

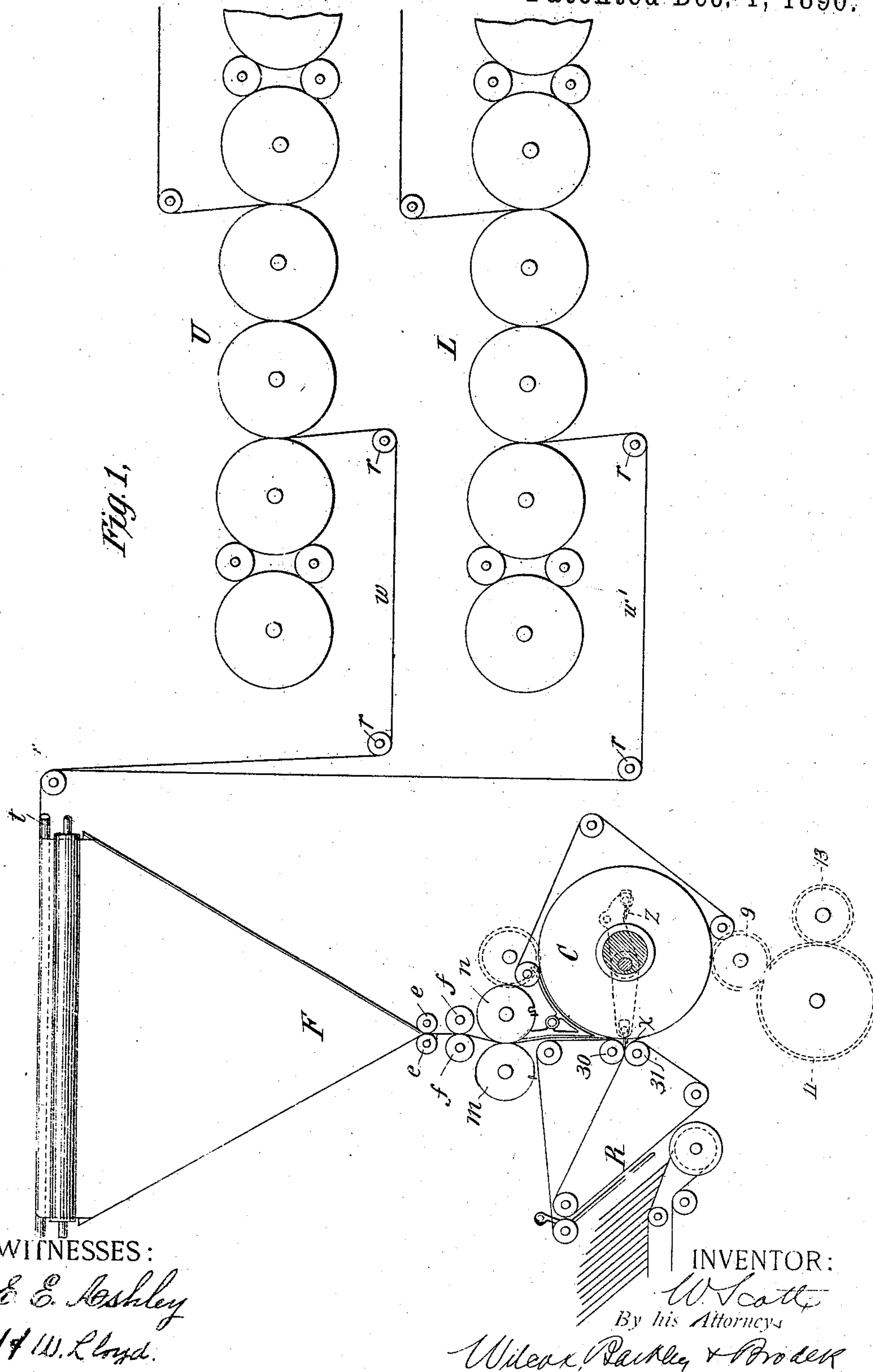
(No Model)

5 Sheets—Sheet 1

W. SCOTT.
FOLDING MACHINE.

No. 572,280.

Patented Dec. 1, 1896.



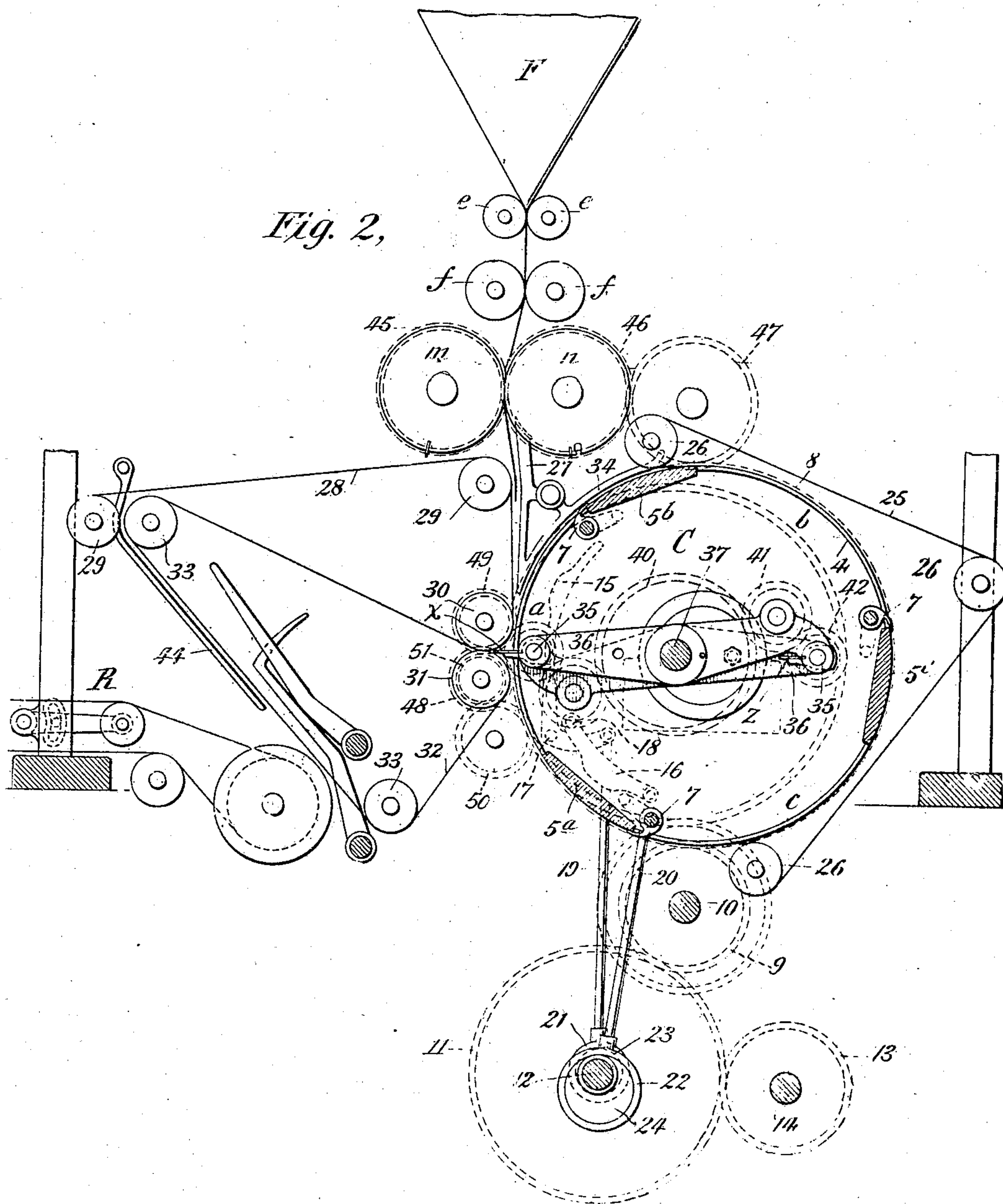
(No Model.)

5 Sheets—Sheet 2

W. SCOTT.
FOLDING MACHINE.

No. 572,280.

Patented Dec. 1, 1896.



WITNESSES.

C. E. Ashley
H. W. Lloyd

INVENTOR:

W. Scott.

By his Attorney:

Wiley Barker & Procter

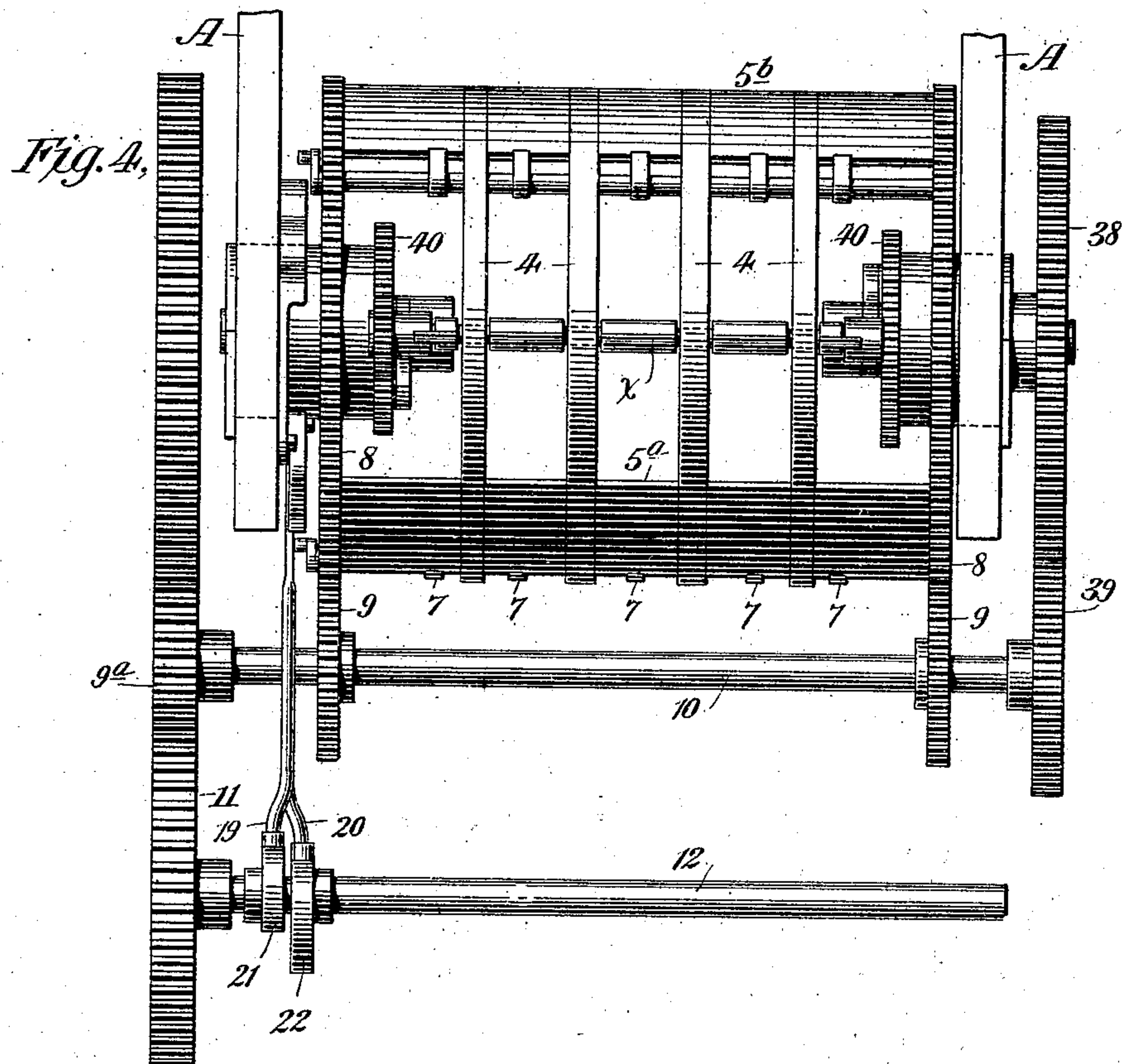
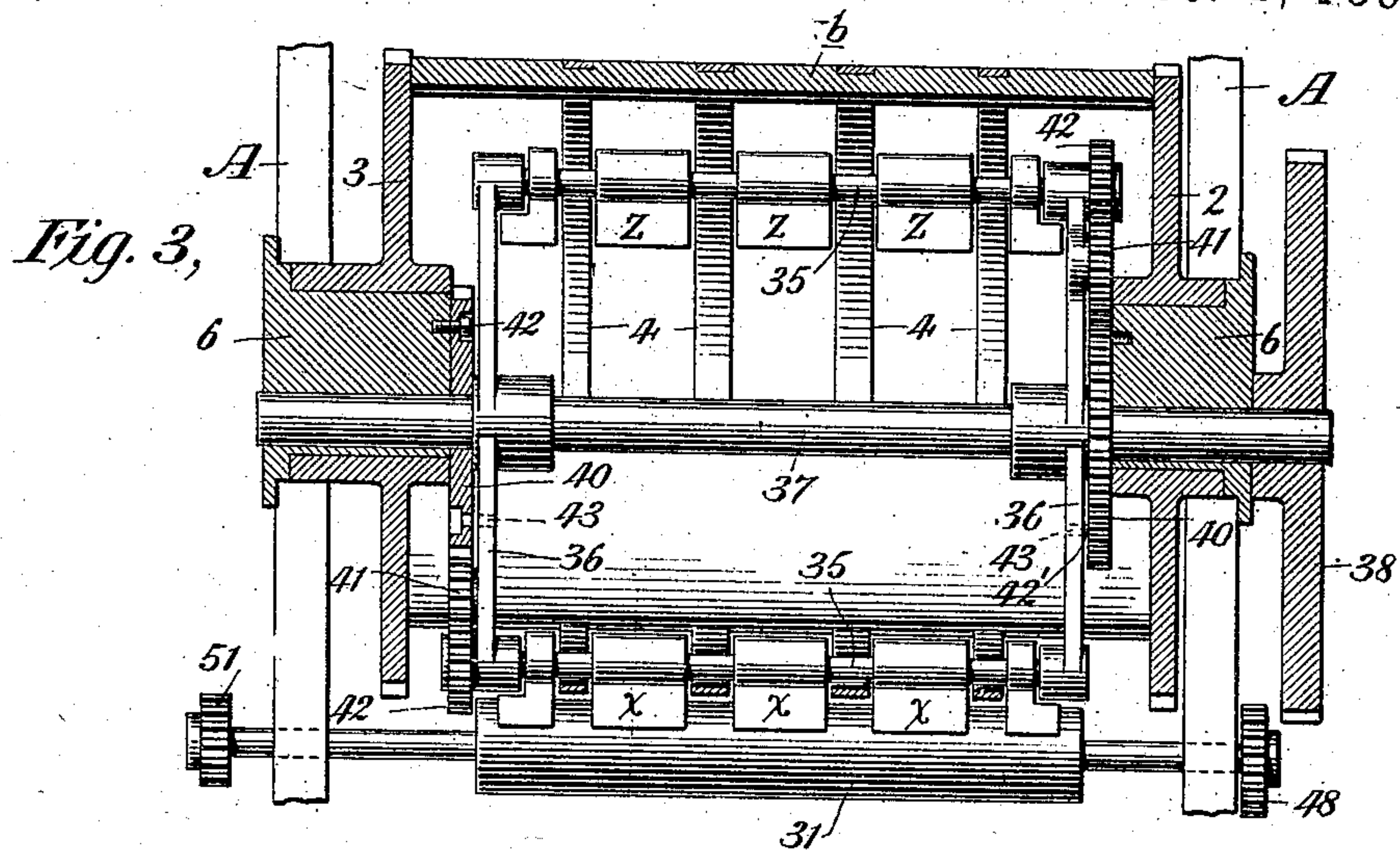
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5 Sheets—Sheet 3.

W. SCOTT.
FOLDING MACHINE.

No. 572,280.

Patented Dec. 1, 1896.



WITNESSES:

L. E. Ashley
J. W. Lloyd.

INVENTOR:

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Wilcox, Parker & Co.

(No Model.)

W. SCOTT.
FOLDING MACHINE.

5 Sheets—Sheet 4.

No. 572,280.

Patented Dec. 1, 1896.

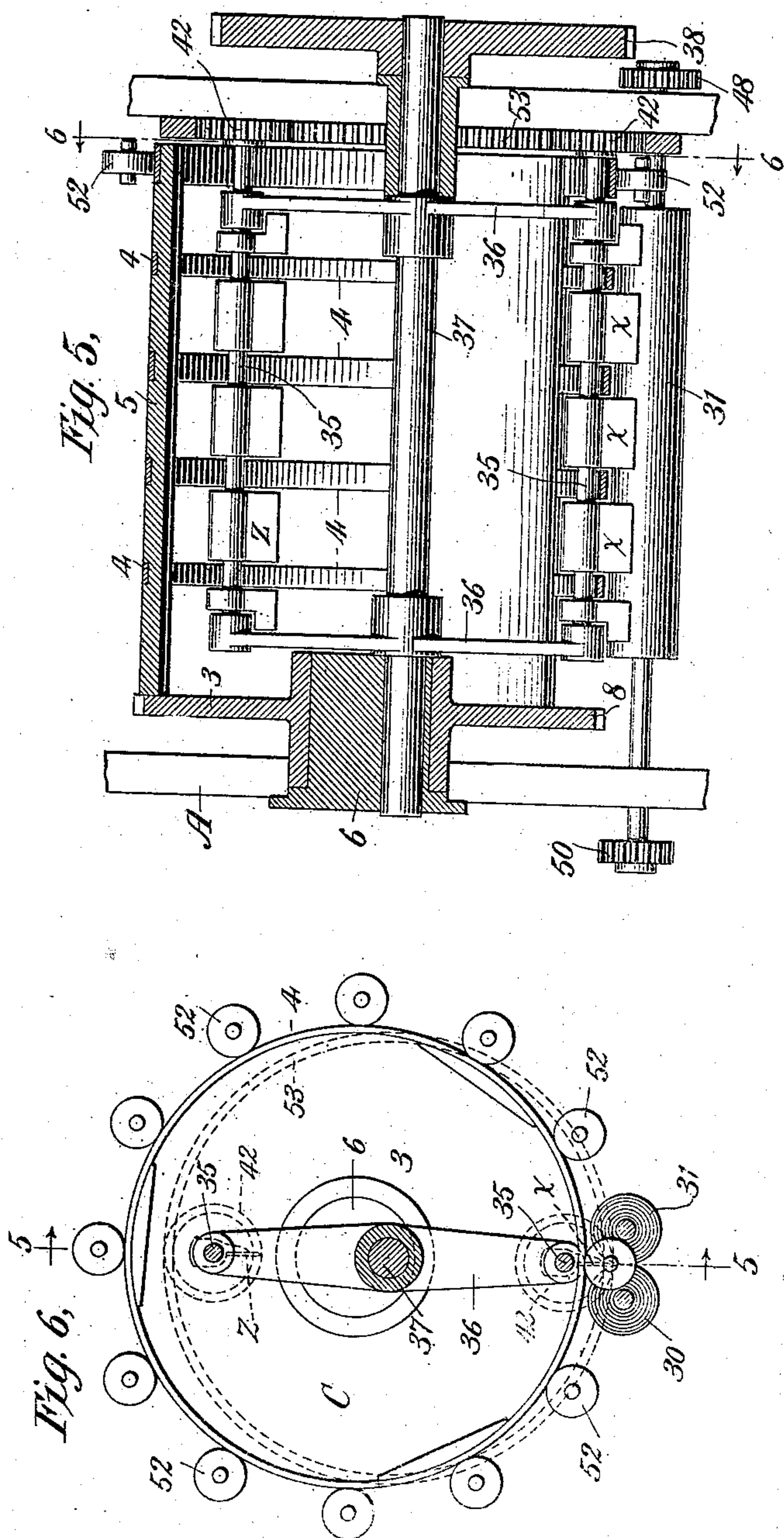
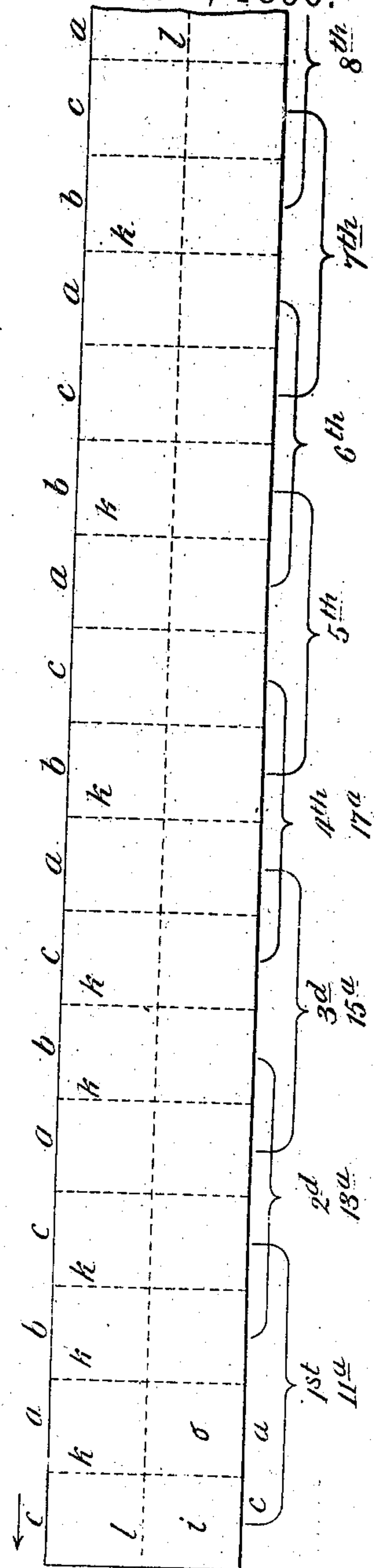


Fig. 7.



