

No. 639,784.

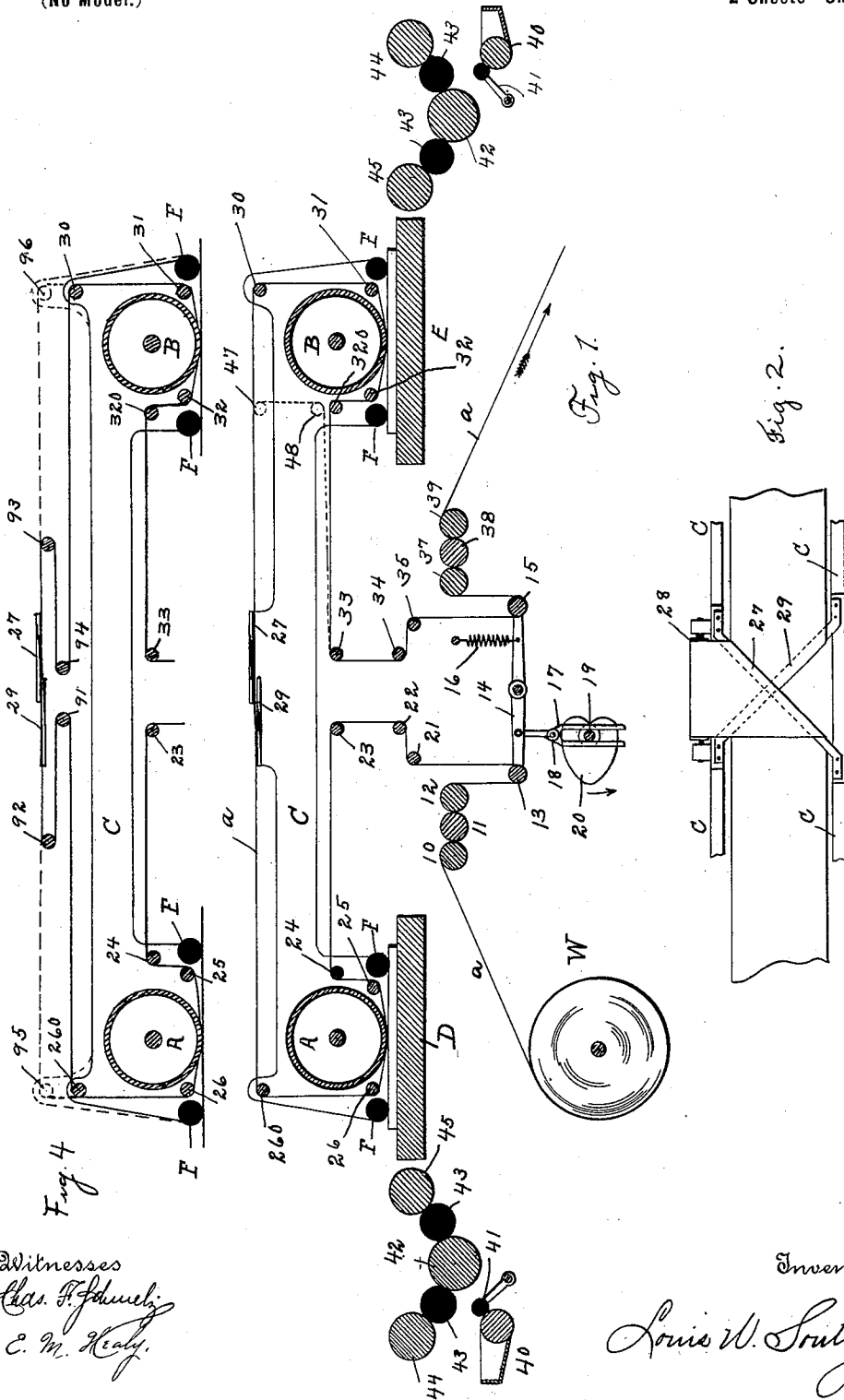
Patented Dec. 26, 1899.

L. W. SOUTHGATE.  
PRINTING MACHINE.

(Application filed Apr. 6, 1893. Renewed May 27, 1899.)

(No Model.)

