

No. 880,282.

PATENTED FEB. 25, 1908.

P. F. COX.

WEB PRINTING PRESS.

APPLICATION FILED OCT. 9, 1907.

2 SHEETS—SHEET 1.

Fig. 1.

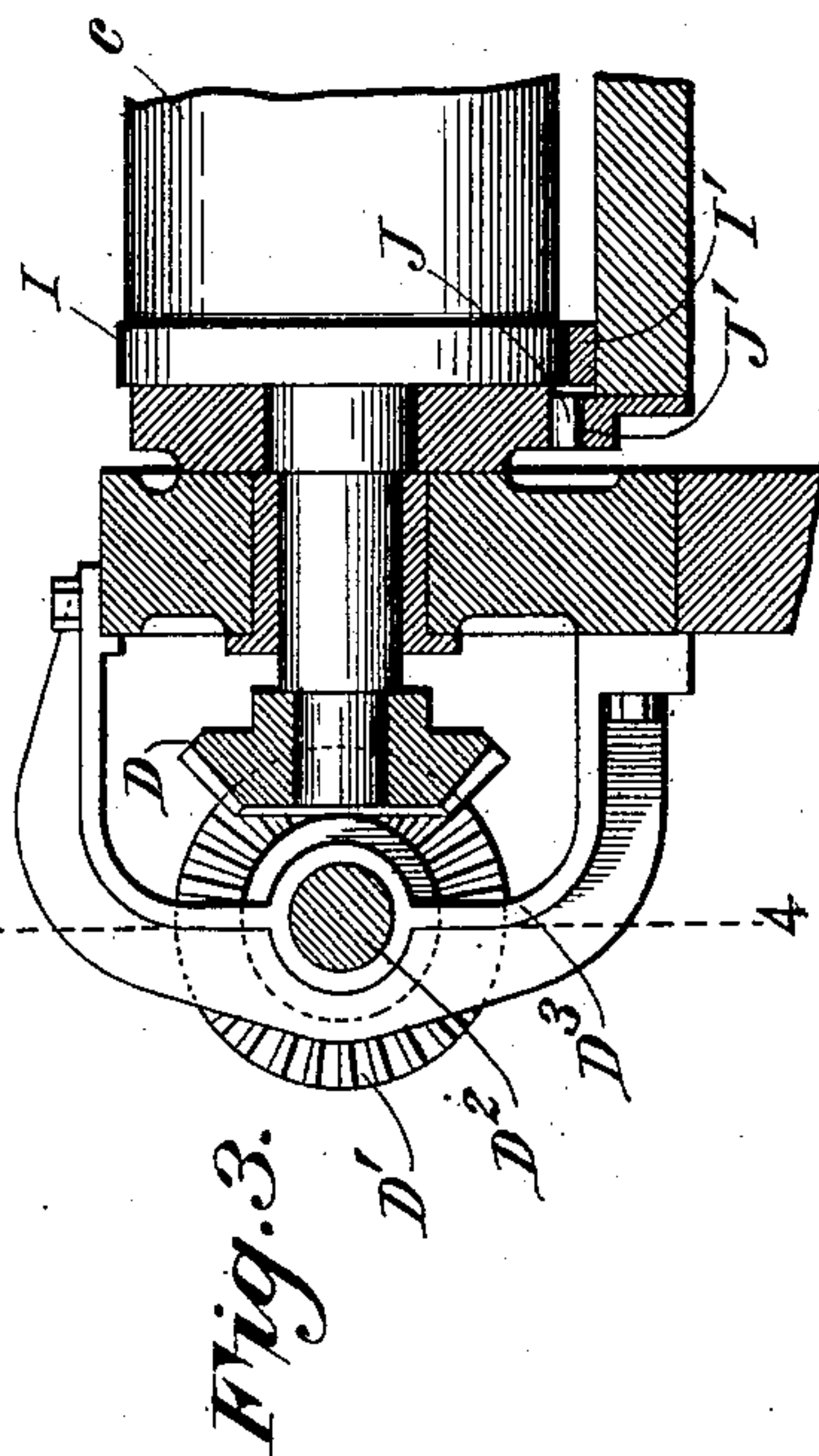
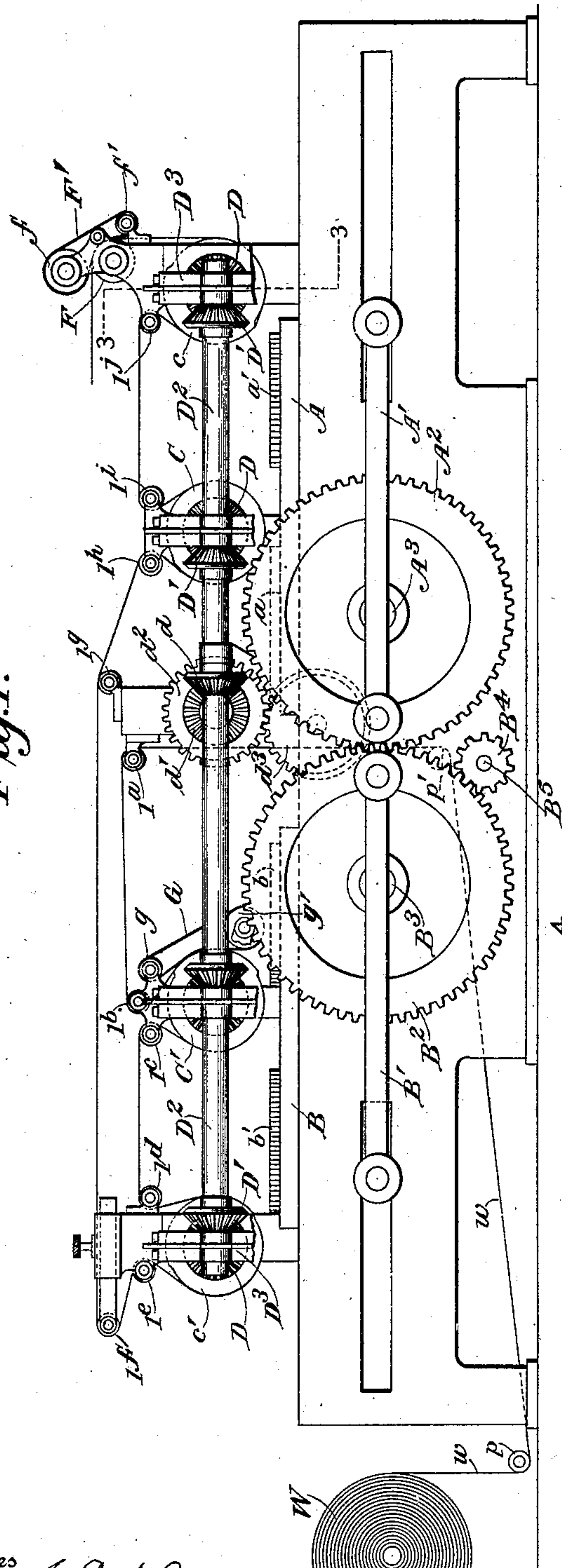
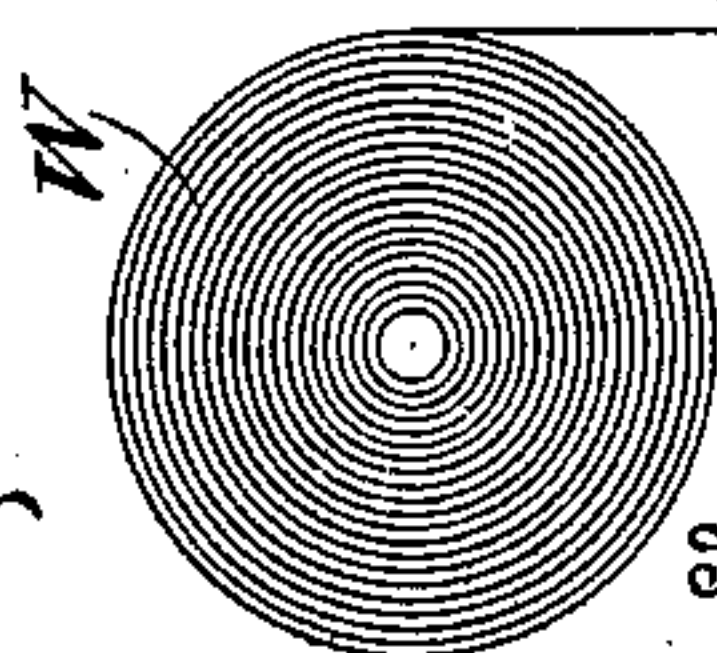


