

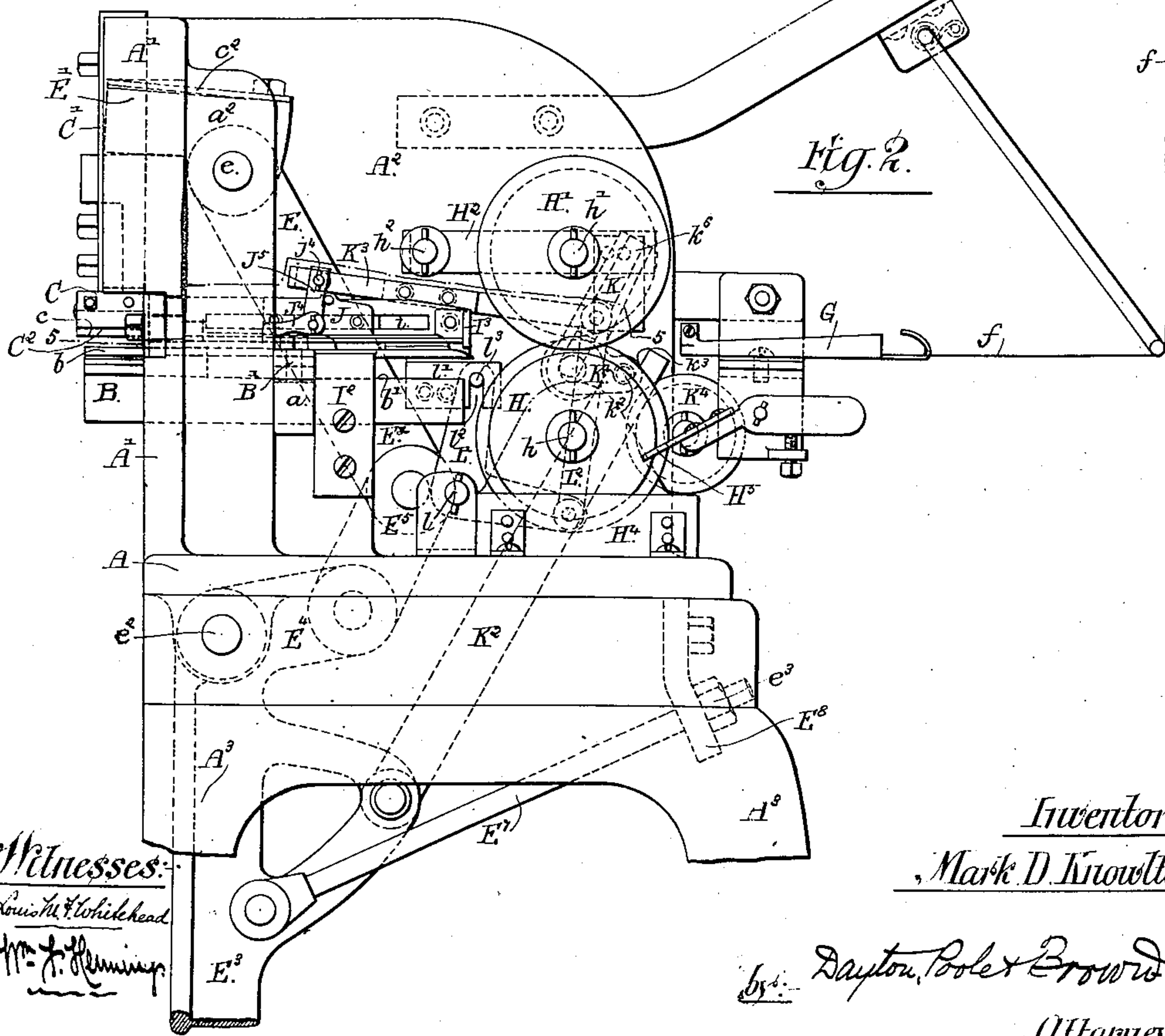
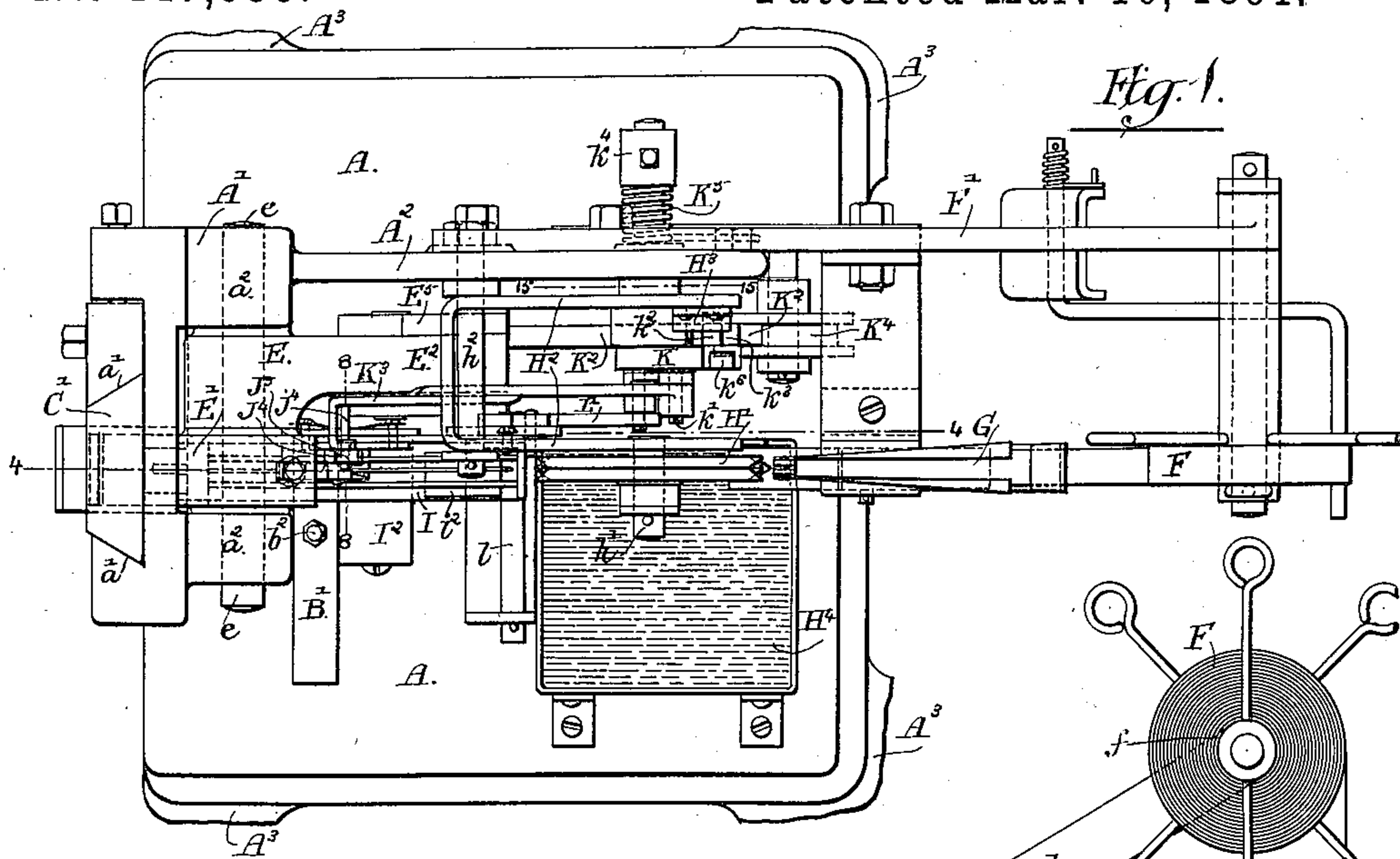
(No Model.)

