

No. 678,449.

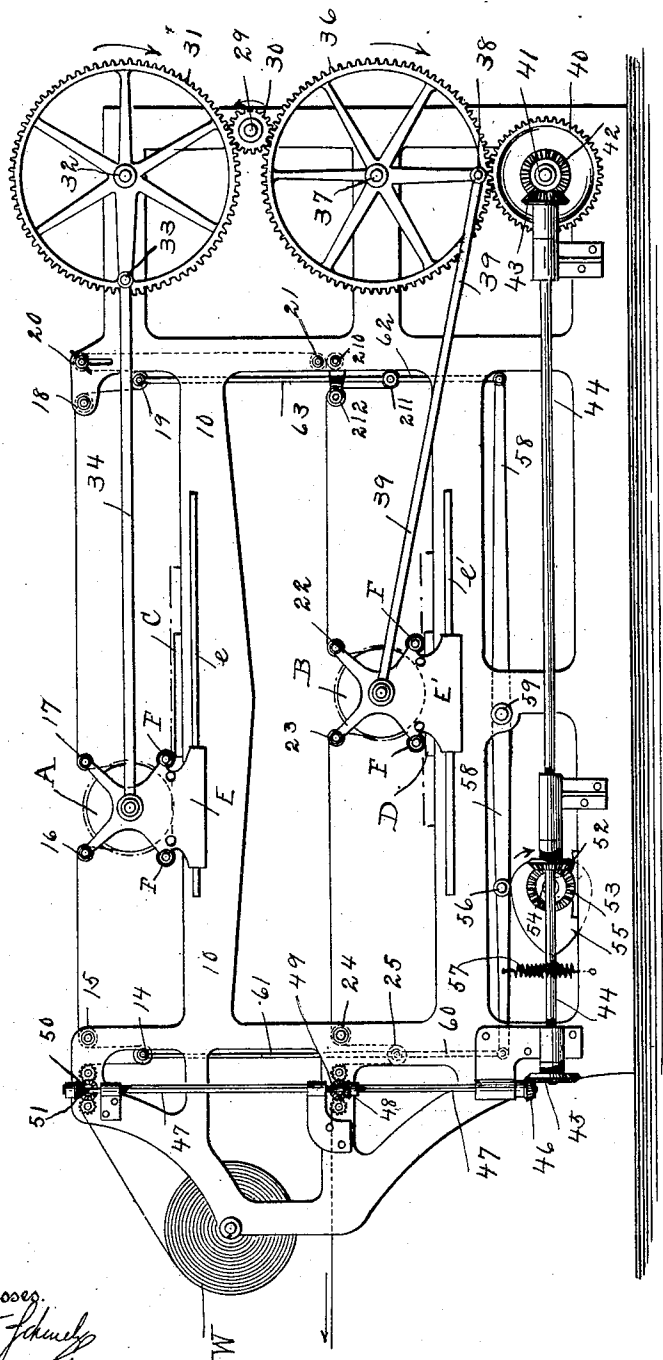
Patented July 16, 1901.

H. A. W. WOOD.
PRINTING MACHINE.

(Application filed Aug. 2, 1893. Renewed Dec. 6, 1900.)

(No Model.)

5 Sheets—Sheet 1.



Witnesses.
Chas. F. Schenck
E. M. Kraly

Inventor.
H. A. W. Wood,

By Attorney.
Louis W. Southgate

No. 678,449.

Patented July 16, 1901.

H. A. W. WOOD.
PRINTING MACHINE.

(Application filed Aug. 2, 1893. Renewed Dec. 6, 1900.)

(No Model.)

5 Sheets—Sheet 2.

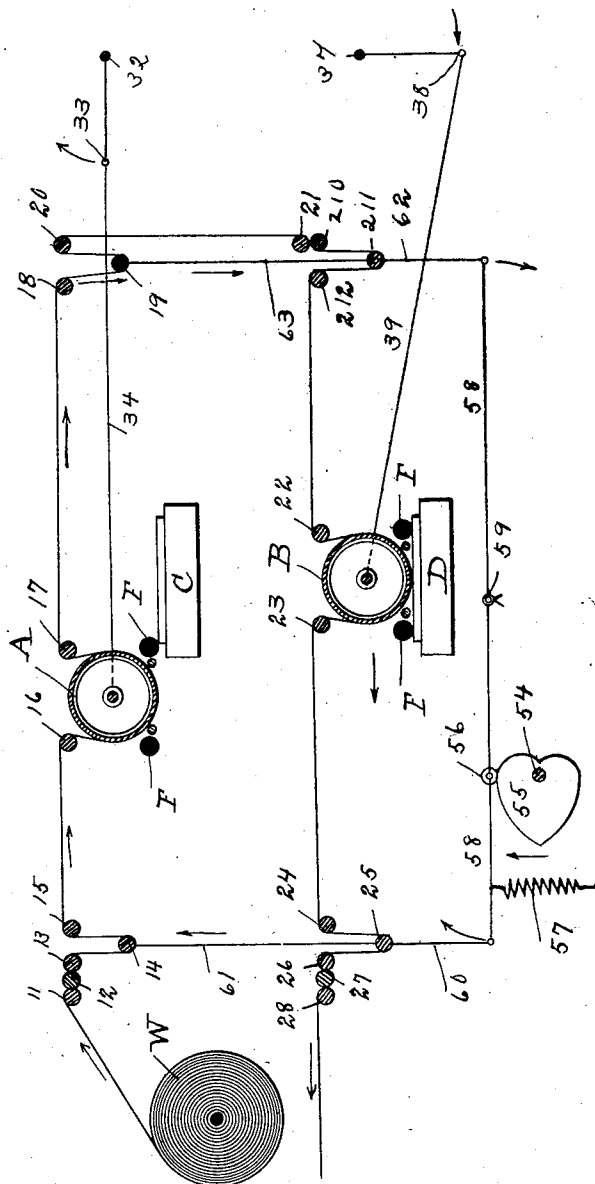


Fig. 2.

