

No. 751,714.

PATENTED FEB. 9, 1904.

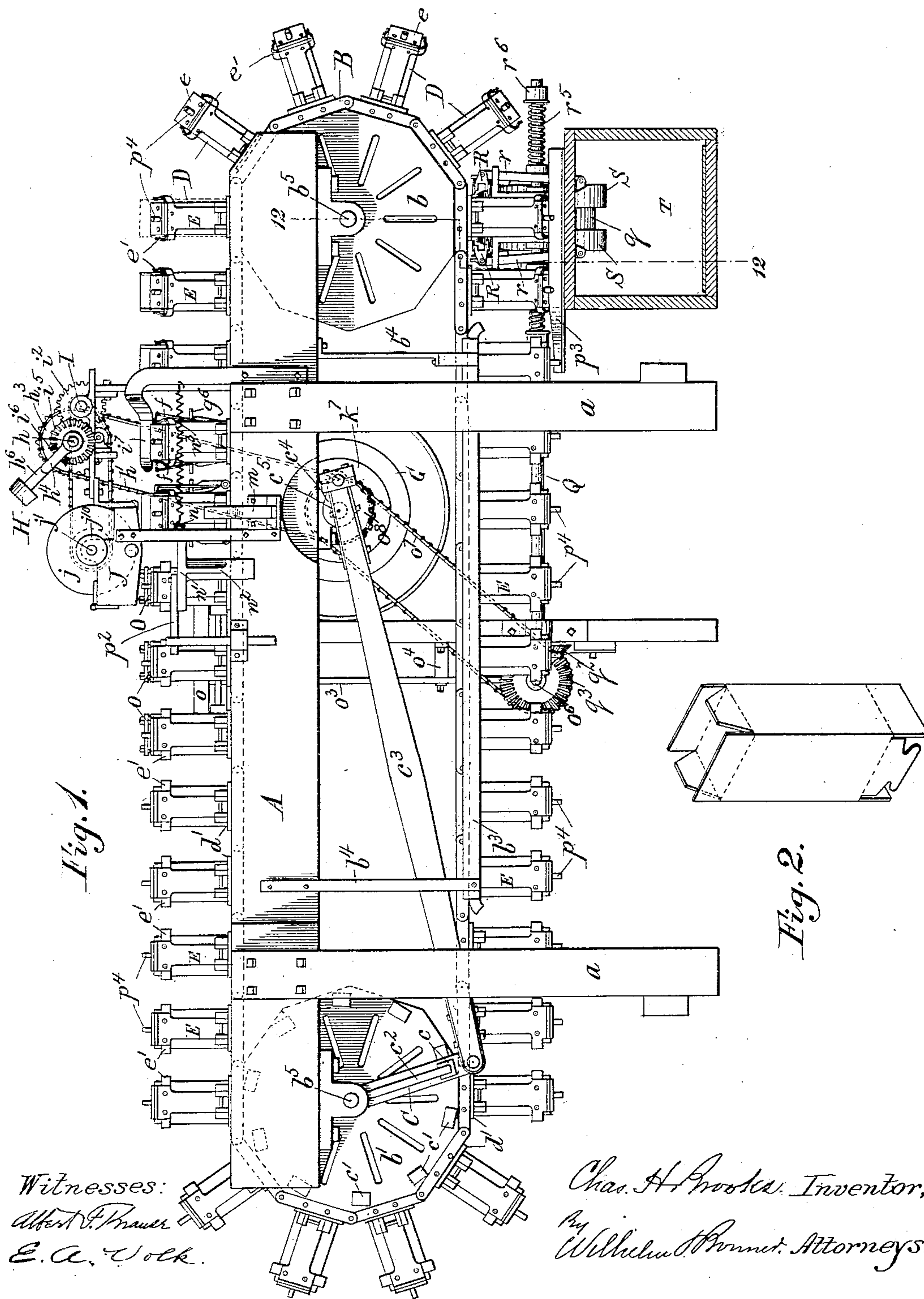
C. H. BROOKS.

MACHINE FOR CLOSING THE ENDS OF PAPER BOXES.

APPLICATION FILED NOV. 6, 1902.

NO MODEL.

6 SHEETS—SHEET 1.



Witnesses:
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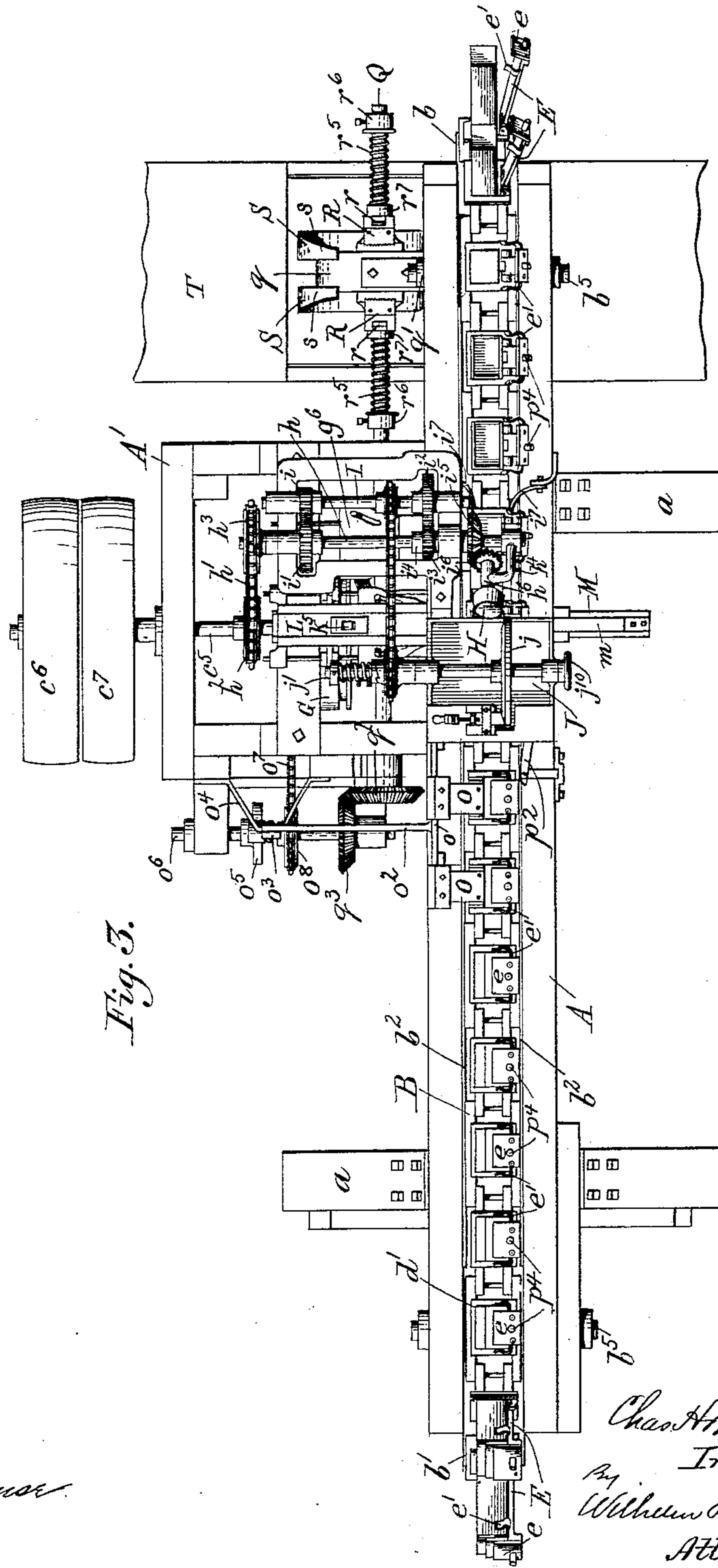


Fig. 3.

