

Aug. 12, 1952

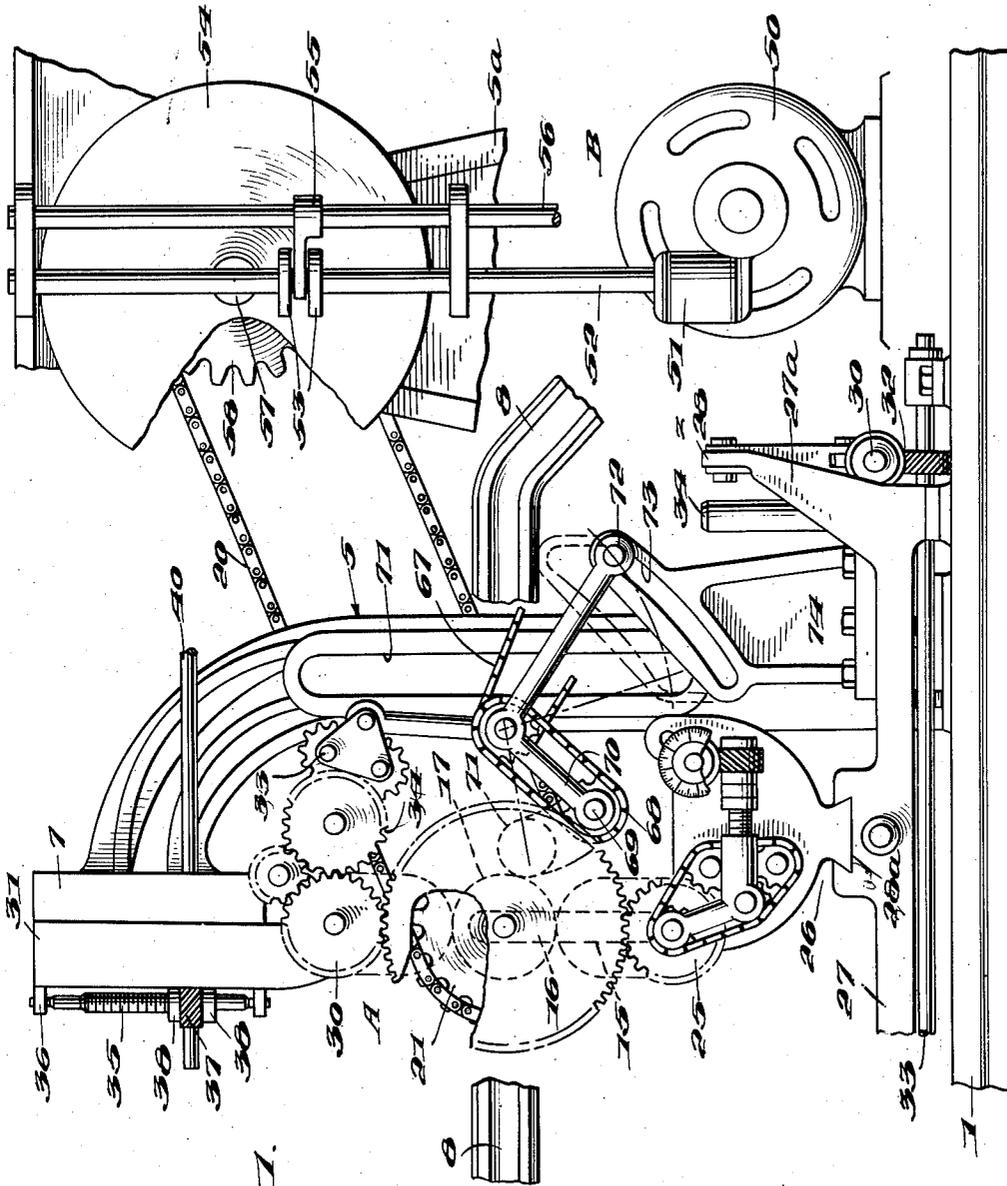
J. HASPERT

2,606,493

ROTARY PRINTING MACHINE EMPLOYING CYLINDERS OF VARIOUS DIAMETERS

Filed Feb. 8, 1946

3 Sheets-Sheet 1



INVENTOR

JOHN HASPERT,

BY

