

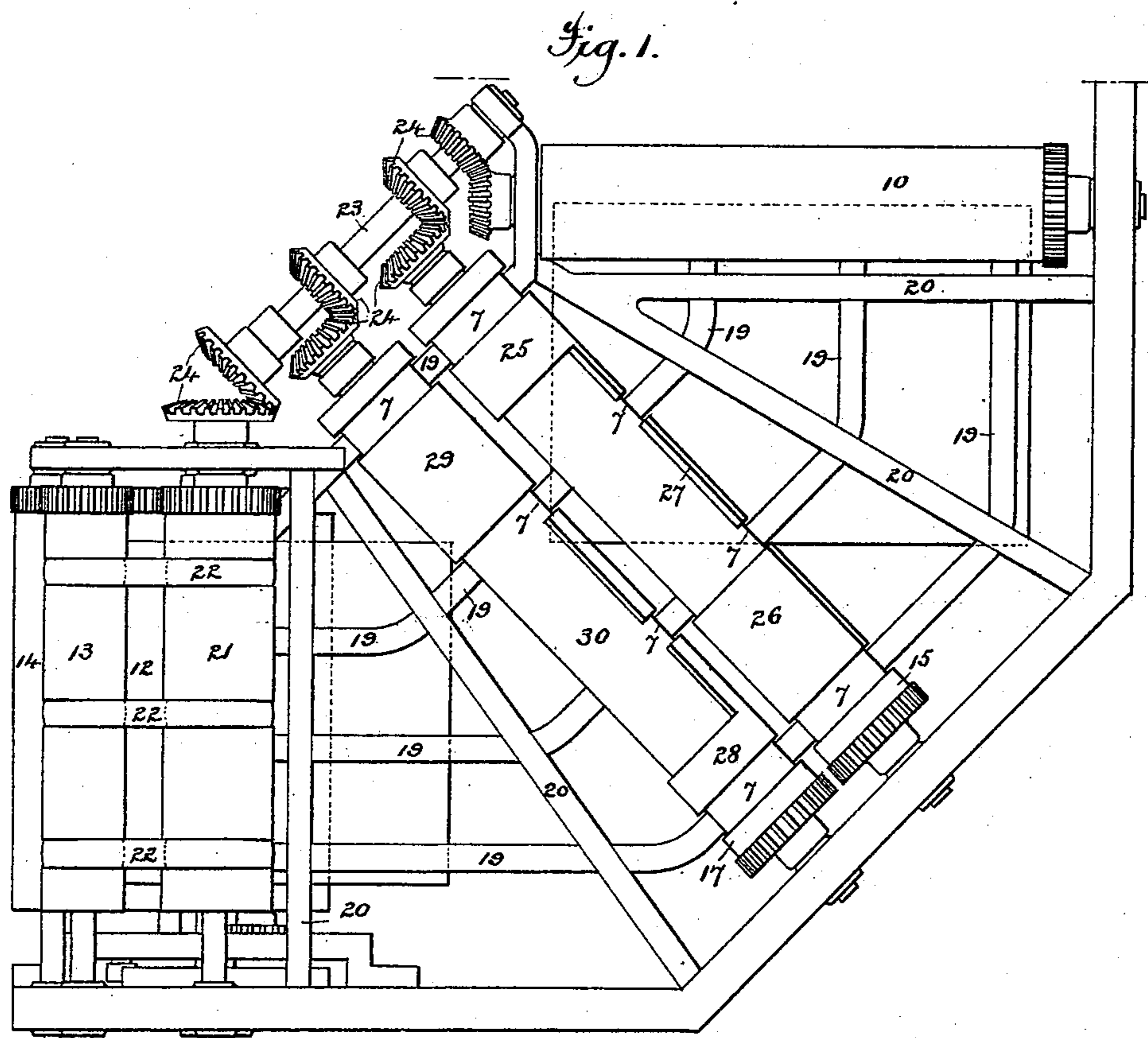
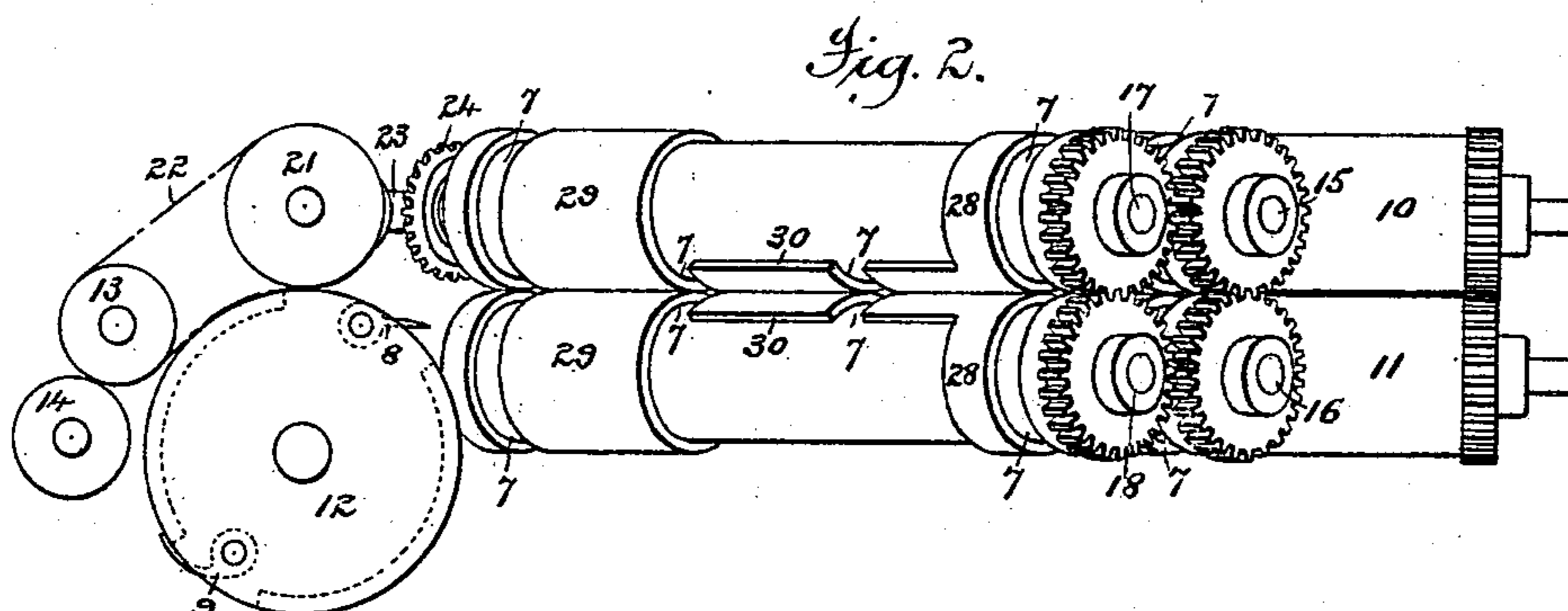
(No Model.)

