

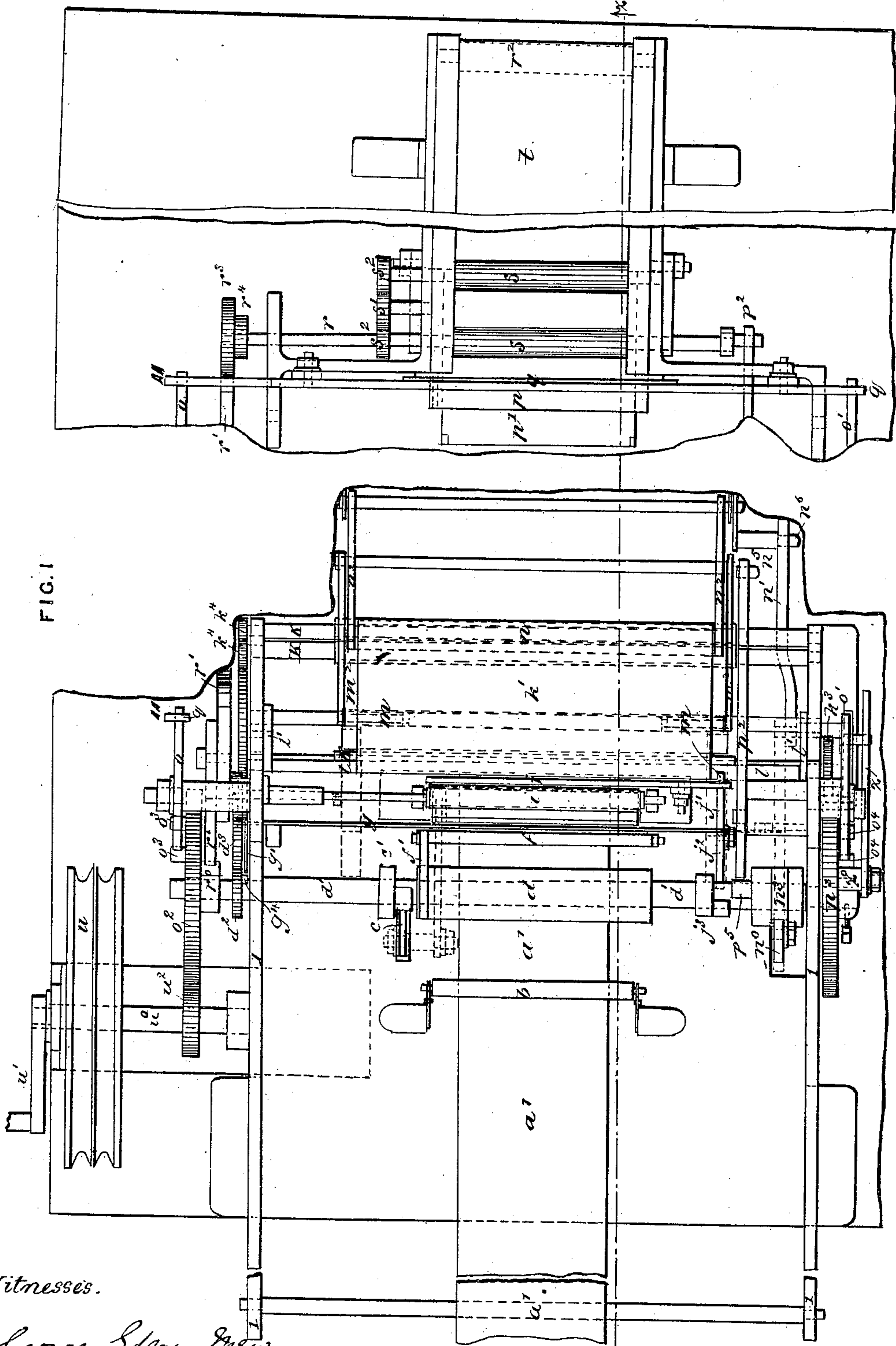
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7 Sheets—Sheet 1.

F. HIPGRAVE.
CIGARETTE MACHINE.

No. 353,945.

Patented Dec. 7, 1886.



Witnesses.

George Edgar Inver.
Chas. H. Moore

Inventor.

Frank Hipgrave

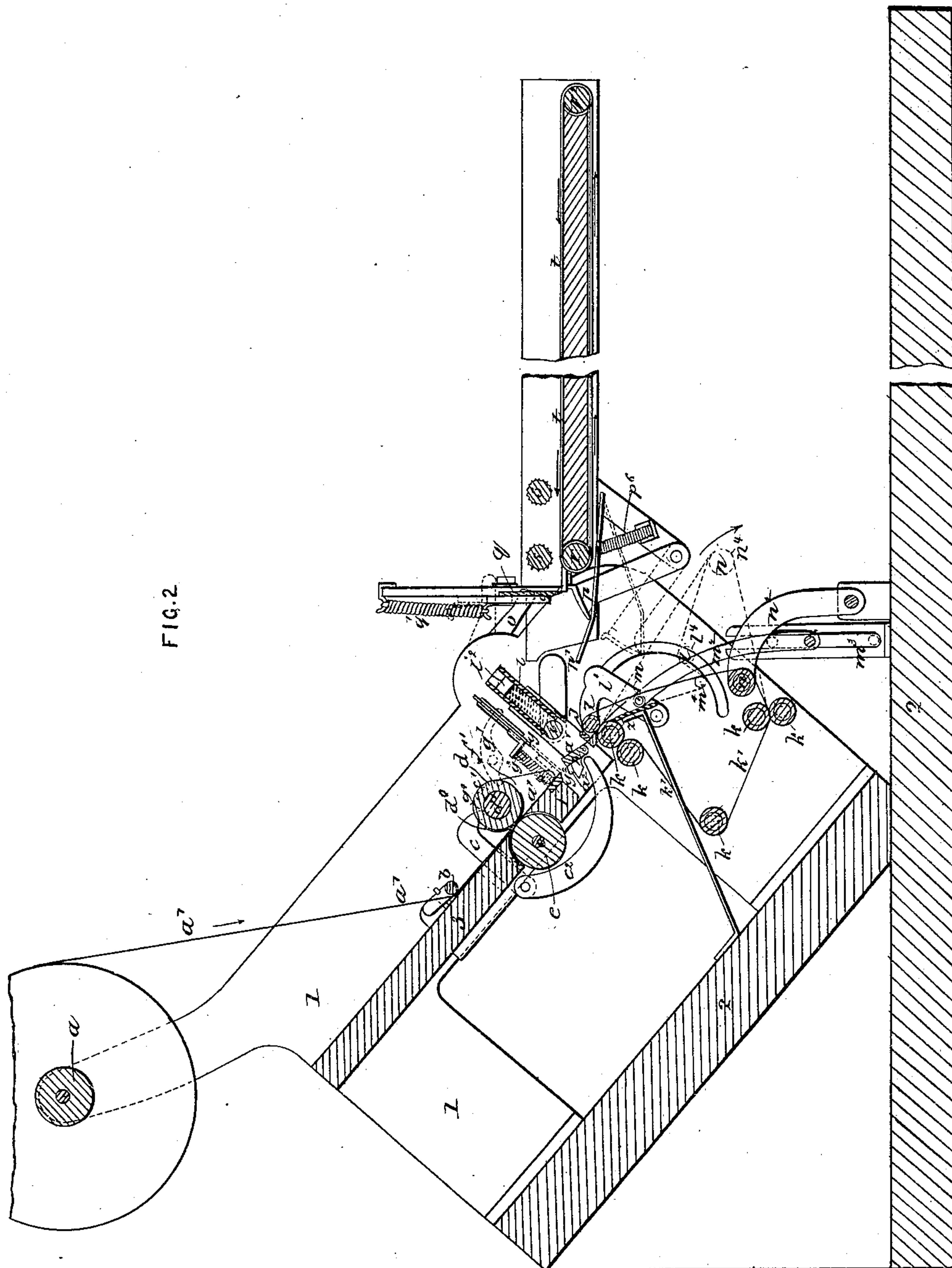
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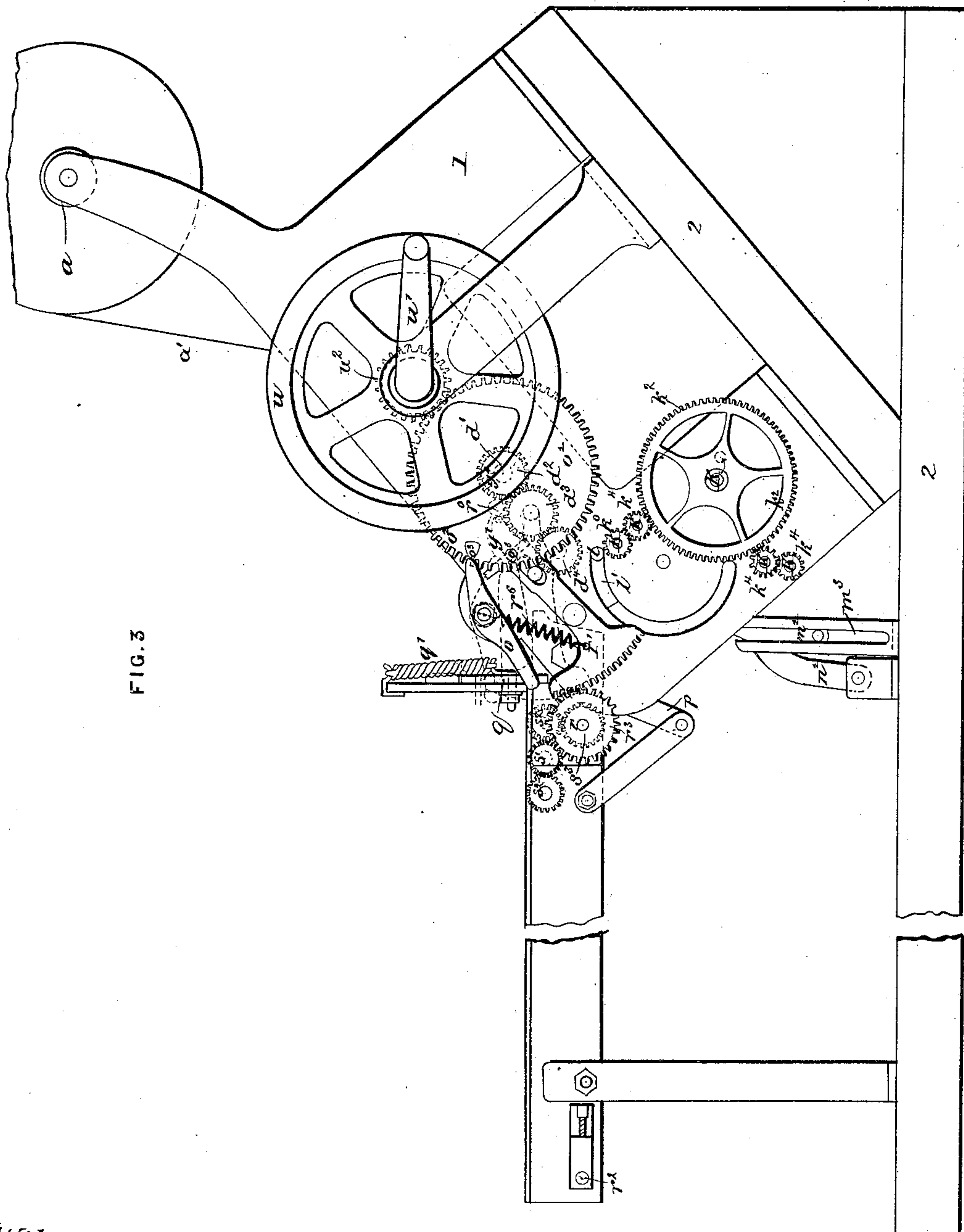
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7 Sheets—Sheet 3.

