

H. F. BECHMAN.  
 FLAT BED PRINTING PRESS.  
 APPLICATION FILED MAR. 4, 1908.

917,838.

Patented Apr. 13, 1909.

2 SHEETS—SHEET 1.

Fig. 1.

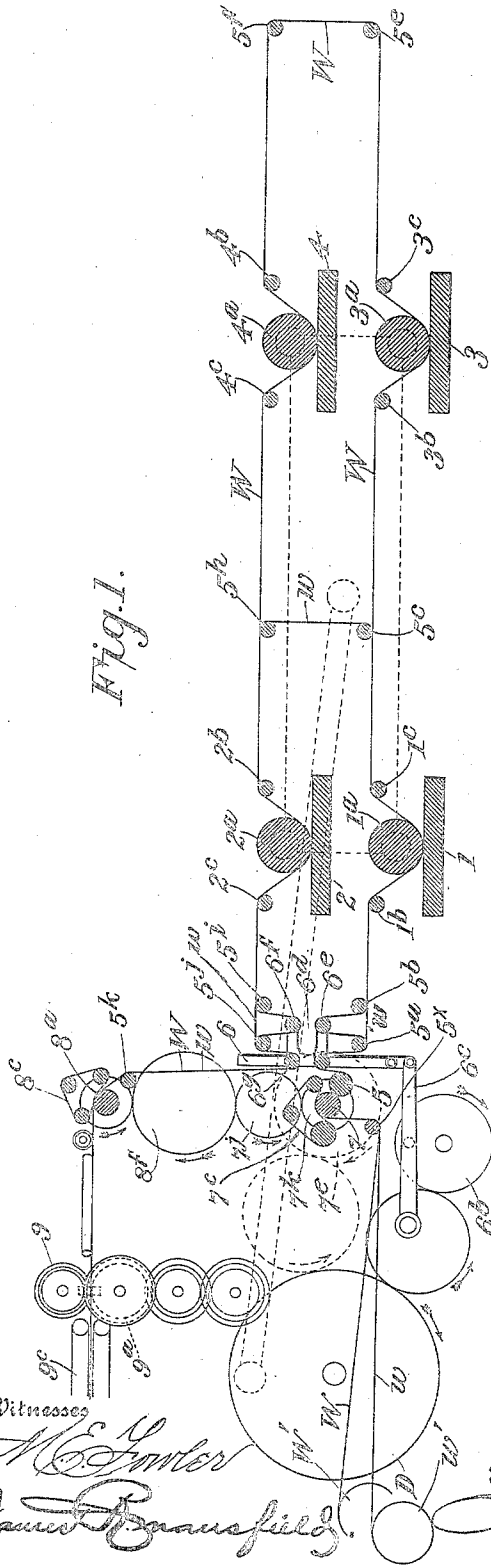
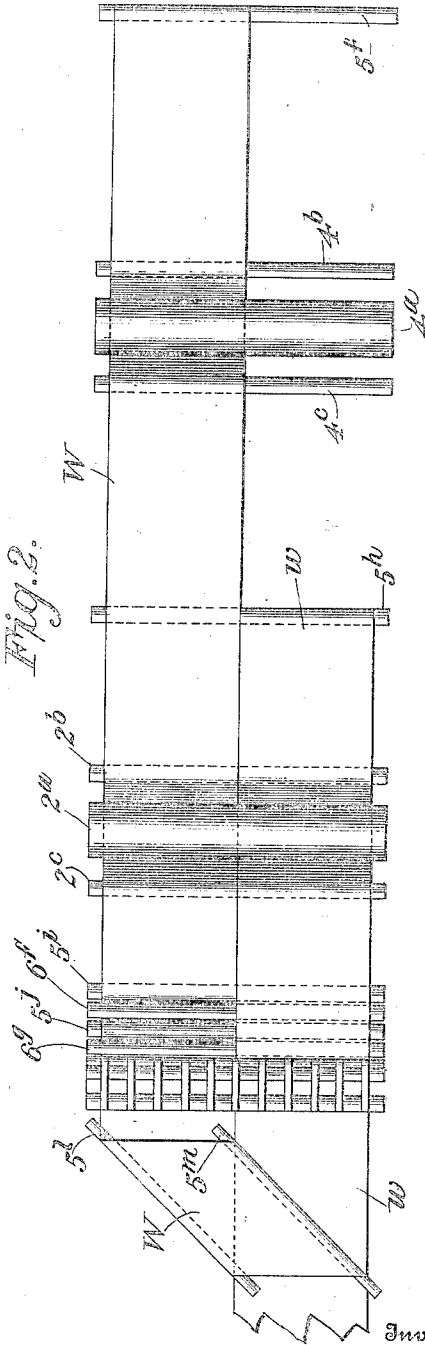


Fig. 2.



