

(No Model.)

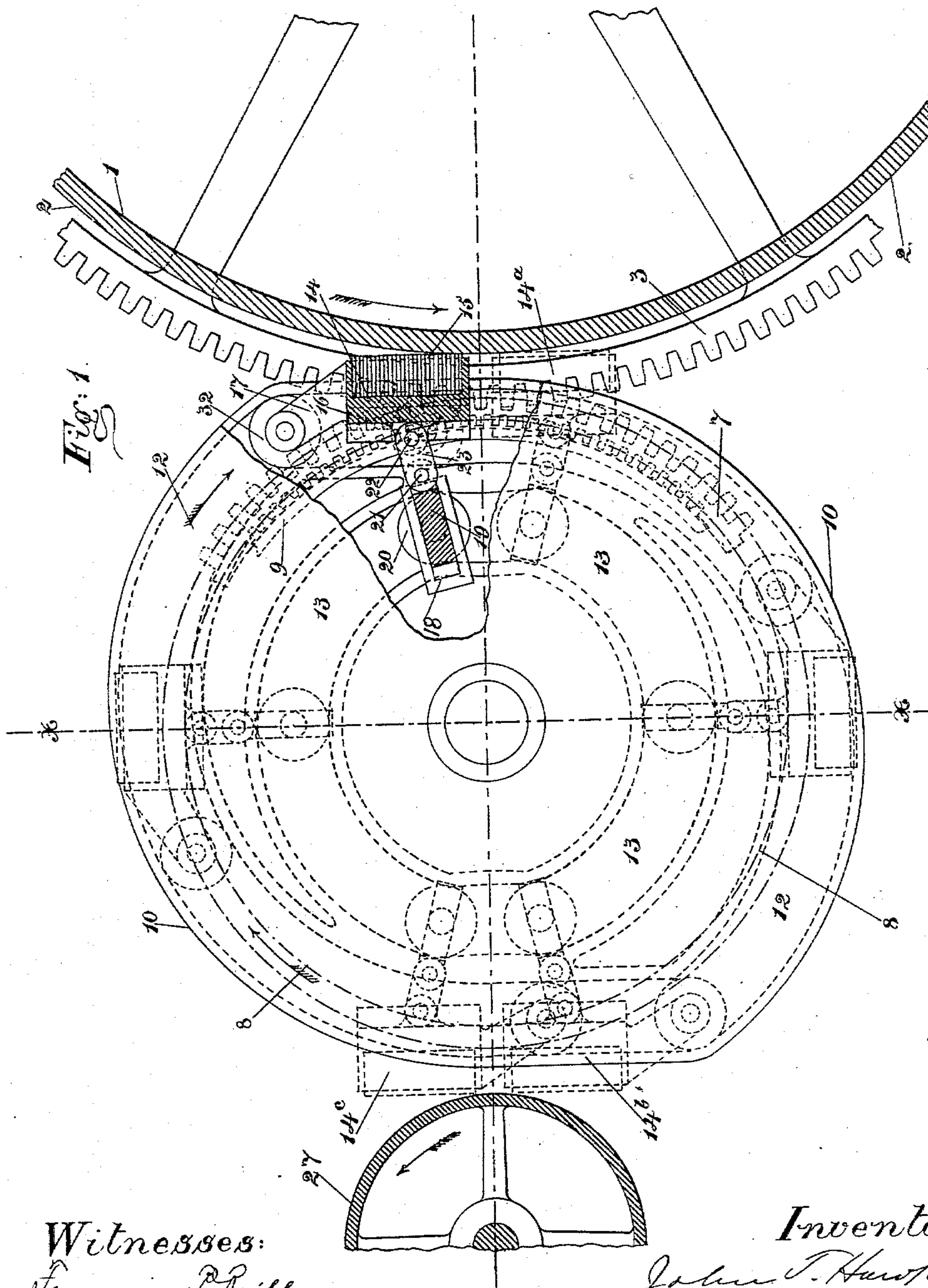
4 Sheets—Sheet 1.

