

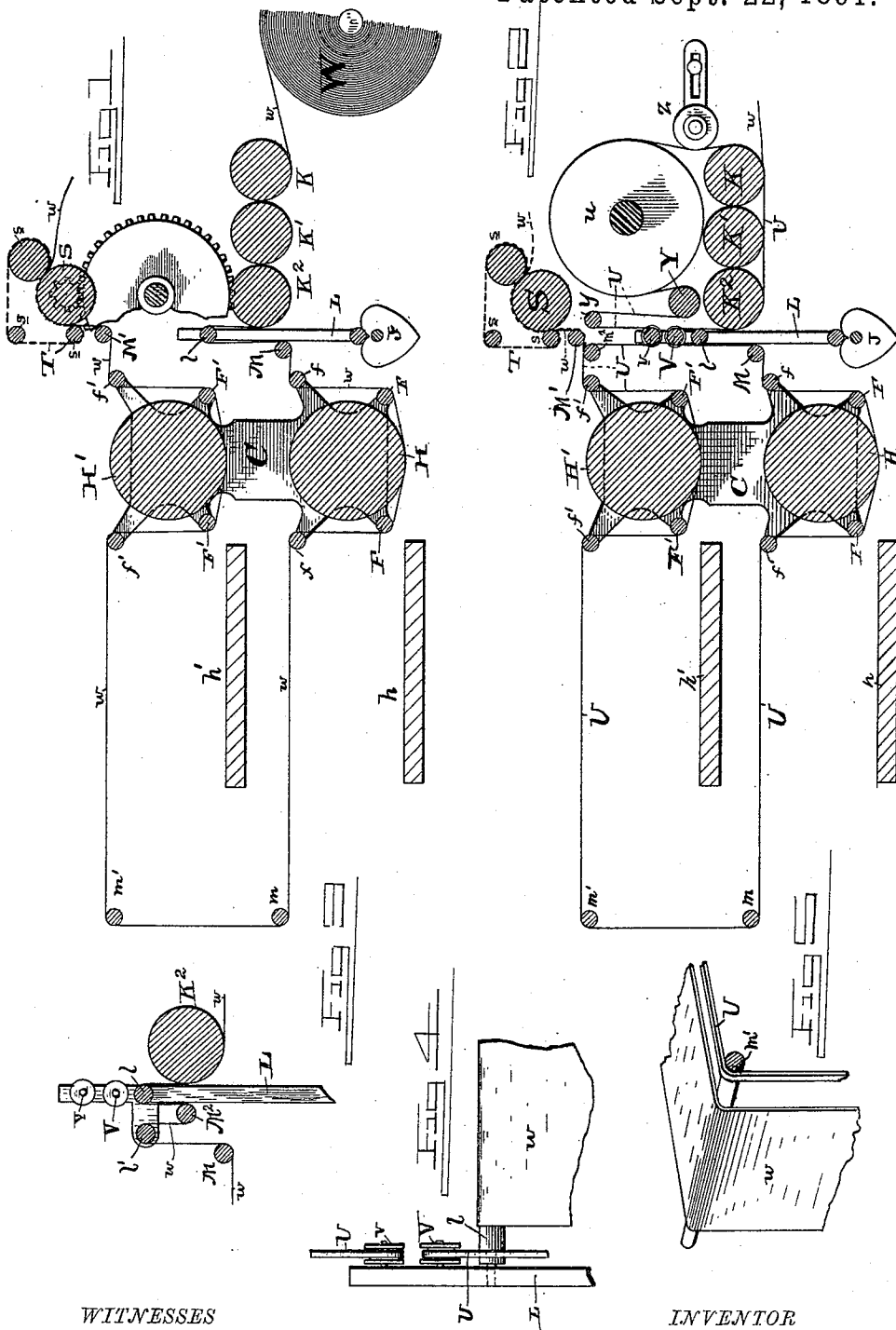
(No Model.)

2 Sheets—Sheet 1.

J. L. COX.
PRINTING PRESS.

No. 459,813.

