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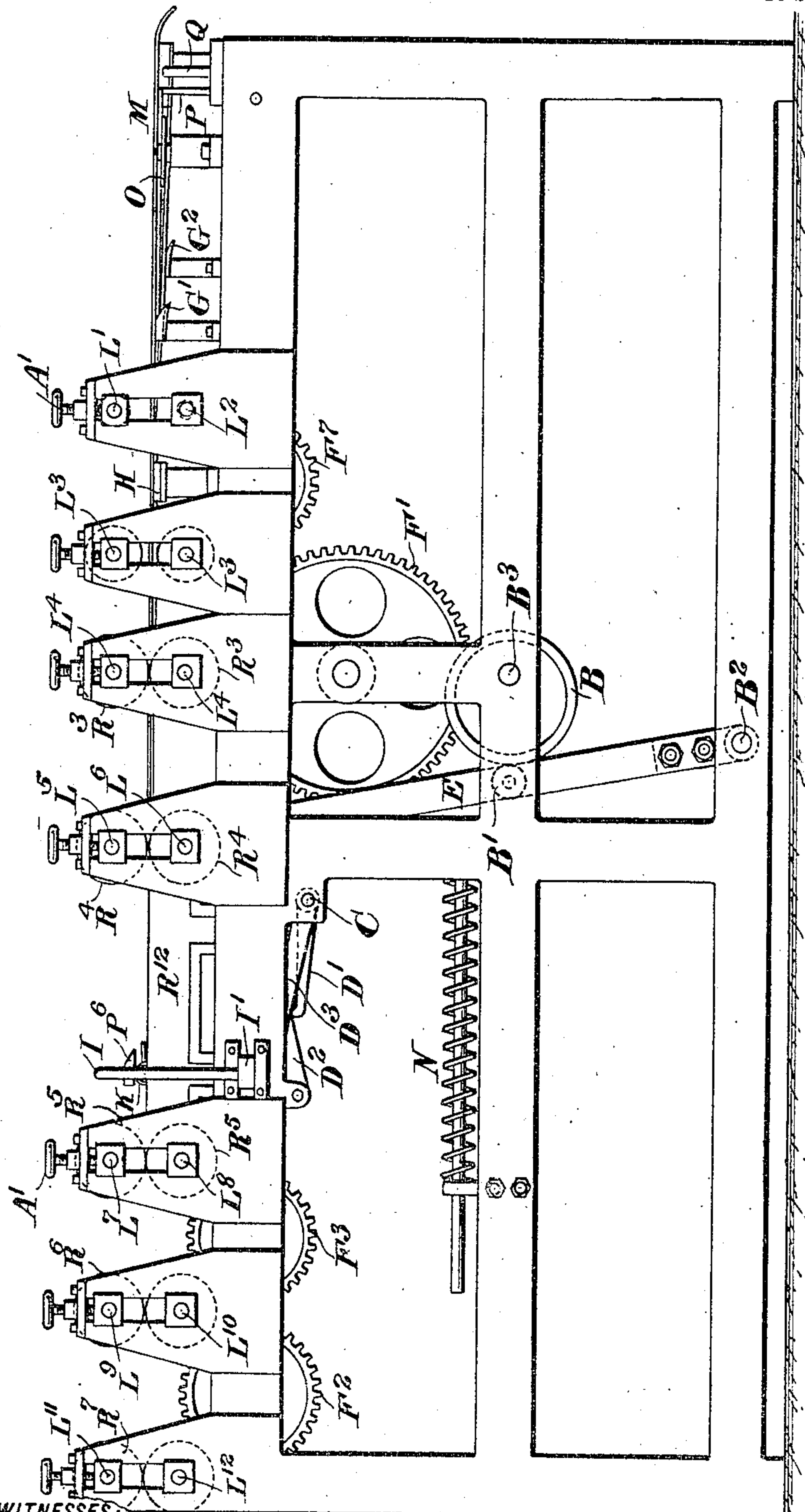
PATENTED DEC. 4, 1906.

P. L. BARTHOLOMEW.
PAPER BAG MACHINE.

APPLICATION FILED JUNE 21, 1900.

13 SHEETS—SHEET 1.

FIG. 1.



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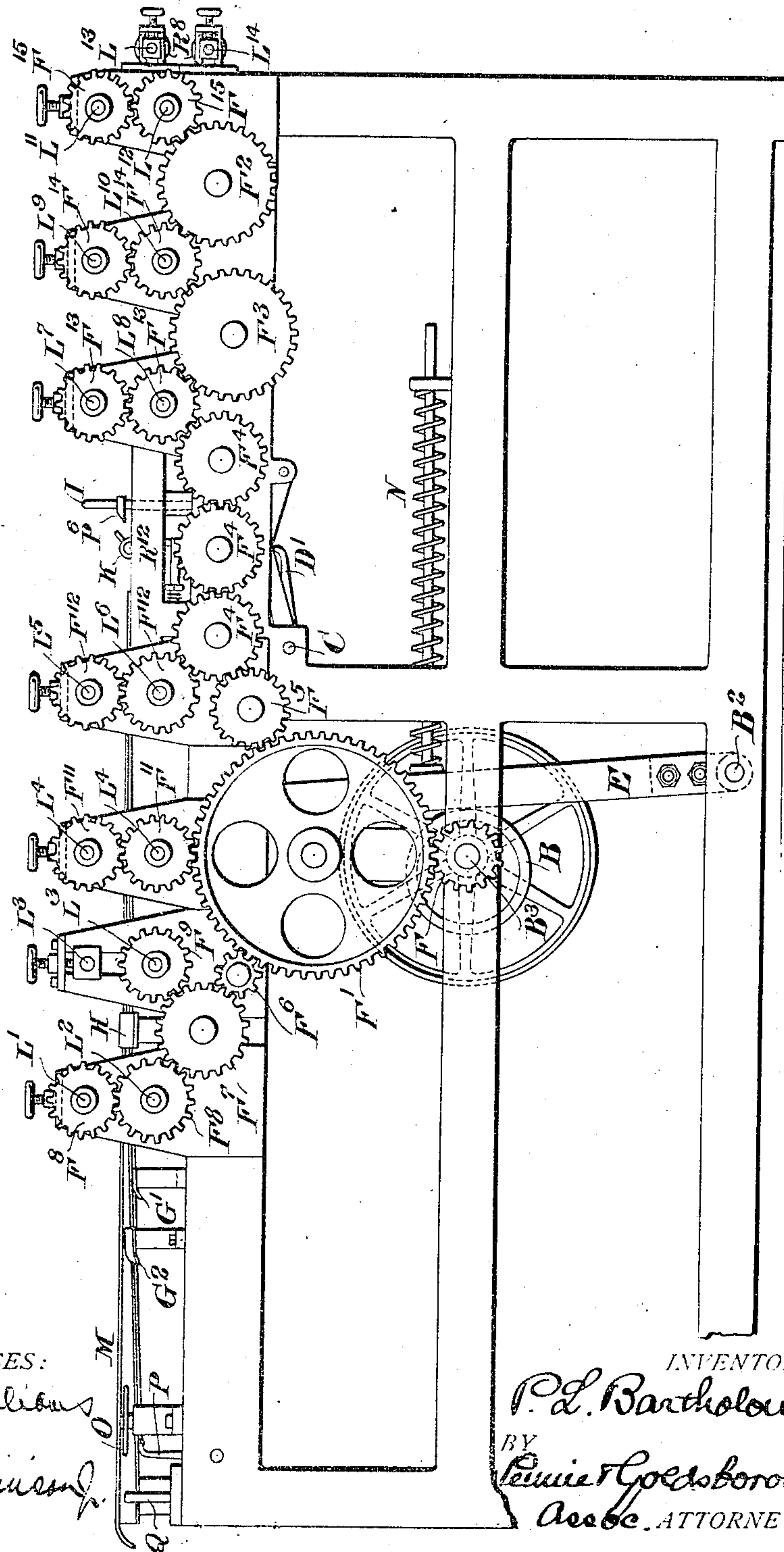
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13 SHEETS—SHEET 2

FIG. 2.



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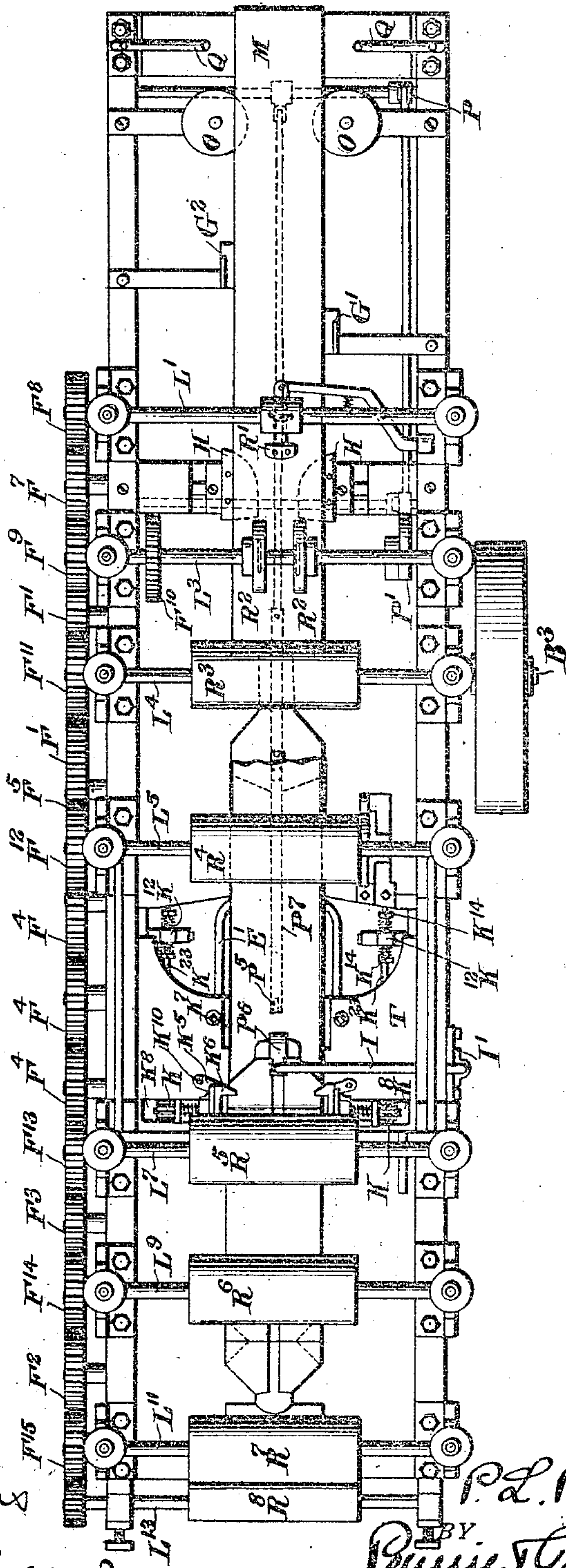
P. L. BARTHOLOMEW.

