

Sept. 23, 1924.

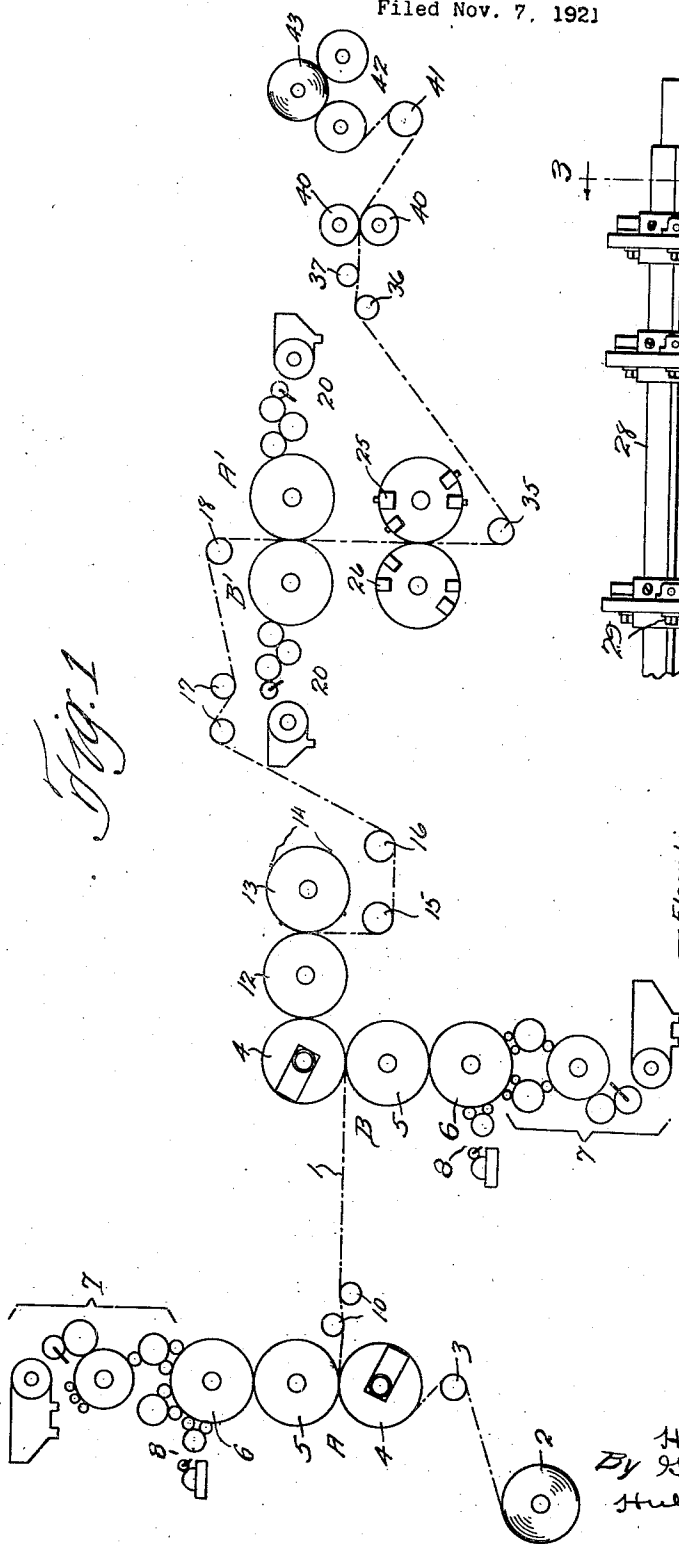
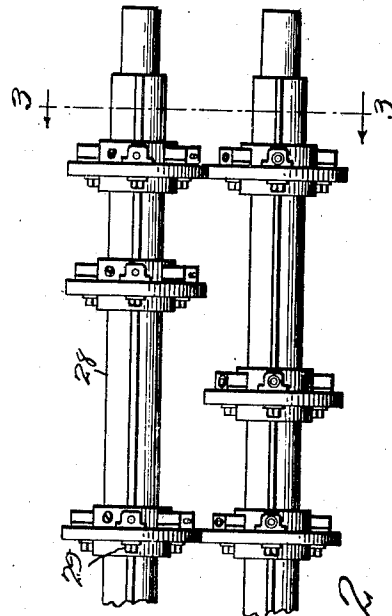
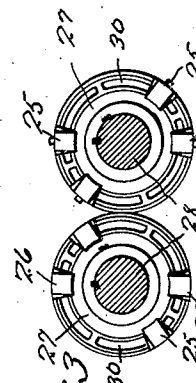
H. E. MURRAY ET AL