F. HIPGRAVE.
CIGARETTE MACHINE.

No. 353,945.

Patented Dec. 7, 1886.



Witnesses.

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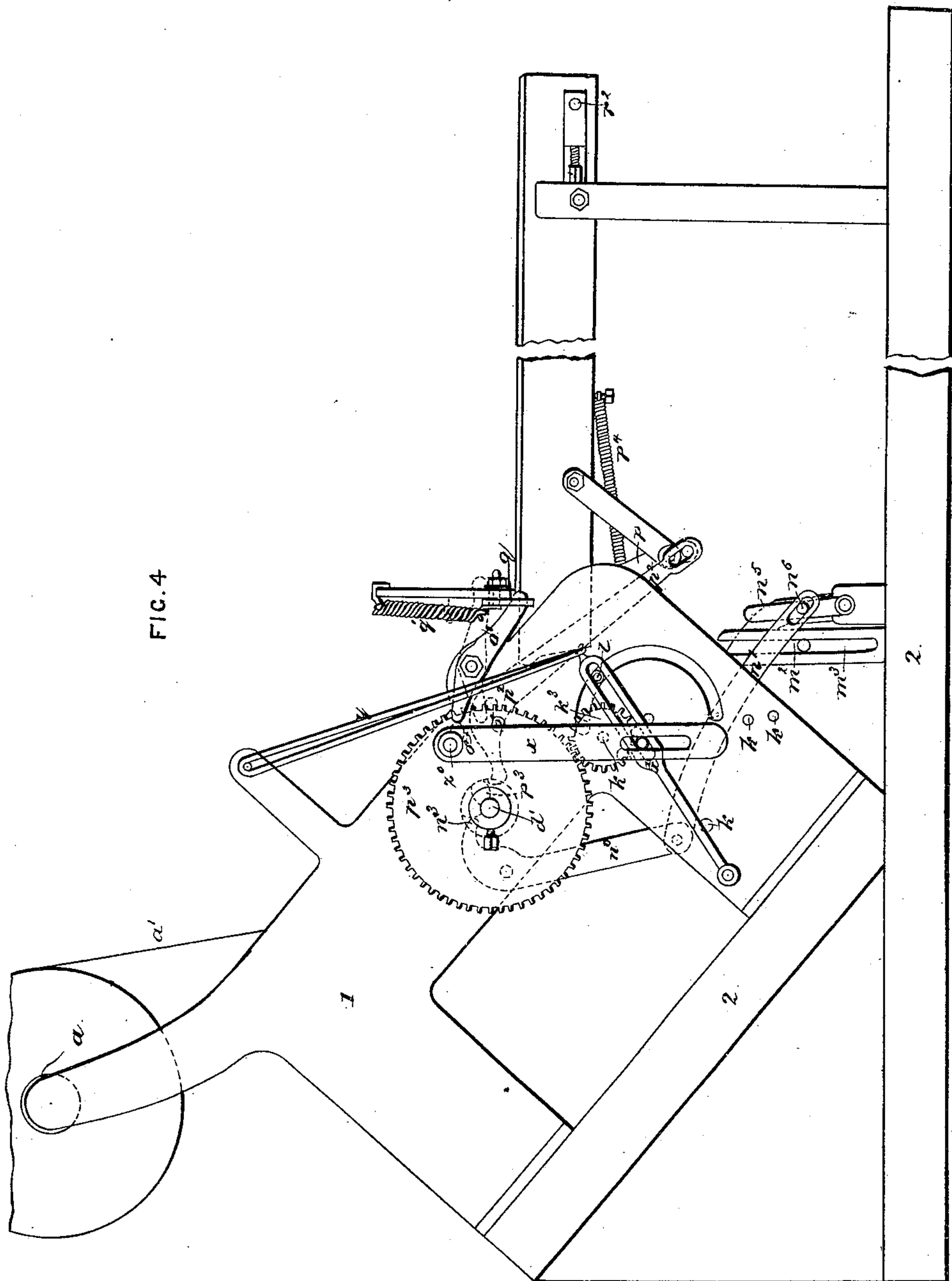
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Witnesses.

