March 3, 1942. G. L. NEWTON 2,274,910

METHOD OF MAKING MANIFOLD SETS

Filed April 14, 1941 2 Sheets-Sheet 1

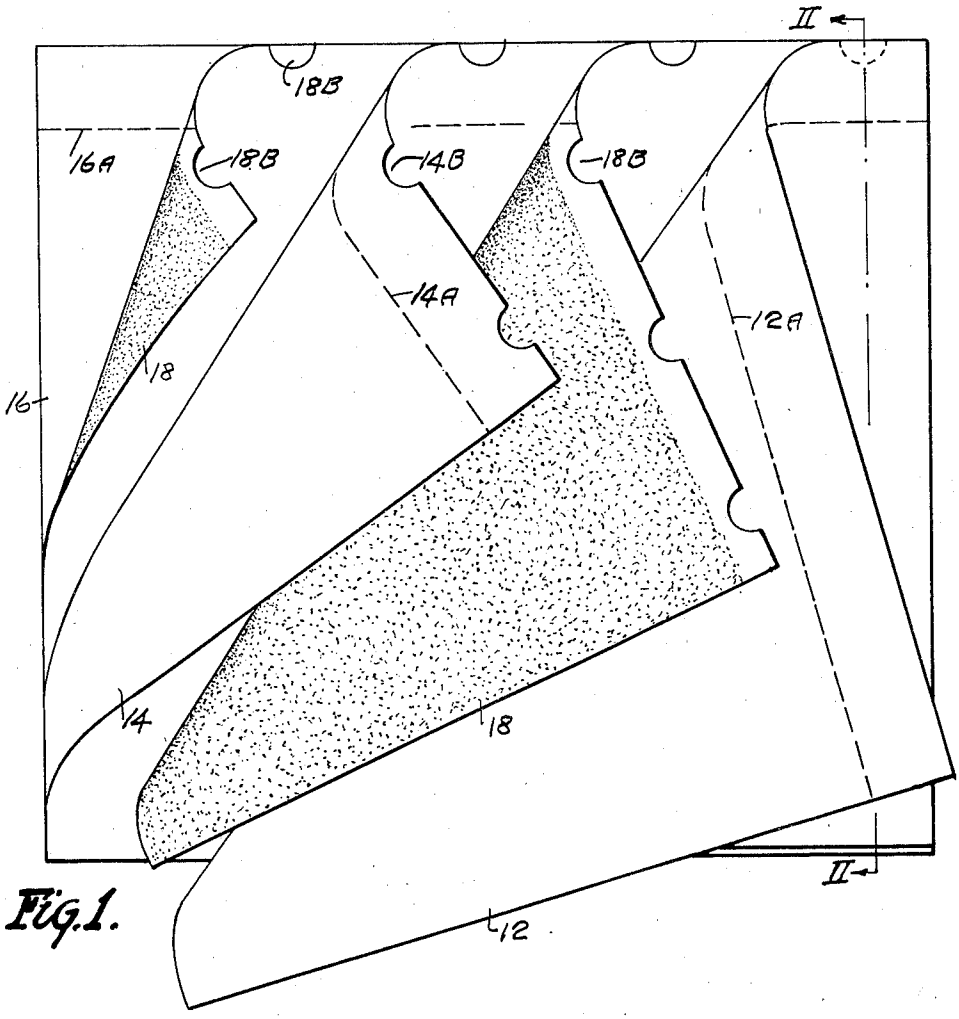


Fig. 1.

Fig. 2.

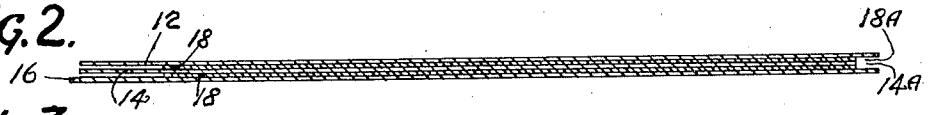


Fig. 3.

