

G. E. PANCOAST.
PRINTING PRESS.

APPLICATION FILED NOV. 15, 1900. RENEWED MAR. 27, 1908.

942,923.

Patented Dec. 14, 1909.

2 SHEETS—SHEET 1.

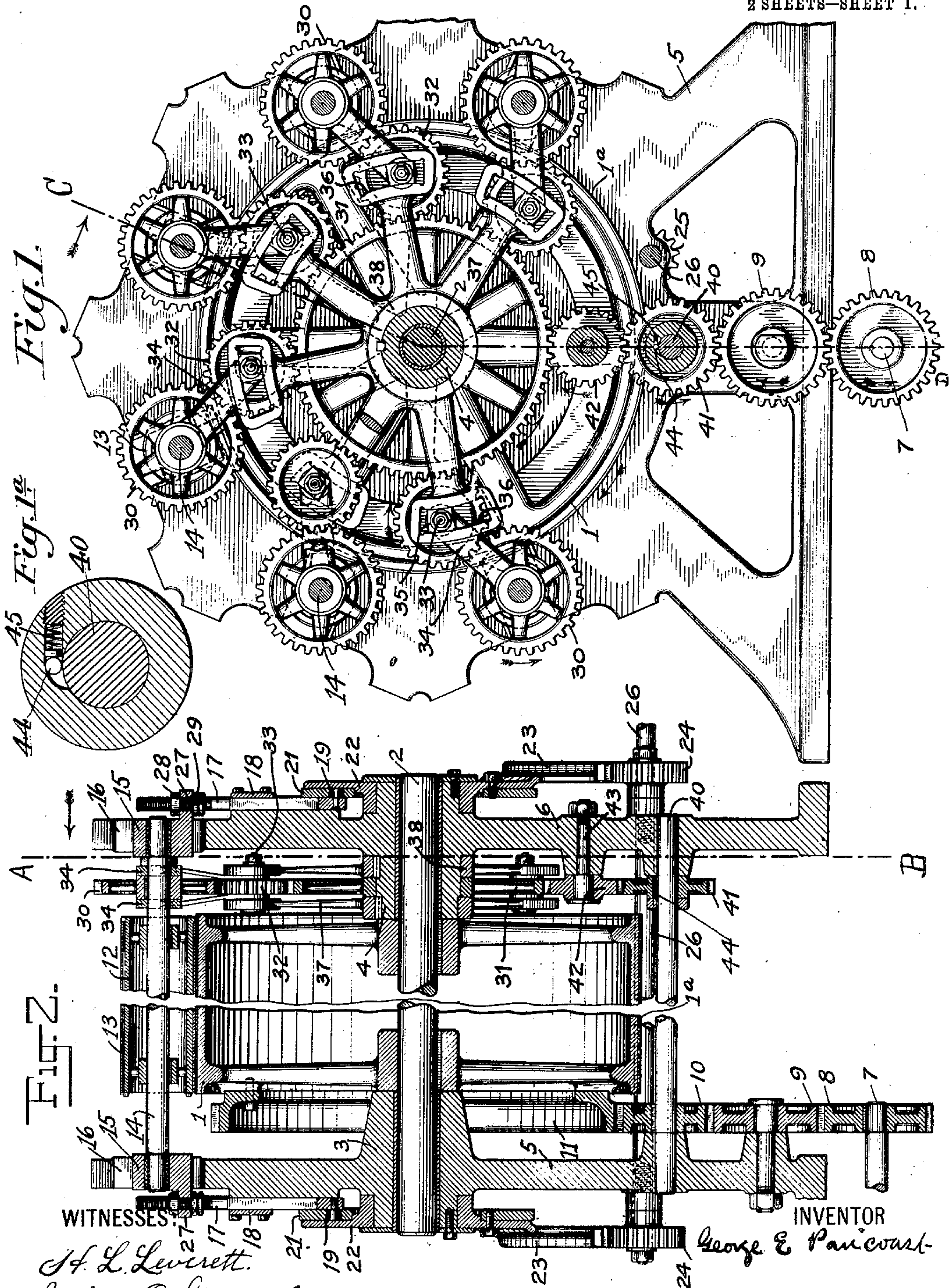


Fig. 2.