PAPER BAG MACHINE.

APPLICATION FILED JUNE 21, 1900.

13 SHEETS—SHEET 3.

FIG. 3.



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13 SHEETS—SHEET 5.

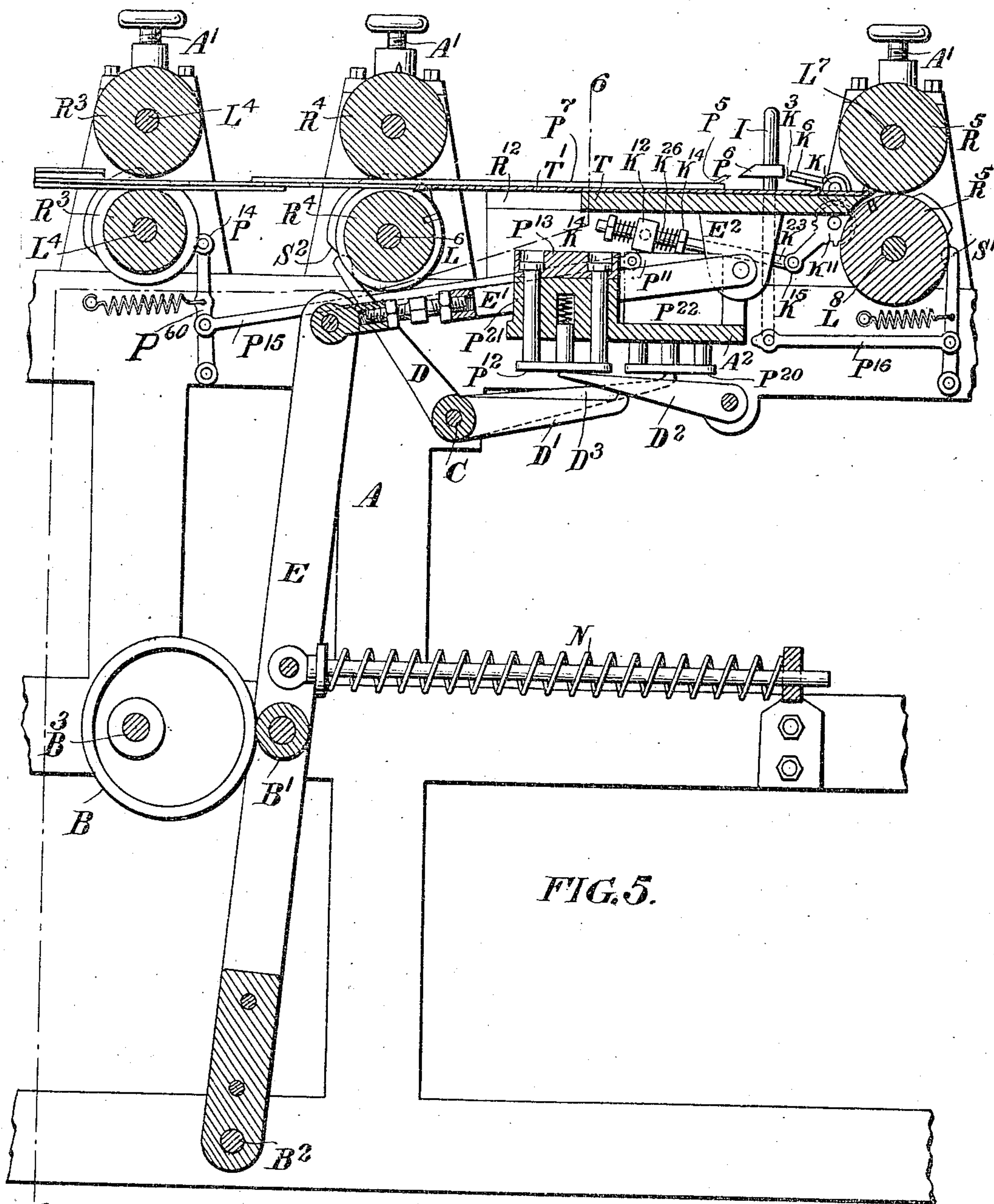


FIG. 5.

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13 SHEETS—SHEET 6.

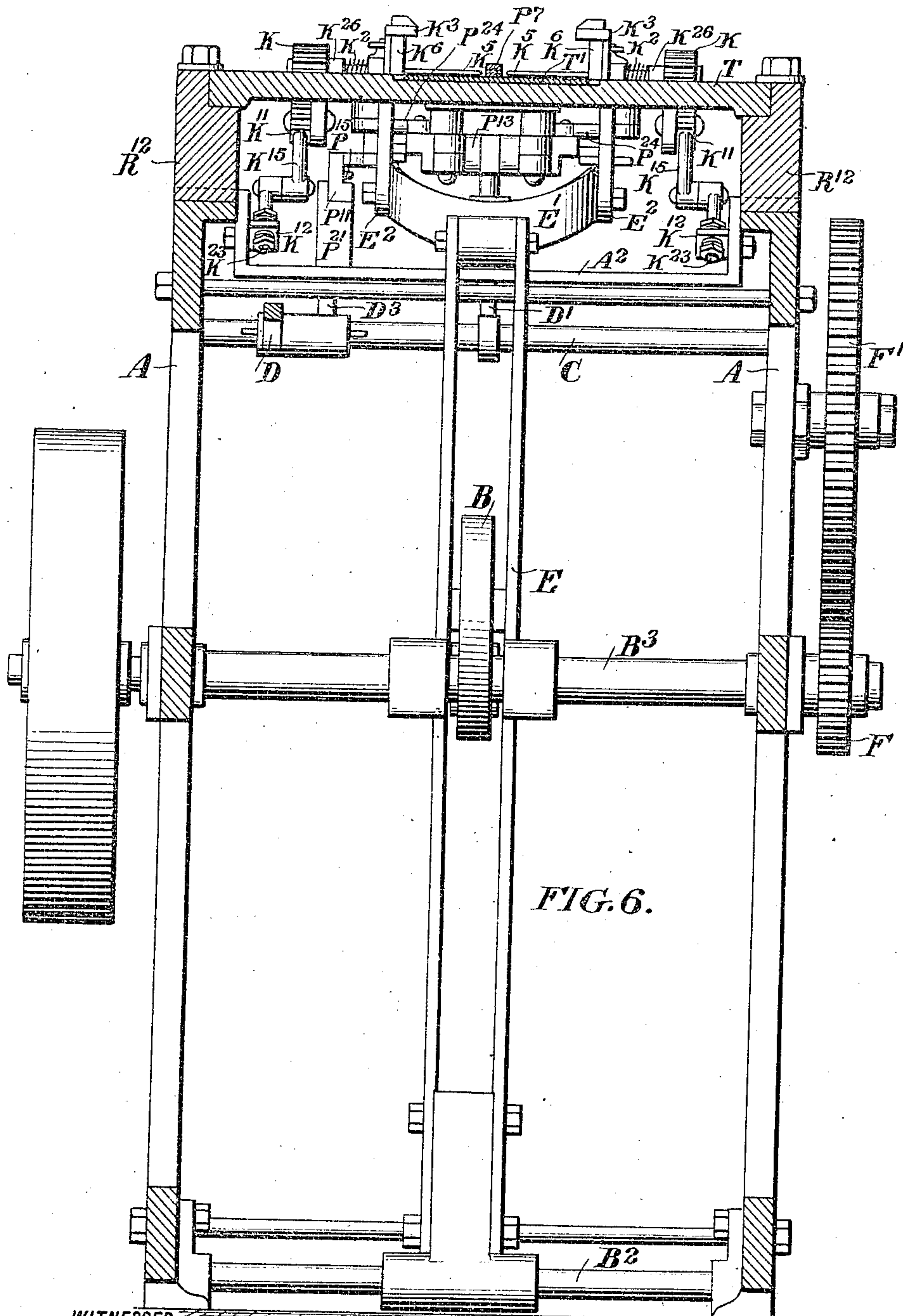


FIG. 6.

