July 30, 1963 H. J. LUEHRS 3,099,210

COMBINATION DOUBLE FOUR COLOR WEB PRINTING PRESS

Filed Sept. 6, 1961 13 Sheets-Sheet 1

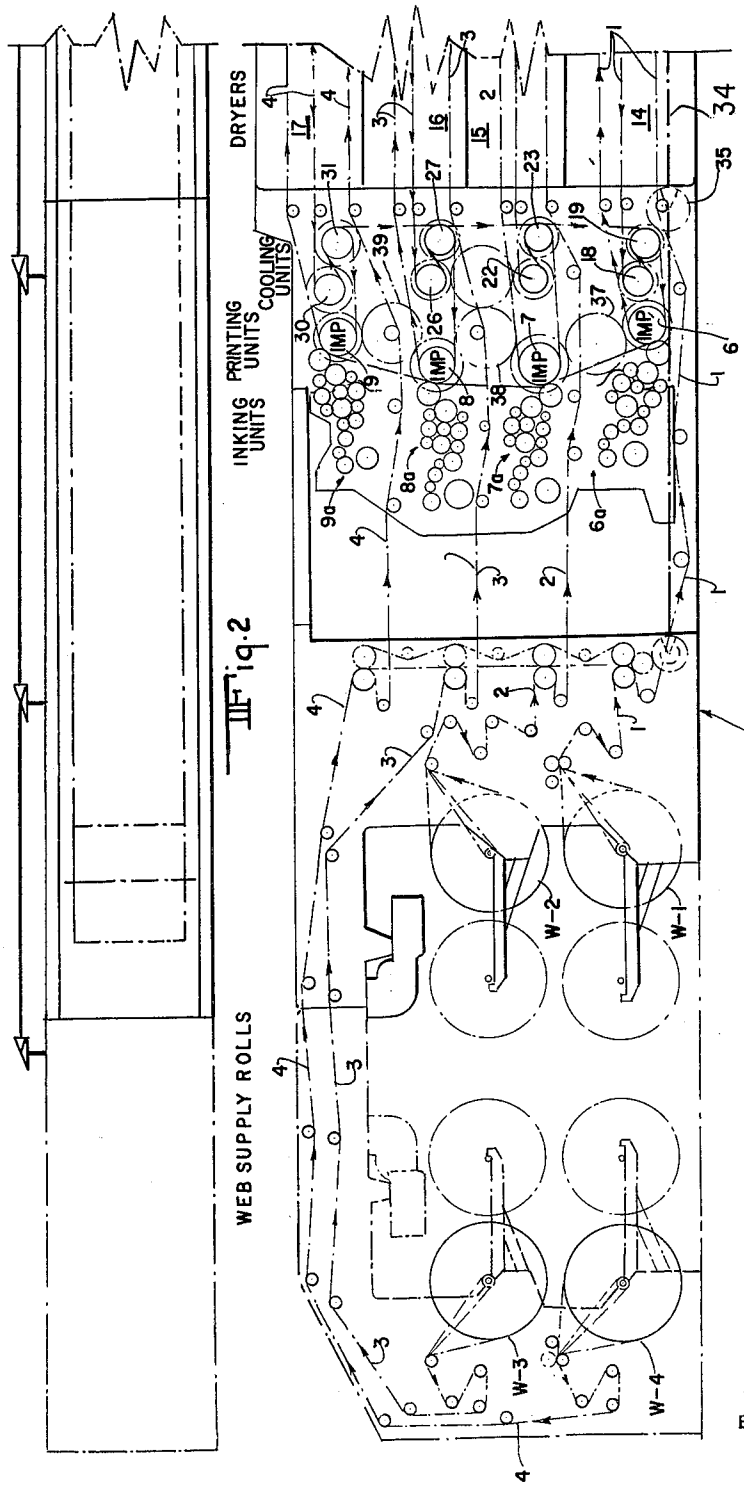

Fig. 2

Fig. 1

INVENTOR
HANS J. LUEHRS
BY Brown & Seward
His ATTORNEYS

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COMBINATION DOUBLE FOUR COLOR WEB PRINTING PRESS

Filed Sept. 6, 1961 13 Sheets-Sheet 2

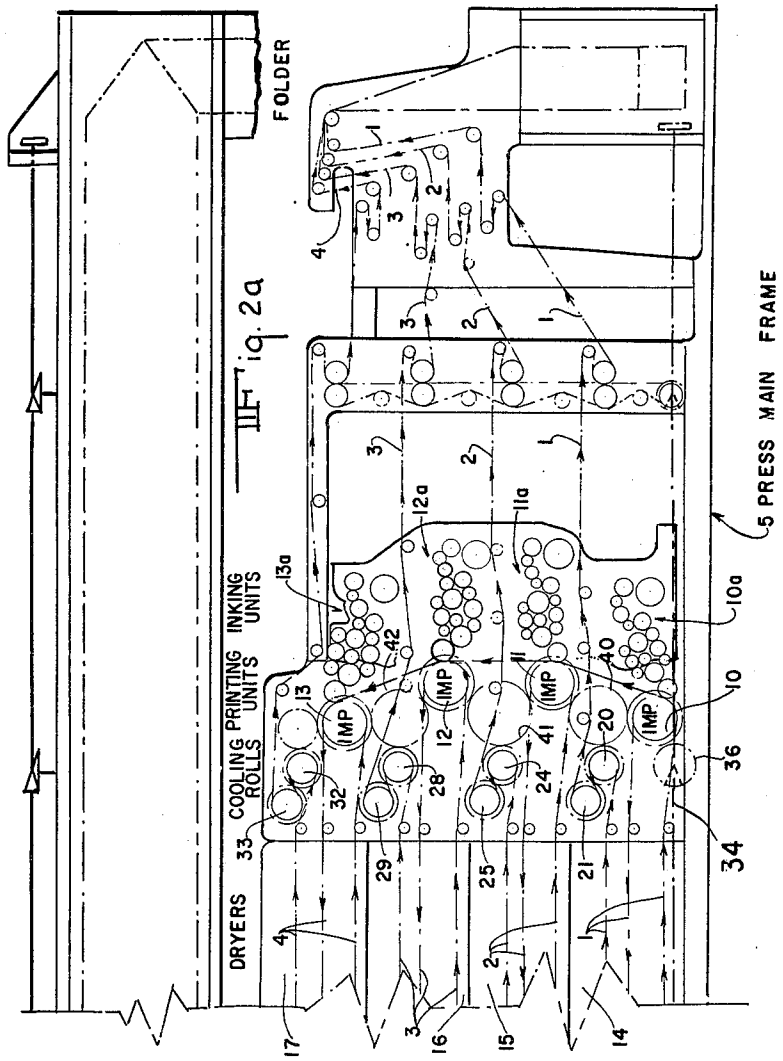

Fig. 2a

Fig. 1a

