No. 841,911. PATENTED JAN. 22, 1907.

H. A. W. WOOD.

RECIPROCATING CYLINDER WEB PRINTING MACHINE.

APPLICATION FILED JAN. 13, 1899. RENEWED APR. 9, 1906.

6 SHEETS—SHEET 1.

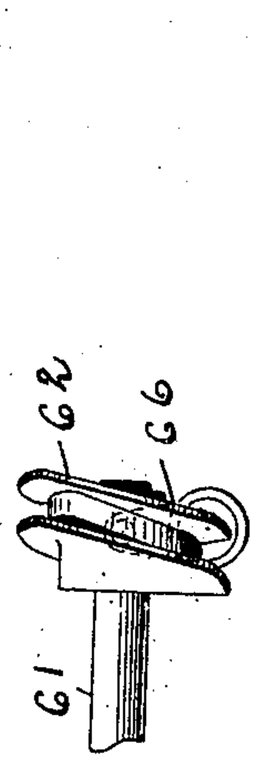

Fig. 2.

Fig. 1.

Witnesses.
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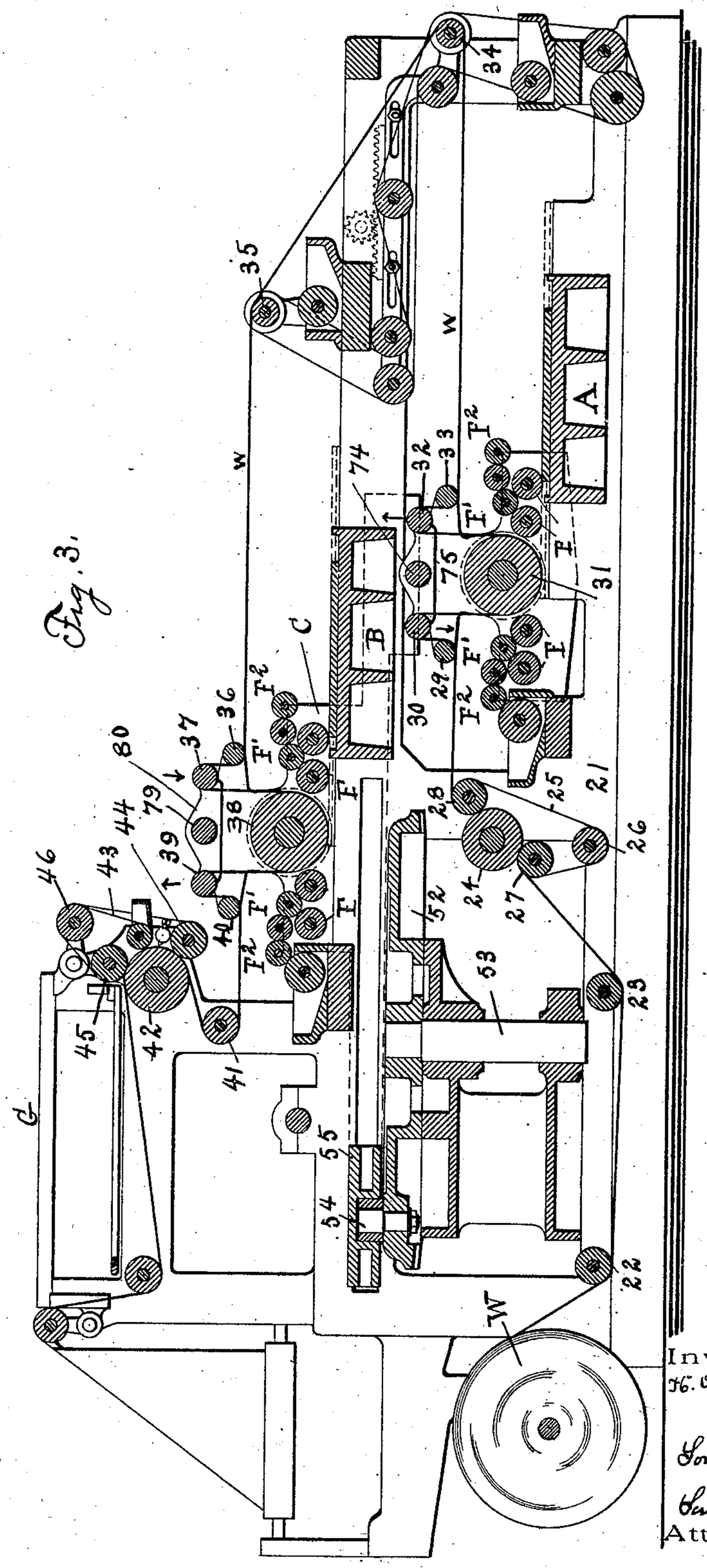
6 SHEETS—SHEET 2.

Fig. 3.



Witnesses.

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6 SHEETS—SHEET 3.