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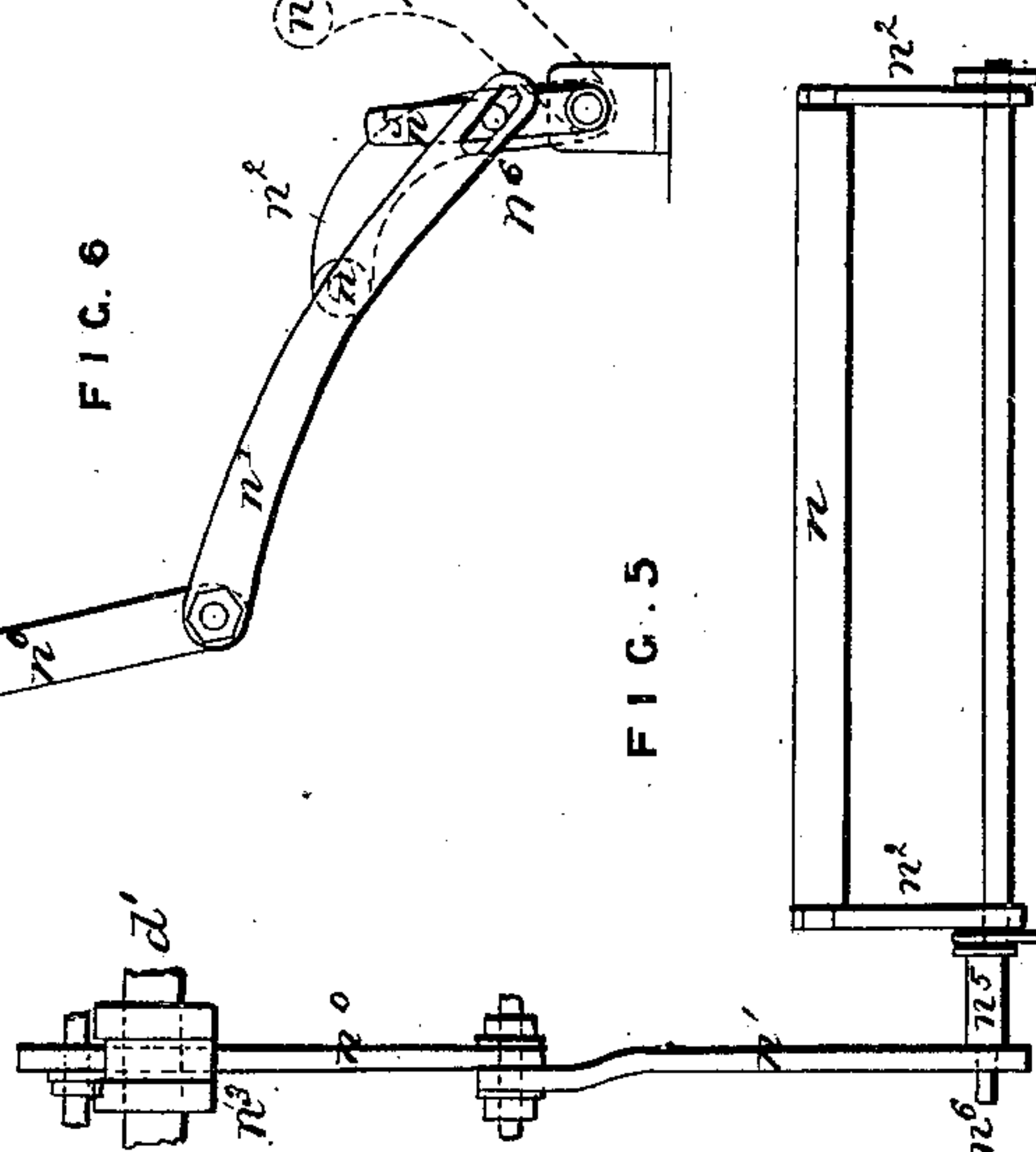
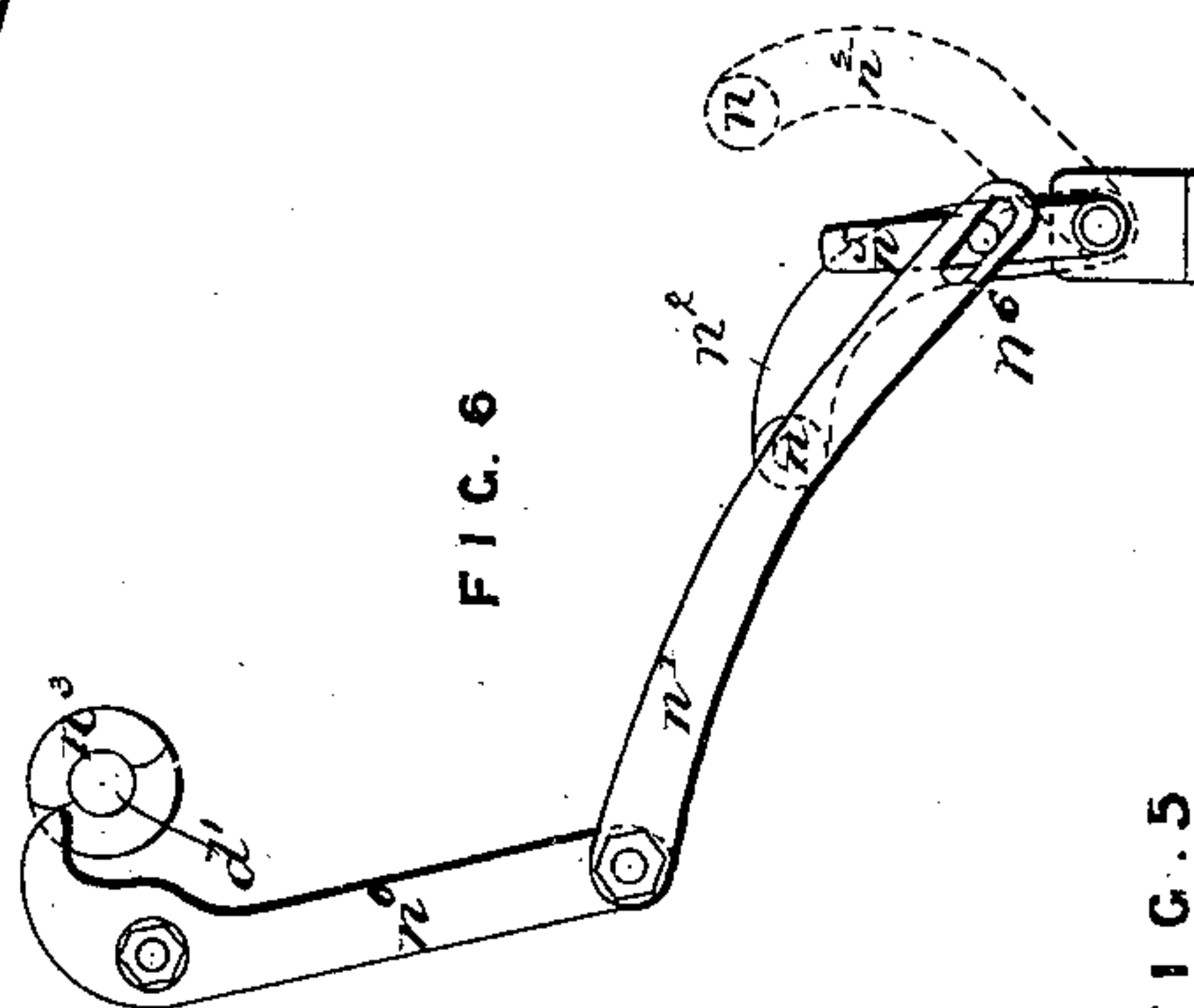
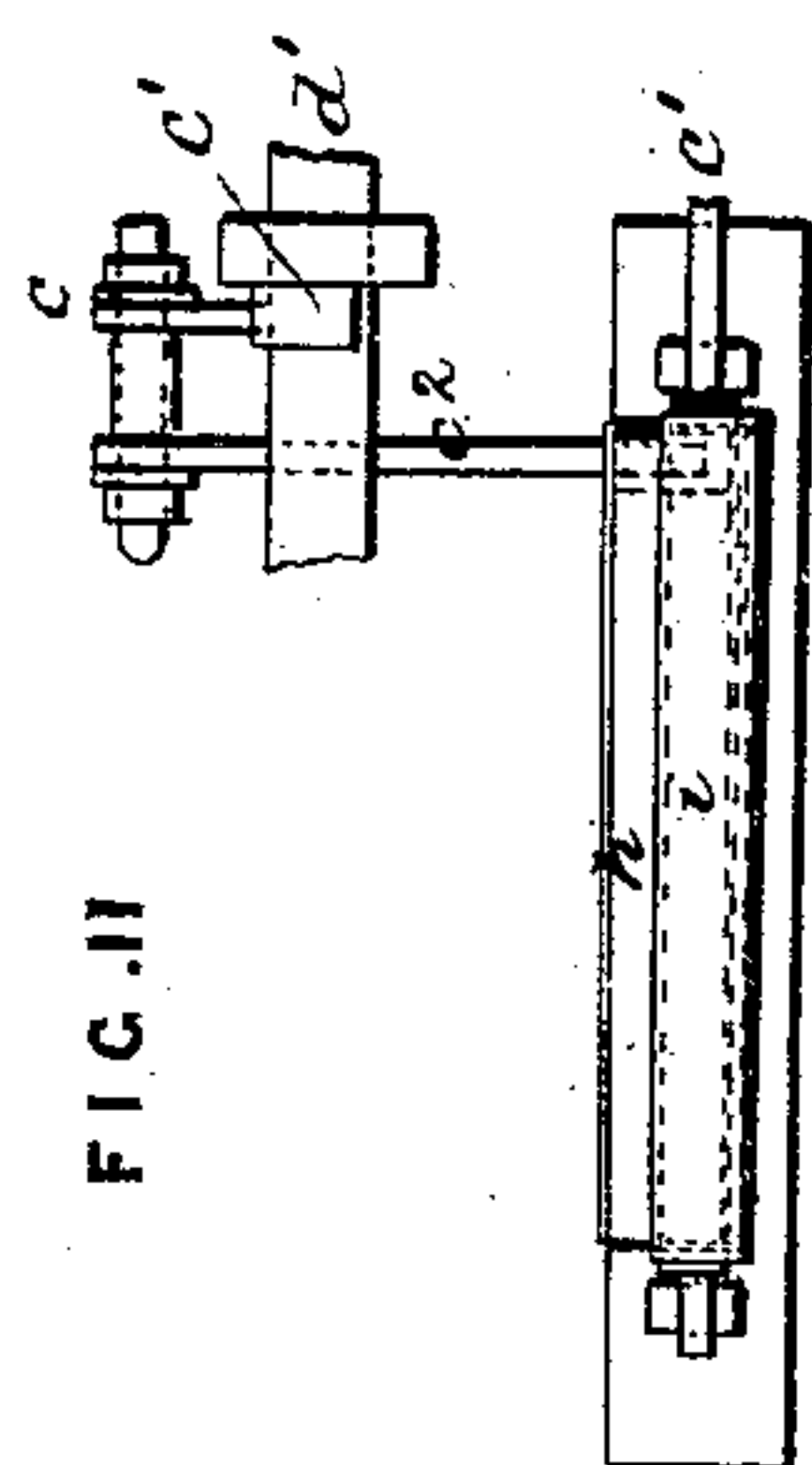
