G. E. PANCOAST.

ROTARY PRINTING PRESS.

APPLICATION FILED FEB. 21, 1905.

1,006,782.

Patented Oct. 24, 1911.

3 SHEETS—SHEET 1.

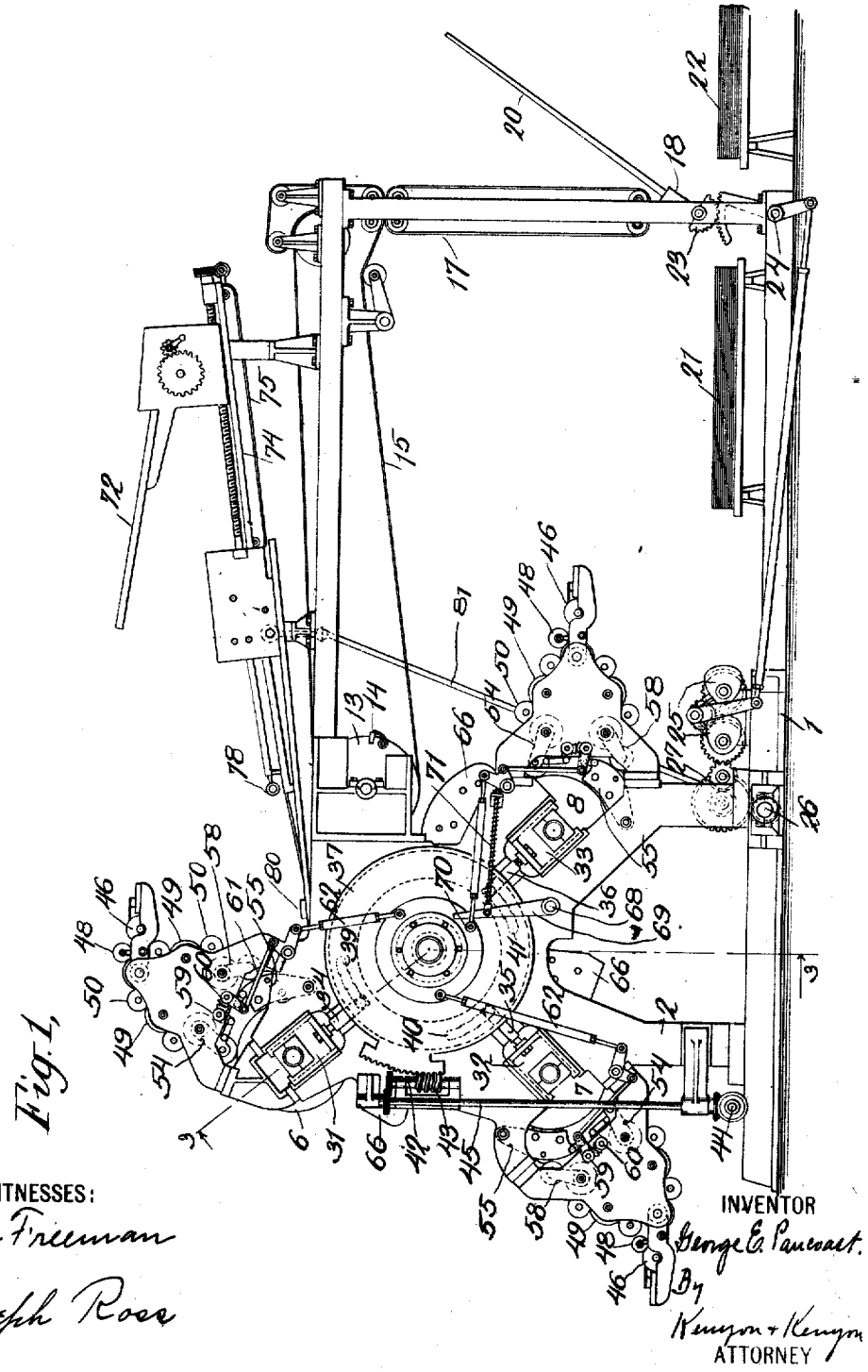

Fig. 1.

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3 SHEETS—SHEET 2.

