

May 26, 1936.

F. F. KAISER

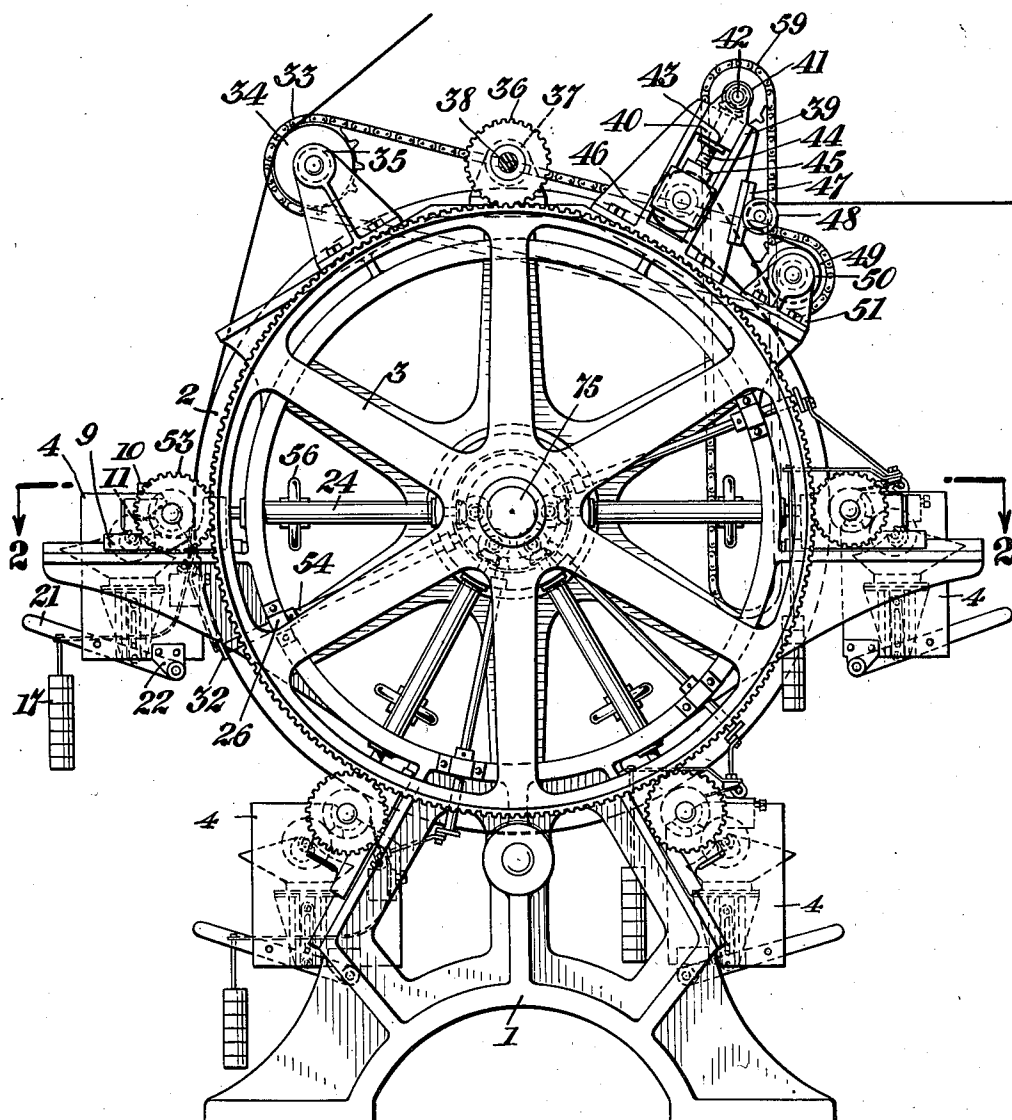
2,042,060

MULTICOLOR PRINTING MACHINE

Filed Oct. 26, 1934

6 Sheets-Sheet 1

Fig. 1.



INVENTOR
Frank F. Kaiser
BY *C. Campbell Hunsicker*
ATTORNEY

May 26, 1936.

F. F. KAISER

2,042,060

MULTICOLOR PRINTING MACHINE

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6 Sheets-Sheet 2

Fig. 2.

