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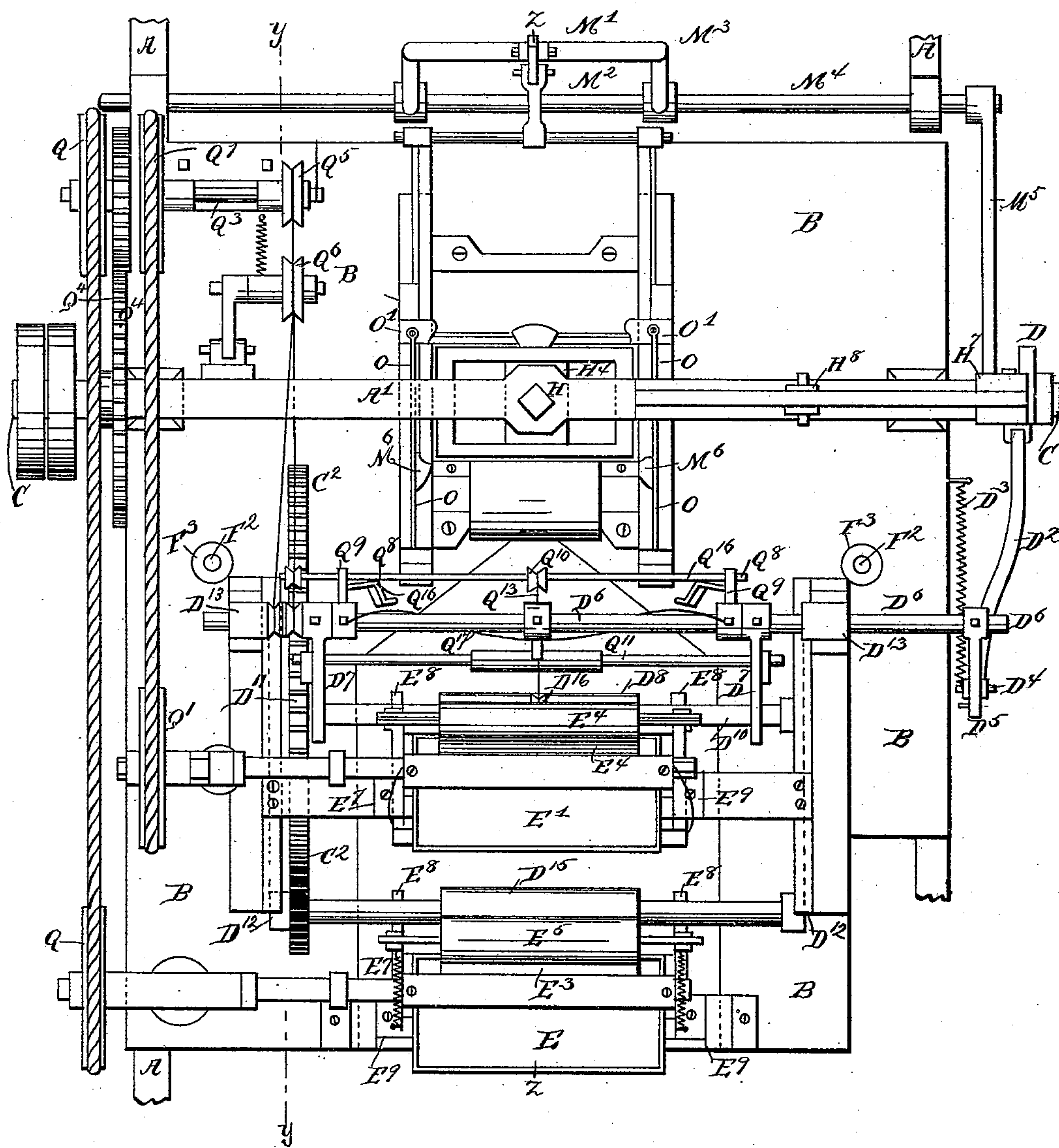
7 Sheets—Sheet 1.

E. RAU.
ENVELOPE MACHINE.

No. 446,124.

Patented Feb. 10, 1891.

Fig. 1



Witnesses

Jas. E. Warner
James M. Hickey

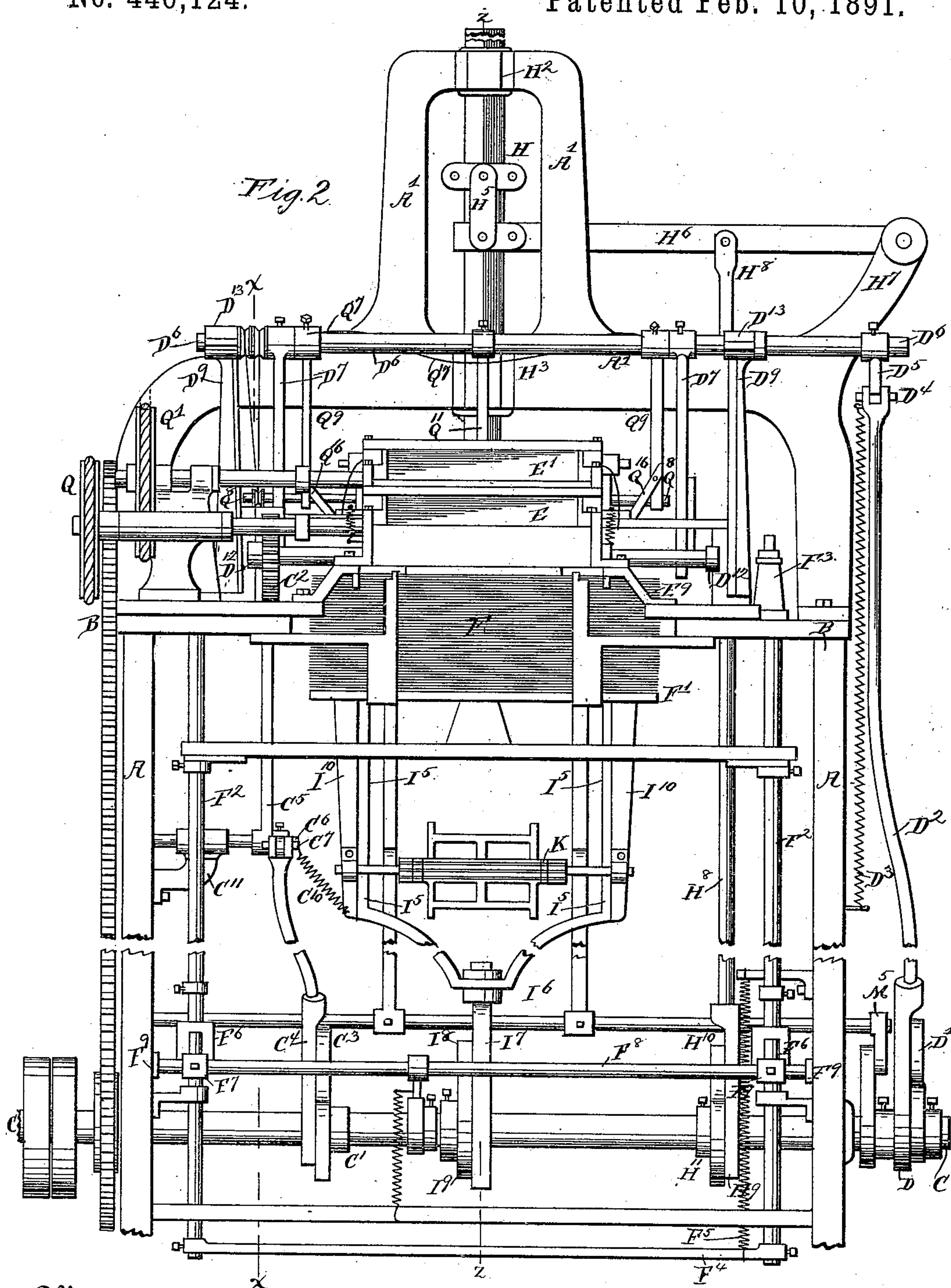
Inventor

Emanuel Rau
By his Attorney
W. L. Remmen

7 Sheets—Sheet 2.

Patented Feb. 10, 1891.