Patented Sept. 22, 1891.



WITNESSES

C. W. Seville
Arthur E. Towell

INVENTOR

J. L. Cox
by
W. Alexander
Attorney

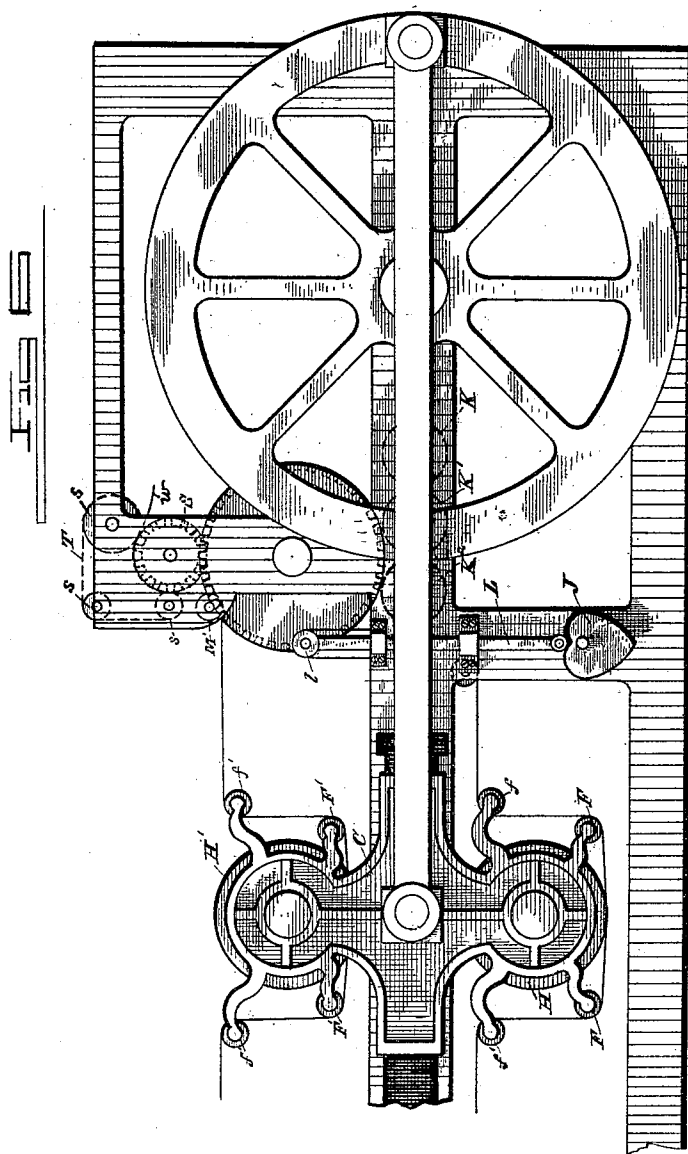
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UNITED STATES PATENT OFFICE.

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

PRINTING-PRESS.

SPECIFICATION forming part of Letters Patent No. 459,813, dated September 22, 1891.

Application filed October 16, 1890. Serial No. 368,285. (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
5 useful Improvements in Printing-Presses; 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
10 thereon, which form part of this specification, in which—

Figure 1 is a diagrammatical vertical longitudinal sectional view through a printing-press, showing the travel of the web of paper and its guide, looping, and feed devices. Fig.
15 2 is a similar view showing the endless belt arranged to control the paper-guide rolls. Figs. 3, 4, and 5 are detail views. Fig. 6 is a detail side elevation of the press, showing one
20 means of reciprocating the carriers.

This invention is an improvement on the printing-press for which I made application for Letters Patent on the 22d day of July, 1890, Serial No. 359,563; and its objects are to dis-
25 pense with the devices for looping the web of paper between the cylinder and the delivery devices, and to take the web direct without loops, after final impression thereon, to the delivery mechanism, and to control the move-
30 ments of the web-guide rollers on the framework of the press and the traveling cylinder-carriers by an endless belt or belts, so that such rollers will be revolved only at the proper times and in the proper direction; and
35 to these ends the invention consists in the novel construction and combination of parts hereinafter clearly described and claimed.