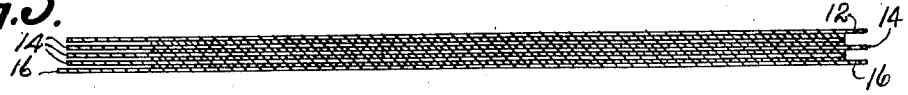
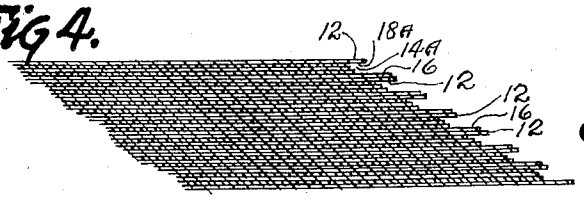


Fig 4.



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METHOD OF MAKING MANIFOLD SETS

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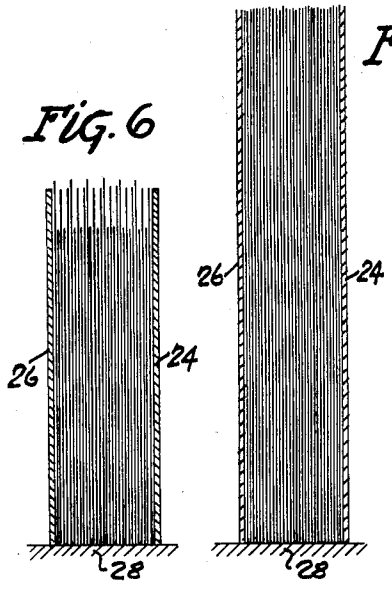


Fig. 6

Fig. 7.

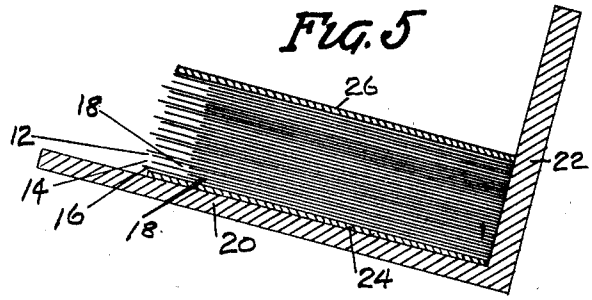


Fig. 5

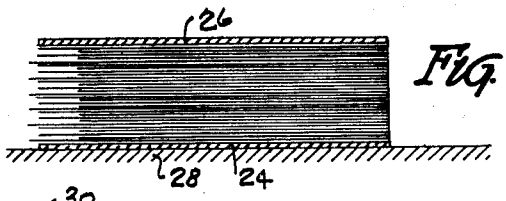


Fig. 8

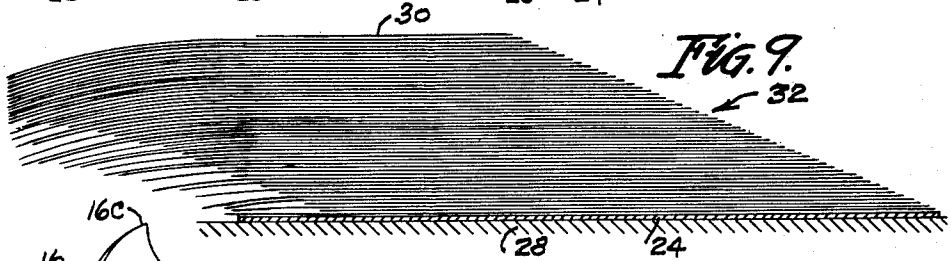


Fig. 9.

