C. N. GALLAND AND W. A. KELSEY.

MULTICOLOR PRINTING PRESS.

APPLICATION FILED SEPT. 22, 1917.

1,382,773.

Patented June 28, 1921.

3 SHEETS—SHEET 1.

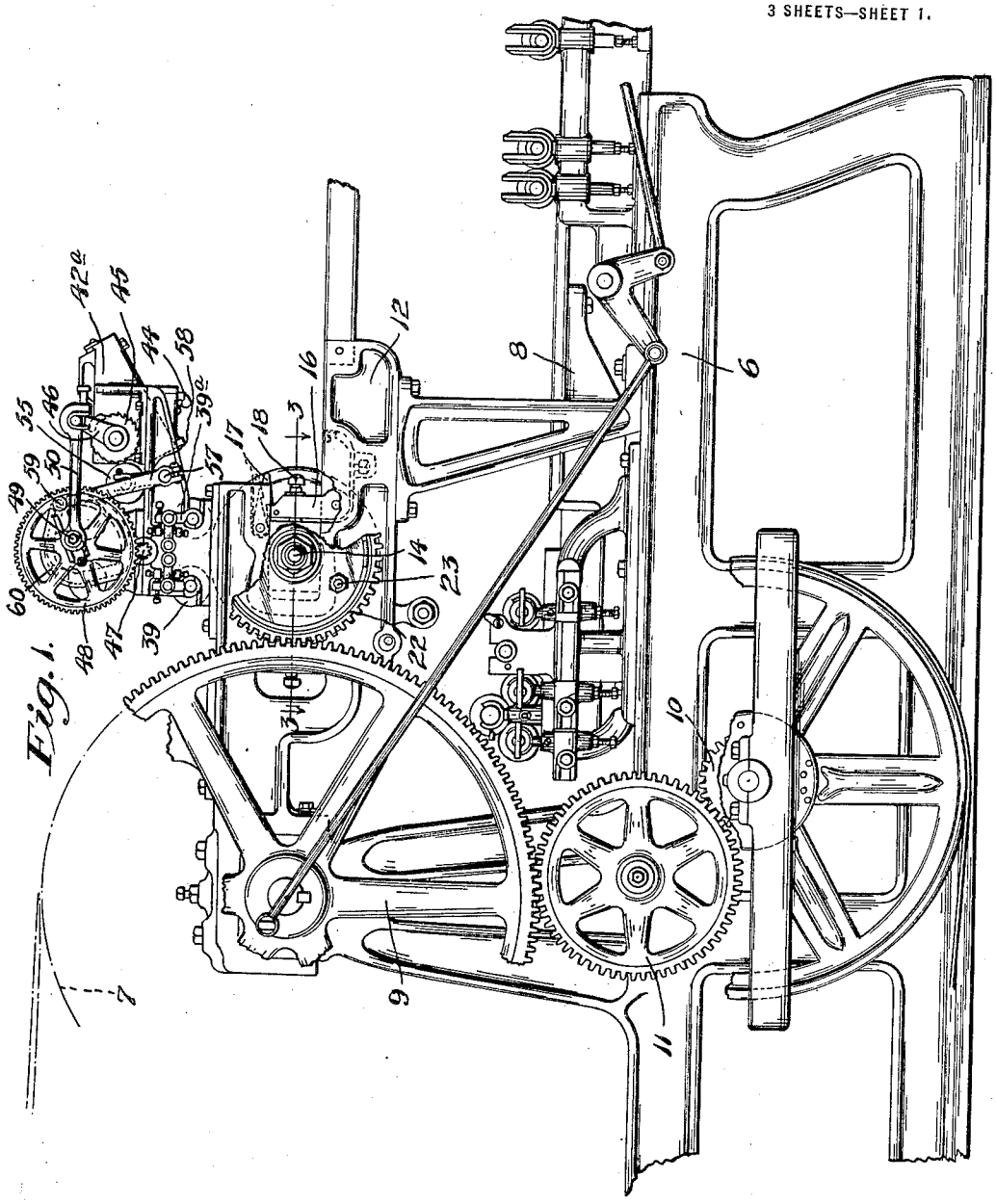


Fig. 1.