1,509,525

METHOD OF AND APPARATUS FOR PRODUCING MANIFOLD CONTINUOUS FORMS

Filed Nov. 7, 1921

2 Sheets-Sheet 1



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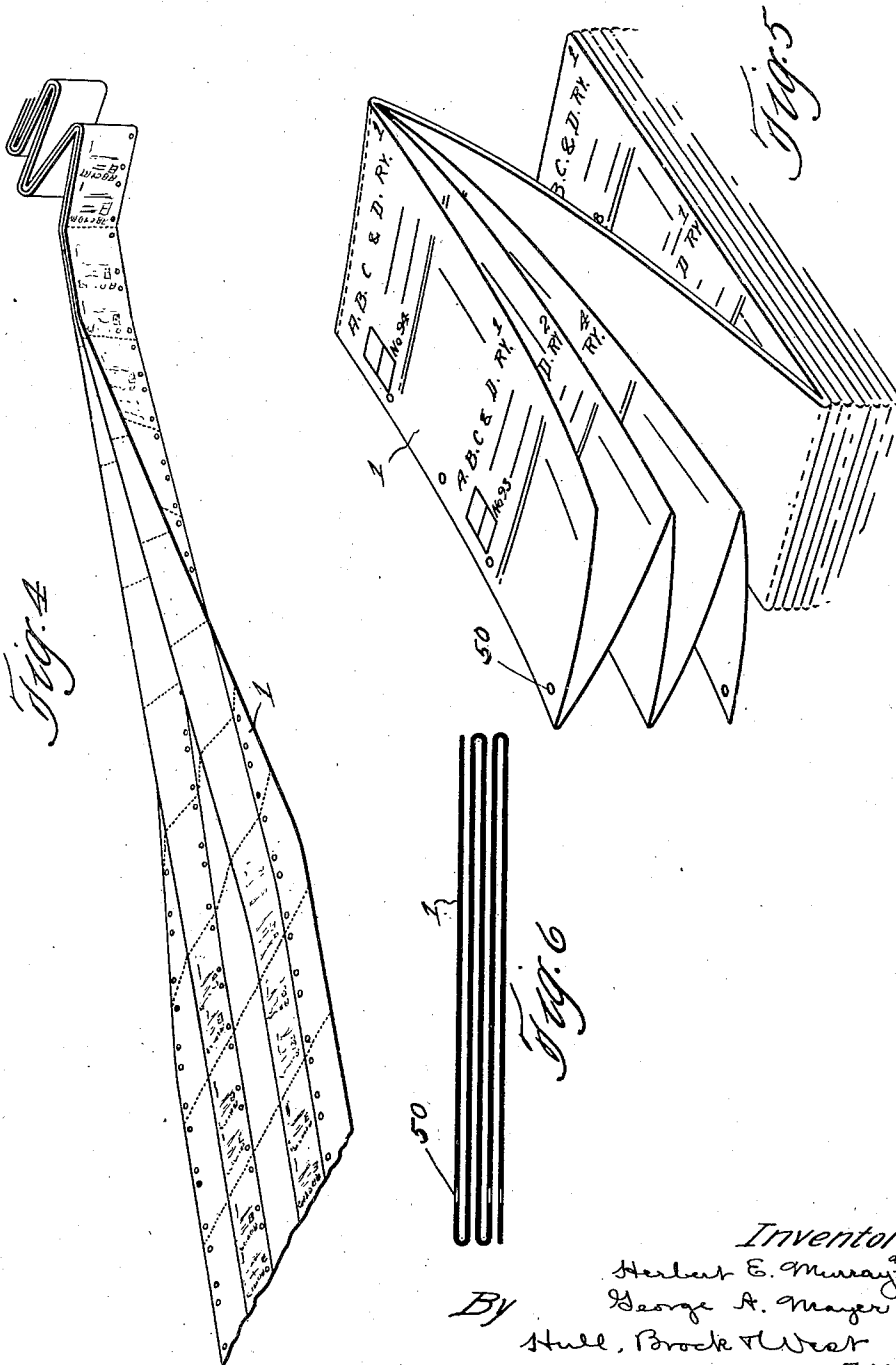
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UNITED STATES PATENT OFFICE.

