

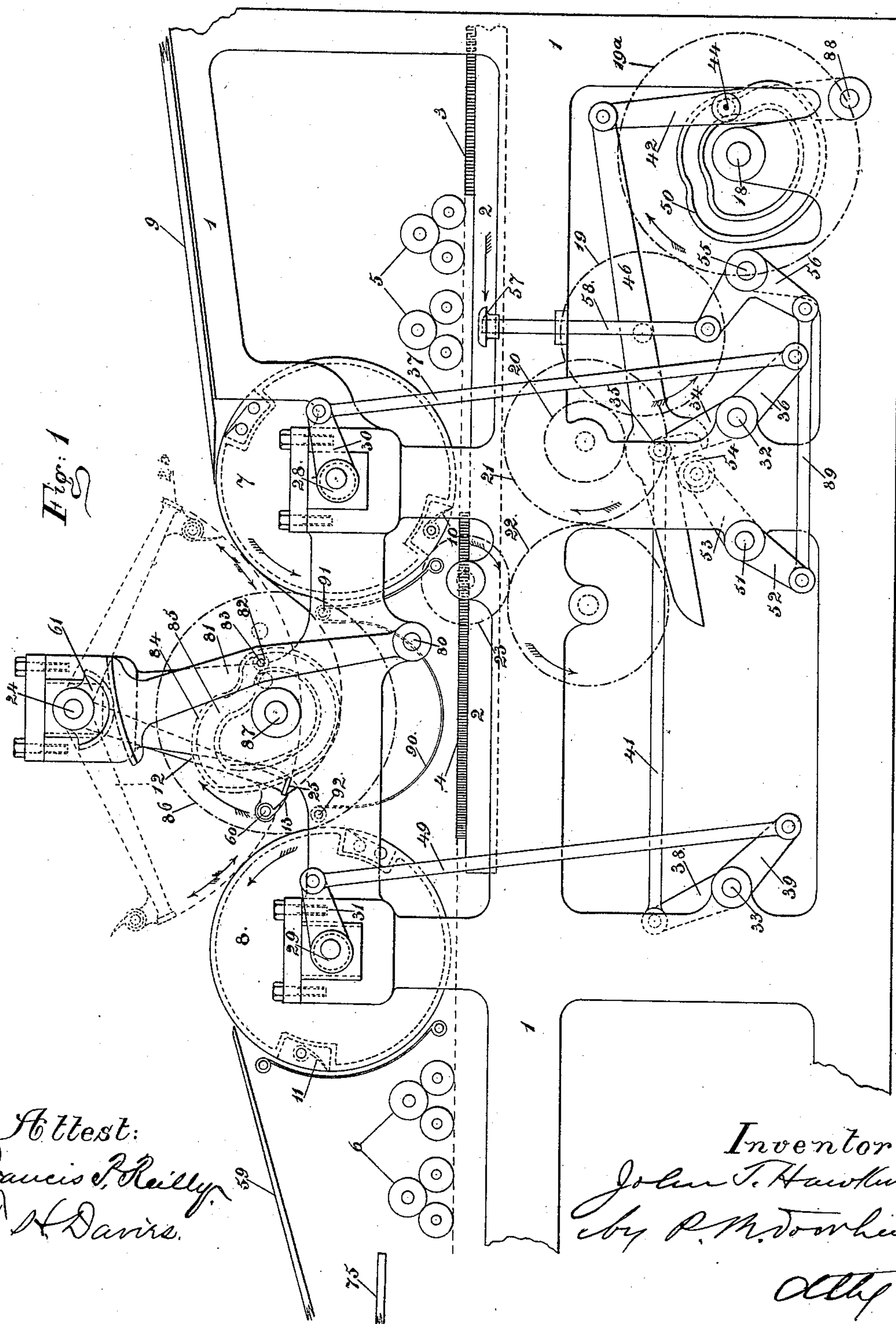
(No Model.)

2 Sheets—Sheet 1.

J. T. HAWKINS.  
TWO COLOR PRINTING MACHINE.

No. 429,905.

