

(No Model.)

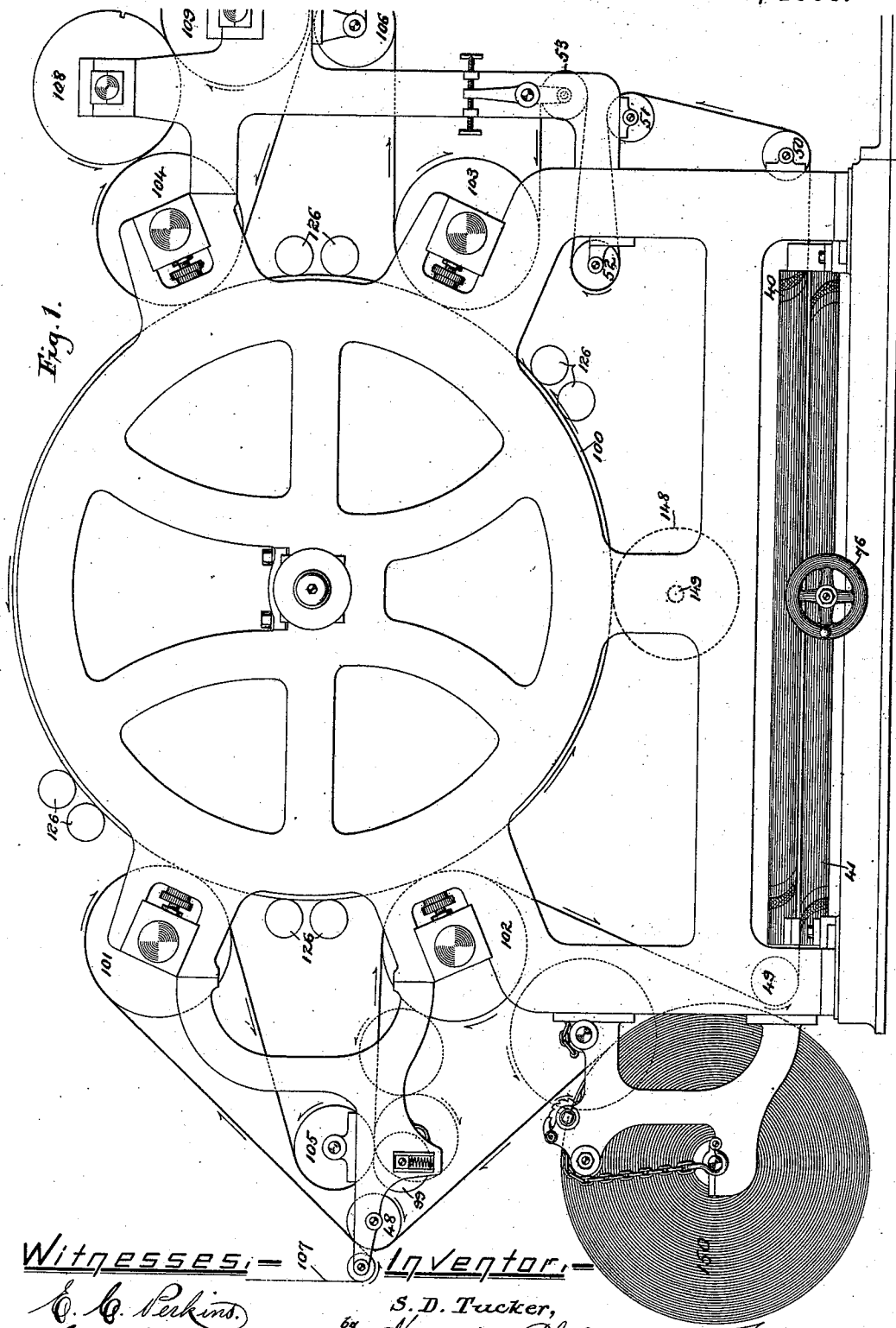
8 Sheets—Sheet 1.

S. D. TUCKER.

WEB PRINTING AND DELIVERY MECHANISM.

No. 380,001.

Patented Mar. 27, 1888.



Witnesses, — Inventor, —

E. C. Perkins,
Geo. H. Graham

S. D. Tucker,
by Munson & Philipp,
Attys.

(No Model.)

8 Sheets—Sheet 2.

S. D. TUCKER.

WEB PRINTING AND DELIVERY MECHANISM.

No. 380,001.

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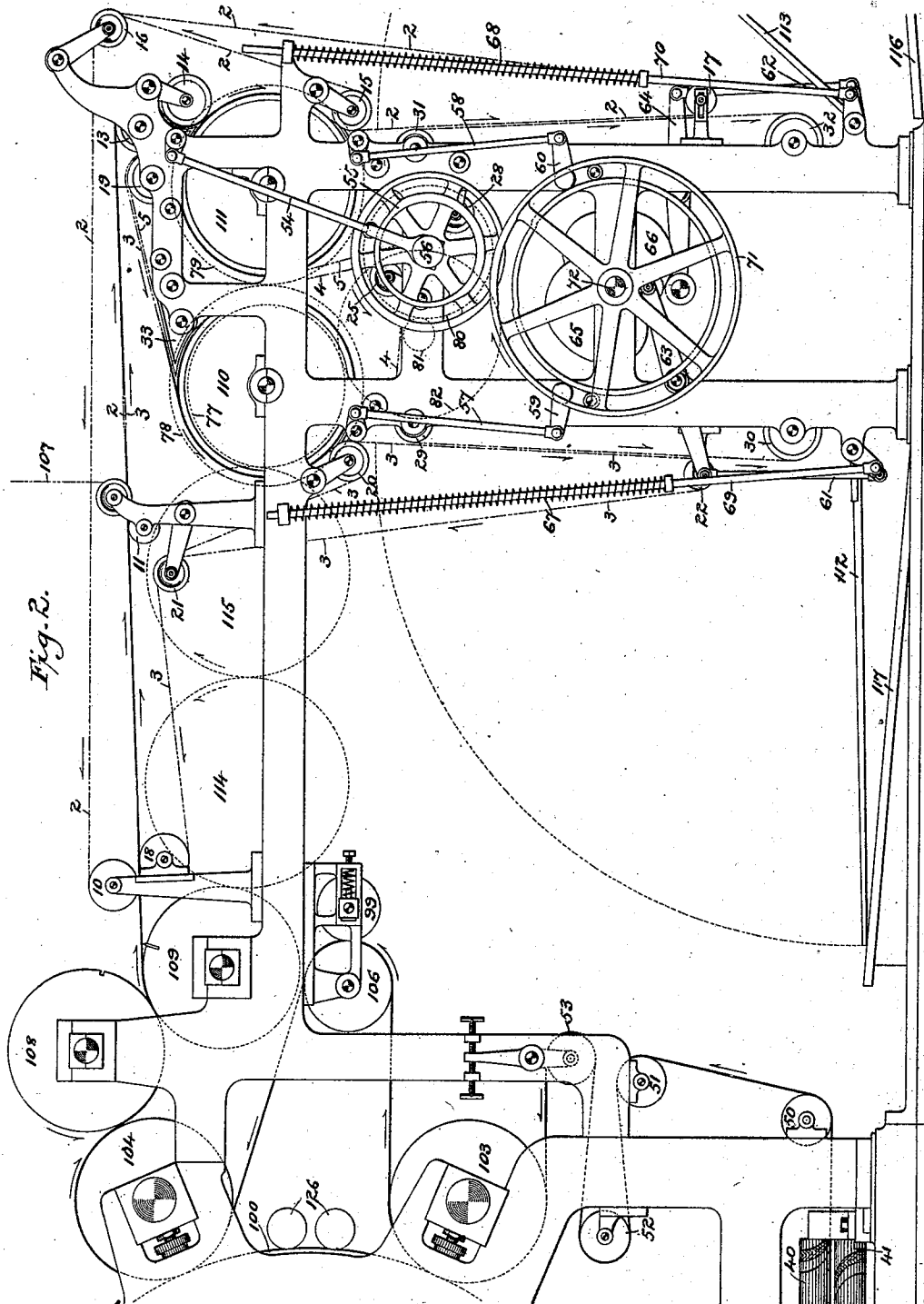


Fig. 2.

