

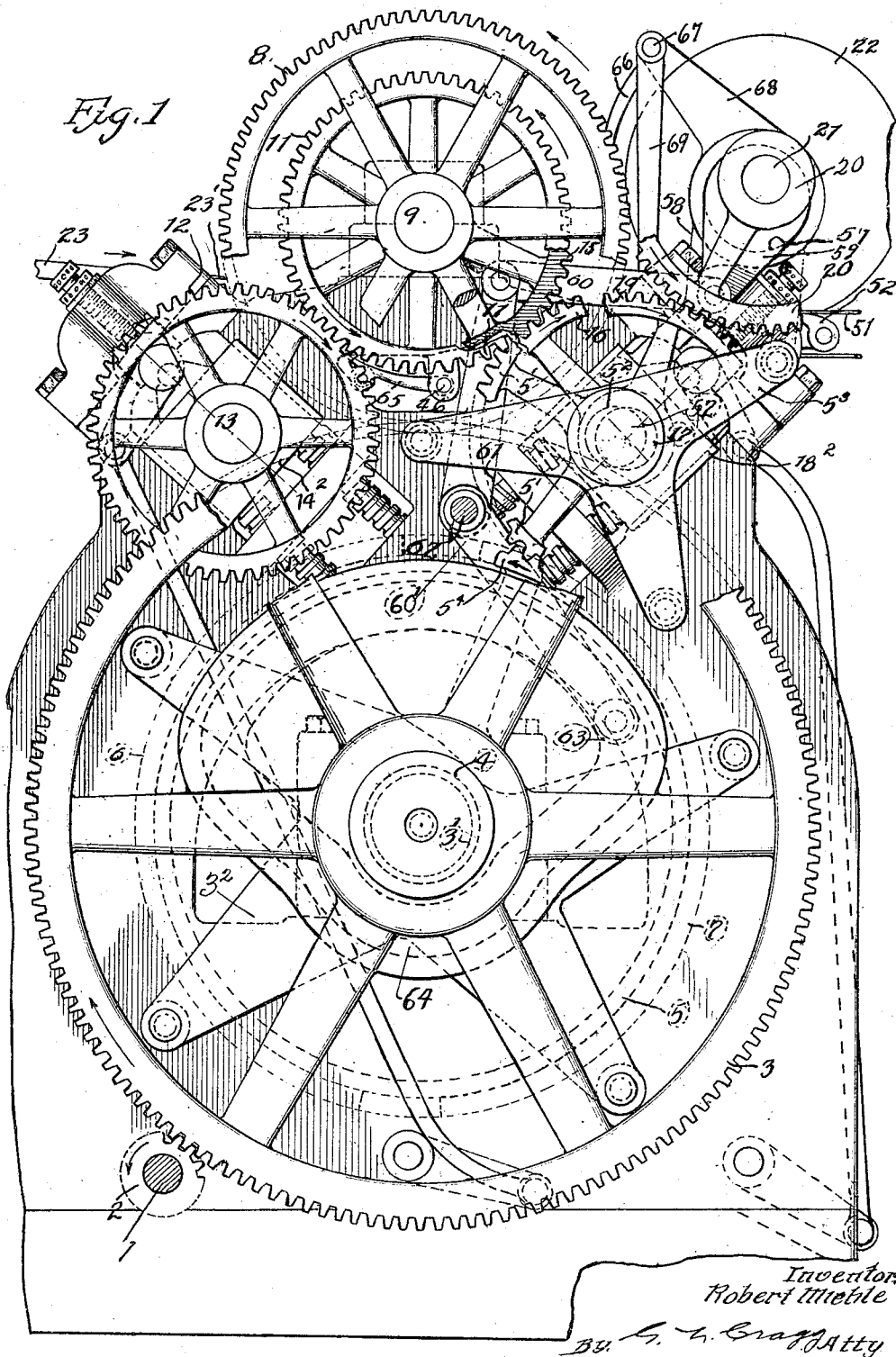
PRINTING PRESS.

APPLICATION FILED FEB. 3, 1917.

1,295,558.

Patented Feb. 25, 1919.

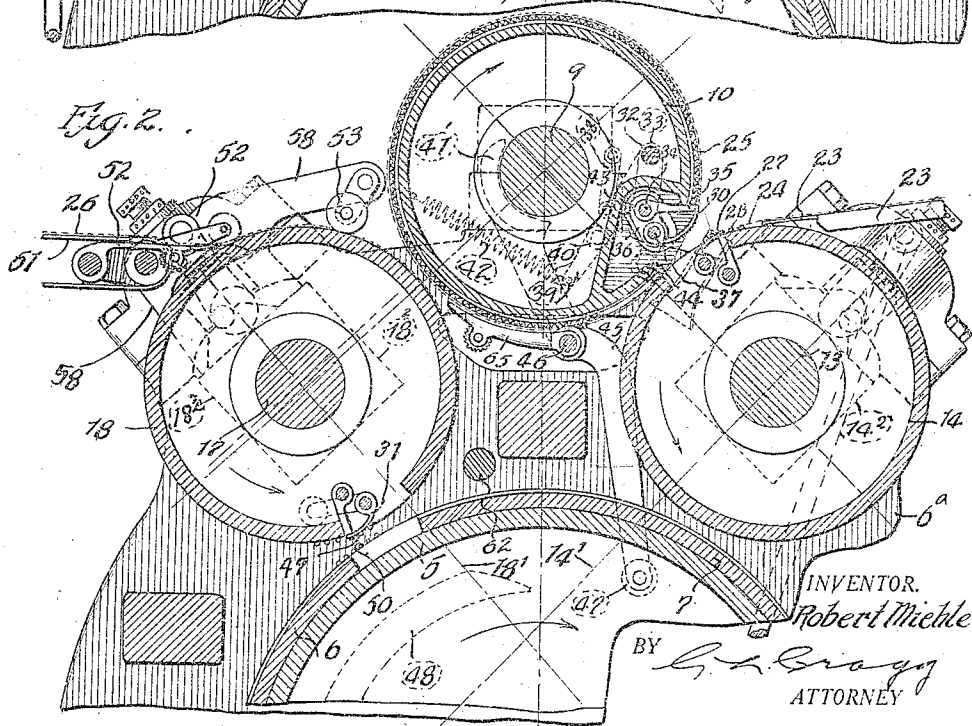
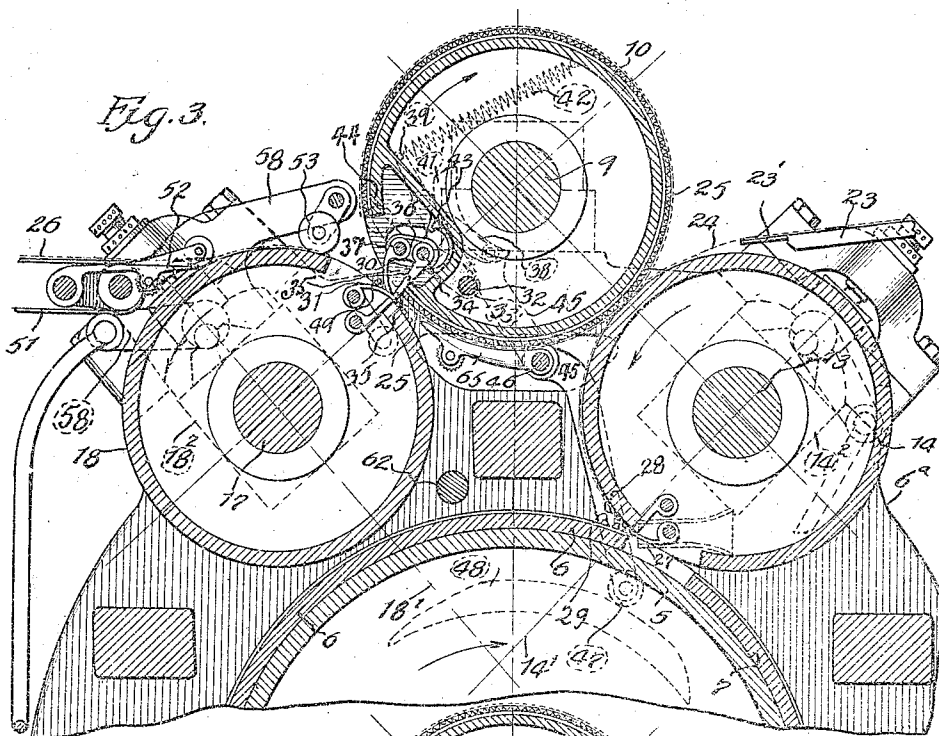
5 SHEETS—SHEET 1.



1,295,558.

R. MIEHLE.
PRINTING PRESS.
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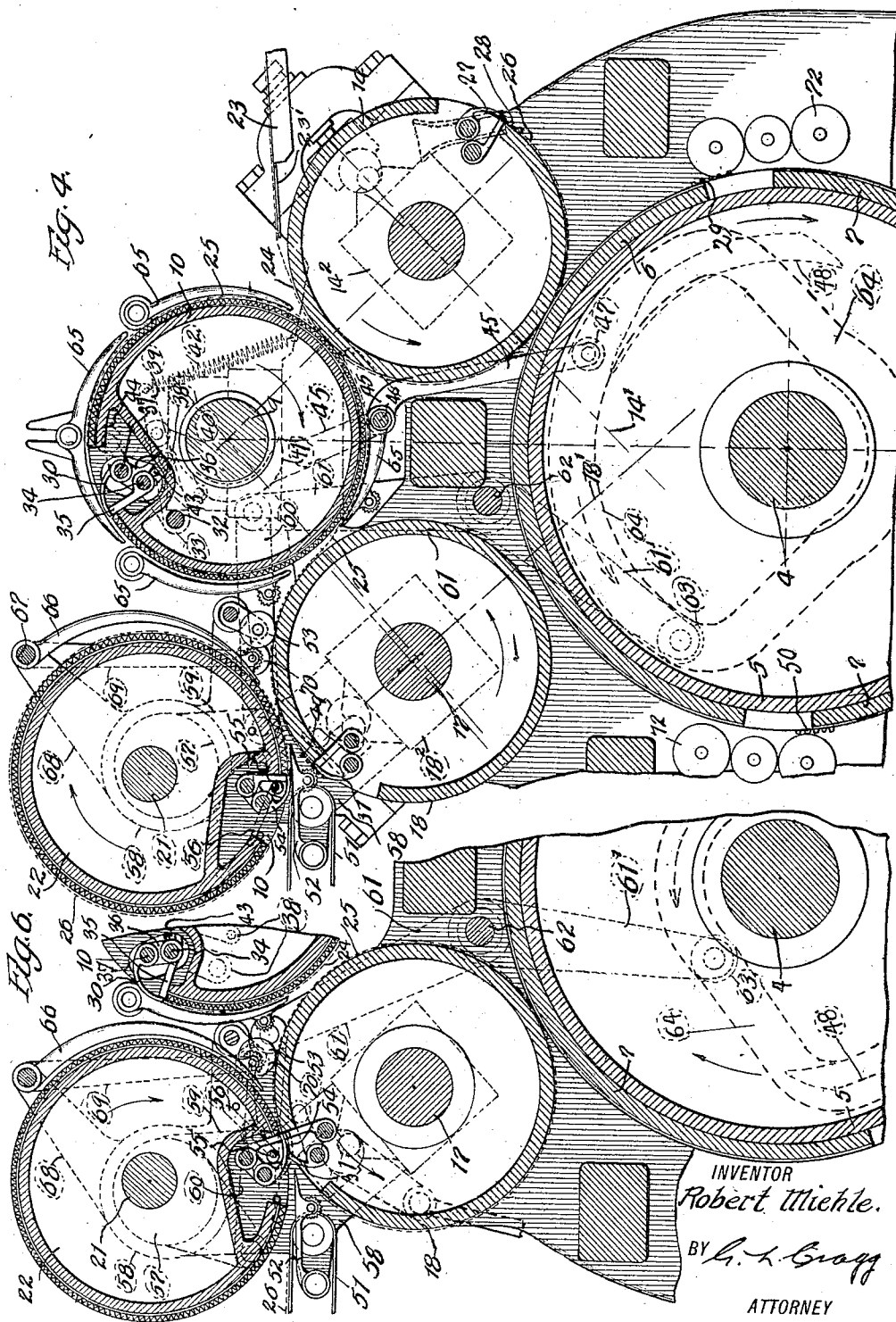
Patented Feb. 25, 1919.
5 SHEETS—SHEET 2.