Patented June 10, 1890.



Attest:  
Francis P. Reilly  
A. H. Davis.

Inventor  
John T. Hawkins  
by P. M. Towhies  
*Atty*

(No Model.)

2 Sheets—Sheet 2.

J. T. HAWKINS.  
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Fig. 2.

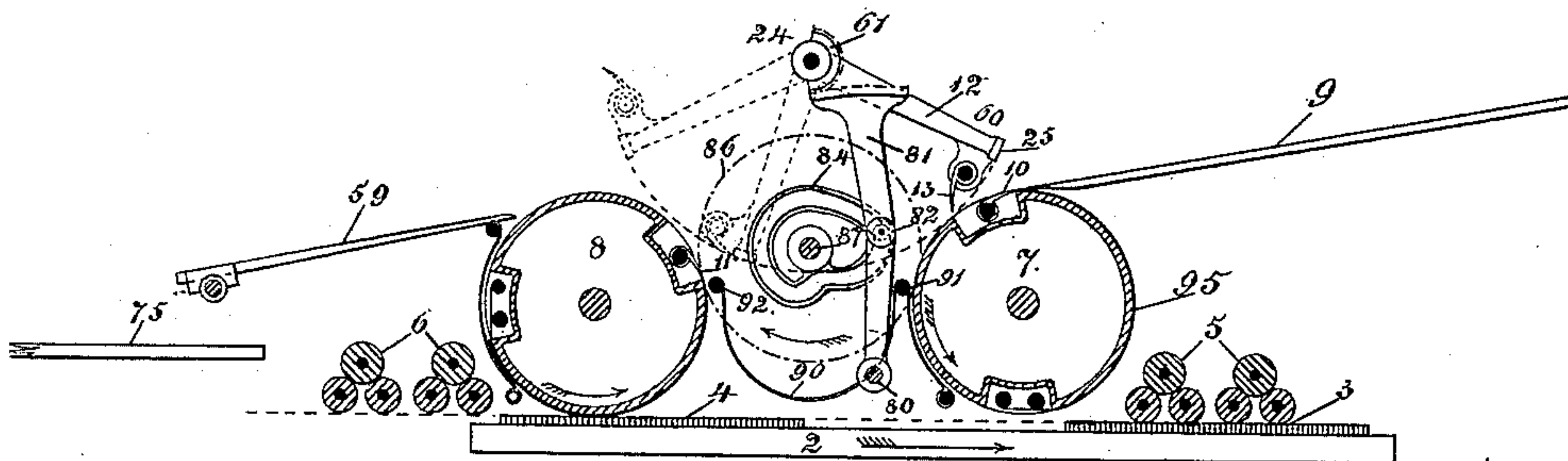


Fig. 3.