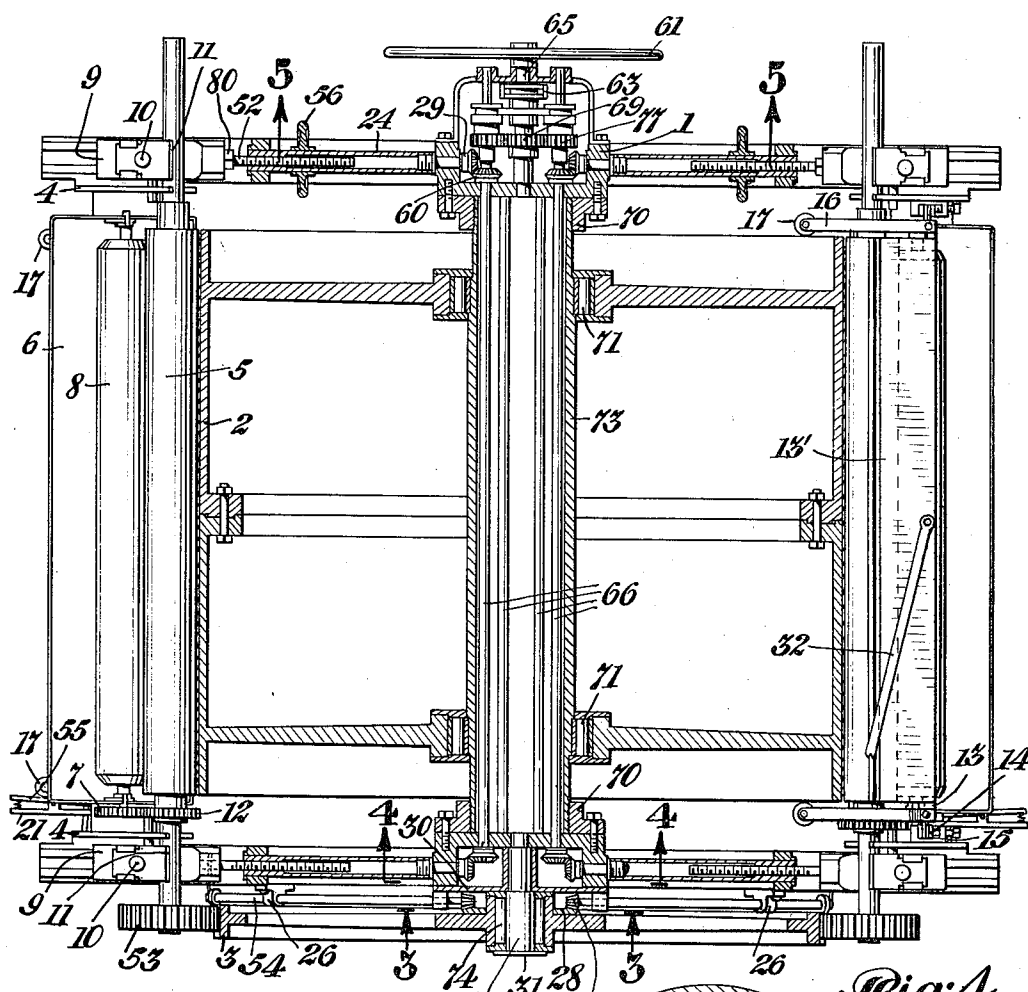


Fig. 3.

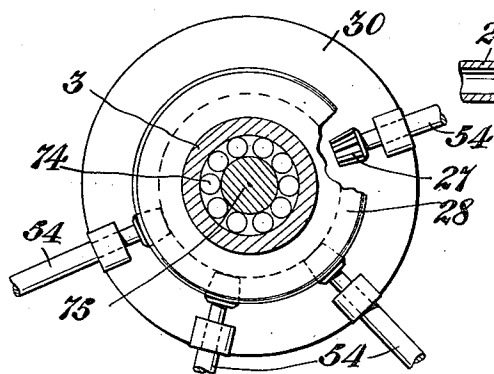
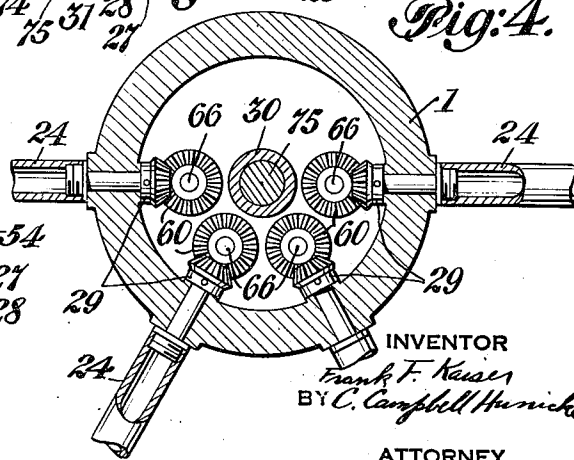


Fig. 4.



INVENTOR
Frank F. Kaiser
BY C. Campbell Hummel
ATTORNEY

May 26, 1936.

F. F. KAISER

2,042,060

MULTICOLOR PRINTING MACHINE

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6 Sheets-Sheet 3

Fig. 5.

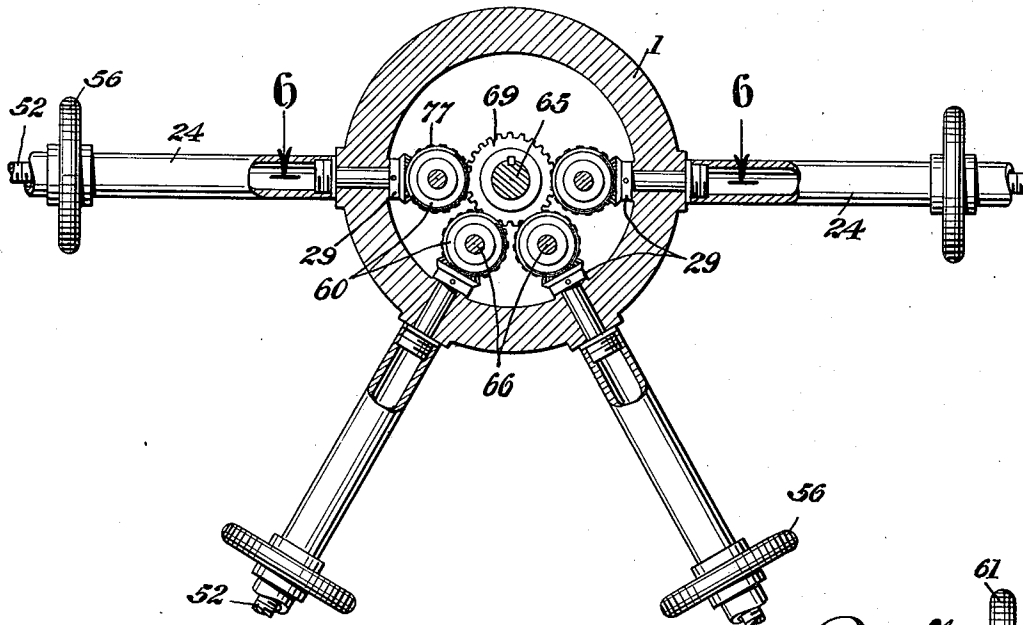


Fig. 6.

