

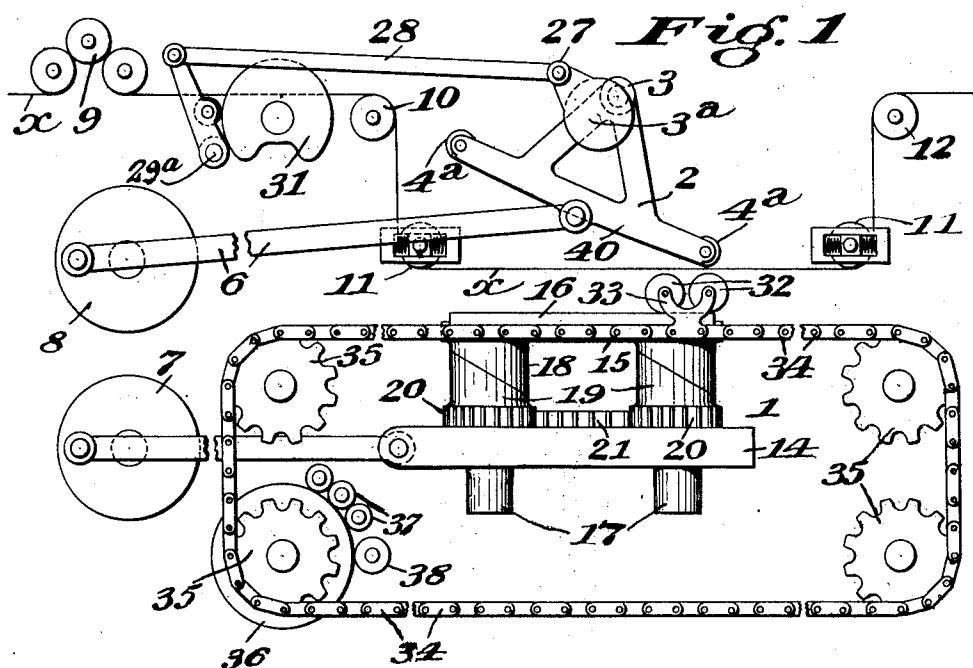
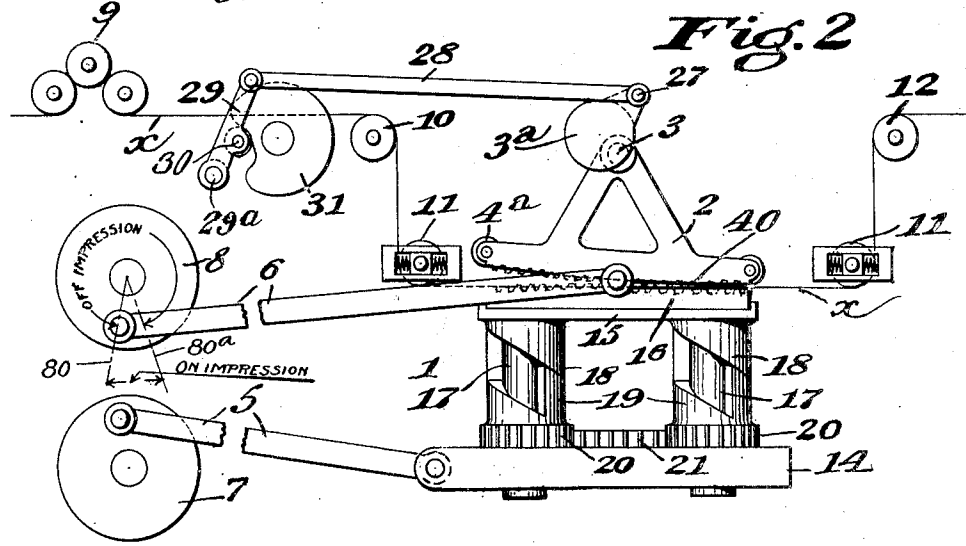
Dec. 18, 1928.

1,695,271

J. D. CAPLINGER
WEB PRINTING MACHINE

Filed Feb. 11. 1918

3 Sheets-Sheet 1



INVENTOR
John D. Caplinger

Dec. 18, 1928.

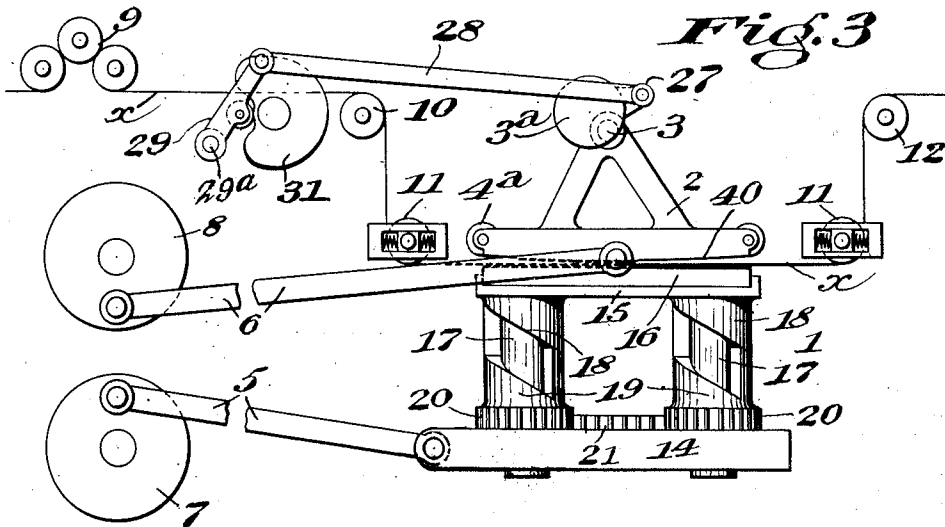
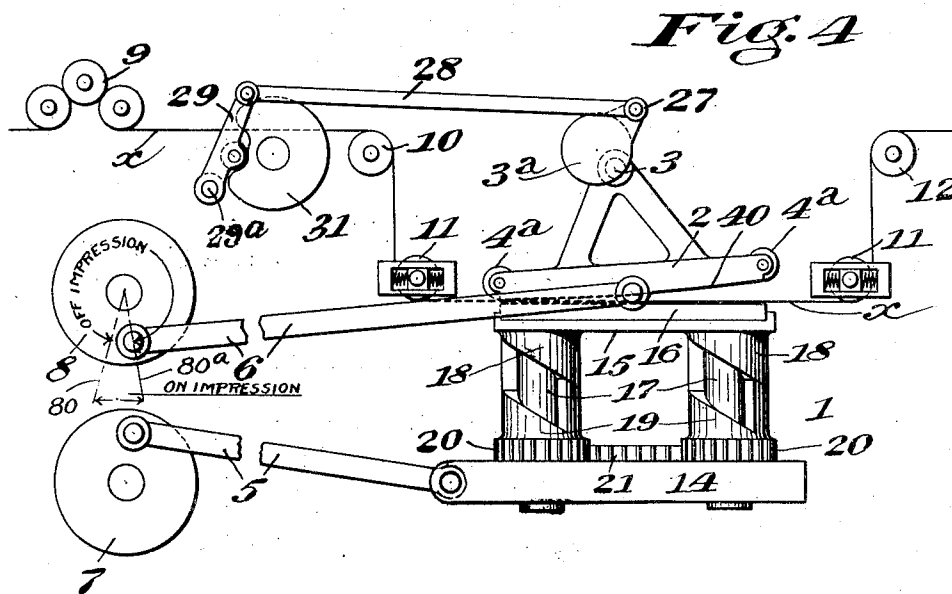
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J. B. CAPLINGER

