No. 860,621. PATENTED JULY 16, 1907.

E. Z. TAYLOR.

PRINTING MACHINE.

APPLICATION FILED AUG. 21, 1906.

2 SHEETS—SHEET 1.

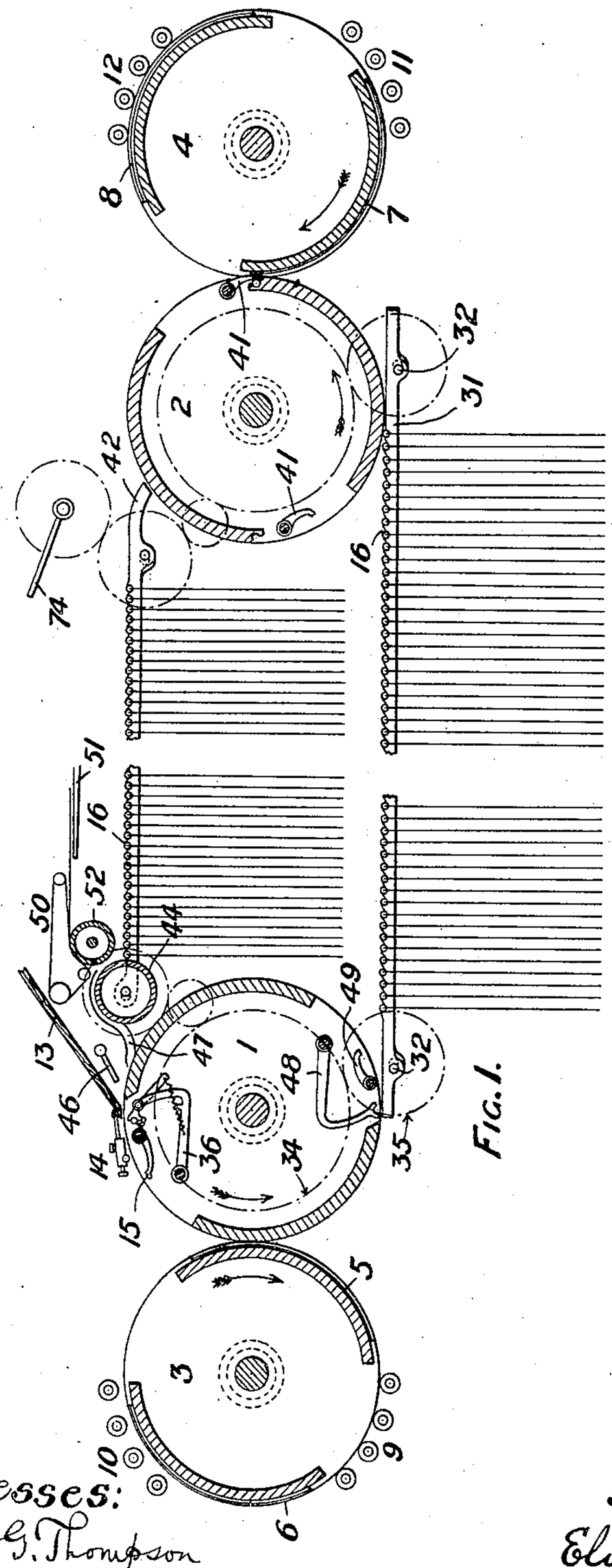

FIG. 1.

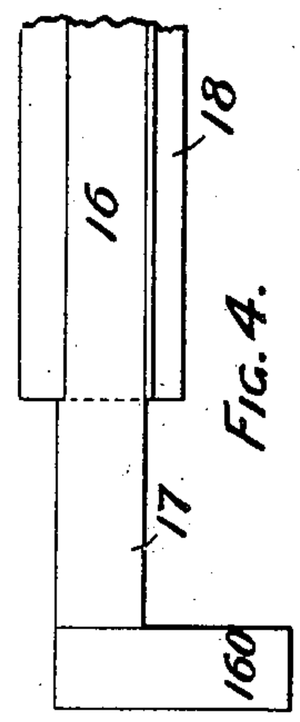

FIG. 4.