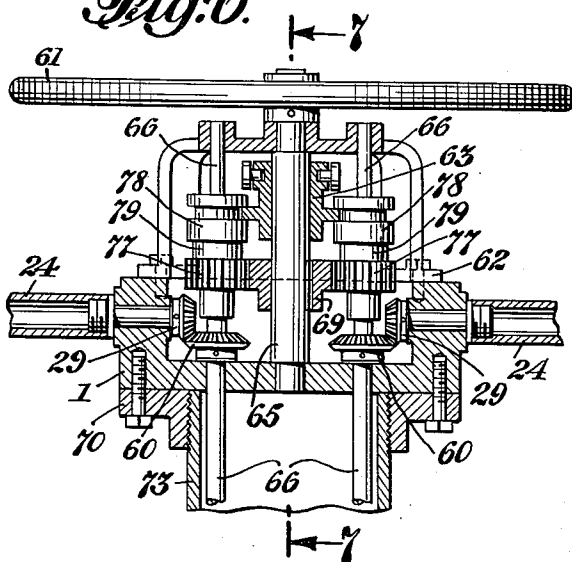
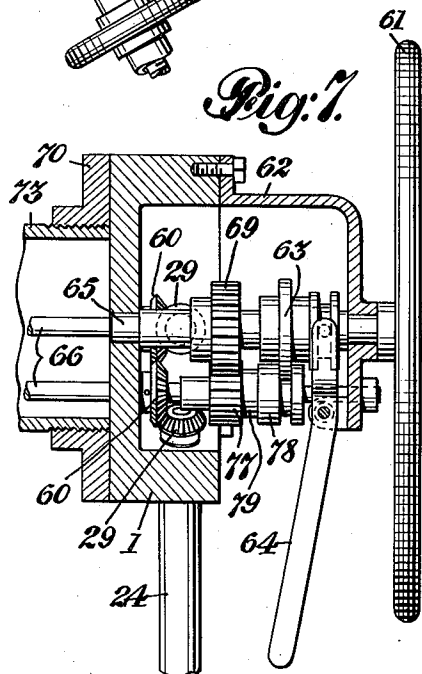


Fig. 7.



INVENTOR
Frank F. Kaiser
BY *C. Campbell Hunnicke*
ATTORNEY

May 26, 1936.

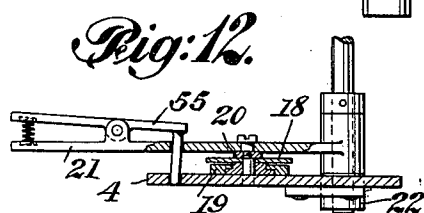
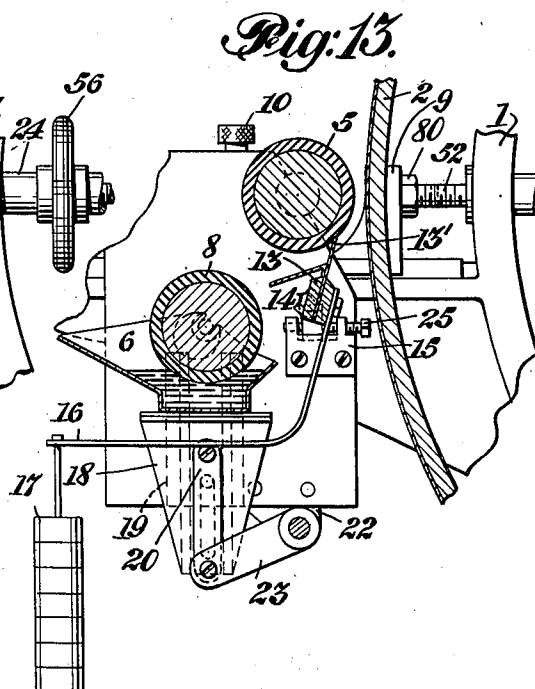
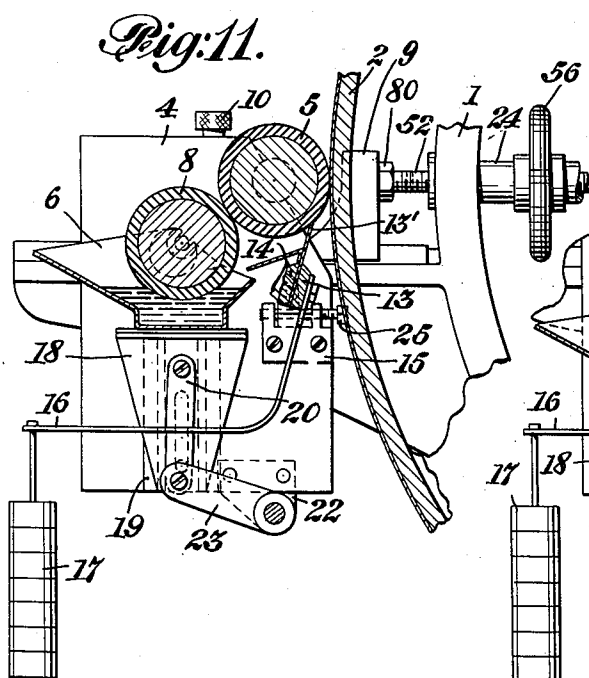
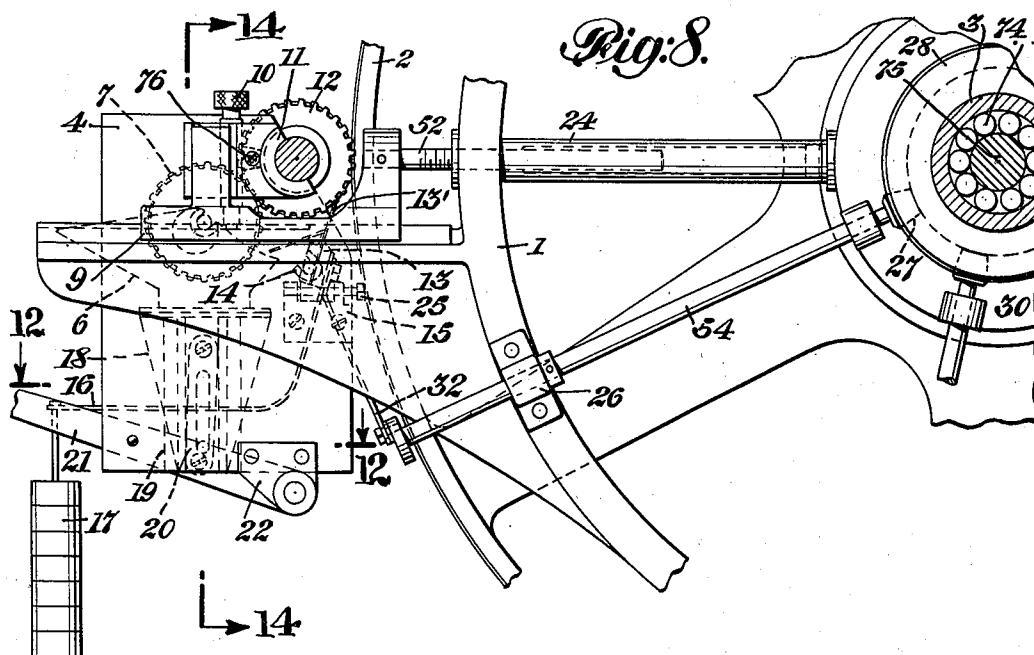
F. F. KAISER

2,042,060

MULTICOLOR PRINTING MACHINE

Filed Oct. 26, 1934

6 Sheets-Sheet 4



INVENTOR
Frank F. Kaiser
 BY *C. Campbell Harris*
 ATTORNEY

May 26, 1936.

