

(No Model.)

4 Sheets—Sheet 1.

J. L. FIRM.

COMBINED PRINTING AND FOLDING MACHINE.

No. 341,740.

Patented May 11, 1886.

Fig. 1.

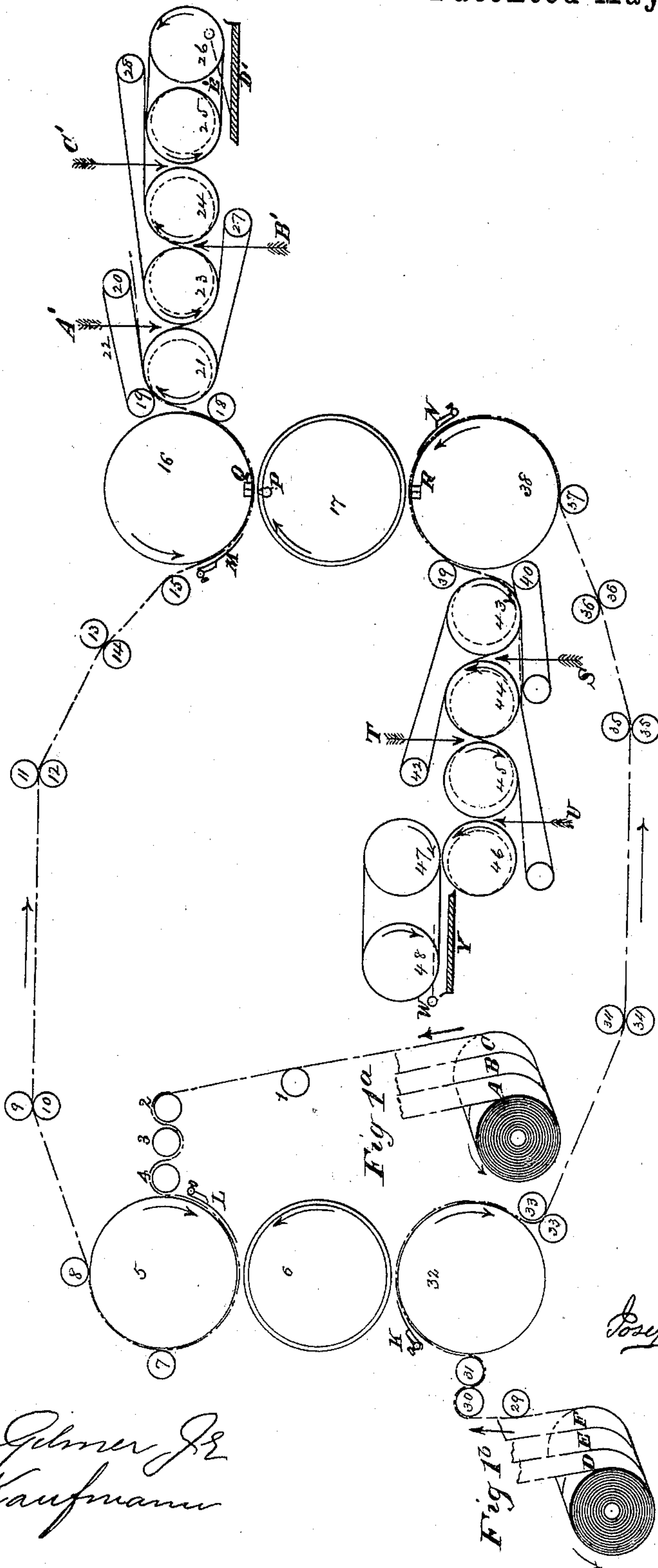


Fig. 1a.

Inventor

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Witnesses

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John Kaufmann

(No Model.)