2 Sheets—Sheet 1.

L. C. CROWELL.
FOLDING MACHINE.

No. 316,122.

Patented Apr. 21, 1885.



Witnesses~

C. C. Perkins.
A. St. Jasbera

Inventor~

Luther C. Crowell,
by Munson & Philipp
Attys.

(No Model.)

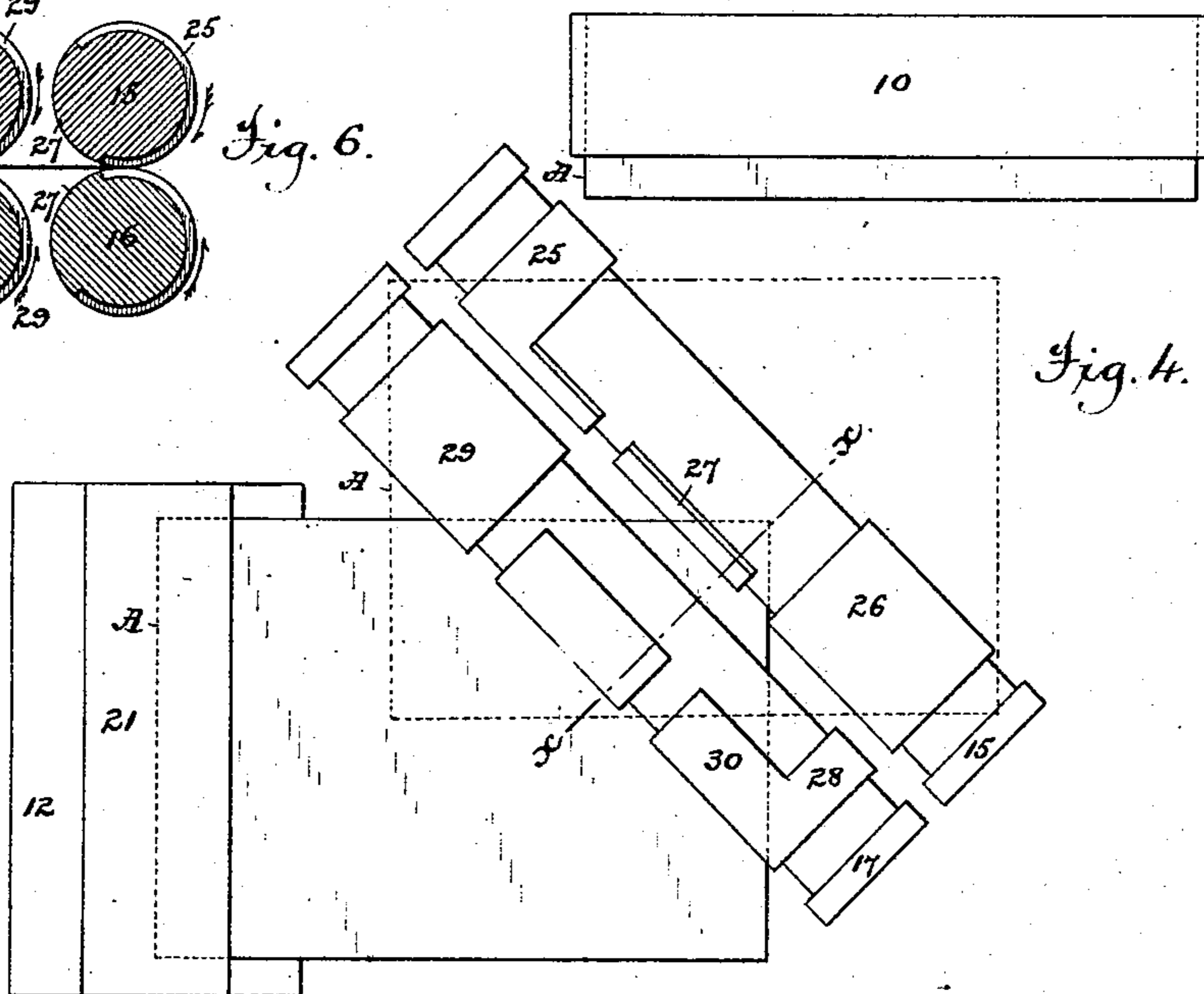
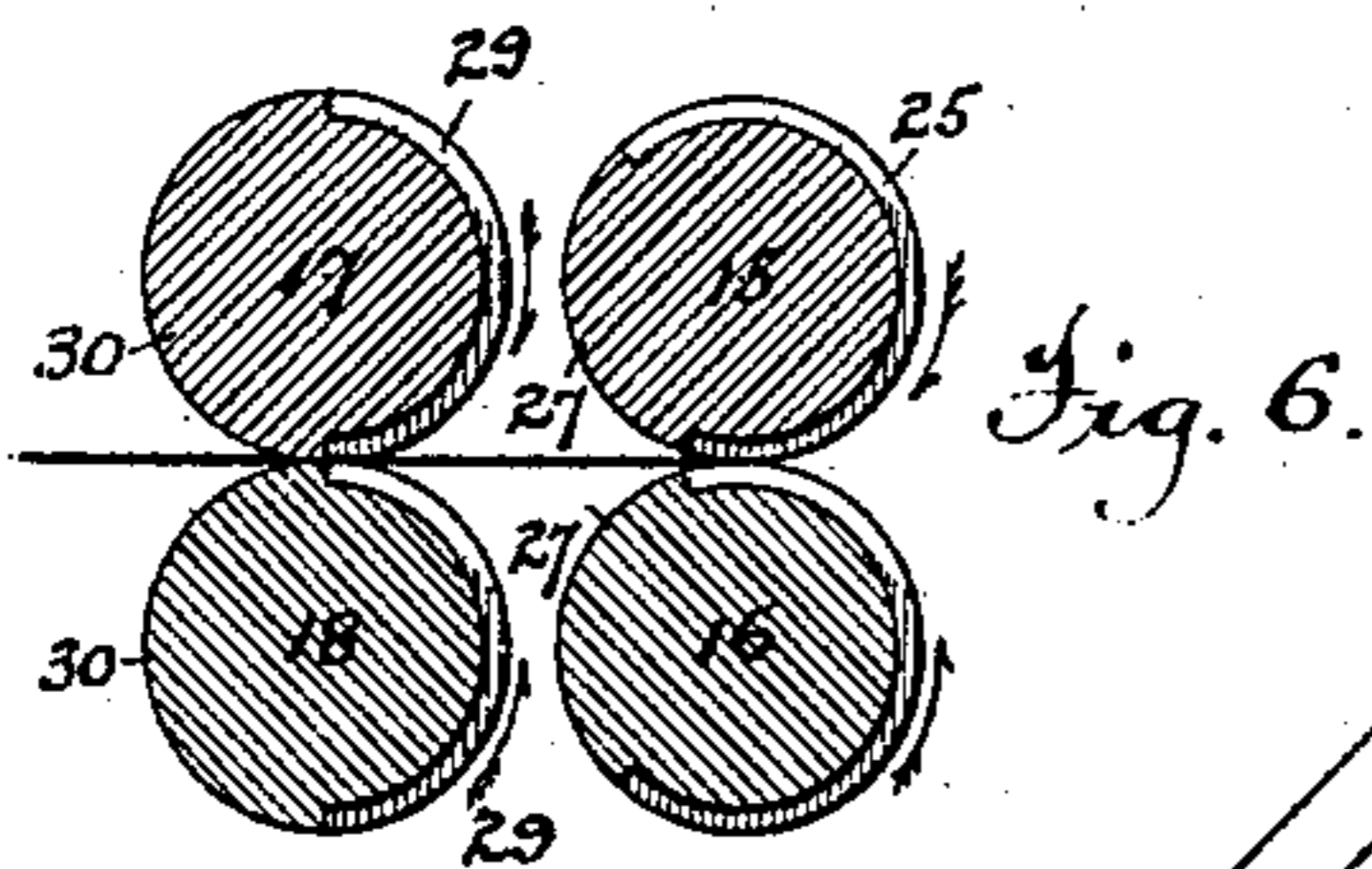