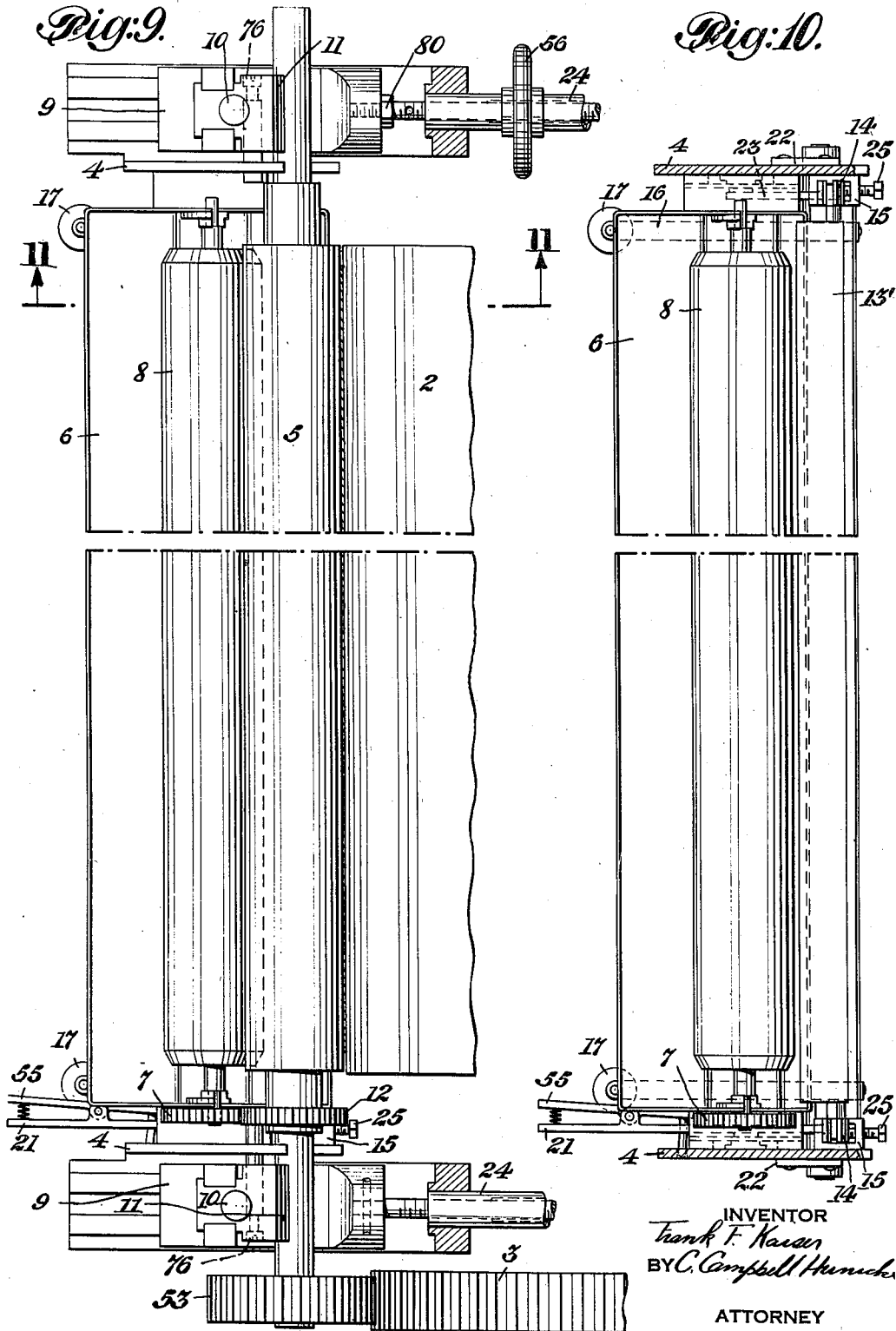
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2,042,060

MULTICOLOR PRINTING MACHINE

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6 Sheets-Sheet 5



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MULTICOLOR PRINTING MACHINE

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6 Sheets-Sheet 6

Fig. 14.

