

Nov. 13, 1923.

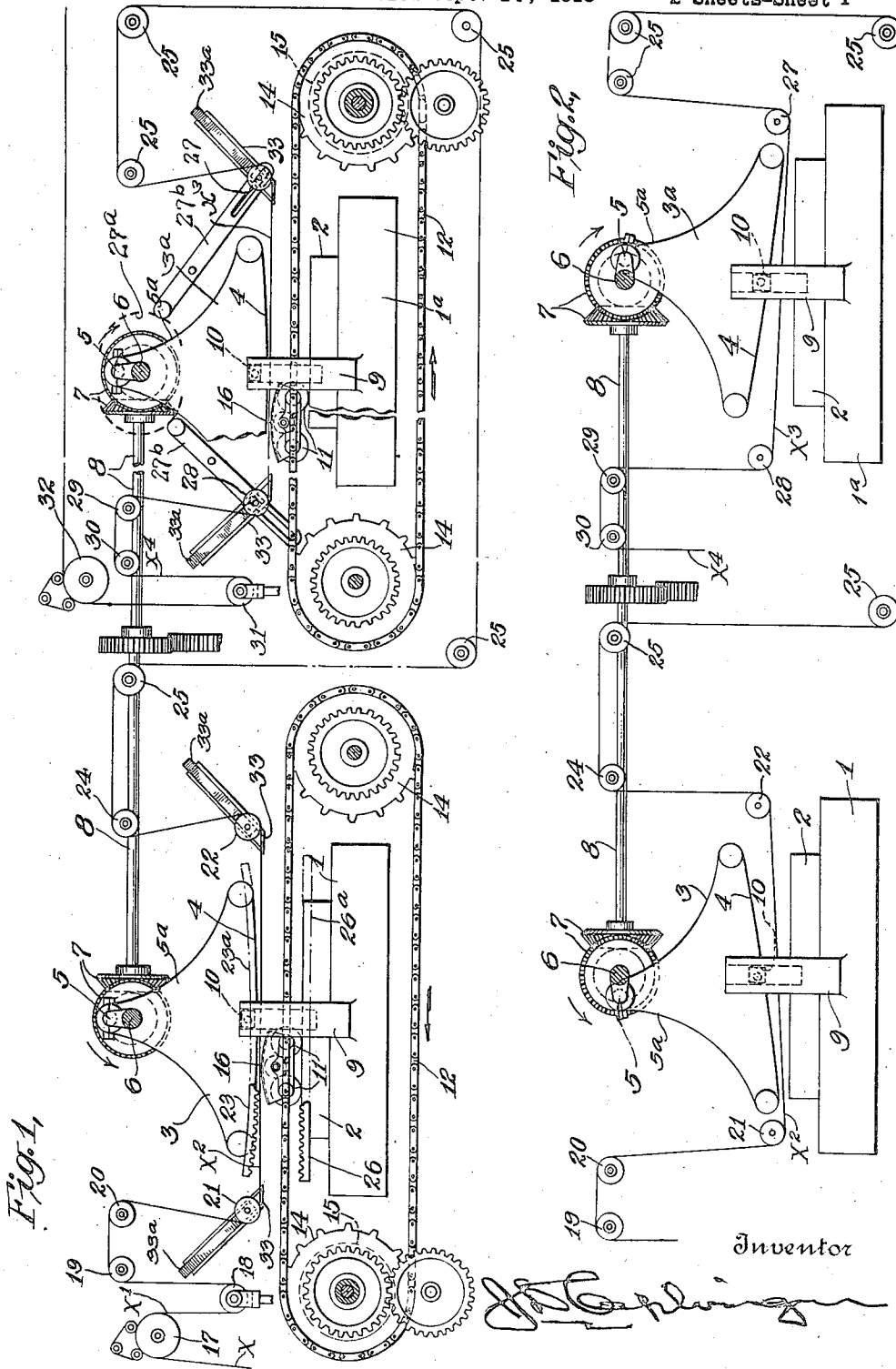
J. D. CAPLINGER

1,474,142

WEB PRINTING MACHINE

Filed Sept. 14, 1918

2 Sheets-Sheet 1



Nov. 13, 1923.