Fig. 1.

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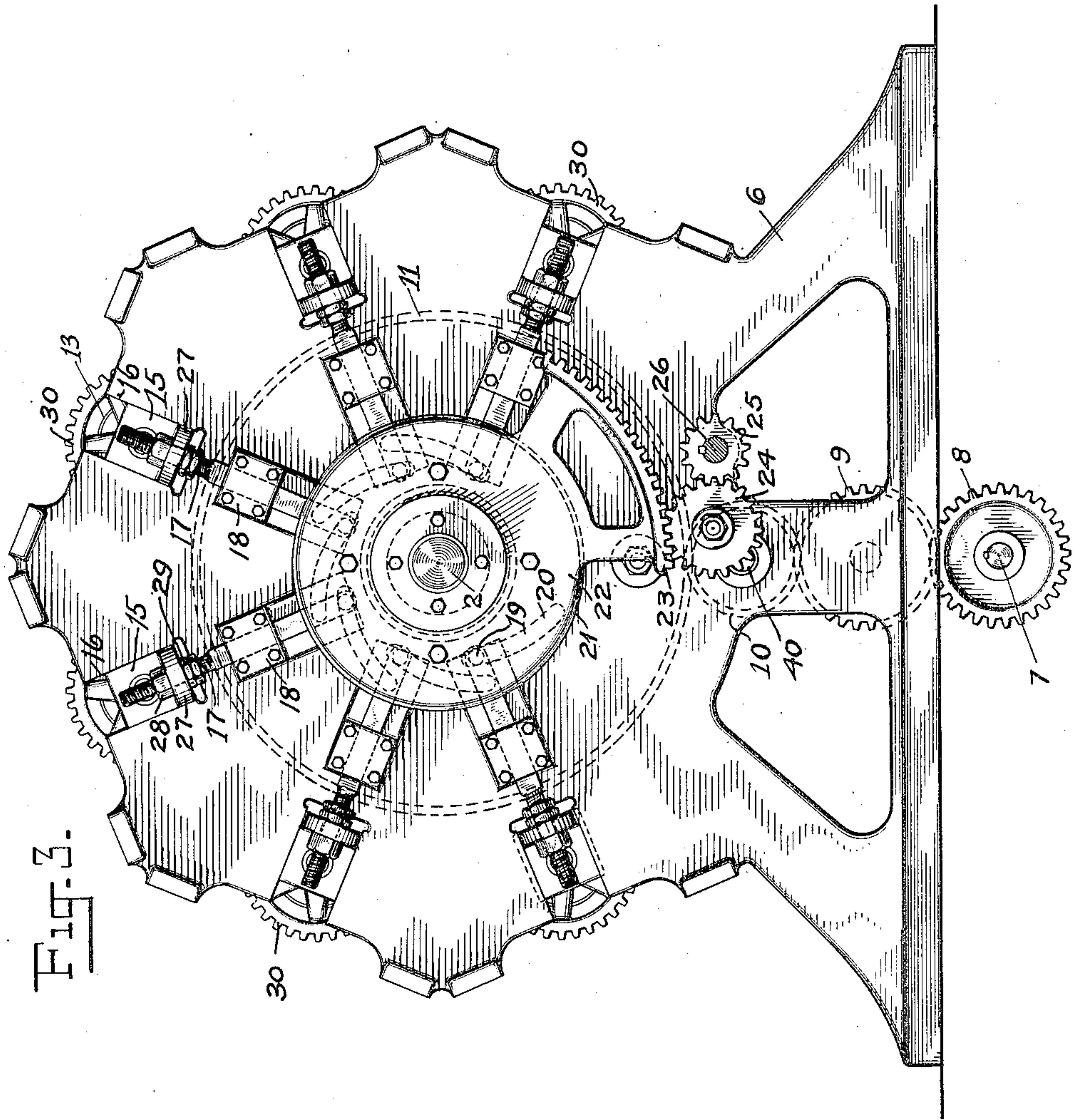


Fig. 3.

