

(No Model.)

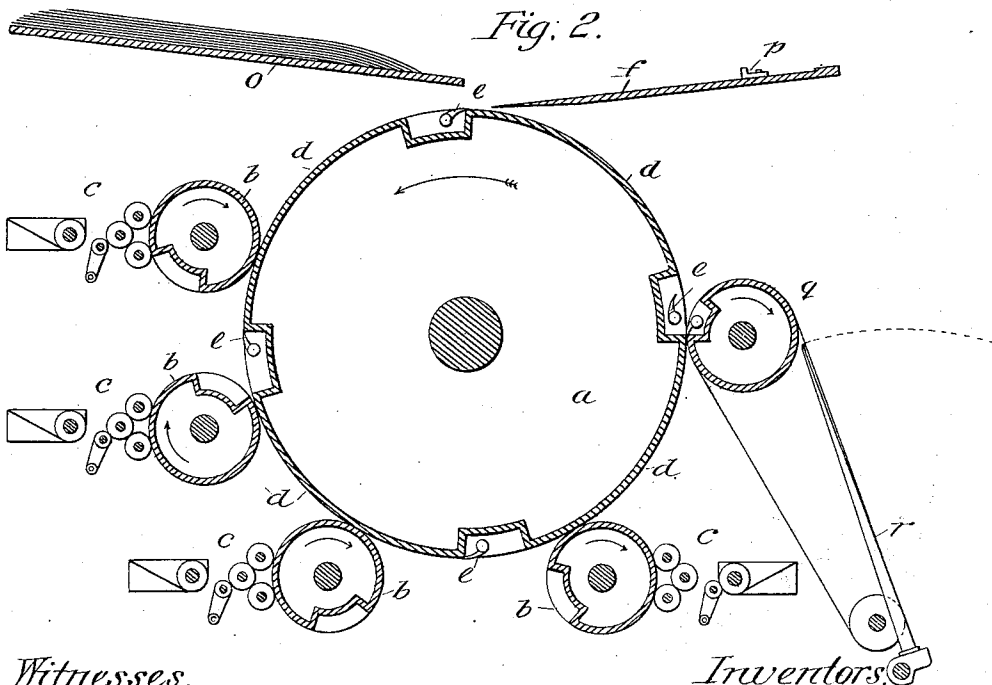
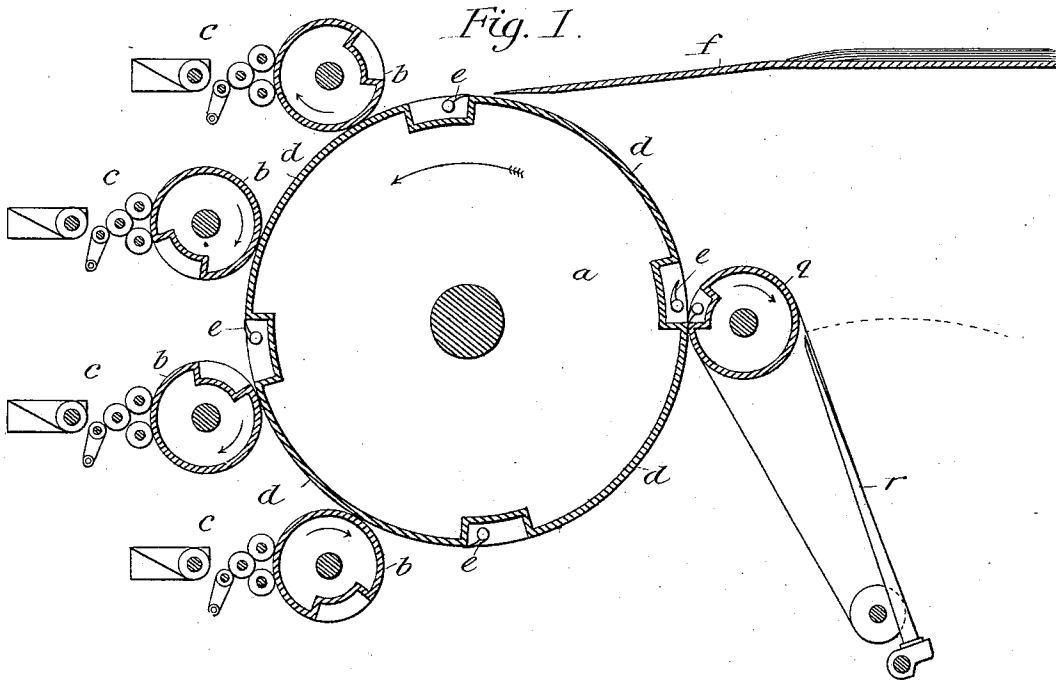
3 Sheets—Sheet 1.

