

(Model.)

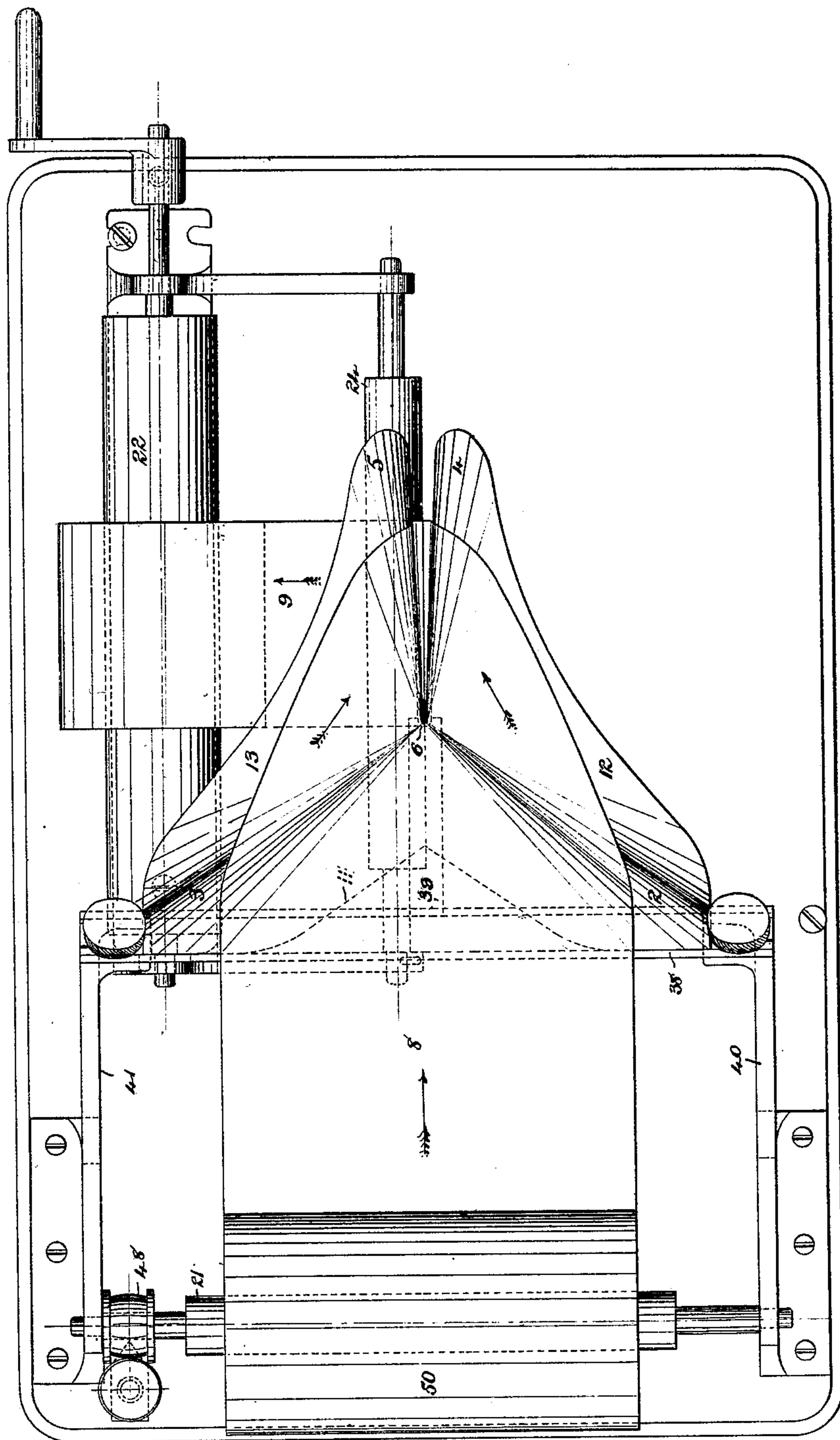
6 Sheets—Sheet 1.

L. C. CROWELL.
Folding Machine.

No. 233,994.

Patented Nov. 2, 1880.

Fig. 1.



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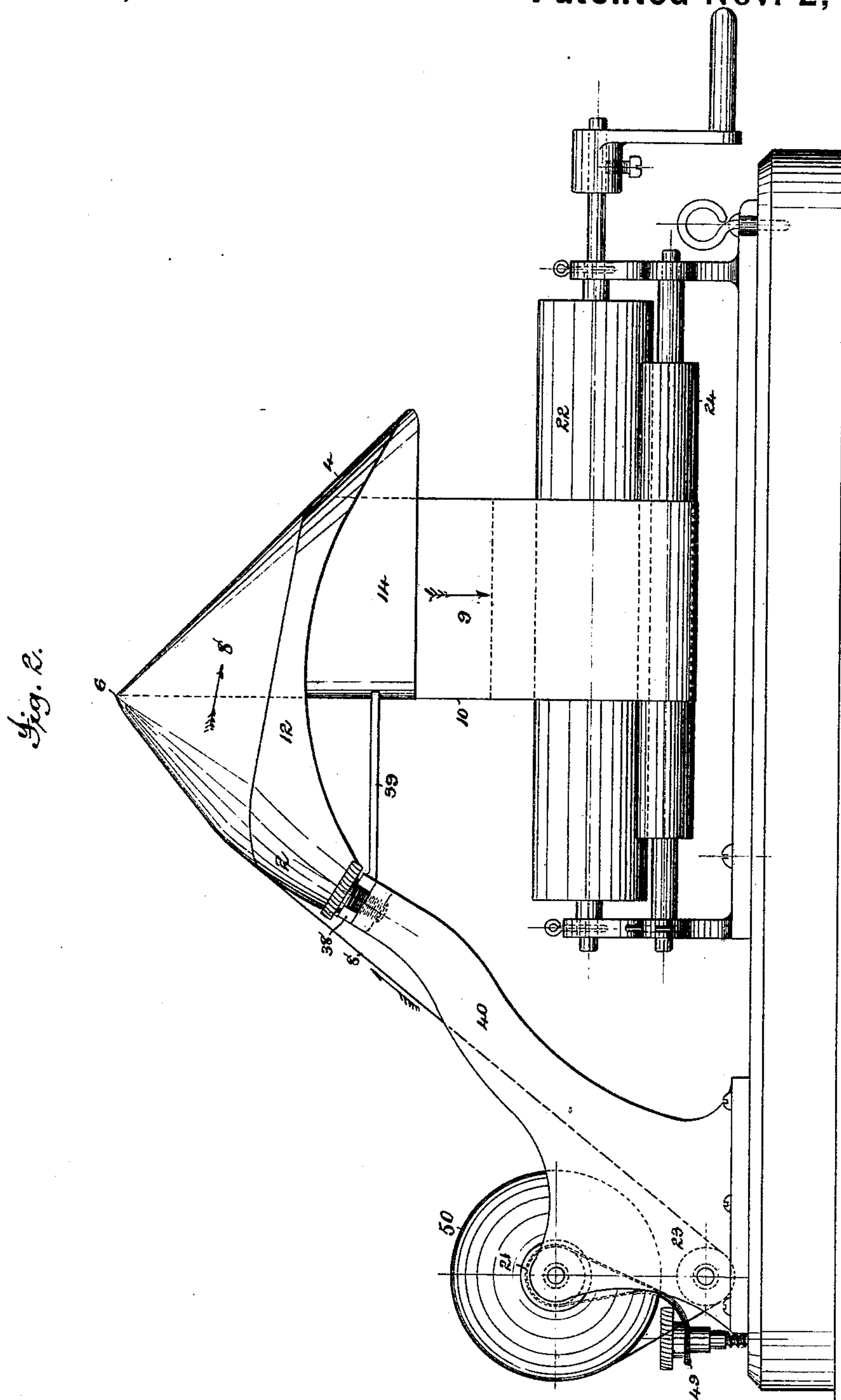
(Model.)