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COMBINATION DOUBLE FOUR COLOR WEB PRINTING PRESS

Filed Sept. 6, 1961 13 Sheets-Sheet 3

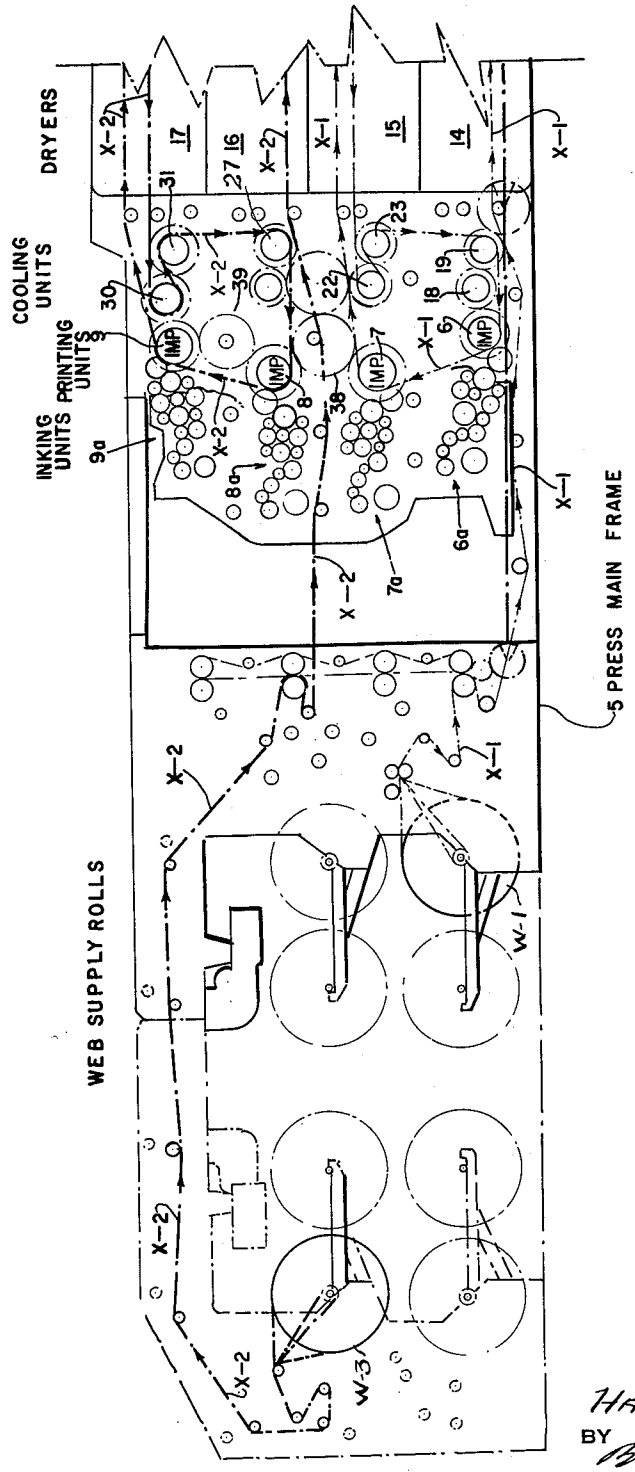

Fig. 3

INVENTOR
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July 30, 1963 H. J. LUEHRS 3,099,210

COMBINATION DOUBLE FOUR COLOR WEB PRINTING PRESS

Filed Sept. 6, 1961 13 Sheets-Sheet 4

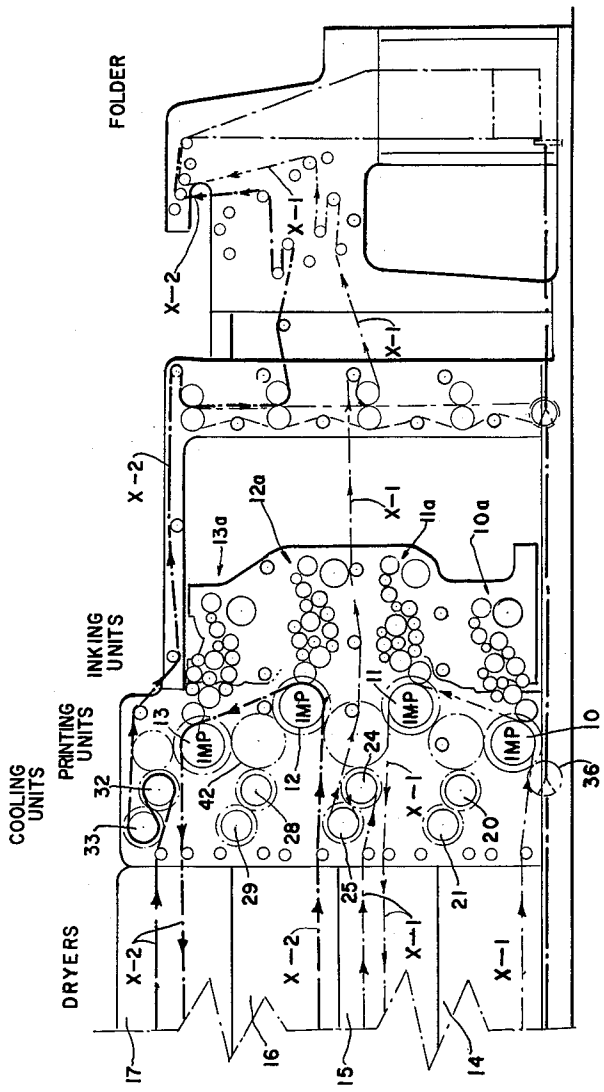

Fig. 3a

INVENTOR
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July 30, 1963 H. J. LUEHRS 3,099,210