No. 446,124.



Witnesses
Jas C. Turner
James M. Hicks

Inventor
Emanuel Rau
By his Attorney
W. L. Bennett

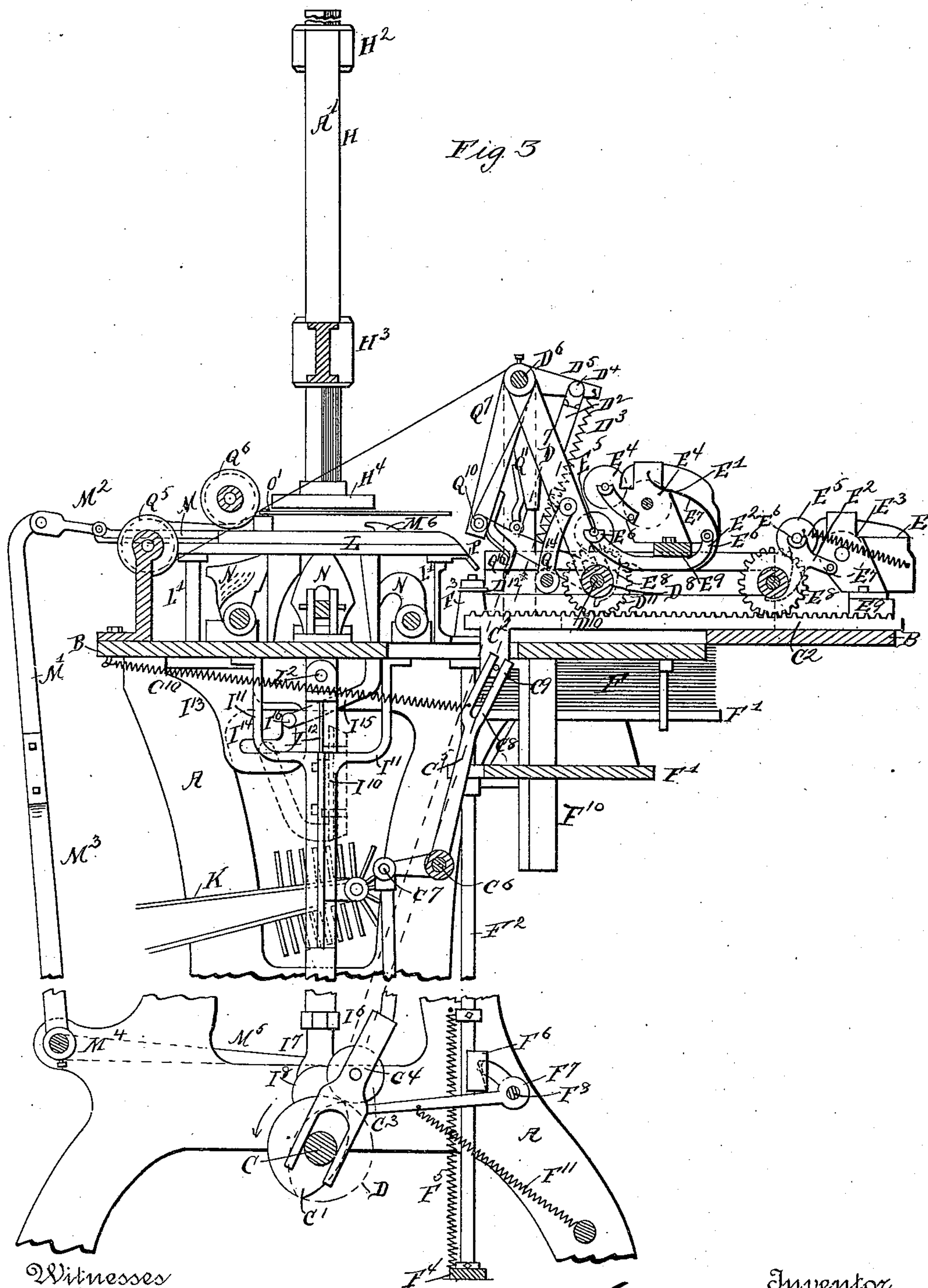
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Patented Feb. 10, 1891.



Witnesses
Jack Starnes
James M. Hicks

Inventor
Emanuel Rau
By his Attorney
W. L. Bennett

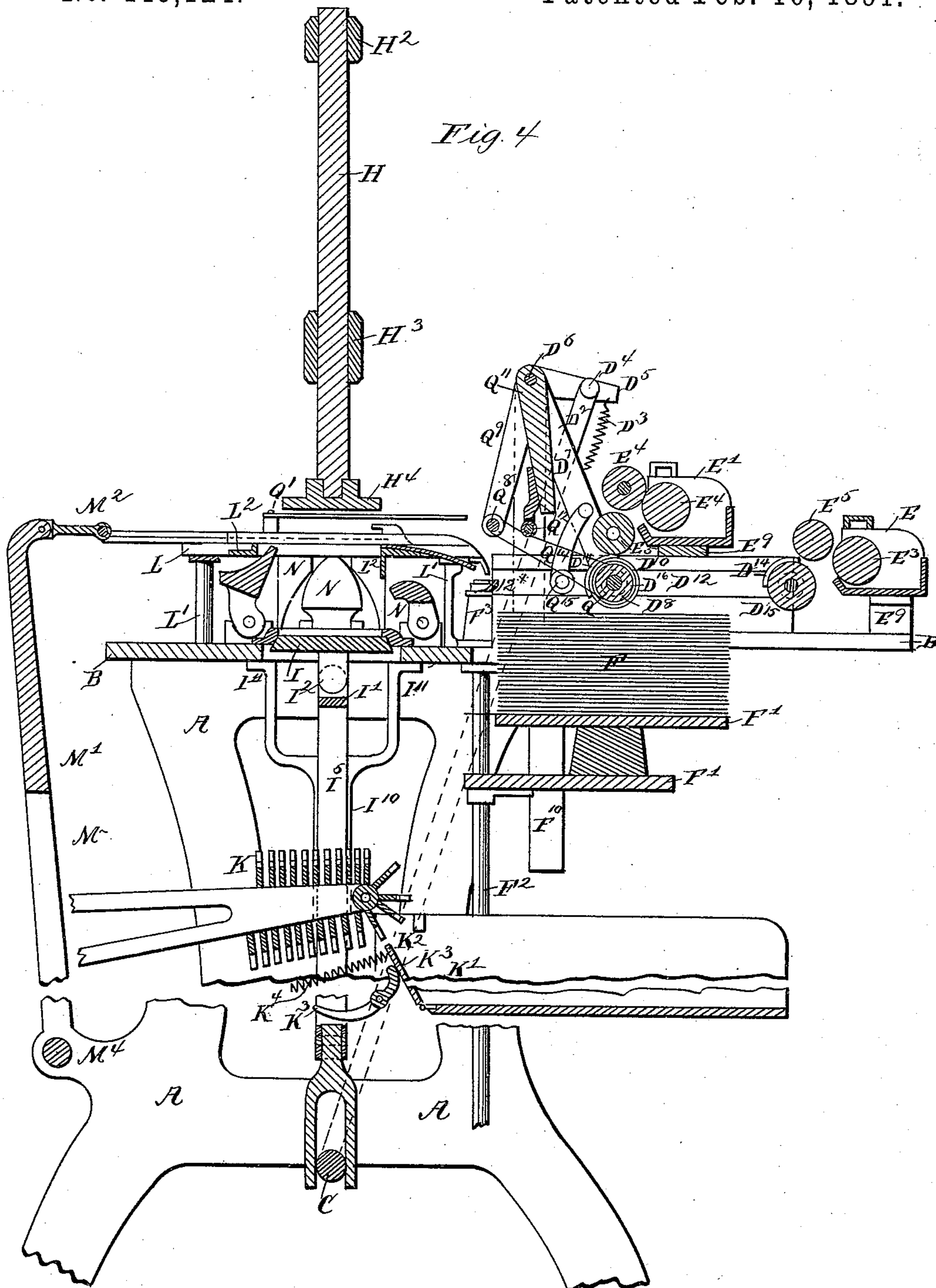
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E. RAU.
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Patented Feb. 10, 1891.



