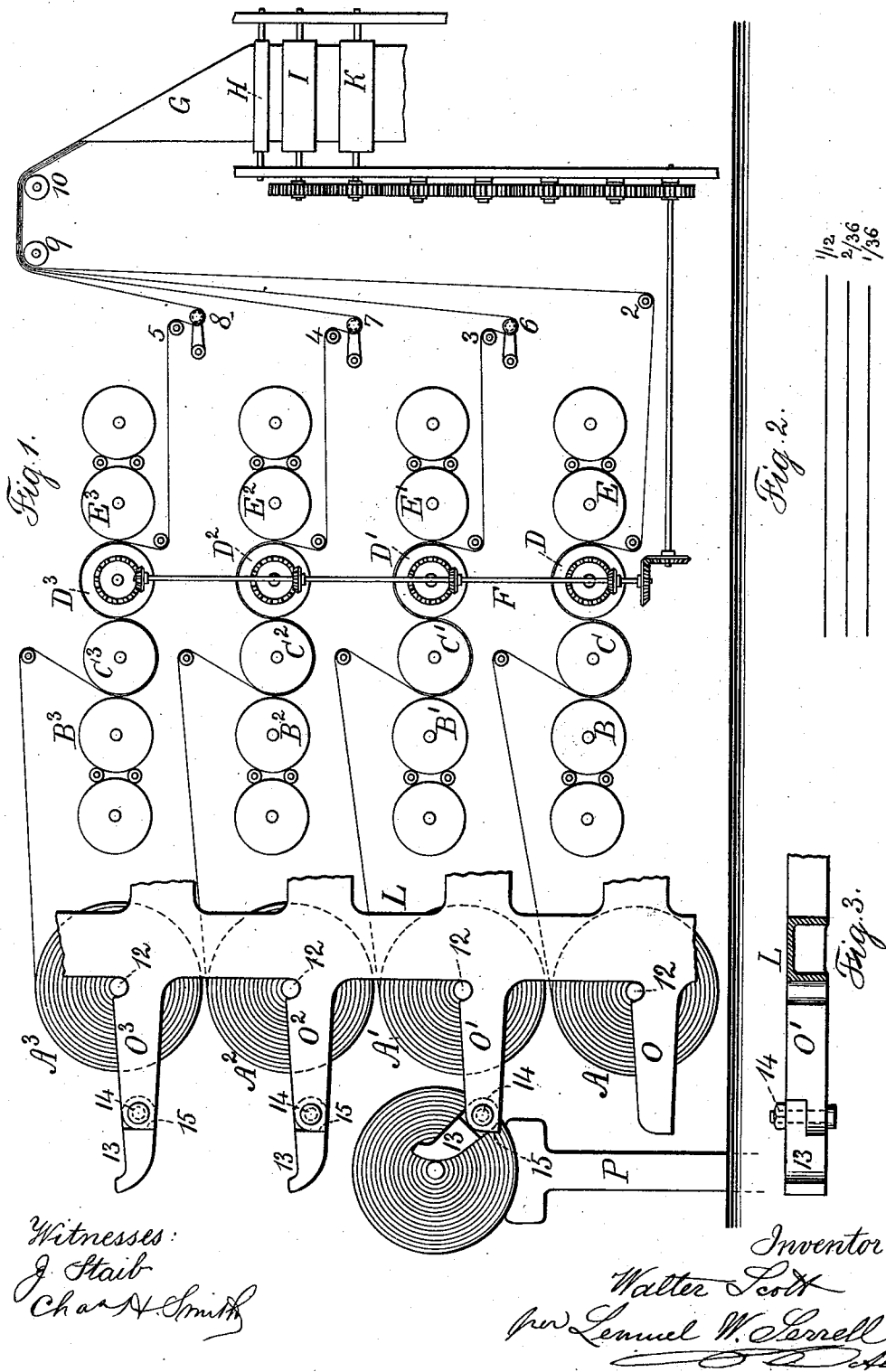


(No Model.)

W. SCOTT.
PRINTING MACHINE.

No. 558,425.

Patented Apr. 14, 1896.



UNITED STATES PATENT OFFICE.

WALTER SCOTT, OF PLAINFIELD, NEW JERSEY.

PRINTING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 558,425, dated April 14, 1896.

Application filed August 26, 1895. Serial No. 560,542. (No model.)

To all whom it may concern:

Be it known that I, WALTER SCOTT, a citizen of the United States, residing at Plainfield, in the county of Union and State of New Jersey, have invented an Improvement in Printing-Machines, of which the following is a specification.