2 Sheets—Sheet 1.



Witnesses  
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No. 639,784.

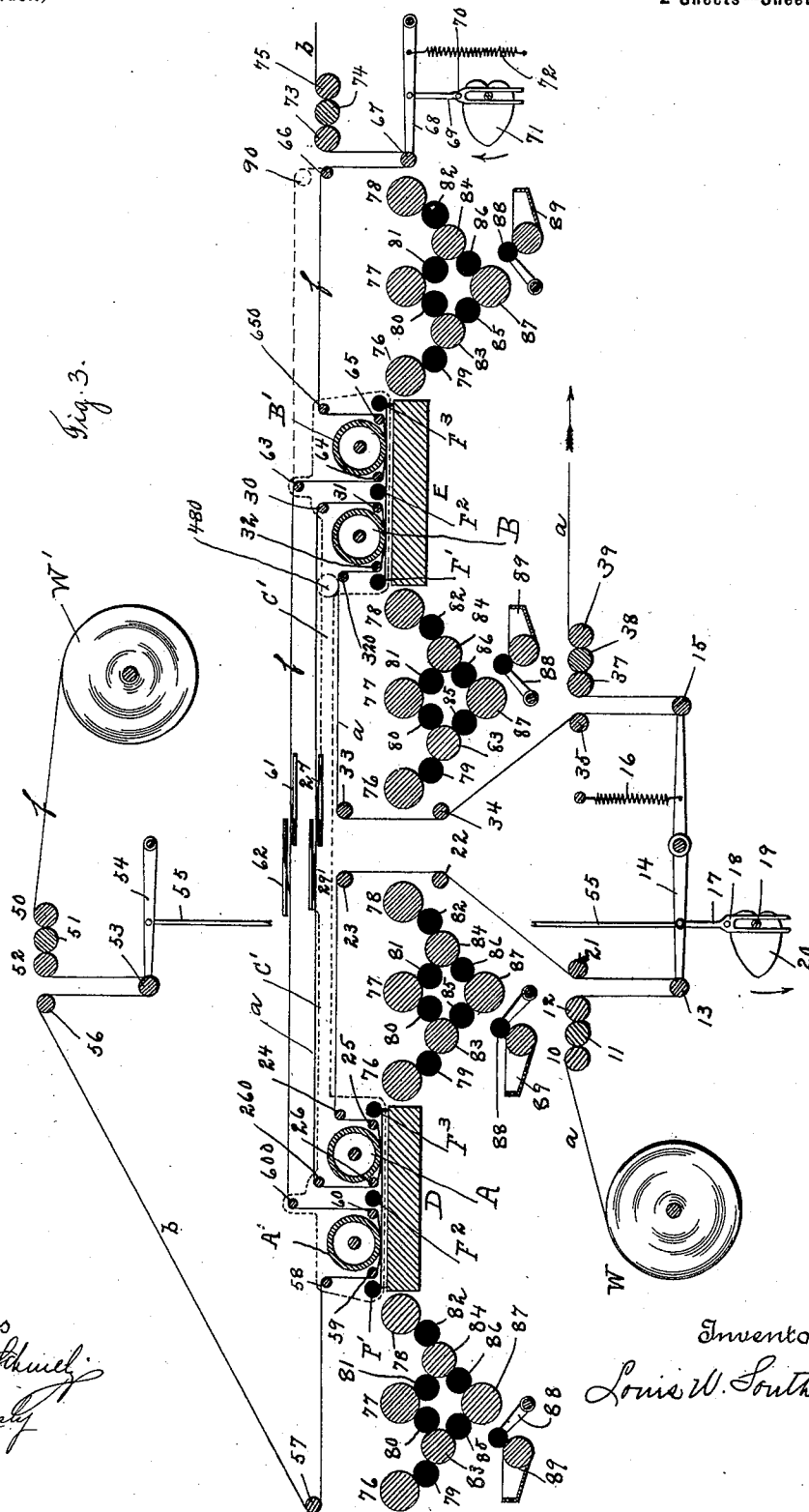
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2 Sheets—Sheet 2.