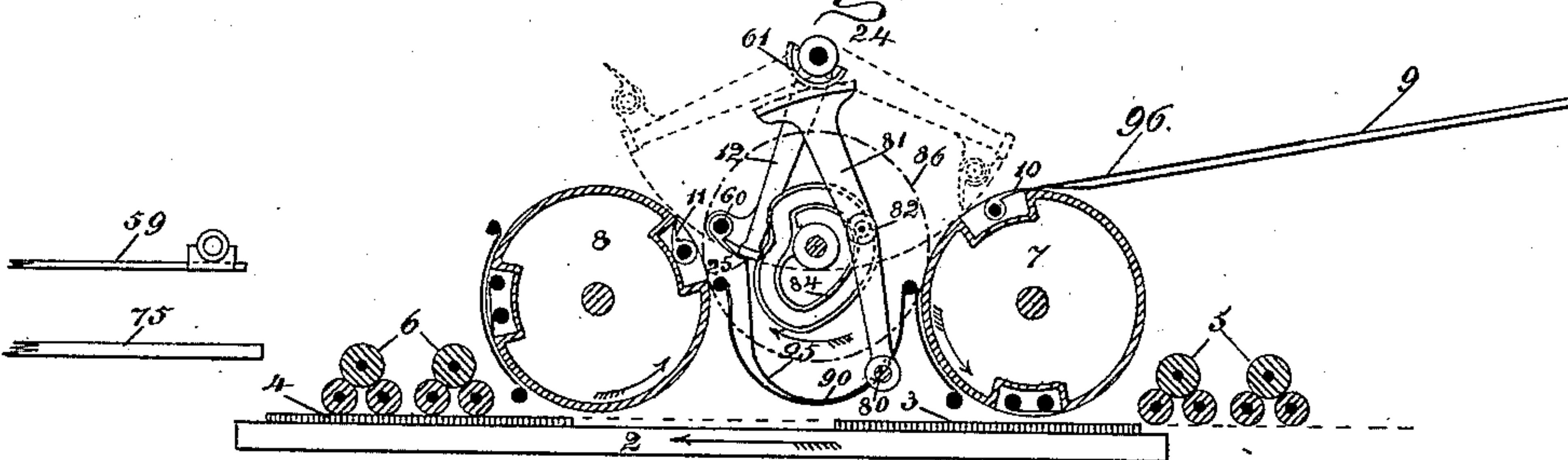
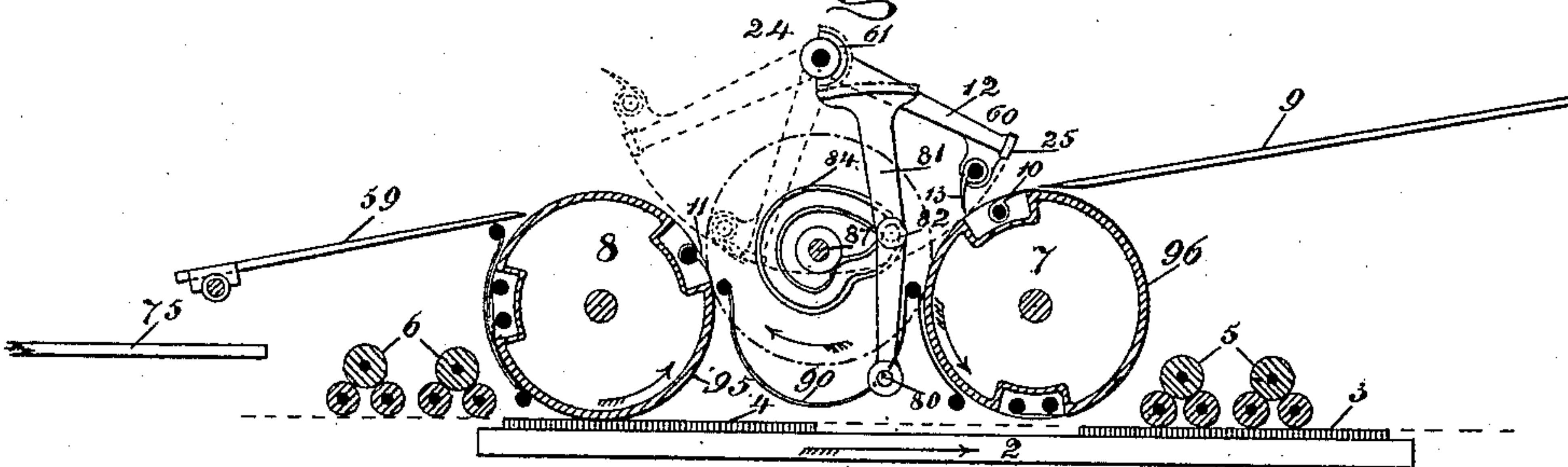


Fig. 4.



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# UNITED STATES PATENT OFFICE.

JOHN T. HAWKINS, OF TAUNTON, MASSACHUSETTS.

## TWO-COLOR PRINTING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 429,905, dated June 10, 1890.

Application filed February 13, 1890. Serial No. 340,255. (No model.)

*To all whom it may concern:*

Be it known that I, JOHN THOMAS HAWKINS, of Taunton, in the county of Bristol and State of Massachusetts, have invented new and useful Improvements in Two-Color Printing-Machines, which invention is fully set forth and illustrated in the following specification and accompanying drawings.