Witnesses.—

C. C. Perkins
Geo. H. Grataau.

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(No Model.)

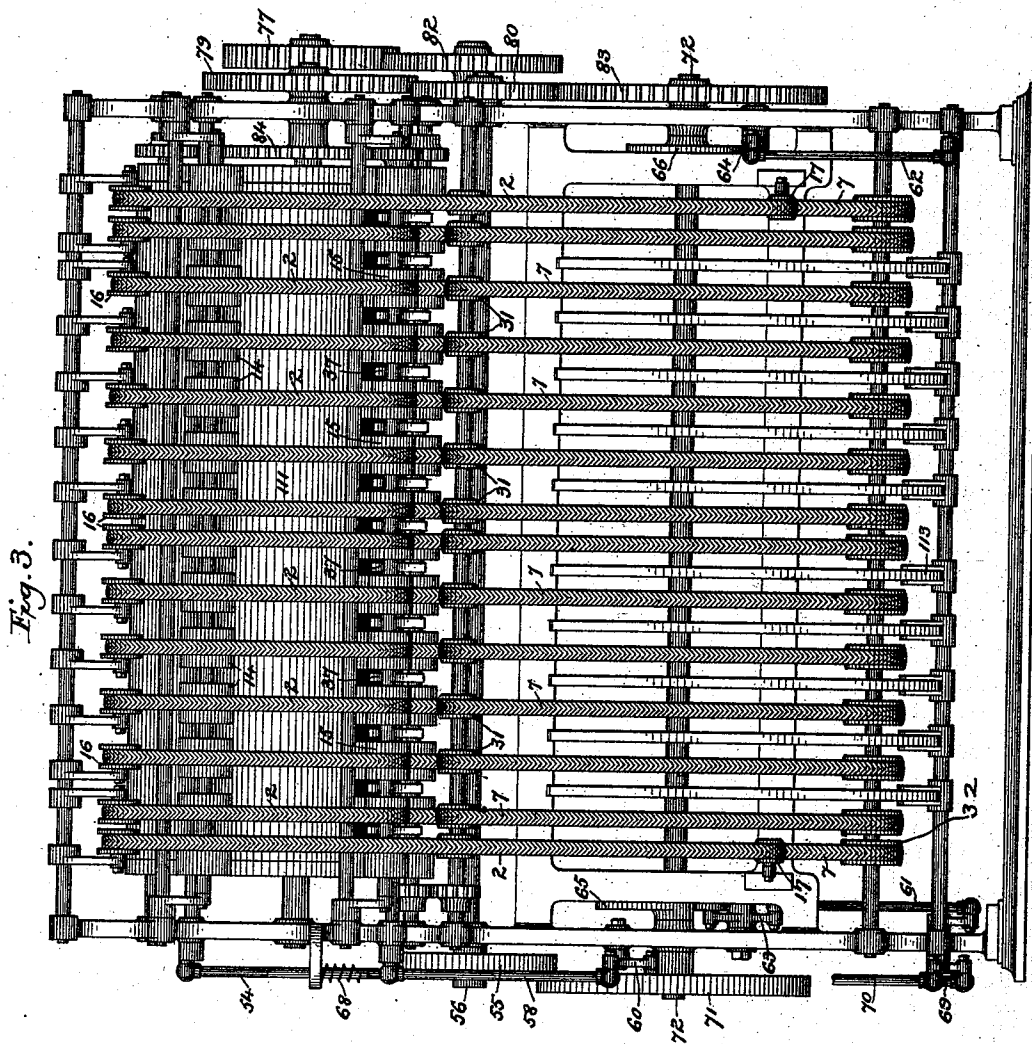
8 Sheets—Sheet 3.

S. D. TUCKER.

WEB PRINTING AND DELIVERY MECHANISM.

No. 380,001.

Patented Mar. 27, 1888.