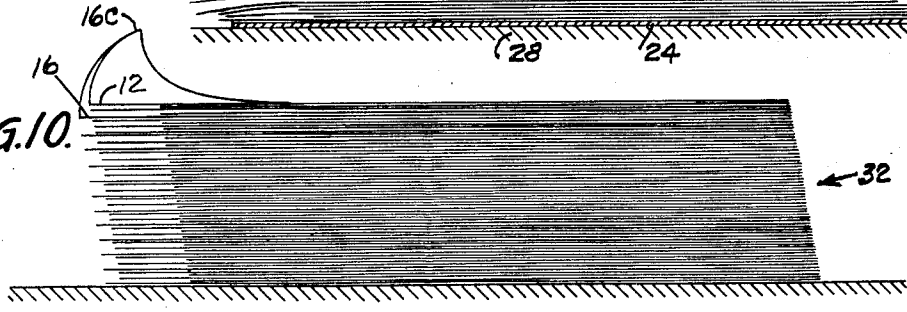


Fig. 10.

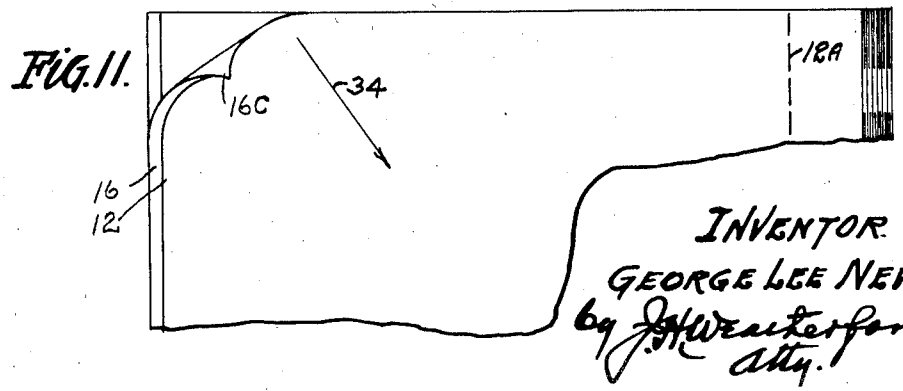


Fig. 11.

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METHOD OF MAKING MANIFOLD SETS

George Lee Newton, Memphis, Tenn.

Application April 14, 1941, Serial No. 388,467

6 Claims. (Cl. 282—24)

This invention relates particularly to a manifold set having carbon or transfer sheets interposed between the record sheets and to a method for assembling and binding such sheets into individual sets.

In modern practice copies are made by the use of carbon sheets which are inter-leaved between the original and successive copy sheets. It has been found advantageous, particularly where multiple copies are to be made, to pre-assemble the record sheets and carbon sheets into sets, securing the sheets of each set together so that the user must necessarily make a complete set of copies, whether by typing or writing otherwise as with pencil and the typist need only handle and insert the unit in the typewriter and proceed with the work. In such sets it is substantially standard practice to perforate the record sheets adjacent the binding edge so that they may be easily detached along such line of perforations, but not to so perforate the carbons, and to terminate the opposite edge of the carbons well short of the corresponding edges of the record sheets so that the binding edge of the set may be firmly grasped, and the record sheets grasped, opposite the bound side and the record sheets snapped apart along the line of perforation leaving the carbon sheets attached to the binding edge, the original and other record sheets being then distributed as may be seen fit, and the carbon sheets thrown away.

Much time and ingenuity has been devoted to the means employed for securing the sheets together and to the method of assembling and accomplishing this securing in an endeavor to hold down the cost, speed up the work and improve the sets so that they may be easily placed in the typewriter. The sheets so formed are secured together along one edge, almost universally by the use of glue or other adhesive which is applied along such edge in some manner.

Quite a number of these structures require the individual application of the adhesive to one or more sheets of the set or to the edge of each individual set, greatly slowing down the manufacture, whereas others apply the adhesive to piles or stacks of sets, usually making openings for the entrance of adhesive through one of the record sheets and folding over this record sheet along the line of holes to form a binder for the other sheets of the set, and compressing the stack of sets adjacent such bound edge in order to cause spreading apart of the sheets and permit penetration of the adhesive for binding purposes, this separation, however extending to the sets themselves permitting entrance of the adhesive between the sets and bonding the sets together so that they must be pulled apart before use, this ordinarily being done by the assembler before shipping so that the typist may not be delayed.