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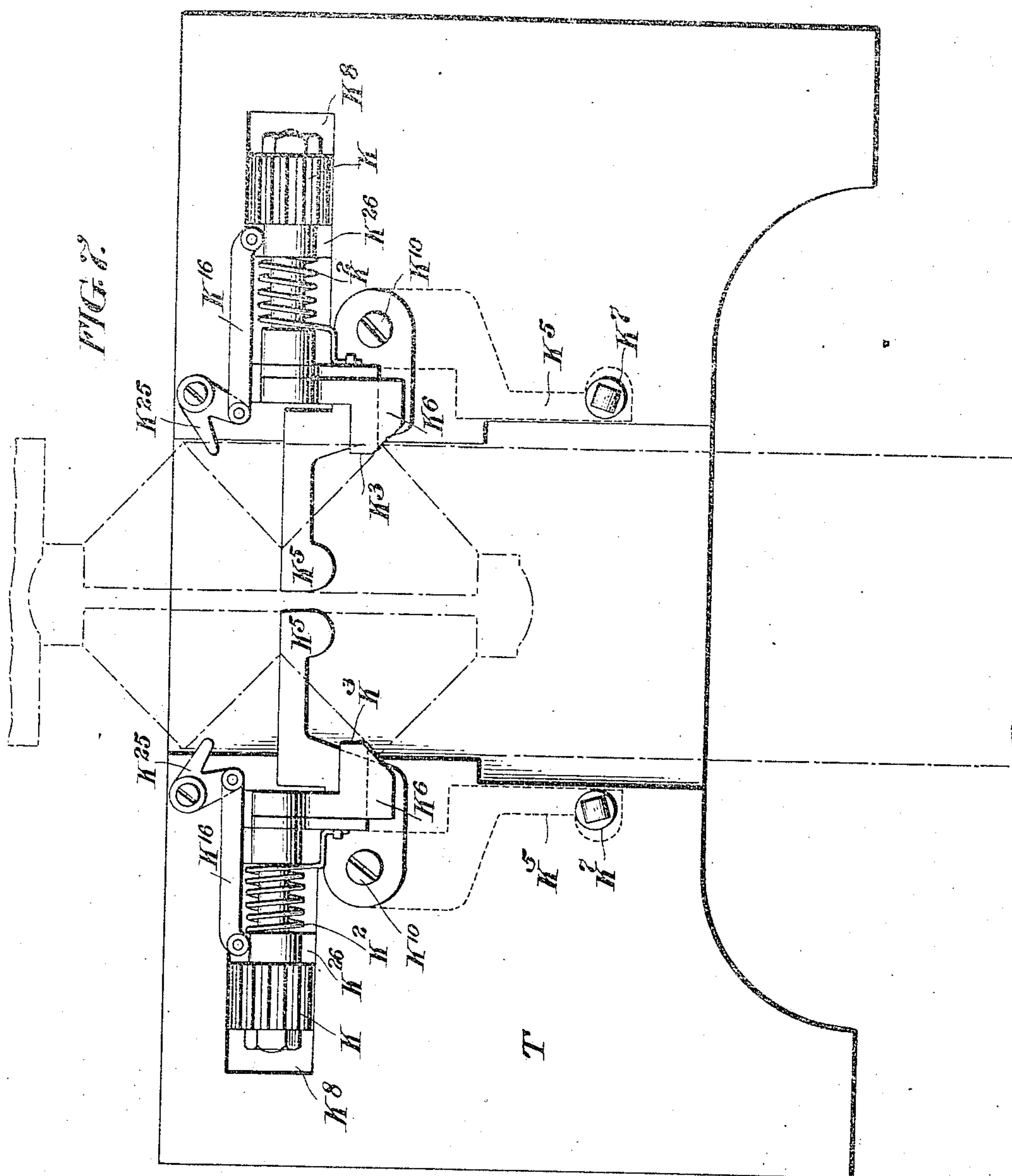
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13 SHEETS—SHEET 7.



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13 SHEETS—SHEET 8.

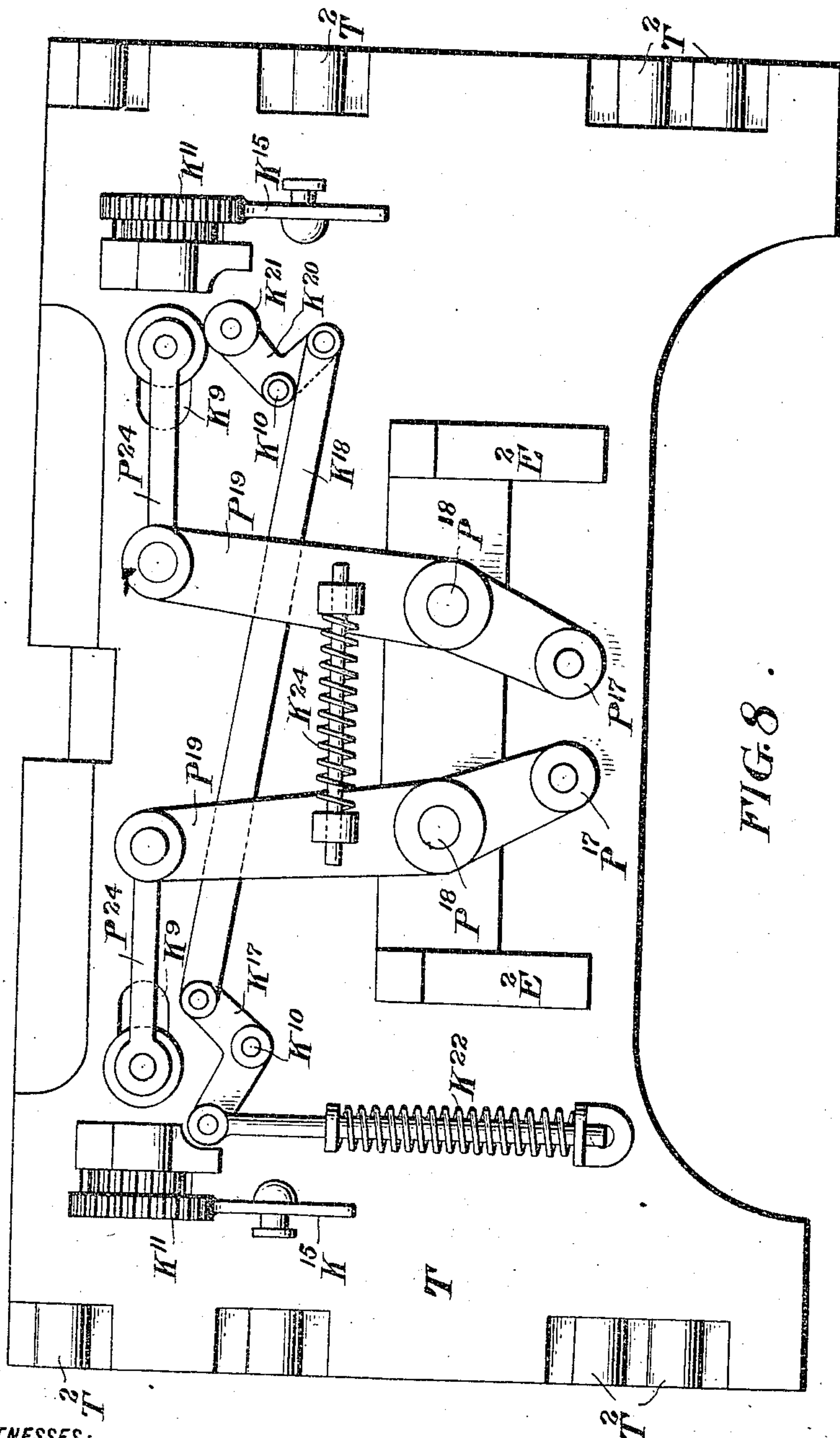


FIG. 8.