Witnesses.
Chas. F. Smith,
E. M. Haley.

Inventor.
H. A. W. Wood,

By Attorney.
Louis W. Southgate

No. 678,449.

Patented July 16, 1901.

H. A. W. WOOD.
PRINTING MACHINE.

(No Model.)

(Application filed Aug. 2, 1893. Renewed Dec. 6, 1900.)

5 Sheets—Sheet 3.

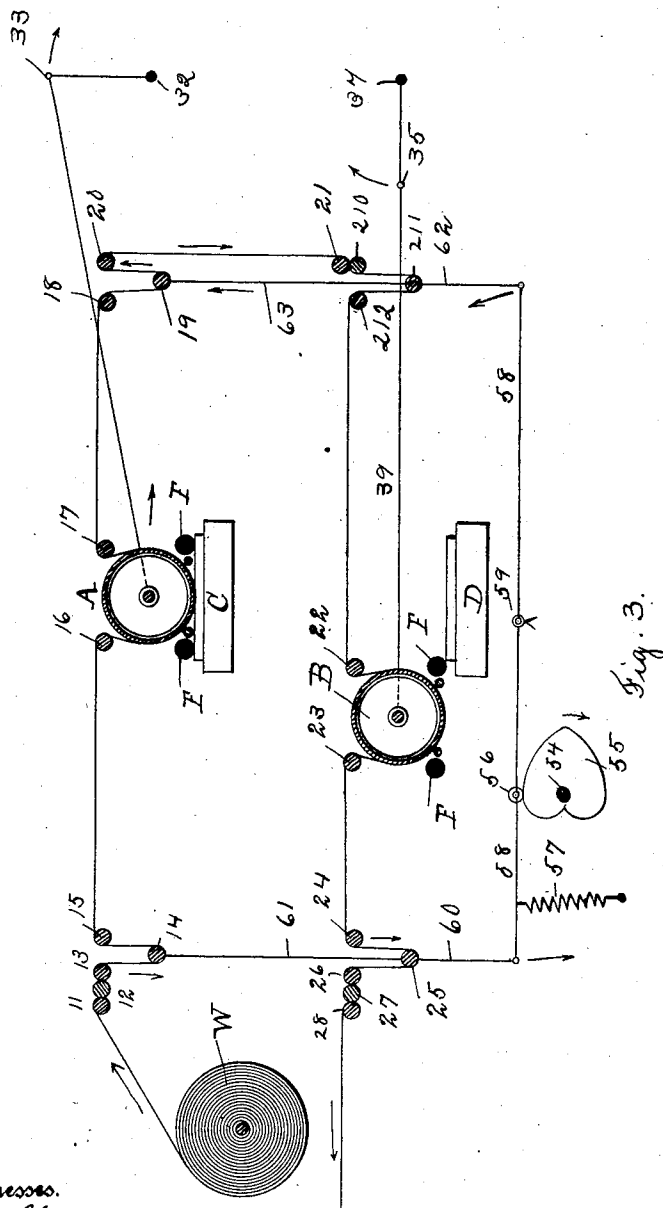


Fig. 3.

Witnesses.
Chas. F. Johnson
E. M. Kealy

Inventor.
H. A. W. Wood.

By Attorney.
Louis W. Southgate

No. 678,449.

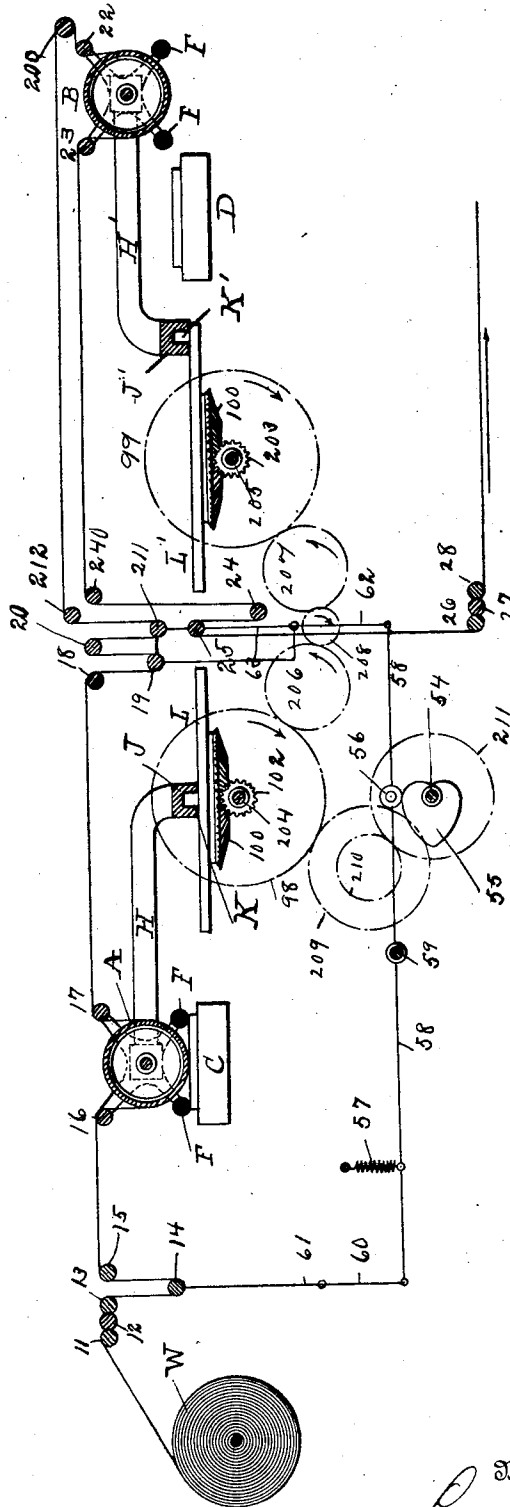
Patented July 16, 1901.