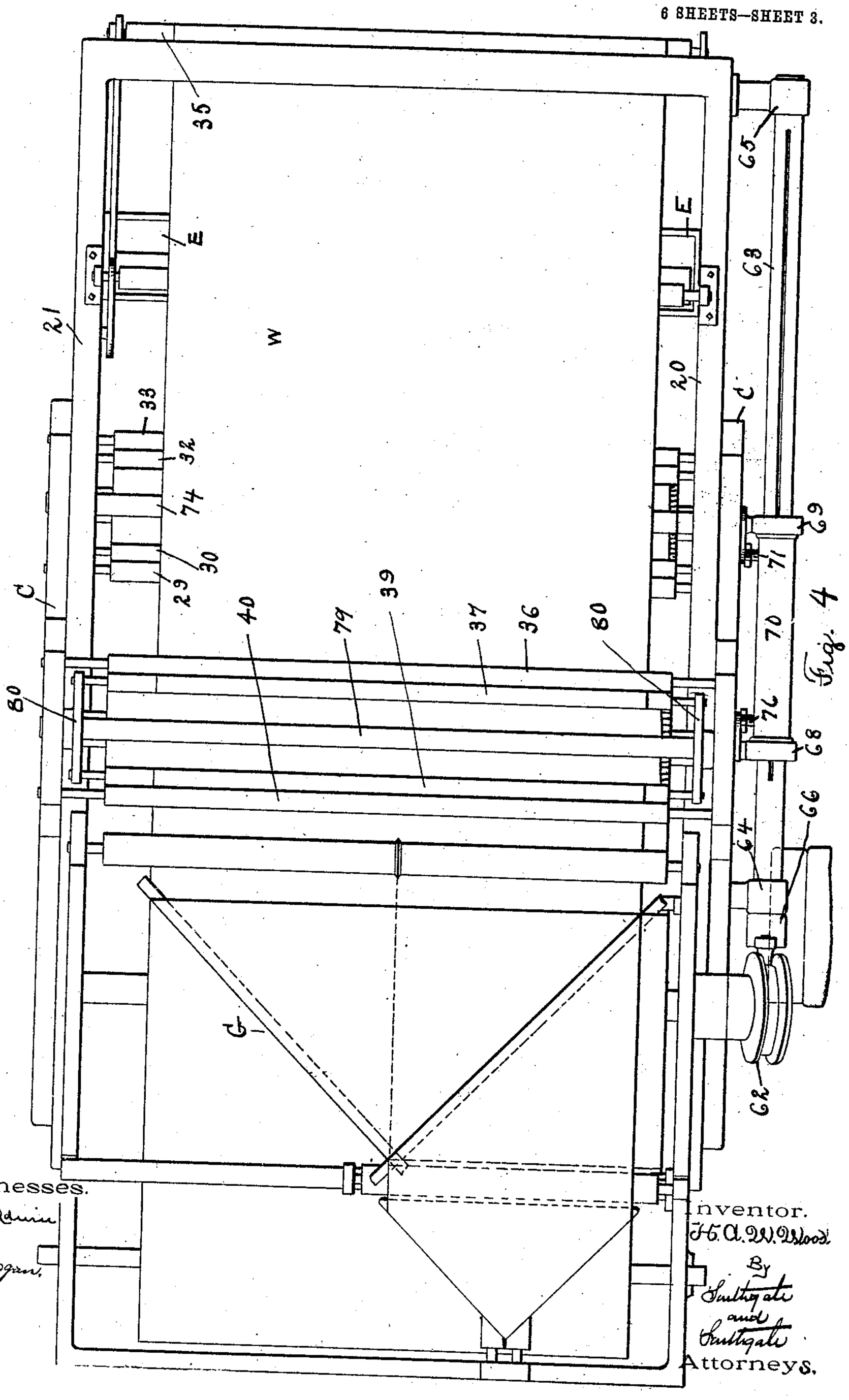

Fig. 4.

Witnesses.
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6 SHEETS—SHEET 4.

Fig. 5.

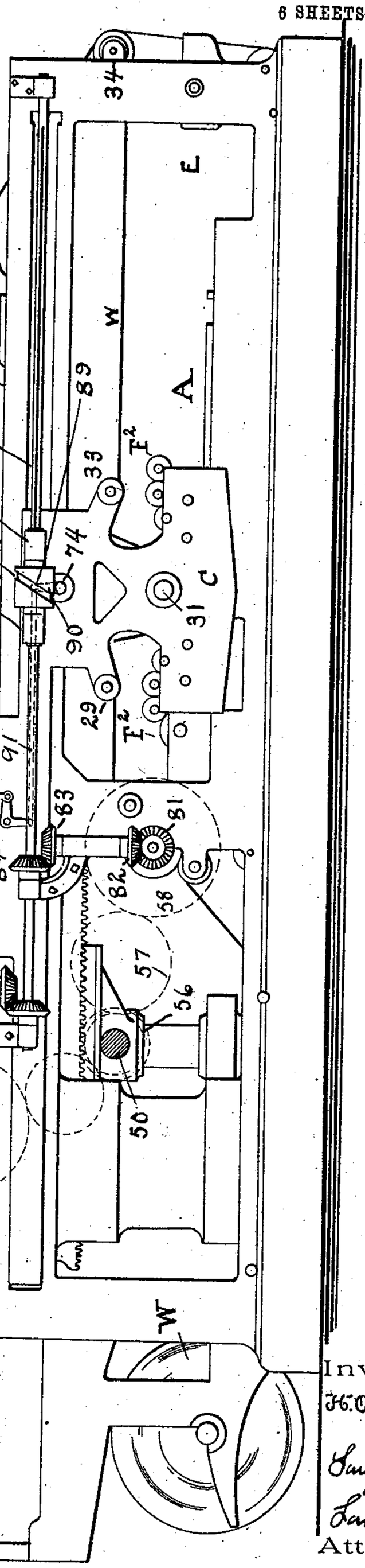
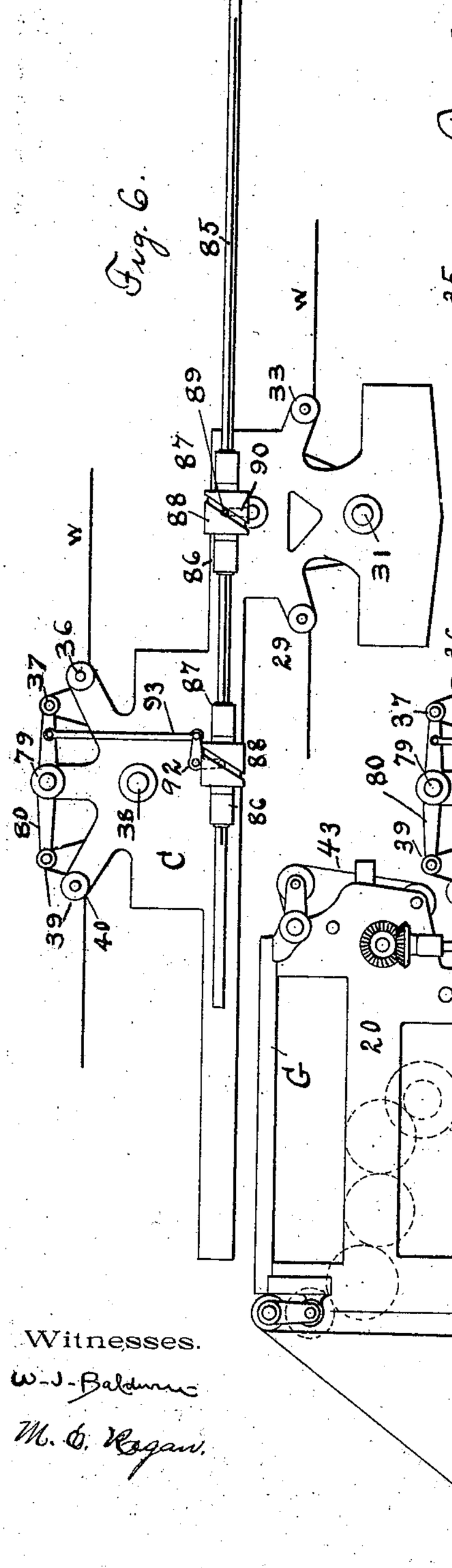


Fig. 6.



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6 SHEETS—SHEET 5.

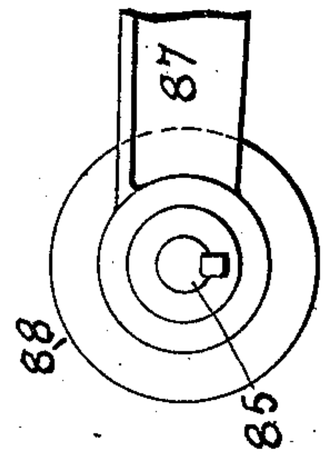

Fig. 8.