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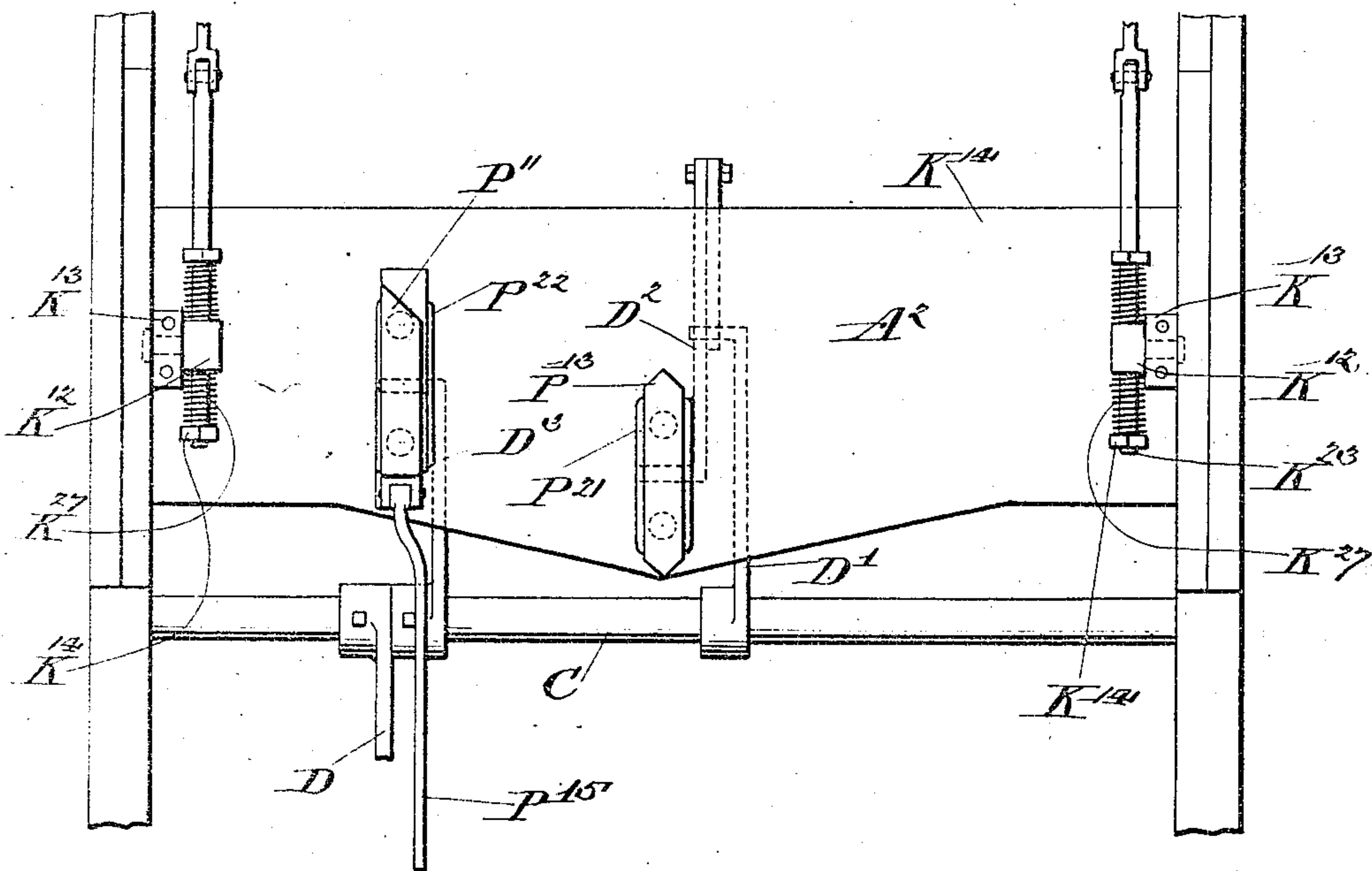
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PAPER BAG MACHINE.

APPLICATION FILED JUNE 21, 1900.

13 SHEETS—SHEET 9.

FIG. 9.



Witnesses:

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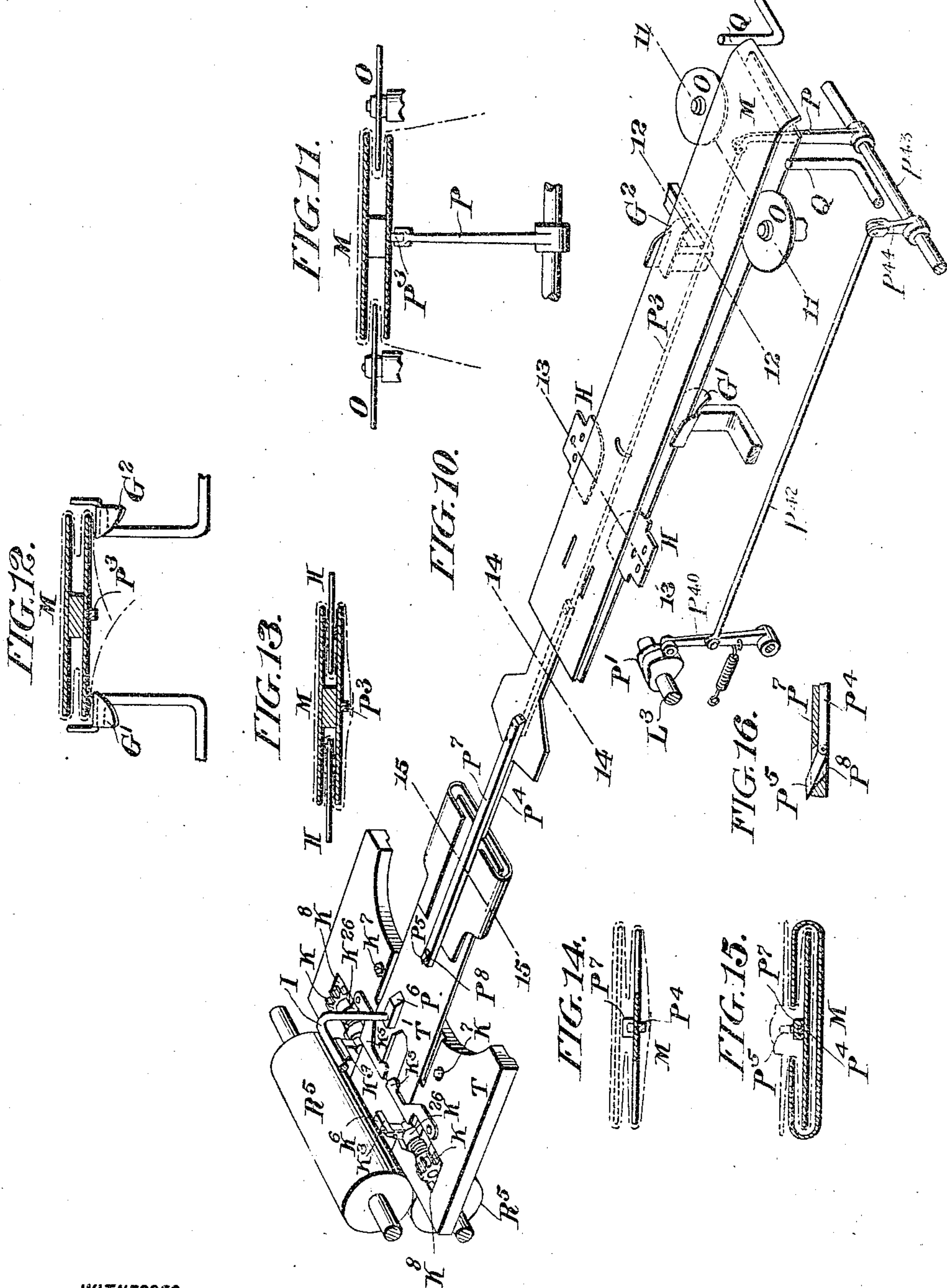
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APPLICATION FILED JUNE 21, 1900.

13 SHEETS—SHEET 10



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APPLICATION FILED JUNE 21, 1900.

13 SHEETS—SHEET 11.

FIG. 17.