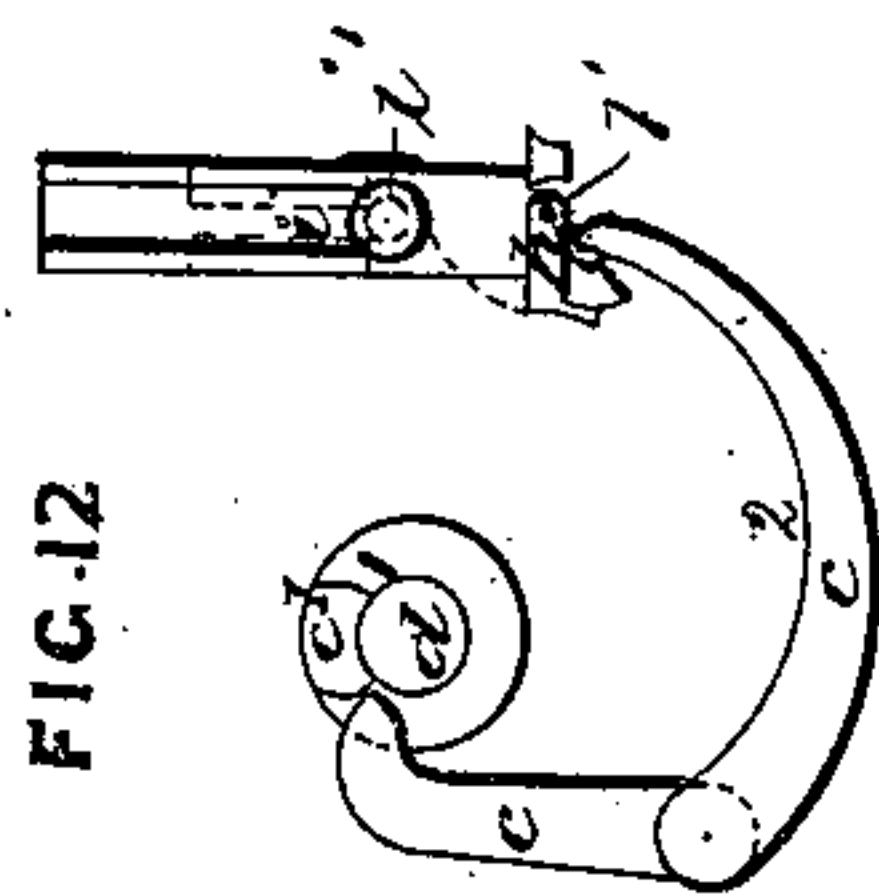
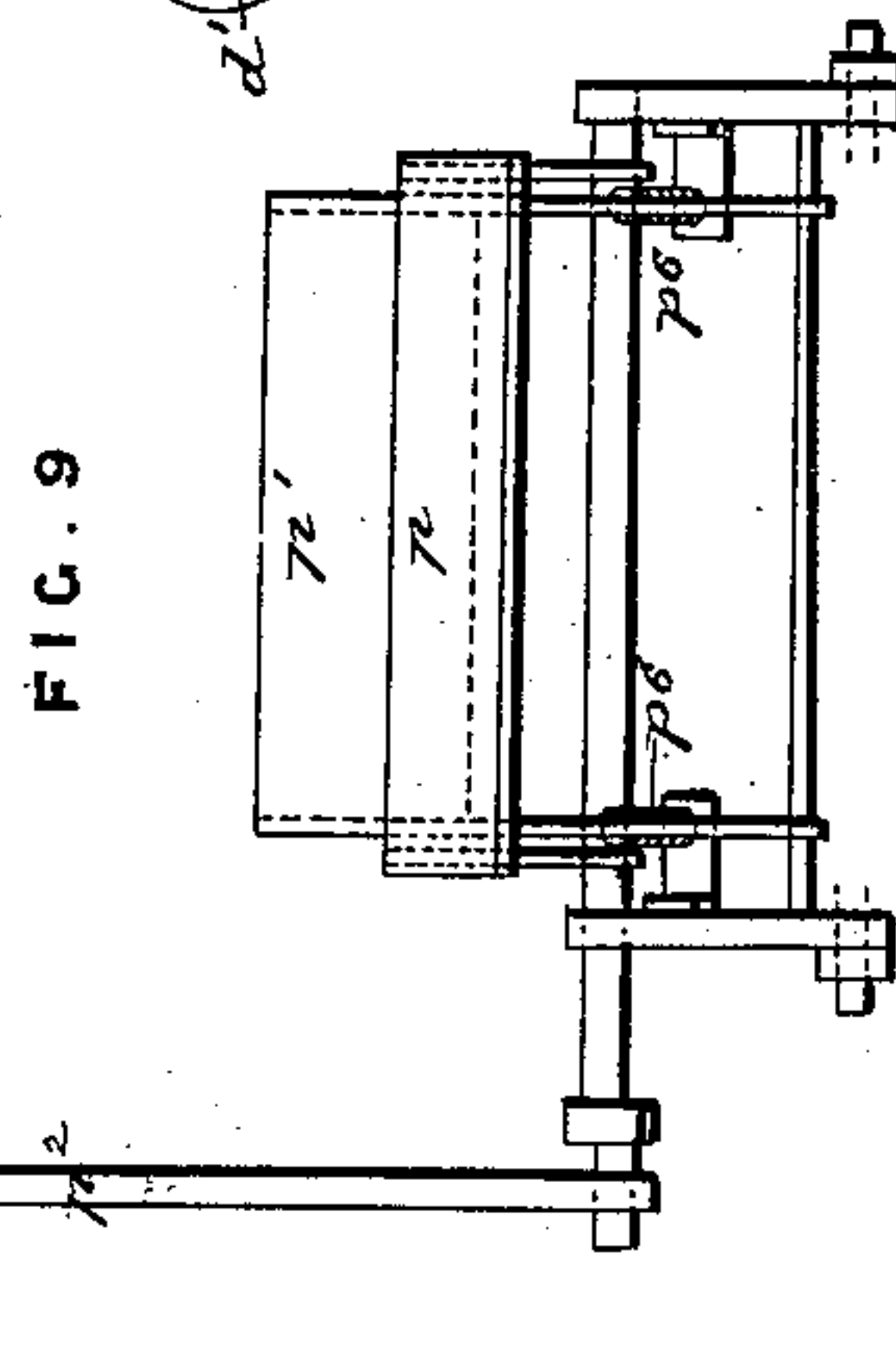
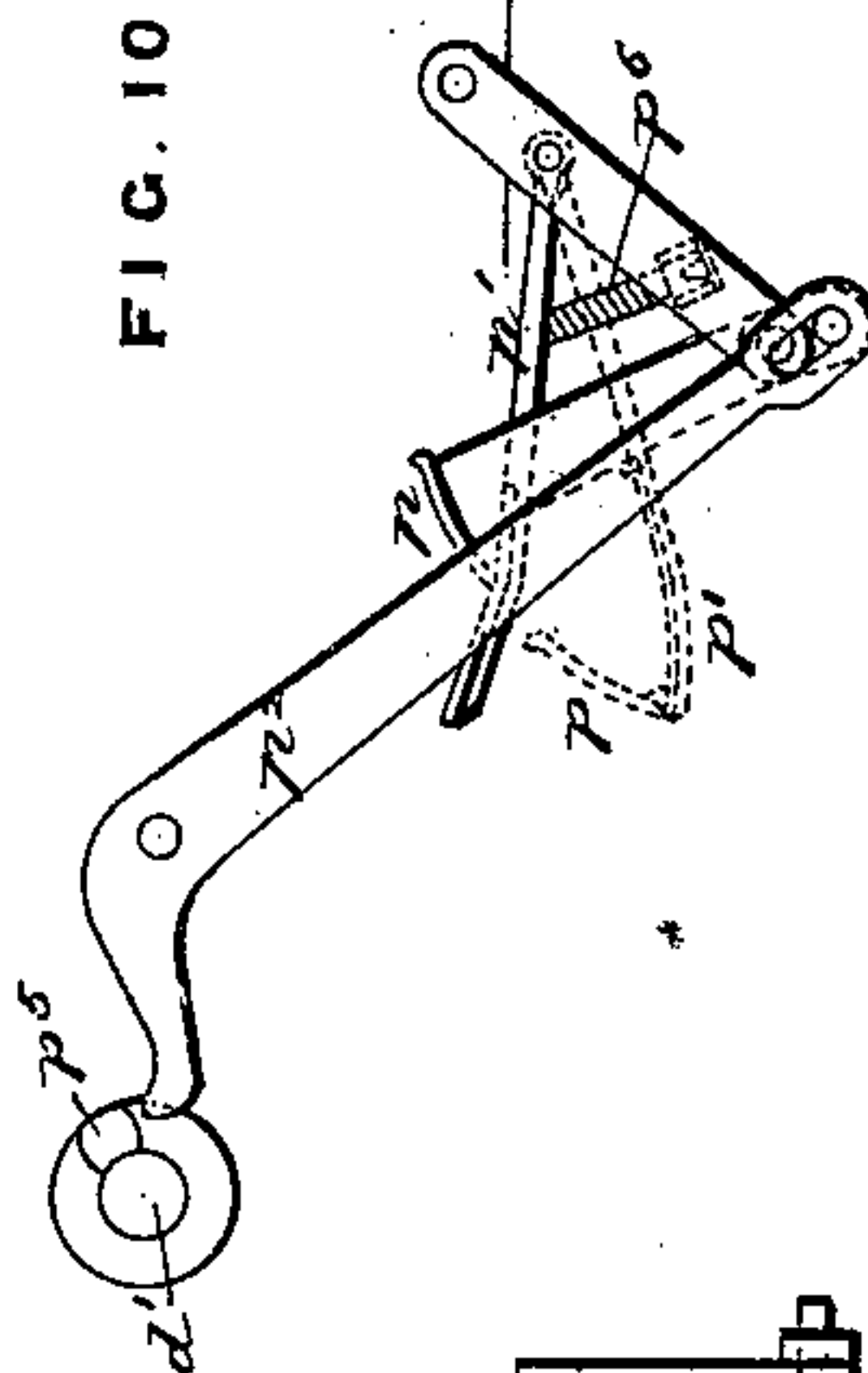
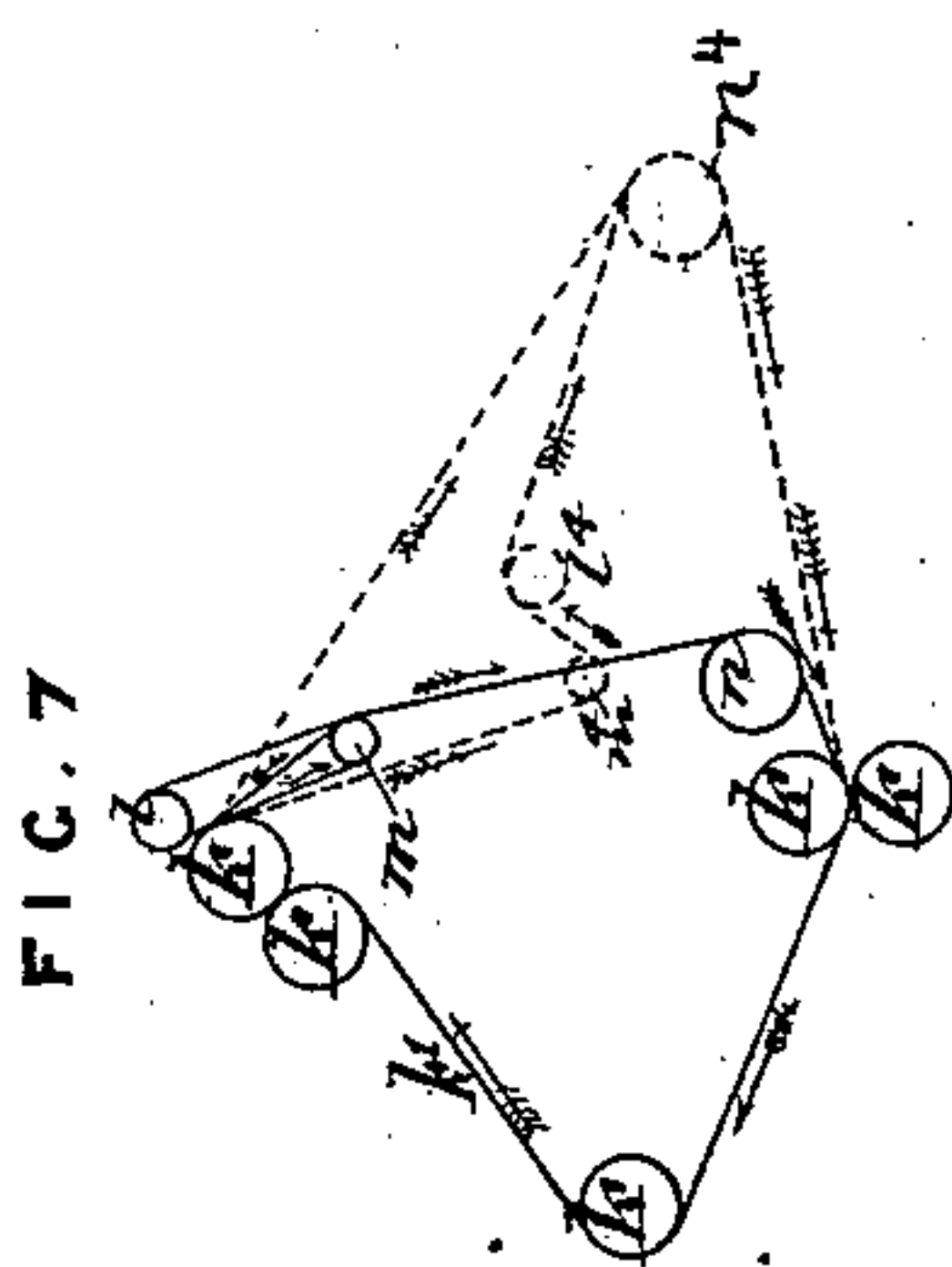