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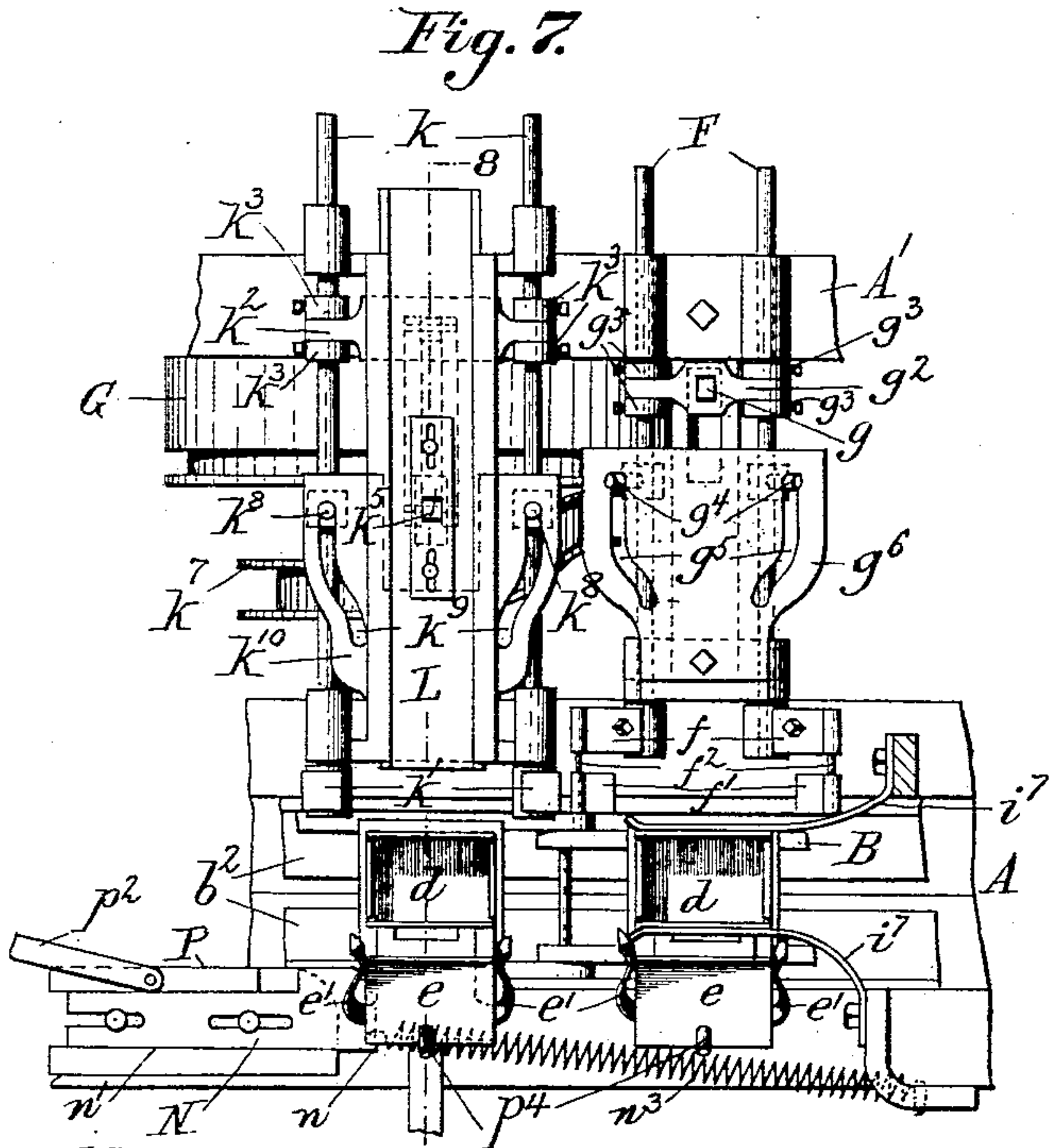
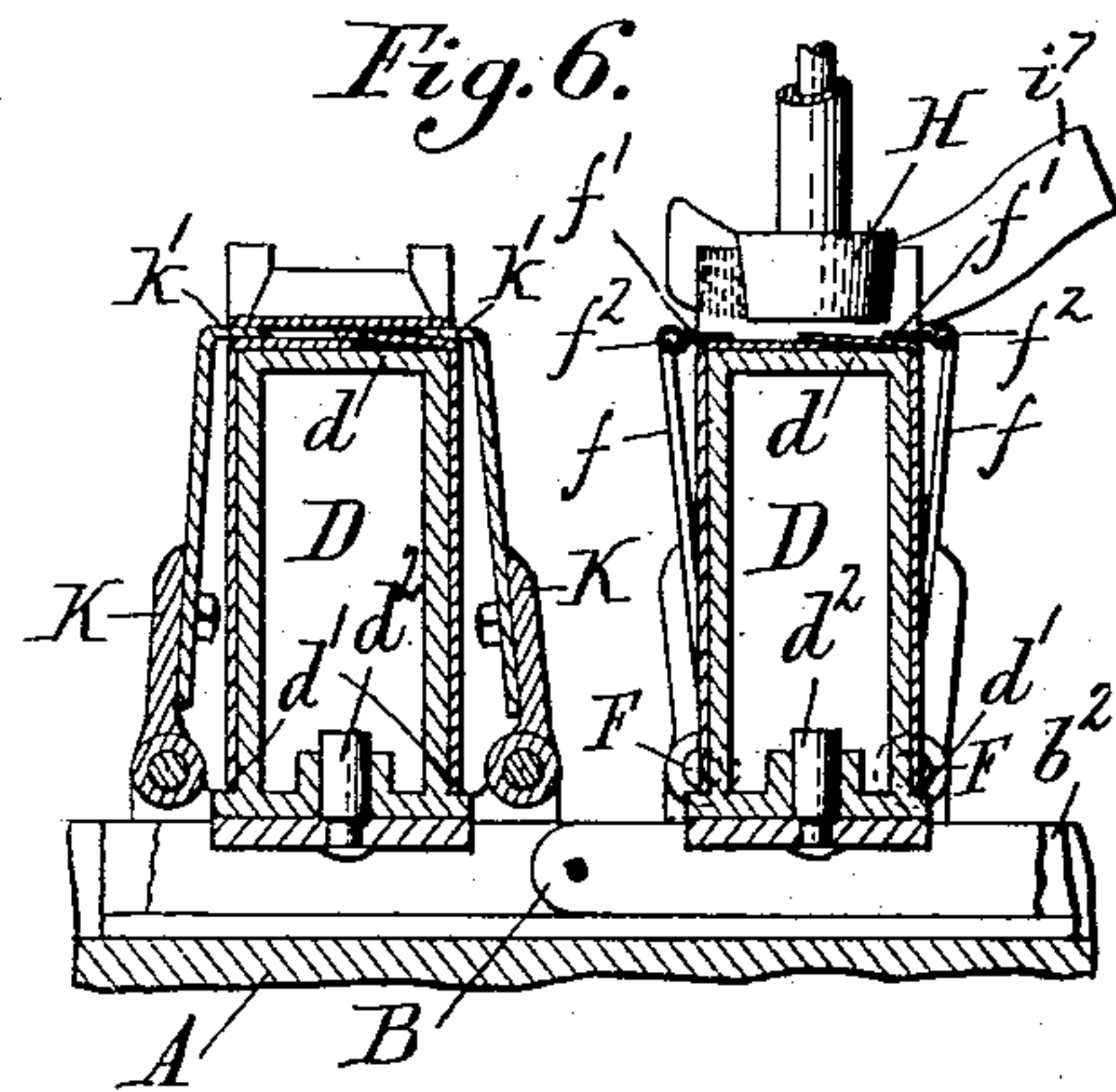
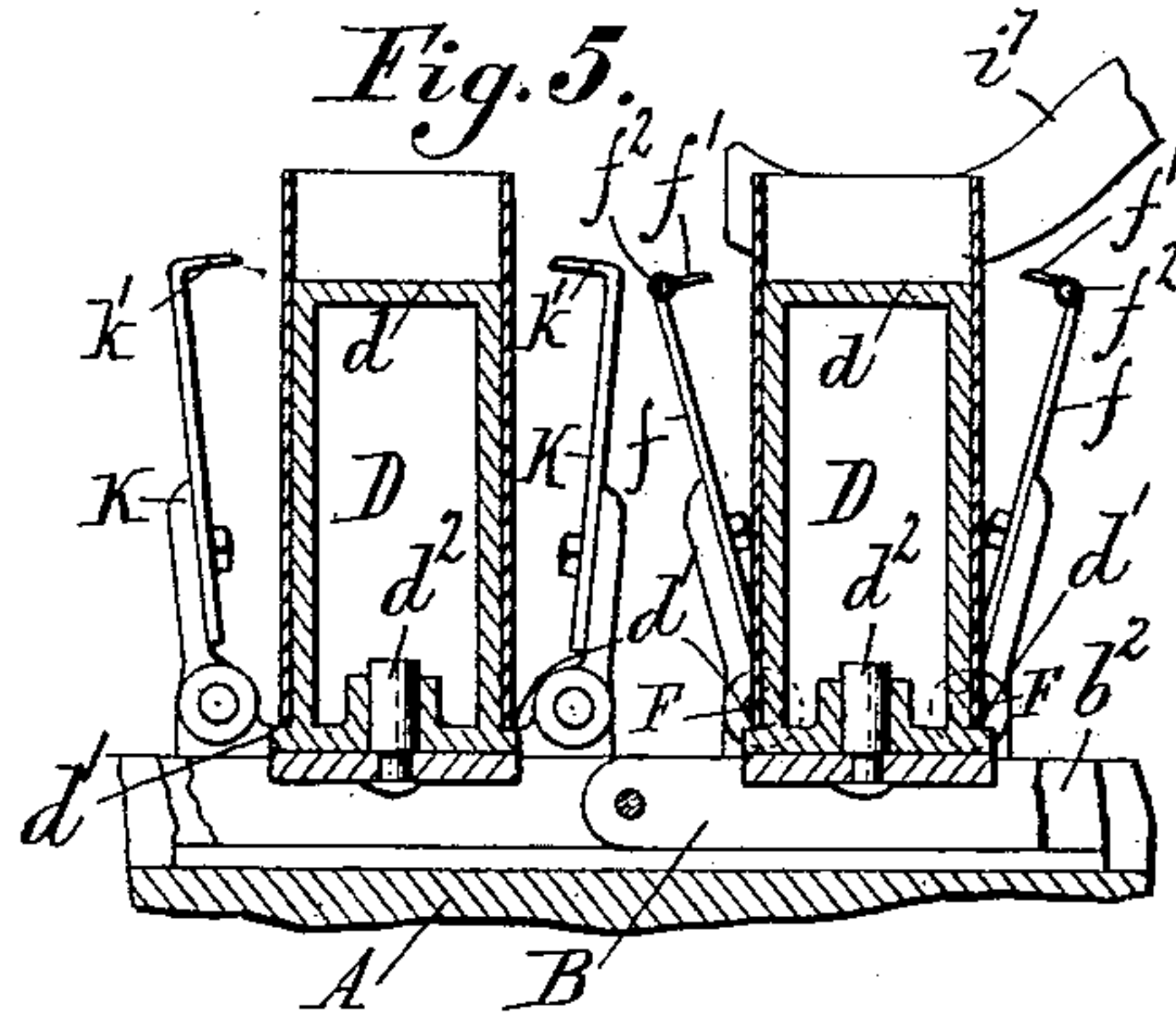
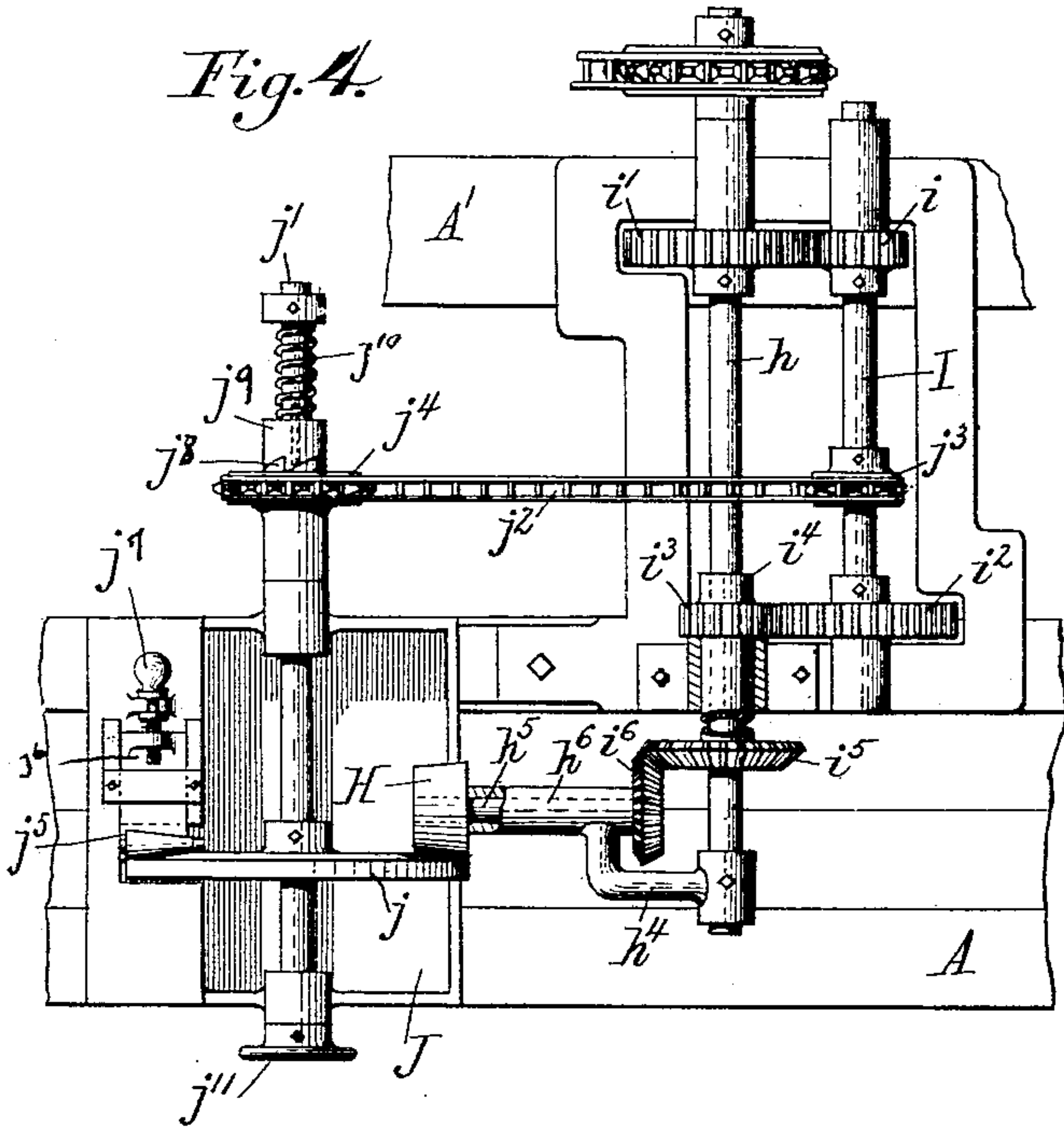
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6 SHEETS—SHEET 3.



Witnesses: 8
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6 SHEETS—SHEET 4.

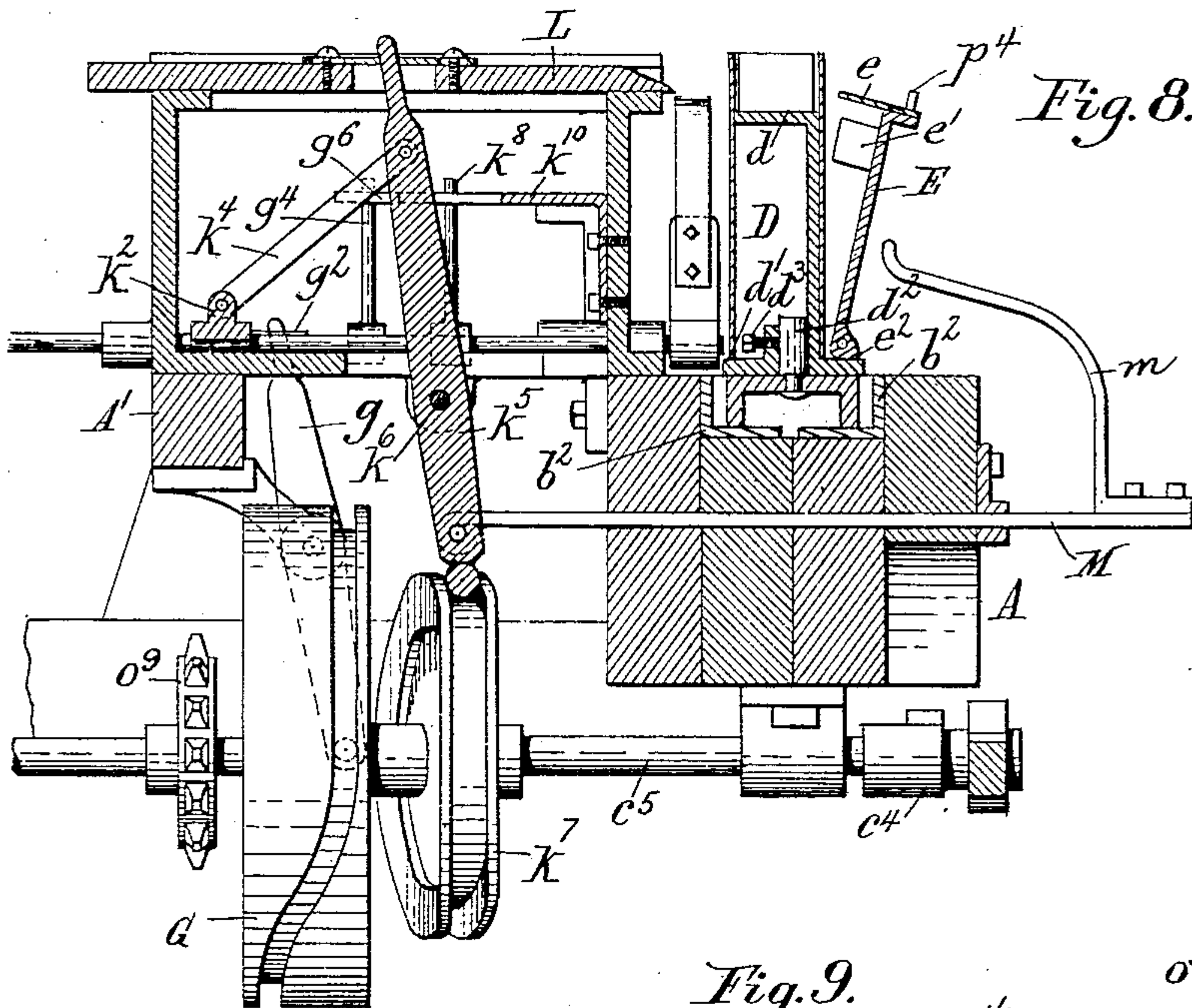


Fig. 8.

