July 10, 1962 J. E. MEYER 3,043,216

WATER ROLL ARRANGEMENT FOR ROTARY PRINTING PRESSES

Filed Nov. 19, 1959

4 Sheets-Sheet 1

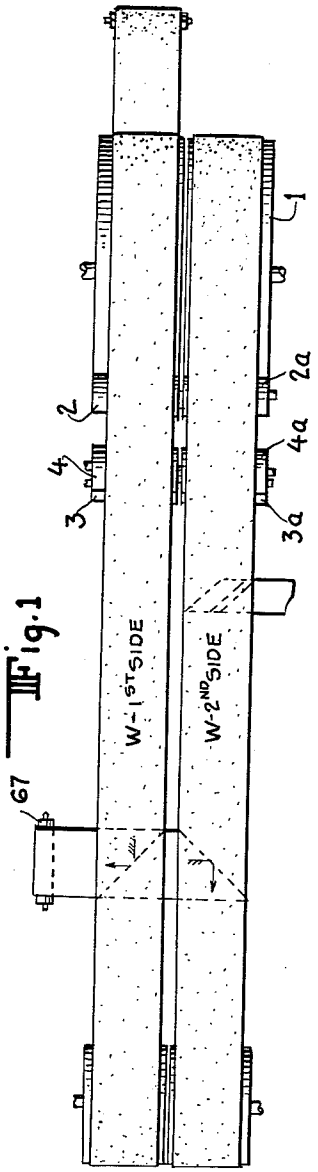