H. A. W. WOOD.
PRINTING MACHINE.

(Application filed Aug. 2, 1893. Renewed Dec. 6, 1900.)

(No Model.)

5 Sheets—Sheet 4.



Witnesses.
Chas. F. Fitch
E. M. Kraly

Inventor.
H. A. W. Wood,
By Attorney.
Louis W. Southgate

No. 678,449.

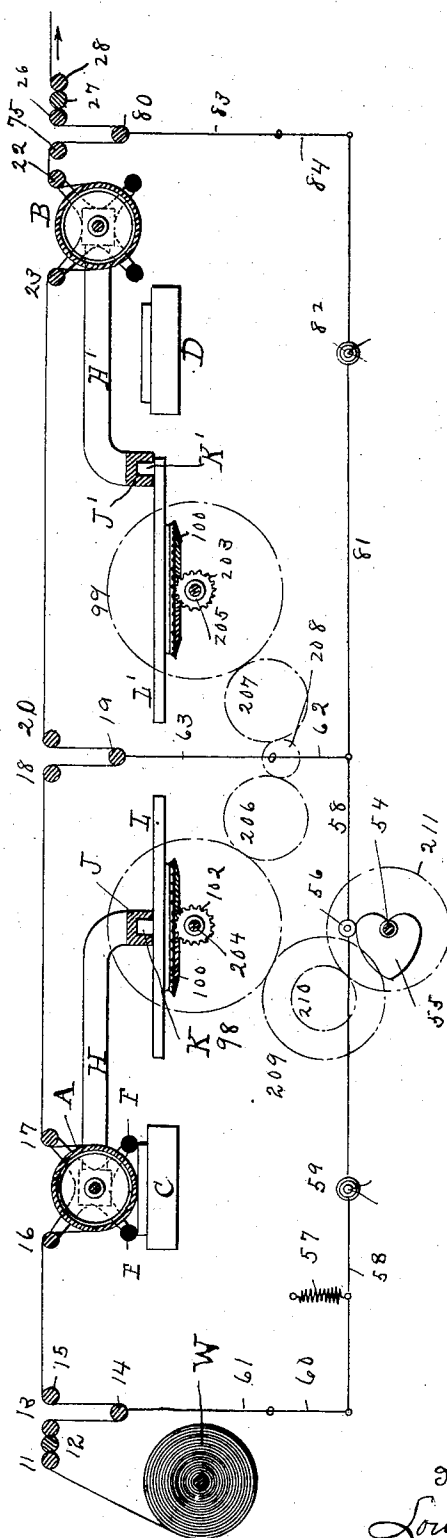
Patented July 16, 1901.

H. A. W. WOOD.
PRINTING MACHINE.

(Application filed Aug. 2, 1893. Renewed Dec. 6, 1900.)

(No Model.)

5 Sheets—Sheet 5.



Witnesses.
Chas. F. Schurz
E. M. Realy.

Inventor.
H. A. W. Wood,
By Attorney.
Loring W. Southgate

UNITED STATES PATENT OFFICE.

HENRY A. WISE WOOD, OF NEW YORK, N. Y., ASSIGNOR TO THE CAMPBELL PRINTING PRESS & MANUFACTURING COMPANY, OF SAME PLACE.

PRINTING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 678,449, dated July 16, 1901.

Application filed August 2, 1893. Renewed December 6, 1900. Serial No. 38,953. (No model.)

To all whom it may concern:

Be it known that I, HENRY A. WISE WOOD, a citizen of the United States, residing at New York, in the county of New York and State of New York, 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 web-printing presses in which two printing-couples are used, each couple comprising an impression-cylinder and a flat printing-form. In all these printing-presses, so far as I am aware, the members of each couple have always been arranged to be in impression or printing contact at the same time and also to be out of printing contact (especially on the reversing movement) at the same time. It is well known that it takes a great deal of power to operate a press of this character while the two couples are in impression or printing contact and a great deal less power to operate the press while the members are not in impression and while the moving members are reversing. This variance causes presses of the character stated to run irregularly, to be subject to violent shocks and strains, and requires that the maximum power of impression be applied to the machine at all times.