Witnesses

Jas Estarner
James B. Hicks

Inventor

By his Attorney
Emanuel Saw
A. L. Pennam

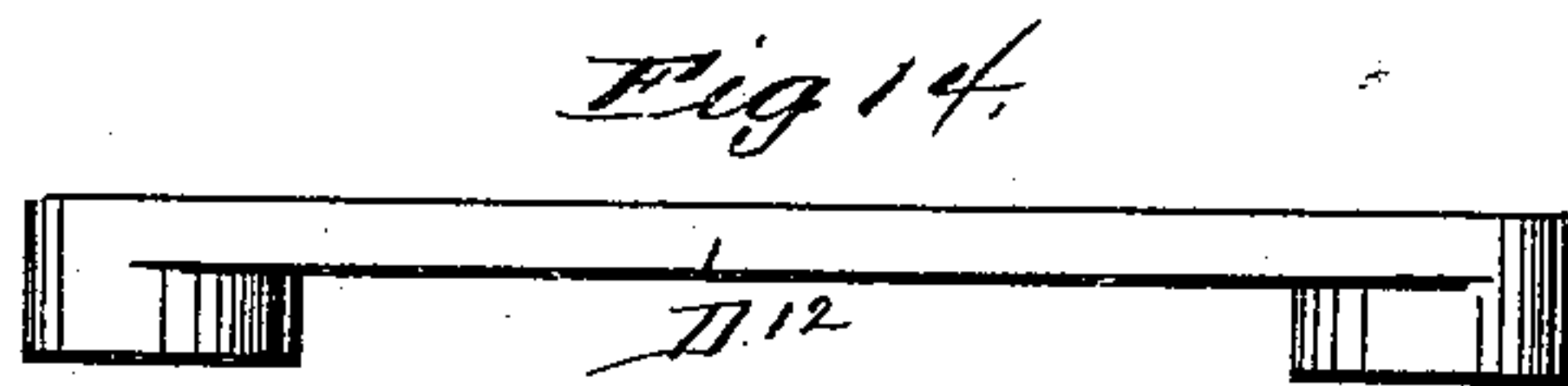
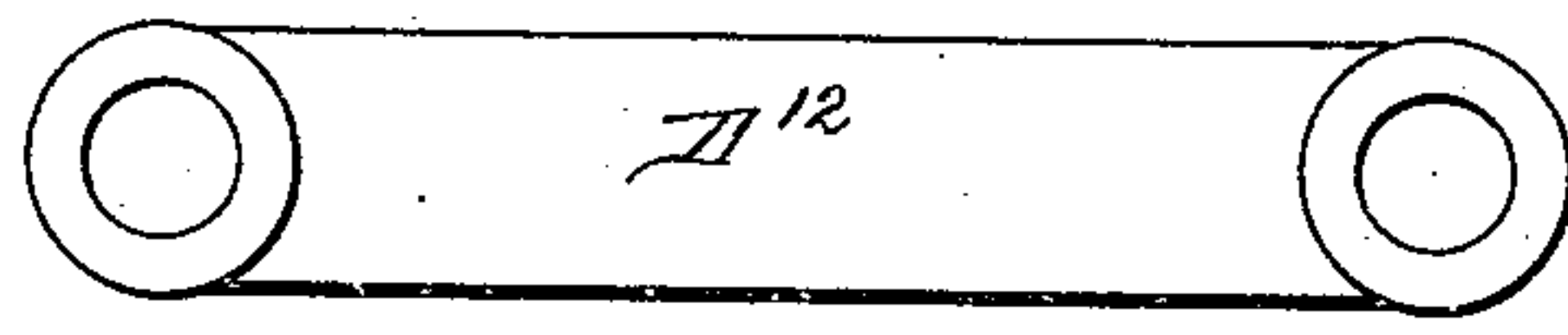
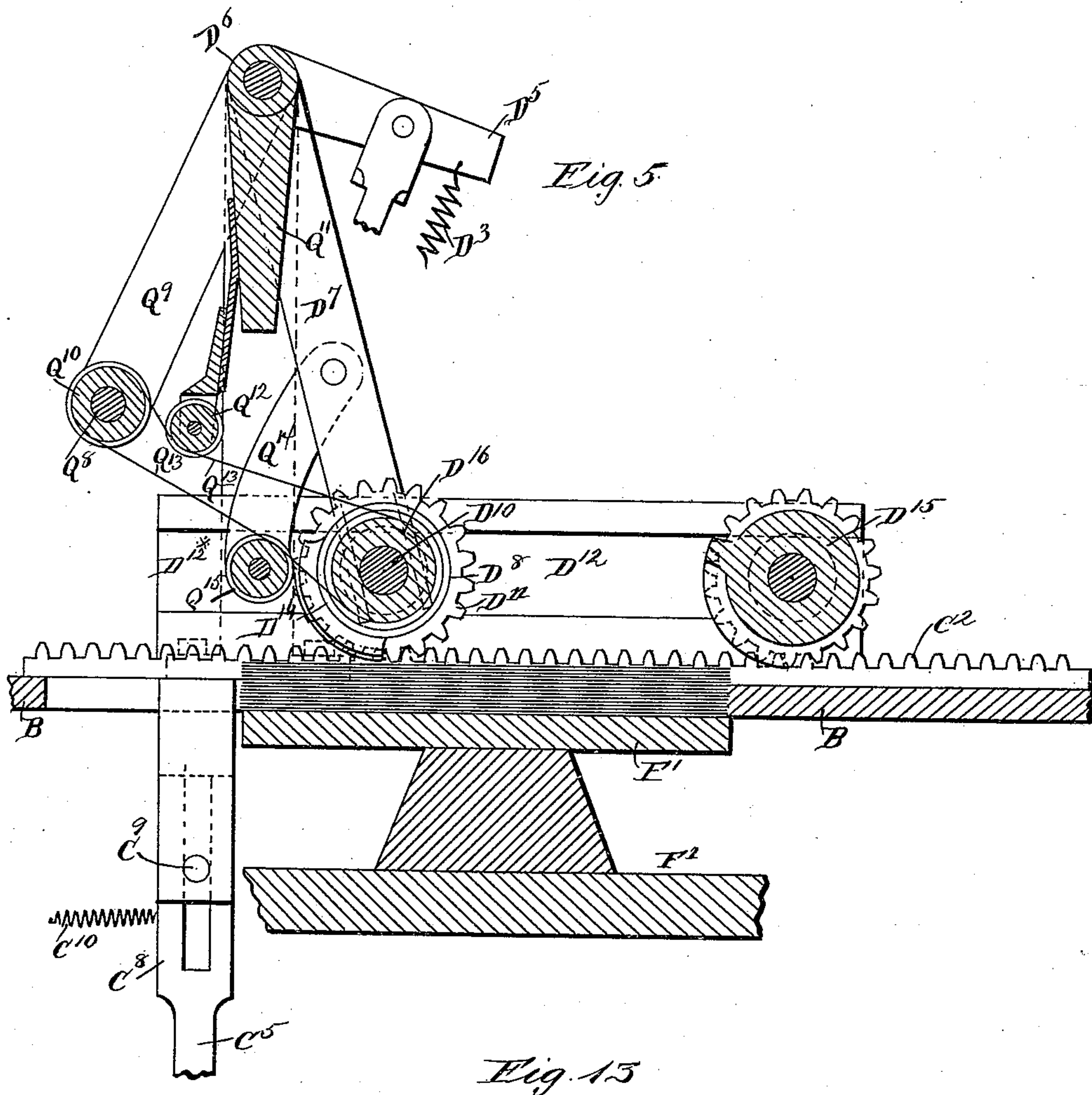
(No Model.)