WEB PRINTING MACHINE

Filed Feb. 11. 1918

3 Sheets-Sheet 2



INVENTOR

John G. Thompson

Dec. 18, 1928.

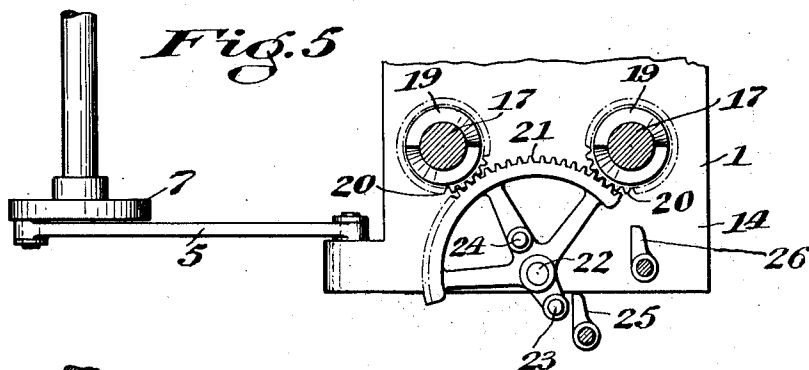
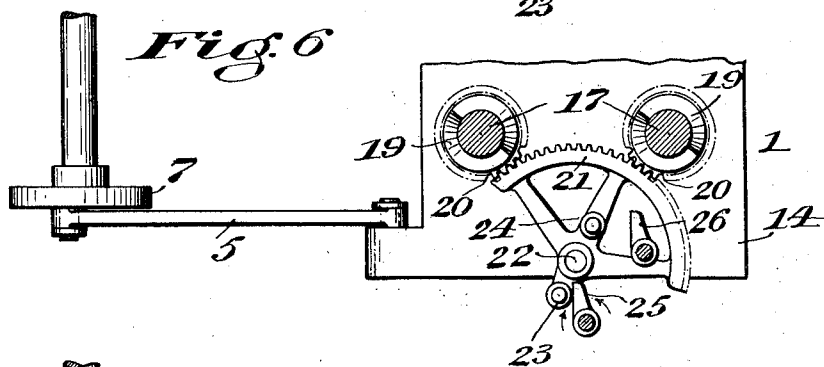
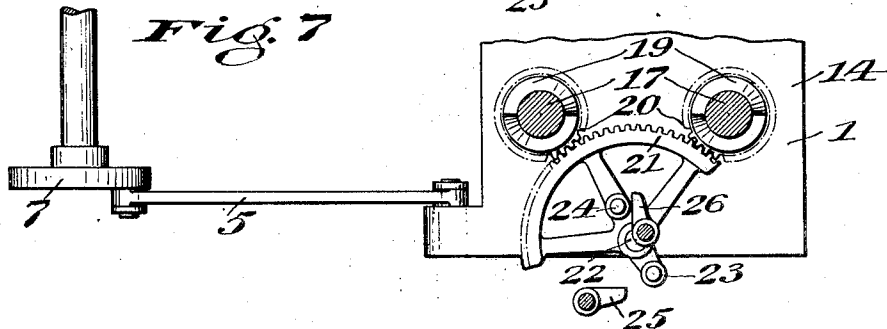
1,695,271

J. D. CAPLINGER

WEB PRINTING MACHINE

Filed Feb. 11. 1918

3 Sheets-Sheet 3



INVENTOR

John D. Caplinger

Patented Dec. 18, 1928.

1,695,271

UNITED STATES PATENT OFFICE.

JOHN D. CAPLINGER, OF NEWARK, NEW JERSEY, ASSIGNOR TO CARL A. KELLOGG, OF
NEW YORK, N. Y.

WEB-PRINTING MACHINE.

Application filed February 11, 1918. Serial No. 216,675.