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UNITED STATES PATENT OFFICE.

GEORGE E. PANCOAST, OF BROOKLYN, NEW YORK, ASSIGNOR TO AMERICAN LITHOGRAPHIC COMPANY, A CORPORATION OF NEW YORK.

PRINTING-PRESS.

942,923.

Specification of Letters Patent.

Patented Dec. 14, 1909.

Application filed November 15, 1900, Serial No. 36,604. Renewed March 27, 1908. Serial No. 423,550.

To all whom it may concern:

Be it known that I, GEORGE E. PANCOAST, a citizen of the United States, and a resident of Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Printing-Presses, of which the following is a specification.

My invention relates to printing presses and particularly to multicolor planographic presses of the rotary type. As presses of the type referred to have been constructed heretofore it is difficult to maintain a perfect rolling contact between the printing and impression surfaces. To accomplish this it is not only necessary that the gearing, which is universally provided in some form between the members of the printing couple, be perfect in construction but the printing and impression surfaces must exactly coincide with the pitch lines of the gearing. If this coincidence is once secured it is destroyed by any change in the condition of the parts, as, for instance, any change in the thickness of the impression blanket or in the diameter of a form or in the distance between the members of the printing couple. When the printing and impression surfaces do not coincide with the pitch lines of the gearing there is a continual slipping between the contacting surfaces which is not only detrimental to good printing but is very destructive of the surfaces themselves. In planographic or lithographic presses especially any slipping between the printing and impression surfaces will soon cause the printing surfaces to take ink on the non-printing or water-carrying parts of the surface, or to "tint" as it is termed in the art.

The object of my invention is to secure a perfect rolling contact between the printing and impression members of presses of the type referred to and nevertheless to provide a press which is practically capable of all the operations necessary or desirable in getting ready to print and in printing and especially in multicolor planographic printing on the web.

With this general object in view the minor objects of my invention are to provide a printing press in which the printing and impression members are driven by frictional contact one from another during the printing operation but are driven independently of each other when separated; also, to provide

in such a machine a construction whereby when the members of the printing couple are separated and brought together, the frictionally driven member is automatically connected to and disconnected from its independent driving mechanism; also, to provide in a machine having a plurality of printing surfaces which may be simultaneously moved into and out of contact with the impression member, a construction whereby the printing surfaces are caused to operate in unison whether in or out of contact with the impression member; also to provide a construction whereby the supports for the printing surfaces may be moved toward or from the impression mechanism to accommodate printing surfaces of different dimensions without disconnecting the support from each other; and to otherwise improve and render more practical the type of printing press specified.

My invention consists in the novel improvements, parts and combinations of parts herein described.

The accompanying drawings, which are referred to herein and form a part hereof, illustrate a rotary multicolor planographic press constructed in accordance with my invention and serve in connection with the description herein to explain the principles of my invention and the best mode contemplated by me of applying those principles.

Referring to the drawings, Figure 1 represents a sectional side elevation taken on the line A, B of Fig. 2, looking in the direction of the arrow; Fig. 1^a is a sectional detailed view; Fig. 2 is a transverse central section of the same, taken on the line C—D Fig. 1 and looking in the direction of the arrow; and Fig. 3 is a side elevation of that side of the machine located at the left in Fig. 2.

Like reference numerals refer to like parts.