6 Sheets—Sheet 2.

L. C. CROWELL.
Folding Machine.

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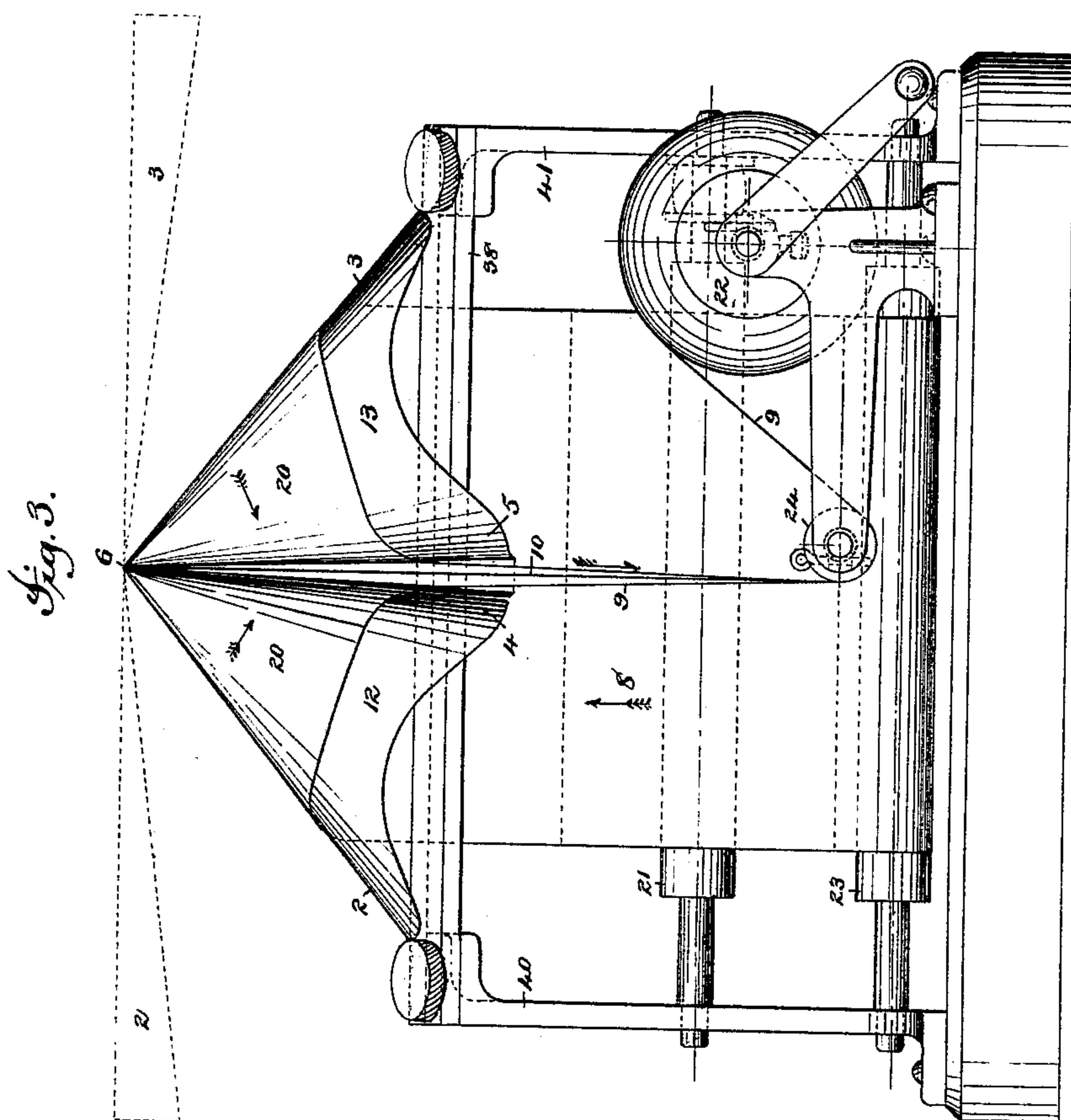
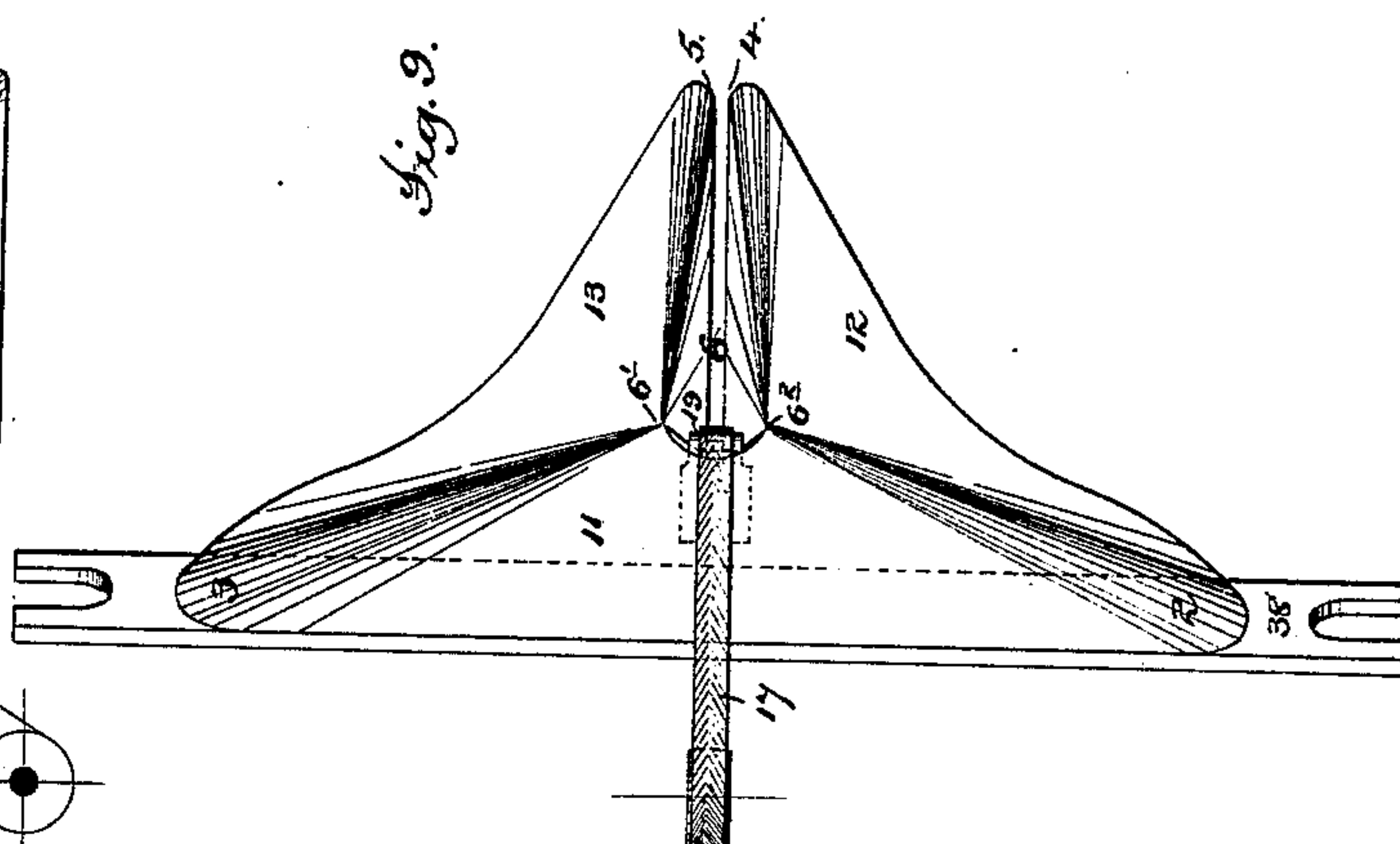
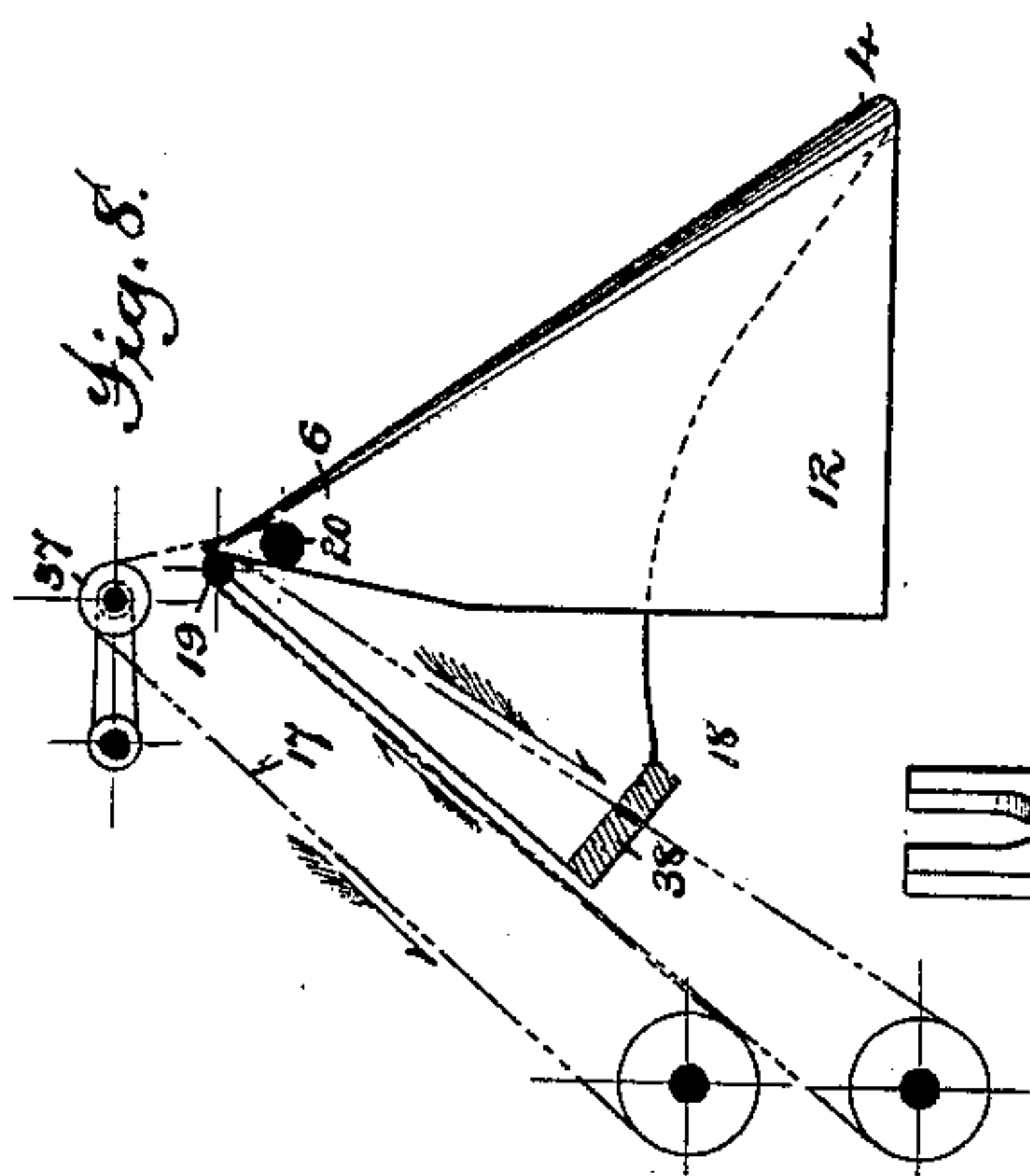
(Model.)