COMBINATION DOUBLE FOUR COLOR WEB PRINTING PRESS

Filed Sept. 6, 1961 13 Sheets-Sheet 5

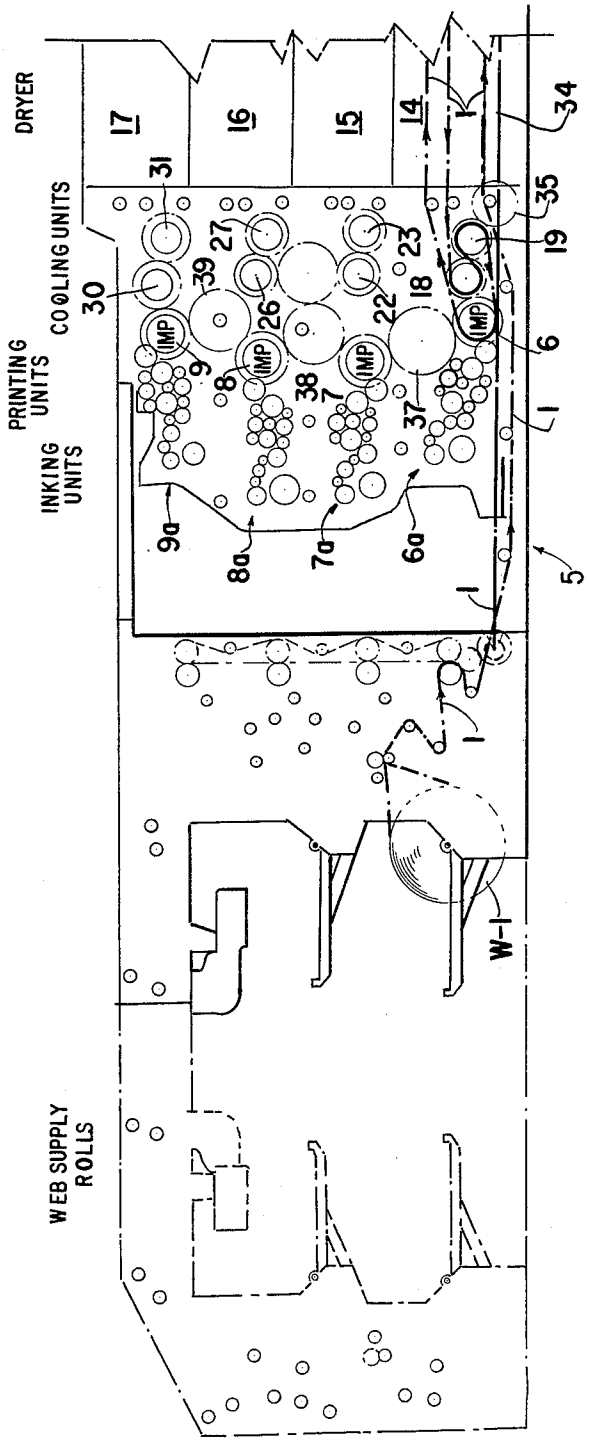

Fig. 4

INVENTOR
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July 30, 1963 H. J. LUEHRS 3,099,210

COMBINATION DOUBLE FOUR COLOR WEB PRINTING PRESS

Filed Sept. 6, 1961 13 Sheets-Sheet 6

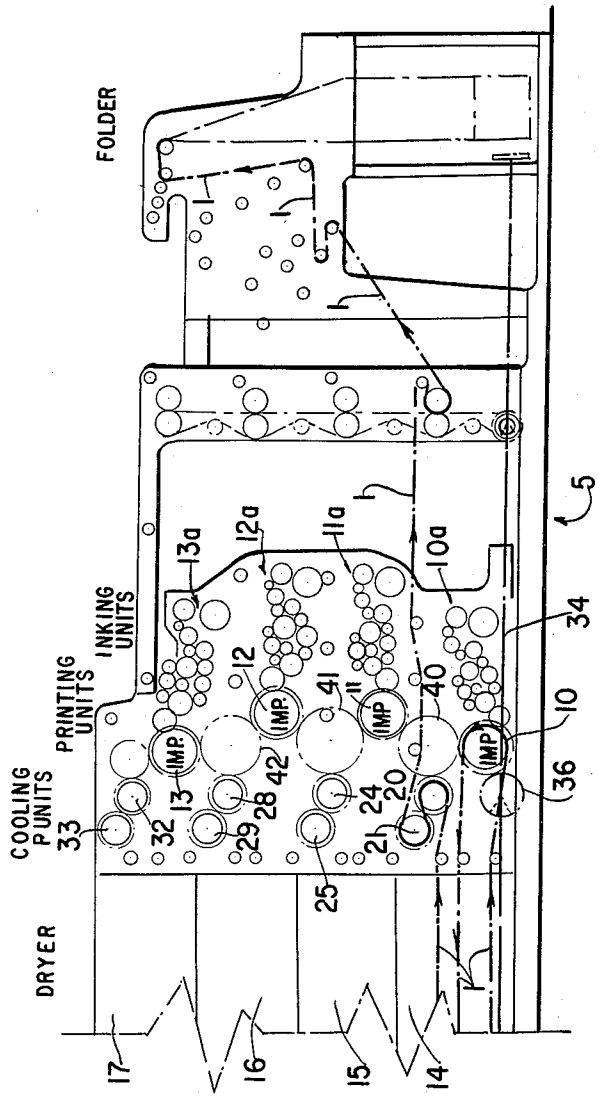

Fig. 4a

INVENTOR
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July 30, 1963 H. J. LUEHRS 3,099,210