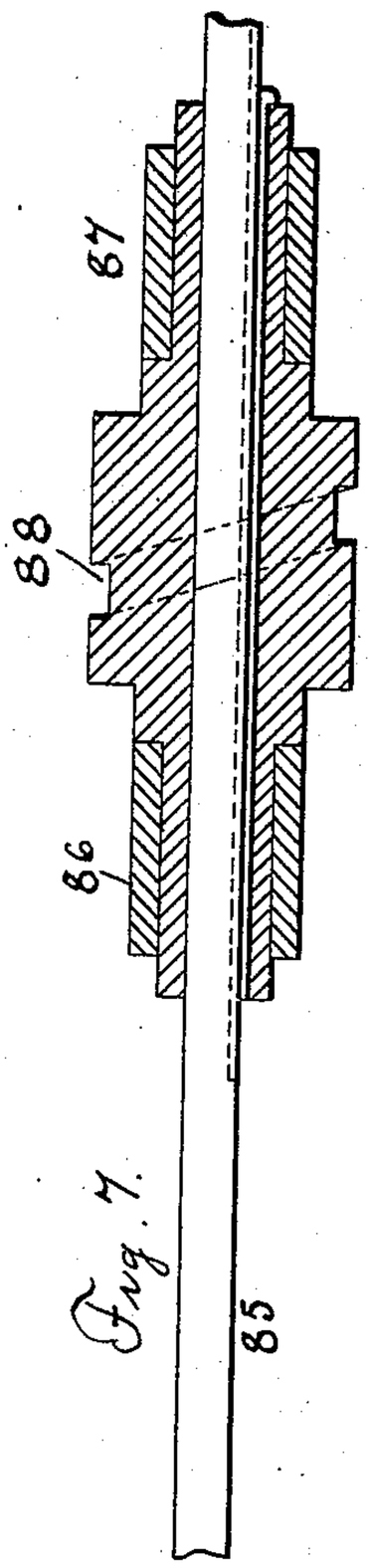

Fig. 7.

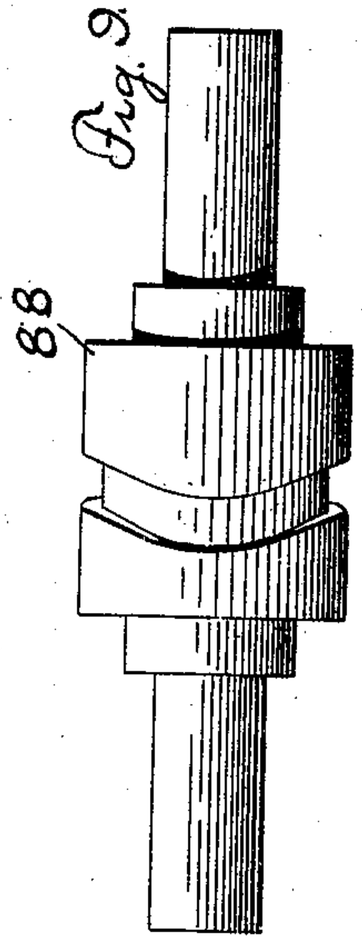

Fig. 9.

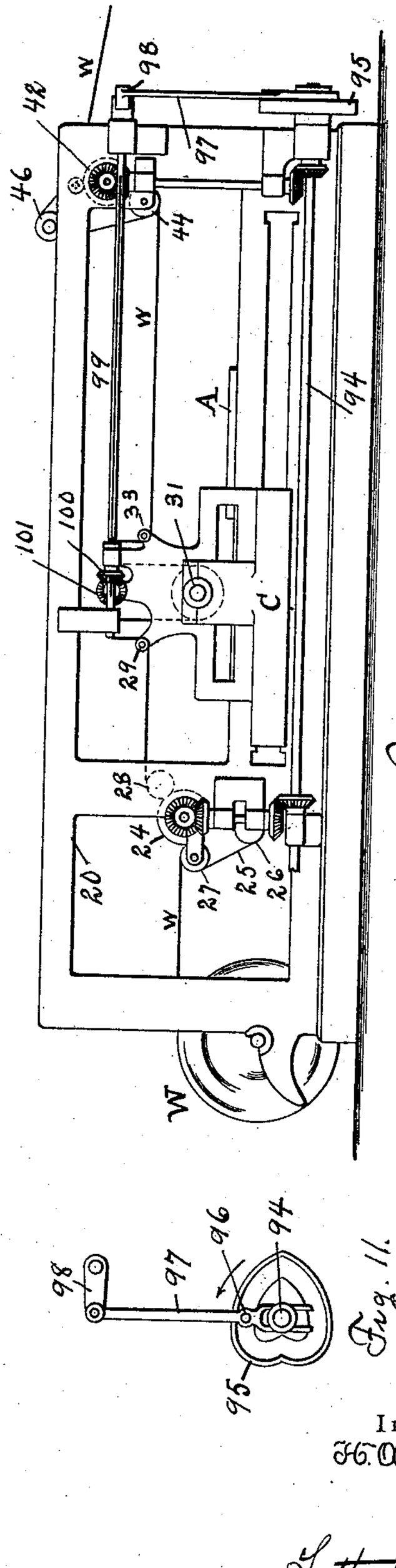

Fig. 10.

Fig. 11.

Witnesses.
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RECIPROCATING CYLINDER WEB PRINTING MACHINE.

APPLICATION FILED JAN. 13, 1899. RENEWED APR. 9, 1906.

6 SHEETS—SHEET 6.

Fig. 12.

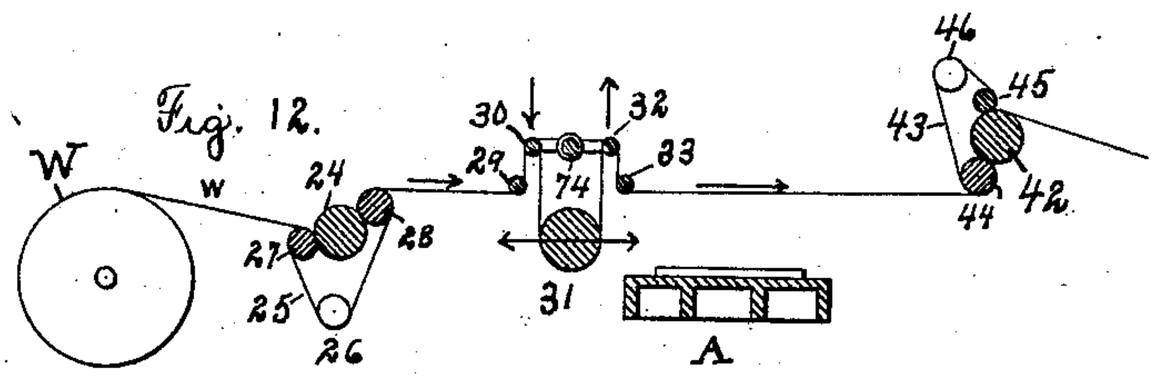


Fig. 13.

