

No. 666,328.

Patented Jan. 22, 1901.

G. F. READ.

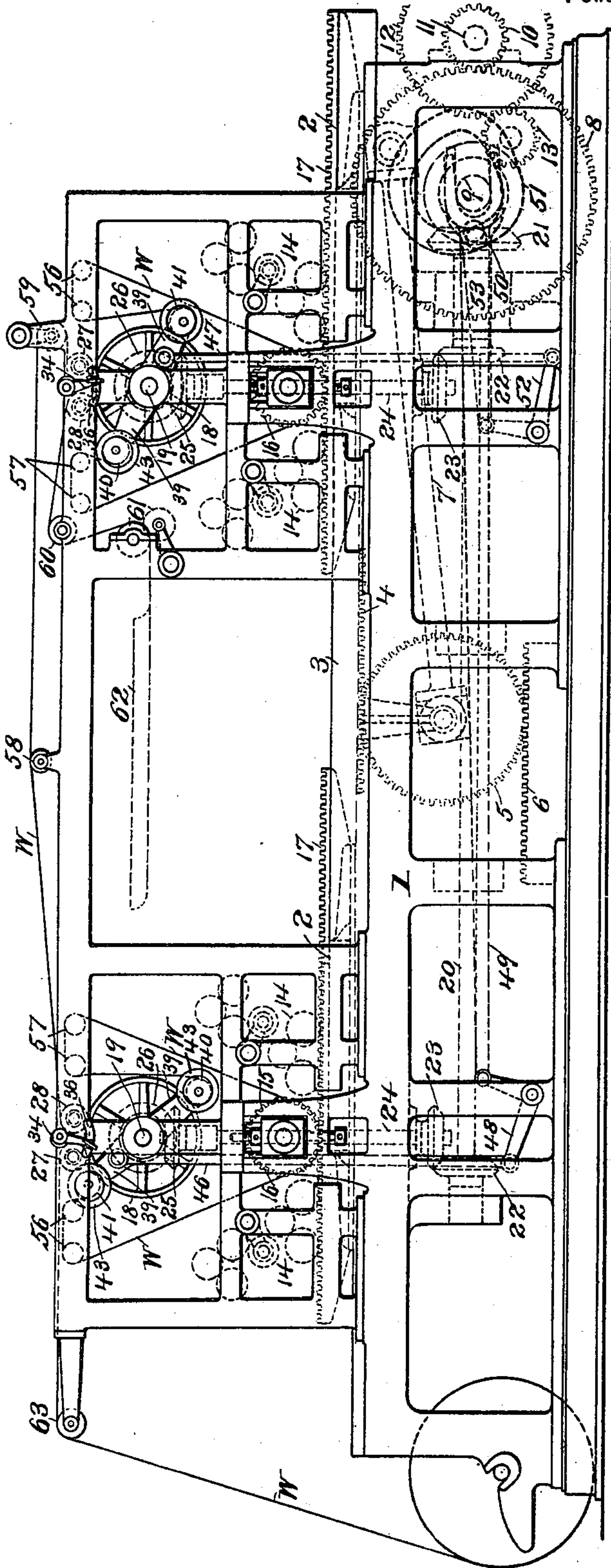
WEB FEEDING AND COMPENSATING MECHANISM FOR PRINTING MACHINES.

(Application filed July 10, 1899.)

(No Model.)

