

No. 735,383.

PATENTED AUG. 4, 1903.

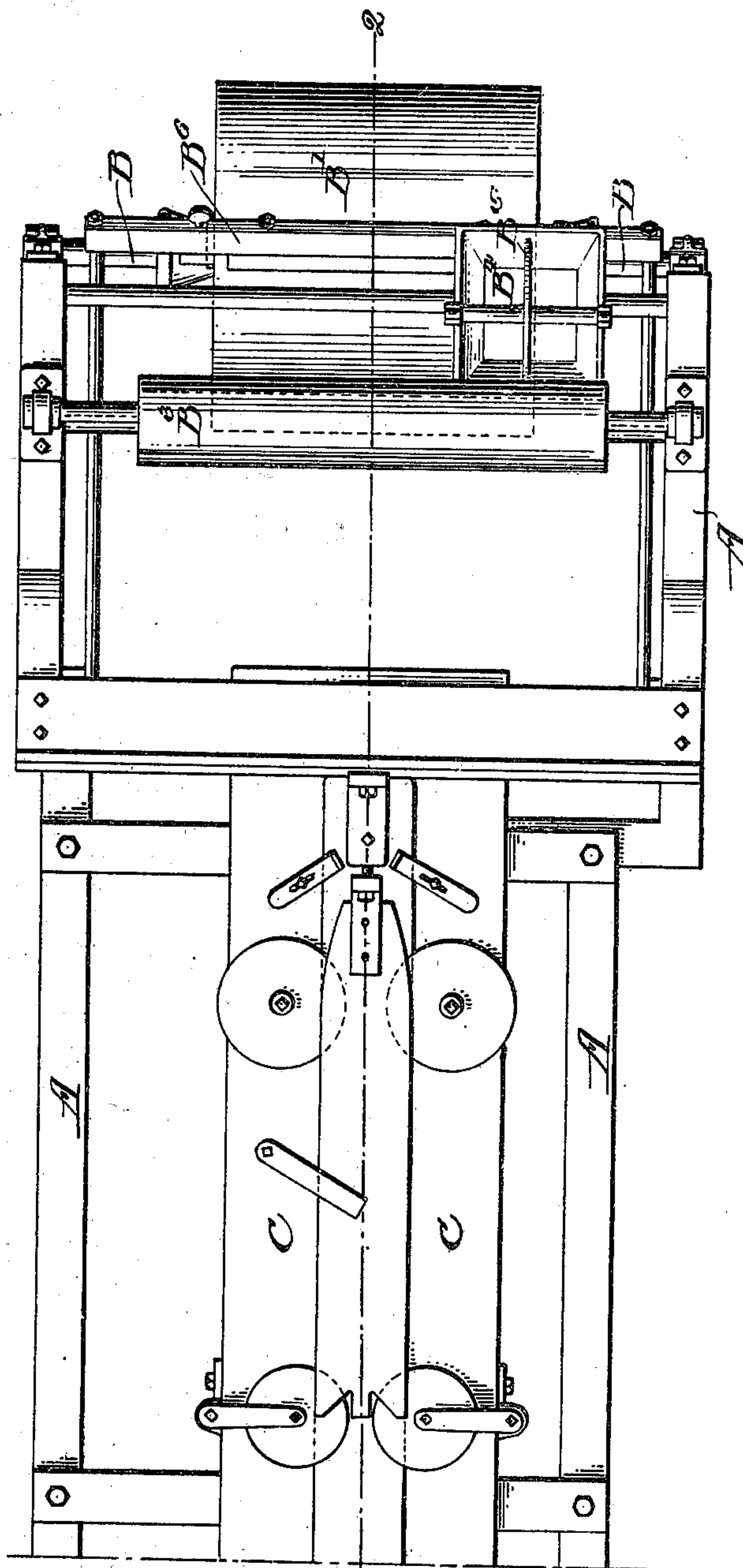
E. J. HOWLETT.
PAPER BAG MACHINE.

APPLICATION FILED APR. 9, 1902.

NO MODEL.

14 SHEETS—SHEET 1.

FIG. 1.



WITNESSES:

Wm. C. Cassner
W. C. Cassner

INVENTOR:

Ernest J. Howlett
by his atty.
Francis T. Chambers

E. J. HOWLETT.
PAPER BAG MACHINE.

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NO MODEL.

14 SHEETS—SHEET 2.

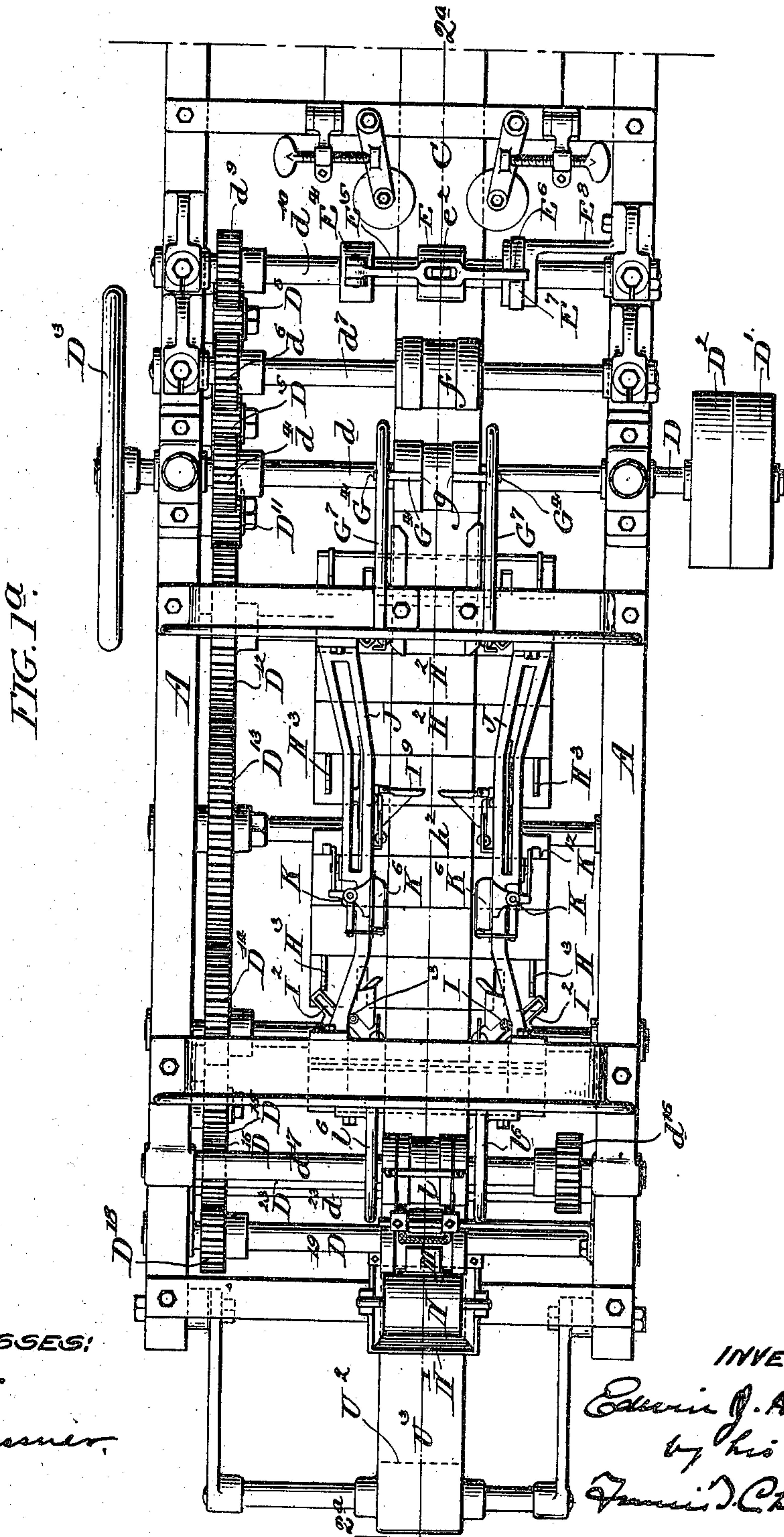


FIG. 1a.

WITNESSES:
W. H. Gassner
W. H. Gassner

INVENTOR:
Edwin J. Howlett
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James D. Chambers

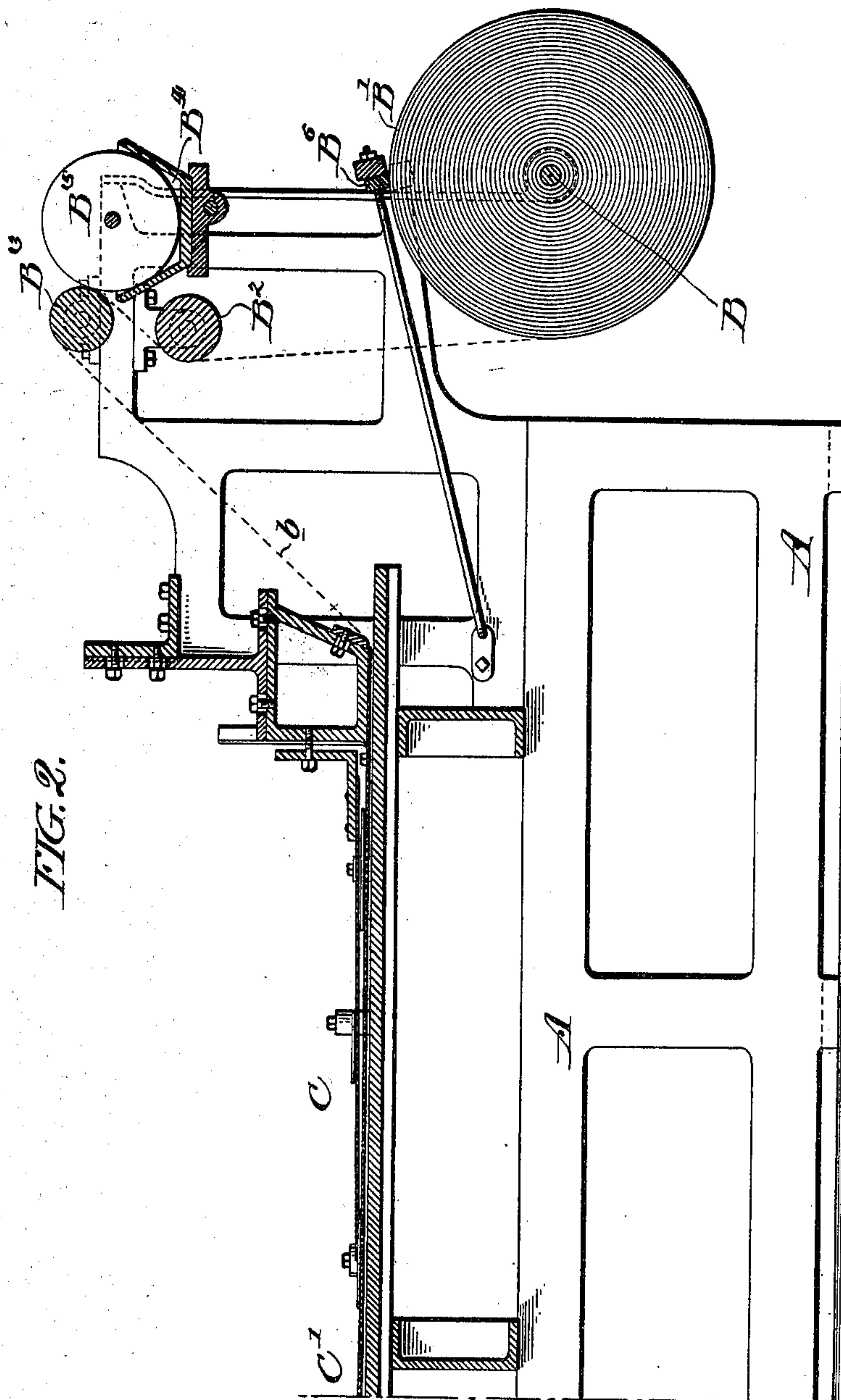
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NO MODEL.