WITNESSES:

C. E. Ashley
W. W. Lloyd

INVENTOR:

W. Scott
By his Attorney,
Wilcox, Barker & Broderick

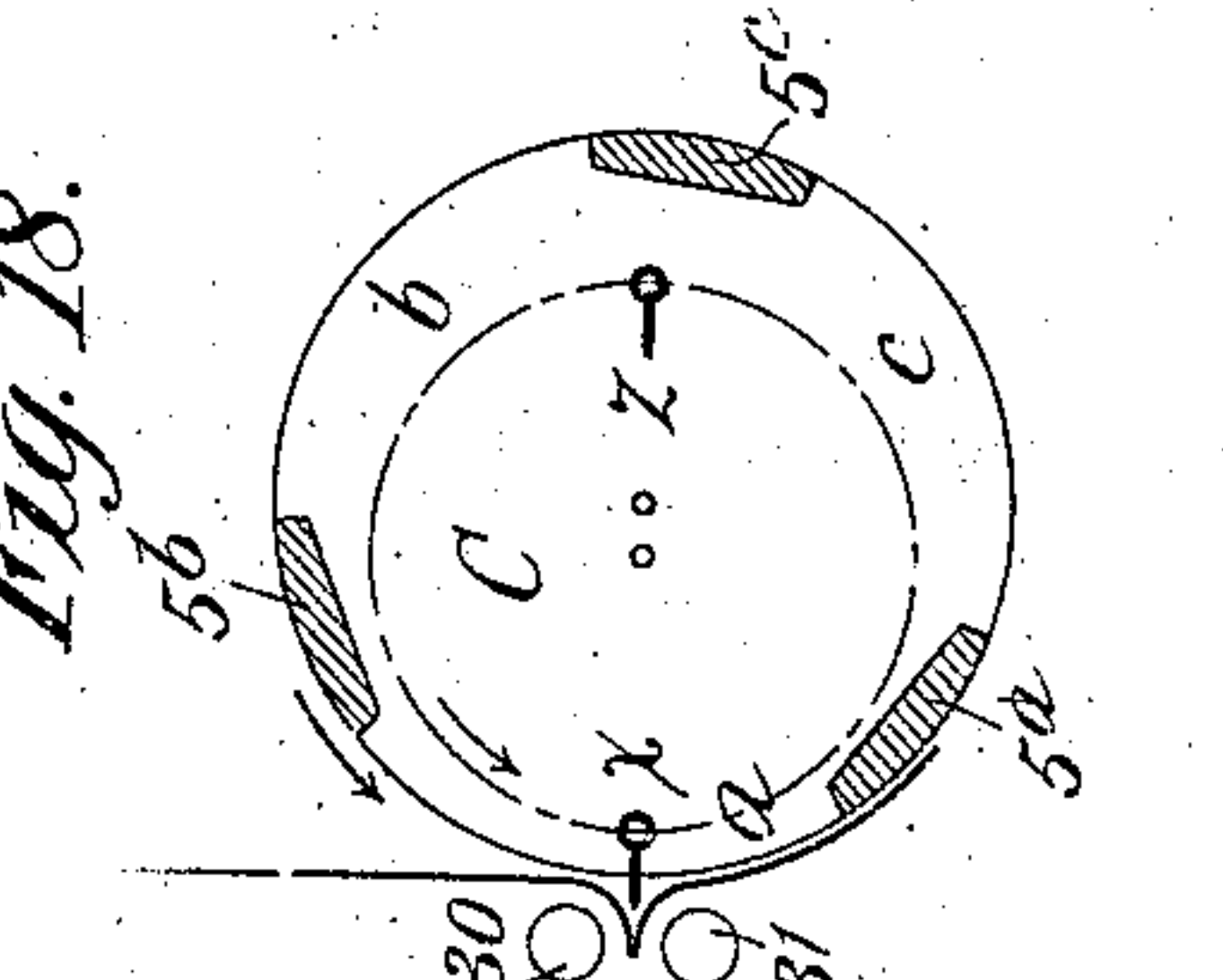
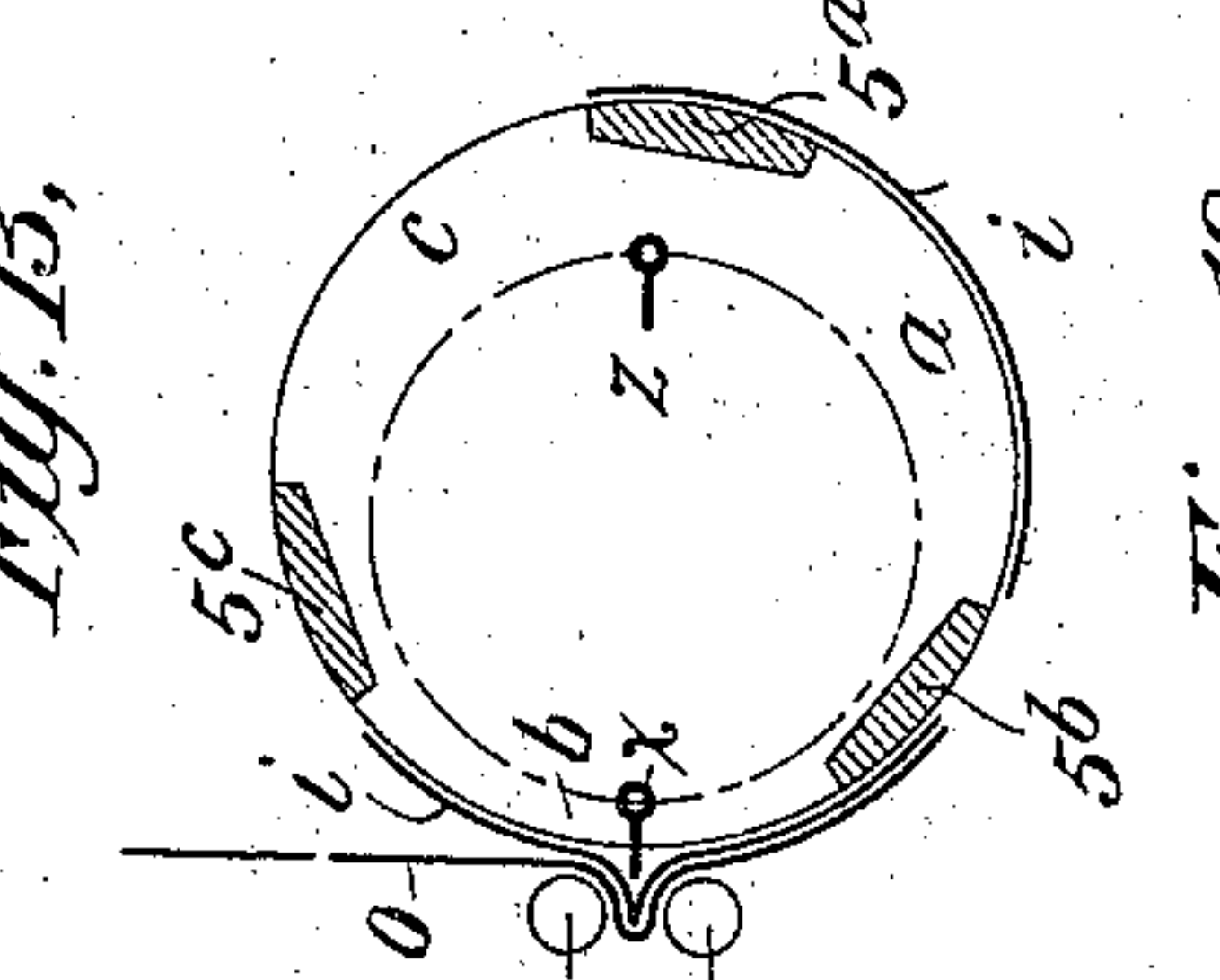