Fig. 3.

Witnesses

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PAUL FLEMMING COX, OF JACKSON, MICHIGAN, ASSIGNOR TO THE JACKSON PRINTING PRESS COMPANY, OF JACKSON, MICHIGAN, A CORPORATION OF MICHIGAN.

WEB-PRINTING PRESS.

No. 880,282.

Specification of Letters Patent.

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Application filed October 9, 1907. Serial No. 396,617.

To all whom it may concern:

Be it known that I, PAUL FLEMMING COX, of Jackson, in the county of Jackson and State of Michigan, have invented certain new and useful Improvements in Web-Printing Presses; and I hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, which form part of this specification.

This invention is an improvement in bed and cylinder web printing presses and has particular reference to the type of press shown in my Patent No. 847,912, dated March 19, 1907, in which reciprocating beds are employed to carry the forms of type beneath the cylinders.

One of the objects of the present invention is to construct a press,—preferably having the general arrangement of beds and cylinders shown in my said patent, so that the cylinders will rotate continuously in the same direction while the beds are on and off impression. The impression is preferably thrown off by slightly reducing that portion of the periphery of each cylinder which is contiguous to the beds during the return stroke thereof, so that during such return stroke the paper will not be impinged between the periphery of the cylinder and the type forms.

A further object of the invention is to provide novel means for rotating the cylinders at a peripheral speed, during printing, exactly uniform with the linear movement of the type forms during impressions and to continue the rotation of the cylinders at such speed after impressions as is desired or necessary to enable the proper amount of web to be fed to the press, during each cycle of operations of the machine.

A further object is to utilize the impression cylinders as a means for feeding the web through the press.

These several objects are accomplished by the machine illustrated in the drawings, which show one embodiment of the invention, and in such a machine the web may be fed continuously by the impression cylinders both during and after impressions so that it does not have to stop but can continuously travel from the roll to the folder, if desired, thus obtaining practically the advantages of a rotary press in the continuous movement of the web, and also avoiding the necessity of

oscillating the cylinders, thus enabling me to increase the speed of reciprocations of the type beds, and also to do away with the necessity of any looping mechanisms or auxiliary devices for changing the speed of travel of the web through the press; and in the press shown I also dispense with the necessity for using any mechanism for raising or lowering the cylinders or the type beds to throw the same on or off impression. I am enabled, as shown in my said patent, to dispense with a number of cams, levers, and eccentrics for operating throw off mechanisms and looping mechanisms, thus simplifying the construction of the machine and lessening its cost.

I will now describe the machine illustrated in the accompanying drawing, which will enable those skilled in the art to construct and use the invention, although I do not wish to be restricted to the arrangement of parts shown in said drawings.

In the drawings—Figure 1 represents a diagrammatic side elevation of a press embodying the invention parts being broken away. Fig. 2 is a longitudinal section therethrough showing the epicycloidal gears in elevation. Fig. 3 is an enlarged detail section on line 3—3, Fig. 1 showing the bed and cylinder racks; Fig. 4 is a section on line 4—4, Fig. 3.

In the press A and B designate opposite type beds, which are reciprocated by means of pitman A', B', connected to crank gears A², B², mounted on shafts A³, B³, journaled on the main frame. The gears A², B², preferably mesh so that the beds will be reciprocated in unison but in opposite directions. The gears may be driven by pinions B⁴, on a driving shaft B⁵ meshing with gears B², as indicated in the drawings.