14 SHEETS—SHEET 3.



WITNESSES:

Stewart
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INVENTOR:

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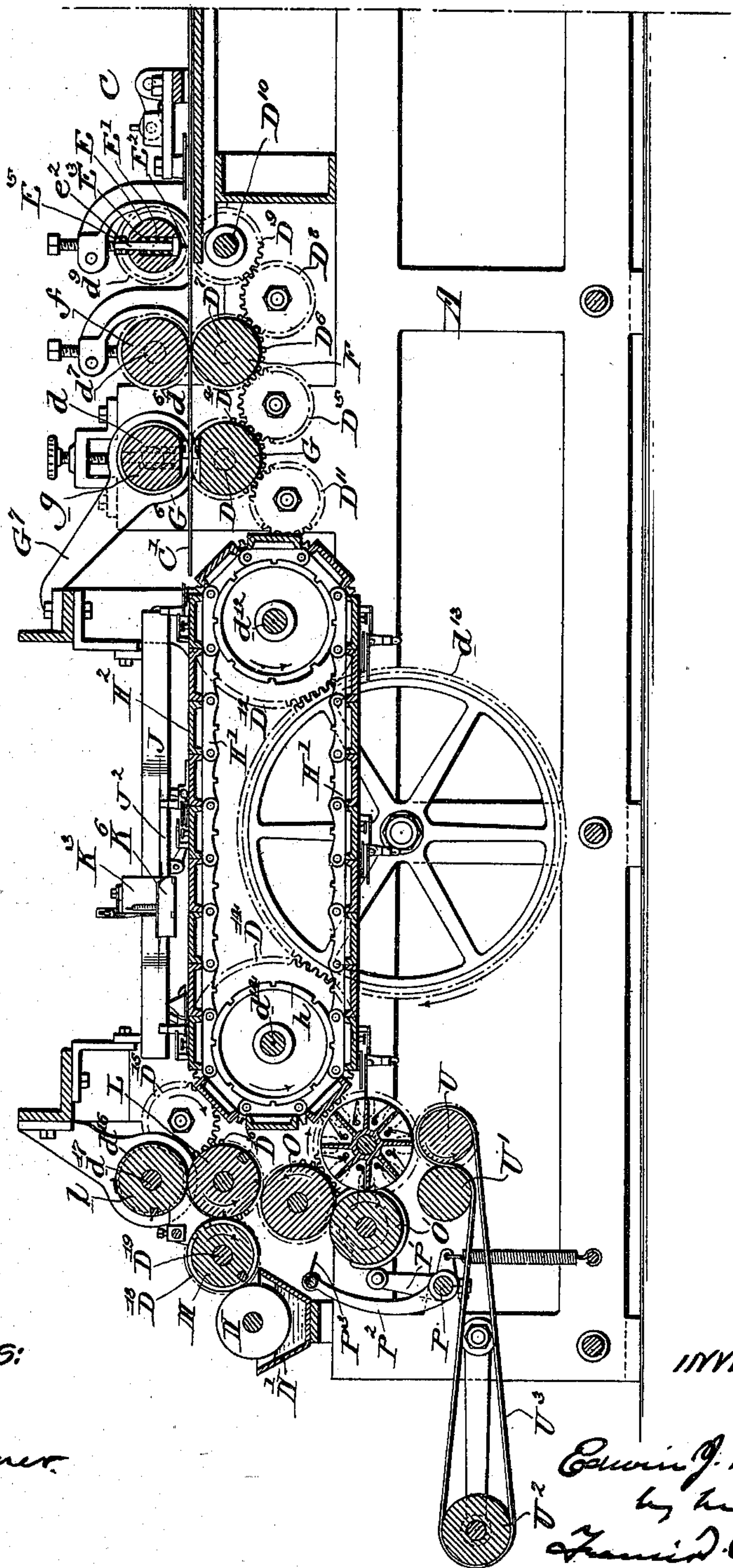
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APPLICATION FILED APR. 9, 1902.

NO MODEL.

14 SHEETS—SHEET 4.



WITNESSES:

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INVENTOR:

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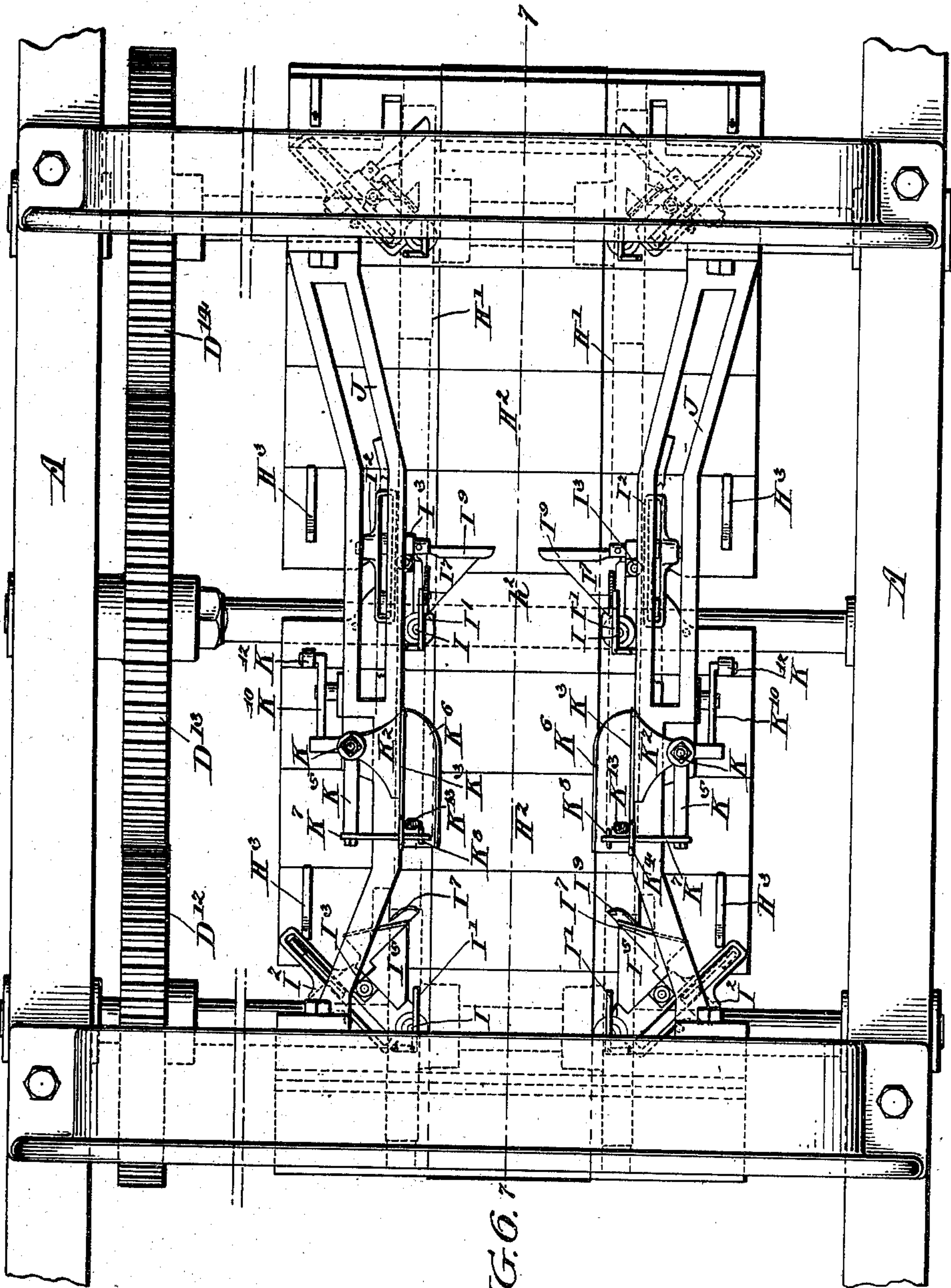
PATENTED AUG. 4, 1903.

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PAPER BAG MACHINE.

APPLICATION FILED APR. 9, 1902.

NO MODEL.

14 SHEETS—SHEET 6.



WITNESSES:

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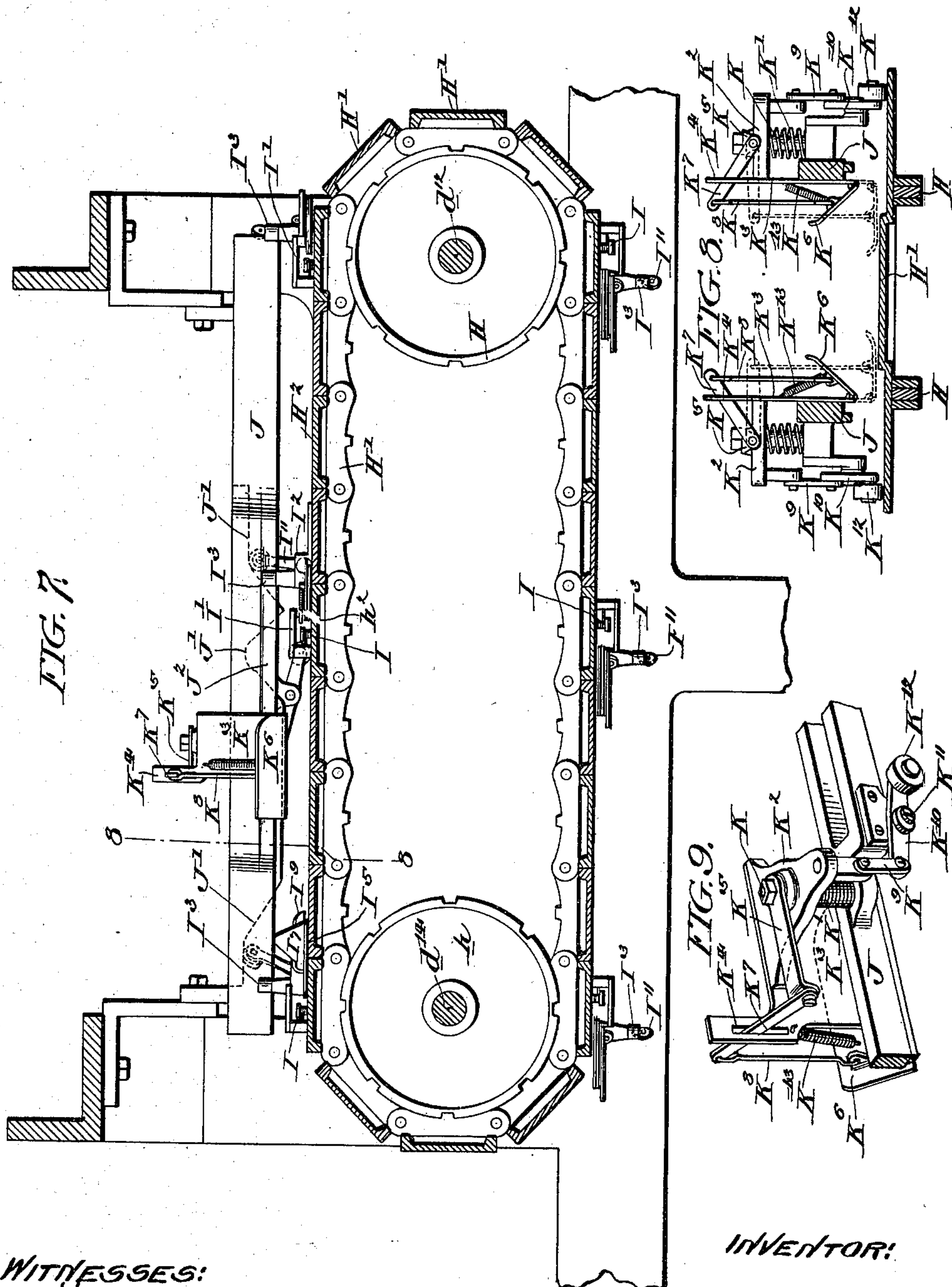
PATENTED AUG. 4, 1903.

