

No. 658,209.

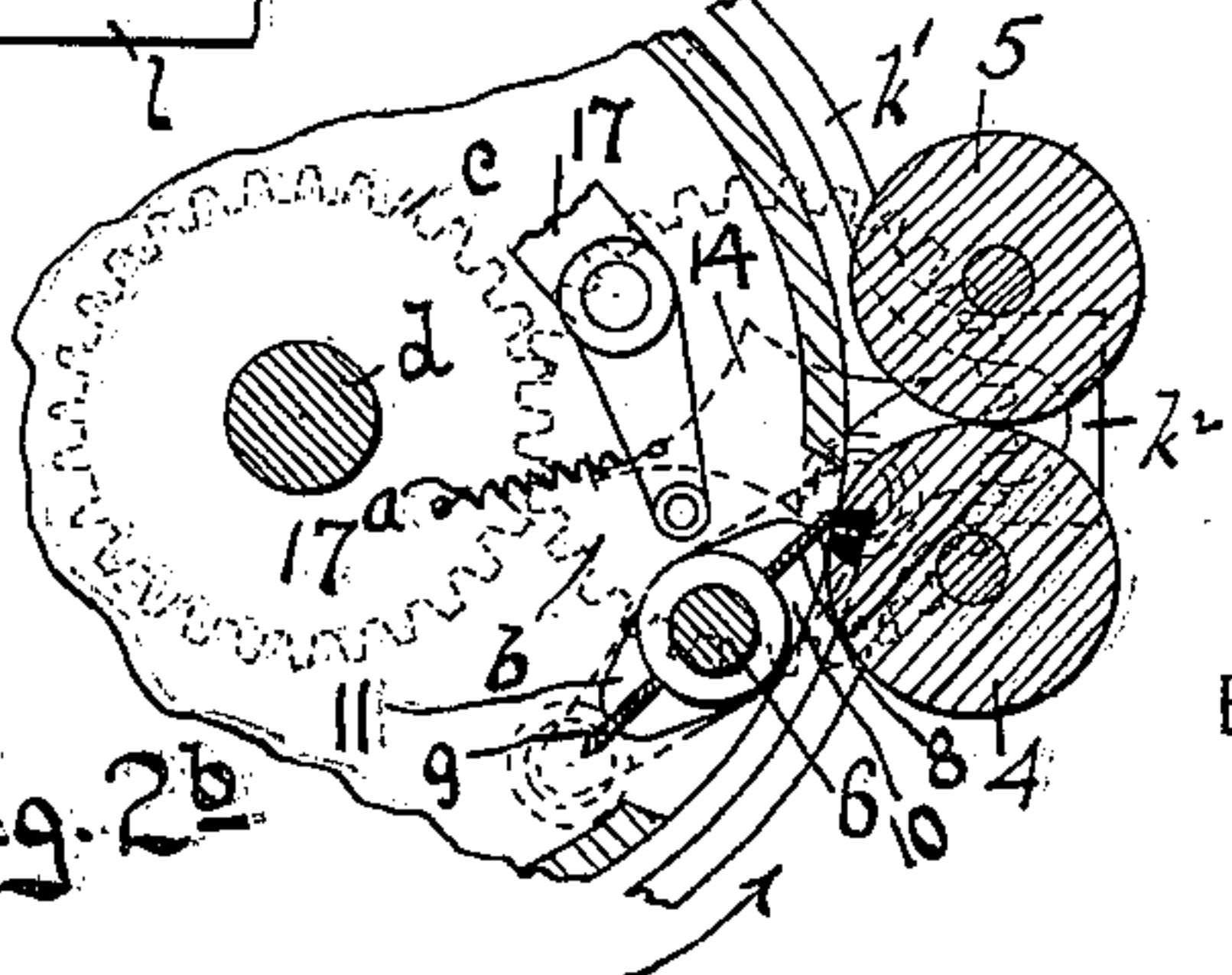
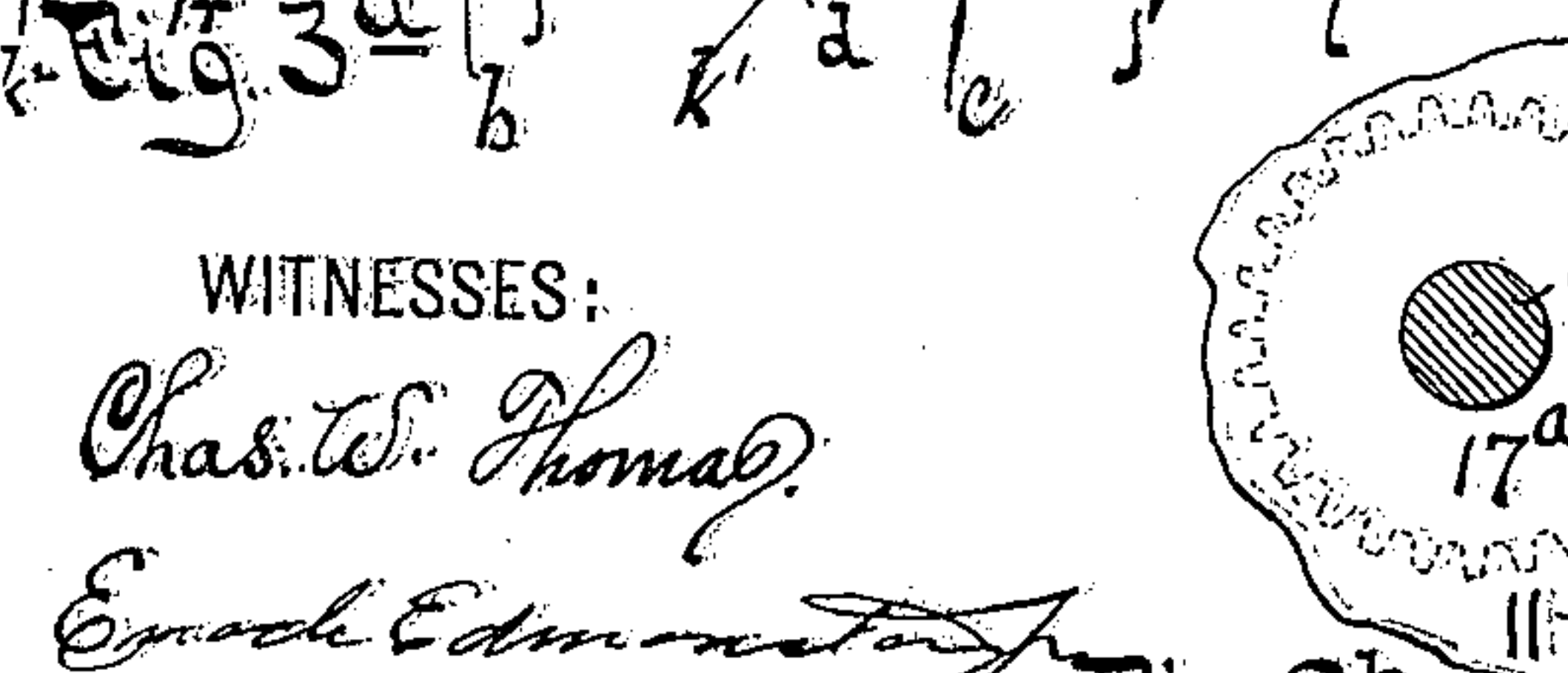
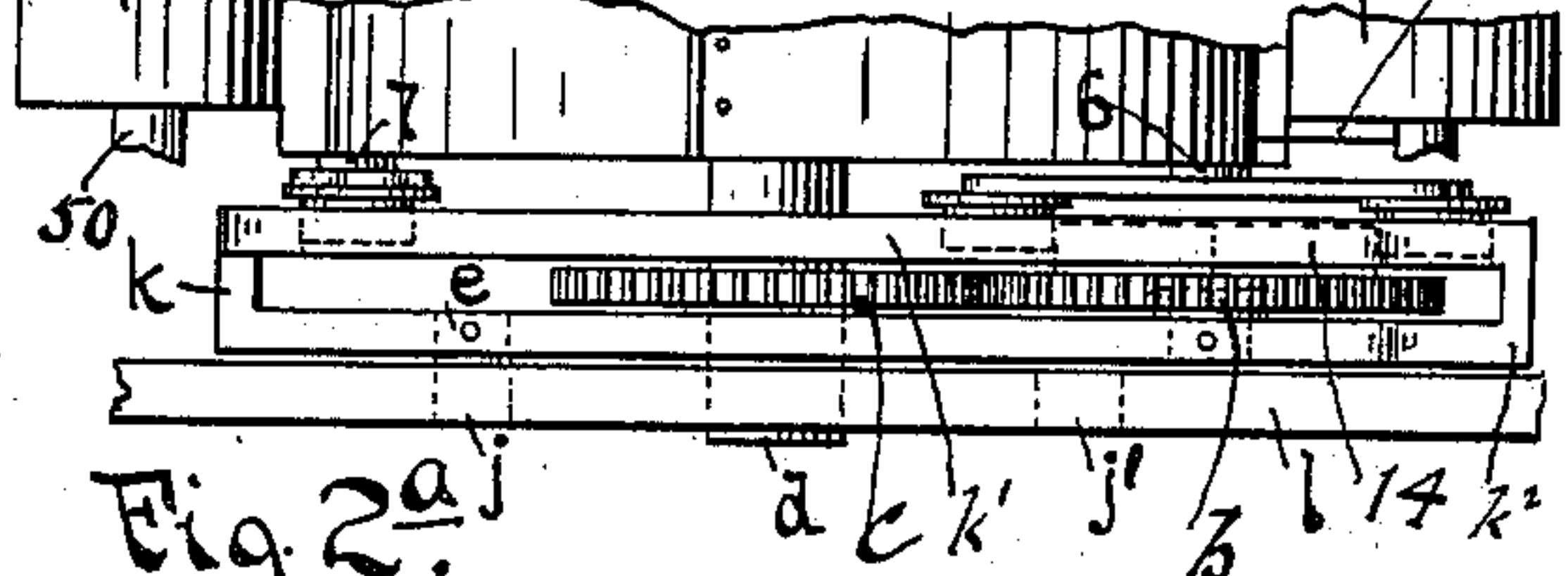