This invention relates to certain improvements in web printing machines, and more particularly in that class or type of such machines in which a printing couple including members, one of which is capable of reciprocatory movement, is employed for printing the web from a flat form, and wherein the capacity of the printing machine, which is obviously dependent upon the velocity with which the web may be fed through the machine is limited or controlled by the rapidity with which the reciprocatory member may be operated, and the object of the invention is to provide a printing machine of this general character having certain features of novelty and improvement whereby the period or interval of time required for impression is capable of being shortened in such a manner as will permit reduction in the extent of travel of the reciprocatory member of the printing couple, sufficient to permit of imparting thereto the requisite reciprocatory movements in more rapid succession than is ordinarily practicable or possible, in order that the web may be passed through the machine with greater velocity and an increased number of impressions of the form thereon may be obtained within a given time.

The invention consists, in part, in a printing machine including a printing couple having members capable of reciprocatory movement, and one of them movable toward and away from the other for purposes of impression, wherein means is provided for feeding a web between the members of the printing couple in such a manner that successive impressions are produced upon the web by the movement of one member of the couple toward the other and during that part of the reciprocating movement of said members, which is co-directional with the movement of the web between said members.

The invention also consists, in part, in a printing machine of this general character wherein the period or time required for the impression of the form upon the web, instead of being controlled or dependent solely or mainly upon the time required for the reciprocation of one element of the printing couple alone, to an extent equal to the length of the form, or for the conjoint reciprocatory movements to a similar extent of both members of the printing couple in reverse directions, as is customary in web printing machines of this class or type as heretofore designed, is short-

ened or quickened in such a manner that the impressions are increased in extent and rapidity so that the impression may be performed quickly and within a comparatively short extent of reciprocatory movement of one or both members of said printing couple whereby the total travel of the said member or members of the printing couple may be materially lessened to permit of performing the necessary reciprocations with greater rapidity, and thereby attaining greater speed or capacity of the improved printing machine.

The invention further consists in a web printing machine of the character above set forth wherein the form supporting bed is reciprocated in such a manner as to permit the web to be fed forward through the printing machine during impression, without great or excessive interruption of its movement such as is requisite when a stationary bed is employed, in order to avoid the imposition upon the web of such excessive stress, arising out of the requisite equalization of its movement with the necessary stoppage for impression, and which in other printing machines of the general character to which my invention relates greatly interferes with rapid feeding of the web and thereby reduces the capacity of the machine.

The invention further consists in a printing machine of the general character hereinbefore set forth wherein the platen has a curved impression surface so proportioned as to its radius as to be adapted to traverse the co-acting form during a comparatively short or small extent of angular movement of the platen, and wherein the pivotal support of said platen is eccentrically positioned with respect to said impression surface so that a comparatively small extent of reciprocatory movement of the platen in the direction of travel of the web suffices for assuring enough angular or rotatory movement thereof for effecting the full impression and permits of very materially reducing the required total travel of the members of the printing couple beyond what is requisite in other types of printing machines thereby assuring much more rapid operation of the machine than is possible or practicable in other machines of this general class as heretofore constructed, wherein a much greater extent of reciprocatory movement of said members is requisite for the completion of the impression.

The invention further consists in a print-

ing machine wherein a platen having a curved impression surface is pivoted eccentrically with respect thereto and actuating means are provided for reciprocating or oscillating said platen upon its pivotal supports in such a manner as to maintain a line impression across the co-acting form throughout the period of impression.

The invention also consists in certain novel features of the construction, and combinations and arrangements of the several parts of the improved printing machine, whereby certain important advantages are attained, and the machine is rendered simpler, more compact and less expensive as compared with other flat bed web printing machines heretofore in use, and is rendered more effective and otherwise better adapted and more convenient for use, 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, wherein

Figure 1 is a fragmentary view of a somewhat diagrammatic character, illustrating an embodiment of my invention wherein the printing couple includes a reciprocatory form supporting bed and an eccentrically supported reciprocatory or oscillatory platen for printing upon a continuously or constantly moving web, the parts being shown in the positions wherein they stand when the members of the couple are off impression as, for example, at an end of their stroke and during inking of the form;

Figure 2 is a view somewhat similar to Figure 1, but illustrating the members of the printing couple in the positions assumed by them at the commencement of impression;

Figure 3 is another view somewhat similar to the preceding figures but illustrating the positions of the members of the printing couple upon impression, as at midstroke;

Figure 4 is another view somewhat similar to the preceding figures, but illustrating the positions assumed by the members of the printing couple at the completion of the impression;

Figure 5 is a sectional detail view taken through the machine in the plane of the reciprocatory bed, illustrating certain features of construction of a means for raising and lowering the bed for throwing the same on and off impression, and

Figures 6 and 7 are other views, somewhat similar to Figure 5, but showing different positions of adjustment of the devices therein shown.

In these views I have shown my improvements embodied in a web printing machine having a bed, indicated as a whole at 1, supported for reciprocatory movement along

horizontally directed guides (not shown) in the frame of the machine, and adapted to cooperate with a platen 2, supported as shown at 3, upon bearings or trunnions positioned eccentrically with respect to its curved impression surface 40, which latter is struck with a radius considerably exceeding its distance from said trunnions or bearings in order that the lowering of the platen arising during rocking thereof upon its eccentrically positioned supports, may be utilized according to my invention for effecting more rapid travel of the platen over the form and thereby securing the complete impression of said form upon the web more quickly and during a relatively short portion of the reciprocatory travel of the web and form.

The bed 1 and platen 2 are, of course, adapted for movement in unison with one another, the one along its guides in the frame, and the other upon its eccentric supports at 3, and by reason of the curvature of the impression surface 40 being so great that its center is above the bearings or trunnions 3, it will be apparent that during the conjoint movement of the bed and platen upon impression, the axis of said impression surface 40 will be moved with relatively increased velocity oppositely to the forward travel of the web and bed to the extent necessary for effecting the impression by the rolling of said impression surface over the form in order that advantage may be taken of the increased rapidity of such axial movement of said platen for shortening the time required for impression. The bed and platen will, of course, be coupled for movement in unison during impression by means of toothed gearing or the like such as is ordinarily provided in machines of this kind.