E. J. HOWLETT.
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APPLICATION FILED APR. 9, 1902.

NO MODEL.

14 SHEETS—SHEET 7.



WITNESSES:
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PATENTED AUG. 4, 1903.

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PAPER BAG MACHINE.
APPLICATION FILED APR. 9, 1902.

NO. MODEL.

14 SHEETS—SHEET 8.

FIG. 12.

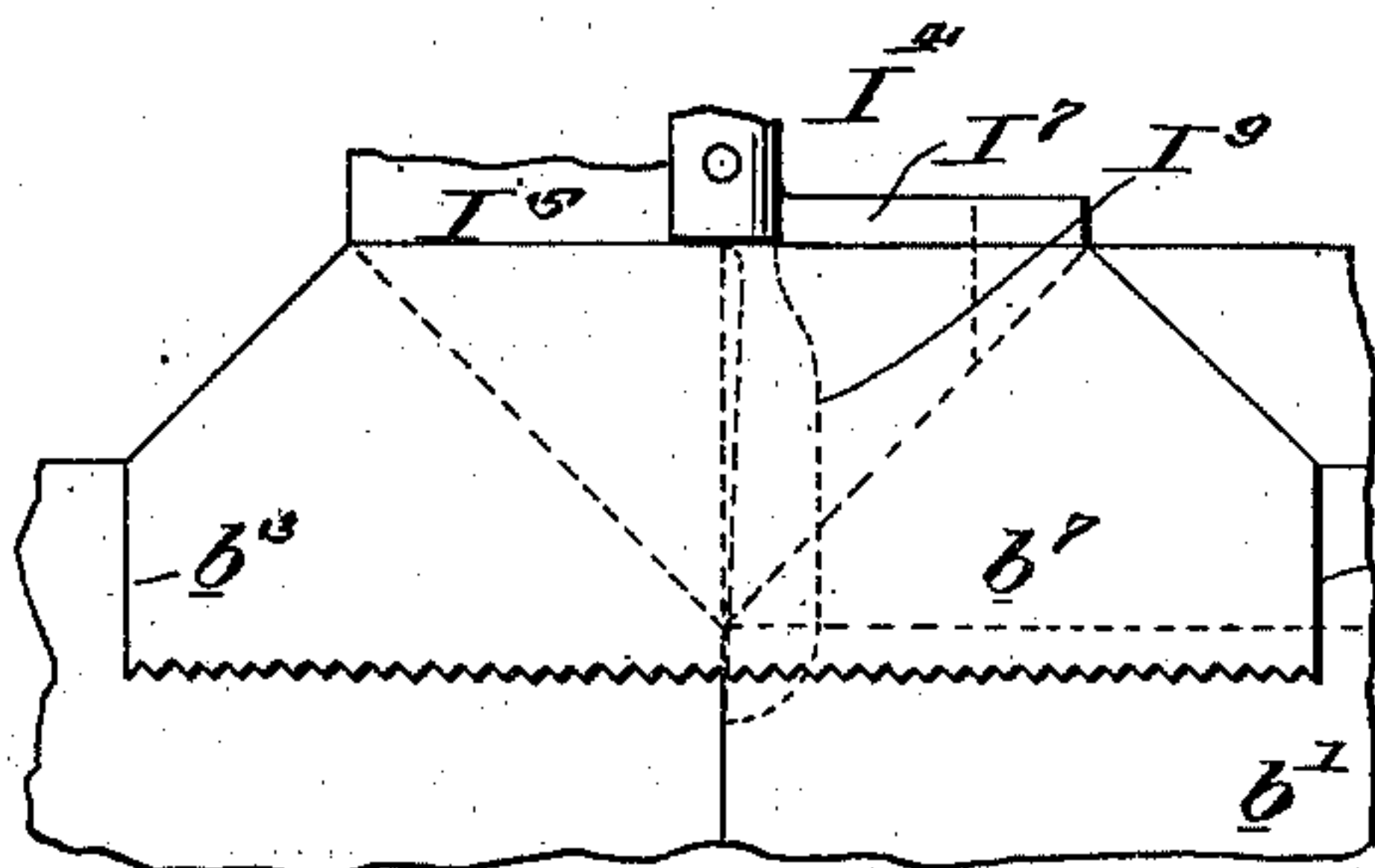


FIG. 11.

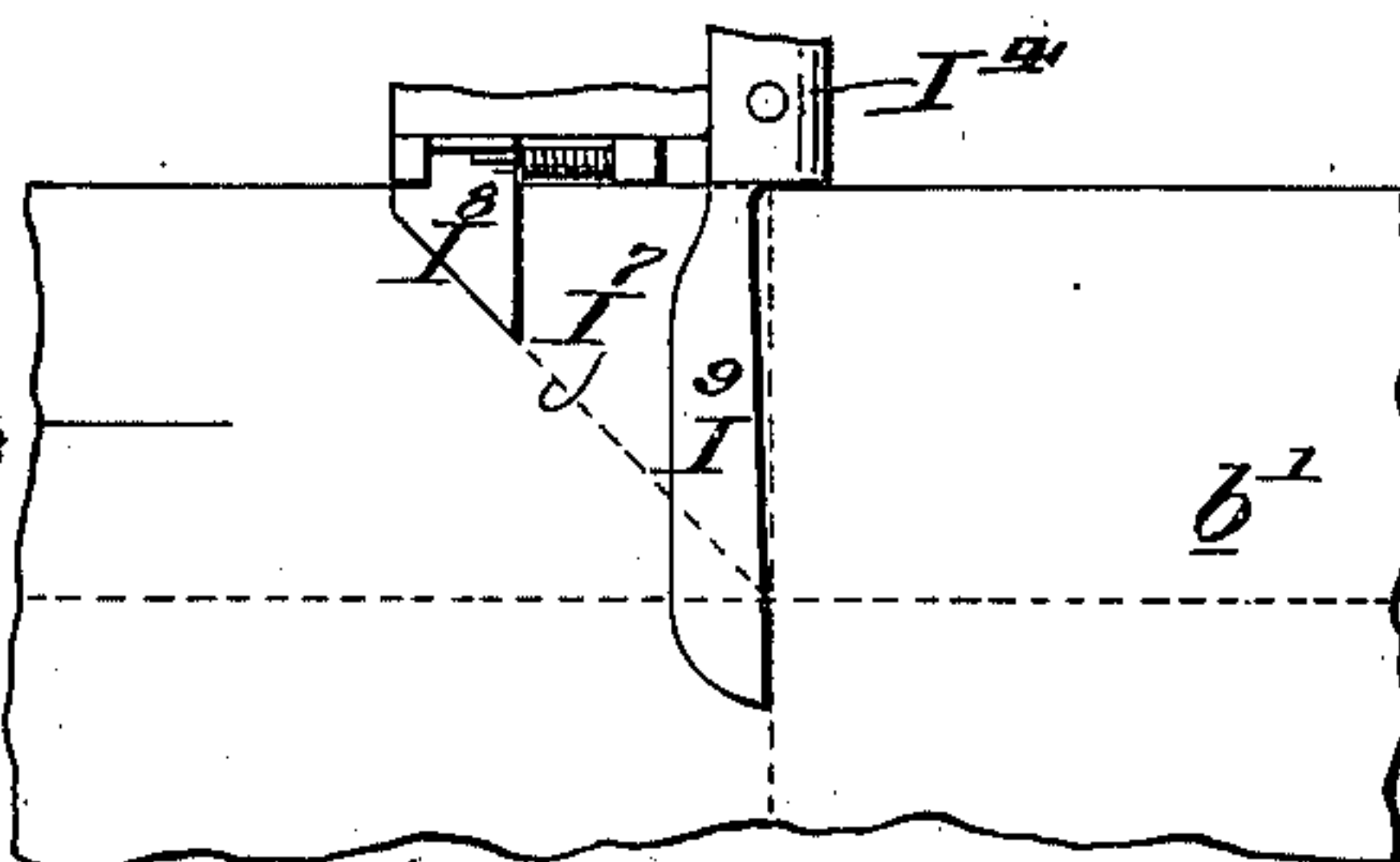


FIG. 10.