6 Sheets—Sheet 3.

L. C. CROWELL.
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No. 233,994.

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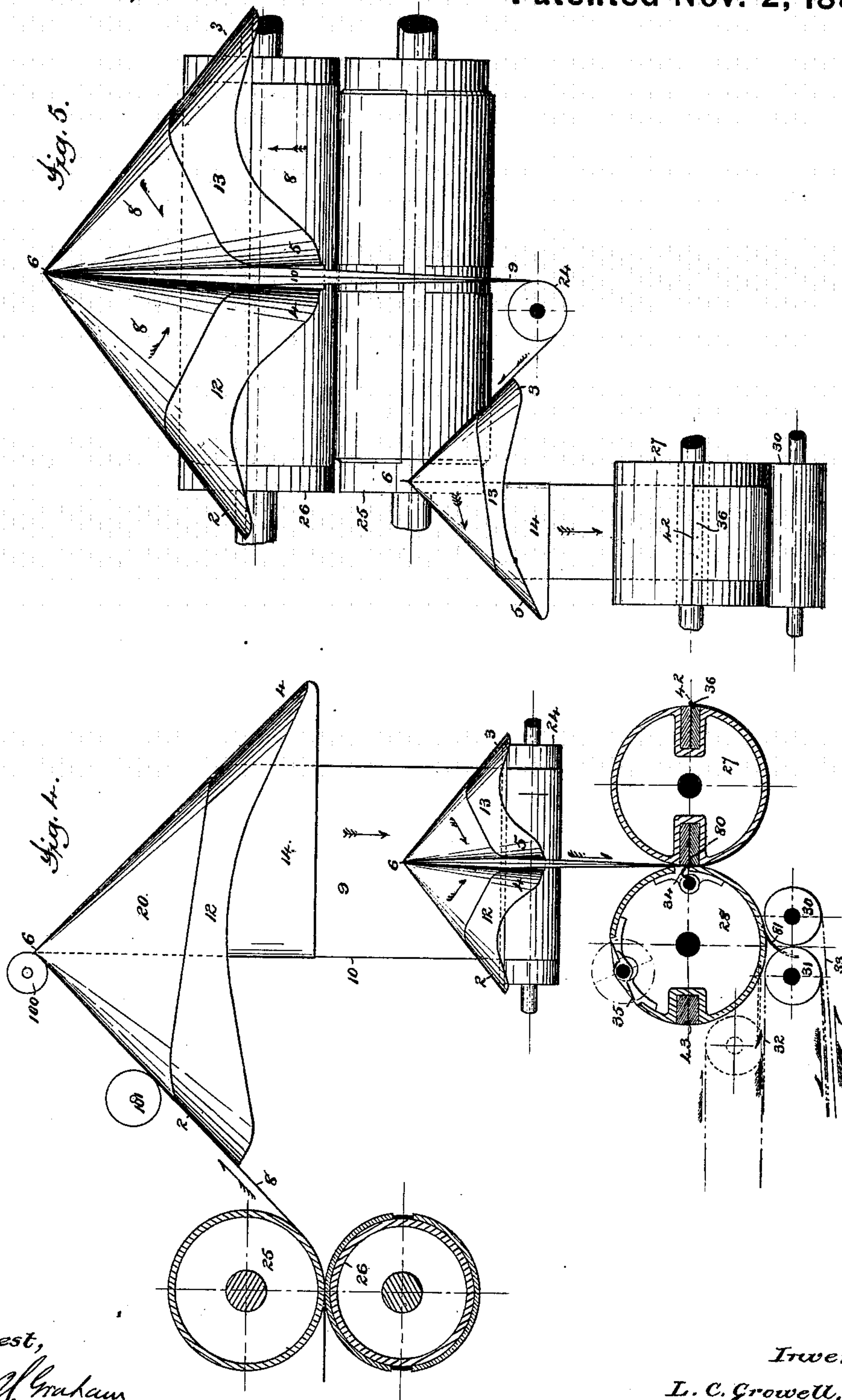
(Model.)