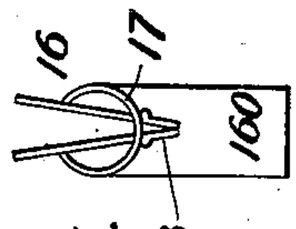

FIG. 3.

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Inventor:
Elmer Zebley Taylor:
By Henry H. Bates
Att'y

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2 SHEETS—SHEET 2.

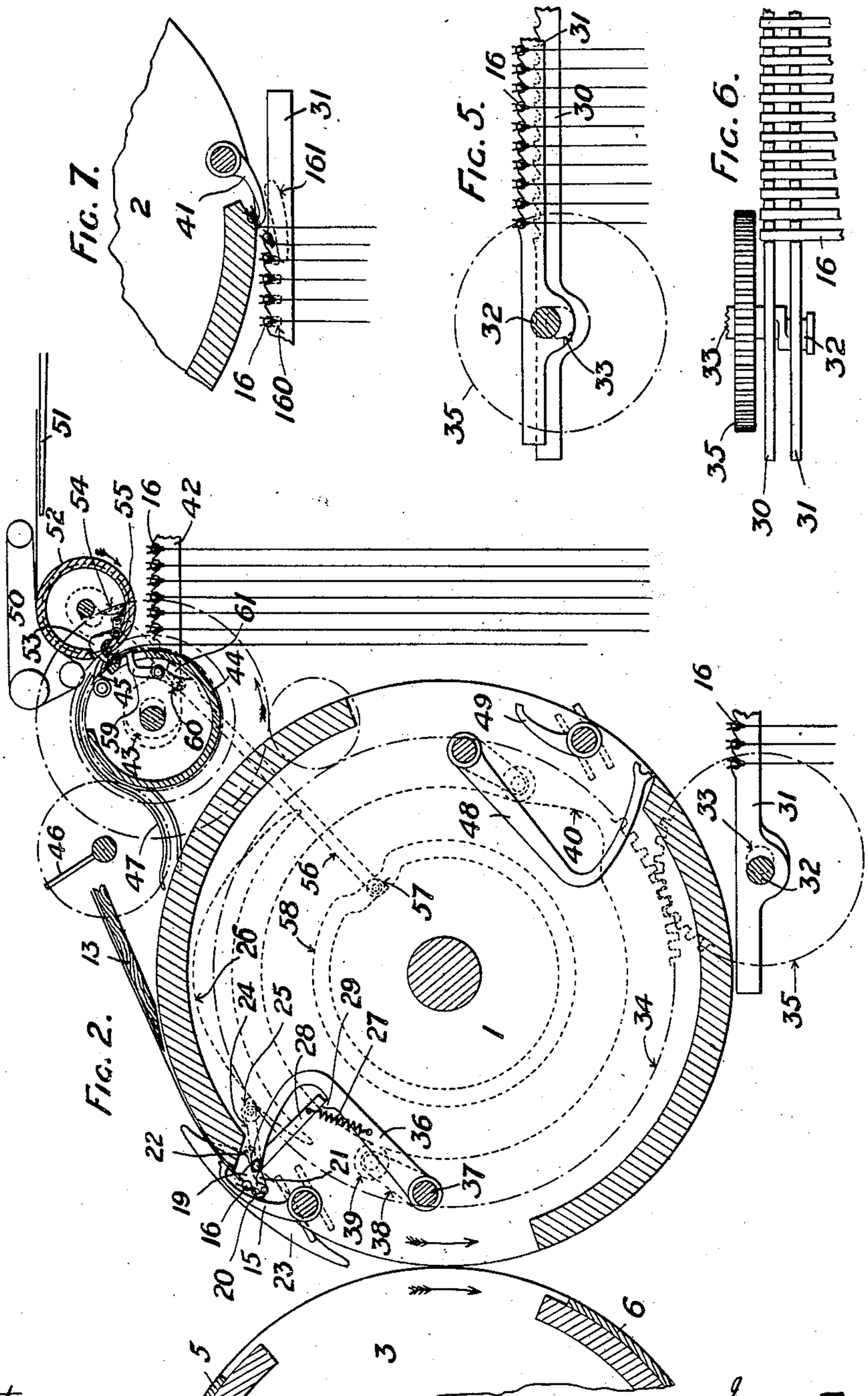

FIG. 2.