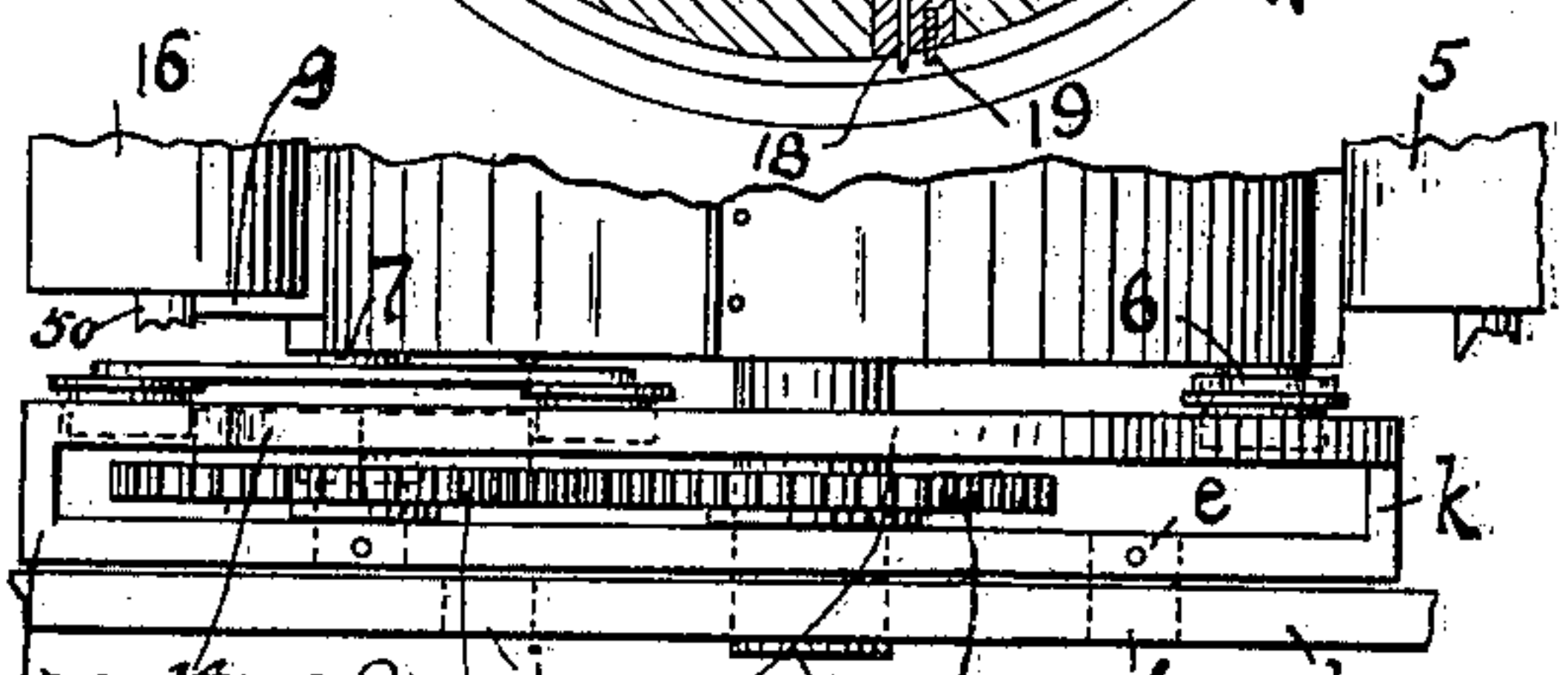
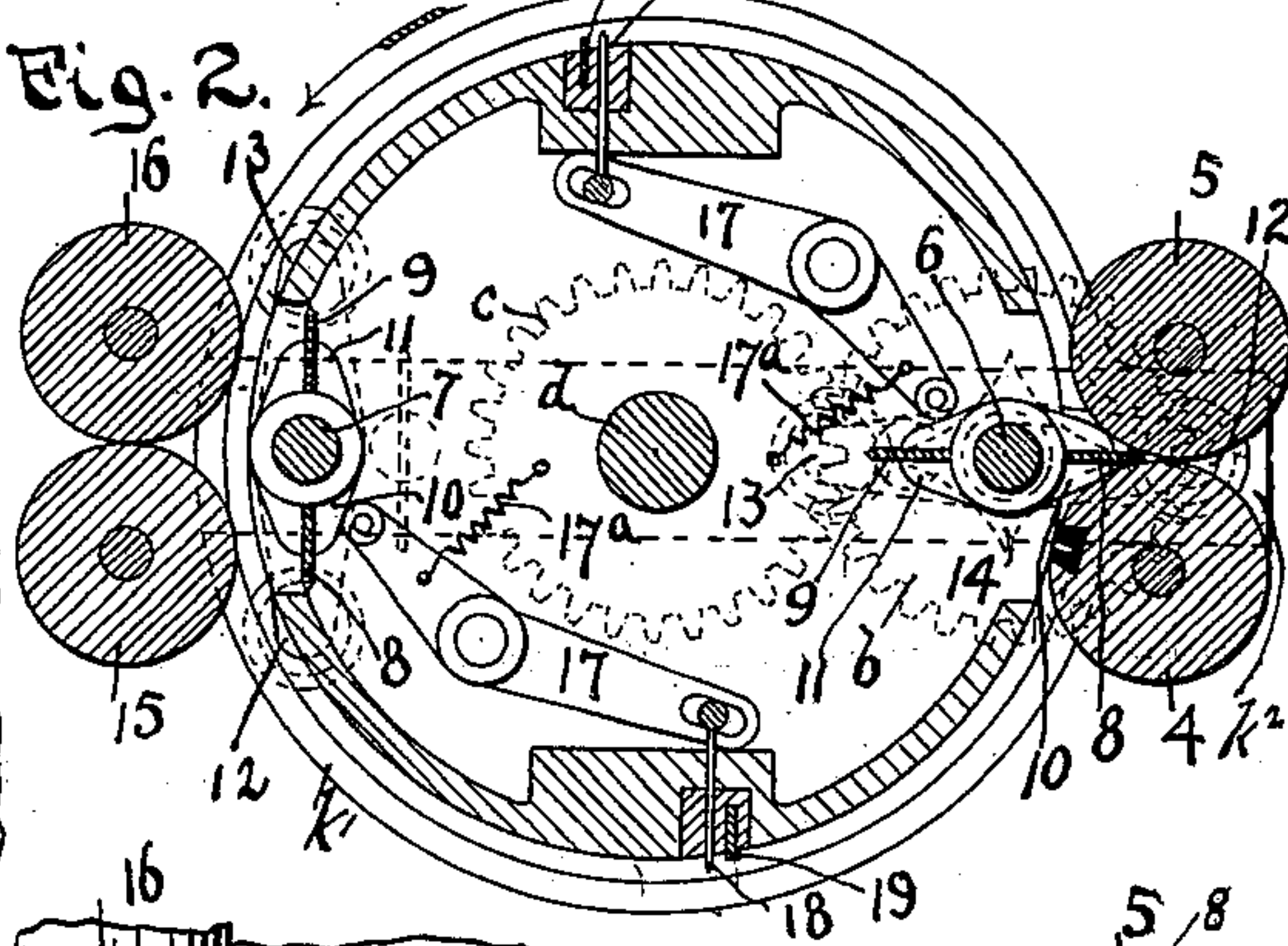
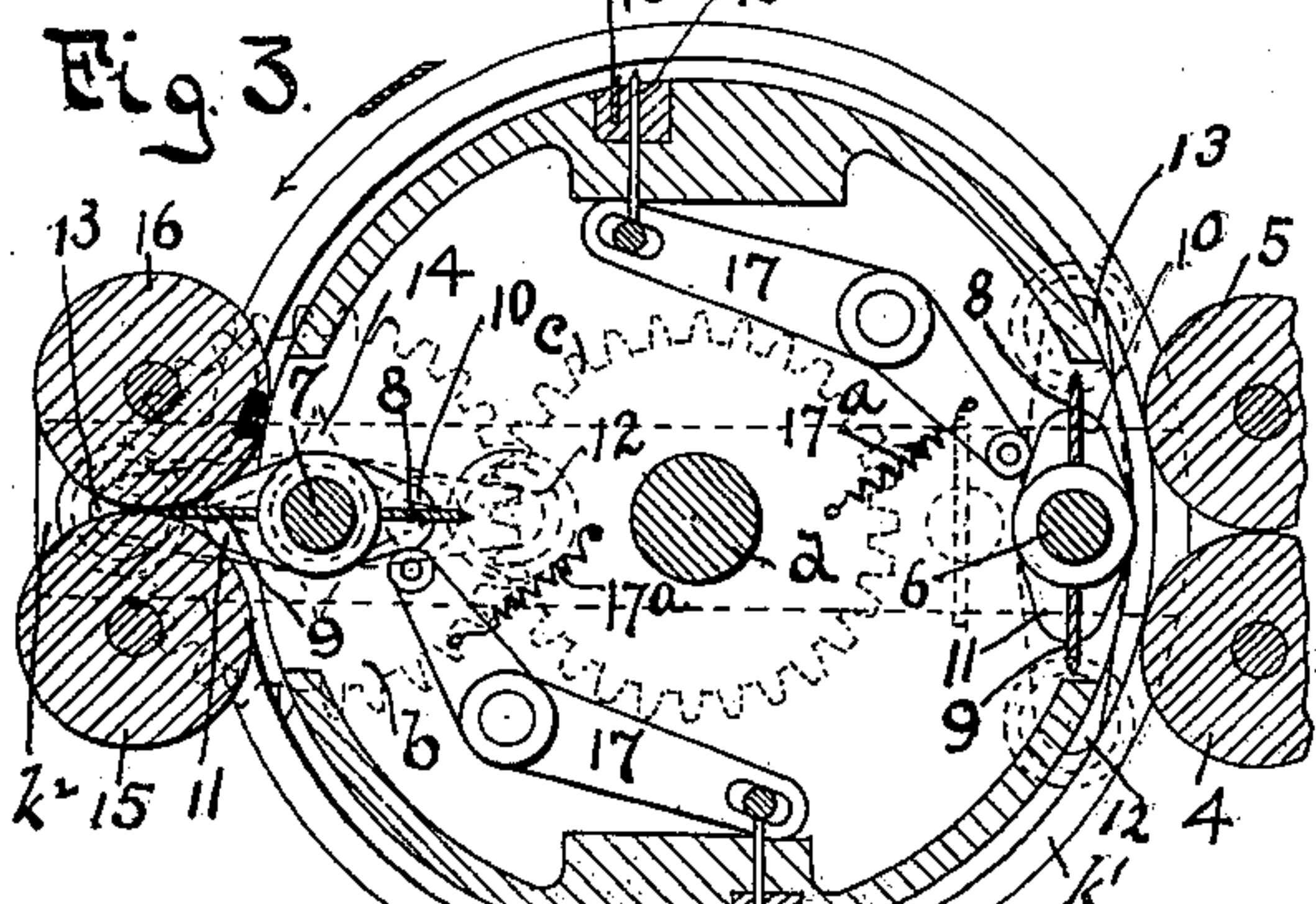