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5 SHEETS—SHEET 3.

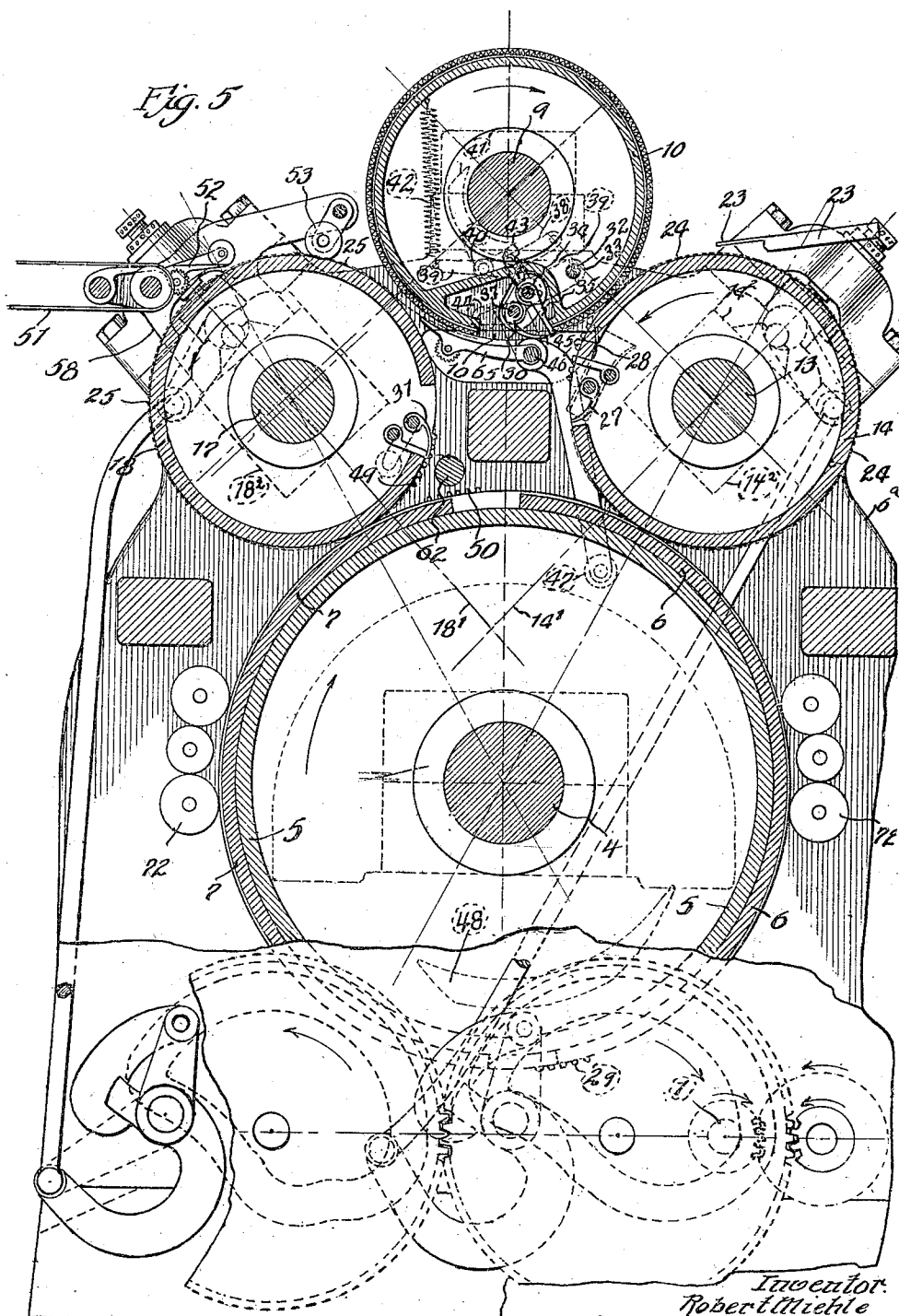


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1,295,558.

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5 SHEETS—SHEET 4.

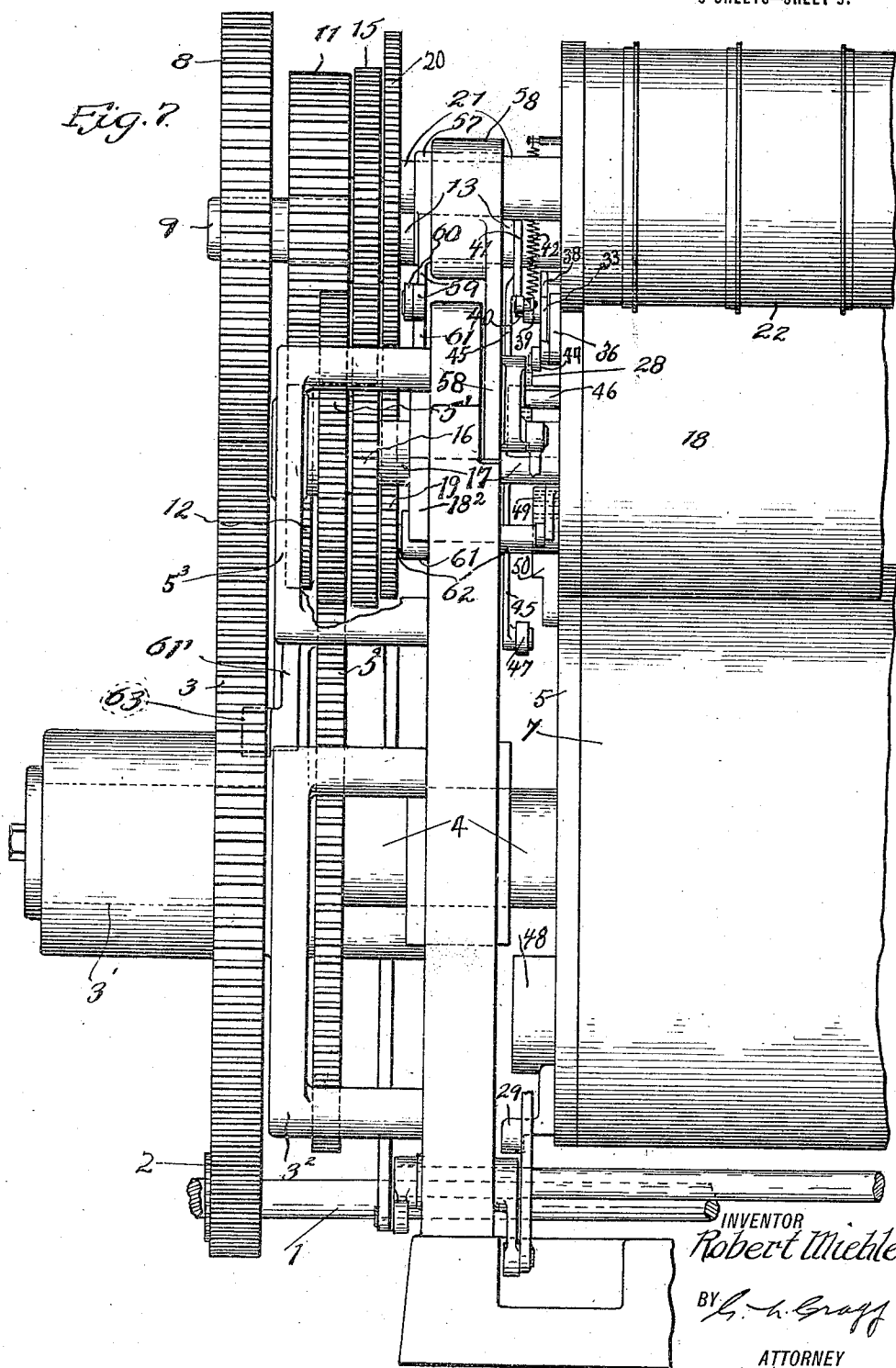


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By *L. L. Craig* Atty.

1,295,558.

R. MIEHLE.
PRINTING PRESS.
APPLICATION FILED FEB. 3, 1917.

Patented Feb. 25, 1919.
5 SHEETS—SHEET 5.



UNITED STATES PATENT OFFICE.

ROBERT MIEHLE, OF CHICAGO, ILLINOIS.

PRINTING-PRESS.

1,295,558.

Specification of Letters Patent.

Patented Feb. 25, 1919.

Application filed February 3, 1917. Serial No. 146,330.

To all whom it may concern:

Be it known that I, ROBERT MIEHLE, citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Printing-Presses, of which the following is a full, clear, concise, and exact description.

My invention relates to printing presses and, in many of its aspects, is of particular service in connection with rotary printing presses. The invention has for one of its objects the provision of mechanism whereby the forms or printing faces of the printing or form cylinders are not unduly impaired in the printing operation, a result which I achieve by the omission of direct gear connections between these cylinders whereby either is driven by the other. The engaged cylinders are permitted to preserve their proper printing relation substantially uninfluenced by the gearing which is employed to drive them and without slippage of either cylinder with reference to the other that would cause a rubbing or grinding action upon the form or printing surface upon the printing cylinder. As I have illustrated my invention herein it has been shown embodied in a type letter press but the invention is not to be thus restricted.

The press of my invention is of particular service in multi-color printing and when employed for this purpose I desirably use two impression cylinders, one for each color, though there are characteristics of the invention that are not to be limited to such an embodiment. When there are two impression cylinders there is a form or printing surface individual to each. The forms or printing surfaces are desirably carried upon the same printing cylinder which is then common to the impression cylinders. The impression cylinders are relatively adjustable to establish and break printing relation with the printing cylinder in the preferred embodiment of the invention.

My invention has for another of its objects the provision of an improved interrelation of transfer cylinders with the impression cylinders and the timing thereof with respect to the impression cylinders and the sheets. The invention has for its further object, in a multi-color printing press, improved means for effecting transfer from a transfer cylinder to the impression cylinder

that is to take sheets therefrom whereby there will be no interference between the printing surfaces of the sheets upon such impression cylinder with the sheets on the transfer cylinder so that printing will not be offset upon the latter sheets.

My invention also has for its object the provision of bodily adjustment of a transfer cylinder toward and from its associate impression cylinder for the purpose of preventing the offset of printing from printed sheets to other sheets. As I have practised my invention this feature thereof is employed in connection with a second transfer cylinder associated with the second impression cylinder but I do not wish to be limited to this arrangement. A printing press realizing certain objects of my invention is inclusive of a printing couple having two cylinders, a train of gears for driving one of the cylinders of the printing couple, a gear connected with the other cylinder for driving it, a driving gear common to said train of gears and the aforesaid gear, and registering mechanism having an element connected with each of said cylinders.

There are many important features that relate to the gearing employed in driving the cylinders of the press, the mechanism for adjusting grippers of transfer cylinders, mechanism for timing and interrelating operations of various elements of the press, the movements of the impression cylinders with respect to the printing cylinder and with respect to the transfer cylinder or cylinders whereby new and important results are secured, explanation of which will require reference to the accompanying drawings illustrating the employment of the invention in a two color type letter printing press.