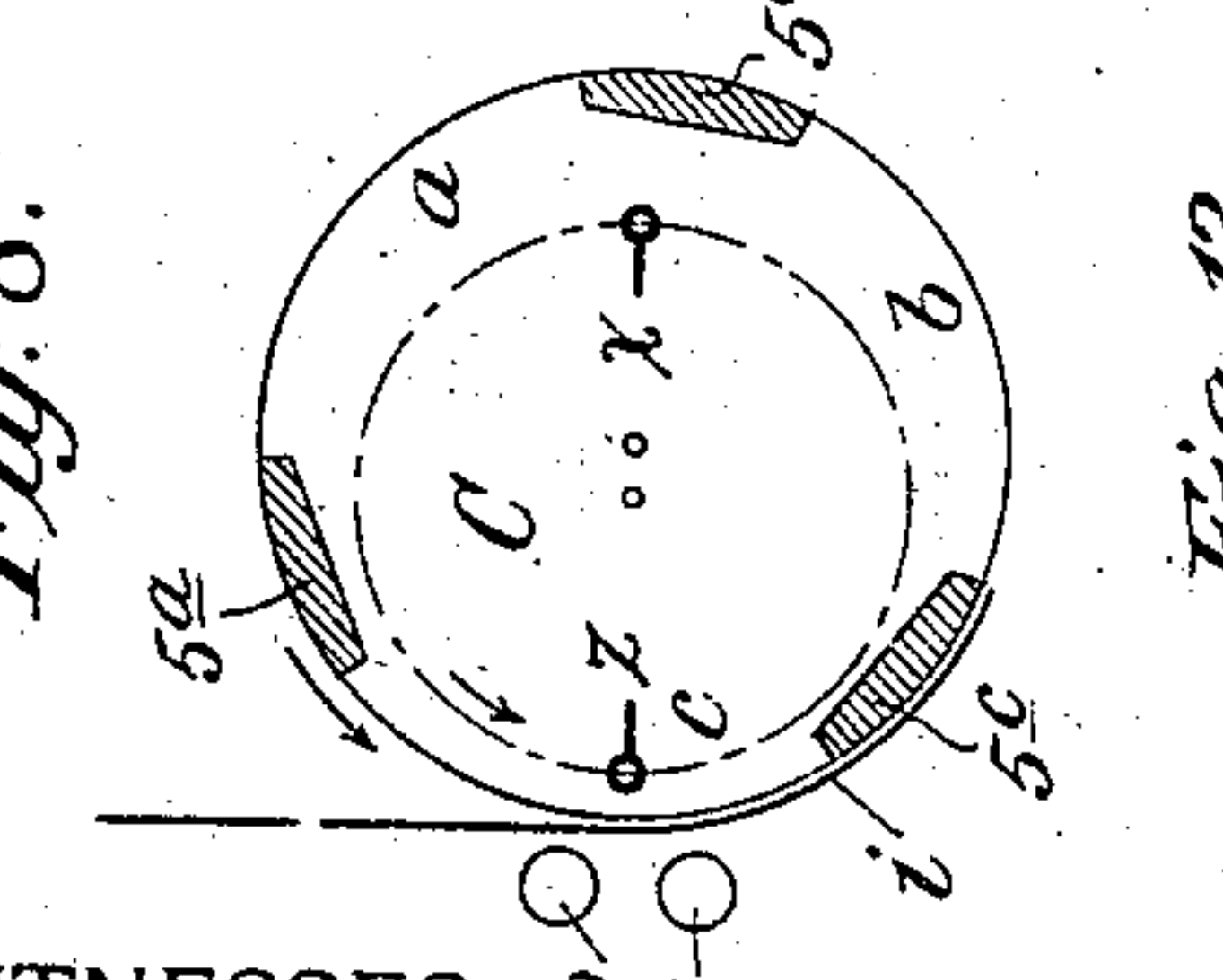
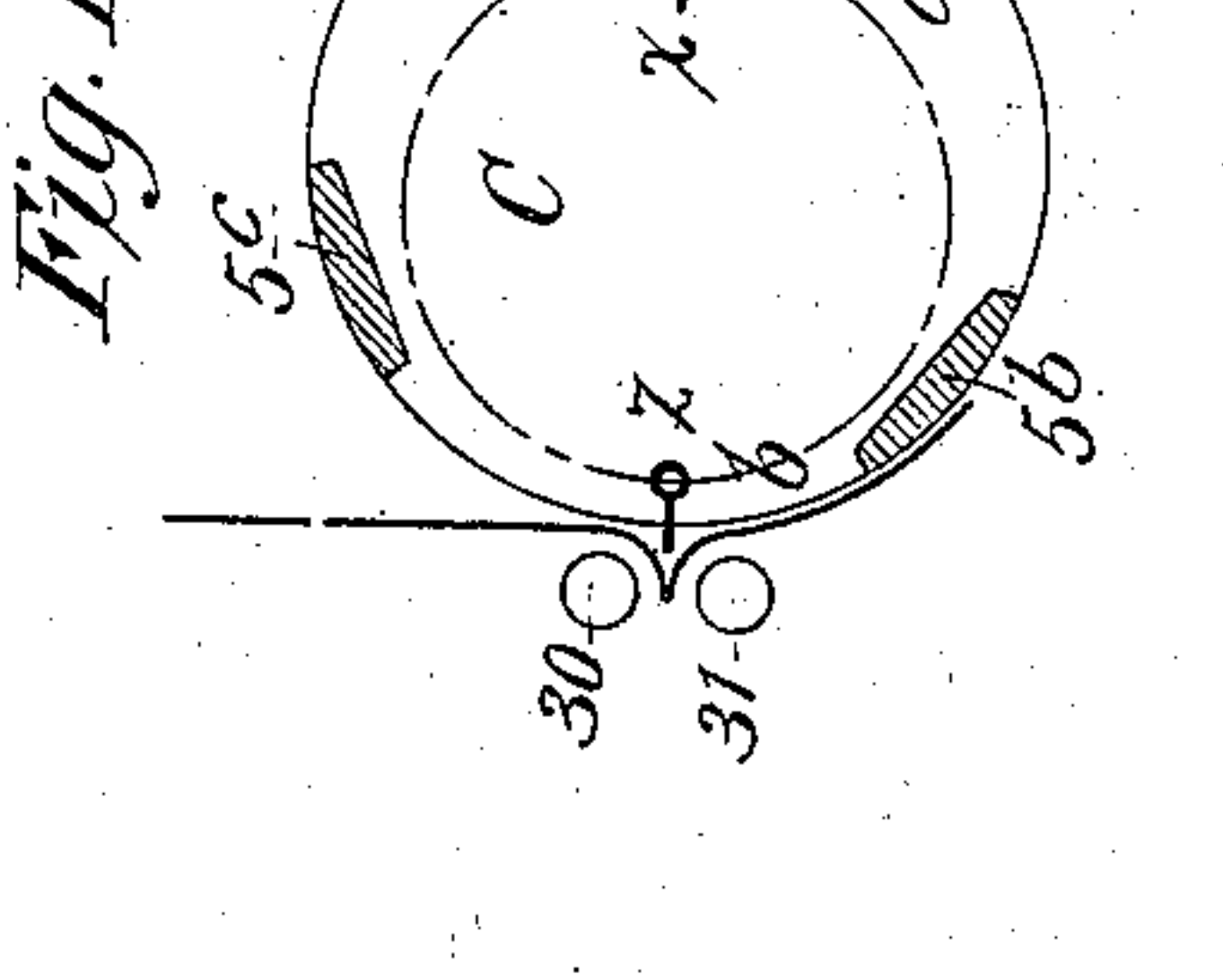
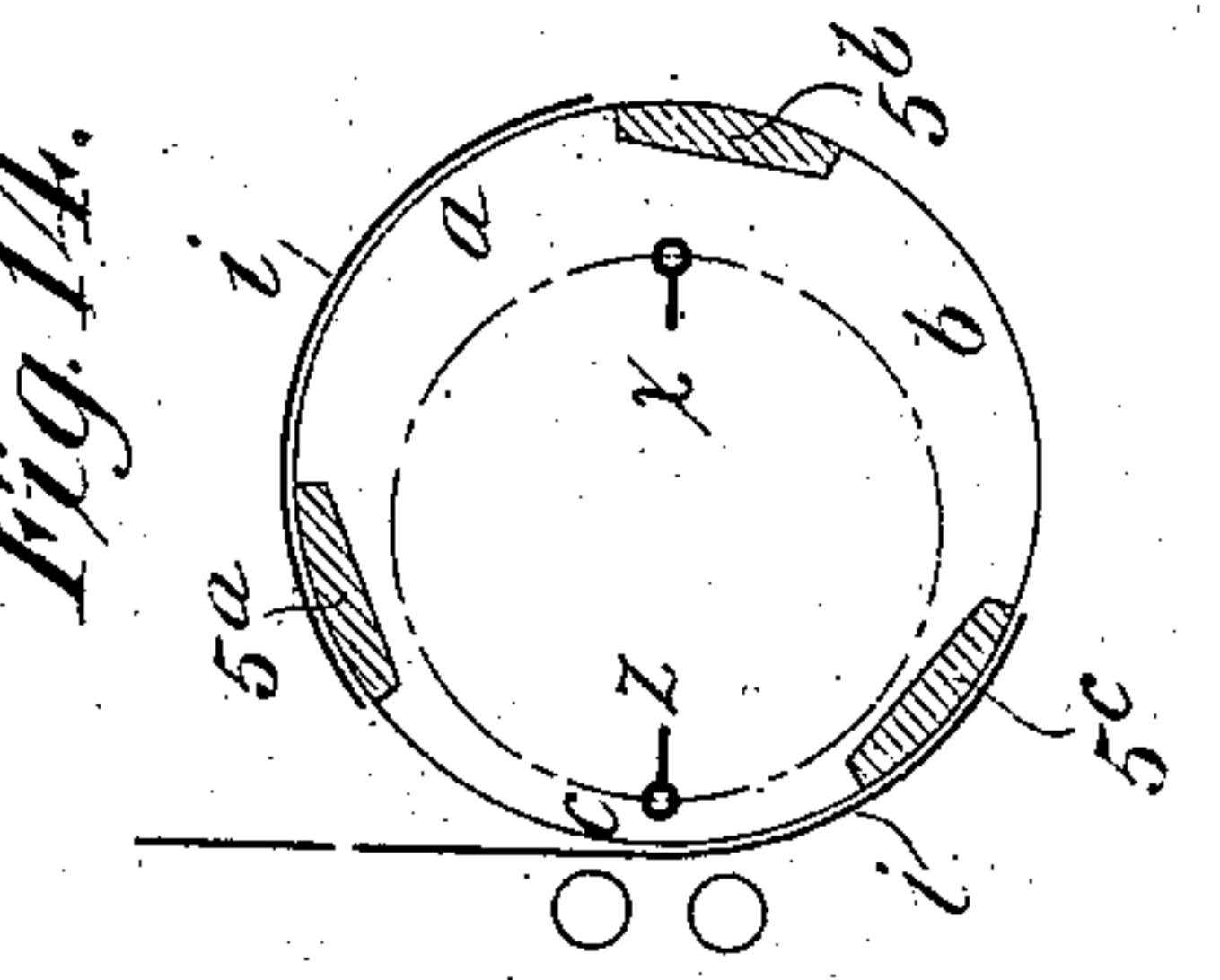
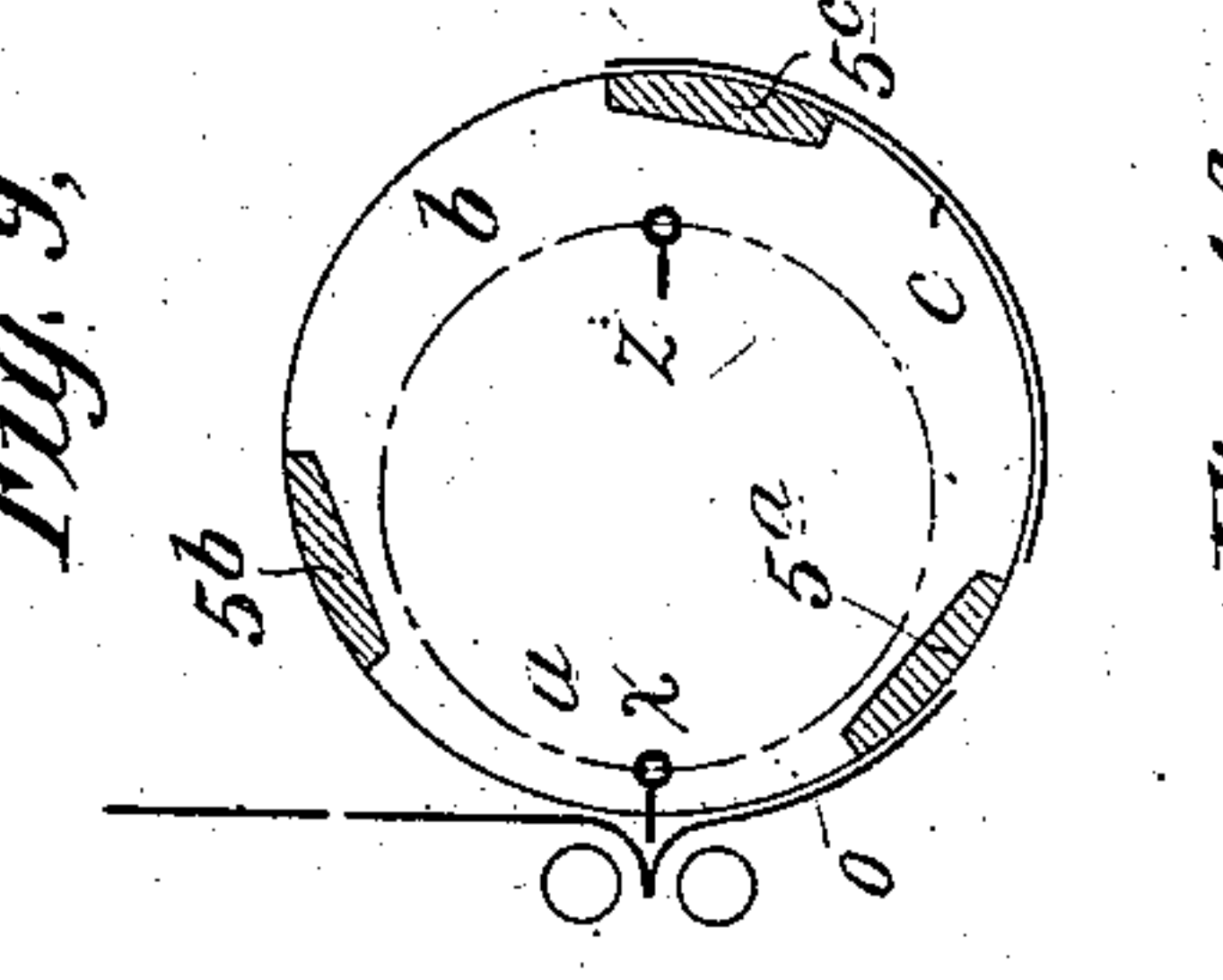