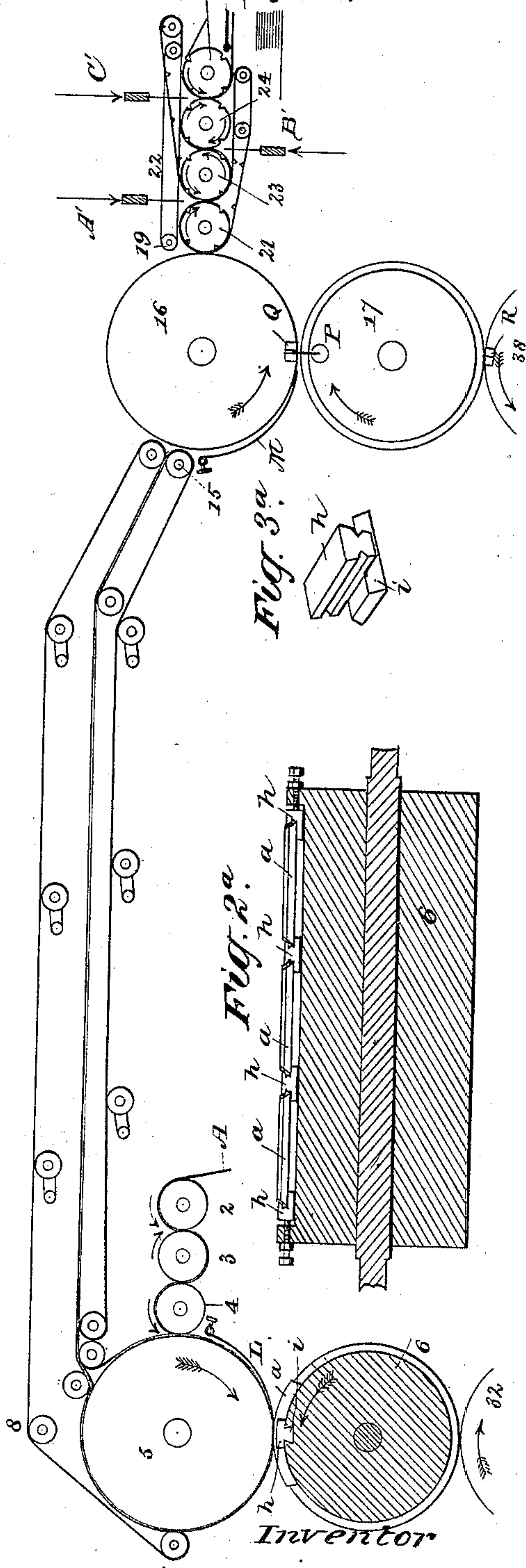
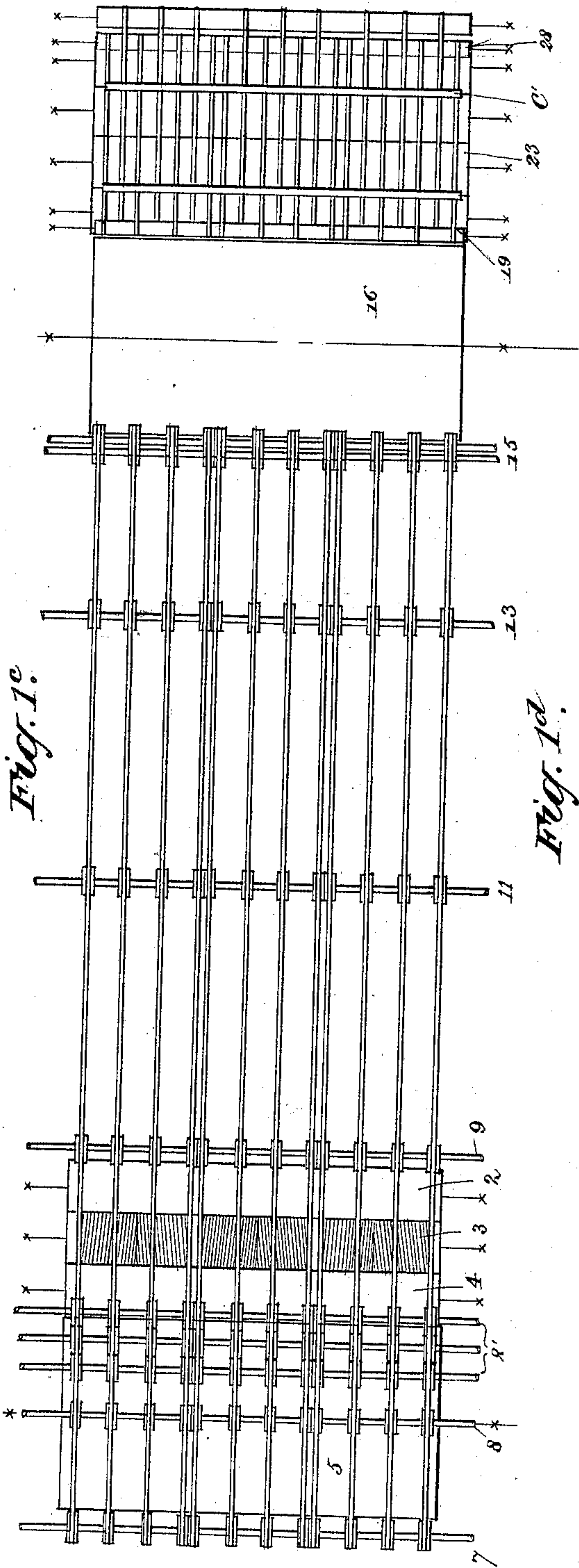
4 Sheets—Sheet 2.