I will explain my invention more fully by reference to the accompanying drawings showing the preferred embodiment thereof and in which Figure 1 is a view taken from the main gear side of the press, parts being broken away in order that characteristics of construction may be more fully revealed, other parts of the press which are well known to those skilled in the art being omitted; Figs. 2, 3, 4, 5 and 6 are sectional views looking from the other side of the press which respectively show some of the successive positions of component parts of the mechanism; and Fig. 7 is an end view of a part of the press showing mechanism

that appears in Figs. 1 and 5 and omitting certain parts that are not required to be shown in Fig. 7.

Like parts are indicated by similar characters of reference throughout the different figures.

The main driving pinion shaft 1 carries a pinion 2 which is in mesh with the main driving spur gear wheel 3 that is mounted to turn upon a fixed stub shaft 3¹ carried by the bracket 3². The rotating shaft 4 is concentric with shaft 3¹ and carries the printing cylinder 5 that rotates therewith. The type of rotary press here shown, but to which the invention is not to be limited, is a letter press in which event the printing cylinder is a form cylinder. The press illustrated is one which is adapted to the printing of two colors and as I have illustrated but one form cylinder this form cylinder carries two form beds 6 and 7. A spur gear 8 meshes with the gear 3, which is below the gear 8, and said gear 8 is fixed with respect to the shaft 9 of the transfer cylinder 10, this transfer cylinder being co-axial with the shaft 9 and the gears disposed about such shaft. A spur gear 11 is also fixed upon the shaft 9 and is in mesh with the spur gear 12 that is fixed upon the shaft 13 pertaining to the impression cylinder 14. This gear 12 operates in a plane distinct from the plane of the gear 5⁴ to prevent clashing when the impression cylinder is moving bodily with respect to the printing cylinder. An additional spur gear 15 is also fixed upon the shaft 9 and is in mesh with a spur gear 16 that is fixed upon the shaft 17 pertaining to the impression cylinder 18. The shaft 17 of the impression cylinder 18 also carries a spur gear 19 that is in mesh with a spur gear 20 which is fixed upon the shaft 21 that carries the transfer cylinder 22. The spur gear 11 is also in mesh with a spur gear 5¹ which turns upon a stub shaft 5² that is carried by the bracket 5³. The spur gear 5¹ is in mesh with a spur gear 5⁴ that is in fixed relation to the shaft 4 of the form cylinder. By this arrangement the shaft 9 is a central source of power which drives the impression cylinders and form cylinder and the transfer cylinders, the described gearing being used for this purpose except in the instance of the transfer cylinder 10 that is fixedly mounted upon said shaft. By the mechanism illustrated the spur gears which are upon and drive the impression cylinders are not in mesh with the spur gear that drives the form cylinder but are in mesh, and preferably in constant mesh, with other spur gears, namely, the spur gears 11 and 15. By this arrangement there is no danger of the clashing of the gear teeth as the impression cylinders are restored to printing relation with the form cylinder. Furthermore there are no injurious mechanical reactions be-

tween the impression cylinders and the form cylinder since there is no transfer of power from the latter to the former. The gearing described causes a plurality of revolutions of each impression cylinder and each transfer cylinder for each revolution of the printing cylinder. This gear arrangement of my invention is of particular service in connection with other characteristics of construction which I employ, it being noted that, in order to carry out certain other features of my invention, the impression cylinders are moved along the lines 14¹, 18¹ (Figs. 2, 3, 4 and 5) which do not intersect the axis of shaft 4 and are therefore not radial with respect to the form cylinder. The journal boxes 14², 18² are movable back and forth within guide walls that are respectively parallel with the lines 14¹, 18¹. It will be observed that the cylinder 18 in being moved into and out of printing relation moves along the line 18¹ that is perpendicular to a line joining the center of the shaft 9 with the center of the shaft 17 when this latter center is in the mid-position shown in Fig. 3. The cylinder 14 is moved into and out of printing relation along the line 14¹ which is perpendicular to the line joining the center of shaft 9 with the center of shaft 13 with this latter shaft center having the location given to it when the cylinder 14 is in printing relation. By reason of the perpendicular relationship of the lines of movement 14¹ and 18¹ with the lines passing from the center of shaft 9, as set forth, the gears 12 and 11 and the gears 15 and 16 are maintained practically in perfect mesh in the printing and non-printing positions of the impression cylinders, the axis of rotation of the gearing upon shaft 9 and the axis of rotation of the complementary gears upon cylinders 14 and 18 being respectively substantially fixed distances apart in printing and non-printing relations of the impression cylinders, the axes of rotation of these impression cylinders likewise being substantially fixed distances apart from the axis of said gearing upon shaft 9. There is no back lash while the impression cylinders are in printing and non-printing positions with respect to the printing cylinder so that the registry is not disturbed with the impression cylinders in either of these positions whereby the printed sheets passing through the press are transferred from impression cylinder to impression cylinder in exact registry and have exact registry with the printing cylinder in the printing operation.

If the impression cylinders were driven by a spur gear upon the form cylinder it would not be practical bodily to shift the impression cylinders along these lines 14¹, 18¹ to bring the impression cylinders into and out of printing relation with the form cylinder. As I am enabled to move the impression cyl-

inders along the lines 14¹, 18¹ I am also enabled to secure the desired interrelation between the impression cylinders and the transfer cylinders.

5 The impression cylinders 14 and 18 are respectively individual to the form beds 6 and 7 and are provided with the usual mechanism whereby each may be brought into printing relation with the form bed to which
10 it is individual and may be prevented from having printing relation with the other form bed when passing about the same and as this forms no part of my present invention a detail description thereof need not be furnished, it sufficing to say that such mechanism as that illustrated in my Patent 1,081,320, dated December 16, 1913 may be employed for this purpose, the cams being
15 modified to suit the proper timing relation with the movements of the impression cylinders and the form surfaces on the printing cylinder.

The sheets to be printed upon are fed to the first impression cylinder 14, from the
25 feed board or feed structure 23, the mechanism of the press changing its relationship to the paper being printed upon and having the relationship of its parts changed as illustrated in Figs. 2 to 6 inclusive, these figures
30 taken in their order, illustrating successive steps in a cycle of operations from the time the sheet is taken from the feed board until its transfer to the tapes of the delivery mechanism. These figures illustrate the progress
35 of three sheets 24, 25 and 26 through the press. In Fig. 2 the grippers 27 have partially withdrawn the sheet 24 from the feed board 23, this sheet having been taken by these grippers at the ends of the feed board
40 guide tongues 23¹. The impression cylinders turn in a counterclockwise direction while the form cylinder and transfer cylinders turn in a clockwise direction as viewed in Figs. 2 to 6 inclusive. As the cylinder 14 turns the
45 sheet 24 is laid thereon and the printing operation upon the sheet commences shortly after the gripped ends of the sheet 24 reaches the beginning of the form bed 6 as indicated in Fig. 3, registering segments 28 and 29 being provided upon the impression cylinder
50 14 and the form cylinder 5.

In Fig. 4 printing upon the sheet 24 is in progress and in Fig. 5 the printing upon sheet 24 is nearly concluded and one end of
55 this sheet has been taken by the grippers 30 upon the transfer cylinder 10 preparatory to removing the sheet from the impression cylinder 14 and thereafter effecting its transfer to the impression cylinder 18. During the
60 time that the sheet 24 has been taken from the feed board, is printed upon, and is taken by the grippers 30, as indicated in Fig. 5, the preceding sheet 25 has been taken by the grippers 30 and passes through the stages
65 illustrated in Figs. 2, 3, 4 and 5. The im-

pression cylinder 18 has grippers 31 to which the sheet upon the cylinder 10 (sheet 25 as illustrated in Fig. 3) is transferred from the grippers 30, when the impression cylinder 18 and transfer cylinder 10 are in the relation illustrated in Fig. 3, this transfer being effected when the impression cylinder 18 is mid-way between its printing and non-printing positions, the axis or center of the impression cylinder 18 then being in a radius
70 of the transfer cylinder 10, the gears 11 and 19 then being in most perfect mesh to insure proper registry of the sheet upon the cylinder 18. The freshly printed or wet side of the sheet 25 lies against the sheet supporting
75 portions of the transfer cylinder 10 which are generally of tooth form to reduce as far as possible contact with the wet surface. In order to prevent the freshly printed side of the paper sheet on the impression cylinder
80 18 and the sheet upon the transfer cylinder 10 from coming in contact, I space these cylinders apart and maintain these cylinders in register by enlarging the diameters of the pitch circles of their gears 15 and 16 so that
85 these pitch circles meet mid-way in the space between said cylinders. In order that the sheet (the sheet 25 now being particularly borne in mind, this sheet having undergone the same operation which was described in
90 connection with sheet 24) may be transferred from the cylinder 10 to the second impression cylinder 18 to undergo a second printing operation, means are provided for causing the approach of grippers upon one of
95 these cylinders to the grippers upon the other cylinder. I desirably employ means, to this end, which does not involve the bodily movement of either cylinder 10 or 18 toward the other but merely involves the movement of
100 the grippers upon one of such cylinders toward the grippers upon the other cylinder. The grippers which are moved with reference to the cylinder carrying it and toward the grippers upon the other cylinder are desirably the grippers 30 that are carried by the transfer cylinder 10. The mechanism whereby the movement of the grippers 30 with respect to the cylinder 10 toward and from the grippers 31 is desirably inclusive
105 of a shaft 32 journaled in the ends of the cylinder 10, this shaft fixedly carrying arms 33 that terminate around the shaft 34 which is journaled at its ends upon the arms 33. The shaft 34 has fixed thereupon the
110 gripper stops 35. The bell crank levers 36 are fixed upon the shaft 34. The gripper rod 37 (the rod that carries the gripping fingers 30) is journaled in the upper ends of the said bell crank levers 36.
115 The lower ends of the bell crank are connected with the links 38 that are pivoted upon the cylinder 10. The arm 39 is fixed to the shaft 32 and carries a roller 40 whose position is influenced by the cam 41. A 130

spring 42 maintains the roller 40 in engagement with the cam 41 when said cam is to operate to project the grippers 30 toward the grippers 31 as indicated in Fig. 3. At other times the spring 42 operates to maintain the gripper stop structure in engagement with the lug 43 whereby the cam roller 40 is then relieved of engagement. This mechanism operates to move the grippers 30 and the gripper stops 35 where they engage the sheet 25 in a manner not to cause creepage or backlash of the sheet upon the cylinder 10 which would mar the printing. The elements 38 and 33 act as links in substantially parallel motion mechanism to the end last stated. The usual roller mechanism 44 is operated to close the grippers 30 at the proper time.

After the sheet 25 is taken by the grippers 31 of cylinder 18 the grippers 30 are disengaged from said sheet and are bodily moved in toward the shaft 9 of the cylinder 10 after the cam roller 40 has passed out of engagement with the cam 41 (Fig. 4). In the first revolution of the transfer cylinder 10 when it receives the sheet the cam 41 is shifted out of the range of the roller 40 so that in this first revolution the grippers 30 will not be moved outwardly. In the second revolution of the cylinder 10 the cam 41 is brought into the range of the roller 40 so that the grippers 30 may be moved toward the impression cylinder 18 for the purpose stated. The mechanism that may be employed for this purpose is inclusive of an arm 45 upon the outer end of which the cam 41 is carried, this arm being pivoted at the point 46. The inner end of the arm 45 carries a cam roller 47 while the form cylinder carries a cam 48. The lower end of the arm 45 is heavy enough to maintain the cam 41 against the shaft 9, in which position of the cam the roller 40 may pass over the cam without engaging it (Fig. 2). When the cam 41 is in operation upon the roller 40 the cam 48 engages the roller 47 and rocks the arm 45 to move the cam 41 outwardly (Fig. 3), in which position of the cam 41 the roller 40 will turn thereupon to move the grippers 30 outwardly as has been described.