Witnesses,—

E. C. Perkins,
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(No Model.)

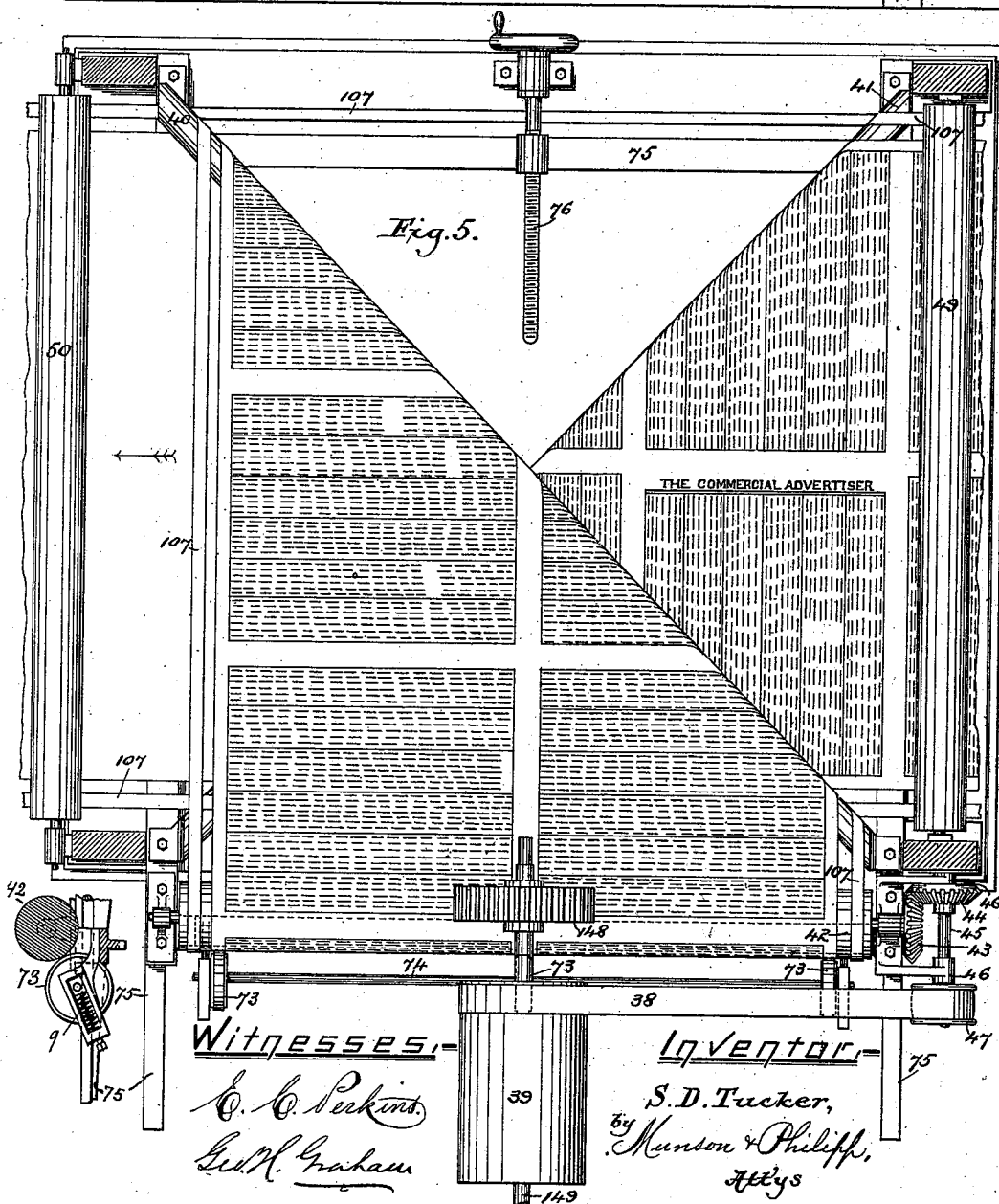
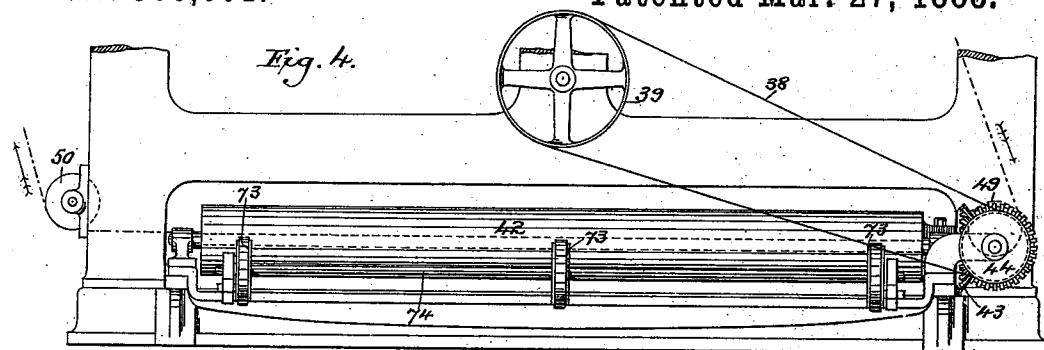
8 Sheets—Sheet 4.

S. D. TUCKER.

WEB PRINTING AND DELIVERY MECHANISM.

No. 380,001.

Patented Mar. 27, 1888.



Witnesses:

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Geo. H. Graham

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(No Model.)

8 Sheets—Sheet 5.

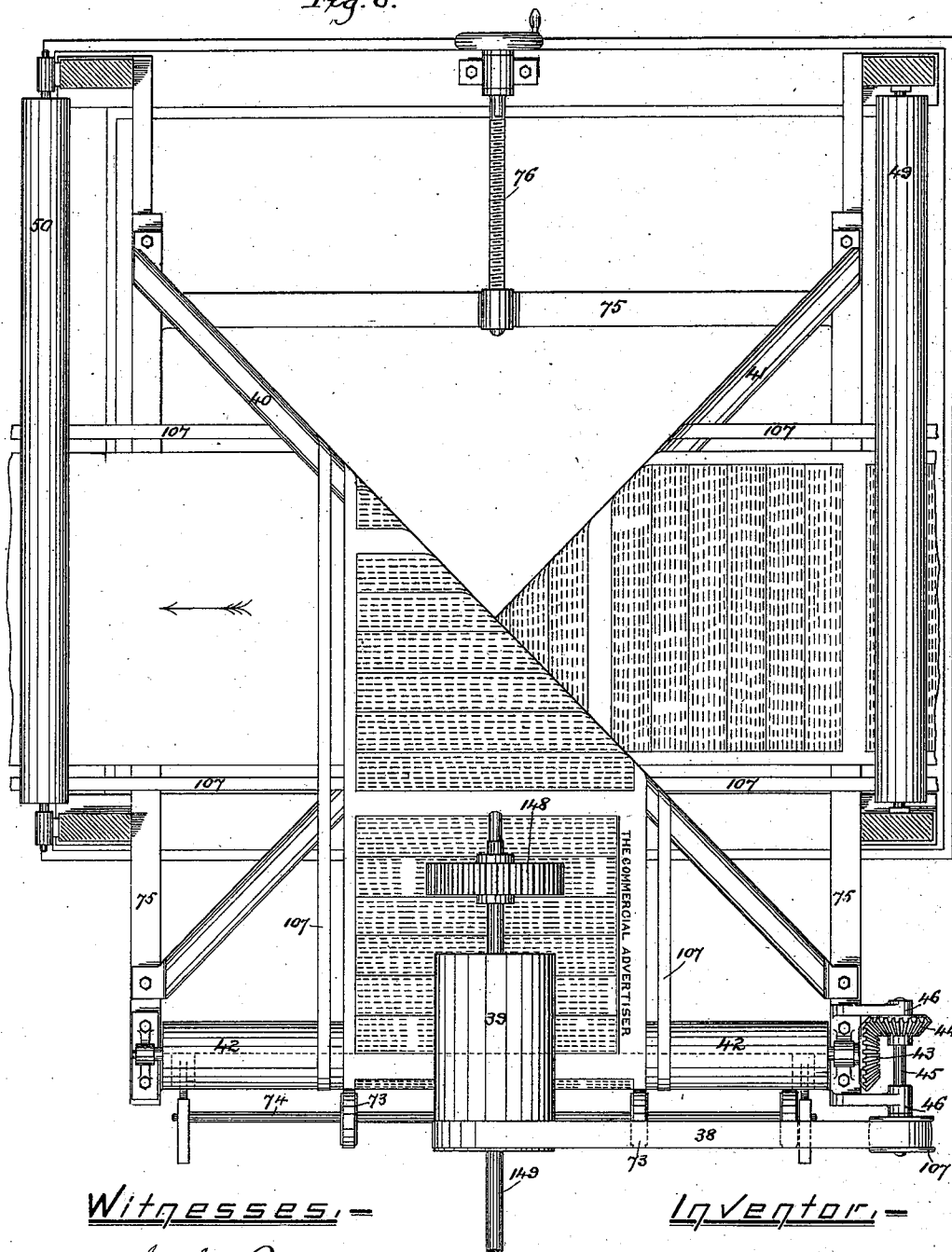
S. D. TUCKER.

WEB PRINTING AND DELIVERY MECHANISM.

No. 380,001.

Patented Mar. 27, 1888.

Fig: 6.



Witnesses, -

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(No Model.)

8 Sheets—Sheet 6.

S. D. TUCKER.

WEB PRINTING AND DELIVERY MECHANISM.