Perry Miller

ATTORNEYS

Aug. 12, 1952

J. HASPERT

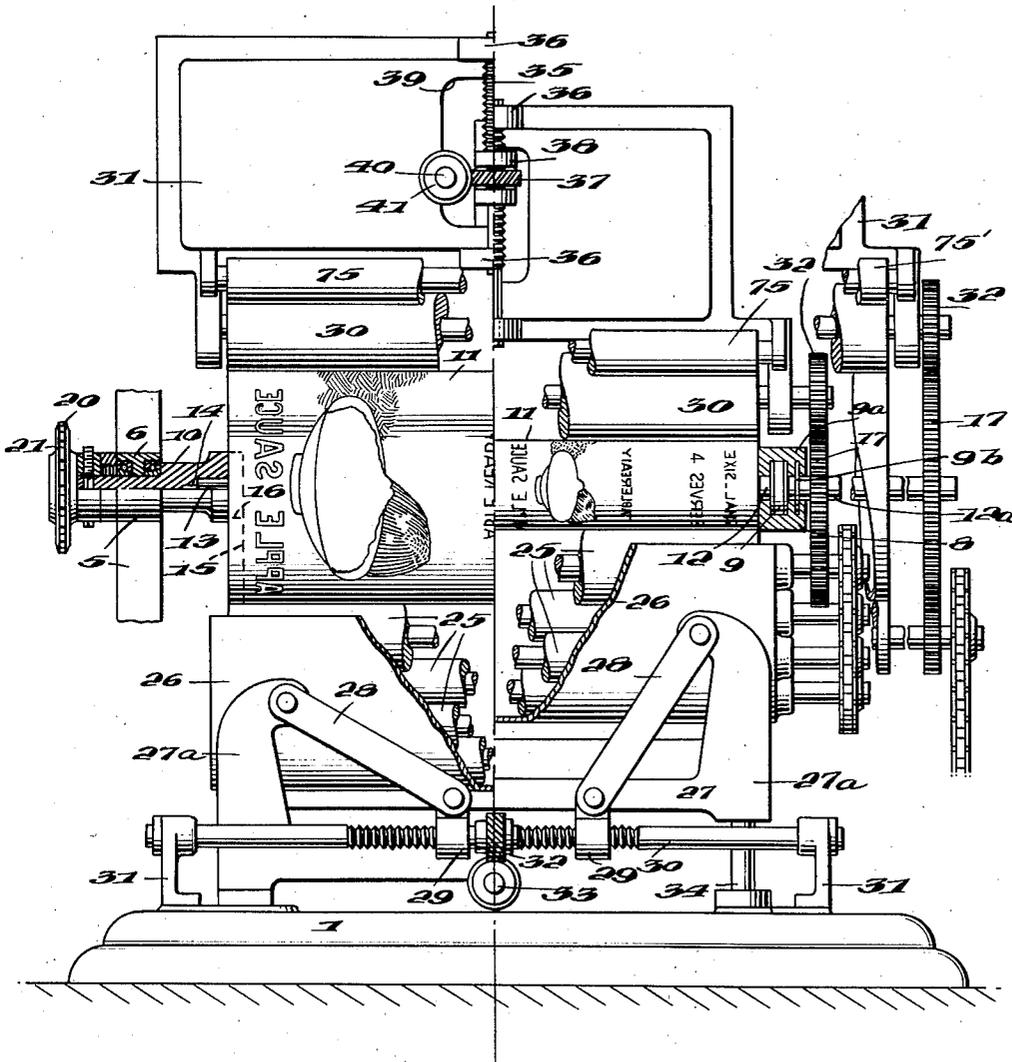
2,606,493

ROTARY PRINTING MACHINE EMPLOYING CYLINDERS OF VARIOUS DIAMETERS

Filed Feb. 8, 1946

3 Sheets-Sheet 2

Fig. 2.