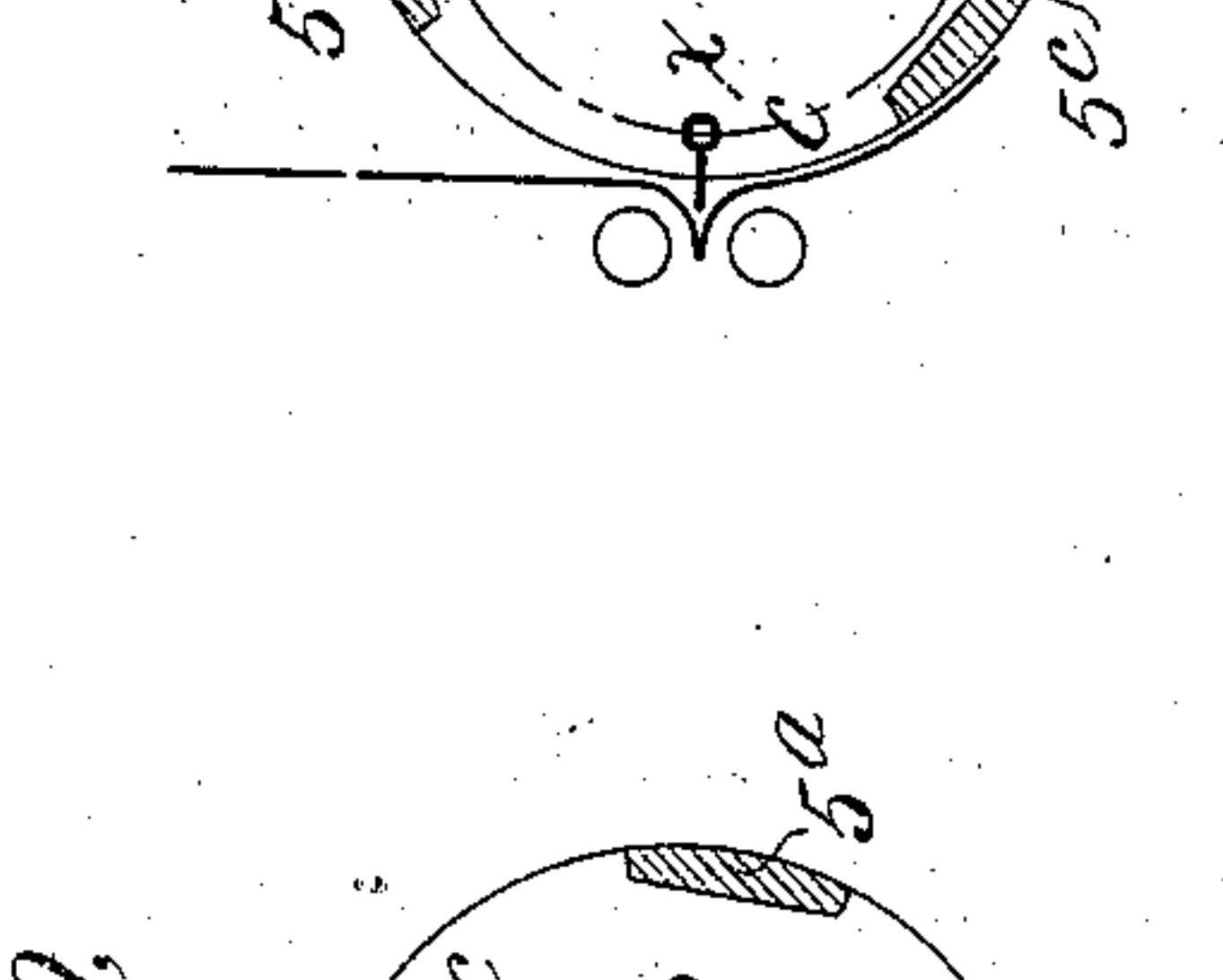
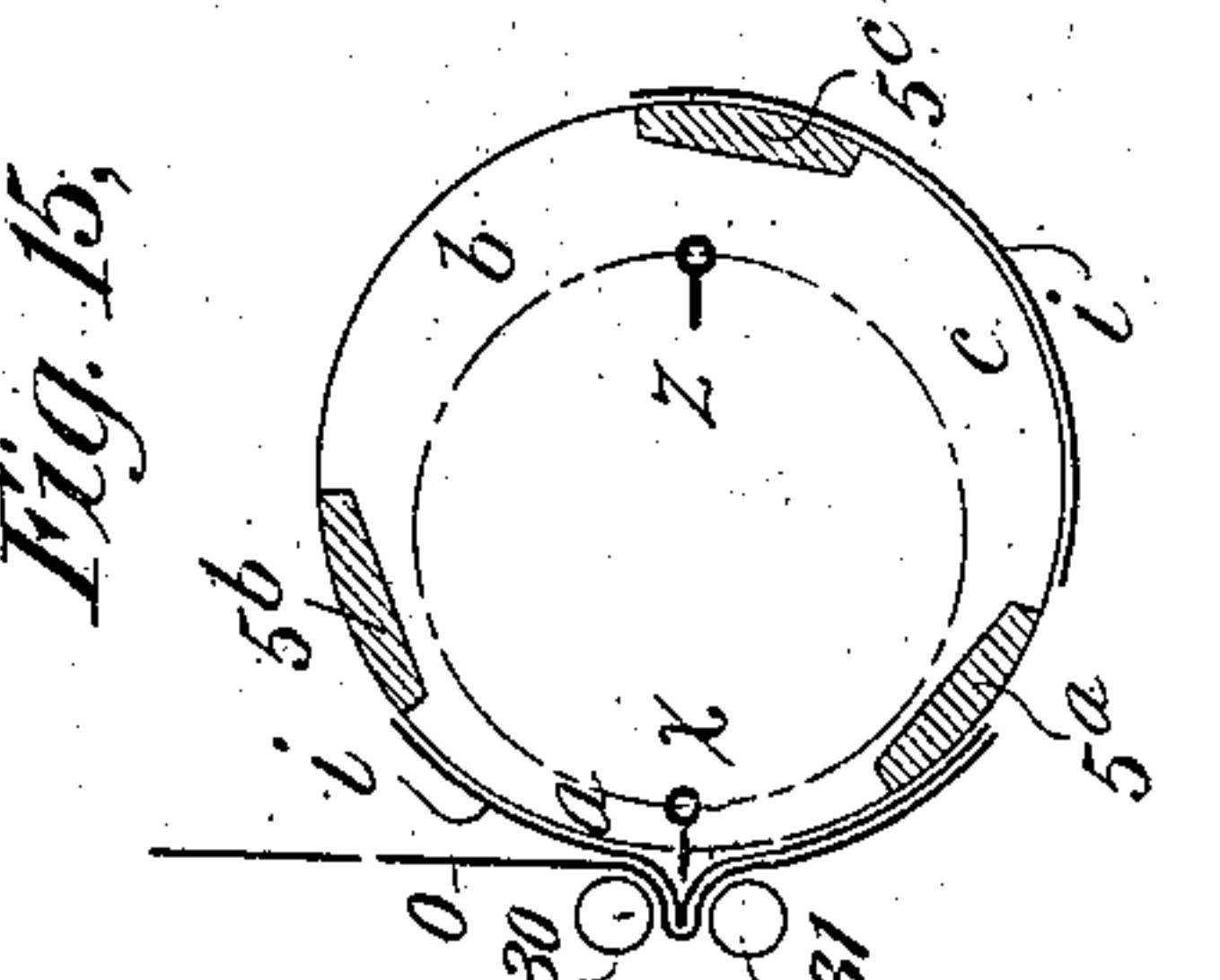
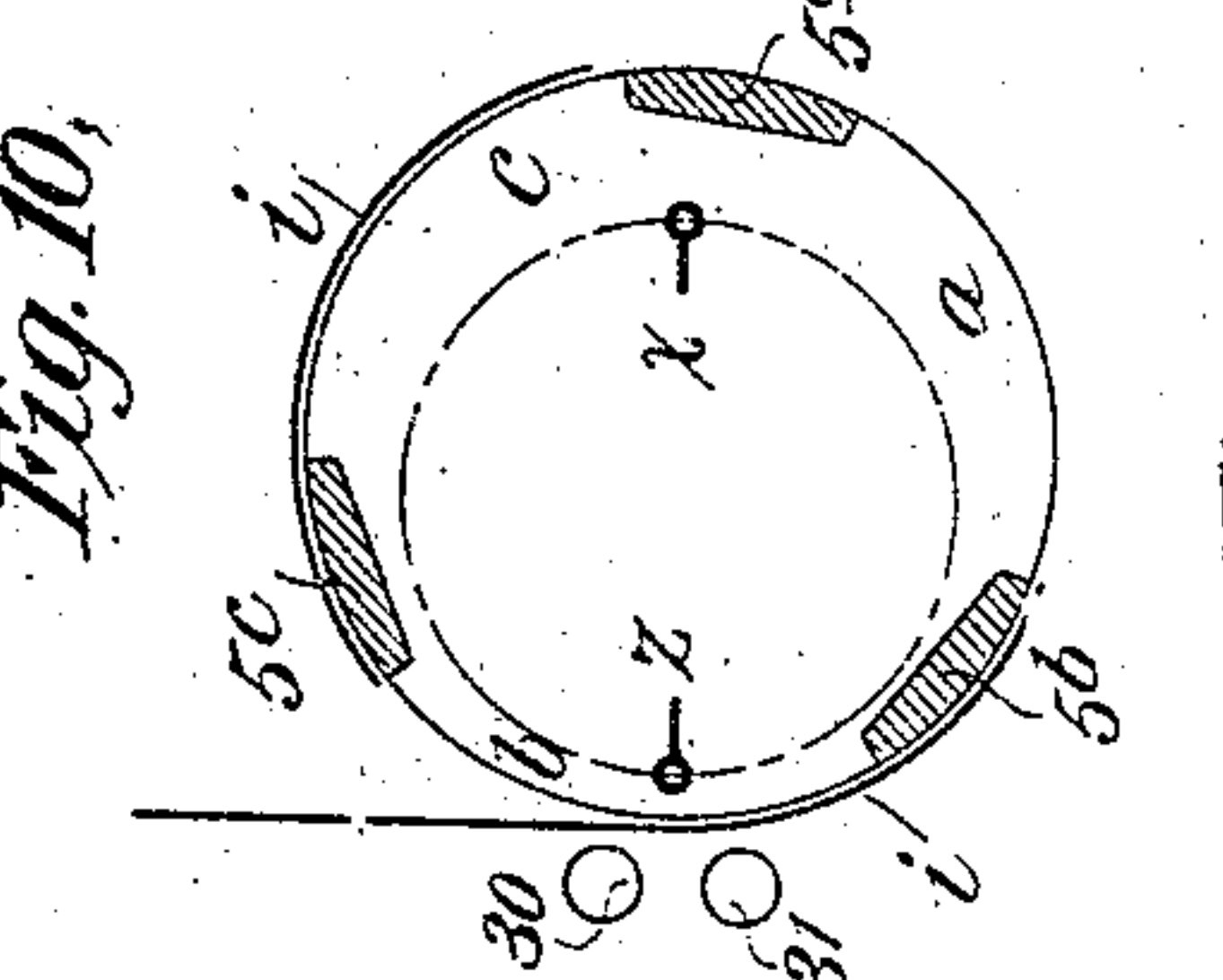
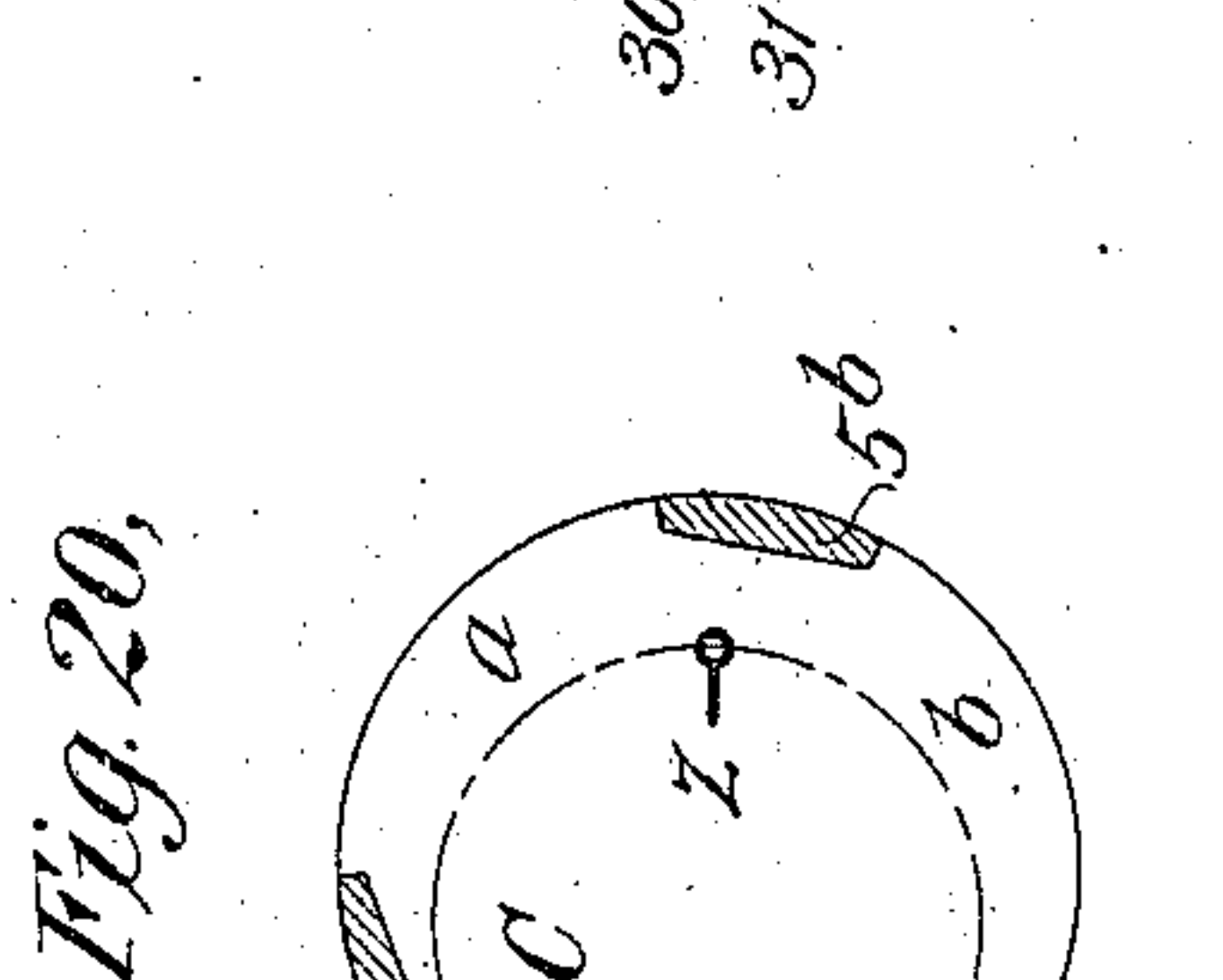
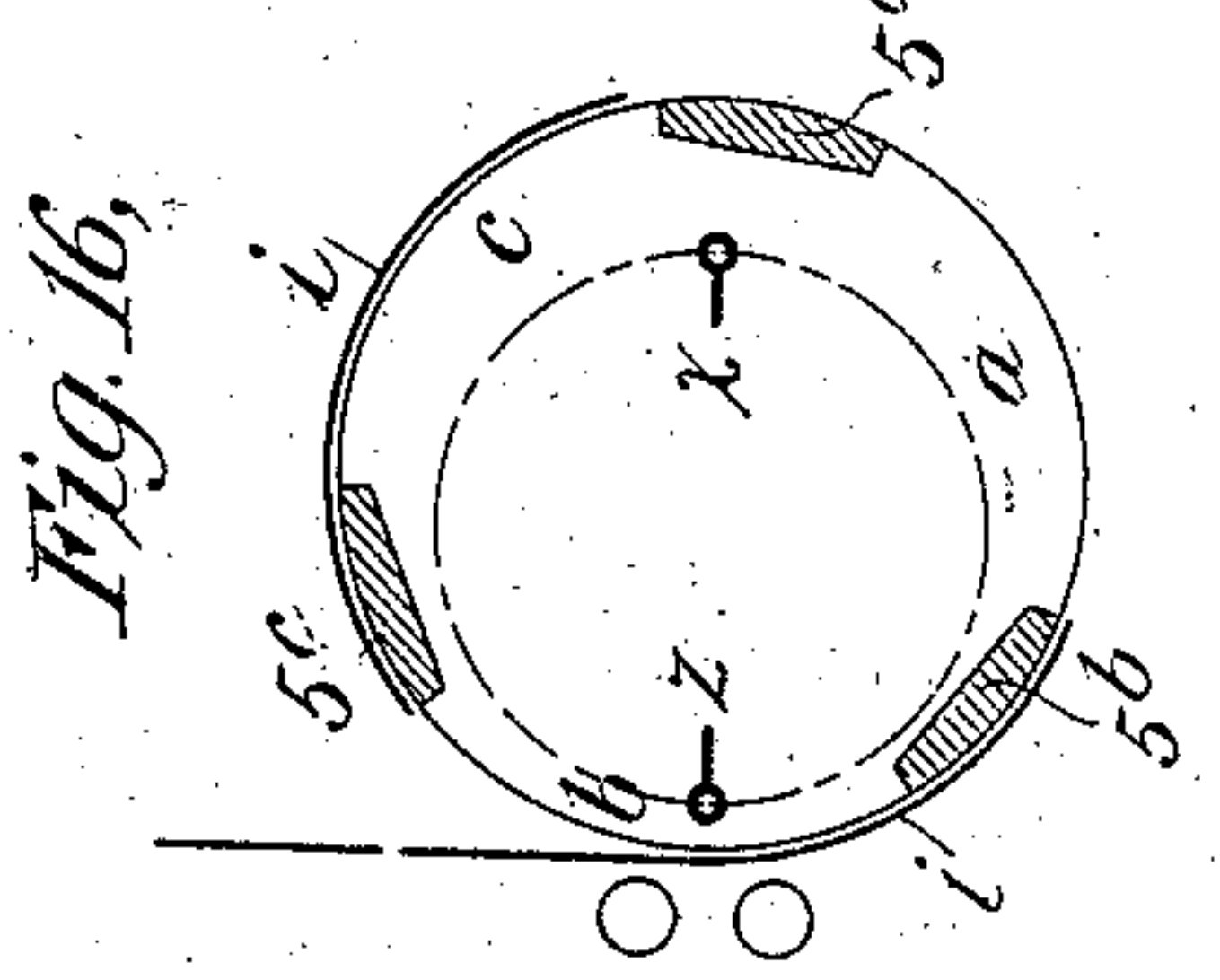