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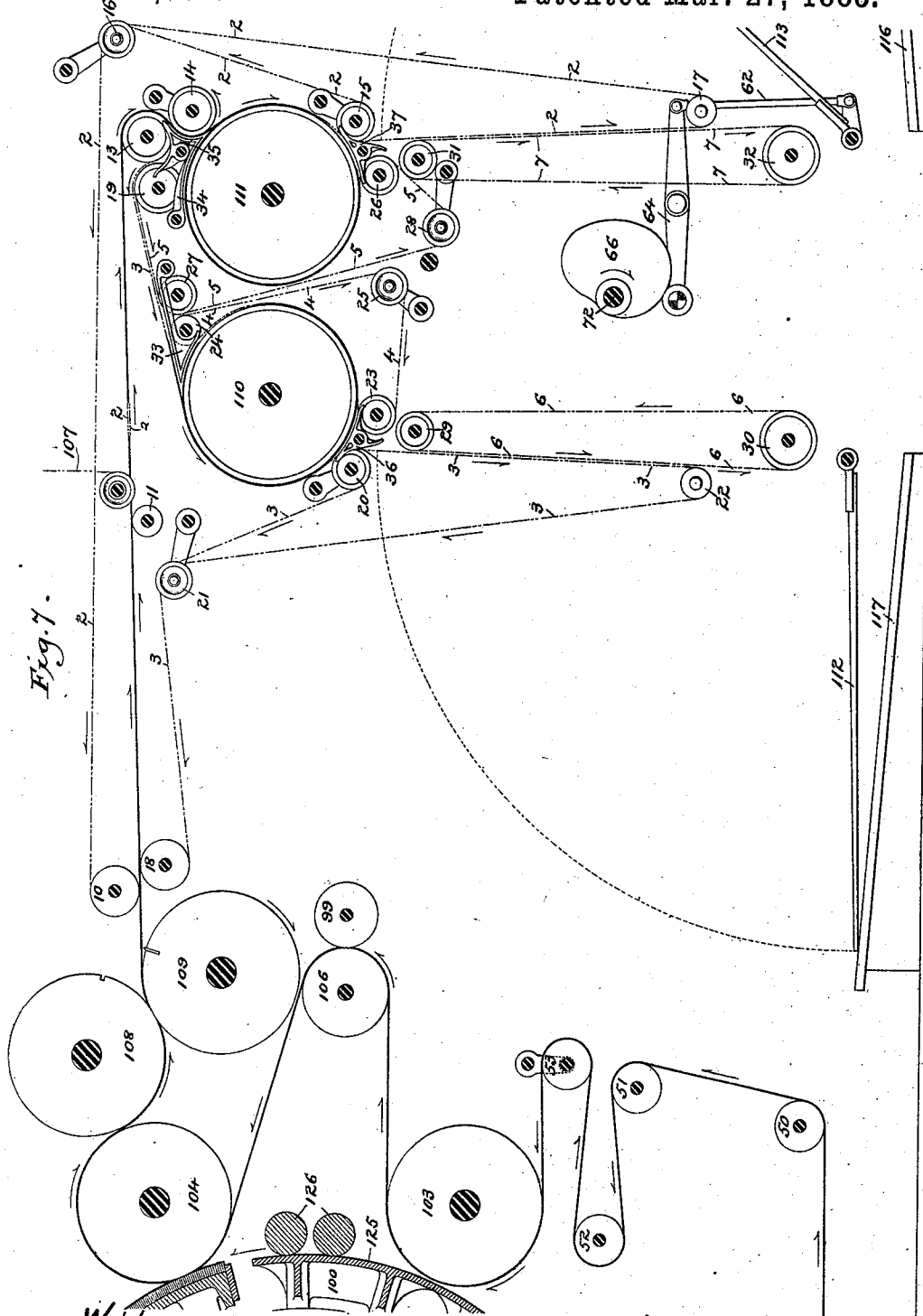


Fig. 7.

Witnesses, —

C. C. Perkins.
Geo. H. Graham

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S. D. Tucker,
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(No Model.)

8 Sheets—Sheet 7.

S. D. TUCKER.

WEB PRINTING AND DELIVERY MECHANISM.

No. 380,001.

Patented Mar. 27, 1888.

Fig. 8.

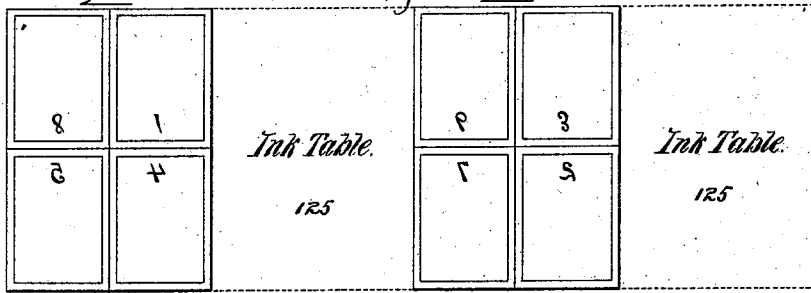


Fig. 9.

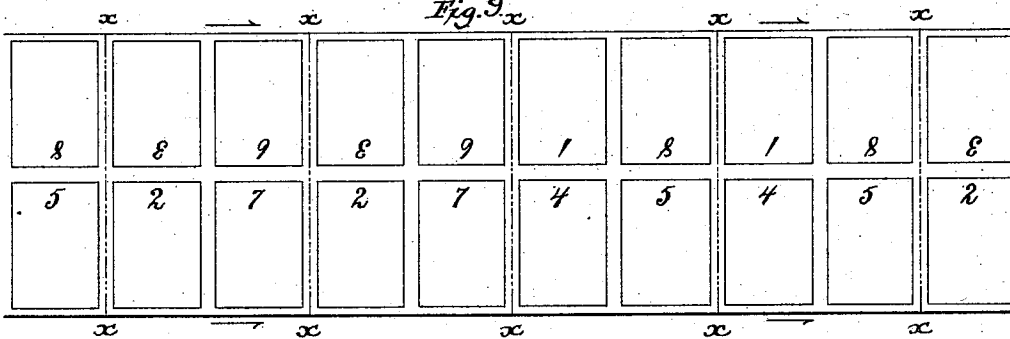


Fig. 10.

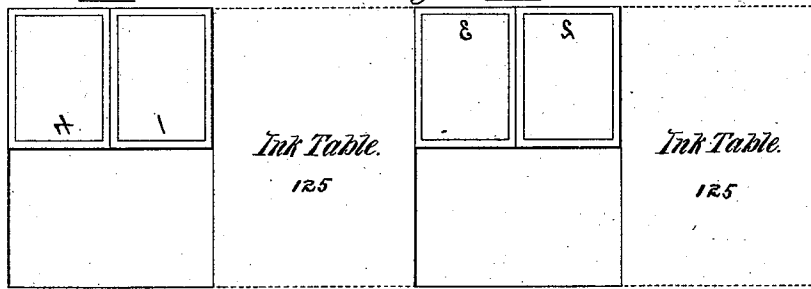
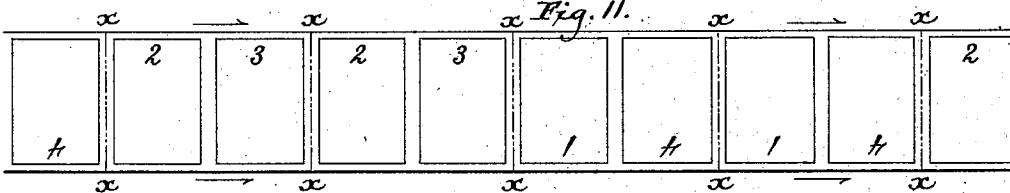


Fig. 11.