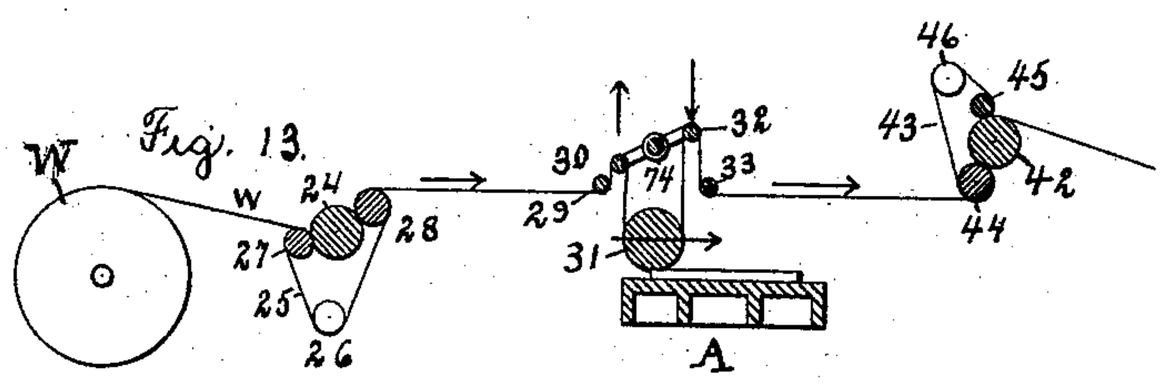


Fig. 14

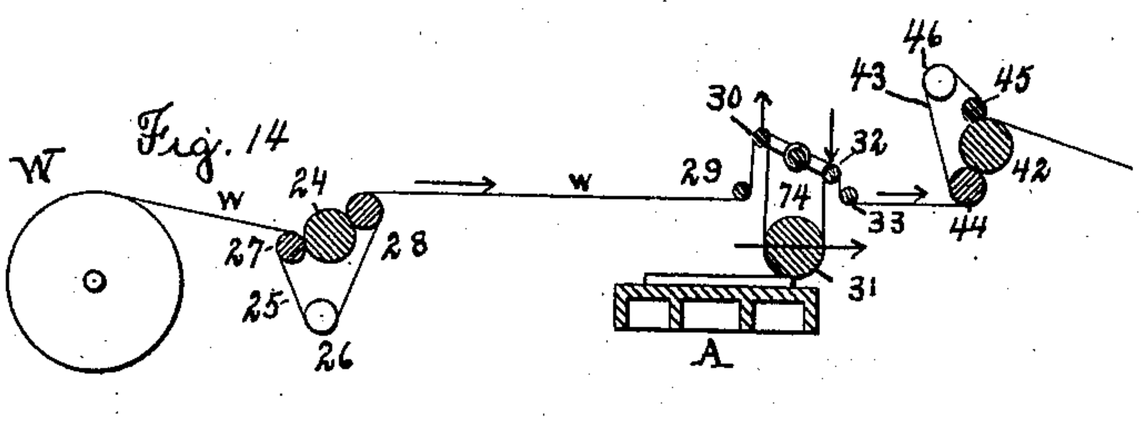


Fig. 15

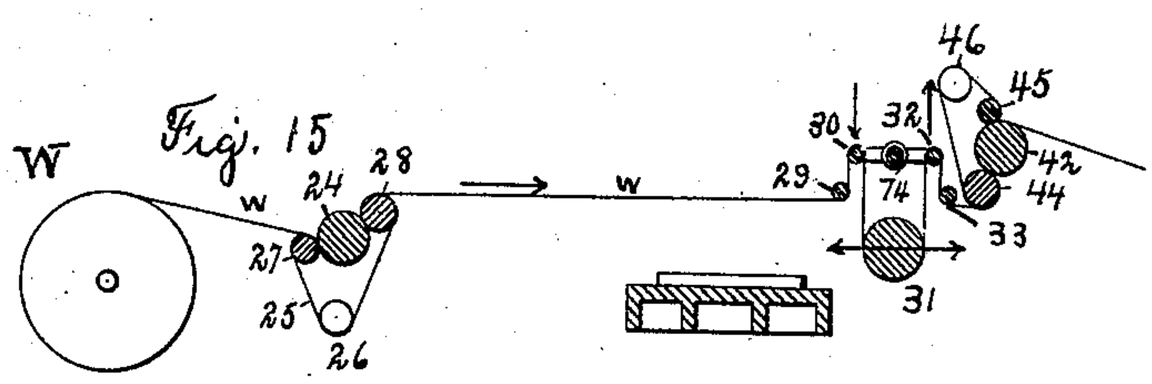
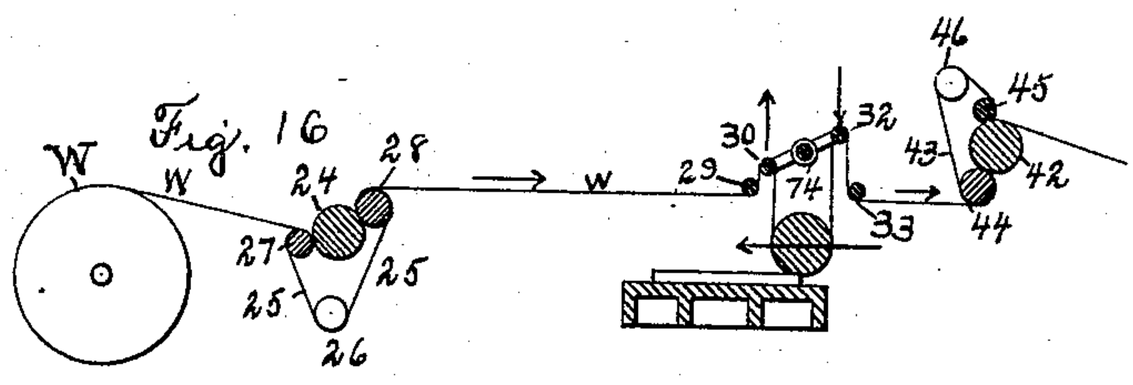


Fig. 16

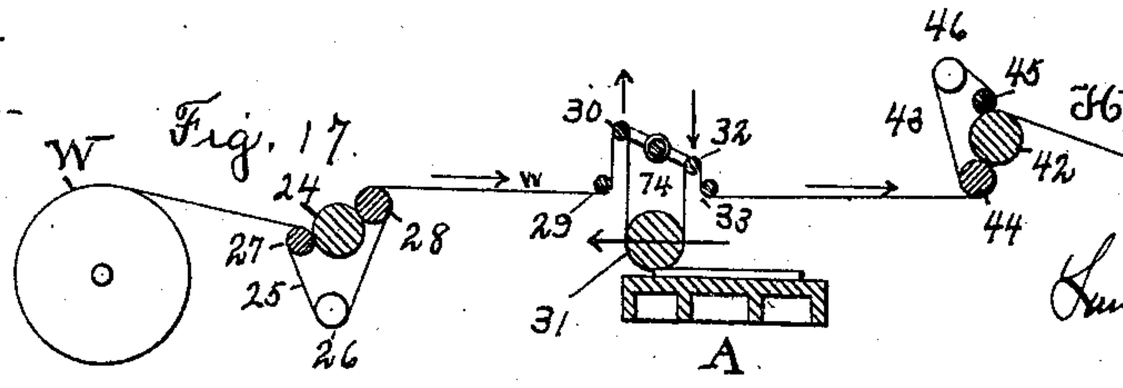


Witnesses.