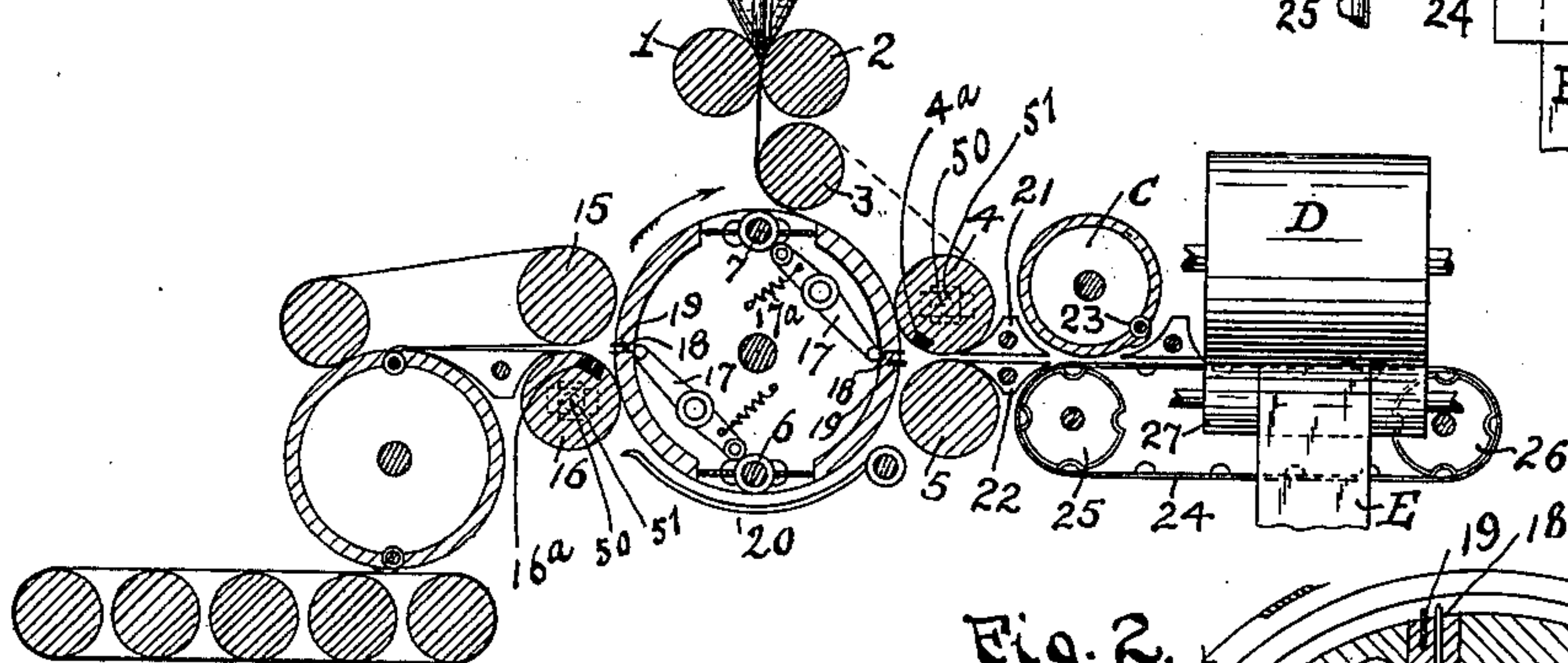
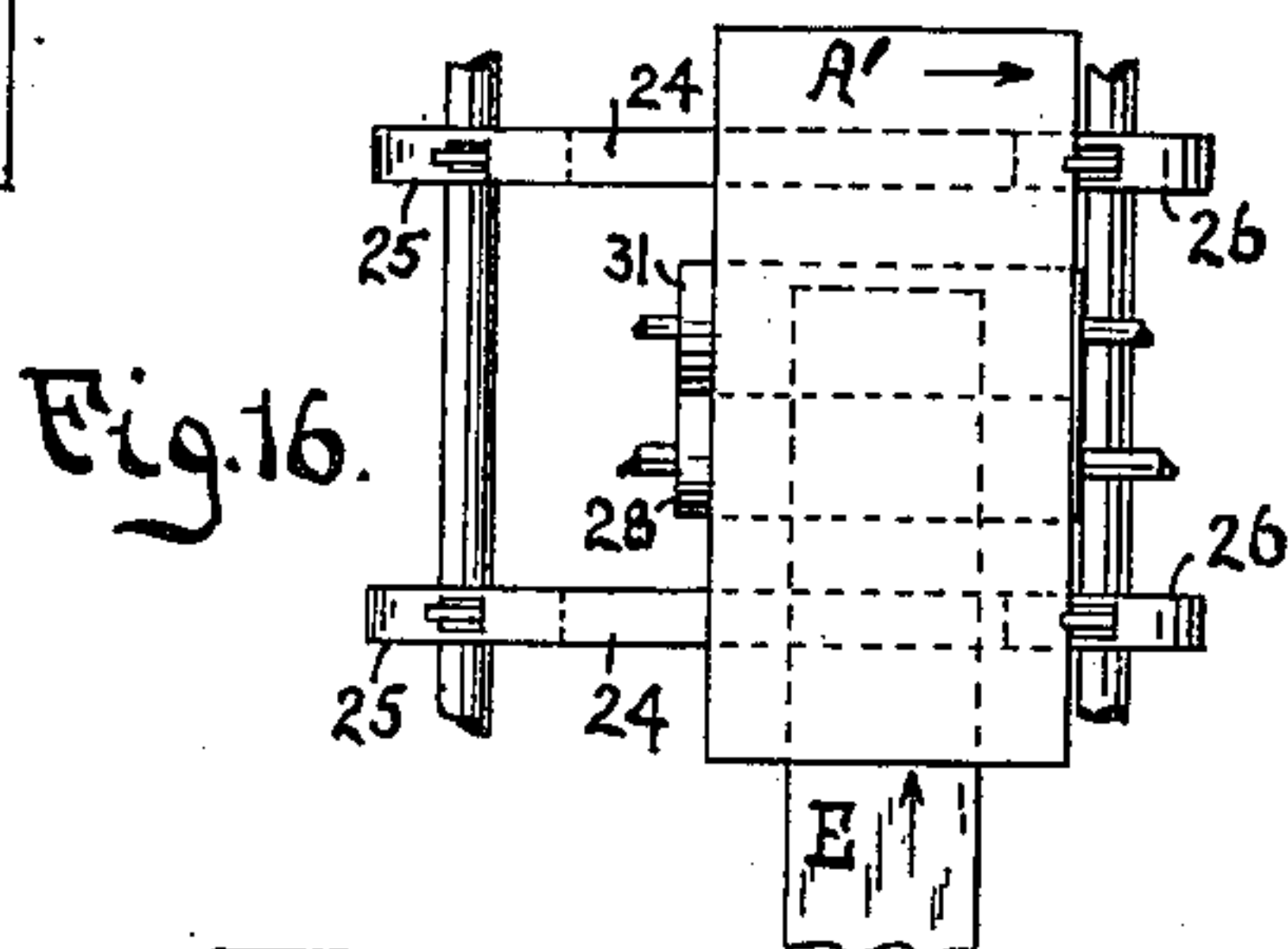
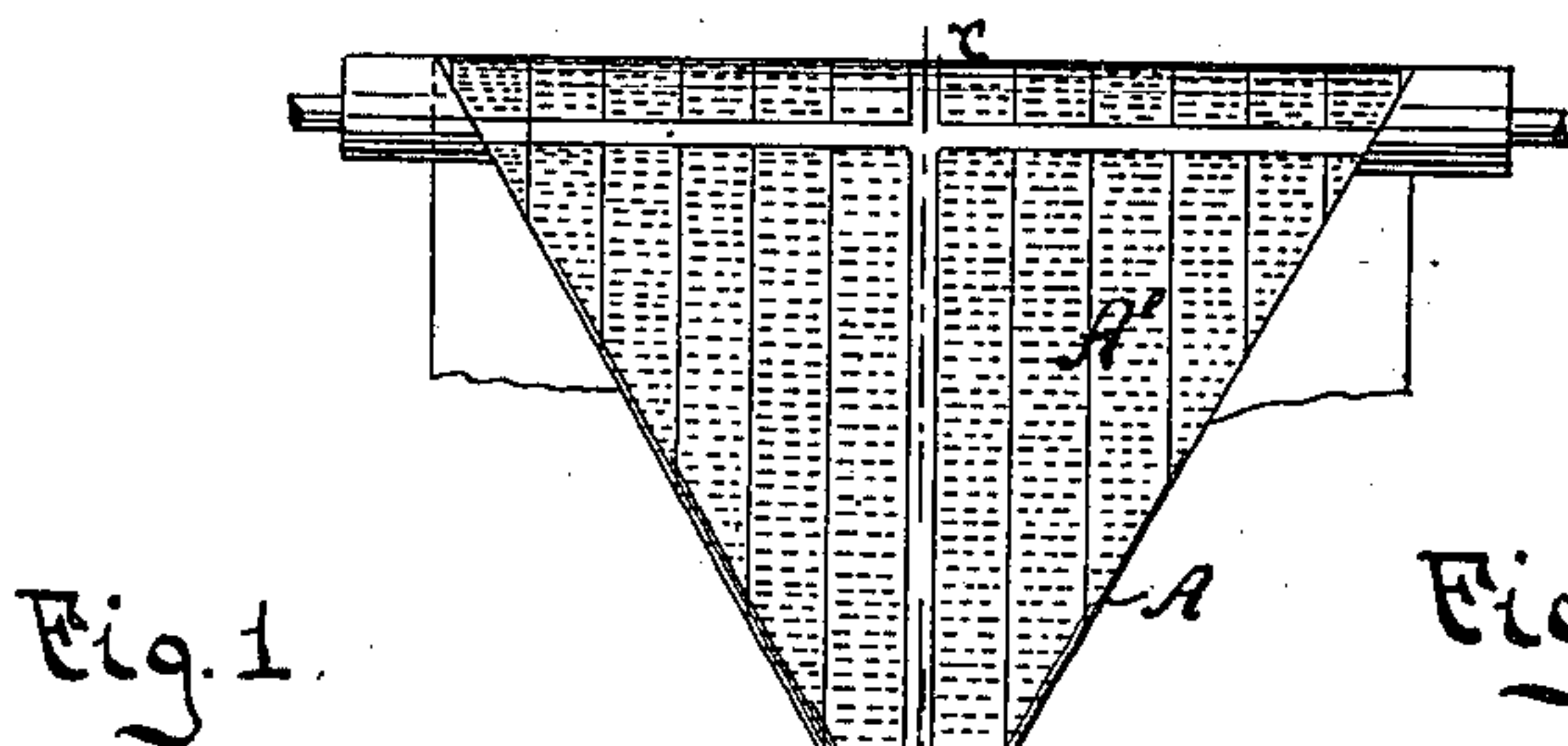
Patented Sept. 18, 1900.

