

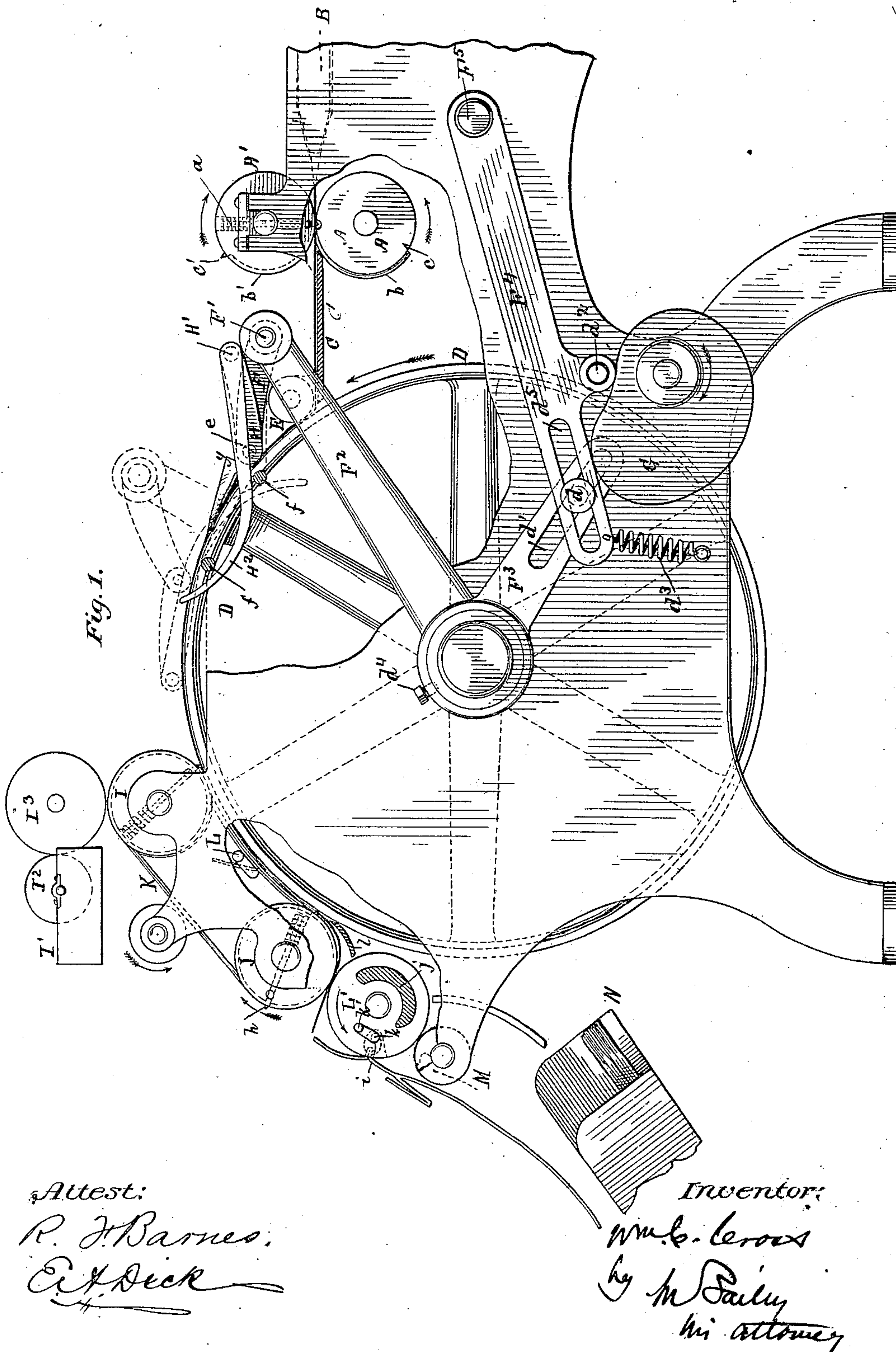
(No Model.)

7 Sheets—Sheet 1.

W. C. CROSS.
Paper Bag Machine.

No. 240,972.

Patented May 3, 1881



Attest:
R. H. Barnes.
C. H. Dick

Inventor:
Wm. C. Cross
by M. S. Bailey
his attorney

(No Model.)

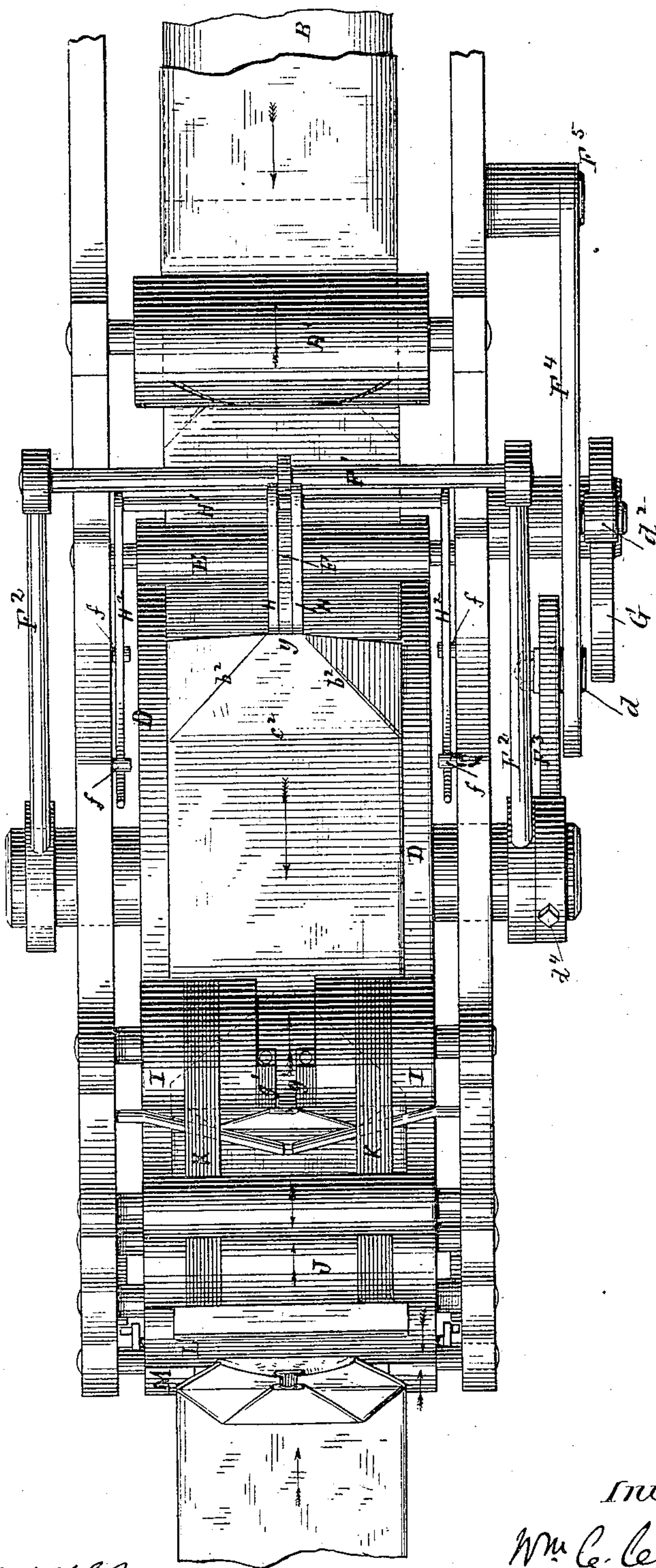
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Fig. 2.