Witnesses
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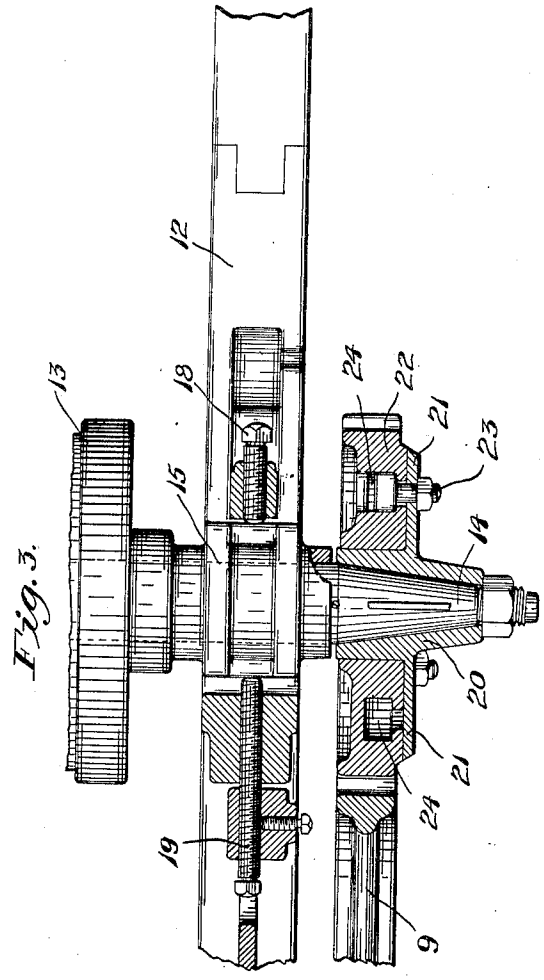


Fig. 3.

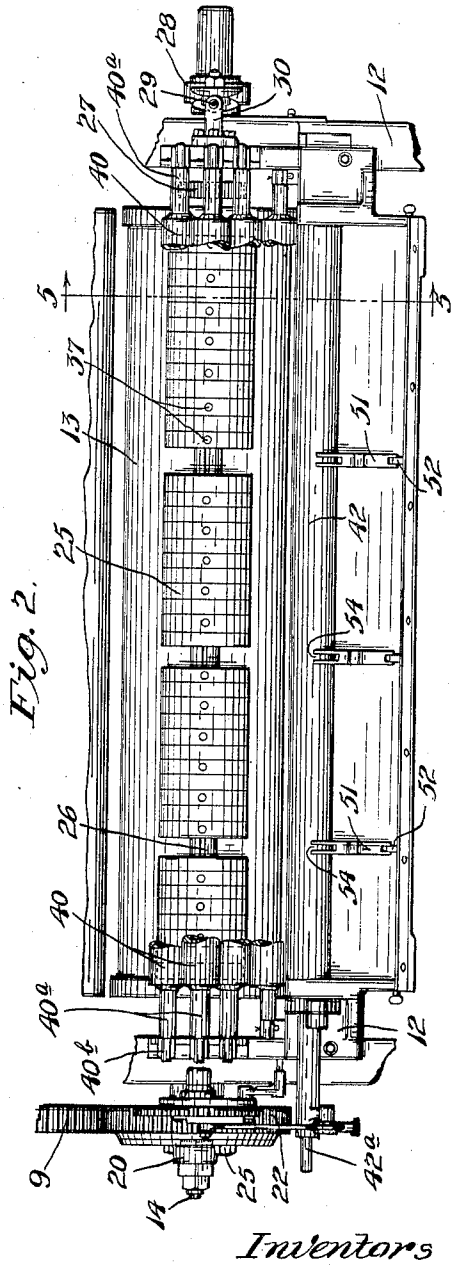


Fig. 2.

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3 SHEETS—SHEET 3.

Fig. 5.