D. S. CLARK & W. C. WENDTE.

CHROMATIC PRINTING MACHINE.

No. 367,024.

Patented July 26, 1887.



Witnesses.

D. S. Clark
W. C. Wendte

Inventors.

Dwight S. Clark
William C. Wendte
By J. W. Osborn att.

(No Model.)

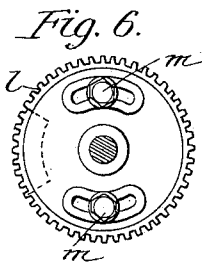
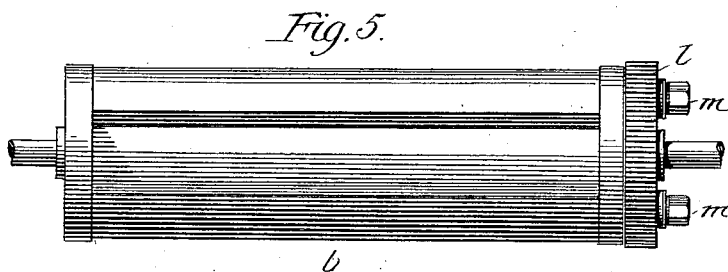
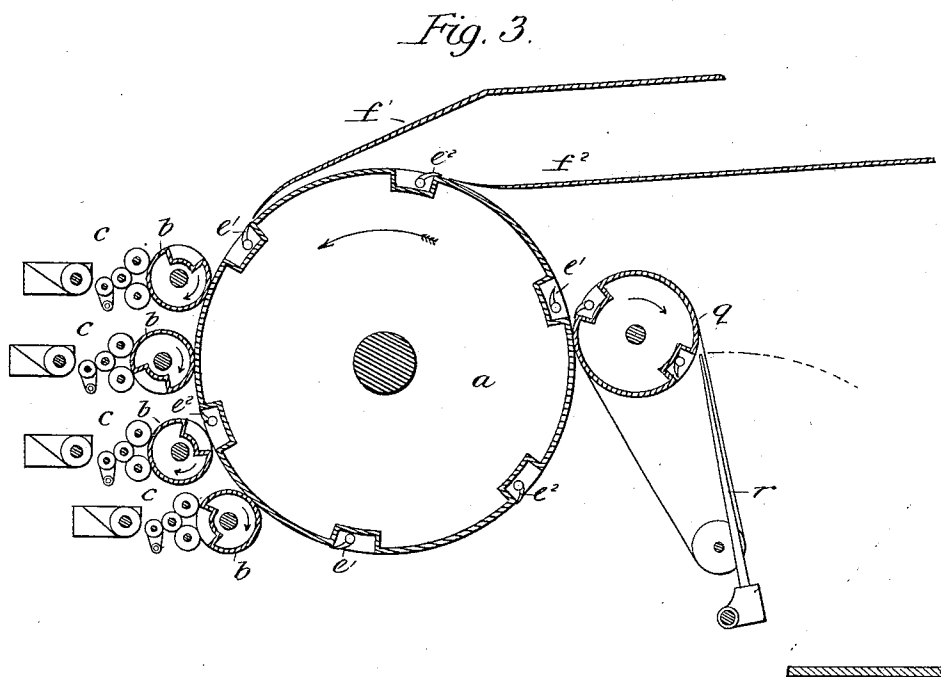
3 Sheets—Sheet 2.