In the operation of the press the cylinder 18 is moved outwardly from the position illustrated in Fig. 3 to the position illustrated in Fig. 4 after the grippers 31 take the sheet 25. This operation is not required except when the cylinder 18 is tripped in the usual way since, in the tripping operation, the cylinder 18 has to be moved from the position shown in Fig. 3 to the position shown in Fig. 4 to enable the registering gear segment 49 to clear the registering gear segment 50 to separate the orbits of said segments when a printing operation is to be omitted. The sheet supporting por-

tions of the impression cylinders are almost continuous except where the grippers are disposed and are co-extensive with the forms on the printing cylinder to which they are individual whereby the printing cylinder has maximum form capacity and the impression cylinders have maximum impression capacity. The spaces intervening between the forms upon the printing cylinder are co-extensive with the gaps or non-sheet supporting portions of the impression cylinders. By this arrangement the maximum lineal speed of the paper through the press is obtained and maximum capacity is secured. The separation of the registering segments 49 and 50 is required when the cylinder 18 is tripped since the impression cylinder 18 does not move on a radial line of the form cylinder (Fig. 5) and therefore the registering segments would not properly mesh in the off position of the impression cylinder 18 if the impression cylinder could move no farther outwardly than is indicated in Fig. 3. The pair of registering segments 49 and 50 are in a different plane of rotation from the plane of rotation of the pair of registering segments 28 and 29 so that the registering segment upon either impression cylinder will not engage the registering segment upon the form that is individual to the other impression cylinder.

After the sheet 25 has undergone this second printing operation while upon the cylinder 18 it is discharged (directly or indirectly) upon the delivery tapes 51. By the mechanism illustrated in Figs. 2, 3 and 5 the stripping fingers 52 strip the sheet from the cylinder 18 and guide it upon the tapes 51. Rollers 53 engage marginal portions of the paper (parts of the paper not printed upon) to cause the paper to travel with the cylinder 18 thereby to insure the discharge of the paper upon the tapes.

In case the sheets being printed upon are of such a nature that they cannot well be discharged from the press by the mere co-operation of the rollers 53 and the strippers 52, I employ a transfer cylinder 22 whose grippers 54 may be set by the attendant not to close upon their stops when the discharge upon the tapes is to be effected by the co-operation of the rollers 53 and strippers 52. When the transfer cylinder 22 (Figs. 4 and 6) is to effect the discharge of the sheet these grippers are arranged in coöperative relation with their stops to enable them to grip the sheets. A suitable device for adjusting the grippers is indicated at 55 which includes a hand lever 56 and the eccentric mechanism illustrated, the working parts of the adjusting device being held in positions to which they are adjusted by friction. The transfer cylinder 22 is bodily moved away from the cylinder 18 after its grippers have taken the sheet and after

the printing has been completed, to which end the shaft 21 is carried in an eccentric 57 turning within a frame 58 that is in rigid connection with the journal boxes 18² of the cylinder 18. This eccentric 57 has an arm 59 by means of which it may be turned for the purpose of moving the impression cylinder 22 in and out. The mechanism employed for moving the arm desirably includes a link 60, an arm 61 connected with the link and pivoted at 62 the lower arm 61' and a roller 63 engaging the cam 64 carried by the gear 3 so that the operation of the cam mechanism will not disturb or have any ill effect upon the printing surface of the printing cylinder while in printing contact with the paper upon the impression cylinder. The eccentric mechanism and the mechanism for operating the same which has been described is desirably duplicated at both sides of the press except cam 60 and arm 61'. After the paper which has been transferred to the cylinder 22 is laid upon the same and this cylinder has made one revolution and the grippers 54 have passed sufficiently above the tapes 51, such grippers are released from engagement with the paper and the tapes carrying the paper to the delivery mechanism. The transfer cylinders are provided with sheet guards 65 (for the cylinder 10) and 66 (for the cylinder 22). The guards 65 pertaining to the cylinder 10 are stationary, as usual. The guards 66 are provided with mechanism whereby the points thereof follow the bodily movement of the cylinder 22. To this end the guards 66 may be fixedly mounted upon a rod 67 journaled in the upper ends of the arms 68 that are carried by the frame 58. Arm 69 is also in fixed relation to the rod 67 and carries roller 70 at its lower end. The rod 67 is so positioned that the weight of the guards 66 and the arm 69 maintain the roller 70 in engagement with the transfer cylinder 22 in all positions to which this transfer cylinder is bodily adjusted.

Certain features of construction are illustrated and not specifically described as their operation is well known by those skilled in the art. Among these are the stripping fingers 52 and the mechanism for opening and closing the grippers upon the transfer and impression cylinders and also the ink rollers 72 which are individually adjustable toward and from the printing cylinder.

It will be seen that I have provided a printing press with an impression cylinder adapted to receive a sheet and print thereupon during the first revolution of its cycle and to discharge the sheet during the second revolution of its cycle, a transfer cylinder adapted, in the first revolution of its cycle, to receive the sheet being discharged from said impression cylinder and in the second

revolution of its cycle to discharge said sheet, a second impression cylinder adapted, in the first revolution of its cycle, to receive and print thereupon the sheet discharged from the transfer cylinder and, in the second revolution of its cycle, to discharge such sheet, and rotary printing means cooperating with said impression cylinders in printing. This press, as the invention is herein illustrated, includes a printing cylinder common to the impression cylinders and having printing surfaces one for and individual to each impression cylinder, and means for causing the revolution of each impression cylinder a plurality of times for a revolution of the printing cylinder. It will also be seen that where the second transfer cylinder is employed it serves, in the first revolution of its cycle, to receive the sheet being discharged from the second impression cylinder and, in the second revolution of its cycle, to discharge said sheet, there being automatic means for moving this second transfer cylinder away from the second impression cylinder upon the discharge of a sheet from the latter cylinder.

While I have herein shown and particularly described the preferred embodiment of my invention I do not wish to be limited to the precise details of construction shown as changes may readily be made without departing from the spirit of my invention, but having thus described my invention I claim as new and desire to secure by Letters Patent the following:—

1. A rotary printing press including a printing cylinder; an impression cylinder, said cylinders being relatively adjustable to establish and break printing relation between them; a gear having connection with the impression cylinder; a gear in mesh with and driving the aforesaid gear, the axes of rotation of these gears being substantially a fixed distance apart whether said cylinders are in printing or non-printing relation; and a transfer cylinder co-axial with the second gear.

2. A rotary printing press including a printing cylinder; an impression cylinder, said cylinders being relatively adjustable to establish and break printing relation between them; a gear having connection with the impression cylinder; means other than the printing cylinder for driving said gear; and a transfer cylinder also operated by said means.

3. A rotary printing press including a printing cylinder; an impression cylinder, said cylinders being relatively adjustable to establish and break printing relation between them; a gear having connection with the impression cylinder; a gear in mesh with and driving the aforesaid gear, the axes of rotation of these gears being substantially a fixed distance apart whether said cylinders

are in printing or non-printing relation; a third gear having connection with the printing cylinder and driven by the means that drives the second gear; and a transfer cylinder co-axial with the second gear.

4. A rotary printing press including a printing cylinder; an impression cylinder, said cylinders being relatively adjustable to establish and break printing relation between them; a gear having connection with the impression cylinder; a gear in mesh with and driving the aforesaid gear; the axes of rotation of these gears being substantially a fixed distance apart whether said cylinders are in printing or non-printing relation; a third gear having connection with the printing cylinder and driven by the second gear; and a transfer cylinder co-axial with the second gear.

5. A rotary printing press including a printing cylinder; an impression cylinder, said cylinders being relatively adjustable to establish and break printing relation between them; mechanism common to said cylinders for rotating them and operating upon the impression cylinder independently of the printing cylinder in the printing and non-printing operations; and a transfer cylinder also operated by said mechanism.

6. A rotary printing press including a printing cylinder; an impression cylinder, said cylinders being relatively adjustable to establish and break printing relation between them; mechanism common to said cylinders for rotating them and operating upon the impression cylinder independently of the printing cylinder; and a transfer cylinder also operated by said mechanism.

7. A rotary printing press including a printing cylinder; an impression cylinder; a gear having connection with the impression cylinder; a gear in mesh with and driving the aforesaid gear, the axes of rotation of these gears being substantially a fixed distance apart; a third gear having connection with the printing cylinder and driven by the means that drives the second gear; and a transfer cylinder co-axial with the second gear.

8. A rotary printing press including a printing cylinder; an impression cylinder; a gear having connection with the impression cylinder; a gear in mesh with and driving the aforesaid gear, the axes of rotation of these gears being substantially a fixed distance apart; a third gear having connection with the printing cylinder and driven by the second gear; and a transfer cylinder co-axial with the second gear.

9. A rotary printing press including a printing cylinder; an impression cylinder; mechanism common to said cylinders for rotating them and operating upon the impression cylinder independently of the printing cylinder in the printing and non-

printing operations; and a transfer cylinder also operated by said mechanism.

10. A rotary printing press including a printing cylinder; an impression cylinder; a gear having connection with the impression cylinder; means other than the printing cylinder for driving said gear; a transfer cylinder also operated by said means; and a second impression cylinder cooperating with the printing cylinder, said transfer cylinder operating to transfer sheets from one impression cylinder to the other.

11. A rotary printing press including a printing cylinder; an impression cylinder, said cylinders being relatively adjustable to establish and break printing relation between them; a gear having connection with the impression cylinder; a gear in mesh with and driving the aforesaid gear, the axes of rotation of these gears being substantially a fixed distance apart whether said cylinders are in printing or non-printing relation; a transfer cylinder co-axial with the second gear; and a second impression cylinder cooperating with the printing cylinder, said transfer cylinder operating to transfer sheets from one impression cylinder to the other.

12. A rotary printing press including a printing cylinder; an impression cylinder, said cylinders being relatively adjustable to establish and break printing relation between them; a gear having connection with the impression cylinder; means other than the printing cylinder for driving said gear; a transfer cylinder also operated by said means; and a second impression cylinder cooperating with the printing cylinder, said transfer cylinder operating to transfer sheets from one impression cylinder to the other.

13. A rotary printing press including a printing cylinder; an impression cylinder, said cylinders being relatively adjustable to establish and break printing relation between them; a gear having connection with the impression cylinder; a gear in mesh with and driving the aforesaid gear, the axes of rotation of these gears being substantially a fixed distance apart whether said cylinders are in printing or non-printing relation; a third gear having connection with the printing cylinder and driven by the means that drives the second gear; a transfer cylinder co-axial with the second gear; and a second impression cylinder cooperating with the printing cylinder, said transfer cylinder operating to transfer sheets from one impression cylinder to the other.

14. A rotary printing press including a printing cylinder; an impression cylinder, said cylinders being relatively adjustable to establish and break printing relation between them; a gear having connection with the impression cylinder; a gear in mesh

with and driving the aforesaid gear, the axes of rotation of these gears being substantially a fixed distance apart whether said cylinders are in printing or non-printing relation; a third gear having connection with the printing cylinder and driven by the second gear; a transfer cylinder co-axial with the second gear; and a second impression cylinder coöperating with the printing cylinder, said transfer cylinder operating to transfer sheets from one impression cylinder to the other.

15. A rotary printing press including a printing cylinder; an impression cylinder, said cylinders being relatively adjustable to establish and break printing relation between them; mechanism common to said cylinders for rotating them and operating upon the impression cylinder independently of the printing cylinder in the printing and non-printing operations; a transfer cylinder also operated by said mechanism; and a second impression cylinder coöperating with the printing cylinder, said transfer cylinder operating to transfer sheets from one impression cylinder to the other.