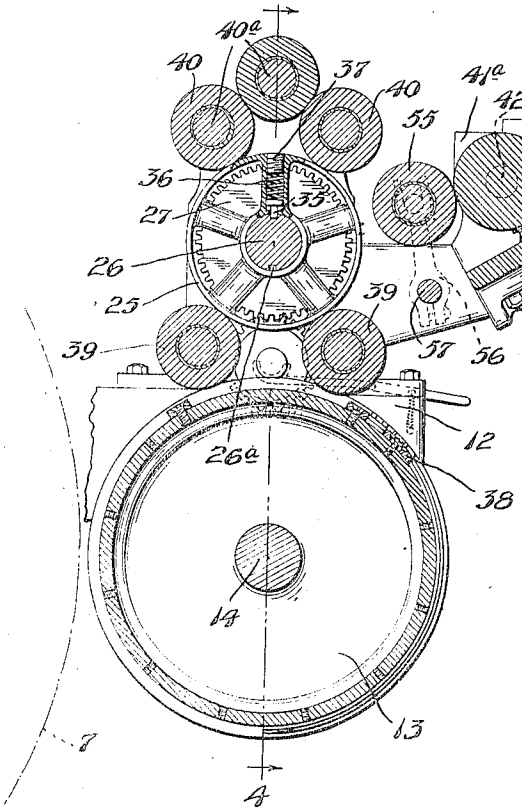
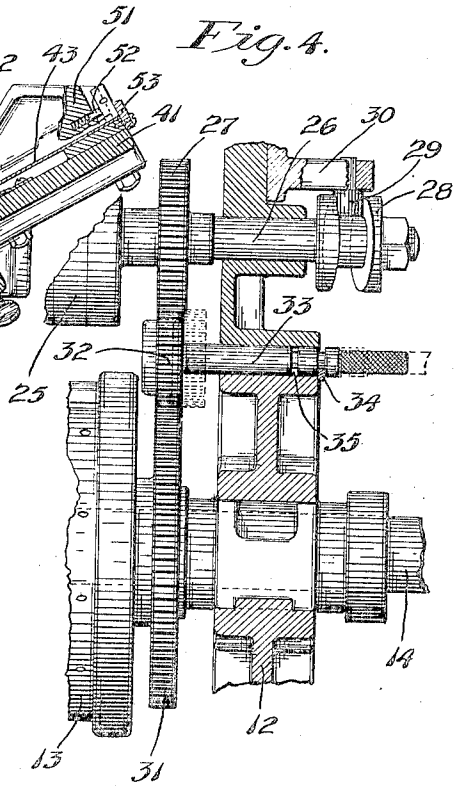


Fig. 4.



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UNITED STATES PATENT OFFICE.

CHARLES N. GALLAND AND WILLIAM A. KELSEY, OF MINNEAPOLIS, MINNESOTA, ASSIGNORS TO MULTICOLOR PRINTING AND MACHINERY COMPANY, OF MINNEAPOLIS, MINNESOTA, A CORPORATION OF SOUTH DAKOTA.

MULTICOLOR-PRINTING PRESS.

1,382,773. Specification of Letters Patent. Patented June 28, 1921.

Application filed September 22, 1917. Serial No. 192,780.

To all whom it may concern:

Be it known that we, CHARLES N. GALLAND and WILLIAM A. KELSEY, citizens of the United States, residing at Minneapolis, in the county of Hennepin and State of Minnesota, have invented certain new and useful Improvements in Multicolor-Printing Presses; and we do hereby 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.

Our invention relates to printing presses and is an improvement in the means for multicolor printing. Broadly stated, the invention consists of the novel devices and combinations of devices hereinafter described and defined in the claim.

Particularly, the present invention is in the nature of an improvement on, or refinement of the printing mechanism disclosed and claimed in Letters Patent of the United States, No. 1,040,264, granted of date October 8th, 1912, to Charles N. Galland and Asa P. Brooks, and entitled "Color printing attachment for printing presses."