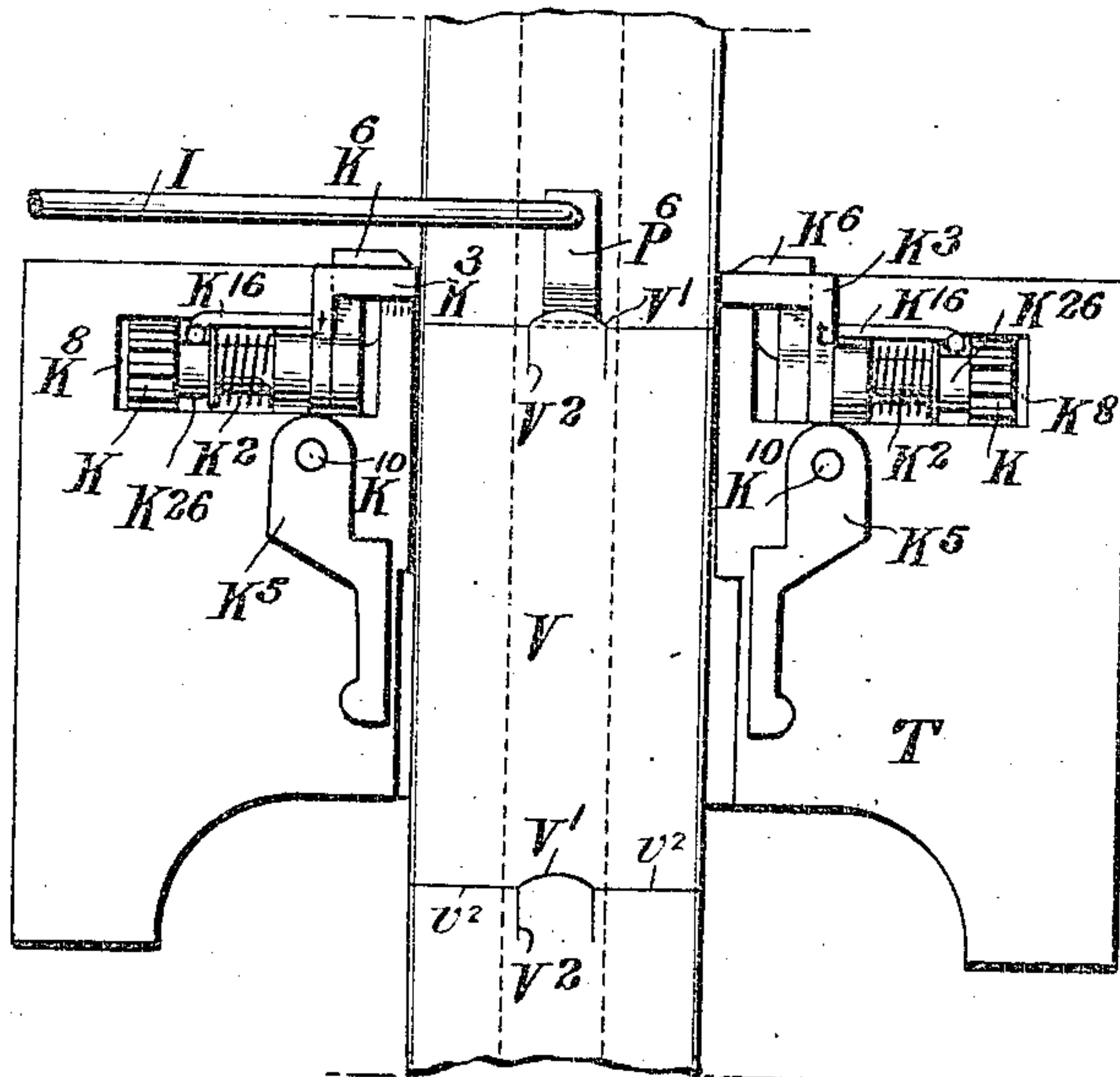
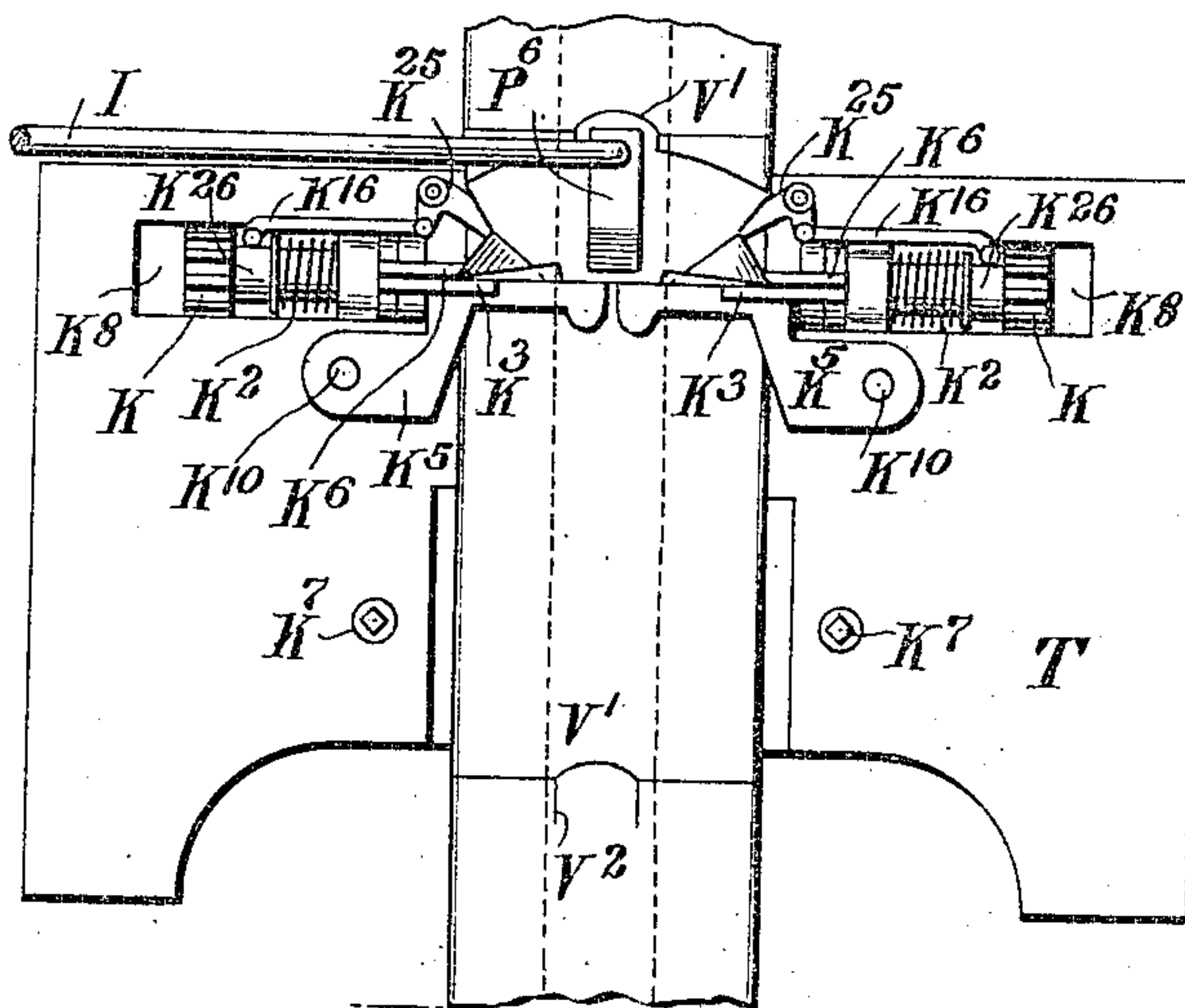


FIG. 18.



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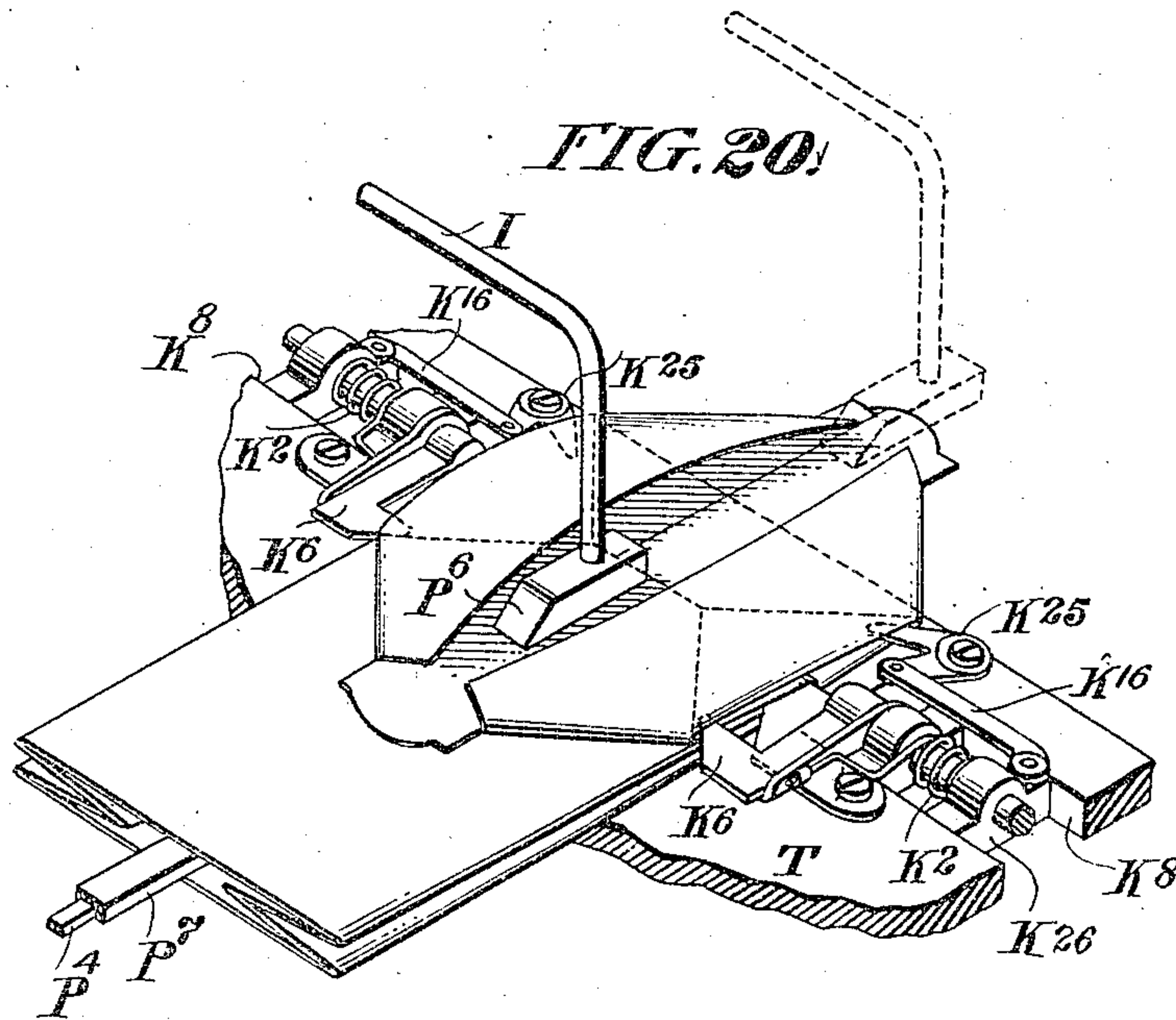
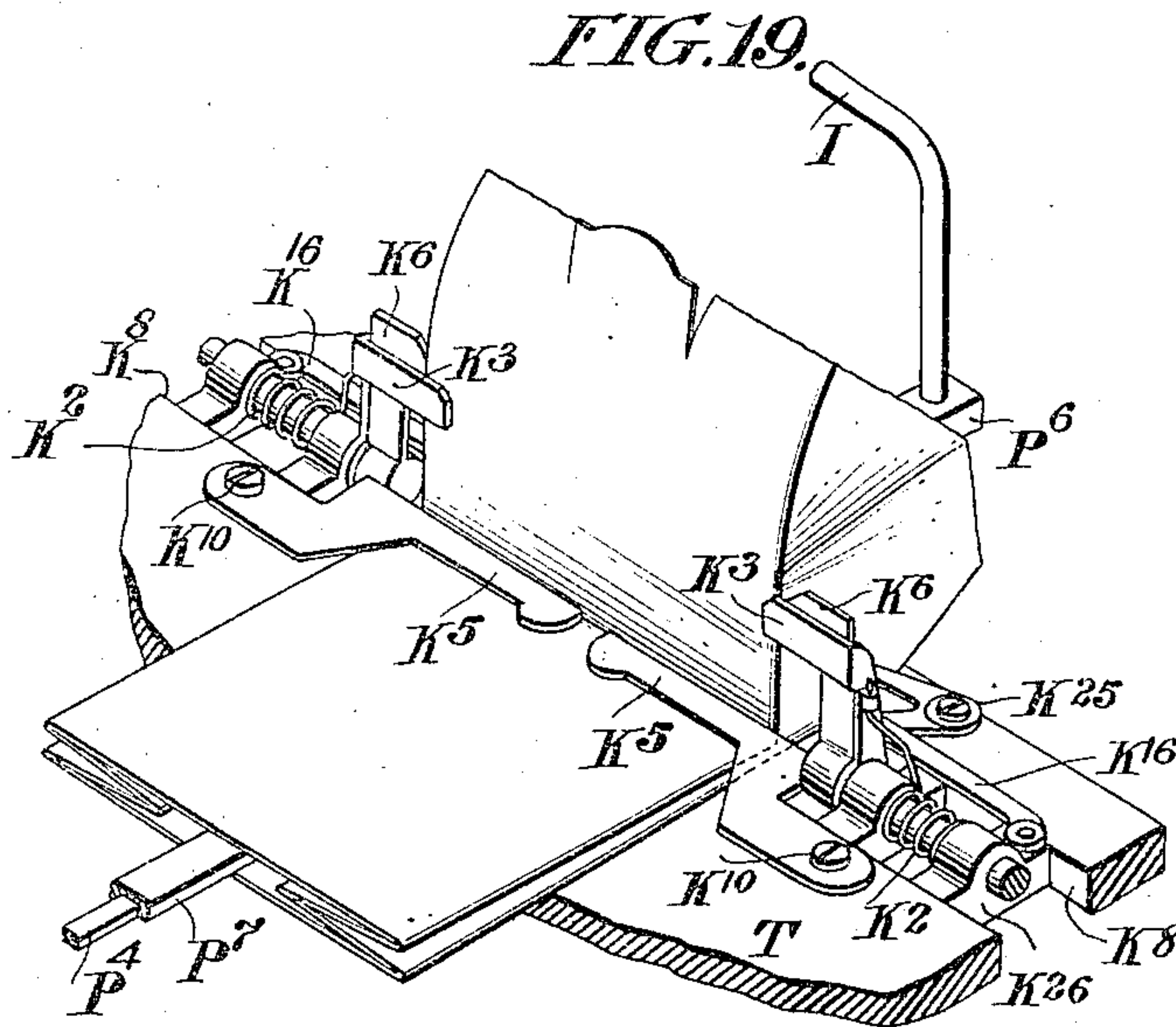
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APPLICATION FILED JUNE 21, 1900.