Each bed A and B is adapted to carry two rows of type forms *a*, *a'* and *b*, *b'*, respectively. Above bed A, are a pair of cylinders C, *c*, respectively adapted to simultaneously co-act with the forms *a*, *a'*, on one stroke of the bed, as described in my aforesaid patent. Above bed B, are located cylinders C' and *c'*, respectively adapted to simultaneously co-act with the forms *b*, *b'*, on bed B, as described in my said patent.

The cylinders are preferably journaled in stationary bearings, and each cylinder has on one of its journals a bevel gear D, which meshes with a bevel pinion D', on a lay shaft

D^2 , which extends beside all the cylinders and has bearings in brackets D^3 , bolted to the cylinder bearings, as indicated in Fig. 4, or to any convenient adjacent portion of the frame. On the shaft D^2 , intermediate the cylinders C and C' , is a bevel pinion d , which meshes with a bevel gear d' attached to a gear d^2 , journaled on a stud attached to the frame. Gear d^2 meshes with a gear d^3 , secured to a shaft E^2 to which is secured an irregular or epicycloidal gear E , which meshes with a like gear E' fastened to the shaft A^3 of the adjacent crank gear A^2 . The gearing is so proportioned that the impression cylinders are caused to make one rotation for and during each reciprocation of the type beds; and gears E , E' , are so formed that the cylinders are caused to rotate peripherally, during impressions, at a speed coincident with the linear movement of the type forms during the taking of impressions. As the type beds, in the example shown, are reciprocated by a crank movement, the peripheral speed of the cylinders must be alternately accelerated and retarded during the taking of an impression, while thereafter the cylinders may complete their rotation at uniform speed. The gearing must be such, however, that the cylinders are not accelerated with a jerk at the beginning of the impression nor suddenly checked at the end of the printing operation. This is very easily accomplished, preferably by means of the irregular or epicycloidal gears E , E' , which are so shaped as to impart to the impression cylinders through the intermediate gearing and shaft, a speed of rotation coincident with the linear movement of the bed at the commencement and during the taking of impressions, and to complete the rotation after impression without jerk or jar in the interval between impressions. Each cylinder has that portion, x , of its periphery which coöperates with the type form during impression slightly greater in radius than the remaining portion x' , of its periphery. The part x' is made slightly less in radius than part x , so that during the return stroke of the bed the forms will pass under the portion x' of the cylinder without impinging the web, and the web can be continuously moved forward at the peripheral speed of the cylinders, both during and after the printing operations.

In the particular press shown, and as described in my aforesaid patent, the cylinders C , c , print the same side of the web and print at the same time thereon during the outward stroke of bed A , but the cylinder c , prints portions of the web skipped by cylinder C . This enables me to print, say, thirty-five inches of web at each outward stroke of the bed A , while only moving the bed on said stroke seventeen and one-half inches during impression. The same is true

of bed B and cylinders C' , c' . Thus by using two cylinders with each bed and having the cylinders print alternate spaces on the web, I can print and perfect thirty-five inches of web with a seventeen and one-half inch movement of the beds during impressions. This method of printing necessitates that seventeen and one-half inches of web, less margins, be fed between the bed and cylinders during the taking of impressions and an additional seventeen and one-half inches of web, plus margins, be fed between the bed and cylinders after the taking of impressions and during the return strokes of the beds; thus, practically in this particular press, the web is fed continuously between the beds and cylinders, both during and after the taking of impression and the gearing is so proportioned as to drive the cylinders to feed one length of web in unison with the movement of the beds while the impression is on,—and to feed a like length of web between the beds and cylinders after the taking of impressions, or while the impression is thrown off.