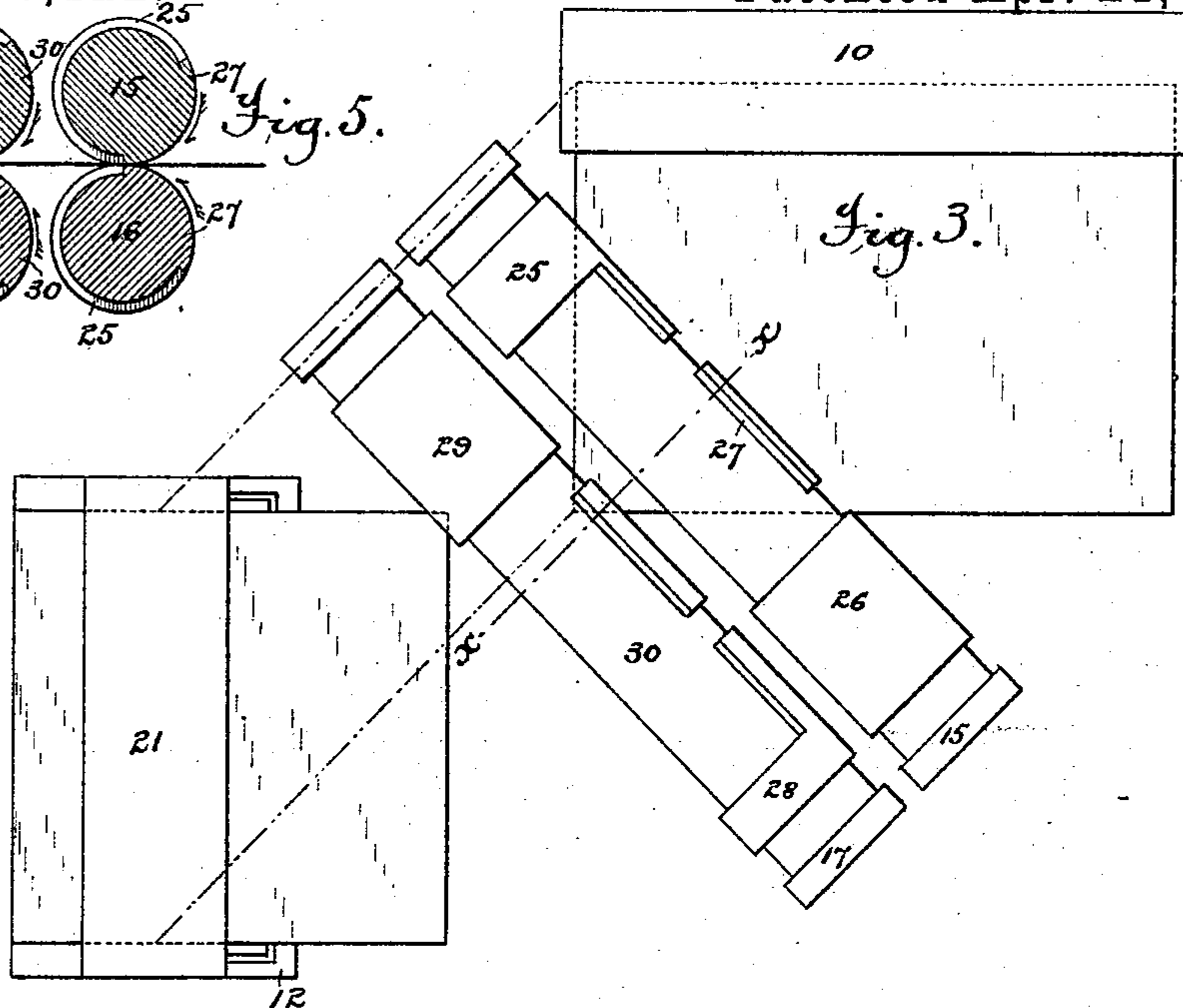
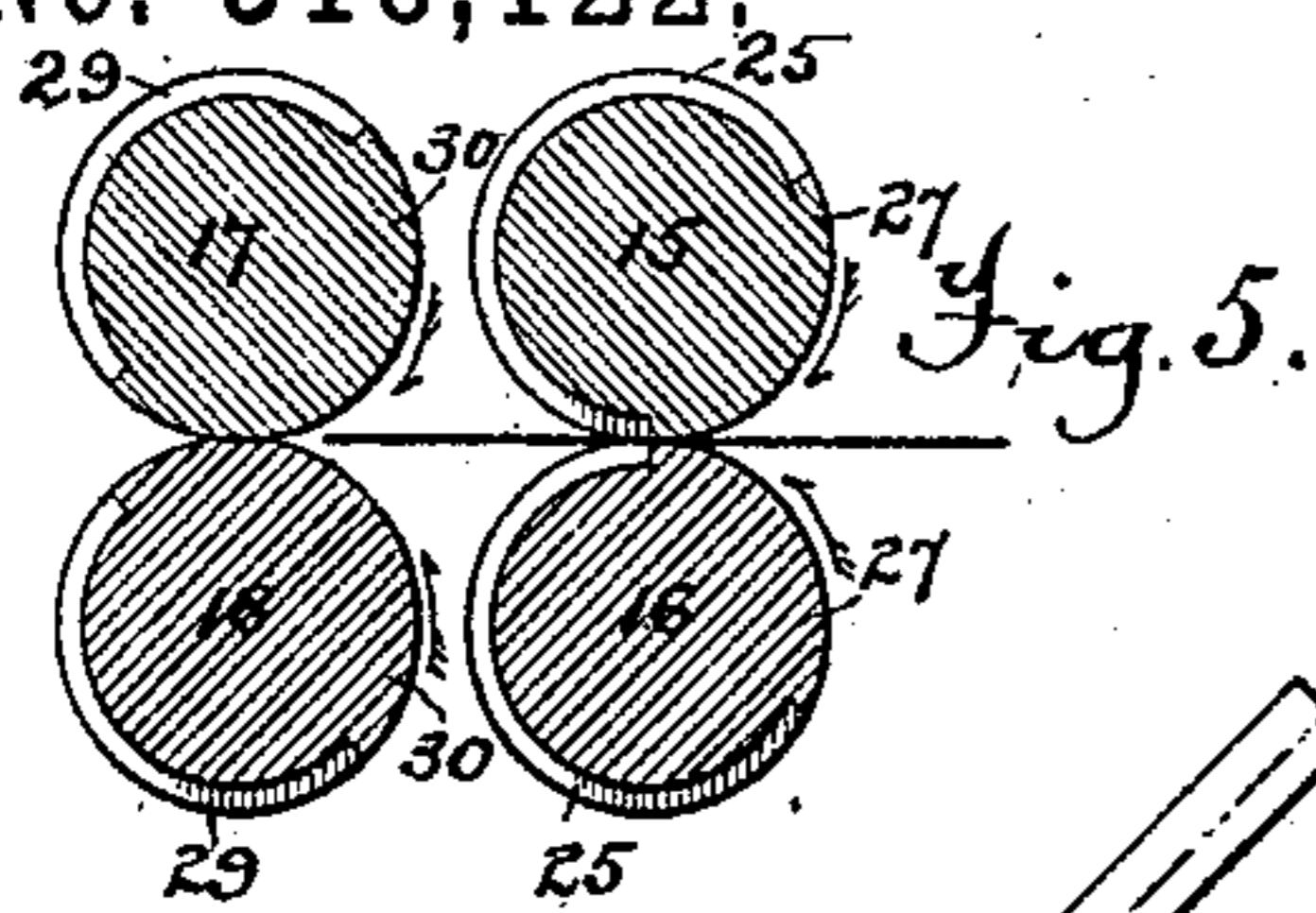
2 Sheets—Sheet 2.

