Feb. 5, 1924. 1,483,047

J. A. B. SMITH

PROCESS AND APPARATUS FOR PRODUCING MULTIPLE PLY WEBS

Filed Jan. 9, 1923

Fig. 1.

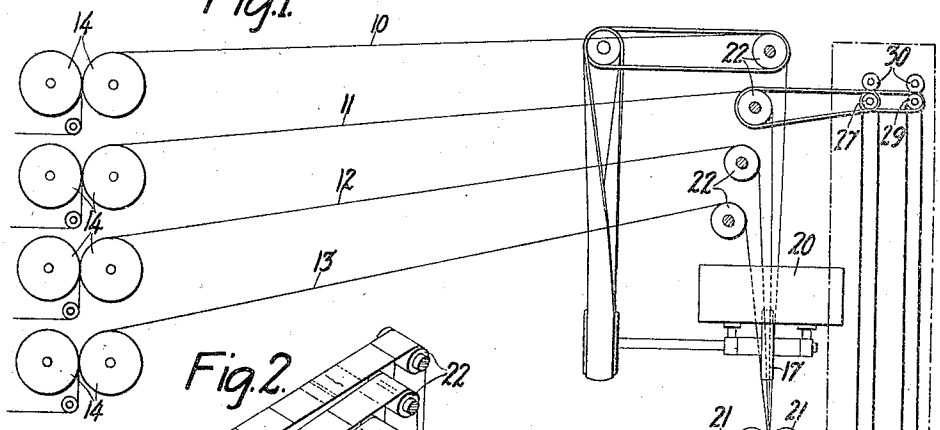


Fig. 2.

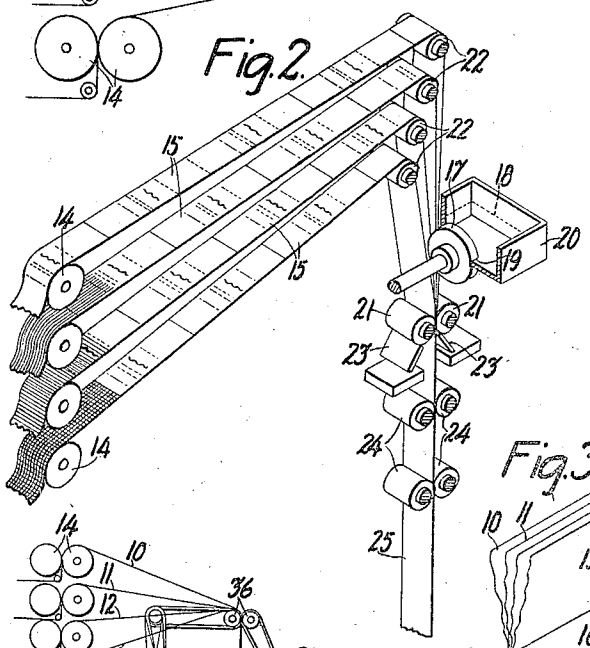


Fig. 3.

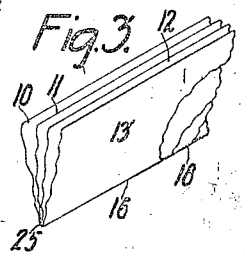


Fig. 4.

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UNITED STATES PATENT OFFICE.

JESSE A. B. SMITH, OF STAMFORD, CONNECTICUT, ASSIGNOR TO UNDERWOOD TYPEWRITER COMPANY, OF NEW YORK, N. Y., A CORPORATION OF DELAWARE.

PROCESS AND APPARATUS FOR PRODUCING MULTIPLE-PLY WEBS.

Application filed January 9, 1923. Serial No. 611,620.

To all whom it may concern:

Be it known that I, JESSE A. B. SMITH, a citizen of the United States, residing in Stamford, in the county of Fairfield and State of Connecticut, have invented certain new and useful Processes and Apparatus for Producing Multiple-Ply Webs, of which the following is a specification.

This invention relates to a method and apparatus for making a composite or multiple-ply work-web of superposed printed forms for use in typewriting machines, as, for example, in the class of machines illustrated in the patent to Wernery and Smith, No. 1,132,055, dated March 16, 1915, in which the carbon-sheets, inserted between the webs or plies, are shifted backwardly at intervals, preparatory to typing fresh portions of the webs or plies. In application, Serial No. 245,810, filed July 20, 1918 (now Patent No. 1,400,631, dated December 20, 1921), the claims are limited to the product. In the present application the claims are limited to a method and apparatus by which the web elements first have forms printed thereon, after which they are assembled, padded and folded or coiled. In another application, Serial No. 352,202, filed January 17, 1920 (now Patent No. 1,400,572, dated December 20, 1921), I have claimed the method and apparatus by which the web elements may be assembled, padded and coiled or folded irrespective of the method and apparatus for printing the same.