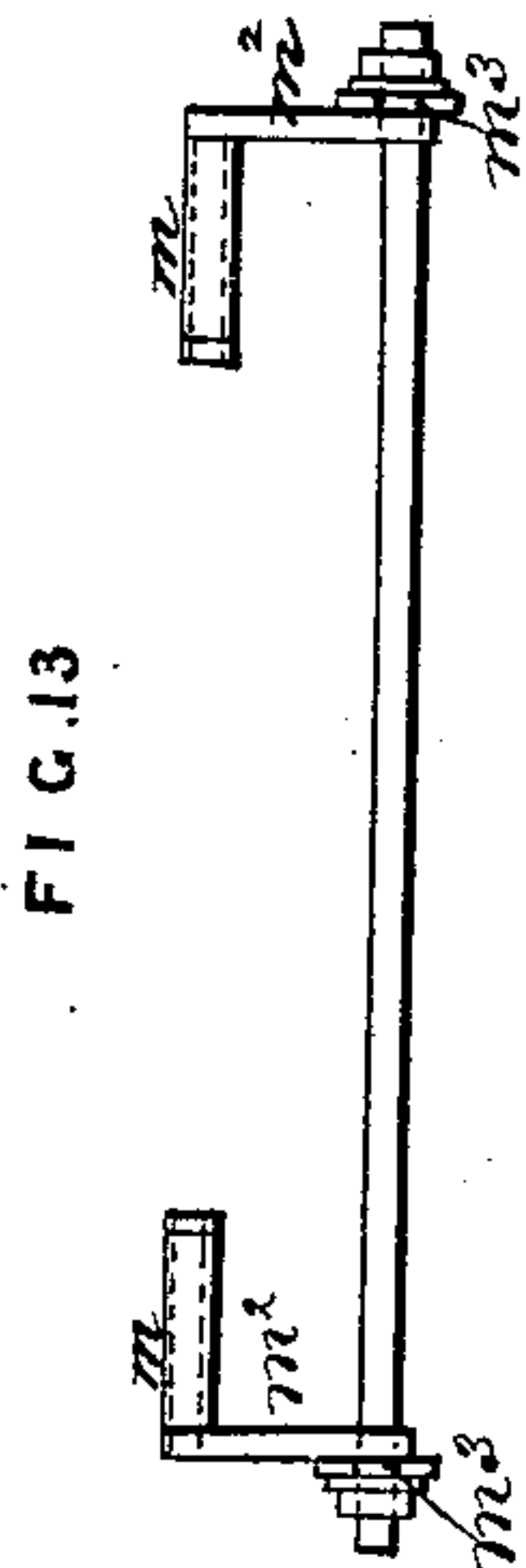
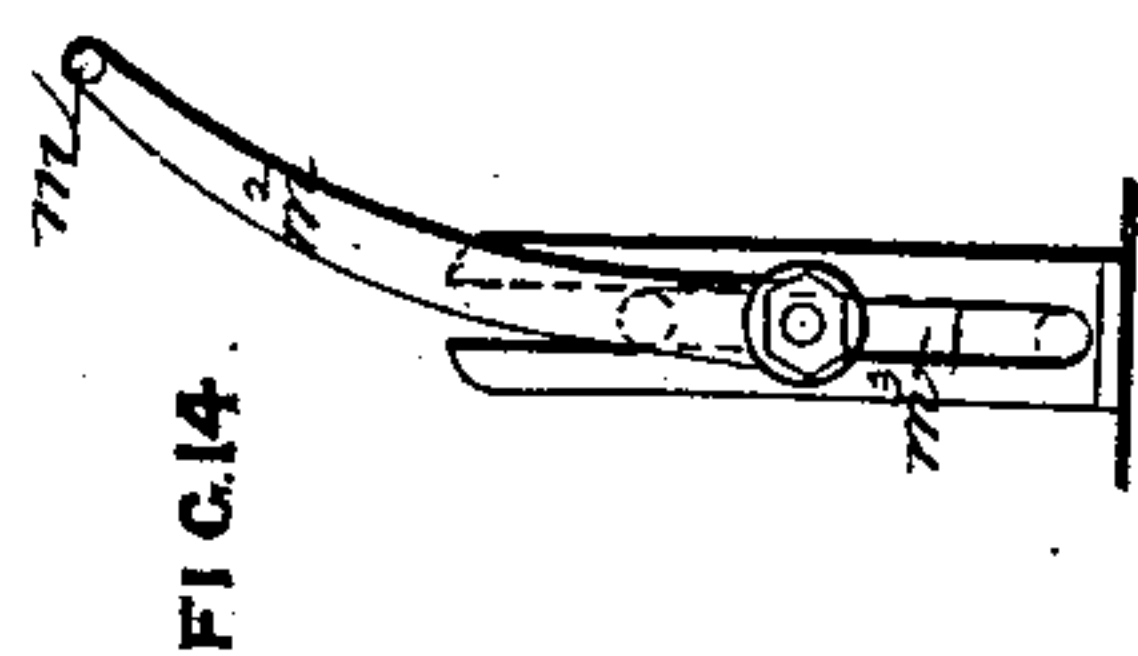
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7 Sheets—Sheet 5.

