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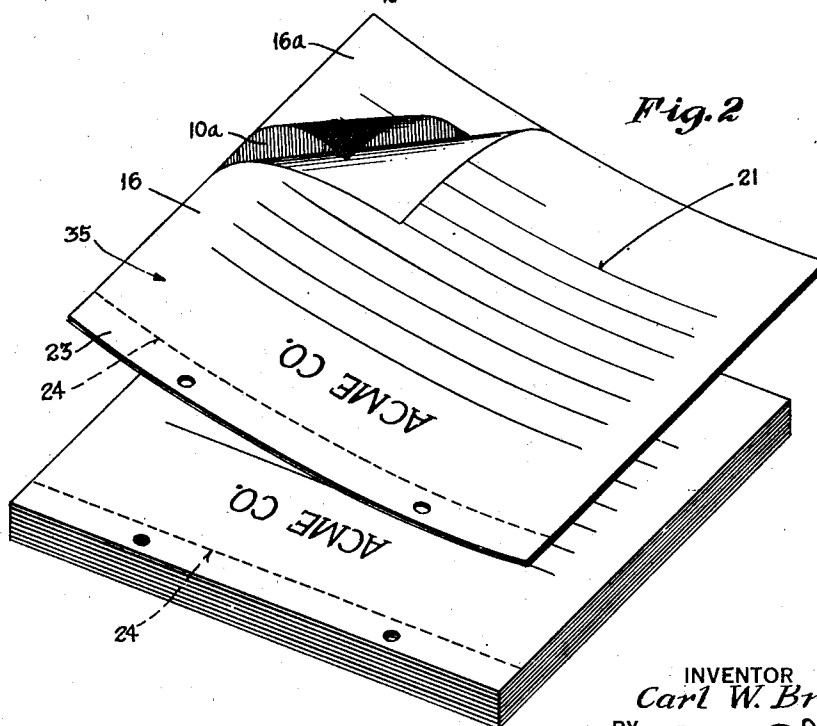
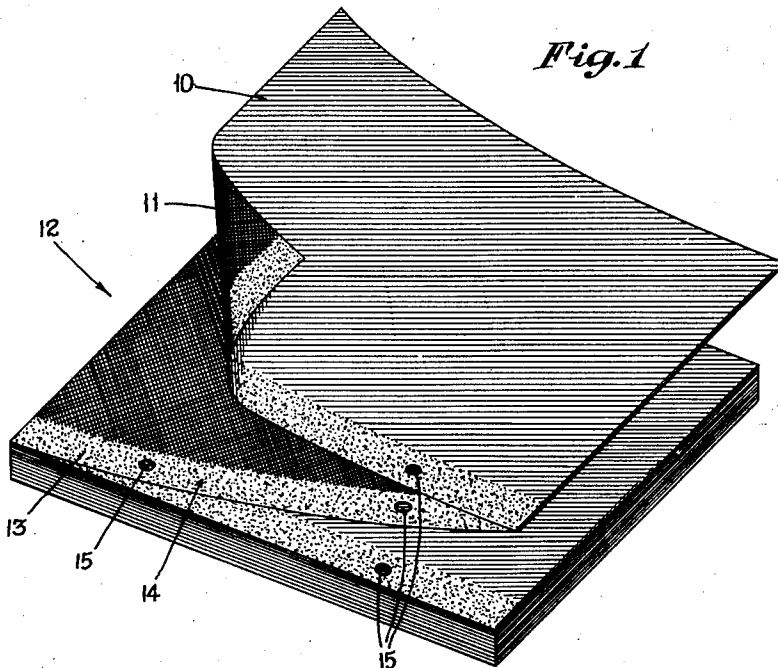
C. W. BRENN

