

No. 709,515.

Patented Sept. 23, 1902.

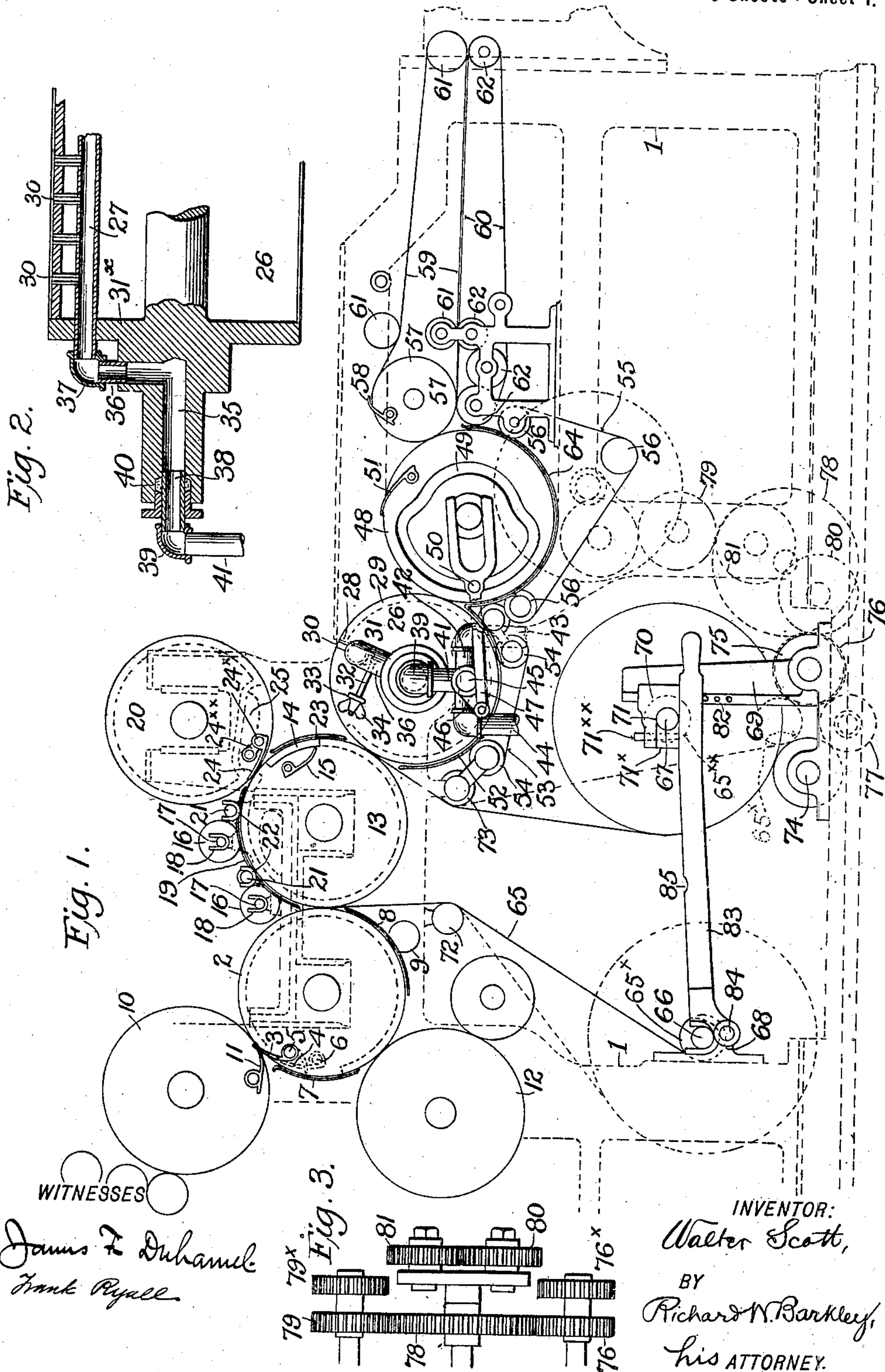
W. SCOTT.

PRINTING MACHINE.

(Application filed Oct. 7, 1899.)

(No Model.)

3 Sheets—Sheet 1.



No. 709,515.