The object of this invention is to provide a machine which shall print two separate colors or two separate impressions upon one side of a sheet by means of two forms attached to a single reciprocating bed and two impression-cylinders corresponding thereto in passing the sheet once through the machine, and to effect this without contact of the printed side of the sheet with any part of the mechanism in the transfer from one impression-cylinder to the other or in the process of delivery.

The invention will first be described in detail and then particularly set forth in the claims.

In the accompanying drawings, Figure 1 is a side elevation of so much of a machine for printing in two colors, or two impressions in one color, as is necessary to the complete illustration of the invention, sundry parts being omitted, such as the mechanism for reciprocating the form-bed, that for operating the various grippers and the fly, the ink-fountain, and other parts of the inking apparatus, these being capable of construction in a variety of ways well known in the art and not necessary to a full illustration of this invention. Figs. 2, 3, and 4 are diagrams, on a reduced scale, showing the relative positions of several parts for three different positions of the sheet in passing through the machine.

In said figures the several parts are indicated by reference-numbers, as follows:

The numbers 1 1 indicate the main frames. The form-bed 2 carries two forms 3 and 4, the numbers 5 and 6 indicating the form-inking rollers, respectively, for said forms.

The number 7 indicates the impression-cylinder for form 3, and 8 the impression-cylinder for form 4, both cylinders making two revolutions to each impression. From a feed-board 9 the sheets are fed to the impression-cylinder 7. The impression-cylinders 7 and 8 are provided with grippers 10 and 11, oper-

ated to take and release the sheets at the proper time by any of the well-known methods. To a rock-shaft 24, journaled in the frames 1, are secured between the frames 1 a series of arms 12, carrying on their free ends gripper-rests 25. Journaled in the arms 12 is a rock-shaft 60, carrying a series of grippers 13. Outside the frames 1 a sector-pinion 61 is secured to shaft 24. On a stud 80, secured in one of the frames 1, is fulcrumed a lever 81. The upper end of lever 81 forms a toothed sector meshing with the sector-pinion 61. Lever 81 carries a roller 82, running freely on a stud 83, secured in the lever. The lever 81 is operated to oscillate arms 12 at the proper times by means of a cam 84 into the groove 85, of which the roller 82 runs. The cam 84 is secured to an intermediate spur-gear, as indicated by the circle 86, which meshes into similar gears secured to the axes of impression-cylinders 7 and 8, as indicated by the circles of the cylinders themselves, and through which cylinder 8 is rotated from cylinder 7. Cam 84, with its gear 86, runs freely on a stud 87, secured in one of the frames 1. The impression-cylinders are caused to rise and fall to clear and make contact with their respective forms by the following-described mechanism: A shaft 18 is journaled in the frames 1 and actuated by a suitable train of gearing, as indicated by the circles 19, 19<sup>a</sup>, 20, 21, 22, and 23, in such proportion as to make one revolution to each sheet printed or one revolution to each two revolutions of impression-cylinders 7 and 8. The journals of the impression-cylinders 7 and 8 run in eccentric boxes 28 29, whose eccentricity is shown in dotted lines. The boxes 28 29 have arms 30 31 secured to them, the boxes and arms being the same for both sides of the machine. Journaled in the frames 1 are rock-shafts 32 33. On rock-shaft 32, inside the frame 1, is secured a lever 34, carrying on its free end a roller 35. On the same shaft, outside the frame 1, is carried a lever 36. Secured to the rock-shaft 33, inside the frame 1, is a lever 38, and a similar lever 39 outside frame 1. Levers 34 and 38 are connected by a link 41. Fulcrumed on the inside of the frame 1, on a stud 88, is a lever 42, carrying a roller 44. To the free end of lever 42 is



connected a hook-bar 46, whose hooked end engages a roller 35. Connecting the free ends of levers 30 36 for impression-cylinder 7 and levers 31 39 for impression-cylinder 8 are links or connecting-rods 37 49. Eccentric boxes 28 29, levers 30 31, links 37 49, and levers 36 39 are the same for both sides of the machine. A box-cam 50 is secured to shaft 18, and the roller 44 engages a groove of cam 50, as shown. The cam-groove of cam 84 is so formed as to give intermittent oscillation to the gripper-arms 12, and the groove of cam 50 is so formed as to oscillate the eccentric boxes 28 29 at the proper times.