4 Sheets—Sheet 1.

*Fig. 1.*



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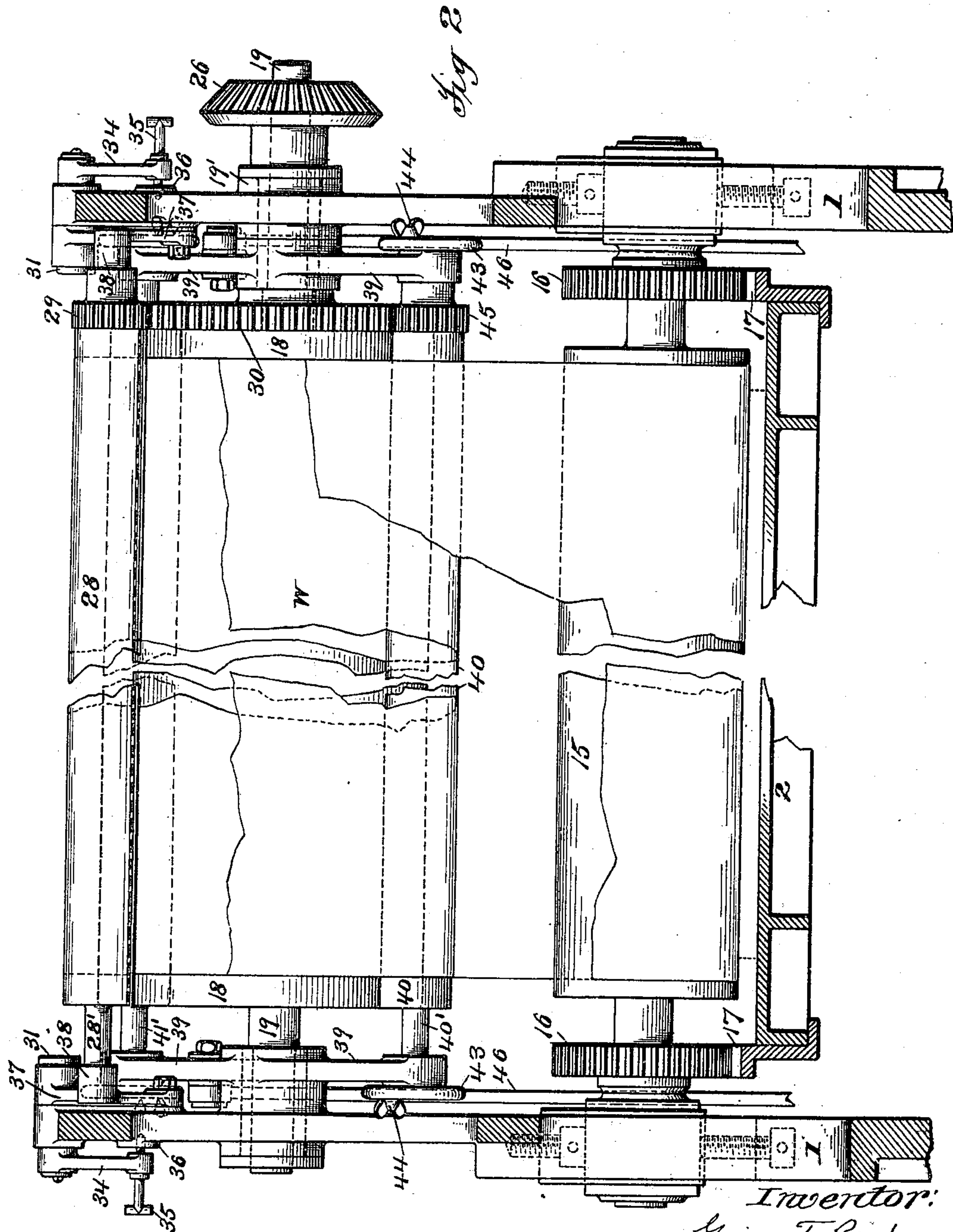
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4 Sheets—Sheet 2.



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4 Sheets—Sheet 3.