J. T. HAWKINS.

PRINTING MACHINE FOR PRINTING FROM ROTARY FLAT FORMS.

No. 546,325.

Patented Sept. 17, 1895.



Witnesses:  
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W. A. Brückel,

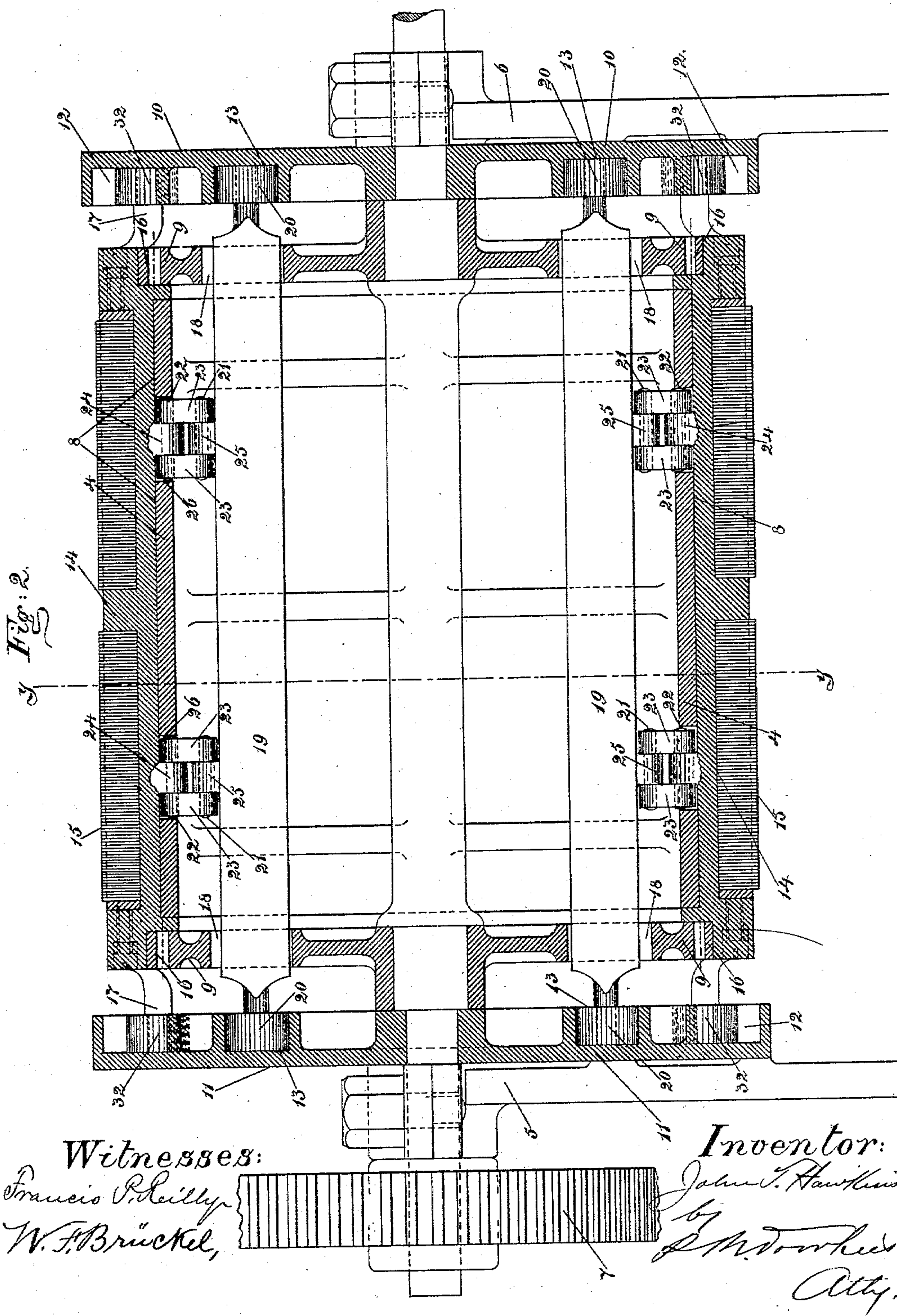
Inventor:  
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by R. M. Doorkees  
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4 Sheets—Sheet 2.

