

March 15, 1927.

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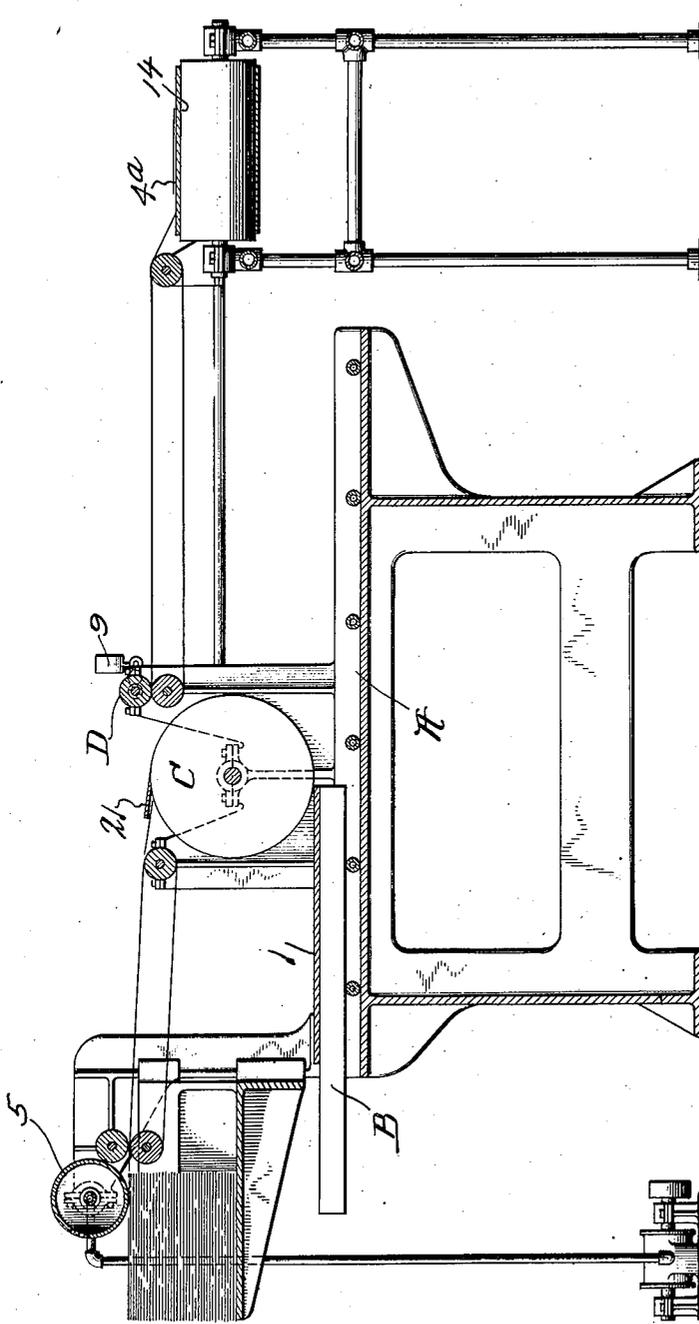
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APPARATUS FOR PRINTING AND ASSEMBLING MANIFOLDING BOOKS, PADS, ETC

Filed May 14, 1923

3 Sheets-Sheet 1

Fig. 1.