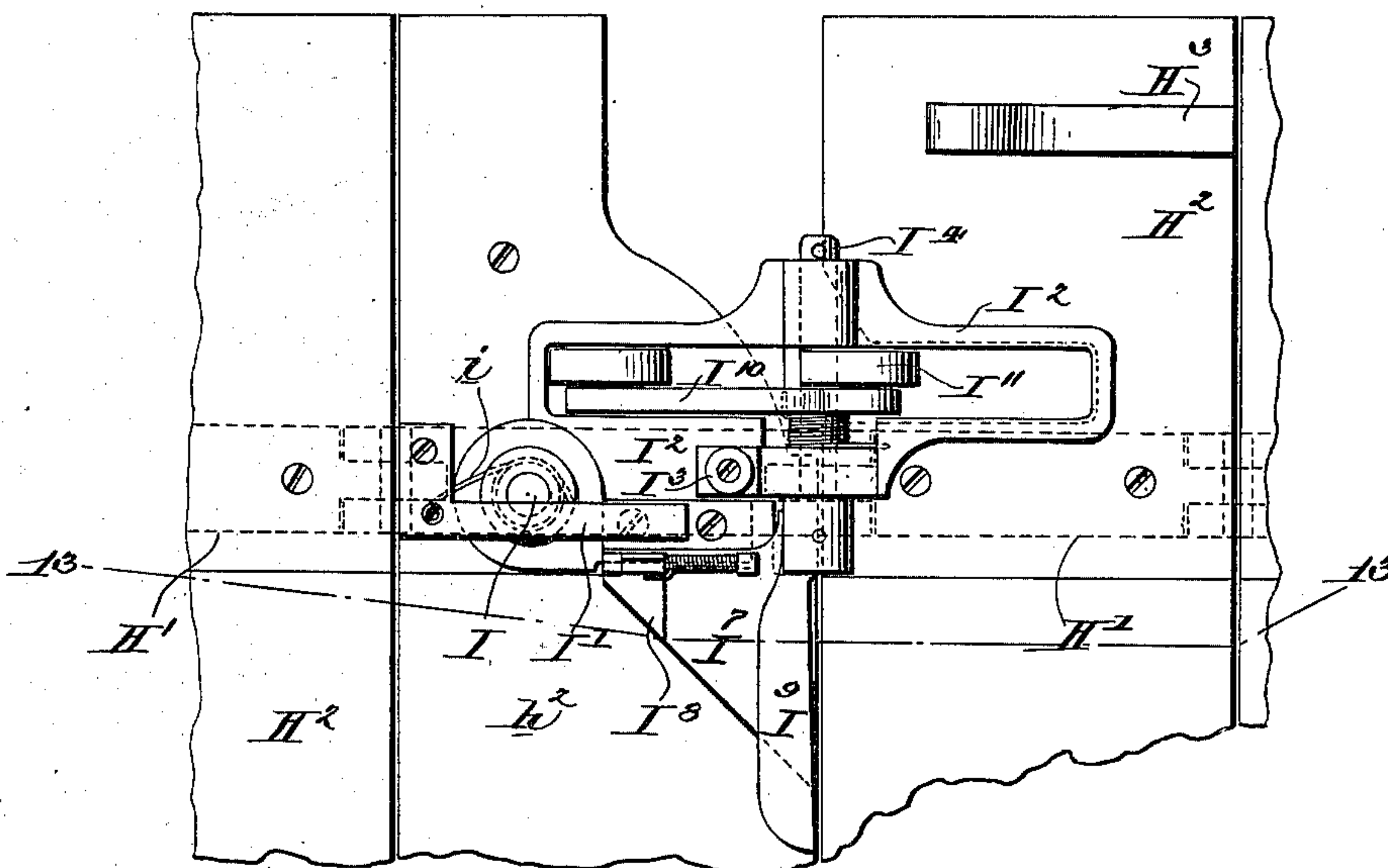
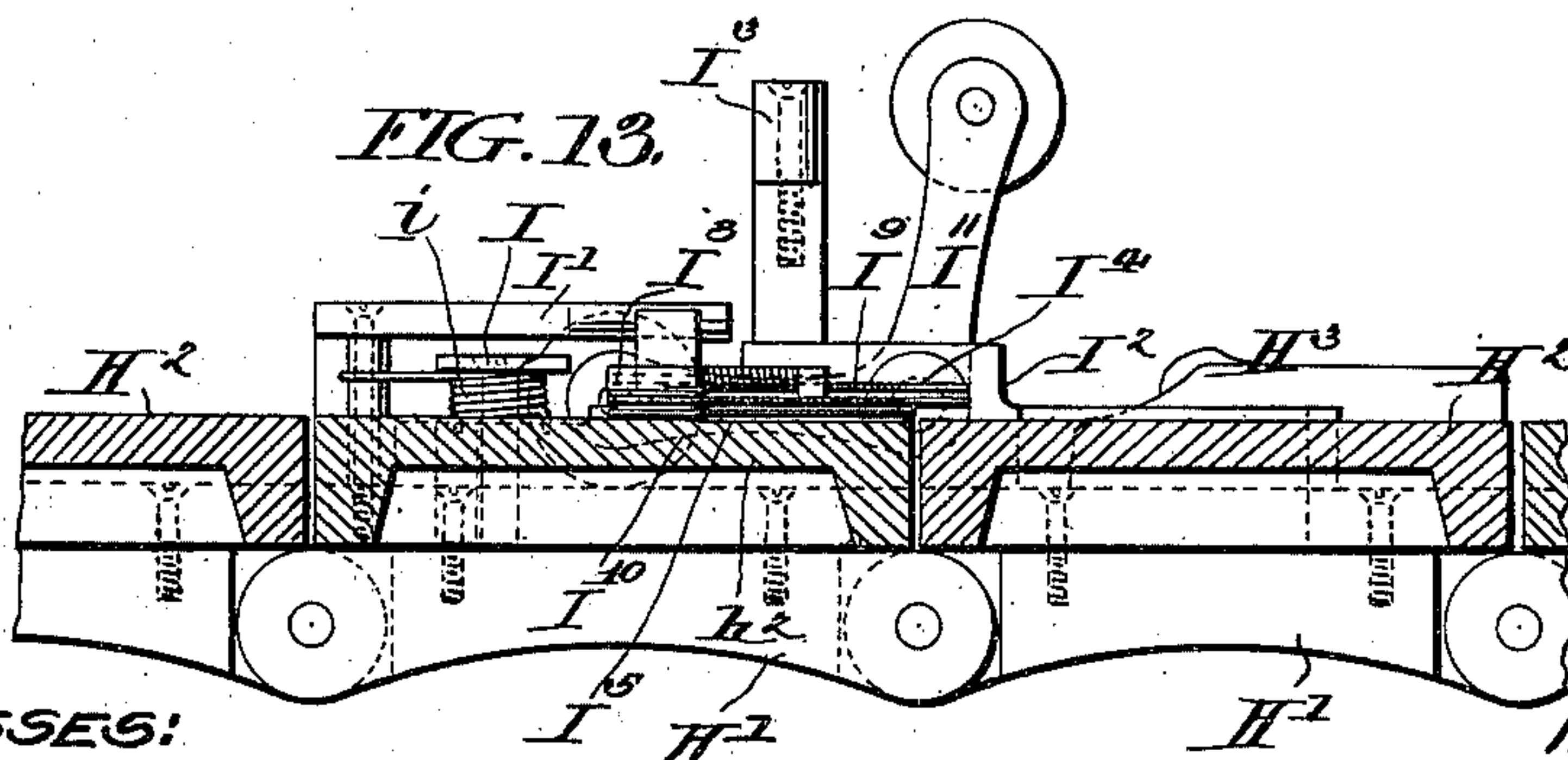


FIG. 13.



WITNESSES:

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W. C. H. H.

INVENTOR:

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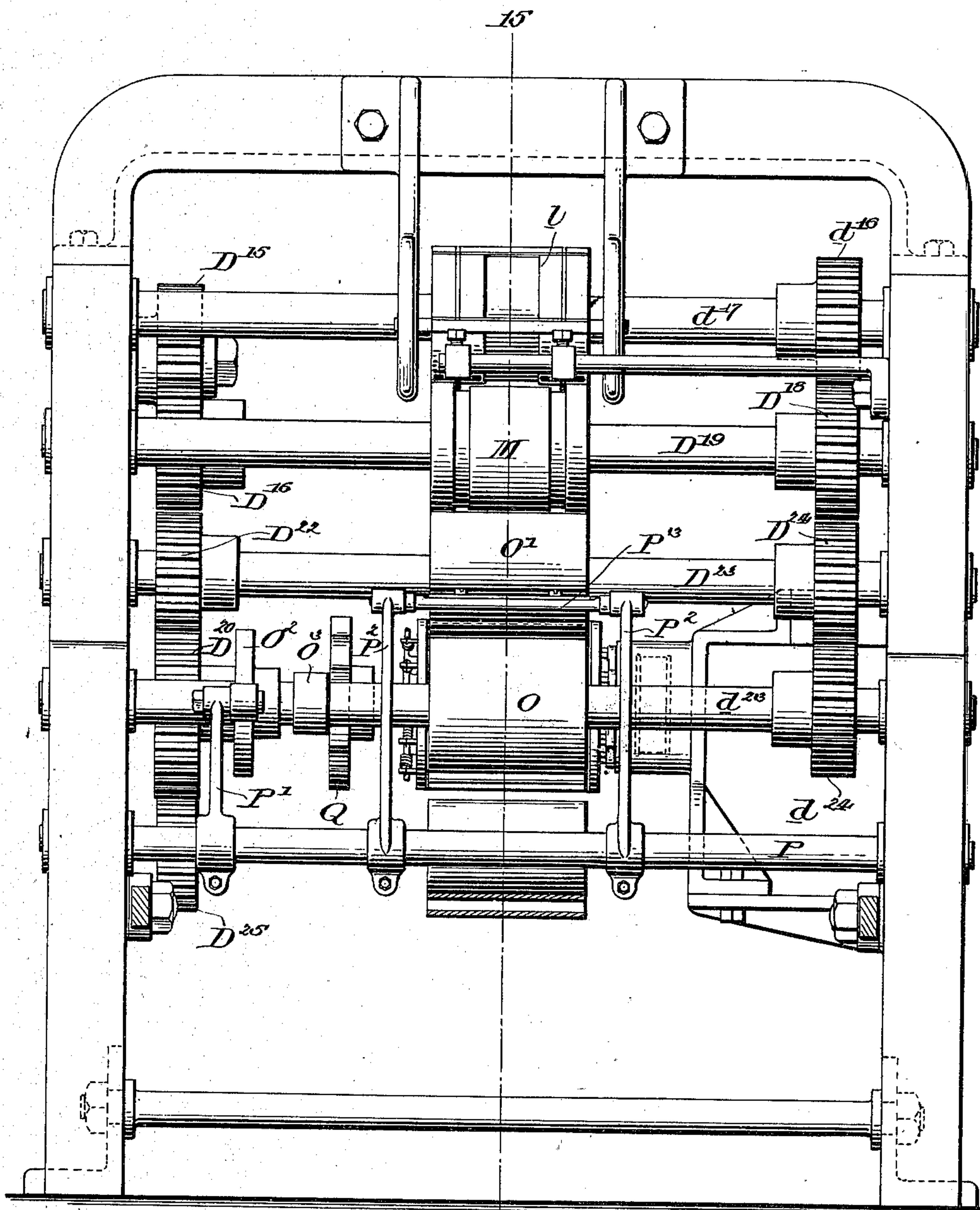
E. J. HOWLETT.
PAPER BAG MACHINE.

APPLICATION FILED APR. 9, 1902.

NO MODEL.

14 SHEETS—SHEET 9.

FIG. 14.