The cylinders in the press shown, being arranged to rotate continuously, have a circumferential extent equal to the length of web to be fed both during and after impression; and in the example stated, the circumference of the cylinders would be thirty-five inches. Of course the exact mathematical proportions are not stated herein nor attempted to be shown in the drawing. In the present case, the cylinders are also utilized as the web feeding devices to carry forward the web through the press. As shown, the web w , may be slacked off from a roll W , at one end of the machine by any suitable means, not shown, and may be carried forward under guides p , p' , to the center of the press and then led up between the beds and pairs of cylinders to and over a guide 1^a thence over a guide 1^b around cylinder c' , up over a guide 1^c , to a guide 1^d , then around cylinder C' , to and over a guide 1^e ; and over a registering roller 1^f , back over guides 1^g , 1^h , to and around cylinder C , up over guides 1^i and 1^j , to and around cylinder c , and then up to a delivery mechanism, which preferably consists of a roll F , and co-acting tapes F' running over rollers f , f' , on the frame; roll F being driven by a train of gears f^2 , from the shaft of the adjacent cylinder c .

A set of tapes G , running over rollers g , g' , may be arranged beside and co-act with cylinder C' , so as to draw the web continuously into the press at the exact peripheral speed of the cylinders. If desired, a set of tapes H can be run over the guide rollers 1^d , 1^e and around cylinder c' , as indicated in Fig. 2, so as to keep the web in contact with the periphery of the cylinder. A like arrangement of tapes could be used with the other impression cylinders if desired, such tapes being

preferably located to work in the marginal spaces of the web. The web can thus be actually fed through the press by the impression cylinders and will be fed thereby in exact uniformity with the peripheral speed of the cylinders, and exactly as is required both during and after impression.

Each impression cylinder may be provided with the usual bearer I, as indicated in Fig. 3, co-acting with a bearer I', on the beds; and in order to insure absolute uniformity of movement between the peripheries of the impression cylinders and the type forms, during the taking of impressions, each cylinder may be provided, if desired, with a segmental gear J, adapted to mesh with a rack J' on the bed, during the actual impression operation. The toothed portion of the segment J only meshes with the rack J', during the actual impression operation, the teeth being cut away so as not to clash with the rack J' during the return stroke of the bed.

In the press shown, the cylinders C', c', print one side of the web and the cylinders C, c, print the opposite side thereof. The web can be led from the delivery roll F, to a folder, not shown. At each operation of the press, say thirty-five inches of web will be printed, although the beds only move seventeen and one-half inches and only print on their outward strokes, and the impression is thrown off during the return strokes of the beds by having the non-printing portions of the cylinders reduced in diameter. As the beds only have to travel seventeen and one-half inches during the taking of impression, they can be reciprocated at high speed and as the web is continuously moving at variable speed always in the same direction, it can be traveled at high speed without danger of rupturing it, and no looping devices or compensating rollers are necessary to take up or give out slack in the web, during the operation of the machine. The press is simple in construction, all parts are easily accessible, and there are practically no cams to adjust in order to control the operation of the web at any point. The press is practically a rotary machine so far as the impression cylinders are concerned.

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

1. In a printing press, the combination of a reciprocating type bed, a cylinder co-acting therewith, means for rotating the cylinder in one direction only, and at a varying speed in unison with the bed during the printing operation, and means for directing a web between the bed and cylinder, the cylinder operating to feed the web between itself and the bed both during and after impression.

2. In a printing press, the combination of a reciprocating type bed, a cylinder co-acting therewith, means for continuously rotating

the cylinder and at a varying speed in unison with the bed during the printing operation, and means for directing a web between the bed and cylinder, the cylinder operating to feed the web between itself and the bed both during and after impression.

3. In a bed and cylinder web printing press, the combination of a reciprocating type bed, a cylinder co-acting therewith, means for directing a web between the bed and cylinder, means co-acting with the cylinder for feeding a length of web between the bed and cylinder at a varying speed during impression and for feeding a corresponding length of web between the bed and cylinder after impressions, and means for rotating the cylinder continually in one direction at variable speed.

4. In a printing press, the combination of a reciprocating type bed, a pair of cylinders simultaneously co-acting therewith, means for continuously rotating the cylinders in one direction and at a varying speed but uniform with the movement of the bed during impression, and means for directing a web successively between the bed and cylinders.