PRINTING MACHINE FOR PRINTING FROM ROTARY FLAT FORMS.

Patented Sept. 17, 1895.



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(No Model.)

4 Sheets—Sheet 3.

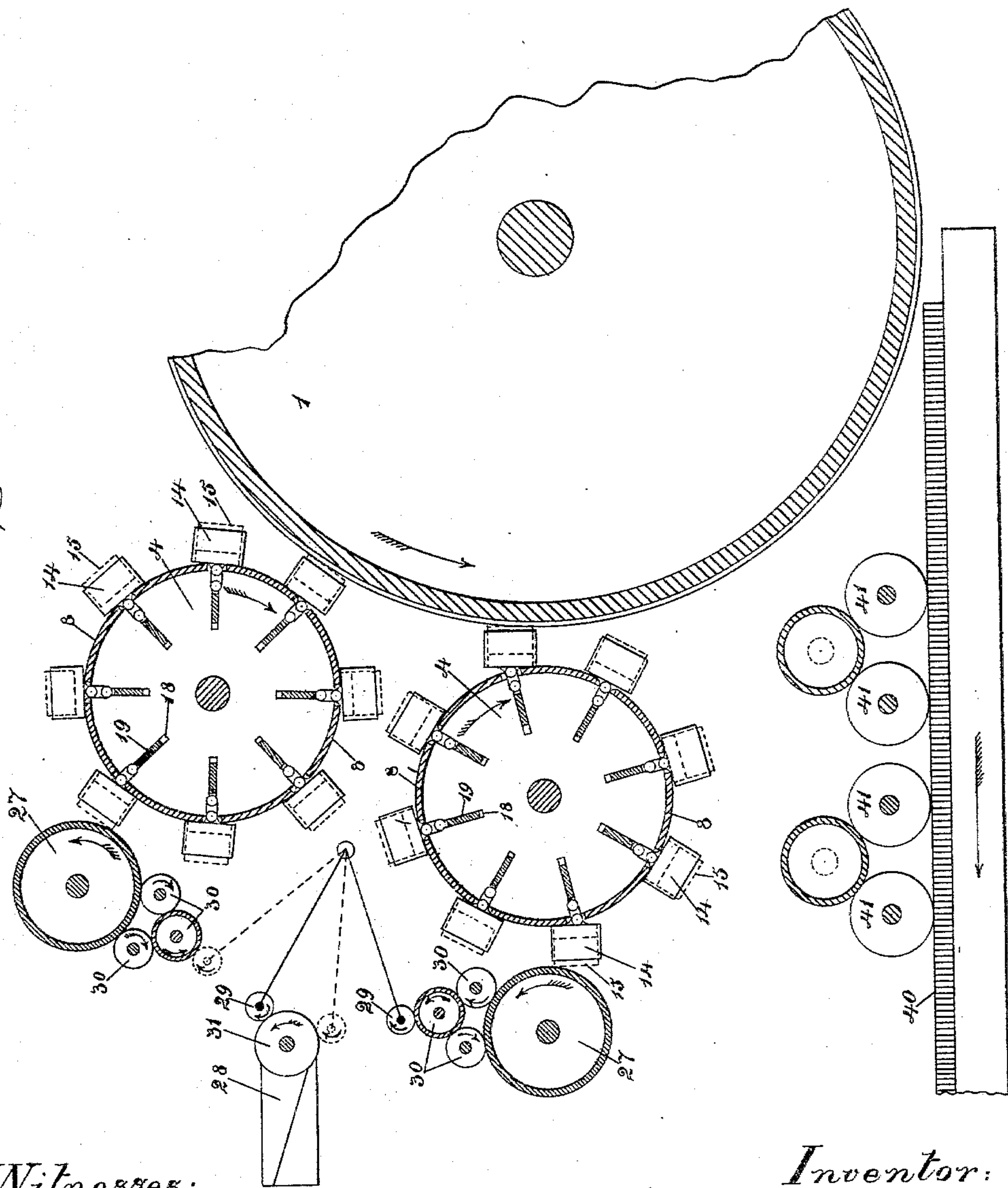
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Fig. 3.



