April 23, 1940. E. B. OTIS 2,198,457

MANIFOLDING ASSEMBLY

Filed Aug. 30, 1939

Fig. 1

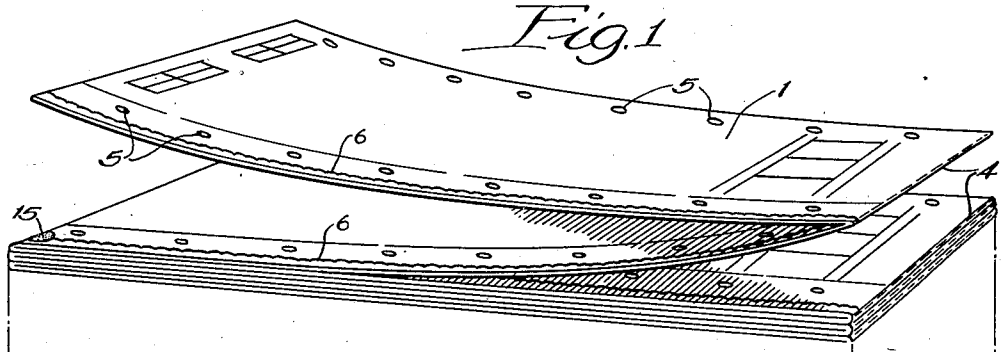


Fig. 2

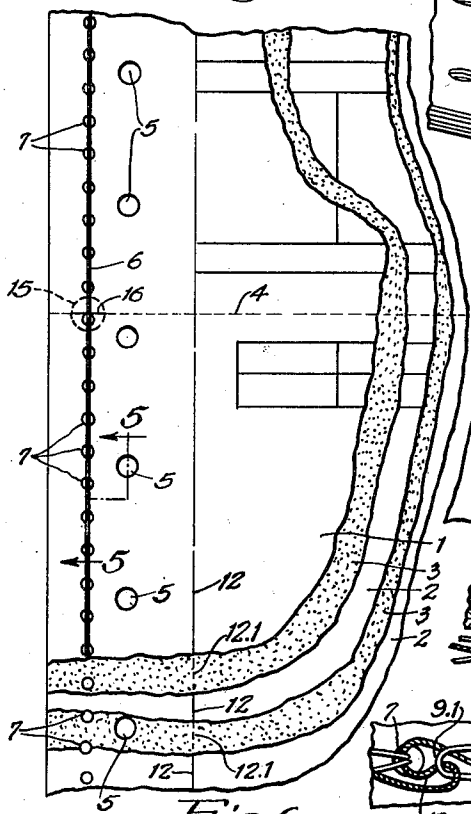


Fig. 4

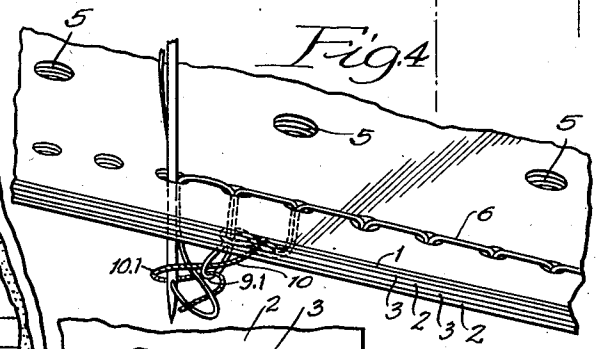


Fig. 3

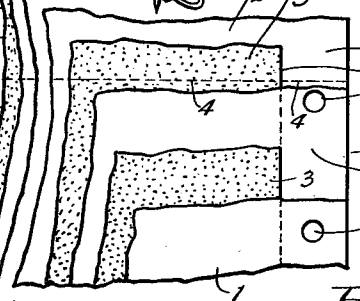


Fig. 5

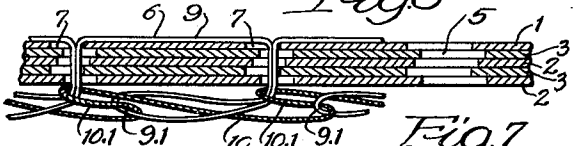


Fig. 7

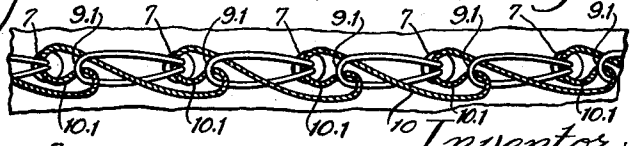
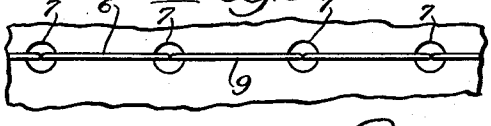


Fig. 6



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UNITED STATES PATENT OFFICE

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MANIFOLDING ASSEMBLY

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8 Claims. (Cl. 282—12)

This invention relates to manifolding assemblies and particularly to those of the continuous web type designed for use in various forms of writing machines equipped with feeding devices having pins for engaging marginal apertures in the webs for accurate feeding of the same to and from the printing position.