2,260,601

MANIFOLDING

Original Filed May 19, 1938

3 Sheets-Sheet 1



INVENTOR
Carl W. Brenn
BY *Arthur E. Johnson*
ATTORNEY

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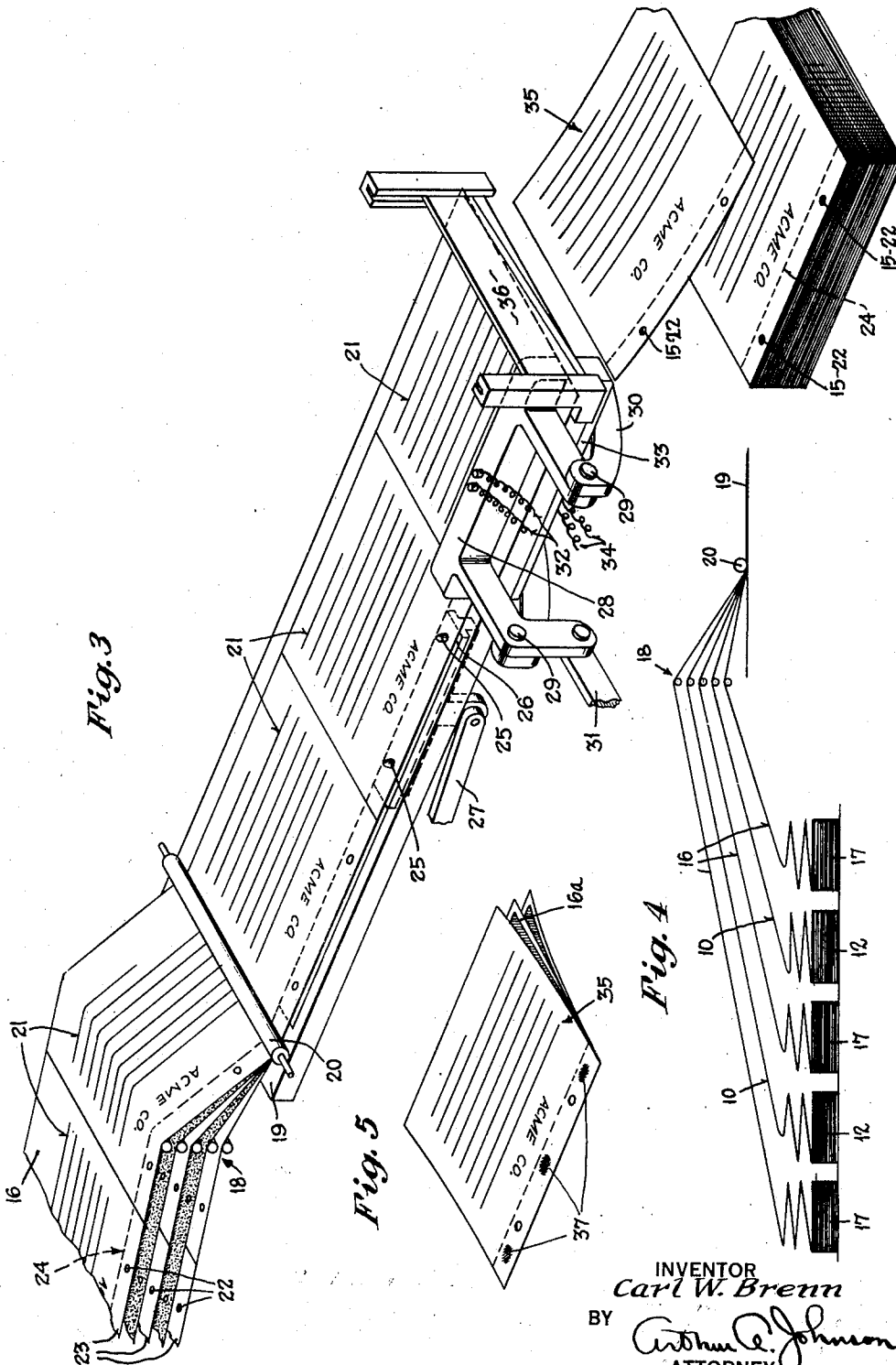
C. W. BRENN