F. HIPGRAVE.
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No. 353,945.

Patented Dec. 7, 1886.



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(No Model.)

7 Sheets—Sheet 6.

F. HIPGRAVE.
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Patented Dec. 7, 1886.

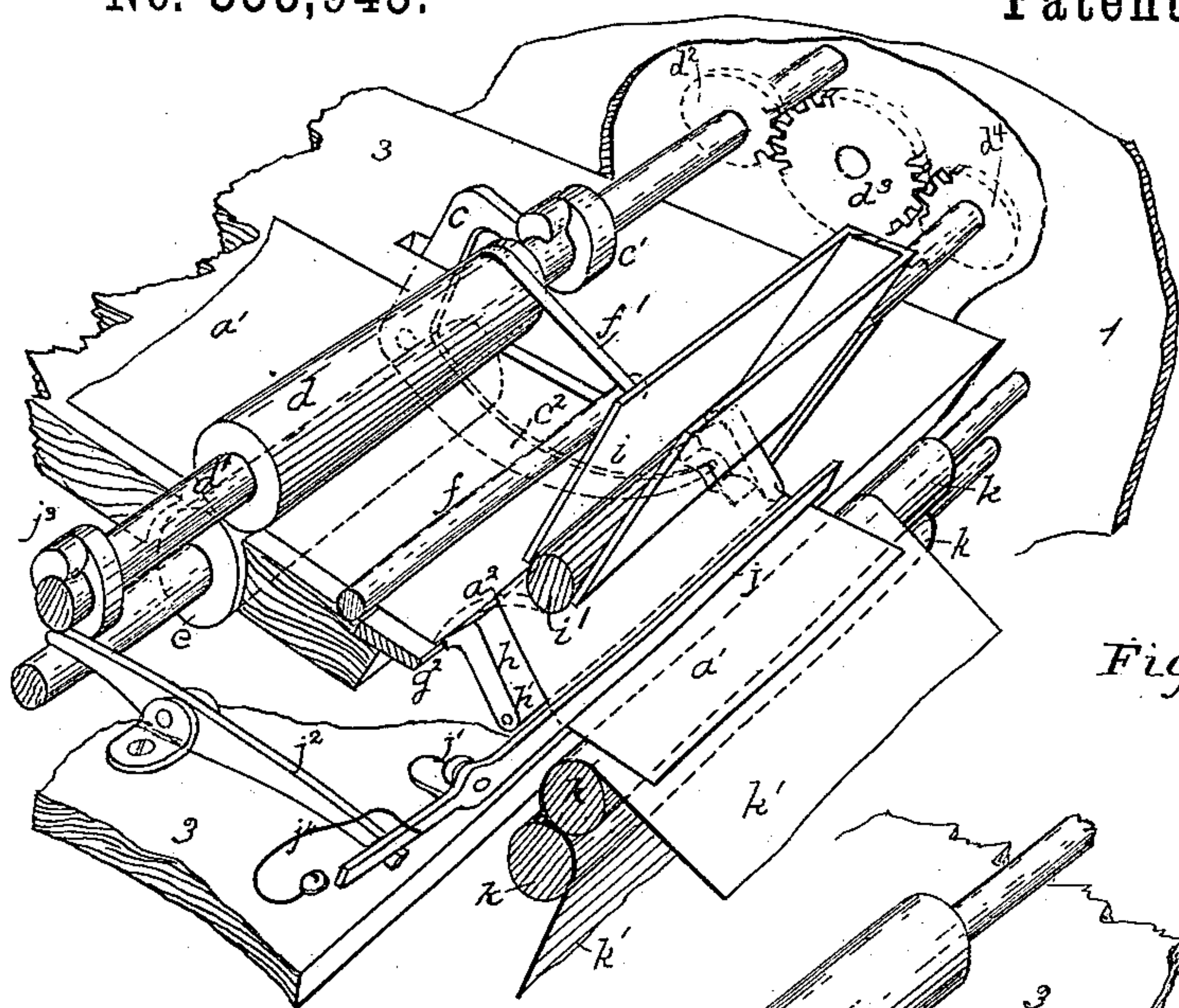


Fig. 8.

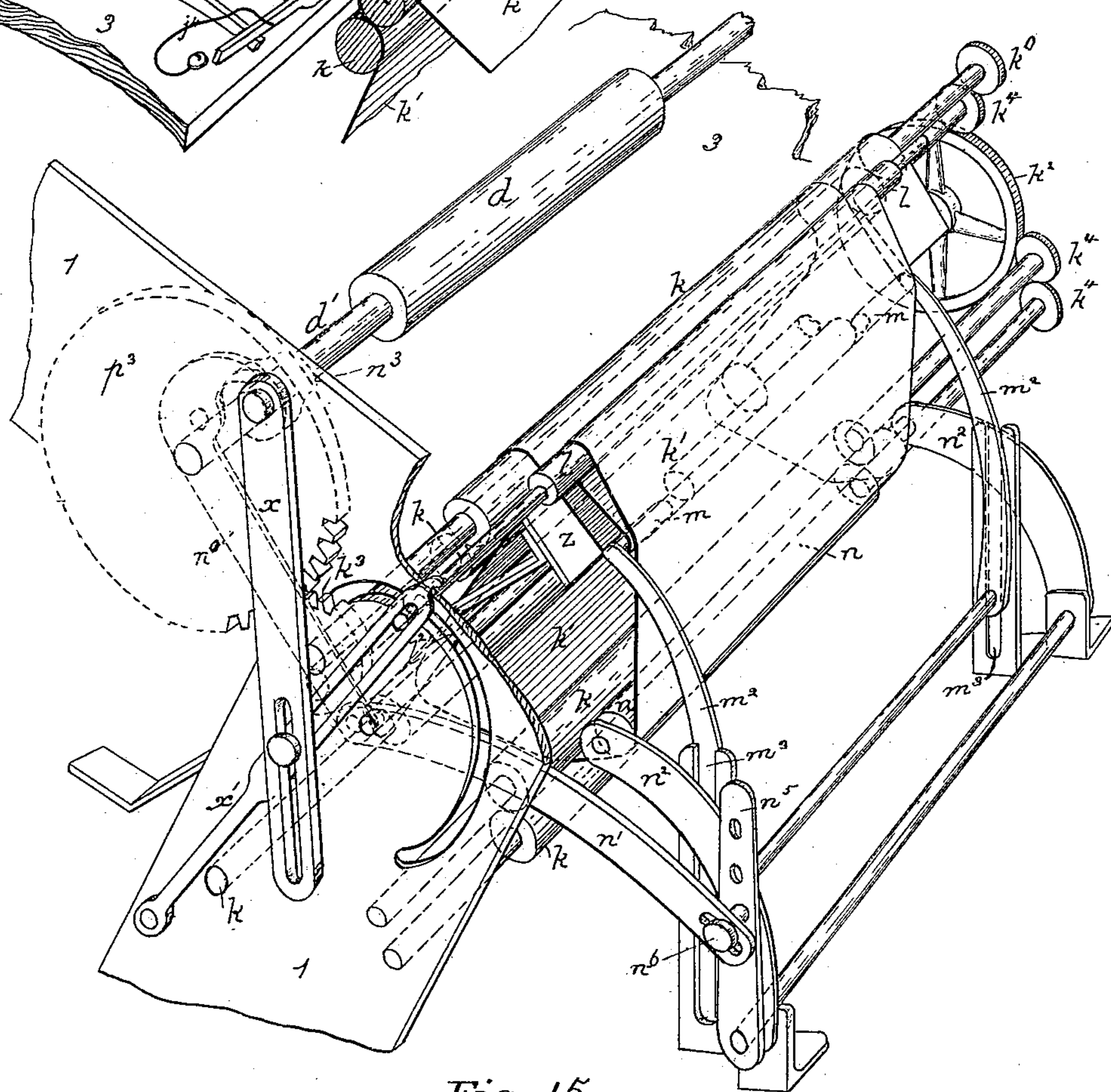


Fig. 15.

