Dec. 14, 1937. H. A. SCOTT ET AL 2,102,386

PATTERN REGISTRATION MEANS FOR MULTIPLE CYLINDER PRINTING MACHINES

Filed June 9, 1936 5 Sheets-Sheet 1

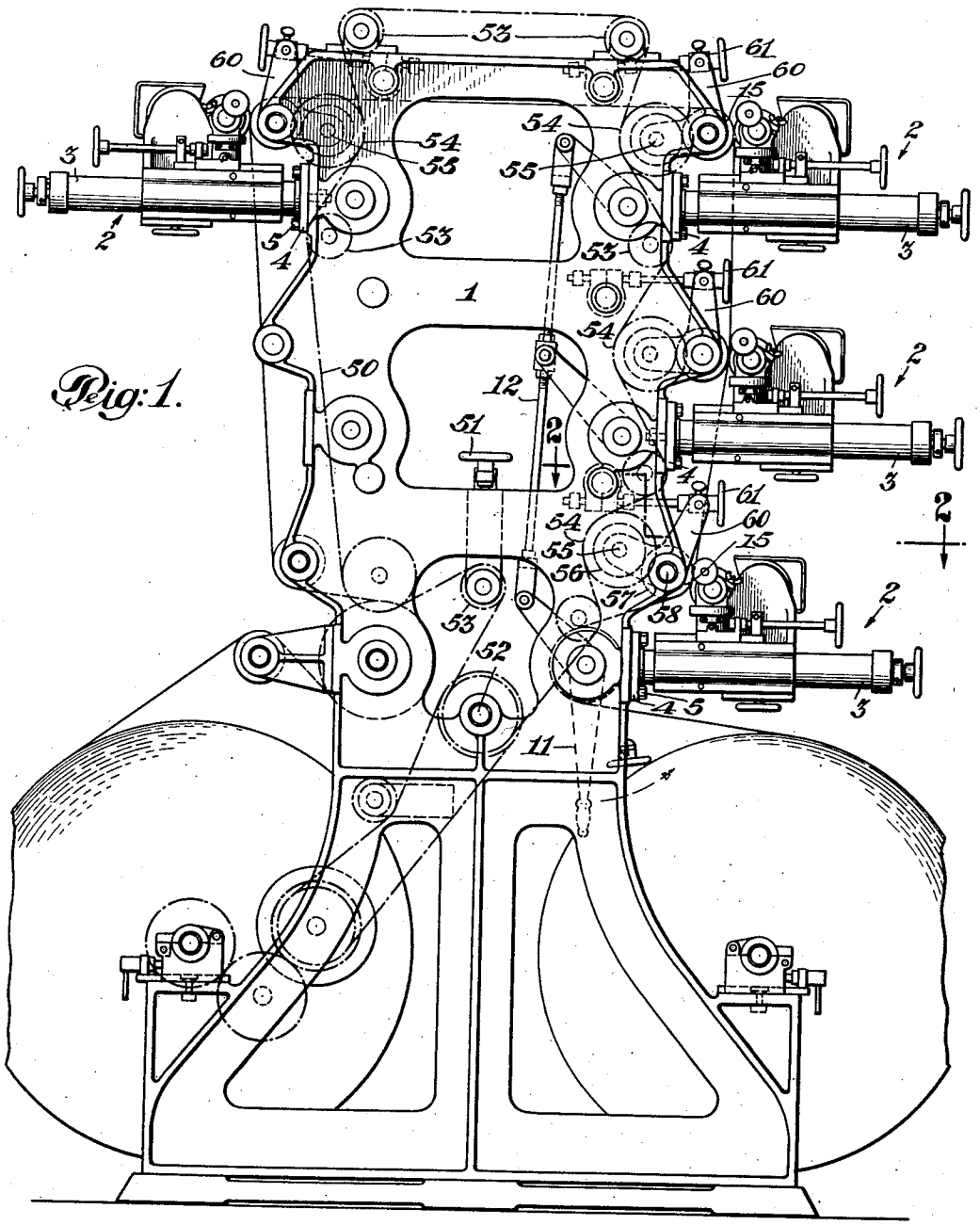


Fig. 1.