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MANIFOLDING

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3 Sheets-Sheet 2



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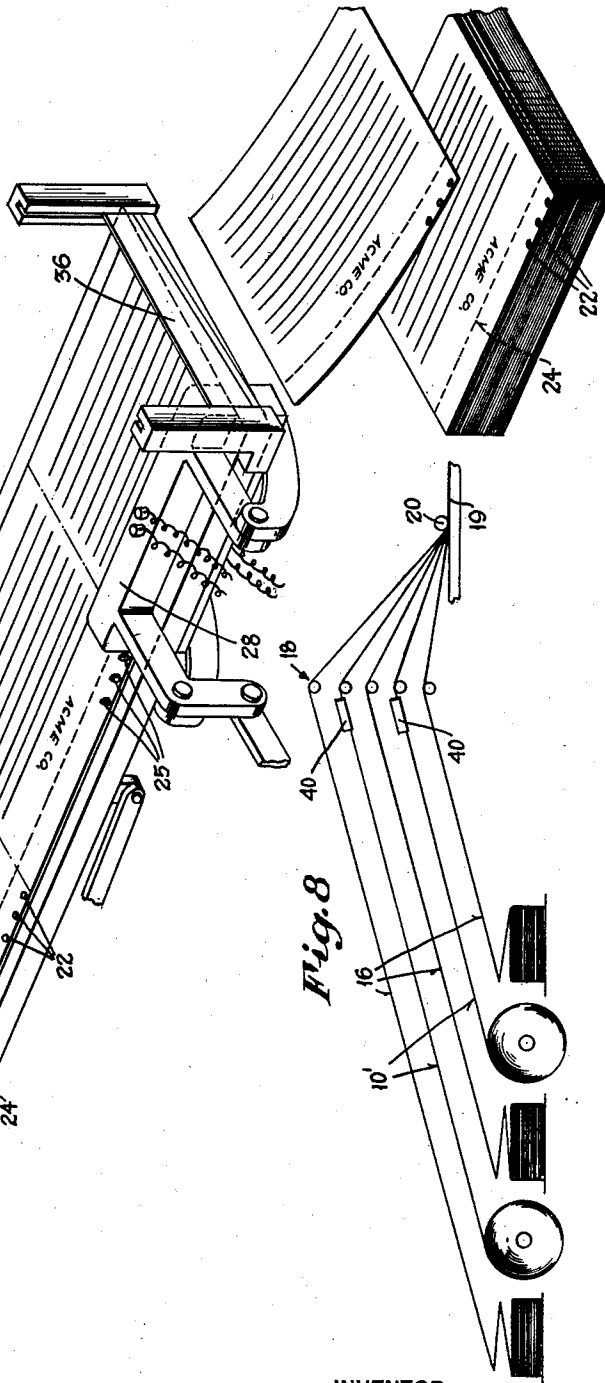
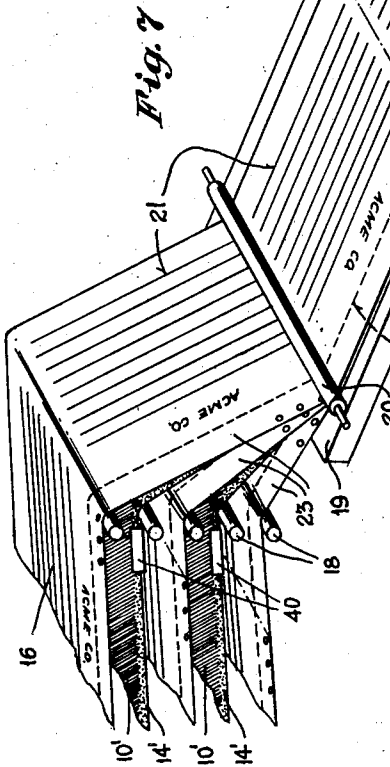
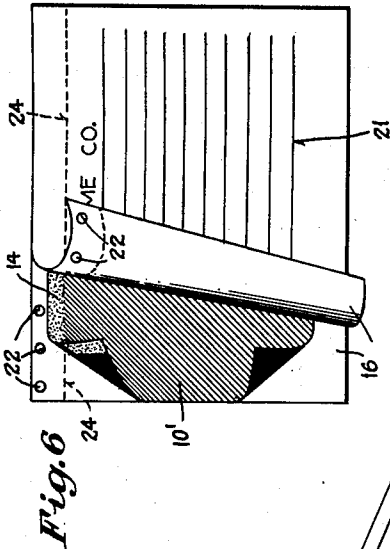
C. W. BRENN

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MANIFOLDING

Original Filed May 19, 1938

3 Sheets-Sheet 3



INVENTOR
Carl W. Brenn
BY *Arthur E. Johnson*
ATTORNEY

UNITED STATES PATENT OFFICE

2,260,601

MANIFOLDING

Carl W. Brenn, Montclair, N. J., assignor to Auto-graphic Register Co., Hoboken, N. J., a corporation of New Jersey

Original application May 19, 1938, Serial No. 208,795. Divided and this application October 28, 1938, Serial No. 237,375

16 Claims. (Cl. 270—52)

This application is a division of my copending application Serial No. 208,795 and relates to the method and apparatus for making manifolding material, and, more particularly, collated sets of record and carbon sheets.

Heretofore it has been proposed to collate continuous printed record strips with interleaved carbon strips, secure the strips together, and cut the strip into sheet-lengths for use. The record strips usually have along one margin a weakening line constituting a stub or binding margin within which the strips may be secured together, and along which weakening line the record sheets may be torn when it is desired to remove the record sheets from the carbon sheets after the writing operation has been performed.