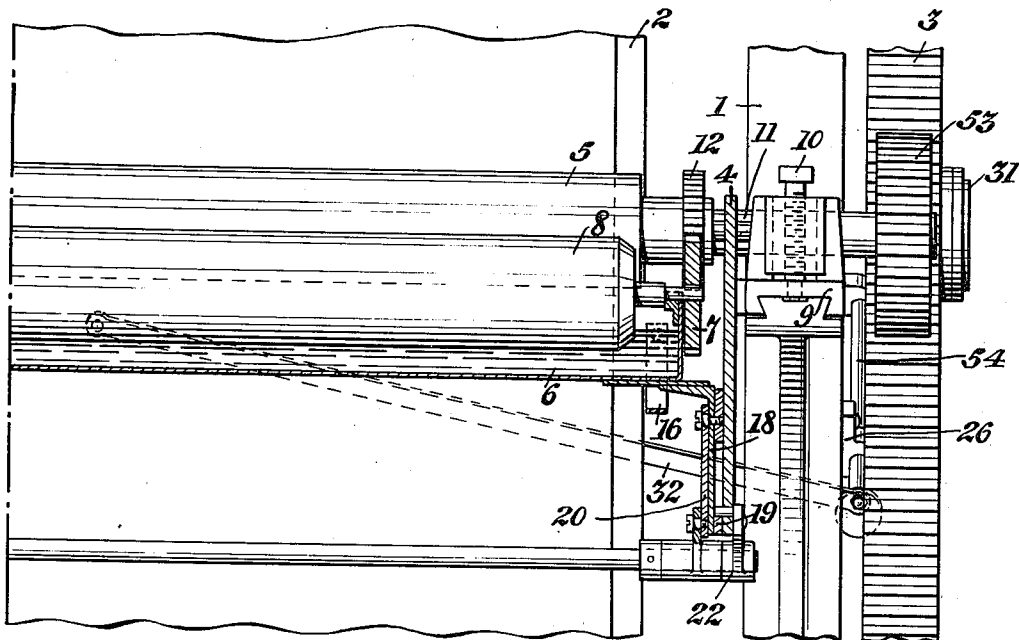
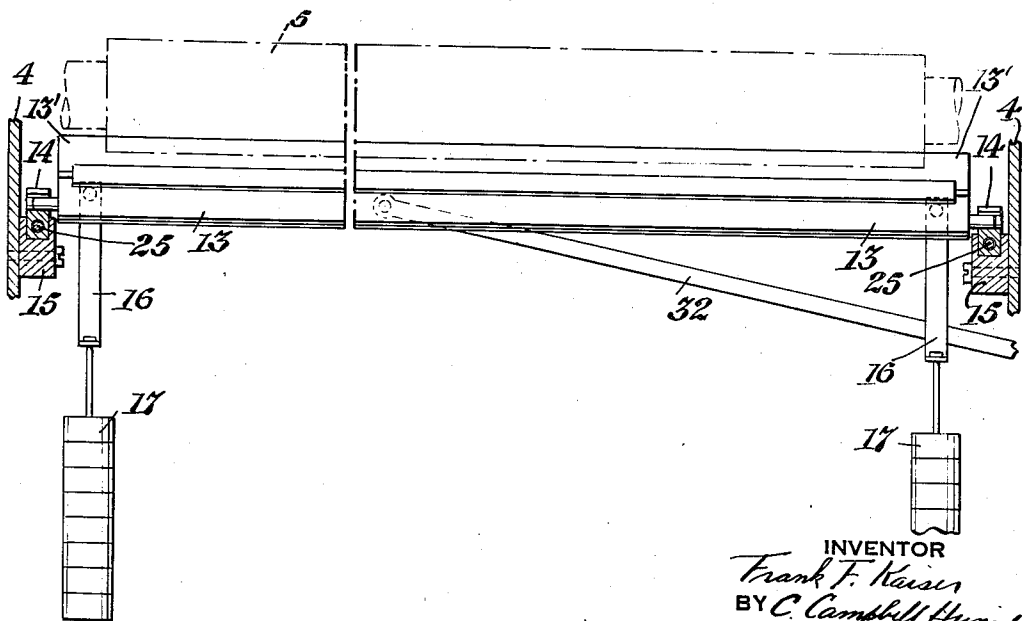


Fig. 15.



INVENTOR
Frank F. Kaiser
BY *C. Campbell Hurvick*
ATTORNEY

UNITED STATES PATENT OFFICE

2,042,060

MULTICOLOR PRINTING MACHINE

Frank F. Kaiser, Montrose, N. Y., assignor to John
Waldron Corporation, New Brunswick, N. J., a
corporation of New Jersey

Application October 26, 1934, Serial No. 750,041

7 Claims. (Cl. 101—182)

This invention relates to multi-color printing machine.

In the multi-color printing rolls the operator adjusts the pressure on the printing rollers against the cylinders upon each side independently. It therefore is dependent upon the skill of the operator as to whether the pressure is equal or not. If the pressure is unequal a uniform print will not be obtained across the entire face of the printing roller. In addition, in the present type of machine the doctor on one or more of the printing rollers may collect a bit of grit or other foreign substance and thus cause a scratch on the material being printed in which case the operator must release each printing roller in the machine separately in order to stop the defective printing of materials and to enable him to remove the foreign substance under the doctor blade. In consequence, considerable material is printed which is wasted during the required releasing of each printing roll from the printing cylinder. For as each printing roller is drawn away from the cylinder the printing of the other colors continues until all the printing rollers are drawn away from the cylinder and the machine is stopped. The same thing occurs after the foreign material is removed from the doctor and the rollers are again drawn up to the printing cylinder.

It has also been generally necessary for the operator to adjust the color furnishing rollers and color pans from each side of the machine up to the printing roller necessitating constant walking around the machine by the operator to make the adjustments, entailing a considerable loss of time.

One of the objects of my invention is to provide means for automatically bringing the printing rollers up to the cylinder in a parallel line at one time and under uniform pressure to make possible a perfect print.

Still another object of my invention is to release all of the printing rollers simultaneously for cleaning purposes.

A further object of my invention is to permit individual adjustment of the printing rollers as may be required by the engraving on the individual printing rollers, after which the printing rollers may be withdrawn from the printing cylinder simultaneously for cleaning or any other purpose and again returned to the printing cylinder simultaneously without having changed the individual printing roller pressure adjustments.

A further object of my invention is to reduce

the amount of waste in multi-color printing machines.

A still further object of my invention is to reduce the operating costs.

Other objects will appear more fully hereinafter.

Referring to the drawings:

Figure 1 is a view in elevation of the right end of a printing machine embodying the principles of my invention.

Figure 2 is a sectional plan view of Figure 1 along the line 2, 2, looking in the direction of the arrows.

Figure 3 is a sectional view of Figure 2 along the line 3, 3, looking in the direction of the arrows.

Figure 4 is a sectional view of Figure 2 along the line 4, 4, looking in the direction of the arrows.

Figure 5 is a sectional view of Figure 2, along the line 5, 5, looking in the direction of the arrows.

Figure 6 is a sectional view of Figure 5 along the line 6, 6, looking in the direction of the arrows.

Figure 7 is a sectional view of Figure 6 along the line 7, 7, looking in the direction of the arrows.

Figure 8 is a detail view in elevation of the inking and printing roll and the supporting carriage.

Figure 9 is a detail plan view of the printing and fountain rolls.