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E. RAU.
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Patented Feb. 10, 1891.



Witnesses
Jas. C. Warner
James M. Hilda

Inventor
Emanuel Rau
By his Attorney
W. L. Bennett

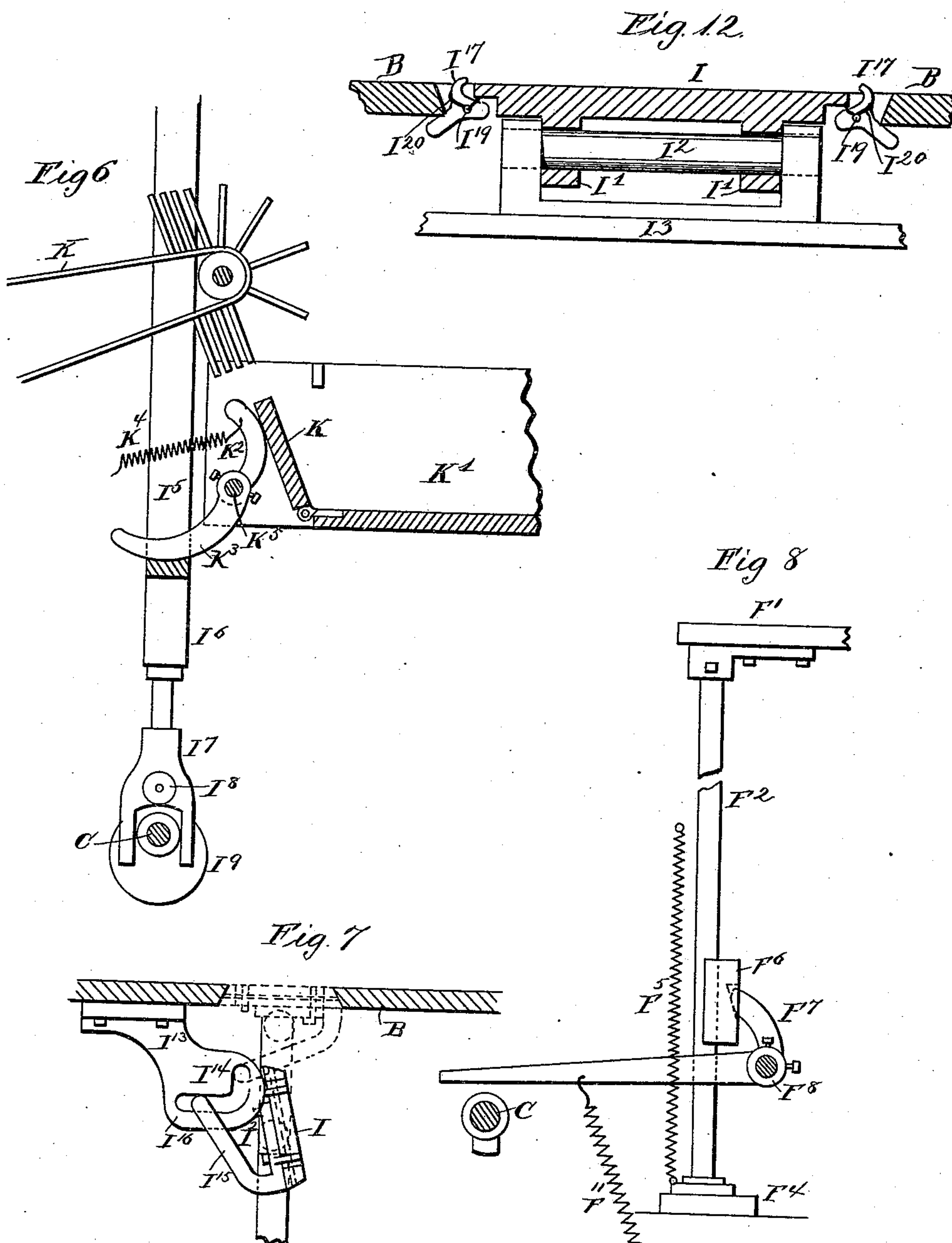
(No Model.)

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E. RAU.
ENVELOPE MACHINE.

No. 446,124.

Patented Feb. 10, 1891.



Witnesses
James Warner
James H. Hild

Inventor
Emanuel Rau
By *his* Attorney
M. L. Bennett

(No Model.)

7 Sheets—Sheet 7.

E. RAU.
ENVELOPE MACHINE.

No. 446,124.

Patented Feb. 10, 1891.