L. C. CROWELL.

FOLDING MACHINE.

No. 316,122.

Patented Apr. 21, 1885.



Witnesses.

E. C. Perkins
A. N. Jasbera

Inventor.

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UNITED STATES PATENT OFFICE.

LUTHER C. CROWELL, OF BROOKLYN, ASSIGNOR TO R. HOE & CO., OF
NEW YORK, N. Y.

FOLDING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 316,122, dated April 21, 1885.

Application filed February 25, 1884. (No model.)

To all whom it may concern:

Be it known that I, LUTHER C. CROWELL, a citizen of the United States, residing in the city of Brooklyn, county of Kings, and State of New York, have invented certain new and useful Improvements in Folding-Machines, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

10 The present invention relates to a sheet-folding mechanism which is designed to operate in connection with a web printing and severing mechanism to impart two or more folds to the successively-produced sheets, said
15 folds being at right angles to each other.

It is the object of the invention to accomplish this result by the use of ordinary oscillating or rotating folding-blades operating in connection with folding rolls or jaws and without arresting the sheets in their travel through the machine.

To this end the invention consists, broadly, in the combination, with two folding mechanisms arranged at right angles to each other, of a sheet-feeding mechanism arranged to act upon the sheets after they have received their first and before they receive their second fold, and cause them to move laterally in a direction at right angles to their previous path of travel, so that what was the side edge of the sheets at the time of the first fold becomes the leading edge at the time of the second fold, thereby causing both folds to be made in a direction transverse to the travel of the sheet at the time they are made, and thus making it possible to make these folds by the ordinary mechanisms named without arresting the travel of the sheet.

40 The invention also embraces various details of construction and combinations of parts in the mechanisms for accomplishing this result, all of which will be hereinafter fully explained and particularly pointed out.

In the accompanying drawings, Figure 1 is a plan view of a mechanism embodying the present invention. Fig. 2 is an elevation of the same, the supporting frame-work and certain minor parts being omitted in order to more fully expose the principal moving parts.

50 Figs. 3 and 4 are diagrams showing the differ-

ent positions of the sheet in its travel from the first to the second folding mechanism. Fig. 5 is a cross-section of the feed-rolls, taken upon the line *x x* of Fig. 3; and Fig. 6 is a like view of the same rolls, taken upon the line *x x* of Fig. 4.