5. In a printing press, the combination of a reciprocating type bed, a pair of cylinders co-acting therewith, means for rotating the cylinders continuously in one direction and at a varying speed but uniform with the movement of the bed during impression, and means co-acting with the cylinders for moving the web between the bed and cylinders both during and after impression.

6. In a printing press, the combination of a reciprocating type bed, a pair of cylinders co-acting with said bed, means for directing a web between the bed and cylinders, means for rotating the cylinders in one direction at a varying speed, the peripheries of the cylinders moving in unison with the bed during impression, and means co-acting with the cylinders for feeding a length of web between the bed and cylinders during impression and a like length of web between the bed and cylinders after impression.

7. In a printing press, the combination of a reciprocating type bed, a pair of cylinders co-acting with said bed, means for directing a web between the bed and cylinders, means for rotating the cylinders continuously but at varying speed in one direction, the peripheries of the cylinders moving in unison with the bed during impression, and means co-acting with said cylinders to feed a length of web between the bed and cylinders during impression and a like length of web between the bed and cylinders after impression.

8. In a printing press, the combination of a pair of beds and co-acting cylinders, means for reciprocating the beds in opposite directions, means for directing a web successively between the beds and cylinders, means for rotating the cylinders continuously in the di-

rection of the feed of the web during the operation of the press, and means for causing the peripheries of the cylinders to move in unison with the beds during the taking of impression, and means for feeding a web between the beds and cylinders both during and after impressions.

9. In a web printing press, the combination of oppositely reciprocating type beds, cylinders co-acting with such beds; means for directing a web between the beds and cylinders, said cylinders acting to continually feed the web through the press, and means for rotating said cylinders in the direction of the travel of the web both during and after impressions.

10. In a printing press, the combination of a pair of beds and co-acting cylinders, means for reciprocating the beds in opposite directions, means for directing a web successively between the beds and cylinders, said cylinders operating to feed the web through the press both during and after impressions, and means for rotating the cylinders continuously in the direction of the feed of the web and at a peripheral speed corresponding to the movement of the bed during the taking of impressions.

11. In a printing press, the combination of a pair of oppositely moving beds, a pair of cylinders above and co-acting with each bed, means for directing a web successively between the beds and their co-acting cylinders, means for rotating the cylinders continuously in the direction of the travel of the web and at a speed, during the taking of impression, corresponding to the linear travel of the bed, said cylinders feeding a length of web through the press during impression and a similar length of web after impression.

12. In combination, a reciprocating bed, a cylinder co-acting therewith, gearing for driving the cylinder continually in one direction, and means for actuating said gearing to cause the periphery of the cylinder to move at varying speed during impression co-incident with the travel of the bed; with means for directing a web between the bed and cylinder, and means co-acting with the cylinder for feeding a length of web forward between the bed and cylinder during impression and a corresponding length of web between the bed and cylinder while the impression is thrown off.

13. In combination, a reciprocating type bed, a cylinder co-acting therewith, gearing for driving the cylinder in one direction, and irregular or epicycloidal gears for actuating said gearing, whereby the periphery of the cylinder is moved during impression at a speed co-incident with that of the type bed; with means for directing a web between the bed and cylinder, said cylinder operating to feed a length of web forward between the bed and cylinder during impression and a cor-

responding length of web between the bed and cylinder while the impression is thrown off.

14. In a printing press, the combination of a reciprocating type bed, a pair of cylinders co-acting therewith, gearing between said cylinders, and means for rotating the cylinders to cause their peripheries to travel at varying speed in unison with the movement of the bed during impression, and to continue the rotation of the cylinders while the impression is thrown off.

15. In a printing press, the combination of a reciprocating type bed, a pair of cylinders co-acting therewith, gearing between said cylinders, and means for rotating the cylinders to cause their peripheries to travel at a varying speed in unison with the movement of the bed during impression, and to continue the rotation of the cylinders while the impression is thrown off; with means for directing a web successively between the cylinders and bed, whereby a length of web is fed between the bed and cylinders during impression and a like length of web is fed between the bed and cylinders after impression.

