

May 6, 1930.

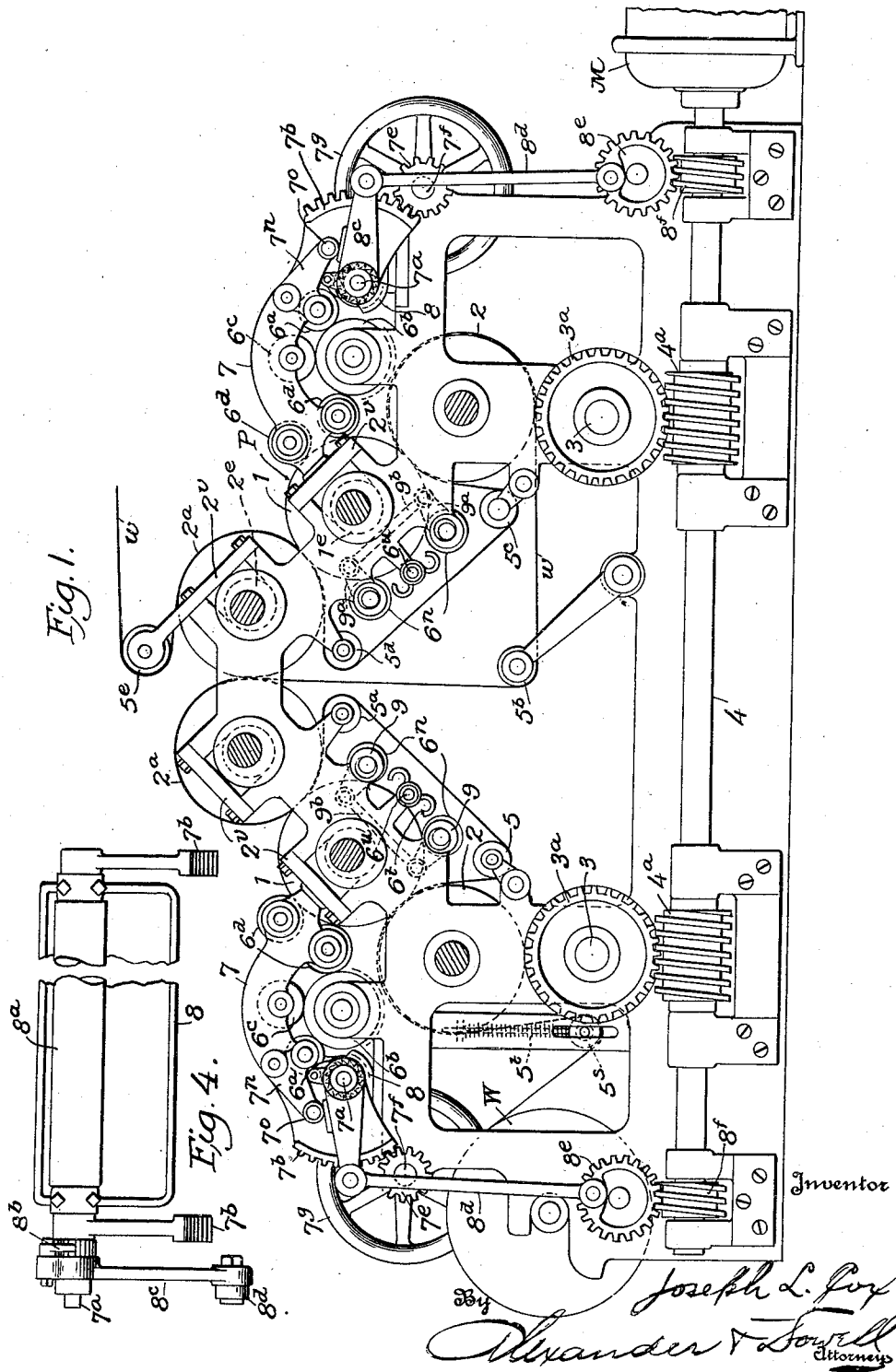
J. L. COX

1,757,901

WEB PRINTING PRESS

Filed Jan. 23, 1929

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

Fig. 3.