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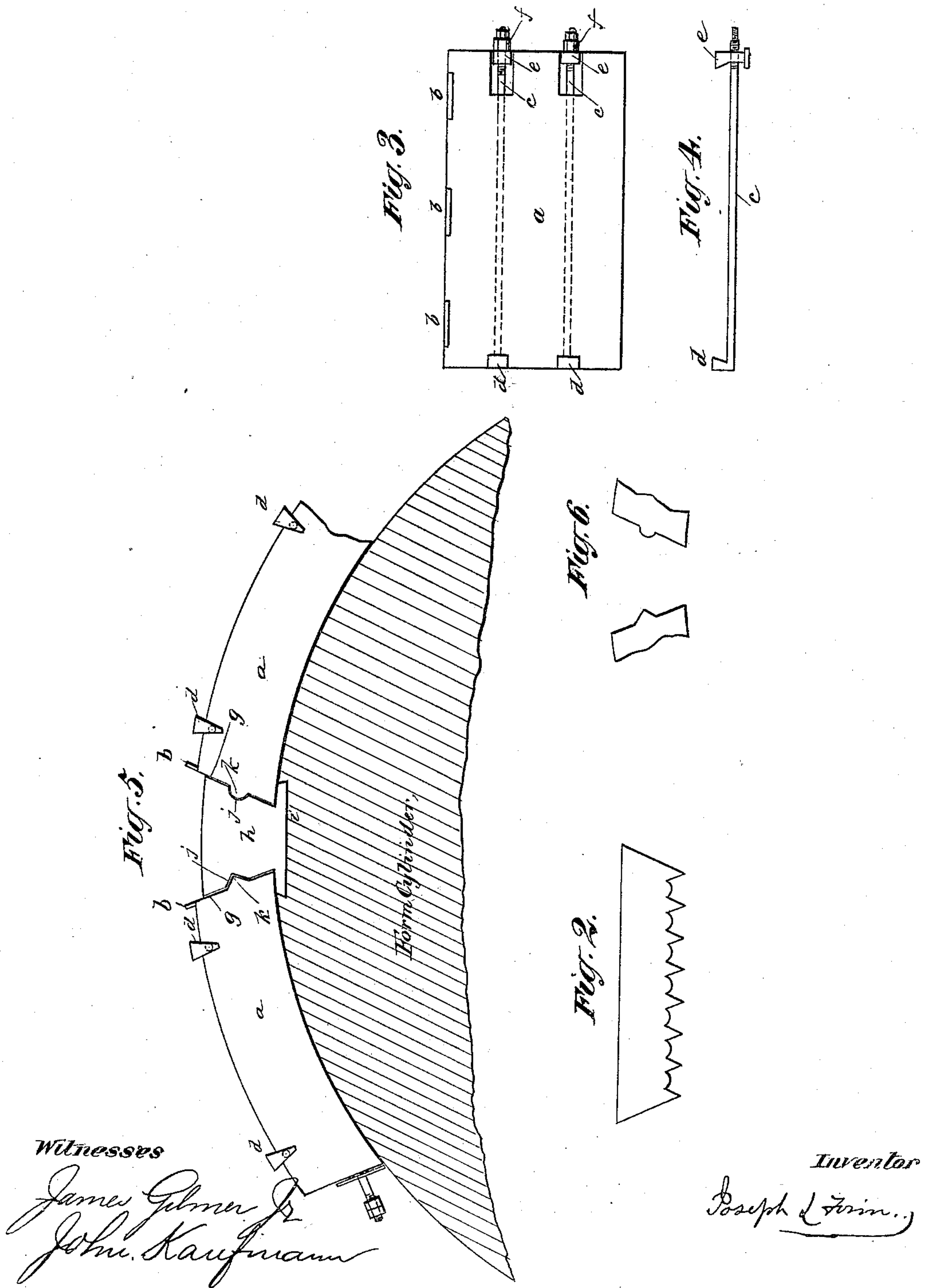
Witnesses
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Wm. H. Finckel, Atty.