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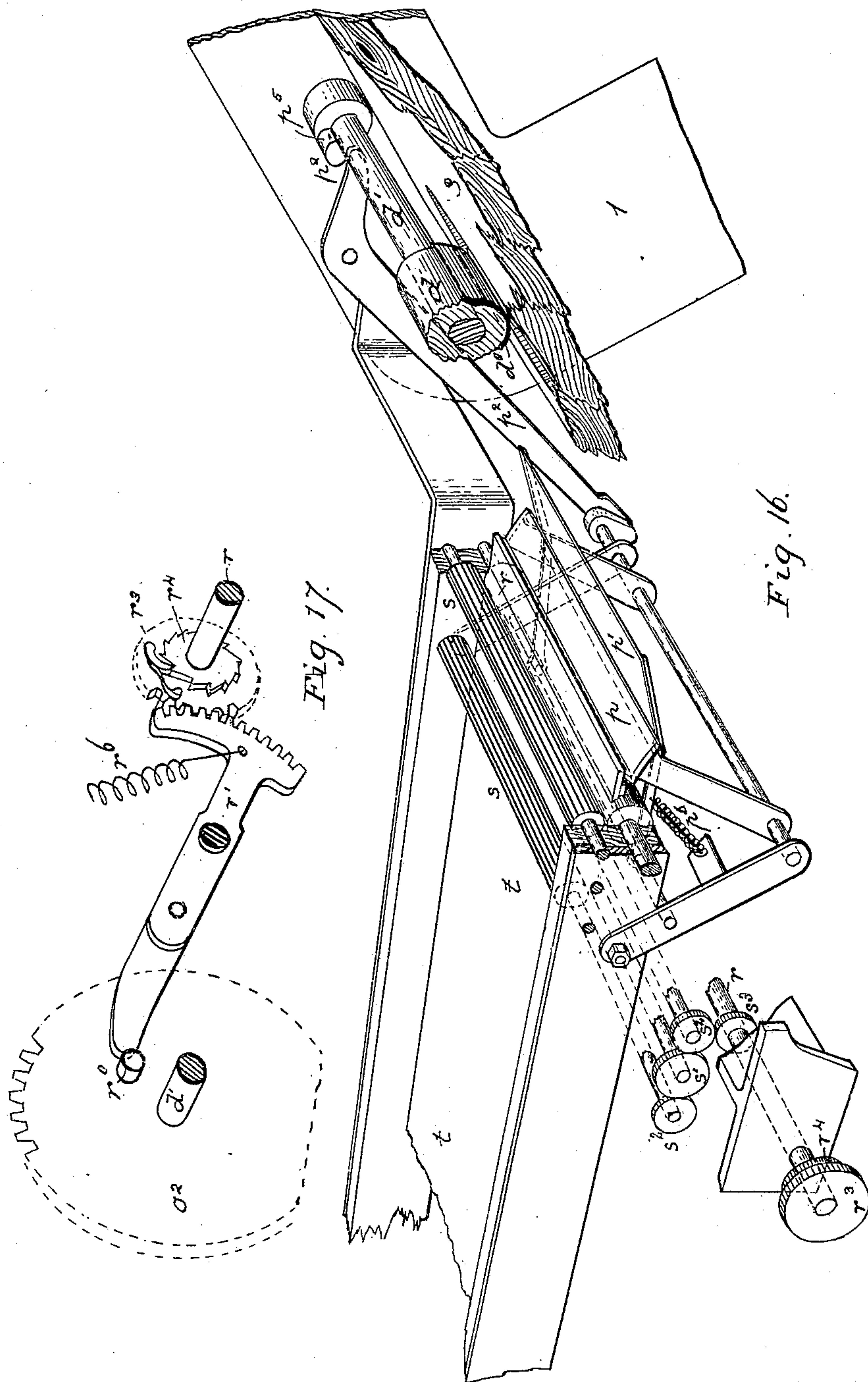
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7 Sheets—Sheet 7.

F. HIPGRAVE.
CIGARETTE MACHINE.

No. 353,945.

Patented Dec. 7, 1886.



Witnesses
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UNITED STATES PATENT OFFICE.

FRANK HIPGRAVE, OF LONDON, COUNTY OF MIDDLESEX, ASSIGNOR TO
AMBROSE BOULTON BIGGS, OF BIRMINGHAM, ENGLAND.

CIGARETTE-MACHINE.

SPECIFICATION forming part of Letters Patent No. 353,945, dated December 7, 1886.

Application filed September 21, 1885. Serial No. 177,763. (No model.) Patented in England June 2, 1885, No. 6,669.

To all whom it may concern:

Be it known that I, FRANK HIPGRAVE, residing at 23 Salisbury Street, Strand, London, in the county of Middlesex, in the United Kingdom of Great Britain, a British subject, have invented an Improvement in Cigarette-Machines, (for which I jointly with William Skinner Rendle, residing at 319 Strand, aforesaid, a British subject, have obtained a patent in Great Britain, No. 6,669, bearing date the 2d day of June, 1885,) of which the following is a specification.

My invention has for its object a machine by means of which cigarettes can be manufactured at a high rate of speed and in a more perfect and economical manner than can be done by any other known mechanical means. I attain this object by the mechanism illustrated in the accompanying drawings, of which—

Figure 1 represents a plan of the entire machine, the break in the center of the same being for the purpose of showing parts which overlie and underlie each other, and the amount of breakage will be understood by reference to the point A A in both parts. Fig. 2 represents a longitudinal section on the line xx , Fig. 1; Fig. 3, an elevation, right side; Fig. 4, an elevation, left side; and Figs. 5, 6, 7, 9, 10, 11, 12, 13, and 14 represent separate drawings of different parts of the mechanism which do not clearly appear on the other drawings. Fig. 8 is a perspective view of the tilting table, pasting-trough, and paper-holder. Fig. 15 is a perspective view of the cigarette-band and operating-rollers. Fig. 16 is a perspective view of the tobacco-feed and delivery-tables. Fig. 17 is a reversed and detached perspective view of the intermittent tobacco-feed mechanism.

Similar letters refer to similar parts throughout the various views.

As is well-known, a cigarette is composed of two parts, the paper and the tobacco, the tobacco being wrapped in the paper, the edge of which is pasted or gummed, so as to securely inclose the tobacco.

The machine, for the purpose of description, may be divided into three sections—first, the mechanism used for delivering, cutting, and pasting the paper; secondly, that used for de-

livering and cutting the tobacco into suitable quantities; and, thirdly, that used for rolling and finishing the cigarette. All three of these mechanisms are combined in one machine, being actuated from one center of motion, and working together in such manner that each operation is performed at its proper instant of time.

The machinery is fitted in a frame of cast-iron or gun-metal, (marked 1 in Figs. 1, 2, 3, and 4.) This frame is fixed on a wooden table, (marked 2 in Figs. 2, 3, and 4,) and is provided with a table of wood or metal, (marked 3 in Fig. 2,) which table is used to carry the paper and as means for supporting the roller b .

First, as to the mechanism used for the purpose of delivering, cutting, and pasting the paper. The paper is used in the form of a ribbon of the width of the cigarette which it is desired to make, and wound upon a bobbin, a , Fig. 2. The course of the paper is indicated by the line marked a' . b is a loose tension-roller fitted to the table 3 in the manner indicated in the plan, Fig. 1, and is used to press the paper down upon the table 3 by its own weight, so as to produce the required amount of tension. The paper ribbon next passes between two rollers, d and e , Figs. 2 and 8. The roller d is fitted with a projection, d^0 , Figs. 2 and 16, which is formed of cloth or india-rubber, and is so arranged that when the rollers d and e revolve, during a portion of the revolution the two rollers are in contact, and during the remainder of the revolution there is an open space between them, so that the advance of the paper is intermittent, each revolution of the roller drawing forward exactly the amount of paper required for the production of one cigarette. The action of the two rollers d and e is more clearly shown in Figs. 2 and 8. j , Figs. 1 and 8, is a finger-bar, which holds the paper down while the process of cutting off and pasting is performed. It works on a hinge, j' , and receives its motion from a rocking bar, j^2 , and an eccentric cam, j^3 , on the shaft d' of the roller d . The finger-bar j stands normally lifted from the cigarette-paper by the spring j^4 , and the paper is held in place while the cutting and pasting is being effected by the action of the cam j^3 . This is clearly shown in Figs. 1 and 8. When the machine

is started, the paper is brought forward from under the roller d , and is caught by the bar j and held there. g , Figs. 1 and 2, is a knife, which, at the instant the paper is held by the bar j , comes down and cuts off the paper at the point g^2 . As soon as the paper is cut, the knife returns to position by means of the spring g^3 . f , Figs. 2 and 8, is a roller driven by a band, f' , from roller d , which keeps the paper from rising while the cutting-off is being done. h is a tilting table, which at the time when the cutting-off is done is level with the table 3. The knife is actuated by a cam, g^4 , acting upon the lever g' . The cam g^4 being attached to the roller-shaft d' , the effect is that as the roller d revolves and advances the paper under the finger-bar j the knife g cuts it off. i , Figs. 1, 2, 8, 11, and 12, is a paste-box, and i' its roller. The paste-box is filled with paste, and in the box is placed a weight, i^2 , Fig. 2, to force the paste down on the roller. This roller, which is longitudinally grooved, revolves in contact with the paste in such manner that a small quantity adheres to the roller and is ready for the next operation. The tilting table h is pivoted on a hinge-rod, h' , Fig. 8, and is actuated by the lever c c^2 , driven by a cam, c' , on the shaft d' , and falls back by gravity into its normal position. This action is more clearly demonstrated by reference to the plan and side elevation shown in Figs. 11 and 12. (See also Fig. 8.) While the piece of paper thus cut off is held down at one end by the finger-bar j , the tilting table h rises by the action of the cam c' and lever c c^2 , which brings the edge a^2 of the paper in contact with the paste-roller i' , thus pasting that edge of the paper. This action may be clearly seen by reference to the parts as shown in Figs. 2 and 8. The paper is now ready to enter the rolling mechanism. Simultaneously with the paper being thus prepared the mechanism for the delivery and cutting of the tobacco has been at work.