W. J. Balamin.

M. E. Rogan

Fig. 17.



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UNITED STATES PATENT OFFICE.

HENRY A. WISE WOOD, OF NEW YORK, N. Y., ASSIGNOR, BY MESNE ASSIGNMENTS, TO DETROIT TRUST CO., TRUSTEE, OF DETROIT, MICHIGAN, A CORPORATION OF MICHIGAN.

RECIPROCATING-CYLINDER WEB-PRINTING MACHINE.

No. 841,911. Specification of Letters Patent. Patented Jan. 22, 1907.

Application filed January 13, 1899. Renewed April 9, 1906. Serial No. 310,740.

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 Reciprocating-Cylinder Web-Printing Machine, of which the following is a specification.

The aim of this invention is to improve the reciprocating web-printing press; and the invention especially relates to an improved mechanism for manipulating the web.

In the accompanying six sheets of drawings I have shown various forms of mechanism for carrying out my invention.

Referring to the drawings, Figure 1 is a side elevation of a reciprocating-cylinder web-perfecting printing-press with my improvements applied thereto. Fig. 2 is a detail of a cam used in the press. Fig. 3 is a sectional elevation of the machine. Fig. 4 is a plan view. Fig. 5 is a view similar to Fig. 1, illustrating a modification. Fig. 6 is a side view of one of the reciprocating carriers, illustrating a further modification. Fig. 7 is a sectional view. Fig. 8 is an end view, and Fig. 9 is an elevation of the form of cam used in the device shown in Figs. 5 and 6. Fig. 10 is a side view illustrating the application of my invention to a single-bed machine. Fig. 11 is an end elevation of the cam used in the device shown in Fig. 10; and Figs. 12 to 17, inclusive, are diagrams illustrating the operation.

The reciprocating-cylinder web-printing press as used to-day consists of a bed on which the type is placed, a cylinder which is reciprocated to roll thereover, guides for the web so arranged that the cylinder will move in a moving fold of the web, and a web-manipulating device. These devices in all forms of reciprocating-cylinder presses are arranged so that the web above the bed and to some length beyond the ends of the same is held stationary relatively to the bed during the printing and is pulled or shifted forward during the non-printing or non-impression period.

This description applies to a single-bed press—that is, a press employing one bed and one traveling cylinder arranged to print on but one side of the web.

The same construction is also used in reciprocating-cylinder printing-machines in which the web is twice printed or perfected, in this form of machine two beds and two cylinders being used and the web throughout the machine being shifted or pulled forward during the non-printing period.

It has been found in operating this class of presses that the limit of speed, and therefore the limit of usefulness of this class of machines, is the rate at which the web can be shifted throughout the machine around the surfaces of the impression cylinder or cylinders and the various guides.

As the web necessarily stretching through this part of the machine is of long length, it will be seen that this length of web is intermittently put under great strain, owing to the intermittent pull necessary to intermittently shift a long length of web around a large number of surfaces.

It has been found that the cylinders and apparatus can be operated at a much faster speed than the web can be intermittently shifted.

The ideal way to manipulate a web in a printing-machine is to run the same continuously throughout the entire mechanism, as thereby the web can be run through the machine with very little strain, as every guide around which the same passes can be rotated at the proper speed to help the web along and as a web running continuously will stay accurately in position.

To run all the web continuously is impossible with a printing-press in which a flat form is used, as it is necessary to hold the web stationary longitudinally relatively to the form during the time of impression and to shift the same during the non-impression period.

The aim of this invention is to bring the reciprocating-cylinder web-printing press more nearly and more closely to have a continuous movement of the web.

I have discovered that by moving the manipulating or shifting devices with the cylinder or cylinders nearly all the web in the printing-machine can be run continuously, and only a small section or sections of the web directly around the cylinder or cylinders need be shifted intermittently, and this arrangement constitutes the present invention.

This new manipulation results in a great

improvement in the way of handling a web in a press of this character, as by this construction the web can run continuously from the feeding-in device to the first cylinder, continuously from the first impression-cylinder to the second impression-cylinder, and continuously from the second impression-cylinder to the feeding-out device, and the only portions of the web that have to be given an intermittent movement are the sections which lie directly around the surface of the impression cylinder or cylinders. These small portions of the web necessarily have to be shifted intermittently and during impression kept in harmony with the periphery of the cylinder or cylinders. It will also be seen that by shifting only these small sections of web intermittently a very slight strain is put upon the web, as each of these sections of web is of short length and has to be slipped over but one surface, and that the remaining web in the machine, moving continuously, will run very accurately and nicely around its various guides.

Of course my invention is applicable to either a single form of such machine, in which the web is printed upon but one side, or to a double form of such machine, in which the web is printed upon both sides.

I will now describe the best mode now known to me for applying the principle of my invention, and reference to follow this description should be had to the first three sheets of the drawings, in which I have shown a well-known form of reciprocating-cylinder web-perfecting printing-press with my improvements applied thereto.

Referring to the drawings and in detail, 20 and 21 represent the side frames, between which are arranged the form-beds A and B.

C C designate the cylinder-carriers, which are fitted to slide in ways on the side frames, and these carriers are arranged to carry the cylinders and the various parts hereinafter referred to.

The cylinders have gears arranged on the ends thereof which mesh with racks carried by the beds, as indicated in dotted lines in Fig. 3, so that as the impression-cylinders are reciprocated over the forms they will be rotated so that there will be no slip between the periphery of the impression-cylinders and the forms.

Form-rollers F F are arranged at each side of each cylinder to properly ink the forms placed on the beds, and coöperating with each set of form-rollers are distributers and conveying-rollers F' F^2, which are arranged to take ink from ink-fountains E, arranged at each end of each bed.

The web *w* is drawn from a web-roll W, which may be placed in suitable brackets at the end of the machine, and is led around guides 22 and 23 to the feeding-in drum 24, which is continuously driven.