HERBERT E. MURRAY, OF EAST CLEVELAND, AND GEORGE A. MAYER, OF LAKEWOOD, OHIO, ASSIGNORS TO THE MANIFOLD PRINTING COMPANY, OF CLEVELAND, OHIO, A CORPORATION OF OHIO.

METHOD OF AND APPARATUS FOR PRODUCING MANIFOLD CONTINUOUS FORMS.

Application filed November 7, 1921. Serial No. 513,326.

To all whom it may concern:

Be it known that we, (1) HERBERT E. MURRAY, (2) GEORGE A. MAYER, citizens of the United States, residing at (1) East Cleveland, 5 (2) Lakewood, in the county of Cuyahoga and State of Ohio, have invented a certain new and useful Improvement in Methods of and Apparatus for Producing Manifold Continuous Forms, of which the following is 10 a full, clear, and exact description, reference being had to the accompanying drawings.

This invention relates to the art of printing and has to do more particularly with improvements in printing presses of the so-called rotary type for printing what are 15 known as manifold continuous forms, and to a process practiced upon the press and under which said forms are produced.

Among the several objects of the invention 20 are the production of a printing press of the aforesaid class wherein a plurality of printing couples, used to produce definitely related impressions upon a web of paper, are so disposed to each other as to enable 25 an operator to apply the plates or other printing devices to the cylinders of the respective couples from a single position, thereby affording convenience in setting up the matter within the press and greatly 30 facilitating the adjustment of the plates or other printing devices on the respective cylinders so that the impressions from one cylinder will be properly related to the impressions produced by the other cylinder; to 35 provide a press of the aforesaid class wherein the various guides, printing couples, and other equipment performing operations upon the paper are so arranged as to afford 40 a comparatively straight and short course for the web through the press, thus facilitating the "threading" of the press, avoiding undue stretching of the paper, and reducing the liability of tearing the web since, by 45 in such lengths and to such positions as would subject it to the danger of things striking it; to provide a press of the aforesaid character wherein printing by both the "offset" and "direct" methods may be simultaneously practiced; to provide a press 50 whereon manifold continuous forms are produced and which is equipped with punching dies that are capable of being adjusted and

individually rendered inoperative so that any given ones of a set of forms may be 55 punched while the others are left intact, the punching equipment being very convenient of manipulation and readily accessible so that changes in arrangement of the punching may be readily effected. 60

As to the manifold continuous forms, it will be understood that these consist of a plurality of superposed strips of blank 65 forms that are folded throughout their lengths in zigzag fashion on transverse lines to render them compact, convenient of handling, and suitable for use in continuous 70 billing machines—a style of typewriter designed especially for the writing of forms of this character.

The present approved method of producing manifold continuous forms consists in impressing or printing the matter constituting the forms in longitudinal columns on 75 reverse sides of a web of paper, the columns on one side alternating with those on the other so that when the web is subsequently folded, preferably in zigzag fashion, along 80 lines separating adjacent columns appearing on reverse sides of the web, the forms of each column will properly register with those of the others and all forms will face in the same direction. The corresponding 85 forms of the various strips or columns are known as a set of forms, each set being a duplicate of all the others, although it will be understood that all forms of each set need not be identical in every particular, the use 90 to which the individual forms are to be put determining the exact nature thereof. However, all forms of a set are alike as to the blanks which are to be filled in. Therefore, proper registry of the forms is essential.