FIG. 7.

FIG. 5.

FIG. 6.

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UNITED STATES PATENT OFFICE.

ELMER ZEBLEY TAYLOR, OF LONDON, ENGLAND, ASSIGNOR TO MULTI-COLOUR PRINTING COMPANY (1904) LIMITED, OF WESTMINSTER, LONDON, ENGLAND.

PRINTING-MACHINE.

No. 860,621. Specification of Letters Patent. Patented July 16, 1907.

Application filed August 21, 1906. Serial No. 331,458.

To all whom it may concern:

Be it known that I, ELMER ZEBLEY TAYLOR, a citizen of the United States, residing at London, England, have invented certain new and useful Improvements in Printing-Machines, of which the following is a specification.

This invention relates to improvements in printing machines, and has for its object when applied to multi-color printing, to allow of a definite interval of time between the impressions of the different colors, thus permitting the ink or color of one impression to dry, or partially dry, before the next impression is made.

The invention may also be applied to machines printing in one color only, and in general when it is desirable that an interval of time should elapse between the impression and the subsequent delivery.

It may be employed in connection with either rotary or flat-bed machines, but I will describe it with reference to the accompanying drawings in which a rotary machine for printing in four colors on the same side of the sheet is illustrated, and in which

Figure 1 is a longitudinal section of the machine, Fig. 2. an enlarged view of one of the cylinders thereof, with the delivery and other mechanism connected therewith. Fig. 3. an end view, and Fig. 4. a side view of one of the gripper bars I prefer to employ. Fig. 5. is a side elevation showing one method of operating the accumulating carrier by which the gripper bars, with or without a sheet of paper, are taken from one printing surface to another. Fig. 6. is a plan view thereof but showing the parts in a different position. Fig. 7. is a detail view illustrating one method I may employ for temporarily attaching the gripper bars to the impression cylinders.

In the machine illustrated 1, 2, are the impression cylinders, and 3, 4, the form cylinders, each of the latter carrying two printing plates; 5, 6, and 7, 8, for printing in the four different colors and each inked respectively by the inking mechanisms 9, 10, 11, 12, of the ordinary construction, suitable means being provided for raising the inking mechanisms out of contact with the cylinders during the passage of the forms that are not to be inked.

Suitably disposed over the impression cylinder 1 is a feed board 13, from which the sheets are taken by such cylinder, a lay-mark 14 of ordinary construction being provided to insure their being correctly placed for this purpose. The cylinder 1 is provided with a gripper 15, suitably formed to grip the front edge of the sheet against the surface of the cylinder and carry it round while it receives the first impression from the printing plate 6 on cylinder 3. Either before or during this first impression I provide means for attaching to the forward edge of the sheet a gripper bar 16, which may be of the construction illustrated in Figs. 3 & 4, and which remains attached thereto during the whole of the subsequent impressions and is only released therefrom when the completely printed sheet is ready for delivery.