Referring to said drawings, it is to be understood that the apparatus therein shown as embodying the invention consists of two folding mechanisms, which, for convenience, will be hereinafter termed the "primary" and "secondary" folding mechanisms, and an interposed sheet-feeding mechanism.

The primary folding mechanism consists of a pair of folding-rolls, 10 11, and an ordinary folding or tucking blade, (not shown,) which are arranged to impart a fold to the sheets transversely of their line of travel.

The secondary folding mechanism consists of a rotating cylinder, 12, provided with a set of ordinary sheet-holding grippers, 9, and an ordinary rotating or oscillating folding-blade, 8, and a pair of co-operating folding-rolls, 13 14, which are arranged at right angles to the primary folding mechanism, while the intermediate sheet-feeding mechanism consists of two pairs of rolls, 15 16 and 17 18, arranged at such an angle to the primary folding mechanism that the sheets, as they leave said primary mechanism, will move laterally in a diagonal direction, and be presented to the secondary folding mechanism in such position that what were their side edges as they left the primary mechanism will become their leading edges as they enter the secondary mechanism.

The spaces between the rolls 10 11 and the rolls 15 16 and between the rolls 17 18 and the cylinder 12 are bridged by upper and lower stationary guides, 19, between which the sheets are supported in their passage from the rolls 10 11 to the cylinder 12. These guides are secured to and supported by cross-bars 20, extending between the side frames of the machine, and pass between the rolls 15 16 and 17 18 in circumferential grooves 7, provided for that purpose. Only the upper set of these guides is shown in the drawings; but it is to be understood that the lower set is a duplication of the upper set, and lies directly beneath

it. The cylinder 12 is provided with the usual roll, 21, and series of short tapes 22, which pass around said roll and the folding-roll 13, and serve to hold the sheets in proper position upon the cylinder after they have been released by the grippers 9. The rolls 10 11, 15 16, and 17 18, and the rolls 13 14 21, and the cylinder 12 are geared to each other in the usual manner, and the whole are connected in any suitable manner, as by the shaft 23 and gears 24, so as to be driven in unison. The rolls 15 16, which are of a circumference about equal to the length of the sheets in their line of travel as they emerge from the rolls 10 11, are not, as will be observed, complete cylinders, but are provided with biting portions 25 26 27, the portions 25 26 extending entirely around the rolls, while the portions 27 extend over only about one-third the circumference of the rolls. The rolls 17 18 are of the same size, and are provided with like biting portions 28 29 30; the portions 30, however, in this case extend over about one-half the circumference of the rolls. The purpose of these biting portions of the feeding-rolls will now be explained in connection with a description of the operation of the machine, which is as follows: As the sheets which are to be operated upon are advanced from the printing and severing mechanism or from a folding mechanism which has previously operated upon them, or as they are fed to the machine by an attendant, they are presented in proper position to the primary folding mechanism of the present machine, and are folded transversely between the rolls 10 11. As the successive sheets emerge from between these rolls and are advanced between the guides 19, the rolls 15 16 will be in such position that their biting portions 27 will not be in contact, so that the advance corners of the sheets may be projected between said rolls, as shown in Fig. 3, without being grasped thereby. The parts are so timed, however, that just as each sheet passes out of the control of the rolls 10 11 the portions 27 of the rolls 15 16 will come together so as to grasp the sheet, as shown in Fig. 5, and cause it to change its direction of travel and advance in a lateral diagonal direction, as indicated by the dotted lines in Fig. 3. At or about the same time the sheet is grasped by the biting portions of the rolls 15 16 its leading corner is also grasped by the portions 30 of the rolls 17 18, as shown in Fig. 5, so that it will continue to be advanced in its diagonal path of travel, as indicated by the dotted lines in Fig. 4, until its edge A, which was its side edge as it emerged from between the rolls 10 11, is in position to be taken by the grippers of the cylinder 12, as shown in Fig. 4. The parts are so timed that as soon as the sheet arrives in this position and is taken by the grippers of the cylinder 12 the biting portions 27 30 of the rolls 15 16 and 17 18 will pass out of contact, as shown in Fig. 6, so that the sheet will pass out of the control of the feeding-rolls and into the control of the cylinder 12, and be ad-