6 Sheets—Sheet 4.

L. C. CROWELL.
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(Model.)

6 Sheets—Sheet 5.

L. C. CROWELL.
Folding Machine.

No. 233,994.

Patented Nov. 2, 1880.

Fig. 7.

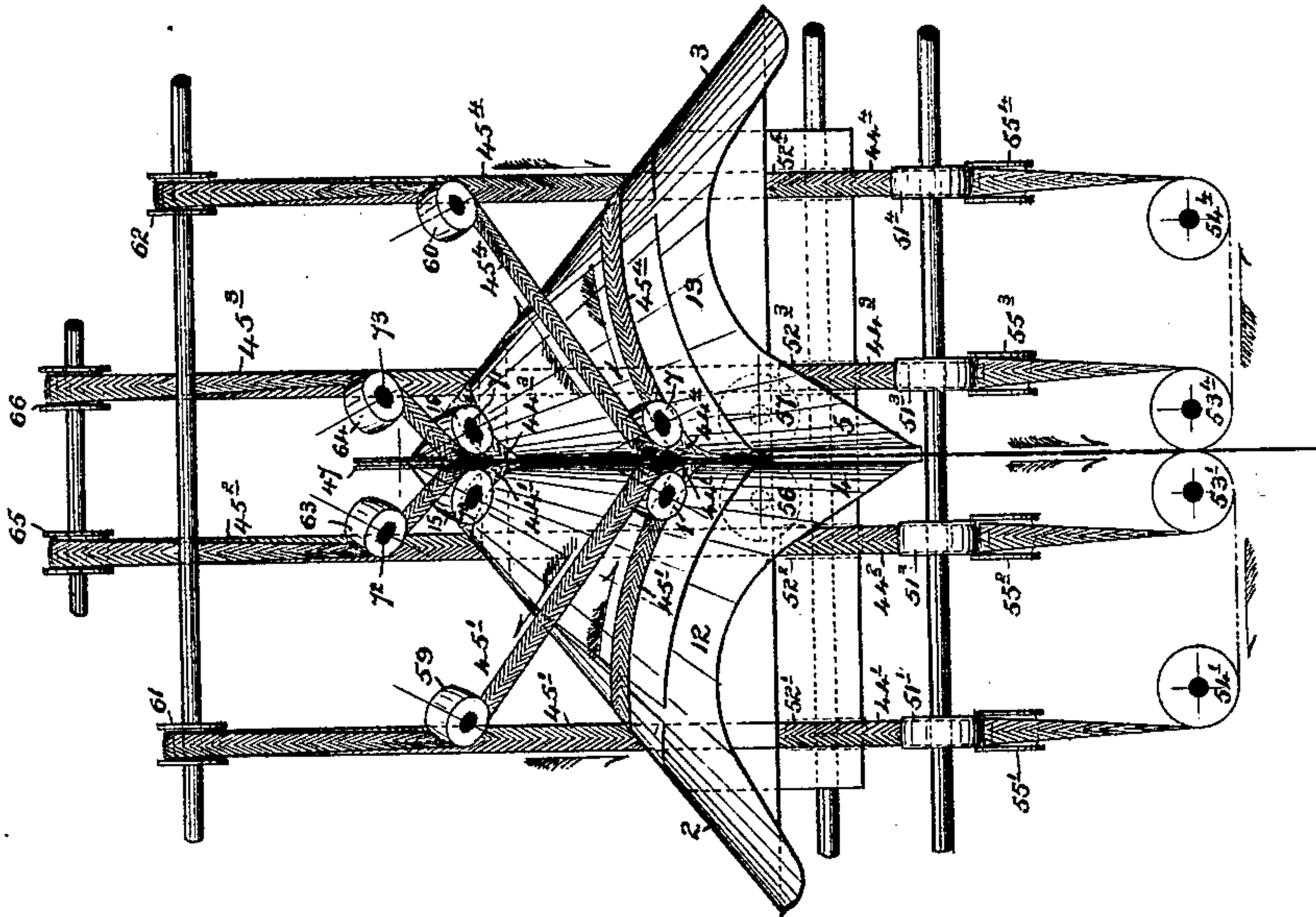
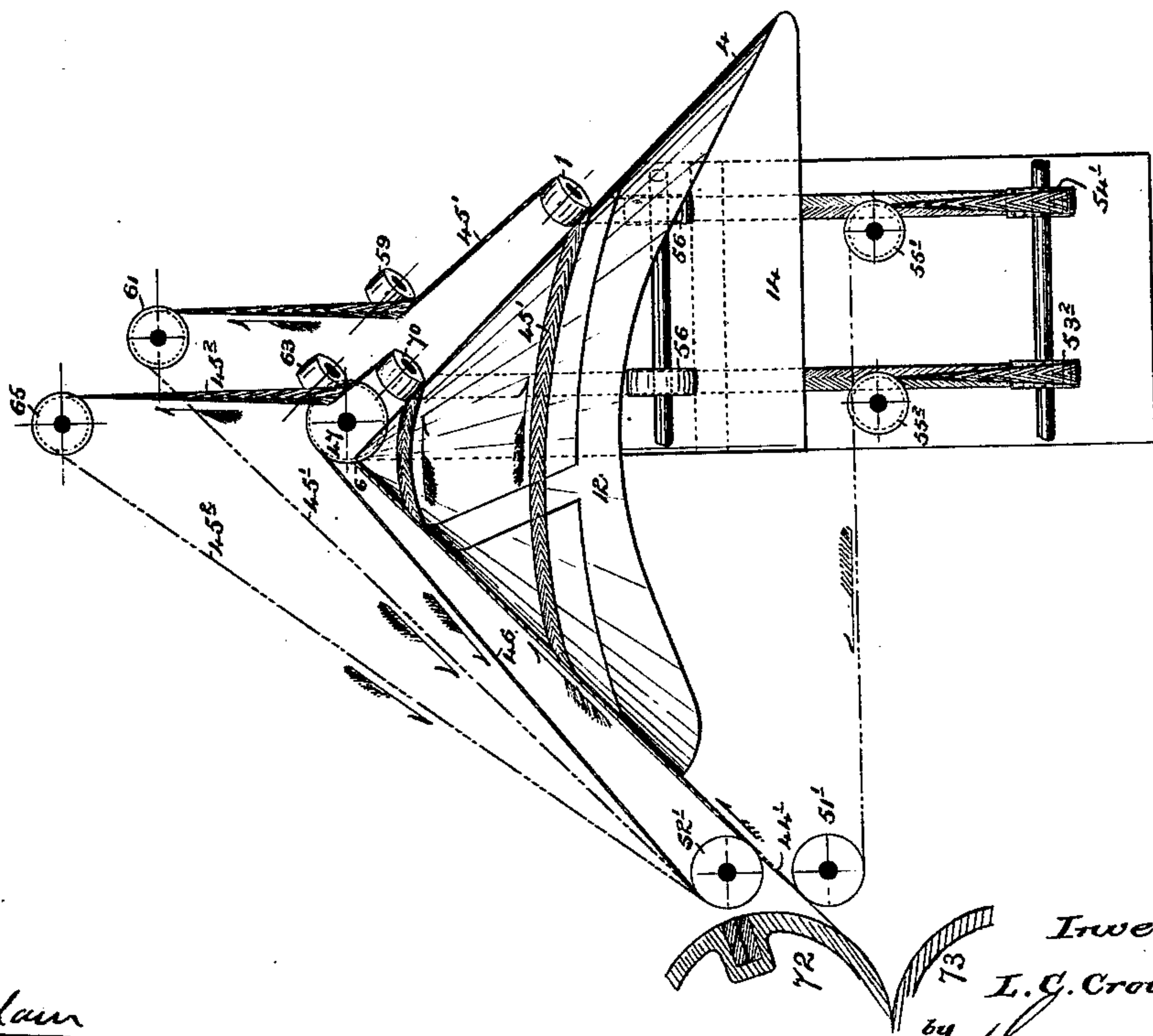


Fig. 6.