As herein shown, both the bed and platen are driven by crank movement, although it will be apparent that other types of drive well known in the art such, for example, as toothed gearing, may be employed in lieu thereof. As herein shown, the bed and platen 1 and 2 are coupled by connecting rods 5 and 6, respectively, with crank disks 7 and 8, driven in unison in any preferred manner, so as to impart similarly directed reciprocatory movements to the bed and platen during operation of the machine, it being understood that whilst the reciprocatory movement of the platen, considered as a whole, is in the direction of the travel of the bed and web, yet the axial movement of the center from which the impression surface is struck is in an opposite direction in order that advantage may be taken of the extent of such axial movement for assisting in completing the impression. Where crank mechanism is provided in this manner for driving the bed and platen, the same will ordinarily be duplicated at opposite sides of the machine as is usual in printing press construction.

The printing machine being of the web type, is provided with means of any approved kind for feeding and directing a web X of paper to be imprinted between the bed and platen, such means, as herein shown, including feed rolls 9 for drawing the web with a substantially constant velocity from the web roll, (not shown) guide rolls 10 and 12 for directing the web to and from the platen, and other spring actuated or yielding tension rolls 11, 11 spaced at opposite sides of the platen for so directing the web as to produce a straight run thereof between the bed and platen, and their yielding operation being calculated to overcome any difficulty arising out of slight differences between the speed of the bed and web during the interval of impression, although it should be understood that where desired, or if the differences between the velocities of the bed and web during impression be sufficient to justify it, the web manipulating means may include equalizing or compensating devices adapted to take up and give or pay out the web at the platen without interfering with a constant velocity of the web at the feed rolls 9 where it is received into the machine, and at the delivery rolls (not shown) where it is discharged from the machine to a folder or other mechanism.

According to my present invention, however, as distinguished from other web printing machines of the reciprocatory bed and cylinder, or platen type, since the reciprocatory movements of the bed and platen are similarly directed, it is possible to utilize the angular movement of the platen, where the same has an eccentric impression surface of sufficiently great radius, for the production or completion of the impression during a much shorter interval of time than would otherwise be possible, and in the embodiment of the invention herein shown, since the impression takes place midway of the stroke, when the members 1 and 2 are travelling at their highest speed, and on account of the comparatively short time required for completion of the impression, it will be apparent that there will occur very slight differences between the travel of the bed and web, and such differences as occur will be halved by the fact of the bed and platen being at midstroke during impression, so that comparatively little need will exist for the employment of equalizing or compensating devices of the character referred to in the web manipulating means, and tension rolls of the kind shown may even be dispensed with in some cases, particularly in case the crank driving means shown be replaced by some driving mechanism capable of operation to impel the bed and platen with a constant velocity equal to that of the web, during the interval or period of impression.

According to my invention means are also

provided for moving one of the members of the printing couple toward or away from the other for the taking of the impression during the reciprocatory movement of said members and in the embodiment of my invention herein shown both members 1 and 2 of the printing couple are capable of such raising and lowering movements so that at the commencement of impression the form is raised and the platen lowered, the lowering of the platen continuing until it reaches midstroke, whereupon the platen begins to rise, this rising movement continuing until the end of the impression, whereupon the members of the printing couple are actuated in such a manner as to clear the web and allow the same to travel at its proper constant speed unhindered by the gradual decrease in velocity of the reciprocatory bed and platen adjacent to the ends of the strokes of these parts, but it will be obvious that my improvements are not limited in this respect since, if desired, the web may be raised and lowered with the platen, or the bed alone may be raised and lowered.

As shown herein, the bed 1 is comprised of a lower main part 14 fitted for movement along the frame guideways hereinbefore referred to, and an upper vertically adjustable part or member 15 adapted to support a flat form 16 which may be secured thereon in the usual or any desired manner, said part or member 15 being adapted by its raising and lowering movement, to throw the form on and off impression in the manner above referred to. As shown, said adjustable upper part or member 15 has pendent rounded studs or guides 17, 17 vertically directed beneath its four corners and traversing openings or bearings in said main lower part or member 14 to guide said adjustable part or member 15 in its raising and lowering movements, and upon said studs or guides 17, 17 are mounted spiral cam surfaces 18, 18 connected with said upper part or member 15, and adapted to co-act with corresponding reciprocal cam surfaces 19, 19 upon rotatable members 20, 20 mounted to turn upon the lower ends of the studs or guides 17, 17 and having peripheral gear surfaces in mesh with an actuating gear 21 in the form of a toothed sector pivoted at 22 upon the main lower bed member or part 14, whereby it will be understood that when the sectors 21, of which there will be one provided adjacent to each side of the bed, are rocked in one direction, the members 20, 20 will be turned in such a manner upon the studs or guides 17, 17 as to operate by the co-action of their cam surfaces 19, 19 with the cam surfaces 18, 18 of the adjustable part or member 15 of the bed, to raise the latter, and when said sectors 21 are reversely turned upon their pivotal mountings at 22, the reverse co-action of said cam surfaces 19 and 18 will operate to lower

said adjustable part or member 15 after the termination of impression.

For the actuation of the toothed sectors 21, 21 in the embodiment of the invention herein shown, any preferred means may be provided such, for example, as a slide member coupled with said segment and slideable in suitable guides in the frame, coacting with appropriate cams driven by suitable means and engageable with the slide member to move the same endwise in one direction or the other at such times in the stroke of the bed as may be desirable to throw the form on or off impression, or, if desired, the means shown in Figures 5, 6 and 7 may be employed for this purpose, wherein the sector is provided at opposite sides of its pivotal support 22 with projections 23 and 24 engageable, respectively, during the travel of the bed with pivotal or rotary fingers 25 and 26, so that upon movement of the bed during the impression stroke, one of said projections, as 23, comes into contact with the corresponding finger, as 25, somewhat in advance of the commencement of impression and thereby gives rise to a somewhat gradual lifting of the form arising from the reciprocatory movement of the bed, and which is terminated at the commencement of impression by a sudden and rapid though slight upward movement of the form, arising from the conjoint reciprocating movement of the bed and the reversely directed rotation of the finger 25, which is actuated at this time to produce this result, after which the projection 23 passes out of contact with the finger 25 and so remains during the period of impression, at the termination of which the oppositely positioned projection 24 of the sector contacts with the corresponding finger 26 and gives rise to a reverse pivotal movement of the sector tending to lower the form again to the position shown in Figure 1.