In effecting the separation of one set from the other much care is necessary to determine the line of demarcation between sets and the separation is definitely slowed down. Ordinarily also the penetration of the adhesive between sets is such that after the line of demarcation is determined it is necessary to run a dull edged knife or spatula between the sets to effect the separation. Also after such sets have been separated they are ordinarily racked up into packages or stacks and so delivered to the typist and particularly where there are a considerable number of sheets involved in each set it is often hard to pick up an individual set.

The objects of the present inventon are:

To provide unitary manifold sets which may be readilly picked up by the typist from a stack of such sets and be placed in the typewriter for use with a minimum of time and trouble and after use may be separated into record sheets and carbon sheets, which latter may be thrown away.

A further object is to make a manifold set which lends itself readily to rapid assembling and securing into such forms; and

A further object is to improve the method of assembling, securing and separating sheets into manifold sets.

The means by which the foregoing and other objects are accomplished and the method of their accomplishment will readily be understood from the following specification upon reference to the accompanying drawings, in which:

Fig. 1 is a face view of a manifold set comprising three record sheets and two carbon sheets with portions of all of the sheets except the final record sheet turned back to as far as possible disclose details.

Fig. 2 is a section on the line II—II of Fig. 1 with the thickness of the sheets greatly increased showing the space created by notching of the sheets, the termination of the carbon sheets short of the edge of the record sheets and the extension of the last record sheet beyond all of the other sheets.

Fig. 3 is a substantially identical section of a set comprising five record and four carbon sheets in which an intermediate sheet is not notched.

Fig. 4 is a similar section showing a stack of

the sets, as shown in Fig. 2, laterally displaced or "fanned" to show the manner in which such displacement provides entrance space in applying the adhesive.

Figs. 5 to 11 inclusive show various stages and steps in the assembling and handling of a stack of sets, Figs. 5 to 8 being on a smaller scale than Figs. 9 to 11. In these views Fig. 5 shows an assembling tray and the method of stacking sets therein. Figs. 6 and 7 show the manner of evening up the end and side edges of a stack of sheets; Fig. 8 placement of a stack prior to application of adhesive; Fig. 9 fanning or lateral displacement of a stack to receive the adhesive; Fig. 10 the stack partially straightened up after placing of the adhesive for drying and also a subsequent step in the separation of the individual sets from the stack.

Referring now to the drawings in which the various parts are indicated by numerals:

12 is an original, 14 intermediate, and 16 a final record sheet, between which sheets are inter-leaved carbon sheets 18, in Figs. 1 and 2 one intermediate sheet being shown and in Fig. 3, five such sheets. All of the record sheets are perforated respectively along lines 12—A, 14—A, 16—A adjacent their upper edges to provide readily detachable binding strips. The carbon sheets are not so perforated. The carbon sheets are provided with notches 18—B, and the intermediate record sheets with notches 14—B, here shown as semi-circular, these notches perferably being all of the same size and adapted to register when the sheets are assembled. The corresponding upper edges of the original record sheet 12 and the final record sheet 16 are not so notched. Also where a comparatively large number of sheets are assembled in a set, as in Fig. 3, one of the intermediate record or carbon sheets, it being immaterial which, may also be left unnotched, as shown by the intermediate record sheet 14—C in Fig. 3.

The carbon sheets are all substantially shorter than the record sheets so that as indicated clearly in Figs. 2 and 3, the record sheets extend well beyond the carbon sheets. Also the final record sheet 16 extends slightly beyond all the other sheets, primarily so that when the sets are stacked, as in Figs. 5, 8 and 10, the lower sheet of each set extends beyond the shorter underlying sheet of the next set and permits rapid and sure engagement in picking up the top set.