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2 SHEETS—SHEET 2.

Fig. 4.

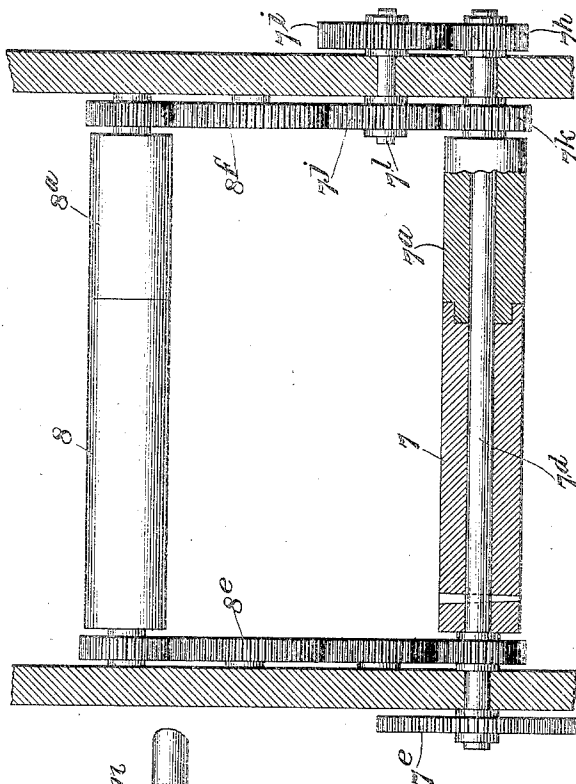
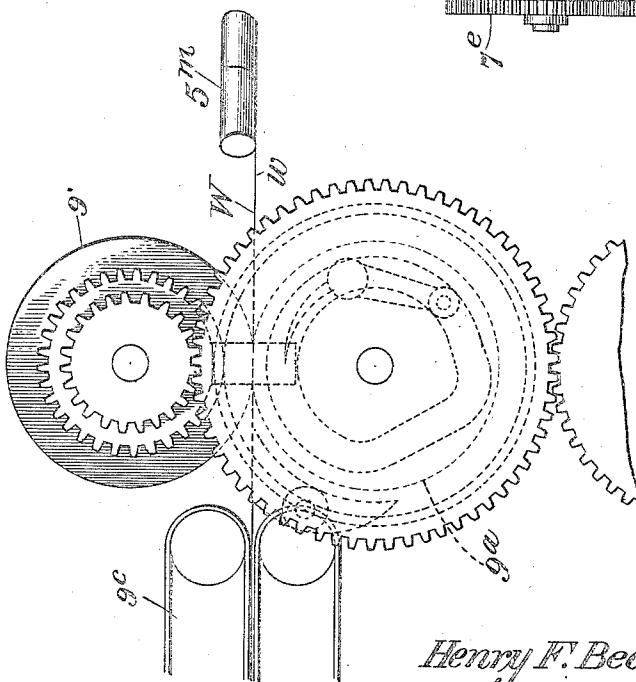


Fig. 3.



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# UNITED STATES PATENT OFFICE.

HENRY F. BECHMAN, OF BATTLE CREEK, MICHIGAN, ASSIGNOR TO DUPLEX PRINTING PRESS COMPANY, A CORPORATION OF MICHIGAN.

## FLAT-BED PRINTING-PRESS.

No. 917,838.

Specification of Letters Patent.

Patented April 13, 1909.

Application filed March 4, 1908. Serial No. 419,228.

*To all whom it may concern:*

Be it known that I, HENRY F. BECHMAN, of Battle Creek, in the county of Calhoun and State of Michigan, have invented certain new and useful Improvements in Flat-Bed Printing-Presses; and I hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, which form part of this specification.

This invention contemplates certain new and useful improvements in web perfecting printing presses of that type which embody a plurality of printing couples and in which a plurality of webs is designed to be fed to the various couples, the said webs being fed continuously to the press and delivered continuously therefrom, but at different speeds, and said webs also passing through the press with an intermittent motion.

The invention has for its object to provide novel means whereby the several webs which are fed to the press and delivered therefrom simultaneously may each be threaded through any selected number of the printing couples and moved through the press independently of each other and at different speeds according to the number of couples through which they are threaded.