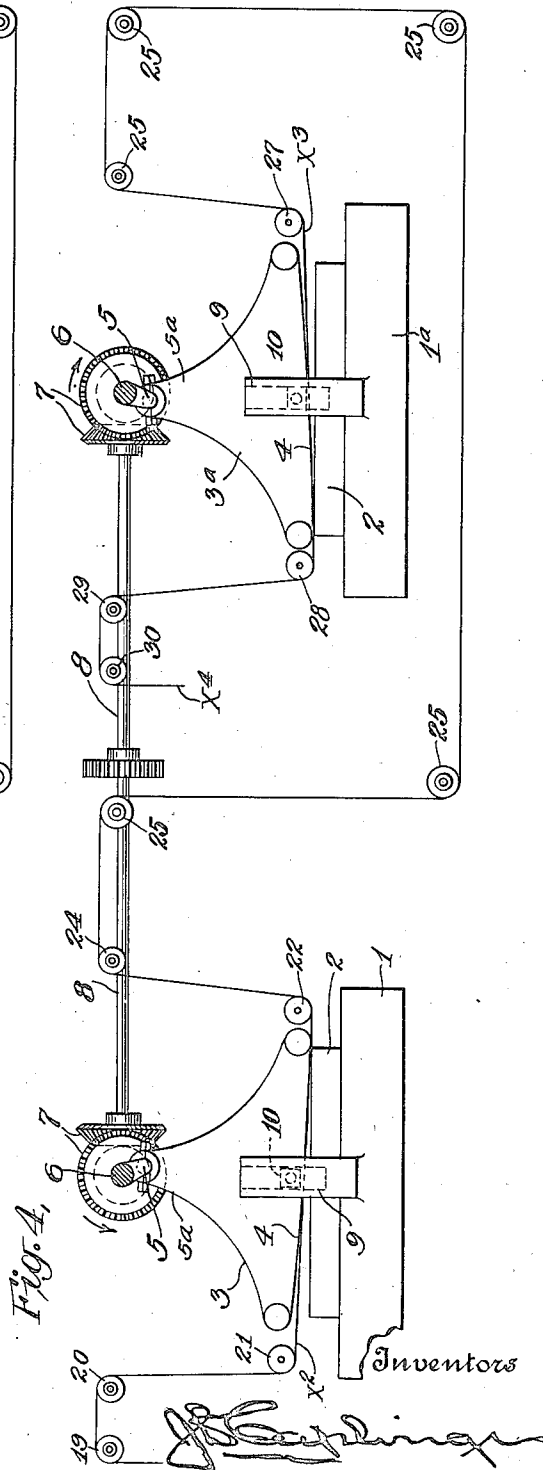
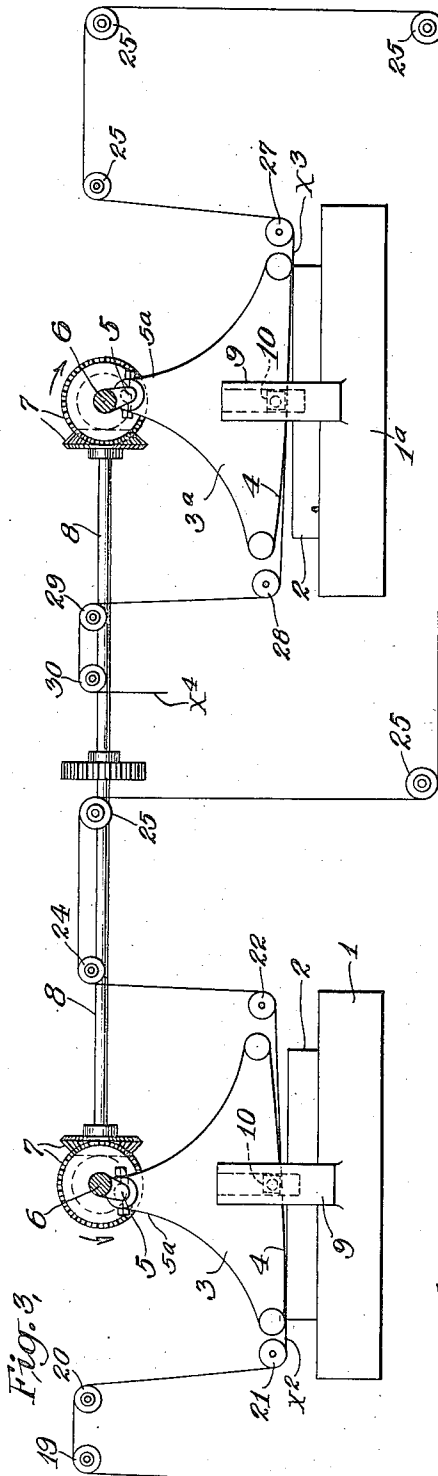
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WEB PRINTING MACHINE

Filed Sept. 14, 1918

2 Sheets-Sheet 2



Inventors

J. D. Caplinger

UNITED STATES PATENT OFFICE.

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OF NEW YORK, N. Y.

WEB-PRINTING MACHINE.

Application filed September 14, 1918. Serial No. 254,162.

To all whom it may concern:

Be it known that I, JOHN D. CAPLINGER, a citizen of the United States, residing at Newark, Essex County, New Jersey, have invented certain new and useful Improvements in Web-Printing Machines, of which the following is a specification.

This invention relates to certain improvements in that class or type of flat bed web printing machines, of which the machine shown and claimed in my co-pending patent application, Serial No. 216,675 is a type, and more particularly in such machines of this class or type as are so constructed and arranged as to require equalization or equivalent control or manipulation of the web feeding means to compensate for slowing down or complete stoppage of the web during the period or interval of impression, and the object of the invention is in part to provide a machine of this general character of a simple, compact and efficient nature wherein the members of the printing couple, together with the means for throwing the same on and off impression, are so constructed and arranged as to permit of completing the impression during a comparatively short interval of time in such a manner as to afford a correspondingly increased and lengthened time for the feeding and equalization of the movement of the web required between impressions so as to permit operation of the improved printing machine at a correspondingly increased capacity, and in part, to provide a machine of this general character having novel and improved means for lessening the drag and stress upon the web due to frictional contact or slip over the impression surface during its feeding movement, whereby a corresponding increase in the rate of travel of the web and consequent increased capacity of the improved printing machine is assured.

The invention consists in a printing machine of the character hereinbefore referred to having a printing couple including a flat form and a curved surfaced platen or impression member, one of the members of the couple being capable of oscillatory or other

movement to assure rolling movement of one member over and along the other during impression, wherein means is provided for so manipulating or controlling the feeding movement of the web as to assure its slowing down or complete stoppage during the time or period of impression, and its movement at correspondingly increased velocity at other times to compensate for such slowing down or stoppage, and wherein the oscillatory or otherwise movable member of the printing couple is so operated as to assure completion of the impression within a comparatively short or small proportion of its movement in order that a correspondingly longer or increased interval of time is provided for between impressions for shifting or feeding the web and compensating for the non-uniform travel thereof with a view to increasing the speed or capacity with which the improved printing machine may be operated.