Fig. 10

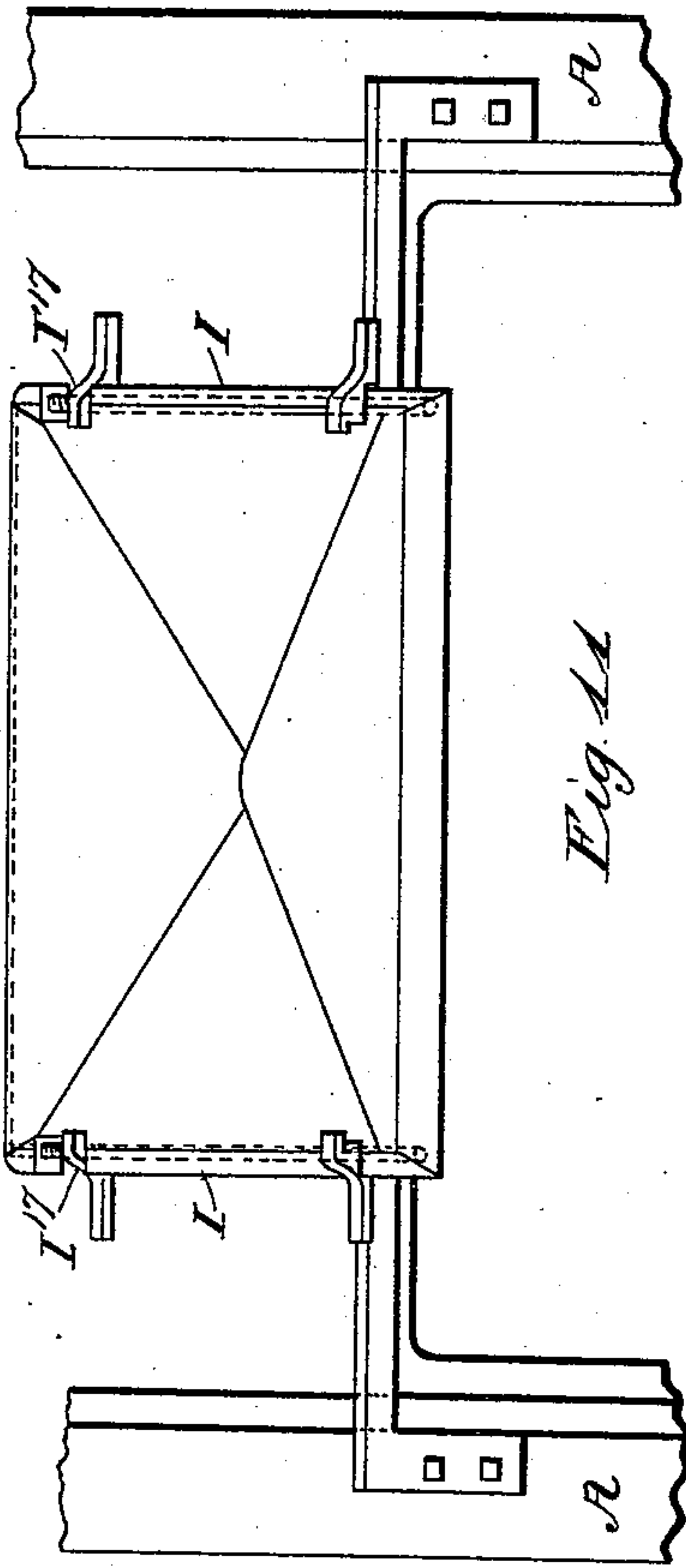


Fig. 11

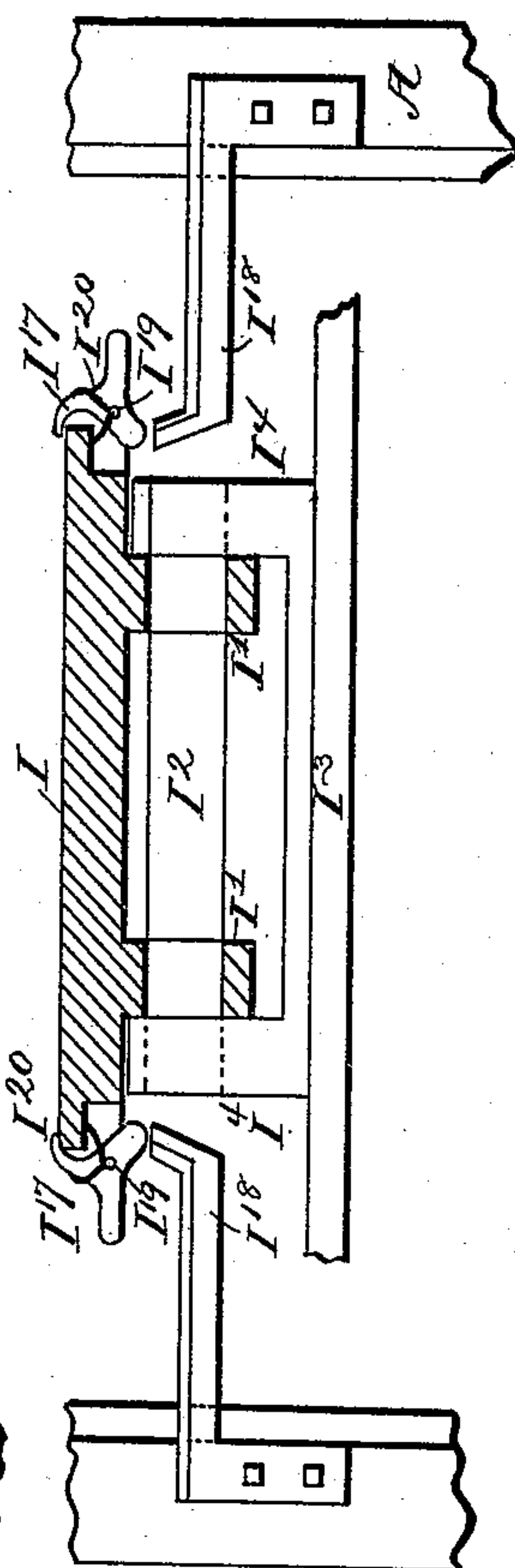
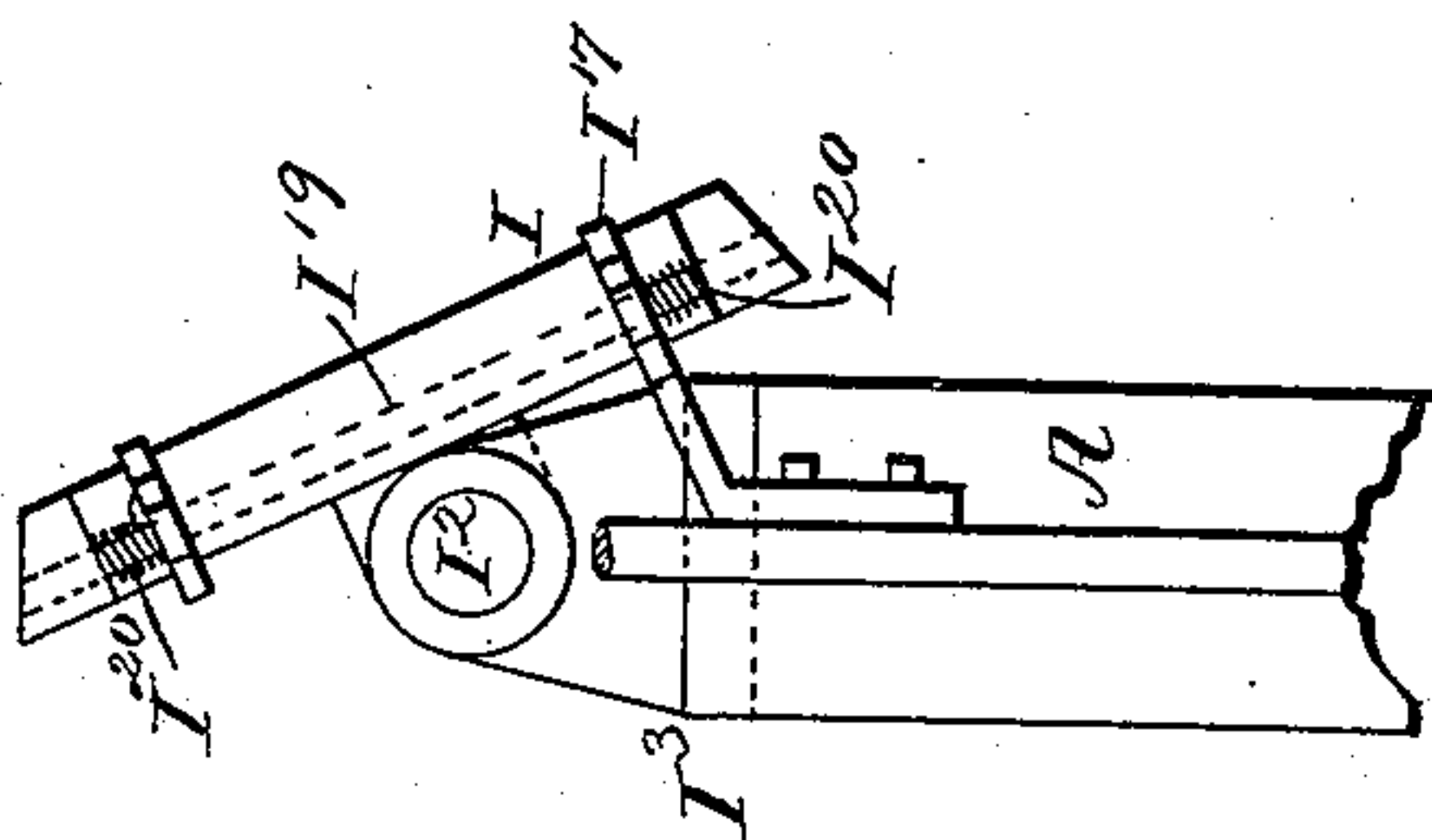


Fig. 9



Witnesses

Jack E. Warner
James M. Hicks

Inventor

Emanuel Rau
By his Attorney
W. L. Bennett

UNITED STATES PATENT OFFICE.