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Filed June 9, 1936 5 Sheets-Sheet 2

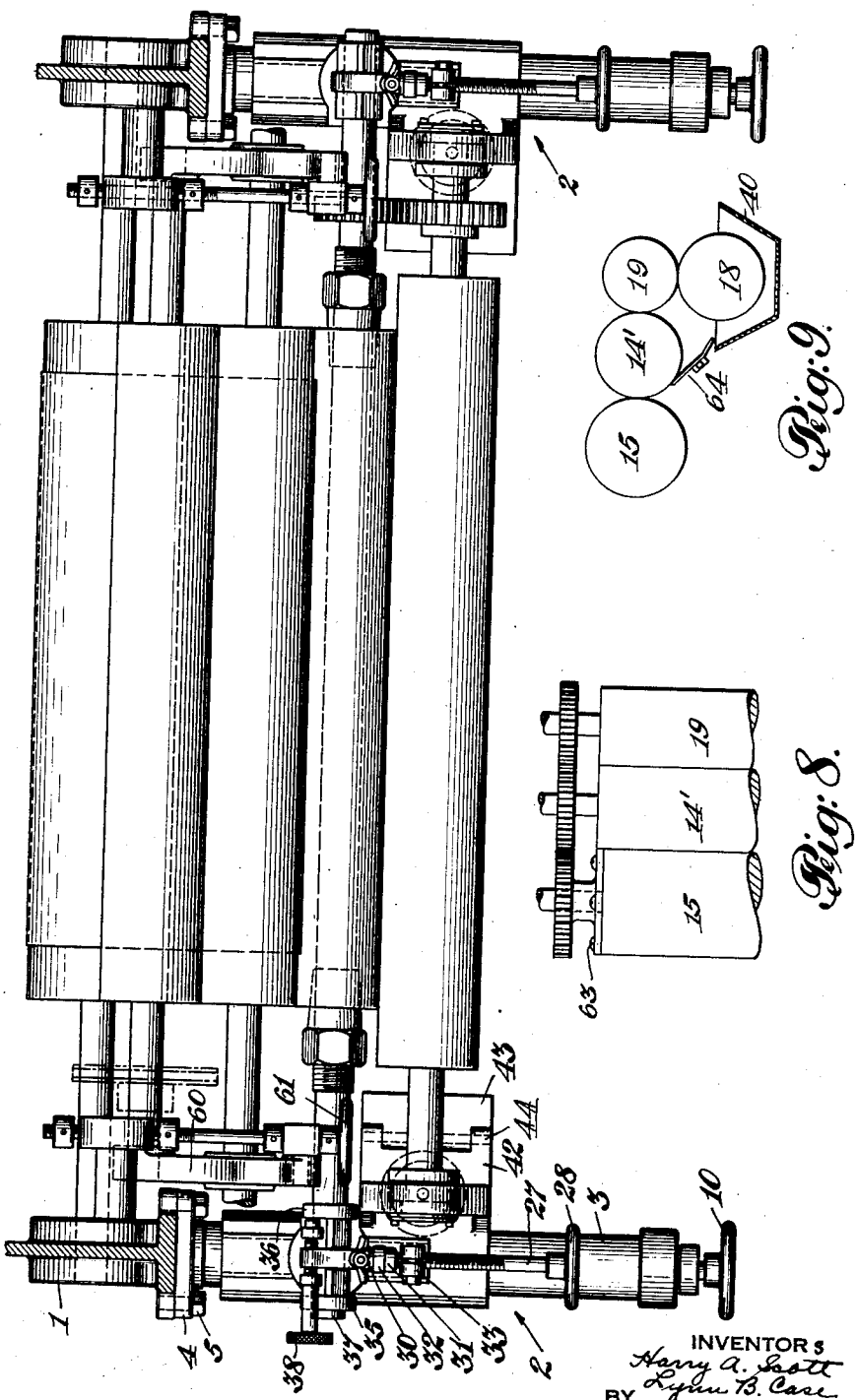


Fig. 2.

Fig. 9.

Fig. 8.