The invention also consists in a web printing machine of the general character hereinbefore set forth wherein one of the members of the printing couple is stationary during impression, at least as regards progressive or forward movement in the direction of the web feed, whilst the other member of said couple, if not moved with a true oscillatory movement is at least so actuated as to travel in a continuous endless path with a view to lessening stress and lessened capacity due to stoppage or reversal of the direction of its movement, its actuation being of such a nature during impression as to assure rolling co-operation of its impression surface with the form, and to compensate for stoppage of the web feed during impression.

The invention also consists in a web printing machine of this general character wherein means is provided for so controlling or manipulating the web between impressions as to reduce or eliminate frictional contact of the same with the impression surface with a view to permitting equalization and manipulation of the web during a maximum time, and preventing lessening of the capacity of the machine due to the stress which

would otherwise be imposed upon the web by dragging or pulling it forward over the impression surface when the latter is travelling with a less velocity or in a direction different than that of the web feed.

The invention also contemplates certain novel features of the construction, and combinations and arrangements of the several parts of the improved printing machine whereby the same is rendered simpler and more compact and otherwise better adapted and capable of more convenient, advantageous and effective employment, all as will be hereinafter fully set forth.

The novel features of the invention will be carefully defined in the claims.

In order that my improvements may be the better understood, I will now proceed to describe the invention with reference to the accompanying drawings, where—

Figure 1 is a fragmentary side elevation of a perfecting web printing machine embodying my improvements, the member of the respective couples being shown in the positions wherein they stand midway of the return or non-impression stroke of their oscillatory members.

Figure 2 is another view, somewhat similar to Figure 1, but illustrating the members of the couples at or approaching the ends of the non-impression or return strokes of the said oscillatory members.

Figure 3 is a third view somewhat similar to the preceding figures, but illustrating the members of the respective couples in the positions which they assume at the commencement of impression and

Figure 4 is yet another view, somewhat similar to Figures 1 to 3, inclusive, illustrating the parts in the positions in which they stand at the close or completion of the impression.

In these views I have illustrated my improvements embodied in a flat bed web printing machine having an oscillatory curved surfaced platen or impression member adapted for rolling movement along or upon a stationary flat form during impression, but it will be apparent that the invention is not restricted to this special application, but may also be embodied in a machine wherein oscillatory or other equivalent movement is imparted to the form supporting bed itself to compel rolling movement of the same along the platen or impression surface during impression. It will also be apparent that the invention is not restricted in its application to machines whose couples have oscillatory members, since a similar result can be obtained by rotating one or the other of the members of the couple upon an eccentric support, in which case it may be desirable so to construct the platen or impression member of each couple, and to provide each such member with a plurality of impression

surfaces adapted to co-operate successively with the form, and so disposed as to serve as a means for counterbalancing the platen or impression members.

In the embodiment of the invention herein shown also the platen or impression members of the couples, by reason of their oscillatory movement are adapted to lift from the forms after impression in order to permit shifting of the web and passage of the form rollers between the members of the couples for inking but it is obviously non-essential so to move the platen or impression members since it will be apparent that an equivalent result may be attained by imparting to said members a simple rocking movement whilst the forms themselves are moved toward and away from the same before and after impression to provide for the shifting of the web and the traversal of the form rollers across the form in inking.

In the embodiment of my invention herein shown also, the members of the initial printing and perfecting couples are constructed and arranged to go on and off impression simultaneously and to travel in reverse directions, so as to permit of more readily equalizing the movement of the web and lessening the jar and vibration which would otherwise arise from the operation of the machine, but I do not desire to be understood as limiting myself in this particular, it being apparent that one couple may alternate with the other upon impression, in which case it will be desirable or needful to duplicate the web controlling or equalizing means so as to permit stoppage of the web at one couple whilst it is being shifted at the other couple, or if desirable or necessary the members of the respective couples may travel in the same direction during impression instead of in reverse directions.

In the embodiment of the invention herein shown the web manipulating or equalizing means, includes a set of looping rolls adjacent to each end of the machine, one being adjacent to the infeed, and another adjacent to the outfeed, but where the couples are arranged to alternate upon impression, one such set of looping rolls may be provided at each side of each printing couple, but it is obviously within the scope of my invention to substitute for such looping rolls various other web manipulating or equalizing means. For example, the web may be supported upon guide rollers at opposite sides of the individual or plural couples, and these guide rollers may be oscillated or reciprocated backward and forward to slow down and stop the web during impression and to permit the same to travel at the requisite increased velocity between impressions whilst being fed into and out of the machine with a constant velocity.

In the embodiment of my invention herein

shown also, the web guiding or manipulating devices are so constructed and arranged as to operate to raise and lower the web at the point or points where the same passes between the form and the platen or impression member, in such a manner as to free the same from the form during inking and to prevent sagging of the web upon the form in such a manner as to blur when on impression, whilst operating also to reduce the drag and stress imposed upon the web by contact of the impression surface therewith when the web is being shifted, but it will be apparent also that my invention is not restricted to such construction and arrangement of the web guiding means since, as before stated, the bed may be raised and lowered for purposes of inking in which case a mere slacking up of the web may be utilized to free it from excessive frictional contact with the impression surface when being shifted.

In the drawings 1 and 1^a represent, respectively, the beds for the initial printing and perfecting couples of the improved printing machine, each supporting a flat form 2, and fixedly mounted in the frame of the machine, which is not shown in the drawings, in such a way as to obviate any difficulty which might arise from loosening or throwing the type from the forms in cases where the forms themselves are raised and lowered or reciprocated or oscillated at high speed.

3 and 3^a represent the platen or impression members arranged to co-act with the respective form beds 1, 1^a, each of said impression members being provided with a curved impression surface 4, adapted for printing co-operation with the forms 2, and being further provided with bearers 23^a extended lengthwise along their opposite sides, designed for rolling contact with similar track-like bearers 26^a upon the beds 1, 1^a, at opposite sides of the forms 2, and with curved toothed racks or gear surfaces 23 parallel with said bearers and meshing with racks 26 carried by the beds 1, 1^a, parallel with their bearers 26^a.