My invention consists in counterbalancing or so arranging the two cylinders and two beds of a web-printing press that while the members of one couple are in impression the members of the other couple are not in impression, the reversing movement taking place, and vice versa.

With this improvement the resistance of the machine at all times is brought nearly, if not quite, to a constant—that is, the maximum resistance of one printing-couple is opposed to the minimum resistance of the other couple, and vice versa, whereby an average resistance is offered by the machine at all times. By this arrangement and invention power can be evenly applied to the machine and the same can be run at a high and an even speed without the heavy jar and shock now common in the two-couple printing-machine.

My invention is especially applicable to two-couple web-printing machines which in-

volve in their structure reciprocating members, such as reciprocating printing members, reciprocating impression members, or both reciprocating printing and impression members.

With my invention applied to a two-couple printing-machine of this character the counterbalanced movement of the reciprocating members causes the machine to resemble in action very nearly a rotary machine, which is the fastest machine known; but the rotary machine has the disadvantage of poor printing, due to the use of curved plates, such as stereotype-plates, and therefore for fine printing flat type-plates on flat forms must be used. Therefore if the press which uses reciprocating members which can carry flat forms can be brought in action and resistance to resemble the rotary press the reciprocating press can be brought to more nearly compete in speed with the rotary press and at the same time do better work.

By my invention the speed of the reciprocating-member press can be greatly increased.

As before stated, the couples of a machine to which my invention is applicable consist each of an impression member and a printing member. The printing member usually consists of a bed upon which the form or printing-surface can be secured. The impression member usually consists of an impression-cylinder which is adapted to press or present the material to be printed to the printing-surface. These beds and cylinders have been variously arranged in two-couple printing-machines, to which my invention is applicable.

In some presses the beds reciprocate and the cylinders are stationary. In some presses the cylinders reciprocate and the beds are stationary. In some presses both beds and cylinders reciprocate in opposition; but in all these presses in which two couples are used, as before stated, the reciprocating members of the two couples move in unison, and hence the faulty action before referred to. My invention applied, as before described, to any of these two-couple presses, in which either or both the members of each couple reciprocate, will transform the resistance and action into nearly a constant.

My invention is therefore of this general application; and it consists in operating or arranging a two-couple web-printing press having beds and cylinders so that the members of one couple are in impression or printing contact while the members of the other couple are out of impression and the reversing movement taking place.

A further advantage of my invention as applied to a web-press of this character lies in the fact that with my invention the web will only have to be shifted around one impression member at a time, as the impression is off only in one couple at a time. Hence the feed or shift of the web around or under either one or the other of the two impression members is always, or substantially so, taking place. This shortens the part of the web that has to be intermittently fed or shifted, or rather divides it into two parts, in which parts the web is alternately shifted. This greatly helps the web through the press and reduces the strain on the web and at the same time increases the speed and easy action of the machine.

In order to enable any person skilled in printing-machines to practice my invention, I will show and describe a web-printing machine in which the impression members of each of the two couples consist of reciprocating cylinders and in which the printing members of each of the two couples consist of stationary beds upon which the printing surfaces or forms may be placed and secured.

Referring now to the accompanying five sheets of drawings, forming part of this case, Figure 1 is a side elevation of a printing-press of this especial character with my improvements applied thereto. Fig. 2 is a section or diagram showing the parts in one position. Fig. 3 is a sectional elevation showing the parts in another position. Fig. 4 is a sectional elevation illustrating a modification hereinafter referred to at length, and Fig. 5 illustrates a still further modification of my invention.

In the perfecting or double printing-form of this press two impression-cylinders are used, each impression-cylinder coacting with a separate form-bed. In this last style of traveling-cylinder press, in which two traveling impression-cylinders are used, all forms of presses heretofore devised have been arranged so that both cylinders print at the same time and so that both cylinders are off the impression, and the feed takes place at the same time around both cylinders. In this form of press it has been found that the strain all comes on the driving mechanism when the cylinder or cylinders are in impression, but that when the cylinder or cylinders are reversing off the forms and the feed taking place very little power is needed to perform this operation. Of course by arranging the two cylinders so that they are both printing at the same time and so that they are both off the form-beds at the same time the driving

mechanism will at one time have to supply a heavy power or thrust to perform the printing operation and at another time will be run easily. This is practically what limits the speed at which this machine is run to-day.

It has been found that when the two-cylinder machine is run at a high rate of speed the action of the press is very irregular, due to the irregular resistance offered by the moving parts.

As before described, the aim of this invention is to so construct the press that the power may be evenly absorbed by the same and to so arrange the parts that they will be very smooth-running and will counterbalance each other, one impression-cylinder printing while the other is reversing, whereby the power will be evenly divided between and absorbed by the two reciprocating cylinders. By this means a very high rate of speed can be obtained. I also arrange the two impression-cylinders so that one is printing as the other cylinder is off the form-bed or reversing. The feed of the web will take place around the latter, whereby the web will be properly fed and the strain thereon equalized. In connection with this I have invented and improved the feeding mechanism, so that the feed will properly take place around each impression-cylinder as the same is off the impression.