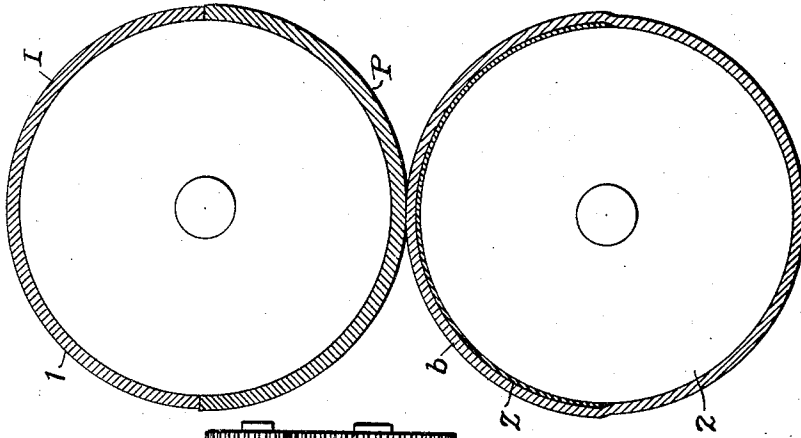
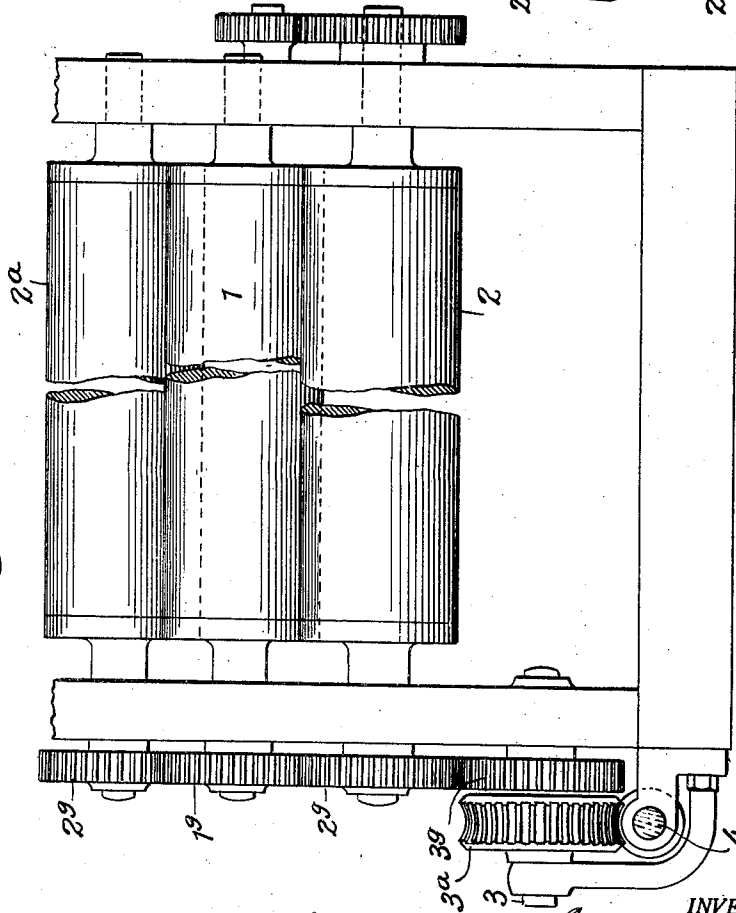


Fig. 2.



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WEB-PRINTING PRESS

Application filed January 23, 1929. Serial No. 334,474.