Each platen or impression member is pivotally supported as shown at 5, at a point eccentric to its curved impression surface 4, which latter is struck with a comparatively large radius greatly exceeding the distance of said eccentric support from the impression surface 4, so that, as in my said co-pending patent application, a comparatively slight extent of angular or rotating movement of the impression member around the center from which the surface 4 is struck will suffice to move said center radially to an extent sufficient to cause the platen member completely to traverse the form upon the related bed 1 or 1^a as is needful to complete the impression of the form upon the web.

The members 3, 3^a have central upstanding bearing portions 5^a at opposite sides in which bearings are provided for their eccentric support at 5, and the latter are coupled to crank shafts 6, 6 journaled in the side frames of the machine and provided, respectively, with gearing 7 by means of which they may be operated conjointly from shafts 8 extended lengthwise along the sides of the machine and driven in any preferred way. The driving means for the shafts 6, 6 may obviously be varied at will, but it is preferable that the same be of such a nature that the members 3, 3^a are moved in opposite directions in order that the jar and stress which would otherwise be imposed upon the machine may be kept within bounds and prevented from rising to dangerous proportions.

The wrist pins which afford the supports 5, 5 for each member 3, 3^a may with advantage be connected together and the throw of the cranks afforded thereby is sufficient, as indicated on the drawings to lower the impression surfaces 4 into printing cooperation with the forms upon the beds 1, 1^a during the period or interval of impression and to raise said impression surfaces, after each impression, to a sufficient height above the forms, as indicated in Figure 1, to permit the form rollers 11, 11 to traverse the intervening spaces for inking the forms preparatory to the next succeeding impression.

As herein shown, each bed 1, 1^a has at opposite sides of its central part upwardly directed guides or forks 9 between which is arranged to slide a block 10 pivotally mounted upon the sides of the corresponding impression member 3 or 3^a so as to retain the members 1 and 3 and 1^a and 3^a of the respective printing couples in relation when the impression members are elevated so that the gears 23 may engage with the bed racks 26 again after said members 3, 3^a are afterwards lowered. Various other means may be substituted for that herein shown for effecting this purpose as, for example, the bed racks may themselves be provided with stems engaged for vertical sliding movement in the beds so that the racks themselves may be raised and lowered with the raising and lowering of the impression members by suitable mechanism. Where the construction shown herein is employed, the opposite sides of the guide ways between which the blocks 10 are engaged, will be proportioned or calculated after the fashion of gear surfaces in order that when the impression members standing raised in the positions shown in Figures 1 and 2 are lowered to the positions shown in Figure 3 at the commencement of impression, the blocks 10 will traverse one surface of each fork 9 in such a manner as to enter the leading ends of the gear surfaces 23 into engagement with the

adjacent ends of the bed racks 26 and when after impression, the impression members 3, 3^a rise from the positions shown in Figure 4, the blocks 10 will traverse the opposite surfaces of the respective forks as the gear surfaces are withdrawn from engagement with said bed racks. I have not deemed it necessary to illustrate herein the exact conformation of these surfaces of the forks, which will be somewhat V shaped, since the same may be readily plotted out by persons skilled in laying out gearing.

As in my co-pending patent application, the form rollers 11, 11 are supported by endless chains 12 mounted upon sprocket wheels 14, one pair of which are concentric with an ink drum 15 so that as the rollers 11 are drawn along by said chains they will first receive a supply of ink from said drum and afterwards upon elevation of the corresponding member 3 or 3^a after impression will be moved between the same and the related form in order to ink the latter, passing from between the form and impression member in time to avoid interference with the next lowering of said impression member for the succeeding impression. Various other forms of inking apparatus may obviously be substituted for that shown herein.

As herein shown the carriage upon which the form rollers 11 are supported and which will ordinarily be connected at opposite ends with the chains 12, 12 is provided with a sheet metal cover or shield 16, extending over the form rollers and vibrator (if the latter be provided) so as to prevent contact of the web with said rolls in case the web be slack, and also to prevent entangling of the web with said rolls in case of breakage. This cover or shield may be made in hinged sections with suitable fastenings or it may be held in place by wing-nuts or the like, so as to be capable of being lifted or removed when access to the rollers is desired.

In the structure shown, the eccentric supports 5 for the impression members 3 and 3^a serve not only to compel the raising and lowering of said members requisite for the passage of the form rollers beneath said members for inking, but also co-operate with the connections of said members with the beds (that is the gear surfaces 23 and related bed racks 26 and the blocks 10 and related guides or forks 9 or equivalent devices) to impart to said impression members a certain extent of forward and rearward rocking motion such as is necessary to assure rolling movement of the impression surfaces over the forms 2 during impression, and the construction and arrangement of the parts is such that the movement thus imparted to the impression members is not a simple reciprocatory movement such as would involve lessening of the speed of operation on account of slowing down and

stoppage of said members at the ends of their strokes, but partakes of the character of true rotatory movement since the center of mass of each of said members is moved through an endless path in such a way as to permit operation of the machine at a rate of speed considerably greater than would be possible were said members simply reciprocated. In a printing machine such as that to which my present invention relates this is a feature of material importance and advantage, and further important advantages are attained by reason of the direct gear or equivalent connection between the impression member and bed during impression, since such connection serves to assure or compel rolling co-action of the platen with the form, and guards against slip of one member of the couple relatively to the other which would otherwise be likely to occur and which would result in the tearing of the web from the machine.