COMBINATION DOUBLE FOUR COLOR WEB PRINTING PRESS

Filed Sept. 6, 1961 13 Sheets-Sheet 7

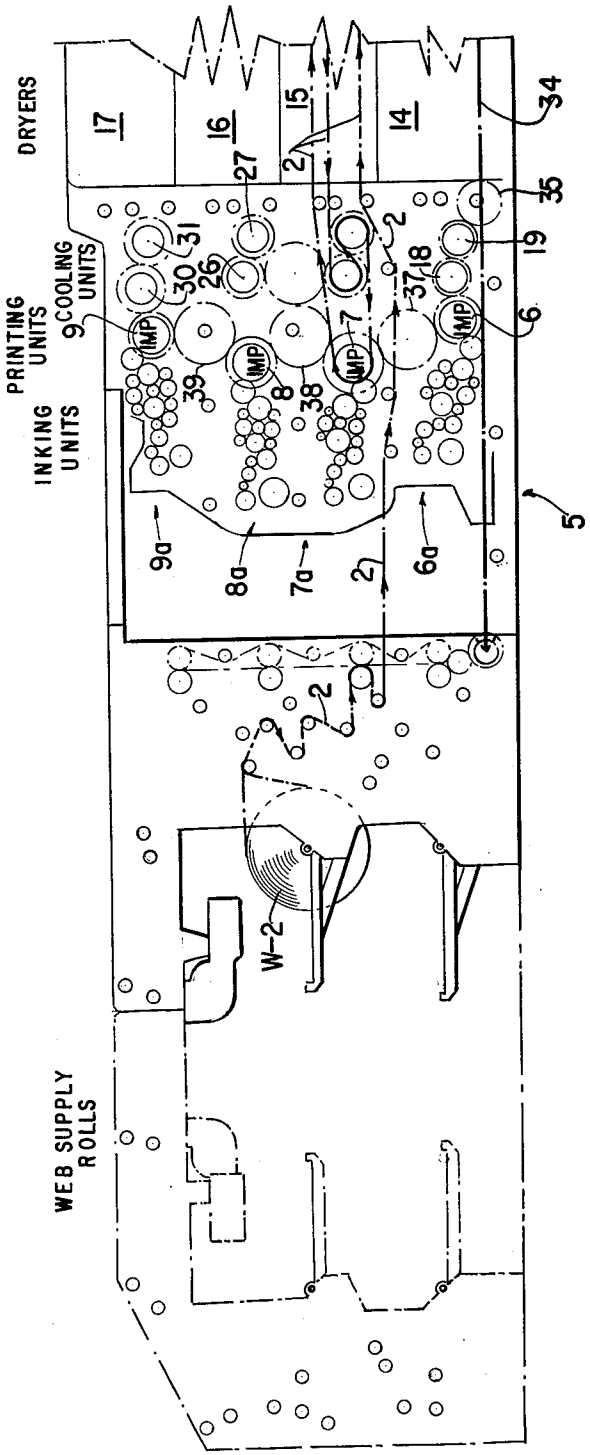

Fig. 5

INVENTOR
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July 30, 1963 H. J. LUEHRS 3,099,210

COMBINATION DOUBLE FOUR COLOR WEB PRINTING PRESS

Filed Sept. 6, 1961 13 Sheets-Sheet 8

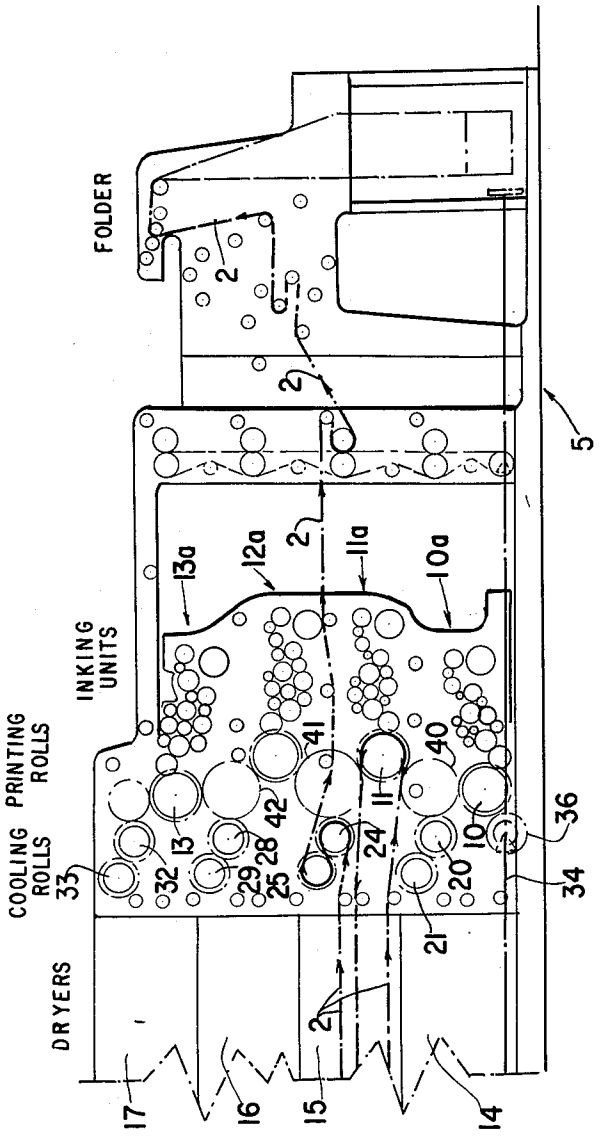

Fig. 5a

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July 30, 1963 H. J. LUEHRS 3,099,210