The gripper bars shown in Figs. 3 & 4, consist of steel tubes 17, split at one side and having two flat steel strips or blades 18, passed through slots opposite the split side and extending through the split opening, the edges of which bear on the sides of the blades with spring action and so normally keep the outer edges of such blades in contact. The blades 18 preferably are not so long as the tubes 17, so as, as shown in Fig. 4, to leave the ends of the gripper bars approximately cylindrical, into which a crank 160 is secured for the purpose hereinafter described. It will be seen that by pressing on the inner ends of the blades 18, the outer ends thereof will be opened, and I provide suitable means for effecting this opening as the gripper bar approaches the sheet and for then closing the blades 18 with the sheet to be printed between them. The means shown for this purpose in Fig. 2 of the drawings, comprise a pivoted lever 19, having a semi-circular recess in its end into which the gripper bar is delivered as hereinafter described, and to which lever 19 a two-armed lever 20 is pivoted. The shaft of lever 19 has an arm 24 outside the cylinder carrying a roller 25, which is acted upon by a cam 26 mounted on the machine framing in such a position and of such shape that after a gripper bar has been placed in the recess provided for it the lever 19 will be turned back out of the way of the sheet to be delivered from the feed board 13 and then returned to the position shown in Fig. 2, a spring 27 secured to an arm 28, effecting this return movement which is preferably limited by a stop 29 against which the end of arm 28 abuts. As the lever 19 completes its return movement carrying the gripper bar 16, the blades 18 of the latter are opened by means of arm 21 of the two-armed lever 20 pivoted to lever 19, such arm 21 being provided for this purpose with a roller 22, acted upon by a cam 23, mounted on the framing of the machine in such a position that the lever 20 will press on the inner ends of the blades 18 of the gripper bar, thus opening the outer ends thereof as the gripper bar approaches the sheet, the forward edge of which is arranged to project slightly beyond the edge of the opening in the cylinder. As soon as the roller 22 leaves cam 23 the blades 18 of the gripper bar 16 will grip the sheet securely between them, holding it as above stated during any further impressions and until the sheet is ready for delivery.

When the sheet has received the first impression from the printing plate 6 on cylinder 3, I arrange that the gripper bar 16 to which it has been secured as above described, shall be delivered on to a carrier along

which it is gradually moved (carrying the sheet with it) towards the cylinder where it receives the next impression. This carrier is so arranged and operated that a certain definite interval of time elapses during the gradual progression of the sheet from one cylinder to the other, thus permitting the ink applied by the first impression to dry or partially set before the next color is applied. A suitable arrangement of carrier for this purpose is that illustrated in the drawings, and which comprises a pair of notched or toothed bars 30, 31, arranged side by side at each side of the machine, one (30) of each pair being stationary and the other (31) having a circular motion imparted to it in the direction of its length by means of a crank 32, on a shaft 33, driven by gear wheels 34, 35 mounted on the shaft of cylinder 1 and on shaft 33 respectively. The operation of this arrangement is that the gripper bars 16 will rest in the notches or teeth of both bars 30, 31, until, on the circular motion being imparted to bar 31, they will be lifted from the notches in which they rest in bar 30 and carried over to the next notches thereof, the throw of the crank 32 being adjusted to give sufficient movement to bar 31 for this purpose. This operation will be repeated again and again until the gripper bar 16 and the sheet it carries arrive at the next cylinder. I arrange a crank 32 at each end of the bar 31 and if necessary at any intermediate points between the cylinders 1 & 2 respectively.

Means are provided for delivering the gripper bar 16 from cylinder 1 to the first notch in the bars 30, 31, and which may consist as shown in Fig. 2, in mounting the shaft of lever 19 above mentioned in the end of an L-shaped lever 36 secured to a shaft 37, to which is also secured an arm 38 provided with a roller 39 acting against a stationary cam surface 40. The gripper 15 which holds the sheet to cylinder 1 during the first impression is arranged to open as the gripper bar arrives opposite the ends of the carrier bars 30, 31, thus permitting the gripper bar to drop and rest on such bars 30, 31, and at this moment roller 39 comes in contact with cam surface 40, and thereby causes lever 36 to project out from the cylinder and push the gripper bar along the smooth ends of bars 30, 31, until it arrives at the first notch. The end of lever 36 then leaves the gripper bar and is returned into the cylinder by a spring or other suitable means. When the gripper bar 16 with its attached sheet arrives at cylinder 2 it is turned by its crank 160 coming in contact with a cam 161 mounted on the machine framing to the proper position and is then seized or secured to such cylinder 2 by suitable means, such for instance as that shown in Fig. 7, and comprising a gripper 41 of ordinary construction, which is operated at the proper time and preferably comes in contact with the closed ends of the blades 18 of the gripper bar, thus re-inforcing the hold of the latter on the sheet. This movement of the gripper bar 41 causes the tubular part of the gripper bar to rest in a semicircular recess formed in the edge of the opening in cylinder 2 and turns such gripper bar into the proper position for drawing the attached sheet round with the cylinder while it receives an impression from the printing plate 7 on cylinder 4. As soon as this has been effected the gripper bar is transferred to a carrier of similar construction to that hereinbefore described, consisting of pairs of notched bars 42, 43, one bar of each pair of which has as before, a circular motion imparted to it by cranks driven by gearing from cylinders 1 & 2.