WITNESSES:

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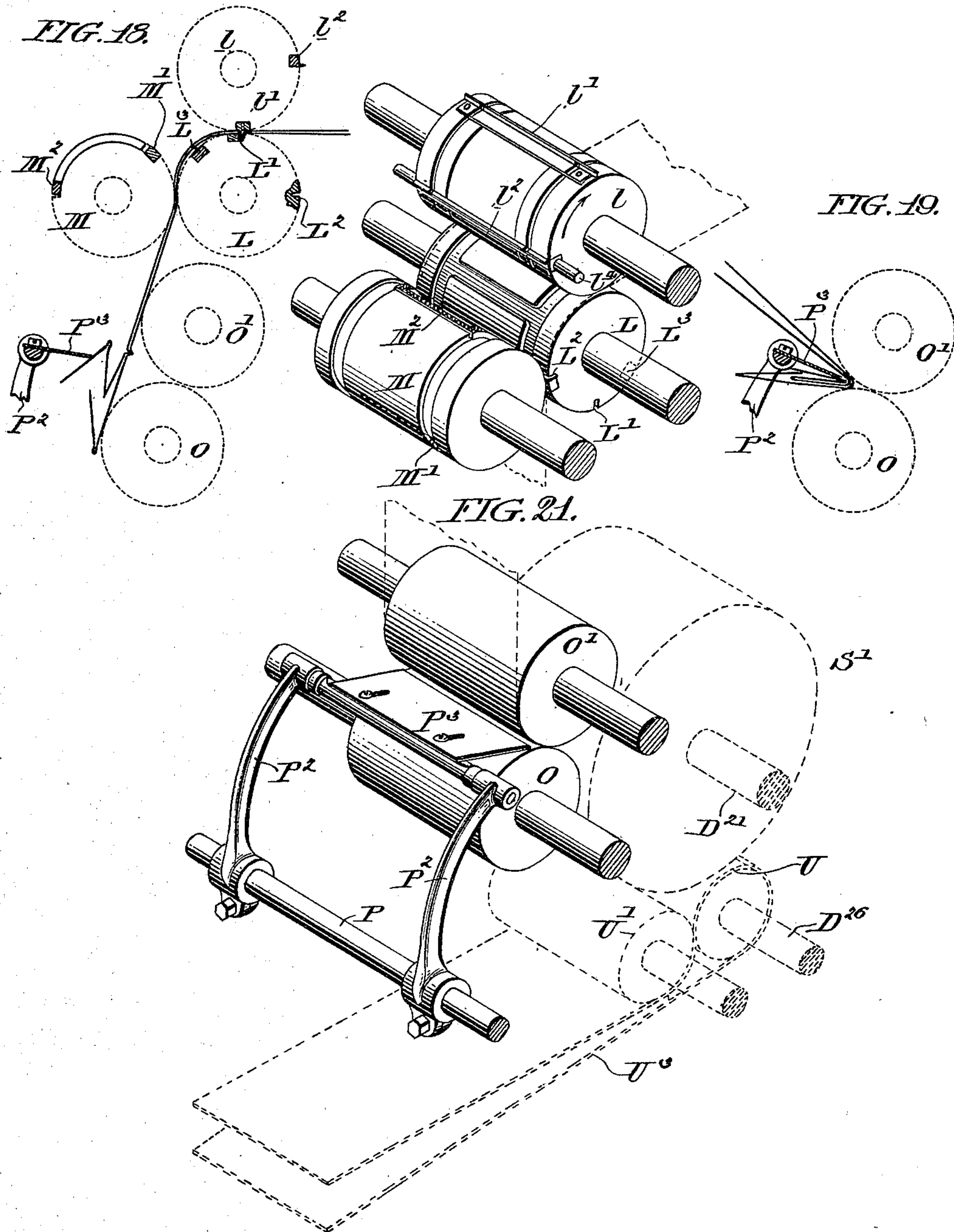
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E. J. HOWLETT.
PAPER BAG MACHINE.
APPLICATION FILED APR. 9, 1902.

NO MODEL.

14 SHEETS—SHEET 11.

FIG. 20.



WITNESSES:
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PAPER BAG MACHINE.
APPLICATION FILED APR. 9, 1902.

NO MODEL.

14 SHEETS—SHEET 12.

FIG. 23.

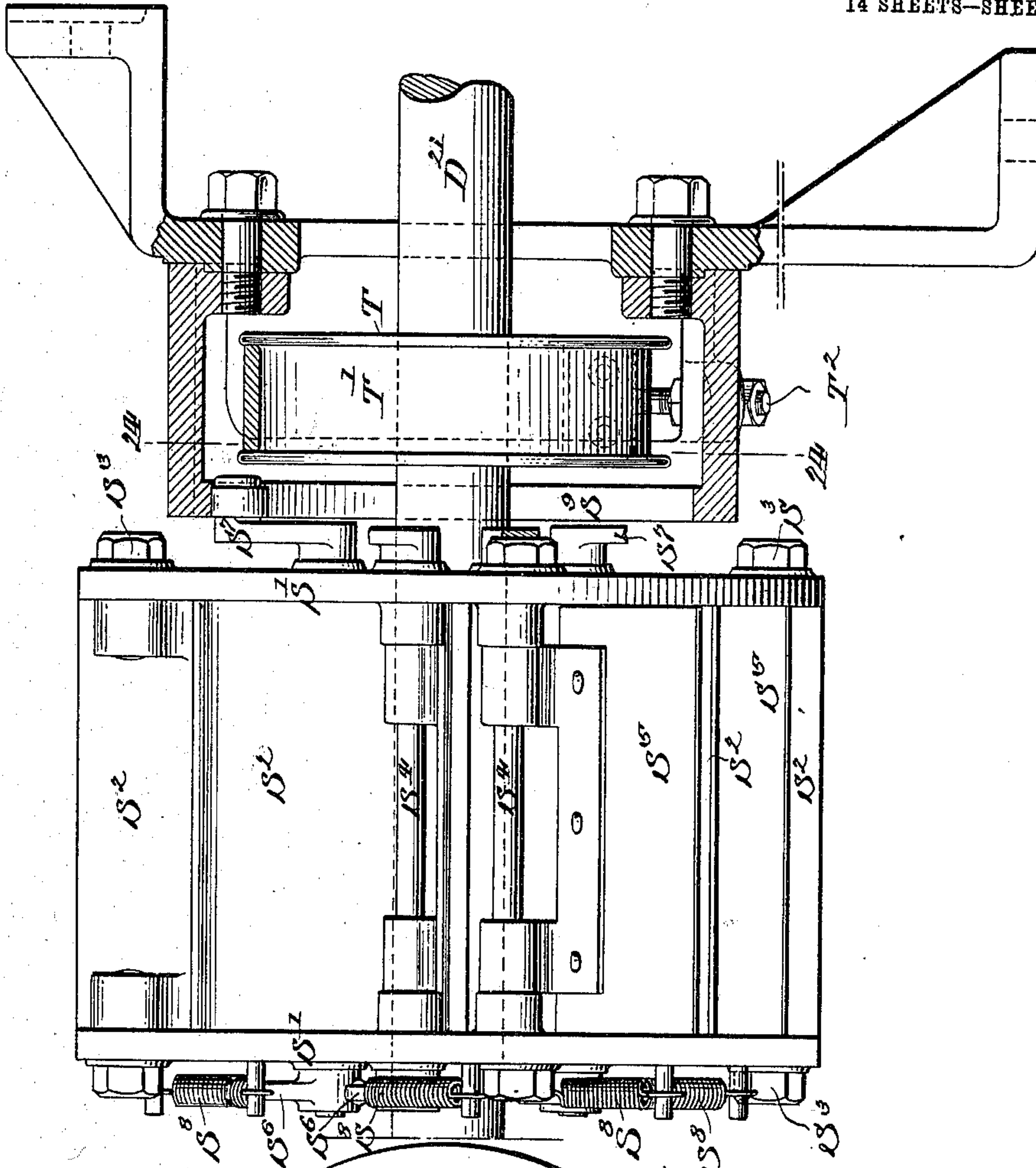
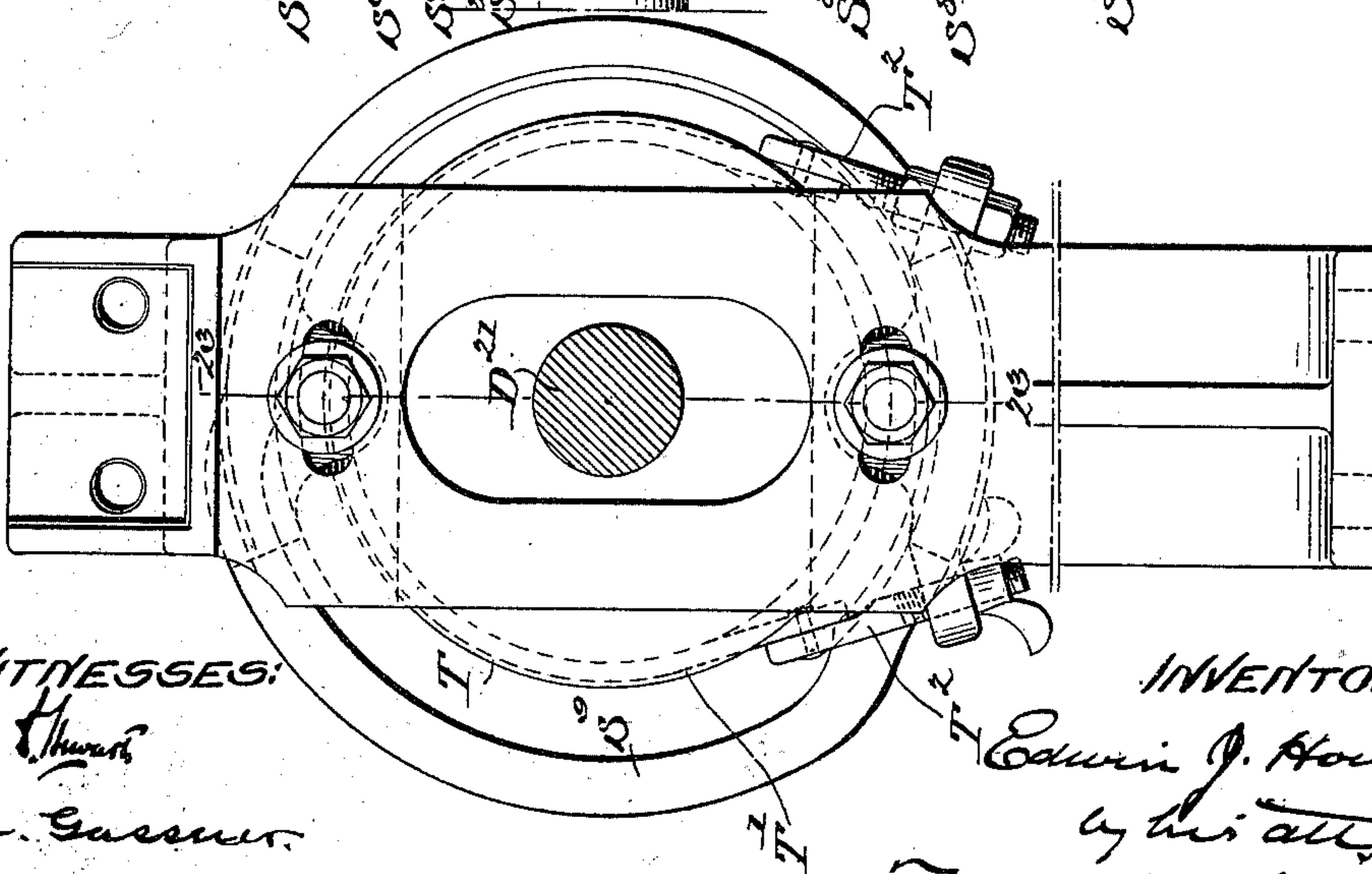


FIG. 22.