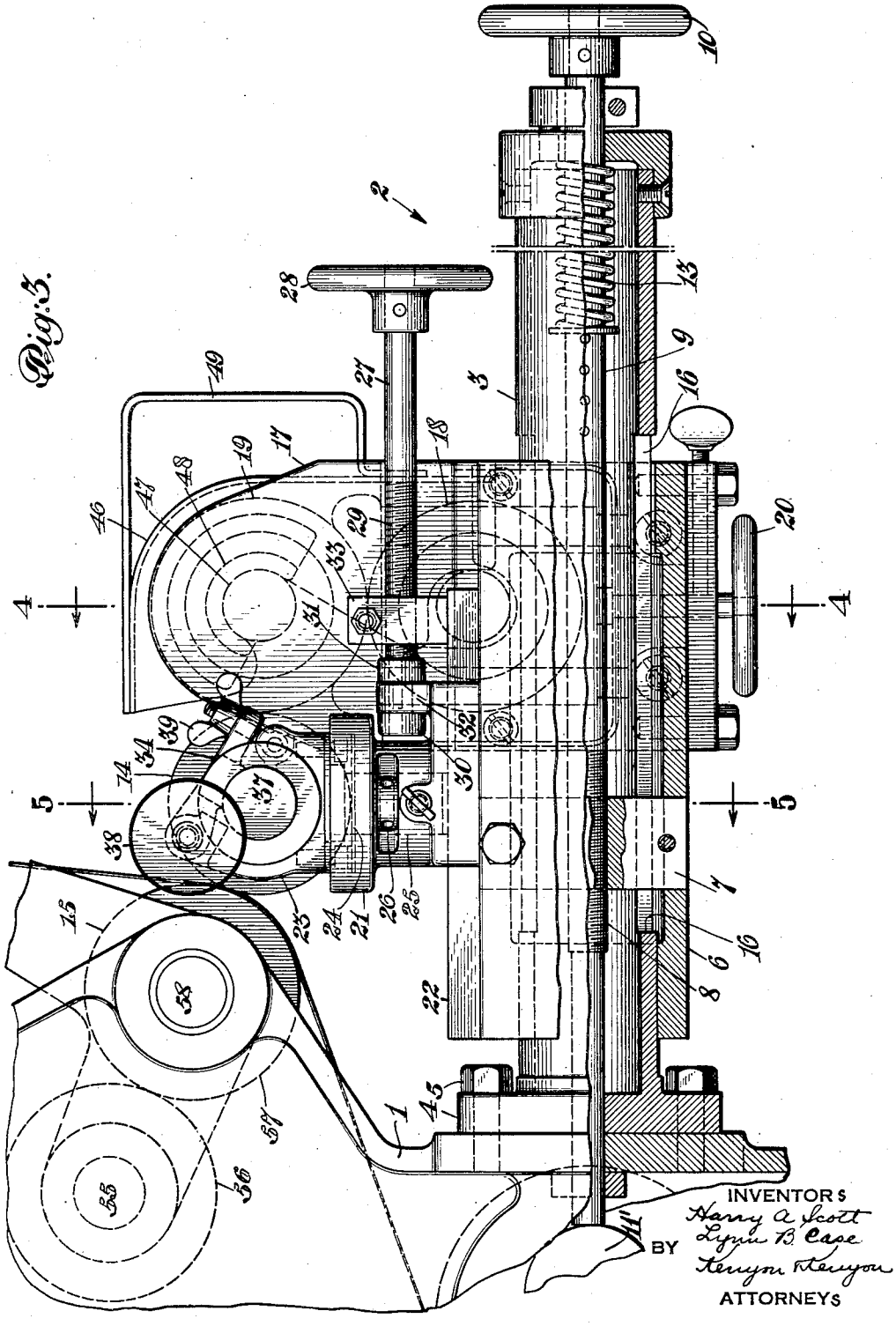
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PATTERN REGISTRATION MEANS FOR MULTIPLE CYLINDER PRINTING MACHINES

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Fig. 3.



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Fig. 5.

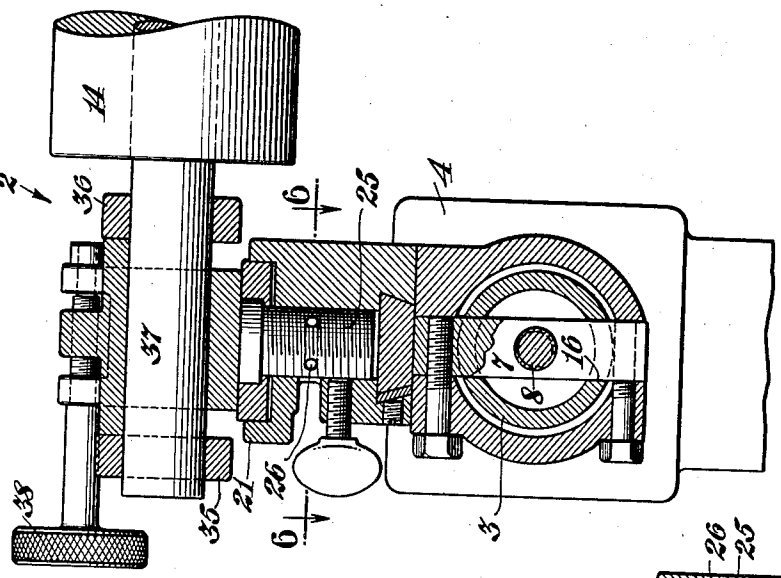


Fig. 6.