(No Model.)

4 Sheets—Sheet 3.

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(No Model.)

4 Sheets—Sheet 4.

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No. 341,740.

Patented May 11, 1886.

Fig. 7.

1	9	5	1	9	5
2	3	4	2	3	4

Fig. 8.

1	4	1	4
2	3	2	3

Fig. 9.

1	8	7	9
2	3	4	5

Fig. 10.

1	10	6	8	7
2	3	4	5	6

Fig. 11.

1	12	11	10	9	8
2	3	4	5	6	7

Fig. 12.

1	14	13	12	11	10	9
2	3	4	5	6	7	8

Fig. 13.

1	16	15	14	13	12	11	10
2	3	4	5	6	7	8	9

WITNESSES

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UNITED STATES PATENT OFFICE.

JOSEPH L. FIRM, OF JERSEY CITY, NEW JERSEY.

COMBINED PRINTING AND FOLDING MACHINE.

SPECIFICATION forming part of Letters Patent No. 341,740, dated May 11, 1886.

Application filed October 2, 1882. Serial No. 73,235. (No model.) Patented in England April 9, 1880, No. 1,454.

To all whom it may concern:

Be it known that I, JOSEPH L. FIRM, of Jersey City, in the county of Hudson, in the State of New Jersey, have invented certain new and
5 useful Improvements in Combined Printing and Folding Machines, whereof the following is a full, clear, and exact description, a part of said invention having been patented in England April 9, 1880, as No. 1,454.

10 This invention relates to that class of printing-presses known as "rotary perfecting;" and the object of the invention is to adapt such machines to print both sides of a sheet or web of paper to make eight, sixteen, or
15 twenty-four pages when folded, and to cut and fold such printed web.

I will now proceed to set forth, and finally claim, the elements of novelty of my invention in accomplishing the object above named.

20 In the drawings, in the several figures of which like parts are similarly designated, Figure 1 is a diagram illustrative of my invention, with Figs. 1^a and 1^b showing in perspective the rolls of paper. Fig. 1^c is a top
25 plan view, and Fig. 1^d is a side elevation, of a machine embodying one form of my invention, to illustrate more particularly the common arrangement of tapes I employ. Figs. 2, 3, 4, 5, and 6 are views of various details
30 hereinafter referred to. Fig. 2^a is a longitudinal section of the form-cylinder supplied with my printing-plate blocks. Fig. 3^a is a perspective detail of part of a batten. Figs. 7, 8, 9, 10, 11, 12, and 13 are diagrams of my
35 mode of imposing the forms and folding the sheets of as many different-paged papers.

The diagram, Fig. 1, shows an arrangement of form and impression cylinders and guiding and folding rollers for printing two copies
40 of a paper of twenty-four pages, or six of an eight-page paper, and twelve copies of a four-page paper, at one revolution of the machine, and folding the same in the form of a W, in such manner as to have the pages numerically
45 consecutive.

In practicing my invention I prefer to use two form-cylinders, each having two impression-cylinders, and I may arrange to print six
50 webs at one time, and have so shown the press in Figs. 1, 1^a, and 1^b. The webs of paper A B C may be suitably arranged on rollers in the usual way, and they are led over the guide-