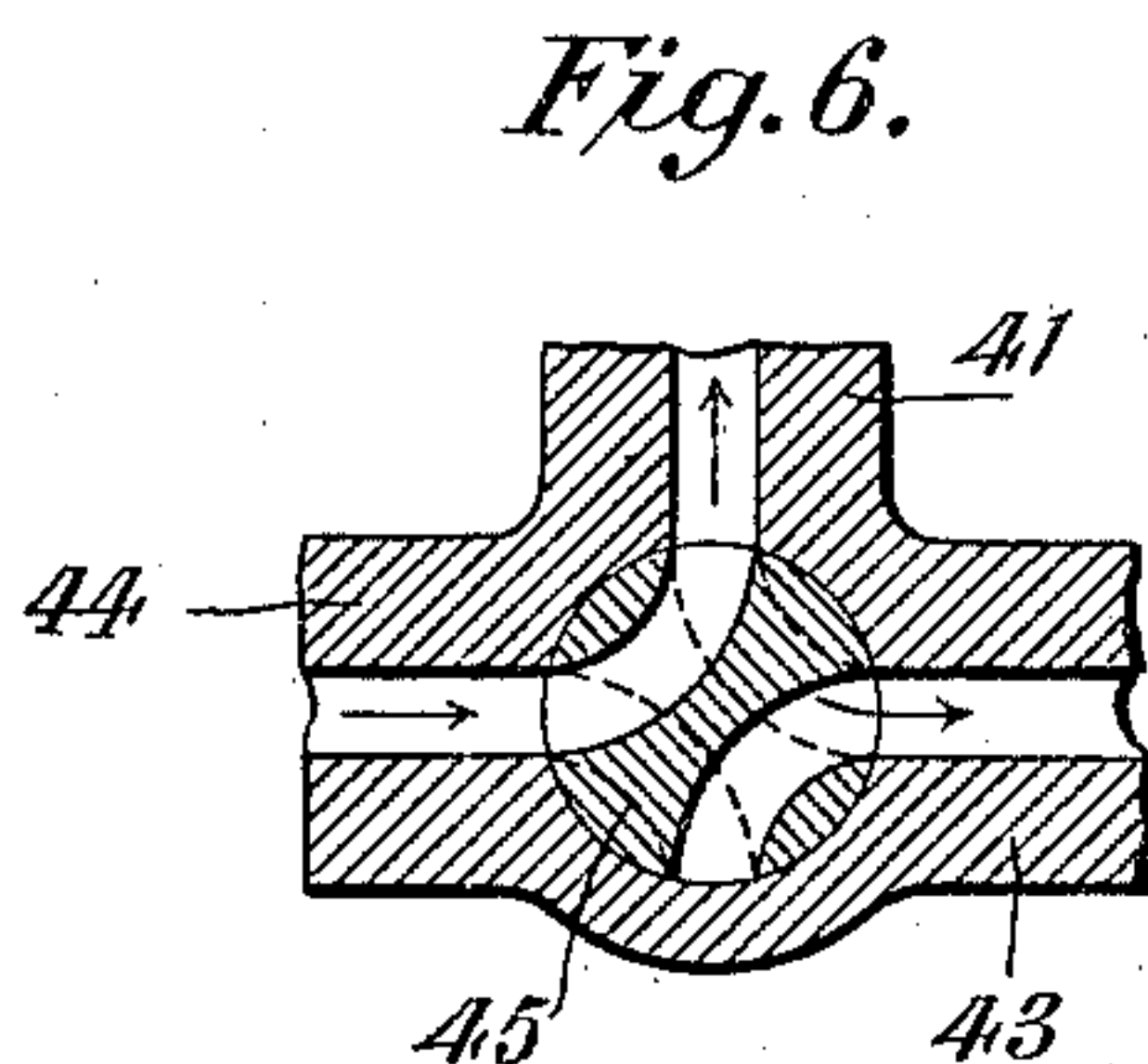
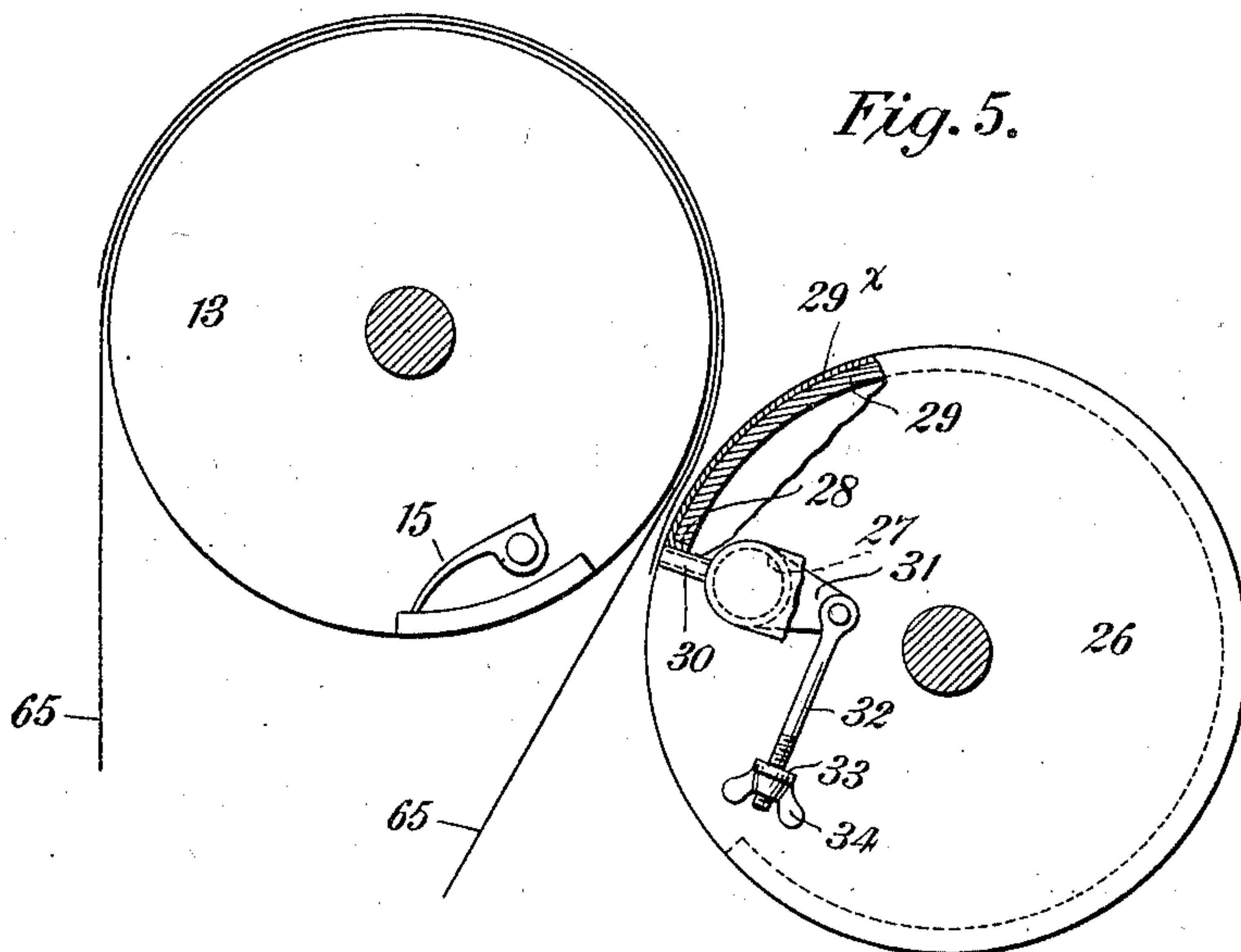