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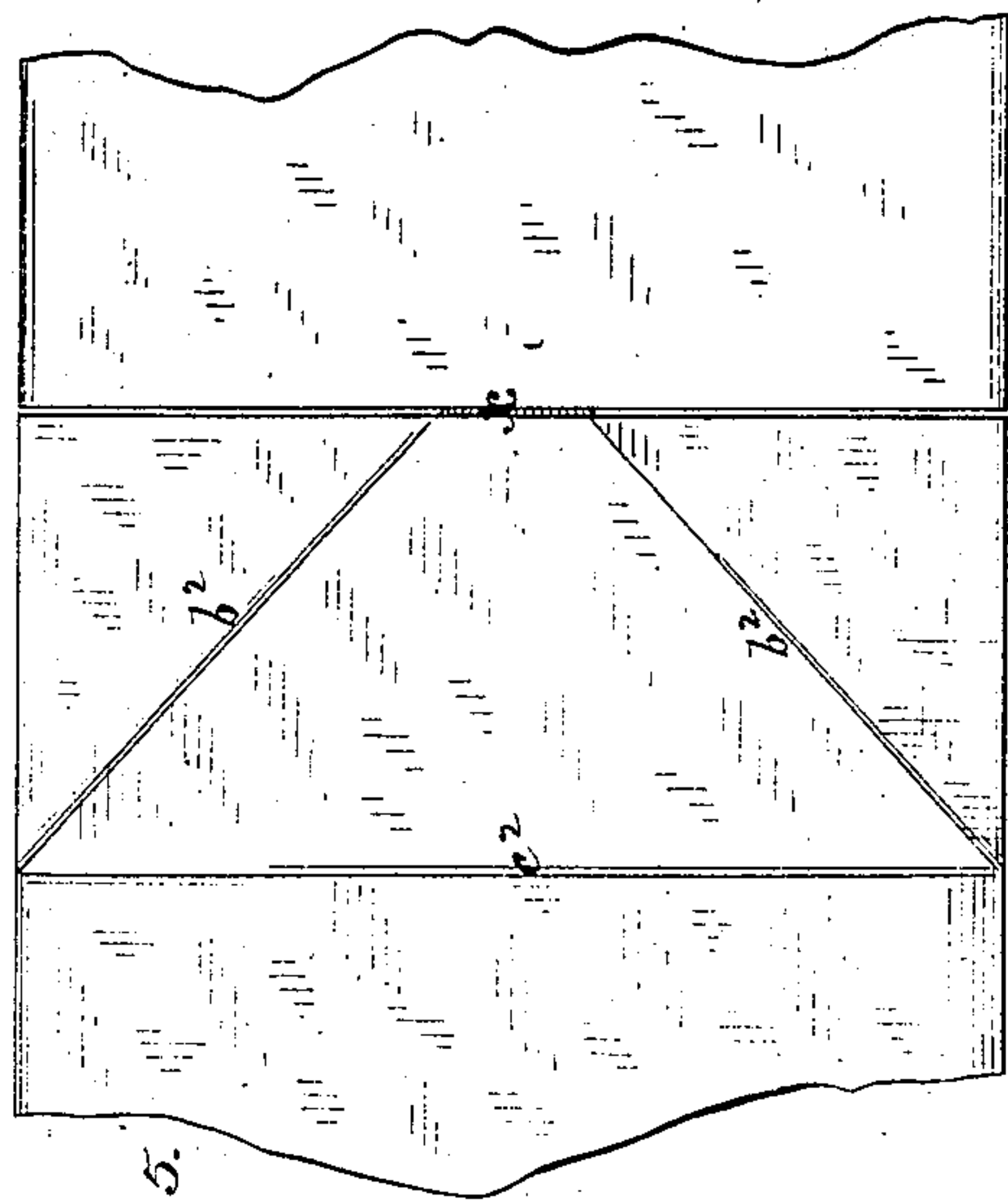
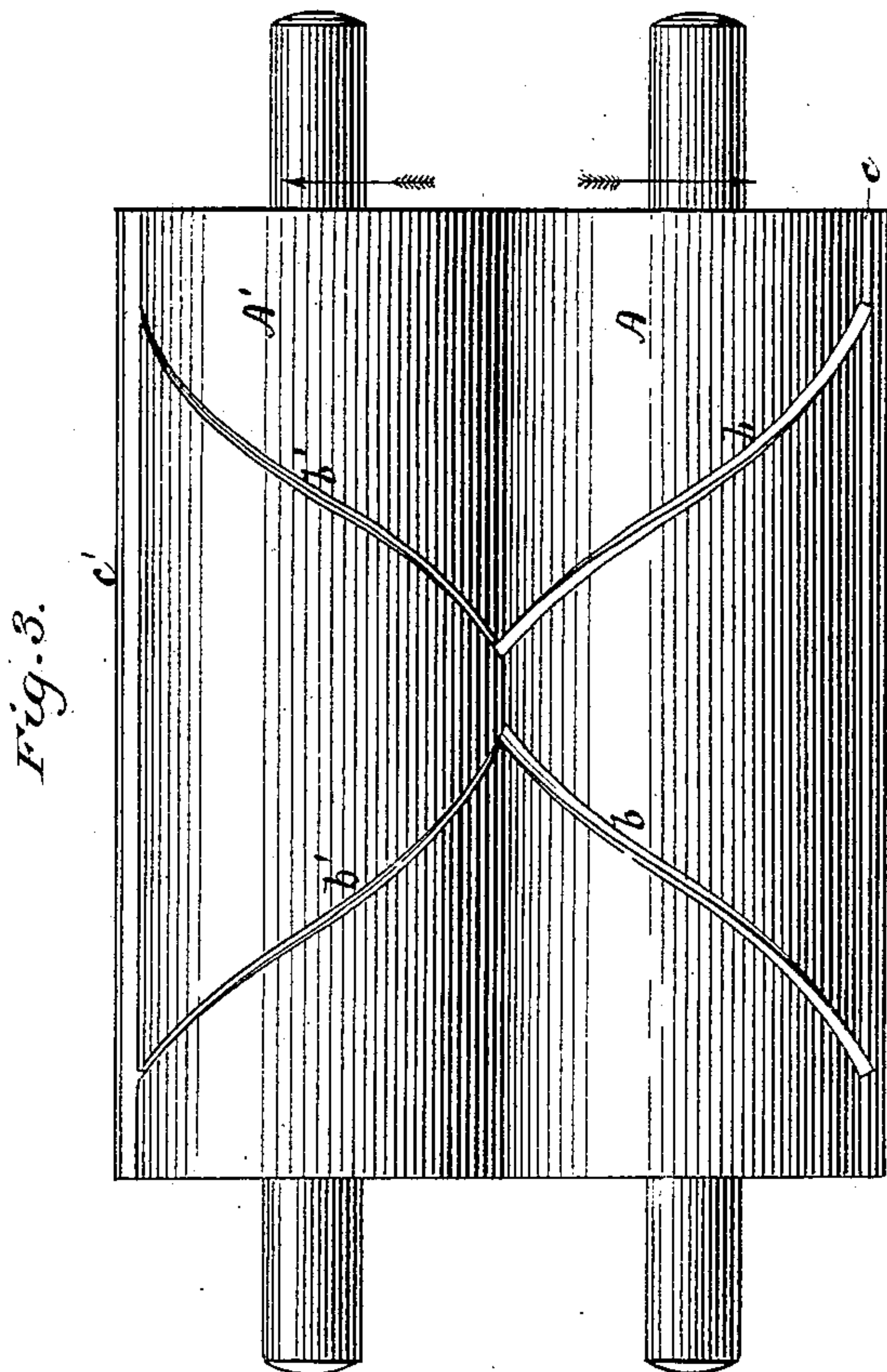
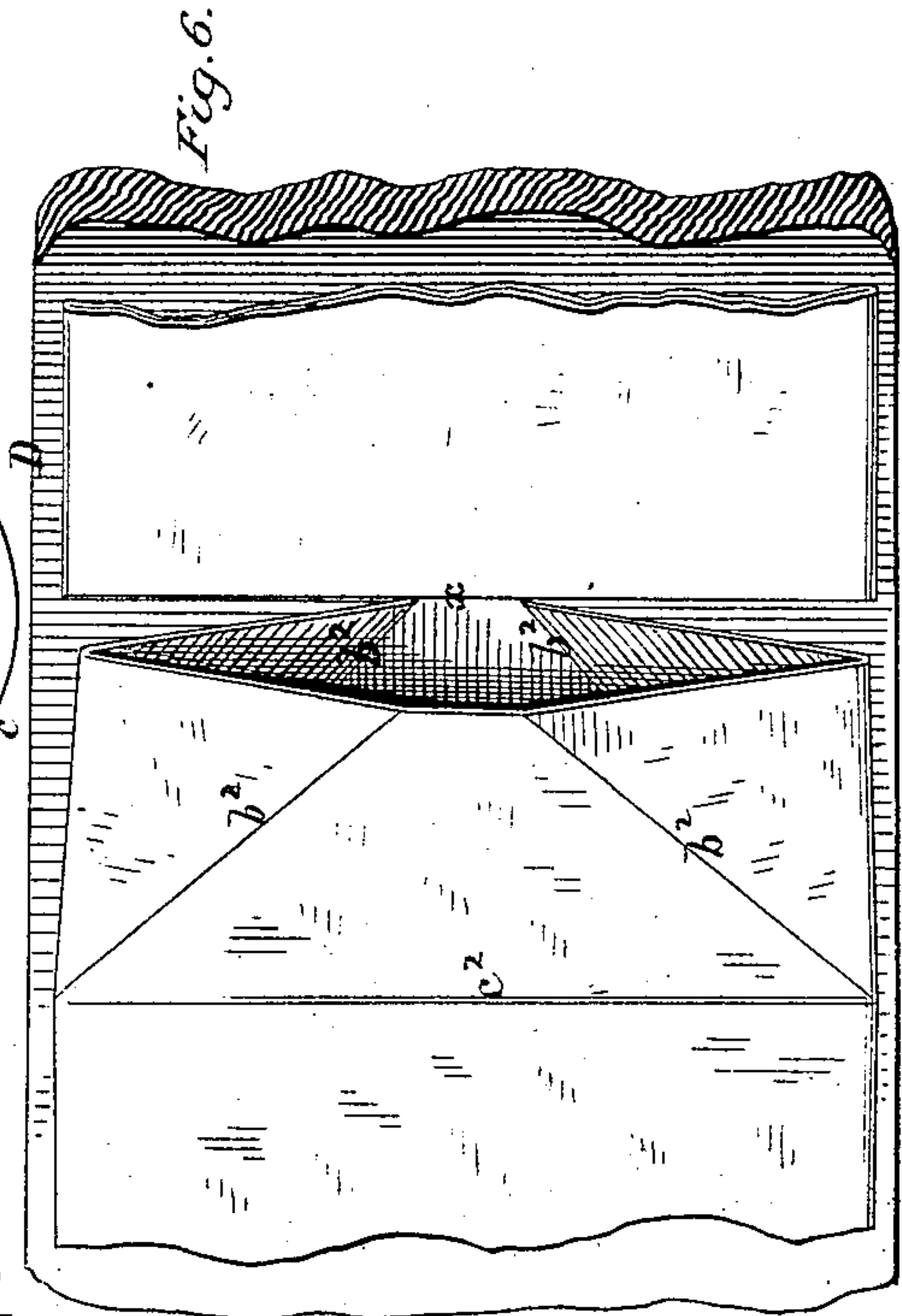
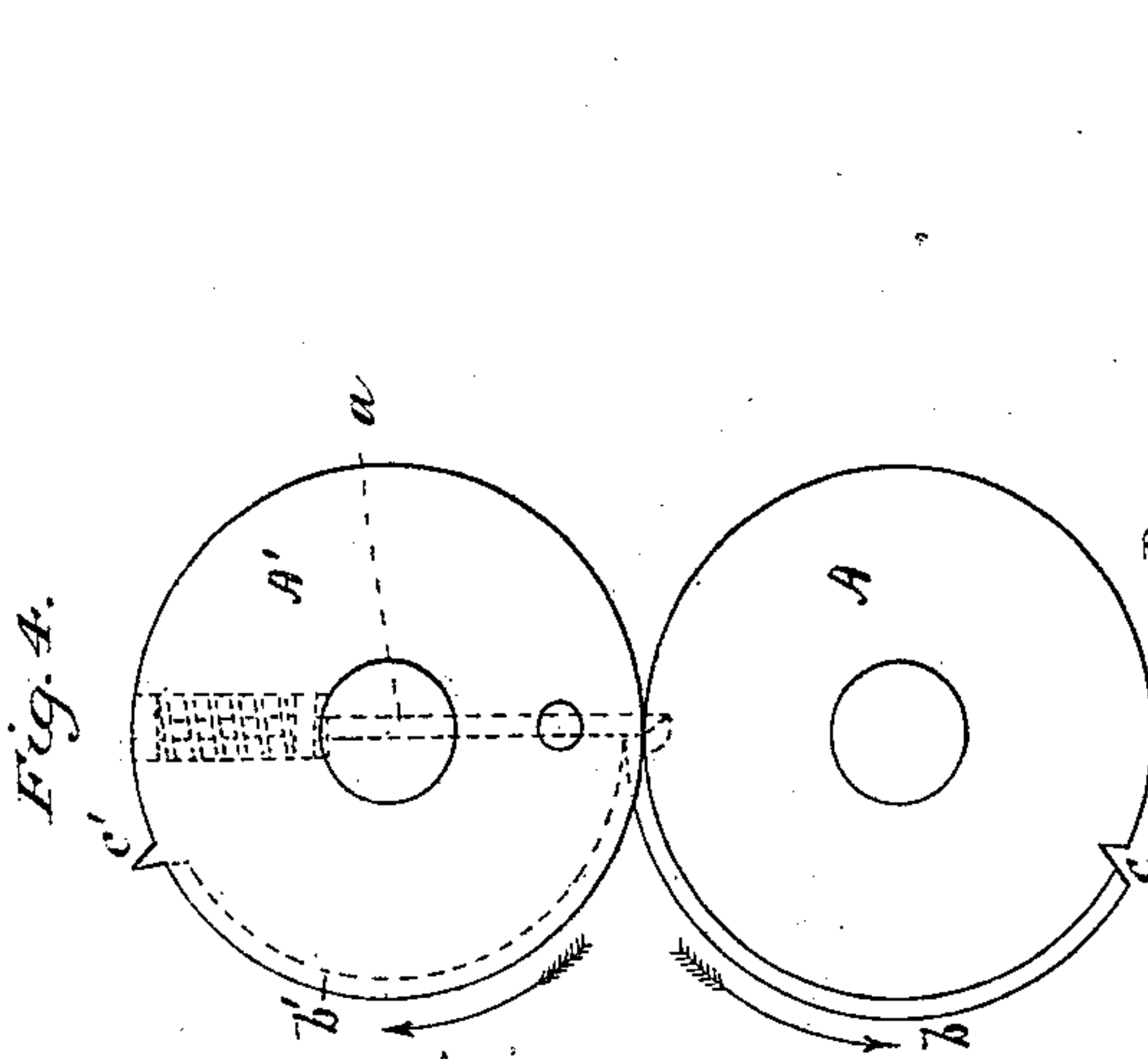