After folding the web along longitudinal 95 lines, as above described, it is folded in zigzag fashion on transverse lines which separate adjacent sets of forms, or adjacent groups of two or more sets. Whether there is one or more sets between adjacent transverse folds depends usually on the length 100 of the form as compared to the convenient spacing of the transverse folds, the spacing of the transverse folds being more or less arbitrary and such as will produce packets of convenient size.

It frequently happens that certain forms 105

of each set are to be filed or bound in temporary binders in which case the forms are provided with apertures for the accommodation of suitable filing posts. It is quite desirable, however, that the other forms of the set—that is, those which are not to be found or filed—be left intact and free from such post receiving apertures.

So far as we know, it has been the practice prior to our invention to punch the forms after the web has been folded as above described, thus making it necessary to punch all forms of each set, and sometimes to avoid having apertures in those of the forms which were not intended for filing, a margin was left on all forms for the accommodation of filing post apertures which afterwards was torn off those forms which were not to be filed. This was a waste of time and material and considerable of an inconvenience and imparted to the forms from which the margins were torn a more or less mutilated appearance.

Also, it may be explained that often it is more desirable to print certain matter of the form by the offset method for the reason that it does not strike through the paper as is the case when printing directly from the type, as, for instance, when certain legend is to be impressed or inscribed upon the reverse side of the form; while, with respect to the other data that is to appear upon the form, such, for instance, as trade-marks, serial numbers, etc., it is essential that the same be absolutely permanent and less susceptible to eradication than impressions made through the offset method, and in such instances it is desirable to print by the direct method.

Further objects of the invention are to provide a process through which manifold continuous forms may be printed simultaneously by the offset and direct printing methods; and to provide a method of producing manifold continuous forms wherein one or more of the forms of each set may be provided with filing post apertures, while the others of the set shall remain intact.

The exact nature of our improvements will be better understood by reference to the drawings accompanying and forming a part hereof and wherein similar reference characters, used in the following detailed description of the invention, designate corresponding parts throughout the several views.

In the drawings, Fig. 1 is a diagram showing the arrangement of the essential elements of our improved rotary press; Fig. 2 is a fragmentary elevational view of the punching equipment; Fig. 3 is a sectional detail on the line 3—3 of Fig. 2; Fig. 4 is a perspective view of a web of paper which has been printed and punched on our improved press and shown in the act of being folded; Fig. 5 is a perspective

view of the manifold continuous form; and Fig. 6 is an exaggerated transverse section through the same.

Inasmuch as our invention relates in no way to the structural features of a rotary press, but has to do purely with the arrangement of the printing couples, punches, perforators and guides, it is deemed advisable for the sake of clearness to omit structural details and show, diagrammatically, as in Fig. 1, the arrangement of the essential elements of the press and to illustrate them in conventional outline.

Proceeding then, with a more specific description of our invention and with reference particularly to Fig. 1 of the drawings, the web of paper, designated 1, is shown as being drawn from a supply roll 2 over a guide roller or bar 3 between an impression cylinder 4 and transfer cylinder 5 of a printing couple A. This couple includes also a plate cylinder 6 and an inking outfit 7 of usual construction, and will be readily recognized from the arrangement of its parts as one for performing the "offset" method of printing. There is associated with the plate cylinder 6 the usual dampening mechanism 8. The web 1 continues on from the printing couple A, between compensating or justifying rollers 10, to a second printing couple B that is similar to the first and comprises corresponding elements designated by the same reference characters. The web passes from the second printing couple over a blanket roller 12 and between it and a cylinder 13 that is provided with a series of perforating blades 14 which, by cooperation with the blanket roller 12, perforates the web transversely at regular intervals. From here the web is directed over guides 15 and 16 and between compensating or justifying rollers 17 and thence over a guide designated 18 from which it passes downwardly between numbering cylinders A' and B'. These cylinders, so called, are equipped with suitable cumulative numbering heads, which may be of any approved style, and which impress, by the direct printing method, serial numbers upon the respective forms previously printed in accordance with the "offset" method by the printing couples A and B. It may be explained that the printing cylinders A' and B' are each made up of printing and impression elements mounted upon a common shaft so that the printing elements of one cylinder will cooperate with the impression elements of the other. Inking outfits 20 supply ink to the numbering heads.