The invention will be fully understood from the accompanying drawings and summarized in the claims following the description of the machine illustrated in the drawings.

In said drawings—Figure 1 is a diagrammatic longitudinal sectional view through a machine embodying the invention, two webs being utilized and one of the webs being threaded through all of the said couples while the opposite web is only shown as threaded through two couples. Fig. 2 is a top plan view of Fig. 1. Fig. 3 is a detail enlarged view of the delivery mechanism. Fig. 4 is a detail sectional view of the sectional feed and delivery rolls and their gearing.

A printing press embodying the present invention comprises essentially a plurality of flat stationary type beds and coacting reciprocating impression cylinders designed to receive two or more webs, novel means being provided whereby the individual webs can each be adjusted independently and threaded through any selected number of the printing couples and fed through the press at the desired rate of speed. Any desired number of

coacting type beds and impression cylinders may be employed and in the arrangement shown the press comprises four printing couples.

Referring to the drawings it will be observed that each printing couple comprises a stationary type bed, and a co-acting reciprocating impression cylinder. As shown the printing couples are arranged in pairs, two type beds 1 and 3 being in one plane and the other two type beds 2 and 4 being arranged in a plane parallel with beds 1 and 3; and the bed 2 is directly over the bed 1, and bed 4 is directly over bed 3. With each bed co-acts a reciprocating impression cylinder 1<sup>a</sup>, 2<sup>a</sup>, 3<sup>a</sup>, 4<sup>a</sup>, respectively; and said cylinders may be mounted in connected cross-heads (not shown) in the well known "Duplex" manner; and reciprocated simultaneously back and forth over the type beds after the manner of the "Duplex" press. Beside each impression cylinder are located web guides 1<sup>b</sup>, 1<sup>c</sup>; 2<sup>b</sup>, 2<sup>c</sup>; 3<sup>b</sup>, 3<sup>c</sup>; 4<sup>b</sup>, 4<sup>c</sup>; respectively.

At the end of the press adjacent beds 3 and 4, are stationary web guides 5<sup>e</sup> and 5<sup>f</sup>. Intermediate the cylinders 1<sup>a</sup>, 3<sup>a</sup>, is a stationary web guide 5<sup>c</sup>; and intermediate cylinders 2<sup>a</sup>, 4<sup>a</sup>, is a stationary guide 5<sup>d</sup>. At the drive end of the press are located the feeding and delivering devices hereinafter described, and the web mechanism for looping the web, so as to stop the part of the web in the press just before and during the printing operations; and then shift the web quickly over the beds, after the manner of the Duplex web compensating devices. These looping or compensating devices comprise a vertically reciprocating frame 6 actuated in any approved manner as through the medium of the cam-wheel 6<sup>b</sup>, and lever 6<sup>c</sup>, like the Duplex loopers. The frame 6 carries a lower set of looping rollers 6<sup>d</sup>, 6<sup>e</sup>, and a corresponding upper set of looping rollers 6<sup>f</sup> and 6<sup>g</sup>. Co-operating with the looping rollers 6<sup>d</sup>, 6<sup>e</sup>, are the lower stationary web guides 5<sup>a</sup>, 5<sup>b</sup>, and the upper stationary web guides 5<sup>i</sup>, 5<sup>j</sup> coöperate with looping rollers 6<sup>f</sup> and 6<sup>g</sup>.

The web feeding in devices consist of a roll composed of two parts 7, 7<sup>a</sup>, with which co-act tapes 7<sup>c</sup>, running over tape-guide rollers as usual. The sections 7, 7<sup>a</sup>, may be fastened together so as to be driven as one, but normally are independently driven; for this purpose (see Fig. 4) section 7 may be fast on the roll-shaft 7<sup>d</sup>, while section 7<sup>a</sup> is loose on

said shaft. The shaft may be driven at the desired speed by train of gears 7<sup>e</sup> from the main crank shaft of the machine, as shown in the drawings; while section 7<sup>a</sup> may be driven  
 5 at a different speed from the roll-shaft 7<sup>d</sup> by means of the gears 7<sup>h</sup>, 7<sup>i</sup>, 7<sup>j</sup>, 7<sup>k</sup>, and intermediate shaft 7<sup>l</sup>, carrying gears 7<sup>i</sup> and 7<sup>j</sup>. The gear 7<sup>k</sup> is fast to the roll section 7<sup>a</sup>. The gears 7<sup>h</sup>, 7<sup>i</sup>, may be changeable so as to  
 10 vary the speed of rotation of section 7<sup>a</sup>.

