No. 896,186. PATENTED AUG. 18, 1908.

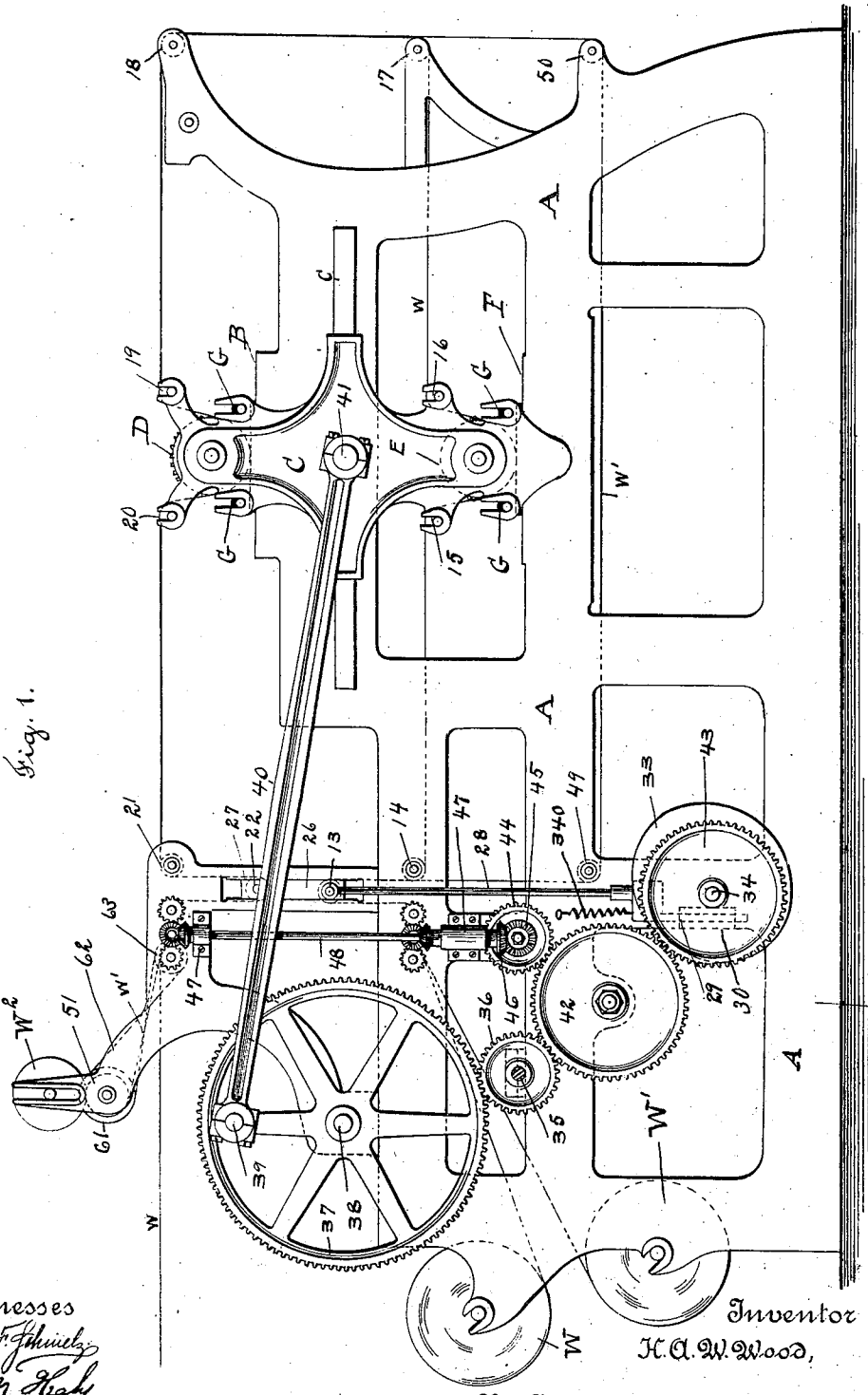
H. A. W. WOOD.

PRINTING MACHINE.

APPLICATION FILED JAN. 13, 1894. RENEWED DEC. 26, 1907.