A short rock-shaft 51 is journaled in one of the frames 1. Outside the frame a lever 52 and inside the frame a lever 53 are secured to rock-shaft 51. The free end of lever 53 carries a roller 54, which engages the under side of the free end of hook-bar 46. On a stud 55, secured in the frame 1, is fulcrumed a bell-crank lever 56, to one arm of which is articulated a link 89, connecting with the free end of lever 52, and to the other arm a vertically-sliding rod 58, provided with a tread 57 in its upper end. A depression of the tread 57 by the attendant disengages the hook-lever 46 from roller 35, keeping the impression-cylinders 7 and 8 raised from the forms whenever desired.

An oscillating fly 59, operated by any well-known means, receives the sheet from the top and front of impression-cylinder 8 and deposits it on the usual receiving-board 75. A supporting-apron 90 is secured to rods 91 92, which are themselves secured at their ends in frames 1. The apron 90 is for the purpose of supporting the tail of the sheet away from the forms during its transfer from impression-cylinder 7 to impression-cylinder 8, after being printed on the first form.

The operation of the mechanism is as follows: A sheet being fed from the feed-board 9 to the impression-cylinder 7 is carried around and printed on the first form 3. After a complete revolution of the impression-cylinder 7 the grippers 10 release and the grippers 13 take the sheet, the gripper-arms 12 being caused to move by the cam-groove 85 from their extreme right-hand position (shown in dotted lines, Fig. 1) toward the left, so as to meet and coact with grippers 10, grippers 10 opening simultaneously with the closing of grippers 13, grippers 13 thus taking the leading edge of the sheet from the impression-cylinder 7. During the succeeding revolution of impression-cylinder 7 and the non-printing excursion of the forms the cam-groove 85 causes the gripper-arms 12 to pass farther to the left at a gradually-retarded rate until their arrival at the position shown in full lines, Fig. 1, allowing them to rest at that point for a proper period. The sheet meanwhile travels at a faster rate as the velocity of the gripper-arms 12 is reduced and bends downward and falls upon the apron 90, its leading edge remaining in the grippers 13.

The cam-groove 85 during the next non-printing revolution of impression-cylinders 7 and 8 again moves the gripper-arms 12 to the left until they reach the extreme left-hand position, (shown in dotted lines, Fig. 1,) the grippers 13, as they pass coacting with grippers 11 of impression-cylinder 8, to transfer the sheet to impression-cylinder 8 the grippers 13 opening simultaneously with the closing of grippers 11. The sheet is now carried down and printed on the second form 4, while the gripper-arms 12 by the action of the cam-groove 85 are carried again to the extreme right-hand position, while the impression-cylinders 7 and 8 are down on the forms and printing, and therefore clearing the grippers 13 on their right-hand excursion. Meanwhile the impression-cylinder 7 has taken a new sheet, printed it on the form 3, and grippers 13 and 10 are again in position to coact to transfer the second sheet. During the next non-printing revolution of impression-cylinders 7 and 8 the first sheet is delivered down the fly 59 and turned over upon the receiving-board 75.

In the above operation the sheet will lie in the apron 90 printed side up, and will pass down the fly 59 with the blank side in contact therewith, and nothing will have touched the printed side of the sheet during its transfer or delivery.