Coacting with the drum 24 is a set of tapes 25, which pass around suitable tape pulleys or rolls 26, 27, and 28. By this construction the web will be continuously drawn from the web-roll and continuously paid into the machine. The web then passes to a roller or guide 29, mounted in the carriers, then up around a looper-roll 30, down around the first impression-cylinder 31, up around another looper-roller 32, and then around a guide 33, also carried by the carriers. From the guide or roller 33 the web is led around an adjustable register-roll 34, up around a roller 35, and these rollers 34 and 35 may be continuously driven by any of the usual belting mechanism, so that the web will continuously run around the same. From the roller 35 the web is led to a guide 36, mounted in the carriers, up around a looping-roller 37, down around the second impression-cylinder 38, up around another looping-roller 39, and then around a guide 40, the parts 36 to 40, inclusive, being mounted in the carriers. From the roll 40 the web is led to a guide 41 and then to a continuously-turning feeding-out drum 42, coacting with which is a set of tapes 43, which turn around tape-pulleys 44, 45, and 46. From the continuously-running feeding-out device the web may be slit into sections, the sections associated by suitable turners G, and the associated webs led to any suitable form of folding device, the details of which are not necessary to describe in this application.

The operating and driving mechanism for these parts may be arranged as follows:

50 designates a shaft from which power may be applied to the machine. On this shaft is arranged a bevel-pinion which meshes with and engages a large bevel driving-gear 52, which is mounted on the end of the vertical shaft 53, which is stepped in suitable bearings, as shown. The bevel-gear 52 carries a crank-pin 54, which carries a suitable block, which engages a slotted yoke 55, which connects the two carriers, the yoke passing through slots cut in the side frames of the machine, as indicated. Also mounted on the shaft 50 is a pinion 56, which meshes with an intermediate 57, which intermediate drives a gear 58, secured upon the shaft 59 of the feeding-in drum 24, as indicated in dotted lines in Fig. 1. This gear is so proportioned that the feeding-in drum will feed forward a length of web equal to two sheets during each forward and backward reciprocation of the carriers. Also engaging the pinion 56 is an intermediate gear 60, which drives a shaft 61, which I term a "cam-shaft." From the cam-shaft the feeding-out drum 42, the guide 41, and the various rollers over which the web or sections of web pass are driven by gearing, as indicated by dotted lines in Fig. 1. The cam-shaft 61 is so geared that it will make two turns for each reciprocation of the car-

riers. Arranged on the cam-shaft 61 is a screw-cam 62.

63 designates a pipe-shaft (which form is adopted for purposes of rigidity) which extends parallel to the movement of the carriers and which is journaled in brackets 64 and 65, secured to the side frame 20. On the end of this shaft 63 is secured an arm 66, which has a roller 67, engaging the screw-cam 62.

Extending from the rear carrier C are brackets 68 and 69, between which is fitted a longitudinal sleeve or bush 70, which has a key fitted therein, which engages a keyway cut in the pipe-shaft 63.

By this construction as the carriers are reciprocated the bush 70 will be moved back and forth on the pipe-shaft, and as the pipe-shaft is oscillated the bush will also be oscillated. Extending from the bush 70 is an arm 71, which connects by link 72 to an arm 73, mounted on a shaft 74, which shaft is journaled in the carriers above the first impression-cylinder 31. Mounted on this shaft 74 are walking-beam arms 75, in which the looping-rollers 30 and 32 are journaled. Also extending from the bush 70 is an arm 76, which connects by link 77 to an arm 78, fitted on a shaft 79, which is journaled in the carriers above the second impression-cylinder 38 and which carries walking-beam arms 80, in which the looping-rollers 37 and 39 are journaled. By this means the said looping-rollers 30 and 32 and 37 and 39 will be oscillated from the cam 62 independently of the reciprocation of the cylinders.

The operation of this mechanism will be described after describing the operation of the single-bed machine.

There are many other various forms of gearing which may be used to actuate the loopers carried by the carriers, one such modified form being shown in Fig. 5. In this figure a miter-gear 81 is arranged on the shaft of the feeding-in drum, and by means of this miter and miters 82, 83, and 84 drives a slotted shaft 85, which is journaled in suitable bearings on the rear side frame. The feeding-out drum may also be driven, if so desired, from the slotted shaft 85 by means of suitable miters, as shown.

The slotted shaft 85 passes through suitable brackets 86 and 87, projecting from the rear carrier C, and fitted in these brackets is a cam 88, which has a key which engages the slotted shaft 85, as shown in detail in Figs. 7, 8, and 9. One or two cams may be used.

In Fig. 5 a single cam is shown, engaging which is a roller 89, mounted on an arm 90, projecting from the shaft 74, and which arm connects by link 91, bell-crank lever 92, and link 93 to one of the walking-beam arms 80.

In Fig. 6 two cams 88 are shown, the second cam engaging a roller projecting from the bell-crank lever 92 and the link 91 being dispensed with.

With both these constructions the loopers carried by the carriers will be properly actuated.

In Figs. 10 and 11 I have shown a single-bed machine to illustrate the simplest application of my invention.

In this machine there is shown a single bed A, coacting with which is an impression-cylinder 31, mounted in carriers C, which are reciprocated by any mechanism not necessary to detail.

The feeding-in and feeding-out drums 24 and 42 are arranged at opposite ends of the machine, as shown.

94 designates a shaft, which is driven from any suitable part of the machine and from which by suitable gearing, as indicated, the feeding-in and feeding-out drums are continuously rotated.

On the end of the shaft 94 is arranged a cam 95, engaging which is a roller 96, carried by yoke 97, which is connected to an arm 98, secured on the end of a slotted shaft 99. Sliding on this shaft 99 is a bevel-gear 100, which has a key to engage the shaft 99 and which is fitted in a bracket formed with or projecting from one carrier C. This bevel-gear engages a bevel-gear 101 on the shaft 74, the other parts numbered being substantially the same as in the previous constructions.

Referring now to the diagrams shown in the sixth sheet of the drawings, I will first describe the operation of my improved device as applied to the single-bed machine.

Suppose that the length of the sheet it is desired to manipulate, with the margins, is twenty-four inches and that impression is to exist for a quarter-revolution of the driving mechanism or that the periods of impression and non-impression are equal in point of time. With this assumed proportion the feeding-in and feeding-out drums will be turned so that forty-eight inches of web will be continuously paid in and paid out of the machine during a complete forward and backward reciprocation of the carriers.

Referring now to the diagrams, it will be seen that the reciprocation of the impression-cylinder, the loopers and guides mounted in the carriers, does not affect the longitudinal position of the web. This can be readily understood by imagining that the web was held stationary between the feeding-in and feeding-out drum and that the cylinder and the guides and loopers are reciprocated back and forth over the bed. This will not affect the longitudinal position of the web, as the web will run around said parts during their reciprocation.