The delivery device comprises a roll having sections 8, 8<sup>a</sup>, corresponding to sections 7, 7<sup>a</sup>, of the feed roll; and may be driven in unison therewith by trains of gears 8<sup>e</sup>, 8<sup>f</sup>, as indicated in the drawings. With sections 8,  
 15 8<sup>a</sup>, co-act the tape systems 8<sup>c</sup>, as usual.

The peculiar structure of the feeding and delivery rolls is not claimed *per se* herein. These feed and delivery rolls are adapted,  
 20 when their sections are driven at different speeds, to handle two webs through the press,—one web W passing over sections 7 and 8, and I term it the “fast” web; and the other web w passing over sections 7<sup>a</sup>, 8<sup>a</sup>, and  
 25 I term it the “slow” web.

One method of threading the webs through the press is clearly shown in the drawings, and will suffice to explain the mode of operation of the press. The webs being led there-  
 30 through as follows: The webs are drawn from their respective rolls W', w', and passed under a guide 5<sup>x</sup> up to the feed rolls 7, 7<sup>a</sup>. The course of web W is then as follows: From the roll section 7 it passes down under  
 35 a guide 5, up over looper 6<sup>d</sup>, down under guide 5<sup>a</sup>, up over looper 6<sup>e</sup>, down under guide 5<sup>b</sup>, thence over guides 1<sup>b</sup>, 1<sup>c</sup>, 3<sup>b</sup>, 3<sup>c</sup>, and under the cylinders 1<sup>a</sup>, 3<sup>a</sup>, to the guide 5<sup>e</sup>; thence up over guide 5<sup>f</sup>, back over guides  
 40 4<sup>b</sup>, 4<sup>c</sup>, 2<sup>b</sup>, 2<sup>c</sup>, and under cylinders 4<sup>a</sup>, 2<sup>a</sup>, to guide 5<sup>i</sup>; then it passes down under the upper looper 6<sup>f</sup>, up over guide 5<sup>j</sup>, down under looper 6<sup>g</sup>, thence up over a guide 5<sup>k</sup> to the section 8 of the delivery roll, thence it passes  
 45 over deflector bars 5<sup>l</sup>, 5<sup>m</sup>, to and between the cutting and collecting cylinders 9, 9<sup>a</sup>, being assembled at this point with the web w and passed therewith to the folding mechanism 9<sup>c</sup>, which may be of any suitable construction.  
 50

It will be observed that four impressions are made on web W, and that it can thus be perfected in colors, or the impressions  
 55 on beds 1 and 3 may be imprinted side by side, and perfected by the impressions from beds 4 and 2; this method of printing will give twice the number of pages that would be possible to print on only one pair  
 60 of beds (1 and 2, or 3 and 4) and necessitates a more rapid feed and delivery of the web; which is however compensated for accurately by the looping mechanism, by reason of the double loops formed thereby as described.

The course of web w is as follows: After  
 65 leaving section 7<sup>a</sup> of the feed roll, it passes

under guide 5, up over looper 6<sup>d</sup>, down under guide 5<sup>a</sup>, and thence either through the printing mechanism after the manner of web W—provided it is desired to perfect it in  
 70 multicolor, otherwise after passing guide 1<sup>c</sup>, it is led up over guide 5<sup>e</sup> to and over guide 5<sup>h</sup>, thence back over guides 2<sup>b</sup>, 2<sup>c</sup>, and under cylinder 2<sup>a</sup> to guide 5<sup>j</sup>, down under looping roller 6<sup>g</sup>, up over guide 5<sup>k</sup> to the delivery roll section 8<sup>a</sup>, thence it passes to the cutting and  
 75 collecting cylinders 9, 9<sup>a</sup>, and is assembled with web W. As the web w, in the example stated, is led over but one set of looping devices, it is fed and delivered more slowly than web W,—and in the example shown, eight  
 80 pages may be printed on web W for each operation of the press, and four pages on web w, making a total of twelve pages. By using a narrower web w, ten pages can be printed (on both webs) at each operation of the  
 85 press.

From the foregoing description it will be obvious that one compensating device acts upon a plurality of webs, each of which is threaded through a selected number of a plu-  
 90 rality of printing couples.

If the roll sections 7, 7<sup>a</sup>, and 8, 8<sup>a</sup>, be driven at same speed (either fast or slow) both webs can be threaded and handled alike through the press; or a single web wider  
 95 than either web W or w, or as wide as both, can be handled in the press.