INVENTOR
JOHN HASPERT,

BY *Barry Miller*

his ATTORNEYS

Aug. 12, 1952

J. HASPERT

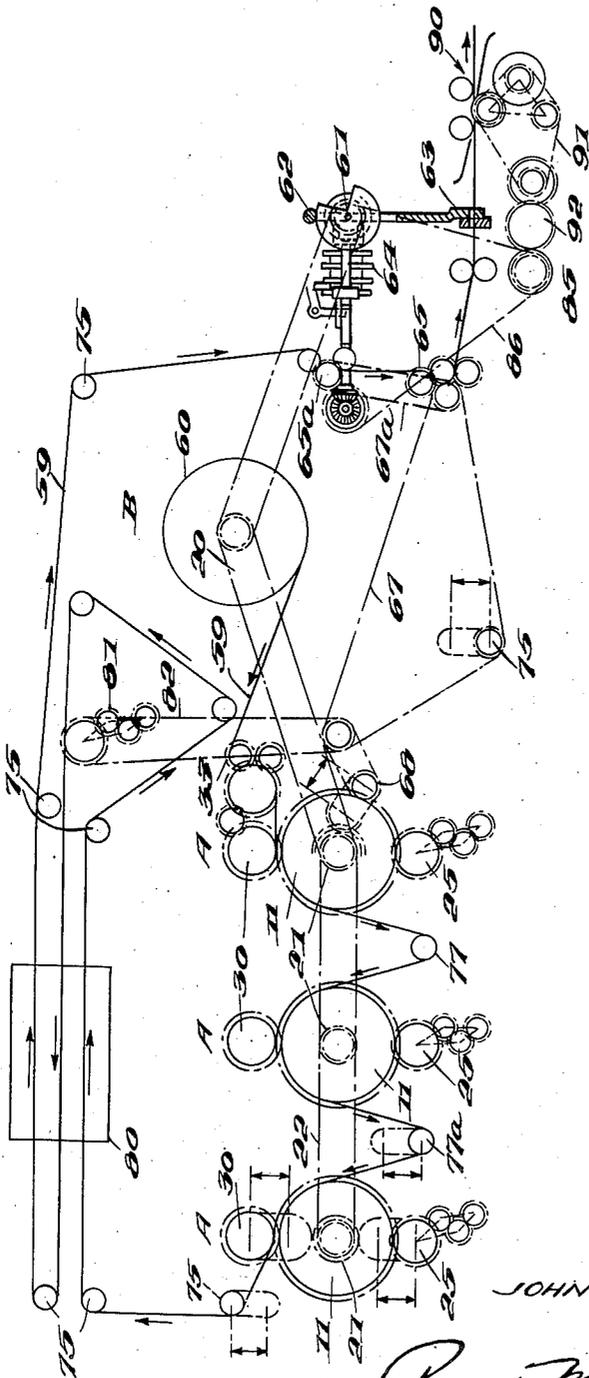
2,606,493

ROTARY PRINTING MACHINE EMPLOYING CYLINDERS OF VARIOUS DIAMETERS

Filed Feb. 8, 1946

3 Sheets-Sheet 3

Fig. 3.



INVENTOR
JOHN HASPERT,

BY

Perry & Miller

Attorneys

UNITED STATES PATENT OFFICE

2,606,493

ROTARY PRINTING MACHINE EMPLOYING CYLINDERS OF VARIOUS DIAMETERS

John Haspert, Tampa, Fla.

Application February 8, 1946, Serial No. 646,402

8 Claims. (Cl. 101-178)

1

The present invention relates to improvements in printing machines and aims generally to improve existing printing machines.