16. A rotary printing press including a printing cylinder; an impression cylinder, said cylinders being relatively adjustable to establish and break printing relation between them; mechanism common to said cylinders for rotating them and operating upon the impression cylinder independently of the printing cylinder; a transfer cylinder also operated by said mechanism; and a second impression cylinder coöperating with the printing cylinder, said transfer cylinder operating to transfer sheets from one impression cylinder to the other.

17. A rotary printing press including a printing cylinder; an impression cylinder; a gear having connection with the impression cylinder; a gear in mesh with and driving the aforesaid gear, the axes of rotation of these gears being substantially a fixed distance apart; a third gear having connection with the printing cylinder and driven by the means that drives the second gear; a transfer cylinder co-axial with the second gear; and a second impression cylinder coöperating with the printing cylinder, said transfer cylinder operating to transfer sheets from one impression cylinder to the other.

18. A rotary printing press including a printing cylinder; an impression cylinder; a gear having connection with the impression cylinder; a gear in mesh with and driving the aforesaid gear, the axes of rotation of these gears being substantially a fixed distance apart; a third gear having connection with the printing cylinder and driven by the second gear; a transfer cylinder co-axial with the second gear; and a second impression cylinder coöperating with the print-

ing cylinder, said transfer cylinder operating to transfer sheets from one impression cylinder to the other.

19. A rotary printing press including a printing cylinder; an impression cylinder; mechanism common to said cylinders for rotating them and operating upon the impression cylinder independently of the printing cylinder in the printing and non-printing operations; a transfer cylinder also operated by said mechanism; and a second impression cylinder coöperating with the printing cylinder, said transfer cylinder operating to transfer sheets from one impression cylinder to the other.

20. A rotary printing press including a printing cylinder; an impression cylinder, said cylinders being relatively adjustable to establish and break printing relation between them; a gear having connection with the impression cylinder; means other than the printing cylinder for driving said gear; a transfer cylinder also operated by said means; and a second impression cylinder coöperating with the printing cylinder and adjustable with respect to the printing cylinder to establish and break its printing relation therewith, said transfer cylinder operating to transfer sheets from one impression cylinder to the other.

21. A rotary printing press including a printing cylinder; an impression cylinder, said cylinders being relatively adjustable to establish and break printing relation between them; a gear having connection with the impression cylinder; a gear in mesh with and driving the aforesaid gear, the axes of rotation of these gears being substantially a fixed distance apart whether said cylinders are in printing or non-printing relation; a third gear having connection with the printing cylinder and driven by the means that drives the second gear; a transfer cylinder co-axial with the second gear; and a second impression cylinder coöperating with the printing cylinder and adjustable with respect to the printing cylinder to establish and break its printing relation therewith, said transfer cylinder operating to transfer sheets from one impression cylinder to the other.

22. A rotary printing press including a printing cylinder; an impression cylinder, said cylinders being relatively adjustable to establish and break printing relation between them; a gear having connection with the impression cylinder; a gear in mesh with and driving the aforesaid gear, the axes of rotation of these gears being substantially a fixed distance apart whether said cylinders are in printing or non-printing relation; a third gear having connection with the printing cylinder and driven by the second gear; a transfer cylinder co-axial with the second gear; and a second impression cylinder co-

operating with the printing cylinder and adjustable with respect to the printing cylinder to establish and break its printing relation therewith, said transfer cylinder operating to transfer sheets from one impression cylinder to the other.

23. A rotary printing press including a printing cylinder; an impression cylinder, said cylinders being relatively adjustable to establish and break printing relation between them; mechanism common to said cylinders for rotating them and operating upon the impression cylinder independently of the printing cylinder in the printing and non-printing operations; a transfer cylinder also operated by said mechanism; and a second impression cylinder cooperating with the printing cylinder and adjustable with respect to the printing cylinder to establish and break its printing relation therewith, said transfer cylinder operating to transfer sheets from one impression cylinder to the other.

24. A rotary printing press including a printing cylinder; an impression cylinder, said cylinders being relatively adjustable to establish and break printing relation between them; mechanism common to said cylinders for rotating them and operating upon the impression cylinder independently of the printing cylinder; a transfer cylinder also operated by said mechanism; and a second impression cylinder cooperating with the printing cylinder and adjustable with respect to the printing cylinder to establish and break its printing relation therewith, said transfer cylinder operating to transfer sheets from one impression cylinder to the other.

25. A rotary printing press including a printing cylinder; an impression cylinder, said cylinders being relatively adjustable to establish and break printing relation between them; a gear having connection with the impression cylinder; a gear in mesh with and driving the aforesaid gear, the axes of rotation of these gears being substantially a fixed distance apart whether said cylinders are in printing or non-printing relation; a transfer cylinder co-axial with the second gear; and a second impression cylinder, said transfer cylinder operating to transfer sheets from one impression cylinder to the other.

26. A rotary printing press including a printing cylinder; an impression cylinder, said cylinders being relatively adjustable to establish and break printing relation between them; a gear having connection with the impression cylinder; means other than the printing cylinder for driving said gear; a transfer cylinder also operated by said means; and a second impression cylinder, said transfer cylinder operating to transfer

sheets from one impression cylinder to the other.

27. A rotary printing press including a printing cylinder; an impression cylinder, said cylinders being relatively adjustable to establish and break printing relation between them; a gear having connection with the impression cylinder; a gear in mesh with and driving the aforesaid gear, the axes of rotation of these gears being substantially a fixed distance apart whether said cylinders are in printing or non-printing relation; a third gear having connection with the printing cylinder and driven by the means that drives the second gear; a transfer cylinder co-axial with the second gear; and a second impression cylinder, said transfer cylinder operating to transfer sheets from one impression cylinder to the other.

28. A rotary printing press including a printing cylinder; an impression cylinder, said cylinders being relatively adjustable to establish and break printing relation between them; a gear having connection with the impression cylinder; a gear in mesh with and driving the aforesaid gear, the axes of rotation of these gears being substantially a fixed distance apart whether said cylinders are in printing or non-printing relation; a third gear having connection with the printing cylinder and driven by the second gear; a transfer cylinder co-axial with the second gear; and a second impression cylinder, said transfer cylinder operating to transfer sheets from one impression cylinder to the other.

29. A rotary printing press including a printing cylinder; an impression cylinder, said cylinders being relatively adjustable to establish and break printing relation between them; mechanism common to said cylinders for rotating them and operating upon the impression cylinder independently of the printing cylinder in the printing and non-printing operations; a transfer cylinder also operated by said mechanism; and a second impression cylinder, said transfer cylinder operating to transfer sheets from one impression cylinder to the other.

30. A rotary printing press including a printing cylinder; an impression cylinder; said cylinders being relatively adjustable to establish and break printing relation between them; mechanism common to said cylinders for rotating them and operating upon the impression cylinder independently of the printing cylinder; a transfer cylinder also operated by said mechanism; and a second impression cylinder, said transfer cylinder operating to transfer sheets from one impression cylinder to the other.

31. A rotary printing press including a printing cylinder; an impression cylinder;

a gear having connection with the impression cylinder; a gear in mesh with and driving the aforesaid gear, the axes of rotation of these gears being substantially a fixed distance apart; a third gear having connection with the printing cylinder and driven by the means that drives the second gear; a transfer cylinder co-axial with the second gear; and a second impression cylinder, said transfer cylinder operating to transfer sheets from one impression cylinder to the other.

32. A rotary printing press including a printing cylinder; an impression cylinder; a gear having connection with the impression cylinder; a gear in mesh with and driving the aforesaid gear, the axes of rotation of these gears being substantially a fixed distance apart; a third gear having connection with the printing cylinder and driven by the second gear; a transfer cylinder co-axial with the second gear; and a second impression cylinder, said transfer cylinder operating to transfer sheets from one impression cylinder to the other.

33. A rotary printing press including a printing cylinder; an impression cylinder; mechanism common to said cylinders for rotating them and operating upon the impression cylinder independently of the printing cylinder in the printing and non-printing operations; a transfer cylinder also operated by said mechanism; and a second impression cylinder, said transfer cylinder operating to transfer sheets from one impression cylinder to the other.

34. A rotary printing press including impression cylinders; a transfer cylinder for transferring sheets from one impression cylinder to the other; a printing cylinder having forms thereupon each individual to an impression cylinder and co-extensive with the sheet supporting or impression portion of such impression cylinder; mechanism for moving each impression cylinder away from the printing cylinder when the form upon the printing cylinder that is individual to the other impression cylinder is passing thereby and for restoring printing relation thereof with the printing cylinder when its own form is passing thereby; and mechanism for causing a plurality of revolutions of each of the impression and transfer cylinders for each revolution of the printing cylinder.

35. A rotary printing press including impression cylinders; a transfer cylinder for transferring sheets from one impression cylinder to the other; a printing cylinder having forms thereupon each individual to an impression cylinder and co-extensive with the sheet supporting or impression portion of such impression cylinder; mechanism for moving each impression cylinder away from

the printing cylinder when the form upon the printing cylinder that is individual to the other impression cylinder is passing thereby and for restoring printing relation thereof with the printing cylinder when its own form is passing thereby; mechanism for causing a plurality of revolutions of each of the impression and transfer cylinders for each revolution of the printing cylinder; and a registering mechanism for each impression cylinder having one element upon each impression cylinder and the other at the form upon the printing cylinder which is individual to such impression cylinder.

36. A rotary printing press including impression cylinders; a transfer cylinder for transferring sheets from one impression cylinder to the other; a printing cylinder having forms thereupon each individual to an impression cylinder and co-extensive with the sheet supporting or impression portion of such impression cylinder; mechanism for moving each impression cylinder away from the printing cylinder when the form upon the printing cylinder that is individual to the other impression cylinder is passing thereby and for restoring printing relation thereof with the printing cylinder when its own form is passing thereby; mechanism for causing a plurality of revolutions of each of the impression and transfer cylinders for each revolution of the printing cylinder; and a registering mechanism for each impression cylinder one segment upon such impression cylinder and a complementary segment at the form upon the printing cylinder which is individual to such impression cylinder.

37. A rotary printing press including impression cylinders; a transfer cylinder for transferring sheets from one impression cylinder to the other; a printing cylinder having forms thereupon each individual to an impression cylinder and co-extensive with the sheet supporting or impression portion of such impression cylinder; mechanism for moving each impression cylinder away from the printing cylinder when the form upon the printing cylinder that is individual to the other impression cylinder is passing thereby and for restoring printing relation thereof with the printing cylinder when its own form is passing thereby; mechanism for causing a plurality of revolutions of each of the impression and transfer cylinders for each revolution of the printing cylinder; and a registering mechanism for each impression cylinder one segment upon such impression cylinder and a complementary segment at the form upon the printing cylinder which is individual to such impression cylinder, the registering segment at each form upon the printing cylinder being out of the

plane of operation of the registering segment upon the impression cylinder that is not individual to such form.

38. A rotary printing press including impression cylinders; a transfer cylinder for transferring sheets from one impression cylinder to the other; a printing cylinder having forms thereupon each individual to an impression cylinder and co-extensive with the sheet supporting or impression portion of such impression cylinder; mechanism for moving each impression cylinder away from the printing cylinder when the form upon the printing cylinder that is individual to the other impression cylinder is passing thereby and for restoring printing relation thereof with the printing cylinder when its own form is passing thereby; and mechanism for causing a plurality of revolutions of each of the impression and transfer cylinders for each revolution of the printing cylinder, the axis of the transfer cylinder being maintained substantially a fixed distance from the axis of each impression cylinder.

