supporting sheet and is bonded thereto and extending the slits through said second transparent covering sheet.

13. A method of making index strips comprising the steps of placing indicia in rows on one side of a paper sheet, placing said paper sheet between two sheets of cellulose acetate, placing a sheet of wood veneer with one side against said sheet of cellulose acetate facing the other side of said paper sheet, placing a sheet of cellulose acetate against the other side of said veneer sheet to form a pile of lamina, placing against said pile a die having a plurality of knife-like members extending between said rows of indicia, pressing said die against said pile while applying heat thereto so that all the sheets are integrally bonded together by the heat and partially severed by the knife-like members.

14. The method of claim 13, in which a symmetrical pile of lamina is provided by placing a sheet of paper against said last mentioned sheet of cellulose acetate and a sheet of cellulose acetate against said paper.

15. A symmetrical laminated index sheet comprising a central sheet of wood veneer, a bonding sheet of cellulose acetate on each side of said veneer sheet, a paper sheet against each of said bonding sheets and a covering sheet of cellulose acetate against each of said paper sheets, said sheets being integrally bonded together.

16. The combination of claim 15 with scoring means to allow strips to be severed from said laminated sheet.

17. A method of making index strips comprising the steps of placing indicia in rows on one side of a paper sheet, placing said paper sheet between two sheets of cellulose acetate, placing a sheet of wood veneer with one side against said sheet of cellulose acetate facing the other side of said sheet, placing a sheet of cellulose acetate against the other side of said veneer sheet to form a pile of lamina, integrally bonding said lamina together by the application of heat and pressure and partially severing said integrally bonded sheet into a series of juxtaposed strips.

18. A method of making index strips comprising the steps of placing a paper sheet between two sheets of cellulose acetate, placing a sheet of wood veneer with one side against said sheet of cellulose acetate, placing a sheet of cellulose acetate against the other side of said veneer sheet to form a pile of lamina, integrally bonding said lamina together by the application of heat and pressure and partially severing said integrally bonded sheet into a series of juxtaposed strips.

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