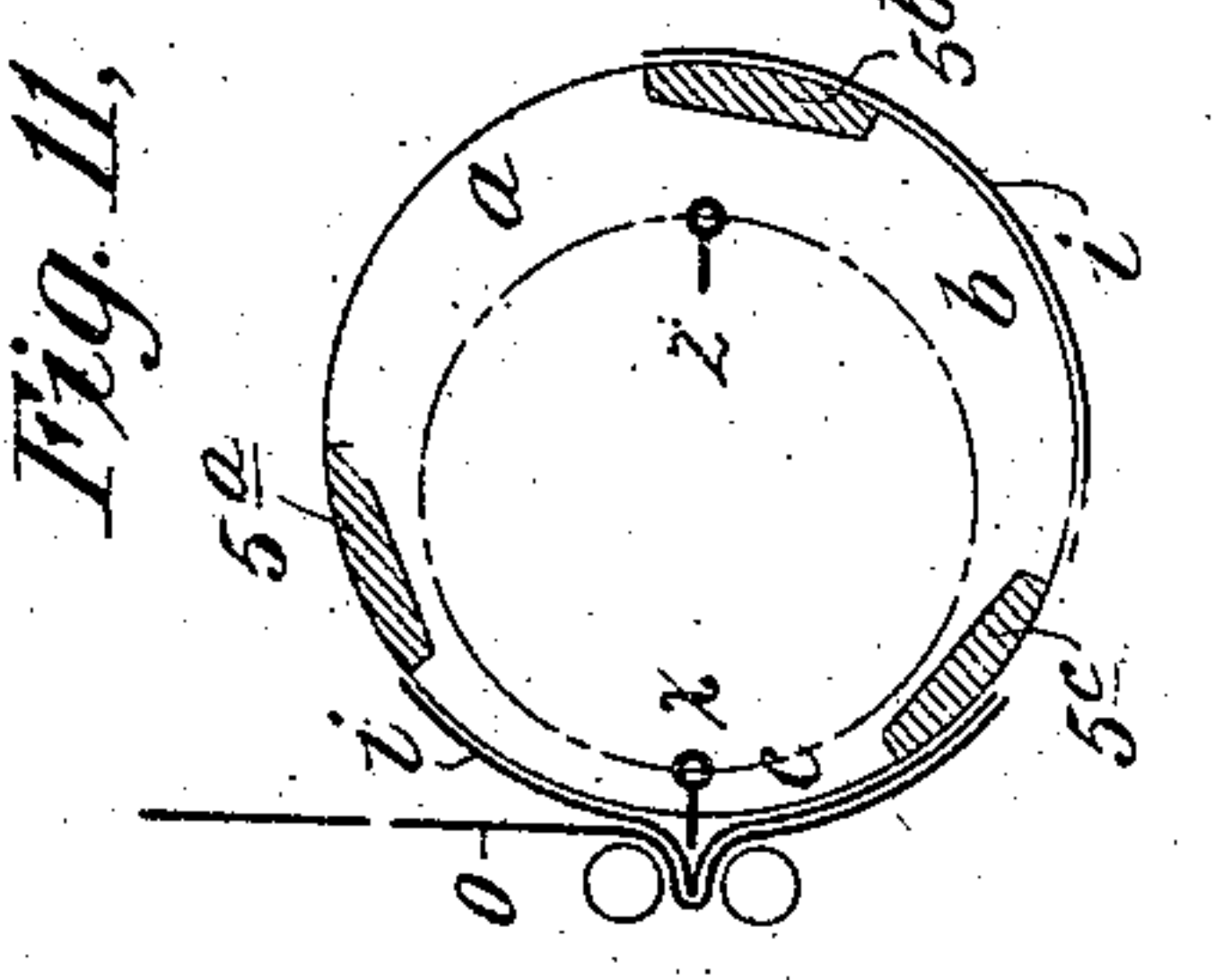
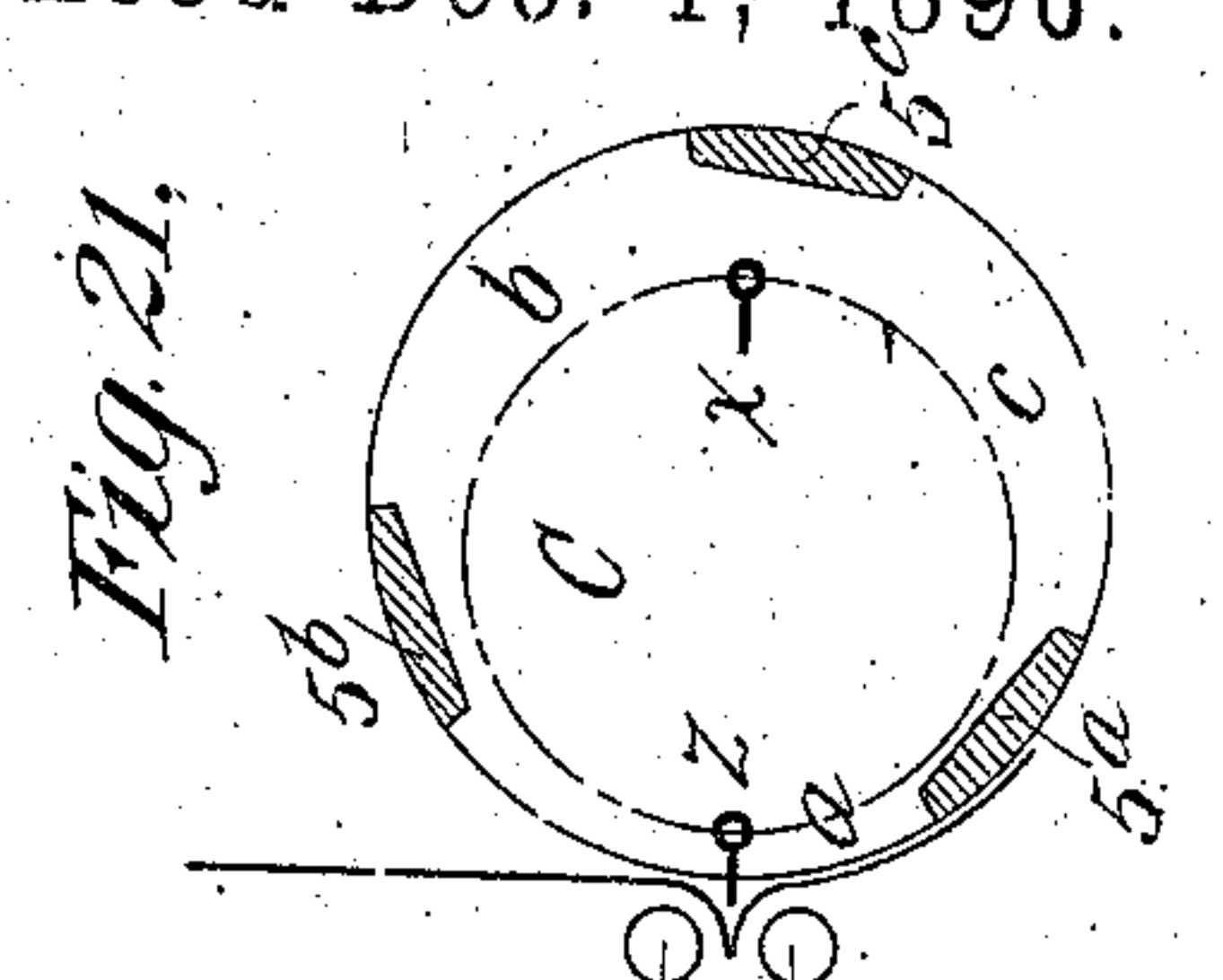
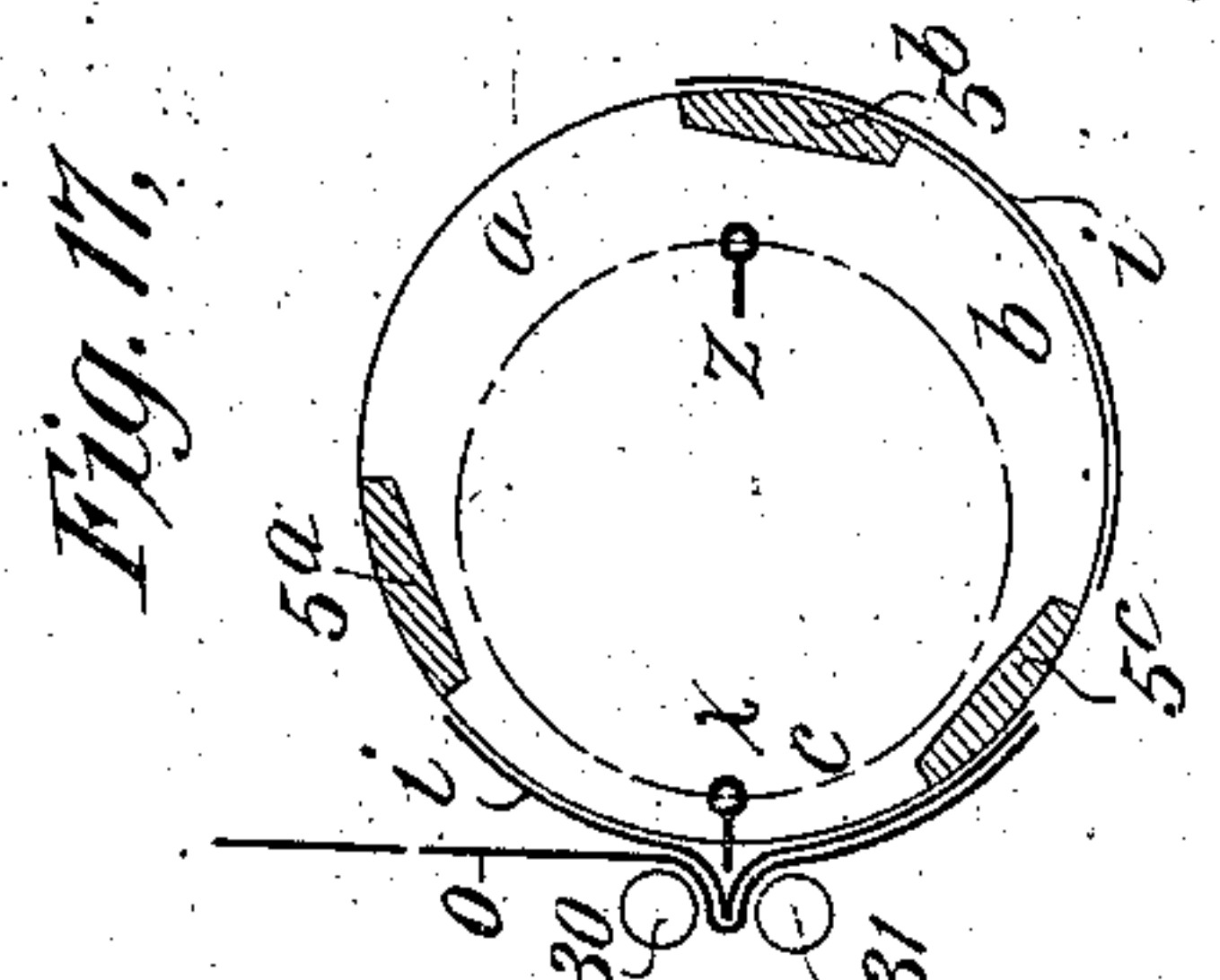
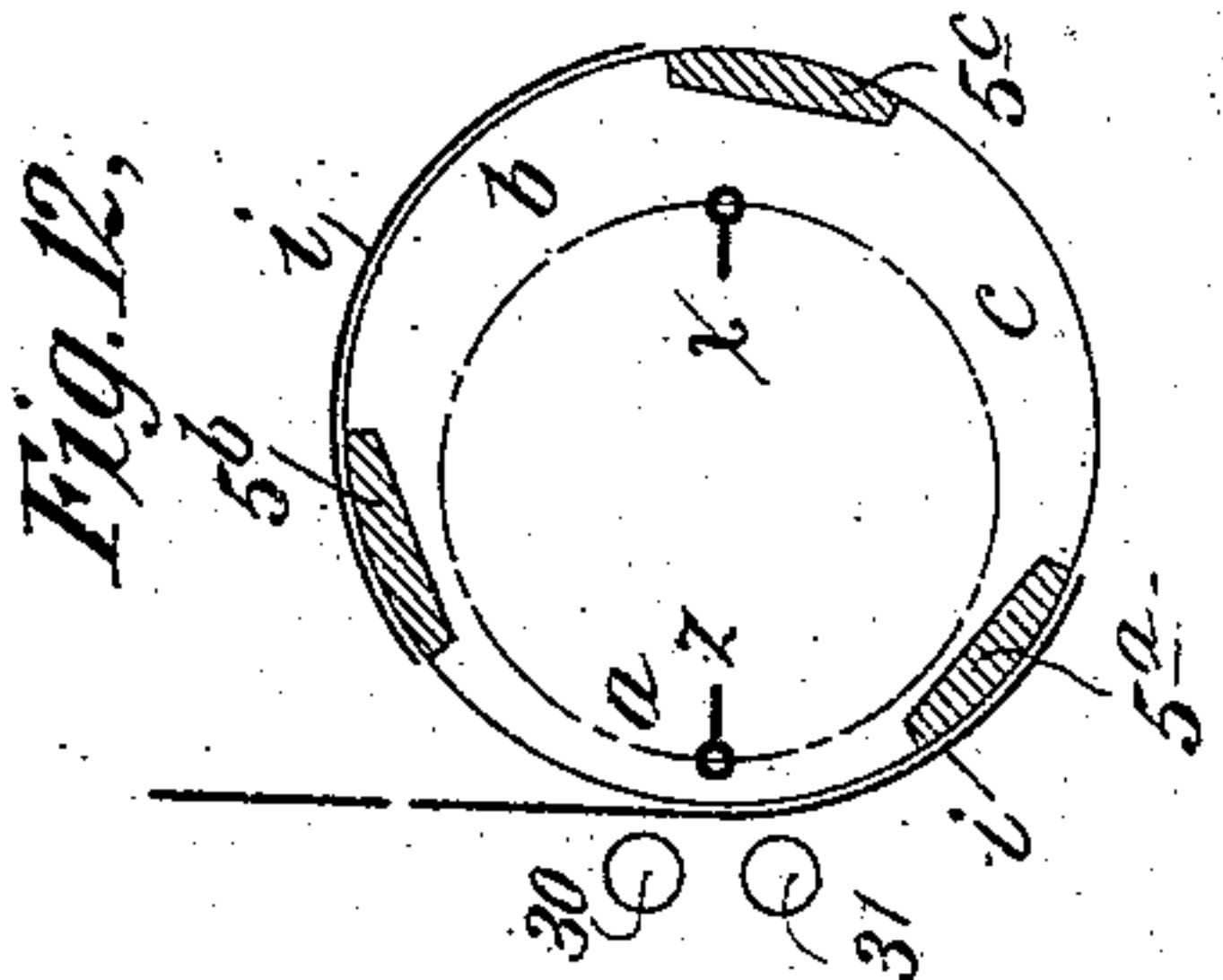
(No Model.)