In the accompanying drawings which illustrate the present invention, like characters indicate like parts throughout the several views. Referring to the drawings,

Figure 1 is a view in side elevation with some parts broken away and some parts removed, illustrating our invention as applied to a printing press of the type known as a drum printing press, and, in which, paper is carried by a cylinder onto the type of an oscillatory table;

Fig. 2 is a plan view of the ink font or trough and associated parts of the color printing device or attachment;

Fig. 3 is a view partly in plan and partly in horizontal section on the line 3—3 of Fig. 1;

Fig. 4 is a view partly in elevation and partly in vertical section on the line 4—4 of Fig. 5; and

Fig. 5 is a vertical section approximately on the line 5—5 of Fig. 2.

Of the parts of the press proper, it is sufficient for the purposes of this case to note the frame 6, the paper feed cylinder 7, the reciprocatory table 8 which carries the type form, the large gear 9 carried by the shaft of the cylinder 7, and the pulley driven pinion 10 which drives the gear 9 through intermediate gear 11.

The color printing device or attachment which embodies our invention will now be described.

The various parts thereof are supported by two heavy laterally projected frame brackets 12 that are rigid with the sides of the main frame 6. For printing in colors in the proper space on the paper sheet carried by the feed cylinder 7, is a multicolor type drum 13, the shaft 14 of which is journaled in bearing boxes 15 that are removably held in open seats formed in the brackets 12, and are therefore, detachably held in working position, as shown, by novel means including a lock arm 16 and coöperating lock dogs 17, both of which are pivoted to the brackets 12. The dogs 17 interlock with the free upper ends of the arms 16 to hold the same in working position, and the said arms are provided with set screws 18 that impinge against the boxes 15, as best shown in Figs. 1 and 3. Set screws 19 which oppose the set screws 18, work through the brackets 12, so that by the coöperating opposing set screws 18 and 19, the boxes 15 may be set at any desired adjustment. At the same time, simply by raising the lock dogs 17 and turning down the arms 18, the bearing boxes 15, together with the shaft 14 and type drum 13, may be readily slid from working position and removed. Of course, by reverse operation, they may be replaced. This removal and replacement of the said parts is accomplished without changing the properly set adjustment of the set screws which determine the position of the type drum 13 in respect to the main cylinder 7.

At one projecting end, the shaft 14 is tapered and fits the tapered bore of a gear hub 20 that has a projecting annular flange 21. Mounted on the hub 20 is a small spur gear or pinion 22 that is meshed with the larger spur gear 9 which, as noted, is carried by the shaft of the main cylinder 7. The pinion 22 is secured to the hub 20 for rotation therewith, but is made circumferentially adjustable, by means of short nut-equipped bolts 23 passed through the flange 21 and having

their heads seated in circumferentially extended "T-grooves" 24 formed in the said pinion 22. This adjustment permits the type drum 13 to be set for properly timed relation and position in respect to the main cylinder 7 and the sheet of paper fed over the same, to the type carried by the said type drum 13.

Located above and out of contact with the type drum 13 is an ink distributing drum of novel construction, and which is made up of a multiplicity of narrow wheels or pulley-like drum sections 25 that are all of the same diameter, so that when any number thereof are grouped together, they form a smooth cylindrical ink distributing surface. These so-called drum sections 25 have hubs through which is passed a shaft 26 that is mounted, both for rotary and for endwise movements in suitable bearings afforded by the bearing brackets 12. The shaft 26, at one end, just inward of the adjacent brackets 12, is provided with a spur gear 27, and just outside of said bracket is provided with a cam hub 28 which has a profile cam groove that extends oblique to a plane at a right angle to the axis of said shaft. Working in the oblique cam groove of this cam hub 28 is a roller-equipped stud 29 mounted on the projecting arm 30 of the adjacent bracket 12 (see Fig. 4). The stud 29 and cam hub 28 coöperate to produce a slow endwise movement of the shaft 26 and of the sectional distributing roller 25, when said shaft and distributing roller are rotated. The shaft 26 is rotated from a spur gear 31 carried by the shaft 14 of the type drum 13 through an intermediate pinion 32 which is mounted on a stud 33 (see Fig. 4), which, in turn, is arranged to slide in the adjacent bracket 12 and is adapted to be set in either of two positions by the engagement of a spring latch or detent 34 on said bracket that engages with either of two grooves 35 in said stud.