This invention is a novel improvement in rotary stereotype web printing presses of the type in which consecutive duplicate printed impressions are printed upon the web by means of a single set of semi-cylindric plates which are carried on the plate cylinders. Each printing unit comprises two impression cylinders which cooperate with the same plate cylinder, and the web is led successively between the plate and impression cylinders in each unit so that the blank spaces between impressions produced upon the web by the first impression cylinder and one plate cylinder, are filled in by like impressions produced from the same plates by the second impression cylinder. This manner of printing is sometimes aptly termed the "hit and skip" method. Two such printing units are employed to perfect the web.

The principal object of the present invention is to provide a novel perfecting press capable of producing two eight page papers for each rotation of the plate cylinders from a single set of eight page plates. By duplicating the perfecting units, the capacity of such a press could be increased as desired so that papers of any desired size can be produced from a single set of semi-cylindric plates.

Another object is to have all the plate and impression cylinders of like diameter, so that they may be directly intergeared and also to have all composition and form rollers mounted and rotate in fixed bearings while in operation.

A further object is to provide novel means for driving the cylinders; and whereby the first and the last cylinder in each perfecting unit will be simultaneously and directly driven so as to obviate backlash or lost motion in the gearing between such cylinders.

The cylinders in each printing unit are arranged in line—and the two printing units in a perfecting unit are oppositely inclined. This enables the plate cylinders to be plated from above, and located at conveniently accessible height above the floor; and to have the inking mechanism in convenient position for adjustment and control while in operation. This arrangement also provides a novel path for the web whereby it may

be printed by the hit and skip method, in each printing unit and be reversed between the units in a simple and very short path, and which enables the web to be very easily threaded through each perfecting unit and led from the perfecting unit to a folder.

A further object is to provide simple means whereby the inking rollers can be readily set on and off the ink drums when it is not desired to supply ink; and can also readily be moved out of the way when it is desired to plate the cylinders.

The accompanying drawings illustrate one practical embodiment of the invention, and I will describe same with reference thereto. In the claims I have summarized the novel features of the invention and novel combinations of parts for which protection is desired.

In said drawings:

Fig. 1 is a side elevation of an eight page unit press constructed in accordance with the invention.

Fig. 2 is a view showing the cylinders and driving gear for each couple.

Fig. 3 is an enlarged section through a plate cylinder and one of its related impression cylinders.

Fig. 4 is an enlarged view of the swinging arms for the form rollers, and the ink fountains.

In the construction shown the press has two plate cylinders 1 with each of which two impression cylinders 2 and 2^a cooperate. Each printing unit comprises a plate cylinder 1 and two coating impression cylinders 2, 2^a. The two printing units are preferably arranged at an angle of approximately 90° to each other, the cylinders 2^a being uppermost at the apex of the angle, and the cylinders 2 being lowermost at the base of the angle.

The journals of the cylinders 1 and 2^a are preferably mounted in eccentric boxes 1^b, 2^b, which are adjustably secured in the main frame as usual, such boxes enabling the cylinders to be correctly adjusted for the proper contact of the plates on the plate cylinder with the blankets on the impression cylinder.

All the cylinders are of the same size on

the pitch line, and they are driven by means of intermeshing gears 1^s, 2^s as indicated in Fig. 2. The gears 2^s on the impression cylinders 2 and 2^a mesh with gears 1^s on the plate cylinders 1. The gears 2^s on the two upper cylinders 2^a intermesh; also the gears 2^s on the lower cylinders 2 preferably intermesh with gears 3^s on stub shafts 3, which carry worm gears 3^a directly meshing with worms 4^a on a counter shaft 4 which is preferably directly connected to and driven by an electric motor M, as shown in Fig. 1. Thus the press is driven directly from the motor, and the worm gearing enables the motor to be driven at normal speed while the speed of the press cylinders is reduced to the desired speed. By having both the infeed cylinder 2 and outfeed cylinder 2^a directly driven from the shaft 4, the last or outfeed cylinder will start and stop instantly with the infeed cylinder, and this will obviate lost motion in the gearing, and prevent the cylinders in one unit lagging or running ahead of those in the other unit. This will also prevent tightening and breaking of the web between the infeed and outfeed cylinders in the press.