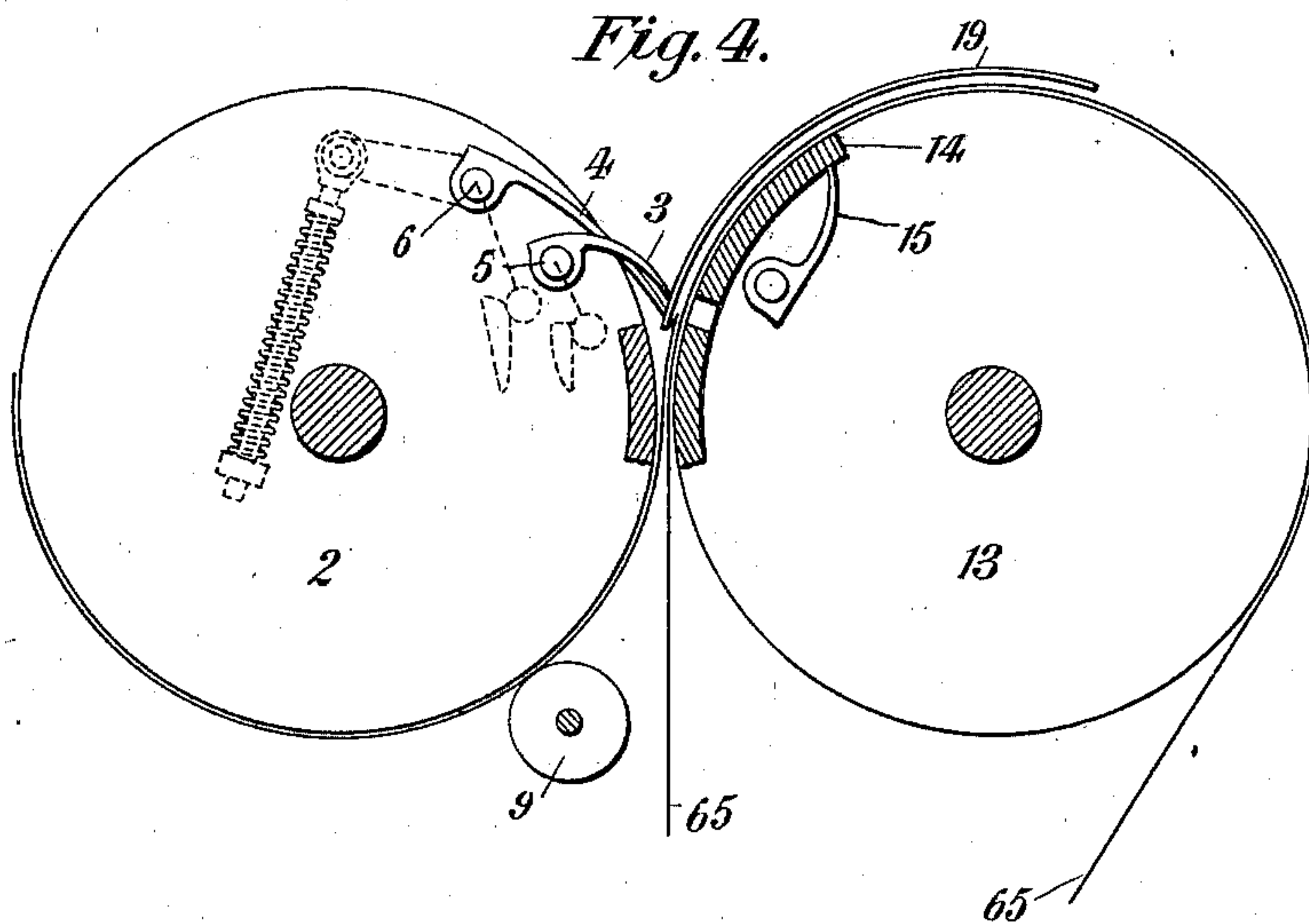
Patented Sept. 23, 1902.