Referring now to the drawings and in detail, 10 10 designate the side frames of a machine of the character referred to. Secured between these side frames are the two form-beds C and D, with which coact the reciprocating impression-cylinders A and B. The impression-cylinder A is mounted in suitable reciprocating carriers E, which carriers E are mounted or gibbed to suitable guides e, secured to the frames, and this impression-cylinder coacts with forms placed upon the bed C. The impression-cylinder B is mounted in similar carriers E', which are gibbed or secured to guideways e' on the frames, and this impression-cylinder coacts with forms placed on the bed D. Arranged at each side of each impression-cylinder in any of the usual manners are form-rollers F F', to which form-rollers ink may be supplied in any of the usual manners. The impression-cylinders have gears on the ends of the same, which mesh with suitable racks arranged on the sides of the beds, as indicated in dotted lines in Fig. 1, so that as the impression-cylinders travel forward and backward they will revolve to properly register with the forms, which arrangement is well understood.

W represents a web-roll from which the web is led into the machine.

From the web-roll W the web is led between the continuously-running rollers 11, 12, and 13, which draw the web from the roll and feed the same into the press. From the roll 13 the web is led around the looping-roller 14, then around the stationary guide-roller 15, then around the guide or roller 16, mounted in the carriers E, under the impression-cylinder A,

then around the guide-roller 17, also secured in the carriers E, around the guide-roll 18, secured in the frame of the machine, around the looping-roller 19, then around the stationary guide or roller 20. This stationary guide-roller 20 may be made adjustable for the purpose of obtaining register of the web between the two impression-cylinders. From the roller 20 the web passes to the rollers 21 and 210, secured in the frame of the machine, then around the looping-roller 211, and then around the stationary guide or roller 212, then to the guide or roller 22, secured in the carriers E', around under the impression-cylinder B, then over the guide or roller 23, also mounted in the carriers E', around the stationary guide or roller 24, mounted in the frames, around the looping-roller 25, then out through the continuously-running delivery-rollers 26, 27, and 28. The guides 15, 18, 20, 21, 210, 212, and 24 are preferably made in the form of rollers, which, while stationary in the frames, are free to revolve. By this passage of the web it will be seen that the web will be presented to have one side printed from forms upon the bed C and to have the other side printed or the web perfected by forms placed upon the bed D.

A suitable driving-shaft 29 is mounted in the frames, as shown, to which power can be applied in any suitable manner, and on the ends of this shaft 29 are arranged pinions 30. These pinions 30 engage gears 31, mounted on a shaft 32, journaled in the main frames. These gears 31 carry crank-pins 33, which crank-pins 33 are connected by suitable pitmen 34 to the reciprocating carriers E. Also meshing with the pinions 30 are the gears 36, which are mounted on the shaft 37, journaled in the main frames of the machine. Secured to these gears 36 are crank-pins 38, which are connected by suitable pitmen 39 to the reciprocating carriers E'. This gearing is the same on each side of the press. It will be seen that the two sets of gear-wheels 36 and 31 turn in the same direction; but it will be seen that the two sets of crank-pins 33 and 38 are set quartering. By this means one impression-cylinder will be off the form-bed while the other impression-cylinder is on the form-bed.

The length of the forms is preferably so arranged that each cylinder will be in engagement with the same for one-quarter of the revolution of the crank-pins—that is, each impression-cylinder will engage the forms during two-quarters of the revolution of the crank-pins and will be off the forms in either direction during one-quarter of the revolution of the crank-pins, the crank-pins thus making a complete revolution. These quarters will be determined, of course, by drawing forty-five-degree lines through the centers of rotation of the two sets of crank-pins. Meshing with one of the gears 36 is a gear 40, which is one-half the size of the same and which is mounted on the shaft 41, journaled in the main frame 10. Secured on this shaft

41 is a miter-gear 42, which meshes with a miter-gear 43, secured on the end of a shaft 44, which is mounted in suitable bearings or journals secured to the frame 10. Arranged on the end of this shaft 44 is a bevel-gear 45, which meshes with and drives a bevel-pinion 46, mounted on the end of a vertical shaft 47, which is journaled in the brackets secured to the main frame 10. Mounted on this vertical shaft 47 is a bevel-pinion 48, which meshes with and engages a bevel-pinion 49, secured on the continuously-running delivery-roller 27. The continuously-running delivery-rollers 26, 27, and 28 are geared together, and by this means it will be seen that they will be continuously revolved. Also secured to this shaft 47 is a bevel-pinion 50, which meshes with a bevel-pinion 51, secured upon the continuously-running roller 12. The continuously-running feeding-in rollers 11, 12, and 13 are geared together, and by this means it will be seen that they are continuously turned to feed the web into the press. Also mounted on the shaft 44 is a miter-gear 52, which meshes with and engages a miter-gear 53, secured on the end of the shaft 54, which shaft 54 is journaled in suitable bearings or journals secured to the main frames. Arranged on this shaft 54 are two heart-shaped cams 55. Bearing against these heart-shaped cams are rollers 56, mounted on arms 58, which arms 58 are journaled or pivoted upon a shaft 59, secured in the main frames. The rollers 56 are kept normally against the cams by means of springs 57, which are connected to the arms 58 and to the main frames, as shown. The left-hand ends of the arms 58 are connected by suitable pitmen 60 to rods or brackets 61, which rods or brackets 61 are secured in suitable bearings or ways in the main frames and which rods or brackets 61 carry the looping-rollers 14 and 25. The other ends of the arms 58 are connected by pitmen 62 to arms or brackets 63, which are suitably mounted in the main frames so as to be vertically movable and in which arms or brackets 63 the looping-rollers 19 and 211 are mounted.