WITNESSES:

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INVENTOR:

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Francis J. Chamberlain

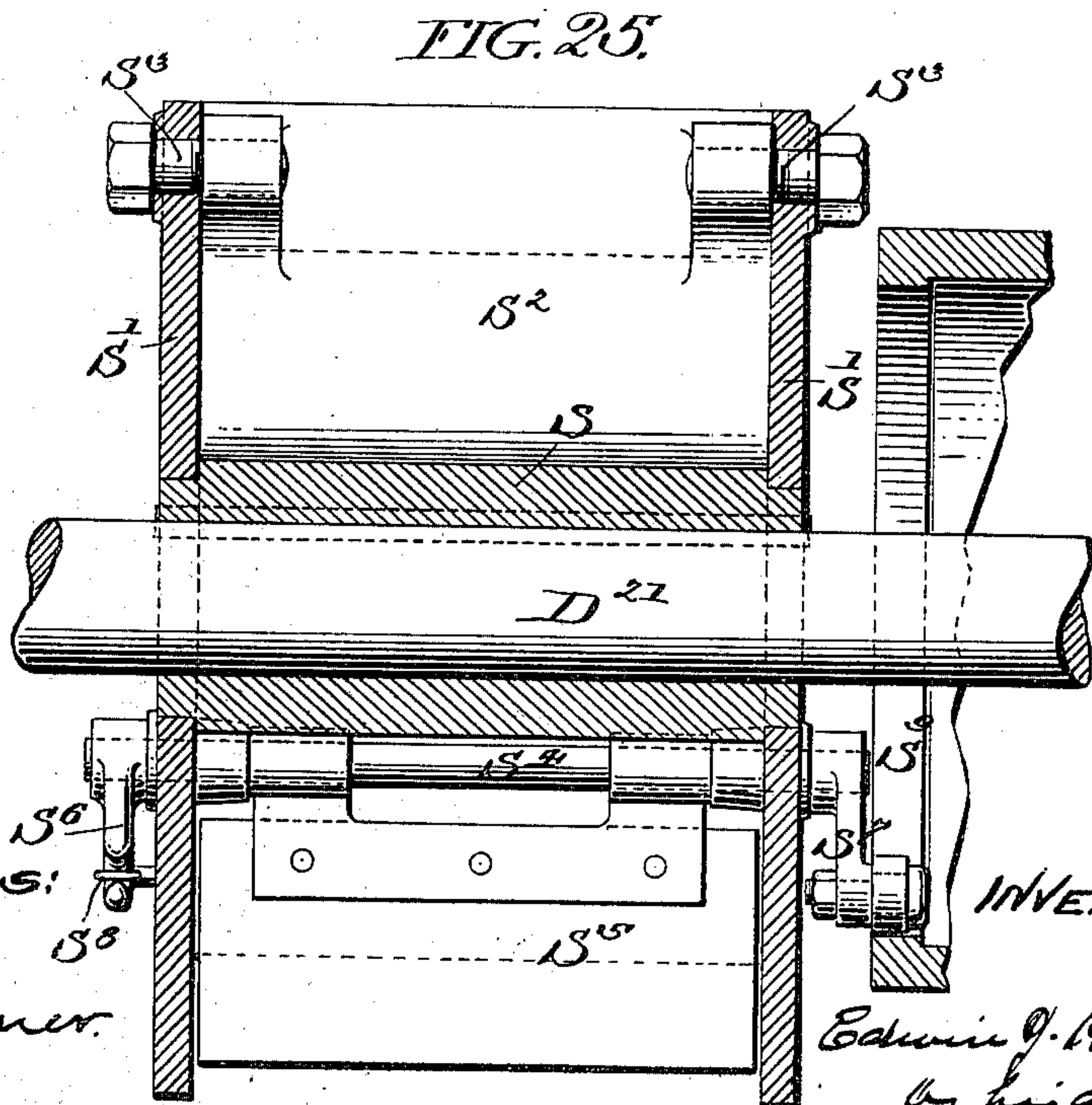
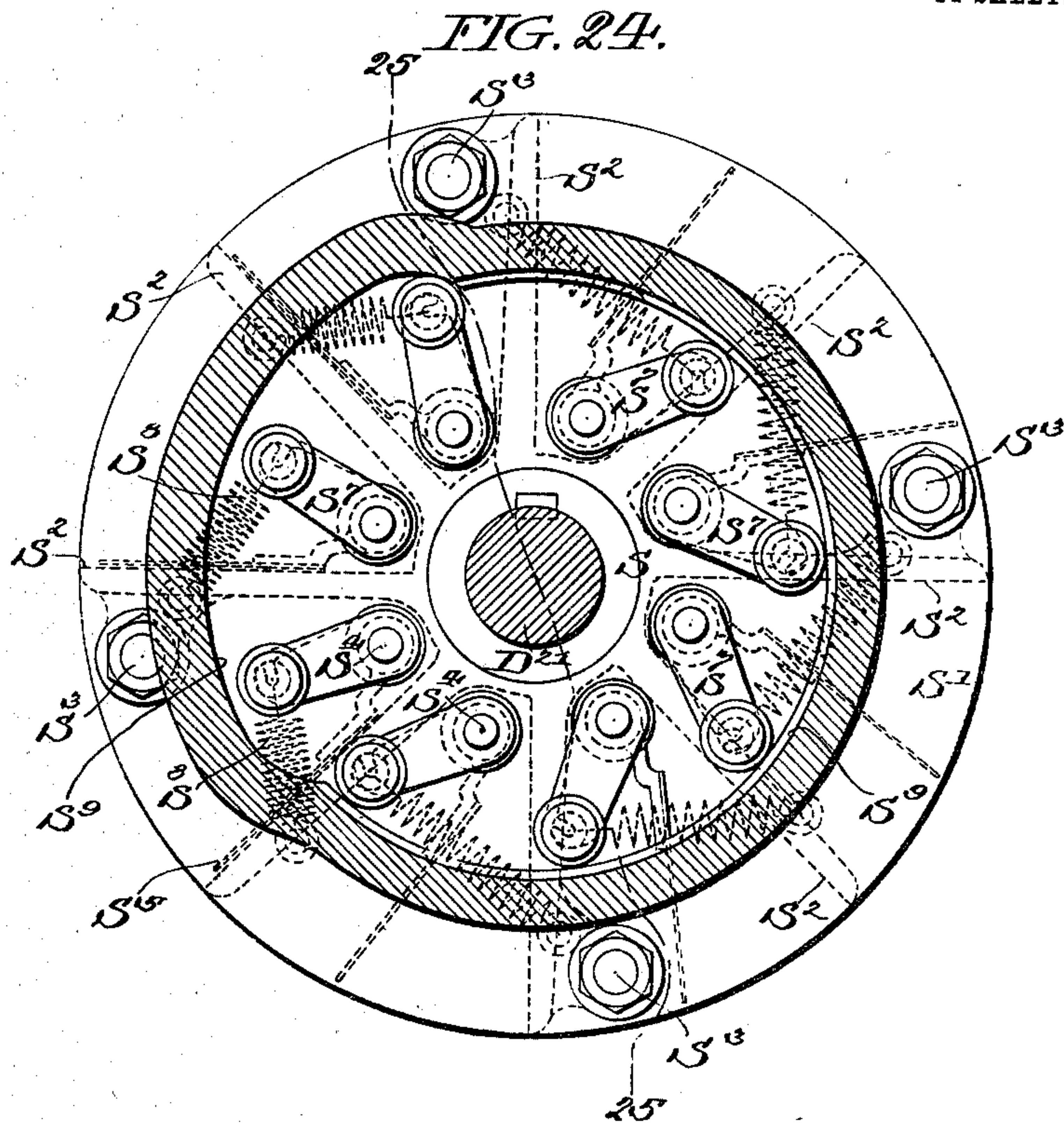
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E. J. HOWLETT.
PAPER BAG MACHINE.
APPLICATION FILED APR. 9, 1902.

NO MODEL.

14 SHEETS—SHEET 13.



WITNESSES:

W. H. Gassner
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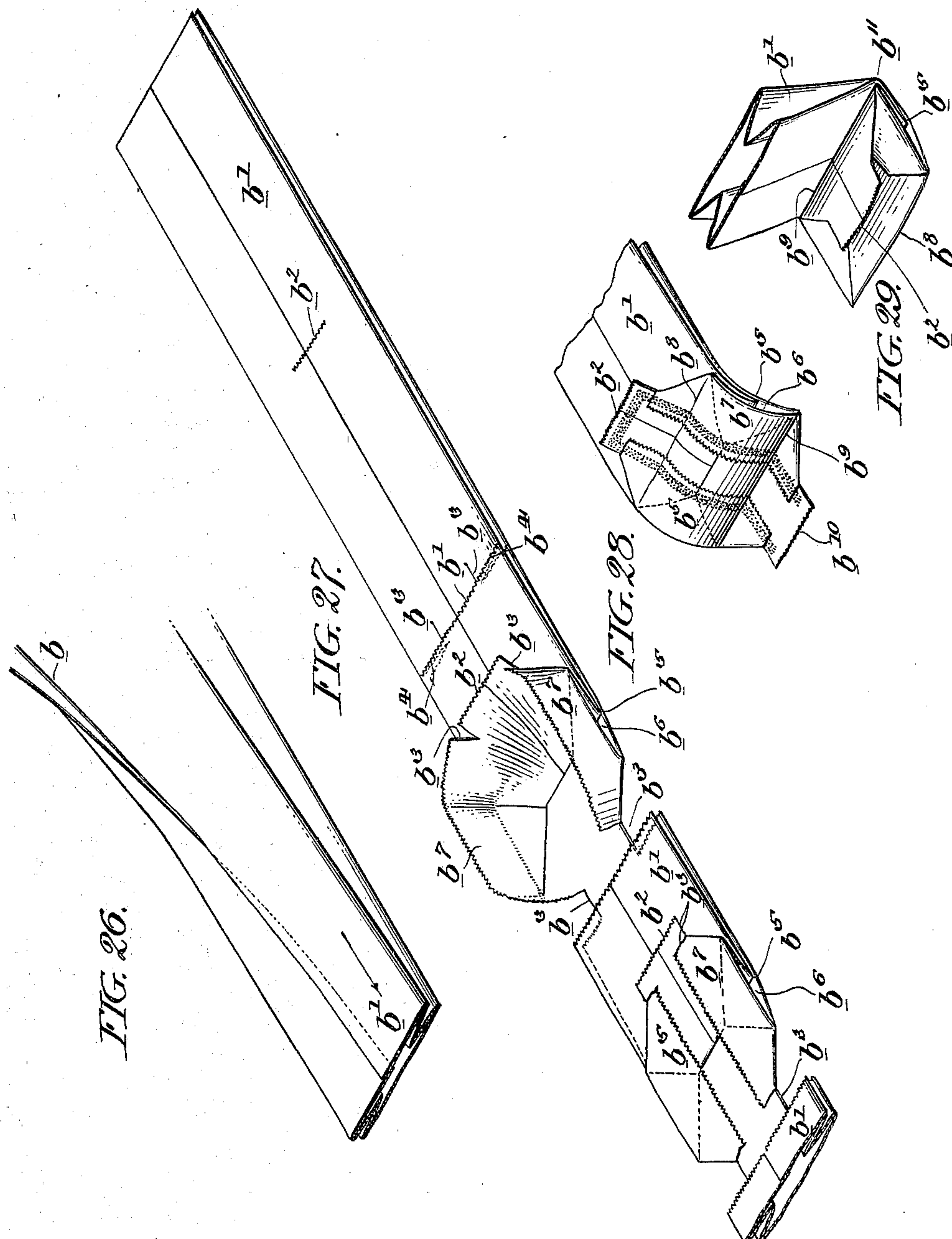
PATENTED AUG. 4, 1903.