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(Model.)

6 Sheets—Sheet 6.

L. C. CROWELL.
Folding Machine.

No. 233,994.

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Fig. 10.

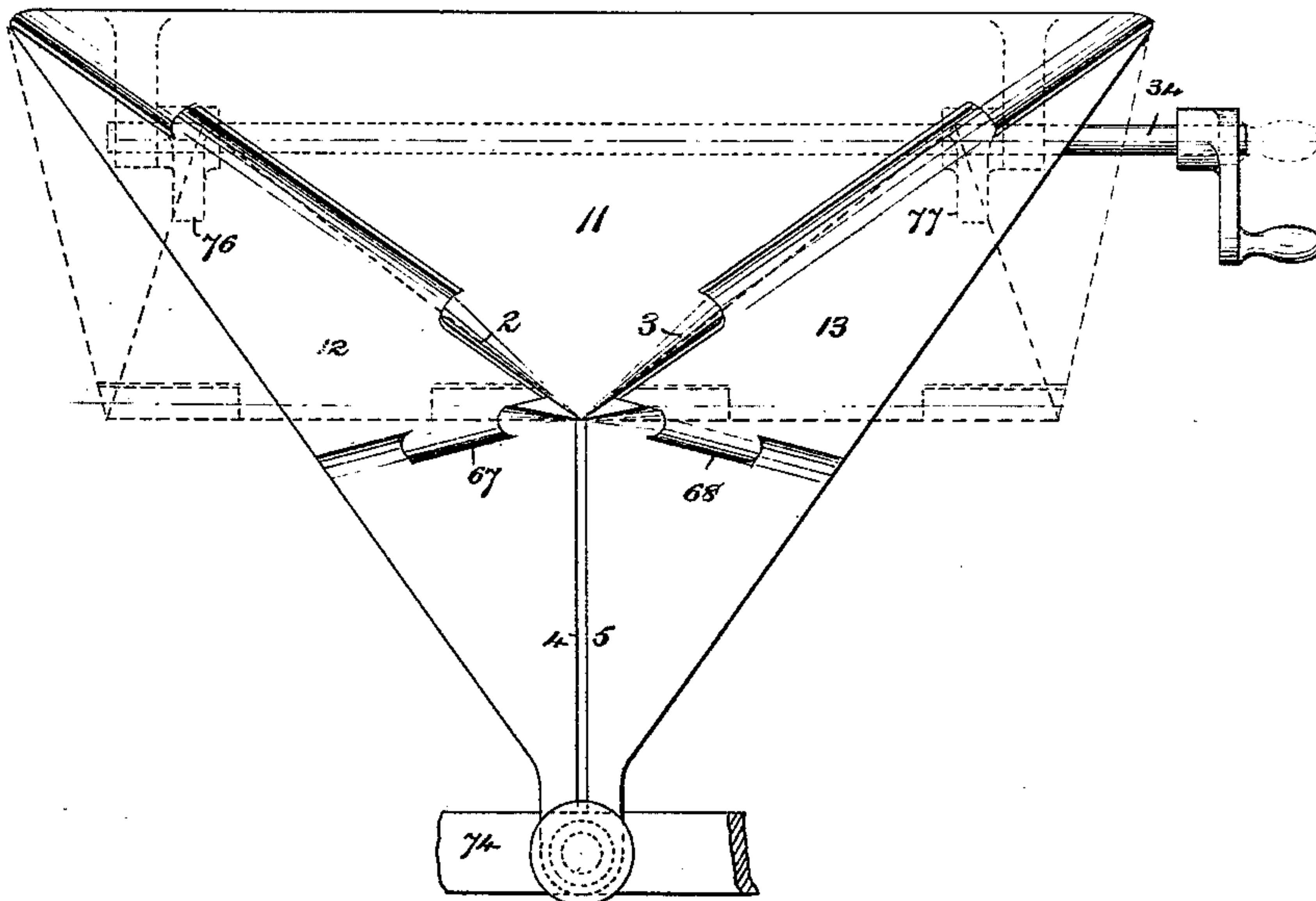
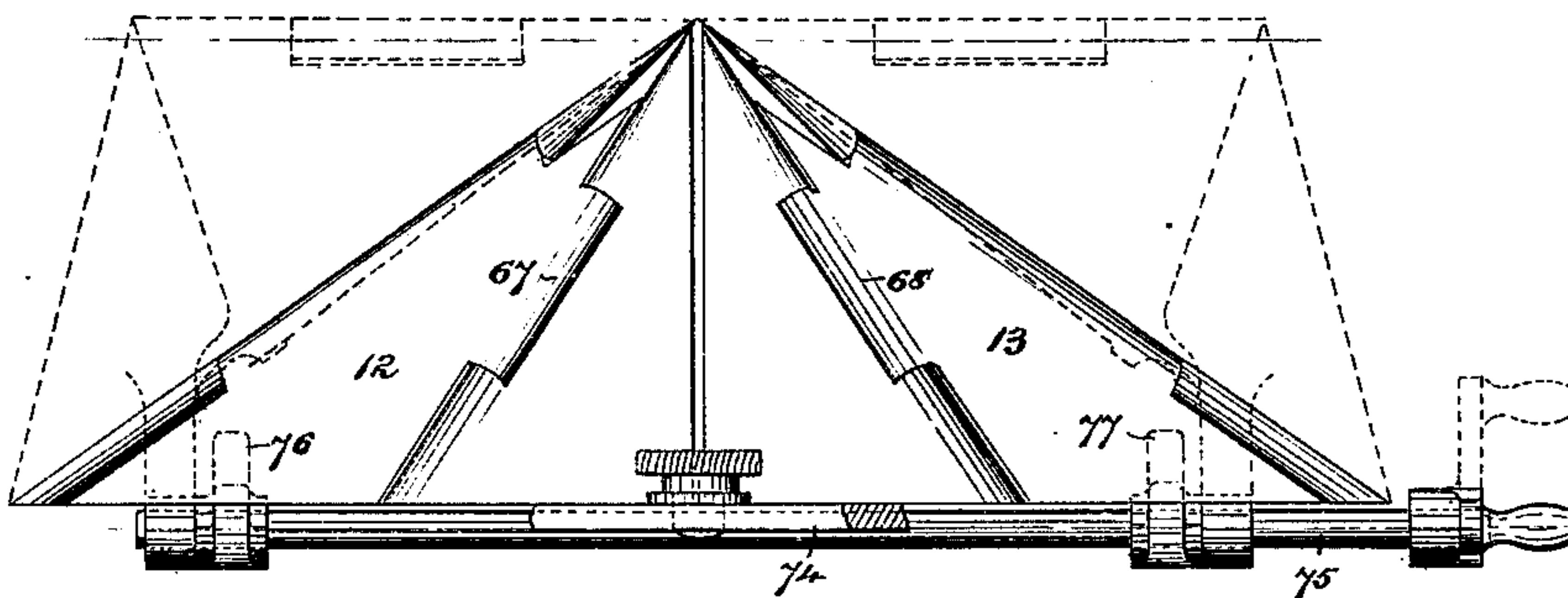


Fig. 11.



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UNITED STATES PATENT OFFICE.

LUTHER C. CROWELL, OF BROOKLYN, NEW YORK.

FOLDING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 233,994, dated November 2, 1880.

Application filed May 6, 1880. (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, (Case B,) fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

In said drawings, Figure 1 represents a plan view of an apparatus embodying my improvements. Fig. 2 represents a side elevation of the same, and Fig. 3 represents an end elevation thereof. Fig. 4 shows a side elevation, partly in section, and Fig. 5 an end elevation, of the principal devices of the apparatus, the said figures illustrating particularly its arrangement with a printing mechanism and with a transverse-folding mechanism. Figs. 6 and 7 show, respectively, side and end elevations of the folder as provided with carrying-tapes. Figs. 8 and 9 show, respectively, a sectional elevation and a plan view of a modification of the folder and an arrangement of taping for facilitating the introduction of a web through it. Figs. 10 and 11 show, respectively, a plan view and end elevation of a modified structure of the folder.