The means shown in Fig. 1 for transferring the gripper bar 16 from cylinder 2 to the carrier 42, 43, consist in an arm 74 operated by gearing from cylinder 2, and so adjusted as to push the gripper bar, immediately it is released by the gripper 41, along the smooth ends of bars 42, 43, until it arrives at the first notch therein, when the circular motion of bar 43 will gradually progress it along the carrier until it arrives at a cylinder 44. This cylinder 44, which is driven by gearing from the shaft of cylinder 1, so as to rotate twice to each revolution of the latter, is provided with a gripper 45, which closes on the gripper bar 16, resting in the last notch of bars 42, 43, and thus takes such gripper bar and its attached sheet round with it until such gripper releases the gripper bar, when an arm 46 mounted on a shaft driven by gearing from the shaft of cylinder 44 comes in contact with the gripper bar and pushes it along a curved guide 47 towards cylinder 1, a pivoted lever 48, carried in which, arrives at this moment, the correct position of the bar being maintained by its crank 60, moving in the guides at each end. Such lever 48 has a recessed end into which the tubular part of gripper bar 16 is directed by the arm 46 and guide 47, and as soon as such gripper bar is in this position, a gripper bar 49, mounted in cylinder 1, clamps such gripper bar therein, its end preferably coming in contact with the closed ends of the blades 18 of the gripper bar, which will thus be again secured to cylinder 1, for the sheet it carries to receive a third impression by contact with the printing plate 5 on cylinder 3. When this third impression has been made the gripper bar will again be transferred to the carrier 30, 31, the shaft of lever 48 being for this purpose provided with an arm and roller similar to those of lever 36, and also acting in conjunction with cam surface 40 to deliver the gripper bar into the first notch of the carrier 30, 31, along which it will be gradually progressed as before towards cylinder 2. The latter has two grippers 41, of exactly similar construction and operation, and the second of these grippers will now take the gripper bar with the sheet which has already received three impressions, and such sheet will receive a fourth impression by contact with the printing plate 8 on cylinder 4, after which its gripper bar will be again transferred to carrier 42, 43, by means of arm 74. At the end of its gradual progression along the carrier 42, 43, the sheet having now received its four impressions will be ready for delivery. For this purpose I may employ the means shown in Fig. 2, which consist in providing means for opening the gripper bar 16 and releasing the sheet therefrom, and for causing such sheet to be engaged by tapes 50, which convey it to a fly frame 51, or other means of delivery. To effect this object I mount a cylinder 52 adjacent to cylinder 44, and driven by gearing from the shaft thereof, this cylinder 52 being provided with a pivoted arm 53, which at the proper moment is caused to project from the cylinder and come in contact with the inner ends of the blades 18 of the gripper bar carried by cylinder 44, thus opening the outer ends of such blades and releasing the sheet. This movement of the arm 53 may be effected by means of a cam 54 acting against a roller 55 on an arm on the shaft of the arm 53,

and which cam is mounted on a sliding bar 56, having a roller 57, running in a groove 58, in the side of cylinder 1, and is therefore only brought into operation once during each revolution of such cylinder 1. The sheet being thus released from the gripper bar, a pusher 59 mounted in cylinder 44 and operated by a roller 60, acting against a cam 61, also carried by the sliding bar 56, operates to push it out from cylinder 44, until it is engaged by the tapes 50, which carry it round cylinder 52 to the fly frame 51. In the meantime the empty gripper bar is taken round by the cylinder 44, and delivered by the arm 46, and guide 47, into the recessed end of the lever 19, carried by cylinder 1, ready to be opened and secured to a new sheet from the feed board 13.