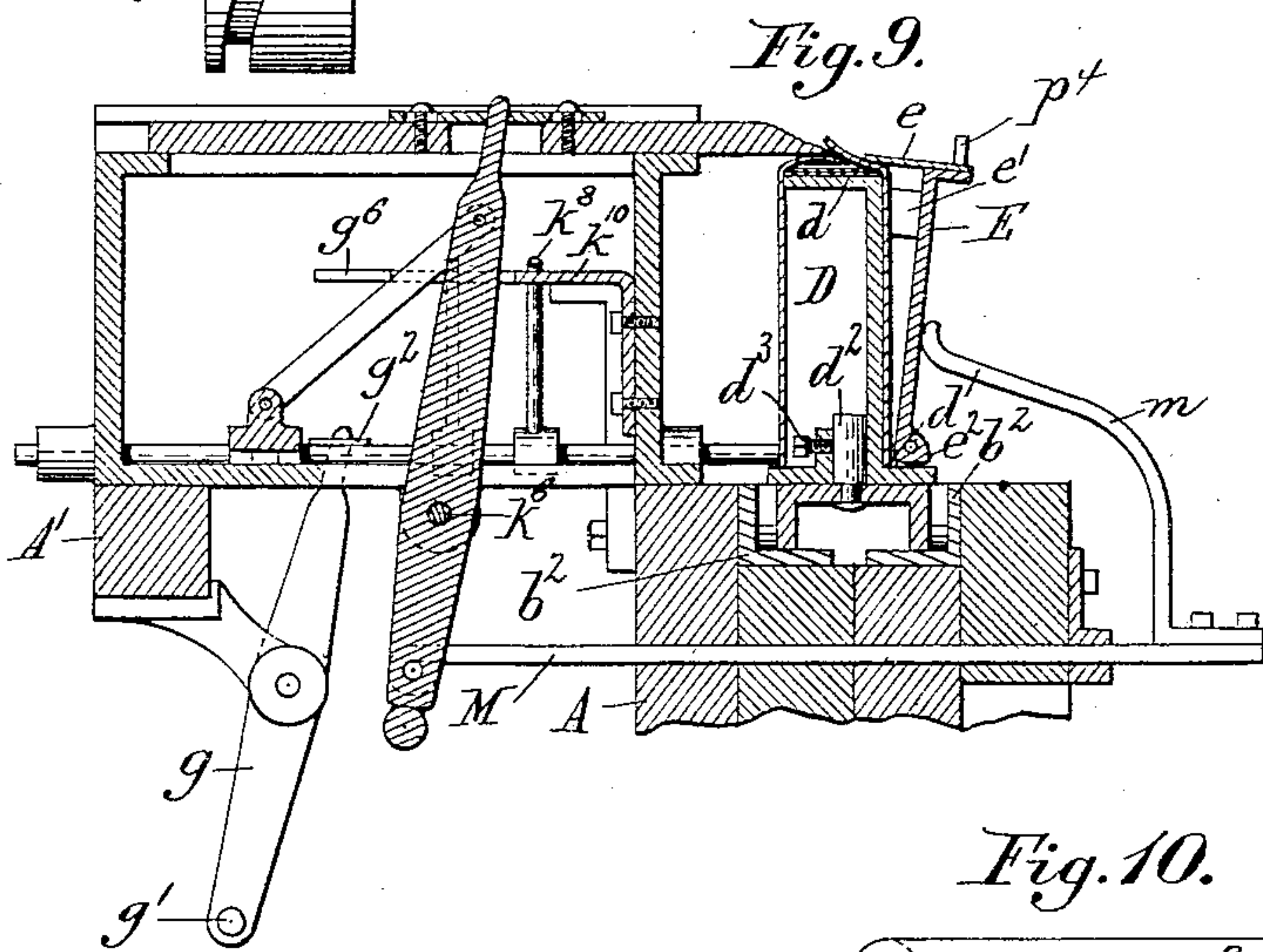


Fig. 9.

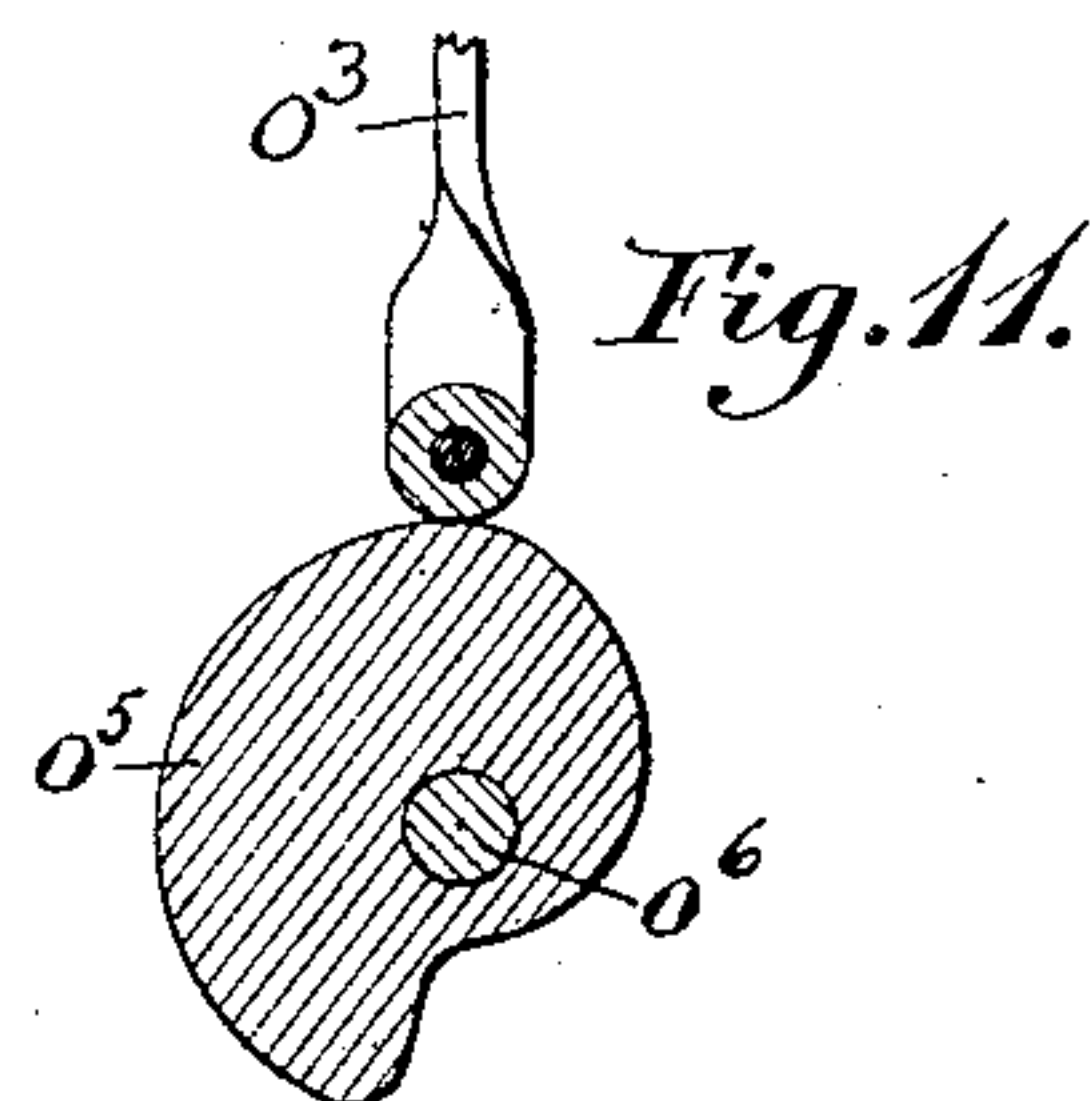


Fig. 11.

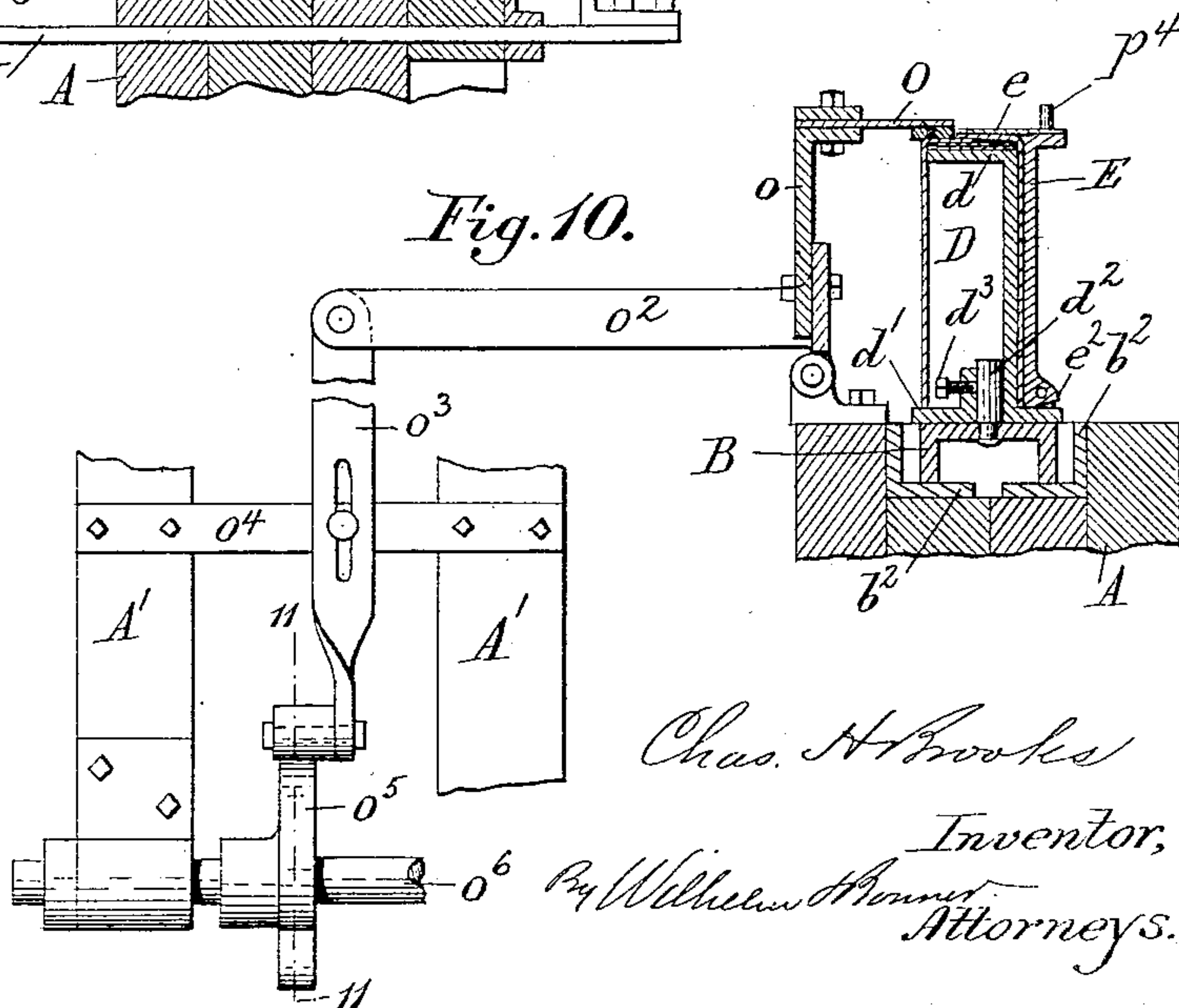


Fig. 10.