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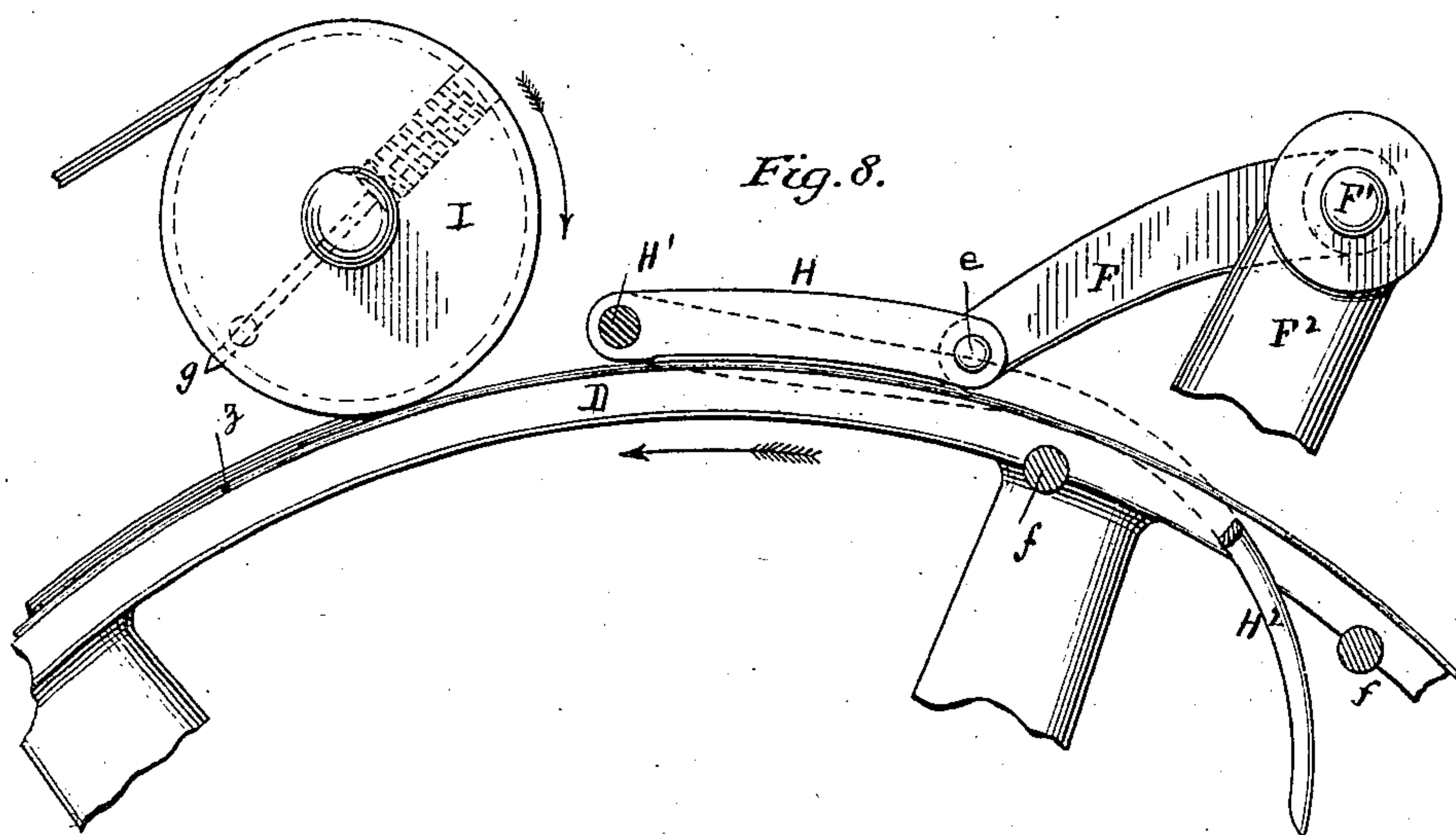
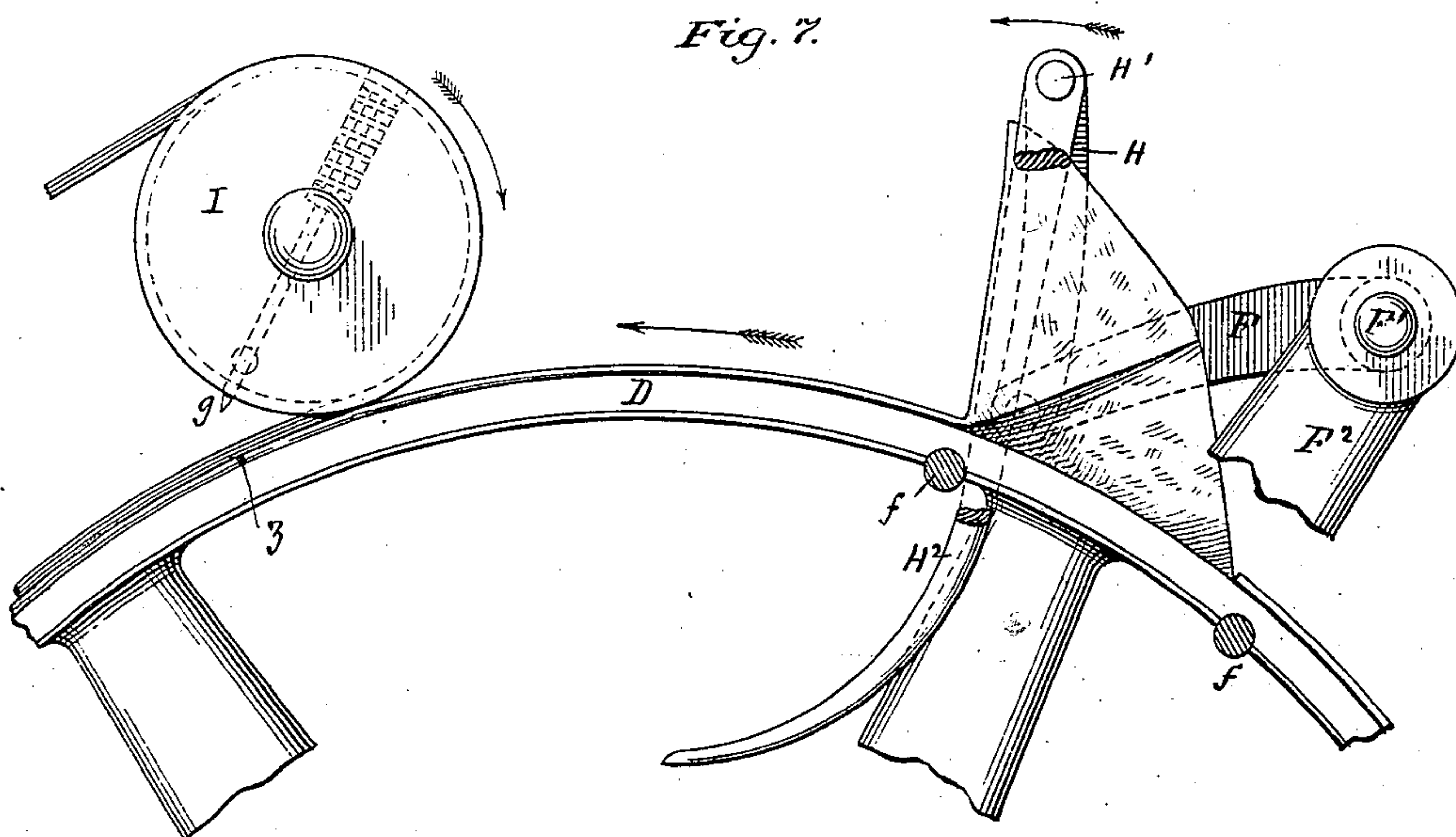
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W. C. CROSS.
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7 Sheets—Sheet 5.