In the drawings, *h h'* represent fixed type-
40 beds, and *H H'* impression-cylinders mounted on reciprocating carriers *C*.

FF ff are paper-web-guide rollers mounted on the carriers beside cylinder *H*, and *F' F' f' f'* are similar rollers mounted on the upper portion of the carriers beside cylinder *H'*.

45 *K K' K²* are the paper-feed rolls or calendars.

M' M are guide-rollers journaled on the frame-work of the press above and below the feed-rolls, respectively, and between the lat-
50 ter and the type-beds, and *m m'* are similar

rollers parallel with rollers *M M*, but mounted at the opposite end of the press, the type-beds and cylinders lying between rollers *M' M'* and *m m'*, as indicated.

L designates a looping-frame having only 55 one looping-roller *l*, situated between the feed-rolls and rollers *M M'*, and its roller *l* lies above the feed-rolls and roller *M*, as shown. *J* designates a cam for operating said frame.

The above-mentioned parts are constructed, 60 arranged, and operated substantially as described in my aforementioned application, except that but one looping-roller *l* is used.

S designates a delivery-roll mounted above roller *M'*, and *T* designates tapes running 65 over a series of rollers *s s*, arranged in such relation to roller *S* that the tapes contact therewith and coact therewith to draw the web of paper forward. Roller *S* is driven by suitable gearing or belting from the feed-rolls, as
70 indicated, so that it has a peripheral speed about twice as fast as the peripheral speed of the feed-rolls.

The paper web *w* is taken from roll *W* between the feed-rollers, thence up over loop- 75 ing-roller *l*, down under roller *M*, thence forward toward the type-bed to and over roller *f* at the inner side of cylinder *H*, down beside the cylinder to and under roller *F* under the cylinder and roller *F* at the opposite side 80 thereof, up over the other roller *f*, forward to and under roller *M*, up over roller *M'*, thence inward to and over the nearest roller *f'*, down under adjoining roller *F'* under the cylinder *H'* and opposite roller *F'*, up and over 85 the remaining roller *f'* to and under roller *M'* and up to and between roller *S* and tapes *T*, thence to the cutting and folding mechanisms, being substantially the same course of travel shown in my above-mentioned appli- 90 cation. It will be observed, however, that there is no compensating loop between the roller *M'* and the delivery mechanism. I dispense with such loop and yet feed the paper continuously into the press, but deliver it in- 95 termittently, as follows: The looping-frame is so timed in its movements that during the taking of an impression it will loop the paper between the feed-rollers and roller *M* to such an extent as to take up all the web fed 100

in by the calenders, not allowing any to slip past roller M'; but as soon as the impression is completed the roller is dropped, giving out all the web that was taken up in forming the loop, and, in addition thereto, all that is paid in by the continuously-revolving calenders or feed-rolls during the descent of the roller l. The delivery-roll and tapes will, after the impression is ended and while the web is given off freely from the loop and calenders, as described, immediately draw forward all the web that is allowed to slip past roller M', so that the portion of the web between the calenders and roller M' will be kept properly tensioned, and to do this it is necessary that the delivery-roll and tapes shall have a greater peripheral speed than the calenders. For instance, if the length of paper required to be fed in for each impression is twenty-six inches the calenders must revolve sufficiently fast to pay in twenty-six inches of web for each movement of the cylinders back or forth, and the tapes and delivery-roll must be so speeded that they would pay out fifty-two inches of web for each movement of the cylinders, or twenty-six inches of web while the cylinders are off the type. Now during the taking of an impression the calenders feed in thirteen inches of web and while the cylinders are off the type they feed in thirteen inches additional. The looping-roller takes up the first thirteen inches fed in while the cylinders are on the bed, but pays out this thirteen inches while the cylinders are off the type, so that the thirteen inches from the loop and thirteen inches fed in by the calenders, twenty-six inches in all, must pass through the press or from roller M to M' while the cylinders are off the type. Consequently the delivery-rolls and tapes must have a peripheral movement at least twice as great as the calenders. At the moment twenty-six inches of web has been drawn through the press and the calenders begin to move forward to make a new impression the looping-roller begins to move and takes up in forming the loop all the web paid in from the calenders, so that the portion of the web between the roller M' and the delivery is stopped until the impression is ended.