With the particular proportion above assumed the cam which is to operate the loop-

ers, turning twice for each forward and backward reciprocation, resolves itself into substantially a heart-shaped cam.

Starting first with the impression-cylinder in the position shown in Fig. 13 as just commencing its printing movement to the right, and suppose that it moves to the position shown in Fig. 14. During this movement a quarter-revolution of the driving mechanism takes place, so that twelve inches of web will be paid in by the feeding-in drum 24 and twelve inches of web will be drawn out by the feeding-out drum 42. The twelve inches of web paid in by the feeding-in drum will be taken up by the looper 30, rising from the position shown in Fig. 13 to the position shown in Fig. 14, and the twelve inches of web required by the feeding-out drum 42 will be supplied by the looper 32 descending to the position shown in Fig. 14. This movement of the loopers, however, will keep the section of the web between the same around the impression-cylinder in harmony with the impression-cylinder during impression, the result being that the web will run continuously from the feeding-in device to the first looper 30 and continuously from the feeding-out looper 32 to the feeding-out device without affecting the section of web about the impression-cylinder or its presentation to the form.

Now then suppose that the impression-cylinder passes off the form to its extreme right-hand position, as shown in Fig. 15, and back to the position shown in Fig. 16, or, in other words, that the impression-cylinder reverses its movement off the form, which under the assumed proportions occupies a quarter-rotation of the driving-gear. During this movement of the cylinder from the position shown in Fig. 14 to the position shown in Fig. 16 the cam that operates the loopers will make a half-revolution and will restore the loopers to the position shown in Fig. 13; but during this movement twelve inches of web will be paid into the machine by the feeding-in drum and twelve inches of web will be paid out of the machine by the feeding-out drum, and during this reversal the looper 32 will rise from the position shown in Fig. 14 to the position shown in Fig. 16, and the looper 30 will oppositely move. This movement of the loopers will cause a shift of twelve inches of web about the surface of the impression-cylinder, which added to the twelve inches of forward movement imparted to the web by the feeding-out drum will make a total shift of web about the surface of the impression-cylinder equal to twenty-four inches, or the length of the sheet.

During the next impression period as the cylinder moves to the left—that is, from the position shown in Fig. 16 to the position shown in Fig. 17—the loopers will act to hold the section of web about the periphery of the impression-cylinder in harmony therewith and allow the feeding in and out to continue, as above described in the movement from Fig. 13 to Fig. 14.

As the cylinder reverses at its left-hand extreme—that is, as it passes from the position shown in Fig. 17 to its extreme left-hand position shown in Fig. 12 back to the position shown in Fig. 13—the loopers will again act to shift or respace the web. In other words, the loopers are so timed as during impression to act in opposition to the feeding-in and feeding-out devices to nullify the movement thereof, so that the section of web about the periphery of the impression-cylinder will remain in harmony therewith during impression, and to act during each of the non-impression periods in conjunction with the feeding-in and feeding-out devices to give a shift of web about the periphery of the impression-cylinder of the amount of web fed in during one of the impression periods, together with the amount of web stored by the loopers during one of the non-impression periods. This is a most advantageous construction, as all the web possible moves continuously and at a uniform speed—that is, the web runs continuously from the feeding-in drum to the looper 30 and continuously from the feeding-out looper 32 to the feeding-out drum 42 during the entire operation—so that the only section of web which has to be given an intermittent movement or slip is the small section of web extending about the periphery of the cylinder 31 between the loopers 30 and 32.

The action in the preferred form of machine shown in the first four sheets of the drawings is like that described in connection with the diagrams, except that as the web is led in opposite directions about the two impression-cylinders the loopers 30 and 39 and 32 and 37 will have to move oppositely, which is done by the connections before described.

In the perfecting form of the device it will be seen that the web moves continuously at all times from the web-roll to the looper 30, continuously from the looper 32 to the looper 37, and continuously from the looper 39 to the feeding-out device and that the only portions of web which have to be intermittently shifted are those small sections of web lying around the peripheries of the two impression-cylinders and controlled by the loopers.

It is a most advantageous point to keep the web between the two cylinders—that is, the web extending from the looper 32 around to the looper 37—moving continuously, as this is the longest run of web in the ordinary form of machine that has to be intermittently moved. By moving this portion of the web continuously the same will nicely run and

keep in position on the rollers 34 and 35, which, as before described, may be continuously driven by any suitable mechanism.

In some instances I contemplate arranging cam-brackets on each of the side frames, so that the loopers will be driven from both sides, although in most cases it is enough to rigidly secure the arms which carry the loopers on the shafts which are journaled in the cylinder-carriers and to operate them from but one side.

It is within the scope of my invention to lead the web directly from the impression-cylinder 31 around the guide 33 without passing around the looper 32 and then directly from the looper 36 to the impression-cylinder 38 without passing around the looper 37. With this way of leading the web through the press the web will run continuously from the feeding-in device to the looper 30 and continuously from the looper 39 to tne feeding-out device; but the loop of web between the two impression-cylinders will be moved intermittently.

While this arrangement is within the scope of my invention, the previous construction is very much preferred for reasons before stated.

Other manipulating devices besides loopers may be arranged to move with the impression cylinder or cylinders to take up or pay out the web to get the results before described.

My invention is applicable, of course, to machines which have other proportions between the impression and non-impression periods and which manipulate other lengths of sheets and which have other arrangements of beds and carriages and of the various parts, the particular forms chosen being those which can be shown to best illustrate the application of my invention.

My invention is of course applicable to a device in which the impression-cylinder or cylinders print in but one direction.

The details and arrangements herein described may 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 of a bed, a reciprocating cylinder coöperating therewith, web-manipulating mechanism moving with the cylinder for bringing the web into harmony with the impression-cylinder during impression, continuously running or acting web-feeding mechanism, and web-guiding mechanism arranged so that the web moves continuously to and from said web-manipulating mechanism.

2. The combination of two beds, a reciprocating impression-cylinder coacting with each bed, a web-manipulating mechanism moving with each cylinder for bringing the web into harmony with the impression-cylinder during impression, continuously acting or running web-feeding devices, and a web-guiding device arranged so that the web passes continuously to and from said web-manipulating mechanism.

3. The combination of a stationary bed, a reciprocating cylinder coöperating therewith, web-manipulating mechanism moving with the cylinder for bringing the web into harmony with the impression-cylinder during impression, and web-feeding mechanism.

4. The combination of two stationary beds, a reciprocating impression-cylinder coacting with each bed, web-manipulating mechanism moving with each cylinder for bringing the web into harmony with the impression-cylinder during impression, and web-feeding devices.

5. The combination of a bed, a reciprocating impression-cylinder coöperating therewith, web-manipulating mechanism moving with the cylinder arranged to bring the web into harmony with the surface of the impression-cylinder during impression, and to shift the web forward around the surface of the impression-cylinder during non-impression, and web-feeding mechanism.