W. SCOTT.
PRINTING MACHINE.

(Application filed Oct. 7, 1899.)

(No Model.)

3 Sheets—Sheet 2.



WITNESSES:
C. E. Ashley
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No. 709,515.

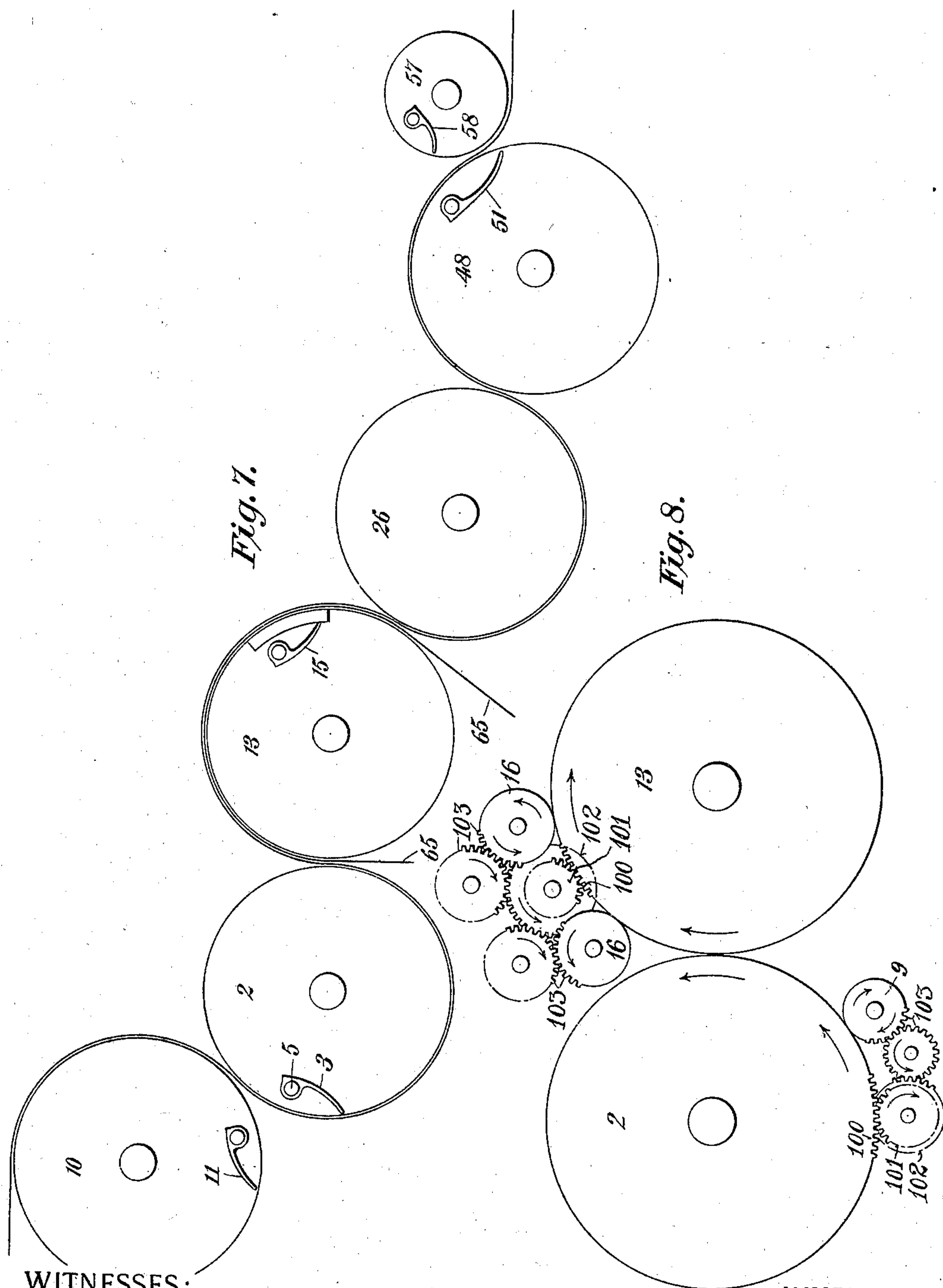
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W. SCOTT.
PRINTING MACHINE.

(Application filed Oct. 7, 1899.)

(No Model.)

3 Sheets—Sheet 3.



WITNESSES:

C. E. Ashley
MCM

INVENTOR

Walter Scott,
By his Attorney,
Richard W. Barker.

UNITED STATES PATENT OFFICE.

WALTER SCOTT, OF PLAINFIELD, NEW JERSEY.

PRINTING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 709,515, dated September 23, 1902.

Application filed October 7, 1899. Serial No. 732,861. (No model.)

To all whom it may concern:

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

The present invention relates to perfecting printing-machines of the class wherein the forms are arranged on rotary cylinders and coact with other cylinders to print both sides of sheets fed thereto.

One object of the invention is to avoid "set-off."

Another object is to secure accurate register and the transfer of sheets to and from impression-cylinders over which a tympan-web passes.

Another object is to adapt one and the same press for use in printing upon a web and also upon separate sheets with or without the use of a tympan-web, and other objects, as will hereinafter more fully appear.

To these ends the invention includes features of construction and combinations of devices hereinafter described, and more particularly pointed out in the claims concluding this specification.

The preferred form of the invention is illustrated in the accompanying drawings, forming part of this specification, in which—

Figure 1 is a side elevation of part of a printing-press in which the invention is embodied; and Figs. 2 and 3 are detail views, respectively, of a connection for an air-pipe and of gearing for changing the direction of winding up of a tympan-web. Fig. 4 is a diagrammatic view illustrating the transfer of a sheet from one cylinder to another on which there is a tympan-web. Fig. 5 is a like view illustrating the transfer of a sheet from a cylinder on which there is a tympan-web to another cylinder. Fig. 6 is a sectional view of a three-way valve. Fig. 7 is a diagrammatic view showing the course of a web through the press shown in Fig. 1. Fig. 8 is a view exaggerated as to proportions in some parts of gearing for causing pressure-rolls to have a slightly greater surface speed than have the cylinders with which they coact.

In the drawings the reference 1 indicates

a suitable framework in which the working parts are appropriately mounted.

2 is the first impression-cylinder and is provided with a set of grippers 3 and with lifting-fingers 4. The grippers 3 and fingers 4 are carried, respectively, by shafts 5 and 6, which are suitably journaled in the cylinder 2 and are operated in any suitable manner at the appropriate times to take, release, and lift the sheets.

7 8 are curved guides adjacent the cylinder 2 for retaining the sheets thereagainst as the cylinder rotates.

9 is a pressure or feed roll or pulleys co-acting with cylinder 2.