It is necessary to so adjust the tension of the tapes T T in relation to the roll S that the web will not be broken when its movement is stopped by the taking-up action of the looping-roller. The tapes T, however, are so speeded as to comb the web and be ready instantaneously to feed it forward and draw it through the press whenever the looping-roller ceases to take up the feed. These tapes have a continual tendency to coax or draw the web forward, so that the web is tensioned thereby during the printing operation as well as fed forward after the impression is taken. I thus avoid the necessity of a looping device between the last impression-cylinder and delivery mechanism and continuously feed the

web, but intermittently deliver it. I preferably use a number of tapes equal to the number of longitudinal margins or spaces left between the printed matter of the impression, so that the tapes run only against clean uninked surfaces, thus avoiding smearing thereof.

In taking up the thirteen inches of web paid in by the calenders during the taking of an impression the looping-roller would have to travel six and one-half inches, and to lessen the travel of the looping-frame I may use a duplex looping device, (shown in detail figure,) in which a second roller M² is arranged between roller M' and the calenders, and a second roller l' is attached to lateral arms projecting from frame L parallel with roller l. The roller l' moves between and above rollers M' M² and roller l' above and between the calenders and roller M². The web is then looped over l' between the calenders and roller M², and again looped over roller l between rollers M² and M'. By thus making a duplex loop the frame L will only require a movement of three and one-quarter inches to take up the necessary length (thirteen inches) of web.

In the practical operation of my press I found that the web-guide rollers, particularly those mounted on the carriers, would acquire such a rotary momentum during the travel of the cylinders and while the web was being drawn through the press after the impressions were taken that they would continue to rotate when the web was stopped and sometimes even rotate in a direction contrary to the travel of the web during the return strokes of the cylinders. This caused a dangerous strain to be put on the web which it was necessary to obviate, and to do this I had to replace the rollers by bars; or to drive them mechanically, and yet avoid damaging the web, it is necessary to drive them simultaneously with the travel of the web and to stop them when the travel of the web is interrupted. This is accomplished by the means shown in Fig. 2, consisting of an endless belt U, which is driven by a drum or pulley u, mounted above the calenders K K' K² and driven by gearing therefrom, so as to have a peripheral speed exactly corresponding to that of the calenders. The belt U passes from the drum under the calenders K K' K² and up over a small pulley V, mounted on an upright of the looping-frame L above roller l, thence the belt passes alongside the web through the press under and over the various guide-rollers and cylinders from the roller M' to a roller M² beside and below roller M, and from roller m² it passes down under a second pulley v, mounted on the upright of the looping-frame above roller V, thence up over an idler y, down under another idler Y, and onto the drum U, as shown. The belt thus follows the course of the web throughout the press, but is looped between the calenders and first cylinder and between the second cylinder and drum.

Z is a tightening device for the belt. The belt is driven continuously, but owing to the upper and lower loops therein, which are alternately but simultaneously taken up and paid out, the portion of the belt between rolls M and M' moves only with and as the web, and the belt is kept sufficiently taut to stop any excessive movement of the web-rollers and to impart thereto the exact and desired movement necessary to properly actuate the web. During the taking of an impression the lower loop takes up all the belt coming in from the calenders, but at the same time the upper loop in the belt is paid out, so that the drum receives as much of the belt as it turns off and the travel of the belt over the drum is continuous, for while the lower loop takes up thirteen inches of belt the upper loop pays out in the same time thirteen inches of belt. It will be apparent that whatever movement the paper web has over and around the guide-rollers and cylinders the belt has also, that when the portion of the web in the press is moving the belt is positively actuating the rollers in the proper direction, and when the portion of the web between the feed and delivery mechanism is stopped the belt is stopped, and that the rollers, instead of being driven by frictional contact with the web, are positively driven by the belt or by frictional contact therewith. None of the rollers in the press can exert any strain on the web, but such strain will be upon the belt alone, as the tension of the belt can be made so much greater than the paper that the web will have no effect thereon nor be affected thereby, except in the desired manner and at the proper time.