The operation of the complete arrangement may be briefly described as follows:—A sheet fed from feed board 13 will be taken by the gripper 15 of cylinder 1, and receive a first impression (say in yellow) from the printing plate 6 on cylinder 3, before or during which impression a gripper bar 16, carried in the recess in arm 19, will be secured to its front edge by the means described. Such gripper bar with the sheet attached will then be transferred to the carrier 30, 31, and gradually carried by same to the cylinder 2, to which the gripper bar will be secured, the sheet then receiving its second impression (say in red) from the printing plate 7 on cylinder 4. When this impression has been made the gripper bar will be transferred to carrier 42, 43, which conveys it to cylinder 44, from which it passes through guide 47 back to cylinder 1, this time into the recess in arm 48, in which it is secured by gripper 49. The sheet will then receive a third impression (say in blue) from printing plate 5 on cylinder 3, after which the gripper bar will be again transferred to carrier 30, 31, on passing along which it will be taken a second time by cylinder 2, and receive its fourth impression (say in black) from printing plate 8 on cylinder 4. Cylinder 2 will then deliver it again to carrier 42, 43, and at the end of its travel along same the gripper bar will be taken by cylinder 44, and opened by arm 53 to release the sheet, which will be conveyed away by tapes 50, while the empty gripper bar passes round cylinder 44, and along guide 47, into the recess in arm 19, ready to be opened to receive another sheet.

I have only described the action of a single gripper bar, but it will be understood that at each revolution of the cylinder 1 a fresh sheet is taken in and one is delivered, and that in order to completely start the machine printing and delivering sheets in four colors as described a sheet must have been attached to each gripper bar, each of such sheets having received its full complement of color. Thus in starting the machine with all the gripper bars empty it will be necessary for the first gripper bar with its attached sheet to make one complete cycle before all the gripper bars are filled and the machine is working as above described.

It will be understood that although I have described the application of the invention to a particular type of color printing machine, same is applicable to any machine in which sheets are printed in colors or in which after an impression has been made it is desirable that a time should elapse before the sheet is delivered. It will also be readily understood that I do not confine myself to the particular means for carrying out my invention described, as same will vary with the type of machine to which it is applied, and many modifications may be made without departing from the spirit of my invention.

What I claim as my invention, and desire to secure by Letters Patent, is:—

1. In printing machines, in combination, a plurality of impression surfaces, a plurality of form surfaces, a series of semi independent gripper bars to each of which a sheet is detachably secured, and carrier bars along which said gripper bars with their attached sheets are conveyed in definite intervals of time from one impression surface to the next and to the point of delivery, substantially as and for the purpose specified.

2. In printing machines, a plurality of impression surfaces, a plurality of form surfaces, a series of gripper bars to each of which a sheet is detachably secured, means for automatically securing and detaching said sheets at prescribed intervals, carrier bars in pairs along which said gripper bars with their attached sheets are conveyed in succession by the operation of the machine from one impression surface to the next and to the point of delivery, and means for the final delivery of said gripper bars to the starting point, substantially as specified.

3. In printing machines, a plurality of impression surfaces, a plurality of form surfaces, a series of gripper bars to each of which a sheet is detachably secured, means for automatically securing and detaching said sheets, carrier bars in pairs along which said gripper bars are conveyed in succession by a step by step movement from one impression surface to the next to allow a definite interval of time to elapse between impressions, and means for the final delivery of said gripper bars to the starting point, substantially as specified.

4. In a multiple impression printing machine, the combination of a gripper mechanism for seizing a sheet of paper, a series of auxiliary semi-independent grippers brought into contact with and made fast to the sheet of paper before or during the first impression, a mechanism for releasing the said auxiliary semi-independent grippers and sheets of paper, a carrier for conveying them from one impression surface to another, sets of grippers for locking such auxiliary semi-independent grippers to the subsequent impression cylinders during the time of printing, and means for delivering the completed sheets, substantially as specified.

In witness whereof I have signed this specification in presence of two witnesses.

ELMER ZEBLEY TAYLOR.

Witnesses:
FREDK. L. RAND,
R. F. WILLIAMS.