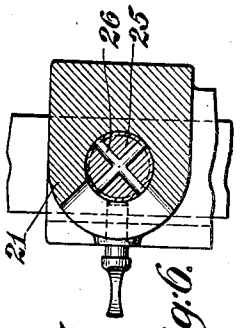
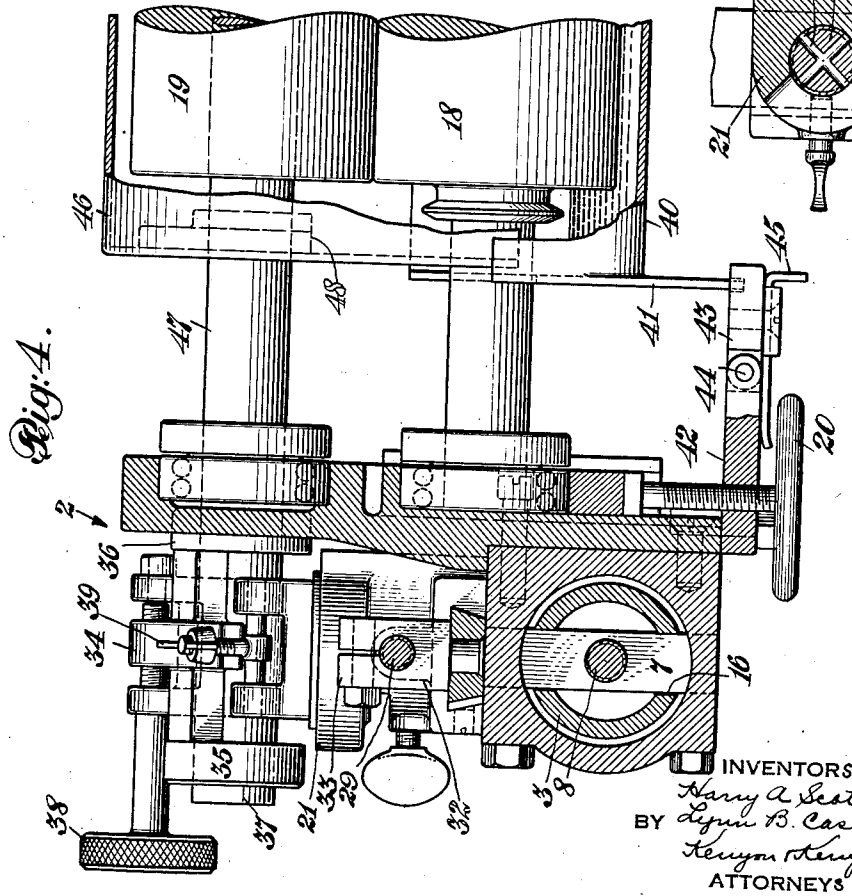


Fig. 4.



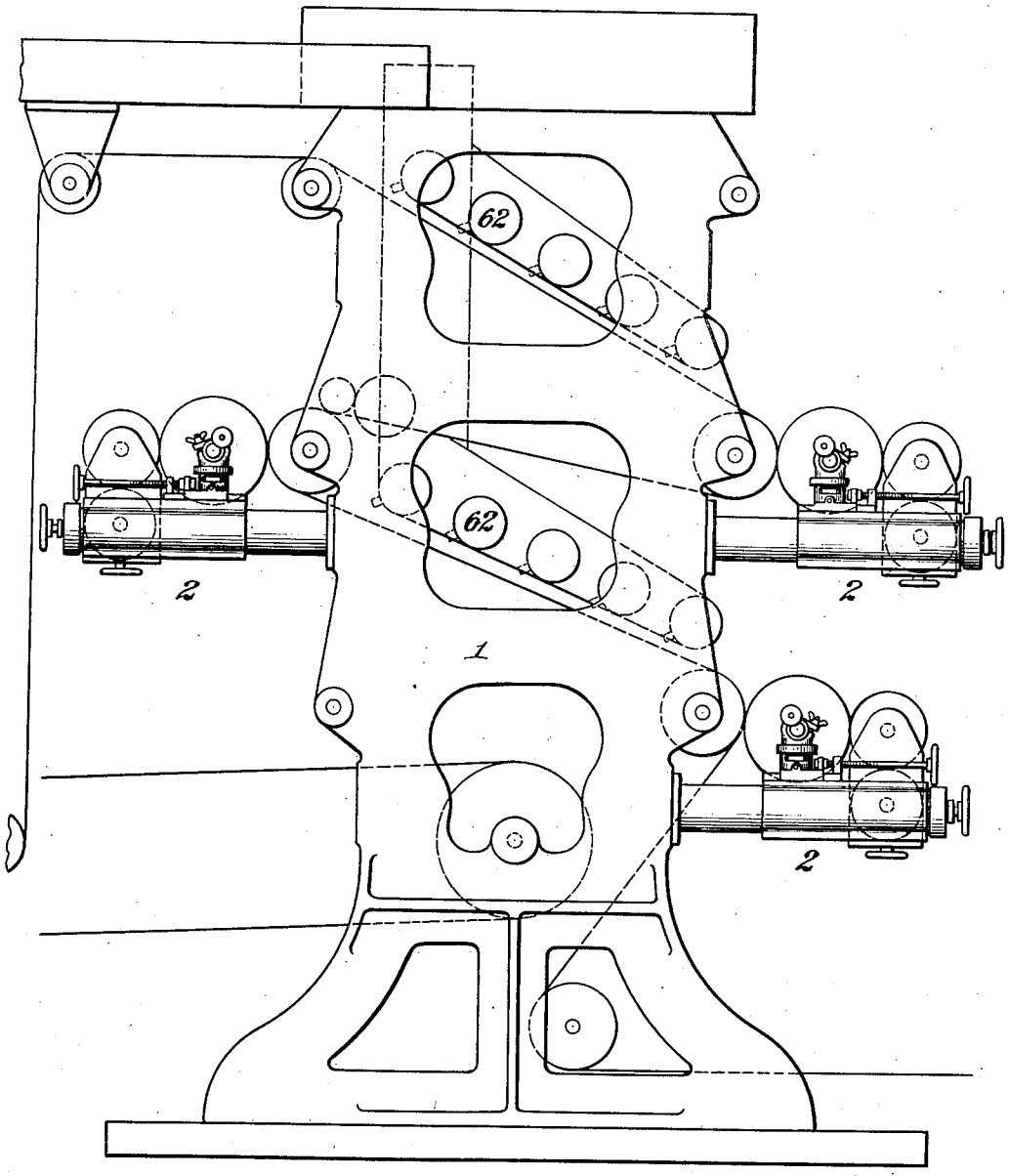
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Fig. 7.