In the aforesaid patent to Wernery and Smith, there is illustrated a single-piece web which is folded longitudinally in zigzag fashion, making what is known as a fan-fold web. An objection that has arisen to the use of this web for some purposes, is that, if the grade of paper be high enough for sending out to customers, it is too expensive to use for office purposes; it being usually desired to send the ink-ribbon copy to the customer, and to retain the carbon copies for office filing and other uses. Moreover, if the grade of paper is high, it is usually of such heavy quality that a large number of copies cannot be clearly manifolded. If the paper used is thin, for manifolding, and of a low grade, for economy, it does not prove suitable to send out to customers. In other words, the same paper that is used for one purpose, must be used for all purposes; and frequently it is found to be either too expensive for one purpose or too poor for another purpose. Again, it is desired to have certain of the plies of different color from others, and this has heretofore been accomplished in an inexpensive way by printing a color stripe upon a portion of the broad web as it passes through the printing-press preparatory to being fan-folded. Still other methods have been proposed for overcoming the foregoing and other difficulties attendant upon the use of the fan-fold web, but in practice the field for use of such web has been limited, thereby narrowing the market for typewriting machines adapted to handle this class of work.

Prior to said Wernery and Smith invention, there were attempts to use superposed separate webs or plies of paper fed into the machine from spools; and since the date of said invention, various efforts have been made to adapt the separate web method to the Wernery and Smith machine, so as to permit the use of superposed webs or plies of different colors and qualities, but all printed with a succession of similar or complementary forms. But the trouble has been encountered that, owing to the feeding of the superposed webs around the cylindrical platen of the typewriting machine, there occurs relative creeping of the webs upon one another, this creeping being cumulative, so that, after several forms have been typed, the forms on the several webs are found to be out of register with one another, so that words typed in their proper places upon one web or ply will fall out of place upon underlying webs or plies. To overcome this difficulty, several proposals have been made, one of which is to provide impaling pins upon the typewriting machine, and to form corresponding re-registering holes in all of the forms in all of the webs, thereby enabling the operator to re-register the webs preparatory to the typing of each form. This, of course, calls for additional work and attention on the part of the operator, and the holes in the paper which are apt to prove unsightly and objectionable, particularly in the sheets which are to be sent out to the customers. Furthermore, the holes have to be large, and necessarily extra paper has to be provided or allowed on each form to accommodate these holes, and this adds sub-

stantially to the expense of the paper and to the bulkiness of the copies intended for filing.

The object of the present invention, therefore, is to provide a way whereby superposed plies or webs of different qualities and often of different colors, may be employed without incurring the described trouble of relative creeping among the several webs or plies, and without the necessity of punching objectionable re-registering holes in the webs, or of providing extra paper which the use of such holes necessitates.

In practicing the preferred manner of manufacturing a composite product to be used in a typewriting machine, the separate single-ply webs, of a variety of colors and grades, may be printed simultaneously in the same printing-press, in such a manner that the forms printed upon the various webs register accurately with one another, and while such registry is maintained, the edges of the webs are padded together, preferably by means of an adhesive material, any well-known padding paste or glue being suitable for this purpose, especially of the kind which is elastic when dry. Rubber cement may be used in some cases; the elasticity of this or other adhesive materials being of an advantage to permit the padded web to pass readily around the platen or rolls of the typewriting machine.

The adhesive material may be applied in any suitable way, as, for example, by means of a brush or roll which may be supplied with adhesive material from a fount. After the application of the adhesive material, the assembled webs or plies may be run through pressure-rolls to press them together along the line of adhesive material, and these rolls may, if desired, be heated so as to facilitate the drying of the adhesive material.

Preferably the web with a single set of edges thus padded together is permitted to dry before leaving the apparatus, and, for thus purpose, the web may be led up and over a roll and then allowed to fall and to form a loop, the web running up over a second roll, and so on, there being as many rolls and loops as desired, so as to secure the needed time for drying. These looping rolls may be enclosed in an oven or drying closet.

The drying rolls may be driven at suitable speed, being preferably connected to the printing-press so as to secure an accurate timing of the rolls. From the drying closet, the composite web may be led into a suitable packaging device, by which the web may be given preferably a zigzag cross-fold, whereby it is compacted into a package suitable for marketing.

Such a web may be readily led through either the typewriting machine disclosed in said Wernery and Smith patent, or through other varieties of typewriting machines, and the successive forms may be torn off after typing, and there will be no difficulty experienced from accumulation of creep along the webs, since, when a portion is torn off, the remainder of the padded web remains in its original registered condition, and hence no re-registry of the plies or webs among themselves is at any time necessary, nor is it necessary to form unsightly re-registering holes therein, or to provide extra paper to accommodate the holes; while each of the various plies may be of any desired grade or color independently of the others.