3 SHEETS—SHEET 1.

Fig. 1.



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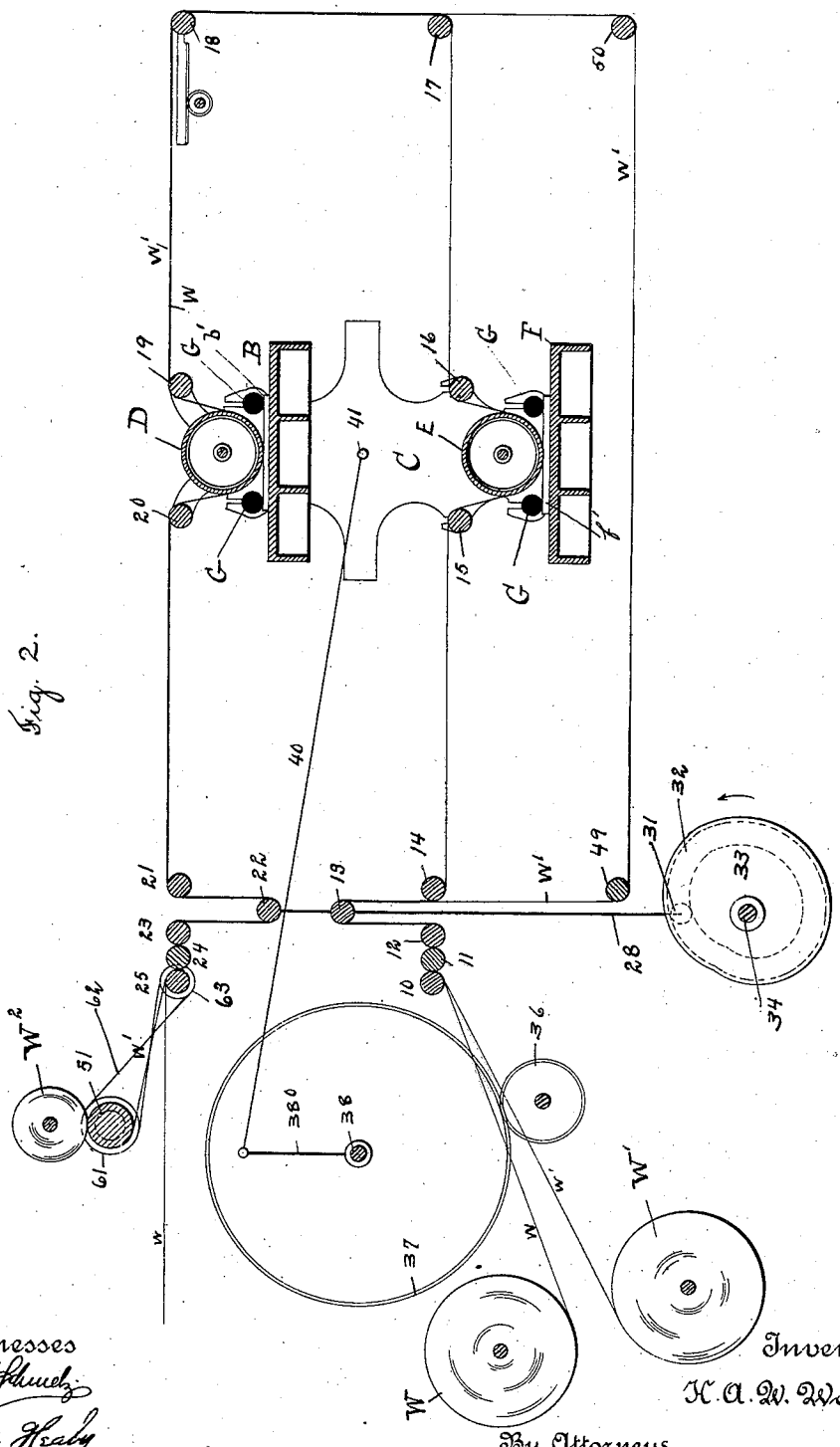
3 SHEETS—SHEET 2.

Fig. 2.