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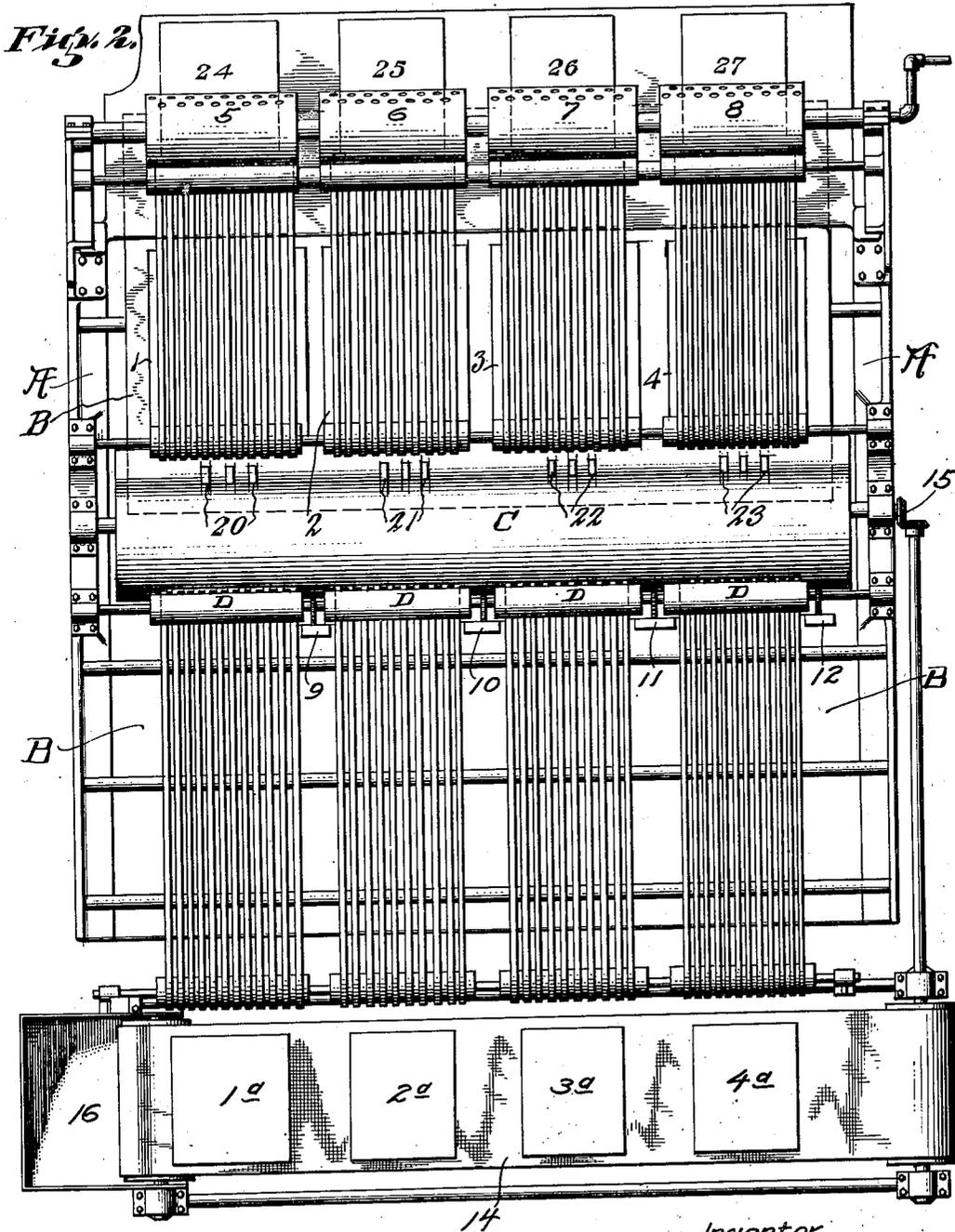
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3 Sheets-Sheet 2



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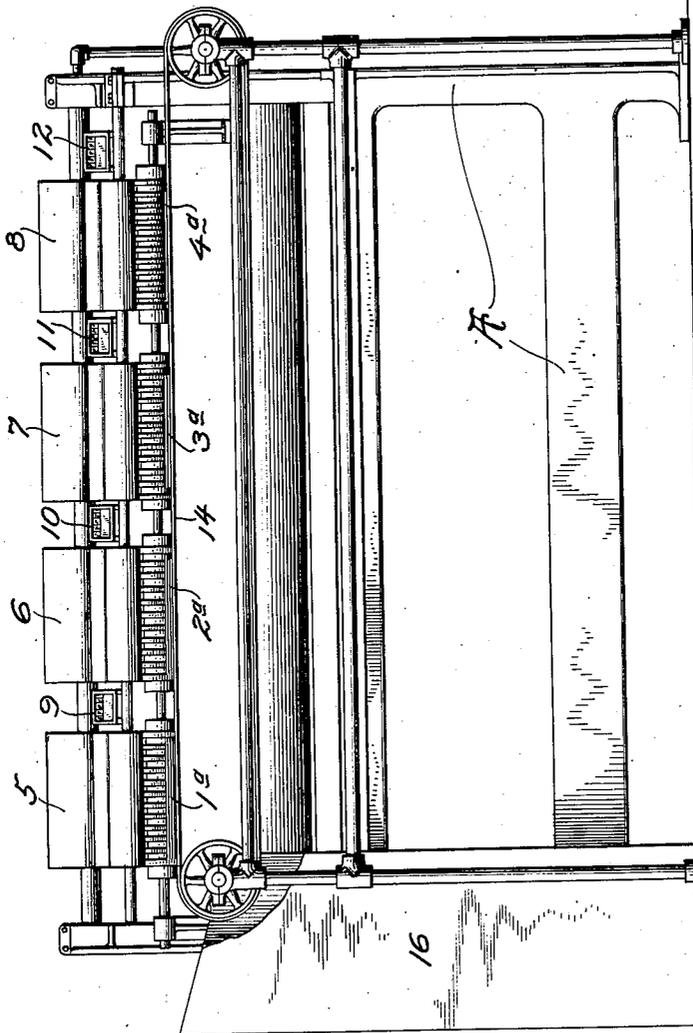
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3 Sheets-Sheet 3

Fig. 3.