Other features and advantages will hereinafter appear.

In the accompanying drawings,

Figure 1 is a diagrammatic side elevation of the multiple printing-press and padding, drying and coiling apparatus.

Figure 2 is a perspective view of a portion of the devices seen at Figure 1.

Figure 3 is a perspective view of a fragment of the product.

Figure 4 is a side elevation on a small scale of another form of padding and drying apparatus.

The webs or plies 10, 11, 12, 13, of which four are illustrated, although the product may comprise less or more than four webs, are passed simultaneously through a printing-press comprising printing-couples 14, whereby successive forms 15 are printed upon the webs, with the forms upon each web registering with those upon the other webs. From the printing-press the webs are led on to a padding apparatus, which superposes and pads the webs together while they remain in exact registry from the printing-press. Preferably, the composite web is padded along only one edge at 16, Figure 3, so that it may open out at the opposite edge for conveniently inserting the carbons.

To illustrate one method of padding or catching the plies together, there is shown a pasting roll 17 for applying adhesive material 18 to certain of the edges of the plies. This roll 17 may run in an aperture 19 in the bottom of a fount 20 in which the adhesive material 18 may be placed, and this fount and roll may be provided with any suitable heating device, for keeping the paste or adhesive material in proper fluent condition. In carrying out the invention in one way, the adhesive material may be applied only to the inner plies 11 and 12, as at Figures 1 and 2, the roll being made too thin to reach the outer plies 10 and 13. All of the plies at this stage are seen converging towards the feed-rolls 21 below the fount of adhesive material; suitable guide-rolls 22, over which the plies bend, being provided between the printing-press and the adhesive-material-applying roll 17. The feed-rolls 21 constitute pressing rolls for bring-

ing the adhesive-carrying edges of the plies into contact. As the plies contact, the adhesive material sticks all four plies together. The feed-rolls 21 may, if desired, be of sufficient length to press the plies together at their adhesive edges, to make the adhesion more firm; and, if desired, the rolls 21, 22, etc., may be heated, to hasten the drying of the adhesive material. It will be understood that the feed-rolls 21 need not be long enough to reach the pasted edges, and hence that the adhesive material may remain only upon the extreme edge of the composite web and not tend to spread across the faces of the plies, so that, after the web has been typed, the plies may be easily separated one from another.

However, if the feed-rolls 21 are used to press the pasted edges of the webs together, stationary stripping or cleaning knives 23 may be used for keeping the rolls clean from adhesive material; and, if desired, one or more couples of additional heating and feeding rolls 24 may be provided below the feed-rolls already mentioned. All of the driving rolls 21, 24, etc., may be suitably connected with the printing-couples of the printing-press, to secure proper speed of the composite web as it feeds through the padding and packaging apparatus.

To facilitate the drying of the padded web 25, it may be led under a guide-bar or roll 26 and looped up over a feed-roll 27, and then may be allowed to drop to form a second loop 28, whence it may rise to pass over a second feed-roll 29; and in this manner as many more loops as desired may be formed, by providing an additional feed-roll for each loop. These feed-rolls may co-operate with pressure-rolls 30, and may be connected to the rolls of the printing-press so as to give the requisite speed to the composite web 25 as it travels up and down the loops. The loops may be contained in a heated oven or drying closet 31, and the web may be passed around a roll 32 and led out from said closet and between suitable feeding rolls 33 to a zigzag cross-folding device 34, which may be of any suitable or known construction and operation, and thereby the padded web may be finally compacted into a package 35 convenient for marketing.

In use, the web may be placed in a box which may rest upon the floor close to the stand which supports the typewriting machine, and the web may be led up in open condition from said box to the typewriting machine; the thinness of the composite padded web and the elasticity of the dried adhesive material permitting the web to pass freely around the platen or rolls of the typewriting machine. The invention may be carried out in various ways, and is not limited to the precise method of padding or the precise product herein described by way of illustration; the principle of the invention being the padding of plies of web, which is coiled or reduced to a condition to be marketed in compact and available form.

In practicing the invention in the manner shown in Figure 4, the webs, in passing from the printing-couples 14 of the press, are assembled between feed-rolls 36 and pass down until their edges come in contact with a pasting roll 37, below which is arranged a couple of rolls 21 corresponding to the rolls seen in Figure 1; and in place of looping the padded web 25 up and down, as seen in Figure 1, it is carried to and fro horizontally upon endless traveling belts 38, 39, arranged in a heated drying oven or closet 40; the belts connected to run alternately in opposite directions, so that the web 25 runs to and fro in a zigzag path; suitable connections being made from the printing-press rolls to the rolls 38^a which carry the endless belts. From this drying closet 40, the web is led over feeding rolls 41 to a zigzag cross-folder 34 to produce the packaged product.