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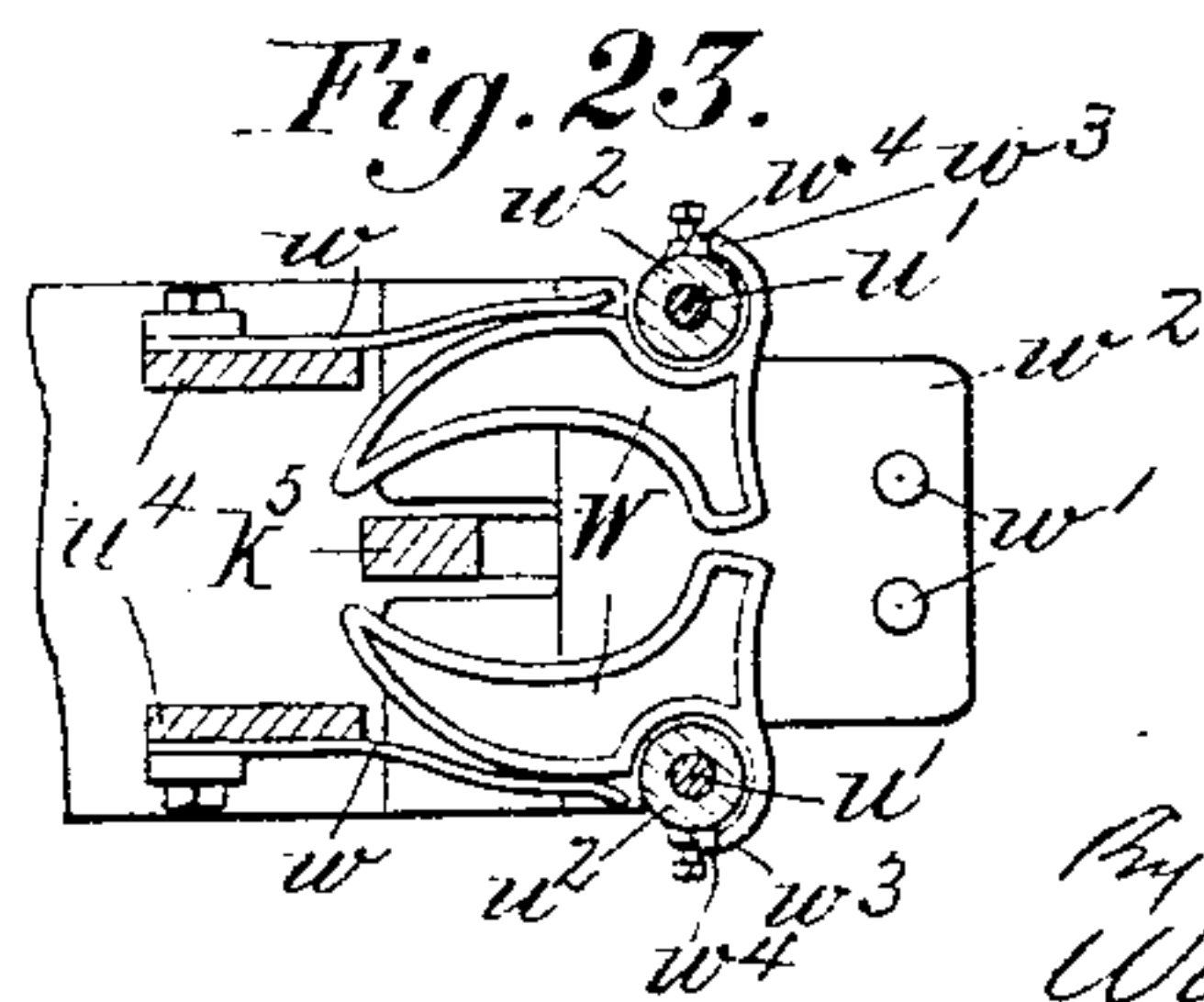
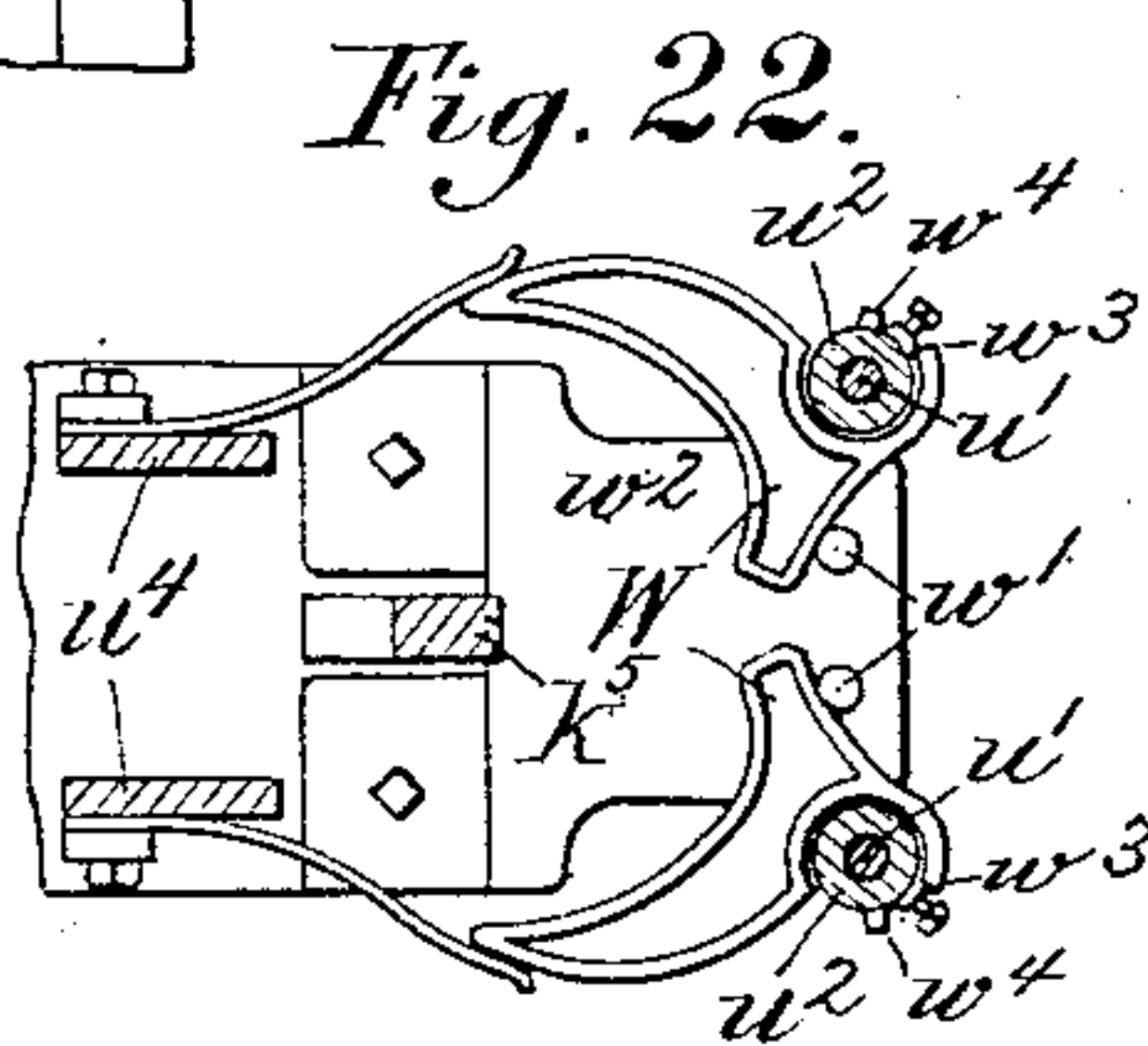
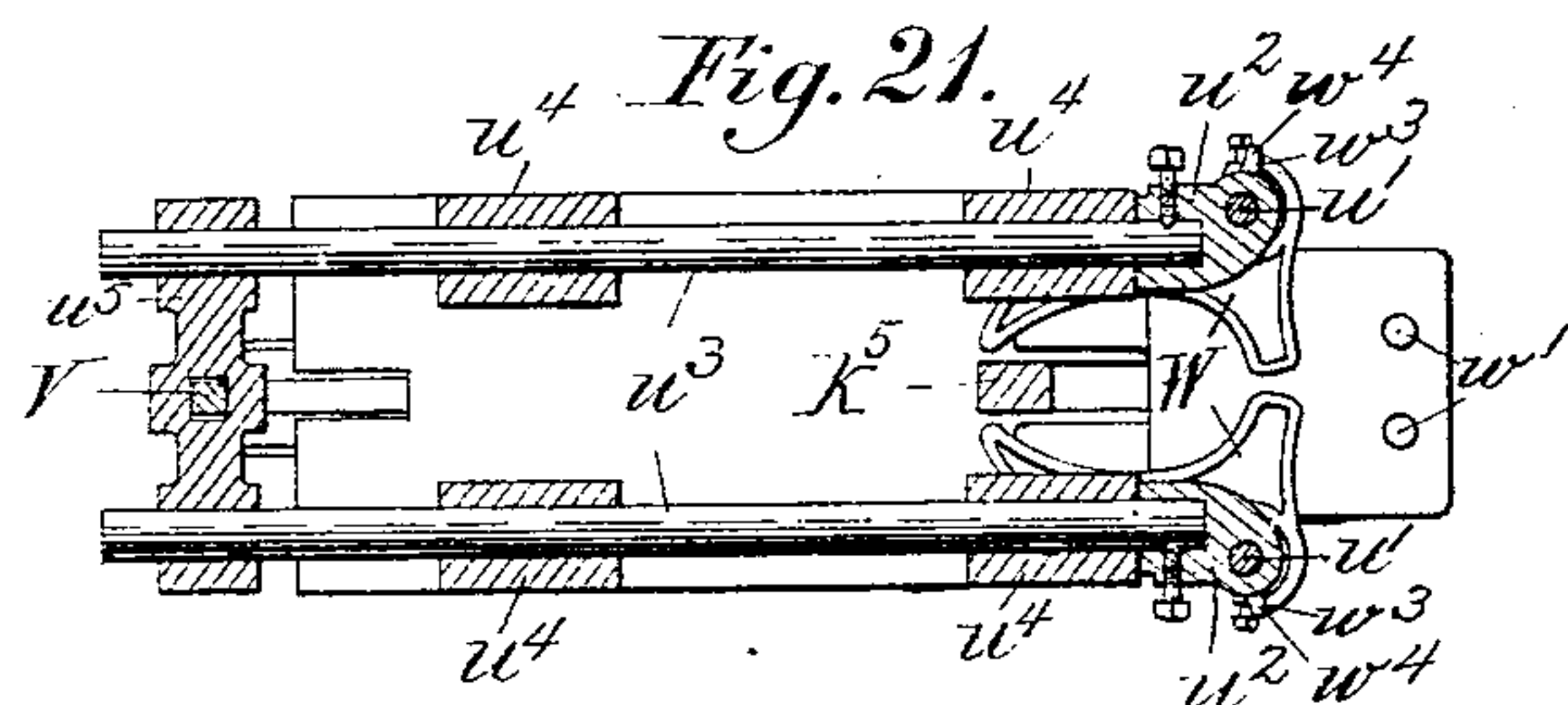
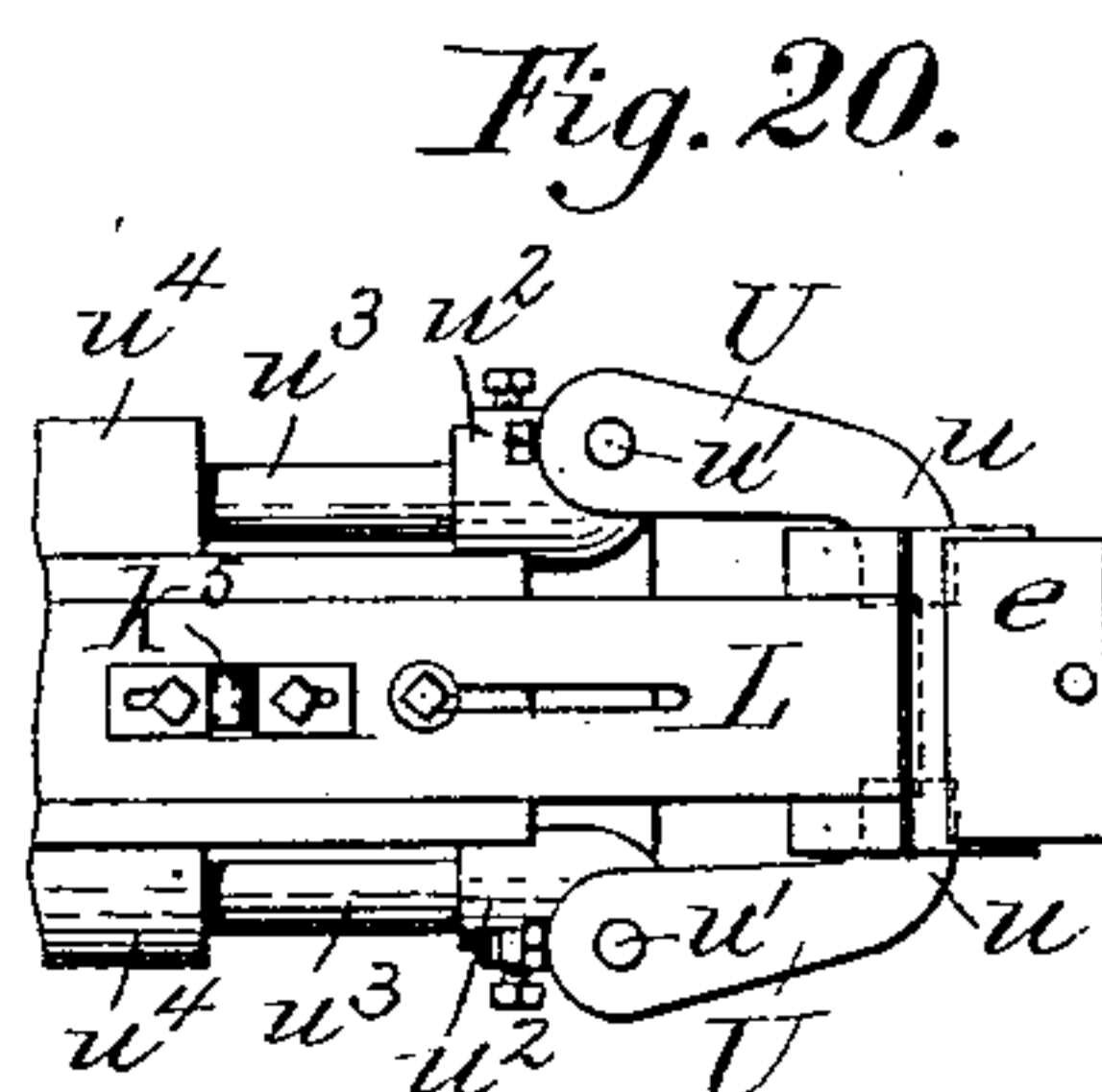