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UNITED STATES PATENT OFFICE.

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APPARATUS FOR PRINTING AND ASSEMBLING MANIFOLDING BOOKS, PADS, ETC.

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This invention relates to an apparatus for printing and assembling multiple form manifolding books, pads, etc.

Multiple form manifolding books and pads, such as invoices, requisitions, order blanks, receipts, etc., containing an original and one or more copies, that is, duplicate forms, triplicates, quadruplicates, etc., are today manufactured or printed in great quantities as they have been uniformly adopted in practically every line of business where modern bookkeeping and accounting systems are employed.

Keen competition between the printers has naturally developed due to the large demand or business created and it might here be stated that some of the larger printing firms have gone so far as to specialize in this class of work, even building special presses to reduce manufacturing cost to a minimum. These firms usually employ specially built rotary presses as these presses have so far proven the most economical, but practical experience has determined that they can only be economically operated on large orders as the time required to make ready and the paper waste encountered on small orders render the cost prohibitive. There are other objections to rotary presses, even those specially built, among which may be mentioned the following:

First, positive registration of the multiple forms in certain classes of work cannot be guaranteed; second, high-grade printing is usually out of the question; third, limitations in size are encountered; fourth, variation in size between the original and duplicates, triplicates, etc., cannot be obtained; and fifth, bill-heads, etc., previously lithographed in another press cannot be handled as a rotary press can only be fed by a continuous web of paper. These and other objections have forced the printers to resort to the use of employing cylinder presses or the like where each original, duplicate, triplicate, etc., must be individually printed in one or more presses, then collated, hand-gathered, etc., the cost being thereby greatly increased.

The object of the present invention is to provide an apparatus for printing work of this character whereby economy may be insured whether the order is large or small; whereby paper waste is reduced to a minimum; accurate registration and high-grade printing obtained; practically any variation

in size secured, and whereby gathering or assembling of the multiple forms is automatically taken care of simultaneously with the printing operation. Further objects will hereinafter appear.

One form which my invention may assume is exemplified in the following description and illustrated in the accompanying drawings.

Fig. 1 is a side elevation in section showing a feeding, printing, numbering, and assembling mechanism.

Fig. 2 is a plan view of the same.

Fig. 3 is an end view of the machine showing the assembling belt.

By referring to the drawing it will be noted that a flat bed cylinder press has been illustrated, the width of the press being such that two or more type forms may be placed side by side on the bed B of the press if desired. In the present instance four type forms are illustrated as indicated at 1, 2, 3 and 4. Four automatic feeders are also illustrated as indicated at 5, 6, 7 and 8, and four separate numbering devices are also illustrated as indicated at 9, 10, 11 and 12. A standard form of flat bed cylinder press may be employed, the bed of the press being illustrated at B. The bed is reciprocally mounted, but the means for imparting a reciprocal movement thereto is not illustrated. The cylinder of the press is indicated at C, the frame in which it is journaled at A, and the cylinders which carried the numbering devices are generally indicated at D. Disposed adjacent the discharge end of the press is an endless conveyor belt 14. This belt is driven from the press in any suitable manner or as here indicated by a bevel gear train 15. The belt is continuously driven and the speed is such that the sheets discharged will be automatically arranged in their proper order and finally delivered to a receiving hopper 16. The operation will be as follows:

Supposing that a quadruplicate book or form is required; that is, a book or pad containing an original, a duplicate, a triplicate, and a quadruplicate. If this is the case four type forms will be required as indicated at 1, 2, 3 and 4. These forms are secured to the bed of the press in the usual manner and the cylinder will consequently be provided with four sets of grippers as indicated at 20, 21, 22 and 23 to receive and release the individual sheets as the machine oper-