16. In a printing press, the combination of reciprocating beds, cylinders co-acting therewith, guides for directing a web between the beds and cylinders, tapes co-acting with one cylinder to feed the web thereto, and means for driving the cylinders continually in the direction of the travel of the web and during the taking of impression at a speed co-incident with the linear movement of the beds.

17. In combination, a pair of reciprocating beds, cylinders co-acting therewith, guides for directing a web between the beds and cylinders, devices co-acting with the cylinders to feed the web, means for driving the cylinders continuously in the direction of the travel of the web at a varying speed during the taking of impressions at a speed co-incident with the linear movement of the beds, and for completing the rotation of the cylinders while the impression is thrown off.

18. In a printing press, the combination of oppositely moving type beds, cylinders co-acting with each bed, means for directing a web successively between the beds and cylinders, means co-acting with the cylinders to feed the web through the press, gearing for rotating all the cylinders synchronously in the direction of the travel of the web, and means for driving the cylinder gearing so as to rotate the cylinders continuously, whereby a length of web is fed between the beds and cylinders during impression and a corresponding length of web is fed between the beds and cylinders while the impression is thrown off.

19. In a printing press, the combination of a pair of type beds, cylinders co-acting with each bed, means for directing a web successively between the beds and cylinders,

tapes co-acting with the cylinders to feed the web into the press, means co-acting with the last cylinder for delivering the web from the press, gearing for rotating the cylinders in the direction of the travel of the web, and means for driving the cylinder gearing so as to rotate the cylinders at a peripheral speed uniform with the linear movement of the beds during the taking of impressions and to complete the rotation of the cylinders while the impression is thrown off, whereby a length of web is fed between the beds and cylinders during impression and a corresponding length of web is fed between the beds and cylinders while the impression is thrown off.

20. In a web printing press, the combination of a pair of reciprocating type beds, a pair of cylinders co-acting with each type bed, means for leading a web successively between the beds and their co-acting cylinders, a common line shaft and gearing between said shaft and each cylinder for rotating the cylinders continuously in the direction of the travel of the web both during and after impression, and for causing the cylinders to move peripherally in unison with the linear movement of the bed during the taking of impressions, and means for driving the line shaft at varying speed whereby a length of web is fed through the press during the taking of impression and a corresponding length of web is fed through the press while the impression is thrown off.

21. In a printing press, the combination of a pair of moving beds, a pair of cylinders above and co-acting with each bed, means for directing a web successively between the beds and their co-acting cylinders, a line shaft, and gearing between such shaft and each cylinder for rotating the cylinders in the direction of the travel of the web and at a speed corresponding to the linear travel of

the bed during the taking of impression, said cylinders moving the web through the press, and means for driving said line shaft at varying speed.

22. In a printing press, the combination of a pair of type beds, cylinders co-acting with each bed, means for directing a web successively between the beds and cylinders, a line shaft, bevel gearing between such shaft and each cylinder for rotating the cylinders in the direction of the travel of the web, and means for driving the line shaft at varying speed so as to rotate the cylinders at a peripheral speed uniform with the linear movement of the beds during the taking of impressions and to complete the rotation of the cylinders while the impression is thrown off.

23. In combination, a reciprocating type bed, a cylinder co-acting therewith, a line shaft, bevel gearing for driving the cylinder from said shaft, and irregular or epicycloidal gears for actuating said line shaft in one direction whereby the periphery of the cylinder is moved during impression at a speed co-incident with that of the type bed.

24. In a printing press, the combination of a reciprocating type bed, a pair of cylinders co-acting therewith, a line shaft, and bevel gearing between said cylinders and said shaft for rotating the cylinders in unison, epicycloidal gears for driving said shaft so as to cause the peripheries of the cylinders to travel in unison with the movement of the bed during impression, and to continue the rotation of the cylinders while the impression is thrown off.

In testimony that I claim the foregoing as my own, I affix my signature in presence of two witnesses.

PAUL FLEMMING COX.

Witnesses:

NINA M. BRECK,
LOUIS C. WATKINS.