Each plate cylinder is adapted to carry a semi-cylindric plate P (Fig. 3) on one half of its periphery, and preferably carries four of such plates arranged in a row on one half of the periphery of the cylinder. The diametrically opposite half of each plate cylinder carries an inking surface I of any suitable kind.

The web *w* may be led directly from the roll W to and between the near plate and impression cylinders 2 and 1; then down under a guide roller 5 to and over a second guide roller 5^a; then between the plate cylinder 1 and second impression cylinder 2^a; then down between the two impression cylinders 2^a, 2^a to and under an adjustable guide roller 5^b; then under and partly around the far impression cylinder 2 and between it and the far plate cylinder 1 of the second printing unit; then under guide roller 5^c to and over a guide roller 5^d; then to and between the far plate cylinder 1 and its coating impression cylinder 2^a and partly around said cylinder 2^a to a guide roller 5^e; from which the web may be led to the folder.

The web guide rollers 5 and 5^a are so located and spaced that the blank spaces left on the web *w* between impressions printed thereon by the cooperating cylinders 1 and 2, will be filled up by impressions produced on the web from the same plates by the cooperation of the cylinders 1 and 2^a. Similarly the rollers 5^c and 5^d are so located and spaced apart that the blank page spaces left between impressions produced on the web by the plate cylinder 1 and impression cylinder 2 of the second unit, will be filled up by page impressions produced on the web from the

same plates on the second cylinder 1 and the second impression cylinder 2^a. Thus by the use of a single set of semi-cylindric stereotype plates identical consecutive impressions with equal margins will be produced lineally upon the web. The first printing unit will print one side of the web; and the second printing unit will print the opposite side or perfect the web, in the well understood manner. The plates P are inked between each impression by the means hereinafter described.

The impression cylinders are all of exactly the same diameter and the usual packing (felt and rubber) blankets are alike on the bearer or printing line. To obtain the desired impression squeeze a sheet of zinc *z* or press board about 1/64 inch in thickness is placed under the blanket *b* (Fig. 3) on that half of each impression cylinder that coacts with the usual semi-cylindrical stereotype page plates P to produce an impression; thus leaving the packing on the non-printing half of each compression cylinder 1/64 of an inch lower than the impression portion. This is sufficient to prevent the web contacting with the ink plates I carried by the impression cylinder opposite the printing plates. The ink plates I can be cast in the usual plate casting boxes; that is, both the plates P and the ink plates or dummies I can be cast in the same plate casting box, and both can be cut and trimmed by the usual stereotype machinery. Preferably the dummy inking plates I are made slightly thinner than the thickness (through the type) of the printing plates P; so that while the plate cylinders are turned perfectly cylindric the type on the plates P project slightly beyond the plane of the surface of the inking plates, though the bearers on all cylinders are alike.

Both the printing plates P and the ink plates I can be secured in position on the peripheries of the plate cylinders by the usual rings and clamps commonly used on the plate cylinders of rotary stereotype presses, for double plating. One set of such clamps holding the plates P, and the other set holding the ink transfer plates I.

The main cylinders are preferably journaled in eccentric bearings as shown, for adjustment while the gearing is in mesh. Preferably the main frame castings are slotted to receive the cylinder journals or bearings so that any cylinder can be readily removed or replaced and said bearings are held in proper position by caps 2^v bolted to the main castings.

The construction shown enables all cylinders to be set in perfect alignment so that all the gears will run accurately on their pitch line.

More or less impression pressure can be obtained by adding or removing sheets of packing after the cylinder centers are correctly

determined. This is to keep the ordinary operator or pressman from changing his cylinder centers after the expert or erector has them correctly established.

5 In the construction shown I have provided a web compensating and take up roller 5^a between the web roll and the first impression cylinder 2 which may be yieldingly depressed by a spring 5^t.