Shown as disposed below the numbering cylinders are the punching dies for producing the filing post apertures hereinbefore referred to. As will be seen more clearly from Figs. 2 and 3, the entering and receiving elements of the dies, which are desig-

nated 25 and 26, respectively, are carried by spiders 27 mounted upon shafts 28. The dies are capable of being circumferentially adjusted with respect to the spiders by reason of their being connected thereto by clamping screws 29 which extend through slots 30 of the spiders. The spiders are keyed to the shafts 28 and are readily adjustable therealong. In setting up the press for the production of a given form, the cooperating die members are brought into proper transverse position so as to locate the apertures correctly as to their transverse positions upon the forms, and the dies are adjusted, circumferentially of the spiders, to properly locate the apertures longitudinally of the forms. There is a set of dies for each longitudinal column of forms, and in those cases where certain of the forms are to be without filing post apertures, the corresponding dies are shifted transversely with respect to each other thereby to be thrown out of register and accordingly rendered inoperative by moving the spiders longitudinally of the shafts 28.

After being punched, the web passes on over the guides 35, 36 and 37, between perforating rollers 40 which produce the longitudinal rows of perforations between the columns of forms, and thence over a guide 41 to what is known as a "rewind" 42 which serves to wind the paper into a roll 43.

Attention is called to the fact that, by reason of the relation between, and the proper spacing apart of the printing couples A and B, an operator is permitted to stand between these couples when placing plates upon the respective cylinders 6 thereof, his ability to mount the plates on the two cylinders without having to go from one place to another contributing to convenience and a saving of time, but what is regarded as of considerable more importance is that without changing his position except in turning from one cylinder to the other, he is enabled to adjust the plates of the two cylinders so that the impressions made therefrom upon the web will be in correct relative positions.

What may also be pointed out as an advantage arising from the arrangement which our invention provides is the comparatively direct course of the web through the press.

This facilitates "threading" of the press and gives greater protection to the web than in cases where the web is carried overhead or below platforms and exposed to the liability of injury as from its being struck and torn by passing objects, and, furthermore, there is less likelihood of the web stretching and throwing the forms out of register than in cases where greater lengths of web occur between successive feeding mechanisms. The principal factor contributing to the attainment of this advantage is the reverse arrangement of the constituents of the two printing couples A and B. This allows the web to be carried directly from one to the other without having to reverse or turn it over for the purpose of printing on its opposite sides.

Turning our attention now to the product of the apparatus above described, it will be understood that as the web passes through the printing couple A a series of form columns are printed on one side of it, and as it passes through the printing couple B, a second series of form columns are printed upon the reverse side of the web intermediate the columns of the first series. The forms thus printed on the opposite sides of the web are given their proper serial numbers by the printing cylinders A' and B', the body portions of the forms having been impressed upon the web by the "offset" method while the numbers have been imparted thereto by the "direct" method of printing. After being punched by the dies 25 and 26 to provide the filing post apertures, the web is perforated longitudinally between the printed columns occurring on its reverse sides by means of the perforating rollers 40. From here, according to our present illustration, the web is rewound into the roll 43; but whether rewound or passed immediately from the press to the folding apparatus, it is ultimately gathered together transversely into superposed strips, as indicated in Fig. 4, after which it is folded in zigzag manner into the form illustrated in Fig. 5.