In Figs. 5 to 11, which are directed to stacks of the sets, 20 is a tray having an end wall 22 at right angles, the bottom of the tray preferably inclining downward toward the end wall. The various sheets of the sets, five sheet sets being shown, are successively deposited in this tray, the elongated final record sheet 16 being first deposited and then in succession a carbon sheet 18, intermediate record sheet 14, a second carbon sheet 18 and the original record sheet 12 completing the set, and this operation is successively repeated until such number of sets have been assembled as may be desired in the stack.

Prior to placing the first sheet in the tray a backing sheet 24, as of card board, may be placed in the tray and the sheets forming the sets assembled thereon. On completion an additional backing sheet 26 may be laid on the top of the last set placed and the stack thus enclosed for picking up. Often, however, the stacks are assembled and removed without the use of these backs, it being customary, however, for more ready handling and for protecting the top and bottom sets of the stack to make use of some such backing, at least during subsequent handling of the stack.

After a number of stacks of sets have been assembled they are transferred to the gluing table. Here each stack is upended on the surface of the table 28, as shown in Fig. 6, and while held loosely between the backs 24, 26, the upper end edges of the sheets are brought even. Usually the stack is then turned on one side edge, as shown in Fig. 7, and similarly evened up sidewise. The stack is then laid flat on the table, as shown in Fig. 8, and subsequently the back 26 removed. The sheets of the stack are then fanned or displaced, substantially as shown in Fig. 9, to prepare the end edges to receive the glue or other adhesive to be placed thereon. A guard sheet 30, of paper, is placed on the top set to protect the surface against adhesive and with a brush (not shown) the fanned end 32 of the sheets forming the sets is very copiously and thoroughly covered with the adhesive. In doing this it will readily be seen that the notches 14—A, 18—A allow much greater than normal edge penetration of the adhesive and permit effective adherence of the bottom and top sheets (unperforated) or of the bottom, intermediate and top sheets, Fig. 3, which with the minor edge penetration accomplishes the desired securement of all the sheets of the set, yet minimizes interset securing. Immediately following the application of the adhesive the stack is restored, as shown in Figs. 10 and 11, to about its original position as shown in Fig. 8, except that the end 32 of the stack is preferably not quite restored to a vertical line, this primarily being done to give slightly more overhang to the opposite ends of the bottom sheets.

After this step of the operation the adhesive is allowed to partially dry and set, this drying period depending obviously on the rapidity with which the adhesive sets up. After such drying and setting period the operator engages with his finger a corner edge 16—C of the final or bottom sheet 16 of the top set of sheets, the projection of the sheet 16 making it easy for this to be rapidly and accurately accomplished. The corner 16—C, together with the sheets thereabove, are curled upward, as disclosed in Figs. 10 and 11, and the set removed from the underlying sets, the progress of removal being diagonally along and across the stack in the general direction of the arrow 34 in Fig. 11, and the operation being accomplished with extreme ease and rapidity. The disengaged sets may be promptly piled in stacks again as the stickiness of the adhesive has been substantially destroyed. It is obvious that it is advantageous to remove the sets before final hardening of the adhesive is accomplished, but it will be understood that this operation can be and is often performed after the adhesive is thoroughly dry, the rolling movement of the set is accomplishing the removal substantially removing tendency of the final sheet, or any others, to tear apart along the line of perforations 16—A and the penetration of the adhesive between the end edges of the bottom sheet of the set being removed, and the top sheet of the next underlying set, being so slight as to provide little resistance to such removal.

After drying and setting of the adhesive the piles or stacks of loose sets are delivered to the user, each set being handled by the typist as a unit.

I claim:

1. The method of forming manifold sets which includes assembling a pile of sheets to form a plurality of superposed sets, each set including in alternating succession record sheets and carbon sheets, each set being begun with a record sheet and completed with a record sheet, evening the binding ends of the sheets of said pile, placing said pile on a support with said sheets in such superposed relation, displacing the successively overlying sheets of said pile in substantial even progression away from said binding end to create a stepped end pile, applying adhesive to said stepped end, re-shifting said sheets toward said end to substantially restore said even end pile, allowing said adhesive to partially dry, raising a corner of the top set of sheets remote from said binding end, and removing said set by pulling said corner daigonally across said pile, and repeating said separating action until all said sets are separated.