10 In the construction shown ink is supplied to each plate cylinder 1 by means of form rollers 6^d and 6^e at diametrically opposite sides of the plate cylinder. The rollers 6^d receive ink from an ink distributing drum 6^b to which ink is supplied by a ductor roller 6^a from the fountain roll 8^a. An ink distributing roller 6^c directly cooperates with drum 6^b.

15 The rollers 6^d contact alternately with the printing plate P and the ink distributing plate I; and the latter supplies ink to the form inking rollers 6^e which are journaled in brackets on the sides of the frame to the inner side of the plate cylinder 1 as shown.

20 The rollers 6^d and 6^e are preferably mounted in swinging arms 7 which are pivoted on studs 7^a which may be attached to the frame or to the ends of the ink fountains 8. Each arm 7 has a segment 7^b which meshes with a pinion 7^c on a through shaft 7^f having a hand wheel 7^e. By turning this hand wheel the arms 7 with the set of inking rollers thereon can be swung upward away from the plate cylinder, to permit ready access to the cylinder when plating the same.

25 The fountain roll 8^a may be operated by a pawl 8^b pivoted on a lever 8^c which lever is pivoted on one of the studs 7^a and is connected by a link 8^d to a crank pin on a worm gear 8^e which meshes with worm 8^f on the counter shaft 4. The gear 8^e is so proportioned that the fountain roll is properly intermittently shifted in accordance with the speed of the machine and the demand for ink. The ductor roller 6^a is preferably carried by bell crank levers 7ⁿ pivoted on the arms 7, and one arm of lever 7ⁿ carries a roller 7^o which engages a flat on the upper side of the adjacent lever 8^c, so that as lever 8^c is moved up and down the ductor roller is moved to alternately contact the fountain roll 8^a and the drum 6^b. The form rollers 6^a receive ink from the plate I and supply it to the plate P before the second impression is taken therefrom.

30 The rollers 6^a are preferably mounted in eccentric bearings 9 so that by turning the eccentrics said rollers can be readily set in or out of operative position. The bearings 9 are shown as provided with arms 9^a which are connected by a rod 9^b. All the ink rollers in the press can be readily adjusted into or out of operative position by the operator.

35 On account of the slight difference in the radius of the type surface of the plates P and the surface of the inking plates I the rollers

6^a may rotate in fixed bearings while the press is in operation, the composition surface of these rollers being sufficiently yielding to enable them to contact with both the inking surfaces I and the plates P without injury to themselves and without over inking the plates.

70 The press is shown as provided with a transverse rod 6^u supported by intermediate roller 6^v and on this rod are hangers 6^w in which the form rollers 6^a may be supported while the press is being made ready.

75 The upper rollers 6^d are auxiliary form rollers, and insure proper inking of the forms should there be any defect in the form rollers 6^e which directly contact with the distributing drums 6^b.

80 The novel arrangement of the plate and impression cylinders and inclination of the printing couples (3 cylinders in a line in each couple, and the couples arranged at substantially right angles) makes a very perfect hit-and-skip press and one which can be operated perfectly with dependable web lead tension and feed. This novel arrangement of cylinders also provides ample room for plating the press and for threading and reversing the web through the press and the shortest possible amount of web in the press. It also enables all the underlying composition of form rollers to be readily removed and replaced.

85 The differential packing of the impression cylinders is very important for the reason that to manufacture and machine large impression cylinders cheaply and successfully, they must be turned and finished to a diameter equal to the pitch of the gear tooth line less the blanket space, (generally 1/10 to 1/12 under).

90 With this arrangement of packing and proper setting of the cylinders and gears no impressions will be made on the web by the ink plates I which are purposely cast 1/64 inch thinner than the plates P. To gain impression, without having the cylinder peripheries differ in size—I provide a differential packing on half of the impression cylinder and have all cylinders of one size.

95 The differential packing provided by the sheet of zinc or cardboard Z enables me to print by the hit and skip method and prevent the inking plates smudging the web. Thus the web feed and rotation is compensated by the action of these differential packings; one coming "on" just as the other comes "off", equalizing the tension of the web and keeping it uniform. The smallest half of the full blanketed impression cylinder allows slackness sufficient for the demands of the raised blanket and plates; and the yielding surface of the composition rollers enables them to adjust themselves to the difference in thickness of the inking plates I and printing plates P.