W. SCOTT.
FOLDING MACHINE.

5 Sheets—Sheet 5.

No. 572,280.

Patented Dec. 1, 1896.



WITNESSES:

C. E. Siskley
J. W. Lloyd.

INVENTOR:

W. Scott
By his Attorneys
Wiley, Siskley & Broderick

UNITED STATES PATENT OFFICE.

WALTER SCOTT, OF PLAINFIELD, NEW JERSEY.

FOLDING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 572,280, dated December 1, 1896.

Application filed August 29, 1895. Serial No. 560,831. (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 certain new and useful Improvements in Folding Mechanism, of which the following is a specification.

This invention relates to mechanism for folding sheets, and has reference to such a construction of the same that cuts or sheets delivered thereto may be folded without being collected, or by a simple adjustment of the mechanism may be collected and folded. It is immaterial whence or how the sheets are supplied to the folding mechanism.

The invention includes a carrier provided with a number of spaces through which folding-blades may be protruded, folding-blades differing in number from said spaces, said blades and carrier having different times of revolution, so a blade passes the place where the fold is given with each space, thus allowing of folding the sheets or cuts without any collecting. If one or more of the blades be rendered inoperative, collecting of sheets takes place, followed by folding.

The invention also includes a rotating carrier-cylinder combined with a folding-blade (or blades) having an axis of revolution eccentric to the axis of the cylinder. The times of revolution may be as in the first case mentioned.

The invention also includes other features, as will be hereinafter more fully pointed out.

The particular embodiment of the invention shown in the accompanying drawings and hereinafter described includes a carrying or collecting cylinder provided with three spaces through which folding-blades may be protruded and two folding-blades revolving in times different from the times of rotation of the cylinder and having at least two motions, one of revolution and the other of rotation. Preferably the motion of revolution of the blades is about an axis eccentric to that of the said cylinder, as this avoids any in-and-out or radial motion of the blades in addition to the two motions above named. The blades make three revolutions about their axis eccentric to that of the cylinder to two revolutions of the cylinder, thus allowing of the collecting of two non-successive cuts or sheets

before folding, one blade being inoperative, or the folding of the cuts or sheets separately, both blades being in operation. This construction permits of collecting but two cuts before the folding. If a mechanism capacitated to collect three or more cuts or none be desired, the rule is to have a carrier provided with a number of spaces through which folding-blades may be protruded greater by one and a number of blades equal to the number of cuts to be collected. The revolutions of the cylinder and the blades are to each other as the number of blades is to the number of said spaces.

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

Figure 1 is an end view of the carrier and folding devices, showing also two rotary printing-presses and mechanism for giving a longitudinal fold to the web or webs, some parts being omitted. Fig. 2 is a like view of the carrier and folding devices or mechanism, but on a larger scale, and shows the parts omitted in Fig. 1. Fig. 3 is a sectional plan view of the carrier and folding mechanism shown in Fig. 2. Fig. 4 is a side view of the carrier and folding mechanism, certain parts being omitted. Fig. 5 is a sectional plan view, and Fig. 6 is a side view, of a modification. Fig. 7 is a diagram showing what cuts from a web are collected in the case of the collecting of two cuts to form one product. Figs. 8 to 17, both inclusive, are diagrams showing the position of the parts at each third of a rotation of the carrier when collecting sheets. Figs. 18 to 21, both inclusive, are diagrams showing the positions of the parts at each third of a rotation of the carrier when folding cuts separately.