# UNITED STATES PATENT OFFICE.

LOUIS W. SOUTHGATE, OF WORCESTER, MASSACHUSETTS, ASSIGNOR TO THE CAMPBELL PRINTING PRESS AND MANUFACTURING COMPANY, OF NEW YORK, N. Y.

## PRINTING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 639,784, dated December 26, 1899.

Application filed April 6, 1893. Renewed May 27, 1899. Serial No. 718,562. (No model.)

*To all whom it may concern:*

Be it known that I, LOUIS W. SOUTHGATE, a citizen of the United States, residing at Worcester, in the county of Worcester and State of Massachusetts, have invented a new and useful Improvement in Printing - Machines, of which the following is a specification.

The aim of this invention is to improve the construction of printing-presses, and especially relates to web-printing presses which are known in the art as "traveling-cylinder" web-printing presses, although my invention may be applied to other forms of presses, as hereinafter described.

My invention consists, broadly, in so arranging the parts of a press that two independent webs may be presented to and printed from a single set of forms, thereby doubling the product; and in carrying out this invention I have accomplished the same by inventing what I may call an "internal" web printing and manipulating device, which in itself is a new form of press.

The broad idea of my invention, however, is the handling of two webs, so as to double the product of the press.

One preferred form of my machine is shown in diagram, and the operation of the traveling-cylinder press and its auxiliary parts is so well known that it is not necessary here to show or describe all the specific details, the diagrams fully illustrating the scope of my invention.

Referring to the drawings and in detail, Figure 1 represents a diagram of my improved internal press used as a single press. Fig. 2 represents the turner which is preferably used between the two impression-cylinders. Fig. 3 represents in diagram my broad invention whereby two webs can be manipulated, and Fig. 4 represents a different way in which the web can be led in the single press.

Referring now to the drawings and in detail, I will first describe my peculiar internal press, and reference, to follow this description, should be had to the first sheet of drawings.

The first impression-cylinder is represented by A and the second by B, and these impression-cylinders may be mounted in the usual

carriage or framing C, which is supposed to be reciprocated by any of the usual well-known mechanisms; not necessary here to describe.

D represents the first bed; and E the second bed, and, as shown, these beds are arranged in substantially the same horizontal plane, although, of course, any arrangement of beds that is well known can be used.

On each side of the impression-cylinders A and B in the carriage C are placed form-rollers F.

W represents the web-roll from which the web is led. From the web-roll the web  $\alpha$  passes around the usual continuously-running feeding-in rollers 10, 11, and 12, then around the looping feeding-roller 13, which may be mounted in the pivoted arms 14, and also in the other ends of these arms may be mounted the looping delivery-roller 15, whereby the looping-rollers will be simultaneously vibrated in opposite directions. The pivoted arms 14 are kept normally in proper position, as by means of springs 16. Connected to the pivoted arms 14 are the yokes 17, which carry rollers 18, which bear on cams 20, secured on a shaft 19, which shaft 19 is supposed to revolve twice for each complete forward-and-backward reciprocation of the impression-cylinders. The cams are preferably made heart-shaped, and by this arrangement of feeding mechanism the web will be held stationary while the cylinders are on the forms and will be shifted around the impression-cylinders when they are off the forms in either direction, and also the web will be continuously fed into and out of the press, all of which is well understood. From the looping feeding-in roller the web  $\alpha$  passes around the stationary rollers 21, 22, and 23, which are supposed to be journaled in the framing of the machine. From the roller 23 the web is led to the rollers or guides 24 and 25, carried by the carriage C, under the impression-cylinder A, and then up over the rollers 26 and 260, as shown. From the roller 260 the web passes to a turner device which is preferably carried by the carriage, as shown, so as to turn the web over between the two impression-cylinders. This turner may be of any of the usual constructions, and one of such constructions is shown as consisting of the turner-

bar 27, mounted on top of the carriage, and the roller 28, which is carried by the carriage and mounted parallel with the movement of the same and outside of the rear frame, as shown, and this roller 28 may be made adjustable, if desired, for the purpose of obtaining register between the two impression-cylinders. From the roller 28 the web passes back into the carriage and up over the turner-bar 29, and from the turner-bar 29 the web is led to the carriage-guides 30 and 31, under the impression-cylinder B, and then to the carriage-rollers 32 and 320. From the carriage-roller 320 the web is led around the stationary guides or rollers 33, 34, and 35, which are supposed to be mounted or journaled in the frame of the machine, then around the looping delivery-roller 15, before referred to, and then into the bite of the continuously-running delivery-rollers 37, 38, and 39.