ates. Automatic feeders of any suitable type may be employed, said feeders being indicated at 5, 6, 7 and 8. A stack of the required size and grade of paper is placed in front of each feeder as indicated at 24, 25, 26 and 27 and as the feeders are arranged to operate in unison, four sheets will simultaneously be delivered to the cylinder and printed when discharged during one reciprocation of the bed B. The individual sheets may also be numbered if desired by suitably arranging the numbering devices generally indicated at 9, 10, 11 and 12. In the present instance we will suppose that form 1 prints the original form, 2 the duplicate form, 3 the triplicate, and 4 the quadruplicate. In that instance the original, the duplicate, the triplicate and the quadruplicate, will discharge in unison after the printing operation has been completed and as such will be delivered to the continuously moving belt 14. The original will assume the position indicated at 1^a, the duplicate the position indicated at 2^a, the triplicate the position indicated at 3^a, and the quadruplicate the position indicated at 4^a. It is necessary that the original be placed on top of the duplicate and next the triplicate under the duplicate, and that the quadruplicate assume the bottom position. This arrangement is automatically obtained in the present instance by causing the belt to travel at such a speed that the quadruplicate will move from the position shown at 4^a to the position shown at 3^a during the time period required for one printing operation. The triplicate simultaneously moves from the position 3^a to the position 2^a, and the duplicate moves from the position 2^a to the position indicated at 1^a. Thus, after the four forms have been delivered and while the press is making its second printing operation, the sheets will all advance one position when the press completes its next printing and discharging operation. A new quadruplicate will thus be deposited by the belt, a new triplicate will be deposited on the quadruplicate which has advanced one position, a new duplicate will be deposited on the triplicate, which has also advanced one position, and a new original will be deposited on the duplicate which has advanced one position. During the third operation of the press the sheets or forms will again advance one step and a new quadruplicate will be deposited, a new triplicate, a new duplicate and a new original, as previously described, and after the press has made four operations, the quadruplicate which was first printed will by this time reach the position indicated at 1^a, thus making a stack of four sheets in the position 1^a, a stack of three sheets in the position 2^a, a stack of two sheets in the position 3^a, and a single sheet in the position 4^a. This formation will continue

as long as the press is operated and it is, therefore, only necessary to throw out the sheets discharged by the press during the first three printing operations to insure perfect assembly of the printed forms or sheets and successive placing of each assembly in the hopper 16 in numerical order. The only reason for removing the sheets discharged into the hopper during the first three printing operations is due to the fact that it will first receive sheet 1^a, secondly, it will receive sheets 2^a and 1^a, and third, it will receive the sheets 3^a, 2^a and 1^a, and as these are not complete assemblies, it is obvious that they must be removed and that this, practically speaking, constitutes the only paper waste encountered during a complete run of a certain book form. Of course there may be a few damaged sheets, but such waste is small and need hardly be considered.

A flat bed cylinder press in itself is not new nor are the automatic feeders indicated at 5, 6, 7 and 8, nor the numbering devices indicated at 9, 10, 11 and 12, but the arrangement here shown is new as is also the assembling method produced by the use of the endless conveyor 14. It is a well-known fact that high grade work can be obtained in a flat bed cylinder press; furthermore, that accurate registration may be obtained; practically any grade of printing and registration may, therefore, be insured by this arrangement; any variation in size of the forms to be printed may also be taken care of in a flat bed cylinder press; any variation in size between the original, duplicate, triplicate, and quadruplicate, may also be taken care of as the size of the forms 1, 2, 3 and 4, may be increased or decreased as desired; practically any grade of paper may be employed in regard to quality, color, weight, etc., as individual feeders are employed for each grade; previously printed bill-heads, forms, etc., whether lithographed or otherwise, may be taken care of, and as the assembling or gathering operation is automatic, collation and hand-gathering may be entirely eliminated; practically any order may thus be taken care of and economy is insured in all cases as paper waste is reduced to a minimum, and all operations are automatically taken care of once the press is made ready and the operation is started.

While a flat bed cylinder press is here illustrated, it is obvious that a job press or any other type of press suitable for the purpose, may be employed; similarly, that two, three or more presses may be set up and run in unison if desired.

Having thus described my invention, what I claim and desire to secure by Letters Patent is—

1. In a printing press of the character described, a cylinder, a bed reciprocally

mounted with relation thereto, a plurality of paper feeders mounted adjacent the cylinder, said feeders cooperating therewith and adapted to deliver a plurality of paper sheets in unison, a plurality of type forms carried by the bed, one for each feeding device to permit the plural sheets to be printed in unison and to permit the printed sheets to be discharged in unison, a numbering device cooperating with each feeder to successively number the sheets, an endless conveyor mounted adjacent the discharge end of the press and adapted to receive the sheets simultaneously discharged by the press, means for imparting a continuous movement to the conveyor, the speed or movement of the conveyor being such that the sheets will advance a predetermined distance during each printing operation of the press, thereby permitting stacking of multiple forms in predetermined order, and a hopper adapted to receive the stacked multiple forms.

2. In a printing press of the character described, a cylinder, a bed reciprocally mounted with relation thereto, a plurality of paper feeders mounted adjacent the cylinder, said feeders cooperating therewith and

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