COMBINATION DOUBLE FOUR COLOR WEB PRINTING PRESS

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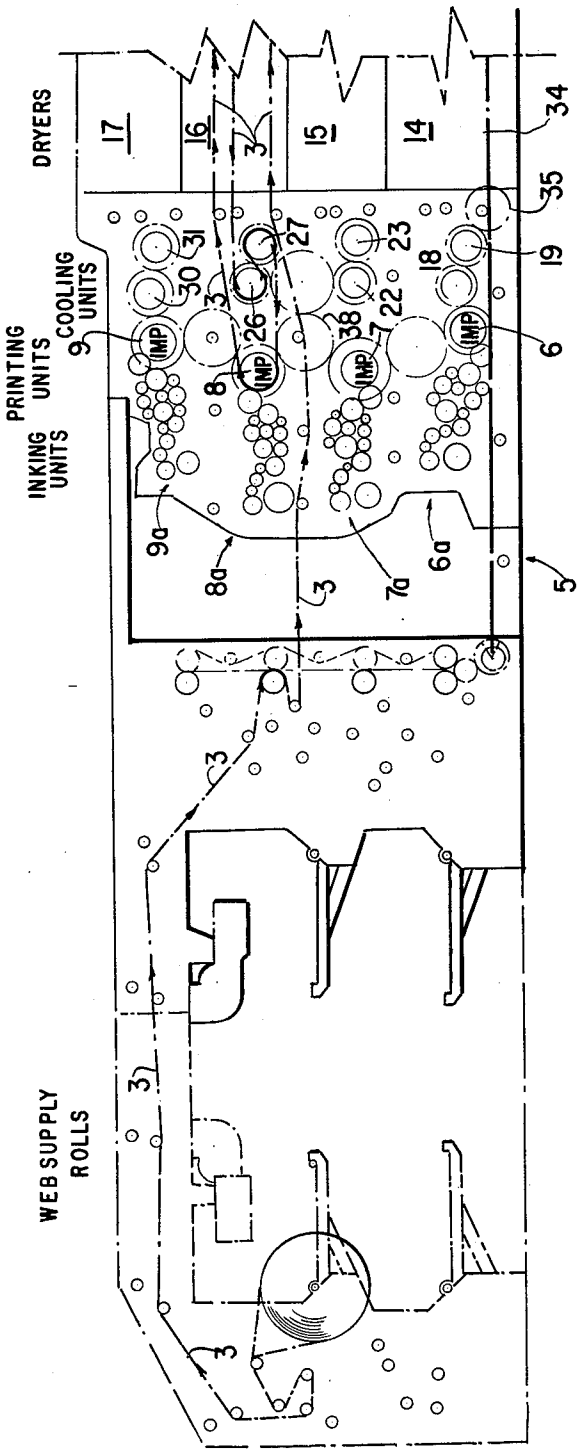

Fig. 6

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July 30, 1963 H. J. LUEHRS 3,099,210

COMBINATION DOUBLE FOUR COLOR WEB PRINTING PRESS

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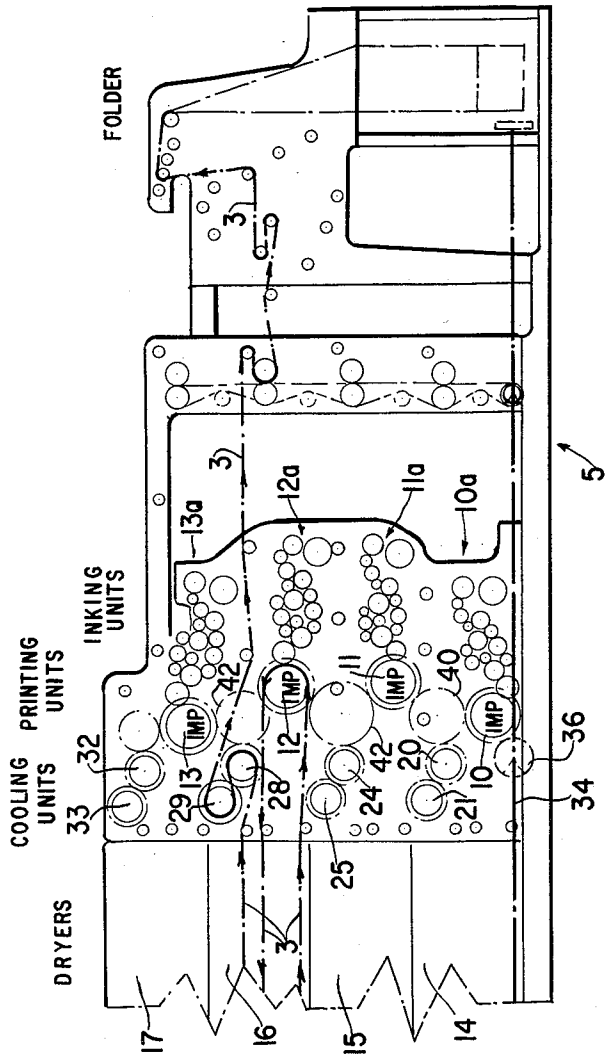

Fig. 6a

INVENTOR
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July 30, 1963 H. J. LUEHRS 3,099,210

COMBINATION DOUBLE FOUR COLOR WEB PRINTING PRESS

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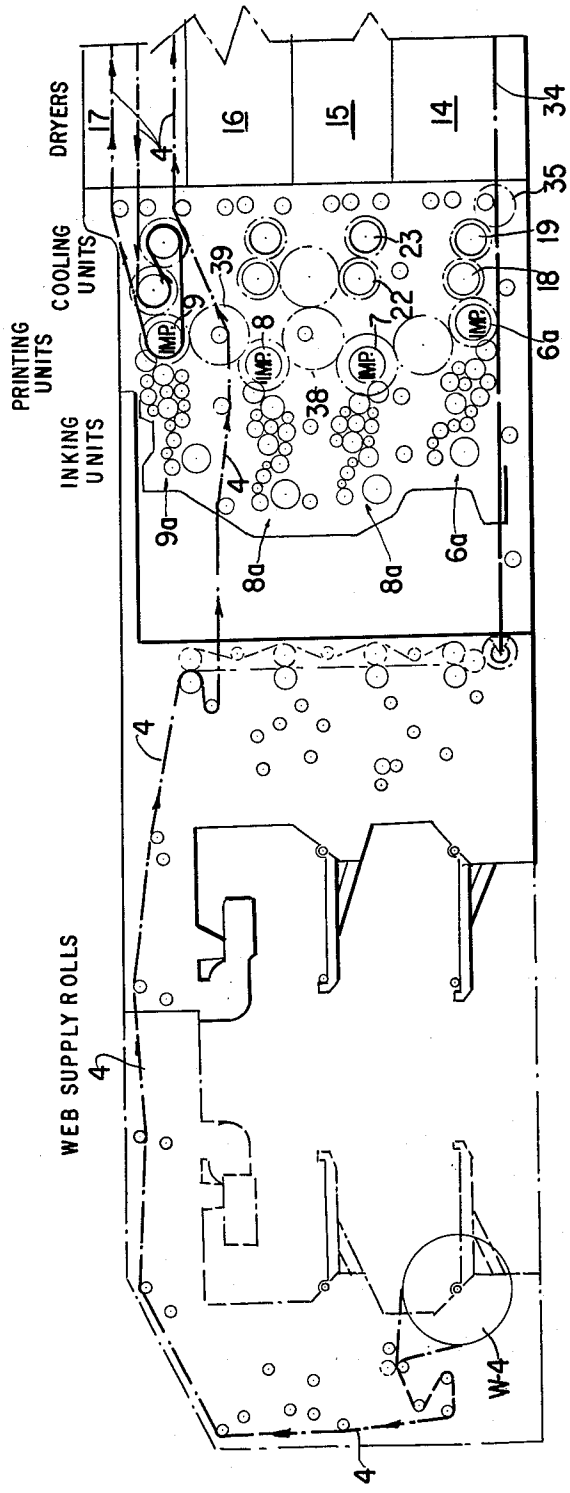