Any suitable inking mechanism may be provided, and one simple form is shown which may consist of the fountains, as 40, the vibrating ductor-rollers 41, the drums 42, the conveying-rollers 43, and the drum-cylinders 44 and 45, this inking mechanism being mounted at the outside end of each bed and being so arranged that when a cylinder is off the outer end of a bed the form-rollers on both sides of the cylinder will receive their supply of ink from the two drum-cylinders 44 and 45. By this means the form will be inked for each impression and so that an impression can be taken for each forward-and-backward movement of the impression-cylinders.

The printing-press before described is peculiar in the short path between the two impression-cylinders, the web passing directly from one impression-cylinder to the other and being preferably turned in this course, so that the same will be perfected by the two impression-cylinders.

The action of the web in the press is peculiar. Thus, taking, for example, the case where the impression-cylinders move to the left, in this case the web being held stationary on the roller 23 the impression-cylinder A will press the same to the form on the bed D; but the rollers 26 and 260, moving to the left, will move in a loop of the web and will pull the web above the impression-cylinder A to the left twice as fast as the impression-cylinder moves; but the web being held stationary also at the point 33 and the carriage-rollers 30 and 31 also moving in a loop of the web in the opposite direction from what the rollers 26 and 260 move in their loop will pay the web out around the roller 30, so that the same will be given out to the left twice as fast as the impression-cylinders move to the left. By this means a compensating double loop is formed, so that the web can remain stationary on the points 23 and 33 and also be held stationary with relation to the beds while the impression is taking place, but so that the web will run through the turner while the impres-

sion is being taken. When the impression-cylinders are off the forms, the web between these points is shifted, so as to provide a fresh surface for the next impression, and the web is preferably shifted, as before described, when the impression-cylinders are off the forms in either direction, so that impressions are taken in both directions. By this arrangement of parts it will be seen that I have provided a very short path for the web and that very little web will be in the press.

If the web is led directly from the impression-cylinder A to the impression-cylinder B without passing through the turner, as it may be, the impression-cylinders will print twice on the same side of the web, and this construction is useful for a two-color press. This double-compensating loop may be applied to a press in which only one form and reciprocating cylinder are used. Thus, for example, suppose in Fig. 1 that the right-hand or the second cylinder and bed are omitted. In this case the web would be led directly from the roller 260 to a roller 47, carried by the carriage, then to a roller 48, carried by the carriage, and then back to the roller 33, and of course in this leading of the web the turner would not be used.

In a press organized as described it will be seen that the double-compensating loop is still used, but that the second or right-hand end of the same is not used for printing, the printing simply being done in the left-hand loop, the double compensation of the loop being of course necessary whether single or double printing is done. Thus it will be seen that my device can be applied as well to a press in which a single cylinder is used, and it may be done either by placing these additional rollers in the carriage and leading the web, as before described, and still keeping the press so that the same can be used either to print on one or both sides of the web, or otherwise by omitting the second cylinder, whereby the press is simply organized to print on one side of the web, or otherwise by leaving off the form on the second bed.

Thus I have provided a very simple form of traveling-cylinder press and one in which the path of the web is very short; but the chief advantage of this peculiar press is that the same can be combined with a traveling-cylinder press of the ordinary construction, so that two impression-cylinders can be arranged to cooperate with each bed, each impression-cylinder carrying a separate web, whereby the product of the machine can be doubled and twice as many impressions can be taken from the same forms. It is not necessary to place the turner between the two impression-cylinders on the carriage, as the turner could be arranged stationary, as indicated in Fig. 4, and by this construction the impression-cylinders A and B could be brought still closer together, if desired.