Various means for securing the collated carbon strips and record strips have been proposed, including wire staples going through the pile of strips in the binding margins, and adhesives applied to the binding margin as the strips are being collated and before they are cut into sheet-lengths. It has been difficult, when applying adhesive to paper strips to secure them together, to have the adhesive applied in just the right quantity and at just the right degree of wetness, with the result that some of the sheets would adhere together satisfactorily while others would not. Yet, it is decidedly preferable, in many situations, to fasten the strips with an adhesive rather than with staples.

The present invention contemplates the securing of the strips together by a dry adhesive, which is caused to adhere to the strips as a result of being heated rather than as a result of being wetted, as is the common practice. This avoids the use of water or wet adhesives on or in the vicinity of the collating machine, and enables the collating, the registering, and finally the cutting of the strips into form-lengths to be performed without the messiness attendant upon the use of water and wet adhesive on or about a machine of this kind.

The adhesive material used preferably is such that it is rendered tacky when heated to temperatures in excess of body temperature and in the particular form of the invention herein disclosed, the adhesive for securing the strips together is applied to the carbon or transfer strips, preferably while coating these strips with carbon. For this purpose, the carbon strip is usually left with one or more uncoated margins, and the heat-set adhesive is applied to the uncoated margin in a wet state with such a vehicle or solvent as will dry rapidly. The adhesive is preferably

of the type which is not tacky and which is impervious to water.

With this new article of manufacture consisting of a continuous strip coated with transfer material and having areas thereof provided with a dry adhesive, it is merely necessary, in making the collated sets of the record and transfer sheets, to collate the strips and bring them into register and then, while in registration, to apply heat to the pile of strips so that the adhesive on the carbons becomes activated and adheres to the adjacent record strip. By applying the adhesive to both the face and the back of the carbon strip, the carbon strip itself becomes the binding unit for holding together the record strip above it and below it, and it is immaterial how many carbon strips and record strips are contained within the pile, so long as sufficient heat can be applied to activate the adhesive material carried by the carbon strips.

The present invention also provides for apparatus for collating, registering, and cutting off the assembled record and carbon strips, with provision being made for applying heat to the piles of strips, either localized to portions of the binding margins or to the entire surface of the binding margin.

The adhesive material employed may be of any suitable kind. For instance, it may consist of a thermoplastic lacquer containing a solvent or vehicle which quickly evaporates and leaves the coating of thermoadhesive material dry and impervious to water or moisture. Since it can be applied to the carbon strip in the carbon-coating machine, its manufacture becomes a simple matter, because operators of carbon-coating machines are familiar with coating processes and can regulate, with considerable skill and certainty, the quantity of adhesive applied to the carbon strip, and practically the only additional cost in the manufacture of the carbon strip of the present invention is the cost of the adhesive material itself.

In the broader aspects of the invention, the adhesive, applied to the carbon strip and dried, may be of the water-soluble type without losing all of the advantages above referred to. It is true that, if the adhesive is of the water-soluble type, it must be moistened as it goes to the collating machine, but then, the mere moistening of the strip is better than an attempt to apply the adhesive at the collating machine; and, by applying the adhesive to the carbon, as when coating the strip with transfer material, the quantity of adhesive applied may be controlled

with accuracy. Likewise, other forms of adhesive may be used with more or less advantage, depending upon the particular circumstances, provided it is applied to the carbon strip before any attempt is made to collate the carbon strip with record strips.

Other features and advantages will hereinafter appear.

In the accompanying drawings—

Figure 1 is a perspective view of the improved carbon strip of the present invention.

Fig. 2 shows a pile of manifolding sets made according to the present invention, with one manifolding set falling in place on the pile.

Fig. 3 is a perspective view, showing the manner in which the records and carbons are assembled, registered and fed, pressed into adhering relation, and cut off into sheet-lengths.

Fig. 4 is a diagrammatic view, showing the record and carbon strips being led from individual zigzag folded piles to the collating machine shown in Fig. 3.

Fig. 5 is a perspective view of a manifolding set made according to the present invention, in which the records and carbons are caused to adhere to each other at limited zones of attachment.

Fig. 6 is a view of a manifolding set partially rolled back and showing the relation of the carbon sheet and record sheets.

Fig. 7 is a view similar to Fig. 3 showing another form of the invention.

Fig. 8 is a diagrammatic view similar to Fig. 4, showing the form of the invention shown in Fig. 7.