39. A rotary printing press including impression cylinders; a transfer cylinder for transferring sheets from one impression cylinder to the other; a printing cylinder having forms thereupon each individual to an impression cylinder and co-extensive with the sheet supporting or impression portion of such impression cylinder; mechanism for moving each impression cylinder away from the printing cylinder when the form upon the printing cylinder that is individual to the other impression cylinder is passing thereby and for restoring printing relation thereof with the printing cylinder when its own form is passing thereby; mechanism for causing a plurality of revolutions of each of the impression and transfer cylinders for each revolution of the printing cylinder; and a registering mechanism for each impression cylinder having one element upon each impression cylinder and the other at the form upon the printing cylinder which is individual to such impression cylinder, the axis of the transfer cylinder being maintained substantially a fixed distance from the axis of each impression cylinder.

40. A rotary printing press including impression cylinders; a transfer cylinder for transferring sheets from one impression cylinder to the other; a printing cylinder having forms thereupon each individual to an impression cylinder and co-extensive with the sheet supporting or impression portion of such impression cylinder; mechanism for moving each impression cylinder away from the printing cylinder when the form upon the printing cylinder that is individual to the other impression cylinder is passing thereby and for restoring printing relation

thereof with the printing cylinder when its own form is passing thereby; mechanism for causing a plurality of revolutions of each of the impression and transfer cylinders for each revolution of the printing cylinder; and a registering mechanism for each impression cylinder one segment upon each impression cylinder and a complemental segment at the form upon the printing cylinder which is individual to such impression cylinder, the axis of the transfer cylinder being maintained substantially a fixed distance from the axis of each impression cylinder.

41. A rotary printing press including impression cylinders; a transfer cylinder for transferring sheets from one impression cylinder to the other; a printing cylinder having forms thereupon each individual to an impression cylinder and co-extensive with the sheet supporting or impression portion of such impression cylinder; mechanism for moving each impression cylinder away from the printing cylinder when the form upon the printing cylinder that is individual to the other impression cylinder is passing thereby and for restoring printing relation thereof with the printing cylinder when its own form is passing thereby; mechanism for causing a plurality of revolutions of each of the impression and transfer cylinders for each revolution of the printing cylinder; and a registering mechanism for each impression cylinder one segment upon such impression cylinder and a complemental segment at the form upon the printing cylinder which is individual to such impression cylinder, the registering segment at each form upon the printing cylinder being out of the plane of operation of the registering segment upon the impression cylinder that is not individual to such form, the axis of the transfer cylinder being maintained substantially a fixed distance from the axis of each impression cylinder.

42. A rotary printing press including impression cylinders; a transfer cylinder for transferring sheets from one impression cylinder to the other; a printing cylinder having forms thereupon each individual to an impression cylinder and co-extensive with the sheet supporting or impression portion of such impression cylinder; mechanism for moving each impression cylinder away from the printing cylinder when the form upon the printing cylinder that is individual to the other impression cylinder is passing thereby and for restoring printing relation thereof with the printing cylinder when its own form is passing thereby; mechanism for causing a plurality of revolutions of each of the impression and transfer cylinders for each revolution of the printing cylinder, the transfer cylinder being spaced apart from the second impression cylinder;

and means for bringing the sheet into position to be taken by the second impression cylinder.

43. A rotary printing press including impression cylinders; a transfer cylinder for transferring sheets from one impression cylinder to the other; a printing cylinder having forms thereupon each individual to an impression cylinder and co-extensive with the sheet supporting or impression portion of such impression cylinder; mechanism for moving each impression cylinder away from the printing cylinder when the form upon the printing cylinder that is individual to the other impression cylinder is passing thereby and for restoring printing relation thereof with the printing cylinder when its own form is passing thereby; mechanism for causing a plurality of revolutions of each of the impression and transfer cylinders for each revolution of the printing cylinder; a registering mechanism for each impression cylinder having one element upon each impression cylinder and the other at the form upon the printing cylinder which is individual to such impression cylinder, the transfer cylinder being spaced apart from the second impression cylinder; and means for bringing the sheet into position to be taken by the second impression cylinder.

44. A rotary printing press including impression cylinders; a transfer cylinder for transferring sheets from one impression cylinder to the other; a printing cylinder having forms thereupon each individual to an impression cylinder and co-extensive with the sheet supporting or impression portion of such impression cylinder; mechanism for moving each impression cylinder away from the printing cylinder when the form upon the printing cylinder that is individual to the other impression cylinder is passing thereby and for restoring printing relation thereof with the printing cylinder when its own form is passing thereby; mechanism for causing a plurality of revolutions of each of the impression and transfer cylinders for each revolution of the printing cylinder; a registering mechanism for each impression cylinder one segment upon such impression cylinder and a complemental segment at the form upon the printing cylinder which is individual to such impression cylinder, the transfer cylinder being spaced apart from the second impression cylinder; and means for bringing the sheet into position to be taken by the second impression cylinder.

45. A rotary printing press including impression cylinders; a transfer cylinder for transferring sheets from one impression cylinder to the other; a printing cylinder having forms thereupon each individual to an impression cylinder and co-extensive with the sheet supporting or im-

pression portion of such impression cylinder; mechanism for moving each impression cylinder away from the printing cylinder when the form upon the printing cylinder that is individual to the other impression cylinder is passing thereby and for restoring printing relation thereof with the printing cylinder when its own form is passing thereby; mechanism for causing a plurality of revolutions of each of the impression and transfer cylinders for each revolution of the printing cylinder; a registering mechanism for each impression cylinder one segment upon such impression cylinder and a complemental segment at the form upon the printing cylinder which is individual to such impression cylinder, the registering segment at each form upon the printing cylinder being out of the plane of operation of the registering segment upon the impression cylinder that is not individual to such form, the transfer cylinder being spaced apart from the second impression cylinder; and means for bringing the sheet into position to be taken by the second impression cylinder.

46. A rotary printing press including impression cylinders; a transfer cylinder for transferring sheets from one impression cylinder to the other; a printing cylinder having forms thereupon each individual to an impression cylinder and co-extensive with the sheet supporting or impression portion of such impression cylinder; mechanism for moving each impression cylinder away from the printing cylinder when the form upon the printing cylinder that is individual to the other impression cylinder is passing thereby and for restoring printing relation thereof with the printing cylinder when its own form is passing thereby; mechanism for causing a plurality of revolutions of each of the impression and transfer cylinders for each revolution of the printing cylinder, this axis of the transfer cylinder being maintained substantially a fixed distance from the axis of each impression cylinder, said transfer cylinder and the second impression cylinder having grippers; and means for moving the grippers of one of these cylinders across the gap between the cylinders to enable the grippers upon the second impression cylinder to take the sheet.

47. A rotary printing press including impression cylinders; a transfer cylinder for transferring sheets from one impression cylinder to the other; a printing cylinder having forms thereupon each individual to an impression cylinder and co-extensive with the sheet supporting or impression portion of such impression cylinder; mechanism for moving each impression cylinder away from the printing cylinder when the form upon the printing cylinder that is individual to

the other impression cylinder is passing thereby and for restoring printing relation thereof with the printing cylinder when its own form is passing thereby; mechanism for causing a plurality of revolutions of each of the impression and transfer cylinders for each revolution of the printing cylinder; a registering mechanism for each impression cylinder having one element upon each impression cylinder and the other at the form upon the printing cylinder which is individual to such impression cylinder, the axis of the transfer cylinder being maintained substantially a fixed distance from the axis of each impression cylinder, said transfer cylinder and the second impression cylinder having grippers; and means for moving the grippers of one of these cylinders across the gap between the cylinders to enable the grippers upon the second impression cylinder to take the sheet.

48. A rotary printing press including impression cylinders; a transfer cylinder for transferring sheets from one impression cylinder to the other; a printing cylinder having forms thereupon each individual to an impression cylinder and co-extensive with the sheet supporting or impression portion of such impression cylinder; mechanism for moving each impression cylinder away from the printing cylinder when the form upon the printing cylinder that is individual to the other impression cylinder is passing thereby and for restoring printing relation thereof with the printing cylinder when its own form is passing thereby; mechanism for causing a plurality of revolutions of each of the impression and transfer cylinders for each revolution of the printing cylinder; a registering mechanism for each impression cylinder one segment upon each impression cylinder and a complemental segment at the form upon the printing cylinder which is individual to such impression cylinder, the axis of the transfer cylinder being maintained substantially a fixed distance from the axis of each impression cylinder, said transfer cylinder and the second impression cylinder having grippers; and means for moving the grippers of one of these cylinders across the gap between the cylinders to enable the grippers upon the second impression cylinder to take the sheet.

49. A rotary printing press including impression cylinders; a transfer cylinder for transferring sheets from one impression cylinder to the other; a printing cylinder having forms thereupon each individual to an impression cylinder and co-extensive with the sheet supporting or impression portion of such impression cylinder; mechanism for moving each impression cylinder away from the printing cylinder when the form upon the printing cylinder that is individual to

the other impression cylinder is passing thereby and for restoring printing relation thereof with the printing cylinder when its own form is passing thereby; mechanism for causing a plurality of revolutions of each of the impression and transfer cylinders for each revolution of the printing cylinder; a registering mechanism for each impression cylinder one segment upon such impression cylinder and a complemental segment at the form upon the printing cylinder which is individual to such impression cylinder, the registering segment at each form upon the printing cylinder being out of the plane of operation of the registering segment upon the impression cylinder that is not individual to such form, the axis of the transfer cylinder being maintained substantially a fixed distance from the axis of each impression cylinder, said transfer cylinder and the second impression cylinder having grippers; and means for moving the grippers of one of these cylinders across the gap between the cylinders to enable the grippers upon the second impression cylinder to take the sheet.

50. A rotary printing press including impression cylinders; a transfer cylinder for transferring sheets from one impression cylinder to the other; a printing cylinder having forms thereupon each individual to an impression cylinder and co-extensive with the sheet supporting or impression portion of such impression cylinder; mechanism for moving each impression cylinder away from the printing cylinder when the form upon the printing cylinder that is individual to the other impression cylinder is passing thereby and for restoring printing relation thereof with the printing cylinder when its own form is passing thereby; mechanism for causing a plurality of revolutions of each of the impression and transfer cylinders for each revolution of the printing cylinder, the axis of the transfer cylinder being maintained substantially a fixed distance from the axis of each impression cylinder, said transfer cylinder and the second impression cylinder having grippers; and means for moving the grippers of the transfer cylinder across the gap between the cylinders to enable the grippers of the transfer cylinder to present the sheet undergoing transfer to the grippers of the second impression cylinder.

51. A rotary printing press including impression cylinders; a transfer cylinder for transferring sheets from one impression cylinder to the other; a printing cylinder having forms thereupon each individual to an impression cylinder and co-extensive with the sheet supporting or impression portion of such impression cylinder; mechanism for moving each impression cylinder away from the printing cylinder when the form upon the printing cylinder that is individual to

the other impression cylinder is passing thereby and for restoring printing relation thereof with the printing cylinder when its own form is passing thereby; mechanism for causing a plurality of revolutions of each of the impression and transfer cylinders for each revolution of the printing cylinder; a registering mechanism for each impression cylinder having one element upon each impression cylinder and the other at the form upon the printing cylinder which is individual to such impression cylinder, the axis of the transfer cylinder being maintained substantially a fixed distance from the axis of each impression cylinder, said transfer cylinder and the second impression cylinder having grippers; and means for moving the grippers of the transfer cylinder across the gap between the cylinders to enable the grippers of the transfer cylinder to present the sheet undergoing transfer to the grippers of the second impression cylinder.