Fig 7

INVENTOR
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July 30, 1963 H. J. LUEHRS 3,099,210

COMBINATION DOUBLE FOUR COLOR WEB PRINTING PRESS

Filed Sept. 6, 1961 13 Sheets-Sheet 12

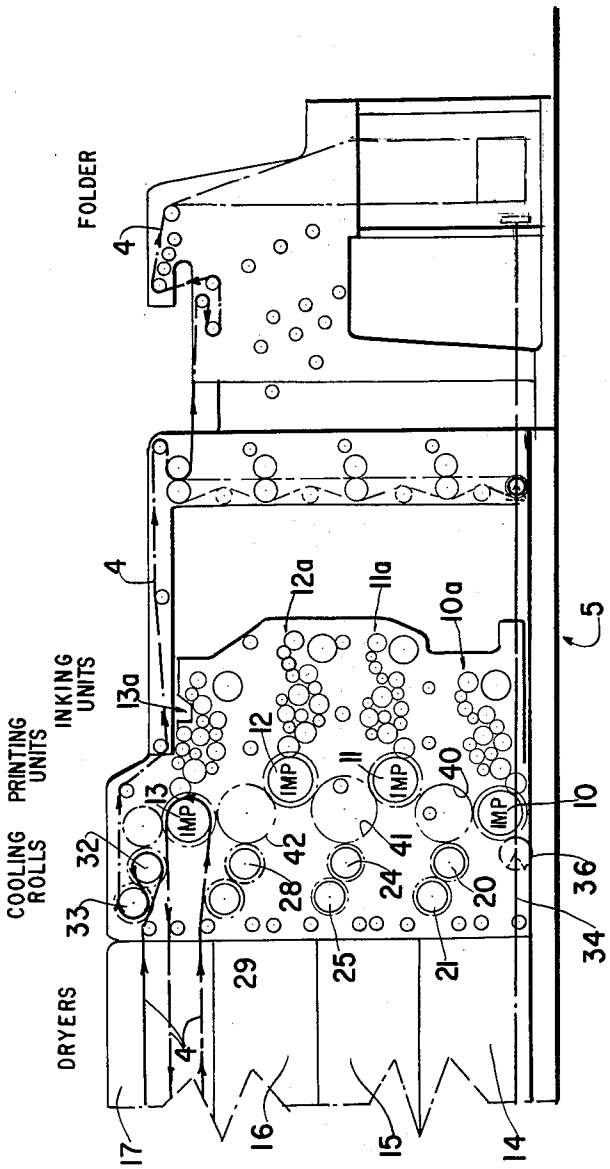

Fig. 7a

INVENTOR
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July 30, 1963 H. J. LUEHRS 3,099,210

COMBINATION DOUBLE FOUR COLOR WEB PRINTING PRESS

Filed Sept. 6, 1961 13 Sheets-Sheet 13

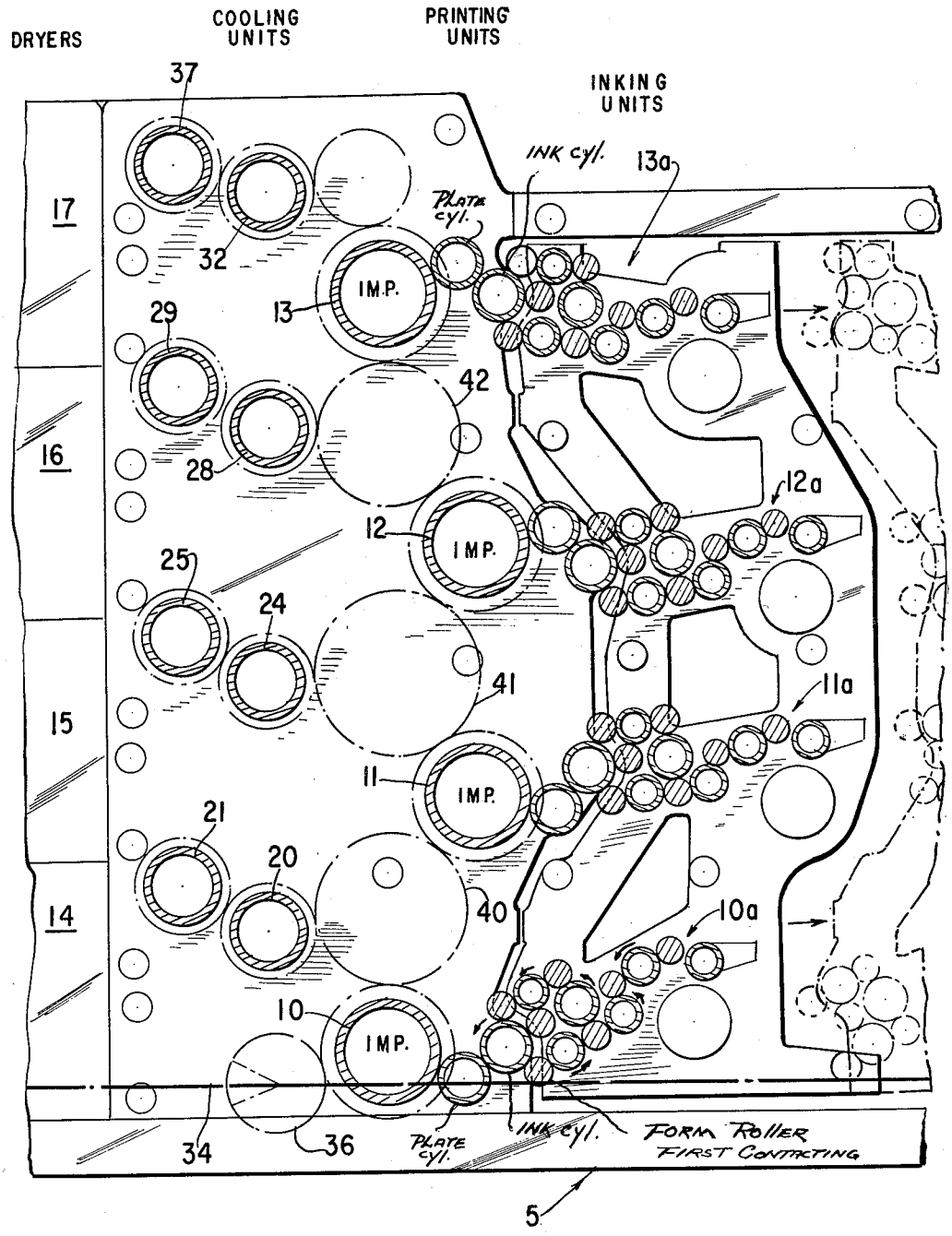

Fig. 8

INVENTOR
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United States Patent Office