The main object of this invention is to provide an improved form of fastening of the superposed webs that will permit of relative flatwise shifting of one sheet with respect to another as they pass over the feeding devices, so that the different layers will readily adjust themselves to the pins of the feeding devices regardless of different degrees of expansion or contraction of the layers of paper and of the shifting due to passage of the web around a roller or due to the folding of the pack when it is zig-zag folded to form a pack.

Another object is to provide an improved arrangement of the fastening means with respect to the weakened severance lines so that when the forms have been written upon they can be readily detached from the strip in form length packs and separated from the interleaved transfer strips.

Other objects and a more complete understanding of the invention may be had from the following description of an illustrative embodiment shown in the accompanying drawing, in which:

Figure 1 is a perspective view of a manifolding form pack of the continuous traveler web type.

Fig. 2 is a fragmentary view of a portion of the assembly with various layers broken away to disclose features of the underlying sheets, this view being taken in the vicinity of the binding margin.

Fig. 3 is likewise a fragmentary view of the assembled webs broken away at successively different points to show the relation of the sheets at their opposite margin.

Fig. 4 is a fragmentary perspective view showing the arrangement of the binding stitches with respect to the punched apertures which loosely accommodate the threads.

Fig. 5 is an enlarged fragmentary sectional detail taken on the line 5—5 of Fig. 2 and indicating in an exaggerated way a suitable type of stitching and indicating how the sheets might shift relatively to each other.

Fig. 6 is an enlarged top view illustrating a specific type of stitching in relation to the aforesaid enlarged apertures.

Fig. 7 is a bottom view of the same.

In the form shown in the drawing, the manifolding pack is of the type in which a plurality of traveler strips or webs of paper are assembled one above the other in manifolding relation with interleaved strips of carbon paper and then zig-zag folded into convenient lengths to form a pack. Usually the uppermost strip, upon which the ribbon-record is imprinted by typewriting machine or upon which the written notations are made by hand as in the case of autographic registers, is thicker and of better quality of paper than the underlying copy sheets and the interleaved transfer sheets, or carbons, which latter may be of very thin material, especially when used in connection with forms of such size that the transfer strips are not intended for reuse.

In certain large forms the carbon strips are of such size that when sub-divided into form lengths and separated from the record and copy forms they will be capable of repeated use for other purposes such as ordinary typewriting operation.

The topmost strip 1 and the copy strips 2 will be herein referred to as record strips or webs. These are usually printed as blank forms with appropriate headings, guide lines and other indicia for guiding the operator of the machine or typewriter in which the form is to be used and the forms are printed one after another along the webs and then collated so that the printed matter on the record registers accurately with the printed matter on the record copy sheets, and so that the transfer sheets 3 will be properly interleaved between the record and copy sheets. Each web is sub-divided by transverse lines of severance 4 and when the sheets are properly collated these lines of severance of the various layers will register with each other exactly so that pads including all of the layers can be torn off as a unit on the lines representing the ends of the form lengths and so that the whole plural ply pack can be folded on the lines 4 alternately back and forth to form a zig-zag folded pack such as is shown in Fig. 1.

In certain types of machines, herein generally referred to as pin feed machines, the forms are fed by sprocket-like wheels, alining racks, or belts provided with pins formed to engage apertures in the forms and the traveler strips are provided in one or both of their longitudinal marginal edge portions with a series of holes 5 that are accurately spaced for engagement with the pins of the feeding device. These holes

are in all of the plies and register with each other depthwise of the pack.

It is important that the various plies of record and copy sheets be kept in accurate registration with each other so that the writing or printing that is later applied to the record form by hand or by the typewriting machine will appear in proper relation to the form material on the copy sheets. Obstacles that have to be overcome in such manifolding assemblies are the different amounts of expansion and contraction of different materials under changes of atmospheric conditions which may cause the different plies or layers to expand and contract unevenly; also, the folding of the multiple layered pack whereby the folds of certain sheets must be accommodated within the folds of others causes a slight relative shifting between the different layers at each fold. Of course, the zig-zag folding largely compensates for this latter cause of displacement because the web that is outermost on one fold will be innermost on the next fold and so on alternately.