13 SHEETS—SHEET 12.



WITNESSES:

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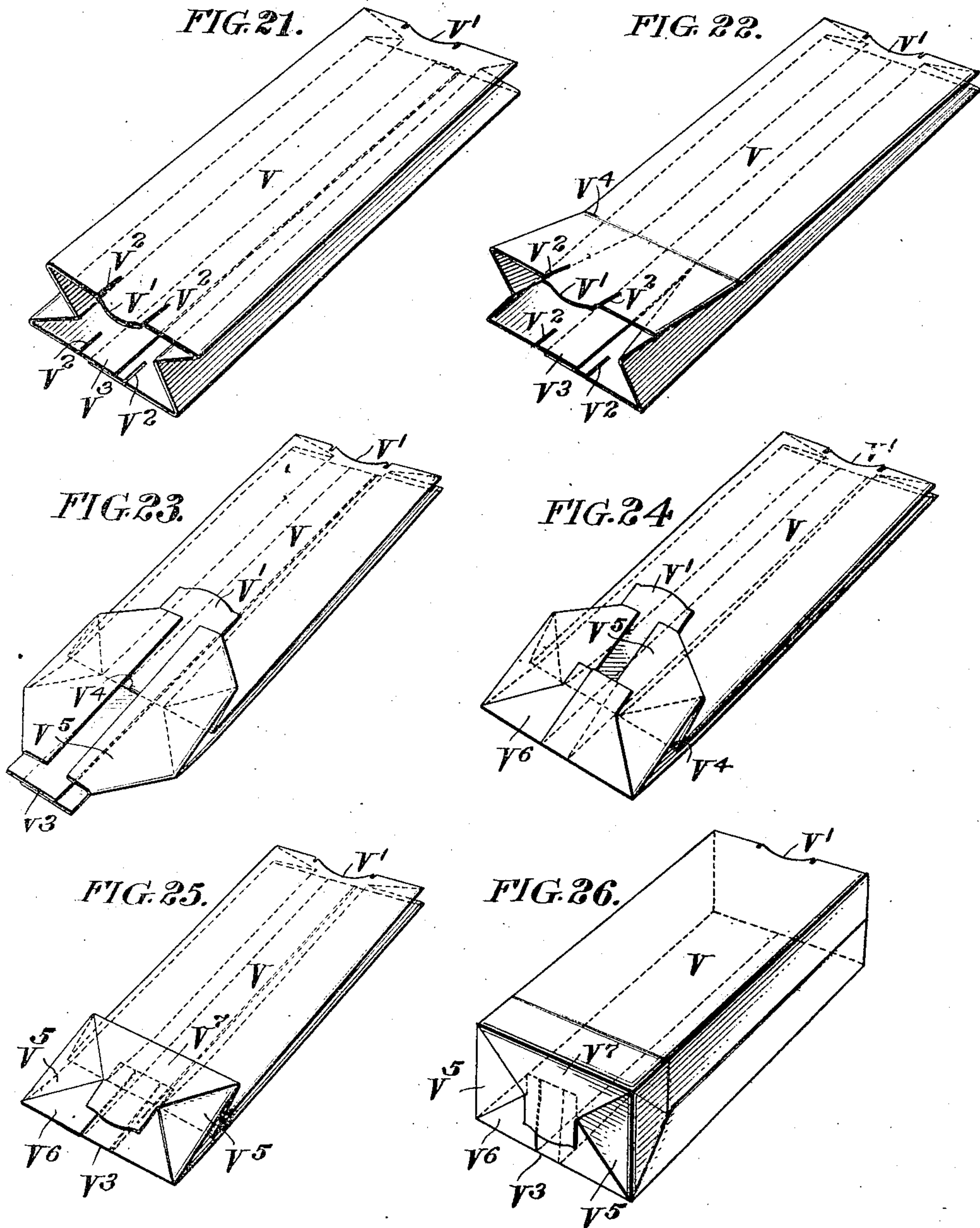
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APPLICATION FILED JUNE 21, 1900.

13 SHEETS—SHEET 13.



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UNITED STATES PATENT OFFICE.

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PAPER-BAG MACHINE.

No. 837,275.

Specification of Letters Patent.

Patented Dec. 4, 1906.

Application filed June 21, 1900. Serial No. 21,126.

To all whom it may concern:

Be it known that I, PHINEAS L. BARTHOLOMEW, a citizen of the United States, residing at Omaha, in the county of Douglas and State of Nebraska, have invented certain new and useful Improvements in Paper-Bag Machines, of which the following is a specification.

My invention relates to improvements in paper-bag machines; and it consists of certain improvements which are set forth in the following specification and are shown in the accompanying drawings, which form a part thereof.

My invention relates to that class of machines designed for forming a satchel square bottom upon a bellows side-fold tube in which the paper tube upon which the bottom is to be formed is carried over a stationary table, while grips and fingers operated on a carriage at the sides of the table make the necessary diamond fold.

The present invention comprises certain improvements in machines of this class designed to more perfectly form the bottom of the bag. These improvements are concerned with the devices for forming the diamond fold.

I shall describe the invention with reference to the accompanying drawings, which show a paper-bag machine of the general character referred to having my improvements applied to it.

In the drawings, Figure 1 is a side elevation of my machine; Fig. 2, an elevation of the opposite side, showing the gear-train. Fig. 3 is a plan view; Fig. 4, an elevation taken on a central longitudinal section; Fig. 5, an enlarged view of the portion of the machine which forms the diamond fold, shown on the same section as Fig. 4. Fig. 6 is a cross-sectional view taken as on the irregular line 6 6 of Fig. 5. Fig. 7 is a plan view of the carriage T and parts attached thereto. Fig. 8 is a plan view of the bottom of carriage T. Fig. 9 is a plan view of the bracket holding the movable cams and lying normally beneath carriage T. Fig. 10 is a perspective view of the tube-forming and diamond-folding mechanism; Fig. 11, a section on line 11 11 of Fig. 10; Fig. 12, a section on line 12 12 of Fig. 10; Fig. 13, a section on line 13 13 of Fig. 10; Fig. 14, a section on line 14 14 of

Fig. 10; Fig. 15, a section on line 15 15 of Fig. 10; Fig. 16, a longitudinal section through the slotted tongue guiding and lifting device. Fig. 17 is a plan view of the carriage and its mechanism, the parts being shown in the positions they occupy just before engaging the blank. Fig. 18 is a similar view showing the said parts acting on the blank. Fig. 19 is a perspective view of the parts acting on the blank in about the same position as shown in Fig. 18. Fig. 20 is a similar perspective view showing a more advanced position of the parts and the diamond completed. Figs. 21 to 25 show progressively the operations performed on a blank to convert it into a bag, and Fig. 26 shows the completed bag fully opened.