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I claim:

1. In a printing press, two units each comprising a plate cylinder and impression cylinders cooperating therewith to print and perfect a web, means to ink the plates between successive impressions therefrom; intermeshing gearing between all the cylinders; and means for directly and simultaneously driving the first impression cylinder of each unit. 5
2. In a printing press, two units each comprising a plate cylinder and impression cylinders cooperating therewith to print and perfect a web, means to ink the plates between successive impressions therefrom, a gear on each cylinder meshing with a gear on the adjacent cylinder, whereby the cylinders are rotated in unison; a motor driven shaft and direct gearing between said shaft and an impression cylinder of the first unit and gearing between said shaft and an impression cylinder of the second unit. 10
3. In a printing press two printing units each comprising a plate cylinder and two impression cylinders disposed at opposite sides of the plate cylinder and cooperating therewith, each plate cylinder being adapted to carry a single set of semi-cylindric stereotype plates on one half its periphery; means to ink the plates between successive impressions therefrom; means for directing a web successively between the impression cylinders and plate cylinders of the first unit to print the web on one side; and then successively between the impression cylinders and plate cylinders of the second unit to perfect the web, the blank spaces between impressions produced by the plate cylinder and first impression cylinder in each unit being filled by the impressions produced by the plate cylinder and the second impression cylinder of the unit; intermeshing gearing between all the plate and impression cylinders; and means for directly driving one impression cylinder in each and both units. 15
4. In a printing press two printing units each comprising a plate cylinder and two impression cylinders disposed at opposite sides of the plate cylinder and cooperating therewith, each plate cylinder being adapted to carry a single set of semi-cylindric stereotype plates on one half its periphery; means to ink the plates between successive impressions therefrom; means for directing a web successively between the impression cylinders and plate cylinders of the first unit to print the web on one side, and then successively between the impression cylinders and plate cylinders of the second unit to perfect the web, the blank spaces between impressions produced by the plate cylinder and first impression cylinder in each unit being filled by the impressions produced by the plate cylinder and the second impression cylinder of the unit; intermeshing gears on 20
5. In a printing press of the character specified two printing units each comprising a plate cylinder and two impression cylinders disposed at opposite sides of the plate cylinder and cooperating therewith, the said units being arranged at an angle to each other with the uppermost impression cylinders in the units at the apex of the angle, and the lowermost impression cylinders in the units spaced apart at the base of the triangle, each plate cylinder being adapted to carry a single set of semi-cylindric stereotype plates on one half its periphery; means to ink the plates between successive impressions therefrom; means for directing a web successively between the impression cylinder and plate cylinders of the first unit to print the web on one side, and then successively between the impression cylinders and plate cylinder of the second unit to perfect the web, the blank spaces between impressions produced by the plate cylinder and first impression cylinder in each unit being filled by the impressions produced by the same plate cylinder and the second impression cylinder of the unit; intermeshing gears on all the plate and impression cylinders, and means for directly positively driving the first impression cylinder of each unit. 25
6. In a printing press of the character specified two printing units each comprising a plate cylinder and two impression cylinders disposed at opposite sides of the plate cylinder and cooperating therewith, the said units being arranged at an angle to each other with the uppermost impression cylinders in the units at the apex of the angle and the lowermost impression cylinders in the units spaced apart at the base of the triangle, each plate cylinder being adapted to carry a single set of semi-cylindric stereotype plates on one half its periphery; means to ink the plates between successive impressions therefrom; means for directing a web successively between the impression cylinder and plate cylinders of the first unit to print the web on one side, and then successively between the impression cylinders and plate cylinder of the second unit to perfect the web, the blank spaces between impressions produced by the plate cylinder and first impression cylinder in each unit being filled by the impressions produced by the same plate cylinder and the second impression cylinder of the unit; a gear on each cylinder intermeshing with a gear on the adjacent cylinder, whereby the cylinders are rotated in unison, a driven shaft 30

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and direct gearing between said shaft and an impression cylinder of the first unit and direct gearing between said shaft and an impression cylinder of the second unit.