Witnesses.—

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L. H. Graham.

Inventor.—

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Attys

(No Model.)

8 Sheets—Sheet 8.

S. D. TUCKER.

WEB PRINTING AND DELIVERY MECHANISM.

No. 380,001.

Patented Mar. 27, 1888.

Fig. 12.

8	8	9	8	9	8	9	1	8	1	8	1	8	8	9
5	2	7	2	7	2	7	4	5	4	5	4	5	2	7

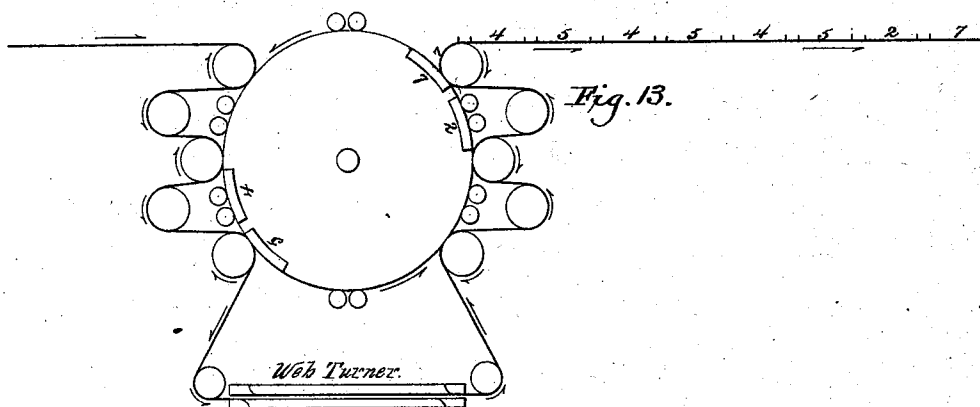
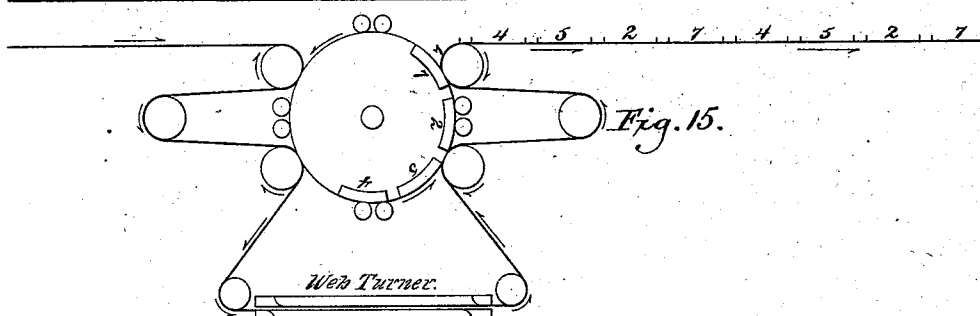


Fig. 14.

8	8	9	1	8	8	9	1	8	8	9	1	8	8	9
5	2	7	4	5	2	7	4	5	2	7	4	5	2	7



Witnesses.—

C. C. Perkins.
Geo. H. Graham.

Inventor.—

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UNITED STATES PATENT OFFICE.

STEPHEN D. TUCKER, OF NEW YORK, N. Y.

WEB PRINTING AND DELIVERY MECHANISM.

SPECIFICATION forming part of Letters Patent No. 380,001, dated March 27, 1888.

Application filed March 8, 1884. Serial No. 123,482. (No model.)

To all whom it may concern:

Be it known that I, STEPHEN D. TUCKER, a citizen of the United States, residing in the city of New York, county of New York, and State of New York, have invented certain new and useful Improvements in Web Printing and Delivery Mechanism, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

The present invention relates to that class of web-printing machines in which the forms for printing both sides of the web are carried upon a single cylinder, and in which the web after being printed upon one side is turned over and re-presented to the same forms to be printed upon its opposite side, the travel of the web between the printing of the opposite sides being so distanced that the inside pages of the sheet printed upon one side of the web will fall opposite the outside pages of the sheet printed upon the other side of the web, and vice versa. The machines of this class possess many desirable characteristics and have gone into extensive use, particularly in those establishments where it is desired to print directly from the type instead of from stereotype or other plates. When, however, the printing is to be done from the type, it is necessary to make the form-cylinder of a very much larger size than when plates are to be used, as in practice it is found impossible to successfully secure ordinary parallel type onto a cylinder as small as those commonly employed when plates are used; and when a cylinder of sufficient size to successfully carry the forms in type is used, it will be so large that the forms for printing both sides of an ordinary folio or four-page newspaper will occupy very much less than its whole circumference, and this fact makes it necessary in this class of machines, when the printing is to be done directly from the type, to provide an increased number of impression-cylinders and register-rolls, so that the forms will make two or more impressions upon each side of the web at each revolution of the form-cylinder.

It will readily be seen that when a web is perfected by a mechanism of this character its alternate sheets or pair or series of sheets will have different matter upon their upper or outer surfaces, and if the columns of the forms are

placed lengthwise of the form-cylinder, as is usual when printing from type, the heads of their pages will be at opposite sides of the machine, and this fact makes it necessary, in order to pile the sheets in a regular and orderly manner, to provide two flies and means for directing the alternate sheets or series of sheets to each.

It is the principal object of the present invention to increase the speed of the machines of this character; and to this end the invention consists in a means for aiding and easing the travel of the web during its passage through the turning or reversing mechanism between the printing of its opposite sides, and also in means for flying the sheets in two piles at greater speed than has heretofore been attained.

The invention also embraces various details of construction and combinations of parts both in the printing and delivery mechanisms, all of which will be hereinafter fully explained and particularly pointed out.

Referring to the accompanying drawings, Figure 1 is a side elevation of a web-printing mechanism of the character just specified embodying certain features of the present invention. Fig. 2 is a like view of a delivery mechanism therefor embodying certain other features of the invention. Fig. 3 is an end elevation of the delivery mechanism, looking from the right of Fig. 2. Fig. 4 is an elevation of the web-turning mechanism, looking from the rear of Fig. 1. Fig. 5 is a plan view of the same, showing the parts adjusted so as to operate upon a full-width web. Fig. 6 is a like view showing the parts adjusted to operate upon a half-width web. Fig. 7 is a longitudinal sectional elevation of the delivery mechanism. Fig. 8 is a development, on a smaller scale, of the circumference of the form-cylinder, showing the position of the eight forms for printing an eight-page sheet. Fig. 9 is a view illustrating the order in which the impressions from these eight forms are imprinted on one side of the web, the opposite side of the web being printed in proper order from these same forms. Fig. 10 is a development, upon a like scale, of the circumference of the form-cylinder, showing the position of the four forms for printing a four-page sheet. Fig. 11 illustrates the order in which the impressions from these four forms are imprinted

on a half-width web. Fig. 12 shows a web on which are printed three sheets in succession having the same side uppermost, and Fig. 13 is a diagram illustrating the printing mechanism to produce this result. Fig. 14 shows a printed web on which the alternate sheets have the same side uppermost, and Fig. 15 is a diagram illustrating the printing mechanism to produce this result.