It will be seen that by the gearing before described the cams 55 will turn twice for every revolution of the crank-pins 33 or 38, and by this means the feed will properly take place. It will also be seen by reference to the diagrams that the web is looped in the same manner around all the looping-rollers 14, 19, 211, and 25, but that the looping-rollers 19 and 211 move up as the rollers 14 and 25 move down, and vice versa.

In Fig. 2 the parts are shown in the same position as in Fig. 1. In this arrangement the impression-cylinder B is in printing contact with forms placed upon the bed D and the impression-cylinder A is at its extreme limit to the left, the looping-rollers 14 and 25 are moving upward, and the looping-rollers 19 and 211 are moving downward. The feed is thus taking place around the impression-

cylinder A, the web given up by the continuously-running feeding-in rollers 11, 12, and 13, and the looping-roller 14 being taken up by the downwardly-moving looping-rollers 19 and 211. These downwardly-moving looping-rollers 19 and 211 are, in effect, a single looper, which has twice the capacity of the looper 14 and which acts to take up both the web supplied by the continuously-running feeding-in rollers and by the upwardly-moving feeding-in roller 14, and of course a single looping-roller having double the movement could be used in place of the rollers 19 and 211, as shown and described in one of the modifications. The web from the roll 212 to the roll 24 is held stationary and is being pressed by the impression-cylinder B onto forms placed upon the bed D. The looping-roller 25 is rising, and the web let out by this rising looping-roller is continuously paid out of the press by the delivery-rollers 26, 27, and 28. By this means the feed around the impression-cylinder A at its left-hand extreme takes place.

In Fig. 3 the crank-pins are shown as having made a quarter-revolution. This will move the impression-cylinder B to its left-hand extreme and will draw the impression-cylinder A onto the forms placed upon the bed C. In this position of the parts the looping-rollers 14 and 25 are moving downwardly and the looping-rollers 19 and 211 are moving upwardly. The web fed in by the continuously-running feeding-in rollers 11, 12, and 13 is being now taken up by the downwardly-moving looping-roller 14 and the web between the rollers 15 and 18 is held stationary, so that the impression-cylinder A can properly act. The web let out by the upwardly-moving looping-rollers 19 and 211 is being taken up by the downwardly-moving looping-roller 25 and the continuously-running feeding-out rollers 26, 27, and 28, and thus the feed around the impression-cylinder B is taking place. The feed of the web around the impression-cylinders at the right-hand extremes is just the same, the impression-cylinders simply being in their other extreme positions, the feeding mechanism then being, of course, in the same position as indicated in the diagrams, as the cams turn twice as fast as the crank-pins. The action of the looping-rollers 14 and 25 in conjunction with the continuously feeding-in and feeding-out rollers is well known. When the looping-roller 14 moves downward, it takes up all the web fed in by the continuously-running rollers; but when the looping-roller 14 moves upward both the web fed in by the continuously-running rollers 11, 12, and 13 and that paid out by the roller 14 is delivered forward around the roll 15. Thus the web is intermittently paid out around the roll 15. As the looping feeding-out roller 25 rises it will supply just the web necessary for the proper action of the continuously-running feeding-out rollers; but as the looping-roller 25 descends a double amount of web will be

pulled forward around the roll 24, due both to the downward action of the looping-roller 25 and the action of the continuously-running feeding-out rolls. The action of the other looping-rollers 19 and 211 allows the feed to properly and nicely take place around the impression-cylinders at the proper times and is a very simple and efficient mechanism for this purpose. By this means it will be seen that I have gained the great advantage of having one impression-cylinder printing while the other impression-cylinder is off its formed and its feed properly and accurately taking place.

Of course the proportions of the time in which the cylinders are printing and reversing and the shape of the cams could be varied as desired. Also it will be seen that the loopers are arranged in the path of the web between the impression-cylinders to perform the important function of intermediate looping devices, and by their arrangement the web will only be shifted around one impression-cylinder at a time.

My preferred form of feeding devices will be seen to be continuously-running feeding-in rollers, a looping feeding-in roller, an intermediate looping device arranged in the path of the web between the two impression-cylinders acting in opposition to the feeding-in looping-roller and adapted to draw forward the web as fast as the same is paid out both by the feeding-in rollers and the looping feeding-in roller and a looping-out roller arranged in the path of the web beyond the last impression-cylinder acting in unison with the feeding looping-in roller, and the continuously-running delivering-rollers.

While it is preferred to continuously slack the web off the web-roll and to deliver the web continuously from the press, this is not necessary so far as the broad scope of my invention is concerned, as the feeding devices may be otherwise arranged.

Any equivalent device may be substituted for the looping-rollers, and I do not wish to be understood as limited to the feeding mechanisms I have shown. In the device that I have previously discussed the beds are shown as arranged one directly over the other.

