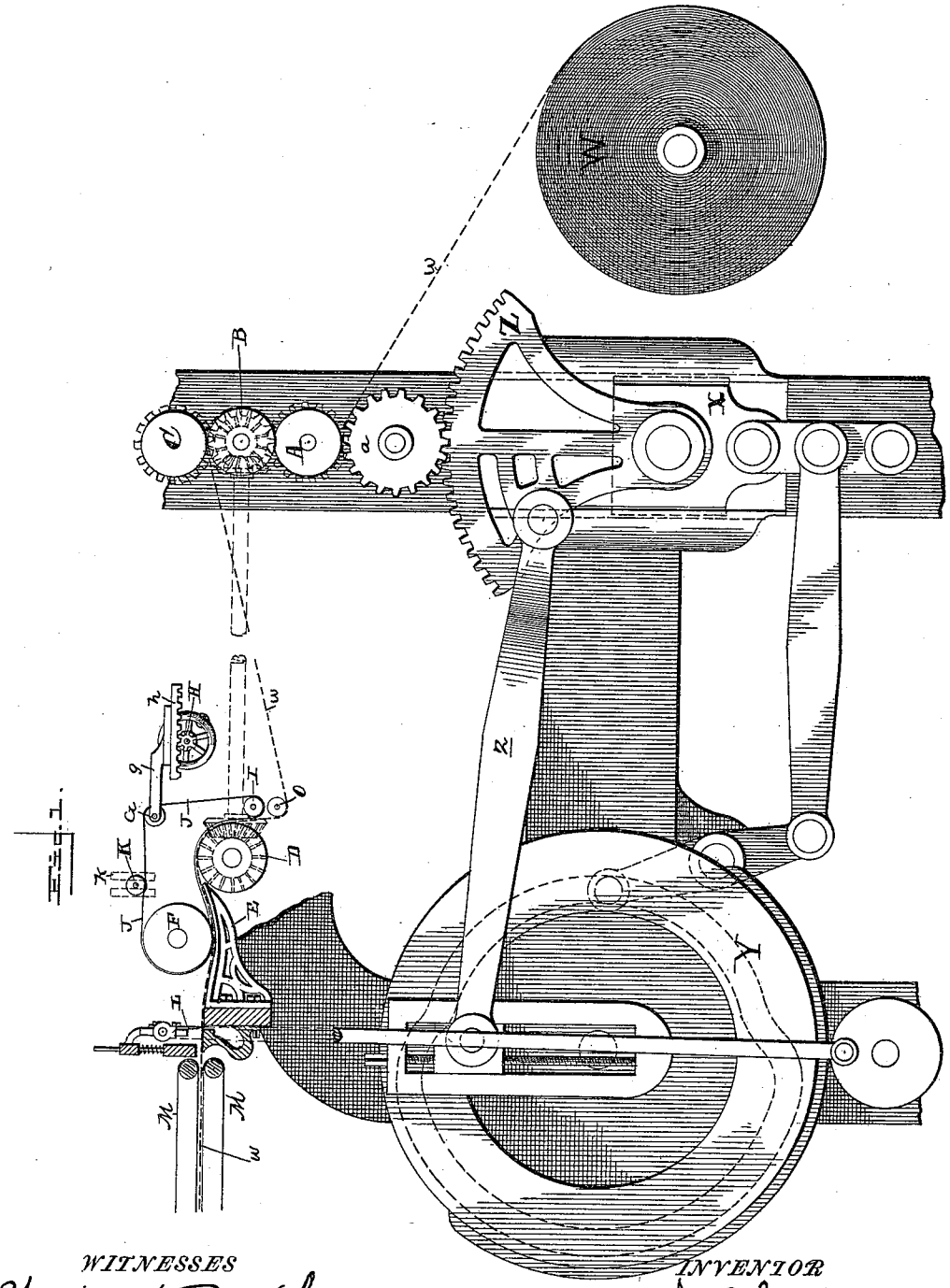
(No Model.) 2 Sheets—Sheet 1.

J. L. COX.

PAPER WEB TENSION DEVICE FOR PRINTING MACHINES.

No. 438,529. Patented Oct. 14, 1890.