The sheets may be fed to the cylinder 10 (or to cylinder 2) in any suitable way, as by tapes and cutters receiving a web and severing it into sheets. (Not shown.) The cylinder 10 has a set of grippers 11 thereon for taking the sheets from the feeding-tapes and for releasing the same as the grippers 3 close down at the line of tangency of the two cylinders 2 and 10. A plate or form cylinder 12 coacts with the cylinder 2 to give impressions to one side of the sheet upon the cylinder 2. A second impression-cylinder 13 ad-

joins the cylinder 2 and is provided with a removable section 14 and with a set of grippers 15, which are placed to be held inactive when the section 14 is in place upon the cylinder 13. The section 14 may be held in place on cylinder 13 in any suitable way and when in place forms a continuation of the surface of the cylinder, or rather practically completes the surface thereof, and prevents sagging of the tympan when it is used. Adjacent the cylinder 13 and coacting therewith to hold the sheets thereagainst are pulleys 16, which are carried by shafts 17, journaled in bearings 18 on the framework 1. Curved guides 19 extend about the cylinder 13 from near the line of tangency thereof with cylinder 2 to near the second plate-cylinder 20, said guides being carried by transverse shafts or rods 21, which rest in open bearings 22 on the frame 1. In making ready the pulleys 16 and their shafts 17 and the guides 21 and their rods 22 may be removed in the order stated and be replaced in the inverse of said order. A set of guides 23 is shown for keeping the sheets against the cylinder 13, said

guides being at one side of the printing-line or line of contact of cylinders 13 and 20, and the guides 19 aforesaid being at the other side of said line. The cylinder 20 is provided with a set of fingers 24 on a shaft 24^x, journaled in the cylinder, and which are held closed by springs. (Not shown.) A cam 25 on the framework 1 is shaped to operate an arm 24^{xx} on shaft 24^x to open or move said fingers 24 as they pass the cylinder 13 for a purpose presently to appear.

Below the guides 23 is a take-off cylinder 26, which is provided with an air-pipe 27, extending longitudinally thereof adjacent the leading edge 28 of the sheet-supporting surface 29 thereof. Pipe 27 is provided with vents or suction 30, opening into the air and into the pipe 27. The pipe 27 is journaled in the ends 31^x of the cylinder and at one or both ends is provided with an arm 31, to which one end of a rod 32 is pivoted. The rod 32 passes through a lug or ear 33 on the adjacent end of the cylinder 26 and is screw-threaded and provided with a nut 34, by means of which the pipes 30 may be drawn tightly against the edge 28 aforesaid to hold one edge of a blanket or other sheet 29^x (see Fig. 5) on the surface 29. One end of the axis of the cylinder 26 is by preference provided with a bore 35, extending along the same and transversely thereof, as indicated in Fig. 2. The radial part of the bored-out portion 35 has inserted therein a short pipe 36, to which is secured an elbow 37, in which the end of the pipe 27 is arranged to turn, the joints all being air-tight. A short pipe 38 is inserted in the axial part of the bore 35, and the outer end thereof is provided with an elbow 39, pointing downwardly. The pipe 38 is preferably fast to the elbow and turns in the bore 35, a suitable stuffing-box 40 being provided to insure that the joint between the pipe 35 and the axis of the cylinder is air-tight. The elbow 39 is connected with a pipe 41, which connects with a cross-pipe 42, the two forming a T. The ends of the pipe 42 are connected one with an exhaust-air pipe 43 and the other with an air-pressure pipe 44. A suitable valve 45 is provided for the purpose of putting the pipe 41 in connection with either of the pipes 43 44, according to the position of the valve, or two valves may be used. The stem of the valve 45 is provided with an arm 46, with which a rod 47 is pivotally connected and by which the valve 45 is operated from time to time, as will shortly appear. Adjacent the cylinder 26 is a cylinder 48, on which is a cam 49 to operate valve 45. The rod 47 is forked to embrace the shaft of the cylinder 48 and is provided with a pin or roller 50 for engagement with cam 49, it being understood, of course, that the described construction may be placed at both ends of the cylinders 26 and 48. The cylinder 48 is provided with a set of grippers 51 for taking the sheets from the cylinder 26, and this cylinder may collect sheets in any

suitable way. A set of guides 52 is shown adjacent the cylinder 26 for retaining the sheets thereagainst, and these may be aided or replaced by a set of tapes 53, running on rollers or pulleys 54 and against the cylinder 26. A set of tapes 55, running on rollers or pulleys 56, bear against the cylinder 48 to retain the sheets thereagainst. From the cylinder 48 the sheets go to a transfer-cylinder 57, being taken by a set of grippers 58 thereon and being delivered by said grippers between sets of tapes 59 60 and thence delivered in any suitable manner. The tapes run on the cylinder 57 and on rollers or pulleys 61, while the tapes 60 run on rollers or pulleys 62.

When using the foregoing devices for printing upon a web of paper, the grippers 3 11 15 51 58, the lifters 4 and fingers 24, and the air-pipe 27 are all rendered inactive or inoperative in any suitable manner, as by removing the cams which operate the grippers, lifters, and fingers and turning off the connections with the pipe 27. (See Fig. 7.) The web is led to the first impression-cylinder in any suitable manner and passes through the machine around the cylinders 2, 13, 26, 48, and 57 to any suitable cutting and folding mechanism.