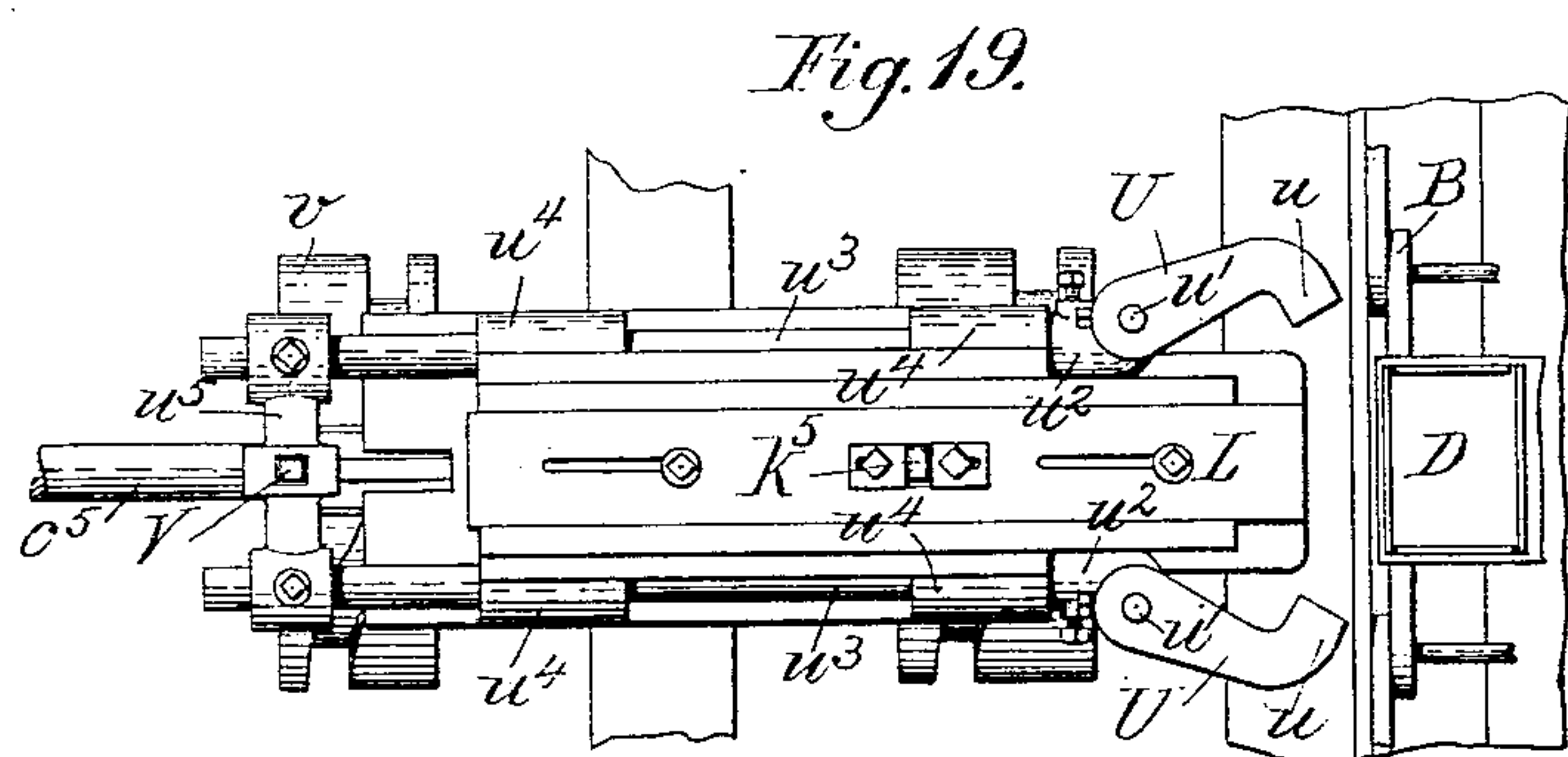
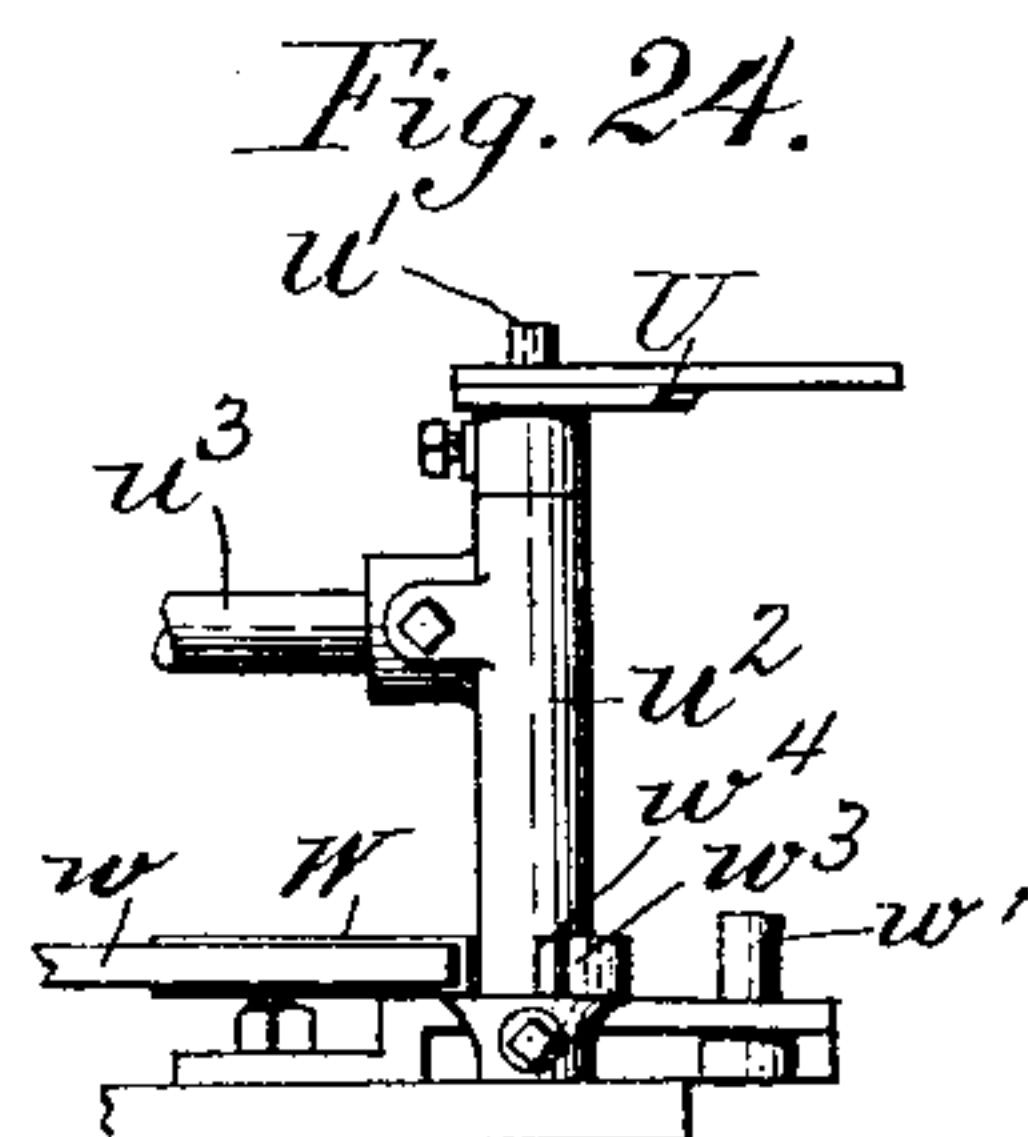
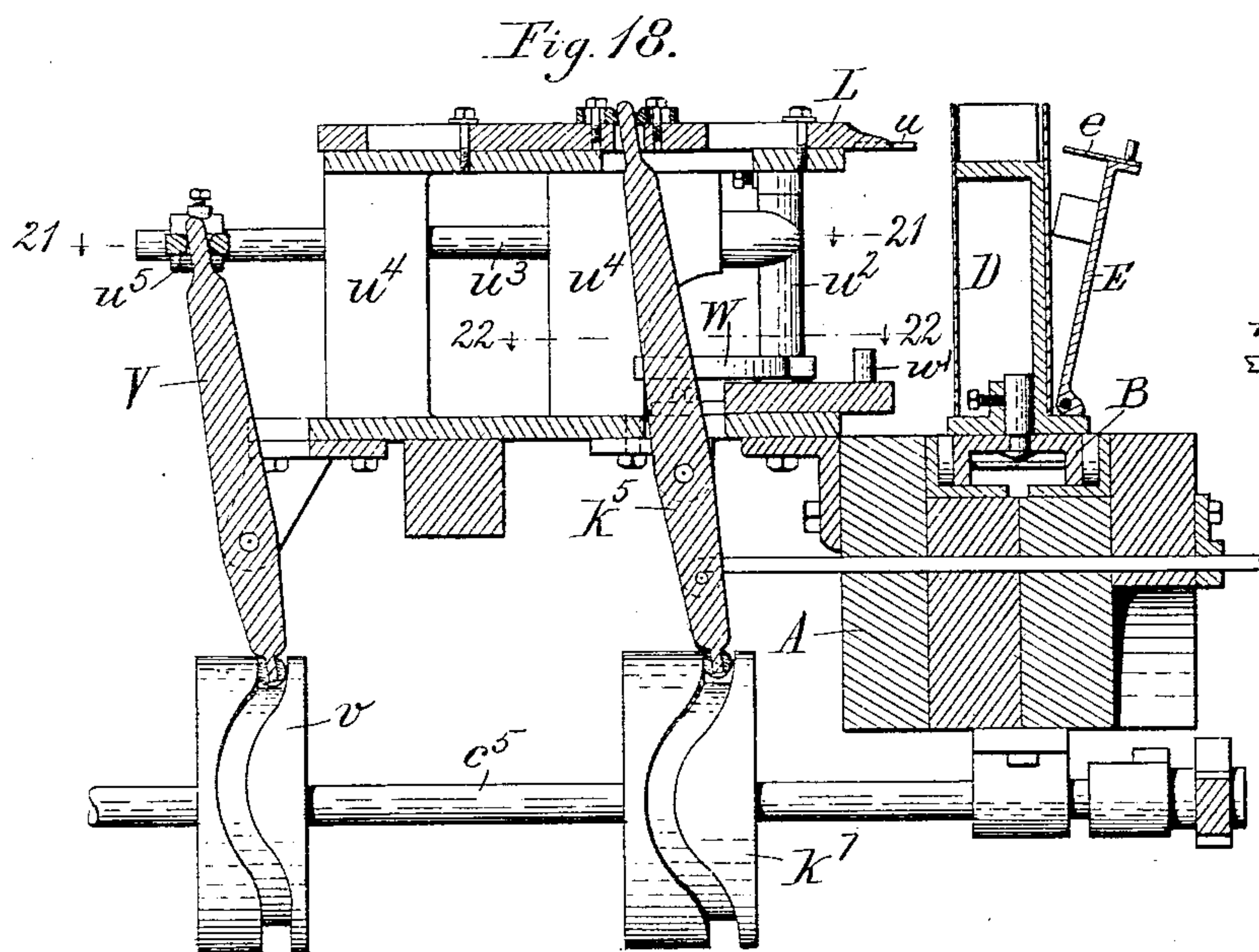
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NO MODEL.