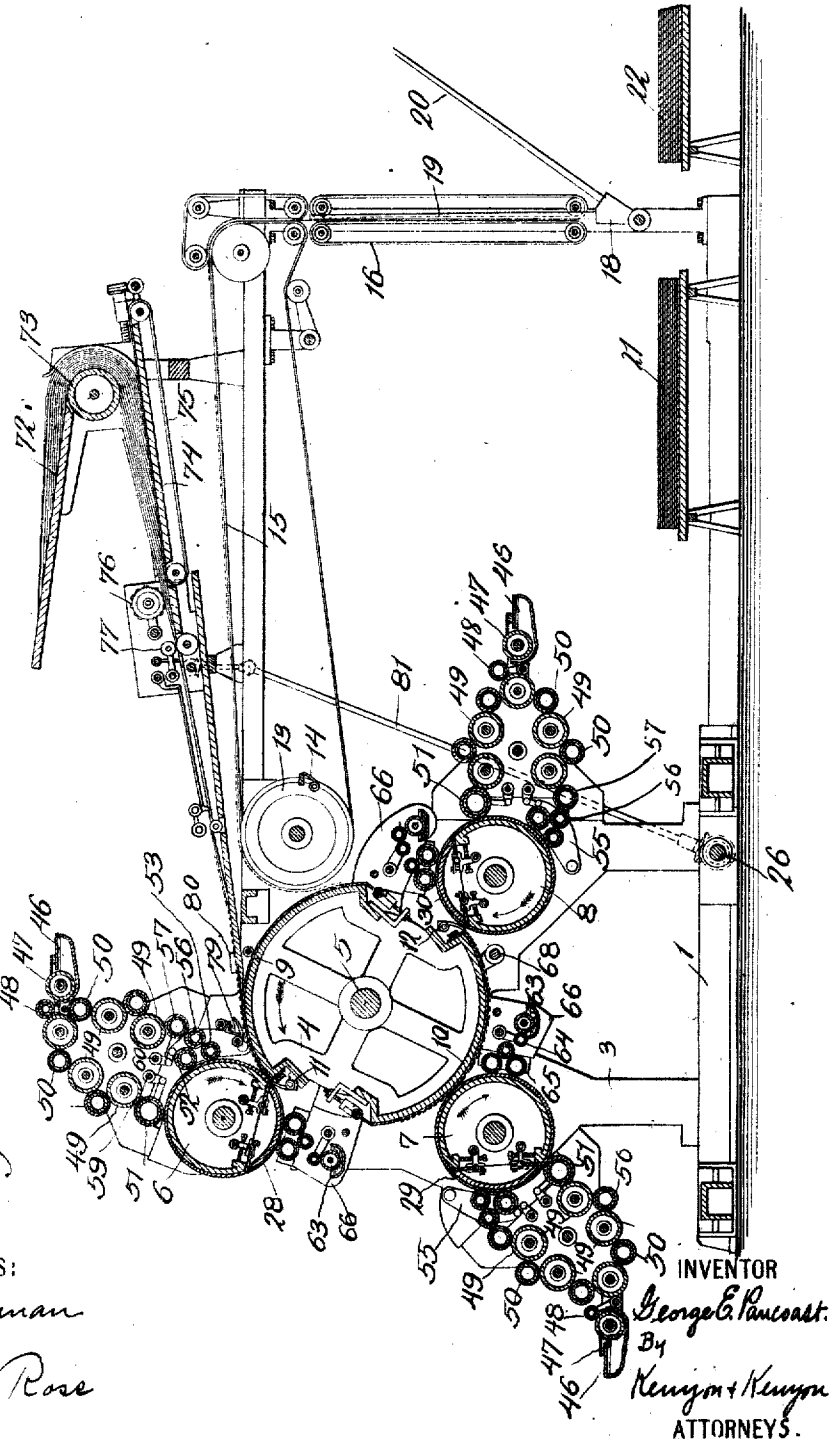

Fig. 2.

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3 SHEETS—SHEET 3.

Fig. 3.