The carbon strip claimed in said copending application comprises a long continuous strip 10 of paper, or other suitable fabric, coated, usually on one side only, with carbon or transfer material 11, and folded at predetermined intervals along transverse lines to make a zigzag folded pile 12. One longitudinal margin 13 of the carbon strip is left uncarbonized, and on this longitudinal margin there is provided, by any suitable method, a coating of adhesive material 14. This coating of adhesive material may be applied to the strip 10 at the same time the strip is provided with the coating of transfer material 11, and preferably the adhesive material 14 is provided on both the front and back of the carbon strip. The adhesive 14 is dried before the strip is zigzag folded, and the zigzag folded pile 12 is stored in this condition until it is to be collated with the record strips.

The adhesive 14, as stated above, may be of any suitable kind. It may be water-soluble, in which case it is merely necessary to wet it just prior to collating the carbon strip with record strips. Preferably, however, the adhesive 14 is of a kind which, while dry and nontacky, may be activated by pressure and/or heat, so that when the carbon strip is collated and brought into registration with record strips, it is merely necessary to press, or to press and heat, the adhesive 14, thereby causing it to adhere to the record strip material with which it is in contact. Preferably, a thermoplastic adhesive is used, requiring only heat in excess of body heat with sufficient pressure to bring the carbon strip into intimate contact with the record strips, and such an adhesive material is in the form of a thermoplastic lacquer having a highly volatile vehicle, so that when the adhesive is applied to the carbon strip in the making of the latter, the vehicle will quickly evaporate, leaving the ther-

moplastic lacquer on the marginal portion of the carbon strip, and in dry and nontacky condition.

The strips and packs formed therefrom, as the adhesive material is not affected by temperatures approximating body temperature, may be handled without danger of the adhesive becoming tacky and adhering to the handler's fingers or to adjacent portions of the strip or pack.

In any event, by stripping the carbon strip with the adhesive 14 while coating the strip with transfer material 11, the quantity of adhesive contained by the carbon strip may be very accurately determined, so that neither too much nor too little adhesive material is carried by the carbon strip. By applying the coating of adhesive to the carbon strip simultaneously with the coating of the strip with carbon or transfer material 11, the same coating machine operator may attend to both the carbon coating and the adhesive coating.

Of course, if desired, the carbon strip 10 may be supplied in roll form rather than in zigzag folded pack form, as shown in the accompanying drawings.

In addition to having the adhesive 14 in the longitudinal margin 13 of the carbon strip, this margin also has apertures 15 predeterminedly spaced throughout its length. Depending upon the way in which the carbon strip is collated with record strips, these apertures may be used for feeding a superposed pile of record and transfer strips, or they may be used merely for registering the carbon strip with the record strips. Preferably, the apertures 15 are used both for registering and feeding the carbon strip with the record strips.

When it is desired to collate the carbon strips 10 with the record strips 16 to make the manifolding sets claimed in said copending application, the zigzag folded piles 17 of record strips are placed in a row, and interposed between them are placed the piles 12 of carbon strips, as shown in Fig. 4. The ends of the strips 10 and 16 are then led over guide rollers 18 and from thence on to a collating table 19 where they are in superposed position, being held down by a pressure roller 20.

The record strips 16 have printed forms 21, and in one longitudinal marginal portion have apertures 22 in predetermined and definite relation with regard to the printing on the forms. This apertured binding margin 23 of the record strips 16 is defined by a longitudinal line of weakness 24.

The superposed pile of record and carbon strips may be brought together in registration on the collating table by any suitable means, preferably by bringing the registering apertures 15 in the carbons and 22 in the records all into alignment with each other.

This may be done conveniently by providing a pair of pins 25, as shown in the accompanying drawings, which project up through the records and carbon strips and substantially fit the apertures to thereby bring the records, and carbons into registration. Having been brought into registration, the pile of strips may be advanced in any suitable way along the collating table 19. Here, again, the pins 25 may be employed, and for this purpose they are preferably mounted on a carriage 26 having an actuating link 27 by means of which they may be reciprocated along the paper table. Any suitable mechanism for withdrawing the pins from the pile, returning the pins to starting position, projecting them

through the pile again, and advancing them, may be employed. The pins 25 and carriage 26 advance the superposed pile form-length intervals intermittently, so that the pile of strips may be caused to adhere together and may be severed into sheet-lengths.

To cause the carbons and records, or at least a binding marginal portion thereof, to be brought to intimate contact, the collating table preferably has a pressure device 28 which may be pivoted at 29 to the frame 30, and which has an actuating link 31 by means of which it is raised from and pressed down upon the pile of strips. When the adhesive 14 is of the kind which is thermoplastic, the pressure device 28 is heated preferably by electrical resistance coils to which current is fed by wires 32. Also, to facilitate the heating of the pile of records and carbon strips, a heating device 33 may be incorporated in the table 29, and this also has wires, as, for instance, wires 34, carrying current to it. The record and carbon strips are cut off into manifolding sets 35 by a guillotine or other suitable form of knife 36 operated in any suitable way.