EMANUEL RAU, OF BROOKLYN, ASSIGNOR TO THE EMANUEL RAU MANUFACTURING COMPANY, OF NEW YORK, N. Y.

ENVELOPE-MACHINE.

SPECIFICATION forming part of Letters Patent No. 446,124, dated February 10, 1891.

Application filed January 7, 1890. Serial No. 336,208. (No model.)

To all whom it may concern:

Be it known that I, EMANUEL RAU, a citizen of the United States of America, residing at Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Envelope-Machines; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the drawings making part thereof.

My invention relates to the operations of gumming, folding, and delivering the envelopes after the blanks have been cut and placed on the machine; and it consists in certain mechanism and combinations of mechanism fully hereinafter specified and claimed.

In order that persons skilled in the art may understand, construct, and use my invention, I will proceed to describe it, referring to the drawings, in which the same letters indicate like parts in the several figures.

Figure 1 is a top or plan view of my invention. Fig. 2 is an elevation from the end where the paste-boxes are located. Fig. 3 is a vertical longitudinal section of my machine on line X Y of Figs. 1 and 2. Fig. 4 is a longitudinal vertical central section on line Z Z of Figs. 1 and 2. Fig. 5 is a vertical longitudinal central section of the gum-transferring rolls and operating mechanism, in part, drawn to a larger scale. Fig. 6 is a side elevation of a portion of the delivery mechanism on a larger scale. Fig. 7 is an enlarged detail view of the tipping foundation-plate mechanism. Fig. 8 is a detail side elevation of the mechanism for sustaining and feeding the envelope-blanks upward to the gum-transferring rolls above. Fig. 9 is another detail side elevation of the tilting foundation-plate. Fig. 10 is a top or plan view of the foundation-plate in its horizontal position. Fig. 11 is a central cross-section of the foundation-plate, Fig. 10. Fig. 12 is a cross-section of the foundation-plate and bed-plate of the machine, showing the clasps in elevation out of the way of the envelope to be folded. Fig. 13 is a front view of one of the connecting-links, and Fig. 14 is a top view of the same.

A is the frame of the machine.

B is the horizontal table or top plate of the frame.

A' is a yoke which projects above the table and guides the folding-plunger.

C is the main driving-shaft.

C' is a cam on the main shaft for operating the rack.

C² is a reciprocating rack located on the top of the table B.

C³ is a cam-roll.

C⁴ is a forked rod which straddles at its lower end the shaft C. It sustains the roll C³ in contact with the cam C'.

C⁵ is a bell-crank arm fulcrumed by the pin C⁶ to the table-frame A. The arm C⁴ is pivotally joined to the bell-crank lever C⁵ by a pin C⁷.

C⁸ is the forked portion of the upper arm of bell-crank C⁵. It straddles a pin C⁹, located on a downwardly-projecting lug attached to the rack C². By these operating connections the rack C² is reciprocated horizontally when the shaft C is revolved, and it is limited in its motions by the shape of the cam C'. A spring C¹⁰ aids in keeping cam-roll C³ in contact with cam C'.

C¹¹ is the bearing which supports pin C⁶ on the frame A.

On the opposite end of shaft C cam D is located, and a cam-roll D' on rod D² rests upon it, assisted by spring D³, to keep the two in contact. The lower end of rod D² straddles the shaft C. The upper end of the rod D² is pivoted by a pin D⁴ to an arm D⁵, keyed to a shaft D⁶, which runs across the machine. Arms D⁷ are keyed to shaft D⁶ inside its supporting-bearings D¹³. These bearings D¹³ are supported above the frame and table of the machine by brackets D⁹, Fig. 2.

At the lower ends of arms D⁷ the roll D⁸ is carried and controlled in its forward and back motions. The roll D⁸ is a pasting or gumming roll. At its central portion it is provided or constructed with a raised portion D¹⁴ partially around its circumference and shaped to conform to the shape of the line of gum to be transferred to the envelope-blank. The lower ends of arm D⁷ are forked and straddle the ends of the shaft D¹⁰, which runs through the roll D⁸ and extends each end beyond the roll for this purpose. A gear-wheel D¹¹ on the end of roll D⁸ meshes into and rests upon the toothed rack C², so as to be revolved by the

rack when the rack reciprocates. Longitudinal links D^{12} , located on each side of the machine-table, receive the ends of the shaft D^{10} and guide its reciprocating motions. Thus when the shaft C is revolved the roll D^8 is, through the operating mechanism, moved forward and back from one extreme limit of motion (shown in Figs 3, 4, and 1) to the other extreme limit.

A roll D^{15} is connected by the links D^{12} on each side with roll D^8 and has the same motions as D^8 . It also meshes into and is revolved by rack C^2 . The ends of its central shaft project and are guided in the forward and back movements in the side grooves D^{12x} . It is also a gumming-roll, and has similar construction in every way with D^8 .

E and E' are gum-boxes containing gum in a dissolved state. In one gum-box E' rolls E^4 and E^4 and in gum-box E a roll E^3 revolve in bearings by means of belt-connections and intermediate pulleys with the main shaft, which will be hereinafter explained and indicated.

E^5 are rolls which revolve alternately in contact with gum-rolls E^4 and D^8 and E^3 and D^{15} , respectively. They are supported in bearings E^6 , which bearings are attached to the gum-boxes E and E' by long arms pivotally, so that they swing to and fro when forced to do so. Springs E^7 hold these swinging rolls in contact with rolls E^4 . They are thrown into contact with rolls D^8 and D^{15} when D^8 and D^{15} are moved forward so as to strike arms E^8 , which hang down from and are attached to the pivoted arms E^2 . Thus the gumming-rolls D^8 and D^{15} receive gum.

The gum-boxes E and E' are supported above the frame-table on cross-brackets E^9 , secured at each end to the table B.

Beneath the opening in the table B a pile of envelope-blanks F is supported on a table F', which is supported by upright rods F^2 , to which this table F' is secured. These rods pass at their upper ends through guides F^3 in the table B at each side of the machine. At their bottom they pass through guides and are connected to a bar F^4 , which is drawn upward by a spring F^5 , attached to the frame A and the bar F^4 . Brake-shoes F^6 fit these rods on one side, which shoes are intermittently moved away and against the rods F^2 by means of the double lever F^7 , secured on a rod F^8 , which runs from side to side across the machine and turns in bearings F^9 in the frame A. The long arm of the lever F^7 extends over a lifting-cam on the shaft C, so that as the cam revolves the arm F^7 is raised and lowered, tightening and releasing the brake-shoes F^6 into and from the rods F^2 and allowing the spring F^5 to move the table F', which contains the blanks to be gummed, upward by one revolution of the shaft C. This operation goes on until all the blanks are used up, when the table is forced down again and a new lot of blanks are placed thereon.

F^{10} are pendent guides on the under side

of table B, which keep the envelope-blanks in position.