Figure 10 is a detail view of the fountain roll with the printing roll removed.

Figure 11 is a detail sectional view of Figure 9 along the line 11, 11, looking in the direction of the arrows.

Figure 12 is a detail view of Figure 8 along the line 12, 12, looking in the direction of the arrows.

Figure 13 is a detail sectional view of Figure 8 showing the printing roll and its inking mechanism in non-printing position.

Figure 14 is a view in partial section and elevation of Figure 8 along the line 14, 14, looking in the direction of the arrows.

Figure 15 is a detail sectional view of the doctor mechanism.

In carrying out my invention, I provide main frame members 1. The frames 1 are constructed with open nips spaced wide apart for speed in production and ease of operation and pattern fitting and to accommodate printing rollers from 15" circumference up to and including 54" without dismantling the machine for the large rollers. The impression cylinder 2 is mounted on roller bearings 71 which latter are in turn carried on hollow shaft 73 fastened to frames 1 by flanges 70. Hollow shaft 73 thus forms the stay rod which supports the side frames 1 in an upright

position. The shaft 73 in connection with flanges 70 hold the frames 1 rigid and tie frames 1 together as a unit. The master gear 3 is mounted on a roller bearing 74 mounted on stud 75 which is carried by frame 1 on the inside and by the supporting spider 30. The sliding bearing housings and aprons 4 carry the printing roller bearings 11 and the color furnishing mechanism and are in turn supported by the sliding members 9 mounted on the supporting arms of the frames 1. The printing rollers 5 are supported in position on the machine in the vicinity of the color reservoir 6 which latter are carried by sliding members 18. Spur gears 7 are mounted on the end of the color furnishing rollers 8 and drive color furnishing rollers 8. Spur gears 12 are equal in number to the number of printing rollers 5. The number of printing rollers being determined by the number of colors for which the machine is designed to print. Each spur gear 7 is mounted on an ink furnishing roller 8 of which there are also an equal number. Master gear 3 meshes with spur gears 53 which are mounted on printing rollers 5. Spur gears 53 being driven by master gear 3 drive the printing rollers 5 which in turn drive impression cylinder 2 by surface friction when the printing rollers 5 are brought in contact with the impression cylinder 2 and also drive ink furnishing rollers 8 through spur gears 7 mounted on ink furnishing rollers 8 and mesh with spur gears 12 mounted on printing rollers 5. The color furnishing rollers are supported in bearings attached to the ends of the color reservoir 6. The sliding members 9 are supported by frames 1 and are slidably mounted on frame 1 to draw the printing rollers 5 up to the printing cylinder 2. The vertical adjusting screws 10 adjust the printing roller bearings either up or down to make them parallel to the printing cylinder 2. The bronze bearings 11 supporting the journals of the printing rollers 5 are slidably mounted to move in a horizontal direction in bearing housing 4 to move printing rollers 5 sideways for putting them horizontally in pattern. The doctor mechanism is as follows: the doctor shears 13 carrying the doctor blades 13' are slideably mounted in bearings 14 which are carried by supports 15 on aprons 4 allowing the doctor shear bearings to be slid back and forth by means of adjusting screws 25. Doctor shears 13 have doctor weight supporting arms 16 attached thereto carrying doctor weights 17. The sliding members 18 support the color furnishing reservoir and are slidably mounted on aprons 4 and guides 19. The sliding members 18 are connected by links 20 to latch levers 21 to raise color furnishing reservoirs up to or lower them away from printing rollers 5 as well as to hold them in position. Rocker shafts 23 are held in bearings 22 attached to aprons 4 and operate by means of latch levers 21 to raise or lower ink reservoir 6 and ink furnishing rollers 8 by means of connecting links 20 attached to slides 18 slidably mounted in guides 19 and levers secured to links 20 and rocker shafts 23. Adjusting nuts 24 are for the printing roller and adjusting screws 25 are for the doctor shears 13. 26 are eccentric shaft bearings and 27 are the eccentric shaft beveled pinions. The bevel gear 28 drives the eccentric shaft bevel pinions 27 and is fastened to the master gear 3. The printing roller adjusting nuts 24 are secured to bevel pinions 29. The spider 30 supports the master gear stud 75. End plate 31 is for the master gear stud 75. 32 are the doctor motion connecting rods. The pull roller 34

has driving sprocket 33 with pull roller bearing housing 35. The driving pinion 36 meshes with the master gear 3 and has driving shaft bearing housings 37. The driving shaft 38 is driven from any convenient source of power. The pressure roller bearing guides 39 carry pressure bearings 40. Pressure shaft bevel pinions 41 cooperate with pressure nuts 43 and pressure shaft 42. Pressure screws 44 raise and lower the pressure roller 46 through pressure roller bearing sliding housing 45. Pressure roller 46 is surface driven by the cylinder. Idler roller 48 has idler roller bearing housings 47. Brake roller 50 has brake roller bearing housings 51 and has friction driven brake roller sprocket 49. The printing rollers 5 are operated to bring them up or away from impression cylinder 2 by pressure screws 52 and are rotated by means of registering gears 53 mounted on the journals of printing rollers 5 and driven by master gear 3. The doctor eccentric motion shafts 54 are connected to the doctor motion connecting rods 32. The color furnishing rollers 8 have adjusting levers 55 and the individual printing rollers have adjusting handwheels 56. Chain sprocket 59 is for the pressure shaft adjusting means. Cross shaft bevel pinions 60 are for the printing roller adjusting means. The printing roller shifting mechanism is operated by handwheel 61 and is supported by the supporting member 62 for printing roller shaft mechanism. Clutch shifting member 63 is within supporting member 62 and is utilized for the printing roller shifting mechanism and is operated by central clutch shifting lever 64. Clutch shifting member 63 is carried by clutch shifting shaft 65. Cross shafts 66 are for printing roller pressure adjustment. Spur gear 69 is the central clutch shifting shaft spur gear. The clutch gears 77 drive the printing roller pressure adjusting cross shafts 66 through spur gear 69 which is driven by revolving handwheel 61. The clutch gears 77 become operative when shifting lever 64 is pulled out toward handwheel 61 which in turn shifts clutch shifting plate 63 toward frame 1 of the machine, clutch shifting plate 63 being in engagement with clutch collars 78 cause clutch collars 78 to move toward frame 1 and thus engages clutches 79 on which clutch gears 77 are mounted causing clutch gears 77 and clutches 79 to engage printing roller pressure adjusting cross shafts 66. The adjusting screws 76 adjust the printing rollers 5 in a horizontal adjustment by moving the printing roller bearing 11 sideways in the sliding bearing housings in aprons 4. This adjustment is accomplished as follows:

If one or more of the printing rollers 5 have to be adjusted to put them in pattern horizontally and must be moved to the right as you face the machine the adjusting screw 76 on the right side of the machine must be backed off or turned to the left, this causes the entire printing roller 5 to be moved to the right. If the printing roller 5 must be moved to the left to put it in pattern horizontally the procedure is reversed.