J. L. FIRM.
PRINTING MACHINE.

(Application filed Apr. 27, 1896.)

(No Model.)

5 Sheets—Sheet 1.



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No. 658,209.

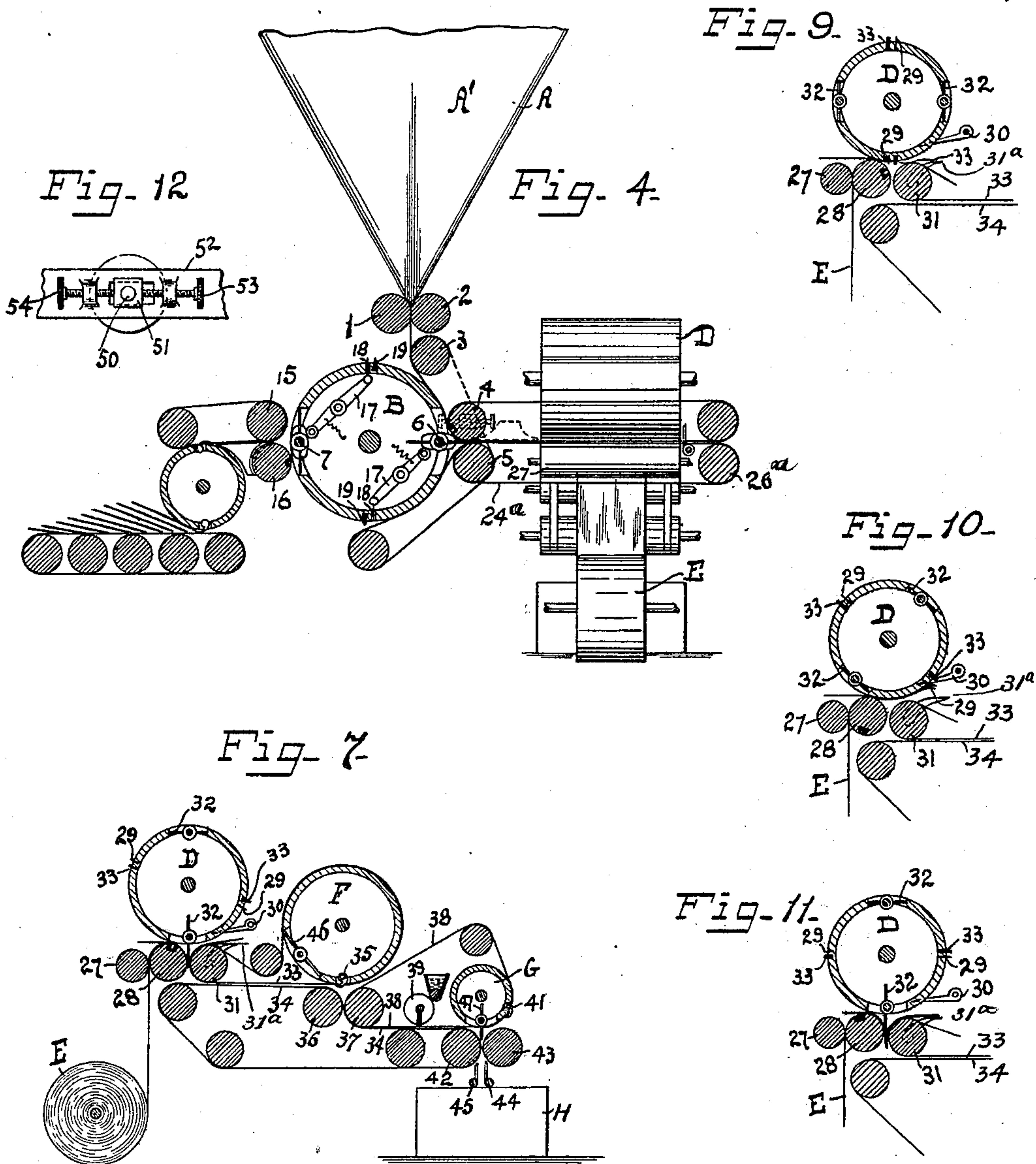
Patented Sept. 18, 1900.

J. L. FIRM.
PRINTING MACHINE.

(Application filed Apr. 27, 1896.)

(No Model.)

5 Sheets—Sheet 2.



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Patented Sept. 18, 1900.

J. L. FIRM.
PRINTING MACHINE.

(Application filed Apr. 27, 1896.)

(No Model.)

5 Sheets—Sheet 3.

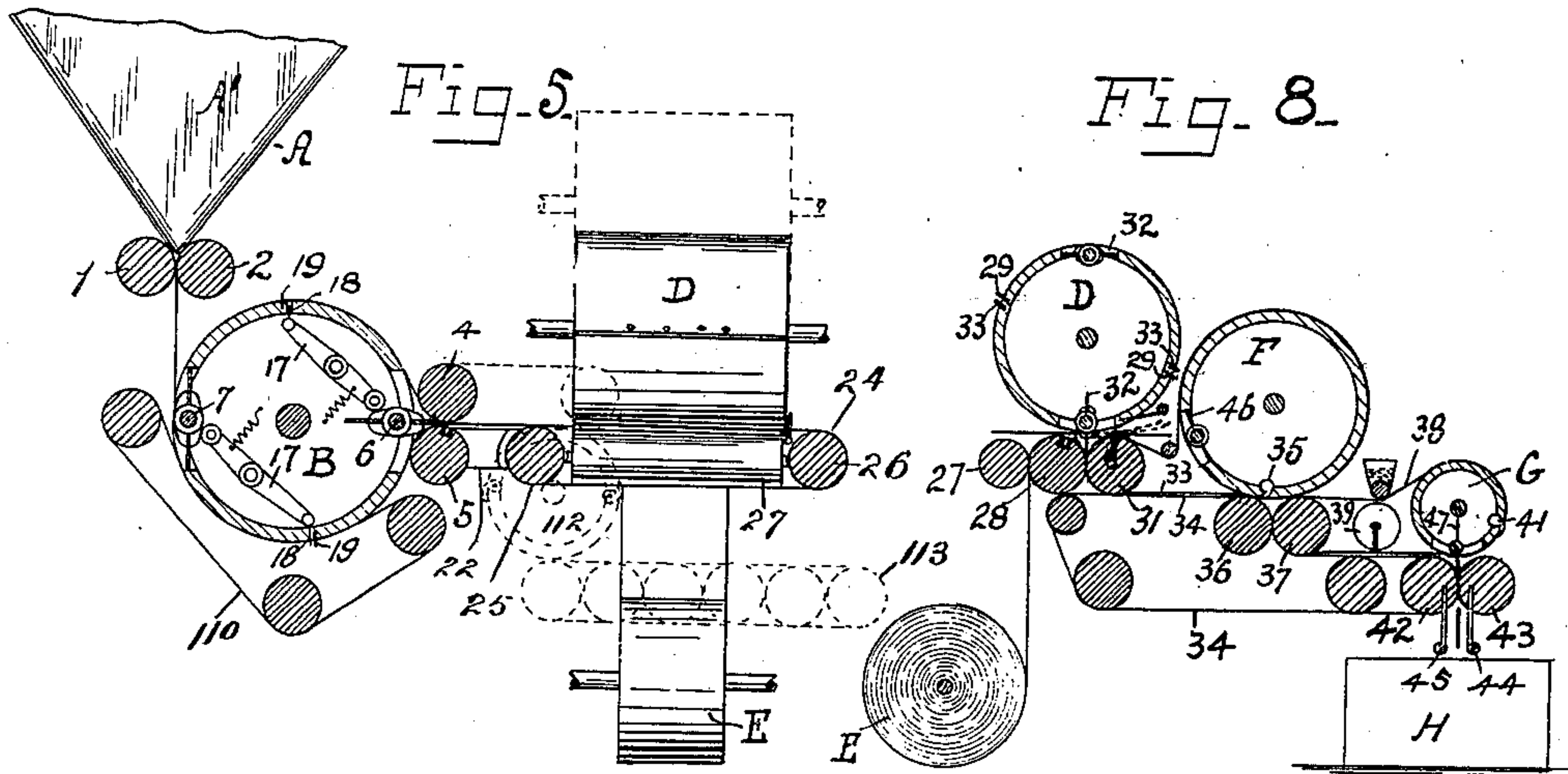
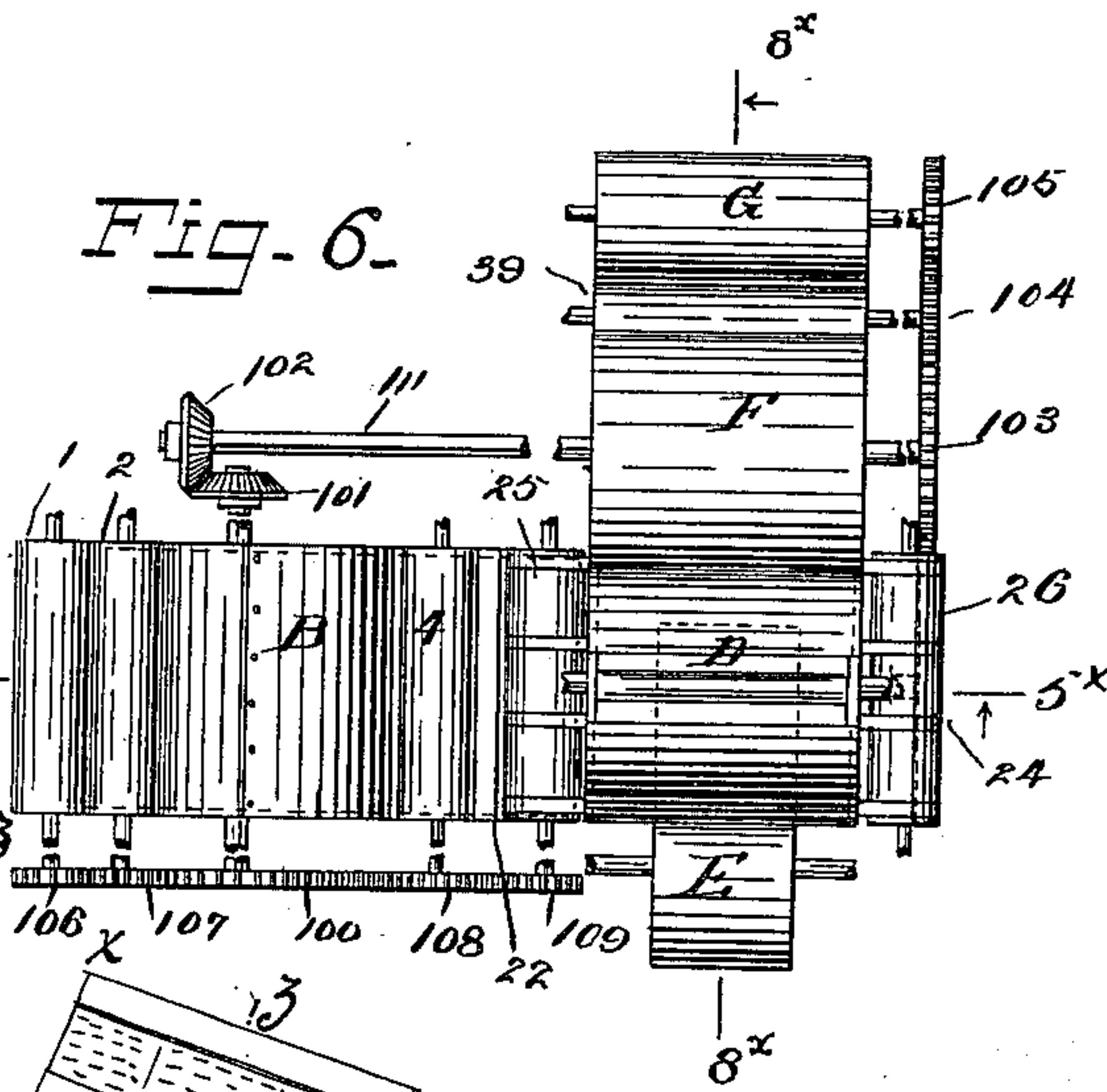
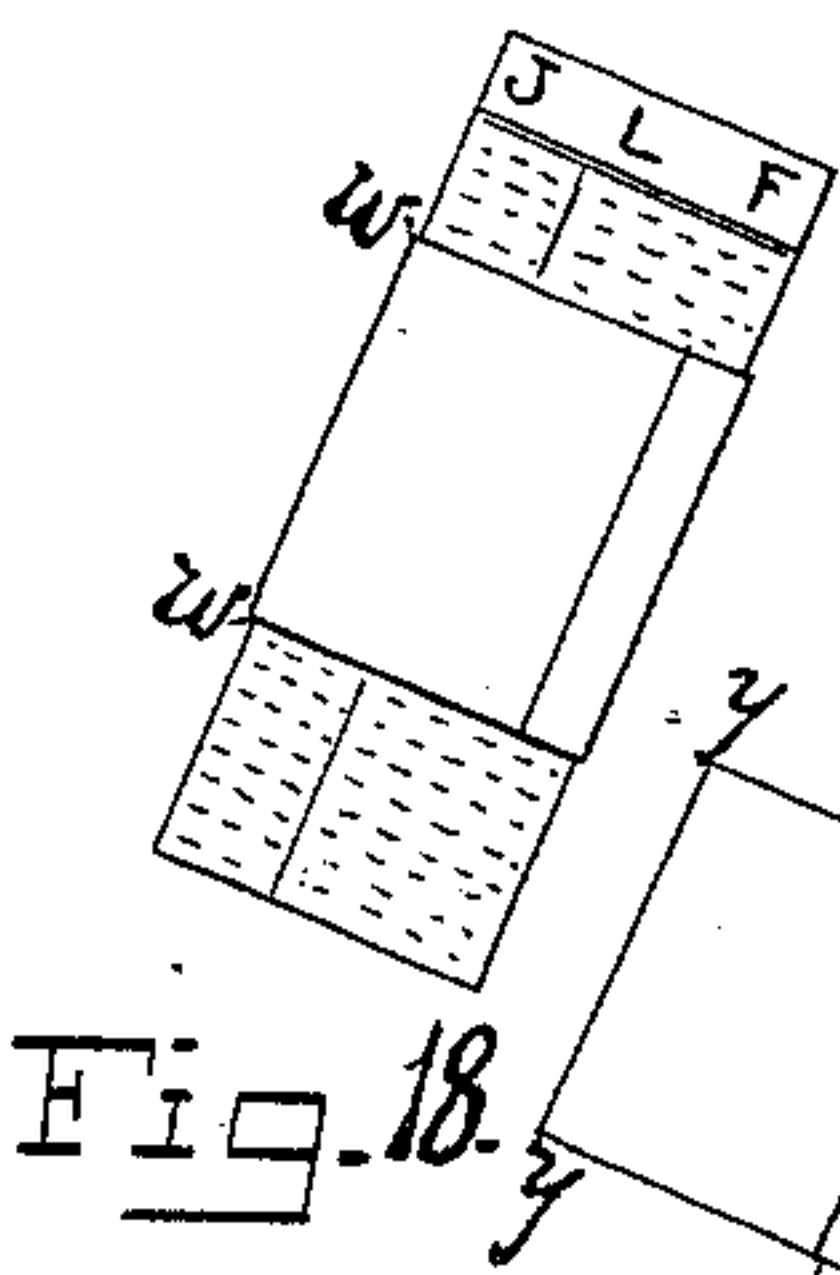