52. A rotary printing press including impression cylinders; a transfer cylinder for transferring sheets from one impression cylinder to the other; a printing cylinder having forms thereupon each individual to an impression cylinder and co-extensive with the sheet supporting or impression portion of such impression cylinder; mechanism for moving each impression cylinder away from the printing cylinder when the form upon the printing cylinder that is individual to the other impression cylinder is passing thereby and for restoring printing relation thereof with the printing cylinder when its own form is passing thereby; mechanism for causing a plurality of revolutions of each of the impression and transfer cylinders for each revolution of the printing cylinder; a registering mechanism for each impression cylinder one segment upon each impression cylinder and a complementary segment at the form upon the printing cylinder which is individual to such impression cylinder, the axis of the transfer cylinder being maintained substantially a fixed distance from the axis of each impression cylinder, said transfer cylinder and the second impression cylinder having grippers; and means for moving the grippers of the transfer cylinder across the gap between the cylinders to enable the grippers of the transfer cylinder to present the sheet undergoing transfer to the grippers of the second impression cylinder.

53. A rotary printing press including impression cylinders; a transfer cylinder for transferring sheets from one impression cylinder to the other; a printing cylinder having forms thereupon each individual to an impression cylinder and co-extensive with the sheet supporting or impression portion of such impression cylinder; mechanism for moving each impression cylinder away from the printing cylinder when the form upon the printing cylinder that is individual to the other impression cylinder is passing

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away from the printing cylinder when the form upon the printing cylinder that is individual to the other impression cylinder is passing thereby and for restoring printing relation thereof with the printing cylinder 70
when its own form is passing thereby; mechanism for causing a plurality of revolutions of each of the impression and transfer cylinders for each revolution of the printing cylinder; a registering mechanism for each impression cylinder one segment upon such impression cylinder and a complementary segment at the form upon the printing cylinder which is individual to such impression cylinder, the registering segment at each form upon the printing cylinder being out of the plane of operation of the registering segment upon the impression cylinder that is not individual to such form, the axis of the transfer cylinder being maintained substantially a fixed distance from the axis of each impression cylinder, said transfer cylinder and the second impression cylinder having grippers; and means for moving the grippers of the transfer cylinder across the gap between the cylinders to enable the grippers of the transfer cylinder to present the sheet undergoing transfer to the grippers of the second impression cylinder. 80

54. A rotary printing press including impression cylinders; a transfer cylinder for transferring sheets from one impression cylinder to the other; a printing cylinder having forms thereupon each individual to an impression cylinder and co-extensive with the sheet supporting or impression portion of such impression cylinder; mechanism for moving each impression cylinder away from the printing cylinder when the form upon the printing cylinder that is individual to the other impression cylinder is passing thereby and for restoring printing relation thereof with the printing cylinder when its own form is passing thereby; mechanism for causing a plurality of revolutions of each of the impression and transfer cylinders for each revolution of the printing cylinder, the transfer cylinder being between the impression cylinders; and a shaft co-axial with the transfer cylinder and in driving relation to all of the aforesaid cylinders. 100
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55. A rotary printing press including impression cylinders; a transfer cylinder for transferring sheets from one impression cylinder to the other; a printing cylinder having forms thereupon each individual to an impression cylinder and co-extensive with the sheet supporting or impression portion of such impression cylinder; mechanism for moving each impression cylinder away from the printing cylinder when the form upon the printing cylinder that is individual to the other impression cylinder is passing 120
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thereby and for restoring printing relation thereof with the printing cylinder when its own form is passing thereby; mechanism for causing a plurality of revolutions of each of the impression and transfer cylinders for each revolution of the printing cylinder, the transfer cylinder being between the impression cylinders; and a shaft co-axial with the transfer cylinder and in driving relation to all of the aforesaid cylinders and operating the impression cylinders without the intervention of the printing cylinder.

56. A rotary printing press including impression cylinders; a transfer cylinder for transferring sheets from one impression cylinder to the other; a printing cylinder having forms thereupon each individual to an impression cylinder and co-extensive with the sheet supporting or impression portion of such impression cylinder; mechanism for moving each impression cylinder away from the printing cylinder when the form upon the printing cylinder that is individual to the other impression cylinder is passing thereby and for restoring printing relation thereof with the printing cylinder when its own form is passing thereby; mechanism for causing a plurality of revolutions of each of the impression and transfer cylinders for each revolution of the printing cylinder, the transfer cylinder being between the impression cylinders; and a shaft co-axial with the transfer cylinder and in driving relation with the impression cylinders.

57. A rotary printing press including impression cylinders; a transfer cylinder for transferring sheets from one impression cylinder to the other; a printing cylinder having forms thereupon each individual to an impression cylinder and co-extensive with the sheet supporting or impression portion of such impression cylinder; mechanism for moving each impression cylinder away from the printing cylinder when the form upon the printing cylinder that is individual to the other impression cylinder is passing thereby and for restoring printing relation thereof with the printing cylinder when its own form is passing thereby; mechanism for causing a plurality of revolutions of each of the impression and transfer cylinders for each revolution of the printing cylinder, the transfer cylinder being between the impression cylinders; and a shaft co-axial with the transfer cylinder and in driving relation with the impression cylinders without the intervention of the printing cylinder.

58. A rotary printing press including impression cylinders; a transfer cylinder for transferring sheets from one impression cylinder to the other; a printing cylinder having forms thereupon each individual to an impression cylinder and co-extensive with the sheet supporting or impression portion

of such impression cylinder; mechanism for moving each impression cylinder away from the printing cylinder when the form upon the printing cylinder that is individual to the other impression cylinder is passing thereby and for restoring printing relation thereof with the printing cylinder when its own form is passing thereby; mechanism for causing a plurality of revolutions of each of the impression and transfer cylinders for each revolution of the printing cylinder, the transfer cylinder being between the impression cylinders; a shaft co-axial with the transfer cylinder and in driving relation to all of the aforesaid cylinders; a gear upon said shaft; and a gear below this gear for driving the gear that is upon the shaft.

59. A rotary printing press including impression cylinders; a transfer cylinder for transferring sheets from one impression cylinder to the other; a printing cylinder having forms thereupon each individual to an impression cylinder and co-extensive with the sheet supporting or impression portion of such impression cylinder; mechanism for moving each impression cylinder away from the printing cylinder when the form upon the printing cylinder that is individual to the other impression cylinder is passing thereby and for restoring printing relation thereof with the printing cylinder when its own form is passing thereby; mechanism for causing a plurality of revolutions of each of the impression and transfer cylinders for each revolution of the printing cylinder, the transfer cylinder being between the impression cylinders; a shaft co-axial with the transfer cylinder and in driving relation to all of the aforesaid cylinders and operating the impression cylinders without the intervention of the printing cylinder; a gear upon said shaft; and a gear below this gear for driving the gear that is upon the shaft.

60. A rotary printing press including impression cylinders; a transfer cylinder for transferring sheets from one impression cylinder to the other; a printing cylinder having forms thereupon each individual to an impression cylinder and co-extensive with the sheet supporting or impression portion of such impression cylinder; mechanism for moving each impression cylinder away from the printing cylinder when the form upon the printing cylinder that is individual to the other impression cylinder is passing thereby and for restoring printing relation thereof with the printing cylinder when its own form is passing thereby; mechanism for causing a plurality of revolutions of each of the impression and transfer cylinders for each revolution of the printing cylinder, the transfer cylinder being between the impression cylinders; a shaft co-axial with the transfer cylinder and in driving relation

with the impression cylinders; a gear upon said shaft; and a gear below this gear for driving the gear that is upon the shaft.

61. A rotary printing press including impression cylinders; a transfer cylinder for transferring sheets from one impression cylinder to the other; a printing cylinder having forms thereupon each individual to an impression cylinder and co-extensive with the sheet supporting or impression portion of such impression cylinder; mechanism for moving each impression cylinder away from the printing cylinder when the form upon the printing cylinder that is individual to the other impression cylinder is passing thereby and for restoring printing relation thereof with the printing cylinder when its own form is passing thereby; mechanism for causing a plurality of revolutions of each of the impression and transfer cylinders for each revolution of the printing cylinder, the transfer cylinder being between the impression cylinders; a shaft co-axial with the transfer cylinder and in driving relation with the impression cylinders without the intervention of the printing cylinder; a gear upon said shaft; and a gear below this gear for driving the gear that is upon the shaft.

62. A printing press including an impression cylinder; a transfer cylinder normally spaced apart from the impression cylinder, both cylinders adapted to carry sheets at the same time, the space between the cylinders preventing the sheet upon the transfer cylinder from contacting with the freshly printed surface of the sheet upon the impression cylinder; and means for effecting transfer of a sheet from the transfer cylinder to the impression cylinder.

63. A printing press including an impression cylinder; a transfer cylinder normally spaced apart from the impression cylinder, both cylinders adapted to carry sheets at the same time, the space between the cylinders preventing the sheet upon the transfer cylinder from contacting with the freshly printed surface of the sheet upon the impression cylinder; grippers upon said cylinders; and means for moving the grippers upon a cylinder across the gap between the cylinders to enable the grippers upon the impression cylinder to take the sheet.

64. A printing press including a cylinder; a second cylinder normally spaced apart from the first cylinder, both cylinders adapted to carry sheets at the same time, the space between the cylinders preventing the sheet upon the second cylinder from contacting with the freshly printed surface of the sheet upon the first cylinder; and means for effecting transfer of a sheet from the second cylinder to the first cylinder.

65. A printing press including a cylinder; a second cylinder normally spaced apart from the first cylinder, both cylinders

adapted to carry sheets at the same time, the space between the cylinders preventing the sheet upon the second cylinder from contacting with the freshly printed surface of the sheet upon the first cylinder; grippers upon said cylinders; and means for moving the grippers upon a cylinder across the gap between the cylinders to enable the grippers upon the first cylinder to take the sheet.

66. A printing press including an impression cylinder; a transfer cylinder normally spaced apart from the impression cylinder, both cylinders adapted to carry sheets at the same time, the space between the cylinders preventing the sheet upon the transfer cylinder from contacting with the freshly printed surface of the sheet upon the impression cylinder; grippers upon said cylinders; and means for moving the grippers upon a cylinder across the gap between the cylinders to enable the grippers upon the impression cylinder to take the sheet and operating to move the sheet across the gap without effecting creepage or backlash of the sheet upon the cylinder from which the sheet is being transferred.

67. A printing press including a cylinder; a second cylinder normally spaced apart from the first cylinder, both cylinders adapted to carry sheets at the same time, the space between the cylinders preventing the sheet upon the second cylinder from contacting with the freshly printed surface of the sheet upon the first cylinder; grippers upon said cylinders; and means for moving the grippers upon a cylinder across the gap between the cylinders to enable the grippers upon the first cylinder to take the sheet and operating to move the sheet across the gap without effecting creepage or backlash of the sheet upon the cylinder from which the sheet is being transferred.

68. A printing press including an impression cylinder; a transfer cylinder normally spaced apart from the impression cylinder, both cylinders adapted to carry sheets at the same time, the space between the cylinders preventing the sheet upon the transfer cylinder from contacting with the freshly printed surface of the sheet upon the impression cylinder; grippers upon said cylinders; means for moving the grippers upon a cylinder across the gap between the cylinders to enable the grippers upon the impression cylinder to take the sheet; and meshing gears carried by said cylinders and co-axial therewith whose axes are maintained substantially a fixed distance apart and whose pitch circles touch at the middle of the gap.

69. A printing press including a cylinder; a second cylinder normally spaced apart from the first cylinder, both cylinders adapted to carry sheets at the same time, the space between the cylinders preventing the sheet upon the second cylinder from con-

tacting with the freshly printed surface of the sheet upon the first cylinder; grippers upon said cylinders; means for moving the grippers upon a cylinder across the gap between the cylinders to enable the grippers upon the first cylinder to take the sheet; and meshing gears carried by said cylinders and co-axial therewith whose axes are maintained substantially a fixed distance apart and whose pitch circles touch at the middle of the gap.