W. C. CROSS.
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Fig. 10.

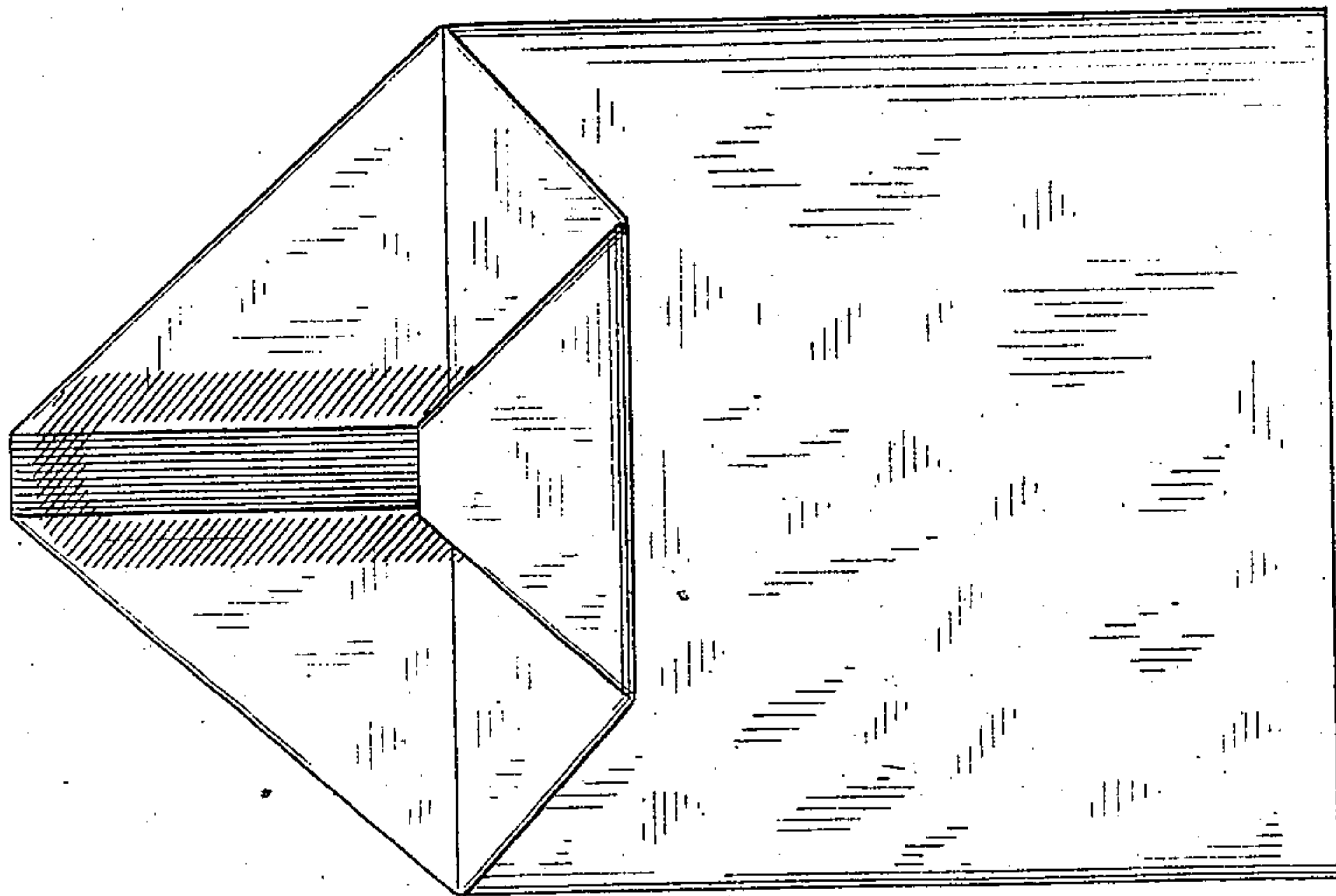
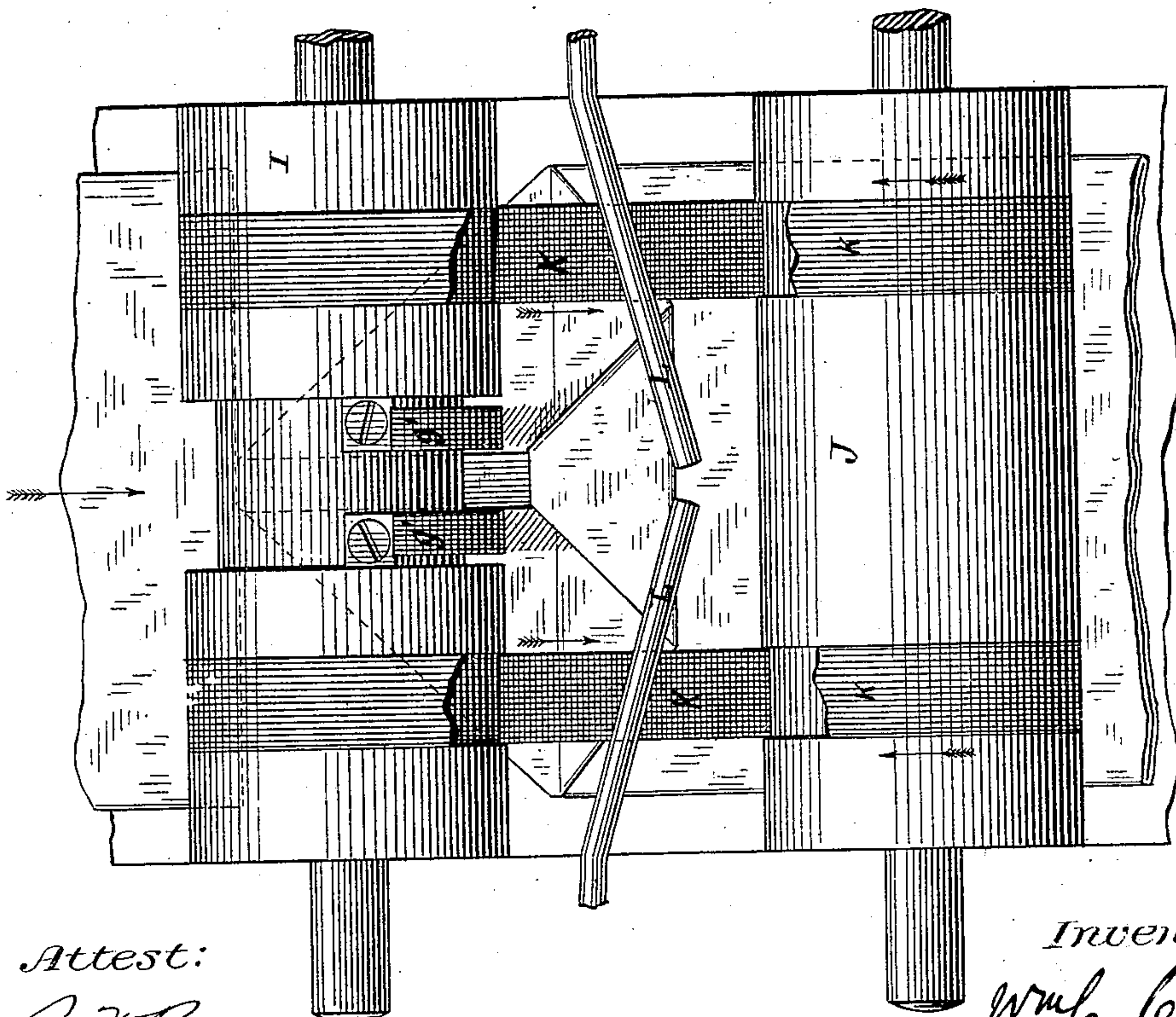


Fig. 9.