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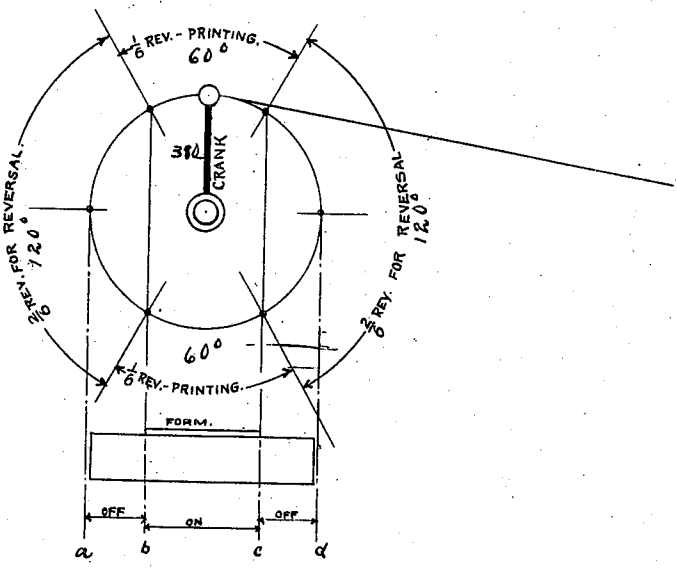
3 SHEETS—SHEET 3.

Fig. 3.



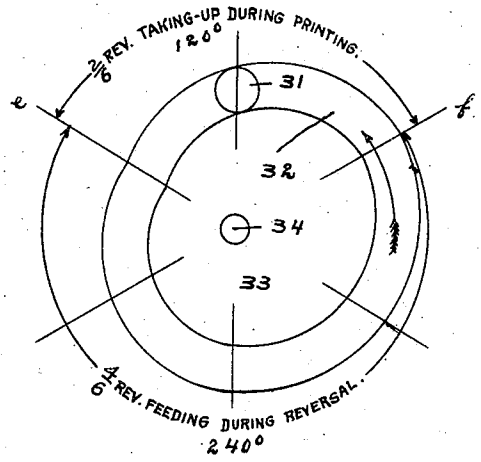


Fig. 4.

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UNITED STATES PATENT OFFICE.

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

PRINTING-MACHINE.

No. 896,186. Specification of Letters Patent. Patented Aug. 18, 1908.

Application filed January 13, 1894, Serial No. 496,819. Renewed December 26, 1907. Serial No. 408,149.

To all whom it may concern:

Be it known that I, HENRY A. WISE WOOD, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented a new and useful Improvement in Printing-Machines, of which the following is a specification.

The aim of this invention is to improve the arrangement of parts and devices in traveling cylinder web printing presses, or traveling cylinder web perfecting printing presses, and to this end, the invention consists of the devices and arrangements described and claimed in this specification, and particularly pointed out in the claims.

An apparatus embodying my invention is shown in the accompanying three sheets of drawings, in which,

Figure 1 is a side elevation of a printing press arranged to work after my invention, Fig. 2 is a sectional elevation of the operating parts of the press, Fig. 3 is a diagram illustrating the movement of the cylinder or cylinders, and Fig. 4 is a diagram illustrating the arrangement of the cam or cams that controls or control the feed of the web.

My invention relates to traveling cylinder web printing presses, or to traveling cylinder web perfecting presses, such as is shown and described in Letters-Patent granted to John H. Stonemetz, January 3, 1888, No. 376,053, or in Letters-Patent granted to Joseph L. Cox, July 5, 1892, No. 478,503. The operation of this form of press is well understood, and in brief, is as follows:—The printing couple consists of a bed upon which the form of type is placed, and of a traveling impression cylinder around which the web is led together with web manipulating devices, which hold the web stationary while the impression is being made, or while the impression cylinder is in contact through the web with the form, and which feeds or shifts the web forward for a new impression while the cylinder is thrown out of impression or is off of the form in either direction. The movement of the impression cylinder, while the same is printing, may be called the printing movement, and the movement while the impression cylinder is not printing, and while the web is being fed may be called the reversing movement. In all presses of this class, heretofore designed and built, the reversing movement of the cylinder compared with the printing movement of the cylinder, so far as time is concerned is equal or is less.