5 7. In a printing press of the character specified, two printing units each comprising
 10 a plate cylinder and two impression cylinders disposed at opposite sides of the plate cylinder and cooperating therewith, the said units being
 15 arranged at an angle to each other with the uppermost impression cylinders in the units at the apex of the angle and the lowermost
 20 impression cylinders in the units spaced apart at the base of the triangle; each plate cylinder being adapted to carry
 25 a single set of semi-cylindric stereotype plates on one half its periphery and having a semi-cylindric ink distributing plate on the opposite
 30 half of its periphery; means to ink the plates between successive impressions therefrom; means for directing a web successively
 35 between the impression cylinder and plate cylinders of the first unit to print the web on one side, and then successively between the
 impression cylinder and plate cylinders of the second unit to perfect the web, the blank spaces between impressions produced by the
 plate cylinder and first impression cylinder in each unit being filled by the impression
 produced by the same plate cylinder and the second impression cylinder of the unit; direct
 gears between all the plate and impression cylinders and means for positively and directly
 driving the first impression cylinder of each unit.

8. In a printing press of the character specified two printing units each comprising a
 40 plate cylinder and two impression cylinders disposed at opposite sides of the plate cylinder and cooperating therewith, the said units
 45 being arranged at an angle to each other with the uppermost impression cylinders in the units at the apex of the angle and the lowermost
 50 impression cylinders in the units spaced apart at the base of the triangle; each plate cylinder being adapted to carry
 55 a single set of semi-cylindric stereotype plates on one half its periphery and having a semi-cylindric ink distributing plate on the opposite
 60 half of its periphery; means to ink the plates between successive impressions therefrom; means for directing a web successively
 65 between the impression cylinder and plate cylinders of the first unit to print the web on one side, and then successively between the
 impression cylinder and plate cylinders of the second unit to perfect the web, the blank spaces between impressions produced by the
 plate cylinder and first impression cylinder in each unit being filled by the impressions
 produced by the same plate cylinder and the second impression cylinder of the unit;
 a gear on each cylinder meshing with a gear on the adjacent cylinder, whereby the cylinders
 are rotated in unison; a driven shaft,

and direct gearing between said shaft and an impression cylinder of the first unit, and direct gearing between said shaft and an impression cylinder of the second unit.

9. In a printing press of the character specified two printing units each comprising
 70 a plate cylinder and two impression cylinders disposed at opposite sides of the plate cylinder and cooperating therewith, the said units
 75 being arranged at an angle to each other with the uppermost impression cylinders in the units at the apex of the angle and the lowermost
 80 impression cylinders in the units spaced apart at the base of the triangle; each plate cylinder being adapted to carry
 85 a single set of semi-cylindric stereotype plates on one half its periphery and having a semi-cylindric ink distributing plate on the opposite half of its periphery; an ink
 90 supply; form rollers cooperating with said ink supply and distributing plate to ink the printing plates between successive impressions
 95 therefrom; means for directing a web successively between the impression cylinders and plate cylinders of the first unit to print the web on one side, and then successively
 100 between the impression cylinders and plate cylinders of the second unit to perfect the web, said means including spaced guide rollers whereby the web is so led between the
 105 impression cylinders of each unit that the blank spaces between impressions produced by the plate cylinder and first impression cylinder in each unit being filled by the impressions
 produced by the same plate cylinder and the second impression cylinder of the unit; intermeshing gearing between all the plate and impression cylinders, and means
 for positively and directly driving the first impression cylinder of each unit.