70. A printing press including an impression cylinder; a transfer cylinder normally spaced apart from the impression cylinder, both cylinders adapted to carry sheets at the same time, the space between the cylinders preventing the sheet upon the transfer cylinder from contacting with the freshly printed surface of the sheet upon the impression cylinder; grippers upon said cylinders; means for moving the grippers upon a cylinder across the gap between the cylinders to enable the grippers upon the impression cylinder to take the sheet and operating to move the sheet across the gap without effecting creepage or backlash of the sheet upon the cylinder from which the sheet is being transferred; and meshing gears carried by said cylinders and co-axial therewith whose axes are maintained substantially a fixed distance apart and whose pitch circles touch at the middle of the gap.

71. A printing press including a cylinder; a second cylinder normally spaced apart from the first cylinder, both cylinders adapted to carry sheets at the same time, the space between the cylinders preventing the sheet upon the second cylinder from contacting with the freshly printed surface of the sheet upon the first cylinder; grippers upon said cylinders; means for moving the grippers upon a cylinder across the gap between the cylinders to enable the grippers upon the first cylinder to take the sheet and operating to move the sheet across the gap without effecting creepage or backlash of the sheet upon the cylinder from which the sheet is being transferred; and meshing gears carried by said cylinders and co-axial therewith whose axes are maintained substantially a fixed distance apart and whose pitch circles touch at the middle of the gap.

72. A printing press including an impression cylinder; a transfer cylinder adapted to receive sheets from said impression cylinder; and press actuated means for moving said transfer cylinder to and away from said impression cylinder and adapted to maintain said transfer cylinder disassociated from said impression cylinder during certain periods in the normal operation of the machine.

73. A printing press including an impression cylinder; a transfer cylinder; mechanism whereby the transfer cylinder is bodily

moved with respect to the impression cylinder; and sheet guards having means whereby they are caused to follow the transfer cylinder in its bodily movements.

74. A printing press including a transfer cylinder; grippers thereon for taking sheets and operating to hold the sheets for a plurality of revolutions of the transfer cylinder; and means for preventing the grippers from taking the sheets around with the transfer cylinder when the sheets are to be discharged direct.

75. A printing press including a transfer cylinder; grippers thereon for taking sheets and operating to hold the sheets for a plurality of revolutions of the transfer cylinder; means for preventing the grippers from taking the sheets around with the transfer cylinder when the sheets are to be discharged direct; and riders for directing the sheets when they are delivered without being carried around with the transfer cylinder.

76. In a printing press the combination with an impression cylinder adapted to receive a sheet and print thereupon during the first revolution of its cycle and to discharge the sheet during the second revolution of its cycle; of a transfer cylinder adapted, in the first revolution of its cycle, to receive the sheet being discharged from said impression cylinder and in the second revolution of its cycle to discharge said sheet; a second impression cylinder adapted, in the first revolution of its cycle, to receive and print upon the sheet discharged from the transfer cylinder and, in the second revolution of its cycle, to discharge such sheet; a second transfer cylinder adapted, in the first revolution of its cycle, to receive the sheet being discharged from the second impression cylinder and in the second revolution of its cycle to discharge said sheet; rotary printing means cooperating with said impression cylinders in printing; and means for moving the second transfer cylinder away from the second impression cylinder upon the discharge of a sheet from the latter cylinder.

77. In a printing press the combination with an impression cylinder adapted to receive a sheet and print thereupon during the first revolution of its cycle and to discharge the sheet during the second revolution of its cycle; of a transfer cylinder adapted, in the first revolution of its cycle, to receive the sheet being discharged from said impression cylinder and in the second revolution of its cycle to discharge said sheet; a second impression cylinder adapted, in the first revolution of its cycle to receive and print upon the sheet discharged from the transfer cylinder and, in the second revolution of its cycle, to discharge such sheet; a second transfer cylinder adapted, in the first revolution of its cycle, to receive the sheet being dis-

charged from the second impression cylinder and in the second revolution of its cycle to discharge said sheet; a printing cylinder common to said impression cylinder and having printing surfaces, one for and individual to each impression cylinder; means for causing the revolution of each impression cylinder a plurality of times for a revolution of the printing cylinder; and means for moving the second transfer cylinder away from the second impression cylinder upon the discharge of a sheet from the latter cylinder.

78. In a printing press the combination with an impression cylinder adapted to receive a sheet and print thereupon during the first revolution of its cycle and to discharge the sheet during the second revolution of its cycle; of a transfer cylinder adapted, in the first revolution of its cycle, to receive the sheet being discharged from said impression cylinder and in the second revolution of its cycle to discharge said sheet; a second impression cylinder adapted, in the first revolution of its cycle to receive and print upon the sheet discharged from the transfer cylinder and, in the second revolution of its cycle, to discharge such sheet; a second transfer cylinder adapted, in the first revolution of its cycle, to receive the sheet being discharged from the second impression cylinder and in the second revolution of its cycle to discharge said sheet; a printing cylinder common to said impression cylinder and having printing surfaces, one for and individual to each impression cylinder; means for causing the revolution of each impression cylinder a plurality of times for a revolution of the printing cylinder; means for breaking the printing relation between each impression cylinder and the printing cylinder when the printing surface not individual to such impression cylinder is passing thereby; and means for moving the second transfer cylinder away from the second impression cylinder upon the discharge of a sheet from the latter cylinder.

79. In a printing press the combination with an impression cylinder adapted to receive a sheet and print thereupon during the first revolution of its cycle and to discharge the sheet during the second revolution of its cycle; of a transfer cylinder adapted, in the first revolution of its cycle, to receive the sheet being discharged from said impression cylinder and in the second revolution of its cycle to discharge said sheet; a second impression cylinder adapted, in the first revolution of its cycle, to receive and print upon the sheet discharged from the transfer cylinder and, in the second revolution of its cycle, to discharge such sheet; a second transfer cylinder adapted to receive the sheet being discharged from the second impression cylinder; rotary printing means co-

operating with said impression cylinders in printing; and means for moving the second transfer cylinder away from the second impression cylinder upon the discharge of a sheet from the latter cylinder.

80. In a printing press the combination with an impression cylinder adapted to receive a sheet and print thereupon during the first revolution of its cycle and to discharge the sheet during the second revolution of its cycle; of a transfer cylinder adapted, in the first revolution of its cycle, to receive the sheet being discharged from said impression cylinder and in the second revolution of its cycle to discharge said sheet; a second impression cylinder adapted, in the first revolution of its cycle to receive and print upon the sheet discharged from the transfer cylinder and, in the second revolution of its cycle, to discharge such sheet; a second transfer cylinder adapted to receive the sheet being discharged from the second impression cylinder; a printing cylinder common to said impression cylinder and having printing surfaces, one for and individual to each impression cylinder; means for causing the revolution of each impression cylinder a plurality of times for a revolution of the printing cylinder; and means for moving the second transfer cylinder away from the second impression cylinder upon the discharge of a sheet from the latter cylinder.

81. In a printing press the combination with an impression cylinder adapted to receive a sheet and print thereupon during the first revolution of its cycle and to discharge the sheet during the second revolution of its cycle; of a transfer cylinder adapted, in the first revolution of its cycle, to receive the sheet being discharged from said impression cylinder and in the second revolution of its cycle to discharge said sheet; a second impression cylinder adapted, in the first revolution of its cycle to receive and print upon the sheet discharged from the transfer cylinder and, in the second revolution of its cycle, to discharge such sheet; a second transfer cylinder adapted to receive the sheet being discharged from the second impression cylinder; a printing cylinder common to said impression cylinder and having printing surfaces, one for and individual to each impression cylinder; means for causing the revolution of each impression cylinder a plurality of times for a revolution of the printing cylinder; means for breaking the printing relation between each impression cylinder and the printing cylinder when the printing surface not individual to each impression cylinder is passing thereby; and means for moving the second transfer cylinder away from the second impression cylinder upon the discharge of a sheet from the latter cylinder.

82. In a printing press, the combination with an impression cylinder adapted to receive a sheet and print thereupon during the first revolution of its cycle and to discharge the sheet during the second revolution of its cycle; of a transfer cylinder adapted to receive the sheet being discharged from said impression cylinder; a printing cylinder cooperating with the impression cylinder in printing; means for causing a plurality of revolutions of the impression cylinder for a revolution of the printing cylinder; and means for moving the transfer cylinder away from the impression cylinder upon the discharge of a sheet from the latter cylinder.

83. In a printing press, the combination with an impression cylinder adapted to receive a sheet and print thereupon during the first revolution of its cycle and to discharge the sheet during the second revolution of its cycle; of a transfer cylinder adapted to receive the sheet being discharged from said impression cylinder; a printing cylinder cooperating with the impression cylinder in printing; and means for moving the transfer cylinder away from the impression cylinder upon the discharge of a sheet from the latter cylinder.

84. In a printing press, the combination with an impression cylinder adapted to receive a sheet and print thereupon during the first revolution of its cycle and to discharge the sheet during the second revolution of its cycle; of a transfer cylinder adapted to receive the sheet being discharged from said impression cylinder; a printing cylinder cooperating with the impression cylinder in printing; means for causing a plurality of revolutions of the impression cylinder for a revolution of the printing cylinder; and automatic means for moving the transfer cylinder away from the impression cylinder upon the discharge of a sheet from the latter cylinder.

85. In a printing press, the combination with an impression cylinder adapted to receive a sheet and print thereupon during the first revolution of its cycle and to discharge the sheet during the second revolution of its cycle; of a transfer cylinder adapted to receive the sheet being discharged from said impression cylinder; a printing cylinder cooperating with the impression cylinder in printing; and automatic means for moving the transfer cylinder away from the impression cylinder upon the discharge of a sheet from the latter cylinder.

86. A rotary printing press including a printing cylinder; an impression cylinder, said impression cylinder being adjustable to establish and break printing relation between it and said printing cylinder; a gear having

connection with the impression cylinder; a second gear in mesh with and driving the aforesaid gear, the axes of rotation of these gears being substantially a fixed distance apart whether said cylinder is in printing or non-printing position; a driving connection between said second gear and said printing cylinder; coacting registering segments on said cylinders; and means for moving said impression cylinder into non-printing position and adapted to separate the orbits of said registering segments when said impression cylinder is in non-printing position.

87. A rotary printing press including a printing cylinder; an impression cylinder; a transfer cylinder, said impression cylinder being adjustable to establish and break the printing relation between it and said printing cylinder, said impression cylinder being movable in a path to maintain its axis substantially a fixed distance from the axis of said transfer cylinder; a gear having connection with said impression cylinder and movable therewith; a second gear having connection with said transfer cylinder for driving the same and meshing with said first mentioned gear at a point substantially coincident with the line of closest proximity of said impression cylinder and said transfer cylinder; a driving connection between said second gear and said printing cylinder; coacting registering elements on said printing cylinder and said impression cylinder; and means for moving said impression cylinder into non-printing position and adapted to separate the orbits of said registering segments when said impression cylinder is in non-printing position.

88. A rotary printing press including a printing cylinder; an impression cylinder; a transfer cylinder, said impression cylinder being adjustable to establish and break printing relation between it and said printing cylinder and movable in a path to maintain its axis substantially a fixed distance from the axis of said transfer cylinder; a gear mounted on said impression cylinder; a second gear mounted on said transfer cylinder and meshing with said first mentioned gear; a driving connection between said second gear and said printing cylinder; coacting registering elements on said printing cylinder and said impression cylinder; and means for moving said impression cylinder into non-printing position and adapted to separate the orbits of said registering segments when said impression cylinder is in non-printing position.

In witness whereof, I hereunto subscribe my name this first day of February A. D., 1917.

ROBERT MIEHLE.