6 SHEETS—SHEET 6.



Witnesses:
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UNITED STATES PATENT OFFICE.

CHARLES H. BROOKS, OF SYRACUSE, NEW YORK, ASSIGNOR TO MERRELL-SOULE COMPANY, OF SYRACUSE, NEW YORK.

MACHINE FOR CLOSING THE ENDS OF PAPER BOXES.

SPECIFICATION forming part of Letters Patent No. 751,714, dated February 9, 1904.

Application filed November 6, 1902. Serial No. 130,350. (No model.)

To all whom it may concern:

Be it known that I, CHARLES H. BROOKS, a citizen of the United States, residing at Syracuse, in the county of Onondaga and State of New York, have invented new and useful Improvements in Machines for Closing the Ends of Paper Boxes, of which the following is a specification.

This invention relates to a machine for closing the ends of four-sided paper or cardboard boxes or cartons of that kind in which the end is composed of four flaps which are folded at right angles to the sides of the box and held by paste or gum applied to the two outermost end flaps.

The machine embodying the invention comprises automatic mechanisms for applying paste to the two outer end flaps, folding the flaps in their correct closed relation, pressing the same to cause the pasted flaps to adhere together, and ejecting the boxes or cartons after the paste has dried or set.

While the novel features of the present invention are more particularly designed as improvements upon the machine disclosed in United States Letters Patent No. 664,458, granted to me December 25, 1900, they are not limited in their useful applications to a machine of the type therein shown and described, but are also useful in machines of different construction and organization.

One object of the present invention is to provide a pasting mechanism which will more evenly and perfectly apply the paste or gum without waste to the outer flaps and spread the paste over a larger surface.

Another object of the invention is to provide a presser device for holding the pasted flaps together which will act upon a greater surface of the end and exert its pressure for a longer period of time, thus giving the paste more time to set before the pressure is relieved.

Another object is to provide a simple mechanism for stripping the boxes from the forms or holders on which they are carried while being operated upon and while the paste is drying, which mechanism will be certain in operation and will not injure or mar the boxes or cartons.

A still further object is to produce a rapid and efficient machine for the purpose stated of generally improved and simplified construction.

The machine hereinafter specifically described, and shown in the drawings, briefly stated, is constructed and operates as follows: An intermittently-moving endless carrier or feed-chain is provided with numerous four-sided holders or forms, on each of which a box or carton blank is placed in an inverted position by the operator as the holders pass by the operator. In this position the four bottom flaps of the blank project outwardly from each holder and are in this position presented by the movement of the carrier to the paste-applying mechanism, which latter applies the paste, gum, or mucilage to the inner faces of two opposite or the rear and front flaps. While the paste is being applied to the front and rear flaps, the two opposite side flaps are held down by suitable mechanism out of the path of the paste-applying device. The following movements of the carrier present the blank to the mechanisms by which the two side flaps are folded down upon the top of the holder, the gummed rear flap is folded down upon the side flaps, and the gummed front flap is folded down upon the rear flap. All of these operations take place on the upper run of the horizontal carrier, from which the blank-holders project upwardly, while they project downwardly from the lower run of the carrier. The carrier is made so long that the paste, gum, or mucilage dries while the boxes, of which the bottoms have been closed, travel with the chain. After the bottoms have become dry the boxes are presented to an ejecting mechanism by means of which each box is stripped or removed from its holder. The tops of these boxes or cartons are also each composed of four flaps; but these remain open until the box has been filled and are usually so constructed that they must be closed by hand. When the top flaps are also so constructed that they can be secured by pasting,

the herein-described mechanisms for applying the paste and folding the flaps can be used for performing these operations in closing the boxes after they have been filled. In that
 5 case a second machine is provided, which has the holders on the feed-chain constructed to receive the filled boxes with the top flaps projecting upwardly therefrom, the gumming or
 10 pasting mechanism and the folding mechanism being constructed and arranged to operate as in the first-mentioned machine.

This invention is therefore not limited to devices for closing the bottom flaps of box-blanks, but embraces also devices for closing
 15 similar top flaps of filled boxes.

In the accompanying drawings, consisting of six sheets, Fig. 1 is a side elevation of a machine embodying the invention, the receptacle for receiving the boxes from the ejecting mechanism being shown in section. Fig.
 20 2 is a perspective view of a box-blank before the ends are closed. Fig. 3 is a top plan view of the machine shown in Fig. 1. Fig. 4 is a fragmentary plan view, on an enlarged scale, showing the pasting mechanism. Fig. 5 is a
 25 fragmentary sectional elevation, on an enlarged scale, through two adjacent box-holders and boxes in position to have the flaps pasted and folded. Fig. 6 is a similar view showing the flaps of one box having paste applied thereto and the flaps of the other box
 30 folded. Fig. 7 is an enlarged fragmentary plan view, partly in section, showing the flap holding and folding mechanism. Fig. 8 is a vertical section through the folding mechanism in line 8 8, Fig. 7. Fig. 9 is a fragmentary section of the folding mechanism, showing the parts in folding position. Fig. 10 is
 35 an enlarged fragmentary sectional elevation of the presser device and operating mechanism. Fig. 11 is a section in line 11 11, Fig. 10, through the operating-cam for the presser device. Fig. 12 is an enlarged fragmentary sectional elevation through the ejecting mechanism in line 12 12, Fig. 1. Fig. 13 is a section through the ejecting mechanism in line
 40 13 13, Fig. 12. Fig. 14 is a section in line 14 14, Fig. 12, showing the jaw-levers in the position indicated by dotted lines at 14 in Fig. 12. Fig. 15 is a section in the same line, Fig. 12, showing the jaw-levers in the position indicated by dotted lines at 15. Fig. 16 is an enlarged section through one of the stripping-jaws in line 16 16, Fig. 13. Fig. 17 is a
 50 section through the jaw in line 17 17, Fig. 16. Fig. 18 is a vertical sectional elevation showing a slightly-different form of folding mechanism for the side flaps. Fig. 19 is a plan view thereof, showing the folding-arms separated and retracted out of the path of the box-holders. Fig. 20 is a fragmentary plan view thereof, showing the arms in folding position. Fig. 21 is a horizontal section thereof in line
 60 21 21, Fig. 18. Fig. 22 is a fragmentary horizontal section in line 22 22, Fig. 18, showing

the position of the parts when the folding-arms are in folding position. Fig. 23 is a similar view showing the relation of the parts when the arms are separated. Fig. 24 is a fragmentary elevation showing one of the
 70 folding-arms and associated parts.

Like letters of reference refer to like parts in the several figures.

The main frame of the machine consists, essentially, of a longitudinal bed A, provided
 75 near each end with a pair of supporting-legs α and having a lateral extension A' on its rear side.

The endless carrier, feed-chain, or belt B passes around polygonal supporting-wheels b
 80 b' , arranged at opposite ends of the bed, and its upper horizontal portion runs over a horizontal guide or rail b^2 , arranged lengthwise on top of the bed, while its lower horizontal portion runs over a horizontal guide or rail b^3 ,
 85 arranged lengthwise below the bed and supported from the latter by hangers b^4 , as shown in Fig. 1. Each of the supporting-wheels is mounted on a transverse shaft b^5 , which is journaled in bearings on the under side of the bed. 90
 An intermittent forward movement is imparted to the carrier by any suitable means—for instance, as shown in said patent, by a ratchet mechanism, consisting of a pawl-arm C, hung loosely on the shaft of the rear chain-wheel b' ,
 95 and a pawl c , sliding transversely in the pawl-arm and held yieldingly in the path of the ratchet-teeth c' on the side of the wheel b' by a spring c^2 , as shown in Fig. 1. The pawl-arm is oscillated by a pitman c^3 , connected at
 100 one end to said arm and at its opposite end to a crank c^4 , arranged on the front end of the main drive-shaft c^5 . The latter is journaled transversely of the frame in bearings on the latter and is provided at its rear end with loose
 105 and fast pulleys c^6 c^7 .

Each of the chain-links is provided with a form or holder D, suitable for receiving a box-blank in an inverted position—that is, with the bottom end flaps at the outer end of the
 110 holder. Each holder consists of an open four-sided frame having the form and size of the body of the box or carton blank and a flat top or outer end d , against which the bottom flaps of the box are folded. The lower end of the
 115 holder is provided with a base or enlargement forming a shoulder d' , with which the ends of the cover-flaps of the box engage and which limit the downward movement of the box on the holder, so as to cause the bottom flaps to
 120 project upwardly beyond the upper flat end of the holder, as shown in Figs. 5 and 8. The holders may be secured to the links in any suitable way, the means shown in the drawings consisting of a stud d^2 , projecting from
 125 each chain-link into a hollow boss on the base of the holder, in which it is held by a set-screw d^3 passing through the boss.

Each blank-holder is provided on its front side with a folding-arm E, which is pivoted
 130

at its lower or inner end to the base of the holder and carries at its upper end a rearwardly-projecting folding-blade e , by which the front flap of the box is folded down. This folding-arm is provided on opposite sides of its outer end with spring clasps or fingers e' , which when the arm is closed against the holder engage against opposite sides of the blank-body carried by the holder, as shown in Figs. 1 and 2, and by frictional resistance prevent the arm from swinging open. The opening movement of the jaw is limited by shoulders e'' , formed thereon adjacent to its pivot and adapted to engage with the base of the holder, as shown in Figs. 8 to 10.

The box-blanks are placed upon the holders by the operator while the holders pass along the front or receiving end of the bed, with the four bottom flaps standing up straight, as shown in Figs. 1, 2, and 7. Each blank is then advanced to and stands still at the pasting or gumming mechanism.

The paste or gum is applied to the inner surfaces of the two opposite or front and rear flaps of the box by a paste-applying wheel journaled on a rotary arm which moves the wheel between the separated front and rear flaps. Paste is not applied to the two side flaps, and it is therefore desirable to hold these flaps down out of the path of the paste-applying wheel. The mechanism for accomplishing this is constructed as follows: F represents two horizontal rock-shafts, which are slidable longitudinally in bearings provided therefor on the main frame and the frame extension in rear of the endless carrier. The shafts are provided at their front ends with arms f' , which carry at their upper ends holding-fingers f'' , which are preferably connected to the arms by horizontal pins f''' . In the normal position of the holding-arms they diverge upwardly from each other, as shown in Fig. 5, and stand in rear of or out of the path of the holders on the carrier, as shown in Fig. 7. After the carrier comes to rest with a holder and box thereon in correct position beneath the pasting apparatus the rock-shafts F are moved forwardly to carry the holding-fingers opposite to the side flaps and are then rocked to swing the arms and fingers toward each other to fold the flaps downwardly on the top of the form. For this purpose the main or driving shaft c^5 is provided with a cam G, Figs. 1, 7, and 8, which is provided with a peripheral cam-groove, and a lever g , which is fulcrumed intermediate of its ends on a pin secured to a bracket projecting from a suitable portion of the frame extension A', is provided with a roller or projection g' , which enters the peripheral groove of the cam, while the upper end of the lever loosely engages in a cross-head g'' , which is connected to the rock-shafts. In order to enable the rock-shafts to rock in the head and be moved longitudinally therewith, the shafts pass loosely through holes

in the head, and collars g^3 are secured to the rock-shafts on opposite sides of the head. Each rock-shaft is provided with an upwardly-extending pin g^4 , which enters a slot g^5 in the horizontal stationary plate g^6 , located above the rock-shafts and secured in any suitable manner to a standard rising from the frame of the machine. The slots g^5 are provided with straight parallel rear portions and front portions which incline or converge toward each other. When the rock-shafts are moved forward to carry the holding-fingers to a position opposite to the side flaps of the box, the pins g^4 engage the inclined portions of the slots, their upper ends are drawn together, and the rock-shafts rocked to carry the holding arms and fingers toward each other to engage and hold down the side flaps, as indicated in Fig. 6.