Fig. 19.

Fig. 6.



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J. L. FIRM.
PRINTING MACHINE.

(Application filed Apr. 27, 1898.)

(No Model.)

5 Sheets—Sheet 4.

Fig. 13.

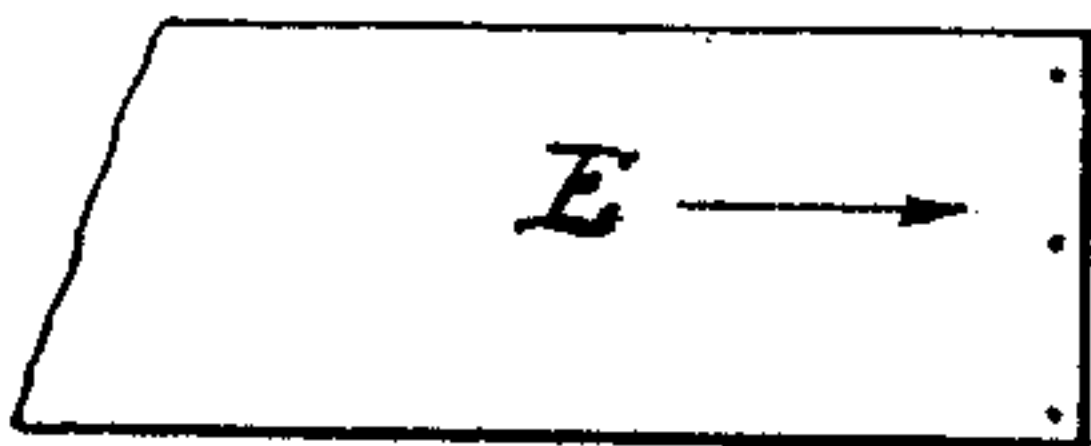
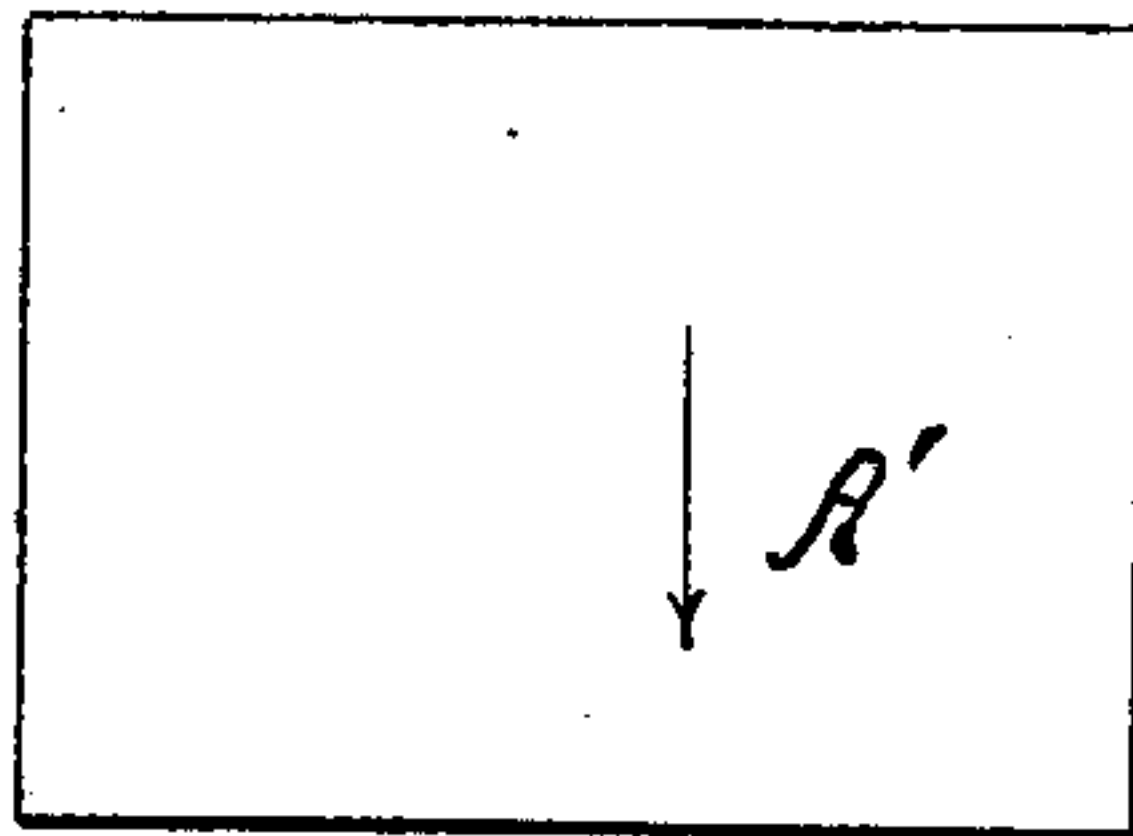


Fig. 14.