When the above-described devices are to be used without a tympan-web for perfecting sheets, the grippers 3, 11, 15, 51, and 58 and the air-pipe 27 are all put in operation, the section 14 being removed from the cylinder 13. A sheet is taken by the grippers 11 from a suitable feed and is delivered to the grippers 3 of the cylinder 2 as grippers 3 and 11 pass the line of tangency of cylinders 2 and 10, the grippers 11 being opened and grippers 3 closed in any suitable manner. The sheet is carried around the cylinder 2, receiving an impression from the plate-cylinder 12 as it passes the same, and is delivered to the second impression-cylinder 13 as the grippers 3 and 15 pass the line of tangency of the cylinders, the grippers 3 opening quickly and releasing the heads of the sheets. The fingers 4 are not used in this case, not being necessary, and the grippers 15 closing to take the sheet at this time. The sheet is carried around by the cylinder 13 and receives an impression from the plate-cylinder 20 as it passes the same. As the sheet approaches the line of tangency of cylinders 13 and 26 the suction or exhausts 30 also approach the same line, and the valve 45 is operated by the cam 49 and the link 47 to turn on the exhaust, as pipe 43, and as the grippers 15 and the head of the sheet pass said line of tangency the grippers are opened and the head of the sheet is pressed over the openings of the suction 30 and is drawn to the cylinder 26 and carried around the same until it reaches the line of tangency of cylinders 26 and 48, at which moment the suction is cut off and air-pressure is put on by the two-way valve 45, and the grippers 51, which have been previously opened, close on the sheet and transfer it to

the cylinder 48. The cylinder 48 may, as above intimated, collect two or more sheets thereon before delivering to the cylinder 57.

When the cylinder 48 is to deliver sheets to the cylinder 57, the grippers 58 open previously to the time the heads of the sheets on cylinder 48 reach the line of tangency of cylinders 48 and 57, and the grippers 51 open as the heads of the sheets reach said line and the grippers 58 close simultaneously therewith and transfer the sheets to the cylinder 57. As the grippers 58 pass the roller 62, co-acting with cylinder 57, they open and release the sheets, which then run out between tapes 59 60 and are folded and delivered in any suitable manner, or the sheets may be delivered flat. The sheets may be held against the cylinder 26 by suitable guides 52 in addition to the tapes 53, above described. When the cylinder 48 also collects sheets, the sheets may be prevented from dropping away therefrom by guides 64, in addition to or in lieu of the tapes 55.

In order to prevent set-off, it is desirable that a tympan-web be used, and the foregoing devices for transferring sheets from one impression-cylinder to another having the tympan-web thereon are especially useful in such case. A tympan-web 65 is detachably secured at its ends to spools 65^x 65^{xx}, which are carried by spindles or shafts 66 67. The tympan 65 is led from one of these spools around the second impression-cylinder 13 and then to the other spool. The frame 1 is provided with bearings 68, open at the top for the reception of the ends of the spindle of the paying-off roll of the tympan, and with vertical ways 69, along which blocks 70, provided with bearings 71 for the ends of the spindle of the receiving or winding-up roll of the tympan, move as the winding-roll gets larger and larger. Assuming that spindle 66 is in bearings 68 and spindle 67 in bearings 71, the tympan 65 passes from spool 65^x, around a guide-roller 72, to and around the second impression-cylinder 13, and around a guide-roller 73 to the spool 65^{xx}. As shown in full lines in the drawings, the tympan-web 65 is nearly completely wound on the spool 65^{xx}. The winding-up shaft for the tympan may be rotated in either direction in order to wind the web thereon, thus allowing of the use of both sides thereof without turning the roll end for end. The following means are shown for driving the winding-up roll: Two parallel friction-rollers 74 75 are journaled in suitable bearings in the framework 1, near the bottom thereof and at a distance apart such that the empty spool 65^{xx} may rest against and be turned by the two rolls 74 75 at the beginning of the winding up of the tympan 65. These rollers 74 75 are provided with pinions 76, which mesh with an idler-pinion 77, also journaled in the framework 1. The pinion 76 on roller 75 meshes with a pinion 78, which is driven by another pinion 79 and suitable gearing connecting the last with the main drive-shaft or

other part of the machine when it is desired to have the rolls 74 75 rotated in one direction; but when it is desired to have the rollers 74 75 rotate in the other direction the gear 76 on roll 75 is put in mesh with a pinion 80, which in turn meshes with a pinion 81, and the last-named pinion meshes with pinion 79 aforesaid. This change in mesh may be secured in any suitable way, as by having the pinions 78, 80, and 81 slidable endwise into and out of mesh with gears 76 and 79, or, what is the same thing, gears rigidly connected therewith, as indicated in Fig. 3, and bearing the references 76^x 79^x.

In order to transfer the full roll of the tympan to the bearings 68 and the empty shaft to the bearings 71, the following devices are provided: The guides or ways 69 are provided with holes 82 therein in which pins may be put for the support of the ways 83 for the roll-shaft. The ways 83 are at each side of the machine and are pivoted on studs 84, and each of the ways 83 may be removable from its stud 84 to give easy access to the machine, merely slipping it endwise thereof. Near their middle portion the ways 83 are provided each with a rounded notch 85 to receive the ends of the shafts 66 67 during the operation of transferring the wound-up roll to the bearings 68. When it becomes requisite to make such transfer, the end of the web 65 is disconnected from the spool, which is supported by the bearings 68, and the web is run through the press and wound wholly upon the winding-up roll. The ways 83 are put in place directly under the ends of the shafts 66 67, and the pins are inserted in the holes 82 close up to the ways 83, which are allowed to rest on the pins. Then the keys 71^{xx} are removed to release the blocks 71^x of the bearings 71, (it being understood that there is such construction at each side of the machine,) and the tympan-roll is then rolled out, with the projecting ends of the shaft supported upon the ways 83, as 67, and is rolled along the ways until the said ends of the shaft rest in the notches 85. The empty shaft, as 66, is then lifted from bearings 68 and over the full roll and is placed in the bearing 71, and the blocks 71^x and their keys 71^{xx} are put in place to secure it there. The wound-up or full roll is then moved along the ways 83 from the notches 85 and into the bearings 68, and the web is untied and is threaded through the machine and the end made fast to the empty spool on the shaft, which is now in the bearings 71. Previous to this the levers or ways 83 may be swung down or out of the way, the pins being removed from the holes 82, and the blocks 70 are lowered until the spool 65^x rests on the rollers 74 75, as indicated in dotted lines in Fig. 1.