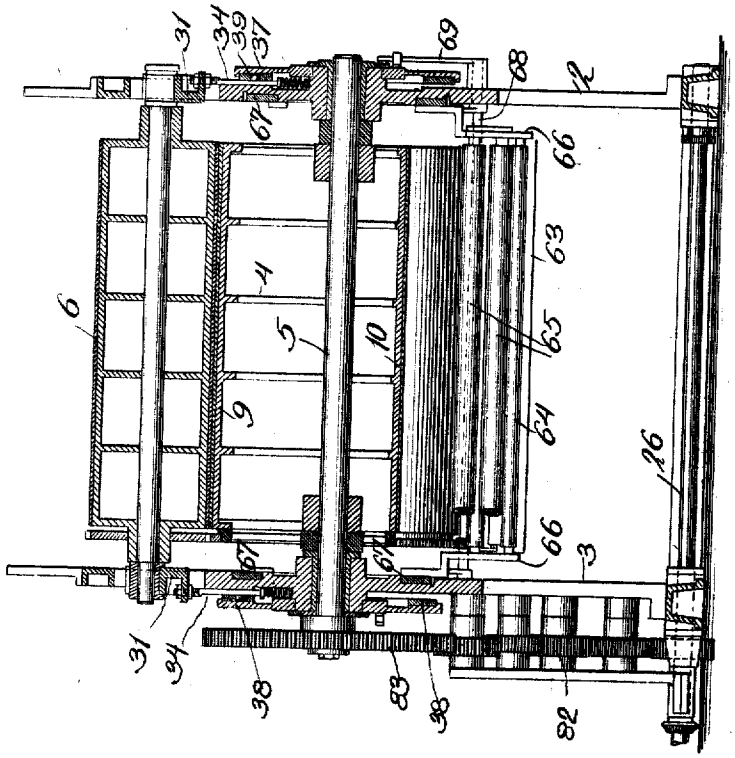
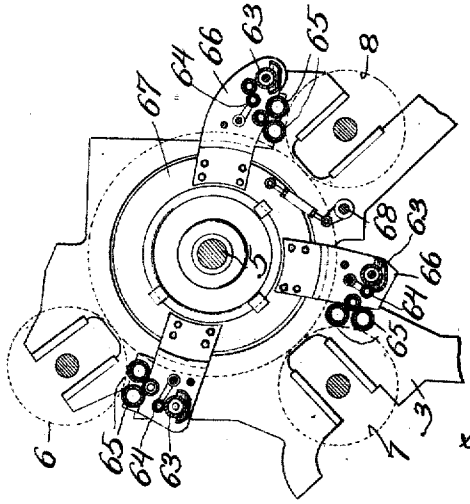


Fig. 4.



WITNESSES:

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GEORGE E. PANCOAST, OF NEW YORK, N. Y.

ROTARY PRINTING-PRESS.

1,006,782. Specification of Letters Patent. Patented Oct. 24, 1911.

Application filed February 21, 1905. Serial No. 246,692.

To all whom it may concern:

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

My invention relates to rotary printing presses and more particularly to rotary planographic presses employed in multicolor printing.

My invention is directed more especially to rotary presses employing a plurality of planographic design surfaces for printing several colors in register on paper or similar material in the form of separate sheets.

An object of my invention is to increase the capacity of presses of the character referred to without however lowering the grade or character of the work done thereon.

It is well known that the quality of the impressions made in a press employing planographic design surfaces and the life of the surfaces themselves are dependent upon the speed at which the surfaces are driven while printing. The faster the speed, the poorer the quality of work and the shorter the life of the surfaces, as measured by the number of good impressions which may be taken therefrom. In view of these and other considerations presses of the character referred to in practice have always been so constructed and so operated that they can easily be supplied with sheets or "fed" by hand. Although automatic sheet-feeding devices have long been in common use on presses of various classes, it has never been considered desirable or practicable to employ such devices in connection with rotary planographic presses.

The universal method of presenting sheets to presses of the character referred to is to place the sheets against suitable guides from which they are taken by sheet grippers carried on the impression cylinder, certain of the guides being lifted to permit the sheet to pass from the feed board on to the impression cylinder and then being dropped into position to receive the succeeding sheet. In order that the sheets may be accurately positioned against the guides, it is necessary that considerable time be provided for this operation. This time is invariably greater than the time required to draw the sheet from the feed board on to the impression cylinder.

Where the impression cylinder is driven at constant speed and the impression surface thereon has a circumferential extent equal to the width of the largest sheet that the machine is designed to print, there must be a blank space provided on the impression cylinder which is greater than the length of the impression surface itself. In practice the impression cylinder is provided with a single impression surface which has a circumferential extent less than one-half of the circumference of the impression cylinder, and each of the several design cylinders is made one-half the diameter of the impression cylinder, so that they have two revolutions to each revolution of the impression cylinder and print only on alternate revolutions or if the design cylinders make one revolution to each revolution of the impression cylinder, the design surface occupies less than one-half the circumference of the cylinder.