In the finished product, as illustrated in Fig. 5, the successive strips or columns bear the respective form Nos. 1, 2, 3, 4 and 5. Now let it be assumed that forms Nos. 1, 4 and 5 of each set are to be provided with filing post receiving apertures 50, while forms 2 and 3 are to be without such apertures. To this end the punching dies corresponding to the columns bearing the forms Nos. 2 and 3 are shifted out of registry so as to be rendered inoperative and as a consequence thereof as the web comes from the press only columns bearing forms Nos. 1, 4 and 5 have apertures 50. This is better illustrated in Fig. 6.

Having thus described our invention, what we claim is:

1. In printing apparatus of the character set forth, the combination of a pair of printing couples wherein the arrangement of the constituents of one couple is the reverse of that of the other so that a web of paper directed therethrough will be printed by the respective couples on opposite sides thereof, and a pair of printing cylinders between which the web is passed, each cylinder consisting of printing and impression elements, the printing elements of one cylinder cooperating with the impression elements of the

other so that said cylinders print on opposite sides of the web.

2. In printing apparatus of the character set forth, the combination of a pair of offset printing couples wherein the arrangement of the constituents of one couple is the reverse of that of the other so that a web of paper directed therethrough will be printed by the respective couples on opposite sides, and a pair of direct printing cylinders between which the web is passed, each cylinder consisting of printing and impression elements, the printing elements of one cylinder cooperating with the impression elements of the other so that said cylinders print on opposite sides of the web.

3. In a rotary press, the combination of printing means arranged to print longitudinal columns of matter on a web of paper, and punching apparatus incorporated in the press for punching filing post apertures in said columns, the punching means for the individual columns being capable of adjustment whereby they may be rendered inoperative so that only certain ones of the columns are punched.

4. In a rotary press, the combination of printing couples arranged to print longitudinal columns of forms on reverse sides of a web of paper, the columns on one side alternating with those on the other, and punching apparatus incorporated in the press for punching filing post apertures in said columns, the punching means for the individual columns being adjustable transversely of the columns and capable of being rendered inoperative so that only certain ones of the columns are punched.

5. In a rotary press, the combination of printing couples arranged to print longitudinal columns of forms on reverse sides of a web of paper, the columns on one side of the web alternating with those on the other, a pair of shafts, spiders carried thereby that are adjustable longitudinally of the shafts, and punching dies carried by the spiders of the respective shafts and adjustable circumferentially of the spiders, as and for the purpose specified.

6. A method of producing manifold continuous forms characterized by certain of the sheets of each set less in number than

those constituting the entire set are provided with filing post apertures which consists in printing columns of forms longitudinally on reverse sides of a web of material, the columns on one side alternating with those on the other, folding the web on lines separating adjacent columns occurring on reverse sides of the web thereby to superpose the longitudinal sections of the web bearing such columns so that the forms all face the same direction, folding the superposed strips on transverse lines at intervals throughout their lengths, the corresponding areas of the superposed strips defined by adjacent transverse folds constituting a set of sheets, and punching the web prior to folding it so that certain of the sheets of each set less in number than that comprising the entire set is provided with filing post apertures.

7. The method of producing manifold continuous forms characterized by certain of the form sheets of each set less in number than that comprising the entire set is provided with filing post apertures, which consists in impressing upon the reverse sides of a web of material longitudinal columns of forms, the columns on one side alternating with those on the other, perforating the web along longitudinal lines separating adjacent columns occurring on reverse sides of the web, perforating the web on transverse lines at intervals throughout its length, the areas of the various columns lying between adjacent transverse lines constituting a set of form sheets, and punching certain of the sheets of each set less in number than that comprising the entire set, and folding the web on the longitudinal lines of perforations, and in zigzag fashion on the transverse lines of perforations.

8. In a rotary press, the combination with printing means arranged to print a series of longitudinal columns of matter on a web of paper, and punching apparatus incorporated in the press for punching filing post apertures in certain of said columns less in number than that comprising the entire series.

In testimony whereof, we hereunto affix our signatures.

HERBERT E. MURRAY.
GEORGE A. MAYER.