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By J. W. Osborn, atty

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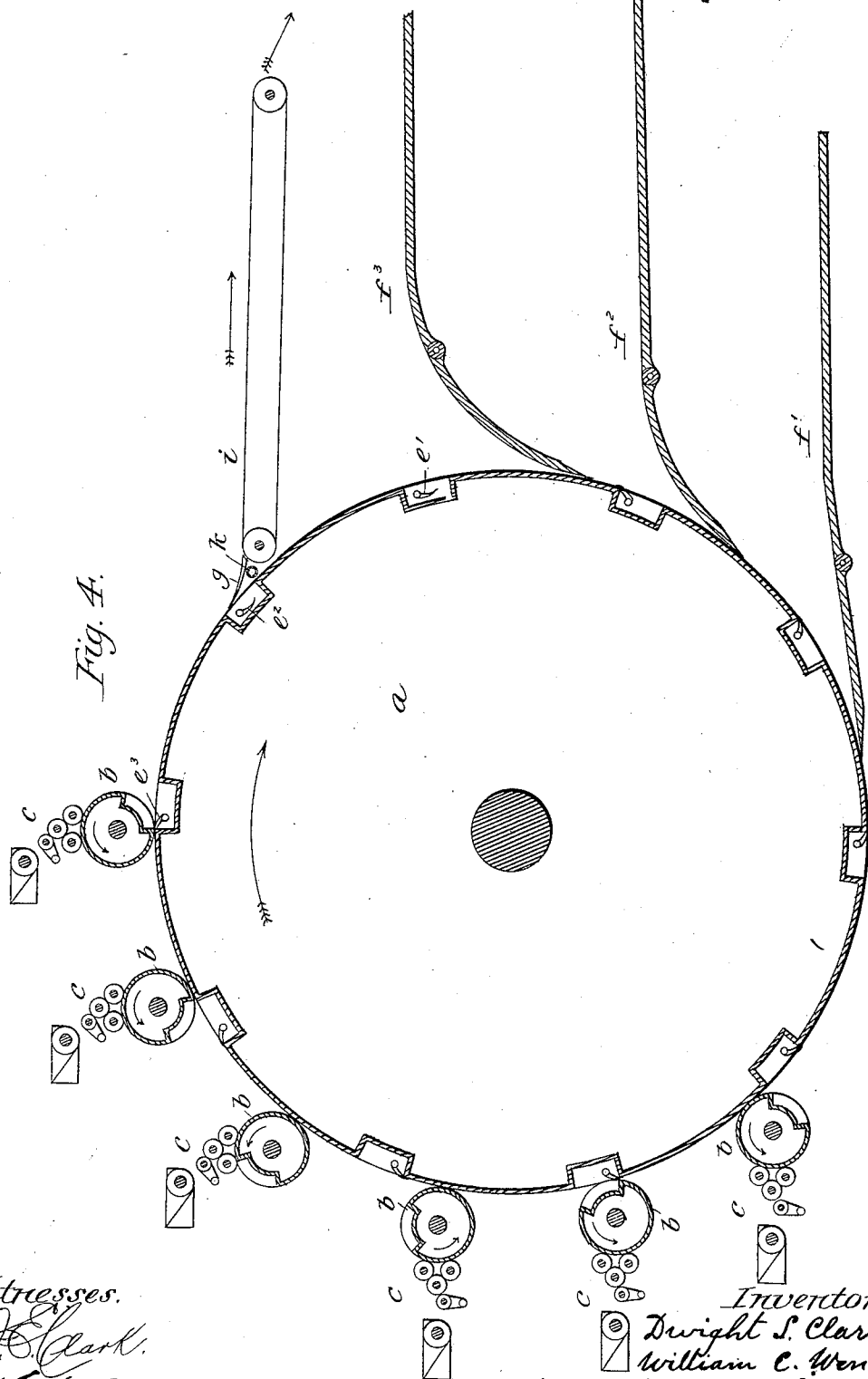
3 Sheets—Sheet 3.

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W. Wendte.

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William C. Wendte.

Wm. J. W. Osborn

UNITED STATES PATENT OFFICE.

DWIGHT S. CLARK, OF CAMBRIDGE, AND WILLIAM C. WENDTÉ, OF LANCASTER, ASSIGNORS TO WILLIAM H. FORBES, OF BOSTON, MASSACHUSETTS.

CHROMATIC-PRINTING MACHINE.

SPECIFICATION forming part of Letters Patent No. 367,024, dated July 26, 1887.

Application filed February 11, 1887. Serial No. 227,372. (No model.)