The endwise movement imparted to shaft 26 is not sufficient to carry gear 27 out of mesh with pinion 32, when the latter is set at the left, as shown in full lines in Fig. 4; but when the said pinion is set in its dotted line position, Fig. 4, it will be moved out of mesh with the said gear 27, and the latter will not then be driven from the gear 31.

Returning to the construction of the sectional distributing drum, it will be noted that the sections 25, in certain of the radial arms, have small keys or splines 35 (see Fig. 5) that engage longitudinal keyways formed in the shaft 26. The said keys 35 are mounted in radial bores formed in certain of the arms of the drum sections 25, and they are yieldingly pressed inward by coiled springs 36 that are compressed between the same and plugs 37 screwed into the outer extremities of said arms and turned over flush with the smooth peripheries of the drum sections (see Fig. 5). The keys 35 are made to "bottom" in the keyways 26^a, so that under the force of the springs 36, there will be sufficient friction produced to prevent accidental slipping of the said drum sections 25. Otherwise stated, the said drum sections may be slid longitudinally on the shaft 26 and assembled in groups of any desired number with the proper gaps between the groups, as shown in Fig. 2, for example, and they will remain set just as they are assembled in this group, regardless of the otherwise movements imparted thereto, and to the shaft 26.

To maintain the counterbalance of the shaft 26 and sectional distributing drum, said shaft is preferably provided with keyways 26^a at diametrically opposite points, so that the engagement of the keys 35 of the successive drum sections 25, with the said two keyways, may be alternated.

The type for printing in different colors on the sheet carried by the main cylinder 7 are curved or of sectional formation, and are suitably secured to the periphery of the type drum 13. These type, herein indicated at 38, are secured on the type drum by suitable means, not necessary here to consider, except to state that of course, those that are to print a certain color will be properly alined with the paper that is fed over the main cylinder 7.

Running in contact with the sectional distributing roller 25 and with the type on the drum 13 are ink distributing rollers 39 which may be here designated as the form rollers. The shafts of these rollers 39 are carried in suitable adjustable bearings on the brackets 12 and the said rollers are driven by frictional contact with the roller 25 and faces of the type.

The so-called form rollers 39 (see Fig. 1), are shown as journaled in adjustable bearing arms 39^a that are pivoted to the brackets 12 and subject to adjusting screws not necessary for the purpose of this case to further consider.

Working over and in contact with the upper surface of the sectional distributing drum 25 is a group of distributing rollers 40, the shafts of which are also journaled in suitable bearings on the brackets 12. These distributing rollers 40 have shafts 40^a that project at their ends and engage open seats 40^b of the brackets 12, (see Fig. 2).

The ink font is made up of an inclined trough plate 41 and a fountain roll 42. The said plate 41 is formed with end plates 41^a in which the shaft 42^a of the roll 42 is journaled, and in which the ends of said roll closely engage. The body proper of the ink font is formed by a thin metal plate 43 (see Fig. 5) which, by means of adjusting screws 44, is adapted to be pressed into close en-

gagement with the surface of roll 42, thus forming a receptacle which will hold the thick printing ink.

At one end, the shaft 42ª of the fountain roll 42 projects and is provided with a ratchet wheel 45 (see Fig. 1) that is engaged by the dog of a dog-equipped arm 46 that is mounted to oscillate on said shaft. The shaft 26 of the sectional distributing drum, at one end, is provided with a small spur pinion 47 (see also Fig. 1) that meshes with a spur gear 48 journaled to the upper projection of one of the brackets 12. This gear 48 is provided with an adjustable throw crank pin 49 that is connected to the free end of the dog-equipped arm 46 by a short crank rod 50. By the connections just described, a step by step rotary movement is imparted to the fountain roll 42 through the pawl and ratchet device, and the amount of movement imparted thereto at each throw may be varied by radial adjustments of the crank pin 49.