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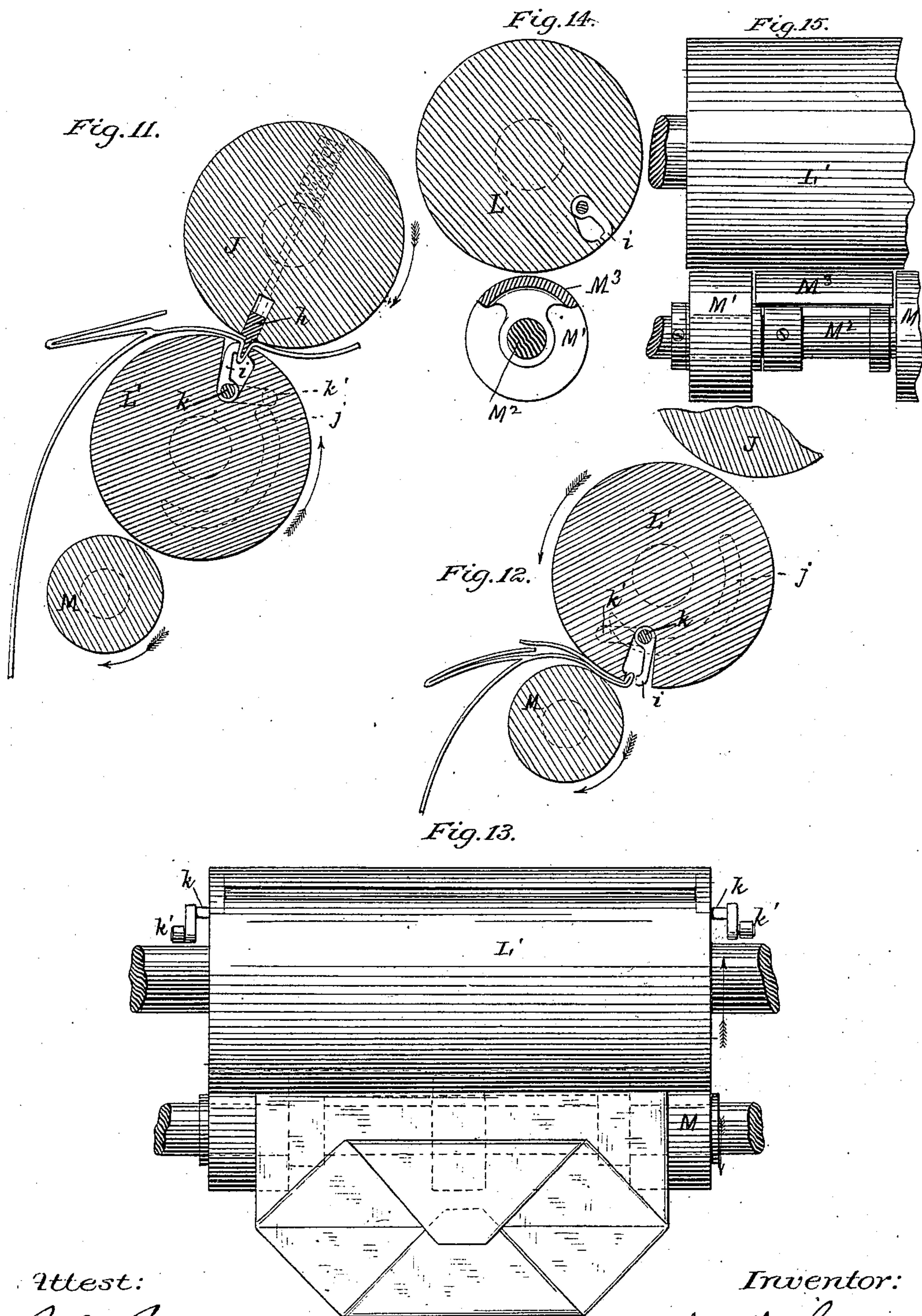
(No Model.)

7 Sheets—Sheet 6.

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Patented May 3, 1881.