The folding apparatus constituting the present improvements is more especially designed to form part of the delivery mechanism of that class of printing-machines known as "web-perfecting," but may be used in folding webs of any material, and with the modifications described it may operate to fold sheets of the same.

As is well known, the rotary mechanisms of web-perfecting printing-machines are capable of operating at a very high rate of speed, and require, if such speed is utilized, to be provided with means for severing such web into sheets and delivering the same that will operate at a speed equal to that at which the printing mechanisms may practically run. It is also desirable, in the present improved state of the art of printing, that such sheets shall be delivered in a folded form, and in a large class of machines it is necessary that the first fold imparted to such sheets shall be longitudinal, or on a line parallel with the direction in which the sheet is moving when it emerges from the printing-machine.

The present improvement relates to a folding apparatus effecting this mode of operation, the same consisting of a folder constituted by stationary turners arranged in such a manner that a web or sheet passing over them will be folded longitudinally, or in the direction of its travel, which operation lays one side section of the web or sheet upon the other, thus doubling the web or sheet, and at the same time reducing its dimensions widthwise, according to the relation the line of folding bears to the center of the web or sheet. It comprehends certain modifications of the structure of parts and various combinations of devices, including that of the folder, with feeding and delivering mechanisms, all of which is too particularly hereinafter set forth to need further preliminary description.

In order to a ready understanding of the invention, the simplest form of the mechanism will first be described, and then its arrangement with the printing-machine, as well as its modifications, will be explained.

As illustrated in Figs. 1 to 3, the apparatus is shown as receiving a web, 8, from a roller, 21, imparting a longitudinal fold to it, and delivering such folded web to a winding-up roller, 22, suitable leading-rollers, 23 24, being provided to secure its travel in appropriate planes with respect to the turners. These rollers 23 and 24 will be properly supported at a right angle to each other in suitable bearings attached to a proper supporting bed-plate or frame.

The folder consists of four turners, 2 3 4 5, (stationary in the sense of not turning,) over the faces or bearing-surfaces of which the material is to run. These turners may be straight or conical bars, or simple rods, wires, or plates. Two of them, 2 3, are disposed so that if extended their inner ends would meet at a common point, 6, and they extend rearwardly and spread outwardly at an angle preferably about ninety degrees, Figs. 1 and 3, and incline forward at an angle of about forty-five degrees from the perpendicular, Fig. 2. The other two, 4 5, are disposed so that if extended their inner ends would meet the others at the same common point, 6. They extend forwardly and downwardly at an angle of about forty-five degrees, Fig. 2, and spread a slight distance apart at their free or open forward ends, Figs.

1 3. These turners may be secured in proper relations to each other by suitable connections with the frame-work, as cross-bar 38 and side frames, 40 41. It is desirable, however, since the fabric passes in contact with a portion only of their surfaces, to connect them together by bearing-plates, as 11 12 13, thus affording the fabric a complete support breadthwise during its entire passage through the folder.

10 It is preferable to construct the turners and their uniting-plates in a single piece of metal, and this may be conveniently done by bending a square plate of metal upon a line extending from its center to the middle of its front edge, and causing bends to be formed on lines extending from the center to the opposite corners of the front and sides. When this central bend is carried far enough rearward to bring the corner-folds nearly together, and the rear end is provided with similar corner-folds doubled to a less degree, the plate will assume a form approximating to that of a pyramid, as shown in the drawings, its rear side constituting the bearing-plate 11, its rear corners constituting the turners 2 3, its sides constituting the bearing-plates 12 13, and its front corner constituted by the two parallel turners 4 5, the extension of their inner portions constituting the inwardly-doubled plate 14, only one half or side of which is seen in Fig. 2.

20 This mode of constructing the folder affords a ready means for securing it in place by a cross-bar, 38, and stay-rod 39, secured to the side frames, 40 41. It should be observed, however, that though these turners, as represented, seem to meet and form the point 6, in practice the ends of these turners are blunted or cut away so that the fabric shall have no bearing at the point 6. This point, therefore, is an imaginary one at which the first creasing of the fabric takes place without any support immediately beneath it.

The web of fabric 8 to be folded, taken from a supply-roll, 50, mounted on the roller, as 21, is led upward in such a plane as to rest on the turners 2 3 and be supported widthwise between them upon the bearing-plate 11, Fig. 1, which guiding is accomplished by the proper placing of the leading-roller 23. The web is then bent down onto the turners 4 5, and its central part or line of folding is pressed in between them, which will cause the leading end to hang downward and bring the opposite portions of its upper surface together in the form of a longitudinal fold, while its under surface will rest on the plates 12 13 over the turners 4 5. The doubled fabric is then led under the leading-roller 24, (one face of which is appropriately arranged beneath the turners 4 5,) and thence passes onto the winding-up roller 22. This roller is provided with a crank for rotating it, and the roller 21 is furnished with a suitable tension device, consisting of a pulley, 48, and friction-strap 49. Upon turning the crank the web will be drawn through the folder, causing its opposite sections to be brought together, thus doubling such web longitudinally.

The line of fold is made at the point 6, which would be the apex of the pyramidal folder or point of union of all the turners if extended to meet, as before explained, and the folding at this point is determined by the disposition of the turners, which cause the sections of the fabric to move in different planes with this point as their common center.

In passing through the folder the web first bears directly onto the rear faces of the turners 2 3, which support its entire width. As its central line passes over the point 6 and is drawn between the turners 4 5 the opposite sections bend over the turners 2 3, droop downwardly over the plates 12 13, and approach each other diagonally, thus causing the upper surface of the web, as it passes over the faces of the turners 4 5, to nearly meet or fold together, and in passing under the roller 24 they are brought in face-to-face contact, the longitudinally-folded web thus formed being wound upon the roller 22. The web is thus doubled longitudinally upon a line in such relation to the edges of the web as may be determined by the lateral disposition of the web with respect to the point 6, and the sections of the web will then be lapped so that its upper face will form the inner surfaces of the folded product.

Essential differences exist between this system or method of folding and that commonly practiced, where the line or lines of folding are determined by surfaces over which the fabric is turned, as follows:

Heretofore in turning a web or sheets of fabric to impart a fold thereto the fabric was strained at the line of intended fold between a folding-edge on one side and coacting devices on the other, whereby the sections of fabric are forced toward each other over the folding-edge to cause said sections to lap together. In these improvements the turners or surfaces over which the web or sheets are carried are all disposed on one side of the fabric, and are so related to each other that the sections to be lapped together are gradually turned and caused to travel in such different planes as to ultimately come together or be lapped without the aid of any device acting upon the opposite side of the fabric.

Such a structure, besides simplifying the mechanisms, enables one surface of the fabric to be coated with paste, printed, or otherwise ornamented, and whether such coating or ornamentation be freshly applied or dry, the fabric may undergo the folding operation without damage or injury thereto.

It has furthermore been the practice to define the line of fold by means of a folding-edge in contact with the fabric at the line of intended fold, whereby such fabric is strained, distorted, or broken on the line of folding by such folding-edge.

In these improvements the turners are so disposed with respect to each other that they do not extend to the point where the fabric is folded, said folders, on the contrary, being

blunted or cut away or set apart so as to leave the fabric without any bearing-surface at that point. The fabric, though given the proper direction by the support afforded by the turners, nevertheless remains free or unsupported at the folding-point, and may hence bend or double at that point without being strained by any rigid supporting-surface or opposing force on either side of it.