H represents the paste-applying wheel, and h , Figs. 1 and 4, the operating-shaft therefor. This shaft is arranged transversely of the machine above the carrier and box-holders and is journaled in suitable bearings on standards rising from the frame extension. The shaft is driven by suitable means, such as a sprocket-chain h' , which runs on sprocket-wheels h^2 h^3 , secured, respectively, to the drive-shaft and operating-shaft for the paste-applying wheel. The shaft h is provided at its front end with an arm h^4 , which carries the paste-wheel, which latter is secured to a spindle h^5 , journaled in a sleeve or bearing h^6 on the arm h^4 . When the shaft h is rotated, the paste-applying wheel is carried by its arm between the two standing front and rear flaps of the box. The paste-applying wheel is rotated rapidly about its axis to properly spread the paste on the flaps by suitable mechanism. The mechanism shown in the drawings consists of a counter-shaft I, which is journaled in suitable bearings parallel with the operating-shaft for the paste-applying wheel and driven from the latter by intermeshing gear-wheels i i' , secured, respectively, to the counter-shaft and the operating-shaft for the paste-applying wheel. The counter-shaft I is provided with a gear-wheel i^2 , which meshes with a gear-wheel i^3 , fixed to a sleeve or hollow shaft i^4 , loosely journaled on the shaft h . The sleeve or hollow shaft is provided at its front end with a bevel gear-wheel i^5 , which meshes with and drives a bevel-gear pinion i^6 , secured to the spindle of the paste-applying wheel.

i^7 represents two separated yielding arms or bars between and against which the front and rear flaps stand while the wheel applies the paste. The arms are secured to suitable standards rising from the main frame and hold the flaps yieldingly against the paste-applying wheel to insure the proper application of the paste. The paste-applying wheel is preferably tapered somewhat, as shown.

The means shown in the drawings for supplying paste or gum to the paste-applying

wheel is constructed and arranged as follows: J represents a paste-supply trough or receptacle, which is of any suitable form and is held by suitable supports above the path of the forms on the endless carrier. *j* represents a paste-supplying wheel, which is arranged vertically, so that its lower portion dips into the paste or gum in the paste-receptacle. The paste-supplying wheel is secured to a horizontal shaft *j'*, which is journaled in suitable bearings on the paste-receptacle and is slowly rotated by suitable means—such, for instance, as a sprocket-chain *j''*, running on sprocket-wheels *j'''* *j''''* on the counter-shaft I and shaft *j''* for the paste-supplying wheel. The latter is so positioned that the paste-applying wheel will contact with the same when it is swung around by its carrying-arm, and will thus receive the paste or gum from the paste-supplying wheel. Preferably means are provided for wiping the paste-supplying wheel, so that it does not deliver an excess of paste to the paste-applying wheel. This device is shown in Fig. 4 and consists, preferably, of a roller *j''''''*, which bears against the paste-supplying wheel and is carried by a slide *j''''''''*. *j''''''''''* represents an adjusting-screw or the like, by which the roller is caused to bear with the necessary pressure against the paste-supplying wheel to remove any excess of paste and return the same to the paste-receptacle. In order to permit the operator to remove a surplus of paste from the supplying-wheel or to clean or scrape the latter at any time by hand, the sprocket-wheel *j''''* is loosely mounted on the shaft *j''* and provided with clutch-teeth *j''''''*, which interlock with cooperating teeth on a collar *j''''''''*, mounted to rotate with and move longitudinally on the shaft. The collar is pressed toward the sprocket-wheel by a spring *j''''''''''*, coiled about the shaft *j''* between a fixed collar thereon and the collar *j''''''''*. The teeth on the wheel and collar are provided with abrupt and inclined faces, so that the shaft may be rotated by hand rearwardly or in a direction opposite to that in which it is driven by its sprocket-chain. The shaft is provided at its front end with an operating knob or wheel *j''''''''''*.

After the front and rear flaps of the box have had the paste applied thereto the holding-arms are separated and then moved rearwardly to carry the fingers out of the path of the box-holder, and the latter is moved a step forward to carry the box to the flap-folding mechanism.

K represents folding-arms for the side flaps of the box. These arms are secured at their lower ends to the front ends of two transversely-arranged horizontal shafts *k*, which are slidably journaled in bearings carried by the main frame and the frame extension A'. The folding-arms normally stand in rear of and out of the path of the box-holders in the inclined position indicated in Fig. 5, with the inwardly-projecting folding-fingers *k'* at their

upper ends separated a distance greater than the width of the box. The rock-shafts are moved forwardly and rocked to fold the side flaps down in a manner somewhat similar to that described in connection with the rock-shafts for the holding-fingers. The rock-shafts *k* are connected by a cross-head *k''*, provided with holes, through which the shafts loosely pass, the shafts being caused to move forwardly and rearwardly with the cross-head by collars *k'''*, fixed to the shafts on opposite sides of the cross-head. The cross-head is connected by a link *k''''*, Fig. 8, to the upper arm of an upright lever *k''''''*, which is pivoted intermediate of its ends on a fulcrum-pin *k''''''''*, secured in any suitable manner to the frame extension A'. The lower end of the lever projects into a peripheral cam-groove in a cam *k''''''''''*, secured on the main drive-shaft *c''*. The lower end of the lever is preferably provided with an antifriction-roller, which engages in the cam-groove. The cam-groove is shaped to move the lever to carry the rock-shafts forwardly and return them while the carrier is at rest. The rock-shafts are provided with upwardly-projecting pins *k''''''*, which extend into slots *k''''''''* in a horizontal plate *k''''''''''*, fixed in any suitable manner above the rock-shafts. These slots are formed similar to the slots *g''* for the pins on the rock-shafts of the holding-fingers and operate in a similar manner to throw the fingers toward each other to fold the side flaps down when the shafts are moved forwardly and to separate the fingers when the shafts are returned rearwardly. After the side flaps have been folded down the rear flap of the box is folded forwardly on top of the side flaps by a reciprocating folding-bar L, Figs. 3 and 8. This bar is provided with a beveled front end and is mounted to move horizontally in guide-ways supported by suitable means above the frame extension. The folding-bar is moved in its ways by the lever *k''''''*, which operates the shafts for the side-flap-folding arms. The lever is provided at its upper end with a reduced portion, which engages loosely in a hole in the folding-bar. During the last portion of the forward movement of the folding-bar the latter engages against the rear side of the rear flap and loosely folds the same forwardly and downwardly upon the side flaps, during which movement of the bar the folding-fingers for the side flaps stand still in their innermost position and hold the side flaps down. After the side and rear flaps have been folded down the folding-arm E for the front flap is swung rearwardly or toward the holder, so that its blade *e* engages against the front flap and loosely folds the same down upon the side and rear flaps, as represented in Figs. 6 and 9. This movement of the folding-arm is effected by a horizontal shifting rod M, which slides transversely in a guide in the lower portion of the bed and which is connected at its rear end with the lower arm

of the rock-lever k^5 , while its front end is provided with an upwardly-projecting arm or finger m , which engages with the front side of the folding-jaw. The movement of the several members of the folding mechanism is so timed that the side flaps are first folded down upon the holder, after which the rear flap is folded loosely down upon the side flaps, and then the front flap is folded loosely down upon the side and rear flaps. After the flaps have been so folded the movement of the rock-lever k^5 is reversed, whereby the folding-fingers and bar are withdrawn rearwardly from the blank and the finger m is disengaged from the folding-arm of the holder.

In order to prevent the folding-jaw of the holder from moving backward or away from the holder and so cause the unfolding of the front flap when the shifting finger m leaves the folding-arm, a detent device is provided which holds the folding-jaw in its partially-closed position and which is constructed as follows: N represents a catch, which is arranged in front of the holders and capable of movement in the longitudinal direction of the feed-chain. This catch is provided at its front end with a transverse shoulder n , which stands in the path of the folding-arm of the holder as the latter moves from the gumming to the folding mechanism. The catch slides horizontally in a guide n' , formed on a standard n^2 , rising from the front part of the bed. The catch is yieldingly held in its foremost position (shown in Fig. 7) by a spring n^3 , which connects the front end of the catch with an adjacent stationary part of the machine. As the blank-holder moves from the gumming to the folding mechanism its folding-jaw engages with the shoulder n of the catch N and moves the latter in the direction in which the holder moves, thereby straining the spring n^3 . When the front-flap-folding arm is moved toward the holder for partially folding the front flap, the catch is moved in front of the folding-arm by the spring n^3 , thereby preventing the jaw from opening upon the withdrawal of the shifting finger m . After the flaps have been loosely folded in the manner just described and the folding-arms for the side flaps and folding-slide for the rear flap have been retracted the endless carrier moves another step to carry the box to the presser device.

The presser device, Figs. 3 and 10, consists of three forwardly-projecting pressure plates or fingers O , which are preferably yielding and are secured at their rear ends to a head o , pivoted at its lower end to the rear portion of the main frame or bed of the machine. The front ends of the presser-plates are adapted to bear down on the top surfaces of the rear flaps of three adjacent boxes and press the rear flaps down flat against or on top of the side flaps. The head carrying the presser-plates is provided with a rearwardly-extending operating bar or rod o^2 , which is connected

at its rear end to the upper end of an upright rod or bar o^3 , which is slidably mounted in any suitable manner upon a bracket o^4 , secured to the side of the frame extension A' . As shown in Fig. 10, this connection consists of a headed pin or bolt extending through an elongated slot in the upright bar. This means of connecting the bar permits it to move vertically and also to tilt or swing forwardly at its upper end to rock the presser-arm on its pivot. The upright bar o^3 is raised by a cam o^5 , secured on a shaft o^6 , which is arranged transversely of the machine and journaled in suitable bearings on the frame extension A' . The shaft is driven in any suitable manner—for instance, by means of a sprocket-chain o^7 , running on sprocket-wheels o^8 and o^9 , secured to the shaft o^6 and the main drive-shaft c^5 . The cam o^5 is so shaped that the presser-arm is moved forwardly and its fingers held down on the rear flaps of the boxes during the period of time that the endless carrier is at rest. By providing three presser-plates after the rear flap of one box has been engaged and held down by the foremost presser-plate the box is carried forwardly at the next movement of the carrier beneath the next presser plate or finger, and the pressing operation is repeated. Thus each box receives a series of pressures from the single pressure device.

As the box passes from the preliminary folding mechanism to the presser device the folding-arm for the front flap leaves the catch N and passes along the rear edge of a horizontal retaining-guide P , which is formed lengthwise on the standard n^2 in front of the holder and retains the folding-arm E in its partially-closed position. As the holder advances to the presser device the folding-arm of the holder engages with a cam p^2 , which moves the folding-arm rearward to its fullest extent and folds the front flap of the blank firmly and closely down upon the rear flap and the side flaps, as shown in Fig. 10. The folding-jaw of each holder is firmly held in its closed position by its clamping-fingers, which spring over and press the opposite sides of the blank against the holder, so that the flaps are securely held down while they are drying. After the bottom flaps of the blank have been so gummed and folded each blank is carried step by step forwardly on its holder by the movement of the carrier. The holders containing the pasted blanks pass downwardly around the rear supporting-wheel and thence forwardly with the lower portion of the carrier to the ejecting mechanism. The carrier is made so long that the pasted flaps become thoroughly dry and set before the boxes reach the front end of the machine, at which they are removed from the holders.

p^3 , Figs. 1, 12, and 13, represents a cam whereby each front-flap-folding arm is opened or swung away from the box on its holder preparatory to removing the box from the

holder. This cam is arranged adjacent to the front side of the front supporting-wheel and supported in any suitable manner—for instance, by the receptacle which receives the boxes from the ejecting mechanism. Each of the holders is provided on its upper or outer end with a stud or projection p^4 , which engages with the opening-cam as the holder moves forwardly toward the front supporting-wheel, and the arm is thereby swung outwardly, so as to release the box on the holder, as shown in Fig. 12.