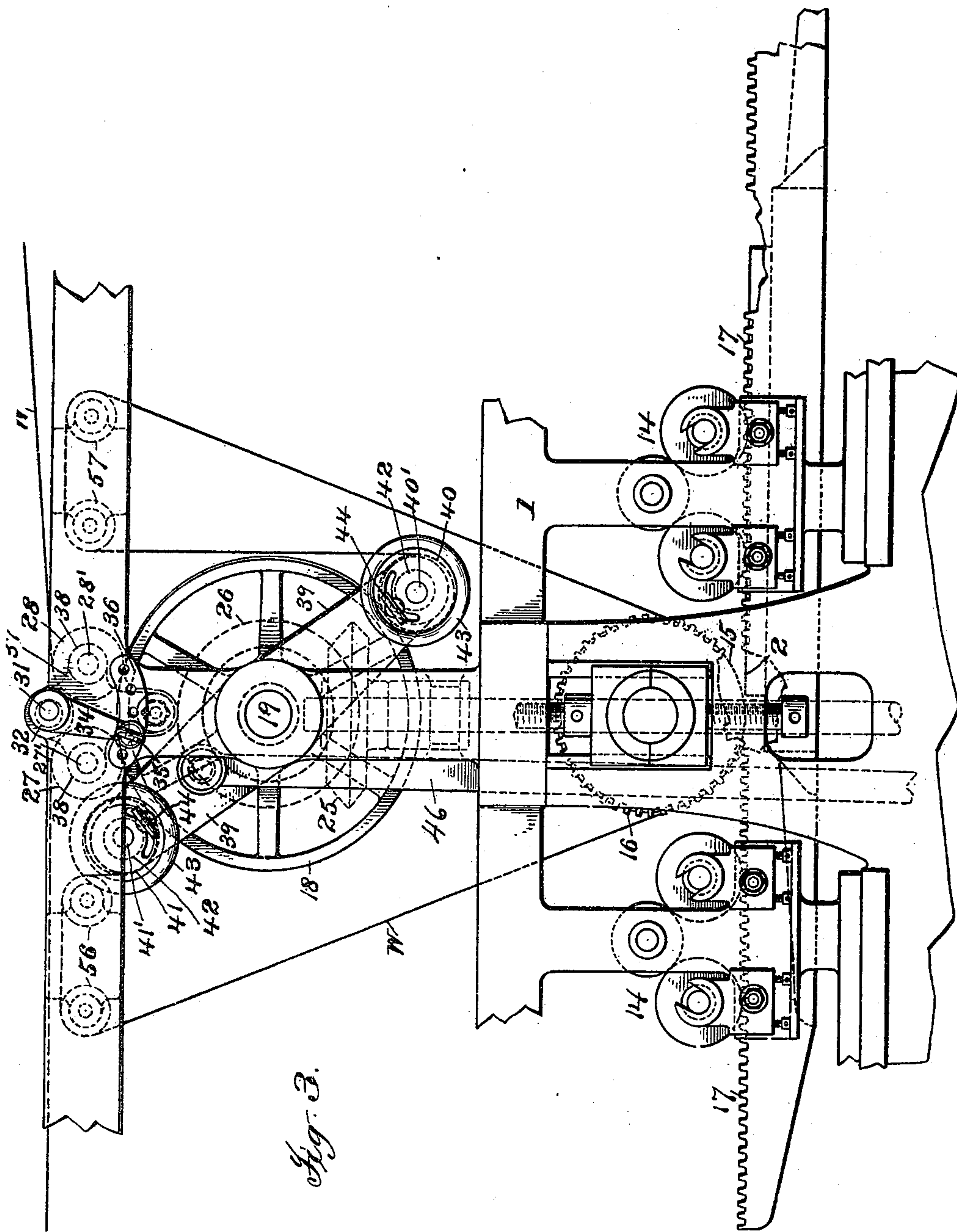


Fig. 3.

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# UNITED STATES PATENT OFFICE.

GEORGE F. READ, OF NEW YORK, N. Y., ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, TO ROBERT HOE AND CHARLES W. CARPENTER, OF SAME PLACE

WEB-FEEDING AND COMPENSATING MECHANISM FOR PRINTING-MACHINES.

SPECIFICATION forming part of Letters Patent No. 666,328, dated January 22, 1901.

Application filed July 10, 1899. Serial No. 723,310. (No model.)

*To all whom it may concern:*

Be it known that I, GEORGE F. READ, a citizen of the United States, residing at New York city, county of Kings, and State of New York, have invented certain new and useful Improvements in Web-Feeding and Compensating Mechanism for Oscillating-Cylinder Presses, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

This invention relates to flat-bed printing-machines, and more particularly to improvements in the web-feeding mechanism of that type of machines in which the printing is accomplished by printing-couples consisting of oscillating cylinders and reciprocating flat beds.

It is, as is well known, particularly advantageous in feeding webs to printing machinery to keep the web in motion throughout as much of its travel through the machine as is possible. It is therefore usual in such machines to feed the web into and out of the machine by continuously-operating feeding devices, whereby the web is continuously fed away from the supply-roll or other source of supply and to the delivery devices. Inasmuch, however, as the machines referred to are ordinarily constructed to print upon both strokes of the bed and as that part of the web being printed upon must move in the same direction as the beds are moving, it will be seen that during a part of the time in some parts of the machine the web will be running in one direction and during a part of the time it will be running in the opposite direction—that is to say, during part of the time the web will be moving throughout all its parts in the general direction in which it travels through the machine, and a part of the time parts of the web will be moving in the same direction and parts will be moving in a direction opposite to the general movement before referred to. It follows, therefore, that mechanism must be provided which shall not only operate to so manipulate the web as to give it the desired movements, but also when the feeding mechanism is feeding into the machine an excess of web to take care of the slack and also to accumulate web