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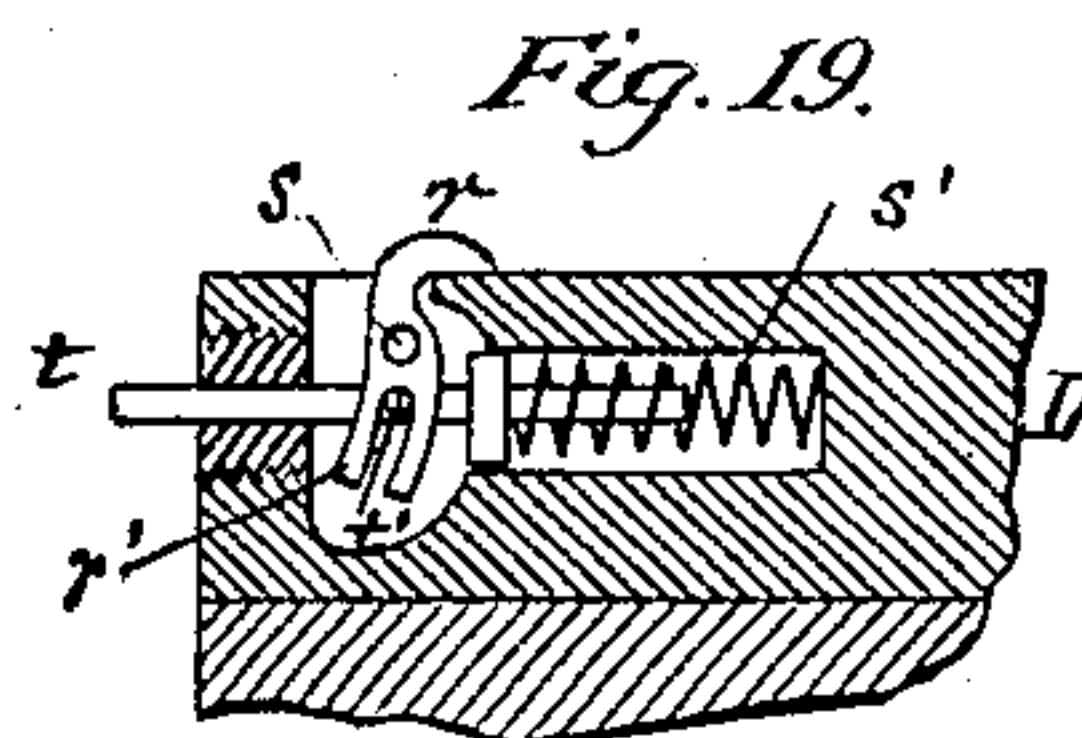
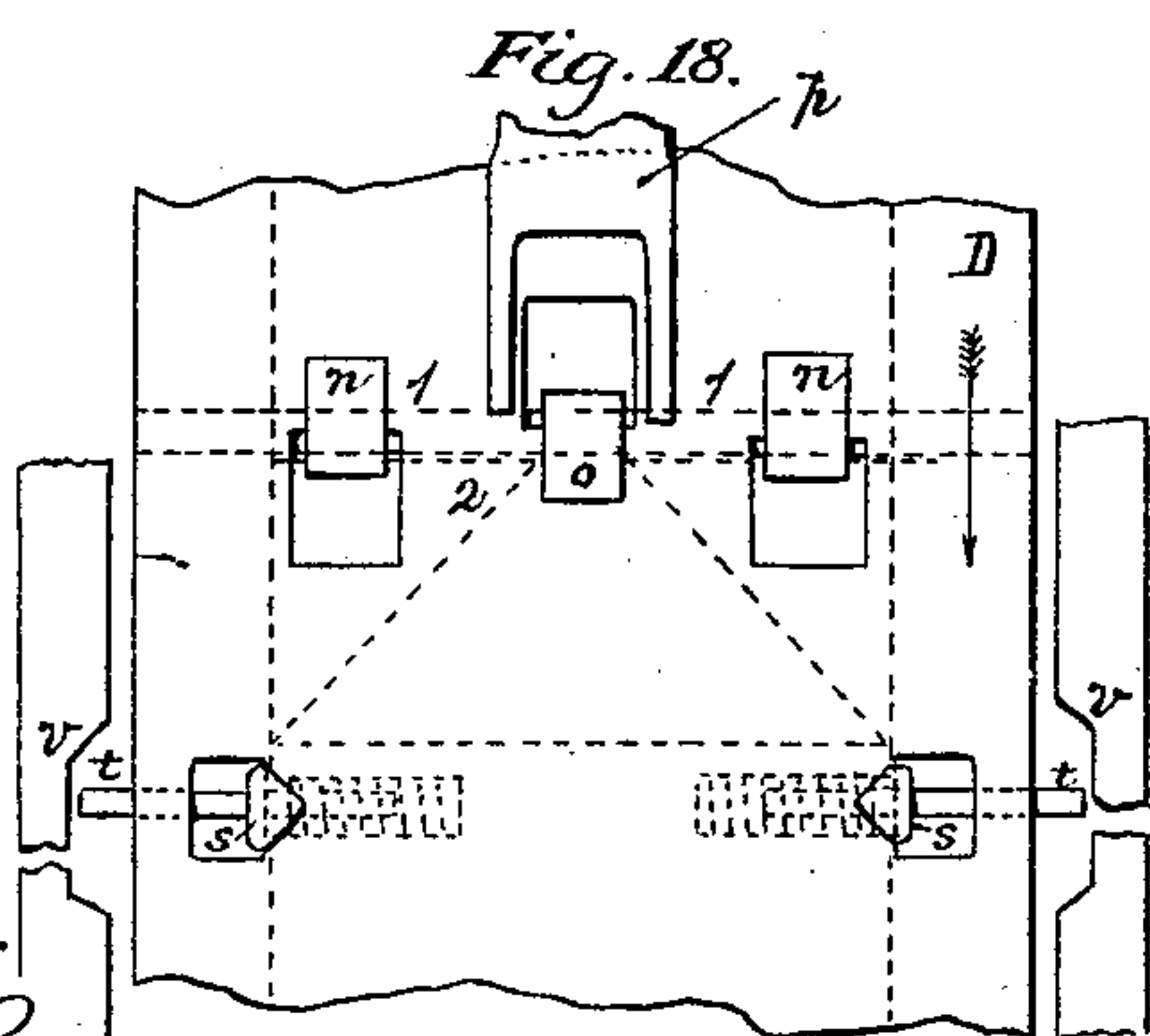
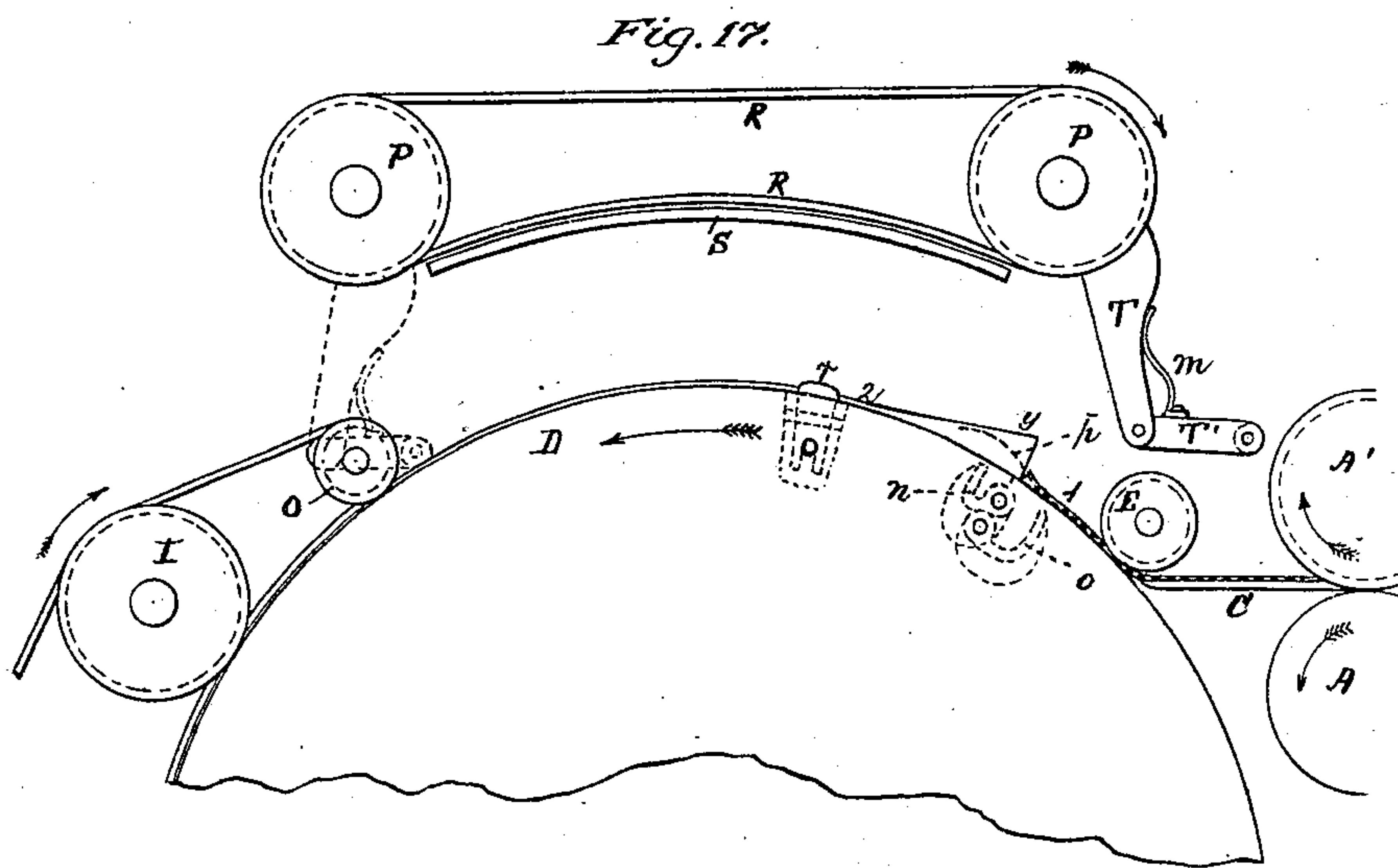
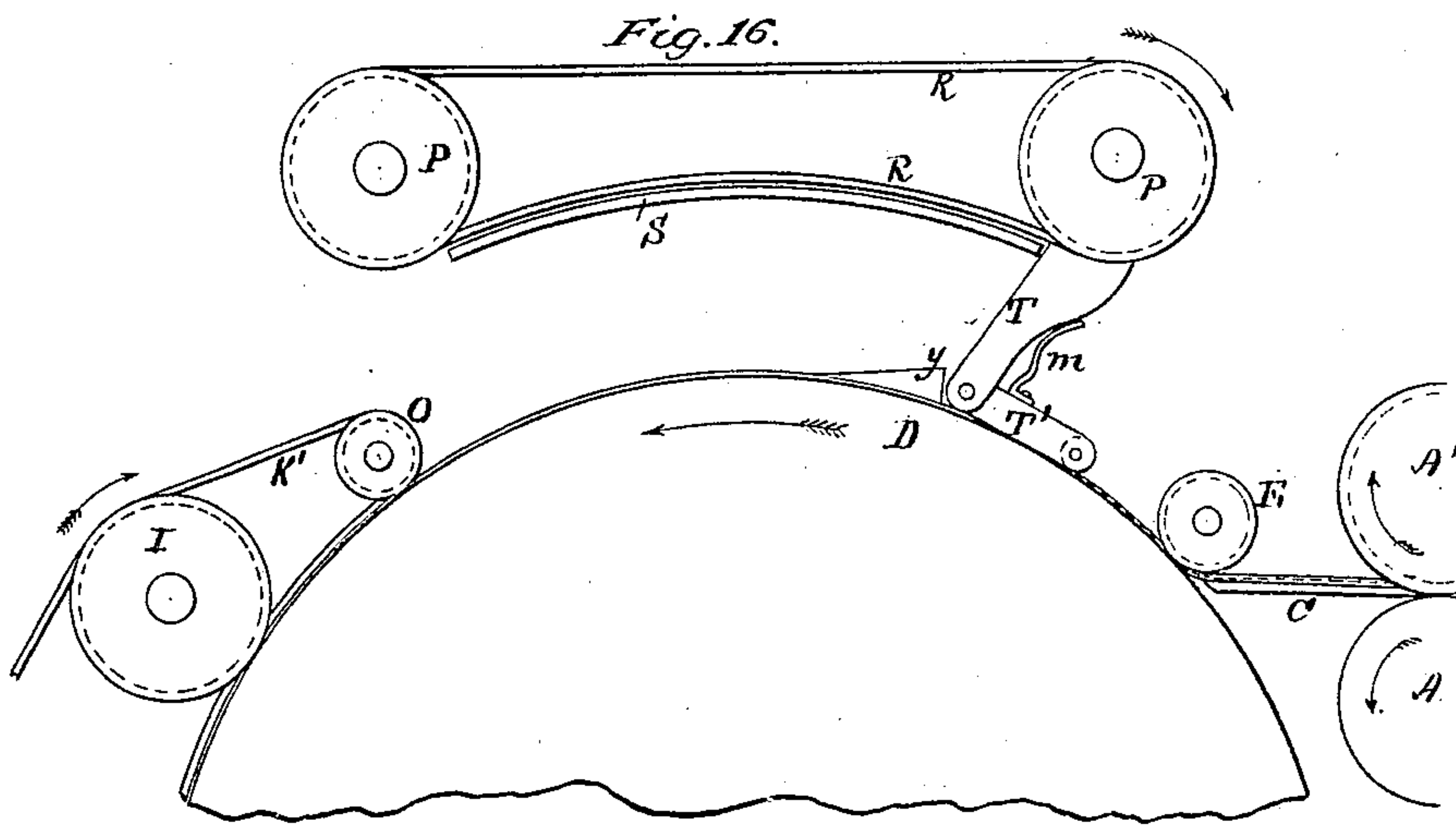
(No Model.)

7 Sheets—Sheet 7.

W. C. CROSS.
Paper Bag Machine.

No. 240,972.