To all whom it may concern:

Be it known that we, DWIGHT S. CLARK, a citizen of the United States, residing at Cambridge, in the county of Middlesex and State of Massachusetts, and WILLIAM C. WENDTÉ, a citizen of the United States, residing at Lancaster, in the county of Worcester and State of Massachusetts, have invented certain new and useful Improvements in Chromatic-Printing Machines; and we do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters and figures of reference marked thereon, which form a part of this specification.

This invention is related to an important class of printing-presses, in which a sheet of paper fed to the same receives impressions in two or more colors upon its face before delivery, said printings all contributing to the formation of a single design; and its object is to provide a machine of simple construction, securing an accurate register and a rapid rate of production.

In the drawings forming part of this specification, Figure 1 represents a cross-section of the cylinders used in a machine for printing four colors. Figs. 2 and 3 are similar views of modified constructions of the press. Fig. 4 is also a similar view, showing a press in which six colors are printed, with other modifications. Fig. 5 is a side, and Fig. 6 an end, elevation of a form-cylinder.

The drawings are diagrammatic in character, the general shape of the several parts which together form the press being for the most part well known and understood; and all unessential details—such as the frame of the press, the bearings for the cylinders, most of the gearing, and many connecting-pieces of mechanism—are omitted, as they tend to obscure the relations of the more important parts.

The large cylinder *a* is an impression cylinder, around which the form-cylinders *b* are arranged at suitable intervals. Each of the latter is provided with an inking apparatus, *c*, which is represented as consisting of the

simplest elements—namely, of an ink-fountain, 50
ductor-roll, rider, and two form-rollers—though in practice a more elaborate and efficient inking system would be required in most cases. Each form-cylinder has attached to and covering part of its surface a cylindrical form 55
adapted for the printing of one of the colors which go to make up the chromatic design, the uncovered portion being depressed so as to form a gap in a way very commonly met with in large presses. This depressed part of 60
each form-cylinder is chiefly used to facilitate the adjustment and making fast of the forms, which operation need not be more fully referred to in this specification. The large cylinder *a* has upon its periphery a number of 65
“impression-surfaces,” *d*, (which term will be adhered to throughout for convenience in description,) and it is also provided with a like number of gaps, in which the grippers *e* are located. These gaps also contain the reel- 70
rods, &c., used for holding and straining the packing and tympan-sheets which cover the impression-surfaces *d*; but they are not shown, as they are in nowise essential to a proper understanding of our invention. In this press 75
the large cylinder is driven by a gear upon its edge, and all the small cylinders are driven by said gear, the same being omitted in the drawings, except in Figs. 5 and 6, in which the gear upon a form-cylinder appears. The di- 80
ameter of the impression-cylinder in this press should be some multiple of that of the form-cylinders, which are all precisely alike, so that any point upon the surface of a form-cylinder 85
invariably comes in contact with the same points upon the impression-cylinder. Furthermore, the form-cylinders are so arranged about the circumference of the large cylinder that the gaps in each correspond, and, as a consequence, each form will roll over an im- 90
pression-surface as it passes.

In the drawings the distances between the centers of the form-cylinders are generally about equal, and to have them so may often be found convenient in practice; but it is by 95
no means necessary, as the coincidence of the forms with the impression-surfaces depends upon the angular position of given points of

contact upon their surfaces, and not upon their disposition about the circumference of the impression-cylinder, means for the adjustment of which will be described subsequently.

5 From the foregoing description of our invention it will be seen that when a number of sheets of paper are fed successively to each impression-surface from the feed-board *f*, as they pass the same, each sheet being taken
10 hold of by the grippers *e* in the well-known way, they will all have received impressions from all the forms when they reach the end of the series of form-cylinders, each having had printed upon it then the finished chromatic
15 design.

Our invention further consists in mechanical devices by which the speed may be increased and the quality of the work done by it raised to the highest excellence. To accomplish these results, it is necessary to supply
20 the machine with sheets of paper at a much faster rate than can be accomplished by a feeder of average capacity, a necessity which is essentially dependent on the peculiarities and perfections of our press. When, as provided for in Fig. 1, a single feeder is employed to lay the sheets upon the feed-board *f* for seizure by every set of grippers on the impression cylinder, it is evident that the time
25 at his disposal after the tail of the preceding sheet has left the feed-board when he can reach the stops in front will only be that required for the passage of the gap.