WITNESSES
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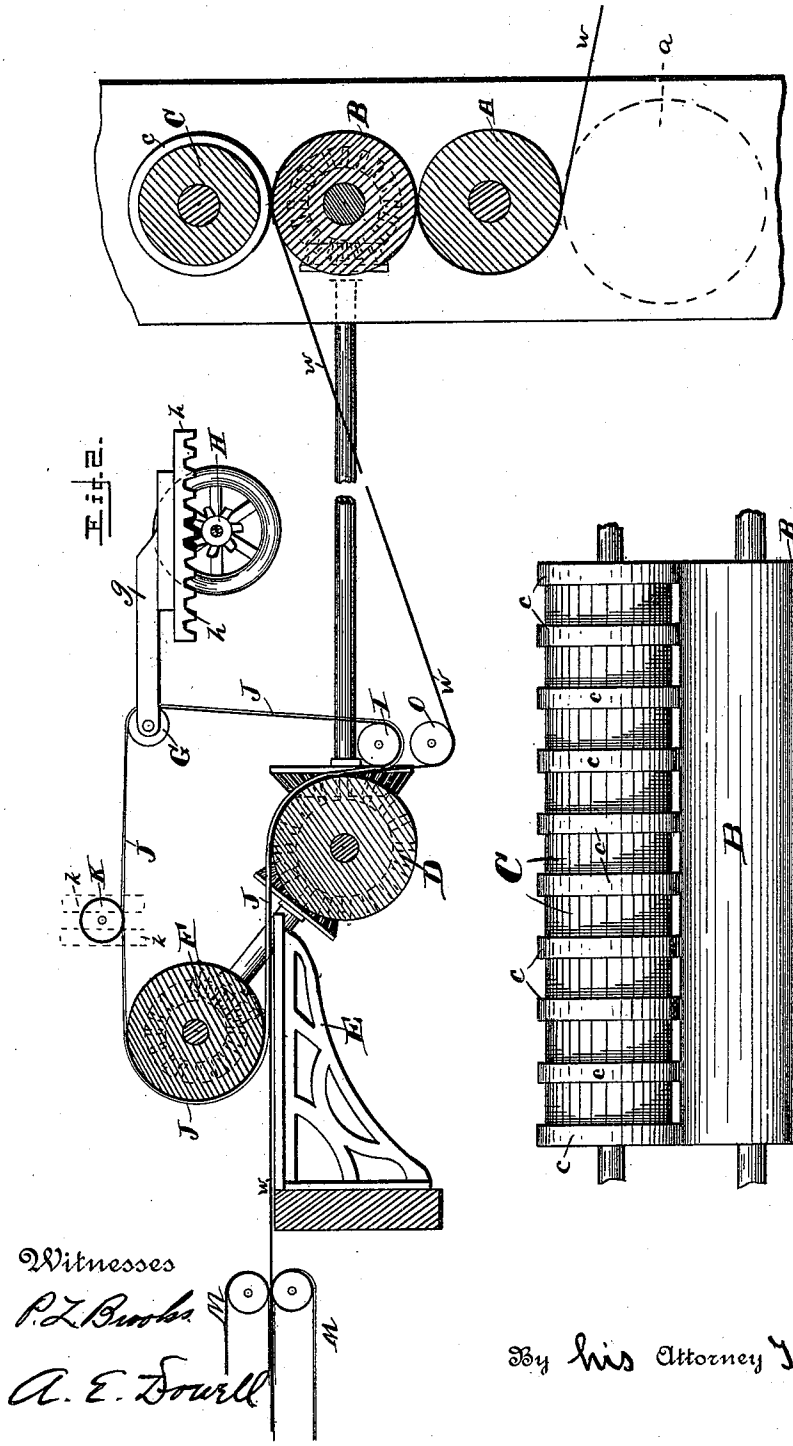
THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

(No Model.) 2 Sheets—Sheet 2.

J. L. COX.

PAPER WEB TENSION DEVICE FOR PRINTING MACHINES.

No. 438,529. Patented Oct. 14, 1890.



Witnesses
P. L. Brooks
A. E. Dowell

Inventor
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By his Attorney W. A. Alexander

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

JOSEPH L. COX, OF BATTLE CREEK, MICHIGAN, ASSIGNOR TO THE DUPLEX PRINTING PRESS COMPANY, OF SAME PLACE.