A indicates the framework of the machine; M, a tube-forming mechanism adapted for forming a web of paper into a bellows-folded tube, the tube-forming mechanism shown being adapted to form a tube with its longitudinal seam upon its lower face, though this is not essential. Q Q indicate guide-rods which direct the edges of the paper downward over the former M. O O are rotatable disks which act to force the paper into the lateral recesses of the former. G' and G² are supports which hold up the flaps on the under side of the former. H H are plates acting to define the bellows folds. R' is a revolving knife which cuts in the top ply of the tube the circular cut, (indicated at V'.) R² R² indicate the revolving knives which cut in the paper longitudinal slits, (indicated at V² V², &c.) R³ R³ indicate feed-rolls which feed the tube along, and R⁴ R⁴ are at once feed-rolls and knife-rolls which form in the tube the transverse cuts, (indicated at v² v² v²,) which sever the blanks from each other with the exception of a narrow web connecting their lower plies. This tube and blank forming mechanism is not of the essence of my invention and any convenient apparatus for forming bellows-folded blanks can be used in its place, and the same is true of the mechanism shown in my drawings for handling the blanks after the diamond fold has been formed upon them and which may be briefly indicated as follows: R⁵ R⁵ are feed-rolls and knife-rolls which draw the diamond-folded blanks forward and complete the severance of these blanks from each other. R⁶

R⁶ are at once feed and paste-applying rolls, while R⁷ R⁷ and R⁸ R⁸ indicate roller mechanism for making the final folds which complete the bags.

5 B³ indicates the main shaft of the machine. F is a gear-wheel on said shaft which through the gear-wheel F' communicates motion to the several trains of gears. Thus it is directly connected with the intermediate gear F⁶, which through the intermediate F⁷ drives the gears F⁸ F⁸, and F⁹. The gear F also drives the gears F¹¹ and through the intermediates F⁵ and F⁴ the gears F¹² F¹², the intermediate F⁴ communicating through the other intermediates, similarly marked, with the gears F¹³ F¹³, which in turn communicate motion through the intermediate F³ to the gears F¹⁴ F¹⁴, said gears communicating through the intermediate F² to the gears F¹⁵ F¹⁵.

20 L' is the shaft to which are attached the upper gear-wheel F⁸ and the knife R'. L² is the corresponding lower shaft, to which is secured the lower gear-wheel F⁸, said last-mentioned gear-wheel and shaft acting in this case simply as intermediates.

L³ represents the shafts to which are secured the slitting-knives R² and the gear-wheels F⁹.

30 L⁴ L⁴ are the shafts to which are secured the feed-rolls R³ R³ and the gear-wheels F¹¹ F¹¹.

L⁵ L⁶ are the top and bottom shafts of the rolls R⁴ R⁴.

L⁷ and L⁸ are the top and bottom shafts of the rolls R⁵ R⁵.

35 L⁹ and L¹⁰ are the top and bottom shafts of the rolls R⁶ R⁶.

L¹¹ and L¹² are the top and bottom shafts of the rolls R⁷ R⁷.

40 L¹³ and L¹⁴ are the top and bottom shafts of the rolls R⁸ R⁸.

A' A', &c., are adjusting-screws for the bearings of the different rolls.

Referring now to the mechanism which acts upon the bellows-folded blanks for the formation of the diamond fold thereon, P⁵ (see Figs. 3, 4, 5, 10, and 16) is a preliminary distending finger or tongue lying in a slot formed in the tongue-plate (indicated at P⁷) and connected with a rod P⁴, which in turn is connected at P¹⁰ with a longitudinal rod P³, extending to or nearly to the end of the former M and given a reciprocating motion through a rock-lever P, which, as shown, (see Fig. 10,) is actuated at proper times by a cam P¹ on the shaft L³ by means of a pivoted rock-lever P¹⁰, held in engagement with said cam P¹ by a spring P⁴¹ and connected with the shaft P⁴³, upon which lever P is secured, by a connecting-rod P⁴² and rock-lever P⁴⁴. When thrust forward, the finger P⁵ is projected upward by the wedge-shaped end of plate P⁷, (shown at P⁸ in Figs. 10 and 16,) and when retracted the finger lies within the slot of the tongue-plate P⁷.

65 A² (see Figs. 4, 5, 6, and 9) indicates a

bracket extending transversely across the machine and formed with vertically-perforated lugs, (indicated at P²¹ P²²,) which act as guides for the rods upon which are supported cams, (indicated at P¹³ and P¹¹,) these parts being best shown in Figs. 4 and 5. The rods which support the cams are fastened at bottom to plates, (indicated at P¹² and P²⁰,) and these plates and the cams supported thereon are raised at proper times by the action of a cam S² on the shaft L⁶ acting on a lever-arm D, which through a rock-shaft C communicates motion to the lever-arms, (indicated at D' and D³,) the lever-arms D' supporting and moving the plate P¹² and cam P¹³ through a pivoted lever-arm, (indicated at D²,) while the arm D³ rests directly in contact with the plate P²⁰ and through it controls the up-and-down motion of the cam P¹¹. The cam P¹¹ has a longitudinal sliding motion as well as the up-and-down motion described, this longitudinal motion being for the purpose of increasing its rapidity of action and being communicated to it through the rod P¹⁵ and rock-lever P⁶⁰, acted on by a cam P¹⁴ (see Figs. 4 and 5) on the shaft L⁴. K¹³ K¹³ (see Fig. 9) are bearings supporting the transversely-perforated pivot-studs K¹² K¹² at the sides of the bracket A², said studs supporting the rods K²³ K²³, having nuts K¹⁴ at their ends and springs (indicated at K²⁷) which oppose longitudinal motion of either of the rods in either direction. These rods are connected with a gear on the carriage, to be described.

T is the reciprocating carriage, which moves in guideways R¹² R¹² on the frame of the machine and is actuated through downwardly-extending lugs E² E² and a yoke E' by a lever-arm E, pivoted at the bottom of the machine at B² and having a cam-roller B', which rests in contact with the cam B, turning with the main shaft B³, N indicating a spring which thrusts against the lever-arm E, so as to maintain contact between the cam and cam-roller. The face of the carriage T is formed with a recess through which passes the stationary table T', and the sides of the carriage are formed with grooved guideways (indicated at K⁸ K⁸) in which move the sliding blocks (indicated at K²⁶) supporting shafts on which are secured the gear-wheels K K and the oscillating folding-fingers K⁶ K⁶.

K³ K³ are gripping-fingers journaled on the shafts to which the fingers K⁶ are secured and normally pressed against the fingers K⁶ by the action of the springs K² K².

K⁵ K⁵ are cross-fold defining-fingers secured on vertical stud-shafts, (indicated at K¹⁰ K¹⁰,) and K²⁵ represents fingers adapted to enter the bellows folds and hold down the lower ply of the paper. These fingers are pivoted on the carriage T and actuated by the sliding blocks K²⁶ through connecting-links, (indicated at K¹⁶.)

K⁷ K⁷ are rollers projecting up from the

face of the carriage T and upon which the ends of the fingers K⁵ rest when said fingers are retracted.

The blocks K²⁰ are made to move in and out by the action of levers P¹⁹ P¹⁹, pivoted at P¹⁸ P¹⁸ (see Fig. 8) and having their longer arms connected with the sliding blocks by links P²⁴, the pins with which said links connect extending up through openings K⁹ in the carriage into the bottoms of the sliding blocks. The pivot-levers P¹⁹ P¹⁹ have on their shorter arms the cam-rollers P¹⁷ P¹⁷, which are acted on at proper times by the central cam P¹³, supported on the bracket A². The sliding blocks are normally held in retracted position by the action of the spring K²⁴ on the lever-arms P¹⁹ P¹⁹. The cross-fold defining-fingers K³ connect, through their shafts K¹⁰, with the bell-crank levers, (indicated at K¹⁷ and K²⁰), said levers being connected by the link K¹⁸ and normally held in position to retract the fingers by the action of the spring K²². (See Fig. 8.) The fingers are thrown into operative position by the action of the cam P¹¹ acting on the cam-rollers K²¹, secured to the lever K²⁰.

K¹¹ K¹¹ are gear-wheels journaled on brackets extending out from the bottom of the carriage T and engaged with the gear-wheels K K of the sliding blocks. These gear-wheels K¹¹ have lever-arms K¹⁵ extending from them, which are engaged with the rods K²³, already described, so that as the carriage moves backward and forward the spring-supported arms K²³ will alternately thrust the lever-arm in one direction or the other, so as to oscillate the gear-wheels K K and the shafts and fingers connected therewith.

Except in matters of detailed construction the mechanism hereinabove described does not differ substantially from known mechanism for engaging the ends of the bellows-folded bag-blanks and forming thereon what is known as the "diamond" fold. The bag blanks are fed forward while the table is moving backward and the blank has reached the proper position with respect to the table, the cam acting on the lever-arm D and through the mechanism controlled by this lever-arm forces into operative position the cams P¹³ and P¹¹, which, acting on the cam-levers secured to the carriage, already described cause, as the carriage moves forward, the fold-defining fingers to be thrust across the blank and the fingers K⁶ to be thrust into the bellows fold, while the fingers K³ pass above the tops of the folds. The same movement of the sliding blocks K²⁰ which thrusts the fingers to the described position, turns inward the folding-fingers K²⁵ K²⁵, which enter the bellows fold and act to hold down the lower ply of the blank. As the table moves forward with the blank the upper ply is tightly gripped between the fingers K⁶ and

K³, and these fingers, acted on by the rods K²³, acting through the gear-wheel K¹¹ and the gear-wheel K, move backward through an arc of nearly one hundred and eighty degrees, carrying with them the upper ply of the paper, which is thus distended approximately into what is called the "diamond" fold. On the completion of this fold and at a proper point in the forward motion of the carriage the finger-controlling levers on the carriage are released from the action of the cams P¹³ and P¹¹, whereupon the suddenly-acting springs already described operate to retract the fold-defining fingers, so that the diamond-folded blank can pass freely forward to the feeding and cutting rolls and thence to the mechanism for completing the folds of the bag.