If about three seconds is occupied in laying a
35 sheet—a rapidity which is not often reached—it will be readily understood that the surface speed of the cylinders—or, in other words, the actual printing speed—is exceedingly slow. It is a well-established fact that good printing
40 is not possible when a press runs much below the normal speed, which is about that reached in reciprocating presses by the best makers. In these last-named machines, where the interval between the sheets fed to the impression-cylinder is relatively long, the actual
45 time in which the printing is done is short, being but a fraction of that required for a perfect revolution of the press, and the quality of such work from a typographic form would be found to undergo deterioration were such a
50 press run at a rate of speed no faster than that of the possible printing speed of the chromatic press fed by one person.

In the press we have invented the utilization of a higher speed than is possible with ordinary feeding, as in Fig. 1, may be accomplished in several novel ways.

In Fig. 2 the increase of surface speed is made feasible by supplementing the ordinary
50 feed-board with the additional board, *o*, placed farther forward on the frame of the press. On this board the pile of unprinted sheets is put. Such an arrangement admits of two feeders working at opposite sides at the same time.
65 Taking sheets alternately from the pile at *o*, each feeder places his sheet on the board *f* to the back-stop at *p*, and holds it down with his

fingers till the grippers seize it. At that moment, without waiting for the sheet to leave the board, the other feeder lays his sheet in like
70 manner to the stop *p* and holds it, the first taking a fresh sheet from the pile while he does so. In this way the speed of the press may be more than doubled with safety, as neither feeder has to wait for the sheet to leave the
75 board. Nor do the feeders in this novel arrangement interfere with each other, because each takes hold of the sheet by the tail and carries it to the back-stop *p*, which they could not do so well if the pile of sheets was on the one feed-board, as in Fig. 1. This method of rapid feeding is plainly applicable to all presses printing sheets when room can be made for the board *o*.

In Fig. 3 another analogous method is shown
85 which makes an increased speed possible. In this case the feeding is done as in Fig. 1, but two independent feed-boards are used, marked *f'* and *f''*, respectively. At each board the feeder places his sheet, in the usual way, to front stops; but alternate grippers only on the impression-cylinder close upon these presented sheets and carry them to the impression-surfaces, so that each feeder has the time required
90 for two sheets in which to place one. Under these circumstances our press can be run much faster than when a single feed-board is used, because in place of having only the time in which one gap passes he has the time of two gaps and a sheet besides after the tail of the
95 preceding sheet has left the board.

In Fig. 4 three feed-boards are employed, and the feeding is done from below, for reasons to be presently stated. These feed-boards are marked *f'*, *f''*, and *f'''*, respectively. They
105 are suitably formed and adapted to the positions in which they are placed, and are provided with the usual hinged flaps, which by well-known devices are raised into place at the moment the sheet is caught by the set of
110 grippers that is to take it. In Fig. 3 the feed-boards are separated from each other by exactly the length of an impression-surface and gap, in consequence of which the two sheets are fed together and seized at the same instant, though printed and delivered *seriatim* afterward; but such a disposition of the feed-boards is by no means essential, and is not followed in Fig. 4, it being quite immaterial where they are placed, provided they present
120 the sheets properly to the impression-cylinder in advance of the form-cylinders. All that is necessary when the feed-boards are put at odd and irregular intervals is that the gripper marked *e'* shall close when it reaches the feed-board *f'*, that marked *e''* when it reaches
125 *f''*, and in like manner *e'''* as it passes *f'''*, and so on, each cam or stud in the press-frame adjacent to each feed-board closing every third gripper as it comes into position and escaping the two intervening, in a manner analogous to the periodic engagement of the stud-and-gripper mechanism in the Boynton and many other presses. Each feeder for the press shown

in Fig. 4 has the interval of time occupied by the passage of three gaps and two sheets in which to lay his own sheet.