In the diagrams, Figs. 2 to 4, inclusive, the passage of the sheet is traced and the several positions of the parts are shown for three different positions of the sheets. In Fig. 2 the first sheet 95 has been taken by impression-cylinder 7, printed on the form 3, and the bed 2 has made the greater part of its printing-stroke with the impression-cylinders 7 and 8 in contact with the forms. The parts of the sheet-transferring apparatus are now so situated that the grippers 13 are at their extreme right-hand position and commence to move to the left to coact at their point of nearest approach to the impression-cylinder 7 with the grippers 10 of cylinder 7 taking the head of the sheet from cylinder 7.

In Fig. 3 the forms have finished their printing-stroke and made a large part of the return or non-printing stroke with the cylinders 7 and 8 raised from the form, and the sheet-transferring apparatus becomes so situated that the head of the first sheet 95 has been taken by the grippers 13, the sheet passed off impression-cylinder 7 and fallen down into the apron 90, the leading edge remaining in grippers 13, and a new sheet 96 is just taken by the grippers 10 of impression-cylinder 7.

In Fig. 4 the forms have completed their non-printing stroke and made a larger part of their second printing-stroke. The first sheet 95 has been transferred to cylinder 8 and nearly printed on the second form 4. The second sheet 96 has been printed on the first form 3, and its transferring apparatus becomes so situated that the gripper-arms 12 have passed to their extreme right-hand po-



sition, ready to move to the left to take the second sheet from the cylinder 7. During the succeeding non-printing stroke of the bed 2 the first sheet 95 is delivered down the fly 59 and the second sheet 96 will lie in the apron 90 with its leading edges held by grippers 13.

I do not confine myself to the exact means herein shown for oscillating the gripper-arms 12, nor for raising and lowering the cylinders 7 and 8, as these movements may be accomplished in many ways without departing from the gist of this invention.

Having thus fully described my invention, I claim—

1. In a printing-machine printing two impressions or colors upon one face of the sheet at one feeding of said sheet, and having two flat forms, as 3 and 4, and two corresponding impression-cylinders, as 7 and 8, carrying grippers, as 10 and 11, and making two revolutions to each impression, the combination, with said impression-cylinders, of oscillating gripper-arms, as 12, carrying grippers, as 13, arranged and operated to coact with the grippers of said impression-cylinders, so as to transfer the leading edge of the sheet from one to the other of said impression-cylinders after having received its first impression, substantially as and for the purposes set forth.

2. In a printing-machine printing two impressions or colors upon one face of a sheet at one feeding of said sheet, and having two flat forms, as 3 and 4, and two corresponding impression-cylinders, as 7 and 8, carrying grippers, as 10 and 11, and making two revolutions to each impression, the combination, with said impression-cylinders, of oscillating gripper-arms, as 12, carrying grippers, as 13, arranged and operated to coact with the grippers of said impression-cylinders, so as to transfer the leading edge of said sheet from one to the other

of said impression-cylinders after having received its first impression, and a supporting-apron, as 90, between said impression-cylinders for holding the sheet from contact with the form during its transfer from one impression-cylinder to the other, substantially as and for the purposes set forth.

3. In a printing-machine printing two impressions or colors on one face of a sheet at one feeding of said sheet, the combination of the following-named elements: two reciprocating flat forms, as 3 and 4, two impression-cylinders, as 7 and 8, printing, respectively, thereon, carrying grippers, as 10 and 11, and making two revolutions to each impression, oscillating gripper-arms, as 12, carrying grippers, as 13, arranged and operated to coact with the grippers of said impression-cylinders, so as to transfer the leading edge of said sheet from one to the other of said impression-cylinders after receiving its first impression, a supporting-apron, as 90, between said impression-cylinders for preventing contact of the blank side of the sheet with the forms during its transfer from one cylinder to the other, a feed-board, as 9, leading to the first impression-cylinder, and an oscillating fly, as 59, arranged to take the sheet from the top and front of the second impression-cylinder after being printed upon the second form, whereby sheets fed to the first impression-cylinder are printed on the first form, transferred to the second impression-cylinder, printed on the second form, and delivered to and upon said fly, all without contact of the printed surface with any part of the mechanism.

JOHN T. HAWKINS.

Witnesses:

THEO. H. FRIEND,  
FRANCIS P. REILLY.