Difficulty has been experienced particularly in connection with fabrics, in the stretch and elongating effects during the printing operation which distorts and affects accurate printing.

In my invention, I provide for sufficient tension on the material on cylinder 2 to remove the stretch of the material and thereby prevent elongation as well as a creeping action which sometimes occurs on the printing rolls particularly when one of the printing rollers is under greater pressure than the adjacent printing roll-

ers. This is accomplished by locating a braking roll 50 prior to the first printing roller and removing the material from the impression cylinder 2 by a pull roller 34 which is rotated at a greater surface speed than the braking roller through a friction drive from the brake roller, the pull roller being driven from the brake roller, and the brake roller being driven by the cloth. The brake roller 50 is driven at the speed of the material by the material being printed which speed is determined by the speed at which the printing rollers 5 are in turn driven by master gear 3 and registering gears 53. The pull roller 34 is driven by means of a friction drive from the brake roller 50 which drives pull roller 34 at a greater surface speed than the brake roller 50 is driven, thereby causing the pull roller to exert a pull on the material being printed which pull takes place between the brake roller 50 and pull roller 34 on the impression cylinder 2, thus taking all the stretch from the material, the pull roller 34 then being held from revolving at a greater surface speed than the brake roller 50. The material being printed causes the friction drive on brake roller 50 to slip to maintain the tension on the material being printed constant and is governed by the amount of stretch the material will allow. The adjustment is accomplished by adjusting the friction drive on brake roller 50 to the proper tension for the material being printed and once set need not be changed during the printing operation. Perfect printing is made possible by this mechanism.

The operation of the machine is as follows:

The material to be printed is fed into the machine over idler roll 48 and around brake roller 50 and over a pressure roller 46, and thence onto cylinder 2 which has the necessary printing pad. After passing around cylinder 2 it is removed over pull roller 34. Printing cylinder 2 is journaled on the central hollow shaft 73 and is surface driven by the printing rollers 5. Externally and at predetermined positions are the printing rollers 5, the number being dependent upon the number of colors that the machine is designed to print. The master gear 3 revolves on a stud 15 and is mounted on roller bearing 74 and drives the printing rollers 5 through gears 53 on each printing roller. This mechanism maintains the printing rollers 5 moist with color but does not operate the machine and print the material until the printing rollers 5 are brought in contact with the materials to be printed on the cylinder 2. This is a very important element of my invention as the simultaneous printing or cessation of printing acts to conserve the material to be printed. The mechanism whereby the printing rollers are brought in contact with the materials to be printed on the cylinder is as follows:

When the printing rollers 5 are ready to be brought up to the material to be printed on the impression cylinder 2, clutch lever 64 is pulled out thus sliding shift clutch plate 63 toward the machine. Clutch plate 63 being engaged in clutch collars 78, move clutch collars 78 toward the machine engaging clutches 79 carrying spur gears 77 with shafts 66. Then handwheel 61 mounted on shaft 65 is revolved in the proper direction which in turn revolves gear 69 being in mesh with gears 77 on shafts 66, thereby revolving shafts 66 which carry beveled pinions 60 which mesh with beveled pinions 29 which are attached to nuts 24, thereby revolving nuts 24 and causing pressure screws 52 to be drawn into nut 24. Pressure screws 52 being fastened to sliding

members 9 which are slidably mounted on frames 1 and in turn carry bronze bearings 11 wherein printing rollers 5 are mounted whereby the above mentioned rotary movement of handwheel 61 causes the printing rollers 5 to be drawn up to the impression cylinder 2 simultaneously and parallel thereto through the above mentioned connecting means. Upon rollers 5 contacting with the material on cylinder 2 it is caused to rotate and the printing of the material begins.

Another important feature of my invention lies in the fact that the rollers 5 are always in parallel relationship and are drawn up in parallel relationship to cylinder 2. This is accomplished even where manual adjustment is required of any particular roller due to the difference of the color or ink used. For instance, some inks for certain colors are thinner and hence require different contact pressures as well as a difference of the nip. Also the color screen may vary in connection with the various rollers. The mechanism that accomplishes this result is as follows:

When it becomes necessary to adjust any individual printing roller 5 because of the density of color, clutch lever 64 is pushed in toward the machine, thus disengaging clutches 79 by means of plates 63 which engages clutch collars 78, after which handwheel 56 which is connected to nut 24, is revolved in the proper direction which in turn draws pressure screw 52 into nut 24, thus drawing the printing roller 5 toward or from cylinder 2 as desired by means of the bevel pinion 29 being connected to nut 24 and meshing with beveled pinion 60 carried by shaft 66 which pass through hollow shafts 73. Shaft 66 carries at its other end bevel pinion 60 meshing with beveled pinion 29 on the corresponding nut 24. As these nuts are right and left threaded, the operation of the handwheel moves roll 5 simultaneously and identical in the same degree, thereby maintaining parallelism regardless of the distance between roller 5 and cylinder 2. In the event of a wearing of the bearings 11 for the shaft of roller 5, I have provided a manual adjustment whereby one side may be varied to take up for such wear by backing off nut 80 and adjusting screw 52.