In the structure shown, the web w is fed into the machine from the web roll, not shown, continuously at a uniform rate of speed by means of the infeed rolls 17 and is thence passed as indicated at w^1 downwards around a vertically movable looping or equalizing roll 18, whence it passes upwards over guide rolls 19 and 20 and downwards beneath a web manipulating roll 21 which is capable of movement along an angular guide and directs the web between the bed and impression member 3 of the first printing couple as shown at w^2 , whence said web is directed around a similar manipulating roll 22 at the opposite side of the first printing couple and passes around guide rolls 24, 25, etc., to the second printing couple, where it is received by other web manipulating rolls 27 and 28, which are arranged at opposite sides of the couple similarly to the rolls 21 and 22, and serve to direct the web between the bed and impression members at the couple and to controllably move said web as will be hereinafter pointed out.

From the second printing couple, the web is passed upwards around guide rolls 29 and 30 and thence downwards as indicated at w^4 around a vertically movable looping or equalizing roll 31 whence it is directed to the outfeed 32 which serves to deliver it from the machine continuously at a uniform rate of travel.

The equalizing or looping rolls 18 and 31 are adapted to be moved vertically in such a manner as to compensate for the web fed into the machine during the period of impression, at which time those parts of the web which are receiving the impressions of the stationary forms at the respective printing couples must obviously be held stationary, and since the structure and arrangement of the parts is such that the impression

is performed by the rocking or rolling co-
action of the curved platen member upon
and along the form supported upon the
related bed within a comparatively small or
5 short portion of the time allowed for the
feeding of a page length of the web through
the machine, it will be apparent that a com-
paratively short travel of said rolls 18 and
31 vertically will be sufficient to effect the
10 necessary compensation. In the structure
shown, the period of impression, during
which the web must be held stationary, is
relatively short, as compared with the
periods or intervals between impressions,
15 during which the web may be moved or fed
between the members of the printing couple,
the impression being completed, as indicated
in Figures 3 and 4, in approximately one
fourth of the time requisite for the feeding
20 of a page length of the web into and out
of the machine, so that it will be apparent
that the web need be held stationary but for
about one fourth of the time, and conse-
quently compensation need be made but for
25 about one fourth of a page length of web,
and the increased velocity of web feed requi-
site for effecting such compensation may
be distributed over approximately three
quarters of the period required for the feed-
30 ing of the page length into and out of the
machine, whereby it will be understood that
a considerably increased length of web may
be fed through the machine in a given time
than would otherwise be possible, and the
35 output of the machine may be correspond-
ingly increased, such output being mani-
festly limited by the speed at which it is
possible to feed the web. Preferably also
the rollers 18 and 31 will make a long easy
40 movement which will change the speed of
the web between the intervals of impression
very gradually from a stop to its highest
speed and back again, so that the variations
in the travel of the web will be extended
45 over a longer time than in the case of ordi-
nary bed and cylinder web machines, and
the stress upon the web which commonly
occurs in flat bed web printing machines as
ordinarily constructed will be much reduced
50 and operation of the machine permitted at
a greater speed. The embodiment of my
improvements herein illustrated, wherein
the form supporting member or bed is sta-
tionary, and the curved surfaced impression
55 member or platen is caused to rock or roll
along the same during impression, presents
important advantages also in that the roll-
ing or rocking movement of the platen or
impression member permits of being utilized
60 to assist in stripping the printed web from
the curved platen surface during the com-
pletion of impression, so that much less
stress is applied to the web upon the com-
mencement of the compensating action and
65 there is therefore less likelihood of tearing

the same, whilst at the same time the form
bed being stationary assures a light, strong
and simple construction, and avoids likeli-
hood of the type being thrown from the
form, the possibility of which, in case the
70 form bed were reciprocated vertically to
throw the machine on and off impression
and for inking, would prevent operation of
the machine at such high speed as may be
attained where the approach and separa-
75 tion of the members is accomplished by
movement of the impression member.

In the structure shown, where the im-
pression members move in opposite directions,
the equalizing or looping rolls 18 and 31, 80
are positioned adjacent, respectively to the
infeed and outfeed of the machine and are
adapted to be moved simultaneously in op-
posite directions, first to take up and pay
out the web during impression and after-
85 wards to shift the web, and it will be ap-
parent that a material advantage is at-
tainable by this construction, since it per-
mits of employing a lever connection be-
tween said rolls, so constructed as to move
90 them simultaneously at equal speeds but in
opposite directions, whereby a single cam
may be utilized for the operation of said
rolls, thereby avoiding such difficulties as
are likely to arise from unequal wear where
95 different cams are employed for operating
the looping rolls individually.

The angular guides 33 along which the
web manipulating rolls 21 and 22 and 27 and
28 for the respective first printing and sec- 100
ond or perfecting couples are movable are
as herein shown arranged at angles of about
45° to the travel of the run of web between
them and at angles of about 90° to one
another, and according to my invention, in
105 the embodiment herein shown the rolls are
mounted in slide bars 33^a and are moved
along these guides in such a manner as to
raise and lower the run of web between
them at each printing couple so as to cor-
110 respond with the lowering of the impres-
sion members during the time of impression
and their elevation after impression suf-
ficiently to allow the passage of the inking
rollers across the forms. The rolls are also
115 capable of being so manipulated along these
guides as to cause the run of web between
them to assume slightly different angles to
the form, for example as shown in Figures 3
and 4 so that blotting or smutting of the
120 web by contact upon the form except at the
point of impression is prevented, and the web
is gradually stripped from the form as the
impression progresses. The movement of
the web manipulating rolls is also such as to
125 withdraw or substantially withdraw the web
from contact upon the impression surfaces
4 after the impression is completed, whereby
it will be seen that drag upon the web aris-
ing from such contact as commonly occurs 130

in other types of flat bed web printing machine is avoided during the shifting of the web for the succeeding impression. By the elimination or reduction of this drag the stress upon the web is very materially reduced, rendering it possible to operate the machine at a speed much greater than would otherwise be practicable, and also preventing the smutting of the web.