to be fed out by the constantly-running feeding-out mechanism when the supply afforded by the machine is insufficient to feed this mechanism. Such mechanisms have been heretofore used in the art and are ordinarily known as “loopers” or “looping” mechanisms. These looping mechanisms have, however, heretofore been entirely independent of the feeding mechanisms—that is to say, they have discharged simply the function of web-controllers and have usually been located between the couple or couples and the feeding-in and feeding-out mechanisms. Furthermore, in machines of this class employing a plurality of couples it has been usual to so arrange the feeding and looping mechanisms that a single set of said mechanisms acted to feed the web to all the couples and a single set of such devices acted to feed the web away from all the couples. As a result very long lengths of web had to be drawn through the machine and the drawing devices acted at substantially a single point in the length of the web. By this manipulation the different parts of the web are necessarily subjected to different degrees of tension. These mechanisms not only stretched the long lengths of web, but stretched them unequally, so that it was difficult to obtain register.

It is the object of this invention to improve the feeding mechanisms heretofore used with the type of machines before specified and to construct such mechanisms so that they shall discharge the function not only of feeding mechanisms, but shall also act as compensating devices, thereby doing away with the necessity of the independent looping mechanisms heretofore employed.

A further object of the invention is to provide machines of the type referred to which employ a plurality of couples with independent feeding mechanisms for each couple which shall operate to feed the web to and away from each couple, thereby reducing very materially the length of web between the feeding devices and the length to be pulled through the machine by any single set of said devices.

With these and other objects in view the invention consists in certain constructions



and in certain parts, improvements, and combinations, as will be hereinafter described, and more fully pointed out in the claims hereunto appended.

5 In the accompanying drawings, which form a part of this specification, and in which like characters of reference indicate the same parts, Figure 1 is a side elevation of a flat-bed perfecting-machine of the type referred  
10 to employing the improved feeding mechanism. Fig. 2 is an end view, on an enlarged scale, of the feeding mechanism. Fig. 3 is a side view, also on an enlarged scale, of the feeding mechanism. Figs. 4 to 7, inclusive,  
15 are diagrams illustrating in detail the operation of the feeding mechanism and showing the position of the various parts at different points in the movement of the bed.

Referring to the drawings, 1 indicates the  
20 frame of the machine. The frame is provided with the usual ways, and as the machine shown is a perfecting-machine it has two reciprocating beds 2, which are preferably connected by a bar 3 for simultaneous movement.  
25 The beds may be reciprocated in various ways. In the machine shown the bar 3 is provided on its under side with a rack 4, which engages with a railroad-gear 5, said gear running on a stationary rack 6 and being driven  
30 by a crank-rod 7, which is connected to a gear 8, mounted on a shaft 9, suitably journaled in the frame. The gear 8 is driven from a pinion 10, which is mounted on a shaft 11, said shaft also carrying a gear 12, which is  
35 driven from the power-shaft of the machine by a pinion 13. The mechanism just described forms an ordinary railroad-gear mechanism, such as is well known in the art. Any  
40 suitable form of driving mechanism may, however, be substituted for it. The beds may be inked by groups of inking-rolls, as 14, of any suitable construction and arranged in any suitable way. Coöperating with the beds  
45 are two oscillating form-carriers. While any suitable form-carriers may be used, said carriers will preferably consist of cylinders 15, said cylinders being journaled in boxes suitably mounted in the frame of the machine in  
50 any ordinary manner. While various means may be employed for oscillating the cylinders, they are preferably provided with gears 16, which engage with racks 17 on the beds, thereby securing perfect uniformity of movement and perfect register.

55 There is preferably provided a feeding mechanism for each printing-couple by which the web is continuously fed to and away from that couple. It is the function of these mechanisms not only, as has been before indicated,  
60 to feed the web continuously to and away from the couple, but also to so control the web as to effect the peculiar movements necessary to properly supply the web to the couples and advance it through the machine. The feeding mechanisms may be variously constructed  
65 to effect the functions specified.

In the machine shown two feeding-cylinders

18 are provided, these cylinders being mounted on shafts 19, suitably journaled in the frame, preferably above and in line with  
70 the boxes in which the shafts of the impression-cylinders are journaled. These feeding-cylinders 18 are continuously driven, and the mechanism by which this driving is effected may be of various kinds. In the machine  
75 shown there is provided a way-shaft 20, said shaft being provided with a miter-gear 21, meshing with a similar gear on the shaft 9. The way-shaft is provided with two miter-gears 22, which mesh with similar miter-gears  
80 23, mounted on vertical shafts 24. These vertical shafts 24 carry miter-gears 25, which mesh with similar gears 26, mounted on the shafts 19 of the feeding-cylinders.