vanced at right angles to its path of travel as it left the primary folding mechanism. As the sheet is carried around upon the surface of the cylinder 12 it will, at the proper point, be released by the grippers 9 and folded between the rolls 13 14 by the blade 8, thus receiving a second fold transversely to its line of travel, but at right angles to the first fold. It will thus be seen that by the use of ordinary oscillating or rotating folding-blades two folds at right angles to each other are imparted to the sheet without arresting it in its travel through the machine. After leaving the rolls 13 14 the sheets may pass to any suitable mechanism to be flown, or further folded and flown, as may be desired.

If desired, a third folding mechanism and a second feeding mechanism, similar to the rolls 15 16 17 18, may be added, so that the sheets may be given a third fold, parallel to the first.

If in any case it should be desired that the first fold given to the sheets should be a longitudinal instead of a transverse fold, the sheets may be directed in an unfolded condition to the feeding-rolls 15 16, and thus receive their first fold from what is herein termed the "secondary mechanism," and in this case the sheets may pass from the secondary mechanism directly to the piling mechanism or to a feeding mechanism similar to the rolls 15 16, to be again directed laterally to a second folding mechanism, to receive a second fold at right angles to the first.

In conclusion, it is to be remarked that the primary and secondary folding mechanisms may be of other forms than those herein shown without departing from the invention. The secondary mechanism, like the primary, may consist of a pair of folding-rolls and a co-operating oscillating folding-blade; or the primary mechanism may consist of a pair of folding-rolls and a co-operating rotating folding-blade; or either or both of said mechanisms may consist of a rotating or oscillating folding-blade and co-operating folding-jaws.

It is not necessary that the primary and secondary folding mechanisms should be placed in such close proximity to the feeding-rolls 15 16 and 17 18 as shown in the present case. They may be located at any desired distance therefrom, the sheets being advanced from the primary mechanism to the feeding-rolls and from said rolls to the secondary mechanism by any suitable form of sheet-feeding mechanism. The feeding mechanism for causing the sheets to take a lateral diagonal direction may also be considerably modified from that shown without departing from the invention. Instead of two pairs of feeding-rolls, as 15 16 and 17 18, a single pair may in some cases be employed; or when two pairs are employed they may be placed at a greater distance from each other than that shown in the present case, and, if desired, the upper and lower rolls of the pairs may be provided with feeding-tapes; or instead of continuous rolls, as herein

shown, a number of pulleys mounted on suitable shafts may be employed to effect the feeding of the sheets.

What I claim is—

5 1. The combination, with two folding mechanisms arranged at right angles to each other, of an interposed sheet-feeding mechanism arranged to cause the sheets to take a lateral diagonal path of travel in passing from the
10 first to the second mechanism, all substantially as described.

2. The combination, with mechanisms arranged to impart two folds to a sheet, said folds being at right angles to each other, of
15 means for causing the sheet to take a lateral diagonal path of travel after receiving its first and before receiving its second fold, all substantially as described.

3. The combination, with mechanism, as the
20 rolls 10 11, for advancing a sheet in one direction, of mechanism, as the cylinder 12, for advancing it in a direction at right angles to the first direction, and mechanism, as the rolls 15 16 and 17 18, for advancing the sheet in a
25 lateral diagonal direction from the first to the

second of these mechanisms, all substantially as described.

4. The combination, with a sheet-folding mechanism, of a sheet-feeding mechanism arranged to advance the sheets in a lateral diagonal direction to present them to said folding mechanism, all substantially as described. 30

5. The combination, with a pair of rolls, as 10 11, of a pair of rolls, as 15 16, arranged at an angle thereto, and provided with biting portions, as 25 26 27, and means for directing
35 the sheets from the first pair of rolls to the second pair, all substantially as described.

6. The combination, with the rolls 10 11, of the rolls 15 16 and 17 18, arranged at an angle
40 thereto, and provided with biting portions, as 25 26 27 and 28 29 30, and the guides 19, substantially as described.

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

LUTHER C. CROWELL.

Witnesses:

J. A. HOVEY,

T. H. PALMER.