Fig. 1

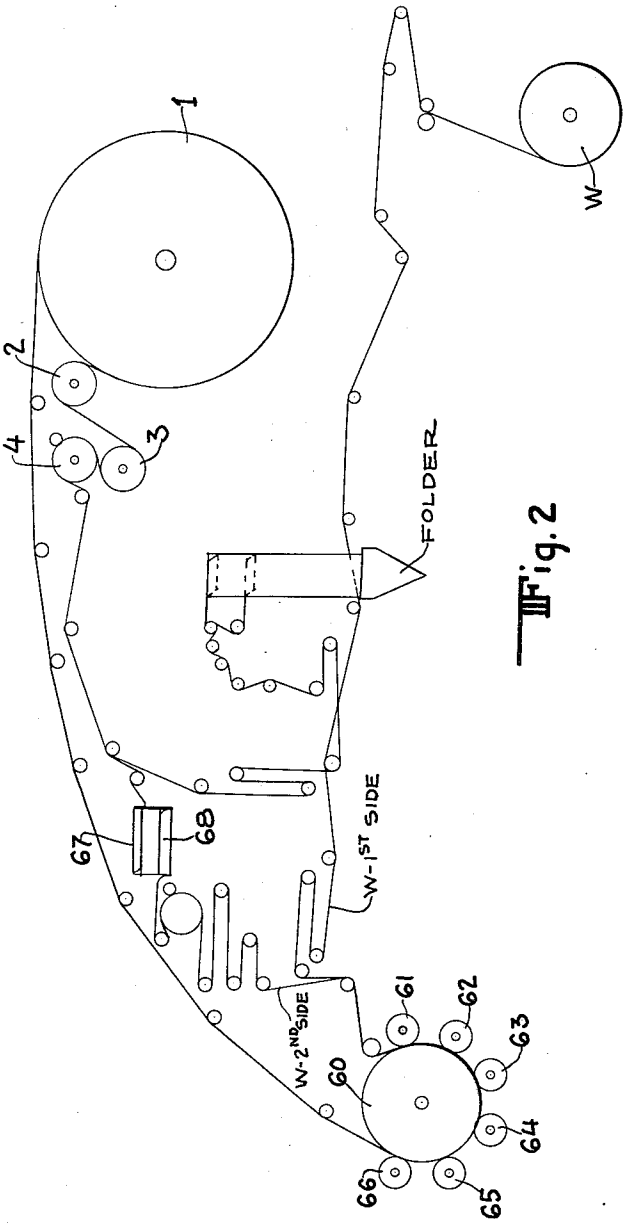


Fig. 2

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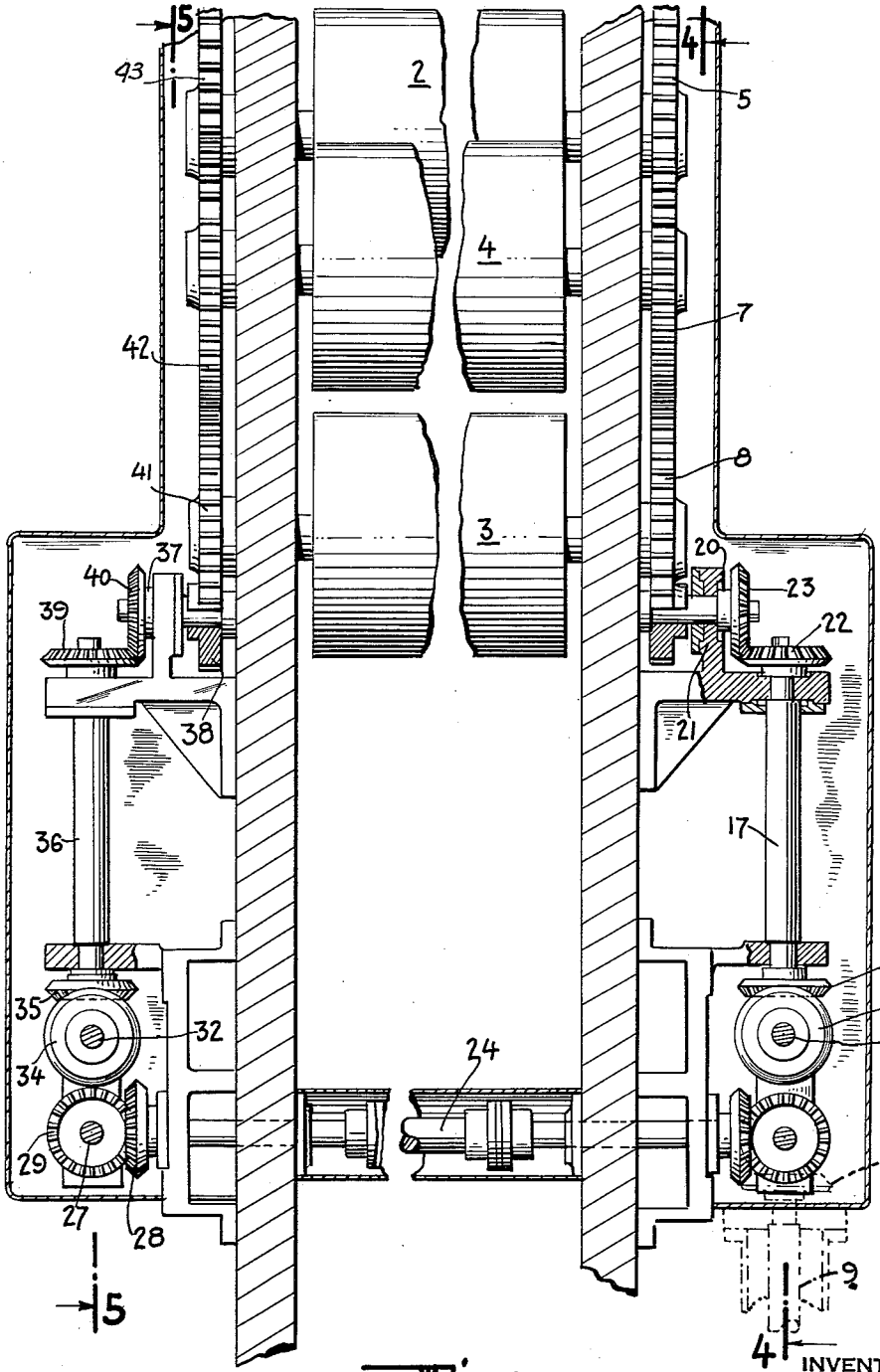