In accordance with one feature of my invention, the impression and design cylinders and the surfaces thereon are so proportioned that said cylinders may operate to print during the greater part of each revolution, and an automatic sheet-feeding mechanism is provided which is adapted accurately to position the sheets with reference to the impression cylinder in less time than is required for the passage of the sheet on to the impression cylinder. Where two or more design cylinders are employed, the impression cylinder is made two or more times the diameter of the design cylinders and a plurality of impression surfaces are provided thereon so that an impression may be made by the design cylinders on one of the impression surfaces at each revolution of the design cylinders, only such space being provided between the adjacent edges of the successive impression surfaces as will provide sufficient time for the positioning by the automatic feeding mechanism of the sheets to be taken by the successive impression surfaces. The space which is necessarily provided between these surfaces for the reception of suitable and convenient means for securing the impression blankets or packing on the impression surfaces and for securing the design surfaces on the design cylinders constitutes a sufficient separation of the impression surfaces to provide for the positioning of the sheets by the automatic feeder. It will be seen that by this construction the

capacity of the machine is doubled without increasing the speed at which the surfaces are driven and consequently without lowering the grade or character of the work or shortening the life of the design surfaces; or, if desired, the machine may be run at a slower surface speed so as to improve the work done thereby and at the same time an increased output be secured.

Other objects of my invention will more fully appear from the following more detailed description of the same in connection with a particular embodiment thereof.

My invention consists in the novel improvements, constructions, and combinations herein shown and described.

In order that my invention may be more fully understood, I have illustrated in the accompanying drawings, which are referred to herein and form a part hereof, one embodiment of the invention, the same serving in connection with the description herein to explain the principles of the invention.

Of the drawings Figure 1 is a side elevation of a machine constructed in accordance with my invention; Fig. 2 is a longitudinal central section of the same; Fig. 3 is a vertical transverse section taken on the line 3,3 of Fig. 1; and Fig. 4 is a side elevation, partly in section, of a detail.

Like reference numerals refer to like parts wherever they appear throughout the several views.

Referring in detail to the particular embodiment of my invention illustrated in the drawings, 1 represents a base frame upon which the various parts of the machine are mounted. Near one end of this base frame is erected the frame of a printing press, said press frame consisting in the main, as shown, of two vertical side frames 2 and 3 upon which the various parts of the press are mounted. The details of the press may be varied between wide limits. As shown, the press comprises an impression cylinder 4 fixed on a horizontal shaft 5 journaled near its opposite ends in the side frames 2 and 3. In the particular embodiment of the invention illustrated three design cylinders 6, 7, and 8 are provided and the impression cylinder is provided with two separate and distinct impression surfaces 9 and 10. It is to be understood however that a greater or less number of design cylinders may be employed and that the impression cylinder will be made of such diameter as is required to accommodate the number of design cylinders employed and at the same time provide sufficient space for the presentation of the sheets thereto; it being understood that where the cylinders are driven at uniform speed and the impression cylinder is made larger than the design cylinder or cylinders, the diameter of the impression cylinder will be a multiple of the diameter of the design cylinder or cylinders, and that the number of impression surfaces on the impression cylinder will equal the number of design surfaces on the design cylinder or the largest one of the design cylinders, where a plurality are employed, multiplied by the number of times that the diameter of that design cylinder is contained in the diameter of the impression cylinder. Where three design cylinders are employed, I find it convenient to make the impression cylinder twice the diameter of the design cylinders, as shown; and where each of the design cylinders carries a single design surface, the impression cylinder is provided with two impression surfaces, as shown, so that each of the design cylinders will operate on each revolution to make an impression on a sheet carried by one of the impression surfaces.

In accordance with one feature of the invention, the adjacent edges of the impression surfaces are separated from each other by a circumferential distance less than the circumferential extent of said impression surfaces, and preferably only by such circumferential distance as will provide sufficient time during the passage of the space between the impression surfaces past a fixed point without substantially varying the speed of rotation of the impression cylinder, to permit the accurate positioning of a sheet by an automatic sheet-feeding mechanism. As shown, the space between the adjacent edges of the two impression surfaces on the impression cylinder is somewhat more than one-third of the circumferential extent of the impression surfaces, the circumferential extent of the design surfaces on the design cylinders occupying somewhat less than three-fourths of the circumference of the cylinders.