In order to maintain the strips of the multiple layered pack in proper registration regardless of the amount of handling that the multiplex web undergoes in its passage from its storage position to the writing position in the machine in which it is used, the strips are bound together along one of their longitudinal margins by stitching 6 formed of thread and extending continuously from form to form throughout the entire length of the webbing. The thread stitching 6 is, however, of such character that it can be applied so as to permit a certain amount of yielding of the different layers flatwise with respect to each other due to conditions imposed upon them by the feed mechanism of the machine or conditions arising from different degrees of expansion and contraction of the different layers. To this end also the apertures or perforations 7 through which the stitching extends from one side to the other of the pack are die punched to a size substantially larger than is required by the thread and the needle, by which the stitching is applied and in this manner provision is again made for a certain amount of relative flatwise shifting of the various plies of the pack.

A suitable form of stitching is shown in Figs. 6 and 7. In this form the thread 9 which appears on the upper side of the pack is carried through the apertures 7 by the needle of the sewing machine in the form of a loop or bight and a second thread 10 carried by the looper is intertwined with the successive loops or bights 9.1 of the thread 9, whereby those bights 9.1 are pulled along the bottom of the pack toward the next succeeding aperture 7 by a bight or loop 10.1 which is passed through one loop 9.1 and runs around or receives the next succeeding loop 9.1 as indicated in Fig. 7. By controlling the tension on the threads during the sewing operation, the stitching is made sufficiently loose to admit of the desired amount of flatwise movement of the sheets with respect to each other as to properly compensate for any movement arising from the folding of the sheets on their transverse lines of severance 4 and such other movement as may be required through engagement of the feed pins of the machine with the holes 5 which in turn assure proper registration of the original record with its copies as it passes through the writing position on the machine.

Preferably the forms are separated from the marginal portions which serve as feed bands and binding stubs by means of a longitudinal line of severance 12 which extends along parallel with the row of stitching and with the feed holes 5. In certain types of narrow forms equipped with one-time carbon paper the longitudinal line of severance 12.1 shown in Fig. 2 may be omitted from the carbons or transfer sheets so that when the feed band stub 11 is severed from a form length pack of record sheets it will strip the carbons from between the record and copy sheets. In other wider sizes of records it is preferable to have the carbon sheets provided with a line of severance 12.1 registering with the line of severance 12 of the record sheets, so that when the feed stub is torn off the carbons of the respective form length are also torn free from the stub in one operation.

Preferably in both of the hereinbefore described instances, the margins of the sheets that are opposite the binding stub should be offset so that the carbons or transfer sheets terminate some distance inward from the marginal edges of the record sheets, thus providing a place where the record sheets can be gripped without gripping the carbons. When the carbons are not provided with lines of severance 12.1, they will readily be stripped from their place between the record sheets if in performing the tearing operation the operator grips the free marginal portion of the record sheets. In the other instance where the carbons and records are severed from the stubs simultaneously in the act of severing the records, if the operator grips the free margin 13 of the record sheets alone, a snap of the hand will throw the carbons out from their position between the record sheets.

It will be readily seen that the thread stitching applied in the manner described produces a neat pack that holds the strips in their properly collated relation and yet admits of the desired degree of slight movement of the individual sheets to allow them to accommodate themselves to the adjusting action of the feed pins of the machine in which they are used and thus prevents the slight discrepancies arising from folding of the sheets or from expansion and contraction of the material from having a cumulative effect as successive forms pass through the machine. If desired the threads of the stitching may be interrupted at the transverse lines of severance or they may be continuous throughout the entire length of the strips of webbing. This latter arrangement avoids the annoyance of unravelling of the chain stitching at these points of severance. If the stitching is continuous it is not necessary to sever it each time a form length pack is removed from the assembly, because such form pack can be first severed from its stub and then torn off on the transverse line of severance at its end or vice versa without necessitating the separation of the stub portions from each other on these transverse lines.

If the particular machines for which the forms are designed are equipped with feed devices on both sides of the strips, then the feed band which is distant from the stub band may also be provided with longitudinal weakened lines of severance as indicated at 14, these lines of severance 14 being preferably located so as to register with each other and with the corresponding marginal edges of the transfer strips. The feed bands 13 are torn from the body portions of the record sheets after the carbons have been stripped out, as aforesaid.

In automatic writing machines such as are used in teletype work, the continuous thread stitching is especially trouble free because it requires no attention from an operator and the forms do not need to be severed from the assembly individually as written. In certain uses the feed bands are automatically severed from the traveler strips as they leave the writing machine and are fed to a form separator or deleaver which separates and refolds the record and transfer strips in separate stacks. The record stacks are then fed to a bursting machine which tears the record lengths apart on the transverse severance lines.