In the modification shown in Fig. 4 the web is led from the carriage-roller 260 to a station-

impression-cylinders are off the form,) of the distributors 79, 80, 81, and 82, the drums 83 and 84, the distributors 85 and 86, the single drum 87, the vibrating ductors 88, and the fountains 89. By this inking mechanism it will be seen that each form-roller will receive a supply of ink when the same is off the form-bed in either direction, whereby the forms will be inked in front of each impression-cylinder for each impression. The operation of this organized structure can be followed from the previous description.

It will be seen that the first press and the second press both print from the forms on the beds D and E, and that substantially double the product is obtained over the form of traveling-cylinder press in which a single web is used, whereby the product of the machine is doubled without increasing the number of forms.

It is evident, of course, that the second bed E and its impression-cylinders could be omitted and the press adapted to print only on one side of both webs. In this case the entire second-printing mechanism would be omitted, except a guide-roller, as 480, for the first press, which would be necessary in order to still keep the double-compensating loop of the first press, as before described. The web *b* could be led, if desired, directly from the first impression-cylinder A' to the delivery mechanism by a roll 90, as indicated in dotted lines.

Another way, of course, that I can use this organized structure as a single press is to omit the second form-bed and to lead the web either in the path before described, where only one bed is used, or in the path where two beds are used, the form on the second bed being omitted, and, of course, the second printing thereby not being done.

The problem in all printing is to get the greatest number of impressions from the same form, and while the other parts of the press can be increased the forms must necessarily be left in their simplest state, if it is desired to run the press without stereotyping, which is one great advantage of the traveling-cylinder press. I accomplish this desirable result, as before stated, by printing two webs from one set of forms.

It is understood, of course, that the web *b* can be led directly from the impression-cylinder A' to the impression-cylinder B' without passing through the turner, whereby the second press, as well as the first, could be organized so as to print twice upon the same side of the web.

Of course the parts, as the feeding mechanism and the inking mechanism, the arrangement of beds, &c., will be varied and designed by a skilled mechanic to suit any form of press without departing from the scope of my invention, and as I believe I am the first to use two webs in a traveling-cylinder printing-machine I wish to cover broadly any construction that will manipulate two webs.

The two emerging printed webs may be associated together and further manipulated or cut into sheets and folded either singly, collected or associated, or associated and collected, as desired.

While the feeding devices shown in the drawings are adapted to shift the web when the impression-cylinders are off the forms in either direction, it is of course evident that the web could be only shifted once for each reciprocation and the impression-cylinders arranged to operate substantially as shown in Letters Patent to W. P. Kidder, No. 291,521, dated January 8, 1884.

The invention described in this application is to be distinguished from the invention described and claimed in my Patent No. 557,907, granted April 7, 1896, as in this case I use two webs for two sets of impression-surfaces and, preferably, a separate web-feeding device for each web, and in this case I claim, broadly, the use of two webs in a traveling-cylinder printing-machine, while in my companion application, before referred to, I claim the use of a double web in connection with a traveling impression-cylinder printing-machine, whereby a single web-manipulating mechanism can be used for the two webs. The details and arrangement of parts herein shown may therefore be greatly varied by a skilled mechanic without departing from the scope of my invention as expressed in the claims.

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

1. The combination in a printing-press of a form-bed, two impression-cylinders coacting therewith, suitable guides for leading a different web to each impression-cylinder, and means for shifting said webs around the impression-cylinders while the impression-cylinders are off impression, substantially as described.

2. The combination in a printing-press of a form-bed, two impression-cylinders coacting therewith, suitable guides for leading a different web to each impression-cylinder, and means for shifting said webs around the impression-cylinders while the same are off impression at each end of the forms, substantially as described.

3. The combination of a stationary form-bed, a traveling impression-cylinder adapted to move outward from the center or body of the press, stationary guides for the web before and after it passes around the cylinder, whereby as said impression-cylinder moves outward, a loop is formed in the web, and means for taking up the slack web on the return of the cylinder, substantially as described.

4. The combination in a printing-machine of two form-beds arranged in substantially the same horizontal plane, a traveling impression-cylinder coacting with each of said form-beds, guiding devices adapted to lead a web to one impression-cylinder from the mid-

ary roll 91, back around a roll 92, then through the turner device, which is mounted stationary in the framing, and which turner device is substantially the same as the turner device used on the carriage in the previous device, then from the turner device around the stationary rollers 93 and 94 to the roll or guide 30, carried by the carriage.