The machine is provided with suitable  
85 means for leading the web to and away from the feeding-cylinders 18. This means consists of guides, which are preferably in the form of feeding-rolls 27 28, though in some instances guides may be used which do not  
90 act as feeding-rolls. These rolls are in contact with the cylinders and operate in connection therewith to feed the web, the rolls 27 acting in connection with each cylinder to feed the web to each couple and the rolls 28  
95 acting in connection with each cylinder to feed the web away from the couple. In order that these feeding-rolls 27 28 may act to feed continuously, it is necessary that they be continuously driven. While this driving may  
100 be effected in various ways, these rolls are preferably provided with pinions 29, which engage with a gear 30, which is preferably mounted on the cylinder-shaft 19 and secured to the cylinder. This gear might, how-  
105 ever, be mounted independently of the cylinder, if desired.

It is desirable that the rolls 27 28 be so mounted that their position with relation to the cylinders can be controlled not only so as  
110 to enable them to press sufficiently upon the cylinders to obtain a good feeding action, but also in order that they may move toward and away from the cylinders when the machine is threaded up. The rolls may be mounted  
115 in various ways so as to effect this function. In the machine shown the frame is provided on each side with short rock-shafts 31, said shafts carrying eccentrics 32, (shown in dotted lines in Fig. 3,) and they also are pro-  
120 vided with arms 34, in the ends of which are located locking-pins 35, which engage with a series of holes, preferably in a locking-strip 36, suitably secured to the frame. On the  
125 eccentrics 32 are located arms 37, which have at their ends bearings 38, in which the shafts 27' 28' of the rolls 27 28 are journaled. It is obvious that by moving the arms 34 to and fro the position of the rolls 27 28 may be readily controlled.  
130

In addition to the feeding-in and feeding-out rolls before described two other feeding-in and feeding out rolls are provided, which also act as compensating devices. These feed-



ing-in and feeding-out rolls may be variously mounted and operated. In the machine shown the shaft 19 is mounted in suitable boxes 19', which extend through the frame of the machine. These boxes are turned off on their inner ends to afford bearings for a pair of rocking levers 39, one of these levers being located at each side of the machine. These levers carry at their ends rolls 40 41, the rolls being mounted on shafts 40' 41', said shafts finding their bearings in eccentric bushings 42, which are mounted in the levers 39. These eccentric bushings have attached to them hand-wheels 43, by which they are turned, and they are locked in position by means of set-screws 44, which pass through slots in the hand-wheels and screw into the levers. The purpose of the eccentric bushings is to permit the rolls to be moved away from the surface of the cylinders 18, so that the web can be readily passed between the rolls and the cylinders when the machine is threaded up, and also, as in the case of the rolls 27 28, to govern the position of the rolls, so as to obtain the proper nip between them and the cylinders 18. In order that these rolls 40 41 may act as feeding-rolls, they are preferably continuously driven. While this continuous driving may be effected in various ways, it is preferably effected by providing them with pinions 45, which mesh with the gear 30 before described.

From the description so far given it will be readily understood that as the shaft 19 is continuously rotated through its driving connections the rolls 27 28 and 40 41 will be continuously driven and in the same direction as the cylinders. They will therefore operate to constantly advance the web, which lies between the cylinders and these rolls.

In order that the rolls 40 41 may act as compensating rolls in addition to their feeding function, it is necessary that they be given movements to correspond to the desired movements of the web as it passes through the machine. These movements may be effected in various ways and by various constructions. In the machine shown the levers 39 have connected to them rods 46 47, the rod 46 being connected to the lever at the left-hand end of the machine and the rod 47 to the lever at the right-hand end. The rod 46 is connected to a bell-crank 48, which is suitably journaled in the frame of the machine and is operated by a reciprocating cam-actuated rod 49, said rod carrying a pin 50, which runs in a groove of the cam 51, mounted on the shaft 9. As the shaft 9 revolves, therefore, the lever 39 at the left-hand end of the machine will be given movements corresponding to the contour of the cam. In the same manner the rod 47 at the right-hand end of the machine is connected to a bell-crank lever 52, suitably journaled in the frame of the machine, this lever being operated by a cam-actuated reciprocating rod 53, which is provided with a pin 54, said pin

running in the groove of a cam 55, which cam is also mounted on the shaft 9. It may be remarked in this connection that both the rods 49 and 53 are provided with forks which straddle the shaft 9.