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(No Model.)

4 Sheets—Sheet 4.

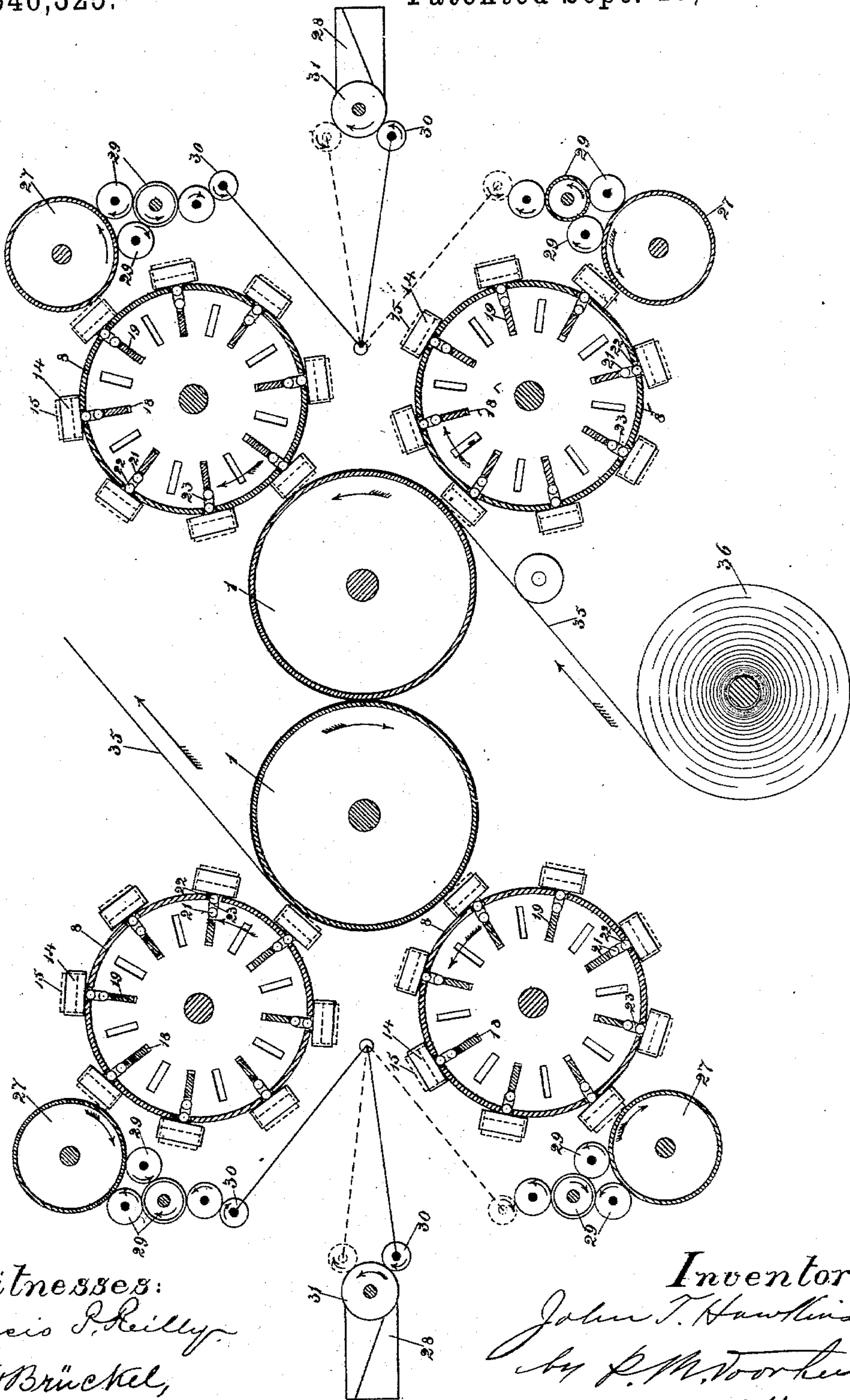
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Fig. 4



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# UNITED STATES PATENT OFFICE.