It is not necessary always to use the rollers 91, 92, 93, and 94, as the web could be led directly from the carriage-rollers, as at 95, to the stationary turner and from the stationary turner to a carriage-roll 96, these rolls 95 and 96 thus taking the place of the rollers 260 and 30.

I intend to use the rolls 91, 92, 93, and 94 when it is desired to keep the impression-cylinders A and B very close to each other; but when this is not desired I intend to lead the web directly to the stationary turner without these rollers 91, 92, 93, and 94, as indicated in dotted lines.

The reason I prefer to mount the turner in the carriage is that the turner will move in the same direction as the web between the impression-cylinders, but at half the speed. This will cause the web to only run at half the speed around the turner mounted in the carriage that the web would run around the stationary turner device, and hence the action of the web would be, when the turner is mounted in the carriage, easier than when the turner is stationary; but both forms, however, are within the scope of my invention.

It will be seen that this press might be called an "internal" press, in that it is not necessary to carry the web in a loop between the impression-cylinders to turn the same, as is done in the device shown in Letters Patent to John H. Stonemetz, No. 376,053, granted January 3, 1888.

The particular advantage of my press, as before stated, is that by using this peculiar form of press I can combine the same with another printing-press, and thus have two impression-cylinders acting to present a different web to each form, and thus this enables me to carry out the broad idea of my invention—viz., of printing two webs from one form-bed or of perfecting two webs from two form-beds—and of course the broad idea of my invention—viz., of printing two webs—could be carried out in other ways. Also the broad idea of my invention contemplates applying the device to a printing-press in which the cylinder or cylinders is or are stationary and the bed or beds reciprocates or reciprocate.

Referring now to the diagram shown in Fig. 3, I have illustrated such a machine. In this case I have arranged the impression-cylinders A and B in the carriage C' exactly as before described, so that they will cooperate with the beds D and E; but in the carriage C', I have arranged another set of impression-cylinders, as A' and B', which also coact with the beds D and E. I preferably arrange with each set of impression-cylinders three form-

rollers F', F<sup>2</sup>, and F<sup>3</sup>, as shown, the form-roller F<sup>2</sup> being arranged between two impression-cylinders A A' or B B'. The path of the web A in this device with relation to the impression-cylinders A and B, is exactly the same as before described and need not be again here detailed. The other parts of the machine are also substantially the same, except that the inking apparatus may be modified, as hereinafter described. The other web b is led from a web-roll w', which may be mounted above the machine, as shown. From this web-roll the web b is led through the continuously-running feeding-in rollers 50, 51, and 52, then around the looping feeding-roller 53, which may be mounted in pivoted arms 54, and these pivoted arms 54 may be arranged to move synchronously with the arms 14 of the first press by connections 55, as shown. From the looping feeding-in roller the web b is carried to a stationary guide-roller 56, then down to a stationary guide or roller 57, mounted in the framing at the end of the machine. From this guide-roller 57 the web passes around the guides or rollers 58 and 59, mounted in the carriage C', then under the impression-cylinder A', then around the guides or rollers 60 and 600, also carried by the carriage C'. From this roller 600 the web may pass to a suitable turner, which may consist of the right-angled turner-bars, as 62 and 61, and the usual parallel roll, which turner device is substantially the same as the turner device for the first press; but I preferably arrange this turner device stationary in the machine instead of mounting the same in the carriage, as is preferred in connection with the first press. From this turner the web passes to the carriage-guides 63 and 64, then under the impression-cylinder B', then around the carriage-guides 65 and 650 to a stationary guide or roller 66 at the end of the press. From this stationary guide or roller the web b may pass around the looping delivery-roller 67, which may be mounted in suitable arms 68, which arms 68 may be actuated by yokes 69, which carry rollers 70, bearing on cams 71, which are rotated synchronously with the cams that actuate the other looping-rollers, and the arms 68 may be held in their normal position by springs 72 in the usual manner. From this looping delivery-roller the web passes to the continuously-running delivery-rollers 73, 74, and 75 out of the press. The organization of this portion of the mechanism is substantially that which is well known and need not be further described, except to state that an impression will be taken on the web for each forward- and backward movement of the impression-cylinders.