Variations may be resorted to within the scope of the invention, and portions of the improvements may be used without others.

Having thus described my invention, I claim:

1. The method of manufacturing a composite web for use in a typewriting machine, consisting in printing successions of forms upon a plurality of plies, assembling the plies with the forms in register, applying adhesive material to one set of edges of the assembled plies to form a padded web, and reducing the composite web to a compact multiple-layer form or coil.

2. The method of manufacturing a composite web for use in a typewriting machine, consisting in printing successions of forms upon a plurality of plies, assembling the plies with the forms in register, applying adhesive material to one set of edges of the assembled plies to form a padded web, drying the adhesive material, and reducing the composite web to a compact multiple-layer form or coil.

3. The method of manufacturing a composite web for use in a typewriting machine, consisting in printing successions of forms upon a plurality of plies, assembling the plies with the forms in register, padding the plies together, and coiling the product.

4. The combination with a printing-press having a plurality of printing-couples to print simultaneously upon separate plies, of means for assembling the printed plies

with the respective forms in registry with one another, and means for padding the plies when so assembled to form a composite web.

5. The combination with a printing-press having a plurality of printing-couples to print simultaneously upon separate plies, of means for assembling the printed plies with the respective forms in registry with one another, means for padding the plies when so assembled to form a composite web, and means for coiling the web.

6. The combination with a printing-press having a plurality of printing-couples to print simultaneously upon separate plies, of means for assembling the printed plies with the respective forms in registry with one another, means for applying padding adhesive material to one set of edges of the assembled plies, means for drying the adhesive material and means for coiling the composite web.

7. The combination with a printing-press having a plurality of printing-couples to print simultaneously upon separate plies, of means for assembling the printed plies with the respective forms in registry with one another, means for applying padding adhesive material to one set of edges of the assembled plies, and means for drying the adhesive material, said drying means comprising means for feeding the plies alternately in opposite directions while maintaining alternate runs separated, each from the other.

8. The combination with a printing-press having a plurality of printing-couples to print simultaneously upon separate plies, of means for assembling the printed plies with the respective forms in registry with one another, means for applying padding adhesive material to one set of edges of the assembled plies, and means for drying the adhesive material, said drying means comprising an oven and means for feeding the plies in opposite directions therethrough while maintaining the alternate runs separated, each from the other, so as to be exposed to the heat.

9. The combination with a printing-press having a plurality of printing-couples to print simultaneously upon separate plies, of means for assembling the printed plies with the respective forms in registry with one another, means for applying padding adhesive material to one set of edges of the assembled plies, and means for drying the adhesive material, said drying means comprising a series of endless belts over which the web is led in a zigzag path.

10. The combination with a printing-press having a plurality of printing-couples to print simultaneously upon separate plies, of means for assembling the printed plies with the respective forms in registry with one another, means for applying padding adhesive material to one set of edges of the assembled plies, means for drying the adhesive material, said drying means comprising a series of endless belts over which the web is led in a zigzag path, and means to drive the belts in opposite directions.

11. The combination with a printing-press having a plurality of printing-couples to print simultaneously upon separate plies, of means for assembling the printed plies with the respective forms in registry with one another, means for applying padding adhesive material to one set of edges of the assembled plies, means for drying the adhesive material, said drying means comprising a series of endless belts over which the web is led in a zigzag path, and means to drive the belts in opposite directions, said driving means connected to the printing-press to secure the required speed of travel for the belts.

12. The combination with means for simultaneously printing a series of separate web plies, of means for assembling the plies with the printed forms in register, means for padding the edge of the web so composed, and means for coiling the web.

13. The combination with means for simultaneously printing a series of separate web plies, of means for assembling the plies with the printed forms in register, means for padding the edge of the web so composed, means for drying the web, and means for coiling the web.

14. Means for producing a composite multiple-ply padded continuous web with successions of forms upon the several plies for typewriter use, with the printed forms of each ply registering with the others, comprising, in combination, a printing-press having a plurality of printing-couples to print simultaneously and in unison upon the separate plies, means operatively associated with the printing-couples for assembling the plies with the respective forms in registry with one another, and means also connected to operate with the printing-couples, for padding the plies when so assembled to form a composite web with the padding-adhesive holding each ply to the next by only one edge portion, to permit subsequent insertion of a carbon-sheet between such plies.

JESSE A. B. SMITH.

Witnesses:
CATHERINE A. NEWELL,
JENNIE P. THORNE.