The invention is shown in connection with two rotary web-perfecting printing-presses U and L, of usual or suitable construction, and a longitudinal folder F, to which the webs *w w'* are led around rollers *r* and turners *t* in a well-known manner. From the rollers *e f* of the folder F the webs pass between the cutting-cylinders *m n*, where they are severed into cuts or sheets. From this point the cuts pass to the mechanism embodying the present invention.

A rotatable carrier-cylinder C, formed of

ends 2 3, Figs. 3 and 4, hoops 4, and longitudinal ties 5^a 5^b 5^c, is journaled on suitable studs or bearings 6 on the framework A of the machine. The spaces *a b c* between the ties 5 permit of the protrusion of suitable folding-blades. This cylinder is to be provided with suitable sheet-retainers, as pins or grippers, the latter being shown at 7 as co-acting with the ties 5 to hold the leading or front edges of the cuts.

The cylinder C is driven by means of the toothed gears 8 on or forming the ends 2 3, the gears 9-9^a on the shaft 10, which is journaled in the framework A, the gear 11 on a similarly-journaled shaft 12, and the gear 13 on the side shaft 14. The grippers 7 are opened at the proper times by suitable means, as the movable cams 15 16, which are pivoted to the framework, as at 17 18. These cams 15 16 are suitably operated from a convenient part of the machinery, as by the rods 19 20, straps 21 22, and eccentrics 23 24 on shaft 12. The gears 9^a 11 are in the proportion of one to two, and gears 9 8 are in the proportion of one to three, whence it follows that shaft 12 makes one (1) turn to two-thirds ($\frac{2}{3}$) of a turn of cylinder C, and that the cams 15 16 are each alternately in and out of the positions in which they open the grippers 7. This is their operation when sheets are collected on cylinder C, it being understood that any set of grippers after being opened to take a first sheet by the cam 15 is not opened by cam 16 until such set passes that cam the second time. For this reason the eccentrics 23 24 are placed at opposite sides of shaft 12. A set of tapes 25, running on rollers or pulleys 26 and guides 34, coact with cylinder C to hold the sheets thereto when collecting. The sheets are guided to the grippers by cylinder C, by the guides or bars 27, and the tapes 28, running on rollers or pulleys 29, and folding-roller 30. There is a second folding-roller 31 for coaction with roller 30.

The folding-blades *x z* are borne by shafts 35, which are journaled in arms 36 on a shaft 37. This shaft 37 is journaled in bearings in the studs 6, which are eccentric to the center of rotation of cylinder C. The shaft 37 is driven by means of gear 38 thereon and the gear 39 on shaft 10, which are in the proportion of two to one. As the gears 9 8 for driving cylinder C are in the proportion of one to three, it follows that one of the blades *x z* passes the rollers 30 31 each time any of the spaces *a b c* pass the same; that is to say, the rotations of the cylinder C and the shaft 37 are to each other as three to two.

The knives *x z* are driven by means of the shafts 35; the gears 40, detachably fastened to the studs 6 and having their centers coincident with the center of shaft 37, and the gears 41, which are journaled on the arms 36, and the gears 42 on the shafts 35. The proportions of this gearing are such that each shaft 35 and its blade *x z* make three rotations while making one revolution about shaft

37. The gears 40 (or only one of them) are fastened to the studs 6 by means of the pins 42', which pass through the gears 40 and into holes in the studs 6. The arms 36 are provided with holes 43. By taking the pin 42 from the position in which it locks a gear 40 to the stud 6 and putting it through a hole in gear 40 and into hole 43 that gear 40 is locked to the corresponding arm 36 and gives no motion to the corresponding blade *x* or *z*. Owing to the hoops 4, the blades *x z* are cut away, so as not to touch the same.

The sheets folded by the blades *x z* and the rollers 30 31 are conveyed away by the sets of tapes 28 32 (the former set running on rollers or pulleys 29 and roller 30 and the latter set running on rollers or pulleys 33 and roller 31) and the guide bars or fingers 44 to the receiver R. As this particular receiver forms the subject-matter of claims in a pending application filed October 23, 1893, Serial No. 488,896, it need not be here described, since any suitable receiver may be substituted for it without departing from the present invention.

The cylinders *m n* are geared together and to the cylinder C by the gear-wheels 45 46 47 8. The rollers 30 31 are geared together by the gear-wheels 48 49 and to cylinder C by the wheels 50 51 8. The wheels 48 49 50 51 are so proportioned that the surface speed of rollers 30 31 is greater than that of the cylinder C, the purpose being to accelerate the speed of the sheets to allow the grippers 7 to take the ends as they come from the cylinders *m n* without injury to the sheet just ahead.

The forms or plates may be arranged on the plate-cylinders of the presses in any suitable manner, regard being had to the fact whether a longitudinal fold is or is not to be given to the webs. In the case shown in the drawings there are to be two forms circumferentially of each plate-cylinder, of which one prints matter belonging to an inside and the other form prints matter belonging to an outside sheet. Such inside and outside sheets are indicated in Fig. 7 by the reference-letters *i o*.

The operation of these parts will now be described, it being premised that the blade *z* is inoperative, the corresponding pin 42 being in the gear 40 and arm 36, (see Fig. 3,) and reference being had to Figs. 1, 2, 3, 4, 7, and 8 to 17, inclusive. Referring to Fig. 7, there is shown a web (or associated webs) which is given a longitudinal fold along the central margin *l l* by the folder F and is cut transversely along the margins indicated by the dotted lines *k*. Assuming for convenience that the leading or end cut of the web in Fig. 7 is an inside sheet and that it is taken by the grippers coacting with the plate 5^c, the position of the parts is that shown in Fig. 8. The succeeding cut, an outside, is fed down in front of the folding-rollers 30 31, and is folded off, as indicated in Figs. 9, 11, 13, 15, and 17. As stated above, the positions of the cylinder

C in Figs. 8 to 17, inclusive, differ from each other by one-third ($\frac{1}{3}$) of a rotation thereof. In Fig. 10 an inside sheet is on tie-plate 5^b. In Fig. 11 occurs a folding of two cuts inside and outside from tie-plate 5^c. In Fig. 12 an inside sheet is on tie-plate 5^a, and in Fig. 13 an outside and an inside sheet are folded off. It will be noted that the positions of the parts in Fig. 2 are those corresponding to diagrammatic Figs. 9 and 15 and that the arrangement and proportions of the various parts are such that the operations thereof are indicated in Figs. 8 to 17, inclusive. Figs. 14 to 17 illustrate similar action of the parts. The reference-letters *a b c* in Fig. 7 indicate the tie-plates 5^a 5^b 5^c, on which the cuts come, while the numerals 11^a 13^a 15^a 17^a indicate Figs. 11, 13, 15, and 17, wherein the collected cuts are shown as being folded. It is understood, of course, that the grippers 7 are operated by the mechanism hereinbefore described. The outside sheets need not be gripped by the grippers 7, as they will be held by the cylinder C and roller 30, and the tapes and guides shown sufficiently to prevent them from falling or getting out of place.

The operation of the parts when both blades *x z* are in use is indicated in Figs. 18 to 21, where every sheet is folded off. In this case the cam for operating the grippers 7 to release sheets is or may be disconnected from the mechanism for operating it and be fixed in position to open the grippers every time they pass it.

In the modification shown in Figs. 5 and 6 the cylinder C is supported at one end on a stud 6 and is open at the other end, which is supported and guided by the antifriction-rollers 52, which coact with one of the hoop

4. The blades *x y* are supported, as before described, but are operated by the fixed internal gear 53 and gears 42 on shafts 35. By moving one of these gears 42 out of mesh with gear 53 the corresponding blade may be rendered inoperative. The operation of the parts is the same as that hereinbefore described.

Many changes in details, parts of combinations, and arrangements of parts may be made without departing from the principle of this invention. For example, pins or other forms of sheet-retainers may replace the grippers shown and described.

What is claimed as new is—

1. In a folding-machine, the combination of a carrier having a number of spaces through which folding-blades may be protruded, folding-blades differing in number from said spaces supported and moving independently of said carrier, and mechanism for giving different times of revolution to said carrier and said blades, substantially as and for the purpose described.

2. In a folding-machine, the combination of a carrier having a number of spaces through which folding-blades may be protruded, folding-blades differing in number from said

spaces supported and moving independently of said carrier, on an axis eccentric to that of said carrier, and mechanism for giving different times of revolution to said carrier and said blades, substantially as and for the purpose described.

3. In a folding-machine, the combination of a carrier having a number of spaces through which folding-blades may be protruded, folding-blades differing in number from said spaces supported and moving independently of said carrier, means for rendering one or more of said blades active or inactive, and mechanism for giving different times of revolution to said carrier and said blades, whereby sheets may be folded separately or be collected and folded, substantially as described.

4. In a folding mechanism, the combination of a carrying-cylinder, and a folding-blade independent of said cylinder and revolving within said cylinder on an axis eccentric to that of said cylinder, substantially as described.

5. In a folding and collecting mechanism, the combination of a carrying or collecting cylinder, three spaces through which a folding-blade may protrude, a folding-blade revolving within said cylinder on an axis eccentric to that of said cylinder, and mechanism for causing said blade to make three revolutions while the cylinder makes two, whereby sheets are collected and folded, substantially as and for the purpose described.

6. In a folding mechanism, the combination of a carrying-cylinder, three spaces through which a folding-blade may be protruded, two folding-blades revolving within said cylinder on an axis eccentric to that of said cylinder, and mechanism for causing said blades to make three revolutions to two of the cylinder, whereby sheets are folded, substantially as described.

7. In a folding and collecting mechanism, the combination of a carrying or collecting cylinder, three spaces through which a folding-blade may be protruded, two folding-blades revolving within said cylinders on an axis eccentric to that of said cylinder, mechanism for causing said blades to make three revolutions while the cylinders make two and means for rendering one of said blades active or inactive, whereby sheets may be folded separately or be collected and folded, substantially as described.

8. In a folding-machine, the combination of a cylinder or carrier, fixed bearings on which it rotates, a shaft journaled in said bearings eccentrically thereto and a folding-blade journaled in arms on said shaft, substantially as described.

9. In a folding-machine, the combination of a cylinder or carrier, fixed bearings on which it rotates, a shaft journaled in said bearings eccentrically thereto, folding-blades journaled in arms on said shaft, and means for rendering one or more of said blades op-

erative or inoperative, substantially as described.

10. In a folding-machine, the combination of a cylinder provided with three spaces 5 through which folding-blades may be protruded, fixed bearings on which it rotates, a shaft eccentrically journaled relatively to said bearings, and two folding-blades journaled in arms on said shaft.

10 11. In a folding-machine, the combination of a carrier or cylinder, a shaft journaled eccentrically thereto, two folding-blades journaled in arms on said shaft, fixed gears, and connections therefrom to said blades, and 15 means for detaching one of said gears and fixing it to the corresponding arm, whereby

the corresponding blade may be rendered inoperative, substantially as described.

12. The combination of a revoluble sheet-carrier, a folding or creasing blade within 20 and supported independently of said carrier, and driving mechanism for revolving said carrier and said blade at different times, substantially as described.

Signed at New York, in the county of New 25 York and State of New York, this 23d day of August, A. D. 1895.

WALTER SCOTT

Witnesses:

FREDERICK GREEN,
R. W. BARKLEY.

Corrections in Letters Patent No. 572,280.

It is hereby certified that in Letters Patent No. 572,280, granted December 1, 1896, upon the application of Walter Scott, of Plainfield, New Jersey, for an improvement in "Folding-Machines," errors appear in the printed specification requiring correction as follows: In line 61, page 1, the comma after the word "one" should be stricken out and the word *than* inserted instead, and line 23, page 4, the word "at" should read *in*; and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed, countersigned, and sealed this 22d day of December, A. D., 1896.

[SEAL.]

JNO. M. REYNOLDS,
Assistant Secretary of the Interior.

Countersigned:

JOHN S. SEYMOUR,
Commissioner of Patents.