For imparting the requisite lowering and lifting movements to the platen at the commencement and termination of impression, I have herein shown the trunnions or journals, 3^a, 3^a wherein said platen is eccentrically supported, capable of a certain extent of rocking or rotatory movement in bearings at opposite sides of the frame of the machine, and provided with arms 27 with which are coupled rods 28, whose opposite ends are connected with levers 29, fulcrumed at 29^a and provided with rollers engaged with cams 31, whose rotation during the operation of the improved printing machine, serves just prior to the commencement of impression, to permit rocking of said levers 29 in such a way as to allow the eccentric trunnions 3^a of the platen to be lowered by gravity in such a direction in the bearings in the frame as will serve to lower the platen surface to the position shown in Figure 2 at the commencement of impression. A further rocking, in

the same direction of levers 29, serves to oscillate the trunnion 3^a in such manner as to lower the platen to the position shown in Figure 3. A further rotation of cam 31 causes the peak of the cam to engage with roller 30 mounted on lever 29, thereby rocking said lever in an outward or reverse direction, the result of which movement is to oscillate trunnion 3^a in such manner that the platen assumes the position shown in Figure 4. It will thus be apparent that a line contact between the platen and the form is maintained from the beginning of the impression to the completion thereof. At the termination of impression, the cams engage said levers so, as shown at Figure 4, as to rock said eccentric supports of the platen in the same direction and to such extent that the platen is lifted clear of the web. When such means is provided, the eccentric supports for the platen, and cam mechanism for operating the same, will ordinarily be duplicated at opposite sides of the machine.

In the embodiment of the invention herein shown, the course of the web through the machine is such that a straight run thereof is produced horizontally between the bed and the platen from one of the tension rollers 11 to the other, whereby it will be seen that upon the lifting of the platen 2 and lowering of the form, these parts are removed absolutely from contact with the web in order that there shall be no interference with the movement of the web, tending to tear or smut the same or to produce any drag on the web, or requiring the employment of equalizing or compensating means, but it will, of course, be apparent that when desired the web may travel over the impression surface of the platen at all times, in which case, guide rolls may be provided at the ends of the impression surface, as indicated at 4^a to facilitate upward deflection of the web. In such event it will be apparent, particularly if the platen is mounted for rocking movement, that some compensating or equalizing means must be provided for accommodating the travel of the web to the rocking movement of the platen. In the construction shown herein it may also be of advantage to provide means for raising the rolls 11 and 12 at the right hand side of Fig. 1, in such a manner as to lift the web gradually from the form during the progress of the impression, and the rollers 10 and 11 at the left hand side of the platen may also be moved to rise and lower the web with the platen into and out of impression, so as to avoid the slapping of the web against the form upon the bed.

In the structure shown herein, advantage is taken of the separation of the form and platen from each other, when the members of the printing couple are off impression for facilitating the passage of an inking roller or rollers 32 over the form for inking the

same preparatory to the next impression, the rollers 32 being herein shown as mounted upon a carriage 33 connected to endless chains 34, 34 at the opposite sides of the machine, and which travel over sprocket wheels 35, 35 so disposed that said chains traverse a path entirely surrounding the bed. When inking apparatus of this kind is provided, it will be apparent that the chains 34 must be disposed between the side frames of the machine, and provision must be made for the travel of the upper runs of said chains at opposite sides of the form 40 that the chains will offer no obstruction to the movement of the members of the printing couple toward each other for effecting the impression. In the construction shown herein, one of the sprockets 35 for each of said endless chains 34 is mounted concentrically with an ink drum 36, either upon the shaft of said drum or otherwise, the parts being so proportioned and arranged that as the chains are moved, the ink rollers 32 are caused to roll over the surface of said drum to take a supply of ink therefrom. 37 represents a plurality of distributor rolls for breaking up and distributing the ink supplied to said drum by a doctor from a suitable fountain.

In the operation of the improved printing machine constructed according to my invention, since the impression is effected by the platen, not by its mere reciprocatory movement in a direction reverse to that of the form as is customary in some flat bed web printing machines heretofore designed, but is dependent in very large degree upon the movement of one member of the printing couple toward the other, either directly, if a flat impression surface be provided, or by rocking of the platen upon the bearings which are capable of being shifted eccentrically or otherwise with respect to its axis of rotation, if a curved impression surface be provided, it will be apparent that the impression may be effected within a comparatively short period of time, and during a comparatively small part in practice less than one-half of the total reciprocatory travel of the members of the printing couple, whereby it will be understood that it is rendered possible to shorten very greatly the extent of travel of said members and consequently to reduce very considerably the size, weight and cost of the machine beyond what would be necessary in the case of such flat bed web printing machines as have heretofore been designed or used, whilst at the same time, it is permitted to operate the machine at greatly increased speeds on account of the reduced weight and extent of movement of the bed and platen and of the fact that where the impression is effected at midstroke, as in the embodiment of the invention herein set forth, where the bed is moving at its greatest and substantially constant speed, there is less likelihood of in-

terference with the feeding of the web through the machine with its maximum velocity, and where such impression is completed within a comparatively small part of the reciprocatory travel of the form there is comparatively no requirement for equalization of the travel of the web with that of the bed, such as imposes upon the web in some other types of flat bed web machines, stress sufficient to tear such web, unless the machine be run at comparatively low speed.