In the Cox patent, before referred to, the time of the printing movement of the cylinder and the time of the reversing movement of the cylinder, is the same, or, if the cylinder is driven forward and backward by a crank movement, the cylinder is in impression and out of impression for a quarter revolution of the crank.

I have found by practical experiments that the feed of the web is the action that is determinative of the speed at which the press can be run, and that if a longer time is given to the feeding of the web while the reversing of the cylinder is taking place, as compared with the printing movement of the cylinder, that the parts can be run at a much higher rate of speed than in the old arrangements.

Therefore, my invention consists of a traveling cylinder web printing press or web perfecting press in which the impression cylinder is reversing off the forms at either end thereof a longer time than the same is in contact with the forms, and printing. I have further found that an efficient arrangement is, if a crank is used to actuate the cylinder, to arrange the mechanisms so that the cylinder is in impression for one-sixth of a revolution of the crank, and out of impression, the web being fed, meanwhile during two-sixths of a revolution. With this arrangement, the web can be fed easier, as revolution for revolution, compared with the old devices, there is much more time to start, shift, and stop the web, and by this arrangement, I have found that I can greatly increase the speed at which the press can be run, as the printing can be done practically at any speed.

My invention further consists, in combination with a perfecting printing press of the character before referred to, of an off-set web which is manipulated and fed by the same devices which manipulate and feed the web to be printed, and with guides, so arranged that the off-set web can be led through the machine so as to clear the first impression cylinder, and so as to prevent contact of the web-to-be-printed with the second impression cylinder.

An apparatus embodying these improvements, is illustrated in the drawings.

Referring to the drawings and in detail, A represents the usual side frames of a press.

B and F represent two stationary form beds which may be arranged in any convenient relative location.

C represents two reciprocating carriers or carriages, which are mounted on guides or ways *c* on the main frames, and mounted in these reciprocating carriers in the usual way are the impression cylinders D and E.

Arranged in the reciprocating carriers at each side of each impression cylinder, are form rollers G—G, to which ink may be supplied in any of the usual ways, not necessary here to describe or show in detail, and these form rollers are so arranged that they will ink the forms on both the forward and backward movements of the impression cylinder, whereby an impression can be made on both the forward and backward movement of the impression cylinders.

Forms b^1 and f^1 may be placed upon the stationary beds. The web to be printed may be fed to the machine from a web-roll W, and the path of the web to be printed, through the press, is as follows:—From the roll, the web is led between the continuously running feeding-in rollers 10—11, and 12, then around the looping feeding-in roller 13, then around the stationary roll or guide 14. From this last guide, the web is carried to the guide 15 mounted in the carriers C, under the first impression cylinder E, then around the guide or roll 16 also mounted in the carriers C to the stationary guide or roll 17. From the roll 17, the web is led around a roll 18, which may be made adjustable in any of the usual ways, for the purpose of obtaining register between the two printing mechanisms. From this registering roll 18, the web passes to the guide or roll 19 carried by the carriers C, under the second impression cylinder D, around the carrier or guide 20 also carried by the carriers C, to the stationary roll or guide 21, then around the looping feeding-out roller 22, out between the continuously running delivery rollers 23, 24, and 25.

The looping rollers 13 and 22 are mounted in carriers 26, which are mounted in suitable guide-ways 27, formed in the main frames A, so that the looping rollers will be capable of vertical movement. Connected to the carriers or blocks 26 are arms 28, which have extensions 29, which are fitted into ways 30, and these extensions 29 carry rollers 31, which engage the grooves 32 of track cams 33 mounted on shaft 34. Springs 340 may be arranged between the extensions 29 and a stationary part, if desired, to counter-balance the weight of the looping rollers and their appurtenances.