PAPER-WEB-TENSION DEVICE FOR PRINTING-MACHINES.

SPECIFICATION forming part of Letters Patent No. 438,529, dated October 14, 1890.

Application filed November 1, 1889. Serial No. 328,946. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH L. COX, of Battle Creek, in the county of Calhoun and State of Michigan, have invented certain new and useful Improvements in Paper-Web-Tension Devices for Printing-Machines; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form part of this specification, in which—

Figure 1 is a detail sectional side view of a web-printing press, showing my improved paper-web tensioning and feeding devices. Fig. 2 is an enlarged sectional view of the same. Fig. 3 is a face view of the paper-feed rolls.

The present invention relates to web-printing presses in which the printing is effected upon a continuous web or sheet of paper fed into the press from a roll; and the objects of this invention are to feed the paper web initially, smoothly, and evenly into the press, and to preserve an equal tension thereon while in the press by an automatic device, and also to provide adjusting devices for the tension.

The invention consists, essentially, in a peculiar combination and construction of paper-feeding rolls and in a novel arrangement of tapes and rollers constituting the tension and delivery devices, all of which will be hereinafter clearly described and claimed.

Referring to the drawings by letters, A, B, and C designate paper-feed rolls mounted one above the other in the order named, roll B lying between rolls A and C and nearly impinging against both, so as to bite a web of paper inserted between it and either of said rolls. These rolls are geared together, so that their peripheries travel equally and are preferably of equal diameter. Roll A is driven in one direction only by suitable mechanism and imparts motion to the other rolls through the gearing. Preferably roll A is driven by gearing from an oscillating segment Z, which is supported on a vertically-movable block X, that is raised or lowered by connections with a cam on a disk Y, which disk is connected by a pitman *z* with segment Z, and the cams are so arranged that segment Z is thrown into engagement with a pinion *a*, which drives the shaft of roll A when it is oscillated in one direction, and is disengaged therefrom before and while making its return-stroke, so that intermittent movements are given roll A in one direction only. These devices for operating roll A form no part of present invention, but are described and claimed in my application for paper-feeding devices for printing-presses filed November 1, 1889, Serial No. 328,944, (Case C.)

W is the roll of paper, and *w* the web, which is fed in under roll A between rolls A B, carried partly around roll B and between the same and roll C, and thence into the press, where it is operated upon by the printing mechanism. (Not shown.) In order to draw the paper evenly throughout its width and insure its equal feed, I employ the third coaxing or coacting roll C to prevent the paper crimping at center, owing to greater tension or strain on the edges of the paper than at center. Hence I face this roll with a yielding material—such as rubber—or I preferably employ a series of annular bands or flanges *c c* (shown in Fig. 3) on said roll made of or faced with flexible material, preferably such as rubber, and these being yielding can be set hard against the roll B, and will positively feed up the central portion of the web equally with the edges, so that the web enters the press uniformly and smoothly.

D designates a feed-roll at the exit end of the press and driven by gearing or by other suitable means at a slightly greater peripheral speed than rolls A B. At the side of roll D is a table E, and over said table is another roll F, driven by gearing from roll D or by other suitable means. Above roll D and opposite roller F is an adjustable roller G, mounted in a frame *g*, having a rack *h* on its under surface which is engaged by a pinion H on a hand-wheel shaft properly supported on the main frame and by operating which the roller G can be thrown toward or from roll F.

I designates a roller parallel with and beside roll D.

J J are tapes running over roller G down under roller I, up over roller D, under and

over roll F to roller G, as shown, the tapes being operated by friction against roller D, which is the driver.

The roll D has a peripheral speed slightly greater than the peripheral speed of rolls A B, and roll F should have a peripheral speed slightly greater than that of roll D. Hence the tapes J J are drawn taut between and against said rolls, and they slip slightly over the surface of roll D as they are drawn or expedited by the rotation of roll F. The tapes thus have a drawing or combing action on the web of paper passing between them and roll D, drawing the web through the press as rapidly as it is fed in and would draw it faster, owing to the difference in speed of the delivery and feed rolls, as described; but this difference is so small that there is not sufficient strain on the paper-web to break it, but yet there is enough to keep it taut and to feed it out as fast as it is received into the press. The greater the tension on tapes J the more forcibly will they draw upon the web of paper, and hence by adjusting the tension of these tapes I adjust and regulate the tension of the web in the press or between the feed-rolls and the delivery. By shifting roller G the tension of the tapes is varied and slack therein taken up.