Suitable guides are provided to properly direct the web through the machine and also to assist the compensating rolls 40 41 in effecting their function. These guides may be variously disposed. These guides preferably consist of suitable bars or rolls, and in the machine shown a group of two of such guides 56 is shown as coöperating with the roll 41, and another group of rolls 57, two in number, are shown as coöperating with the roll 40. A single guide may obviously be used instead of two, if desired, and the precise location of the guides is not material. Other guides 58 59 60 are provided to direct the web in its course through the machine, the guide 59 being preferably made adjustable in any well-known manner. After leaving the guide 60 the web preferably passes between rolls 61, which may or may not be driven, by which rolls it is directed out of the machine and to any suitable delivery device, as 62, said device being indicated in dotted lines in Fig. 1.

The web W is taken from a web-roll located in suitable bearings in the frame and over a guide 63, from which it passes around the rolls 27 and 41 and between these rolls and the cylinder 18 of the feeding device at the left-hand end of the machine. After passing around the roll 41 it runs over guides 56, around the impression-cylinder, over the guides 57, and between the cylinder 18 and the rolls 40 and 28. After leaving the roll 28 it runs over the guides 58 and 59 and then passes between the cylinder 18 and the rolls 27 41 at the right-hand end of the machine. After leaving these rolls it passes over the guides 56, around the impression-cylinder, over the guides 57, around the rolls 40 and 28, and between these rolls and the cylinder 18, over the guide 60, and between the rolls 61 to the delivery device 62.

The operation of the machine will be readily understood from a brief description in connection with the diagrams Figs. 4 to 7, inclusive, these diagrams illustrating the operations of the feeding devices and the couple at the right-hand end of the machine. Inasmuch, however, as the action of both couples and feeding devices is precisely the same a description of the operation of one feeding device and couple will suffice for both.

The diagram Fig. 4 illustrates the parts in the position they occupy, in which the beds are moving to the left and the printing is about to begin. As the beds move to the left or in the direction of the arrow shown in Figs. 4 and 5 the web must run between the cylinder and the bed in the direction in which the bed is moving at this time. It will be remembered that the rolls 27 41 and the cylin-



der 18 are operating at this time to continuously feed web to the couple and the rolls 40 28 and the cylinder 18 are operating to continuously feed the web away from the couple.

5 The course of the web is indicated by the arrows in this figure. As the bed moves to the left web must be given up to the couple to enable it to obtain a sufficient supply in order to effect its printing. At this time, therefore,

10 the cam 55 operates through its connections to move the lever 39 and the roll 41 upward, thus giving up web to the couple in addition to that which is being continuously fed in, and at the same time the roll 40 moves downward,

15 taking up the web which is given up by the couple in excess of what is being continuously fed out. This general movement of the parts continues until the printing has been accomplished, the position of the parts

20 at this time being shown in the diagram Fig. 5. Inasmuch as the bed is to print on its return stroke, at which time the movement of the web, so far as it relates to the printing-couple, will be reversed, it is necessary that

25 an unprinted length of web sufficient for the next printing operation be caused to pass through the couple in the direction in which the web was traveling when the printing operation took place. While, therefore, the bed

30 continues its stroke to the left and reverses and returns, the rolls 27 41 are feeding web into the machine and the rolls 40 28 are feeding it out—that is, they are causing web to run around the impression-cylinder 15 in the

35 direction indicated by the arrows in Figs. 4 and 5. During the time occupied by the bed for the completion of its stroke, its reverse, and its return to printing position the feeding movement of the various rollers will not,

40 however, be quite sufficient to supply the necessary web for the return stroke. The contour of the cam 55 therefore is such as to cause the lever 39 to continue to raise the roll 41 and lower the roll 40, the extreme position of these rolls being shown in the diagram in Fig. 6, at which time the printing

45 operation effected by the return stroke of the bed is about to begin. This compensating action or upward movement of the roll 41, taken in connection with the continuous forward movement of the web, will give up sufficient additional web to supply the printing-couple with a fresh amount for the printing

50 on its return stroke, and the web will be drawn through by the downward movement of the roll 40 in connection with the feeding-out movement. As the couple begins to print on the return movement of the bed the travel of the web around the impression-cylinder is