JOHN T. HAWKINS, OF TAUNTON, MASSACHUSETTS, ASSIGNOR TO THE  
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PRINTING-MACHINE FOR PRINTING FROM ROTARY FLAT FORMS.

SPECIFICATION forming part of Letters Patent No. 546,325, dated September 17, 1895.

Application filed November 12, 1890. Serial No. 371,207. (No model.)

*To all whom it may concern:*

Be it known that I, JOHN T. HAWKINS, of Taunton, in the county of Bristol and State of Massachusetts, have invented a new and  
5 useful Printing-Machine for Printing from Rotary Flat Forms, which invention is fully set forth and illustrated in the following specification and accompanying drawings.

The object of this invention is to provide a  
10 printing-machine for printing newspapers or other work capable of being made up in sections or columns from flat type-surfaces by the continuous rotation of such type or form surfaces either with or without the introduc-  
15 tion of reciprocating type or form carrying members such as are incorporated in machines generally printing from flat surfaces.

In the apparatus hereinafter described either the ordinary printing-type or flat plates  
20 may be used.

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

In the accompanying drawings, Figure 1 is  
25 a side elevation, partly in section, of so much of a printing-machine as is necessary for the illustration of this invention, the sectional portion being taken on the line *y y* of Fig. 2. Fig. 2 is a transverse section of the form-car-  
30 riers and their cylinder and guiding-cams, taken on the line *x x*, Fig. 1. Fig. 3 is a sectional diagrammatic elevation illustrating the use of two form-carrying cylinders in operation in conjunction with a single impres-  
35 sion-cylinder, which also coacts with a reciprocating form-bed. Fig. 4 illustrates in diagram the application of the invention to a rotary perfecting-machine.

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

In Fig. 1 the number 1 indicates a portion of the periphery of an impression-cylinder, in which the line 2 represents the impression-  
45 surface, and in Figs. 3 and 4 the number 1 indicates the entire cylinder. Secured to the axis of cylinder 1, is a spur-gear 3. The number 4 indicates a cylinder whose axis, in common with cylinder 1, is journaled in suitable

framing of the machine 5 and 6, Fig. 2. (Not  
shown in Figs. 1, 3, and 4.) Secured to the axis of cylinder 4 is a spur-gear 7, engaging the spur-gear 3. The two cylinders may be driven through any of the usual mechanism applied to printing-machines in connection  
55 with either of the gears named. In Fig. 1 only a portion of spur-gear 7 is shown, the more clearly to exhibit the remaining mechanism. The dotted line 8, Fig. 1, and full line 8, Figs. 2, 3, and 4, represent the periph-  
60 ery of cylinder 4. The spur-gears 3 and 7 are so proportioned as to give equal surface velocities to the peripheries of cylinders 1 and 4. Secured to each end of cylinder 4, Figs. 1 and 2, is an annular rack 9, whose pitch-lines coin-  
65 cide with the periphery 8 of cylinder 4. Secured to the framing 5 and 6, Figs. 1 and 2, are two stationary box-cams 10 and 11, each having two suitably-formed grooves 12 and 13 for the purpose hereinafter explained. 70  
The numbers 14 indicate long narrow chases or sectional form-holders extending across and oscillating upon and in constant contact with the periphery of cylinder 4, and the number 15 represents the type or plates 75  
locked up in these chases. In Fig. 1 but one of these chases is shown in section, the dotted lines of other chases in the same figure being placed to show them in several positions in passing around the cylinder 4, 80  
as hereinafter explained. In Figs. 3 and 4 the chases 14 are shown in number and arrangement as used in practice. Secured to each end of each chase 14, Figs. 1 and 2, is a short rack 16, whose pitch-lines correspond 85  
with the under surface of the chase, which surface lies and oscillates upon the periphery 8 of cylinder 4. These racks 16 mesh with the annular racks 9. Secured to each end of each chase 14 is an arm or bracket 17, Figs. 90  
1 and 2, carrying a roller 32, which engages the grooves 12 of stationary cams 10 and 11. Sliding in radial slots 18 in the ends of cylinder 4 (shown in all the figures) are bars 19, extending through the ends of cylinder 4 and 95  
carrying on their ends rollers 20, Figs. 1 and 2, which engage the grooves 13 of cams 10 and 11. The bars 19 are articulated to the under