E. J. HOWLETT.
PAPER BAG MACHINE.

APPLICATION FILED APR. 9, 1902.

NO MODEL.

14 SHEETS—SHEET 14.



WITNESSES:

Wm. Cassner

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UNITED STATES PATENT OFFICE.

EDWIN J. HOWLETT, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO THE UNION PAPER BAG MACHINE COMPANY, OF PHILADELPHIA, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

PAPER-BAG MACHINE.

SPECIFICATION forming part of Letters Patent No. 735,383, dated August 4, 1903.

Application filed April 9, 1902. Serial No. 102,027. (No model.)

To all whom it may concern:

Be it known that I, EDWIN J. HOWLETT, a citizen of the United States of America, residing in the city and county of Philadelphia, in the State of Pennsylvania, have invented a certain new and useful Improvement in Paper-Bag Machines, of which the following is a true and exact description, reference being had to the accompanying drawings, which form a part thereof.

My invention relates to machinery for making paper bags, and has for its object to provide a machine for this purpose at once simple and efficient.

My machine incorporates in somewhat-improved form the mechanism for opening the ends of bellows-folded blanks into diamond folds, which mechanism is described and shown in the patent to Justus Doering, No. 626,369, of June 6, 1899, the special object of my invention being to combine this or equivalent diamond-folding mechanism with tube-forming, with slitting mechanism, and with mechanism for converting the diamond-folded blanks into paper bags.

The general nature of my invention, both in its features of general organization and also in the features of particular improvements of parts, will be best understood as described in connection with the drawings in which my said invention is illustrated, and in which—

Figures 1 and 1^a constitute a plan view of my machine; Figs. 2 and 2^a, a central longitudinal section on the line 2 2 of Figs. 1 and 1^a. Fig. 3 is a perspective view of the paper-cutting device which makes the first slit in the tube; Fig. 4, a perspective view of the feed-rolls immediately succeeding to the said slitting device; Fig. 5, a perspective view of the cutting mechanism which separates the bellows-folded tube into bag-blanks connected by a narrow web of paper. Fig. 5^a is a side elevation of one of the cams operating in connection with the cutting-roll of Fig. 5, and Fig. 5^b a sectional view illustrating the connection of the cutter with the roll. Fig. 6 is a plan view of the diamond-folding mechanism on a larger scale. Fig. 7 is a longitu-

dinal sectional view taken on the line 7 7 of Fig. 6. Fig. 8 is a cross-sectional view of the side-folding devices, taken on the section-line 8 8 of Fig. 7. Fig. 9 is a perspective view of one of the said side-folding devices. Fig. 10 is a plan view, on a still larger scale, of one of the wing-folding devices which operate to form the diamond fold. Fig. 11 is a detached view showing the entrance position of the wing-folders with respect to the tube; Fig. 12, a similar view showing the action of the wing-folders on the tube. Fig. 13 is a longitudinal sectional view taken on the line 13 13 of Fig. 10. Fig. 14 is an elevation of the rear end of the machine with the paste-box and paste-drum removed. Fig. 15 is a longitudinal sectional view taken on the line 15 15 of Fig. 14. Fig. 16 is a detached elevation of one of the cams acting on the tucker-blade in the roll *l*. Fig. 17 is a detached view of the pocket-drum-actuating mechanism. Fig. 18 is a diagrammatic elevation illustrating the position of the parts just before the tucker *P*³ forces the bag-blank into the grip of the rolls *O* and *O'*. Fig. 19 is another diagrammatic view illustrating the action of the tucker in delivering the bags to the rolls *O O'*. Fig. 20 is a perspective view illustrating the assemblage of the creasing, pasting, and cutting rolls which act upon the diamond-folded blanks. Fig. 21 is a perspective view illustrating the assemblage of the tucker-blade with the rolls *O* and *O'* and their relationship to the pocket-drum and other mechanism. Fig. 22 is an end view, on a large scale, of the pocket-drum and coacting mechanism. Fig. 23 is a side elevation of said drum and coacting devices, partly shown in section, on the line 23 23 of Fig. 22. Fig. 24 is a side elevation of the drum and coacting devices shown on the broken section indicated at 24 24 of Fig. 23. Fig. 25 is a cross-sectional view of the pocket-drum, taken on the line 25 25 of Fig. 24. Fig. 26 is a perspective view illustrating the formation of the web of paper into a bellows-folded tube. Fig. 27 is a perspective view illustrating the various operations performed on the tube up to the formation of the diamond fold thereon. Fig. 28 is a per-

spective view illustrating the condition of the blank after it is creased and severed from the preceding blank. Fig. 29 is a perspective view of the bag as it is delivered to the pocket-drum.

A indicates the frame of the machine; B, the spindle upon which the roll of paper from which the web is drawn is secured, B' indicating the paper-roll itself, and *b* the web of paper drawn from it.

B² and B³ are guide-rolls over which the web passes on its way to the tube-forming mechanism, B⁴ indicating a paste-trough, and B⁵ a paste-wheel, by which a line of paste is applied to one edge of the paper as it is passed over the guide-roll P³. This mechanism and the tube-forming mechanism (indicated in Figs. 1 and 2 and partly in Figs. 1^a and 2^a and generally designated by the letter C) are of a usual well-understood construction, C' indicating the former or prolongation of the former around which the bellows-folded tube is formed.

Motion is communicated to the various moving parts of my machine by a train of gearing which may be briefly described as follows: D is the main driving-shaft, having secured to it fast and loose pulleys (indicated at D' and D²) and a hand-wheel, (indicated at D³.) The shaft D has secured to it the gear-wheel D⁴, which engages and drives the gear-wheel *d*⁴, secured to the shaft *d*, lying immediately above the shaft D. The gear-wheel D⁴ also engages and drives the intermediate gear D⁵, which in turn actuates the gear-wheel D⁶, secured on the shaft D⁷, said gear-wheel D⁶ actuating a superimposed gear-wheel *d*⁶, secured to the shaft *d*⁷, and the gear-wheel D⁶ also actuates the intermediate gear D⁸, which drives the gear D⁹, secured to the shaft D¹⁰, said gear-wheel D⁹ engaging a gear *d*⁹ on an upper shaft *d*¹⁰. The gear-wheel D⁴ also engages and drives the intermediate gear D¹¹, which in turn engages the gear-wheel D¹², secured on the shaft *d*¹², and the gear D¹² drives the intermediate gear *d*¹³, which communicates motion to the gear D¹⁴, secured on the shaft *d*¹⁴. The gear D¹⁴ engages the intermediate gear D¹⁵, which communicates motion to the gear D¹⁶ on the shaft D¹⁷, another gear-wheel on the same shaft D¹⁷ communicating motion to the gear *d*¹⁶ on the shaft *d*¹⁷ and also to the gear D¹⁸ on the shaft D¹⁹. The gear D¹⁴ also communicates motion to a gear-wheel D²⁰, loosely journaled on the shaft D²¹ and communicating motion to the gear D²² on the shaft D²³, another gear D²⁴ on the shaft D²³ communicating motion through the gear-wheel *d*²⁴ to the shaft *d*²³.

Returning now to the operative parts of the machine, the shaft *d*¹⁰ has secured to it a cylindrical enlargement (indicated at E) which is formed (see Figs. 2^a and 3) with a transverse cavity E', through which extends the knife-carrying bar *e*², supporting the knife E², E³ indicating a spring which tends to press the knife outward or into operative position.

To the upper end of the bar E² is pivotally secured a lever E⁵, pivoted at one end to the shaft through a collar E⁴ and having its free end E⁶ resting in contact with a stationary cam E⁷, surrounding the shaft *d*¹⁰ and supported from the frame by an arm E⁸. The cam is so proportioned as to permit the knife E² to come into operation on the upper ply of the paper tube to form a slit in the said ply, such as is indicated at *b*², (see Fig. 27,) *b*¹ indicating the bellows-folded tube. The bellows-folded tube next passes through the feed-rolls F and *f*, secured on the shafts D⁷ and *d*⁷, and thence it passes to the slitting-rolls G and *g*. (Best shown in Figs. 5 and 5^b.) These slitting-rolls are secured on the shafts D and *d*, the lower roll being formed with cutting-grooves, (indicated at G',) while the upper roll *g* is formed with cavities *g*², opening into longitudinal slits *g*¹, G⁴ indicating knife-blades secured on plungers *g*⁴, which extend into the cavity *g*² and are pressed out by springs G³. The knife-blades and plungers have outwardly-extending arms G⁵, which extend into cams G⁶, supported on arms G⁷ and having portions *g*⁶, which permit the cutters to come down and cut through the paper into creases G' and immediately withdraw the cutters. The effect of these cutters is to form the transverse slits *b*⁴ *b*⁴, extending through all the plies of the paper, and other cutting knives (indicated at G⁸) form at the same time the longitudinal slits indicated at *b*³. The effect of the slitting and cutting operations performed upon the tube is to sever it into a series of bag-blanks connected only by narrow tongues of paper on the under ply—as, for instance, is well illustrated in Fig. 27. The tube of paper partly separated into bag-blanks, as above described, passes next over the rotating endless apron of the diamond-folding apparatus which, as shown in my drawings, is for the most part practically identical with that of the Doering patent, No. 626,369, aforesaid. This mechanism is best shown in Figs. 6 to 13, inclusive, H H indicating sprocket-wheels secured on the shafts *d*¹² *d*¹⁴, H' H' indicating endless chains passing over these spur-wheels and supporting-platform, (indicated at H².) Upon certain equally-disposed platforms (indicated at *h*²) are secured the wing-folding fingers in the same way as described in the Doering patent—that is to say, the finger-supporting frames I² are pivoted on studs I, extending upward from the platform *h*² and normally pressed outward by the action of a spring *i*, their inward movement being limited by the stop-rods I'. The frames I² have extending upward from them the non-rotative fingers I⁵. The frames also support the shaft, (indicated at I⁴), upon the end of which is secured the rotative finger I⁷, with the spring-nipper connected with it, the shaft also supporting the transverse defining finger or plate I⁹. To the shafts I⁴ are attached the cam-contacting levers, (indicated at I¹⁰ and I¹¹.)

J J represent longitudinally-extending cam-bars supported over the upper face of the tables H^2 , as shown, and having upon them cam-paths J' , adapted to act upon the levers I^{10} and I^{11} , and also a cam-path J^2 , adapted to act upon the standards I^3 .