The mechanism of the machine is so coordinated that when the pile of strips has been advanced by the pins 25, the latter remain in strip-holding position until the presser 28 presses down on and firmly engages the strips at the binding marginal portions thereof. As shown, one form, in advance of the form engaged by the pins, is the one which is engaged by the presser, and thus it will be seen that the record and transfer strips are in accurate registration at the time that they are caused to adhesively engage each other. After the presser 28 engages the pile of record and transfer strips, the knife 36 may be operated to cut off a manifolding set 35, and the pins 25 may recede and return to position to again feed the forms.

It should be noted at this point that since the carbon strip has the adhesive 14 on both its front and back, when it is pressed into intimate contact with the overlying and underlying record strips, it itself constitutes the medium for uniting the upper and lower record strips, and that it is immaterial how many record and transfer strips are superposed in the pile, so long as sufficient heat may be applied to the adhesive-containing margins of the pile to make it effective. The adhesive could, of course, be applied to the binding margin of the record strips, but in this case the uppermost strip would be coated with adhesive only on the underside, the intermediate strips would be coated on both the upper side and the underside, and the bottom strip would be coated only on the upper side, and hence it would be necessary to know in advance and to carefully see that each record strip was proper according to the position which it is to take in the pile. With the carbon strip coated on both sides with adhesive as above described, it is immaterial what order the carbon strips have in the pile, and any of the record strips may be made the top one or the bottom one or the intermediate ones, since there is always one carbon strip between two record strips.

Preferably, the presser 28 engages the entire binding margin 23 and 13 of the record and carbon respectively, so that, in the manifolding set 35, the entire margin 23 is secured together as a laminated pile. However, if desired, the adhesive may be activated only in spots, diagrammatically indicated by the shaded areas 37 in Fig. 5. In this case, of course, the presser 28 would have re-

stricted areas of contact with the pile, depending upon the size and position of the spots 37.

As is common practice, the carbon strip 10 is narrower than the record strips 16, so that the record sheets 16a of the manifolding set 35 project beyond the carbon sheets 10a. With this arrangement, after writing is performed on the manifolding set 35, the record strips are grasped at their projecting margins with one hand while the binding margins 23 are grasped by the other hand. By pulling the hands apart, the record sheets 16a will sever from the binding margin along the lines of weakness 24, leaving the carbon sheets 10a secured together by the binding margin and the record sheets 16a free of interleaved carbon material. The feeding and registering of the record strips with the relatively narrow carbon strip is greatly facilitated by the provision of the feeding and registering holes 15 and 22 in the carbons and record strips respectively.

As shown herein, the lines of writing in the forms 21 extend longitudinally of the strips, placing the binding margin 23 at the top of the form. This is a very satisfactory way of arranging the manifolding material, especially where the writing operations are to be performed on the typewriter. However, it should be understood that the forms may extend transversely of the strips if desired. By having the apertures 15 and 22 extending through the strips, the pile of strips may be brought to desired position on the typewriting machine, or other writing device, by well-known means, including aligning or registering pins.

In the form of the invention shown in Figs. 6, 7 and 8, the carbon strip 10' is narrower and does not have any registering apertures therein but is provided only with a narrow band of adhesive material 14' on both sides of the strip along the longitudinal margin.

With the registering apertures omitted from the carbon strip, one operation on the strip is eliminated in the preparation thereof and the coating of adhesive, either of the thermoplastic or water-soluble type, can be applied to the margin strip at the same time the coating of carbon is applied, and the strips packaged in roll or zigzag folded pack form.

The record strips 16, in this form of the invention, have printed forms 21 thereon and have a binding margin 23 defined by a perforated tear line 24 with registering apertures 22 formed in the binding margin as in the form of the invention first above described. In the form of the invention shown in these figures, the binding margin is unutilized for a major portion of the length of each form, as the registering apertures are relatively closely spaced and positioned in the corner of each form adjacent the side margin of the strip as shown in Figs. 6 and 7.

The apertures in each form-length cooperate with the registering pins 25 and associated mechanism to register and feed the record strips as in the previously described form of the invention.

When it is desired to collate the record strips and carbon strips, the supplies of zigzag folded record strips and rolls of prepared carbon strip are disposed as shown in Fig. 8, and the strips led therefrom over the guide rollers 18 to the collating table 19 to be held thereon by the pressure roller 20.