side of chases 14 by pivots 21 and 22, links 23, lugs 24, formed on the chases 14, and lugs 25, formed on the bars 19, slots 26, Fig. 2, being formed in the periphery of cylinder 4 for the free passage of the links 23. The grooves 12 and 13 of cams 10 and 11 are given such deviation from a circle concentric with the axis of cylinder 4 as will cause the rollers 32 and 20 to impart such a rocking or oscillating motion to the chases 14 while they are rotated with the periphery of cylinder 4 as to make them pass from the position shown, for example, for chase 14 in section, Fig. 1, to the dotted-outline chase 14<sup>a</sup> (same figure) in a straight line, and in passing around to the position 14<sup>b</sup> to be rocked or oscillated into the position 14<sup>b</sup> at that point, then to pass from the position 14<sup>b</sup> to the position 14<sup>c</sup> in a right line, and in passing from position 14<sup>c</sup> to 14 to be rocked or oscillated again into the latter position ready to pass again to 14<sup>a</sup> in a right line. A form-inking roller 27, supplied with ink in any of the well-known ways, is set to engage the several surfaces of the types or forms 15 as they pass under it. The distance between the peripheries of cylinders 1 and 4 is equal to the thickness from the tops of the type or plates 15 to the under side of the chase 14, and the usual provision is made for adjusting this distance by movable bearings for the cylinder 4 (not shown) or in any other well-known way to give the necessary pressure between the types or forms 15 and the periphery of cylinder 1, and, similarly, the inking-rollers 27 are adjusted in any of the well-known ways to make the proper contact with the types or forms as they pass under them.

In Fig. 3 the number 40 indicates the principal type-form in the ordinary form of cylinder-press, and 41 the inking-rollers for the same. It will be obvious, as the chases 14 are held in contact with the periphery of cylinder 4 by the rollers 32 and 20 and the racks 16, engaging annular racks 9, that said chases will be carried around by the racks 16 and cylinder 4, with their under sides in contact therewith, and be maintained in parallelism with the axis of the cylinder 4 by the annular racks 9 at all times, while they are so rocked or oscillated by the cam-grooves 12 and 13 upon the periphery of cylinder 4 as to cause the printing-surfaces of the several forms while traveling in right lines to meet the periphery of the impression-cylinder 1 and the ink-rollers 27 at the surface velocity of the periphery of impression-cylinder 1, and thus print an impression upon the sheet while it is being carried around by impression-cylinder 1, just as if the several type or plate forms were non-rotative but continuously traveling in a right line, as in the case of form 40. The inking-rollers 27 will of course be driven at the same surface velocity as the periphery of the impression-cylinder 1 in any of the well-known ways. It will also be obvious that this

construction can be used only for such printing as can be made up in narrow sections or in columns, as in newspapers and some forms of bookwork, and in order to obtain room for locking up the type or plates 15 in the chases or form-holders 14, there are used on the cylinder 4 chases for printing only on each alternate narrow section or column, as shown in Figs. 3 and 4, and a second cylinder 4 is used in conjunction with the same impression-cylinder, as shown in Figs. 3 and 4, carrying the other alternate section or column, in which way, by means of two cylinders 4 and their appurtenances, as hereinbefore described, and one impression-cylinder 1, as in Fig. 3, the whole of one side of the sheet may be printed upon, and by combining these into any of the well-known forms of perfecting machines having two impression-cylinders, by using two forms to each impression-cylinder, a sheet or web may be perfected or completely printed on both sides.