Means are provided for taking the sheets from the sheet-presenting means, to be presently described, and holding them on the impression surfaces successively so that each sheet shall receive an impression from each of the design cylinders during the revolution of the impression cylinder. As shown, a suitable sheet gripping device is mounted on the impression cylinder at the forward edge of each of the impression surfaces, said gripping devices being designated in the drawings by the numbers 11 and 12, the same being operated by any suitable means to receive the sheet at one point in the revolution of the cylinder and after carrying the same around the cylinder to deliver it to a suitable delivery mechanism. As shown, the delivery mechanism comprises a cylinder 13 constructed to make one revolution for each impression surface on the impression cylinder and by means of a suitable gripper 14 to take the sheets from the grippers of the impression cylinder and deliver them to a series of tapes or cords 15 by which the

sheets are carried to any suitable sheet-receiving mechanism. As shown, the sheets are delivered from the tapes 15 downwardly between two sets of margin tapes 16 and 17, from which the sheets are taken by suitable fly mechanism.

In accordance with one feature of the invention, this fly mechanism comprises an oscillating member 18 having two sets of sheet-engaging fingers 19 and 20 arranged to take the sheets from the margin tapes alternately and deliver them in opposite directions in two separate piles 21 and 22, the angle between the two sets of fingers being such that while one set of fingers is depositing the sheet on one pile, the other set is brought into position to take the succeeding sheet, sufficient time being provided to permit the sheet to travel downwardly into the path of the fingers after the fingers have passed the line of travel in the sheets in the margin tapes.

Any suitable means may be provided for oscillating the fly member. As shown, the axis of the fly member is provided with a segment 23 which meshes with a corresponding segment mounted on a rock shaft 24 having suitable arm and link connection with a pair of complementary cams 25 which are rotated in unison from the main shaft 26 by suitable gearing 27.

As above pointed out, my invention is particularly applicable to machines employing planographic design surfaces, one of the objects of the invention being to secure a maximum product from a machine operating upon paper or similar material in sheet form and having the planographic design surfaces driven at a minimum speed. The design cylinders may be constructed to receive any form of planographic design surfaces. As shown, the design cylinders are constructed to receive planographic design surfaces in the form of flexible sheets of material having surfaces adapted to be developed into a planographic design surface, means being provided, as indicated, to suitably secure the flexible sheets upon the cylinders. If desired, the space between the opposite edges of the design surfaces may be occupied by an ink-distributing surface, the ink-distributing surfaces of the several cylinders being indicated by the reference numerals 28, 29, 30.

In accordance with one feature of the invention, means are provided whereby the design cylinders and the impression cylinder may at will be brought into or out of cooperative relation so that the design surfaces may not be brought into or remain in contact with the impression surfaces, when the printing operation ceases. The purpose of this feature is to prevent impressions being made upon the impression surfaces when no sheets are present, and to avoid injury to the design surfaces and to permit them to be gummed up and thus preserved when the machine is stopped for any considerable length of time. This operation of the cylinders may be accomplished by any suitable means.

In accordance with the embodiment of the invention illustrated, the design cylinders are moved into and out of coöperative relation with the impression cylinder. To permit of this operation the bearings for the opposite ends of the design cylinders are carried in slides 31, 32, and 33 mounted in radial guides in the frame and connected by means of radial bars or links 34, 35, and 36 with a pair of cam rings 37 and 38 journaled on the side frames 2 and 3 in concentric relation with the shaft 5 of the impression cylinder and having cam slots 39, 40 and 41 adapted to engage suitable studs on the radial bars or links.

The cam rings may be operated in any suitable manner to impart the desired motions to the design cylinders. As shown, the cam ring 37 is provided with a segment gear 42 which meshes with a worm 43 suitably journaled on the frame and driven from a shaft 44 through the intermediate vertical shaft 45 and suitable gear connections. The shaft 44 may receive motion in opposite directions from any suitable source, as a hand lever or wheel or a suitably controlled motor. The cam ring 38 is caused to move in unison with the ring 37 by any suitable connection, as by duplicating the gear segment and worm driven mechanism on the opposite side of the machine from that shown in Fig. 1 and connecting the same with the shaft 44.