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2,102,386

PATTERN REGISTRATION MEANS FOR MULTIPLE CYLINDER PRINTING MACHINES

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Application June 9, 1936, Serial No. 84,278

10 Claims. (Cl. 101—248)

This invention relates to pattern registration means for printing machines having multiple printing cylinders.

There have been certain complications and difficulties inherent in surface and intaglio printing machines. As the number of colors desired to be printed are increased, the difficulties of maintaining registration or of securing registration when fitting the pattern are increased, in that in general each printing head requires several adjustments resulting in numerous stops with consequent wastage. In making the adjustments, due to the number of variables, they must be made several times to ultimately get exact registration. The adjustment mechanisms are generally complicated and the printing heads and brackets are of such size as to require for a number of colors a comparatively large machine, also the various heads, although similar, cannot be made entirely interchangeable where the drive is from a central main gear.

With our invention, the construction of a surface and intaglio printing machine has been simplified and made more compact with all printing heads interchangeable and operating in the horizontal plane. The design of the heads is such that the vertical distance between the heads is reduced to a minimum thereby permitting more printing heads for a given size machine. The print cylinders are easily removed enabling quick renewal or substitution of print cylinders. The excessive wasteage of the web of material at the commencement of operations is materially reduced in my invention by reducing the number of variables to be adjusted to one for each head and in positioning the controls in such a manner that the operator can make the necessary adjustments for the heads on one side of the machine without materially changing his position. The printing cylinders are maintained against the impression cylinders by spring pressure, thereby enabling any paster or foreign matter adhering to the web to pass between the printing and impression cylinders without damaging the web or affecting the printing adjacent to the foreign matter or harming the cylinders or machinery in any particular. With our invention, all heads may be released simultaneously by manually throwing a quick throwout lever. One of the important elements of our invention is the simplification of the driving means and the utilization of the driving means as a co-operating means to secure registration. By such use many small gears are eliminated and the machine is capable of considerable reduction in size, with various other ensuing benefits. The construction of the machine permits its use both for surface printing as well as intaglio printing.

An object of our invention is to provide a surface printer that will permit easy and quick registration to be obtained with the minimum wasteage of web material.

A further object of our invention is to permit the correct resistering of a multi-color pattern when the pattern is not cut to a true center line of block or plate cylinder.

Further objects will appear more fully hereinafter.

Referring to the drawings:

Figure 1 is a view in side elevation of a device embodying the principles of our invention.

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

Figure 3 is a detailed elevation view of a printing head partly shown in section.

Figure 4 is a detailed sectional view of Figure 3 along the line 4, 4.

Figure 5 is a detailed view along the line 5, 5, of Figure 3 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 modified form of intaglio printing and all over tinting with drying of the web between the application of colors.

Figure 8 is a diagrammatic view showing means for releasing impression roll for intaglio printing.

Figure 9 is a diagrammatic view in side elevation of Figure 7.

In carrying out our invention, we provide a frame 1. Unlike the usual frames for surface printers, it is not the hexagon or octagon shape. The printing heads 2 extend horizontally from the sides of the machine in vertical alinement. In Figure 1, only three printing heads are shown on one side but the frame is adaptable for vertical enlargement to place up to four or more heads on each side of the machine, making a total of eight or more colors that can be printed depending upon the height of the heads.