One of the primary objects of the invention is the provision of a relatively simple and compact machine capable of printing a large variety of matter in either single or multi-colors.

A further object of the invention is the provision of an improved printing machine capable of printing matter in a large variety of sizes, particularly as to length, by the use of a printing cylinder having a circumference substantially equal to the length of the article being printed.

A further object of the invention is the provision of a printing machine as above described having provision for replaceably mounting the printing cylinder therein for controlling the printing of articles of any given length.

A still further object is the provision of a printing machine having a lineal series of printing units of the rotary cylinder type adapted to print images upon a continuous web, it being possible to operate a single printing unit of the machine for single color printing or a plurality of units for multi-color printing as desired.

A still further object is the provision of a relatively small compact machine which will be relatively cheap in the cost of construction, which is economical in the cost of operation for the printing of a great variety of work as above stated, and which may be conveniently mounted on a portable support to be readily moved to a desired location for operation.

Other numerous aims, objects and advantages of the invention will be apparent to persons skilled in the art to which the invention relates, from a consideration of the accompanying drawings and annexed specification illustrating and describing a preferred form of the invention.

In the drawings—

Fig. 1 is a side elevation of one of the printing units and power driven unit suitable for either single color printing or with one of a series of multi-colors, parts of the frame of the machine being broken away better to illustrate the construction;

Fig. 2 is an elevation of one of the printing units similar to that shown in Fig. 1, parts of the unit on opposite sides of a central median line being shown in adjusted positions for cooperation with printing cylinders of different diameters; and

Fig. 3 is a diagrammatic view of the machine illustrating the arrangement and disposition of the several mechanisms as well as the path of travel of the printed web through the machine.

The embodiment of the invention illustrated in the drawings comprises a compact machine for printing printed matter, for example, labels, circulars and the like, in a single color or in multiple

2

colors by a succession of impressions on a continuous strip, the printed impressions of which may be of varying lengths or size within a wide range, the machine having means for thereafter accurately cutting the continuous printed strip into sections of predetermined length.

By way of illustration, one model of the machine is capable of printing labels and the like varying in length from $1\frac{3}{4}$ inches to 15 inches, though it is to be understood that the invention is not restricted to such sizes.

The machine shown in the drawings advantageously may comprise a base plate or bed 1 of suitable material, for example aluminum, along one side of which are mounted brackets 5 at one or more printing stations A, and a bracket 5^a at a power station B. As herein illustrated, three printing stations A are provided for three-color printing work, it being understood that the number of printing stations A will be dependent upon the number of colors in which the printed matter is to be printed. If single color printing only is desired, the printing station A, adjacent the power station, may be used alone.

Mounted upon the base plate 1 at each of the printing stations A is a bracket 5 having an up-standing standard providing a bearing 6 for one end of the printing cylinder, and a laterally extending arm 7 providing a support and guide for a platen or impression roll carriage of the printing mechanism, later to be described.

An elongated bracket 8 is positioned along the opposite side of the machine and is provided with openable bearings 9 to replaceably receive the shaft 12 of the printing roller 11.

The printing mechanism comprises a printing cylinder 11 having one end removably and replaceably mounted in the bearings 9 of the elongated bracket 8 and the other end clutched to a shaft 10 mounted in the bearing 6 of bracket 5. The printing cylinder is of a predetermined diameter to correspond in circumference substantially to the size of the finished printed article or sheet, and has its peripheral surface provided with the cut, type or impression to be printed upon the sheet, which cut may be in the form of a sleeve slipped over the cylinder. In the illustrated form of machine the printing cylinder 11 may be of any suitable diameter. For the printing of articles ranging from $1\frac{3}{4}$ to 15 inches in length the printing cylinders will vary from about $\frac{1}{2}$ inch to about $4\frac{1}{2}$ inches.

The printing cylinder may be of any type suitable for the particular kind of printing to be produced, but preferably comprises a cylinder of solid construction (see Fig. 1), having a coaxial shaft 12, extending beyond the ends thereof, one end of said shaft having a stub end 13 adapted to seat in a recess 14 in the shaft 10 and center the printing cylinder coaxially with the shaft.