A vertical plunger-rod H has a guide-bearing at the top in yoke A at H^2 and lower down at H^3 . At its bottom it has a plate for pressing the gummed envelope-blanks into the usual folding-box beneath. This plate is H^4 . The plate H^4 and its rod H are reciprocated up and down at the proper times by link-connections H^5 , pivoted to the bar H and to the lever H^6 . The other end of H^6 is jointed to a lug H^7 on yoke A' and is supported at one end by said lug midway between the rod H and its jointed bearing in H^7 . A rod H^8 , which passes down to shaft C at its lower end, has a forked extension H^9 , which straddles said shaft. It also at its bottom supports a cam-roll H^{10} , which, with the rod H^8 , rests upon and is operated up and down by a cam H^{11} , Fig. 2, on shaft C. It is kept in its contact with said cam by the weight of the parts; but a spring may be added in case of need. Thus through the parts designated the folding-plunger rises and falls as required, the cam is set to give the proper time to the operation, and the timing of all the operations of the machine is regulated by the position of the various cams on the shaft C.

Directly beneath the folding-plunger is a folding-box above the table B. The bottom of this box is a tipping foundation-plate I, which rises and falls and tips to discharge the envelopes by mechanism driven from the main shaft C. It has two lugs I^1 , which project downward, as seen at Fig. 11. A shaft I^2 passes through holes in these lugs I^1 , by which the plate I is attached to a plate I^3 , from which corresponding lugs I^4 extend upwardly. Shaft I^2 also passes through these lugs. Thus plates I and I^3 are pivotally joined. Beneath the plate I^3 , from each end, rods I^5 run down and converge together at I^6 , Fig. 2, near the transverse center of the machine, and are subtended by a forked piece I^7 , which sustains a cam-roll I^8 on a cam I^9 on shaft C. The piece I^7 straddles the shaft C, like the other cam attachments. On the under side of table B, on the outer sides of the rods I^5 , subtend brackets I^{10} , and they are joined to the table B by forked arms I^{11} to give rigidity. These brackets I^{10} are grooved longitudinally, and feathers I^{12} on rods I^5 run in these grooves to direct their upward and downward movements and give them steadiness of motion.

Beneath the table B, situated at the ends of the tipping plate I, depend bracket-plates I^{13} , provided with face cam-grooves I^{14} . From the under side of foundation-plate I, at its sides, an arm I^{15} is secured, which extends across the vibrating center I^2 of the plate, and by a pin and cam-roll I^{16} the plate I is tilted over, as shown in Fig. 9 in full lines when the pin I^2 is in its extreme downward throw, by the operation of the cam mechanism connected therewith, and when the pin I^2 is in its ex-

treme upward throw the plate I is in its normal position in the table B beneath the folding-box, and is the bottom foundation-plate to said box, upon which the folded envelope rests before being discharged by the tipping operation just described.

Fig. 10 shows a folded envelope on the top of the plate I, with the spring-clasps I¹⁷ holding the envelope until by tipping the plate I the clasps come in contact with the tripping-pieces I¹⁸, which are bolted to the frame A, and thus release the clasps and allow the envelope to drop off the plate. These clasps I¹⁷ are secured to a shaft I¹⁹ on each end of the plate I and work together, so that when one clasp is struck by the tripping-piece I¹⁸ the clasp at the other end of the rod I¹⁹ also works with it. When the envelope is being folded by the plunger H⁴, the clasps I¹⁷ are thrown back out of the path of the envelope by the clasps coming in contact with the bed-plate of the machine, as shown in Fig. 12, and when the plunger retreats the springs I²⁰ press the clasps I¹⁷ over onto the envelope and hold it firmly until the tipping of the plate I causes them to relax their hold, as above explained. The usual drying-carrier K, placed beneath the folding-box and tipping plate I, receives the envelopes and carries them a distance to dry them and returns them into the receptacle K'. A hinged piece K² receives the dried envelope and pushes it forward into the receptacle K' to pack the envelopes together. This hinged back or packing-piece K² is operated back and forth by a pivoted double lever K³, one end of which bears against the hinged piece K² and the other rests on the arms I⁵, so that it is vibrated back and forth at the proper times by the movements of the tilting mechanism. A spring K⁴ aids in keeping the hinged piece K² against the double lever K³. This lever K³ works on and is supported by a rod K⁵, which has bearings in the frame A at its ends. The drying-carrier K is driven from the main shaft C and is of the usual construction. Longitudinal strips or plates L are supported above the table B, under the plunger H, and over the foundation-plate I by standards L'. Plates L² extend or run crosswise between these plates L and are attached to them, leaving an opening formed by their inner sides or edges of the size and shape of the folded envelope and conforming to the shape of the folding-plunger H. The cross-plates L² are flanged to give a proper side surface for proper folding of the blanks.

On the edges of plates L are longitudinal guide-cleats, in which a carrier-plate M moves forward and back on the top of the plates L. This carrier-plate has an opening through it of the shape and size of the folding-plunger or folded envelope-blank. It is moved forward and backward by lever M', which connects with said plate by a link M². The lever M' divides into two branches M³ and is keyed to a cross-shaft M⁴ at its lower end, which shaft has end bearings in the frame A. A lever M⁵

is keyed to the shaft M⁴ and extends over a lifting-cam on main shaft C, which raises and lowers said lever and gives reciprocatory motion through the connecting-levers to the carrier table or plate M at the proper times to bring an envelope-blank under the plunger H, and over the folding-box opening aforesaid on this carrier-plate M, at its forward end, are lugs M⁶, which catch the envelope-blank as the delivery mechanism throws it over them in the extreme forward throw of the carrier-plate and carries said blank to and under the folding-plunger and opening to be folded and dropped by the tipping foundation-plate.

The folders N, being of the usual construction, location, and operation, need not be here described. Horizontal guard-wires O, secured above plates L to back-stop O', direct the envelope-blank over its upper surface onto the carrier-plate. The inclined plates P, secured to and located between plates L at their rear ends, receive the envelope-blanks *in transitu* to the carrier-plate M and guide its movements from beneath.

Q and Q' are grooved pulleys supported on table B on bracket-bearings. Over these pulleys a belt passes and drives the gum-rolls E³ in their respective gum-boxes E and E'. The shaft Q³ is driven by belt-connection to the shaft C below it over chain-pulley Q⁴.

On the inner end of shaft Q³ is a small groove-pulley Q⁵, and near it, supported in a bearing on the table B, is an idler-pulley Q⁶. A belt Q⁷ passes around Q⁵ and under Q⁶, thence up over loose pulleys on shaft D⁶ and down over a groove-pulley on cross-shaft Q⁸, pendent from the shaft D⁶ by arms Q⁹ and keyed to shaft D⁶, and thence back again to pulley Q⁵. This belt thus revolves shaft Q⁸. A pulley Q¹⁰ is located on shaft Q⁸. Near its center, longitudinally around this pulley, a small cord passes to and around a loose pulley D¹⁶ on shaft D¹⁰, between the two gumming-surfaces on roll D⁸, out of the way of the gumming-surface, so that the cord receives no gum upon it.

From shaft D⁶ an arm Q¹¹ hangs, which supports at its lower end a small pulley Q¹², which rests upon the cord Q¹³ as a take-up or tightener. From the lower part of arm D⁷ hangs an arm Q¹⁴, which carries at its lower end a small roller Q¹⁵. It also comes in contact with the cord Q¹³; but on its inner side, between this cord, which travels forward, and the roller Q¹⁵, the gumming-roll D⁸ delivers the envelope-blank after it is gummed, as shown in Fig. 5. The revolution of the roller Q¹⁵ and the travel of the cord Q¹³ carry the blank onto the carrier-plate M, guided by the guards O and P above and below and by guards Q¹⁶, Fig. 3, sidewise attached to arm Q⁹. A spring Q¹⁷, wound around the shaft D⁶, presses the arm Q¹¹ and its pulley onto cord Q¹³.