rollers 1 2, under guide-rollers 3, and over guide-roller 4, to the impression-cylinder 5 between bands L. The rollers 2 and 3 are 55 grooved annularly, so as in connection with the bands to spread out the paper webs and take out wrinkles. The forms are imposed upon the cylinder 6 in the manner indicated in the middle view of the several diagrams, 60 Figs. 7 to 13, and the impression is made on one side of the paper, after which it passes between the guide-rollers 7 and 8 and cylinder 5, and thence between the pairs of guide-rollers 9 10, 11 12, and 13 14, over the roller 65 15, to the bands M, and between the impression-cylinder 16 and form-cylinder 17, which latter form-cylinder has the forms set up as in the uppermost view of the several diagrams, Figs. 7 to 13. The cylinder 16 is provided with 70 the groove Q, and the cylinder 17 has the knife P to cut the printed webs, after which the cut lengths of paper are passed to roller 18, and thence between the rollers 19 20 and wheel 21 against the tapes 22. The wheels 23, 75 24, 25, and 26, and rollers 27 and 28 are connected in suitable manner by tapes and delivery-bands, as shown, to carry and fold the lengths of paper. When the lengths of paper have progressed to wheel 21, a knife such as 80 shown in Fig. 2, and having a serrated edge, and indicated in Fig. 1 by the arrow A', and parts similarly lettered in Figs. 1^c and 1^d, is caused to descend to insure the delivery of the paper to and between the wheels 21 23 to make the 85 first fold, the paper being taken by the bands and forwarded to the wheels 23 24, by which it is carried downward, and between which it is by another knife (indicated by the arrow B' in Fig. 1, and parts similarly lettered in Figs. 90 1^c and 1^d) driven upward to form the second fold, and then the paper passes up over wheels 24 25, and the third fold to complete the W made by a third similar knife, (indicated by the arrow C' in Fig. 1, and in parts similarly 95 designated in Figs. 1^c and 1^d,) and working downward to drive the paper between the wheels 24 25, after which it is taken by the delivery-band and wheel 26 and the fly or knocker E' to the delivery-board D'. These 100 folding-knives, Fig. 2, have the projecting inverted-V-shaped teeth, so as to perforate the sheet, and the blank or non-cutting intervening surfaces, to insure their engagement with

the paper without severing it, and to crease the paper on the line of fold.

In order to double the capacity of the machine, I employ three other paper webs, D E F, suitably hung, and pass them over rollers 29 30 and under roller 31, and between the bands K and impression-cylinder 32, on which they are printed on one side from the form-cylinder 6, and then pass between and are forwarded by the pairs of rollers 33, 34, 35, and 36 and the roller 37 to the impression-cylinder 38 under the bands N, where their other side is printed from the form-cylinder 17, the impression-cylinder 38 having the groove R to receive the knife P of the form-cylinder 17. Instead of or as an auxiliary to the knife, any suitable grippers may be used. I prefer to use my delivery apparatus patented April 18, 1876, No. 176,401. The rollers 30 31 and band K in construction and function correspond with rollers 3 4 and band L. After the second side has been printed the paper is fed to the folding-rollers 39, 40, 41, 42, and 49, and wheels 43, 44, 45, 46, 47, and 48, which are connected, as in the first instance, by tapes and bands, and geared together to properly feed the paper to be acted upon by the knives, (indicated by the arrows S T U,) and be finally caught by the fly W, and laid thereby on the delivery-table Y.

The several rollers, wheels, and cylinders may or may not have connecting-tapes, except where indispensable, and they are geared up to run harmoniously.

As in some instances the matter will be set in a number of forms, it is of prime importance, in order to secure correct registering of the several forms and pages, that the stereotyped forms should be securely and correctly held on the cylinder against the peradventure of displacement; and to this end I employ the devices illustrated in Figs. 3, 4, 5, and 6, 2^a and 3^a, which consist of (taking up one only of a number of substantially similar devices) a block, *a*, provided with side abutments, *b*, to prevent lateral displacement of the plates, and to serve as resistance against which the plates may be tightened up. This block is provided with suitable grooves or ways, in which are arranged rods *c*, having the fixed hooks *d* and the movable dogs *e*, which are adjusted and held against and to hold the plate by the jam-nuts *f*. It will be seen that the stereotype-plate is thus clamped between the abutments *b*, hooks *d*, and dogs *e*, and can be held with any degree of security, and adjusted to properly register. One of the clamping-rods, with its hook, dog, and nuts, is shown detached in side view in Fig. 4. These blocks are attached to the form-cylinder by having their ends *g* beveled to engage wedge-shaped battens or pieces *h*, each secured by a foot, *i*, in a groove in the cylinder. The wedge and adjacent blocks are provided with registering grooves and tongues *j k*, respectively, or equivalent devices, to securely hold them all together, and slugs, Fig. 6, of corresponding

shape may be employed to effect the proper spacing and registering. By this construction the stereotype-plates may be moved laterally without disturbing the blocks after forms have been made up on the curvilinear face of the cylinder, whereby one can use different size blocks for different sizes sheets or webs—a thing not heretofore possible in this class of machine. The end blocks are secured to the cylinder by bolts and nuts, as indicated at the left-hand end of Fig. 5, or by any other suitable means.