Patented May 3, 1881.



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UNITED STATES PATENT OFFICE.

WILLIAM C. CROSS, OF BOSTON, MASSACHUSETTS.

PAPER-BAG MACHINE.

SPECIFICATION forming part of Letters Patent No. 240,972, dated May 3, 1881.

Application filed February 2, 1881. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM C. CROSS, of Boston, Massachusetts, have invented certain new and useful Improvements in the Art of Making Satchel-Bottom Paper Bags by Machinery, of which the following is a specification.

In making satchel-bottom paper bags by machinery it has been customary to form the primary fold, or "diamond fold," as it is usually termed, on that end of the tubular bag-blank which is in front relatively to the direction of feed. This brings to the rear that point or flap of the diamond fold that overlies the body of the blank, and it is an operation of some difficulty to successfully and rapidly fold the said flap. In some cases a following folder has been used to wipe over and down this flap, whether the blank be at rest or in motion. In other cases the flap has been folded by making at the same time a "blind" fold in the body of the bag. In another case the points of the diamond have been reversed so as to bring each point in succession to the front without reversing the body of the blank; and in still another case the whole blank has been reversed, so as to bring its mouth end foremost after the diamond fold has been made.

I have devised a simpler and more expeditious method of getting this overlying flap or point of the diamond fold to the front relatively to the feed or direction of movement of the blank through the machine, the same consisting in forming the diamond fold on the rear end of the blank, instead of on the front end, as heretofore, the result being that the act of thus laying the diamond fold necessarily brings to the front that flap or point of the diamond fold which overlies the body of the bag-blank. It is in this step in the art of making satchel-bottom bags by machinery that my invention principally resides.

It is manifest that the bag-blank can be thus operated on, whether it remain at rest or continue in motion during the time the diamond fold is being formed on its rear end. I prefer to keep the blank in uninterrupted motion in order to avoid intermittent movement of machinery and do more rapid work; and in the accompanying drawings I have represented a machine adapted for the purpose. I desire it

to be understood, however, that the details of construction and arrangement of the various parts of the machine can be varied considerably so long as there is retained the feature of blank-holding and feeding devices combined with diamond-fold-forming mechanism organized and timed to its movements relatively to said holding and feeding devices, so that it shall operate to form the diamond fold on the rear end of the blanks as they pass in succession through the machine.

The nature of my invention and the manner in which the same is or may be carried into effect will be understood by reference to the accompanying drawings, in which—

Figure 1 is a side elevation of so much of a satchel-bottom-bag machine as needed for the purpose of illustrating my invention. Fig. 2 is a plan of the same. Fig. 3 is a front elevation, and Fig. 4 is a side elevation, on an enlarged scale, of the rolls by which the blank is creased preliminarily to making the diamond fold. Fig. 5 is a plan of a portion of the strip of centrally-connected blanks, showing the creases at the rear end of the blank. Fig. 6 is a like view of the same as it appears when on the cylinder or carrier. Figs. 7 and 8 are elevations, on an enlarged scale, representing the positions of the folding mechanism at different stages in the formation of the diamond fold. Fig. 9 is a plan, on an enlarged scale, of that portion of the machine by which the second fold of the satchel-bottom is made. Fig. 10 is a plan of the bag as it appears after said fold is completed. Figs. 11 and 12 are sectional side elevations of the devices for making the final fold, showing the same in the various positions which they assume during the formation of said fold. Fig. 13 is a front elevation of the final or delivery rolls with the completed bag passing out from between them. The remaining figures are views of modifications hereinafter referred to.

I have omitted from the drawings, in order to avoid obscuring those parts which operate directly on the blank, the gearing and motion-transmitting mechanism. These can be of any approved kind, and their arrangement and mode of application are within the knowledge of the workman. I have also omitted from the drawings the mechanism for pasting and form-

ing the paper tube from which the bag-blanks are cut, said mechanism being well known to those skilled in the art to which this invention pertains.

5 The machine shown in Figs. 1 and 2 is one adapted particularly to receive and operate on a connected series of blanks, each blank being connected with those contiguous to it by a central uncut portion, x , of the under ply. The
10 manner of producing this connection is well known, a small cutter being employed in the trunk or former to make the central transverse cut in the upper ply over the portion x to be left uncut in the under ply, and both plies be-
15 ing subsequently severed simultaneously by a knife which leaves untouched the central connecting part, x . This knife is shown at a in one of the power-driven rolls $A A'$, which rolls also serve both to feed along the blanks and to
20 crease them. The paper tube having the central transverse cut in its upper ply passes from the former or trunk B to and between the rolls $A A'$, and thence over a table, C , to the carrier. The carrier in the present instance consists
25 of a rotating cylinder, D , and the connected series of blanks pass to this cylinder under the binding-roll E , which bears with yielding pressure on the cylinder and runs by frictional contact therewith. The under roll, A , is provided
30 with diagonal ribs b , which match diagonal grooves b' in the upper roll, A' , and with a cross-groove, c , which matches a cross-rib, c' , on roll A' . The ribs and grooves $b b'$ form in the rear end of the blank the creases $b^2 b^2$, Figs.
5 5 and 6, which determine the boundaries of the diamond fold, and the rib and groove $c c'$ form the transverse crease c^2 , which is the central line of fold of the diamond. By putting the ribs b on the under roll the creases b^2 are so
60 formed as to facilitate the laying of the diamond fold, and also to cause the upper ply to stand up away from the under ply when the blank is stretched on the cylinder, as indicated in Fig. 6, thus opening the rear end of the blank to
5 the diamond-fold-forming mechanism. By putting the rib c' on the upper roll, A' , the upper ply is indented from above along the line c^2 , on which that ply is turned over in making the diamond fold.
70 The cutting and creasing devices on rolls $A A'$ are so placed with reference to the blank that the creasers will crease the rear end of the blank just before the cutter severs the same (excepting the central connection, x) from the
5 main paper tube in the rear. The connected series of blanks creased and partially severed from one another passes under the binding-roll, up over the carrier-cylinder, moving in unison
80 therewith, and held at the front in the bite of the roll I , which runs against and in unison with the carrier-cylinder. As each blank passes out from under the binding-roll E the creased rear portion of its upper ply rises, as shown in Fig. 6, and also at y in Figs. 1 and 2, thus open-
5 ing its rear end to the mechanism for turning over and laying down said upper ply, and thus making the diamond fold. Various kinds of

mechanism may be employed for the purpose. One convenient form is shown in the drawings. As there shown, it consists of a central finger, F , the front end of which a little more than
70 clears the periphery of the cylinder. This finger is fast on a cross-bar, F' , which, in turn, is immovably secured to oscillating arms F^2 , which are mounted loosely on the hub of the cylinder
75 D , or are otherwise arranged so that their axis of oscillation shall be coincident with the axis of the cylinder. One of the arms F^2 is connected adjustably at d^1 to a slotted arm, F^3 , which carries a roller-stud, d , adjustable in the
80 slot d' of the arm. This stud projects loosely into the slot d^5 of another arm, F^4 , pivoted at F^5 to the frame of the machine. The object of the adjustable connection between the parts
85 $F^2 F^3 F^4$ is to regulate the length of throw or stroke and at the same time to bring the finger back always to the same point. The part F^4 is provided with a roller-stud, d^2 , which runs
90 against the periphery of a rotating power-driven cam, G , being held in contact therewith by a spring, d^3 . When the machine is in motion the effect of this arrangement will be to im-
95 part an oscillatory movement to the finger F on the center of the carrier-cylinder as an axis, the finger moving back and forth once for every revolution of the cam. Upon the front end of
100 the finger is pivoted at e the forked opener or folder H , which at its other end is hung so that it may turn on a cross-rod, H' , to the ends of which rod are rigidly fastened wiper-fingers
105 H^2 , which play between and are acted on by wiper-studs f , fixed to and projecting from the frame of the machine. These studs, although not so represented in the drawings, are in practice made adjustable to meet the wiper-fingers
110 sooner or later in the stroke, as may be required by the size of bag to be made.

The action of the mechanism thus far described is as follows: Supposing the blank that is to be operated on is moving along uninter-
110 ruptedly through the machine. As the rear y of the blank emerges from under the finger F (in which position it is represented in Figs. 1 and 2) the finger begins to move forward, thus entering the open rear end of the blank. By the
115 time the finger has entered the bag nearly far enough to reach the central crease, c^2 , it has moved far enough forward to bring the wiper-fingers H^2 in contact with the front wiper-studs, f . Continued forward movement of the finger
120 F throws the opener H (by the action of studs f or wipers H^2) quickly forward on the pivot e as an axis, thereby first lifting the upper ply, as shown in Fig. 7, and then by the time the
125 finger F has reached its extreme forward position turning the ply down, as shown in Fig. 8, thus making the diamond fold. The folding mechanism retains the position shown in the figure last referred to until the front over-
130 lying flap of the diamond is in such position that it will pass under the roll I , and then returns to the position shown in Fig. 1 in time to act on the rear end of the next succeeding blank. In thus laying the diamond fold I bring

to the front that flap which overlies the body of the blank, and have the blank in a position in which the succeeding folds can be made by any suitable known mechanism without difficulty.