60 reversed, as indicated by the unfeathered arrows in Fig. 6. This reverse movement of the web is effected by the printing-couple, between the members of which the web is nipped, the contour of the cam 55 being such

65 as to cause the roll 40 to rise with sufficient rapidity to give up the necessary web to the couple, and also to supply the web which is

to be fed out and the roll 41 to move downward, so as to take care of the web which has passed through the couple, and also to take

70 care of the web which is continuously fed into the couple by the rolls 27 41 and the cylinder 18. As soon as this printing stroke is completed, the parts then assuming the position shown in the diagram Fig. 7, the travel

75 of the web with respect to the impression member is reversed in order to draw back the printed portion of the web and at the same time bring a blank portion into position to be again printed on the return stroke of the

80 bed. The action of the continuously in and out feeding rolls will be sufficient, taken in connection with the slight compensating movement of the rolls 40 41, to effect this result. While the bed therefore is moving from

85 the position shown in Fig. 7 up to its point of reverse and returning, the cam 55 causes the rolls 40 41 to move from the position shown in Fig. 7 to the position shown in Fig. 4. After this the cycle of operations which

90 has just been described will be repeated.

Various modifications of construction are possible, the underlying idea of the invention being to provide a flat-bed printing-machine employing an oscillating cylinder with continuously-operating feeding devices, which

95 also operate as compensating devices, so that the web may be fed from the feeding mechanism directly to and directly away from the couple, thus doing away with the independent looping mechanisms heretofore employed.

100 While, also, it is preferable that the compensating devices form a part of the feeding devices, they need not invariably be so constructed. The invention is not, therefore, to

105 be limited to the mechanisms shown and described or to the specific details of construction, but is to be understood as embracing all changes and variations which fall within its spirit and scope.

110

What is claimed is—

1. In a printing-machine, the combination with a plurality of printing-couples consisting of flat beds and oscillating members, the web being advanced with respect to both

115 members as the printing is effected, of an independent feeding mechanism for each couple which operates to feed the web to and away from the couple, and compensating devices by which the movement of the web is

120 controlled, substantially as described.

2. In a printing-machine, the combination with a plurality of printing-couples consisting of flat beds and oscillating members, the web being advanced with respect to both

125 members as the printing is effected, of an independent feeding and compensating mechanism for each couple, the compensating devices forming a part of the feeding mechanism, substantially as described.

130

3. In a printing-machine, the combination with a plurality of printing-couples consisting of flat beds and oscillating members, the web being advanced with respect to both



members as the printing is effected, of an independent continuously - operating feeding mechanism for each couple which operates to feed the web to and away from the couple, and compensating devices by which the movement of the web is controlled, substantially as described.

4. In a printing-machine, the combination with a plurality of printing-couples consisting of flat beds and oscillating members, the web being advanced with respect to both members as the printing is effected, of an independent continuously - operating feeding and compensating mechanism for each couple, the compensating devices forming a part of the feeding mechanism, substantially as described.

5. In a printing-machine, the combination with a printing-couple consisting of an oscillating member and a flat bed, the web being advanced with respect to both members of the couple as the printing is effected, of a continuously-operating feeding-in mechanism by which the web is fed to the couple, a continuously-operating feeding-out mechanism by which the web is fed away from the couple, and means whereby one of the continuously-operating feeding members of each feeding mechanism is caused to operate as a compensating mechanism, substantially as described.

6. In a printing-machine, the combination with a printing-couple consisting of an oscillating member and a flat bed, the web being advanced with respect to both members of the couple as the printing is effected, of a continuously-operating feeding-in mechanism acting at two points on the web to feed it forward, a continuously-operating feeding-out mechanism acting on the web at two points to feed it forward, and means whereby a part of each feeding mechanism also acts as a compensating mechanism, substantially as described.

7. In a feeding mechanism for web-printing machines, the combination with a feeding-cylinder, of means whereby it is continuously rotated, continuously-operating feeding-in and feeding-out rolls operating in connection with the cylinder, a rocking lever, compensating devices carried by the lever, and operating in connection with the feeding-in and feeding-out rolls, a shaft independent of the cylinder-shaft, a cam on said shaft, and means whereby said cam is caused to rock the rocking lever, substantially as described.