3

One end of the cylinder is also formed with a radial groove 15 to form a female clutch part to receive a male clutch part 16 on the shaft 10. This provides a positive drive between the shaft 10 and cylinder 11 while permitting the cylinder to be unclutched from the shaft 10 for replacement by a cylinder of different diameter. The opposite end 12^a of the shaft 12 is provided with a driving gear 17 having a pitch diameter equal to the diameter of the cylinder 12.

The end 12^a of the shaft 12 is supported in the openable bearing 9 on the bracket 8 having a seat in the bracket 8 and a removable cap 9^a adapted to be maintained in closed position around the shaft 12^a by any suitable fastening (not shown). The bearing seat 9 and the cap 9^a may have keys extending into an annular groove on the shaft 12^a to prevent endwise displacement of the shaft 12 and cylinder 10 in its mounting.

The drive shaft 10 for the cylinder 11 may be driven by a suitable source, later to be described, through a chain 20 and sprocket drive 21, and preferably this shaft 10 is a synchronizing drive for other printing cylinders of the machine, when a plurality of printing mechanisms are used. For this purpose the several printing cylinders may be interconnected by a chain drive 22 extending around sprockets 21 on the shafts 10 of each printing cylinder.

Each of the printing cylinders 11 is provided with inking mechanisms preferably in the form of inking rolls 25 and inking wells 26 mounted below the cylinder 11. The inking wells 26, whether a single well or a plurality of wells, and the associated rolls 25 are preferably mounted on a unitary platform 27 adapted to be raised and lowered to present the final inking roll into surface contact with the printing cylinder 11. Suitable raising and lowering mechanisms may comprise pairs of links 28 at opposite ends of the platform, one end of each link being pivotally connected to an upstanding bracket 27^a on the platform and the opposite end of the link pivoted to a nut 29 having threaded engagement with a shaft 30 journaled in bearings 31 on the platform 1 and adapted to be rotated by a miter gearing 32 from an actuating shaft 33. The threaded portions of the shaft 30 are oppositely threaded so that the respective nuts 29 are simultaneously moved toward and away from the center position as will be apparent. The inking well platform 29 is advantageously guided during raising and lowering by guide rods 34 mounted in the bed plate 1.

The inking wells 26 may be of any suitable type and construction to hold a supply of printing ink and transfer it to the printing cylinder carrying the printing image. The present application is not concerned with the details of construction of the inking wells 26 nor the construction and mounting of the rolls, it being understood that any suitable form of inking mechanism may be used.

The inking wells 26 are securely mounted upon the platforms 27 as by dovetail keys and ways 28^a, which not only holds the inking mechanism securely in its predetermined position on the platform but permits of ready and easy removal therefrom and replacement thereon for repair, cleaning and the like.

The paper or other web is printed as it passes between the rotating printing cylinder 11 and a rotating platen or impression roll 30 which is mounted in a carriage 31 adjustable radially

4

toward and from the axis of the printing cylinder 11. The carriage 31 is suitably mounted for slidable adjustment on the laterally extending arm 7 of the bracket 5, as by a dove-tail guide, and the platen or impression roll 30 carries a gear 32 adapted to be brought into meshing engagement with the gears 17 on the shaft end 12^a of the printing cylinder shaft 12 so that the impression roll 30 will be synchronously driven from the printing cylinder 11 as it is brought into operative printing relation therewith.

The impression roll carriage of the printing unit A next adjacent the power drive station B preferably carries a plurality of web feeding rolls 3 (see Figs. 1 and 3) adapted to be rotated by a gear 36 geared to the platen roll gear 32. This provides a positive feed for the web to be printed when the platen is in operative printing position to present the paper web to the printing unit A between the printing cylinder 11 and platen roll 30. As will be apparent when the platen carriage is moved away from the printing cylinder, rotation of the web feeding rolls is stopped.