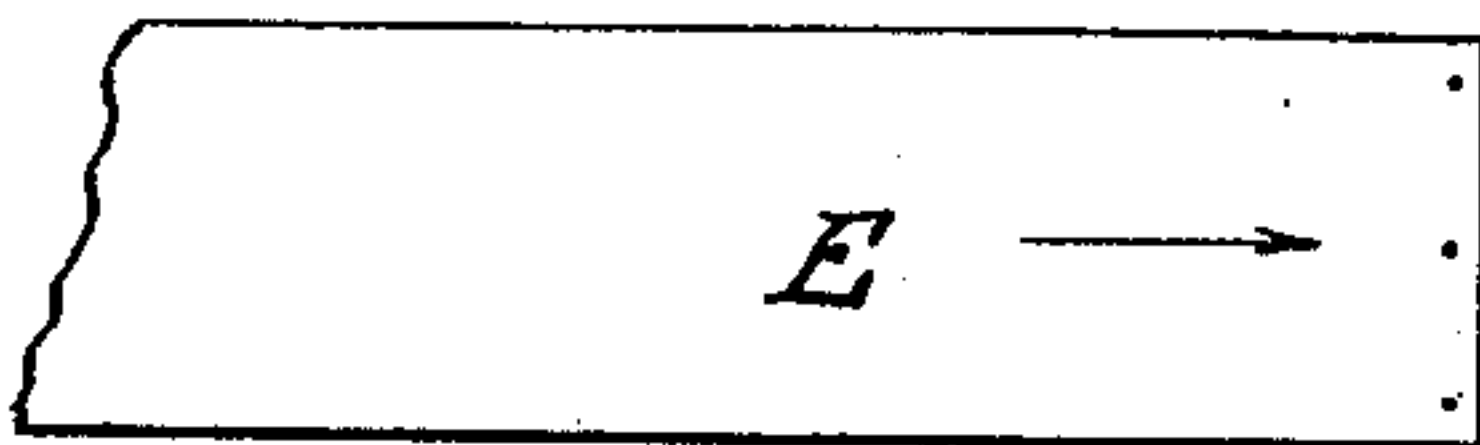
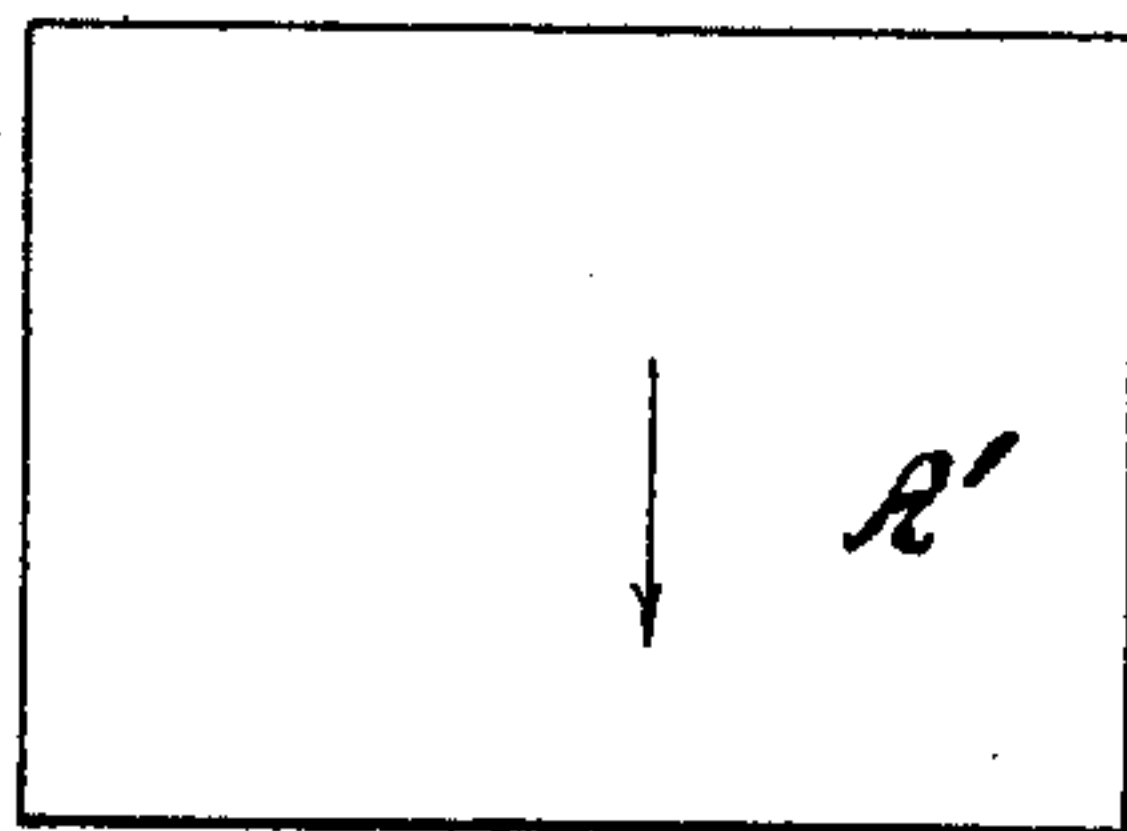
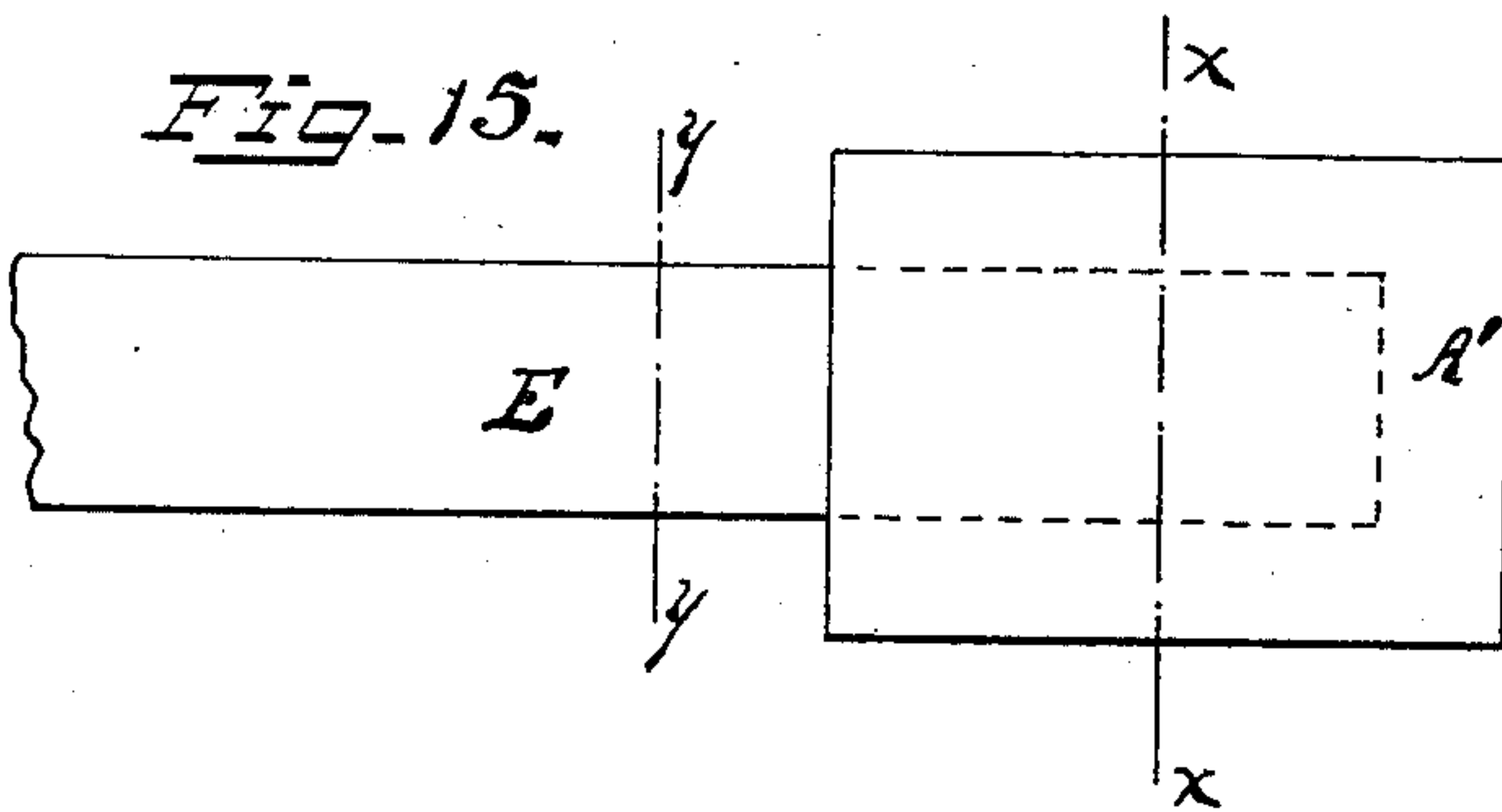


Fig. 15.



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No. 658,209.

Patented Sept. 18, 1900.

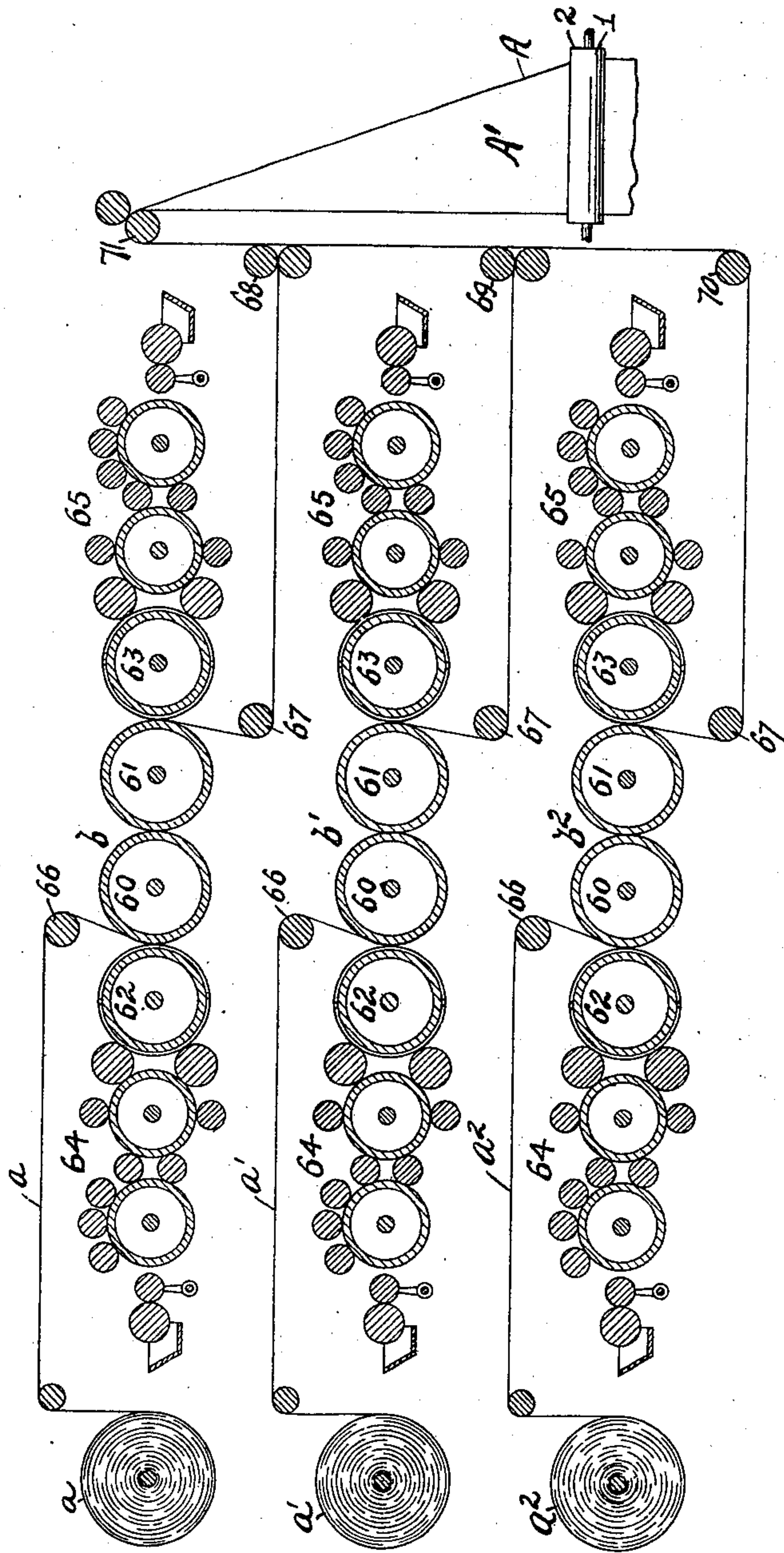
J. L. FIRM.
PRINTING MACHINE.

(Application filed Apr. 27, 1896.)

(No Model.)

5 Sheets—Sheet 5.

Fig-20-



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UNITED STATES PATENT OFFICE.

JOSEPH L. FIRM, OF JERSEY CITY, NEW JERSEY, ASSIGNOR TO THE GOSS PRINTING PRESS COMPANY, OF CHICAGO, ILLINOIS.

PRINTING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 658,209, dated September 18, 1900.

Application filed April 27, 1896. Serial No. 589,249. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH L. FIRM, a citizen of the United States, and a resident of Jersey City, in the county of Hudson and State of New Jersey, have invented certain new and useful Improvements in Printing-Machines, of which the following is a specification.

In my Patent No. 556,409, dated March 17, 1896, I described a printing-machine in which a mailing-wrapper was combined and folded with the printed sheets in such a manner that one end of the wrapper was caused to extend between the folds of the sheets. As described in said patent, the sheets received two longitudinal folds before encountering the wrapper and the wrapper was laid longitudinally on the sheets. The sheets and wrapper together then received two transverse folds and then the projecting end of the wrapper a third transverse fold. It is desirable that the folds whereby the wrapper is combined with the sheets should be longitudinal folds—that is, parallel with the columns of printed matter—and this is one of the objects accomplishable by my present invention.