35 represents a shaft, which is journaled in bearings secured to the main frames, and this shaft may be the driving shaft of the machine, if desired, and power may be supplied to the same, in any of the usual ways. Mounted on this shaft 35 are pinions 36—36, which mesh with and drive crank-wheels 37—37 mounted on a shaft 38, which is journaled in the side-frames A—A. These crank wheels 37 carry crank-pins 39, which connect by pitmen 40 to studs 41 on the carriers C, and by this means, the impression cylinders will be reciprocated forward and backward over the forms. Also meshing with one of the pinions 36 is an intermediate 42, which intermediate 42 meshes with, and drives a gear 43 mounted on the end of the cam-shaft 34. The gear 43 is preferably made of one-half the size of the driving gears 37, and by this means, the cams 33 will turn twice for each forward and backward movement of the impression cylinders. The impression cylinders will be driven practically by a crank or cranks 380, of the radius at which the crank-pins 39 are set. Meshing with the intermediate 42 is a gear 44, which is mounted on a suitable stud, and arranged to turn with the gear 44 is a miter gear 45, which meshes with and engages a miter 46 secured on the end of a vertical shaft 48, which is journaled in suitable brackets 47—47, secured to one of the side frames, as shown. From this vertical shaft, the continuously running feeding-in rolls and the continuously running feeding-out rolls may be driven by any suitable gearing, such, for example, as is shown in Fig. 1.

If it is desired to do nice printing, an off-set web may be used to prevent contact of the first printed side of the web-to-be-printed with the second impression cylinder. This off-set web w^1 may be led in from a roll W^1, and may travel with the web-to-be-printed as far as the roll 14. From the roll 14, the web w^1 may be led under the first bed F, by means of suitable guides or rolls 49 and 50, and may unite with the web-to-be-printed on the roll 17, as shown in Fig. 2.

Instead of introducing the off-set web as above described it is evident that the off-set web may be introduced between the surface of the first impression cylinder and the web to be printed, and may thereafter be transferred to the opposite side of the web-to-be-printed by any suitable arrangement of guide-bars. In some cases, I also contemplate introducing the off-set web at the other end of the machine; that is to say, the off-set web may be led from its supply roll directly to the roller 17. From the roller 17, the web-to-be-printed and the off-set web may travel together until the two webs are delivered from the continuously running delivery rolls, when the off-set web may be wound up into a roll W^2, by any suitable winding device, as for instance, the cylinder 51, upon which the roll W^2 may rest. This cylinder 51 may be driven continuously by any suitable means, as for instance, by means of pul-

leys 61, 63, and belt or cord 62, from any suitable part of the machine, as for instance, the last continuously running feeding-out roller 25. By this means, it will be seen that I can use an off-set web in a press of this character without complicating or increasing the mechanism, and simply by the addition of two guides or rollers, and by the addition of a rewinding device. Of course, so far as the first part of my invention is concerned, the off-set web need not be used therewith.

The relative arrangement between the feeding mechanism and the cylinder driving mechanism is peculiar, and may be comprehended from the diagram shown in the last sheet of the drawings. In Fig. 3 thereof, I have illustrated the crank movement which operates to move the impression cylinders, and as the pitmen which connect the cranks with the carriers, are so long the slight variation due to the use of the same may be neglected, and the cylinder may be considered as being driven directly by a crank as 380. In the arrangement which I have shown, I have given more time to the feeding or reversing movement of the impression cylinders than to the printing movement, and in the especial arrangement, I have made the reversing or feeding movement of the impression cylinders double the printing movement. Thus for one-sixth of a revolution of the cranks, the cylinders will be printing, for two sixths of a revolution, the cylinders will be reversing at one end of the form, for the next sixth of a revolution, the cylinders will be printing on the opposite movement, and for the next two-sixths, the cylinders will be reversing at the opposite end.

It will be seen by the plotting shown in Fig. 3 that the movement of the cylinders off the forms is not very large as compared with the movement of the cylinders while in impression, but it will be seen that the time of the movement of the cylinders while they are out of impression is greater or double the printing movement. This enables me to run the press at a much higher speed than has been before possible, because I can, for instance, double the speed of the press, and still give the web the intermittent feed in the same time as in the presses where the printing movement and feeding movement are the same, and as the speed at which the printing is done, does not affect the same, the increased speed will not affect the product. The cam or cams, to actuate the looping rollers, have necessarily to be proportioned to suit this arrangement, and in Fig. 4, I have shown in diagram, the peculiar form of cams used. Thus, in these cams, the same will be proportioned to move the looping rollers up for two-sixths of their revolution, and to draw the looping rollers down for four-sixths of a revolution of said cams, the downward movement giving the web its intermittent feed between the rollers or guides 14 and 21. Of course, so far as the broad scope of my invention is concerned, that is, of giving more time to the feed than to the printing, other devices can be used without departing from the scope of my invention, as expressed in the claims.