2. The method of forming manifold sets which includes assembling a pile of sheets to form a plurality of superposed sets, each having a binding end, each set including in alternating succession record sheets and carbon sheets, each set being begun with a record sheet and completed with a record sheet, the bottom sheet of each said set being slightly longer than the other sheets of said set, evening the binding ends of the sheets of said pile, placing said pile on a support with said sheets in such superposed relation, displacing the successively overlying sheets of said pile in substantial even progression away from said end to create a stepped pile, applying adhesive to said stepped end, re-shifting said sheets toward said end to substantially restore said even end pile, allowing said adhesive to partially dry, engaging a projecting corner edge of the bottom sheet of the top said set of sheets, remote from said end, raising the corresponding corner of said set and removing said set by pulling said corner diagonally across said pile, and repeating said separating action until all said sets are separated.

3. The method of forming manifold sets which includes arranging in alternating succession a plurality of record and carbon sheets into said sets, each said set being begun with a record sheet and completed with a record sheet, intermediate sheets of said sets being notched along one edge, assembling said sets into a pile with said notched edges superposed, alining the edges of said sheets at the notched ends of said sets, placing said alined pile on a support, displacing the successive overlying sheets of said pile in substantially even progression away from said end to step said alined end, applying adhesive to said stepped end and into said notches, re-shifting said sheets toward said end to substantially restore said even end pile, allowing said adhesive to partially dry, raising a corner edge of the top said set remote from said adhesived end, removing said set as a unit by pulling said corner diagonally across said pile, and repeating said removal action until all said sets are separated.

4. A method in accordance with claim 3 in which the bottom sheet of each said set is made longer than the other said sheets to facilitate separation of said sets.

5. The method of forming manifold sets comprising preforming record sheets including an original sheet, intermediate sheets of substantially equal length and a final sheet slightly longer than said original and intermediate sheets, perforating each said sheet adjacent one end to form a detachable binding strip and notching the binding strips of the said intermediate strips only at intervals, preforming carbons of substantially less length than said record sheets, and notching the binding edges of said carbons in substantial conformity with said notched binding strips; assembling said record sheets, with carbons interposed, into sets, superposing said sets in a stack, evening the binding edges of said sheets, into substantial alinement, placing said stack on a support, shifting the sheets and carbons of said stack from bottom to top progressively and evenly away from the binding edges of the underlying sheets to substantially evenly fan the binding end of said stack, applying an adhesive evenly over said end and into said notches, re-shifting the sheets and carbons of said pile toward and almost to their original position, allowing said adhesive to partially harden, and separating said pile into individual sets by manually raising a corner of the projecting final sheet of the top set, grasping said corner of said set and drawing said corner toward the diagonally opposite corner of said pile to complete separation.

6. The method of forming manifold sets comprising preforming record sheets including an original sheet, intermediate sheets of substantially equal length and a final sheet slightly longer than said original and intermediate sheets, perforating each said sheet adjacent one edge to form a detachable binding strip and notching the binding strips of the intermediate sheets only, at intervals, preforming carbons of substantially less length than said record sheets, and notching the binding edges of said carbons in substantial conformity with said notched binding strips; assembling said record sheets, with carbons interposed into sets, each including at least a final sheet, an original sheet and a carbon, superposing said sets in a stack, evening the binding edges of said sheets into substantial alinement, shifting the sheets and carbons of said stack from bottom to top progressively and evenly away from the binding edges of the underlying sheets to substantially evenly fan the binding end of said stack, applying an adhesive evenly over said end and into said notches, re-shifting the sheets and carbons of said pile toward and almost to their original position, allowing said adhesive to partially harden, and separating said pile into individual sets by manually engaging and raising a corner of said set and drawing said corner toward the diagonally opposite corner of said pile to complete separation.

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