Printing-machines have heretofore been made by me in which there have been three rolls of paper, one above the other, from which the webs have been taken off and brought together over a longitudinal folder, and in this machine the lower press, which has printed the web that runs in contact with the surface of the longitudinal folder, has been made with plate or printing cylinders that are smaller than the plate or printing cylinders in the press next above the same, the object being to obtain a proper register of the printed matter upon the webs as they pass over the longitudinal folding-incline, notwithstanding the fact that the lower web that is in contact with such longitudinal folding-incline is subjected to friction upon such incline which tends to retard, stretch, or elongate such web.

In practice I have discovered that there is a peculiar action upon the webs passing through a printing-machine where there are three or more of such webs that are brought together and folded longitudinally previous to being cut off, and this peculiar action consists in the tendency to produce sheets of progressively-increasing length when running three or more webs through the press—that is to say, if three or more webs were run through the machine without reference to the printing, and such webs were kept under the proper tension to operate advantageously, and such webs were folded longitudinally and cut off transversely to form separate products from the associated webs, the sheets would be of progressively-increasing lengths—that is to say, the web running next to the longitudinal folder would be the shortest and the outer or upper web the longest and the intermediate webs of intermediate lengths. This appears to arise from the fact that the webs as they pass around the inclined edges of the converging folder lie one upon the other and the thickness of each under web augments the length of each upper web, and in addition the tension-rollers that draw the web through the

presses, acting against the outer web, tend to move said web the fastest.

In consequence of the peculiar condition hereinbefore mentioned, it will be apparent that if the presses were not constructed with reference to supplying the webs in such a manner that the increased lengths in such webs would be supplied for the sheets associated in one product, the paper would be wrinkled or injuriously stretched, or the register of the printed pages would not be accurate.

My present invention relates to a printing-machine in which three or more presses are associated together to print upon three or more webs carried through the machine and brought together, folded longitudinally, and cut off transversely as one product, the presses being constructed to print upon and forward to the folding and cutting mechanism progressively-increasing lengths for the sheets—that is to say, so that the inner sheet will be shortest and the outer sheet the longest and the intermediate sheets of intermediate lengths in order that the register of the printed matter may correspond and the webs may be drawn through the machine without injury by undue strain and without creasing by undue fullness.

In carrying out this invention I make the plate or printing cylinders of the press that prints on the web forming the inner folded sheet the smallest in diameter, and I make the plate or printing cylinders of the upper press that prints upon the outer sheet of the folded product the largest, and the intermediate presses with printing or plate cylinders of proportionate intermediate diameters. The types pressing upon the paper during the printing operation tend to embed themselves, so that the paper is moved along by the type-cylinders with reliability and with the proper relative speeds.

In printing-machines where there are three or more presses one over the other I have heretofore experienced difficulty in supplying the rolls of paper into their proper places in the upper presses, because, as these rolls of paper are heavy and difficult to handle, it is usual to roll them along upon the floor that corresponds in position or nearly so to the level of the roll as introduced into the lowest press in the printing-machine, and as these

rolls usually come to a definite position upon the floor before being passed into the machine it is difficult to elevate these rolls to the proper places in the upper presses. To obviate this difficulty, I provide an elevating mechanism that is adapted to raise the rolls of paper from the lowest position to the highest press; but as these rolls have to be handled with rapidity, and a failure in the accurate working of the apparatus is liable to cause a stoppage of the entire press, I provide automatic means for receiving the shafts of the rolls as they are raised to position. With this object in view the frame of the press is extended out to form rails that terminate at the bearings that support the roll while the paper is being unwound, and at the ends of these rails hinged arms are provided, which swing upwardly by the contact therewith of the shaft or axis of the roll of paper, and they drop beneath such axis, so that the attendant simply has to raise the roll of paper by the lifting mechanism to the proper press where it is to be delivered, and the hinged arms dropping beneath the shaft of the paper roll receive and support such paper roll as the hoisting mechanism is lowered. By this means the rolls of paper can be received substantially automatically and supported in the respective presses ready to be rolled into position with the end of the web of the fresh roll ready to be attached to the back end of the exhausted web, so as to be drawn through the press.

In the drawings, Figure 1 is a diagrammatic elevation showing four presses in a printing-machine. Fig. 2 is a diagram with measurements indicating approximately the diameters of the printing or plate cylinders in the respective presses, and Fig. 3 is a plan view showing one of the hinged arms for receiving the shaft of the paper roll.