3,099,210
Patented July 30, 1963

3,099,210

COMBINATION DOUBLE FOUR COLOR WEB PRINTING PRESS

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Filed Sept. 6, 1961, Ser. No. 136,363
3 Claims. (Cl. 101—180)

It will be understood that while conventional plates may be used in the structure described below, the design of same is particularly suitable for wrap-around plate utilization.

The object of my invention is to provide a web rotary press in which a web or webs can be perfected in one or more colors by passing same through desired printing units and drying units which always remain in their same structural relationship regardless of the printing and drying operations to be performed.

Another object is to provide a press of the character described in which ink cylinders are mounted in the main press frame with their plate and impression cylinders to assure required rigidity and accurate contact of cylinders.

Another object is to provide a single unit dryer between two stacks of color printing units so that minimum travel of a printed web is obtained prior to printing the second side of the web at its printing unit.

The arrangement of the two stacks of four printing couples each permits the use of a single unit dryer, yet the designed arrangement provides for single web perfecting in four colors, in one color, plus any intermediate combination thereof without physical contact of the freshly printed side of the web before drying and without the necessity of reversing the direction of rotation of any units.

A further object is to provide a web rotary press of the character described in which, without structural alteration, it is possible to perfect four webs simultaneously by printing in one color on each side of each web, or to perfect one web in four colors on each side thereof, or to perfect two webs in two colors on each side thereof, or to perfect other webs in predetermined numbers and colors limited only by the available web leads and color printing units of the press.

Broadly, my invention comprises a web printing press in which a plurality of stacked color printing units are located on opposite ends of a single unit dryer with at least one web supply adjacent one stack of color printing units and means for handling the printed product adjacent the second stack of printing units, such means comprising a folder, cutter and/or other product handling mechanism, such as a delivery.

A practical embodiment of my invention is illustrated in the accompanying drawings in which,

FIGS. 1 and 1*a* represent in diagrammatic side elevation a rotary web printing press constructed in accordance with my invention and illustrating a plurality of the operations possible on webs led in their predetermined paths, i.e.; for perfecting four webs each in one color on each side or, in the alternative, one web in four colors on both sides.

FIGS. 2 and 2*a* illustrate diagrammatically in a plan view the embodiment of my invention shown in FIGS. 1 and 1*a* showing all the units of the press in longitudinal alignment.

FIGS. 3 and 3*a* illustrate diagrammatically the web leads for perfecting each of two webs in two colors on each side, the web being denoted by X–1 and X–2.

FIGS. 4 and 4*a* illustrate diagrammatically side elevation the web lead for perfecting a single web in one color on both sides, said web being taken from the web supply W1.

FIGS. 5 and 5*a* illustrate diagrammatically in side elevation a single web taken from the web supply W2, said web being perfected in one color on both sides thereof.

FIGS. 6 and 6*a* illustrate diagrammatically in side elevation a single web being perfected in one color on both sides thereof said web being taken from the web supply W3.

FIGS. 7 and 7*a* illustrate diagrammatically in side elevation a single web taken from the web supply W4, said web being perfected in one color on both sides thereof.

In all of the foregoing figures, the press frame has been left incomplete for purposes of clarification.

FIG. 8 shows the frame construction used in all the foregoing figures designated as 1*a*, 2*a*, 3*a*, 4*a*, 5*a*, 6*a* and 7*a*.

Referring to FIGS. 1 and 1*a* of the accompanying drawings, a multicolor rotary printing press is here illustrated comprising its main press frame 5, a plurality of web supply rolls designated respectively W1, W2, W3 and W4, a series of superposed printing units, the impression cylinders of said units designated by 6, 7, 8 and 9 respectively on one side of the drying units.

The other set of printing units are superposed and have impression cylinders of said units designated by 10, 11, 12 and 13. The impression cylinders are shown as being twice the diameter of their plate and ink cylinders to insure rigidity for good printing. The several webs are marked 1, 2, 3 and 4.

The inking units for the first mentioned printing units are designated generally 6*a*, 7*a*, 8*a* and 9*a*, and the inking units for the other set of printing units are designated generally by 10*a*, 11*a*, 12*a*, and 13*a*. It will be noted the ink distributions are retractable to facilitate plating and web threading in spite of the simple, compact yet versatile press structure.

The ink trains are such that the first contacting form roll is the one loaded with the heaviest film of ink while the other two form rolls carry the remainder of the supplied ink to the ink cylinder at a different location on its surface, thus securing a uniform supply of ink to the plate.

The drying units are designated by 14, 15, 16 and 17 and are located in a single stack between the two stacks of printing units mentioned above. At the opposite ends of the drying units are pairs of cooling rolls designated by the numerals 18 through 33 inclusive.

The usual means taken from the press drive is provided for rotating the respective cylinders and is designated generally by the numeral 34 which indicates a horizontal shaft driving separate trains of gears driven from gears 35 and 36 at opposite ends of the drying units. Gear 35, for example, drives cooling rolls, 19, 18 and impression cylinder 6, intermediate gear 37 carrying the drive to impression cylinder 7. It will be noted that this interme-

diate gear designated as 37 is duplicated at 38, 39, 40, 41 and 42 in the respective units with the respective drives being transmitted thereby to the other units interconnected therewith as shown in FIGS. 1 and 1*a*, 3 and 3*a*. This system of driving the respective units minimizes backlash and gives improved registration. As the cooling rolls are also driven directly from the same intermediate gears, an economic and simple design is created.