As shown in Figs. 6 and 7, the adhesive margin of the carbon strip is narrower than the binding margin of the record strips. When the strips are fed onto the collating table, the carbon strips are

disposed with relation to the record strips so that the adhesive-containing margin on the carbon strip lies in the zone between the registering apertures in the record strips and the line of perforations. This is clearly shown in the view of a manifolding set folded back in Fig. 6.

In starting the collating operation, the strips are assembled with the carbon sheet properly positioned in the pile so that the adhesive margin lies in the desired zone in the binding margin of the strips. The first set is caused to adhere together and thus hold the leading ends of the carbon strips in place. Adjacent the rollers 18 are guide means 40, one for each carbon strip, which are adjusted by suitable means to engage the edge of the carbon strips and properly locate them with respect to the lateral margin of the record strips as they are fed along so that they lie in the desired zone in the binding margin and do not overlie the registering apertures in the record strips.

The assembled pile of strips are caused to adhere together as by having heat and pressure applied to the binding margins thereof while on the collating table by the heating device 28 and its associated mechanism, after which the sets are severed from the continuous strips by a cutting means 36 as in the previously described form of the invention.

Variations and modifications may be made within the scope of this invention and portions of the improvements may be used without others.

I claim:

1. The herein described method of making manifolding material, the steps of applying thermo-active adhesive to both faces of a transfer strip along the margin thereof, permitting said adhesive to dry so that said strip may be handled, interleaving the transfer strip with a plurality of record strips so that the margins of the record strips engage the dried adhesive carried by the margin of the transfer strip, and applying heat and pressure to the margins to secure the strips together as a unit.

2. The herein described method of making manifolding material, the steps of applying thermoplastic adhesive to both faces of a transfer strip along the margin thereof and drying the same so that said strip may be stored, subsequently interleaving the transfer strip with a plurality of record strips so that the record strips engage the adhesive-carrying margin of the transfer strip, and applying heat and pressure to the margins of the interleaved strips to cause the thermoplastic adhesive to adhere the record strips to the transfer strip.

3. The herein described method of making manifolding sets which consists of preparing continuous printed record strips with registering and feeding apertures along one longitudinal margin, preparing continuous carbon strips with registering and feeding apertures along one marginal portion and with dry thermoplastic adhesive material in said apertured marginal portion on both the front and the back of the carbon strips, interleaving said record and carbon strips in superposed relation with the apertured marginal portions over one another, registering said strips by means of said apertures, intermittently advancing said strips sheet-length intervals, and, between said feeding operations and while the strips are held in registration, pressing the apertured margins of the record and carbon strips together while applying heat thereto to cause the carbon strip to adhere to the adjacent un-

derlying and overlying record strips, and at the same time cutting off a previously secured-together sheet-length of said strips.

4. The herein described method of making manifolding material, the steps of forming spaced apertures along a margin of a continuous transfer strip, applying thermo-active adhesive to both faces of the strip along a margin thereof and allowing the adhesive to dry so that said strip may be folded and stored, subsequently forming a plurality of continuous record strips with corresponding apertures along a margin thereof, interleaving the transfer strip and record strips with the apertured margins in superposed relation, registering the strips by means of said apertures, and applying heat and pressure to the apertured margins of the strips to cause the record strips to be adhered together and to the transfer strip.

5. The herein described method of making manifolding material, the steps of forming spaced apertures along a margin of a continuous transfer strip, applying adhesive to both faces of the strip along said margin and allowing the adhesive to dry so that said strip may be folded and stored, subsequently forming a plurality of continuous record strips with corresponding apertures along the margin thereof, interleaving the transfer strip and record strips with the apertured margins of the strips in superposed relation, registering the strips by means of said apertures, and applying heat and pressure to the apertured margins of the superposed pile of strips to adhere the record strips together and to the transfer strip.

6. In a machine for making manifolding material, means for collating a plurality of record and transfer strips, means for registering said superposed strips, means for feeding the registered superposed strips, and means for applying sufficient heat to a margin of the strip to cause a dry thermoplastic adhesive previously applied to and carried by a margin of the transfer strip to be made effective to adhere the record strips together and to the transfer strip.

7. In a machine for making manifolding material, the combination of a table upon which a plurality of record and transfer strips are collated, means for guiding said strips to the table, means for registering the strips depthwise in superposed relation, means for feeding the registered superposed strips, and means on the table for applying sufficient pressure to a marginal portion of the collated strips to cause a dry adhesive previously applied to and carried by a margin of the transfer strip to be effective to adhere the record strips together and to the transfer strip.