The heads are of special construction. The number of heads that can be affixed to each side of the machine is considerably increased in proportion to the main frame height in our invention by the utilization of tubular support 3 doing away with the usual cast iron brackets. Tubular support 3 has a foot 4 welded thereto which is bolted by bolts 5 to frame 1. Carriage 6 encloses and is slidably mounted on tubular support 3. Secured to carriage 6 is a threaded nut

7 meshing with threaded portion 8 of shaft 9 passing through tubular support 3, foot 4 and a portion of frame 1. Shaft 9 has adjustment handwheel 10 at one end and the other end of shaft 9 bears against a throwout cam 11' carried by hand lever 11. Hand lever 11 is the quick release that operates all the heads through links 12. A spring 13 in tubular support 3 has a dual function, it maintains shaft 9 against cam 11' of the quick release through compression pressure, at the same time, in the case of foreign matter on the web, it permits it to pass between the print roll 14 and the impression roll 15. Nut 7 also has a plurality of functions. Not only does it cause movement of carriage 6 when handwheel 10 is rotated due to the threaded portion 8 of shaft 9, but also nut 7 maintains the head in vertical position due to its engagement in slot 16. (See Figures 3, 4 and 5). Of course, the primary function of nut 7 is to operate as a key in slot 16, whereby carriage 6 will slide on support 3.

Secured to carriage 6 is casting 17 supporting the bearings for the fountain roll 18 and the inking roll 19. Manual adjustment of inking roll 18 is accomplished through handwheel 20 which raises or lowers the slide bearings contained in casting 17. This gives control with respect to the distance between the fountain roll 18 and the inking roll 19, thereby permitting control of the amount of ink supplied to roll 19. The bearings for rolls 18 and 19 are of the self-alining ball bearing type. Supported on carriage 6 and adapted to slide on a dovetail 22 on the top thereof, is support 21. Support 21 carries print roll 14 in latch bearing 23. Latch bearing 23 is supported on swivel plate 24, which in turn is fastened to threaded stud 25, the latter being mounted in support 21. By turning stud 25 by means of a pin inserted in holes 26, stud 25 can be raised or lowered, which in turn raises or lowers latch bearing 23. Latch bearing 23 is free to swivel on swivel plate 24.

The elimination of ripples or creases which form in the paper during the printing is accomplished by varying the horizontal distance from the vertical center line of the machine to the center line of the impression cylinders.

Referring to Figure 1, it will be noted, the first impression cylinder is located closer to the vertical center line than the second impression cylinder and the fourth impression cylinder, if added, would have a center line the same as the first impression cylinder. In other words, the paper is led around a theoretical radius. When a pattern is transferred from a transfer paper to a printing roller and an all over design is cut, sometimes the "putter on" who cuts the pattern, fails to lay the pattern in position with respect to a true center line with the shaft and when this error occurs it is necessary to have a vertical adjustment for the print roll or plate cylinder bearings in order to correct for this human error when registering a multi-colored pattern from side to side of the web. Stud 25 furnishes such adjustment means.

It should be noted that every adjusting screw throughout the machine has a locking arrangement and that no wrenches are required to make adjustments during the operation of the machine.

Roll 14 is adjustable with respect to transfer roll 19. The manual adjustment is made as follows: Shaft 27 carries handwheel 28 at one end and is threaded at 29 adjacent to the other end. Secured to the end of shaft 27 are collars 30 and 31 on each side of lug 32, which latter in turn is integral with support 21. A nut 33 is fastened to dovetail 22, which in turn is secured to carriage 6. The manual operation of handwheel 28, therefore, moves support 21 in dovetail 22, bringing roll 14 towards roll 19, or away therefrom, depending upon the direction of rotation. This adjustment is primarily required to accommodate varying diameters of print roll 14 which may range from about three inches to eight inches in diameter, or larger, depending upon the length of the tubular supports and their centers.

Referring to Figures 2 and 3, the design of the latch bearing 23 is of importance since it is desirable that roll 14 be adjustable in a crosswise position with respect to the impression roller or with respect to the web. The construction of the mechanism is as follows: Latch bearing 23 carries latch 34 which overhangs bearings 23 and rides between two collars 35 and 36 on shaft 37 of print roll 14. Latch 34 is adjusted crosswise by means of threaded screw 38, thereby moving shaft 37 of roll 14 as required. Roll 14 is removed by releasing wing nut 39 and lifting latch 34. As all the heads are standardized the description with respect to one will cover them all.