Figure 1 is an elevation, partly in section, of the mechanism for treating the web after being printed upon and, if desired, for applying the wrapper thereto. Figs. 2 and 2^a are detail views of the carrier B under one condition of adjustment. Figs. 3 and 3^a are detail views of the same under another condition of adjustment. Fig. 3^b is a detail showing relation of the diamond cam and folding-blade as the coaction of the same is commencing, the carrier rotating in the direction of the arrow. Fig. 4 shows the same construction as Fig. 1, with the omission of the superposing carrier C. Fig. 5 is a modification of Fig. 4 in elevation. Fig. 6 is a plan of Fig. 5. Fig. 7 is an elevation of the mechanism for applying and folding the wrapper. Fig. 8 is a modification of the same, in which modification the tape 38 is differently disposed. Figs. 5 and 8 are taken on the section-lines 5^x and 8^x, respectively, of Fig. 6. Figs. 9, 10, and 11 show the action of the carrier D at three different stages. Fig. 12 shows

a detail of mechanism for adjusting the cutter-rollers 4 and 16. Figs. 13, 14, and 15 show three relative positions of the sheet and wrapper. Fig. 16 shows the position of the sheet, wrapper, and underneath supports at the instant of folding. Figs. 17, 18, and 19 show the three folds of the wrapper. Fig. 20 shows a printing mechanism that may be used. The arrows on Figs. 2, 3, and 2^a represent the carrier as rotating in the opposite direction to that indicated by the arrow in Fig. 1. Therefore in Figs. 2, 3, 2^a, 3^a, and 2^b the position of the rollers 15 16 and also of the rollers 4 5 is reversed from that shown in Fig. 1.

As described in patent to me, No. 415,321, dated November 19, 1889, and in patent to me, No. 410,271, dated September 3, 1889, also as arranged in the printing mechanism shown in Fig. 20 of the accompanying drawings, the page-forms on the form-cylinders are arranged so that the forms for those pages constituting the first half of the product (whether a book or a newspaper) are located upon corresponding zones of the various form-cylinders, and the forms for those pages constituting the last half of the product are arranged upon other corresponding zones on the various form-cylinders side by side with the zones in which the forms for the pages of the first half of the product are located. Therefore when the webs are run out over one another, as shown, without turning or reversing the several pages belonging to the first half of the product will arrange themselves above each other and the several pages belonging to the last half of the product will arrange themselves above each other side by side with those belonging to the first half. The longitudinal margin between the pages constituting the first half and those constituting the last half of the product will come in the middle of the folder A, Fig. 1, or on the line *r*, so that the line *r* on which the first longitudinal fold occurs will be in that margin. Then the knives 19 on carrier B will cut the web on the margin at the tops and bottoms of the pages, and the transverse fold made between the rollers 4 and 5 will be transversely across the middle of the pages.

This system of collecting, cutting, and folding is fully illustrated in Figs. 1, 2, 3, and 4 of said Patent No. 410,271.

The web or webs are received from the printing mechanism shown in Fig. 20 onto the longitudinal folder A, whence they pass between the longitudinally-folding rolls 1 2 and receive their first fold. Thence they pass onto the carrier B, from which they are transversely folded between the rollers 4 and 5, the sheets being cut transversely from the web as they leave carrier B.

The construction of the carrier B and the mechanism carried by it is shown in detail in Figs. 2, 2^a, 3, and 3^a. It is fixed to a shaft *d*, to which is fixed the spur-wheel *c*, which drives the spur-wheel *b*. 6 and 7 are two shafts mounted longitudinally in the carrier B, near its periphery, on opposite sides of the center. Fixed to each of these shafts are two inverse folders 8 9. Also fixed to each shaft are the inverse cam projections 10 11. Also fixed to each shaft are the inverse arms 12 13, which are moved by a diamond-shaped cam 14, fast to the spur-wheel *b*. The position of this diamond-shaped cam may be either as shown in Figs. 2 and 2^a or as shown in Figs. 3 and 3^a. It is adjustable from one position to the other at will by rotating the frame *k* on the shaft *d*. The main frame *l*, in which the shaft *d* has one end bearing, is provided with the holes *j* and *j'*, and the rotating frame *k* is provided with a hole *e*. When the rotating frame *k* is in the position shown in Figs. 2 and 2^a, it is held there by a bolt placed in the holes *j* and *e*. When in the position shown in Figs. 3 and 3^a, it is held there by a bolt placed in the holes *j'* and *e*. When the parts are in the position shown in Figs. 2 and 2^a, the shafts 6 and 7 and the parts carried thereby are inactive, excepting at the position shown. When the frame *k* is in the position shown in Figs. 3 and 3^a, the shafts 6 and 7 are inactive, excepting at the position shown. The folding-rollers 4 and 5 are so placed as to coöperate with the folding-blades when the same are operated at the point shown in Fig. 2. The folding-rollers 15 and 16 are placed on the opposite side of the carrier B in the correct position to coöperate with the folding-blades when the same are operated in the position shown in Figs. 3 and 3^a. The frame *k* carries a ring *k'*, that overhangs both of the arms 12 13 and holds them in the position shown at the left of Figs. 2 and 2^a or the right of Figs. 3 and 3^a with the folding-blades inoperative throughout the whole rotation of the carrier, excepting at the point where the folding-blades are required to operate. For this purpose at one point of the circumference the ring *k'* extends radially outward into a pocket *k*². This pocket is fixed radially outside of the diamond cam 14 and permits the arms 12 13 to be moved by said diamond cam into radial position. (Shown at right of Figs. 2 and 2^a and at left of Figs. 3 and 3^a.) The parts in the act of being so moved are

shown in Fig. 2^b. With each of the double cams 10 11 is combined a lever 17, controlling the impaling-pins 18. A spring 17^a, attached to each lever 17, tends to hold each set of pins 18 outward, and said pins are retracted in opposition to said springs by said double cams 10 11, fast to the folding-blades. The timing is as follows: In the construction shown in Fig. 2 the pins are normally held outward by the springs 17^a, and the forward edge of the web will be impaled on one row of the pins 18 as the same is passing the roller 4, which carries the matrix for knife 19. It will remain so impaled until the carrier has advanced about one-quarter revolution, whereupon the cams 10 11, acting simultaneously with the folding-blade, will move the lever 17 so as to retract the set of pins and release the edge of the web held thereby. As soon as the folding-blade has returned to its normal position the pins will be also returned to their normal outward position by the spring 17^a. The same operation is performed by the construction shown in Fig. 3, excepting that the web is impaled against the roller 16, which in this construction carries the matrix. The same operation is also performed by the construction shown in Fig. 1, in which the web may be impaled either against the roller 4 and discharged to the right or may be impaled against the roller 16 and discharged to the left. The arrows show the direction in which the carrier B turns.

19 19 are knives immediately preceding the impaling-pins and operating against the matrix 4^a on roller 4 or the matrix 16^a on roller 16, as the case may be, to cut the web transversely at the same instant that it is impaled on the pins. When the parts are adjusted in the position shown in Figs. 2 and 2^a, the parts shown at the left of the carrier B in Fig. 1 are inactive and the web is folded between the rollers 4 and 5. When the parts are adjusted in the position shown in Figs. 3 and 3^a, the parts shown at the right of carrier B in Fig. 1 are inactive and the web is folded between the rollers 15 and 16, and in order to hold the web onto the carrier in passing underneath it I provide a guide 20.

By the constructions and adjustments above described the operator is enabled to either send the web to the mechanism at the left of carrier B in Fig. 1, whereby it is delivered with one transverse fold, or he may send it to the mechanism shown at the right of the carrier B in Fig. 1, whereby it is treated in the manner hereinafter more particularly set forth.

The sheets pass from the rollers 4 5 between the guides 21 and 22 to a carrier C. They are then gripped by the grippers 23 and carried around the carrier C, and thereby superposed upon the next succeeding sheets, so that every two longitudinally and transversely folded cuts from the web are superposed on each other. The mechanism mounted upon the carrier C, by which this is

accomplished, is well known, and therefore need not be particularly described. One form which will answer the purpose is described in my Patent No. 415,321, dated November 19, 1889. The superposed cuts from the web are received by the gripper-belt 24, which is carried by the sprocket-wheels 25 and 26 into position to be combined with the wrapper-web, or the carrier C may be omitted and tapes 24^a, extending around the rollers 5 and 26^a, may be substituted for the gripper-belt 24, so as to carry each cut without superposing directly from the folding-rollers 4 5 to the position for combining with the wrapper-web E, as shown in Fig. 4.

The wrapper-web E proceeds from its roll past the guide-roll 27 and over the folding-roller 28, where its forward end is impaled, as shown in Fig. 9, upon impaling pins 29, carried by a carrier D. It remains thus impaled until the impaling-pins 29 have advanced to the position shown in Fig. 10, where it is stripped from the impaling-pins by the stripper 30, so that it then lies horizontally across the rollers 23 and 31. Thereupon the folding-blade 32 of the carrier D folds it transversely between the rollers 28 and 31, as shown in Figs. 11, 8, and 9. As the knife 33 passes the roll 28 it will cut the wrapper-web transversely at the proper distance from its fold. Duplicate sets of pins, knives, and folding-blades are carried by the carrier D, so as to produce the above-described operation twice for each revolution of such carrier.

As the web E is being pinned, stripped, folded, and cut by the mechanism on carrier D a printed sheet from web A', folded longitudinally and transversely, is brought into position by the gripper-belts 24 or bands 24^a against stop, so as to be folded longitudinally between the rollers 28 and 31 inside the wrapper at the same time that the wrapper E is folded transversely.

31^a is a fixed guide to assist the belts 24 in supporting the sheet above the roller 31.

In order to explain the timing as between the travel of the sheet and of the wrapper, I will refer to Figs. 13, 14, and 15. In Fig. 13 the sheet A' and the wrapper E are advancing in the directions of the arrows and occupy substantially the relative positions shown when the wrapper is impaled by the pins on carrier D, as shown in Fig. 9. In Fig. 14 they have advanced farther and now occupy the position where the wrapper is stripped from the pins, as shown in Fig. 10. In Fig. 15 they have advanced still farther and now occupy the position for folding, as shown, the fold being made, as shown in Fig. 11, upon the line *xx* and the transverse cut of the wrapper being subsequently made on the line *yy*. Fig. 16 shows the same position as in Fig. 15, with the addition of the folding-rollers 28 and 31 and the belts 24, by which the sheet and wrapper are supported from below at the instant the folding commences, the sheet being on top of the wrapper and the wrapper being

below the belts 24. By timing the movement of the sheet and wrapper, as above described, the pins and strippers manipulate the forward end of the wrapper-web in the intervals between the sheets, and thus I am enabled to bring the wrapper-web transversely into the proper position for receiving its fold together with the sheet. Thereby I am enabled to secure the result of making the first fold of the wrapper and sheet together when the wrapper and sheet occupy such position that the fold is longitudinal of the sheet and transverse of the wrapper, so that the two succeeding folds necessary for the application of the wrapper may be made also longitudinally of the sheet and therefore in the most desirable position with respect to the columns of the sheet.

After the wrapper and sheets have received their first fold together they are as shown in Fig. 17, (in which figure for clearness of illustration the folds of the sheet previous to its union with the wrapper are omitted,) and the wrapper lies, as shown in said figure, transversely of the printed columns, extending entirely across one side and a distance beyond the edge and around the fold *xx* and partially across the other side. This represents the product as it emerges from folding-rollers 28 and 31. By the mechanism shown in Figs. 7 and 8 the product is next folded parallel with the fold *xx* on the line *zz*, Fig. 17, into the form shown in Fig. 18, and next the projecting flap of the wrapper, after being supplied with paste, is folded on the line *ww* into the position shown in Fig. 19, when the product is completed.