6. The combination of two beds, a moving impression-cylinder coacting with each bed, web-manipulating mechanism moving with each cylinder arranged to bring the web into harmony with the surface of the impression-cylinder during impression, and to shift the web forward around the surface of the impression-cylinders during non-impression, and web-feeding devices.

7. The combination of a bed, a reciprocating cylinder coöperating therewith, means for feeding the web continuously into and out of the press, and manipulating devices moving with the cylinder adapted to hold the section of web around the cylinder in harmony with the periphery of the impression-cylinder during impression, and to shift the same during non-impression.

8. The combination of a bed, a reciprocating impression-cylinder coöperating therewith, means for feeding a web continuously into and out of the press, and manipulating devices moving with the cylinder adapted to hold the section of web around the cylinder in harmony with the periphery of the impression-cylinder during impression, and to shift the same around the impression-cylinder when the impression-cylinder is off the form in either direction.

9. The combination of a bed, reciprocating carriers, an impression-cylinder mounted therein, means for feeding the web continuously into and out of the press, and manipulating devices mounted in the carriers adapted to hold the section of web around the cylinder in harmony with the periphery of the

impression-cylinder during impression, and to shift the same during the non-impression period.

10. The combination of a bed, a reciprocating impression-cylinder coöperating therewith, a looper arranged at each side of the impression-cylinder and moving therewith, means for operating the loopers, and means for continuously feeding the web to and from the loopers.

11. The combination with a bed, of a reciprocating impression-cylinder coöperating therewith, a looper arranged at each side of the impression-cylinder and moving therewith around which the web is looped in the same direction, means for oppositely moving the loopers, and means for continuously feeding the web into and out of the machine.

12. The combination with two beds, of a reciprocating impression-cylinder coöperating with each bed, a looper arranged at each side of each impression-cylinder, means for operating the loopers at each side of each impression-cylinder in opposite directions, and means for continuously feeding the web into and out of the machine.

13. The combination of two beds, a reciprocating impression-cylinder coöperating with each bed, web-guides adapted to lead a web in opposite directions around the impression-cylinders, a looper arranged at each side of each impression-cylinder and moving therewith, means for operating the loopers at each side of each impression-cylinder in opposite directions and for operating the two sets of loopers oppositely relatively to each other, and means for continuously feeding the web into and out of the press.

14. The combination of a bed, reciprocating carriers, an impression-cylinder mounted therein, a guide arranged in said carriers at each side of the impression-cylinder, loopers mounted in said carriers around which the web is looped between said guides and impression-cylinder, and means for continuously feeding the web to and from the loopers.

15. The combination in a printing-press of a bed, reciprocating carriers, a cylinder journaled in said carriers, a shaft journaled in said carriers, loopers mounted in arms fixed on said shaft, means for oscillating said shaft, and means for feeding the web continuously to and from said loopers.

16. The combination in a printing-press of two stationary beds, a reciprocating impression-cylinder coöperating with each bed, means for continuously feeding the web into and out of the machine, a looper moving with the first impression-cylinder and arranged in the path of the web between the feeding-in device and the first impression-cylinder, a looper moving with the second impression-cylinder, and arranged in the path of the web between the second impression-cylinder and the feeding-out device, and means for operating said loopers.

17. The combination of two beds, a reciprocating impression-cylinder coöperating with each of said beds, a looper arranged at each side of each impression-cylinder and moving therewith, and means for continuously feeding the web into and out of the press.

18. The combination of the side frames, a bed arranged between said side frames, reciprocating carriers fitted on said side frames, an impression-cylinder journaled in said carriers, loopers at each side of said impression-cylinder arranged in said carriers, a longitudinal shaft journaled in bearings on one of the side frames, connections from this shaft to actuate the loopers, and means for feeding the web continuously to and from the loopers.

19. The combination of the two side frames, two beds arranged between said side frames, reciprocating carriers mounted on said side frames, an impression-cylinder for each of said beds journaled in said carriers, loopers arranged in said carriers at each side of each of said impression-cylinders, a shaft journaled in brackets secured to one of said side frames, connections from this shaft to operate the loopers, and means for continuously feeding the web into and out of the press.

20. The combination of the two side frames, reciprocating carriers mounted thereon, an impression-cylinder journaled in said carriers, loopers carried by said carriers at each side of the impression-cylinder, a shaft journaled upon one of said side frames, a cam for operating said shaft, connections extending from said shaft to operate the loopers, and means for continuously feeding the web to and from the loopers.

21. The combination of the side frames, reciprocating carriers fitted thereon, an impression-cylinder journaled in said carriers, loopers carried by said carriers at each side of the impression-cylinder, a shaft journaled on one of said side frames, a cam for oscillating said shaft, a sleeve keyed to said shaft and moving with the carriers, connections from this sleeve to operate the loopers, and means for feeding the web to and from the loopers.

22. The combination of the side frames, two beds arranged between the side frames, carriers fitted on said side frames, an impression-cylinder for each of said beds journaled in said carriers, a shaft journaled in said carriers above each of the impression-cylinders, arms secured to said shafts carrying loopers arranged at each side of each impression-cylinder, a cam-actuated shaft journaled in bearings secured to one of the side frames, a bush or sleeve keyed to said shaft and moving with the carriers, connections from said bush to operate the loopers, and means for feeding the web into and out of the press.

23. The combination in a printing-press of

two beds, a reciprocating impression-cylinder coöperating with each bed, a guide arranged at each side of each impression-cylinder and moving therewith, a looper arranged between each of these guides and the reciprocating impression-cylinders and moving with the guides and impression-cylinders, means for continuously feeding the web into and out of the machine, guides as 34 and 35 arranged to direct the web through the machine, and means for continuously feeding the web into and out of the machine, whereby the web will run continuously from the feeding-in device to one looper, continuously from the next looper around said guides to a looper moving with the other impression-cylinder, and continuously from the last looper to the feeding-out device.

24. The combination in a printing-press of two beds, a reciprocating impression-cylinder coacting with each bed, a looper arranged at each side of each impression-cylinder, means for actuating the loopers, means for continuously feeding the web into and out of the machine, and continuously-driven guides as 34 and 35 arranged to direct the web from one impression-cylinder to the other.

25. The combination in a printing-press of two beds, a reciprocating impression-cylinder coöperating with each bed, a guide arranged at each side of each impression-cylinder and moving therewith, a looper arranged between each of these guides and the respective cylinders and moving with the cylinders, means for actuating the loopers, guides arranged in line with the guides moving with the cylinders for directing the web through the machine, and means for feeding the web into and out of the press.

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

H. A. WISE WOOD.

Witnesses:

ROBT. J. MCMAHON,

LOUIS W. SOUTHGATE.