t is an endless band of silk or other suitable material, which is drawn in the direction of the arrows indicated in Fig. 2 by means of the rollers r r^2 . Upon this band the tobacco is spread evenly by hand. This band has to be drawn forward with an intermittent motion, so that only sufficient of the tobacco to produce one cigarette is advanced at one time. This intermittent motion is conveyed as follows: The roller r (shown in Figs. 2, 3, 16, and 17) is fitted with a wheel, r^3 , carrying a pawl in such a manner that when (looking at plan) it travels from right to left it causes the roller to revolve by engaging a ratchet-wheel, r^4 , Fig. 17, thereon, and thus drives the band; but when traveling the reverse way the roller is stationary, the pawl slipping over the ratchet-teeth. r' , Figs. 1, 3, and 17, is a cogged lever or quadrant actuated by a pin, r^0 , fixed to the inside periphery of wheel o^2 , (see Figs. 3 and 17,) which pin, as o^2 revolves, drives the cogged end of r' down, and so drives forward the belt. As soon as the cam has released lever r' it is

forced back into position by means of a small spiral spring, r^5 , the pawl-wheel r^3 giving way with it, but without moving the roller or the belt. As wheel o^2 revolves, the motion is repeated, so that as each cigarette is made the band carrying the tobacco is advanced a step. s s are rollers, which revolve in the same direction by means of the gearing and interim cog-wheels s^3 s^2 s' , Figs. 3 and 16, and are used to press the tobacco ready for cutting. They are driven, as shown in Figs. 3 and 16, by a cog-wheel, s^3 , affixed to the shaft of roller r , and therefore work with a similar intermittent motion. q , Fig. 2, is a knife for the purpose of cutting off the required quantity of tobacco. (Omitted in Fig. 16.) It is a guillotine-knife working in slides, and kept up by means of the spiral springs q' and q'' . (Shown, respectively, in Figs. 3 and 4.) This knife gives two cuts for each cigarette, the second cut rapidly succeeding the first, the object being to insure the complete separation of the tobacco. It is actuated by two levers marked, respectively, o and o' , in Figs. 3 and 4, by means of two pins, o^3 and o^3 , in Fig. 3, near the circumference of the main cog-wheel o^2 , and two pins, o^4 o^4 , Fig. 4, near the circumference of the cog-wheel p^3 . This arrangement is clearly shown in Figs. 3 and 4. The tobacco being cut off falls on the table p , Figs. 2, 9, 10, and 16. This table tilts over, so as to throw the tobacco at the proper moment into the rolling mechanism. p' is a second table, upon which the tobacco is pushed by table p as it tilts, so as to cause the tobacco to be dropped in the right place. In Figs. 9, 10, and 16 this action is demonstrated. Motion is given to tables p and p' by means of the lever p^2 , (shown in Figs. 4, 9, 10, and 16,) actuated by the cam p^5 on the shaft d' . The position is recovered by means of suitable springs, p^4 p^6 , as shown in the drawings. The under table, p' , is held up under the other table, p , by thrust-springs p^6 , which may recover both tables into normal position, and is pressed down by the action of the upper table, p , operated by the cam and levers, as aforesaid. (See Fig. 10.)

I next come to the rolling mechanism. It will be recollected that the paper for one cigarette is now duly cut and pasted, and held down by the finger-bar j , and that the tobacco, duly cut off, is on the table p . The rolling is effected in the folds of an endless band of suitable material, preferably silk, indicated in the drawings as k' . This band and its driving-rollers are more clearly shown at Fig. 7, and the direction of motion of the band shown by arrows. k k k k are rollers in fixed positions, which work in different directions by means of cog-gearing p^3 k^3 k^0 k^4 k^2 , as shown in Figs. 3, 4, and 15. k^2 is a connecting cogged wheel, which gears into the pinions k^4 on two of the said rollers. n , Figs. 2 and 15, is a roller, which is caused to revolve by the motion of the band k' . It is fixed to a pair of arms, n^2 , actuated by a lever and link, n^0 n' , Figs. 4, 5, 6, and 15, worked by a cam, n^3 , on the shaft

d' of wheel p^3 . I have thought it desirable for the purpose of clear description to show this part detached, and it will be found in plan at Fig. 5, and side elevation at Fig. 6. l , Figs. 2, 7, and 15, is a roller fixed in a pair of arms, l' , and which in its motion works in semicircular slots in the frame of the machine. The motion of the roller is obtained from the cog-wheel p^3 , as shown in Figs. 4 and 15, by means of a crank-pin, x^0 , Fig. 4, on the wheel p^3 , and an arm and lever, x and x' . This enables the roller l to move to the position indicated at l^4 , Figs. 2 and 7. y is an india-rubber spring fastened as shown in Fig. 4, and used to bring back the lever x' to its original position. m , Figs. 2, 7, 13, 14, and 15, represents a pair of arms holding the endless band, so as to form the pocket for the cigarette. These arms are held up by means of two supporting arms, m^2 , working in slots m^3 , and serving to hold the band down by their own weight. These parts have been shown detached in plan and side elevation at Figs. 13 and 14. z , Figs. 2 and 15, is a fixed table, upon which the cigarette is rolled.

The whole machinery is set in motion, either by hand or steam power, by means of the crank u' or pulley u , Fig. 3, on a shaft, u^0 . This shaft by a pinion, u^2 , turns a cog-wheel, o^2 , Fig. 3, driving the shaft d' , Figs. 8 and 15. The shaft d' , by a pinion, carrying-wheel, and third pinion, d^2 d^3 d^4 , respectively, Figs. 8 and 3, drives the pasting-roller i' in the bottom of the trough i . The shaft d' , also, by the wheel p^3 at its opposite end, drives a pinion, k^3 , on one of the fixed band-rollers k , Figs. 4 and 15. From this roller by a pinion, k^0 , at its other end, and gearing k^4 k^2 k^1 k^4 , Figs. 3 and 15, the other fixed band-rollers are driven.

The machinery may be made to revolve at any speed, provided time is given for each cigarette to become rolled. I find that the machine works most economically when it is worked at a speed to produce from one thousand to fifteen hundred cigarettes per hour.

I have now described all the parts of the machine, and it is only left to show how each cigarette is formed. This is most clearly seen in Figs. 2 and 7. At the beginning of each operation the roller n is in the position indicated at n^1 in these figures. The arms m are in their highest position close between the uppermost of the rollers k and the roller l , with the latter in the position in which it is shown in full lines, and the tables p p' are in the positions in which they are shown in full lines in Fig. 2. The tables now tilt to the position in which they are shown in dotted lines in Fig. 2, depositing the tobacco for the cigarette upon the band k' . At this moment the roller l is brought down to the position indicated at l^4 , loosening that portion of the band k' upon which the tobacco is so deposited, and permitting the arms m to gravitate to the position indicated at m^4 , so as to form a bight in the band, with the tobacco between them. The rollers l and n now return to their original

positions, which tightens the band k' , and thus cause the arms m to return to their said highest position. The protruding edge of the severed wrapper is now caught by the roll of tobacco between said rollers k l , and the wrapping operation begins. It is to be remembered that the band k' is all the while traveling, as indicated by the arrows in Fig. 7. The roller n now draws on the band k' , so as to cause it to roll the cigarette upon the table z , Fig. 2. Finally, the arms m are again brought up to their said highest position, the roller n drops to position n^1 , and the cigarette is thrown out, as indicated by the arrow in Fig. 2, finished, only requiring the ends to be trimmed off by hand.

The size of the cigarette made will, it is obvious, depend upon three things: First, the width of the paper ribbon. This will determine the length of the cigarette. Secondly, the amount of paper cut off. This will depend upon the amount pushed forward at each revolution, which may be regulated by increasing or lessening the width of the cloth or india-rubber projection d^2 on the roller d , causing the paper to be pushed forward to a greater or less extent, as it is desired to make a thicker or thinner cigarette. Third, the amount of tobacco dropped into the cigarette, and this may be varied by the throw of the rack-lever r' being lengthened or shortened, thus causing a larger or smaller number of its cogs to actuate the roller r ; and by this means the requisite amount of tobacco for the cigarette of the size required to be made drawn forward by the endless band t is regulated, as above stated, before being cut off by the knife q . When it is intended to make the cigarette larger or smaller, it is obvious that the endless band which rolls the cigarette must be slackened or tightened. This is done by moving up or down, as the case may be, the bolt n^6 on the bar n^5 in the series of holes shown in Fig. 15. This will cause the arms n^2 to move more or less out, and so slacken or tighten the band at the moment of rolling.

Having thus described my said invention, I claim—

1. The combination of the intermittingly-rotating tobacco feed rolls s s , the tobacco-knife q , and the tilting tables p p' with the intermittingly-acting paper-feed rolls d e , paper-cutting knife g , tilting pasting-table h , paste-trough and roll i i' , the cigarette-forming endless band k' , and suitable operating mechanism, substantially as described.

2. In a cigarette-machine, the rotating wheels o^2 p^3 , each provided with a pair of tap-pet-studs, o^3 o^3 o^4 o^4 , in combination with the levers o o' , knife q , retracting-springs q' , the tobacco-feed rolls s s , mechanism for intermittingly actuating the latter, and suitable connecting mechanism, whereby the tobacco for each cigarette is severed by a rapid double-cut while said feed-rolls are at rest, substantially as described.

3. In a cigarette-machine, the combination,

substantially as herein described, of the inter-
mittingly-acting paper-feed rolls *d e*, finger *j*,
knife *g*, tilting table *h*, paste-trough and roll *i*
i', and suitable operating and connecting
5 mechanisms for said rolls, finger, and knife,
whereby the paper for each cigarette is severed
and pasted in the manner set forth.

4. In a cigarette-machine, the combination,
with an endless band, *k'*, and mechanism for
10 causing the same to travel continuously, of the
gravitating-arms *m*², having bight-forming
stud-arms *m* at their upper extremities, the
frame parts provided with guide slots *m*³, the
rollers *l n*, for opening and closing the bight,

the vibrating arms *l' n*², which carry said roll- 15
ers, and the operating and connecting devices
of each, substantially as described, whereby
the tobacco for each cigarette is rolled and
wrapped in the manner set forth.

Dated this 1st day of September, 1885.

FRANK HIPGRAVE.

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