Suitable means are provided for adjusting the platen rolls 30 toward and from the printing cylinder 11, and advantageously such means may comprise a threaded shaft 35 rotatably mounted in bearings 36 on the carriage 31 and having threaded engagement with a gear 37 positioned between bearings 38 on the bracket arm 7 which extend through an elongated opening 39 in the carriage 31. Advantageously the platen rolls 30 of all printing mechanisms are adjusted in unison and this may be accomplished by a single manually operable actuating shaft 40 having pinions 41 in mesh with each of the gears 37, so as to rotate the gears 37 of the several platen roll-adjusting mechanisms in unison.

The single or several printing mechanisms A are synchronously driven through the interconnecting sprocket and chain drive 22 above described, the initial drive being from a suitable variable speed drive. As herein illustrated, such drive may include an electric motor 50 mounted on the base 1 and having a worm gear drive 51 with a shaft 52 having slidably keyed thereto a friction driving pinion 53 in friction-driving engagement with a disc 54. The driving pinion 53 may be adjusted along the shaft 52 and radially of the disc 54 by means of an adjusting fork 55 threaded on a rotatable shaft 56 suitably journaled in the frame and adapted to be manually rotated by any suitable means (not shown). The disc 54 is secured to a driven shaft 57 carrying a sprocket 58 adapted to drive chain 20 trained over the sprocket 21 on the drive shaft 10.

The sheet to be printed is preferably in the form of a continuous web 59 supplied from a roll 60 on the driven shaft 57 and is adapted to be passed successively through the web feeding rolls 35, the several printing mechanisms A, when multi-color work is to be produced, and later to a shearing or severing mechanism S, later to be described, where the web is cut into sections of predetermined length equal to the circumference of the printing cylinder 11.

The web supply roll 60 is loose upon the shaft 57 and is unwound by the pull on the web exerted by the web feeding rolls 35. The driven shaft 57 rotates in an opposite direction to the direction of the unwinding of the roll so as to present a constant braking action or drag to the rotation of the web supply roll in unwinding direction, tending to keep the portion of the web

between the roll 60 and the feeding rolls 35 taut and prevent the accumulation of slack therein.

The shearing mechanism S may be of any construction suitable for the purpose, the details of which are immaterial to the present invention. Preferably, however, the shearing mechanism includes a clutch controlled shaft 61 (Fig. 3) driven from the drive shaft 57 and having cam and link means 62 for effecting relative movement between reciprocating cutters or knives 63. The clutch controlled shaft 61 is preferably under the control of selective driving means 64 of suitable design whereby the shaft 61 may be controlled to make a single cut and stop the machine, make successive cuts as the machine continues its operation, or may be rendered inoperative to permit the printed web to be wound upon a reel. The particular details of such mechanism will be disclosed in a separate application to be filed.

A web feeding roll mechanism is provided for feeding the printed web to the shearing mechanism S, and such feeding mechanism may be in the form of driven rolls 65 for feeding the printed web to the shears at the proper speed corresponding to the lineal surface speed of the printing cylinder 11 to insure the cutting of printed sheets to exact and predetermined length during each operation of the shearing mechanism and at right angles to the longitudinal edge of the web as well as to prevent doubling or tearing the web.

Advantageously the web-feeding rolls 65 are driven by a chain drive 67 driven from a driving sprocket 68 on a shaft 69 mounted in an arm of a bell crank lever 70 pivoted upon the support 5, which shaft carries a spur gear 71 adapted to be meshed with the spur gear 17 on the end of the printing cylinder shaft 12^a. The opposite arm of the bell crank lever 70 carries a roller 72 working in a cam slot 73 of a bracket 74 secured on the vertically adjustable inking well platform 27. Thus, as the platform 27 is raised or lowered to bring the inking mechanism into contact with the periphery of the printing cylinder, the cam slot 73 will actuate the bell crank lever 70 automatically to move the spur gear 71 into engagement with the spur gear 17 on the end of the printing cylinder. Thus, the web feeding rolls 65 are driven synchronously with the rotation of the printing cylinder insuring the proper feed of the web to the shears and severance of the web into sheets of a length corresponding exactly to the circumference of the printing cylinder 11.