8. In a feeding mechanism for web-printing machines, the combination with a feeding-cylinder, of means whereby it is continuously rotated, means for directing the web to and away from the cylinder, a rocking lever, feeding-rolls mounted on the lever, means whereby said rolls are continuously rotated, a shaft independent of the feeding-cylinder shaft, a cam on said shaft, and means whereby said cam is caused to rock the rocking lever, substantially as described.

9. In a feeding mechanism for web-printing

machines, the combination with a feeding-cylinder, of means whereby it is continuously rotated, means for directing the web to and away from the cylinder, a rocking lever mounted on the shaft of the cylinder, feeding-rolls mounted on the lever, means whereby said rolls are continuously rotated, a shaft independent of the feeding-cylinder shaft, a cam on the driving-shaft of the machine, and suitable connections whereby said cam is caused to rock the rocking lever, substantially as described.

10. In a feeding mechanism for web-printing machines, the combination with a feeding-cylinder, of means whereby it is continuously rotated, means for directing the web to and away from the cylinder, a rocking lever, feeding-rolls mounted on the lever, means whereby said rolls are continuously rotated, a cam on the driving-shaft of the machine, a bell-crank suitably mounted in the frame of the machine, means whereby the cam is caused to rock the bell-crank, and means whereby the bell-crank is caused to rock the rocking lever, substantially as described.

11. In a feeding mechanism for web-printing machines, the combination with a feeding-cylinder, of means whereby it is continuously rotated, continuously-driven feeding-in and feeding-out rolls operating in connection with the cylinder, a rocking lever, feeding-rolls mounted on the lever, means whereby said rolls are continuously rotated, a shaft independent of the feeding-cylinder shaft, a cam on said shaft, and means whereby said cam is caused to rock the rocking lever, substantially as described.

12. In a feeding mechanism for web-printing machines, the combination with a feeding-cylinder, of means whereby it is continuously rotated, continuously-driven feeding-in and feeding-out rolls operating in connection with the cylinder, a rocking lever mounted on the shaft of the cylinder, feeding-rolls mounted on the lever, means whereby said rolls are continuously rotated, a shaft independent of the feeding-cylinder shaft, a cam on the driving-shaft of the machine, and suitable connections whereby said cam is caused to rock the rocking lever, substantially as described.

13. In a feeding mechanism for web-printing machines, the combination with a feeding-cylinder, of means whereby it is continuously rotated, continuously-driven feeding-in and feeding-out rolls operating in connection with the cylinder, a rocking lever mounted on the shaft of the cylinder, feeding-rolls mounted on said lever, means whereby said rolls are continuously rotated, a shaft independent of the feeding-cylinder shaft, a cam on the driving-shaft of the machine, a bell-crank suitably mounted in the frame of the machine, means whereby the cam is caused to rock the bell-crank, and means whereby the bell-crank is caused to rock the rocking lever, substantially as described.

14. In a printing-machine, the combination with a printing-couple consisting of a flat bed



and an oscillating member, of a feeding-cylinder, means whereby it is continuously driven, means for directing the web toward and away from the cylinder, two feeding-rolls mounted  
5 in bearings carried on the shaft of the cylinder, means whereby the rolls are continuously driven, and means whereby the rolls in their bearings are given vibrating movements to cause them to act as compensating devices,  
10 the operation of the feeding and compensating mechanism being such as to cause the web to advance with respect to both members of the couple as the printing is effected, substantially as described.

15 15. In a web-printing machine, the combination with a printing-couple consisting of an oscillating member and a flat bed, said members being arranged to print on both strokes of the bed, of a continuously-driven feeding-  
20 cylinder, continuously - operating feeding-rolls operating in connection with the cylinder to feed the web to and away from the couple, continuously-driven rolls mounted in bearings carried on the shaft of the cylinder,  
25 and means whereby the rolls in their bearings

are given a vibrating movement to cause them to act as compensating devices, the arrangement being such that the web is caused to be fed continuously into and out of the feeding mechanism and to advance with respect to  
30 both members of the couple as the printing is effected, substantially as described.

16. In a printing-machine, the combination with a feeding-cylinder, of means whereby it is continuously driven, rocking levers mounted  
35 on the shaft of the cylinder, eccentric bearings in the ends of the levers, compensating rolls mounted in the bearings, and means whereby the bearings may be turned to move the rolls toward and away from the circum-  
40 ference of the feeding-cylinder, substantially as described.

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

GEORGE F. READ.

Witnesses:

F. W. H. CRANE,  
L. ROEHM.