Fig. 3

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WATER ROLL ARRANGEMENT FOR ROTARY PRINTING PRESSES

Filed Nov. 19, 1959 4 Sheets-Sheet 3

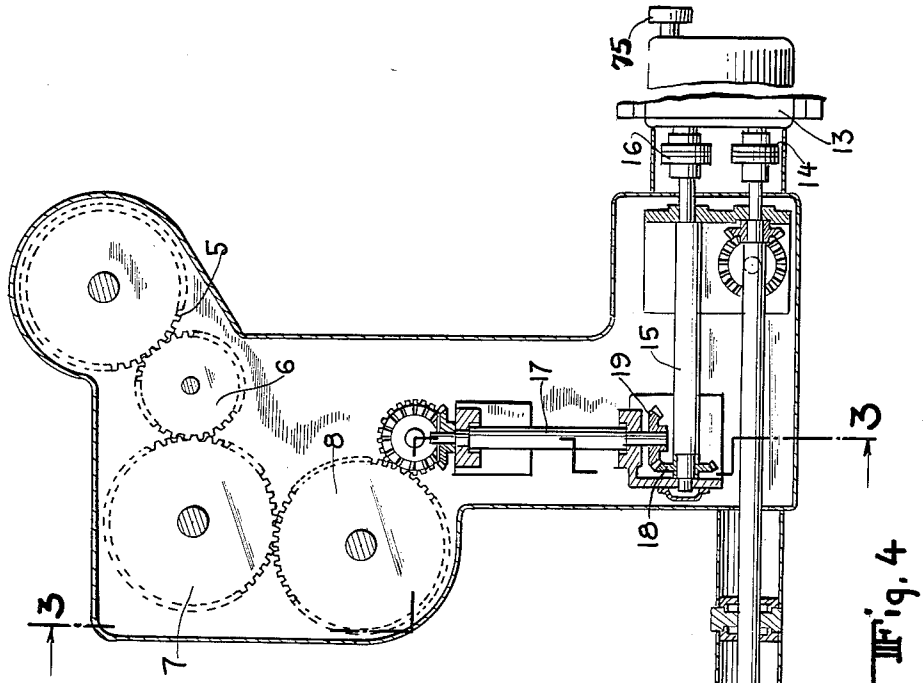


Fig. 4

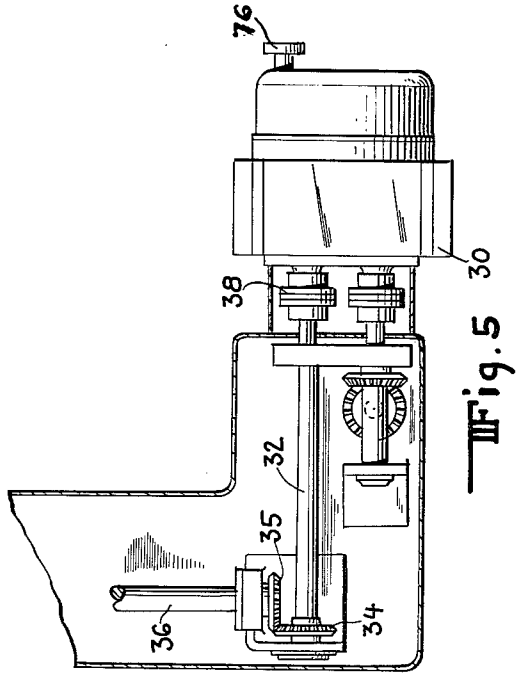


Fig. 5

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WATER ROLL ARRANGEMENT FOR ROTARY PRINTING PRESSES

Filed Nov. 19, 1959 4 Sheets-Sheet 4

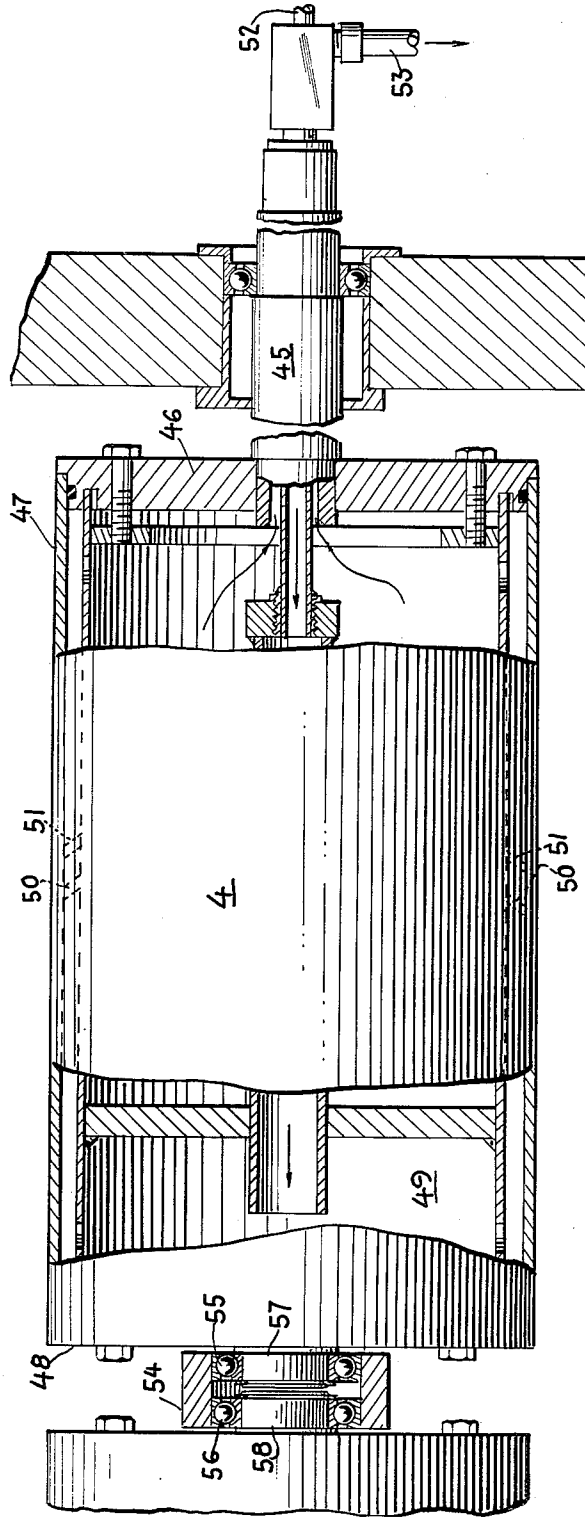


Fig. 6

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United States Patent Office

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WATER ROLL ARRANGEMENT FOR ROTARY PRINTING PRESSES

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5 Claims. (Cl. 101—179)

Web multicolor printing presses in which a plurality of colors are printed on one side of a web which is subsequently dried, printed on the reverse side, dried and folded, cut and delivered, have serious problems of web control in obtaining the proper register of the paper with respect to the printing and handling operations.

The present invention is directed to a water or chilling roll construction and arrangement for use in web rotary printing presses wherein the web is printed on one side, dried, turned over, printed on the second side by the same printing unit, dried by the same drying unit and then folded, cut and delivered.

In this type of press, known as a "double-ender", the web goes through the same printing unit twice, is printed first on one side and then on the other and, as above noted also travels twice through the same dryer (once after each printing). The dryer comprises a heating roll or other suitable source of heat for application to the printed web which is then led around one or more water or chilling rolls.

Due to the effects of the printing, drying and chilling operations on the paper web as it travels through the press, it may wander out of its correct path, or shrink, or expand as it runs, thereby affecting the web tension and consequently the color register, cutoff, and other subsequent operations on the web.

In order to minutely control the web tension as the web travels through the press, I have invented a means for effecting the desired control which includes water, or chilling, rolls of a construction which permits sections of the same roll to be driven at different speeds to rectify any mis-register of the web which may occur from the above web treatment of printing, heating and chilling, or from any combination thereof or from any other cause.