Of course my invention is applicable to any convenient arrangement of beds. Thus in Sheet 4 of the drawings I have shown the two beds C and D as arranged in the same horizontal plane and the impression-cylinders as each driven by a separate driving mechanism, substantially the same as the driving mechanism described and claimed in my application filed December 19, 1892, Serial No. 455,613. This driving mechanism consists substantially of a yoke, as J, to which the bearers H, that carry the impression-cylinder A, are connected. Engaging this yoke J is a crank-block K, which is mounted on a revolving disk or crank-arm L. A similar driving mechanism J' H' K' L' is used in connection with the second impression-cylinder

B, and the crank-pins of the two driving mechanisms are set quartering. To drive the disks L and L', I attach bevel-gears, as 100, to the underside of the disks. Engaging the left hand of the gear 100 is the bevel-pinion 102, and engaging the right-hand bevel-gear is a bevel-pinion 203. These bevel-pinions are mounted on shafts 204 and 205, respectively. Mounted on these shafts are large gears 98 and 99, which mesh with intermediates 206 and 207, which intermediates mesh with a single driving-gear 208, to which driving-gear power may be suitably applied. The cams 55 may be driven from the gear 98, as by means of gear 209 and 210, meshing with a gear 211, secured upon the cam-shaft 54, as shown. In this modification the two intermediate looping-rollers 19 and 211 are mounted so as to move upwardly and downwardly together, and in opposition to the feeding looping-in roller 14. Otherwise the arrangement of parts in this modification is the same as that previously described, and the action of this modification is readily understood from the previous description. The path of the web through the press in this modification is substantially the same as before described, except that a registering-roll, as 200, corresponding in function to roll 20 of the previous device, is used between the two impression-cylinders, and that the web from the last impression-cylinder B passes over two intermediate guiding-rollers, as 240 and 24, to the looping-out roller 25, the looping guiding-roller 24 corresponding in function to the looping-roller 24 of the previous device. This press possesses the advantages of that of the press previously described.

In the two presses previously described the web is perfected or printed upon each side.

There is another form of press in which two traveling impression-cylinders are used, and the same is known as the "two-color" press, by which the web is twice printed upon the same side by two impression-cylinders. My invention is equally applicable to this style of press, and one form of such device is shown in Fig. 5. This device is arranged substantially the same as that before described, except that the web passes directly from one impression-cylinder to the other, and beyond the last impression-cylinder B is led down over the stationary roll 75, under a looping-roller 80, which acts in unison with the feeding-in looping-roller 14. It has been before stated that the intermediate looping device is in effect simply a looper which acts in opposition to the feeding-in looping-roller and the feeding-out looping-roller, but which takes up twice the amount of the web, and it has been before stated that a single roller could be used in the path of the web between the impression-cylinders. This is shown in this modification. In this modification the pivot 59 of the arms 58 is arranged so that the looping-roller 19 will have double the movement of the looping feeding-in roller

14. A convenient way to drive the feeding-out looping-roller is to connect the arms 81 (as by slotted joints) to the ends of the arms 58 to pivot these arms, as at 82, and connect the same by pitman 84 to the arms 83, which carry the looping-roller 80. With this form of press the action is substantially the same as that in connection with the other devices, except that the web is twice printed upon the same side.

In the device shown in Fig. 4 it will be seen that the feeding-out looper is arranged oppositely to the feeding-in looper, but that the two looping-rollers 14 and 25 move oppositely. This is in effect the same as forming the loops in the same direction and moving the rollers in the same direction, as is shown in the device in Figs. 2 and 3. In this modification shown in Fig. 4 the feeding-in and feeding-out looping-rollers act in unison; but the intermediate looping devices move in opposition to the feeding-in and feeding-out rollers. It is not necessary that the two cranks or two crank-pins that actuate the two impression-cylinders revolve in the same direction, as the cylinders would be properly moved if they revolved oppositely, provided they are set quartering. Therefore it will be seen that I have improved two-couple printing-machines so that the same can be run at a very high rate of speed, so that the strain put on the driving mechanism is as near as possible equal at all times, and that I have provided a web-feeding device which has all the advantages of an intermediate looping system, whereby the web has to be only shifted around one impression-cylinder at a time.

The details and arrangements can be greatly varied by a skilled designer without departing from the scope of my invention as expressed in the claims, and my broad invention can be applied as before described.

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

1. The combination in a web-printing press of two printing-couples, each comprising an impression-cylinder and a form-bed, means for operating said couples so that one couple will be in impression while the other couple is out of impression, guides for leading a web around said impression-cylinders, and a web-manipulating mechanism arranged to shift the web through one printing-couple at a time, substantially as described.

2. The combination in a web-printing press of two printing-couples, each comprising an impression-cylinder and a form-bed, means for moving one of the parts of each couple so that one couple will be in impression while the other couple is out of impression, guides for leading a web around said cylinders, and a web-manipulating mechanism arranged to shift the web around one couple at a time, substantially as described.

3. In a web-printing press, the combination of two printing-couples comprising impres-

sion-cylinders and flat beds, means for operating said couples so that the members of one couple will be in impression while the members of the other couple are not in impression, and web-shifting devices adapted to shift the web independently around each impression-cylinder when the same is out of impression, substantially as described.

4. The combination in a web-printing press of two printing-couples comprising impression-cylinders and flat beds, means for operating said couples so that the members of one couple will be in impression while the members of the other couple are not in impression, web-shifting devices adapted to shift the web independently around each impression-cylinder while the same is out of impression, and constantly-operating web feeding and delivering mechanism, substantially as described.

5. The combination in a web-printing press of two printing-couples each comprising an impression-cylinder and a flat bed, means for operating said couples so that the members of one couple will be in impression while the members of the other couple are not in impression, and a web-manipulating device arranged in the path of the web between the two impression-cylinders whereby the web can be independently shifted around each impression-cylinder while the same is out of impression, substantially as described.