The short duration of impression as compared with the nonimpression periods in the operation of the machine is graphically shown in Figures 2 and 4 of the drawings. Figure 2 shows the platen at a time when it is commencing impression and Figure 4 shows it at the time when it is leaving impression and in these two figures the axis of the wrist pin of the pitman 6 is situated in the radial line 80 and at the finish of impression, such axis is situated in a radial line 80^a. The accurate distance between the lines 80 and 80^a traveled by the wrist pin is a measure of the period of impression and the angle included between these lines is designated in the drawings by the expression "on impression." Through the remainder of the rotation of the wrist pin, the platen is "off impression" and is so designated on the drawings. From this showing, it is obvious that the impression occupies a relatively small part of the total movement of the parts and while I have hereinbefore stated that the impression occupies less than one-half the total movement, such impression is, in practice, very considerably less duration as will be apparent from Figures 2 and 4, and it is apparent that if the curvature of the platen is changed the time of taking the impression will be correspondingly changed. If the curve is of a larger radius the period of impression will be shortened and if the curve of the platen is of a smaller radius than shown the period of impression will be longer.

It follows that the impression may be taken in any predetermined part of $\frac{1}{2}$ of the total movement of the platen. The curve of the impression surface is struck from a point far above the point at which it is pivoted and by pivoting the platen at a point between its curved face and that from which it is struck permits of taking the impression in a comparatively short part of its movement without having a machine of great height, making a simple compact machine. By finding the point from which the platen is struck it will readily be seen that a platen with the curved surface as shown would be out of all proportion and of great height if it were pivoted at the point from which the impression surface is struck. By pivoting the platen eccentrically it is possible to still retain the large curve and have a small compact machine, capable of operation to take the impres-

sion in a small part of the movement of one member of the couple.

While it is within the scope of my invention to move but one of the members of the printing couple towards and from the other for effecting the impression, it may be of advantage as hereinbefore set forth to so actuate both the members of the printing couple, since in this manner by comparatively small movement of each member of the printing couple in this fashion, sufficient space is afforded between the members for the passage of the ink roller or rollers for inking the form, and the necessity for lengthening the travel of the form supporting bed sufficiently to effect the inking of the form is entirely avoided.

From the above description of my improvements, it will be apparent that the printing machine constructed according to my invention is of a comparatively simple and exceedingly compact construction, and is particularly well adapted for use by reason not only of its light weight, small amount of floor space required for its installation, and the economies arising from its lessened cost, and it will also be obvious from the above description that the printing machine is capable of considerable modification without material departure from the principles and spirit of the invention, and for this reason I do not desire to be understood as limiting myself to the precise form and arrangement of the several parts herein set forth in carrying out my invention in practice.

For example in some instances, but one member of the printing couple need be reciprocated as in case a stationary bed be provided and equalizing means employed for stopping the web during the short time required for rocking or oscillating the platen for the completion of the impression.

While I have shown my invention with but a single printing couple, and one web, it will be understood that other printing couples may be added in any way desired, either above, at the side, or end to end, where it is desired to perfect one or more webs. The form bed may also carry one or more forms abreast, or end to end, or both, without departure from the broad spirit of the invention.

I have not deemed it necessary to show the mechanical movements for the operation of the different parts shown and described, as there are many ways the operations may be accomplished, and any mechanic skilled in the art can readily supply them.

It will be apparent that the platen 2 need not necessarily have the same center of curvature, but may be made up of curved surfaces struck from different centers.

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

1. In a web printing machine, a bed, means for reciprocating said bed endwise, means for continuously feeding a web over said bed, in combination with a pivoted platen having a curved impression surface, said platen being pivoted below the center of curvature of said impression surface, and means functioning to separate the bed and platen at intervals to permit the free movement of the web.

2. In a web printing machine, a printing couple embodying a bed adapted to support a flat form, a pivoted platen, having a curved impression surface, adapted to cooperate with the bed, the axis of the platen being below the center of curvature of said impression surface, means operable to move the couple in synchronism, whereby the impression is completed in a relatively small part of a combined total movement of the couple, in combination with means for automatically feeding a web between the printing couple synchronously with the movement of the couple during the period of impression, and means functioning to separate the bed and platen at intervals to permit the free movement of the web.

3. In a web printing machine, a reciprocating bed operable in a horizontal path, adapted to support a flat form, a platen having a curved impression surface coacting therewith, automatic means operable to feed a web between the bed and impression member during the period of impression and at a speed conforming to that of the bed, and means functioning to separate the bed and platen at intervals to permit the free movement of the web.

4. In a web printing machine, a printing couple, one member of which is adapted to support a flat form, and the other member of which has a curved impression surface, separate means operable to move each member of the couple in the same direction during impression, automatic means operable to feed a web between the members of the couple in the same direction as the movement of the couple and at a speed conforming to that of the couple during the period of impression, and means functioning to separate the elements of the printing couple at intervals to permit the free movement of the web.

5. In a web printing machine, a printing couple embodying a reciprocating bed, and a platen having a curved impression surface cooperating with the form, means for operating said platen, means operable to feed a web between the members of the couple, means, separate from the platen operating means, for moving the bed, during the period of impression, at a speed conforming to that of the web, and means functioning to separate the elements of the printing couple at intervals to permit the free movement of the web.

6. In a web printing machine, a reciprocating bed adapted to support a flat form, a mov-

able platen having a curved impression member coacting therewith, means for moving the bed at a predetermined speed during impression and at different speeds therefrom prior to and after impression, and means operable to automatically feed a web between the bed and impression member during the period of impression at a speed conforming to that of the bed at that time.

7. In a web printing machine, a couple embodying a bed and a platen having a curved impression member cooperating with said bed, means for moving one element of said couple, said means being operable, when so moved, to complete the impression in less than one-half of its total movement, in combination with means for continuously and automatically feeding a web between the couple.

8. In a web printing machine, a reciprocating bed, means for raising and lowering said bed, a reciprocatory platen having a curved impression surface cooperating with said bed and means for feeding a web between the bed and platen.