In Fig. 3, the reversing movement of the cylinders at the left, is represented by the distance between *a* and *b;* the printing movement in either direction, by the distance between *b* and *c*, and the reversing movement at the right, by the distance between *c* and *d*.

In Fig. 4, the movement of the cam, which allows the web to remain stationary, is represented by that portion above the lines *e* and *f*, and the feeding portion of the cam is represented below the lines *e* and *f*. The function of the looping rollers in this class of machines is to hold the web stationary during the printing movement, or in other words, to absorb the web which is fed into the machine during the printing movement, and to give the same out during the reversing movement.

In a machine constructed according to my invention, the time of the printing movement is shorter than the time of the reversing movement, and it follows that the loopers are not required to hold the web stationary during so long a period, and hence they may move more slowly, and cover shorter distances.

In a machine, in which the time of the printing movement of the cylinder is equal to the time of the reversing movement of the cylinder, the looping-rollers would have to take up twelve inches of web in order to print a twenty-four inch sheet, whereas in a machine constructed according to my invention, and having the time of the printing movement of the cylinder equal to one-half of the time of the reversing movement of the cylinder, the looping-rollers would only have to take up eight inches of web in order to print the same length of sheet, which results in a considerable saving in power, and in wear of the parts. So far as this part of my invention is concerned, the same may be applied to a traveling cylinder printing press, in which a single cylinder is used, or in which a plurality of impression cylinders are used.

The details and the mechanisms for accomplishing the functions herein described may be greatly varied by a skilled mechanic without departing from the scope of my invention as expressed in the claims.

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

1. The combination in a traveling cylinder web printing machine of a form bed, a traveling impression cylinder coacting with said form bed, a cylinder driving mechanism adapted to move the impression cylinder rel-

atively to the form so that the impression cylinder will be off the form and reversing in either direction a longer time than in impression and printing, and a web-manipulating device arranged to shift the web around the cylinder while the cylinder is out of impression at either end of the form, the shift of the web thus occupying more time than the printing operation.

2. The combination in a traveling cylinder web printing press of two form beds, a traveling impression cylinder coacting with each of said form beds, a cylinder driving mechanism adapted to move the impression cylinders relatively to the forms, so that the impression cylinders will be off the forms and reversing in either direction double the time that they will be in impression and printing, and a web-manipulating device consisting of means for continuously feeding the web into and out of the press, two loopers, and cams for operating said loopers, the cams being proportioned to have one third of their periphery arranged to move the loopers so as to hold the web about the cylinders stationary, and two-thirds of their peripheries arranged to move the loopers to shift the web.

3. The combination in a web printing press of two form beds, a traveling impression cylinder coacting with each of said form beds, a cylinder driving mechanism adapted to move the impression cylinders relatively to the form beds so that the impression cylinders will be off the form beds and reversing double the time that they will be in impression and printing, and a web manipulating device consisting of means for continuously feeding the web into and out of the press, two loopers and cams for operating the loopers, said cams being ascending cams for one-third of their periphery, and descending cams for two-thirds of their periphery.

4. The combination in a traveling cylinder web perfecting printing press with the mechanism for manipulating the web-to-be-printed, of an offset web led in and controlled thereby, with guides so arranged that the offset web will avoid the first printing surface, and will thereafter prevent contact of the first printed side of the web-to-be-printed with the second impression surface, the off-set web being controlled by the web-manipulating device which controls the web-to-be-printed.

5. The combination in a web perfecting traveling cylinder printing press of a web manipulating device consisting of means for continuously feeding the web into and out of the press, and a web-shifting device, of an off-set web, guides for leading the off-set web through the machine so as to avoid the first printing mechanism and to prevent contact of the web-to-be-printed with the second impression surface, the off-set web being led in and controlled by the mechanism which manipulates the web-to-be-printed.