Operation: The operation of the various parts is as follows: Envelope-blanks cut to the required shape are placed upon table F' and pressed upward to the level of the under

surface of the gumming-rolls D^8 and D^{15} by means of spring F^5 , guided by rods F^2 and held firmly in position by brake F^6 . The positions of the various parts are shown in Figs. 1, 2, 3, and 4, which show the gumming-rolls D^8 and D^{15} , in contact with the swinging gum-transferring rolls E^5 , ready to be revolved and to receive gum. By the revolution of the shaft C and cam C' , through the intermediate mechanism before described, rack C^2 is thrown backward and forward and revolves the rolls D^8 and D^{15} in contact with the gum-transferring rolls E^5 . These gum-transferring rolls have been thrown into contact by means of the pendent arms E^8 , struck and moved by the forward motion of the rolls D^8 and D^{15} . The gum-transferring rolls have previously received gum from the gum-rolls E^3 and E^4 , which revolve in the gum-boxes E and E' , as before described. These gumming-rolls D^8 and D^{15} are then thrown backward over the rack C^2 (while this rack remains stationary) to their extreme backward limit. The position of the rack C^2 in Fig. 5 indicates the gumming-rolls D^8 and D^{15} as having moved partially forward and in the act of picking up and delivering the gummed blank to the cord and pulley, which moves it onto the carrier M. The continued forward movement of the rolls D^8 and D^{15} brings them to their extreme forward movement ready to receive gum from the distributing-rolls. The further revolution of the shaft C throws the rack C^2 backward and forward and revolves the rolls D^8 and D^{15} in contact with the distributing-rolls. After the rolls D^8 and D^{15} have received gum they imprint it on the edges of the blank which are to be gummed, and at the forward movement of roll D^8 pick up the blank and deliver it to the pulley Q^{15} , over its upper surface, between it and the traveling cord Q^{13} , which carries it onward to the carrier M, which has by the revolution of the shaft and through the carrier mechanism before described been moved forward to its extreme limit of motion ready to receive the blank thus gummed. The blank by means of the cord and pulley aforesaid is delivered to the carrier over the retaining-lugs M^6 . The carrier M is then moved backward to its extreme limit of motion, which carries the blank under the folding-plunger H^4 . This having been done, by a further revolution of shaft C the rolls D^8 and D^{15} are moved forward over the rack C^2 until they come into the position shown in Figs. 1, 2, 3, and 4, as previously described, ready to perform the same operation again. While the gum is being applied to the blanks the brake F^6 is released from the rods F^2 , and spring F^5 forces the pile of blanks upward to their proper level, and then the brake seizes the rods F^2 and checks the further movement upward, as has been before described. The blank now, over the folding-box and under the plunger H^4 , is pressed downward by said plunger through the opening in the shape of the folded envelope in

the plate L and onto the foundation-plate I' . The plunger then rises to the position shown in Fig. 3. Immediately the folders N, operated by mechanism from shaft C in the usual way, fold the envelope-flaps onto each other and stick them together, leaving one flap unstuck and but partially folded over. By the revolution of the shaft C and through the mechanism before described the foundation-plate then descends, and in doing so the plate is tipped over and discharges the envelope into the usual drying system K beneath. The envelope is then carried a distance and then returned into the receptacle K' , and is moved forward in receptacle K' by the levers K^5 and K^3 and the hinged back piece K^2 , as has been previously described. All of these various operations have been accomplished during one revolution of the shaft C. The various cams and mechanisms have been set, timed, and arranged to perform their work in succession, as described.

Having now fully described my invention and the manner in which I have embodied it, what I claim as new, and desire to secure by Letters Patent, is—

1. In an envelope-machine, the combination of the main frame, the table F' , on which envelope-blanks are carried, vertical rods mounted in bearings in the main frame and to which the table is secured, springs connected to said rods, which hold them elevated and tend to lift them, brake-shoes engaging with the rods and adapted to move toward and from them, a lever-arm connected with the shoes, and a cam revolved by the main driving mechanism, which engages intermittently with the lever-arm.

2. The combination, in an envelope-machine, of the main frame, the blank-carrying table, the vertical rods to which the table is secured, springs connected with the rods which hold the table in an elevated position and tend to lift it, brake-shoes engaging with the vertical rods and adapted to move toward and from them, a lever-arm to which the brake-shoes are connected, a spring tending to hold the lever-arm in such position as to hold the shoes against the vertical rods, and a cam carried around with the driving mechanism and adapted to intermittently operate the lever to disengage the brake-shoes from the rods.

3. In an envelope-machine, a drying-frame or carrier, in combination with an envelope-delivery box located and secured beneath the machine-table and arranged to receive folded envelopes directly from said drying-frame or carrier and provided with a back plate hinged to said delivery-box, and a spring and pivoted double lever adapted to take against the hinged plate and vibrate it at each revolution of the main shaft, all combined substantially as specified.

4. In an envelope-machine, the combination, with the foundation-plate of the folding mechanism, of an arm provided with a cam-roll attached to and arranged beneath said

plate, a plate provided with a cam-slot in which said roller moves, located below the table of the machine, an upward-and-downward-moving rod pivoted to said foundation-plate, and a cam mechanism for reciprocating said rod, located upon the main shaft beneath, all combined and operating to tilt said foundation-plate positively and discharge one envelope from said plate at each revolution of said shaft, substantially as specified.

5. The combination, with the foundation-plate of the folding mechanism of an envelope-machine and tilting mechanism, of the clasps arranged to hold an envelope firmly on said plate after it has been folded and to release said envelope after the foundation-plate has been tilted over to discharge it, and tripping-pieces attached to the machine-table, substantially as specified.

6. The combination, with a gum-box of an envelope-machine, of the reciprocating gumming-roll and a gum-transferring roll secured to said gum-box by pivoted arms and provided with a pendent lug or arm located in the path of the reciprocating gumming-roll and arranged to be thrown against said gumming-roll by the horizontal travel of the same and against the gum-feeding roll in said trough by the action of a spring, all combined and operating substantially as specified.

7. In an envelope-machine, gumming-rolls geared upon their ends and connected together by links, in combination with a rack located upon the table of the machine, the pivoted forked rod C⁴, provided with a cam-roll C³, secured to said rod and arranged to receive reciprocating motion from a cam located on the main shaft, connected to said rack by the forked lever C⁵, and a pin whereby the pivoted rack is caused to reciprocate, substantially as specified.

8. In an envelope-machine, gumming-rolls

secured together at their ends with a connecting link or links adapted to slide back and forth in a guide or guides upon the machine-table for the purpose of receiving gum from gum-transferring rolls and transferring it to envelope-blanks located on a table beneath, and all combined substantially as specified.

9. In an envelope-machine, rolls for transferring gum to the gumming-rolls, secured together by reciprocating links at their ends, and gears secured to the ends of said rolls, resting on and adapted to be revolved by a reciprocatory rack beneath, all combined substantially as specified.

10. In an envelope-machine, the combination, with geared and guided gumming-rolls and actuating mechanism from the main shaft by which reciprocatory motion is given to said rolls, of a reciprocating rack beneath said rolls and adapted to rotate said rolls by the movements of the said rack, substantially as specified.

11. In an envelope-machine, the combination, with reciprocating geared and guided gumming-rolls adapted to be revolved intermittently on a reciprocating rack beneath by the reciprocation of said rack and by a system of lever-arms on shaft D⁶, located above the bed-plate of the machine, and all receiving motion from the main shaft of the machine, of a grooved driving-pulley and cord pendent from said lever-shaft, and a loose pulley centrally located upon the shaft of one of the said gumming-rolls and operating, in connection with the said grooved driving-pulley, for receiving the envelope-blank from the gumming-rolls and transferring it to the carrier-plate, substantially as specified.

EMANUEL RAU.

Witnesses:

W. L. BENNEM,
JAS. E. WARNER.