In the embodiment of my invention shown, the impression member is in the form of a large drum 1, having a circumferentially continuous impression surface 1^a, around which the material to be printed is passed in web form. The impression surface 1^a is preferably formed of rubber which is vulcanized directly onto the surface of the drum 1. The impression drum 1 is mounted on a shaft 2 journaled in the bearings 3 and 4 of the side frames 5 and 6 respectively. In the present embodiment of my invention, the impression drum 1 is driven from a shaft

7, to which power is applied by any suitable motor, through a train of gears 8, 9 and 10, the last member 10 of which meshes with a gear ring 11 which is securely bolted to the drum at one side thereof. The printing member of the press shown comprises a plurality of cylindrical printing form-supports 12, arranged at suitable intervals around the circumference of the drum 1, concentrically therewith, and a plurality of circumferentially continuous cylindrical planographic printing forms 13 removably and interchangeably mounted upon the form-supports. Each of the form-supports 12 is provided with a suitable shaft 14, which is journaled at its opposite ends in suitable sliding boxes 15 mounted in the radial slide-ways 16 in the frames 5 and 6.

In order that the printing forms 13 may be moved into and out of contact with the impression drum 1, as is required in printing, the boxes are secured to radially arranged sliding pressure bars 17 mounted in suitable guide-ways 18 on the outside of the frames 5 and 6. At their inner ends the bars 17 are provided with stud rollers 19 which are engaged by a plurality of cam grooves, seen in dotted lines at 20 in Fig. 3. The cam grooves 20 are formed in a pair of annular cam plates 21, which are carried by, and are rigidly secured to a pair of disks 22 suitably journaled on the outer ends of the bearings 3 and 4. Each of the disks 22 is provided with a gear segment 23, which gear segments are adapted to mesh with a pair of pinions 24 which are mounted on suitable studs at opposite sides of the machine and are driven by a pair of pinions 25 secured at the opposite ends of a transverse shaft 26 suitably journaled in the side frames 5 and 6. The shaft 26 may be operated to move the printing forms into or out of contact with the impression drum, as desired, by any suitable means, such as the controlling engine shown in either of the patents granted to Edward Hett, November 21, 1899, Nos. 637568; 637569; 637570 and 637571.

For the purpose of accommodating printing forms and printing form-supports of different sizes, the pressure bars 17 are threaded at their outer ends and are passed through perforations in the laterally extending lugs 27 of the boxes 15. The threaded ends of the bars 17 are provided with suitable nuts 28, 29, which embrace the opposite sides of lugs 27 and by the adjustment of which the position of the boxes radially of the machine may be varied, as desired.

In order to secure perfect register of the designs carried by the printing forms 13, it is essential that the form cylinders be positively driven in unison with each other. This is accomplished in the machine shown as follows: Each shaft 14 is provided with

a gear 30 which is rigidly secured thereto. The gears 30 are each connected through intermediate gears 32 to a centrally located master gear 31 suitably journaled on the inner end of the bearing 4. In order to permit the necessary movement of the shafts 14 radially of the machine without interrupting their connection with the master gear 31, the intermediate gears 32 must be so mounted that their centers always remain the same distance from the centers of the shafts 14 and the axis of the gear 31 irrespective of the position of the shafts 14 with relation to the center of the machine. This is accomplished by mounting the gears 32 to one side of the lines between the centers of the shafts 14 and the axis of the master gear 31 and connecting the axes of the gears 32 with the shafts 14 and with the center of the gear 31 by independent rigid connecting means. In the construction shown, the short shafts 33 of the gears 32 are connected with the shafts 14 by the links 34, there being, preferably, two links 34 for each gear 32, one on each side thereof, as shown in Fig. 2. The shafts 33 of the gears 32 obviously could be connected with the center of the gear 31 by links similar to the links 34, but preferably and as shown, the ends of the shafts 33 are provided with suitable boxes 35 which are adapted to slide in the circumferentially arranged slideways 36 formed at the ends of the arms 37, which arms are carried by hubs 38 rigidly secured to the bearing 4 concentrically with the gear 31. A set of boxes 35, slideways 36, arms 37 and hubs 38 are provided on each side of the gears 31 and 32, as clearly shown in Fig. 2. By this construction it will be seen that the printing cylinders will be driven by the impression drum when in contact therewith, but they will nevertheless be driven in perfect unison with each other irrespective of any slight variations in the sizes thereof, and also that the shafts 14 may be moved to and from the center of the machine, not only as required in the ordinary operation of the machine but also to accommodate printing cylinders of different diameters or degrees of curvature, without disconnecting the printing cylinders from each other.