The operation of this combination is as follows: Assuming that it is desired to perfect each of four webs in one color only on both sides thereof, the web 1 is led from its supply roll W–1 to and through the usual web advancing means (not numbered) to and around impression cylinder 10 where it is printed on one side in one color and led back through the dryer 14 to cooling roll 18 and around the cooling roll 19. From the latter it is led to and around impression cylinder 6 where it is printed in one color on its opposite side and then led back through dryer 14 to and around cooling rolls 20 and 21 and from there to the folder.

The web 2 is led from its supply roll W–2 by the usual web advancing means to and around the impression cylinder 11 where it is printed in one color on one side then back through dryer 15 to and around cooling rolls 22 and 23, thence to impression cylinder 7 where it is printed in one color on the opposite sides then back through dryer 15 to and around cooling rolls 24 and 25, thence to the folder.

The web 3 is led from its supply roll W–3 and advanced by the usual web advancing means to and around impression cylinder 12 where it is printed on one side in one color, thence back through dryer 16 to and around cooling rolls 26 and 27, thence back to impression cylinder 8 where it is printed in one color on the other side, thence back through dryer 16 to and around cooling rolls 28 and 29 and thence to the folder.

The web 4 is led from the supply roll W–4 and forwarded by the usual web advancing means to and around the impression cylinder 13 where it is printed on one side in one color, thence back through dryer 17 to and around cooling rolls 30 and 31, thence to impression cylinder 9 where it is printed in one color on the other side thereof and is then led back through dryer 17 to and around cooling rolls 32 and 33 and from thence to the folder.

It will be seen that four webs can thus be perfected in one color on both sides simultaneously and delivered to a common folder.

Assuming that it is desired to perfect a single web by printing in four colors on each side thereof, the web 1 is advanced by the usual web advancing means from the supply roll W–1 to impression cylinder 10 where it is printed in one color, thence to impression cylinder 11 for printing in a second color, thence to impression cylinder 12 to receive a third color and thence to impression cylinder 13 to receive a fourth color. The web is then passed through dryer 17 to and around cooling rolls 30 and 31 and downwardly in contact with cooling rolls 27, 23 and 19 successively from whence it is passed around impression cylinders 6, 7, 8 and 9 for receiving four colors on the opposite side of the web. The web 1 is then led from the impression cylinder 9 to and through dryer 17 to and around cooling rolls 32 and 33 from which it is forwarded to the folder. It will be seen that a single web has been perfected in four colors on both sides without changing the location or direction of rotation of any unit from the position it occupied to print four webs as above described.

If it is desired to perfect two webs by applying two colors to each side of both webs which can be accomplished by this apparatus as follows: The web designated X–1 in FIGS. 3 and 3*a* may be drawn from the web supply designated in FIG. 1 as W–1. The web X–1 is passed by the usual web advancing means to impression cylinder 10 where it receives one color then to impression cylinder 11 where, on the same side, it receives a second color. The web X–1 is then passed to and through dryer 15 to and around cooling rolls 22, 23 and 19 to impression cylinder 6 where, on the opposite side, it receives one color and to impression cylinder 7 where it receives a second color thence to and through the dryer 15 to and around cooling rolls 24 and 25 and from there to the folder, thus having been perfected by the application of two colors to each side of said web X–1.

At the same time the web designated by X–2 can be supplied from the web supply roll designated as W–3 to the impression cylinder 12 where it is printed in one color on one side and from there to impression cylinder 13 where it receives another color on the same side, the web is then passed through dryer 17 to and around cooling rolls 30 and 31 and from there to roll 27 from whence it is led to impression cylinder 8 for the application of one color to its white side and from there to impression cylinder 9 for the application of a second color to that side. The web X–2 is then led to and through dryer 17 to and around cooling rolls 32 and 33 from whence it is led to the folder.

It will thus be seen that two webs have been perfected in two colors on each side simultaneously and without relocating the operating parts of the press constructed according to my invention.

It will be obvious that other web combinations and combinations of numbers or colors thereon may be feasible in this structure, without a chang or location of parts, and without departing from the scope of this invention.

It will be noted that the printing units are spaced with a stack of single unit dryers therebetween and that a common folder may be provided to handle all the webs when they have been printed.

It should be noted further there is only one gear between color units which facilitates registry and adjustment as outlined above.

Since it is evident that changes may be made in the form, construction and arrangement of the several parts without departing from the spirit and scope of my invention, I do not intend to be limited to the specific embodiments herein shown and described except as set forth in the appended claims.

What I claim is:

1. In a combination plate rotary web printing press, a plurality of web supply rolls, a first stack of color printing units, a second stack of color printing units, a stack of single unit dryers located between said stacks of printing units, a single gear connecting coacting color printing units of the same stack with each other, web handling means located beyond the second stack of printing units and web advancing means for forwarding a single web from any supply roll to and through the several units of a stack of printing units, back through a dryer, to and through the several units of the other stack of printing units, back through a dryer and to the web handling means whereby the said web is printed in multi-color on both sides thereof.

2. In a combination plate rotary web printing press, a plurality of web supply rolls, a first stack of color printing units, a second stack of color printing units, a stack of single unit dryers located between said stacks of printing units, a single gear connecting coacting color printing units of the same stack with each other and coacting cooling rolls connected with at least one of said single gears and driven thereby, web handling means located beyond the second stack of printing units and web advancing means for forwarding a single web from any supply roll to and through the several units of a stack of printing units, back through a dryer, to and through the several units of the other stack of printing units, back through a dryer and to the web handling means whereby the said web is printed in multi-color on both sides thereof.

3. In a combination plate rotary web printing press, at

least one web supply, a main frame, stacks of superposed color printing units comprising impression cylinders, plate cylinders, and their ink cylinders, at least one ink cylinder being mounted in said main frame, a single gear connecting coacting color printing units of the same stack with each other, a stack of single unit drying units located between stacks of printing units, a web handling unit located beyond the second stack of printing units and web advancing means for forwarding a web from a supply roll to and through at least one printing unit of said second stack of printing units, back through a drying unit,

to and through at least one printing unit of said first stack of printing units, thence back through a drying unit to the web handling unit whereby at least one web is printed in at least one color on each side of said web.

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