The operation of the fingers will be well understood and is exactly the same as in the Doering patent aforesaid. When the blanks are received on the tables of the endless aprons, the fingers are retracted, as shown in Fig. 7 blanks move forward with the same speed as the table, and the cams J^2 , acting on the standards I^3 , press the fingers which are folded together, as shown in Figs. 10, 11, and 13, into the bellows folds of the tube, the finger I^9 passing over the top of the tube. The cams J' next operate successively on the levers I^{11} and I^{10} , folding over the fingers I^7 and I^9 from the position shown in Figs. 10 and 11 to that shown in Fig. 12, opening up the diamond approximately, as shown in the partly-distended blank of Fig. 27, while or just after the wing-folders have performed their operation on the blank it goes between the side-folder plates. (Best shown in Figs. 8 and 9.) The device here illustrated is secured to the cam-supporting bars J through upwardly-extending studs, (indicated at K,) to the top of which are firmly secured the bars K^5 , having pivoted at their ends the levers K^7 .

K^2 represents plates through which the studs K pass and which are held up in the position shown in Figs. 8 and 9 by the action of springs K' . The plates K^2 have vertically-extending portions K^3 , to the lower edge of which are pivoted the folder-plates K^6 , said plates being normally drawn up, as shown by the action of springs K^{13} and also by the free ends of rods K^8 . The plates K^2 are connected with pivot-levers K^{10} by links K^9 , and the levers K^{10} , pivoted to the frames J at K^{11} , have on their free ends cam-rollers K^{12} , which lie in the path of cam projections H^3 , secured to appropriate tables H^2 of the traveling pulley. In operation, the blank with the partly-distended diamond lying between the upwardly-extending folder-blanks K^6 , the cams H^3 come in contact with the cam-roller K^{12} , turning the lever K^{10} and drawing the plate K^2 downward. This plate has a slotted extension K^4 , through which the lever K^7 extends, and the upper part of this slot as the lever moves upward presses it downward, so that the folder-plates are moved from the position shown in full lines to that shown in dotted lines in Fig. 8, with the effect of flattening down the diamond to the complete form. (Shown in Fig. 27.) This side-folding device is an improvement upon the mechanism provided for a similar purpose in the Doering patent and has been found to give better results.

Passing now to the mechanism which completes the bag, I will state that the diamond-folded connected series of blanks pass from the table upon which the diamond folds are

formed between the rolls L and l , secured to the shafts D^{17} and d^{17} . These rolls in their coaction serve at the same time as feed-rolls and as creasing-rolls, which form the transverse crease-lines, (indicated at b^8 and b^9 in Fig. 28.) For this purpose the roll l is provided with a fixed creasing-blade l' , which in coaction with the slot L' in the roll L is sufficient to form the front crease b^9 . The roller l is also provided with a creasing-blade l^2 , which is readily movable in a slot formed in the face of the roll and pressed outward by springs, as indicated in Fig. 15. The ends of the creasing-bar project from the sides of the roll, as indicated at l^4 , and work in the cams l^5 , supported on the arms l^6 , and which permit the springs to force the creasing-bar l^2 into the slot L^2 of the lower roll and immediately withdraw the same, the effect being to form a much stronger crease at b^8 , where the crease has to be through numerous plies of paper. The roll L also serves as a feed-roll and cutting-roll in its combination with a roll M, secured on the shaft E^{10} , said roll M also serving as a paste-applying roll, having a portion of its face (indicated at M^2) elevated and of the conformation of the line of paste to be applied to the diamond, as shown in Fig. 28, said elevated face running in contact with the paste-drum N in the paste-trough N'. Said roll M also has a knife-block M' secured to its face, which operates in connection with a knife L^3 , secured across the roll L, which knife severs the blanks from each other on the line indicated at b^{10} , Fig. 28. From the rolls L and M the creased and pasted blanks are fed downward in front of the rolls O and O', secured on the shaft d^{23} and D^{23} , to approximately the position indicated in Fig. 18, and in this position the blanks are engaged by the advancing tucker P^3 , secured on lever-arms P^2 , which in turn are secured to a rock-shaft P, having secured to it the cam-lever P' , which rests in contact with the cam O^2 on the shaft d^{23} , a spring P^4 acting to hold the cam-lever in contact with the face of the cam. The action of the tucker E^3 is indicated in Figs. 18 and 19, where it is shown as forcing the blank into the bight of the rolls O and O', forming what is known in the art as a "blind fold." From the rolls O and O' the blind-folded bags are delivered into pockets of the rotating drum secured on the shaft D^{21} , said drum being made up of a hub S, to which are secured the side plates S' S' and from which extend the radial portions S^2 S^2 , forming a series of pockets in the face of the drum. Extending through the face of the pockets and through the walls S' are a series of shafts S^4 S^4 , &c., to which are secured the presser-plates S^5 S^5 . At one side the shafts S^4 have projecting levers S^6 , to which are connected springs S^8 , the action of which is to press plates S^5 against the partition S^2 . From the other ends of the shafts S^4 extend cam-contacting levers S^7 , cam-rollers on the end of which are acted on by the cam S^9 , secured around the shaft

D²¹, as well shown in Figs. 22, 23, 24, and 25. The action of this cam is to cause the plate S⁵ to move away from contact with the partitions S² for the purpose both of affording entry to the bags and also of permitting them to fall out of the drum. The pocket-drum is secured to the shaft D²¹, which shaft is actuated by the action of the rotating shaft d²³, engaging at each rotation in one of the teeth of the star-wheel Q, secured on the shaft D²¹, as shown in Fig. 17. This gives to the shaft and pocket-drum an intermittent rotative movement, causing a further pocket to be presented to receive a bag from the rolls O O' at each rotation of said rolls, and in order to prevent the shaft and drum from moving too fast I have secured on the shaft D²¹ the brake-wheel T, over which passes the friction-band T', secured to and adjusted by the screws T². In operation the blind-folded bags are fed by the rolls O and O' into a pocket of the drum, the presser-plate and pocket in registry being turned back, as well shown in Fig. 15, and immediately thereafter the drum makes a partial rotation, the cam S⁹ causing the presser-plate to close down on the inserted bag-bottom, pressing it against the partition, and at the next movement of rotation the cam again operates to press the presser-plate back, permitting the bag to fall out of the bight, as indicated at b' in Fig. 15, and for the purpose of opening the bag out into proper position and obliterating the blind fold I provide the feed-rolls U and U', which seize the front end of the bag and of course press back the body of the bag. By preference I surround the roll U with a belt U³, which passes also over a roll U², and which serves to carry away the bag, also insuring it longer contact with the roll U'.

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 of mechanism for forming a bellows-folded tube and slitting the same into a series of blanks connected by a narrow neck on the under side only, of a rotating table arranged to receive the blanks from the forming mechanism and having connected to it two or more sets of tube-distending fingers, mechanism for moving said fingers in and out as the table advances, so as to engage and disengage the bellows folds of the tube, mechanism for rotating the movable fingers while engaged with the folds to spread open the bottoms of the blanks, mechanism for folding down the sides of the distended tube end formed by the fingers to form a diamond, acting on the blank while it is carried by the table, and mechanism arranged to receive the connected diamond-folded blanks from the table, having in combination devices for cutting said blanks apart and folding in the ends of the diamond folds to complete the bags.

2. In a paper-bag machine, the combination of mechanism for forming a bellows-folded

tube and slitting the same into a series of blanks connected by a narrow neck on the under side only, of a rotating table arranged to receive the blanks from the forming mechanism and having connected to it, two or more sets of tube-distending fingers, mechanism for moving said fingers in and out as the table advances, so as to engage and disengage the bellows folds of the tube, mechanism for rotating the movable fingers while engaged with the folds to spread open the bottoms of the blanks, mechanism for folding down the sides of the fold formed by the fingers and mechanism arranged to receive the connected diamond-folded blanks from the table, having in combination devices for creasing the blanks across on the lines of the final folds, cutting the connected blanks apart, and folding the ends of the diamond over on the crease-lines to complete the bag.

3. In a paper-bag machine, the combination of mechanism for forming a bellows-folded tube and slitting the same into a series of blanks connected by a narrow neck on the under side, of a rotating table, arranged to receive the blanks from the forming mechanism and having connected to it two or more sets of tube-distending fingers, mechanism for moving said fingers in and out as the table advances to engage and disengage the bellows folds of the tube, mechanism for rotating the movable fingers while engaged with the folds, to spread open the bottoms of the blanks, wing-folders K⁶ K⁶, secured to the frame of the machine, mechanism for actuating said wing-folders actuated by cams on the table and whereby the wing-folders are brought down against the sides of the diamond fold as each partly-distended blank passes them, and mechanism for severing the diamond-folded blanks and folding them into bags and arranged to receive the connected blanks from the table.

4. In a paper-bag machine, the combination with folding mechanism for completing the folds of a bag, a receiving-drum having a series of pockets into which the bag-bottoms are successively delivered, a series of pressers, one secured in each pocket, means for intermittently and rotatively moving the drum, and means for actuating the pressers to grip and press each bag-bottom and subsequently release the same.

5. In a paper-bag machine, the combination with folding mechanism for completing the folds of a bag, a receiving-drum, having a series of pockets into which the bag-bottoms are successively delivered, a series of pressers, one secured in each pocket, a pair of feed-rolls placed beneath the pocket-drum to receive the bags therefrom, means for intermittently revolving the drums, means for actuating the pressers to close on and compress the bag-bottoms as the drum-pocket moves away from its receiving position, and to release the bags when in position to fall into the grip of the feed-rolls.

6. In a bag-machine, the combination of mechanism for forming a web of paper into a bellows-folded tube, mechanism for cutting said tube into bag-blanks connected by narrow necks of paper on the under ply and mechanism for opening the ends of the connected blanks into diamond folds, of bag-finishing mechanism having in combination, a pair of creasing-rolls adapted to crease the diamond on the lines of the final folds, pasting-rolls arranged to receive and apply paste to the creased diamonds, a cutter operating to sever the connecting-necks of paper, a pair of feed-rolls O O', in front of which the pasted blanks are presented, a tucker P³, operating to force the blanks into the bight of rolls O O', as described, a receiving-drum having a series of pockets into which the bags are delivered by rolls O O', said drum having in each pocket a presser-plate, means for intermittently rotating the drum, and means for operating the presser-plates so that they open to receive the bags, close on said bags, and again open to deliver the same.

7. In a bag-machine, the combination of mechanism for forming a web of paper into a bellows-folded tube, mechanism for cutting

said tube into bag-blanks connected by narrow necks of paper on the under ply and mechanism for opening the ends of the connected blanks into diamond folds, of bag-finishing mechanism having in combination, a pair of creasing-rolls adapted to crease the diamond on the lines of the final folds, pasting-rolls arranged to receive and apply paste to the creased diamonds, a cutter operating to sever the connecting-necks of paper, a pair of feed-rolls O O', in front of which the pasted blanks are presented, a tucker P³, operating to force the blanks into the bight of rolls O O', as described, a receiving-drum having a series of pockets into which the bags are delivered by rolls O O', said drum having in each pocket a presser-plate, means for intermittently rotating the drum, means for operating the presser-plates so that they open to receive the bags, close on said bags, and again open to deliver the same, and a pair of feed-rolls arranged to receive the bags from the drum and open out the blind fold.

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Witnesses:

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