It is desirable to drive the printing cylinders when they are out of contact with the impression drum, and it is desirable also that the printing surfaces be driven at very nearly the same surface speed as the impression drum, in order that there will be a minimum amount of slipping between the printing and impression surfaces when they are brought into contact. This is accomplished as follows: The gear 10 is mounted on a shaft 40 journaled in the side frames 5 and 6 and at the opposite side of the machine from the gear 10, the shaft 40 is provided with a gear 41, which drives the gear

31 through an intermediate gear 42 mounted on a suitable stud 43 carried by the side frame 6. The gear 41 is loosely mounted on the shaft 40 and is provided with a suitable clutch connection which will compel the gear 41 to revolve with the shaft 40 but will permit it to rotate thereon in the same direction at a faster speed. The clutch connection shown consists of a small cylindrical friction pawl 44 mounted in a suitable recess in the gear and held in operative position by a spring 45 as indicated in Fig. 1.

The gears 10 and 41, as shown, are of the same pitch diameter, so that when the gear 41 is driven by the shaft 40 it has the same surface speed as the gear 10, which speed is conveyed through the gears 42, 31 and 32 to the gears 30 on the shafts 14. The gears 30, however, are slightly larger in pitch diameter than the largest form which is to be used in the machine, and preferably also, the gear 11 is slightly less in pitch diameter than the drum 1. It follows, therefore, that the surface speed of the printing forms will be slightly less than the surface speed of the impression drum when the printing forms are not in contact therewith, but when said parts are brought into contact they are permitted to move at the same speed by reason of the described connection between the gear 41 and the shaft 40. It will be seen that the shaft 40 and the gearing between it and the shafts 14 constitute mechanism for driving the printing forms independently of the impression surface and that the clutch between the shaft 40 and the gear 41 constitutes automatic means for rendering the independent driving means operative or inoperative when the printing and impression members are separated or brought together.

Any suitable form of inking and damping mechanisms and paper feeding and delivering devices may be used. As these devices form no part of my present invention they are not shown or described. The operation of the machine described will be readily understood without further description.

My invention is not limited to the precise construction shown, nor to the particular construction by which it may be carried into effect, as many changes may be made therein without departing from the principles of my invention. For instance my invention in its broader aspects is not limited to a printing member comprising a plurality of circumferentially continuous printing forms, nor to forms having planographic or lithographic printing surfaces, nor to an impression member having a single circumferentially continuous impression surface, as other forms of printing and impression members may be used if desired. It is immaterial, moreover, which member of the printing couple is positively driven or which member is moved into or out of coöperative re-

lation with the other. My invention is not limited, furthermore, to the particular form of driving mechanism shown, nor to the particular form of mechanism for separating the members of the couple and bringing them together. Many other changes will readily suggest themselves to those skilled in the art.

What I claim as new and desire to secure by Letters Patent is:—

1. In a printing press the combination with an impression member, of a printing member comprising a plurality of printing forms, one of said members being frictionally driven from the other, means for simultaneously separating or bringing together two or more of the printing forms and the impression member, and connections whereby the printing forms are at all times caused to operate in unison, substantially as described.

2. In a printing press the combination with an impression member, of a printing member comprising a plurality of printing forms, one of said members being frictionally driven from the other, means for simultaneously separating or bringing together two or more of the printing forms and the impression member, and means for driving said printing and impression members independently of each other when separated, substantially as described.

3. In a printing press the combination with an impression member consisting of a drum, of a printing member comprising a plurality of printing cylinders, one of said members being frictionally driven from the other, means for simultaneously moving the printing cylinders into or out of coöperative relation with the impression drum, and means for driving said printing and impression members independently of each other when out of coöperative relation, substantially as described.