The box-ejecting mechanism or mechanism for removing the boxes from the holders or forms is shown in Figs. 12 and 17 and is preferably constructed as follows: Q represents the ejector-shaft, which is arranged longitudinally in rear of the main frame and journaled at its rear end in a bearing in the frame extension A' and at its front end in a cam-plate q , which is supported by a bracket q' , secured in any suitable manner to the frame of the machine at the forward end thereof or adjacent to the front supporting-wheel for the endless carrier. The shaft is driven from the operating-shaft for the presser device by intermeshing bevel-gears $q^2 q^3$, Fig. 3, secured, respectively, to said shafts. R represents the box-removing jaws. There are two oppositely-arranged jaws, which are adapted to grasp the box between them, and the jaws are preferably provided with roughened or serrated gripping-faces. Each jaw is secured to the outer end of a lever r . The inner ends of the levers are pivoted to slide-blocks r' , which are guided in ways radial to the ejector-shaft in carrying-plates r^2 , which are secured to the ejector-shaft to rotate therewith on opposite sides of the cam-plate q . (See Figs. 13 to 15.) The outer end of each lever passes between separated guide-lugs r^3 on the carrying-plate, and the levers are slotted longitudinally for the passage of the ejector-shaft. Each slide-block is provided with a stud entering a cam-groove in the adjacent face of the cam-plate q , and these studs are preferably provided with anti-friction-rollers r^4 . The levers are pressed yieldingly toward each other by springs r^5 , which are coiled about the ejector-shaft between fixed collars r^6 thereon and movable collars r^7 , which bear against the levers.

S S represent two stationary segmental circular tracks, which are fixed in any suitable manner to the cam-plate q or other stationary part of the machine concentric with the ejector-shaft. The opposite ends of the segmental tracks S are beveled at their outer edges, as indicated at s , and the levers for the gripping-jaws are provided on their inner faces with bearing-blocks or raised portions s' , which are adapted to slide on the segmental tracks. Assuming the levers and gripping-jaws to be in the position indicated at 15 in Fig. 12, the carrying-plates, which rotate with the ejector-shaft, will carry the levers around

from left to right, as indicated by the arrow in Fig. 12, and the jaws will follow the path indicated by the broken lines by reason of the shape of the cam-grooves in which the studs on the slide-blocks connected to the levers engage. The levers and jaws are first drawn inwardly toward the ejector-shaft, so that the jaws will not strike the endless carrier, and they are then projected out until they stand on opposite sides of the box on the holder. When the levers leave the position 15, their bearing-blocks s' pass off of the segmental tracks S; but as the bearing-blocks bear on the flanges s^2 of the carrying-plates, as indicated in Fig. 15, the jaws are held separated. When the jaws are projected opposite to the box on the holder, the bearing-blocks slide off of the flanges s^2 , and the jaws are forced together to grasp the box by the springs r^5 . After the box is grasped the jaws are moved by reason of the shape of the cam-grooves in a line parallel with the sides of the box-holder until the box is disengaged from the holder. This right-line movement of the jaws with the box prevents the latter from being torn or broken in being disengaged from the holder. As the levers continue their movement the bearing-blocks s' engage the beveled edges of the segmental tracks S, and the levers are thereby separated, as indicated in Fig. 14, and the box dropped from between the jaws into a suitable receiving-receptacle T, Fig. 12. After the levers are separated by the segmental tracks they are drawn in by the cam far enough for their bearing-blocks s' to again engage on the flanges s^2 of the carrying-plates. In case a box should cling to the jaws and not be dropped it will be carried around by the jaws until they pass the bracket q' , which will strike the box and disengage it from the jaws. The action of the ejecting device is thus positive, and there is no possibility of a box being carried against the holder and crushed, as might happen with a reciprocating ejecting device.

In order to permit the gripping-jaws to bear squarely on the box on the holder, the jaws are pivoted to the levers by pins s^3 , Figs. 16 and 17, which pass through the levers and lugs s^4 on the jaws. The angularity of the levers and jaws must change as the jaws move parallel with the box-holder in removing the box from the holder. The jaws are therefore also preferably mounted to swing in a plane at right angles to the plane of their movement on the pins s^3 . For this purpose each pin s^3 passes through slots s^5 in the end of the lever, which are of greater width than the diameter of the pin and through a hole in a circular block s^6 , which is free to turn in a circular opening in the end of the lever. The pin s^3 fits tightly in the hole in the circular block, so that the latter swings with the pin. Thus while the pin and the jaw are free to swing on the lever there is no looseness in the parts.

s^7 represents a spring which is secured to the end of the lever and bears at its free end on one of the lugs s^4 of the jaw to normally hold the jaw in the position indicated in Figs. 12 and 17. This spring permits the jaw to turn on the lever in removing the box from the holder, but returns the jaw to its initial position to properly grasp the next box. The spring s^7 is not necessary to the operation of the gripping-jaws and may be omitted, if preferred.

In Figs. 18 to 24 is shown a side-flap-folding mechanism which is slightly different in form from that before described and may be substituted therefor to operate in conjunction with the front and rear flap folding devices. The mechanism, as shown in said figures, is constructed and operates as follows: U represents the folding-arms, which are arranged horizontally in rear of the endless carrier and provided at their forward ends with inwardly-extending flap-engaging fingers u . The arms are secured at their rear ends to the upper ends of vertical rock-shafts u' , which are journaled in upright tubular bearings u^2 , carried at the front ends of horizontal reciprocating rods or shafts u^3 , which are mounted to slide toward and from the endless carrier in bearings on standards u^4 , rising from the frame extension. The reciprocating rods are connected at their rear ends by a cross-head u^5 and are reciprocated by a lever V, fulcrumed on the frame extension and having its upper end connected with the cross-head, while its lower end engages in the groove of a cam v , secured to the drive-shaft c^5 . The rock-shafts u' have secured to their lower ends bent levers W, having rearwardly-projecting arms and arms which extend inwardly or toward each other. w represents flat or leaf springs, which are secured at their rear ends to the forward standards u^4 and bear at their free front ends against the outer faces of the rear arms of the levers W, and w' represents stops located in front of and in the path of the inwardly-extending arms of the levers W. The stops rise from a forwardly-extending plate w^2 , secured to the frame extension. When the reciprocating rods are in their rear or retracted position, the rear arms of the levers are pressed toward each other by the springs w and the folding-arms held separated, as shown in Fig. 19. The outward movement of the folding-arms is limited by stop-shoulders w^3 on the levers W, engaging stop lugs or shoulders w^4 on the bearings for the rock-shafts. When the reciprocating rods are moved forwardly, the folding-arms are held separated by the springs until the inwardly-projecting arms of the levers strike the stops w' , which upon the continued movement of the rods cause the levers to swing to the position shown in Fig. 22, thus rocking the vertical rock-shafts and throwing the folding-arms toward each other to engage and fold

the side flaps. When the levers are swung by engagement with the stops, the springs are strained and when the reciprocating rods are moved rearwardly the springs return the levers and folding-arms to their initial position.

While this construction is described in connection with the folding-arms, it is obviously applicable to the arms which hold the side flaps down while the paste is being applied to the front and rear flaps.

I claim as my invention—

1. The combination of a holder for a box, a paste-applying wheel, an axle on which said wheel is journaled, means for moving said axle and wheel past the box, and means for rotating said wheel on its axle to apply the paste to the box, substantially as set forth.

2. The combination with a holder for a box, of a rotary arm which is adapted to sweep past the box, a paste-applying wheel journaled on said arm, and means for rotating said paste-applying wheel on said arm, substantially as set forth.

3. The combination with a holder for a box, of a paste-applying wheel, means for rotating said wheel about its axis, means for carrying said wheel past the box-flaps to apply the paste to the same, and yielding arms for holding said flaps against the paste-applying wheel, substantially as set forth.

4. The combination with a holder for a box, of a rotary shaft, an arm carried by said shaft and adapted to sweep past the box, means for rotating said shaft, a paste-applying wheel secured to a spindle journaled on said arm, and gearing operatively connecting said spindle and said shaft to rotate the spindle, substantially as set forth.

5. The combination with a holder for a box, of a paste-applying wheel, means for rotating said wheel on its axis, means for carrying said wheel past the box to apply the paste to the latter, and a paste-supplying device with which the paste-applying wheel contacts in its movement, substantially as set forth.

6. The combination with a holder for a box, of a paste-receptacle, a paste-supplying wheel dipping into the paste in said receptacle, a paste-applying wheel, means for rotating said wheel about its axis, and means for carrying said wheel past said paste-supplying wheel to receive the paste and past the box to apply the paste to the latter, substantially as set forth.

7. The combination with a holder for a box, of a paste-receptacle, a paste-supplying wheel dipping into the paste in said receptacle, a paste-applying wheel, means for rotating said wheel about its axis, means for carrying said wheel past said paste-supplying wheel to receive the paste and past the box to apply the paste to the latter, and a scraping device bearing against said paste-supplying wheel to remove surplus paste, substantially as set forth.

8. The combination of a paste-applying device, an intermittently-moving holder for a box arranged to carry the box beneath said paste-applying device with its open end uppermost, means for holding down the end flaps at the opposite sides of the box, and means for moving said paste-applying device between the standing front and rear end flaps of the box in a direction longitudinally relative to the direction of movement of the box-holder, substantially as set forth.

9. The combination of a paste-applying device, an intermittently-moving holder for a box arranged to carry the box beneath said paste-applying device with its open end uppermost, horizontally-swinging folding devices, means for moving said folding devices toward said box-holder in a direction transversely to the direction of movement of the box-holder, means for swinging said folding devices toward each other to turn down the end flaps at the opposite sides of the box, and means for moving said paste-applying device between the standing front and rear end flaps of the box in a direction longitudinally relative to the direction of movement of the box-holder, substantially as set forth.

10. The combination of an intermittently-moving holder for a box, horizontally-swinging folding-arms, vertical rock-shafts carrying said folding-arms, means for moving said rock-shafts and folding-arms horizontally toward said box-holder in a direction transversely to the direction of movement of said box-holder, and means for oscillating said folding-arms toward each other to fold the opposite end flaps of the box, substantially as set forth.

11. The combination of an intermittently-moving holder for a box, horizontally-swinging folding-arms, vertical rock-shafts carrying said folding-arms, means for moving said rock-shafts toward the box-holder in a direction transversely of the direction of movement of said box-holder, levers secured to said rock-shafts, stationary parts which engage said levers to oscillate said rock-shafts and swing said folding-arms toward each other, and springs acting on said levers to oscillate said rock-shafts in the opposite direction, substantially as set forth.

12. The combination with an intermittently-moving box-holder, of stripping devices, means for moving the same transversely toward the box-holder, and means for moving said stripping devices in right lines in a direction parallel with the longitudinal axis of said box-holder to remove the box while said box-holder is stationary, substantially as set forth.

13. The combination with a movable box-holder, of gripping-jaws, levers carrying said jaws and pivoted to swing in planes at right angles to the plane of movement of the box-

holder, means for moving said levers bodily toward said box-holder, means for moving said jaws toward each other to grasp the box, and means for moving said jaws in right lines in a direction parallel to the longitudinal axis of the box-holder to remove the box from the holder, substantially as set forth.

14. The combination with a box-holder, of gripping-jaws, pivoted levers carrying said jaws, means for swinging the said levers bodily to carry said jaws toward the box-holder, means for swinging said levers on their pivots to cause the jaws to grasp the box, and means for moving said levers in a direction at an angle to the direction of movement of the levers toward the box-holder to remove the box from the holder, substantially as set forth.

15. The combination with a box-holder, of a rotary shaft, a stationary cam, levers mounted to rotate with said shaft, gripping-jaws carried by said levers, parts connected to said levers and engaging said cam whereby said levers are moved toward the box-holder and also moved parallel with the box-holder, means for moving the jaws to grasp the box, and means for separating said jaws to release the box, substantially as set forth.

16. The combination with a box-holder, of a rotary shaft, a stationary cam, carrying-plates secured to said shaft, pivoted levers mounted on said carrying-plates and connected to parts engaging said cam, gripping-jaws carried by said levers, springs surrounding said shaft for forcing said levers toward each other, and stationary tracks adapted to be engaged by said levers to separate the latter, substantially as set forth.

17. The combination with a box-holder, of a rotary shaft, a stationary cam, carrying-plates secured to said shaft, slide-blocks on said carrying-plates provided with parts engaging said cam, levers movable with said carrying-plates and pivoted to said slide-blocks, springs coiled about said shaft for forcing said levers toward each other, gripping-jaws carried by said levers, and stationary tracks adapted to be engaged by said levers to separate the latter, substantially as set forth.

18. The combination with a box-holder, of rotary levers, means for rotating said levers, means for forcing said levers toward each other, and gripping-jaws pivoted to said levers, substantially as set forth.

19. The combination with a box-holder, of rotary levers, means for rotating said levers, means for forcing said levers toward each other, and gripping-jaws universally connected to said levers, substantially as set forth.

Witness my hand this 3d day of November, 1902.

CHARLES H. BROOKS.

Witnesses:

B. M. CUMMINGS,
M. D. CLARK.