The form of construction shown in Figs. 5, 6, and 8 may be described in detail as follows: The carrier B and folding-rollers 4 and 5 are as described in connection with Fig. 1. The longitudinal-folding rollers 1 2 are arranged so that the longitudinally-folded web descends vertically tangent to the carrier B, being received between the carrier B and the tape 110 and held onto the carrier until it reaches the folding-rollers 4 and 5, between which it is transversely folded. Thence it passes over the guide 22 onto the gripping-belts 24, which and the remainder of the mechanism, are of substantially the same construction as before described. In Fig. 6 the mechanism for driving the various parts is shown. Supposing the gear 100, fixed on the shaft of carrier B, to be the prime mover, it drives the gear 107, fixed on the shaft of roller 2, which in turn drives the gear 106, fixed on the shaft of roller 1. The prime mover 100 also drives the gear 108, from which the folding-rollers 4 and 5 are driven, and the gear 108 drives the gear 109, fixed on the roller 25, by which the gripper-belts 24 are driven. The power from the prime-mover shaft is communicated through the beveled gears 101 102 and the shaft 111 of the carrier F to the gear 103. This gear drives the gear 104, fixed to the shaft of the roller 39. The gear 104 drives the gear 105,

fixed to the shaft of carrier G. The carrier D, the folding-rollers 28 and 31, the folding-rollers 36 and 37, and the folding-rollers 42 and 43 may be driven by suitable gears (not shown) from the gear 103. The carrier 112 and delivery-table 113 (shown in dotted lines in Fig. 5) are similar to the corresponding parts shown at the left of Fig. 1 and would only be used in case the carrier D and succeeding mechanism should be dispensed with or moved out of position.

Referring now to Figs. 7 and 8, the product shown in Fig. 17 passes from the rolls 28 31 between the belts 33 and 34, whereby it is carried to the grippers 35 on the cylinder F and carried forward thereby until folded between the rollers 36 and 37 by the folding-blade 46, operated by any suitable mechanism on the carrier F. After the product shown in Fig. 18 passes from the folding-rollers 36 and 37 it is carried by the tapes 34 and 38 past pasting-roller 39 (by which the paste is applied to the projecting end of the wrapper) to carrier G, where it is gripped and held by the gripper 41 until folded by the folding-blade 47 between the folding-rollers 42 and 43, where its last fold is received parallel with the two preceding. It is then dropped between the guides 44 and 45 into the box H completed, as shown in Fig. 19.

In Fig. 12 I have shown a convenient form of adjustment for the bearings of the rolls, as 4 or 16, which carry the knife cutting-blocks. Each journal 50 of the roll is mounted in a block 51, sliding on the frame 52 and held in adjustment between the set-screws 53 and 54. By means of this adjustment both of the rollers containing the matrices which cooperate with the carrier-knives may be adjusted so as to bring either or both of said matrices into cooperative contact with said knives, as shown in Fig. 1. In case both matrices are brought into use the paper will be transversely cut twice for each rotation of the carrier, or either of said matrix-carrying rollers may be adjusted away from the carrier, so that the knives will form cooperative contact with only one matrix for each revolution of the carrier. This feature of adjustment is additional to anything shown in my Patent No. 556,409 and greatly enlarges the scope of the work which may be done upon the machine. Of course only one of the two sets of folding mechanisms will be in use at the same time, one being designed for use when the papers are to be wrapped separately for mailing and the other when they are to be simply folded.

The printing mechanism shown in Fig. 20 may be described as follows: The webs $a a' a^2$ go to make up the composite web A' , being printed on, respectively, by the three printing mechanisms $b b' b^2$. Each printing mechanism consists of a pair of impression-cylinders 60 61, close together in the middle, with a form-cylinder 62 and 63 on each side. The inking mechanism 64 and 65 is arranged on the outside of each form-cylinder. All the form-cyl-

inders are parallel with each other, and the cylinders in each printing mechanism are arranged in a horizontal row. The corresponding cylinders in the different printing mechanisms are arranged in vertical planes. Each web is led into this, its printing mechanism, from a guide 66 above and out of its printing mechanism, to a guide 67 below. Thence they pass to the guides 68, 69, and 70, thence upwardly to the guide 71, and thence together onto the folder A.

I believe that by this invention for the first time a wrapper is brought onto a sheet by being fed transversely of the sheet and the two folded together longitudinally of the sheet.

I claim—

1. In combination, a rotary web-printing mechanism containing forms in which the columns run longitudinally of the web, mechanism whereby the paper printed by said forms is folded longitudinally and transversely and cut transversely, a conveyer whereby a web is brought across the path of said printed paper, a conveyer running transversely of said web-conveyer whereby said folded paper is brought transversely across the web and mechanism whereby said folded paper and said web are folded together longitudinally of the page-columns, substantially as described.

2. In combination, a rotary web-printing mechanism, mechanism whereby the printed web is folded longitudinally and transversely and cut transversely, a conveyer whereby the longitudinally and transversely folded sheet cut from the web is carried, a wrapper-conveyer traveling transversely of said sheet-conveyer and mechanism whereby the folded sheet and wrapper are folded together, substantially as described.

3. In combination, a rotary web-printing mechanism, mechanism whereby the printed web is folded longitudinally and transversely and cut transversely, a conveyer whereby the longitudinally and transversely folded sheet cut from the web is carried, a wrapper-conveyer traveling transversely of said sheet-conveyer and mechanism whereby the folded sheet and wrapper are folded together; said wrapper-conveyer and sheet-conveyer being so timed that the wrapper projects beyond the edge of the sheet on one side and extends more than half-way across the sheet, substantially as described.

4. In combination, folding-rollers as 28 and 31, a wrapper-carrier, as D, containing a folding-blade and impaling-pins, means whereby a wrapper is guided to said impaling-pins and a conveyer running transversely to said carrier D whereby a sheet is brought transversely across said wrapper and means for operating said carrier D, substantially as described.

5. In combination, folding-rollers, as 28 and 31, a wrapper-carrier, as D, a sheet-conveyer running transversely to said carrier whereby a sheet is brought between said wrapper-carrier and wrapper and means whereby said

sheet and wrapper are folded together between said folding-rollers, substantially as described.

6. In combination, a wrapper-conveyer, a sheet-conveyer and folding mechanism; said conveyers operating to convey said wrapper and said sheet transversely across the path of each other and mechanism whereby the motions of said sheet and said wrapper are so timed that one is conveyed to the point at which said paths intersect in advance of the other, substantially as described.

7. In combination, a wrapper-carrier D, a knife mounted thereon, a roller 28 between which and the carrier the wrapper enters, a matrix mounted on said roller to cooperate with said knife, a folding-blade mounted on said carrier, a sheet-conveyer operating transversely to said carrier whereby a sheet is conveyed transversely across said wrapper and means for conveying said sheet and wrapper after the same are thrust away from said carrier by said folding-blade, substantially as described.

8. In combination, the longitudinally-folding rollers 1, 2, the carrier B, the transversely-folding rollers 4, 5, the knife 19 whereby each sheet is cut from the web, a sheet-conveyer, a wrapper-conveyer operated transversely of said sheet-conveyer whereby the sheet and wrapper are brought transversely across one another and means whereby said sheet and wrapper are folded together, substantially as described.

9. In combination, a web-printing mechanism, the longitudinally-folding rollers 1, 2, substantially at right angles with the cylinders of said web-printing mechanism, the transversely-folding rollers 4, 5, substantially parallel with the rollers 1, 2 and the three pairs of folding-rollers 28, 31, and 36, 37 and 42, 43, each of which is substantially parallel with the cylinders of said printing mechanism, substantially as described.

10. In combination, three web-printing mechanisms having substantially-parallel cylinders, guides whereby without turning or reversing, the webs are brought on top of one another, mechanism whereby said collected webs are together folded longitudinally and transversely, mechanism whereby the same are cut transversely, a conveyer whereby the longitudinally and transversely folded sheet cut from the web is carried, a wrapper-conveyer traveling transversely of said sheet-conveyer, means whereby said wrapper-web is cut transversely and means whereby said sheets are folded longitudinally inside of said wrapper, substantially as described.

11. In combination, the carrier B, the vertically-arranged folding-rollers 4 and 5, the conveyer 24 and the carrier D at right angles with the carrier B and substantially tangent to the plane of the conveyer 24, and folding mechanism mounted on said carrier B so timed that the sheets are thrust between said folding-rollers and conveyed by said carrier

24 to said carrier D with intervening spaces between successive sheets, substantially as described.

12. In combination, mechanism whereby sheets are successively severed from a web, a carrier C whereby one sheet is superposed upon the next following, a conveyer for said superposed sheets, a conveyer running transversely of said sheet-conveyer whereby a wrapper is laid across said sheets and means whereby said sheets are folded inside of said wrapper, substantially as described.

13. In a rotary press containing a plurality of web-printing mechanisms, mechanism whereby the webs are run out over one another without turning or reversing, mechanism whereby the sheets are folded on the longitudinal margins between the pages and transversely across the middle of the pages, a conveyer whereby a wrapper is brought across the path of the sheet, a conveyer running transversely of the wrapper-conveyer whereby the sheets are brought transversely across the wrapper and mechanism whereby the sheets and wrapper are folded longitudinally of the page-columns; the forms for those pages constituting the first half of the product being located upon corresponding zones of the form-cylinders of the various printing mechanisms, and the forms for those pages to constitute the last half of the product being arranged on other corresponding zones side by side with the zones in which the forms of the pages of the first half are located whereby the several pages belonging to the first half of the product will, before their first longitudinal fold, arrange themselves above each other and the several pages belonging to the last half of the product will arrange themselves above each other, substantially as described.

14. In combination, the carrier B, the folding-blade mounted thereon, mechanism whereby said folding-blade is operated to thrust the paper off of said carrier in a substantially-horizontal direction, the conveyer 24, the carrier D operating transversely of said conveyer and substantially tangent to the plane thereof, means whereby a web is guided to said carrier D transversely to the travel of said conveyer 24 and a folding-blade on said carrier D whereby said web and the paper supported by said conveyer are folded together, substantially as described.

15. In combination, the horizontal conveyer 24, the carrier D operating transversely to said conveyer, and substantially tangent to the plane of its supporting-surface, a folding-blade on said carrier D, the folding-rollers 28 and 31 substantially tangent to the plane of the supporting-surface of said conveyer on the opposite side from said carrier D, means whereby paper is guided onto said conveyer 24 and means whereby other paper is guided to said carrier D, substantially as described.

16. In combination, a rotary carrier, two diametrically-opposite pairs of folding-rollers

each pair being so arranged that the paper is received between them substantially in line with the radius of the carrier, two folding-blades and two knives on said carrier, a matrix in one folding-roller of each pair, each
5 matrix-carrying roller being in diameter a fraction of the diameter of said carrier, and means of adjustment whereby each of said matrix-carrying rollers may be adjusted bodily

into or out of operation with said knives, to mechanism for operating said folding-blades and means whereby the same may be rendered inoperative at each of said pairs of folding-rollers, substantially as described.

JOSEPH L. FIRM.

Witnesses:

JAMES T. LAW,
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