Referring to the diagrams, Figs. 7 to 13, Fig. 7 shows two six-page papers printed inside and out in one passage through the press, and folded so that its pages run consecutively. Fig. 8 shows two four-page papers printed and folded on my machine. Figs. 9, 10, 11, 12, and 13 show papers of eight, ten, twelve, fourteen, and sixteen pages printed and folded after my invention, and it will be obvious to any printer, from these examples, how the forms should be imposed for papers of a larger number of pages.

The wheels 47 48, in conjunction with a suitable knife, may be utilized to effect an additional fold when desired, and cross or counter rollers or wheels may be placed with relation to the series of wheels for the same purpose.

The press shown in Fig. 1 will be equipped with suitable inking, distributing, and driving mechanism, and is designed to print and fold two copies of a twenty-four-page paper, six copies of an eight-page paper, or four copies of a twelve-page paper, at one revolution of the machine, in series of webs to each impression-cylinder.

In order the better to illustrate the practical operation of my machine, I will now describe how the forms are imposed for a twenty-four-page paper. On form-cylinder 6 are imposed the plates containing pages 2, 10, 18 side by side. Pages 3, 11, 19 are parallel therewith, and pages 4, 12, 20 parallel with 3, 11, 19, and pages 5, 13, 21 parallel with 4, 12, 20. These make up one side of a series of three papers, web A being printed by plates 2, 3, 4, and 5, consecutively, they being in line, web B by plates 10, 11, 12, and 13, similarly, and web C by plates 18, 19, 20, and 21, also likewise.

The form-cylinder 17 has the plates for the remaining pages imposed in the following order: The stereotypes containing pages 1, 9, 17 are placed side by side, pages 8, 16, 24 parallel with them, pages 7, 15, 23 parallel with the latter, and, finally, pages 6, 14, 22 parallel with the last-named. Now, when the series of webs A B C have passed from the cylinder 6 to the cylinder 17, their unprinted or blank side is next to the plates, and said side is printed with pages 1, 8, 7, 6 registering with 2, 3, 4, 5, pages 9, 16, 15, 14 registering with 10, 11, 12, 13, and 17, 24, 23, 22 registering with 18, 19, 20, 21, whereby a complete twenty-four-page paper is given on three sheets folded in W shape, and having its pages numerically consecutive. It will be understood

that the twenty-four-page paper is thus made up of a series of three eight-page lengths or sheets. The same operation is repeated upon the webs D E F.

5 By this invention the use of auxiliary perfecting presses is obviated and the output of completed and folded printed pages is doubled, and inasmuch as three series of pages may be printed at one time on each form-cylinder, 10 and the several series completed on the two form-cylinders, it follows that the utility of the machine as a newspaper-press is very greatly enhanced.

15 Figs. 1^c and 1^d differ slightly in the arrangement of the rollers 8 to 15; but as such an arrangement is in common use it is deemed unimportant.

20 In Fig. 1^a I have shown only roller 3 as grooved annularly, and one such grooved roller may suffice, though two are employed generally.

What I claim is--

25 1. The combination, substantially as shown and described, of two form-cylinders with the forms or plates for opposite sides of the paper imposed thereon in sequence, to give numerical consecutiveness to the folded sheets, with four impression cylinders, two sets of paper-

guiding mechanism, cutters, and folders, as and for the purpose described. 30

2. The combination, with a form-cylinder having a wedge-shaped batten grooved longitudinally, of printing-plate blocks having beveled and tongued edges to engage such batten, substantially as shown and described. 35

3. The printing-plate block having a hooked rod, a movable dog and jam-nuts, and lateral abutments to engage and clamp the printing-plate, substantially as shown and described.

4. The combination, with the feeding and 40 printing mechanism, of grooved guiding-rollers and the bands K L M N, to spread the paper and clear it of wrinkles, substantially as shown and described.

5. The combination, with paper-guiding 45 mechanism, and printing mechanism having the pages arranged in sequence, of folding wheels and tapes, and folding-knives working alternately from above and below, to give the printed sheet a W fold, substantially as shown 50 and described.

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