The operation of the sheet-transferring mechanism when a tympan-web is used is as follows: The section 14 is put in place on the cylinder 13, the grippers 15 being held thereby on the inside of the cylinder, as indi-

cated in full lines in Fig. 1. The sheets are fed to the grippers 3 of cylinder 2 and receive impressions from the first plate-cylinder. As the grippers 3 pass the second impression-cylinder 13 they are opened slowly, and at the same time the fingers 4 are slowly moved outwardly, thus lifting the sheets from the cylinder 2, it being understood that the fingers 4 are under the heads of the sheets on the cylinder 2.

It will be understood, of course, that when the tympan-web is not used the grippers 3 may be thrown open quickly, as usual, and that grippers 15 close equally quickly. It will also be understood that when the tympan-web is used said grippers 3 cannot be opened when transferring sheets to cylinder 13 in the same way they may be opened when the tympan-web is not used. In the first case said grippers must be opened gradually, while in the second case they may be opened by tumbling them in the well-known way. Removable cams and pins are therefore used in the two cases. These are not shown, since they are well known in the art. The grippers 3 and fingers 4 are moved at this time at such rates of speed as will secure that the points of the grippers shall just touch the tympan-web on the cylinder 13 (since they cannot open into cylinder 13 because of the tympan-web 65) and that the fingers 4 shall keep the sheets in contact with the said tympan until the sheets pass beneath the ends of the guides 19 and nearly under the nearest roller 18, when the fingers 4 may snap back into place on the cylinder 2, in which case their operating mechanism is set to throw them after they pass pulleys 9 and before they get so far along as to strike the web 65 on cylinder 13. This slow movement of the grippers 3 and the fingers 4 is not necessary when a tympan-web is not used, there being danger in such case of damaging anything by a quicker motion of said parts. The sheets so fed to the cylinder 13 are carried around thereby and by the guides 19 and rollers 18 to and under the second plate-cylinder 20, whose fingers 24 are operated by the cam 25 to press them against the head or leading edge of the sheet on the cylinder 13 as the latter passes from the control of the guides 19 until said heads have passed beneath the guides 23, and I remark that pressure-rollers may be used in conjunction with guides 23 and cylinder 13 to retain the sheets against the cylinder 13. As the sheets approach the cylinder 26 their heads are drawn to the cylinder 26 by the suction of the pipes 30, which are operated as hereinbefore set forth. In this way the sheets are separated from the tympan-web and are transferred to the cylinder 26. The sheets are held by the exhaust of pipes 30 until the grippers 51 of cylinder 48 take the sheets in the manner hereinbefore described, when the suction is taken off, and the heads of the sheets may be blown off cylinder 26 by the same pipes 30, if desired; but it is sometimes enough to equalize the air-

pressures upon the sides of the head of the sheet. The sheets taken by the cylinder 48 may be collected or not, as desired, and then be delivered to the cylinder 57, and so to the tapes 59 60. It is understood, of course, that the tympan-web goes to the roller in the bearings 71 while the sheets are run through the machine, as above described. The cylinder 48 may operate as does the collecting-cylinder in my United States Patent No. 510,193, dated December 5, 1893.

The grippers 3 and fingers 4 may be omitted and an air or exhaust pipe and nozzles be used instead, said pipe and nozzles and the operating means being similar to those shown on cylinder 26. The action in such case is to exhaust the air-pipe to take sheets from cylinder 10 (or other feed) and to put on air-pressure to force the heads of the sheets against web 65 and cylinder 13 during the transfer of sheets thereto. The bearings 18 may be open, or they may be closed and openable in any suitable way.

The pulleys or rollers 9 and 16 are driven, by preference, at a surface speed slightly greater than the surface speed of the cylinders with which they coact in order to counteract the tendency of the sheets to slip on the cylinders at such times as they are not under the control of grippers. Such driving mechanism is illustrated in Fig. 8, where 100 designates gears on the cylinders 2 and 13, which mesh with gears 101 on the same shafts as gears 102, and where 103 designates gears connecting the gears 102 with the rolls 9 and 16. The gears 102 are of slightly-greater diameter than the gears 101, this difference being greatly exaggerated in the drawings for the sake of clearness.

What I claim as new, and desire to secure by Letters Patent of the United States, is—

1. In a rotary printing-press, an impression-cylinder having a longitudinal opening in the periphery thereof, grippers on said cylinder adapted to coact with the cylinder at one edge of said opening to retain sheets, and a removable section for placement in said opening to adapt the cylinder for web-printing, said grippers being held inside of said cylinder by said section.

2. In a rotary printing-press, an impression-cylinder provided with a longitudinal opening in the periphery thereof, grippers on said cylinder adapted to coact with the cylinder along one edge of said opening, a removable section for placement in said opening to adapt the cylinder to web-printing, said grippers being held inside of said cylinder by said section, and a tympan-web adapted to pass over said cylinder.

3. In a printing-machine, the combination of an impression-cylinder, a form or plate cylinder coacting with said impression-cylinder, guides at each side of but not crossing the printing-line of said cylinders and coacting with said impression-cylinder to retain the sheets thereon, and movable fingers on the

plate-cylinder for coacting with the impression-cylinder to retain the heads of the sheets thereagainst while passing from one set of guides to the other, substantially as described.

5 4. In a printing-machine, the combination of an impression-cylinder, a tympan-web passing over said cylinder, a form or plate cylinder coacting with said impression-cylinder and web, guides at each side of but not
10 crossing the printing-line of said cylinders and coacting with said impression-cylinder and web to retain the sheets thereon, and movable fingers on the plate-cylinder for co-
15 acting with the impression-cylinder to retain the heads of the sheets thereagainst while passing from one set of guides to the other, substantially as described.