Preferably an additional set of web feeding rolls 65^a is provided between the first set of web feeding rolls 35 and the feeding rolls 65 for the shearing unit in order to provide for an adequate travel of the web through the printing units to keep the web at the desired tautness throughout the machine, thus preventing smearing of the printed image. In such cases where the web 59 is subjected to a coating operation, as for example varnish, I prefer to position the additional set of web feeding rolls 65^a beyond that station. Such set of feeding rolls 65^a preferably is provided in advance of the feeding rolls 65, which rolls may be driven by a chain drive 67^a from one of the feeding rolls 65.

As herein illustrated, the web 59, on leaving the roll 60 is passed between the web feeding rolls 35, which unwind the roll 60 and feed the web between the printing cylinder 11 and platen roll 30 of the first printing mechanism A where it receives its first printing impression, in the case of multi-color work. When single color

printing is desired, this first printing mechanism may be the only one used. In the case of multi-color printing, the web 59 passes under a space-adjusting device or slack-compensating device 77 which preferably comprises a roll adjustably mounted in a guide, as for example, an elongated opening 71 in the standard 5, and thence between the printing cylinder and platen roll of the second printing mechanism A, thence under a space-adjusting device 77^a and between the printing cylinder and impression roll of the third printing mechanism A. The space-adjusting device is preferably centrally disposed between adjacent printing units. The web thereafter is passed around a tension roll 75 which may be supported by the platen roll carriage 31 of the end printing mechanism and is passed upwardly over a second tension roll 75 above the printing mechanism.

The web 59 may then be passed forwardly and rearwardly of the machine a desired number of passes over tension rolls 75 to provide for adequately drying the printed images on the web. If desired, this drying may be accelerated by a suitable heating device 80 embracing one or more of the passes and prior to its passage to the web feeding rolls 65^a.

If desired, the printed web 59 may be coated with a lacquer or varnish after the printing thereof and prior to being presented to the web feeding rolls 65 or 65^a. Preferably, the varnish coating is applied at a point in the web travel after it has been initially dried by the heater 80 and prior to its reentry therein, as shown in Fig. 3. The coating may be applied by any suitable coating mechanism, for example a driven roll mechanism 81 similar in construction to the inking rolls and driven by a chain drive 82 from any rotating part of the machine.

The machine provides a power take-off drive for operating a wrapping, folding, gluing or other necessary mechanism in synchronism with the printing and shearing mechanism. This may comprise a driven member such as a gear 85 having a chain and drive connection 86 with a driven shaft of the machine, for example the shaft 61 of the shearing mechanism.

The machine herein illustrated is one adapted to the printing and cutting of labels in multi-colors, and for such work it is desirable to provide a glue coating on one side. Such a gluing mechanism is diagrammatically illustrated at 90, Fig. 3, which may have a chain drive 91 geared to the power take-off gear 85 by an intermediate gear 92 or it may be directly geared thereto depending upon the direction of motion desired in the accessory attachment.

While I have illustrated and described a preferred embodiment of printing mechanism and a preferred arrangement of associated mechanisms acting upon the web, I do not intend to be limited thereby as the scope of the invention is best defined in the appended claims.

I claim:

1. A rotary printing press adapted to employ printing cylinders of various diameters for printing articles of various lengths, comprising a frame including spaced side members, a driving clutch element rotatably mounted in one of said frame side members, a printing cylinder of pre-selected diameter to conform to the length of the articles to be printed replaceably mounted in said frame and having at one end a clutch element, said printing cylinder having at its opposite end a driving pinion of equal diameter therewith, cooperating inking and impression roll

7

mechanisms mounted in said frame and relatively movable toward and from the peripheral surface of a preselected diameter printing roll disposed therein, a driven gear for each of said platen and inking roll mechanisms and movable therewith to be brought into meshing engagement with the driving pinion on said printing cylinder when said mechanisms are adjusted into operative engagement with the surface of said preselected printing cylinder.