4. In a printing press the combination with an impression member consisting of a drum having a circumferentially continuous impression surface, of a printing member comprising a plurality of circumferentially continuous printing cylinders, one of said members being frictionally driven from the other, means for simultaneously moving the printing cylinders into or out of coöperative relation with the impression surface, and means for driving said printing and impression members independently of each other when out of coöperative relation, substantially as described.

5. In a printing press the combination with an impression member consisting of a drum, of a plurality of printing forms arranged concentrically therewith and driven frictionally thereby, means for simultaneously moving the printing forms into or out of coöperative relation with the impression

drum, and means for causing the printing forms to operate in unison whether in or out of coöperative relation with the impression drum, substantially as described.

5 6. In a printing press the combination with an impression member consisting of a drum, of a plurality of printing forms having circumferentially continuous printing surfaces, said forms being arranged concentrically with the drum and driven frictionally thereby, means for simultaneously moving the printing forms into or out of coöperative relation with the impression drum, and means for causing the printing forms to
10 operate in unison whether in or out of coöperative relation with the impression drum, substantially as described.

7. In a printing press the combination with an impression member, of a plurality
20 of cylindrical printing forms driven frictionally thereby, positive connections for causing the printing forms to operate in unison, and means for simultaneously separating or bringing together two or more of the printing forms and the impression member without disengaging the forms from said positive connections, substantially as described.

8. In a printing press the combination
30 with an impression member, of a printing member comprising a plurality of form supports and a plurality of printing forms removably carried thereby, one of said members being frictionally driven from the other, and positive connections for causing said form supports to operate in unison, the constructions being such that the supports may be adjusted for printing forms of different curvatures without being disconnected, substantially as described.
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9. In a printing press the combination with an impression member, of a printing member comprising a plurality of supports and a plurality of printing forms removably
45 carried thereby, one of said members being frictionally driven from the other, means for so adjusting said form supports with relation to the impression member that printing forms of different curvatures may be used, and positive connections for causing said supports to operate in unison, the construction being such that said supports may be adjusted, as described, without being disconnected, substantially as set forth.

55 10. In a printing press the combination with an impression member consisting of a drum, of a printing member comprising a plurality of cylindrical form supports, and a plurality of circumferentially continuous printing forms removably carried thereby, one of said members being frictionally driven from the other, means for so adjusting said form supports with relation to the impression member that printing forms of
60 different curvatures may be used, and posi-

tive connections for causing said supports to operate in unison, the construction being such that said supports may be adjusted, as described, without being disconnected, substantially as set forth.

11. In a printing press the combination with an impression member, of a printing member comprising a plurality of supports and a plurality of printing forms removably carried thereby, one of said members being frictionally driven from the other, means for simultaneously separating or bringing together two or more of the printing surfaces and the impression member, means for so adjusting said form supports with relation to the impression member that printing forms of different curvatures may be used, and positive connections for causing said supports to operate in unison, the construction being such that said supports may be adjusted, as described, without being disconnected, substantially as set forth.

12. In a printing press the combination with an impression member, of a printing member comprising a plurality of printing forms, one of said members being frictionally driven from the other, means for separating said members or bringing them together, connections whereby the printing forms are caused to operate in unison, and means whereby the printing forms are driven through said connections when separated from the impression member, substantially as described.

13. In a printing press the combination with an impression member having a circumferentially continuous impression surface, of a printing member comprising a plurality of printing forms having circumferentially continuous printing surfaces, one of said members being frictionally driven from the other, means for separating said members or bringing them together, connections whereby the printing forms are caused to operate in unison, and means whereby the printing forms are driven through said connections when separated from the impression member, substantially as described.

14. In a printing press the combination with an impression surface, of a printing surface, one of said surfaces being frictionally driven from the other, means for separating said surfaces or bringing them together, mechanism for driving the frictionally driven surface independently of the other surface when separated therefrom, and means for automatically throwing said independent driving mechanism into or out of operation when said surfaces are separated or brought together, substantially as described.