It should be noted that the pans for the fountain rolls are also of special construction. Referring to Figure 4, pan 40, is of sheet metal welded construction surrounding fountain or furnishing roll 18 to about mid-diameter and has supports 41 at each end. We provide for quick and easy removal of pan 40 as follows: Connected to casting 17 is a shelf 42 having a hinged portion 43 with a pivotal connection 44. Hinged portion 43 has a slot to receive support 41 therein. A latch 45 secures portions 42 and 43 in the horizontal plane when in position. The withdrawal of latch 45 drops the hinged portion 43, thereby releasing the support 41, enabling withdrawal of pan 40. Reversing the procedure enables the re-securing of pan 40 in position. We preferably utilize a ball spring device in connection with latch 45 to prevent accidental displacement. This being a well known mechanism, it requires no illustration. We provide a cover 46 partially enclosing the inking roll 19 and the fountain or furnishing roll 18. Cover 46 rests on shaft 47 on a bronze bearing 48. Bearing 48 is a semicircumferential bearing. The sides of cover 46 extend within the ends of pan 40 thereby acting as splash guards. Cover 46 is removable by grasping handles 49 and lifting same from the rolls. Cover 46 not only tends to prevent the drying and evaporation of the quick drying inks but also prevents dust and foreign matters from getting into the pan 40, which would affect the proper printing and injure the rubber covering of the rolls.

With our invention, we propose to drive the various rolls by means of a chain 50. A multiple width chain is preferably utilized. The speed of the chain is preferably run at a lineal speed in excess of the lineal speed of the web. The chain must be maintained taut in order to maintain proper registration and its utilization for correcting out of registry printing. Manual takeup 51 is used for maintaining the chain taut. Any well known form of takeup may be used. The drive is as follows:

Drive shaft 52 actuates chain 50 which passes around idler sprockets 53, thence around sprockets 54 on studs 55 which latter carry gears 56, which mesh with gears 57 on shafts 58 on impression roll 15. Gears 57 in turn drive the gears

connected to rolls 14, 19 and 18. The chain drive enables the utilization of standard interchangeable gears, greater compactness in the design of the machine and elimination of mechanical registering mechanisms for the heads. This latter is accomplished in a novel manner as follows:

Sprocket 54 and gear 56 are carried by the same stud 55 secured to bell crank lever 60. Lever 60 can be motivated through handwheel 61 whereby sprocket 54 can be swung either upwardly or downwardly around the center of shaft 58. The chain drive must be designed and assembled in such a way that there is no material change in the length of the chain 50 when the adjustment of bell crank lever 60 is made. In the movement of lever 60, chain 50 acts as a rack causing sprocket 54 either to rotate faster or slower than chain 50, thereby moving the print roll on one side with respect to the web and with respect to the other printing heads, so that registration may be obtained. With our invention, the actuation of handwheel 61 on each printing head permits the securing of registration lengthwise of the web. Three features enter into the successful design of our chain drive in addition to the foregoing:

(a) multiple width chain;

(b) increased size of the sprocket diameter to the size of the gear attached to same;

(c) the location of the two idler sprockets in relation to the driving sprockets and to the individual impression cylinders so that the adjusting of the bell crank does not affect the actual length of the chain.

The registration cross wise of the web is initially accomplished by the adjustment of the bearing latch arrangement 34 through handwheel 33. Another initial adjustment for straightening up the type alinement is accomplished by the manipulation of stud 26 as previously set forth. In general, once the machine is started in operation practically the only adjustment that is required during operation is the adjustment of handwheel 61, so that with our invention, due to the simplicity of control, a great deal less wastage of web material is had than is generally the case with surface printers.

In Figure 1, the unwind mechanism and the rewind mechanism are shown as component parts of the machine. In a similar manner, slitting mechanisms and other devices may be made component parts, or they may be located at a distance.

Referring now to Figure 7, this illustrates a modified form of device particularly adapted to intaglio printing, using slower drying inks, necessitating drying before a second printing. Also in the device shown, the web of material may be printed on both sides simultaneously, or on one side, as desired. As in the preferred form, the chain drive is utilized with the same printing heads, except that the impression roll is released and allowed to run free in the case of intaglio printing. The modified form is also adapted to surface printing by driving the impression roll, and the substitution of the surface printing roll for the intaglio engraving roll. In the modified form, the web after it leaves the printing head, is conducted internally of the frame, the printed matter being dried by pressure air which may be heated, if desired, from nozzle pipes 62, and also exhausted through a hood overhead, the web coming from the lowest printing head across the machine to the printing head on the opposite side, thence back to another printing head, thence across to delivery, or else additional heads may be added. Where it is desired to print on only one side, the printing heads on the opposite side are released from operation.

In adapting our device for intaglio printing, the only changes that need be made are in connection with print roller 14, for which the intaglio printing roll 14' is substituted and bolts 63 are withdrawn from roll 15, permitting impression roll 15 to run free. (See Figs. 8 and 9.) In intaglio printing it is also desirable to have a doctor 64 and sometimes a lint doctor on all but the first color. This doctor is of the usual vibrating type and pneumatically driven. In other particulars, the various parts both as to construction, adjustment and control are similar to the preferred embodiment. The preferred embodiment likewise is adapted for intaglio printing in the manner described with respect to the modification.