It will be apparent that other arrangements of equalizing means may be employed without departure from my invention, or the web may be fed through the machine by variable feeding means although such means are not usually satisfactory, and various means other than that hereinbefore referred to for moving and guiding the manipulating rolls 18 and 22 and 27 and 28 may also be provided, adapted to maintain a constant length of web between the equalizing rolls during the operation of the machine whilst serving to raise and lower or otherwise move said manipulating rolls to assure the desired application of the web to the forms.

It will also be apparent that my present invention comprehends various other changes in the structure and arrangement of the parts of the improved printing machine as, for example, a structure wherein the bed instead of the impression member partakes of a rocking or oscillatory movement whilst the curved surfaced impression member of the printing couple remains stationary, in which event the means herein shown for operating the impression member may be employed in suitably modified form for operating the bed, whilst the web equalizing and manipulating means, herein shown or equivalent means may be employed for stopping the movement of the web during impression and shifting it forward after impression. Where the impression member is stationary, however, and the bed rises and falls in its rocking movement it will suffice to move the web manipulating rolls only enough to relieve the drag upon the web after impression and to present and withdraw the same properly to and from the form during impression.

I have not deemed it necessary to show the mechanical movements for all the different parts shown as anyone skilled in the art can readily supply them by following the description herein contained.

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

1. A web printing machine having a printing couple including members one of which is a bed stationary during operation and is adapted to support a flat form, and the other of which is a movable impression member, having a curved segmental impression surface, means for operating the movable impression member of said printing

couple to permit rolling co-action between said members during impression and to move the movable impression member toward and away from the stationary member, and means for moving the web between the members of the printing couple with periods of rest or dwell during impression.

2. A web printing machine having a printing couple including members one of which is an impression member having a curved impression surface, and the other of which is a bed adapted to support a flat form, means for moving a web between the members, and means for rocking the impression member upon an axis eccentric to its curved impression surface to permit rolling co-action of said surface with the form upon the bed and to assist in stripping the web from said surface during impression.

3. A web printing machine having a printing couple including members one of which is a bed adapted to support a flat form and the other of which is an impression member having a curved impression surface of comparatively great radius, means for rocking one of the members in rolling co-action with the other member, operable to produce alternating periods of impression and non-impression, the periods of impression being short as compared with the periods of non-impression, means for feeding a web into and from the machine with substantially constant velocity, and web manipulating means operable to stop the web in the machine during the comparatively short periods of impression, and to advance the web during the longer periods of non-impression to compensate for such stoppage.

4. A web printing machine having a printing couple including members one of which is a bed adapted to support a flat form and the other of which is an impression member having a curved impression surface of comparatively great radius, means for rocking one of the members in rolling co-action with the other, operable to produce alternating periods of impression and non-impression, the periods of impression being short as compared with the periods of non-impression, means for feeding a web into and from the machine with substantially constant velocity, and web manipulating means operable to restrict travel of the web between the members of the printing couple during the comparatively short periods of impression, and to accelerate its travel between said members during the longer intervals of non-impression.

5. A web printing machine having a printing couple including members, one of which is a fixed, stationary bed adapted to support a flat form, and the other of which is a movable impression member hav-

ing a curved impression surface of comparatively great radius, means operable to impart to the movable member of the printing couple rocking movement upon an axis eccentric to its curved impression surface and to move the movable member toward and away from the fixed member, toothed gears associated with the respective members and engageable during the impression period to maintain rolling co-action between said members during impression, said gears being disengageable during the non-impression period, and means for moving the web between the members of the printing couple and operable to maintain said web stationary during impression.

6. A web printing machine having a printing couple including members one of which is a bed adapted to support a flat form and the other of which is an impression member having a curved impression surface of comparatively great radius, one of said members being stationary during impression, means for moving the other member of said couple continuously along an endless curved path operable to permit rolling co-action between said members during impression and to separate said members after impression for the passage between them of an inking roller, and means for moving a web between the members of said couple, operable to hold said web stationary during impression.

7. A web printing machine having a printing couple including members one of which is a bed adapted to support a flat form and the other of which is an impression member having a curved impression surface of comparatively great radius, one of said members being stationary during impression and the other member of the couple having a mechanical actuating connection operable to move said member along an endless curved path eccentric to said curved impression surface, operable to impart rolling co-action between said members of the printing couple during impression and to separate said members after impression for the passage between them of an inking roller, and means for moving a web between the members of the couple operable to hold said web stationary during impression.

8. A web printing machine having a printing couple including members one of which is a bed adapted to support a flat form and the other of which is an impression member having a curved impression surface of comparatively great radius, one of said members being stationary during impression and the other member of the couple having a mechanical actuating connection operable to move said member along an endless curved path eccentric to said curved impression surface and operable to separate said members

after impression for the passage between them of an inking roller, reciprocal devices related to the respective members of the printing couple operable to maintain rolling coaction between them during impression, and means for moving a web between said members of the couple operable to hold said web stationary during impression.

9. A web printing machine having a printing couple including members one of which is a bed adapted to support a flat form and the other of which is an impression member having a curved impression surface of comparatively great radius, one of said members being stationary during impression and the other member of said couple having a support operable to move said member along an endless curved path eccentric to said impression surface and operable to separate the members after impression for the passage of a form roller between them, means for maintaining rolling co-action between said members during impression, and means for moving a web between the members of the couple operable to hold said web stationary during impression.