6. The combination in a web-perfecting printing press, of two form supporting surfaces, a traveling impression surface coacting with each of said form supporting surfaces, a web manipulating device adapted to hold the web stationary while the surfaces are in impression, and to feed or shift the web while the surfaces are out of impression, an off-set web led through the press so as to avoid the first printing mechanism and to prevent contact of the web-to-be-printed with the second impression cylinder, the off-set web being controlled and manipulated by the web-manipulating mechanism of the web-to-be-printed.

7. The combination in a web-perfecting printing press, of two form beds, a traveling impression cylinder coacting with each of said form beds, means for continuously feeding the web into and out of the press, and a web shifting mechanism, an off-set web led through the press and controlled by the web manipulating mechanism of the web-to-be-printed, with guides, whereby the off-set web can be led through the press so as to avoid the first printing mechanism, and to prevent contact of the web-to-be-printed with the second impression cylinder.

8. The combination in a web perfecting traveling cylinder printing press of a web manipulating and shifting mechanism for the web to be printed comprising means for continuously feeding the web into and out of the press, and means for shifting the web, an off-set web controlled by the web-manipulating device of the web to be printed, guides for leading the off-set web through the press so as to avoid the first printing mechanism, and a rewinding mechanism for the off-set web.

9. The combination in a web perfecting traveling cylinder printing press, a web manipulating mechanism for the web to be printed consisting of means for continuously feeding the web into and out of the press, and a web shifting device, an off-set web fed continuously into the press by means of the continuously operating feeding in mechanism of the web to be printed, guides whereby the off-set web may be led through the press so as to clear the first printing mechanism, and so as to prevent contact of the first printed side of the web to be printed with the second impression cylinder, the off-set web being delivered from the press by means of the continuously operating delivery device for the main web, and a continuously operating rewinding device for the off-set web.

10. The combination in a web perfecting traveling cylinder printing press, of two form beds, a traveling impression cylinder coacting with each form bed, and suitable web manipulating mechanism, an offset web, and

guides for leading the same through the machine, so that the same will pass under the first bed, and so that the same will protect the first printed side of the web that is being printed from contacting with the surface of the second impression cylinder.

11. The combination in a web perfecting traveling cylinder printing machine, of two form beds, a traveling cylinder coacting with each form bed, a web manipulating mechanism, an offset web, and guides for leading the offset web so that the same will pass through the machine under the first bed, and so that the same will protect the first printed side of the web that is being printed from contacting with the surface of the second impression cylinder, said offset web being also controlled by said web manipulating mechanism.

12. The combination in a traveling cylinder web perfecting printing press, of two form beds arranged one over the other, a traveling cylinder coacting with each form bed, suitable web guides and web manipulating mechanism, an offset web, and guides for directing the same through the machine under the first bed, and over the second impression cylinder, so that the same may be used to prevent contact of the first printed side of the web that is being printed with the surface of the second impression cylinder.

13. The combination in a traveling cylinder web printing press of a printing mechanism, a web guiding mechanism, and a web manipulating mechanism consisting of means for continuously feeding the web into and out of the press, two vertically moving loopers, track cams for operating said loopers, and springs arranged to counter-balance the weight of said loopers.

14. The combination in a traveling cylinder web printing machine, of a printing mechanism, a web guiding mechanism, and a web manipulating mechanism comprising means for continuously feeding the web in and out of the press, two connected vertically moving loopers, track cams for raising and lowering said loopers, connections from the loopers to the cams, and springs arranged to counter-balance the weight of the loopers and their connections.

15. In a printing press, the combination of a type bed, and a cylinder, means for feeding a web between the bed and cylinder, and a tympan interposed between the cylinder and bed, and fed, delivered and shifted uniformly with the web through the printing mechanism by the web feeding, delivering, and shifting devices.

16. The combination of a type bed, a reciprocating cylinder, means for intermittently feeding a web between the cylinder and bed, to be printed thereby; a tympan interposed between the cylinder and web, and laid with the web and fed, delivered, and shifted through the press uniformly with the movement of the web therein by the web feeding, delivering and shifting devices.