A diagrammatic outline of an arrangement of this apparatus as furnished for a perfecting-machine is shown in Fig. 4, in which the numbers 1 1 indicate the impression-cylinders, and the number 35 indicates the web of paper fed from the roll 36.

In Figs. 3 and 4 an arrangement for inking the forms of the two impression-cylinders 4 from one fountain 28 is shown, in which the numbers 29 indicate the distributing-rollers and 30 ductor-rollers transferring the ink from the fountain-roller 31, all of which may be operated in any of the well-known ways.

It is obvious now that with the attachment of one cylinder 4 and its appurtenances, hereinbefore described, mounted in conjunction with an impression-cylinder 1, which is otherwise printing sheets upon the ordinary flat or other form in one color, by using another colored ink on the forms 15 of cylinder 4, and omitting from the original flat or other form matter corresponding to that set up in the chases 14 of cylinder 4 any part of one side of a sheet may be printed in a separate color up to one-half the area of the sheet.

Having thus fully described my said invention, I claim—

1. In a printing machine, the combination of a rotary impression cylinder, a rotary form cylinder, an annular rack carried by said form cylinder and oscillating, sectional form-holders having racks meshing with the annular rack carried by the form cylinder, substantially as described.

2. In a printing machine, the combination of an impression cylinder, a rotating form cylinder having an annular rack, sectional form holders having racks meshing with said annular rack carried by the form cylinder, and also having rollers engaging with a stationary cam, substantially as described.

3. In a printing machine, the combination of an impression cylinder, a rotary form cylinder having an annular rack and a series of



radially movable bars, sectional form holders articulated to said radially movable bars, and having racks meshing with said annular rack, and rollers engaging with a stationary cam, substantially as described.

4. In a printing machine, means for printing rotarily from sectional, flat, type or plate forms, consisting of the following named elements in combination: an impression cylinder; stationary cams, as 10, 11; one or more cylinders geared to said impression-cylinder, so that the surface velocities of the several cylinders shall be equal and provided with sectional form-carriers, or chases, as 14, annular racks, as 9, racks as 16 secured to said chases and engaging said annular racks and rollers as 32, 20, connected to said chases and engaging grooves in said cams; substantially as and for the purposes set forth.

5. In a printing machine, in combination with an impression-cylinder and a principal reciprocating flat form, as 40, means for printing rotarily from flat type or plate forms consisting of the following named elements; stationary cams, as 10, 11; one or more form cylinders geared to said impression cylinder, so that the surface velocities of the several cylinders shall be equal and provided with sectional form-carriers, or chases, as 14, annular racks, as 9, racks as 16 secured to said chases

and engaging said annular racks, and rollers, as 32, 20, connected to said chases and engaging grooves in said cams; and inking rollers; whereby areas for impression may be omitted by said principal form, and printed, in the same or a different color, from a form or forms on said form-cylinder, or cylinders, substantially as set forth.

6. In a perfecting printing-machine, in combination with each of two impression cylinders, means for printing from flat, type or plate forms, consisting of the following named elements; stationary cams, as 10, 11; one or more form-cylinders geared to each of said impression cylinders, so as to have equal surface velocities therewith and provided with sectional form-carriers, or chases, as 14, annular racks, as 9, racks as 16 secured to said chases and engaging said annular racks, and rollers, as 32, 20, connected to said chases and engaging grooves in said cams; and inking-rollers; whereby type, or other flat, forms are rotated and also caused to travel in right lines while being inked and while printing, substantially as set forth.

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