Referring to Figs. 1, 2, and 7, it is to be understood that the printing mechanism is of substantially the construction of that shown and described in United States Letters Patent No. 274,534 and in my former application for Letters Patent, filed in the United States Patent Office June 22, 1883, consisting, essentially, of a type or form cylinder, four impression-cylinders, two register-rolls, a web-turner, and suitable inking mechanism. As this mechanism is designed to operate upon either a double or single width web, so as to print and deliver a product consisting of either eight or four page sheets, the manner in which it is arranged and operated to produce the eight-page product will be first described, after which the changes necessary for the production of a four-page product will be explained.

The form-cylinder 100, which is of such size that the forms will occupy but one-half of its circumference, which makes it of a size sufficient to permit ordinary parallel type to be secured to its periphery, is mounted in bearings in an appropriate frame-work, and carries eight forms of type, which, for convenience, it will be assumed are of suitable size to print the pages of an ordinary eight-page newspaper. These forms are arranged in two groups, located diametrically opposite each other, each group consisting of two pairs of forms, which are placed end to end upon the cylinder, with their columns of matter parallel with its axis and the heads of their pages together at its center. These eight forms are so arranged that those for printing pages 5 4 and 8 1 form one group, and those for printing pages 7 2 and 6 3 the other, the forms for pages 5 8 and 7 6 being the advance ones of their respective groups as the cylinder revolves, as shown in Fig. 8. The spaces upon the cylinder between the groups of forms are occupied by ink-distributing tables or surfaces 125, which are supplied with ink in the usual manner, and from which ink is taken and supplied to the forms by ordinary form-rolls, 126, which operate in the same manner as in the well-known Hoe type-revolving press.

Inasmuch as the forms occupy only one-half the circumference of the form-cylinder, it becomes necessary, in order to print the entire surface of the web, that each form should act twice upon each side of the web at each revolution of the cylinder, and to accomplish this four impression-cylinders and two register-rolls are provided.

The web to be printed is led from its roll 150 around a leading-roll, 48, and thence to and

around the first impression-cylinder, 101, thence outward around a register-roll, 105, and thence inward again to and around the second impression-cylinder, 102. The register-roll 105 is placed at such a distance from the form-cylinder that the advance edge of the impression made on the web by the first group of forms against the first impression-cylinder will arrive upon the second impression-cylinder just in time to exactly join with the rear edge of the impression made by the same group of forms against that cylinder, from which it results that the first group of forms makes two impressions upon the web in succession, the second being just in advance of the first.

Following the rear edge of the impression made by the first group of forms against the first impression-cylinder will be a blank space equal to the space upon the form-cylinder between the groups of forms, and at the end of this space the second group of forms will make an impression upon the web against the first impression-cylinder, and, passing to the second impression-cylinder, will make a second impression just in advance of the first, which second impression will just join with the impression given by the first group of forms against the first impression-cylinder, and thus fill the blank space referred to. This operation being repeated at each revolution of the form-cylinder, one side of the web will be wholly covered, the pages for each side of the sheet occurring twice in succession, as $\frac{1}{4}-\frac{3}{4}$, $\frac{1}{4}-\frac{3}{4}$, $\frac{3}{4}-\frac{1}{4}$, $\frac{3}{4}-\frac{1}{4}$, &c., as shown in Fig. 9.

After passing the second impression-cylinder the web, now printed upon one side, is led around a leading-roll, 49, to a web-turning mechanism which is mounted in a movable frame and is similar in construction and operation to that shown in my application for Letters Patent filed June 22, 1883, by which it is reversed, so as to present its unprinted side to the forms. After leaving this web-turner the web passes around leading-rolls 50 51 52 53, and thence to and around the third impression-cylinder, 103. From this cylinder the web passes outward around the second register-roll, 106, and thence inward to and around the last impression-cylinder, 104.

The operation of the form-cylinder, in connection with the impression-cylinders 103 104, to print the side of the web now presented is exactly the same as already described in connection with the first pair of impression-cylinders, and consequently need not be repeated.

The distance traveled by the web between the printing of its opposite sides is so regulated by the position of the rolls 49 50 51 52 53, one of which, 53, is made adjustable, that the impressions upon its opposite sides will be in perfect register, and that the pages for the inside of the sheets will be backed by the pages for the outside, and vice versa.

The register-rolls 105 106, around which the web is conducted between each pair of impression-cylinders, may, and preferably will,

be provided with forwarding-rolls, as 99, similar to those shown in the Letters Patent before referred to.

The printing mechanism just described may, if desired, be provided with tapes, as 107, arranged as shown and described in my application for Letters Patent filed April 27, 1882, Serial No. 59,747, to aid in conducting the leading end of the web through the mechanism at the commencement of the printing operation.

Motion is communicated to the above-described mechanism from the driving-shaft 149 through a gear, 148, fixed thereon, which engages with a gear upon the shaft of the form-cylinder, this latter gear in turn driving the impression-cylinders through gears fixed on their respective shafts. The web-turning mechanism which operates to turn or reverse the web between the printing of its opposite sides is, as before stated, of substantially the construction shown in my former application for Letters Patent, and consists, as shown in Figs. 4 and 5, of a laterally-movable frame, 75, in which are mounted two turning-bars, 40 41, which are arranged at right angles to each other and at an angle of forty-five degrees to the path of travel of the web, and a leading-roll, 42, mounted at the ends of the bars and arranged at right angles to the axis of the form-cylinder, said frame being provided with an adjusting-screw, 76, by which it can be moved laterally, so as to bring the bars 40 41 and roll 42 into position to properly reverse a web of full or one-half width.

It has been found in practice that where a web-turning mechanism of this character is used the speed of the printing mechanism is limited by the inability of the paper to withstand the strain due to the friction caused by drawing it around the two fixed turning-bars 40 41 when the printing mechanism is run at its highest rate of speed. It is very desirable, therefore, that means should be provided by which this strain upon the paper can be reduced, and to this end I provide means by which the paper is drawn around each bar independently of the other, so that it is required to withstand the friction of only one bar at a time, thus reducing the strain one-half and consequently permitting the printing mechanism to operate at greater speed with paper of the same quality. To effect this the shaft of the roll 42 is provided with a bevel-gear, 43, which engages with a like gear, 44, mounted on a shaft, 45, which is journaled in brackets 46, secured to the movable frame 75. The end of the shaft 45 is provided with a pulley, 47, which is connected by a belt, 38, with a pulley, 39, upon the driving-shaft 149 of the printing mechanism. The pulley 39 is of sufficient width to allow the belt 38 to shift for the required lateral adjustment of the frame 75, and it and the pulley 47 are so proportioned that the roll 42 will have the same surface speed as the form and impression cylinders.

To insure the positive drawing of the web

around the first turning-bar, the roll 42 is provided with three or more elastically-faced co-operating feeding-disks, 73, which are mounted upon a shaft, 74, and constantly pressed against the roll 42 by means of suitable springs, 9. (See Fig. 5.) These disks are preferably adjusted to run on the blank margins of the web. The web is drawn around the second turning-bar by the impression-cylinders 103 104 and register-roll 106 in the usual manner. After leaving the last impression-cylinder, 104, the web passes between the cutting-cylinders 108 109, which operate in the usual manner to partially sever the web upon the lines *xx* (see Fig. 9) between its respective printed sheets, after which the web passes into the control of the tapes 2 3, which are accelerated in the usual manner, so as to complete the severance of the sheets and create working-spaces between them for the operation of the switches, and afterward deliver them to the laying or piling mechanism. The cutting-cylinders 108 109, which, as here shown, are of a circumference just equal to the length of one of the printed sheets, are connected by gears, in the usual manner, with the last impression-cylinder, 104, so as to be driven in unison therewith.