It will thus be seen that we have provided a surface printer that is readily adapted also for intaglio printing, that is of simplified and compact structure, that is easy of adjustment during operation for registration, avoiding wastage of web, that is quickly adjusted for operation, that has interchangeable heads wherein the printing, transfer and furnishing rolls are readily adjustable with respect to the impression roll, and the printing cylinder is positively held with a positive spring pressure against the impression cylinder, but enabling any foreign matter carried by the web to pass through without injury to the mechanism or web. And wherein the drive mechanism is positive, at the same time flexible, and functions as a cooperating means for adjustment for registration of the printing cylinder with respect to the web, or other printing cylinders, and wherein a greater number of colors may be printed on the same sized machine than has generally been possible heretofore.

What we claim is:

1. In a printing machine, a frame, a plurality of impression rollers supported by said frame for successive engagement by a web; an equal number of printing rollers supported by said frame for co-operation with said impression rollers, a sprocket in driving relation to each printing roller, a chain engaging said sprockets, and means for moving each sprocket lengthwise of said chain to effect registration of the patterns produced on the web by said printing rollers.

2. In a printing machine, a frame, a plurality of impression rollers supported by said frame for successive engagement by a web, an equal number of printing rollers supported by said frame for co-operation with said impression rollers, intermeshing gears for each pair of rollers, a sprocket in driving relation to each impression roller, a chain engaging said sprockets, and means for moving each sprocket lengthwise of said chain to effect registration of the patterns produced on the web by said printing rollers.

3. In a printing machine, a frame, a plurality of impression rollers supported by said frame for successive engagement by a web, an equal number of printing rollers supported by said frame for co-operation with said impression rollers, a sprocket in driving relation to each printing roller, a chain engaging said sprockets, a pivoted arm supporting each sprocket, and means for swinging each arm to move the sprocket carried thereby to effect registration of the patterns produced on the web by said printing rollers.

4. In a printing machine, a frame, a plurality

of impression rollers supported by said frame, an equal number of printing rollers supported by said frame for co-operation with said impression rollers, intermeshing gears for each pair of rollers, a sprocket in driving relation to each impression roller, an arm pivoted concentric with each impression roller for supporting said sprocket, a chain engaging said sprockets, and means for swinging each arm to move its sprocket lengthwise of said chain to effect registration of the patterns produced on the web by said printing rollers.

5. In a printing machine, an impression cylinder, an associated printing cylinder, a shaft therefor, a pair of collars on said shaft, a latch having a portion received between said collars, a rotatable member parallel to said shaft and fixed against axial movement, and screw connections between said latch and said member.

6. In a printing machine, a frame, a plurality of printing rolls for successive engagement by a web, an inking and a fountain roll associated with each printing roll, means for adjusting each printing roll with respect to its associated inking roll, means for adjusting each printing roll axially, driving sprockets for said printing rolls, a chain engaging said sprockets and means for moving each sprocket lengthwise of said chain to effect registration of the patterns produced on the web by said printing rolls.

7. In a printing machine, a frame, a plurality of printing rolls for successive engagement by a web, an inking and a fountain roll associated with each printing roll, means for adjusting each printing roll with respect to its associated inking roll, means for adjusting each printing roll axially, a sprocket in driving relation to each printing roll, a chain engaging said sprockets, and means for moving each sprocket lengthwise of said chain to effect registration of the patterns produced on the web by said printing rollers.

8. In a printing machine, a frame, a plurality of printing rolls for successive engagement by a web, an inking and a fountain roll associated with each printing roll, means for adjusting each printing roll with respect to its associated inking roll, means for adjusting each printing roll axially, a sprocket in driving relation to each printing roll, a chain engaging said sprockets, a pivoted arm supporting each sprocket, and means for swinging each arm to move the sprocket carried thereby lengthwise of said chain to effect registration of the patterns produced on the web by said printing rollers.

9. In a printing machine, a frame, a plurality of printing rollers supported by said frame, means for successively engaging a web with said printing rolls, a sprocket in driving relation to each printing roller, a chain engaging said sprockets, and means for moving each sprocket lengthwise of said chain to effect registration of the patterns produced on the web by said printing rollers.

10. In a printing machine, a frame, a plurality of printing rollers supported by said frame, means for successively engaging a web with said printing rolls, a sprocket in driving relation to each printing roller, a chain engaging said sprockets, a pivoted arm supporting each sprocket, and means for swinging each arm to move the sprocket carried thereby lengthwise of said chain to effect registration of the patterns produced on the web by said printing rollers.

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