Any suitable inking device may be provided to supply ink to the form-rollers F', F<sup>2</sup>, and F<sup>3</sup>, and, if desired, inking devices may be arranged at each end of each bed, and these inking devices may consist of drums, as 76, 77, and 78, (which are adapted to give ink to the form-rollers F', F<sup>2</sup>, and F<sup>3</sup> when the

dle of the machine, then around said impression-cylinder, then directly across the machine to the outer side of the second impression-cylinder, then under the second impression-cylinder toward the middle of the machine, and web-manipulating devices arranged to intermittently shift the web around the impression-cylinders, substantially as described.

5 5. The combination in a printing-press of two form-beds arranged in substantially the same horizontal plane, a traveling carriage carrying an impression-cylinder for each of said form-beds, web-guiding devices arranged  
15 to lead the web to and from the impression-cylinders from between said beds, the web passing directly from one impression-cylinder to the other, and web-manipulating devices arranged to intermittently shift the web, substantially as described.

6. The combination in a printing-press of the two form-beds, the reciprocating carriage carrying an impression-cylinder coacting with each of said form-beds, suitable web-guiding  
25 mechanism adapted to guide the web to and from said impression-cylinders from between said beds, the web passing from one impression-cylinder to the other, whereby a double-compensating loop in the web is formed, a  
30 suitable turner arranged in the path of the web between the impression-cylinders, and web-manipulating devices adapted to intermittently shift the web, substantially as described.

35 7. The combination in a printing-press of the two form-beds, the reciprocating carriage carrying an impression-cylinder coacting with each of said form-beds, web-guiding devices adapted to guide the web to and from said  
40 impression-cylinders from between the beds, the web passing from one impression-cylinder to the other, a suitable turner carried by the carriage interposed in the path of the web between the impression-cylinders, and suitable  
45 devices for shifting the web, substantially as described.

8. The combination in a printing-press of the form-beds, the reciprocating carriage carrying an impression-cylinder coacting with  
50 each of said form-beds, web-guiding devices adapted to guide the web to and from said impression-cylinders from between the beds, suitable guides as 260 and 30 mounted in the carriage, adapted to lead the web directly  
55 from one impression-cylinder to the other, whereby a double-compensating loop is formed in the web, a turner carried by the carriage interposed in the path of the web between these two guides, and means for inter-  
60 mittently shifting the web, substantially as described.

9. The combination in a printing-press of two form-beds arranged in substantially the same horizontal plane, means for continuously feeding the web into and out of the  
65 press, two looping-rollers adapted to inter-

mittently shift the portion of the web in the press, guide-rollers adapted to feed the web into and out of the press from between the two beds, the reciprocating carriage carrying  
70 an impression-cylinder coacting with each bed, suitable guides so arranged that the web will be led directly from one impression-cylinder to the other within the limits of the carriage, and a suitable turner carried by the  
75 carriage adapted to turn the web between the impression-cylinders, substantially as described.

10. The combination in a printing-press of the two form-beds, the reciprocating carriage  
80 carrying an impression-cylinder coacting with each of said form-beds, a turner carried by the carriage arranged in the path of the web between the impression-cylinders, consisting of the two right-angled turner-bars, and the  
85 roller mounted on the carriage parallel to the movement thereof, and suitable web feeding and manipulating devices adapted to intermittently shift the web, and to feed the web into and out of the press from between the  
90 beds, substantially as described.

11. The combination in a printing-press of two form-beds, two traveling impression-cylinders coacting with each of said form-beds, web-guides so arranged that two separate  
95 webs may be presented by said impression-cylinders to forms placed on the beds, and means for intermittently shifting said webs, substantially as described.

12. The combination in a printing-press of  
100 two form-beds, two impression-cylinders coacting with each of said beds, web-guides so arranged that two webs may be presented by the impression-cylinders to forms placed on the beds so as to be perfected, and means for  
105 intermittently shifting said webs, substantially as described.