By an inspection of Fig. 9 it will be seen that as a result of the manner in which the web has been perfected by the printing mechanism already described the sheets severed therefrom do not as they travel to the delivery mechanism all contain the same printed matter upon their upper or outer surfaces, but that each alternate pair of sheets bears different printed pages. For this reason it has been customary heretofore, when the sheets severed from the web thus perfected were to be piled in a flat or unfolded condition, to associate the sheets of the similarly-printed pairs, and then direct the alternate pairs to different sheet-fiers, so that each fly at each stroke piled two sheets. It has been found in practice, however, that when working in this manner the two fliers cannot be operated sufficiently fast to properly pile the sheets as fast as they can be produced by the printing mechanism. This difficulty is overcome in the present invention by providing two collecting cylinders, 110 111, and means for directing the pairs of similarly-printed sheets alternately to each cylinder—that is to say, means by which those pairs of sheets having pages $\frac{1}{2}$ — $\frac{3}{4}$ on their upper or outer sides are directed to one of said cylinders and those pairs having pages $\frac{3}{4}$ — $\frac{1}{2}$ upon their corresponding sides are directed to the other. When four, six, or any other predetermined number of sheets have been thus collected upon each cylinder, they are directed off the cylinder in a body and pass to the proper fly to be piled on the table. It is obvious that by this arrangement the speed of the printing mechanism may be increased, while that of the fliers is reduced.

The collecting-cylinders 110 111, which are arranged side by side, as shown in Figs. 2 and

7, receive motion in the following manner: The shaft of the cylinder 110 is provided upon its outer end with a gear, 77, (see Fig. 2,) which is connected, through intermediates 114
 5 115, with a gear of like size upon the shaft of the cutting-cylinder 109, while the cylinders 110 111 are connected to each other by gears 78 79, so that the two collecting-cylinders run turn for turn with each other and with the
 10 cutting-cylinders.

The tapes 2 3, which convey the sheets from the cutting-cylinders to the collecting-cylinders and from the latter to the flies 112 113, are arranged as follows: The tapes 2 pass around pulleys 10, thence above pulleys 11 and around
 15 pulleys 13 14, thence partially around the collecting-cylinder 111 and past pulleys 15. From the pulleys 15 all except the two outer or marginal tapes of the series return directly around
 20 pulleys 16. The two marginal tapes, however, pass downward around pulleys 17, located just above the fly 113, from which pulleys they also return around the pulleys 16. The tapes 3 pass around pulleys 18, thence above the
 25 pulleys 11 and around the pulleys 13, thence above pulleys 19 to and partially around the collecting-cylinder 110 and past pulleys 20. From the pulleys 20 all except the two outer or marginal tapes of this series return directly
 30 around pulleys 21. The two marginal tapes, however, pass downward around pulleys 22, located just above the fly 112, and thence return around the pulleys 21.

Co-operating with the tapes 2 3 and the collecting-cylinders 110 111 are two series of
 35 tapes, 4 5, which are arranged as follows: The tapes 4 pass around pulleys 23, located just below the cylinder 110, thence upward partially around the said cylinder, returning
 40 around pulleys 24 25. The tapes 5 pass around pulleys 26, thence upward partially around the cylinder 111, thence around the pulleys 19, returning around pulleys 27 28. Co-operating with the tapes 2 3, to aid in conveying the associated sheets from the cylinders 110 111 to the flies 112 113, are two series of tapes, 6 7, the former of which pass
 45 around pulleys 29 30, while the latter pass around pulleys 31 32. The spaces between the pulleys 27 and the point where the tapes 3 meet the cylinder 110, and also between the pulleys 24 and the same point, are bridged by a series of stationary guides, 33, which co-operate with the tapes 3 to properly convey the
 50 sheets onto the said cylinder and to hold them to the cylinder after they have been released from the tapes 4, and the space between the pulleys 14 19 is bridged by a similar series of guides, 34, which operate to hold the sheets
 55 onto the cylinder 111 after they have been released from the tapes 5. Between the pulleys 13 14 there is located a switch mechanism, which may be of any approved form and which operates to direct the sheets alternately into
 65 the pathways formed by the tapes 3 5 and the tapes 2 and cylinder 111. As illustrated, the switch mechanism consists of an ordinary os-

cillating switch, 35, which is operated at each second revolution of the cylinders 110 111 by means of a connecting-rod, 54, and the grooved
 70 cam 55, which is mounted upon a transverse shaft, 56, which receives motion in the following manner: This shaft is provided with a gear, 80, which engages with a pinion, 81, secured to an intermediate, 82, which in turn
 75 engages with the gear 77 upon the shaft of the collecting-cylinder 110. The gears 77 and 82 are of the same size; but the gear 80 and pinion 81 are so proportioned that the cam 55 makes but one revolution to each four revolutions of the collecting-cylinders.
 80

The associated sheets are directed off the cylinders 110 111 by means of switches 36 37, which are operated at the proper times through connecting-rods 57 58 and bell-crank levers 59
 85 60 from a grooved cam, 71, mounted upon a transverse shaft, 72, which is driven by means of a gear, 83, which engages with the gear 80 upon the shaft 56, said gears 80 83 being so proportioned that the cam 71 makes but one
 90 revolution to eight revolutions of the collecting-cylinders.

The sheet-fliers 112 113 are operated in substantially the usual manner, their upward movement being effected through connecting-rods 61 62 and levers 63 64 from cams 65 66
 95 upon the shaft 72, and their return movement by springs 67 68, acting upon rods 69 70.

The shafts of the pulleys which drive the several series of tapes are driven by suitable
 100 gearing, so as to move in unison, motion being imparted to them from the inside gears, 84, on the shafts of the collecting-cylinders, which engage with pinions on the shafts of the pulleys 14, 15, 19, 20, 23, 24, and 26.
 105