Moreover, it will be observed that in all positions which the web is made to assume in being folded by the present improvements, it is fully distended widthwise, and therefore has no slack portion which would permit it to buckle up or to be otherwise distorted from its true course. This feature of the invention will be found to exist in the improvements made the subject-matter of separate applications filed respectively as follows: May 12, 22, and 27 and June 29, 1880. This operation may be carried on at a very high speed, one equaling that of a printing or other machine manipulating a web by means of rotating devices; and as the dimensions of the web are thus reduced, it follows that an equal reduction of the dimensions of the mechanisms which are to further manipulate it may be accomplished, whether the same are to fold it into a pack of zigzag folds, as in the Patent No. 8,240, granted to Ambrose and Reynolds July 22, 1851, or are to impart a second longitudinal fold to it, or divide it into sheets and deliver them flat or folded, or to impart a second longitudinal fold, then cut into sheets and impart to them a transverse fold, or to manipulate the product in any other manner.

In Figs. 4 and 5 is illustrated an arrangement of this folder with a printing-machine and a combined cutting and folding mechanism.

The type-cylinder 26 and impression-cylinder 25 represent the last set of such cylinders belonging to a web-printing machine, the structure and operation of which are too well known to need explanation. It may be stated, however, that the impression-cylinder 25 here shown takes the place of and performs the function of the leading-roller 23, shown in Figs. 2 and 3.

The web 8 passes through the primary folder, and is by it folded longitudinally and carried over the leading-roller 24 in precisely the same manner as has been explained. From this roller it passes through a secondary folder constructed of turners like those of the primary folder, and which impart a second longitudinal fold to the once-folded web, as will be readily understood. The web from this secondary longitudinal folder (it might be from the primary) passes to the rotary cutting and folding apparatus, (consisting of a pair of cylinders, 27 28, and devices connected therewith,) which cuts it into proper lengths or sheets and folds them transversely. The cylinder 27 (or a shaft provided with suitable arms) carries a cutting-knife, 42, and upon the opposite side thereto a tucking or folding blade, 80. The cylinder 28 is provided with a cutting-

slot, 43, that co-operates with the cutter 42 and with a vibrating jaw or jaws, 34, that co-operate with the tucking or folding blade 80. This cutting mechanism is of common form, such as that described in United States Patent No. 192,034, and the folding mechanism is described in United States Patent No. 143,674. The cylinder 28 is furthermore provided with a rotating folding-blade, 35, that co-operates with folding-rollers 30 31, the latter being provided with delivering-tapes 32 33, all as is particularly described in United States Patent No. 171,196. The web descends from the longitudinal folder directly to these cylinders 27 28, and, passing between them, is, during their rotation, pressed or doubled transversely by the folding-blade between the jaws 34, which properly close to nip the transversely-doubled portion, holding onto which, said jaws carry the fabric over the roller 30, thus folding it transversely. When the cylinders 27 28 have rotated sufficiently the cutter 42 divides the web transversely, forming a sheet, which sheet is again folded transversely by the rotary folder 35, which doubles it between the rollers 30 31, from which it is delivered by the tapes 32 33, as is described in said Patent No. 171,196.

The leading end of the web may droop down between the cylinders 27 28 or be temporarily held upon pins, as 36, and carried with the cylinder 27, as shown in Figs. 4 and 5, and described in said Patent No. 143,674.

The rotary folder 35 may be omitted, if desired, when the jaws 34 will open in proper time to deliver the sheet with one transverse fold upon a table; or suitable circumferential grooves may be made in the cylinder 28 intersecting the jaw 34, and with suitable guides 81 (shown in dotted lines) cause the sheet to be delivered between rollers 30 31; or the roller 31 and the guides 81 may be placed in the position shown in dotted lines 82 and receive the sheet between the tapes 32 33.

The cutting mechanisms may be omitted from the cylinders 27 28, and a cutting apparatus be supplied to sever the web after it is folded longitudinally and before it reaches said cylinders, suitable conductors, as rods or tapes, being furnished to insure the proper onward travel of the sheets.

Any other common form of folding mechanism may receive the web once or twice folded longitudinally and impart one or more folds to it.

The transverse-folding mechanism may receive the longitudinally-folded web from the primary longitudinal folder and operate upon it to produce one or more transverse folds in it, and deliver such product to the taped folder shown in Figs. 6 and 7, to be again longitudinally folded, as will be hereinafter described.

The longitudinal folder may be adapted to fold separate sheets fed successively to it—as, for instance, sheets delivered from a web-printing machine, as is now common—in which case conducting-tapes will be arranged to carry the

5 sheets from the cutting-cylinders of such printing-machine over the turners constituting the folder. A system of such taping is shown in Figs. 6 and 7, in which one longitudinal folder only is shown.

10 The tape-pulleys around which the tapes pass that receive the sheets will be journaled in the frame-work so as to be in front of and in proper position to receive the partially or wholly severed web from the cutting-cylinders of the printing-machine. The cutting-cylinders, as 72 73, of such a web-printing machine are shown in Fig. 6, and are, in practice, located in front of the last type and impression cylinders, as 25 26. When these cutting cylinders entirely sever the web, conductors are supplied to guide the detached leading end of each sheet between the tape rollers or pulleys, as is described in United States Patent No. 180,966, August 8, 1876, and as is well understood by those familiar with the art of printing.

25 The lowest set of endless conducting-tapes are shown as four in number, but may be more or less, according to the width of the web. This number is, however, well adapted to the purpose. The margin-tapes 44' 44⁴ of this lower set run from pulleys 51' 51⁴ directly onto the bearing-plate 11 over the turners 2 3, follow the bearing-plates 12 13, pass over the turners 4 5, and return, respectively, under the pulleys 53' 53⁴ and the pulleys 54' 54⁴, and thence over the pulleys 55' 55⁴ to the pulleys 51' 51⁴.

35 The midway tapes 44² 44³ of this lower set run from the pulleys 51² 51³ up over the bearing-plate 11, the turners 2 3, the side bearing-plates, 12 13, and the turners 4 5, and return under pulley 53² and its companion, (not seen,) thence over pulleys 55² 55³ to the pulleys 51² 51³. These lower tapes are pressed together in nipping contact beneath the turners 4 5 by means of pulleys 56 57. The upper endless tapes are four in number. The margin-tapes 45' 45⁴ run from pulleys 52' 52⁴ up over the plate 11 and the turning-bars 2 3 and the plates 12 13 to points over the turners 4 5, where they are returned around pulleys 1 7, 59 60, and 61 62 to the pulleys 52' 52⁴. The midway tapes of this series run from the pulleys 52² 52³ up over the plate 11, turners 2 3, and plates 12 13, and return at points over the turners 4 5, around pulleys 15 16, 63 64, 65 66, to the pulleys 52² 52³.

55 A central cord, 46, is also provided, which cord runs from a pulley on the shaft carrying the pulleys 52' 52² 52³ 52⁴ against the face of the plate 11, and returns over a pulley, 47, that is hung with its periphery projecting below the point 6 of the turners.

60 These tapes will preferably be driven at a higher rate of surface speed than that of the cutting-cylinders, whereby they will operate when the forward end of the web is nipped in their embrace to advance the same and detach its forward portion on the line of whole or partial severance, thus forming a sheet, which is carried onward rapidly enough to separate it

a working distance from the succeeding sheet. This increased speed to cause such separation may, however, be accomplished after the longitudinal folding is performed, which expedient will admit of the taping system just described running at a speed equal to that of the cutting-cylinders.

75 The sheets constituted by the severing of the web by the cutting-cylinders will enter between the upper and under series of tapes, and be carried through the folder by them in precisely the same manner that a web is carried through such folder, the taping also operating to keep their edges formed by the transverse cuts of the web from being caught by the air and turned in a wrong direction. The function of the cord 80 is to compel the leading edge of each sheet at the folding-point to be carried inwardly, so as to properly start its line of fold.