10. In a printing press a plate cylinder and an impression cylinder of like diameter; the
 110 plate cylinder being adapted to carry semi-cylindric printing plates on one-half of its periphery and a semi-cylindric inking plate on the other half of its periphery, the inking
 115 plate being slightly less in thickness than the printing plates; the impression cylinder being so packed that half of the impression cylinder which cooperates with the printing
 120 plate is of slightly greater radius than that half of the impression cylinder which comes opposite the inking plate, the difference in thickness of the printing plates and inking
 plate and in the packing of the blanket cylinder providing clearance for the web between said cylinders while the inking plate is passing the impression cylinder.

11. In combination with printing cylinders as set forth in claim 10; means for leading
 125 a web between the cylinders, gearing between the plate and impression cylinders, and rollers adapted to distribute ink on the inking plate and to supply ink therefrom to the
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printing plates, said rollers being mounted in stationary bearings while in operation.

12. In a printing press a plate cylinder and an impression cylinder of like diameter; the plate cylinder being adapted to carry semi-cylindric printing plates on one-half of its periphery and a semi-cylindric inking plate on the other half of its periphery; the inking plate being slightly less in thickness than the printing plates; the impression cylinder having a blanket and a semi-cylindric member under that half of the blanket which cooperates with the printing plate whereby the radius of the half of the impression cylinder which cooperates with the printing plate is slightly greater than the radius of that portion of the blanket cylinder which comes opposite the inking plate; the difference in thickness of the printing plates and inking plate and in the packing of the blanket cylinder providing clearance for the web between said cylinders when the inking plate is passing the impression cylinder.

13. In combination with cylinders as set forth in claim 12; means for leading web between the cylinders, gearing between the plate and impression cylinders, and rollers adapted to both distribute ink on the inking plate and to supply ink to the printing plates, said rollers being mounted in stationary bearings while in operation.

14. In a printing press two printing units each including a plate cylinder and two impression cylinders cooperating therewith all the cylinders being of like diameter; each plate cylinder being adapted to carry semi-cylindric printing plates on one-half of its periphery and a semi-cylindric inking plate on the other half of its periphery, the inking plate being slightly less in thickness than the printing plates; the impression cylinder having a blanket and a semi-cylindric member under that half of the blanket which cooperates with the printing plate; whereby the radius of the half of the impression cylinder which cooperates with the printing plate is slightly greater than the radius of that portion of the blanket cylinder which comes opposite the inking plate; the difference in thickness of the printing plates and inking plate and in the packing of the blanket cylinders providing clearance for the web between said cylinders and the plate cylinders when the inking plates are passing the impression cylinders.

15. In a printing press as set forth in claim 14; means for leading a web successively between the plate and impression cylinders in each unit, gearing for driving the cylinders, and rollers adapted to both distribute ink on the inking plates and to supply ink to the printing plates, said rollers being mounted in stationary bearings while in operation.

16. In a printing press of the character specified two printing units each comprising

a plate cylinder and two impression cylinders disposed at opposite sides of the plate cylinder and cooperating therewith, the said units being arranged at an angle to each other with the uppermost impression cylinders in the units at the apex of the angle and the lowermost impression cylinders in the units spaced apart at the base of the triangle; each plate cylinder being adapted to carry a single set of semi-cylindric stereotype plates on one half its periphery and having a semi-cylindric ink distributing plate on the opposite half of its periphery; an ink supply; form rollers cooperating with said ink supply and distributing plate to ink the printing plates between successive impressions therefrom; means for directing a web successively between the impression cylinders and plate cylinders of the first unit to print the web on one side, and then successively between the impression cylinders and plate cylinders of the second unit to perfect the web, said means including spaced guide rollers whereby the web is so led between the impression cylinders of each unit that the blank spaces between impressions produced by the plate cylinder and first impression cylinder in each unit being filled by the impressions produced by the same plate cylinder and the second impression cylinder of the unit; a gear on each cylinder intermeshing with a gear on the adjacent cylinder, whereby the cylinders are rotated in unison, a motor driven shaft and worm gearing between said shaft and the first impression cylinder of the first unit and direct worm gearing between said shaft and the last impression cylinder of the second unit.

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