15. In a printing press the combination with an impression member, of a printing member comprising a plurality of printing

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forms, one of said members being frictionally driven from the other, means for separating said members or bringing them together, mechanism for driving said frictionally driven member independently of the other member when separated therefrom, and automatic means for throwing said independent driving mechanism into or out of operation when said members are separated or brought together, substantially as described.

16. In a printing press the combination with an impression member, of a plurality of printing forms frictionally driven thereby, means for separating the printing forms and the impression member or bringing them together, mechanism for driving said forms independently of the impression member when separated therefrom, and automatic means for throwing said independent driving mechanism into or out of operation when the printing forms and impression member are separated or brought together, substantially as described.

17. In a printing press the combination with an impression member consisting of a drum, of a plurality of printing forms arranged concentrically with said drum and frictionally driven thereby, means for separating the printing forms and the impression member or bringing them together, mechanism for driving said forms independently of the impression member when separated therefrom, and automatic means for throwing said independent driving mechanism into or out of operation when the printing forms and impression member are separated or brought together, substantially as described.

18. In a planographic press the combination with an impression member having a circumferentially continuous impression surface, of a printing member comprising a plurality of planographic printing forms having circumferentially continuous printing surfaces, one of said members being frictionally driven from the other, means for simultaneously separating or bringing together two or more of the printing forms and the impression member, and connections whereby the printing forms are caused to operate in unison whether in or out of coöperative relation with the impression member, substantially as described.

19. In a planographic press the combination with an impression member having a circumferentially continuous impression surface, of a printing member comprising a plurality of planographic printing forms having circumferentially continuous printing surfaces, one of said members being frictionally driven from the other, means for simultaneously separating or bringing together two or more of the printing forms and the impression member, and means for

driving said printing and impression members independently of each other when separated, substantially as described.

20. In a planographic press the combination with an impression member having a circumferentially continuous impression surface, of a printing member comprising a plurality of form supports and a plurality of circumferentially continuous planographic printing forms removably carried thereby, one of said members being frictionally driven from the other, and positive connections for causing said form supports to operate in unison, the construction being such that the supports may be adjusted for printing forms of different curvatures without being disconnected, substantially as described.

21. In a planographic printing press, the combination with a circumferentially continuous impression surface, of a circumferentially continuous planographic printing surface, one of said surfaces being frictionally driven from the other, means for separating said surfaces or bringing them together, mechanism for driving the frictionally driven surface independently of the other surface when separated therefrom, and means for automatically throwing said independent driving mechanism into or out of operation when said surfaces are separated or brought together, substantially as described.

22. In a planographic printing press the combination with an impression drum having a circumferentially continuous impression surface, of a printing member comprising a plurality of planographic printing forms, one of said members being frictionally driven from the other, means for separating or bringing together two or more of the printing forms and the impression member, and connections whereby the printing forms are at all times caused to operate in unison, substantially as described.

23. In a planographic printing press the combination with an impression drum having a circumferentially continuous impression surface, of a printing member comprising a plurality of planographic printing forms, one of said members being frictionally driven from the other, means for separating or bringing together two or more of the printing forms and the impression member, and means for driving said printing and impression members independently of each other when separated, substantially as described.

24. In a planographic printing press the combination with an impression member consisting of a drum having a circumferentially continuous impression surface, of a printing member comprising a plurality of planographic printing cylinders, one of said members being frictionally driven from the

other, means for moving the printing cylinders into or out of cooperative relation with the impression drum, and means for driving said printing and impression members independently of each other, when out of cooperative relation, substantially as described.

25. In a planographic printing press the combination with an impression member consisting of a drum having a circumferentially continuous impression surface, of a printing member comprising a plurality of circumferentially continuous planographic printing cylinders, one of said members being frictionally driven from the other, means for moving the printing cylinders into or out of cooperative relation with the impression surface, and means for driving said printing and impression members independently of each other when out of cooperative relation, substantially as described.