K designates an idler tension-pulley moving freely between guides *k* on the main frame and resting upon tapes J.

L is the knife, and M the tapes to conduct the severed sheet to the folder, &c.

The web *w* of paper, after passing through the impression mechanism of the press, (not shown,) passes under roller O and over roll D, being confined thereagainst by tapes J, which co-operate with the roll to draw the paper forward, as described, and deliver it onto table E beneath the knife, the construction and operation of which are clearly set forth in my application for paper-cutters, filed November 1, 1889, Serial No. 328,947. The tension on the web of paper should be sufficient to keep it taut between roll D and the feed-rolls or throughout the press, and the pressman usually has to manipulate the tension devices by screws and mechanism until he finds tension sufficient to pull the paper through the press. The tension thus obtained is of course merely the result of guess-work and requires an experienced and careful operator, or the web will be too tight, causing tearing thereof, or too loose, permitting puckering, either of which will impair the operation of the press and appearance of the work.

The roll K is made to perform the office of automatically tensioning the web, as its weight is supported on the tapes J, and of course tensions the latter, causing them to bind more or less closely on the roll D, according to the weight of roll K, and the weight of the roll K is so proportioned to the width of web, length of same, and the friction on the same in its travels through the press that the tapes will comb the paper sufficiently in passing over roll D to draw the web through the press with an equal desired tension and deliver it to the knife. This automatic combing tension device enables the press to be operated by a pressman, who could not properly adjust the tension devices were this adjustment necessary. The differential speed of the delivery rolls and tapes is essential to the proper and effectual operation of the press.

Having described my invention, what I claim as new, and desire to secure by Letters Patent thereon, is—

1. In a web-printing press, the combination of the paper-web-feed rolls with the paper-delivery rolls having a peripheral speed slightly greater than that of the feed-rolls, and the delivery-tapes coacting with said rolls, and an automatically-movable roller for regulating the tension of said tapes, substantially as described.

2. In a web-printing press, the combination of the paper-web-feed rolls with the paper-delivery rolls having a peripheral speed slightly greater than that of the feed-rolls, and the delivery-tapes coacting with said rolls, and the idler-roller for automatically regulating the tension of the web, substantially as specified.

3. In a web-printing press, the combination of the web-feed rollers and a pair of delivery-rolls having a greater peripheral speed than said feed-rolls and one of the delivery-rolls being speeded slightly more than the other, with the delivery-tapes coacting with said delivery-rolls, and the tensioning device for said tapes, all substantially as and for the purpose described.

4. In a web-printing press, the combination of a pair of paper-feed rolls with a roller above the same coacting with one of said rolls and having a flexible or yielding surface and driven at a slightly greater peripheral speed than said rolls, substantially as described.

5. The combination, in a web-printing press, of a pair of paper-feed rolls with a roll above the same having a slightly-greater peripheral speed than said feed-rolls and coacting with one of said rolls and having a series of yielding annular flanges or bands on its periphery, substantially as described.

6. The combination, in a web-printing press, of the paper-delivery rolls, an adjustable roller and the paper-delivery tapes coacting therewith, with an idler-roller resting on said tapes for automatically maintaining the tension of the web, substantially as described.

7. The combination, in a web-printing press, of the paper-feed rolls A B and the coaxing-roll C, substantially as described, with the delivery-rolls D F, and delivery-tapes J, and the devices for tensioning said tapes, substantially as specified.

8. The combination, in a web-printing press, of the paper-feed rolls A, B, and C, constructed substantially as described, with the paper-de-

livery rolls D F, the tapes J, coacting therewith, and the idler-roller K for automatically maintaining the tension on the tapes and web, substantially as described.

9. In a web-printing press, the combination of the paper-feed rolls A and B and the coaxing-roll C, constructed substantially as described, with the paper-delivery roll D, the delivery-roll F, the stationary rollers I, adjustable roller G, the tapes J J, and the idler-roller K, all substantially as specified.

In testimony that I claim the foregoing as my own I affix my signature in presence of two witnesses.

JOSEPH L. COX.

Witnesses:
A. E. DOWELL,
P. Z. BROOKS.