Referring next to what constitutes in combination with mechanism for forming a diamond fold, the essential novel feature of my invention, P⁶ is a plate supported immediately above the path of travel of the blank in that portion of the machine in which the diamond fold is formed. This plate P⁶ by preference has an upwardly and rearwardly inclined end, as shown, and for this reason I have referred to it as a "plow," and it is essential that this plate should be narrow—that is to say, its breadth must not be greater than the distance between the longitudinal slits V² V² formed in the blank. The plate or plow P⁶ is, as shown, supported in the position and given a reciprocatory movement corresponding more or less closely with that of the reciprocating carriage by a rod L, secured to a slide I', (shown in Fig. 1,) and to which a reciprocatory movement is imparted by a cam S' on the shaft L⁸ through connecting mechanism, as indicated at P¹⁶ in Figs. 4 and 5. It will be noticed (see Fig. 5) that the preliminary distending-finger P⁵ lies immediately in front of the front edge or plate P⁶ when it is in its forward position, and as the mouth of the advancing blank moves over the finger P⁵ it is thrown up so as to push up the upper ply of the paper and insure that it passes over the plate P⁶, which plate when provided with an upwardly-inclined surface acts to continue the distention of the tube as it moves forward, so that the inclined surface of the plow or plate performs an important function in the operation of distending the mouth of the blank, this distention also in the construction illustrated serving a most useful purpose in spreading open the bellows fold so that the distending-fingers which co-act in forming the diamond can enter the same freely. The reciprocatory movement of the plate P⁶ is such that it remains practically stationary while the mouth of the blank is fed over it until the end of the blank is engaged by the distending devices, and the plate P⁶ then moves backward with the carriage while the diamond fold is being formed

and thereafter comes to rest or even moves forward again while the diamond-folded blank is being drawn forward, the plate then passing over the rear flap of the diamond, pressing its central part down to true position and holding it there for a sufficient length of time to insure that it will not be distorted in entering the bite of the feed-rolls which then operate upon it.

10 Having now described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a paper-bag machine, the combination with distending devices adapted to engage the end of an advancing tube and fold it into a diamond, of a narrow plate arranged in the line of travel of the blank so as to enter beneath its upper ply before it is folded back to move with the distending devices while they operate on the diamond, and to hold down the rear flap of the diamond while the blank is being withdrawn from the folding mechanism, means for imparting the necessary movement to said parts, and means for withdrawing the folded blanks.

2. In a paper-bag machine, the combination with distending devices adapted to engage the end of an advancing tube and fold it into a diamond, of a narrow plate arranged in the line of travel of the blank so as to enter beneath its upper ply before it is folded back to move with the distending devices while they operate on the diamond and to hold down the rear flap of the diamond while the blank is being withdrawn from the folding mechanism, said plate having a reciprocating movement in the line of movement of the blank and moving with said blank while the diamond is being formed, means for imparting the necessary movement to said parts, and means for withdrawing the folded blanks.

3. In a paper-bag machine, the combination with distending devices adapted to engage the end of an advancing tube and fold it into a diamond, of a narrow plate arranged in the line of travel of the blank so as to enter beneath its upper ply before it is folded back and to hold down the rear flap of the diamond while the blank is being withdrawn from the folding mechanism, means for withdrawing the folded blanks, a former extension passing through the blank, and a preliminary distending-finger, secured to said former extension, and acting to open the tube-mouth to insure that the upper ply shall pass over the narrow plate.

4. In a paper-bag machine, the combination with distending devices adapted to engage the end of an advancing tube and fold it into a diamond, of a narrow plate arranged in the line of travel of the blank so as to enter beneath its upper ply before it is folded back and to hold down the rear flap of the diamond while the blank is being withdrawn from the folding mechanism, said plate hav-

ing a reciprocating movement in the line of movement of the blank and moving with said blank while the diamond is being formed, means for withdrawing the folded blanks, a former extension passing through the blank and a preliminary distending-finger secured to said former extension, and acting to open the tube-mouth to insure that the upper ply shall pass over the narrow plate.

5. In a paper-bag machine: the combination, with feed mechanism delivering bellows-folded blanks to be operated upon, of a reciprocating carriage, fingers moving with said carriage acting to engage, and hold stationary with regard to the carriage, the lower corners of the bellows-folded blank at the points where the corners of the bottom are to be formed, oscillating fingers, also moving with the carriage and acting to engage the corresponding upper corners of the blank and spread out the diamond fold, a reciprocating narrow plate arranged to enter the mouth of the blank before it is spread out into a diamond and to hold down the rear flap of the diamond as the folded blank is withdrawn from the folding mechanism and means for withdrawing the folded blanks.

6. In a paper-bag machine: the combination, with distending devices adapted to engage the end of an advancing tube and fold it into a diamond, with a narrow plate arranged in the line of travel of the blank so as to enter beneath its upper ply before it is folded back to move with the distending devices while they operate on the diamond, and to hold down the rear flap of the diamond while the blank is being withdrawn from the folding mechanism, said plate having an inclined surface extending upward and rearward from its front end acting to spread open the end of the blank and means for imparting the necessary movement to said parts.

7. In a paper-bag machine: the combination, with distending devices adapted to engage the end of an advancing tube and fold it into a diamond, with a narrow plate arranged in the line of travel of the blank so as to enter beneath its upper ply before it is folded back and to hold down the rear flap of the diamond while the blank is being withdrawn from the folding mechanism, said plate having an inclined surface extending upward and rearward from its front end acting to spread open the end of the blank, and a preliminary distending-finger acting on the inside of the blank, to so open its advancing end as to insure its passing over the inclined surface at the end of the narrow plate.

8. In a paper-bag machine having mechanism for feeding the blanks and for forming a diamond fold on the end of a bellows-folded blank as it is fed through the machine, a narrow plate over which the upper ply of the blank passes as it advances to the diamond-folding devices and under which the blank

passes after the diamond is formed, in combination with a preliminary distending-finger acting to open the mouth of the blank to insure its upper ply passing over the plate, and means for operating said finger, comprising a reciprocating rod over which the tubular blanks are formed.

9. In a paper-bag machine the combination of mechanism forming a bellows-folded tube and severing it into bag-blanks connected only on their lower plies by narrow webs, said mechanism acting also to feed the connected blanks to the diamond-folding mechanism, with a reciprocating carriage, mechanism connected and moving with said carriage acting to fold the ends of the blanks into diamond folds, a reciprocating narrow plate arranged in the line of movement of the blanks to enter beneath the lower ply thereof before the formation of the diamond and to hold down the rear flap of the diamond while the blanks are withdrawn, and feed and severing mechanism whereby the diamond-folded blanks are withdrawn and finally severed from each other.

10. In a paper-bag machine, the combination of mechanism for forming a bellows-folded tube and severing it into bag-blanks connected only on their lower plies by narrow webs, said mechanism acting also to feed the connected blanks to the diamond-folding mechanism, with a reciprocating carriage, mechanism connected and moving with said carriage acting to fold the ends of the blank into diamond folds, a reciprocating narrow plate arranged in the line of movement of the blanks to enter beneath the lower ply thereof before the formation of the diamond and to hold down the rear flap of the diamond while the blanks are withdrawn, said plate having a rearwardly and upwardly inclined surface extending from its front end whereby the advancing ends of the blanks are distended as they move over said plate.

11. In a paper-bag machine, the combination, with mechanism for forming a bellows-folded tube with its seam on the lower face and means for cutting said tube into blanks and feeding them to diamond-folding mechanism with the seam still on their lower faces, of mechanism for folding the ends of said blanks into diamond folds, a narrow reciprocating

plate adapted to enter beneath the upper ply of the blanks prior to their distention into a diamond to move with the distending devices while they operate to form the diamond and to hold down the rear flaps of the diamonds as they are withdrawn and means for imparting the necessary movement to said parts.

12. In a paper-bag machine: the combination, of a reciprocating carriage T, with sliding blocks K^{26} , K^{28} , a shaft journaled in each block and having secured to it a gear-wheel and an oscillating finger, levers P^{18} , P^{19} , pivoted on the carriage and connected to operate the sliding blocks, a vertically-movable cam P^{13} , arranged to operate said levers when raised, means for reciprocating the carriage and means for raising and lowering the cam.

13. In a paper-bag machine: the combination, of a reciprocating carriage T, with sliding blocks K^{26} , K^{28} , a shaft journaled in each block and having secured to it a gear-wheel and an oscillating finger, levers P^{18} , P^{19} , pivoted on the carriage and connected to operate the sliding blocks, fold-defining fingers supported on the carriage and movable thereon from a position in which they define the cross-fold of the diamond to a position wherein they clear the blanks, vertically-movable cams P^{13} , P^{11} , arranged to operate the levers connected with the blocks and the cross-fold-defining fingers respectively, means for reciprocating the carriage, and means for raising and lowering the cams.

14. In a paper-bag machine, a reciprocating carriage in combination with sliding blocks supported thereon and supporting shafts having attached to them oscillating fingers and gear-wheels, K, K, gear-wheels K^{11} , K^{11} , journaled on the under side of the carriage and engaged with the gears K, K, said gears K^{11} , K^{11} , having lever-arms K^{15} , K^{15} , attached to them, rods K^{23} , K^{23} , attached to said arms and springs connecting rods K^{23} , K^{23} with a fixed part of the machine and which offer a yielding resistance to the movement of said rods in either direction.

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Witnesses:

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