26. In a planographic printing press, the combination with a circumferentially continuous impression surface, of a planographic printing surface, one of said surfaces being frictionally driven from the other, means for separating said surfaces or bringing them together, mechanism for driving the frictionally driven surface independently of the other surface when separated therefrom, and means whereby said independent driving mechanism is thrown into or out of operation when said surfaces are separated or brought together.

27. In a planographic printing press, the combination with a circumferentially continuous impression surface, of a planographic printing surface frictionally driven from said impression surface, means for separating said surfaces or bringing them together, mechanism for driving the printing surface independently of the impression surface when separated therefrom, and means whereby said independent driving mechanism is thrown into and out of operation when said surfaces are separated or brought together.

28. In a printing press, the combination with an impression member, of a printing member comprising a plurality of printing cylinders, one of said members being frictionally driven from the other, means common to two or more of the printing cylinders for moving said cylinders into or out of cooperative relation with the impression member, and means for driving said printing and impression members independently of each other when out of cooperative relation.

29. In a printing press, the combination with an impression member, consisting of a drum having a circumferentially continuous impression surface, of a printing member comprising a plurality of printing cylinders, one of said members being frictionally driven from the other, means common to

two or more of the printing cylinders for moving said cylinders into or out of cooperative relation with the impression surface, and means for driving said printing and impression members independently of each other when out of cooperative relation.

30. In a printing press, the combination with an impression member, of a printing member comprising a plurality of printing forms adapted to operate in continuous impression contact with said impression member, one of said members being frictionally driven from the other, means for separating or bringing together two or more of the printing forms and the impression member, and connections whereby the printing forms are at all times caused to operate in unison, substantially as described.

31. In a printing press, the combination with an impression member, of a printing member comprising a plurality of printing forms adapted to operate in continuous impression contact with said impression member, one of said members being frictionally driven from the other, means for separating or bringing together two or more of the printing forms and the impression member, and means for driving said printing and impression members independently of each other when separated, substantially as described.

32. In a printing press, the combination with an impression member consisting of a drum, of a printing member comprising a plurality of printing cylinders adapted to operate in continuous impression contact with said impression member, one of said members being frictionally driven from the other, means for moving the printing cylinders into or out of cooperative relation with the impression drum, and means for driving said printing and impression members independently of each other, when out of cooperative relation, substantially as described.

33. A printing press including in combination, an impression member, a printing member comprising a plurality of printing forms adapted to operate in continuous impression contact with said impression member, one of said members being frictionally driven from the other, means common to two or more of the printing forms for separating said two or more forms from the impression member, means for driving the frictionally driven member when not driven from the other member, and connections whereby said two or more printing forms are at all times caused to operate in unison, substantially as described.

34. A printing press including in combination, an impression cylinder, a printing cylinder, means for separating and bringing together said cylinders, and means whereby said cylinders are driven independently when separated and frictionally driven one

from the other when brought together, substantially as described.

35. A printing press including in combination, an impression cylinder, a printing
5 cylinder, means for separating and bringing together said cylinders, and means whereby said cylinders are driven independently when separated, the driving connections of one cylinder being rendered inoperative
10 when the cylinders are brought together.

36. A printing press including in combination, an impression cylinder, a printing
15 cylinder, means for separating and bringing together said cylinders, means for driving said cylinders when separated, and means whereby one of said cylinders is frictionally driven from the other when they
20 are brought together.

37. A printing press including in combination, a printing couple, means for separating and bringing together the members

of the couple, means whereby both said members are driven when separated, and means whereby one member is driven from
25 the other when they are brought together.

38. A printing press including in combination, a printing couple, means for separating and bringing together the members of the couple, and a plurality of driving
30 means for one member of the couple, one driving means being effective when the members are separated and another when the members are brought together.

In testimony whereof, I have signed my
35 name to this specification, in the presence of two subscribing witnesses.

GEORGE E. PANCOAST.

Witnesses:

GEO. H. BARNES

J. H. FREEMAN.