It should be noted, that the manipulation of the single handwheel 61 causes the printing rollers 5 to be moved to or from cylinder 2. Not only are the rollers 5 simultaneously withdrawn, but they are continually kept moist since the color mechanism including the doctors and supplying rolls are moved with the printing rollers 5. In other words, the entire coloring mechanism is designed as a unit and is in continuous operation but can be withdrawn from contact to prevent printing on the material and as the withdrawal of printing rollers 5 stops the movement of the material their withdrawal from contact prevents further printing.

With my invention, the color furnishing rollers 8 and color pans 6 are not required to be adjusted from each side of the machine with respect to their relationship with the printing roller as this adjustment is made by lifting latch lever 21 to raise the color pans 6 and furnishing rollers 8 up to the printing roller 5 in parallel line in the shortest possible time, thereby decreasing the difficulties of the operator of the machine as well as providing better operation of the coloring mechanism. The furnishing rollers 8 are generally made of wood and from time to time must be turned down to true them up. With my invention, the adjustment of lifting latch lever 21 varies the distance of the furnishing roll through the carry-

ing pan 6 with respect to the printing roller 5 thereby enabling quick and accurate adjustment of the furnishing roll with respect to the printing roller.

5 Therefore, in operating the machine the material is threaded around cylinder 2, the printing rollers 5 are adjusted lengthwise to be in pattern, the handwheel 61 is operated to bring rollers 5 into contact with the material and the operator 10 then observes as to whether all the rolls are printing properly. If any of the colors being printed are not of the proper density, individual adjustment can be made while the machine is in operation to correct for this defect as this particular 15 correction must be made during the printing operation. In the event of other difficulties, the operator can at once throw the printing rollers 5 out of contact. The individual pressure of the printing rollers cannot be adjusted until the machine is in operation and printing material, at 20 which time the operator looks at the material being printed and determines which printing rollers need more or less pressure on them and proceeds to adjust them by means of handwheels 25 56 which control the individual adjustments of the printing rollers when the central clutch mechanism for bringing the rollers up to or away from the printing cylinder 2 is disengaged. After this adjustment has been made and the printing is 30 perfect, if for any reason the rollers must be withdrawn from the cylinder, the central clutch mechanism is engaged by shifting clutch lever 64 into position and turning handwheel 61 in the proper direction to simultaneously withdraw the 35 printing rollers from the cylinder and again put them up to the cylinder after remedying the cause for removing them, which operation does not disturb the original adjustment of pressure on the individual rollers, but returns them to the cylinder 40 with exactly the same pressure as they had when the printing operation was going on and performing perfect work, thus making it unnecessary to again set the pressure on each individual roller which would cause a considerable loss of 45 material in so doing. It will thus be seen that with my invention the adjustments can be made during the printing, if necessary, and the printing may be stopped with minimum loss of material and either adjustments or repairs or whatever attention is needed may be made. 50

With my invention, it is not necessary every time the machine is to be started or stopped for the operator to individually release each printing roller one after the other, thereby destroying at 55 least twelve yards or more of the material every time the machine is started or stopped, and in addition, the individual setting of the rolls is affected causing an additional loss of material as it requires adjustment of the rolls after every cessation of operation. Whereas, with my invention, 60 the loss of material is only the amount on the cylinder and the rolls do not have to be reset if the adjustment was correct as the construction is such that the adjustment is unaffected by the 65 movement of the printing rolls toward or from the printing cylinder or material. Furthermore, higher speed printing may be done in connection with my invention than in connection with the 70 previous types since the control by the operator is more rapid and with less wastage. Also a less skilled operator can be utilized in connection with my invention.

What I claim is:

75 1. In a multi-color printing machine, an im-

pression cylinder, a plurality of printing rolls for said cylinder, said printing rolls frictionally surface driving said impression cylinder, means for moving said printing rolls toward and from said printing cylinder simultaneously and in parallel 5 alinement with said impression cylinder.

2. In a multi-color printing machine, an impression cylinder, a plurality of printing rolls, means for rotating said printing rolls, said printing rolls driving said impression cylinder by frictional surface contact, means for moving simultaneously all of said printing rolls from said printing cylinder to stop the printing and wastage of material being printed, and means for separately adjusting any one of said rolls. 15

3. In a multi-color printing machine, an impression cylinder, a plurality of printing rolls, means for maintaining the material being printed in tension on the cylinder, said means comprising a pull roll to remove the material, a braking roll 20 in advance of the first printing roll, said brake roll being operated by the material and said pull roll being driven at a greater surface speed than the braking roll by driving connection between said braking roll and said pull roll. 25

4. In a multi-color printing machine, a frame, a central hollow shaft, an impression cylinder journaled on said shaft, a plurality of printing rolls having a common drive, said printing rolls surface friction driving said impression cylinder, 30 a clutch and clutch lever in said drive for said printing rolls, pressure screws secured to said printing rolls, nuts for said screws, bevel pinions carried by said nuts, shafts carrying bevel pinions meshing with said nut bevel pinions, said bevel 35 pinion shafts within said hollow shaft, a gear carried by each bevel pinion shaft and meshing with a gear on a handwheel shaft, said shaft carrying a handwheel.

5. In a multi-color printing machine, an impression cylinder, means for maintaining the material being printed in tension on said cylinder, a plurality of printing rolls frictionally driving said printing cylinder, said tension means operated by said material, means for individually inking each of said printing rolls continuously, and means for simultaneously moving all of said printing rolls from said cylinder to cease printing 40 when adjustment is required on any one roll, and for simultaneously moving back said printing rolls in parallel alinement to the cylinder to again print when said adjustments have been made and thereby recommence the printing at the point where the printing was stopped. 45

6. In a multi-color printing machine, an impression cylinder, a plurality of printing rolls frictionally driving said printing cylinder, means for individually inking each of said printing rolls, means for smultaneously moving all of said printing rolls from said cylinder to cease printing and stop wastage of material upon which the printing is being done when adjustment is required on any one roll and for simultaneously moving all of said printing rolls to said cylinder when said adjustments have been made in order to resume printing at the place where the printing was stopped. 55 60

7. In a multi-color printing machine, an impression cylinder, a plurality of printing rolls, means for maintaining the material being printed in tension on the cylinder, said means comprising a pull roll and a braking roll, means for driving the pull roll at a greater surface speed than the speed of the braking roll. 70

FRANK F. KAISER.