So far as some features of the invention are concerned, any suitable form of inking and damping mechanism may be provided for each of the design cylinders. In accordance with one feature of the invention, however, means are provided whereby the inking and damping mechanisms and their corresponding design cylinders may at will be readily brought into and out of coöperative relation.

In accordance with the construction shown, each of the inking mechanisms comprises a supplying part including a fountain 46, a suitably driven fountain roller 47, and a ductor roller 48 arranged to move alternately into contact with the fountain roller and a roller of the distributing part of the inking mechanism. As shown, the distributing part of the inking mechanism includes five distributing cylinders 49 having the usual vibratory motion, and the intermediate soft rollers 50, the same serving to distribute the ink and transfer it from the supplying part of the mechanism to the applying part of the mechanism. As shown, the ink-applying part comprises three rollers,

51, 52, and 53. These rollers are preferably made of different diameters, as shown, so that they will more evenly apply the ink to the design cylinders. These rollers are also movably mounted so that they may be moved into and out of ink-applying position without disturbing the other parts of the inking mechanism. As shown, see Fig. 1, the roller 51 is mounted on a pair of arms 54 pivotally mounted in concentric relation with one of the cylinders 49 so that the roller 51 may be moved into and out of contact with the design surface without interrupting its connection with the distributing part.

The rollers 52 and 53 are mounted in a pair of arms 55 suitably pivoted on the frame, and in order that these rollers may be moved into and out of contact with the design surface without interrupting their connection with the distributing part of the mechanism, a pair of intermediate rollers 56 and 57 are provided, the former of which is mounted on the arms 55 and the latter of which are journaled in a pair of arms 58 pivotally mounted in concentric relation with one of the distributing cylinders 49.

For the purpose of moving the applying parts of the several inking mechanisms into and out of operative relation with the design cylinders, any suitable means may be provided. As shown, a pair of transverse rock shafts 59 and 60 are journaled near their opposite ends in the side frames of the inking mechanisms, said shafts being connected to move in opposite directions in unison and suitably connected with the pairs of arms 54 and 55 in which the applying rollers are mounted. These rock shafts may be operated by any suitable means.

In accordance with one feature of the invention, the applying rollers are moved out of contact with the corresponding design cylinder when the design cylinder is moved out of operative relation with the impression cylinder. To this end, the rock shafts 59 and 60 are connected by means of suitable links 61 and 62 with the cam ring 37 in such manner that when the cam rings are moved in a direction to throw out the design cylinder, the applying part of the inking mechanism will also be thrown out of operative position. In accordance with the construction shown, the damping mechanism for each of the design cylinders includes a fountain 63, ductor 64, and water-applying and distributing rollers 65, said parts being mounted on an auxiliary frame 66. The frames for each of the three damping mechanisms are mounted on a pair of rings 67 loosely mounted in concentric relation with the impression cylinder, as shown in Figs. 3 and 4. Any suitable means may be provided to move the inking and damping mechanisms into and out of contact with the design cylinders.

In accordance with one feature of the invention, the damping mechanisms are moved into and out of contact when the design cylinders are moved into and out of operative relation with the impression cylinder. To this end, the frames 67 are connected by suitable link connections with a transverse shaft 68, which is provided at the side of the machine illustrated in Fig. 1 with an arm 69 adapted to be engaged by a stud 70 fixed on the cam ring 37, the arm being normally pressed in such direction by a spring 71 as to throw the damping mechanisms into their operative positions.

Any suitable automatic sheet-feeding mechanism may be provided for supplying the sheets to the impression cylinder, which mechanism is capable of positioning the sheets to be received by the grippers of the impression cylinder within a short space of time, say a fraction of the time required for one of the impression surfaces to pass a fixed point while the press is being driven at printing speed without varying the speed of the impression cylinder.

In the machine shown the sheets must be positioned during something more than one-third of the time required for one of the impression surfaces to pass a fixed point, or in other words during the time that one of the gaps between the impression surfaces is passing a fixed point. A form of sheet-feeding mechanism which has been found suitable for this purpose is represented in the drawings, the same including a table 72 adapted to receive a pile of paper in a fanned out condition, and means including a cylinder 73 for transferring the pile of sheets to a sheet-separating mechanism. The sheet-separating mechanism includes a table 74 having suitably driven pile-supporting tapes or bands 75, a pair of suitably driven sheet-combing wheels 76, sheet-forwarding rollers 77, and sheet-retarding rollers 78. The sheets are presented by this mechanism at the proper time to suitable front gages 79, which are arranged adjacent to the surface of the impression cylinder and are moved out of operative position at the proper times to permit the sheets to be taken by the grippers 11 and 12. Suitable means are also provided for positioning the sheet in a lateral direction, the same being indicated in the drawings by the numeral 80. As the details of this mechanism are well known, it will be unnecessary to fully illustrate the same in the drawings or to further describe the same herein. The sheet-supporting and feeding mechanism may be driven in suitable time relation with the press by any suitable means, as by a shaft 81, receiving motion from the main shaft 26 of the press.