The operation of the delivery mechanism thus organized is as follows: The severance of the sheets from the web having been completed by the tapes 2 3, as already stated, the sheets will pass forward between said tapes
 110 until they arrive at the pulleys 13. For convenience it will be assumed that the first sheet which arrives at said pulleys bears pages $\frac{1}{4}$ upon its upper or outer surface, and that the switches 35 37 are in the position shown in
 115 Fig. 7. This will cause the first sheet to be directed onto the collecting-cylinder 111 and be carried around upon its surface until its leading edge arrives at the switch 35 upon the completion of one revolution of the cylinder,
 120 when the leading end of the second sheet, which bears the same printed pages upon its upper or outer surface, will likewise be directed onto the cylinder, so as to be associated with the first. As the leading end of the third
 125 sheet, which bears the printed pages $\frac{3}{4}$ upon its upper or outer surface, arrives at the pulleys 13, the switch 35 will be shifted, so that said sheet, instead of being directed onto the cylinder 111, will pass forward between the
 130 tapes 3 5 onto the cylinder 110, and the fourth sheet, bearing the same printed pages upon its upper surface, will in like manner be directed onto the same cylinder and associated

with the third sheet. As the leading end of the fifth sheet, bearing pages $\frac{1}{4}$ — $\frac{3}{8}$ upon its upper or outer surface, arrives at the pulleys 13, the switch 35 will be shifted back to its first position, so that the fifth and sixth sheets will be directed to and associated with the first and second sheets upon the cylinder 111. Shortly after this takes place the switch 37 will be shifted, so that as the leading ends of the four associated sheets pass the pulleys 15 they will be directed off the cylinder and into the bite of the tapes 2 7. The fly 113 having in the meantime been raised by the cam 66, this lot of sheets will at the proper time be taken by said fly and deposited upon the piling-table 116. As the leading end of the seventh sheet, bearing pages $\frac{3}{8}$ — $\frac{5}{8}$ upon its upper or outer surface, arrives at the pulleys 13, the switch 35 will be again shifted, so that the seventh and eighth sheets will be directed onto the cylinder 110 and associated with the third and fourth sheets. As the leading end of these four associated sheets arrives at or near the pulleys 20, the switch 36 will be operated, so that as the sheets pass the pulleys 20 they will be directed off the cylinder and into the bite of the tapes 3 6. The fly 112 having in the meantime been raised by the cam 65, this lot of sheets will at the proper time be taken by said fly and deposited upon the piling-table 117, and so the operation will continue to be repeated, the sheets bearing the inside pages upon their upper surfaces being directed to and associated in lots of four each by one cylinder and delivered to one fly, while the sheets bearing the outside pages upon their upper surface are directed to and associated in like lots by the other cylinder and delivered to the other fly, thus causing all the sheets upon each piling-table to occupy a uniform position, and at the same time permitting the printing mechanism to be operated at a very high and the sheet-flyers at a comparatively low rate of speed.

By changing the speed of the shaft 72, which carries the cams 71, 65, and 66, the switches 36 37 may be operated at every twelfth, sixteenth, or other revolution of the collecting-cylinders, so that the sheets, instead of being associated into lots of four, will be associated into lots of six, eight, or more before passing to the flies.

If it should be desired to operate the printing and delivery mechanisms herein described to produce and deliver a product consisting of four instead of eight page sheets, the two pairs of forms for printing the four pages will be placed upon one end of the form-cylinder, the heads of the pages of one pair lying at the end of the cylinder and the heads of the other pair at its center, as shown in Fig. 10. A web of one-half the former width will be used and the web-turner will be so adjusted as to properly reverse said narrow web, as shown in Fig. 6 and as described in my former application for Letters Patent before referred to. When the printing mechanism is thus arranged, the

pages will be printed in the order shown in Fig. 11. The web will then be severed upon the lines $x x$, and all sheets bearing pages 3 2 upon their upper surfaces will be directed to and associated, say, by the cylinder 111 and piled by the fly 113, while all sheets bearing pages 4 1 upon their upper surfaces will be directed to and associated by the cylinder 110 and piled by the fly 112 in the same manner as already described in connection with the eight-page sheets.

Although the system of taping herein shown and described is regarded, all things considered, as the best for giving the required movements to the sheets, yet it will be readily understood that it may be varied in many of its details without departing from the invention. The collecting-cylinders 110 111 may also, if desired, be provided with grippers or other sheet-retaining devices for holding the leading ends of the sheets to the surfaces. The roll 42 of the web-turner may also be driven by different means from that shown. If found more desirable, gearing may be substituted for the belt 38, one of the gears being made capable of sliding on its shaft to permit of the lateral adjustment of the turner.

As shown in Figs. 1, 2, and 7 of the drawings and as thus far described, the form-cylinder is of such size that the forms cover one-half of its circumference and consequently is provided with two impression-cylinders for each side of the web. The form-cylinder is not, however, limited to this size. It may be of such size that the forms will cover its entire circumference, or any aliquot part thereof, and be provided with a corresponding number of impression-cylinders. Fig. 13 illustrates an organization in which the forms cover only one-third of the circumference of the form-cylinder and in which three impression-cylinders are consequently employed for each side of the web. When the printing mechanism is thus organized, the web, instead of being printed so that its alternate pairs of sheets will have the same printed pages upon their corresponding sides, will be printed so that its alternate series of three sheets will have the same pages upon their corresponding sides, as indicated in Fig. 12. When the web is thus printed, the mechanism which operates the switch 35 will be so modified that series of three sheets will be alternately directed to each of the collecting-cylinders, and the mechanism for operating the switches 36 37 and the flies will be modified, so as to cause said switches and flies to properly co-operate with the cylinders. As hereinbefore described, the forms are arranged in two groups upon the form-cylinder; but it is also to be understood that the invention is not limited to such an arrangement of the forms, as the forms may, if preferred, be arranged in a single group, as indicated in Fig. 15. When the forms are arranged in this manner, or when the forms are so large or of such number that they cover the whole circumference of the form-cylinder, the web,

instead of being printed so that the alternate pairs or series of sheets will have different printed pages upon their corresponding sides, will be printed so that its alternate sheets will have different printed pages upon their corresponding sides, as shown in Fig. 14. When the web is thus printed, the mechanism which operates the switch 35 will be modified, so that alternate sheets will be directed to each of the collecting-cylinders.

A threading-tape located just outside of each edge of the web and following its course through the machine, and also the combination, with the form and impression cylinders and web-turners, of associating mechanisms for associating like sheets together, and also the same in combination with two piling mechanisms are not herein claimed, as such matter is claimed in my application filed April 27, 1882, Serial No. 59,747, now Patent No. 367,123. Neither is the combination, with a printing mechanism capacitated to operate upon webs of different widths, of a movable web-turner, whereby webs of different widths may be reversed without lateral transfer, and also the same where the printing mechanism is capacitated to print both sides of the web from the same forms, and also the combination, with the turning-bars and their roll mounted upon a movable frame or carriage, of means for adjusting the position of said frame, herein claimed, as such matter is claimed in my application filed June 22, 1883, Serial No. 98,901, now Patent No. 372,721.

What I claim is—

1. The combination, with the bars 40 41 and the driven roll 42, forming a web-turner, of the

disks 73, co-operating with said roll to form a web-feeding mechanism, substantially as described.

2. The combination, with the bars 40 41 and the driven roll 42, forming a web-turner, said bars and roll being adjustable to different positions, of shifting connections by which said roll is driven from the same moving part in its different positions, substantially as described.

3. The combination, with a web-printing mechanism in which the same form makes a plurality of impressions upon the same side of the web at each revolution of the form-cylinder, of a web-severing mechanism, a switch mechanism for directing the sheets into two different pathways, according to the positions of their printed pages, two collecting or associating mechanisms—one located in each pathway—and two sheet-laying mechanisms, all substantially as described.

4. The combination, with a web-printing mechanism in which the same form makes a plurality of impressions upon the same side of the web at each revolution of the form-cylinder, of a web-severing mechanism, two collecting or associating mechanisms, and a switch mechanism for directing alternate pairs or series of sheets to each of said collecting mechanisms, all substantially as described.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

STEPHEN D. TUCKER.

Witnesses:

CHAS. W. CARPENTER,
W. F. SMART.