5 5. In a printing-machine, the combination of two rotary printing-couples, a tympan-web
2 passing over the impression-cylinder of the second couple, means for retaining the sheets on the first impression-cylinder and trans-
ferring them to the second impression-cylinder, lifting-fingers on the second form or plate
25 cylinder for coaction with the second impression-cylinder to hold the heads of the sheets against said second impression-cylinder as the said heads pass the plate-cylinder, and
30 guides coacting with said second impression-cylinder at each side of but not crossing the printing-line thereof, substantially as described.

6. In a printing-machine, the combination of first and second impression-cylinders, first
35 and second form or plate cylinders, a tympan-web, grippers and lifting-fingers on the first impression-cylinder for retaining the sheets thereon and for delivering them to the second impression-cylinder, guides coacting with
40 said second impression-cylinder to take and retain said sheets, said guides not crossing the printing-line of said second impression-cylinder, other guides at the other side of but not
45 crossing the printing-line of said second impression-cylinder, and outwardly-movable pressers on the second form or plate cylinder for coaction with the second impression-cylinder to hold the sheets thereagainst while
50 passing said printing-line from one set of guides to the other, substantially as described.

7. In a printing-machine, the combination of first and second impression-cylinders, form or plate cylinders coacting therewith, a tym-
55 pan-web on the second impression-cylinder, means for retaining sheets upon the first impression-cylinder and moving their heads away therefrom, guides coacting with said second impression-cylinder and with said de-
60 livery or retaining means of the first impression-cylinder to transfer the sheets to the second impression-cylinder, means carried by the second plate-cylinder for retaining the heads of the sheets against the second im-
65 pression-cylinder as they pass the printing-line thereof, a take-off cylinder, and an exhaust on said take-off cylinder for drawing

the heads of the sheets from said tympan-web, substantially as described.

8. In a printing-machine, the combination 70 of an impression-cylinder, a tympan-web thereon, a take-off cylinder, and exhausts on said take-off cylinder for drawing the heads of sheets away from said tympan-web, substantially as described. 75

9. In a printing-machine, the combination of an impression-cylinder, a tympan-web thereon, a take-off cylinder provided with ex-
haust-nozzles for drawing the heads of sheets from said tympan-web, a transfer or collect- 80 ing cylinder, and a delivery, substantially as described.

10. In a printing-machine, the combination of a blanket-cylinder, an air or exhaust pipe journaled on said cylinder adjacent one edge 85 of said blanket-supporting surface of said cylinder and provided with nozzles, and means for rotating said pipe to press said nozzles against said edge and sheet or blanket to re-
tain the same in place, substantially as de- 90 scribed.

11. In a printing-machine, the combination of two rotary printing-couples for perfecting sheets, a tympan-web, means for retaining the sheets on the impression-cylinders of said 95 couples and transferring from the first to the second thereof, a take-off cylinder 26, and an air-pipe 27 thereon having outlets 30, substantially as described.

12. In a printing-machine, the combination 100 of impression-cylinder 2 provided with grippers 3 and lifting-fingers 4, pressure and feeding roll 9 coacting with cylinder 2 at a point intermediate the printing-line thereof and the point of transfer of the sheets to the second 105 impression-cylinder, a plate or form cylinder coacting with cylinder 2, a second impression-cylinder, guides 19 coacting with said second impression-cylinder, and a plate or form cylinder coacting with said second impression- 110 cylinder, substantially as described.

13. In a printing-machine, the combination of impression-cylinder 2 provided with grippers 3 and lifting-fingers 4, a coacting form or plate cylinder 12 below and to one side of 115 cylinder 2, pressure-roll 9 coacting with cylinder 2 at a point intermediate the printing-line thereof and the point of transfer to the second impression-cylinder, a second impression-cylinder 13, guides 19 and 23 and pres- 120 sure-rolls 16 coacting with cylinder 13, said guides 19 and 23 not crossing the printing-line of cylinder 13, a tympan-web on cylinder 13, a plate or form cylinder 20 coacting with cylinder 13 and provided with lifting-fingers 125 24, and means for taking the sheets from cylinder 13, substantially as described.

14. In a printing-machine, the combination of a rotary printing-couple for giving impres- 130 sions on one side of sheets, a second impression-cylinder 13, guides 19 and pressure-rolls 16 coacting with said cylinder 13, said guides not crossing the printing-line of the cylinder 13, means carried by the impression-cylinder

of said rotary couple for transferring sheets therefrom to said cylinder 13 and guides 19, a tympan-web on cylinder 13, a plate or form cylinder 20 coacting with cylinder 13, and
5 lifting-fingers 24 on said cylinder 20, substantially as described.

15. In a printing-machine, the combination of an impression-cylinder (as cylinder 13), guides (as guides 19), and pressure-rolls (as
10 rolls or pulleys 16) whose surface speed is greater than that of the said impression-cylinder, substantially as described.

16. In a printing-machine, the combination of an impression-cylinder, a take-off cylinder,
15 air-ports in said take-off cylinder, means for drawing air into and for blowing it out of said ports, whereby sheets may be drawn against said take-off cylinder and may be blown there-

from, and means for receiving the sheets blown from the take-off cylinder. 20

17. In a printing-machine, the combination of an impression-cylinder, a tympan-web thereon, a take-off cylinder, air-ports in said take-off cylinder, means for drawing air into and blowing it out of said ports, whereby
25 sheets may be drawn against said take-off cylinder and may be blown therefrom, and means for receiving the sheets blown from the take-off cylinder.

Signed at New York city, in the county of
New York and State of New York, this 2d
day of October, A. D. 1899. 30

WALTER SCOTT.

Witnesses:

RICHARD W. BACKLEY,
FRANK RYALL.