The rolls of paper are represented as one above the other and marked, respectively, A A' A² A³. The first type-cylinders are substantially in line and marked B B' B² B³. The first impression-cylinders are indicated at C C' C² C³, the second impression-cylinders at D, D', D², and D³, and the second type-cylinders at E, E', E², and E³; and it is to be understood that any usual or convenient gearing is made use of for driving the respective presses in absolute unison, and with this object in view I find it advantageous to employ a vertical shaft at F and beveled gears connecting such shaft with gears upon the shafts of the second impression-cylinders D D' D² D³, and the gearing between the cylinders of each press may be of any desired character, and the inking apparatus being provided as usual does not require further description, and the belts or tapes that convey away the printed webs from between the respective second impression-cylinders and second type-cylinders are of ordinary construction. I find it, however, advantageous to pass the webs around the respective rolls 2, 3, 4, and 5, and to provide adjusting-rolls 6, 7, and 8 by which the

webs can be adjusted with convenience for bringing the printed matter of the pages into register one with the other as the same pass over the roll 9, and it is usual to provide a roll 10, the surface of which is in line with the converging folder G, so that all four webs pass together down such converging folder G and are folded longitudinally and pass the rolls or guides H that are adjacent to the apex of the folding-incline, and the rolls I serve to draw the associated webs together and along over the folder, and thus apply the tension to the same, and at K cutting-cylinders of any desired character are provided for separating the associated webs into separate products.

It is to be understood that in folding the webs longitudinally the web that comes next to the converging folder G is subject to a detaining friction that tends to stretch it, and thereby it is not drawn along as rapidly as the other webs, and by being supplied slower, in consequence of the lowest printing-press having printing-cylinders that are slightly the smallest, the register of the printed matter is maintained between the lowest web and the other webs and slackness between the longitudinal folder and the lowest press is prevented.

According to the average thickness or quality of the paper composing the respective webs, so the sizes of the type-cylinders as originally constructed will be proportioned. I have found that with a press of this character it is advantageous to make the type-cylinders B and E about one-twelfth of an inch smaller in diameter than the type-cylinders B² and E² of the upper press and the cylinders of the intermediate presses of proportionate diameters—that is to say, the cylinders B' E' should be about one thirty-sixth of an inch larger than the cylinders B and E and the cylinders B² E² should be about two thirty-sixths of an inch larger than the cylinders B and E. These measurements, however, will vary according to the size of sheet that is to be printed and to the character and condition of the paper acted upon, the object being to deliver to the folding-inclines the webs at such proportionate speeds that the webs will draw through smoothly and the printed pages will register, and, although the edges of the sheets in the associated product do not correspond accurately, this is of no consequence, especially in newspaper printing, and when a printing-press of this character is employed for book-work the differences in the sizes of the sheets is entirely immaterial, because the edges of the sheets are cut off when the book is bound. In the diagram, Fig. 2, I have put upon the straight lines that illustrate the diameters of the respective printing-cylinders measurements to indicate approximately the differences in the respective diameters.

The frame of the printing-press is to be of any desired character. I have represented a portion thereof at L and the arms O, O', O², and O³ extend out from the frame a conven-

ient length for the reception of the rolls of paper, the shafts 12 being received into bearings that are advantageously located adjacent to the junction of the arms and the upright of the frame, and at the ends of the arms there are hinged arms 13, preferably connected by pivot-bolts 14, and the arms are provided with stops 15, that engage the frame and prevent the hinged arms swinging downwardly; but such hinged arms are free to swing upwardly, and the outer ends of these hinged arms are turned up or hook-shaped, as shown, and at P, I have illustrated a suitable hoisting or elevating apparatus adapted to receive and lift the rolls of paper.

In some instances the lower arms O will not be provided with hinged arms, as shown, because the floor or platform upon which the rolls of paper are received is at such a height that the shaft of the paper-roll will come above the arm and the paper-roll can be rolled forward to its proper place in the printing-machine. The elevating apparatus, of any suitable character, is so located that when the roll of paper is lifted the shaft or axis of the paper will swing upwardly the hinged arms by contact with such arms and these arms will drop automatically, and falling below the shaft of the roll will be in a position to receive such shaft if the elevating apparatus is slightly lowered. In this manner the roll of paper can be raised to either press and received by the same automatically as the elevating apparatus is lowered for the reception of another roll of paper; and it is to be understood that the attendants roll the respective rolls of paper along into position and join the back end of the one web to the front end of the next web at the proper time, as heretofore usual.

It will be borne in mind that in presses of this general character the type or printing-plate is rolled up into a cylindrical segment to fit the surface of the type-cylinder, and there are always spaces upon such type-cylinders between one form and the next, and these spaces will vary in the respective cylinders, so that while the plate or type forms are of uniform length peripherally the differences in the lengths of the sheets will occur at the spaces between the printed matter.

If desired, the impression-cylinders may be made to conform to the sizes of the type-cylinders; but this is not always necessary, as the blankets usually vary in thickness.