9. In a web printing machine, a reciprocating bed, means for raising and lowering said bed, a reciprocatory platen having a curved impression surface cooperating with said bed, said platen being pivotally mounted for movement on an axis eccentric to the axis of curvature of its impression surface, and means for feeding a web between the bed and platen.

10. In a web printing machine, a reciprocating bed, an oscillating, reciprocatory platen having a curved impression surface, the axis of oscillation of said platen being materially below that of the axis of curvature of its impression surface, in combination with means for continuously feeding a web between the platen and the bed.

11. A printing machine having a printing couple including a form support and a platen, the latter of which is provided with a curved impression surface, and means for actuating the platen to cause the same to traverse the form during impression, said means being operable to move the platen bodily and to simultaneously roll the curved surface of the same upon the form with a velocity greater than that of the bodily movement of the platen, the form support being also capable of movement to compensate for the movement of the platen during impression.

12. In a printing press of the described class, an oscillating platen having a curved working-face, a movable bed provided with means for holding a flat printing-form, means for moving said bed toward and from the platen, means for actuating the platen to roll the working-piece thereof upon the printing-form while the same is moving in proximity thereto, means for moving the bed to maintain register of the printing-form and platen while the latter rolls upon said form, and

means movable between the bed and platen for inking the form.

13. In a web printing machine, a bed adapted to support a flat form, means for reciprocating said bed, and means for continuously feeding a web over said bed, in combination with a platen having a curved impression surface and means functioning to separate the bed and platen at intervals to permit the free movement of the web.

14. A web printing machine provided with a printing couple one member of which is a pivoted platen having a curved impression surface and the other a reciprocating form bed, means for continuously feeding a web between the printing couple and means for moving one member of the couple on and off impression.

15. A web printing mechanism provided with a printing couple including a pivoted platen having a curved impression surface, a reciprocating form bed, means for feeding a web between the platen and the form bed, means for moving one member of the couple on and off impression and means for moving the impression surface of the platen in the same direction as that of the form bed during impression.

16. A printing mechanism embodying a pivoted platen having a curved impression surface, a bed adapted to support a flat form, means functioning to move the impression surface across the bed and when the said surface is so moved to complete the impression in less than one half its movement.

17. In a web printing machine, a reciprocating bed adapted to support a flat form, a platen having a curved impression surface coacting therewith, means operable to feed a web between the bed and impression member during the period of impression in synchronism with the movement of the bed during impression.

18. In a web printing mechanism, a printing couple, one member of which is a flat form bed, and the other member having a curved impression surface, means operable to move each member of the said couple in the same direction during impression, means operable to feed a web between the members of the couple and at a speed conforming to that of the couple during the period of impression, and means functioning to move one member of the couple on and off impression.

19. In a web printing machine, a reciprocating bed, means for reciprocating said bed, a reciprocatory platen, having a curved impression surface, cooperating with said bed, and means for guiding a web between the bed and platen.

20. In a web printing machine, a reciprocating bed, means for reciprocating said bed, a reciprocatory platen having a curved impression surface cooperating with said bed, said platen being pivotally mounted for

movement on an axis eccentric to the curvature of its impression surface and means to guide a web between the bed and platen.

21. In a printing machine, a reciprocating form bed, means for reciprocating said bed, a reciprocatory platen having a curved impression surface cooperating with said form bed, said platen being pivotally mounted for movement on an axis eccentric to the curvature of its impression surface.

22. In a printing machine, a reciprocating bed, means operable to reciprocate said bed in a straight path, an oscillating platen having a curved impression surface, the axis of oscillation of said platen being eccentric to the curvature of its impression surface, and means operable to move the platen on and off impression.

23. In a printing machine, a reciprocating form bed, an oscillating platen having a curved impression surface, the axis of oscillation of said platen being between the axis of curvature of its impression surface thereof and its impression surface.

24. In a printing machine, a couple embodying a form bed and a platen having a curved impression surface cooperating with said form bed, means for moving the curved surface of said platen, said curved surface when so moved being operable to complete coaction with the bed in one half or less of its total movement.

25. In a printing machine, a couple embodying a reciprocating form bed and a pivoted platen having a curved impression surface adapted to cooperate with said bed, means operable to move the platen, and, when so moved, the curved surface of the same is operable to complete the cooperation with the form bed in one half or less of the total movement of said platen.

26. In a printing machine, a couple embodying a reciprocating form bed and a pivoted platen having a curved impression surface adapted for cooperation with said form bed, means operable to move said platen and when the platen is so moved the curved surface thereof is operable to complete the cooperation with the form bed in one half or less of the total movement of said platen, and means for feeding a web between the couple.

27. In a printing machine, a printing couple including a bed adapted to support a flat form and a platen having a curved impression surface coacting with said bed, means for oscillating said platen and when the platen is so oscillated it operates to complete said coaction in one half or less of the oscillatory movement of the platen and means for feeding a web between the couple continuously.

28. A web printing machine having a printing couple including a reciprocating form bed and a curved impression platen,

means to feed a web between the couple, means for reciprocating the bed in the direction of the travel of the web during impression and to an extent to produce spaced impressions upon the web.

29. In a web printing machine, a reciprocating bed, a reciprocatory platen having a curved impression surface cooperating with said bed, means operable to raise and lower said platen and means for feeding a web between the bed and platen.

30. In a printing couple, a reciprocating bed, a movable platen having a curved impression surface of comparatively great radius operable to take the impression in one half or less of such movement.

31. In a web printing machine embodying a reciprocating form bed and a platen having a curved impression surface, said surface being adapted for rolling coaction with said form, means operable to effect such rolling coaction with the form in one path and to return the platen in a different path, and means for guiding a web between the bed and platen.

32. A web printing couple embodying a reciprocating bed adapted to support a form and a platen having a curved impression surface, said surface being operable for rolling contact with said form, means operable to effect such rolling contact, a continuously driven inking roller, and means operable to separate one member of said couple from the other to allow the passage of the form inking roller.