The object of my invention is to provide, in a web rotary printing press, a chilling roll arrangement in which parts of any single chilling roll may be driven at different speeds if desired, or, at the same speed.

Another object is to provide a chilling roll arrangement of the character described in which the drives for each chilling roll section are driven from the same source.

A further object is to provide a chilling roll structure and arrangement wherein the above and other objects may effectively be attained as will more fully appear from the detailed specification below set forth, together with reference to the drawings illustrating a practical embodiment of my invention.

Referring to the drawings,

FIG. 1 represents in diagram a partial plan view of the printing, drying and web handling means arranged according to my invention;

FIG. 2 represents a diagrammatic side elevation of a printing press embodying my invention and illustrating the web lead and unit arrangement;

FIG. 3 represents, in sectional front elevation (taken on line 3—3 of FIG. 4), the drive for both end sections of the chilling rolls;

FIG. 4 represents, in side elevation, the chilling roll drive and its driving means, as and viewed on line 4—4 of FIG. 3;

FIG. 5 shows, in side elevation, a partial-section taken on the line 5—5 of FIG. 3 and looking in the direction of the arrows, and

FIG. 6 is a front view, partially broken away, of one of the chilling rolls.

In the embodiment shown in the several figures it will be noted that with exception of the chilling roll construction, and the drives therefor, the other elements of the press are conventional and do not require detailed explanation.

Referring to the drawings, the usual steam drying drum is denoted by 1 and the three cooling rolls, located in a group to receive the web as it passes from the steam drum are numbered 2, 3, and 4. The above noted drum and rolls are rotatably mounted in the press frame and said rolls are geared together, outside said frame by spur gears 5, 7 and 8.

As shown in FIG. 4, the drive for the above drum and rolls comprises a vertical shaft 9, which is driven from the usual main drive for the press, drives a horizontal shaft 10 through bevel gears 11 and 12, gear 11 being keyed on shaft 9 and gear 12 on shaft 10. Shaft 10 drives the input side of a variable speed transmission 13, through the coupling denoted by 14.

The drive imparted to the input side of the variable speed transmission 13 by shaft 10 is transmitted in the usual manner to the output side of said transmission 13, which drives the horizontal shaft 15 through the coupling 16. Said shaft 15 drives the vertical shaft 17 through bevel gears 18 and 19, gear 18 being keyed on shaft 15 and gear 19 on shaft 17.

Vertical shaft 17, in turn, drives stud shaft 20 and pinion 21 through bevel gears 22 and 23 said gear 22 being fixed on vertical shaft 17 and said gear 23 on stud shaft 20.

Pinion 21 on stud shaft 20 operatively engages spur gear 8 which, as stated above is geared with 7, the latter with gear 6 and the latter with gear 5.

It will be seen from the foregoing that pinion 21 drives the outer or end sections of chilling rolls 2, 3, and 4 through their spur gears 5, 7 and 8.

The drive for the side of the chilling rolls opposite that above described is provided by a cross shaft 24 which runs horizontally across the press and carriers gear 28 which meshes with gear 29 on shaft 27.

The latter drives the input side of a variable speed transmission 30 through the coupling 31, and the drive imparted to said input side is transmitted to the output side of said transmission 30 in the usual manner.

The output side of variable speed transmission 30 drives a horizontal shaft 32, through coupling 33, the other end of shaft 32 carrying gear 34 which meshes with gear 35 to drive vertical shaft 36. Said shaft 36, in turn drives stud shaft 37 and pinion 38 through bevel gears 39, 40, said gear 39 being fixed on vertical shaft 36 and said gear 40 on stud shaft 37.

Pinion 38 operatively engages spur gear 41 which is geared into the gear 42 comprising part of the train of gears including 41, 42, 43 and 44, said first named three gears being fixed on the opposite ends of divided chilling rolls 2, 3 and 4, from said gears 5, 7 and 8.

The said "opposite" ends of chilling rolls 2, 3 and 4 are denoted in the drawings by 2*a*, 3*a* and 4*a*.