Where two or more webs pass around a cylindrical surface, such as the roll 9 or 10, the outer web is moving around a cylinder with a larger radius than the inner web in consequence of the added thicknesses of the sheets upon the cylinders or rollers. The tendency therefore is to move the outer web along faster than the inner web, and in some characters of presses, where the two or more webs are moving in substantially one direction to a point of delivery and are laid out flat one upon the other, there is a tendency

to produce an imperfect register of the printed matter in consequence of one web being under a greater tension than another web where such webs pass around a roller or cylinder as they are associated together. The aforesaid improvement, which consists in making the cylinders of one press smaller than the cylinders of another press so as to counteract this tendency, is available regardless of the manner in which the webs are finally delivered and cut off as a product formed of a sheet from each web, and I do not limit myself to any particular cylinders in the respective presses that are varied in size, so as to effect the movement of the webs and to counteract or neutralize the before-named tendency to disturb the accuracy of the register of the printed matter.

In my application, Serial No. 536,638, heretofore filed, stationary arms are represented as extending out from the frame adjacent to the roll-bearings for receiving the shaft of the paper roll, and in my application, Serial No. 539,962, swinging brackets are represented for the same purpose. I do not therefore herein lay claim, broadly, to arms or supports extending out from the roll-bearings for receiving the shaft of the paper roll.

I claim as my invention—

1. The combination in a printing-machine adapted to print upon three or more webs of paper, of a longitudinal folder to receive the superposed webs and fold the same longitudinally, and means for drawing the webs along over the longitudinal folder and for cutting off the same, three or more printing-presses each having its type and impression cylinders, the type-cylinders of the press that prints upon the web that comes in contact with the surface of the longitudinal folder being of less diameter than the type-cylinders that print upon the upper or outer web and the intermediate type-cylinders being of proportionate intermediate diameters, substantially as set forth.

2. The combination in a printing-machine, of presses adapted to print upon three or more webs, a longitudinal folder and means for drawing the webs over such folder and cutting off the associated webs, the cylinders of three presses being so proportioned in diameter as to supply the proper lengths of web to prevent wrinkling and cause the printed matter to register, substantially as set forth.

3. The combination in a printing-machine having two or more printing-presses, of a frame and arms extending out from the frame and forming supports for the shafts of the rolls of paper, and hinged arms at the ends of the stationary arms that are adapted to swing upwardly by the contact therewith of the shaft of the paper roll, and to drop beneath such shaft for the reception of the same, substantially as set forth.

4. The combination in a printing-machine adapted to print upon three or more webs of paper, of a longitudinal folder to receive the

superposed webs and fold the same longitudinally, and means for drawing the webs along over the longitudinal folder and for cutting off the same, three or more printing-presses each having its type and impression cylinders, the cylinders of the press that prints upon the web that comes in contact with the surface of the longitudinal folder being of less diameter than the cylinders that print upon the upper or outer web and the intermediate cylinders being of proportionate intermediate diameters, substantially as set forth.

5. The combination in a printing-machine having two or more printing-presses, of a frame and arms extending out from the frame and forming supports for the shafts of the rolls of paper, and hinged arms at the ends of the stationary arms that are adapted to swing upwardly by the contact therewith of the shaft of the paper roll, and to drop beneath such shaft for the reception of the same and mechanism for elevating the roll, substantially as set forth.

6. The combination in a printing-machine, of presses adapted to print upon three or more webs and means for drawing the webs through the press and cutting off the associated webs, the cylinders of three presses being so proportioned in diameter as to supply the proper lengths of web to prevent wrinkling and cause the printed matter to register, substantially as set forth.

7. The combination in a printing-machine,

of presses adapted to print upon three or more webs and means for drawing the webs through the machine in substantially one direction to the point of delivery and for cutting off the associated webs, three of the presses being so proportioned in the diameters of the rollers or cylinders that act upon the webs of paper to carry the same through the respective presses, that the proper lengths of webs will be supplied to the point of delivery, to prevent wrinkling and to cause the printed matter to properly register, substantially as set forth.

8. The combination in a printing-machine, of two or more presses adapted to print upon two or more webs, a cylindrical surface around which the webs pass as they lie one upon the other, and means for drawing along the webs and cutting off the sheets from the associated webs to form separate products, the diameters of the cylinders in the respective presses being so proportioned as to supply the proper lengths of the respective webs, for maintaining the accurate register of the printed matter and to neutralize the tendency for one web to be drawn faster than the other and to maintain uniformity of tension and prevent wrinkling of either web, substantially as set forth.

Signed by me this 23d day of August, 1895.
WALTER SCOTT.

Witnesses:

GEO. T. PINCKNEY,
CHAS. H. SMITH.