The impression and design cylinders together with their inking and damping mechanisms are driven from the main shaft 26

by a train of gears 82 by which a gear 83 fixed on one end of the shaft 5 of the impression cylinder is driven, the printing cylinders and the inking and damping mechanisms being driven by suitable connections with the impression cylinder.

The operation of the machine as a whole will be readily understood from the description of the operation of the several parts thereof which has already been given.

It is to be understood that my invention, as to its broader aspects, is not limited to the particular construction herein shown or escribed or to any particular construction which it has been or may be carried into ect, as the particular construction of the various mechanisms may be varied within wide limits without departing from the main principles of the invention and without sacrificing its chief advantages.

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

1. A multicolor printing press including in combination, an impression cylinder having a plurality of impression surfaces, a plurality of design surfaces arranged to cooperate during each revolution with one of said impression surfaces, and an automatic mechanism for presenting sheets to said impression surfaces in succession including automatic means for accurately positioning the sheets with reference to said impression surfaces in both the lateral and circumferential directions, the adjacent edges of said impression surfaces being separated from each other circumferentially by spaces of less length than the impression surfaces but at the least as great as about one-third such length, whereby sufficient time is afforded for the operation of the sheet-presenting mechanism, without unduly limiting the speed of the press.

2. A multicolor planographic printing press including in combination, an impression cylinder having a plurality of impression surfaces, a plurality of planographic design cylinders arranged to coöperate during each revolution with each impression surface, and an automatic mechanism for presenting sheets to said impression surfaces in succession including automatic means for accurately positioning the sheets with reference to said impression surfaces in both the lateral and circumferential directions, the adjacent edges of said impression surfaces being separated from each other circumferentially by spaces at the least as great as about one-third the length of the impression surfaces, whereby the sheets may be accurately positioned with reference to the impression surfaces in succession without varying or unduly limiting the speed of the impression cylinder.

3. A multicolor planographic printing press including in combination, an impression cylinder having a plurality of impression surfaces adapted to receive the sheets to be printed, the adjacent edges of the impression surfaces being separated circumferentially by spaces of less extent than the circumferential extent of the impression surfaces but at the least as great as about one-third such extent, a plurality of planographic design cylinders arranged to cooperate with each impression surface, and an automatic mechanism for presenting sheets to said impression surfaces in succession including automatic means for separating the sheets from a pile and accurately positioning the sheets with reference to said impression surfaces in both the lateral and circumferential direction.

4. A multicolor planographic printing press including in combination, an impression cylinder having a plurality of impression surfaces, a plurality of design members arranged to coöperate with the impression cylinder, and an automatic mechanism for presenting sheets to said impression surfaces in succession including automatic means for separating the sheets from a pile and accurately positioning the sheets with reference to said impression surfaces in both the lateral and circumferential directions, the adjacent edges of said impression surfaces being separated from each other by circumferential distances less than the circumferential extent of the impression surfaces but at the least as great as about one-third such extent, whereby sufficient time is afforded to permit the accurate positioning of the sheets with reference to the impression surfaces by said automatic mechanism without varying or unduly limiting the speed of the impression cylinder.

5. A planographic printing press including in combination, design and impression cylinders, and an automatic mechanism for presenting sheets to and accurately positioning them on the impression cylinder in both the axial and circumferential positions, the impression and design-carrying surfaces on said cylinders being so proportioned that sufficient time will be provided for the accurate positioning of the sheets by said automatic mechanism without varying or unduly limiting the speed of the cylinders and that said cylinders may operate to print during the greater part of but not more than about three-fourths of each revolution thereof.