Another advantage of thus positively controlling the web-rollers is that all danger of smutting or smearing the web is obviated, as the rollers cannot revolve against a fresh inked surface of the web except as and while the latter travels thereover.

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

1. The combination of a type-bed, a cylinder adapted to be reciprocated thereover, and feed and looping rollers, substantially as described, whereby the web is continuously fed into the press during and after the taking of an impression, and the delivery devices whereby the web is intermittently delivered therefrom after the impression, substantially as described.

2. The combination, with a web-printing press, of two type-beds, two reciprocating cylinders, a continuous-paper feed and an intermittent delivery, web-guide rollers for directing the web from the feed to and between the type-beds and cylinders in succession and to the delivery, and mechanism, substantially as described, for looping the web between the feed and first impression-cylinders only, substantially as specified.

3. The combination of a type-bed, an impression-cylinder coacting with and over said bed, and paper-feed calenders, and a delivery mechanism consisting of a roll and coacting tapes operating, substantially as described, with web-guide rollers for directing the web from the calenders to and between the cylinder and bed and thence to the delivery mechanism, and a looping-roller adapted to intermittently loop the web between the calenders and cylinder, substantially as and for the purpose set forth.

4. In a paper-web-printing press, the combination of a type-bed, an impression-cylinder, web-feed and web-delivery mechanisms, and web-guide rollers arranged to direct the web from the feeding mechanism to and between the cylinder and type-bed and from the latter to the delivery mechanism, with means independent of the web for positively rotating the said guide-rollers in the direction that the web travels thereover when the web is moving between the feed and delivery mechanisms and for stopping said rollers when the portion of web thereon stops, whereby the rollers are prevented from combing on the web when the latter is at rest, all constructed and arranged to operate substantially as and for the purpose specified.

5. The combination of the type-bed, impression-cylinder, paper-feed calenders, delivery mechanism, and web-guide rollers, and a looping-roller adapted to loop the paper between the calenders and cylinder, with an endless belt running over said web-guide rollers and adapted to drive and control the same, and looping devices for said belt, whereby the portion of the belt running on said rollers is caused to travel exactly with the web, substantially as specified.

6. The combination of the type-bed, impression-cylinder, paper-web feed and delivery mechanism, and guide-rollers adapted to direct the web from the feed to and between the cylinder and bed and thence to the delivery, with mechanism, substantially as described, for looping the web intermittently between the feed and cylinder, and an endless belt running over the paper-guide rollers beside the web, and mechanism, substantially as described, for positively looping said belt before and after it passes the cylinder and type-bed, such loops being formed alternately, as and for the purpose set forth.

7. The combination, in a web-printing press, of two type-beds, two cylinders adapted to be reciprocated thereover, web-guide rollers traveling with said cylinders, and stationary web-guide rollers on the frame of the machine, the paper-feed rolls, and a paper-delivery mechanism consisting of a roll and coacting endless tapes and a looping-roller adapted to loop the web between the feed-rolls and cylinder, with an endless belt running from the feed-rolls to and over the stationary and movable guide-rollers and back to the rolls, and mech-

anism, substantially as described, for looping
said belt simultaneously with the looping of
the web between the rolls and cylinder and
for alternately looping the belt after it has
5 passed over the guide-rollers, all constructed
and arranged to operate substantially as and
for the purpose described.

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

JOSEPH L. COX.

Witnesses:

F. W. DUNNING,
FRANK G. EVANS.