5 The second and third fold mechanism, which I am about to describe, is one convenient form of such mechanism; but I do not desire to be understood as restricting myself to the same. The roll I, hereinbefore referred to, has several functions. It carries the knife *g*, by which the connecting portion *x*, between succeeding blanks, is severed before the diamond fold is formed on the blank in rear, as indicated in Figs. 7 and 8, where the dark spot *z* indicates the dividing line between the blanks. It also carries the paste-ridges *g'*, Fig. 9, by which paste is deposited in lines on the diamond in the ordinary way, the supply of paste being drawn from the usual paste-trough *I'* and intermediate rolls, *I*² *I*³. It also serves, in conjunction with the front roll, *J*, to hold the endless tapes *K* against the periphery of the carrier-cylinder *D*. These tapes, in fact, are the same as the carrier-tapes described in my Patent No. 232,945, dated October 5, 1880, and the cylinder *D* takes the place of the carrier-apron described in that patent, the two acting to carry along the blank and the tapes serving to determine the line of fold.

30 *L* are folding-fingers, which are arranged and operate in the same manner as described in my aforesaid Letters Patent, to wipe back and fold down upon a line determined by the tapes that flap which is brought up to them, which in this case is the flap that overlies the body of the bag-blank. The said mechanism is fully described in my said Letters Patent, and its action is also fully illustrated in Figs. 1, 2, and 9. It is sufficient to say that the blank passes out from under the roll *J* mouth end foremost, with the front overlying flap of the diamond folded back, as indicated in Fig. 10, leaving only the rear protruding flap to be folded in order to complete the bag. This last fold I make in the present instance by means of nipper-roll *L'*, which runs against the roll *J*, the latter being provided with a cam-controlled spring tucker-blade, *h*, to act in conjunction with the spring-nipper *i'* of the roll *L'*, the nipper normally closing and being opened and held open at stated intervals by means of a cam, *j*, fixed to the frame of the machine and acting against a crank-stud, *k'*, on the rocking nipper-shaft *k*. This arrangement of parts for making a fold is well known, being shown, for instance, in Stocking's Patent No. 222,544, of December 9, 1879. The operation is as follows: The blank passes, mouth end foremost, between the rolls *J* *L'*, being guided to them by the plate or table *l*. The parts are so timed and positioned that at the time the rear unfolded flap of the diamond comes between the rolls the blade *h* will meet the flap on the proper line of fold and will tuck the flap along this line down into the bite of the nipper, which, being released at the instant from the control of its cam, will close on the flap, as indicated

in Fig. 11. Continued rotary movement of the roll *L'* will carry the bag held by the flap in the bite of the nipper through between the roll *L'* and a binding or pressure roll, *M*, the bag in this operation being reversed so that it passes through satchel-bottom end first. Between these rolls the folds are pressed and the bottom completed, and the bag is thence discharged into a suitable receptacle, *N*.

The roll *M* need not be a full roll, but may be cut away, as shown at *M'* in sectional side elevation, Fig. 14, and in front elevation, Fig. 15. In this arrangement the parts *M'* are friction-wheels, which revolve loosely on the stationary shaft *M*² and run by contact with roll *L'*. They take hold of the side edges of the bag and serve to feed it along. Between the wheels *M'* is a curved segmental plate, *M*³, fixed on the stationary shaft *M*², between which plate and roll *L'* the folds of the satchel-bottom are pressed. In this arrangement the nipper should be caused to retain its hold on the bag longer than where a roll, *M*, is employed, the nipper in the latter case releasing its hold as soon as the flap to be folded is fairly in the bite of the rolls, as indicated in Fig. 12.

In Figs. 16 and 17 is shown, in further illustration of my invention, another mechanical device for turning over the upper ply at the rear of the blank in order to make the diamond fold. The finger *T*, which enters the rear end of the blank and turns over the ply, is fastened to an endless power-driven belt or apron, *R*, which runs around rolls or pulleys *P*, and on its lower side moves upon a segmental supporting-plate, *S*, which is slotted or otherwise formed to permit the passage of the finger *T*, and is curved upon a circle struck from the axis of cylinder *D* as a center, so that the finger, when acting on the bag, will follow the curvature of the cylinder. To the lower end of the finger is pivoted a rearwardly-projecting pressure-bar *T'*, which carries at its free end a friction-roll, and is held by a spring, *m*, normally in the position shown in Fig. 17 in full lines, so that when the finger reaches the cylinder the presser will bear upon the periphery of the cylinder with yielding pressure, as indicated in Fig. 16. The belt *R* travels much faster than the cylinder, and, inasmuch as it carries but one finger, in this instance makes one full revolution for every bag-blank acted on. It is so timed in its movements that the finger will reach the point shown in Fig. 16 at the time the open rear end of the blank has attained the position shown in the same figure. Continued movement of the parts causes the faster-moving finger to raise and fold forward and down, the upper ply thus making the diamond fold, and as the finger, after reaching its forward position, (indicated by dotted lines in Fig. 17,) rises from the cylinder the presser *T'*, which follows, drops and maintains contact with the laid-over flap of the diamond fold until the latter is fairly in the bite of the auxiliary carrying-tapes *K'*. The latter tapes extend from the roll *I* around wheels *O*, mounted

on hubs or short studs, so that the presser may be free to pass between them, as shown by dotted lines, Fig. 17, and thus continues its contact with the blank for the proper length of time.

In lieu of employing a connected series of blanks, as indicated in Fig. 16 and the preceding figures, I can sever each blank before or at the time the blank reaches the cylinder, putting, for this purpose, the proper knife in either the binding-roll E or the creasing-rolls A A'. The latter is the preferable arrangement.

In order to carry the severed blank along on the cylinder I can make use of the devices indicated in Figs. 17 and 18. The said devices, as shown in side elevation, Fig. 17, and plan, Fig. 18, consist of three nippers, *n n o*, mounted in the cylinder D. The outside nippers close by a movement to the rear or any direction opposite to the rotation of cylinder, and their function is to close on the mouth end of the blank at the sides, as indicated by dotted lines 1, Fig. 18, and thus carry the blank along. The central nipper, *o*, closes by a movement to the front or in the direction of rotation of the cylinder, and its function is to close on the central part of the rear end of the under ply of the blank 2, Fig. 18, in front of blank 1, and thus hold down the under ply at this point while the diamond-fold-forming mechanism is acting on the upper ply. All the nippers are operated in the usual way, closing by the action of springs and opening by the action of cams attached to the frame of the machine, and operating on tappets or crank-studs attached to the nipper rock-shafts. The nippers hold the blank for the proper time respectively, and then release it.

To hold the rear end of the blank open I employ a light spring, *p*, which extends from the trunk B, up under the binding-roll E, to the point indicated by dotted lines in Fig. 17. The spring may have a branched or spread-apart free end, so that it will with certainty hold the rear end of the blank open, and is forked, so as to permit the passage of nipper *o*. The spring is light, so that it will yield readily to the blank which passes around it.

I can also, if desired, use side clamps or nippers, *r*, which have a laterally-vibratory movement on pivots *s* in the cylinder D, and close over the blank at the center line of fold of the diamond, thus insuring that the upper ply shall fold over this line. Movement is imparted to each clamp by a spring, *s'*, which closes it, and a sliding rod, *t*, pressed outwardly by the spring and acted on to move against the stress of the spring and open the clamp by a proper cam, *v*, on the machine-frame. The rod *t* is connected with the clamp by means of pin *t'*, which projects laterally from the rod into the forked inner end, *r'*, of the clamp, as shown more clearly in section in Fig. 19.

With respect to the creaser-rolls, I desire to say that the diagonal creasers can be used without the cross-creaser *c'*, which determines the

central line of fold of the diamond. I also remark that these rolls can be used to advantage, not only as adjuncts to my present improvement, but also in machines in which the diamond fold is formed on the front end, instead of the rear end, of the blank. Of course in such case the position of the creaser ribs and grooves should be altered to adapt them to the change.

I also remark that, in lieu of rolls, plates or other instrumentalities having proper movement to and from the blank may be employed to crease the same.

Having described my invention, what I claim, and desire to secure by Letters Patent, is as follows:

1. That step in the art of making a satchel-bottom paper bag by machinery which consists in forming the diamond fold on the blank contained in the machine by lifting and folding forward and down upon the body of the blank the rear portion of one ply, substantially as hereinbefore set forth, whereby the diamond fold is laid with that flap or point which overlies the body of the blank in front relatively to the after movement of the blank through the machine.

2. The improvement in the art of making satchel-bottom paper bags by machinery which consists in forming the primary or diamond fold upon the rear end of the blank while the latter is continuously moving, substantially as and for the purposes hereinbefore set forth.

3. The combination, with the bed or support for the blank and means, substantially such as described, for holding down upon said bed the central portion of the rear end of the contiguous ply of the blank, of mechanism arranged and operating, substantially as described, to lift and fold forward and down upon the body of the blank the rear portion of the other ply, for the purpose of laying the diamond fold, substantially as set forth.

4. The combination, with the continuously-moving blank-carrier and means for holding the blank thereon, of diamond-fold-forming mechanism constructed, arranged, and operating, substantially as described, to form the diamond fold on the rear ends of the successive blanks delivered to and conveyed along by the carrier, substantially as hereinbefore set forth.

5. The combination, with the carrier and mechanism for feeding and delivering the blanks thereto, of diamond-fold-forming mechanism, substantially such as described, constructed, arranged, and operating to form the diamond fold on the rear ends of the successive blanks, and second and third fold forming mechanisms, substantially such as described, the combination being and acting substantially as hereinbefore shown and set forth.

In testimony whereof I have hereunto set my hand this 26th day of January, 1881.

WILLIAM C. CROSS.

Witnesses:

E. A. DICK,
N. C. LANE.