Said variable speed transmissions 13 and 30 are provided with the usual control wheels 75 and 76, respectively which are manually operable to minutely increase, or decrease the output of each transmission in order to obtain the desired speed for chilling rolls 2, 3 and 4, and independently thereof, the speed of the chilling roll opposite sides 2*a*, 3*a* and 4*a* to correctly adjust the speed of the web over said rolls for proper register with respect to the printing unit and other elements of the press as the web is passed therethrough.

It will be noted that fine adjustment is provided to minutely vary the speed of the output ends of said variable

speed transmissions to suit operating conditions which might require tightening or loosening of the web entering and/or leaving the printing unit and drying unit, depending upon whether the web has been stretched or shrunk by the printing and/or drying operation.

As shown in FIG. 6 each chilling roll of each cluster of three rolls is so constructed that one half of each roll may be driven at one speed and its adjoining half driven at a different speed since each roll is driven from both ends simultaneously by independent means initially actuated from the main press drive.

Since the two halves of each chilling roll of a set of rolls are similar in construction, only one roll (2) will be described in detail. Referring again to FIG. 6, shaft 45 is rotatably mounted in the press frame and carries end piece 46 thereon to which is bolted outer shell 47, the opposite end of shell 47 being filled by end piece 48, said shell being spaced from a water receiving section 49 located within the shell 47 by annular spaces 50 and 51.

Each roll section is furnished with water by the usual supply pipes 52 and discharge pipes denoted by 53, function in the usual manner.

The adjacent ends of the roll halves of a single roll are joined in a mounting 54, provided with a plurality of bearings 55, 56 adapted to receive opposed studs 57, 58 of the roll section whereby each roll section may be rotated independently of the other, by means described above, either at the same or at different speeds, to impart the desired rate of travel to the web passing thereover.

The web to be printed is supplied from the usual web roll, driven in any well-known or approved manner and led over a series of rolls, through the usual web control means, including compensating rolls, to and through the printing unit comprising an impression cylinder 60 and its coacting form cylinders 61, 62, 63, 64, 65, 66, thence around the usual rollers to and through the drying unit, comprising a steam drum 1, and a set of three chilling rolls, (2, 3, 4) the latter being constructed according to my invention in sections which may be separately driven through the variable speed means described above. The web is led from the chilling roll 4 to and around the turning bars 67, 68 and the usual rollers back through the printing unit in order to perfect the web by printing upon its unprinted surface. The web is then led back through the drying unit and from there in the usual manner to means for folding, cutting and delivering same.

It will be seen from the diagrammatic plan view (FIG. 1) that the web is printed on one side (1st side—FIG. 1) on one section of the impression cylinder and, subsequently, on its unprinted side (2nd side—FIG. 1) as it is passed over the other side of the same impression cylinder.

As the means for leading the web to and through the printing and drying unit are conventional in construction, they need not be further described. The novel construction and arrangement of the chilling rolls has been detailed above.

Since it is evident that various 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 embodiment herein described except as set forth in the following claims.

What I claim is:

1. In a rotary web printing press a printing unit, a drying unit, at least one chilling roll located at the drying unit and being divided into axially alined sections, a web supply, means for passing the web from said web supply to and through the printing and drying units and around one chilling roll section and repassing the web to and through said units, and around another chilling roll section and means for driving each roll section at a variable speed to control web tension and, thereby, web register.

2. In a rotary web printing press a printing unit, a drying unit at least one chilling roll located at the drying unit and being divided into two axially alined sections, a web supply, means for passing the web from said web supply to and through the printing and drying units and around one chilling roll section, inverting said web, and repassing said web through said units, and around the other chilling roll section, and means for driving each roll section at a variable speed to control web tension and, thereby, web register.

3. A structure according to claim 1 in which the means for driving each roll section at a variable speed includes an independently adjustable variable speed drive.

4. A structure according to claim 1 including a plurality of interconnected variable speed drives, a main press drive, and means for driving one of said variable speed drives from the main press drive.

5. A structure according to claim 2 including main press frames and in which the axially alined chilling roll sections are rotatably connected in a common mounting at their ends remote from the said press frames.

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