8. In a machine for making manifolding material, the combination of a table upon which a plurality of record and transfer strips are collated, means for guiding said strips to the table, means for registering the strips in superposed relation, means for intermittently feeding the registered strip a predetermined distance, and means on the table to apply pressure to the strip during the intermission of the feed to cause an adhesive carried by the transfer strip to be made effective to adhere to the record strips and thereby secure the record strips together and to the transfer strip.

9. In a machine for making manifolding material, the combination of a table upon which a plurality of record and transfer strips are collated, means for guiding said strips to the table, means for registering the strips in superposed

relation, means for intermittently feeding the registered strip a predetermined distance, and means on the table to apply heat and pressure to the strip during the intermission of the feed to cause a dry thermoplastic adhesive carried by both faces of the transfer strip to be made effective to adhere to the record strips and thereby secure the record strips together and to the transfer strip.

10. In a machine for making manifolding sets, the combination of a table upon which a plurality of record and transfer strips are collated, means for guiding said strips to the table, means for registering the strips in superposed relation, means for intermittently feeding the registered strip a predetermined distance, means on the table operable during intermission of the feed to apply pressure to a portion of the superposed pile of strips to cause an adhesive carried by the transfer strip to adhere the record strips together and to the transfer strip, and means operative after the strips have been caused to adhere together and before resumption of feed for severing the strips into sheet-length units.

11. In a machine for making manifolding sets, the combination of a table upon which a plurality of record and transfer strips are collated, means for guiding said strips to the table, a reciprocating paper feed device on the table comprising pin means for engaging feeding and registering apertures in the record and transfer strips and adapted to feed said strips sheet-length intervals, means on the table for applying heat to a portion of the strip to cause an adhesive carried by the transfer strip to be made effective to adhere to the record strips and thereby secure the strips to the pile together, said means being operative while said pin means holds the strips in registration; and means for severing the strips into sheet-length units after they have been caused to adhere together.

12. In a machine for making manifolding material, the combination of a table upon which a plurality of apertured record and transfer strips are collated, means for guiding the strips to the table, means for feeding the collated strips comprising a pin for engaging the apertures to feed and register the record and transfer strips, said pin being adapted to feed the collated strips sheet-length intervals, and means on the table for applying sufficient pressure to a marginal portion of the collated strips to cause a dry adhesive previously applied to and carried by a

margin of transfer strip to be effective to adhere the record strips together and to the transfer strip, said means being operable while the pin of the feeding means holds the strips in registered relation.

13. In the herein described method of preparing a continuous transfer strip to be subsequently interleaved with continuous record strips in the manufacture of manifolding packs, the steps of applying thermo-active adhesive to both faces of one marginal edge of the transfer strip, allowing the adhesive to dry, and collecting the transfer strip into a package for storage.

14. In the herein described method of forming adhesive transfer strips for making manifolding material, the steps of applying thermo-active adhesive to both faces of one marginal edge of the transfer strip, allowing the adhesive to dry, and zigzag folding the transfer strip into a pack preparatory to interleaving the same with record strips to form manifolding material.

15. In the herein described method of making manifolding material, the steps of applying thermo-active adhesive to both faces of one marginal edge of a transfer strip, allowing the adhesive to dry, collecting the continuous strip into a package, subsequently interleaving a plurality of the transfer strips with a plurality of record strips, pressing the adhesive-carrying edge of the transfer strips into intimate contact with the overlying and underlying edge portions of adjacent record strips while applying heat thereto to cause said transfer strips to cohere to the underlying and overlying record strips, and cutting said secured together strips into sheet-lengths.

16. The herein described method of manifolding sets which consists in applying along one longitudinal edge of a continuous carbon strip thermoplastic adhesive material on both the front and back of said strip, storing the so-coated carbon strip until the manifolding sets are to be made, interleaving the continuous carbon strip with continuous record strips, collating and registering the record strips and carbon strips, pressing the adhesive-carrying edge of the carbon strips into intimate contact with the overlying and underlying edge portions of the record strips while applying heat thereto to cause said carbon strip to adhere to the underlying and overlying record strip, and cutting said secured together strips into sheet-lengths.

CARL W. BRENN.

CERTIFICATE OF CORRECTION.

Patent No. 2,260,601.

October 28, 1941.

CARL W. BRENN.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 1, second column, line 15, after "and" insert --one--; line 24, for "piles" read --pile--; page 5, first column, line 37, claim 11, for "strips to" read --strips of--; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 23rd day of December, A. D. 1941.

(Seal)

Henry Van Arsdale,
Acting Commissioner of Patents.