6. The combination in a web-printing press of two printing-couples, each comprising an impression-cylinder and a flat bed, means for operating said couples so that the members of one couple will be in impression while the members of the other couple are not in impression, and a web-manipulating mechanism comprising a feeding-in device, a feeding-out device and an intermediate device arranged in the path of the web between the two impression-cylinders, the parts being so arranged that the web will be independently shifted around each impression-cylinder while the same is out of impression, substantially as described.

7. The combination in a web-printing press of two printing-couples, each comprising an impression-cylinder and a flat bed, means for operating said couples so that the members of one couple will be in impression while the members of the other couple are not in impression, and a web-manipulating mechanism comprising constantly-running feeding-in and feeding-out rollers, a feeding-in and a feeding-out looper, and an intermediate looping device arranged in the path of the web between the two impression-cylinders, said devices being so arranged that the web will be independently shifted around each impression-cylinder while the same is out of impression, substantially as described.

8. The combination in a web-printing press of two form-beds, a traveling impression-cylinder coacting with each form-bed, a crank mechanism for reciprocating each impression-cylinder, the two crank mechanisms being

set quartering, and suitable web-shifting devices, substantially as described.

9. The combination in a web-printing press of two form-beds, a traveling impression-cylinder coacting with each form-bed, means for moving these impression-cylinders, so arranged that one cylinder will be in impression substantially while the other is out of impression, and web-shifting devices adapted to shift the web around each impression-cylinder when the same is out of impression, substantially as described.

10. The combination of a web-printing press of two form-beds, a traveling impression-cylinder coacting with each form-bed, the cylinders being alternately in impression, web-shifting devices for intermittently paying the web into, and drawing the web out of the press, and a web-manipulating device arranged in the path of the web between the two impression-cylinders, whereby the web can be properly shifted around each cylinder while the same is out of impression, substantially as described.

11. The combination in a web-printing press of two form-beds, a traveling impression-cylinder coacting with each form-bed, the cylinders being so arranged as to be alternately in impression, a feeding-in device, a feeding-out device, and an intermediate feeding device of double capacity arranged in the path of the web between the two impression-cylinders, the whole so arranged that the web will be shifted around each impression-cylinder while the same is out of impression, substantially as described.

12. The combination in a web-printing press of two form-beds, a traveling impression-cylinder coacting with each form-bed, said impression-cylinders being arranged so as to be alternately in impression, continuously-running feeding-in rollers, and continuously-running delivery-rollers, a feeding-in and feeding-out device as looping-rollers operating in unison, and an intermediate device arranged in the path of the web between the two impression-cylinders, acting in opposition to the feeding-in and feeding-out devices, and adapted to handle the web fed in by both the continuously-running feeding-in rollers, and the feeding-in device, substantially as described.

13. The combination in a web-printing press of two form-beds, a traveling impression-cylinder coacting with each form-bed, said cylinders being arranged so as to be alternately in impression, continuously-running feeding-in and feeding-out rollers, a feeding-in and feeding-out looper acting in unison, and two intermediate loopers arranged in the path of the web between the two impression-cylinders, acting in unison, but jointly in opposition to the action of the feeding-in and delivering devices, substantially as described.

14. The combination in a web-printing press of two form-beds, two impression-cylinders continuously-running feeding-in and feeding-out rollers, looping feeding-in and delivery

rollers acting in unison, an intermediate looping device arranged in the path of the web between the two impression-cylinders, acting in opposition to the feeding-in and feeding-out looping-rollers, the feeding-in and feeding-out looping-rollers and the intermediate looping devices being connected to the opposite ends of pivoted arms, and means as cams, for operating these arms, substantially as described.

15. The combination in a web-printing press of two form-beds arranged one directly over the other, a traveling impression-cylinder coacting with each form-bed, a separate driving mechanism for each impression-cylinder arranged so that the impression-cylinders will be alternately in impression, and suitable web-manipulating devices adapted to feed the web around each cylinder while the same is out of impression, substantially as described.

16. The combination in a web-printing press of two form-beds, a traveling impression-cylinder coacting with each form-bed, the impression-cylinders being alternately out of impression, continuously-running feeding-in and feeding-out rollers, feeding-in and feeding-out looping-rollers acting in unison, an intermediate looping device arranged in the path of the web between the two impression-cylinders, consisting of two similarly-arranged looping-rollers, these two intermediate looping-rollers acting in unison, but in opposition

to the feeding-in and feeding-out looping-rollers, substantially as described.

17. The combination in a web-printing press of two form-beds, traveling impression-cylinders coacting therewith, a separate crank mechanism for reciprocating each impression-cylinder, said crank mechanisms revolving in the same direction, but set quartering so that the cylinders will be alternately in impression, and suitable web-manipulating devices for properly handling and shifting the web, substantially as described.

18. The combination in a web-printing press of two form-beds arranged one over the other, an impression-cylinder for each bed, two crank mechanisms arranged one over the other and set quartering so that the impression-cylinders will be alternately in impression, continuously-running feeding-in and feeding-out rollers, connected feeding-in and feeding-out looping-rollers acting in unison, and intermediate looping-rollers arranged in the path of the web between the impression-cylinders, acting in unison, but jointly oppositely to the feeding-in and feeding-out looping-rollers, substantially as described.

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

H. A. WISE WOOD.

Witnesses:

HENRY W. COZZENS, Jr.,
JAMES J. McGRATH.