2. A rotary printing press as defined in claim 1 in that the side frame member opposite the one having the driving clutch element is provided with an openable bearing to replaceably receive the printing cylinder adjacent the driving pinion thereon.

3. A rotary printing press as defined in claim 1 wherein said frame includes a transversely disposed bracket above the printing cylinder and said impression cylinder is mounted in a carriage vertically adjustable on said frame bracket.

4. A rotary printing press as defined in claim 1 further characterized in that the frame includes a transversely extending bracket above the printing cylinder which bracket is provided with bearing members rotatably supporting a gear and the impression roll mechanism is carried by a carriage slidably adjustable on said bracket and is provided with a screw having threaded engagement with said gear whereby rotation of the latter will raise and lower said carriage on said bracket.

5. A rotary printing press as defined in claim 1 in which the inking roll mechanism is mounted on a platform and means are provided for raising and lowering said platform to bring said inking roll into cooperative engagement with a preselected diameter printing roll mounted in said frame.

6. A rotary printing press adapted to employ printing cylinders of various diameters for printing articles of various lengths upon a continuous web comprising a frame including spaced side members, a driving clutch element rotatably mounted in one of said frame side members, a printing cylinder of preselected diameter to conform to the length of the article to be printed and having a shaft provided at one end with a comating clutch element adapted to be operatively connected to the said driving clutch element, the opposite end of said printing cylinder shaft being replaceably mounted in an opposed side member of said frame and provided with a driving pinion of equal diameter with said printing cylinder, an impression roll mechanism mounted in said

8

frame and relatively adjustable toward and from said printing cylinder, said impression roll having a driven gear adapted to be meshed with said printing cylinder driving pinion when said roll and cylinder are in operative contact, a plurality of cooperating web feeding rolls, and means for driving said web feeding rolls from said impression roll driven gear whereby feeding of the continuous web is initiated upon rotation of the impression roll from said printing cylinder.

7. A rotary printing press as defined in claim 6 in which the web feeding rolls are mounted for movement with said impression roll.

8. In combination with a rotary cylinder printing press adapted to print impressions upon a continuous web, a rotary printing cylinder having a driven gear associated therewith, a platen roll relatively adjustable toward and from the printing cylinder, power driven web feeding rolls, and means for operatively connecting said rolls directly with said gear for rotation at the same peripheral speed as said printing cylinder, said means including a gear member carried by the platen roll movable into and out of mesh with said driven gear to render said web-feeding rolls inoperative when printing is not taking place.

JOHN HASPERT.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
967,985	Sheldon	Aug. 23, 1910
1,186,536	Ballard	June 13, 1916
1,300,289	Miehle	Apr. 15, 1919
1,329,325	Mascorf	Jan. 27, 1920
1,482,353	Dansmann	Jan. 29, 1924
1,661,209	Wolf	Mar. 6, 1928
1,782,608	Fulk	Nov. 25, 1930
1,867,405	Gurwick	July 12, 1932
1,886,527	Cottrell	Nov. 8, 1932
1,942,168	Hawley	Jan. 2, 1934
2,064,168	Kaddeland	Dec. 15, 1936
2,129,699	Luehrs	Sept. 13, 1938
2,146,963	Lang	Feb. 14, 1939
2,170,025	Jordhoy	Aug. 22, 1939
2,206,620	Schwartz	July 2, 1940
2,242,045	Scott et al.	May 31, 1941
2,270,374	Kanitz	Jan. 20, 1942
2,358,114	Stafford et al.	Sept. 12, 1944
2,460,504	Huebner	Feb. 1, 1949