80 When the tail end of the longitudinally-folded sheet leaves the embrace of these tapes where the upper series return over the pulleys 1 7 and 15 16 its head will have entered the nip of the tapes 44' 44² 44³ 44⁴ given by the forwarding-pulleys 56 57, and will be carried onward until it issues from between the pulleys 53' 53² and 53⁴ and its companion. From these latter pulleys the sheets may be piled in any manner, or be delivered to a transverse folding mechanism of any of the common constructions adapted to the folding of sheets.

100 Although it is practical to introduce the leading end of a web through this folder without the aid of any mechanical guiding device, as is indicated by Figs. 1 to 5, yet that operation may be facilitated by a single central cord or tape arranged to bend the web at its folding-point down between the turners 4 5. Thus a cord arranged as is the cord 46 in Figs. 6 and 7 would accomplish that end.

110 Another arrangement is illustrated in Figs. 8 and 9, where upper and lower central tapes, 17 18, stretched from pulleys back of the lower edge of the rear plate, 11, serve this purpose. The inner ends of the turners 2 3 are separated a considerable distance apart where the turners 4 5 meet them. This provides for the introduction of a tape-pulley, 19, between the said inner ends of these turners, over which pulley the tapes 17 18 pass and descend slightly below the highest points of these turners, the tape 17 returning upward over a pulley, 20, and rearward over a pulley, 37, while the tape 18 returns directly rearward, but beneath the plate 11. When the leading end of the web is introduced through the folder this tape will cause that portion where its folding-line is to be made to bend kindly down between the turners 4 5, so that the sections of the web will be properly lapped or folded.

120 When the turners are thus related to each other the web will bend over the points 6' 6², (which will be blunted or cut away so as not to touch it, as has been explained with respect to the point 6,) and it will again bend at a common point, 6, between the turners 4 5, but be-

low them, and this latter point will constitute the line of fold. These longitudinal folders may be constructed so as to constitute a simple guide, conducting the web while distended to its fullest width onward for manipulation by other mechanism. It may be so arranged when its turners are single instruments, as shown in dotted lines, Fig. 3, by constructing such turners so that they may be raised to bring their upper surfaces into a horizontal plane, as such dotted lines indicate. When constructed in the plate form the side bearing-plates, 12 13, are hinged to the back plate, 11, at the points forming the turners 2 3, (see Figs. 10 and 11,) thus being divided at about midway of their length, so that when they are raised up to a horizontal plane, as in Fig. 11, they will form such guide. If the web is to be bent downward over the straight guiding-edge thus provided, the front edges of the hinged parts of such divided plates will preferably be provided with curved portions, as 67 68. This structure necessitates the securing of the front or remaining parts of the side plates, 12 13, which is accomplished by a support, as the bar 74, as in Figs. 10 11. These figures also show the omission of the bearing-plates 14, and it is to be understood that these plates may be omitted, even when the plates 11, 12, and 13 are used, without impairing the efficiency of the turners. These hinged portions may be raised and lowered by means of a rock-shaft, 75, provided with toes 76 77, that bear on the under surfaces of such hinged portions.

It may be remarked that when the bearing-plates are omitted and the tapes used, these tapes, in addition to carrying the sheets forward, perform the same service as the plates—that is, they support the sheet or web widthwise between the turners over which it is stretched.

When the folder is made in the plate form it may, as is apparent, have the general form of a cone, in which case the bearing-plates 11 12 13 will be curved and the turners 2 3 4 5 merge into them, the shape or form thus provided being sufficient to turn the fabric and fold it longitudinally.

It will be understood that the relation of the turning-surfaces to each other may be such as to cause the folded fabric to take lines of travel of various angles to that in which the fabric approaches. This may be done by raising or lowering the turners 4 5 to any desired position of adjustment with reference to the turners 2 3, and vice versa, either pair of turners being lengthened or shortened as the case may require. So, too, in some of these adjustments the turners 4 5 may be slued sidewise.

It will also be understood that a line of paste may be applied to the upper face of the fabric, whether in the web or sheet form, and this may be done by any common appliance—such, for instance, as the disk 101, and this disk may be placed at any point with respect to either edge of the sheet or web. If placed at the edge, it will be apparent that the web, when once folded,

will be converted into a tube; but if this disk is placed in a proper relation with respect to the edges of the sheet or web, and a slitting-cutter, as 100, is placed so as to divide the web or sheet centrally, and thus convert the same into two portions, these two portions will be pasted together, and when delivered from the secondary folder form a product of four plies pasted together at a common central line of union, said product being suitable for use, when cut transversely, as a pamphlet; or the line of paste may be applied transversely to the upper face of the distended web in such position as to come in line with the transverse folding.

The following is claimed herein:

1. A folding device consisting of four turners that bear upon one surface of the fabric, and which are arranged at such relative angles as to guide its two side sections together and produce a longitudinal fold, substantially as described.

2. A folding device consisting of the four turners 2 3 4 5, united together by means of bearing-plates 11 12 13, substantially as described.

3. A folding device consisting of the four turners 2 3 4 5, united together by means of bearing-plates 11 12 13, said turners 4 5 being further provided with plates 14, substantially as described.

4. The combination, with a folding device consisting of four turners that bear upon one surface of the fabric, and which are arranged at such relative angles as to fold the same longitudinally by guiding its two side sections together, of a leading-roller operating to direct the fabric while it is distended widthwise onto the turners, substantially as described.

5. The combination, with a folding device consisting of four turners that bear upon one surface of the fabric, and which are arranged at such relative angles as to fold the same longitudinally by guiding its two side sections together, of a leading-roller directing the fabric while it is distended widthwise to the folder and a leading-roller over which the doubled fabric is delivered from the folder, substantially as described.

6. The combination, with one or more longitudinal folders, each consisting of four turners that bear upon one surface of the fabric, and which are arranged at such relative angles as to guide its two side sections together, of a folding mechanism operating to transversely fold the longitudinally-folded fabric, all substantially as described.

7. In a longitudinal folder, the turners 2 3, provided with means for securing them in inclined positions to act as turners and in horizontal positions to act as a guide, all substantially as described.

8. The combination, with the turners 2 3 4 5, of the leading-roller 24, substantially as described.

9. The combination of the turners 2 3 4 5 constituting the primary folder with the turn-

ers 2 3 4 5 constituting the secondary folder, substantially as described.

10. The combination, with a longitudinal folder consisting of four turners that bear upon one surface of the fabric, and which are arranged at such relative angles as to guide its two side sections together, of a severing mechanism operating to divide a long length of fabric into short portions or sheets, all substantially as described.

11. The combination of the turners 2 3 4 5 with a cutting and folding mechanism, whereby the web is folded longitudinally and severed into sheets, and said sheets are folded transversely, substantially as described.

12. The combination of the turners 2 3 4 5 with the printing-cylinders 25 26, substantially as described.

13. The combination, with the turners 2 3 4 5, of sets of under and upper tapes, whereby detached or partly-detached sheets may be carried over said folder and delivered therefrom, substantially as described.

14. The combination, with cutting-cylinders, of the turners 2 3 4 5 and the tapes for conducting the sheets over the turners folding the same, substantially as described.

15. The combination, with the turners 2 3 4

5, of the cord or tape 17, substantially as described.

16. The combination, with the turners 2 3 4 5, arranged with respect to each other as in Figs. 8 and 9, of the central tapes, 17 and 18, substantially as described.

17. The combination of a pasting device with a folder consisting of four turners that bear upon one surface of the fabric, and which are arranged at such relative angles as to fold the same longitudinally by guiding its two side sections together, all substantially as described.

18. The combination of a slitting device with a folder consisting of four turners that bear upon one surface of the fabric, and which are arranged at such relative angles as to fold the same longitudinally by guiding its two side sections together, all substantially as described.

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

LUTHER C. CROWELL.

Witnesses:

H. T. MUNSON,
T. H. PALMER.