10. A web printing machine having a printing couple including members one of which is a bed adapted to support a flat form and the other of which is an impression member having a curved impression surface of comparatively great radius, one of said members being stationary during impression and the other member of the couple having a mechanical connection operable to move said member along an endless curved path eccentric to said impression surface and operable to separate the members after impression for the passage of a form roller between them, means for maintaining rolling co-action between said members during impression, and means for moving a web between the members of the couple operable to hold said web stationary during impression.

11. A web printing machine having a printing couple including members one of which is a bed adapted to support a flat form and the other of which is an impression member having a curved impression surface of comparatively great radius, one of said members being stationary during impression, means to impart to the other member of the couple continuous oscillatory movement about an axis eccentric to said curved impression surface, to move said member continuously along an endless curvilinear path, means for maintaining rolling co-action between the members during impression, and means for moving a web between the members of the couple operable to hold said web stationary during impression.

12. A web printing machine having a

printing couple including members, one of which is a bed adapted to support a flat form and the other of which is an impression member having a curved surface of comparatively great radius, one of said members being stationary during impression, means to impart to the other member of the couple continuous oscillatory movement about an axis eccentric to said curved impression surface to move said member continuously along an endless curvilinear path, through a portion of which path the member will have rolling co-action and through another portion of which path they will be separated to allow of movement of a web therebetween, means for maintaining rolling co-action between the members during impression, and means, operable to hold said web stationary during impression, for moving the web between the members of the couple between impressions.

13. A web printing machine having a printing couple including a bed adapted to support a flat form, an impression member, having a curved impression surface, mounted for rolling co-action with the bed about an axis eccentric to its curved impression surface, web manipulating means adapted for engagement with the web at the opposite sides of said couple, said manipulating means being adapted to relax contact of the web upon the impression surface after an impression for relieving stress upon the web during its travel subsequent to impression.

14. A web printing machine having a printing couple including a bed member adapted to support a flat form and an impression member co-acting therewith, means for moving one member of the printing couple through an endless curvilinear path to bring the members off and on impression, and means adapted to withdraw a web from contact with the impression member to relieve stress upon the web during its travel after impression.

15. In a web printing machine, a printing couple embodying a flat form member, and a curved impression member, means for moving one of said members along a continuous curved path to effect a rocking co-action between said members during impression and the separation of said members between impressions.

16. In a web printing machine, a printing couple embodying a flat form member and an impression member having a curved surface, one of said members being stationary during impression, means operable to impart to one member of the couple rocking movement to permit of rolling co-action between the members during impression, to remove the movable member from engagement with the other member and rock it in a reverse direction between impressions.

the movement of said movable member being along an endless curved path, and means for passing a web between said members and operable to compel periods of rest or dwell of the web during impressions.

17. In a printing machine, a printing couple embodying a flat form member and a platen having a curved impression surface adapted for rolling co-action on an intermediate web during impression, in combination with means, supported independently of the platen and movable independently thereof, for laying the web on the curved impression surface of the platen forwardly of the line of contact between the platen and the form on said form member, and stripping it from the flat form member and from the curved impression surface of the platen rearwardly of said line of contact.

18. In a printing machine, a printing couple embodying a flat form member and a curved impression member, adapted for rolling co-action on an intermediate web during impression, means for rolling one of said members over the other member during impression to produce such rolling co-action and to move one of said members in a perpendicular direction toward and away from the face of the other member between impressions, in combination with means movable separately from the movable member and in directions toward and away from the plane of the form member for laying the web on the impression member prior to impression and stripping the web from the form member and from the impression member after impression.

19. In a printing machine, a printing couple embodying a flat form member and a member having a curved impression surface adapted for rolling co-action on an intermediate web during impression, in combination with a pair of directional rolls separately movable in opposite directions toward and away from the plane of the form member for laying the unprinted portion of the web on the impression surface of the platen while the printed portion of said web is stripped from the platen and from the form member.

20. In a printing machine, a printing couple embodying a curved impression member and a flat form member, one of which is stationary and the other movable, means for producing rolling co-action between said members and means, movable independently of the movable member, for guiding a web between the members, said means being supported independently of the movable member and operable to strip the printed portion of the web from said members during the impression period.

21. In a printing machine, a printing couple embodying a flat form member and a curved impression platen, means for moving

the curved impression platen along an endless curvilinear path during impression to effect engagement of and separation between the members of the printing couple and to assist in stripping the printed web from said platen, and a continuously moving form roller, movable between the members of the printing couple while they are separated for inking the form between impressions.

22. In a printing machine, a printing couple embodying a stationary flat form member, and an impression member provided with a curved impression surface of comparatively great radius, mounted for eccentric movement, means for moving the impression member along an endless curvilinear path during impression to effect rolling co-action between said members during impression and to separate said members to allow form inking means to pass therebetween when the members are off impression and to assist in stripping the printed web from said platen, and a continuously moving form roller for inking the form between impressions.

23. A printing machine embodying a flat form member and a curved impression platen, means for eccentrically moving the platen into and out of engagement with the form member and for rolling the platen while in engagement with the form member, said means being so constituted to complete the impression through the rolling co-action between said members in a comparatively short rolling contact.

24. A web printing machine embodying a flat form member and a curved impression member, means operable to periodically move the impression member toward and from the face of the flat form member to bring the impression member off and on impression, and means independent of the impression member and movable independently thereof in directions toward and away from the plane of the form member for holding the web free and clear of both members between impressions.

25. In a printing machine, a printing couple embodying a flat form member and an impression member in the form of a platen having a curved impression surface, means for moving one of said members on and off impression, said means serving to maintain the members of the printing couple on impression during a period of less than one fourth of its total travel.