The essential novelty of the present invention resides in the employment of a plurality of—(more than two)—beds and cylinders  
 100 and means whereby one or two webs can be threaded through any selected number of such printing couples—for example so that one web can be printed on four beds, and the other web can be printed on two beds as  
 105 indicated in Fig. 1; and the web led through all four printing couples can be printed in multicolor if fed at the same rate of speed as the other web; or in one color if fed at twice the rate of speed of the other web.  
 110

I do not herein claim the use of two beds and cylinders to print one or two webs.

Having thus described the invention what I claim as new is:

1. In a perfecting printing press, the combination of a plurality of printing couples,  
 115 means for threading a plurality of webs through the said printing couples to be perfected, each of the webs being designed to be passed through any selected number of the  
 120 couples, and two sets of looping devices for all the webs, said looping devices serving to form a plurality of loops in both webs, the number of loops in each web being variable and depending upon the manner in which  
 125 the web is threaded through the press.

2. In a perfecting printing press, the combination of a plurality of printing couples,  
 130 means for threading a plurality of webs through the said printing couples, each web

being designed to be passed through any selected number of the couples to perfect it, a reciprocating frame, two sets of looping rollers carried by the frame, and two sets of  
 5 co-acting stationary rollers coöperating with the looping rollers, the said looping rollers and stationary rollers acting upon all the webs and the number of loops formed in each web being variable and depending upon the  
 10 manner in which it is threaded.

3. In a perfecting printing press, the combination of a plurality of printing couples, means for threading a plurality of webs through the said printing couples, each of  
 15 the webs being designed to be passed through any selected number of the couples, means for feeding the webs, means for looping the webs, and means for assembling the webs.

20 4. In a perfecting printing press, the combination of four printing couples, means for threading a plurality of webs through the said printing couples, each of the webs being designed to be passed through a selected  
 25 number of the couples, means for feeding the various webs through the couples at different speeds, and means for compensating the webs.

5. In a perfecting printing press, the combination of four printing couples, means for  
 30 threading two webs through the said printing couples, each of the webs being designed to be passed through any selected number of the couples, means for feeding said webs  
 35 at different speeds, means for looping the webs, and means for assembling the webs.

6. In a perfecting printing press, the combination of a plurality of printing couples, each comprising a stationary bed and recip-  
 40 roating cylinder, means for threading a plurality of webs through the said printing couples, each of the webs being designed to be passed through any selected number of the couples, means for feeding the webs at  
 45 different speeds, and a single compensating device for all the webs.

7. In a perfecting printing press, the combination of a plurality of printing couples, each comprising a stationary bed and recip-  
 50 roating cylinder, means for threading a plurality of webs through the said printing couples, each of the webs being designed to be passed through any selected number of the couples, means for feeding the webs at  
 55 different speeds, and a single compensating device for all the webs, said compensating device serving to form a plurality of loops in

the webs and the number of loops in each web being variable and depending upon the manner in which the web is threaded. 60

8. In a perfecting printing press, the combination of a plurality of printing couples, each comprising a stationary bed and recip-  
 65 roating cylinder, means for threading a plurality of webs through the said printing couples, each web being designed to be passed through any selected number of the couples, means for feeding the webs at different speeds, a reciprocating frame, looping  
 70 rollers carried by the frame, and stationary rollers coöperating with the looping rollers, the said looping rollers and stationary rollers acting upon all the webs and the number of loops formed in each web being variable  
 75 and depending upon the manner in which it is threaded.

9. In a perfecting printing press, the combination of four printing couples, each comprising a stationary bed and reciprocating  
 80 cylinder, means for threading a plurality of webs through the said printing couples, each of the webs being passed through any selected number of the couples, means for feeding and delivering the webs at different speeds, a compensating device for all the  
 85 webs, and means for assembling the webs.

10. In a perfecting printing press, the combination of a plurality of printing couples, each comprising a stationary bed  
 90 and reciprocating cylinder, means for threading a plurality of webs through the said printing couples, each of the webs being passed through a selected number of the couples, means for feeding and delivering the various webs at different speeds, and a single  
 95 compensating device for all the webs.

11. In a perfecting printing press, the combination of a plurality of printing couples, each comprising a stationary bed  
 100 and reciprocating cylinder, means for threading a plurality of webs through the said printing couples, each of the webs being passed through any selected number of the couples, means for feeding and delivering the various webs at different speeds, and a  
 105 single looping mechanism for all the webs, and means for assembling the printed webs.

In testimony that I claim the foregoing as my own, I affix my signature in presence of two witnesses.

HENRY F. BECHMAN.

Witnesses:

F. W. DUNNING,  
 IRVING K. STONE.