6. A multicolor planographic printing press including in combination, an impression cylinder having a plurality of impression surfaces, a plurality of planographic design cylinders arranged to coöperate during each revolution with one of said impression surfaces, means whereby the design cylinders and the impression cylinder may

readily at will be brought into and out of coöperative relation, and an automatic mechanism for presenting sheets to said impression surfaces in succession including automatic means for accurately positioning the sheets with reference to said impression surfaces in both the lateral and circumferential directions.

7. A multicolor planographic printing press including in combination, an impression cylinder having a plurality of impression surfaces, a plurality of planographic design cylinders arranged to coöperate during each revolution with one of said impression surfaces, means whereby the design cylinders may at will be readily brought into and out of coöperative relation with the impression cylinder, and an automatic mechanism for presenting sheets to said impression surfaces in succession including automatic means for separating the sheets from a pile and accurately positioning the sheets with reference to said impression surfaces in both the lateral and circumferential directions.

8. A multicolor planographic printing press including in combination, an impression cylinder having a plurality of impression surfaces, a plurality of planographic design cylinders arranged to coöperate during each revolution with one of said impression surfaces, inking and damping mechanisms for each design cylinder, means whereby the inking and damping mechanisms and design cylinders may at will be readily brought into and out of coöperative relation, and an automatic mechanism for presenting sheets to said impression surfaces in succession including automatic means for accurately positioning the sheets with reference to said impression surfaces in both the lateral and circumferential directions.

9. A multicolor planographic printing press including in combination, an impression cylinder having a plurality of impression surfaces, a plurality of planographic design cylinders arranged to coöperate during each revolution with one of said impression surfaces, inking and damping mechanisms for each one of said design cylinders, means whereby the inking and damping mechanisms may at will be readily brought into and out of coöperative relation with their respective design cylinders, and an automatic mechanism for presenting sheets to said impression surfaces in succession including automatic means for accurately positioning the sheets with reference to said impression surfaces in both the lateral and circumferential directions.

10. A multicolor planographic printing press including in combination, an impression cylinder having a plurality of impression surfaces, a plurality of planographic design cylinders arranged to coöperate during each revolution with one of said impression surfaces, inking and damping mechanisms for each design cylinder, means whereby the inking and damping mechanisms and design cylinders may at will be readily brought into and out of coöperative relation, means whereby the design cylinders and the impression cylinder may readily at will be brought into and out of cooperative relation, and an automatic mechanism for presenting sheets to said impression surfaces in succession including automatic means for accurately positioning the sheets with reference to said impression surfaces in both the lateral and circumferential directions.

11. A multicolor planographic printing press including in combination, an impression cylinder having a plurality of impression surfaces, a plurality of planographic design cylinders arranged to coöperate during each revolution with one of said impression surfaces, inking and damping mechanisms for each design cylinder, means whereby the inking and damping mechanisms may at will be readily brought into and out of coöperative relation with their respective design cylinders, means whereby the design cylinders and the impression cylinder may readily at will be brought into and out of coöperative relation, and an automatic mechanism for presenting sheets to said impression surfaces in succession including automatic means for accurately positioning the sheets with reference to said impression surfaces in both the lateral and circumferential directions.

12. A planographic printing press including in combination, design and impression cylinders, inking and damping mechanisms, means whereby the design and impression cylinders and the inking and damping mechanisms may at will be readily brought into and out of coöperative relation, and an automatic mechanism for separating sheets from a pile and accurately positioning them on the impression cylinder, the impression and design-carrying surfaces on said cylinders being so proportioned that sufficient time will be provided for the accurate positioning of the sheets by said automatic mechanism without varying or unduly limiting the speed of the cylinders and that said cylinders may operate to print during the greater part of but not more than about three-fourths of each revolution thereof.

13. A multicolor planographic printing press including in combination, an impression cylinder, a plurality of design cylinders, inking and damping mechanisms, means whereby the design cylinders and the inking and damping mechanisms may at will be readily brought into and out of cooperative relation, an automatic mechanism for separating sheets from a pile and ac-

curately positioning them on the impression cylinder, the impression and design-carrying surfaces of said cylinders being so proportioned that sufficient time will be provided for the accurate positioning of the sheets by said automatic mechanism without varying or unduly limiting the speed of the cylinders and that said cylinders may operate to print during the greater part of but not more than about three-fourths of each revolution thereof.

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

GEORGE E. PANCOAST.

Witnesses:
W. P. TEN EYCK,
JACOB MILLER.