Working within the ink font and closely fitting the bottom 43 thereof, and adjacent surface of the fountain roll 42, are laterally adjustable partitions 51 that are intended and adapted to be set in alinement with the gaps between the groups of sections 25 of the distributing drum. In the outer ends, the font partitions 51 are formed with deep notches in which are set outwardly spring-pressed clamping plungers 52. The said plungers are shown in position in Figs. 2 and 5. These plungers 52 press against a flange bar 53 secured to the outer portion of the font plate 41. By means of the frictional clamping devices afforded by the said plungers, the partitions 51 are tightly pressed against the font roll 42. The curved inner edges of these partitions are formed to fit the roller 42 and they are provided with channels 54 (see Fig. 2) that are adapted to be filled with paraffin wax, or the like, as paraffin wax not only forms a close contact with the roller but serves to keep the same lubricated so that the ink from the different compartments of the font will not be carried by capillary attraction from one side to another of the partitions.

For carrying the ink from the font roller 42 onto the sections 25 of the distributing drum, there is provided a so-called carrier roll 55, the shaft of which projects at its ends and is journaled in the pronged free ends of arms 56 of a rock shaft 57 (see Figs. 1 and 5). The rock shaft 57, at one end, is provided with a long arm 58 (see Fig. 1) having a roller-equipped stud 59 at its free end that is subject to a profile cam 60 which is carried by the gear 48, already noted. The cam 60 is preferably so designed that it holds the transfer roll 55 in contact with the font roll 42 for about $\frac{1}{3}$ of the rotation of the gear 48, holds the said transfer roll in contact with the distributing drum 25 for another approximate $\frac{1}{3}$ rotation of said gear, and imparts the movement of the said transfer roll in each direction during approximately $\frac{1}{6}$ of the rotation of the said gear.

Operation.

The operation of the color printing device described is probably understood from the description already given but may be briefly summed up as follows:

The sections 25 of the distributing drum are adjusted to correspond to the spaces on the paper fed by the cylinder 7, and upon which, printed or other matter is to be printed in the various colors. Also, as stated, the partitions 51 will be set in line with the gaps between the assembled sections of the distributing drum. The different colors of ink will be, of course, contained in the proper compartments of the ink font. These different colors of ink will be carried from the font by the font roll 42, and, by the transfer roll 55, will be transferred onto the assembled sections of the distributing drum 25. By the rolls 37, the ink will be properly spread on the distributing drum, and from the distributing drum, the ink in the several different colors will be carried onto the form rolls 39, and, by the latter, properly delivered to the type 38 carried by the type drum 13. The different colors of ink carried from the ink font by the rolls 42 and 55 will not run together, because the partitions 51 give the same a considerable initial separation on the said rolls. However, if the ink should slightly run together, any commingled ink will not be delivered onto the distributing drum because such would be in alinement with the gaps between the sections thereof. The different colors of ink delivered by the distributing drum 25 to the form rolls 39 will not run together, because they are given a good separation by the gaps between the sections of the said distributing drum. Thus, the several colors of ink are kept distinct, so that they will not be blended or mixed in their delivery to the type.

It will, of course, be understood that in the customary use of the color printing attachment, the main printing in black will be done in the usual way by type carried by the type form of the oscillating table 8. It must also, however, be understood that the type on the type drum 13 for printing in colors will usually be arranged to print in blank spaces left therefor in the said form of the table 8. However, when desired, the printing in color may be made directly over the black print, as for example, when certain large letters in color are impressed over the face of the small type. When printing in this manner, black type will be visible through the large color type, for example.

In fact, the color printing attachment may be also used in a very large number of different ways, but in all cases, the drum 13 which carries the type for printing the colors, must be properly timed in respect to movement of the feed table and main cylinder 7.

What we claim is:

The combination with a printing press having printing devices including a paper delivery cylinder, of an auxiliary printing drum having type thereon for printing in different colors on the paper delivered by said cylinder, an automatic multicolor ink device coöperating with said auxiliary drum and comprising a distributing drum made up of a multiplicity of groups of thin axially shiftable drum sections assembled with gaps between the groups, and an ink font having partitions adapted to be alined with the gaps between the said assembled groups of drum sections, the said drum sections being frictionally held in their assembled positions and capable of sliding movements.

In testimony whereof we affix our signatures in presence of two witnesses.

CHARLES N. GALLAND.
WILLIAM A. KELSEY.

Witnesses:
CLARA DEMAREST,
F. D. MERCHANT.