A further advantage of the thread stitching as a fastening means is the fact that it does not injure the platen of the machine and is free from small metal pieces such as staples which might work free and fall into and injure the mechanism of the writing machine.

For certain uses where it is desired to sever the individual form length packs after the typewriting operation and keep their unit assembly intact for further operations or manifolded notations, it is desirable to cut the threads at each transverse severance line. In such assemblies, provision is made against unravelling of the chain stitching at both sides of such thread breaks by applying a disc or spot 15 of adhesive material at the intersection of the stitching 6 with each transverse line of severance 4 so as to cement the threads to the lowermost web at both sides of the severance line. The disc of adhesive, threads and webs are then severed locally by a cut 16 on each line of severance 4.

Although but one specific embodiment of the invention is herein shown and described, it will be understood that various details of the construction shown may be altered or omitted without departing from the spirit of the invention as defined by the following claims.

I claim:

1. In a continuous web manifolding assembly, a plurality of superposed webs, a row of thread stitching extending longitudinally of the webs and binding them together, one of said webs having a row of die punched apertures through which said stitching threads pass and said apertures being substantially larger in diameter than is required for the stitching threads to permit said one web to shift flatwise relative to other webs.

2. In a continuous web manifolding assembly, a plurality of superposed webs, a row of thread stitching extending longitudinally of the webs and binding them together, said webs having registering rows of apertures through which said stitching threads pass and each of said apertures being die-punched and having a diameter substantially larger than is required for the stitching threads to permit relative flatwise shifting of said webs.

3. In a manifolding assembly for use with a machine having sheet feeding devices, record sheets having a row of holes for simultaneous engagement with the sheet feeding devices, an interposed transfer sheet, a row of thread stitches extending along a marginal edge portion of said assembly for binding the sheets together, said transfer sheet having die-punched apertures for said stitches considerably larger in diameter than the threads of said stitches to permit relative shifting movement of said sheets.

4. A manifolding assembly comprising a plurality of record traveler webs and a transfer web in superposed manifolding relation, each of said record and transfer webs having a series of registering weakened transverse lines of severance for sub-dividing the assembly into unitary form length packs, and said record and transfer webs having a longitudinal marginal line of binding stitches having threads securing together the webs in each pack, and certain webs having relatively large die-punched apertures for said threads, whereby the respective webs in said assembly are held together with limited freedom of shifting relative to other webs.

5. A manifolding assembly comprising a plurality of record traveler webs and a transfer web in superposed manifolding relation, each of said record and transfer webs having a series of registering weakened transverse lines of severance for sub-dividing the assembly into unitary form length packs, and said record and transfer webs having a longitudinal marginal line of binding stitches, said stitches being of thread and extending across said transverse lines of severance, local cuts severing the threads at said lines of severance, and means fastening the threads to one of the webs at each side of said transverse severance lines.

6. A manifolding assembly comprising a plurality of record traveler webs and a transfer web in superposed manifolding relation, each of said record and transfer webs having a series of registering weakened transverse lines of severance for sub-dividing the assembly into unitary form length packs, and said record and transfer webs having a longitudinal marginal line of binding stitches, said stitches being of thread and extending across said transverse lines of severance, local cuts severing the threads at said lines of severance, and a spot of adhesive fastening the threads to one of the webs at each side of said transverse severance lines.

7. A manifolding assembly comprising a plurality of record traveler webs and a transfer web in superposed manifolding relation, each of said record and transfer webs having a series of registering weakened transverse lines of severance for sub-dividing the assembly into unitary form length packs, and said record and transfer webs having a longitudinal marginal line of binding stitches having threads passing through relatively large punched apertures in the webs, whereby the respective webs in said assembly are held together with limited freedom of shifting relative to other webs, said stitches being of thread and extending across said transverse lines of severance, local cuts severing the threads at said lines of severance, and means fastening the threads to one of the webs at each side of said transverse severance lines.

8. In a manifolding assembly for use with a machine having sheet feeding pins, superposed manifolding webs having a longitudinal row of marginal pin holes for engaging such pins, a line of binding thread stitches extending parallel with said row of pin feed holes, said stitching threads having loose engagement with said webs to permit the webs to shift flatwise relative to each other, said stitches being of thread and extending across said transverse lines of severance, local cuts severing the threads at said lines of severance, and means fastening the threads to one of the webs at each side of said transverse severance lines.

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