13. The combination in a printing-press of a form-bed, two traveling impression-cylinders coacting with said form-bed, web-guides  
110 so arranged that a separate web may be presented by each of said impression-cylinders, and separate web-manipulating devices for each of said webs adapted to intermittently shift the webs around the impression-cylinders,  
115 substantially as described.

14. The combination in a printing-press of two form-beds, two traveling impression-cylinders coacting with each of said form-beds, suitable guides, so arranged that two webs  
120 may be presented by said impression-cylinders, and separate web-manipulating mechanisms adapted to intermittently shift the webs around said impression-cylinders, substantially as described.

15. The combination in a printing-press of two form-beds, two traveling impression-cylinders coacting with each of said form-beds, suitable web-guides arranged so that two webs  
125 may be presented and perfected by said impression-cylinders, and separate web-manipulating mechanisms for each of said webs adapted  
130

ed to shift the webs intermittently around said impression-cylinders, substantially as described.

16. The combination in a printing-press of  
5 a form-bed, two traveling impression-cylinders coacting with said form-bed, web-guiding devices, whereby a separate web may be presented by each of said impression-cylinders, suitable web-manipulating devices, and form-  
10 inking rollers arranged outside of each of said cylinders and between the same, substantially as described.

17. The combination in a printing-press of  
15 two form-beds, two traveling impression-cylinders coacting with each of said form-beds, suitable web-guides arranged so that a separate web may be presented to forms placed on said beds by each set of impression-cylinders, suitable web-manipulating devices and  
20 form-inking rollers as F', F<sup>2</sup>, and F<sup>3</sup> arranged at the outside and between said impression-cylinders, substantially as described.

18. The combination in a printing-press of  
25 the two form-beds, the reciprocating carriage carrying two impression-cylinders adapted to coact with each of said beds, web-guiding devices adapted to lead two separate webs around said impression-cylinders, whereby  
30 two separate webs can be printed, turner devices adapted to turn said webs between the impression-cylinders, and means for intermittently shifting said webs, substantially as described.

19. The combination in a printing-machine  
35 of the form-beds D and E, the impression-cylinders A and A' coacting with the bed D, the impression-cylinders B and B' coacting with the bed E, suitable web-guides adapted to lead a web from the impression-cylinder A' to the impression-cylinder B', so that the same  
40 will be perfected by said impression-cylinders, web-guides adapted to lead another web from the impression-cylinder A to the impression-cylinder B within the limits of the carriage, a web-turner interposed in the path of  
45 the web between the impression-cylinders A and B, and web-manipulating devices adapted to intermittently shift the webs, substantially as described.

50 20. The combination in a printing-press of

the form-beds D and E, the impression-cylinders A and A' coacting with the bed D, the impression-cylinders B and B' coacting with the bed E, said impression-cylinders being  
55 mounted in a reciprocating carriage, web-guides adapted to lead a web to the impression-cylinders A and B between said beds, web-guides adapted to lead a web to the impression-cylinders A' and B' from outside of  
60 the beds, suitable turner devices interposed in the path of both webs between the two sets of impression-cylinders, and means for intermittently shifting said webs around the impression-cylinders, substantially as described.  
65

21. The combination in a printing-press of  
the form-beds D and E, the impression-cylinders A and A' coacting with the bed D, and the impression-cylinders B and B' coacting  
70 with the bed E, said impression-cylinders being mounted in a reciprocating carriage, web-guides adapted to lead a web to the impression-cylinders A and B between said beds, web-guides adapted to lead a web to the impression-cylinders A' and B' from outside of  
75 the beds, suitable turner devices interposed in the path of both webs between the two sets of impression-cylinders, the turner device between the impression-cylinders A and B being arranged in the carriage, and the turner  
80 device between the impression-cylinders A' and B' being fixed, and means for intermittently shifting both webs around the impression-cylinders, substantially as described.

22. The combination in a printing-press of  
85 a form-bed, two traveling impression-cylinders presenting separate webs coacting therewith, form-inking rollers as F', F<sup>2</sup>, and F<sup>3</sup>, arranged outside and between said impression-cylinders, and means for supplying ink to said  
90 form-rollers when they are off the form, substantially as described.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

LOUIS W. SOUTHGATE.

Witnesses:

E. M. HEALY,

FREDERICK B. HARLOW.