33. In a printing machine, a couple including a reciprocative bed adapted to support a flat form and a rocking platen having a curved impression surface, means for reciprocating said bed and means operable for rocking said platen, said platen being operable to complete the impression in one half or less of the combined reciprocating movement and rocking movement of said bed and platen.

34. In a printing press, a movable form bed, an impression member having a curved working face, said member being pivotally mounted adjacent such face, and means for moving said member on an additional axis eccentric to its curved face.

35. A printing machine having a printing couple including a form support and a platen having a curved impression surface, and means for actuating the platen to cause the same to traverse the form during impression, said means being operable to move the platen bodily, and simultaneously to roll the curved surface of the same upon the form with a velocity greater than that of its bodily movement, the form support being also capable of movement to compensate for the movement of the platen during impression.

36. In a printing press, a movable form bed, an impression member having a curved impression face, said member being pivotally

mounted adjacent such face, and means for moving the said member on an additional axis eccentric to its curved face.

37. In a printing press, a movable bed adapted to support a form, a platen having a curved face and mounted to oscillate about an axis eccentric to the axis of curvature of said face and lying within the angle between radii extending from said axis of curvature to the longitudinal edges of the curved face.

38. In a printing press, a movable bed adapted to support a form, a platen having a curved impression face, and means for oscillating said platen about an axis located between said curved face and the axis of curvature thereof.

39. In a printing press, a platen having a curved impression surface, means for oscillating the platen on an axis located between said curved surface and the axis of curvature thereof, a bed adapted to support a flat form, means for moving the bed back and forth tangentially to said curved surface, and, when so moved,, operable to complete impression in less than one half of one of said tangent movements.

40. In a printing press of the described class, a bed provided with means for holding a flat printing-form, a platen having a curved working face and mounted to oscillate about an axis adjacent to said working face and distant from the axis of curvature of said face, means for actuating the bed principally in a direction perpendicular to the face of the printing form to thereby approach and recede from the axis of oscillation of the platen, means for oscillating the platen about said axis to roll the curved working face upon the face of the printing-form during proximity of the latter thereto, and means for maintaining register of said faces of the platen and printing form during contact thereof.

41. In a printing machine, a movable bed adapted to support a flat form, a platen having a curved impression surface, said platen being eccentrically mounted for rocking movement, means for rocking said platen back and forth to roll the impression surface over the form, said impression surface being shaped to effect impression in less than one-half of one of said rocking movements.

42. In a printing press, a platen having a curved impression face, means for oscillating the platen on an axis located between said curved face and the axis of curvature thereof, a bed adapted to support a flat form, means for moving the bed toward and away from the axis of oscillation of the platen, to bring the form into and out of contact with said curved surface, and back and forth tangentially to the curved face of said platen, said surface being shaped to complete impression in less than one-half of one of said tangent movements.

43. In a printing press, a platen having a curved impression surface, means for rocking or oscillating said platen on an axis located between said curved face and the axis of curvature thereof, a bed adapted to support a flat form, means for moving the bed toward and away from the axis of oscillation of the platen and back and forth tangentially to the face of said platen, said curved impression surface being shaped to complete impression in less than one-half of one of said tangent movements, and means for guiding a web between the bed and platen.

44. In a printing machine, a reciprocating bed adapted to support a flat form, means to reciprocate said bed, a rocking platen having a curved impression surface, and means to rock the platen to roll the impression surface over the form, said platen rocking means being constructed to operate the platen to complete impression in less than one-half of one of the rocking movements of the platen.

45. In a printing machine, a reciprocating bed adapted to support a flat form, means to reciprocate the bed, a rocking platen having a curved impression surface adapted for rolling engagement with the form, means to rock the platen back and forth to roll the curved impression surface over the form, said platen rocking means being constructed to operate the platen to complete impression in less than one-half of one of said rocking movements, and means for guiding a web between the bed and platen.

46. In a printing machine, a rocking platen having a curved impression surface, and a reciprocating bed adapted to support a flat form, said platen being mounted for forward and back rocking movement to engage said curved surface with the form, means to rock said platen with its curved surface in rolling engagement with the form, said platen rocking means being constructed to operate the platen to complete impression within less than one-half of one of said rocking movements, and means to reciprocate the bed.

47. In a printing press, a rocking or oscillating platen having a curved impression surface, a movable bed adapted to support a flat form, means for rocking or oscillating the platen to roll said impression surface over the form, means for moving said bed toward and from the axis of oscillation of the platen, and means to move the bed back and forth tangentially to said impression surface to engage the form with said curved surface, said platen rocking means being constructed to operate the platen to complete impression in less than one-half of one of said tangent movements.

48. In a printing press, a rocking or oscillating platen having a curved impression surface, a movable bed adapted to support a flat form, means operable to rock or oscillate the platen to roll said surface in contact with the

- form, means to operate said bed to move it toward and away from the axis of the platen, means to move the bed back and forth tangentially to the impression surface, said platen rocking means being constructed to operate the platen to complete impression in less than one-half of one of said tangent movements, and means for guiding a web between the bed and platen.
49. In a printing press, a printing couple, one member of which is a rocking platen having a curved impression surface, and the other member a movable bed adapted to support a flat form, means for moving said bed, means to move one member of said couple toward and away from the other member to bring said members into and out of printing engagement, and means for rocking the platen to roll the curved surface upon the form, said platen rocking means being constructed to operate the platen to complete impression in less than one-half of one of said rocking movements.
50. In a printing press, a rocking or oscillating platen having a curved impression surface, a movable bed adapted to support a flat form, means to rock or oscillate the platen to roll said surface over the form, and means to move the bed back and forth tangentially to said impression surface, said platen rocking means being constructed to operate the platen to complete impression in less than one-half of one of said rocking movements.
- In witness whereof I have hereunto signed my name this 8th day of February, 1918.
- JOHN D. CAPLINGER.