In delivering from the press we have invented we employ known methods which are well understood. So long as a slow speed is admissible, the delivery-cylinder *q* and fly *r* may be employed in the well-known way, as shown in Figs. 1, 2, and 3; but, as a rule, we prefer in most cases the delivery mechanism shown in Fig. 4, which consists of the fingers *g*, which catch the leading edge of the sheet at the moment the gripper is thrown open and convey it face up to the endless tapes *i*, running continuously in the direction of the arrow. From these tapes it falls into a sloping tray or is removed from their surface by hand. Of course such tapes can be carried to any desired distance from the press. To make sure that the leading edge of the sheet shall rise over the fingers at *g*, the tube *k* may be employed. This tube is connected with a blower or other air-compressor of some suitable kind. It is perforated with a row of holes directed toward the approaching sheet, from which a current or blast of air is forced in such a way as to make sure that the leading edge of the printed sheet shall rise over the fingers. This use of a blast of air to lift the sheet from the impression-surface is old, and is by no means the only device that can be employed, as there are several forms of shoo-fly well known to press-builders which can be substituted for it with perfect success. The method of under-feeding is adopted in the case shown in Fig. 4, with a view to the delivery of the sheet face up, by means of the fingers *g* and tapes *i*, from the upper part of the impression-cylinder. The peculiar curved construction of two of the feed-boards in this case, and also in Fig. 3, is designed to present the leading edge tangentially for seizure by the grippers.

In the press we have invented the form-cylinders *b* are so placed that the gaps in them correspond to those containing the grippers in the impression-cylinder, so that the leading edge of the sheet upon the latter meets the leading edge of the form upon the former; but in placing the forms and securing them to the cylinders *b* it is difficult to put them so truly in position circumferentially as to obtain a perfectly exact register. This we accomplish by letting the gears *l* of the form-cylinders *b* (shown in Figs. 5 and 6) turn freely on their shafts within small angular distances, and then clamping them fast after the adjustment for circumferential register has been accurately made. In these figures the bolts used for clamping are marked with the letter *m*, the function of which will be understood without further explanation.

From the foregoing it will be seen that the press we have invented is well adapted for the rapid production of chromatic work, which is essentially due to the fact that all the forms, irrespective of the number of colors, are print-

ing at the same time. In addition to this, we have, by the subdivision of the face of the impression-cylinder into a number of impression-surfaces, succeeded in presenting for the several colored impressions a series of sheets with very little lost space between them, which can be fed with great rapidity and without the delays due to reciprocating machinery or the successive printing of one color after another on the same sheet. It will also be readily understood that while the length of an impression-surface determines that of the longest sheet that the press can print, any shorter sheet can be easily dealt with, as in other presses.

Having thus described our invention and the manner in which the same may be practically carried out, what we claim, and desire to secure by Letters Patent, is—

1. A chromatic-printing press consisting, essentially, of an impression-cylinder having around its periphery two or more distinct impression-surfaces, with gaps between the successive surfaces for the reception of grippers, and two or more form-cylinders in operative relation to and in register with the impression-surfaces, substantially as described.

2. In a chromatic-printing press, the combination of two or more form-cylinders with an impression-cylinder having around its periphery two or more distinct impression-surfaces, with adjoining gaps for the reception of suitable grippers, the length of each impression-surface, with its adjoining gap, being equal to the circumference of each form-cylinder, substantially as described.

3. In a chromatic-printing press, the combination of an impression-cylinder having its periphery divided into a number of equal parts, consisting each of a distinct impression-surface, with adjoining gap for the reception of suitable grippers, with a number of form-cylinders in operative relation to and in register with the impression surfaces, substantially as described.

4. A chromatic-printing press, consisting of an impression-cylinder having around its periphery two or more distinct impression-surfaces, with adjoining gaps for the reception of suitable grippers, two or more form-cylinders in operative relation to and in register with the impression-surfaces, and feeding and delivery devices, substantially as described.

5. In a chromatic-printing press, the combination of an impression-cylinder having around its circumference a number of distinct impression-surfaces with adjoining gaps, and a set of grippers in each gap, with two or more feed-boards, each in simultaneous operative relation to two or more sets of the aforesaid grippers, substantially as set forth.

In testimony whereof we have affixed our signatures in the presence of two witnesses.

DWIGHT S. CLARK.

WILLIAM C. WENDTÉ.

Witnesses:

WINFIELD F. PRIME,

SELWYN Z. BOWMAN.