17. The combination of a type bed, a reciprocating cylinder, means for directing a web through the press and a tympan laid therewith between the cylinder and bed, and means for intermittently feeding and shifting the web and tympan between the cylinder and bed uniformly together, the tympan and web being fed, guided, shifted and delivered by the same means.

18. The combination of a stationary bed, a reciprocating impression cylinder, means for directing a web between the cylinder and bed, means for continuously feeding and delivering a web to and from the press, and means for intermittently shifting the web between the cylinder and bed in its passage through the press; with a tympan laid with the web and interposed between the cylinder and web, and fed, delivered, and intermittently moved by the web handling mechanisms in exact accordance with the movement of the corresponding portion of the web.

19. The combination of a stationary bed, a reciprocating impression cylinder, means for directing a web between the cylinder and bed, means for continuously feeding and delivering the web to and from the press, and means for looping and intermittently shifting the web between the cylinder and bed in its passage through the press; with a tympan interposed between the cylinder and paper web and laid with the web, that portion of the tympan in the press being continuously fed and delivered, looped and intermittently moved by the web feeding, delivering and shifting mechanisms in accordance with the movement of the like portion of the web.

20. The combination of a stationary bed and a reciprocating impression cylinder, means for intermittently feeding a web of paper and a tympan and guiding the same together to between and from the cylinder and bed, the tympan being laid with the web and guided and fed by the same means as the web simultaneously and exactly in accordance with the movement of the web, means for separating the tympan from the web after their passage through the press and means for rewinding the tympan.

21. The combination of a stationary bed, a reciprocating impression cylinder, means for directing a web between the cylinder and bed, means for continuously feeding and delivering the web to and from the press, and means for looping and intermittently shifting the web between the cylinder and bed in its passage through the press; with a tympan interposed between the cylinder and web and continuously fed and delivered looped and intermittently moved by the web feeding, delivering, looping and shifting mechanism,

in accordance with the movements of the paper web, and means for rewinding the tympan after its passage through the press.

22. The combination of a type bed, an impression cylinder, guides for directing the web between the bed and cylinder, means for feeding the web to the press, and means for delivering the web therefrom, and rollers for looping that portion of the web within the printing mechanism; with a tympan laid with the web and fed, delivered and looped by the web feeding, delivering and looping mechanisms.

23. The combination of a stationary bed, a reciprocating impression cylinder, guides for directing the web between the bed and cylinder, means for continuously feeding the web through the press, means for continuously delivering the web therefrom, and looping rollers for giving that portion of the web within the printing mechanism an intermittent movement; with a tympan laid with and handled by the web feeding, delivering, and looping mechanisms, and means for rewinding the tympan web.

24. In a printing press, the combination of two type beds, two cylinders co-acting therewith, and means for feeding a web of paper successively between the cylinders and beds; with a tympan laid with the web and carried through the press by the web feeding and delivering mechanism, said tympan being looped around the first bed and cylinder.

25. The combination of a pair of beds, a pair of co-acting cylinders, a web feed mechanism, a web delivery mechanism, and mechanism for looping the web, substantially as described; with a tympan fed to the press by the web feeding mechanism, then looped around the first web looper, then separated from the web and carried past the first bed and cylinder, then re-united with the web and carried therewith between the second bed and cylinder, under the second web looper and then again separated from the web and carried back to a rewinding mechanism.

26. The combination of a pair of stationary beds, a pair of co-acting reciprocating cylinders, a continuously acting web feeding mechanism, a continuously acting web delivery mechanism, and a pair of web looping rollers, substantially as described, whereby the web is continuously fed to and delivered from the press and intermittently shifted through the printing mechanism; with a tympan fed to the press by the web feeding mechanism; then looped around the first looper, then separated from the web and carried past the first bed and cylinder, then re-united with the web and carried therewith between the second bed and cylinder to and under the second looper, then to the delivery and then carried back to a rewinding mechanism.

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

H. A. WISE WOOD.

Witnesses:
HENRY W. COZZENS, Jr.,
B. WOOD.