26. In a printing machine, a printing couple embodying a flat form member and a curved impression member, means for moving one portion of the impression member in a circular path, and means for restricting another portion of said member to movement in a substantially straight path toward and away from the other member of

the couple, whereby the movable member is moved off and on impression and is rocked over the other member while on impression.

27. In a printing machine, a printing couple embodying a stationary flat form member and an impression member having a curved impression surface, a unitary member movable in a circular path and co-operating with the impression member to move the same on and off impression, and means for guiding the impression member for bodily gyratory movement in a direction toward and away from the flat form member, whereby the impression member is maintained in co-operative relation with the flat form member and has rolling co-action therewith while on impression.

28. In a printing press, a printing couple embodying a form member and a movable impression member having rolling co-action, in combination with mechanism embodying means for supporting the movable impression member on an axis of pivotal movement, and also comprising means for moving said axis about a second axis, whereby the movable member is moved forwardly in one plane and backwardly in a different plane.

29. In a printing machine, a printing couple embodying a form member and a rocking impression member pivoted on an axis extending transversely of the platen and adjacent its impression surface, means for rocking the impression member forwardly in one plane and returning it in a different plane.

30. In a printing press, a form member, an impression member having a curved impression surface and being pivotally mounted on an axis extending transversely of the platen and adjacent such surface and means for rocking said impression member about a center eccentric to its curved surface.

31. In a printing press, a form member, an impression member having a rocking movement and pivoted for such movement on an axis extending transversely through the platen substantially at its impression surface, web feeding means and mechanism whereby an impression may be taken in less than one half the total movement of the impression member.

32. In a printing machine, a printing couple embodying a flat, stationary form member, a continuously moving pivoted platen having a segmental printing surface, and means for guiding a web between the couple.

33. In a printing press, a stationary form member, an impression member having a curved impression surface pivotally mounted adjacent such surface and means for moving said impression member on an axis eccentric to its curved surface.

34. In a web printing mechanism, a print-

ing couple, one member of which is capable of movement on and off impression, devices for guiding a web between said couple and a web manipulating mechanism operable to free the web from the impression member of said couple, when off impression and including means for maintaining a uniform length of web between said guiding devices when the couple is on and off impression.

35. In a printing press having a printing couple one member of which is movable toward and away from the other to throw the couple on and off impression, a web manipulating mechanism movable toward the members of said couple during impression to position the web for impression and to move away from said members between impressions.

36. In a web printing press, a printing couple, means to guide a web between said couple, said guiding means being movable during impression toward one member of the couple to position the web for impression.

37. In a printing press, a printing couple, means operable to move one member of the couple on and off impression, means for guiding a web between said couple and means independent of the couple to move said web into and out of engagement with the impression member of said couple during impression.

38. In a flat bed web machine, a printing couple including a bed adapted to support a flat form and a platen having a curved impression surface, means to ink the form, means operable to move one member of said couple on and off impression, means for guiding a web between the couple including means operable to retain said web out of contact with said impression surface during inking of the form.

39. A web machine having a printing couple including a stationary bed adapted to support a flat form and a platen having a curved impression surface, means operable to move the platen on and off impression to effect rolling coaction with said form, said movement being of less extent than the length of the form, means for guiding a web between the bed and platen and means engageable with said web to cause the web to dwell at the time of impression, said period of dwell being shorter than the interval between impressions.

40. A web printing machine, a couple embodying a bed adapted to support a flat form, said bed being stationary during impression, and a rocking platen having a curved impression surface coacting with said form, means for guiding a web between the bed and platen, means operable to feed a web into and out of the machine and means, movable independently of the platen, to cause the web to dwell during impression.

41. A printing machine having a printing couple including members, one of which is a fixed stationary bed adapted to support a flat form and the other of which members is a movable impression member having a curved impression surface of comparatively large radius, and means operable to impart to the movable member of the printing couple a rocking movement on an axis eccentric to its curved impression surface and operable to throw the members of the couple on and off impression.

42. A printing machine having a couple including a fixed, stationary bed adapted to support a flat form, and a movable platen having a curved impression surface, means operable to impart to said platen rocking movement to effect rolling coaction with said form, and to throw the couple on and off impression, and means for guiding a web between the bed and platen.

43. In a printing machine, a stationary form bed, an oscillating impression platen having a curved working face, the axis of oscillation of said platen being between the axis of curvature of its working face and the working face.

44. A web printing machine having a printing couple one member of which is a curved impression platen and the other member a bed adapted to support a flat form, one member of said couple being movable on and off impression, means to roll one member across the companion member, means for guiding a web between the members of said couple, controlling means engageable with the web to cause said web to dwell during the intervals of impression and to shift the web during the intervals between impression, said means operating to cause the intervals of dwell to be materially shorter than the intervals of shift.

45. A web printing press embodying a flat stationary form bed, a rocking platen with a curved impression surface, means for moving the platen toward the plane of the form bed to engage the form and effect impression and to retract the platen from the form to permit passage of a form roller between the form and platen, the periods of engagement of the platen with the form being shorter than the periods of non-engagement therewith, and means for passing a web between the bed and platen with alternate periods of rest and movement, the periods of rest being materially shorter than the periods of movement.

46. A web printing press embodying a flat stationary form bed, a rocking platen with a curved impression surface, and mounted for rocking movement on an axis eccentric to its curved impression surface, means for moving the platen toward the plane of the form bed to engage the form and effect impression and to retract the

platen from the form to permit passage of a
form roller between the form and platen,
the periods of engagement of the platen
with the form being shorter than the pe-
5 riods of non-engagement therewith, and
means for passing a web between the bed
and platen with alternate periods of rest

and movement, the periods of rest being
materially shorter than the periods of move-
ment.

In testimony whereof, I have signed my
name to this specification this seventh day
of September, 1918.

JOHN D. CAPLINGER.