4 Sheets—Sheet 1.

M. D. KNOWLTON.
BOX JOINTING MACHINE.

No. 447,955.

Patented Mar. 10, 1891.



Witnesses:

Louis M. Whitehead

Wm. J. Fleming

Inventor:

Mark D. Knowlton.

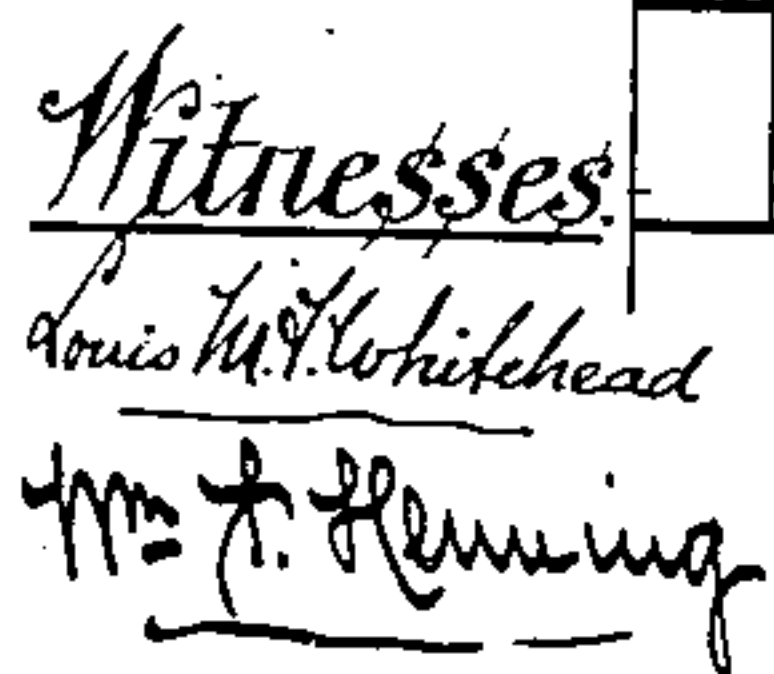
by Dayton, Poley & Brown

Attorneys.

4 Sheets—Sheet 2.

No. 447,955.

Patented Mar. 10, 1891.



Inventor:
Mark D. Knowlton.

By: Dayton Cole & Brown
Attorneys.

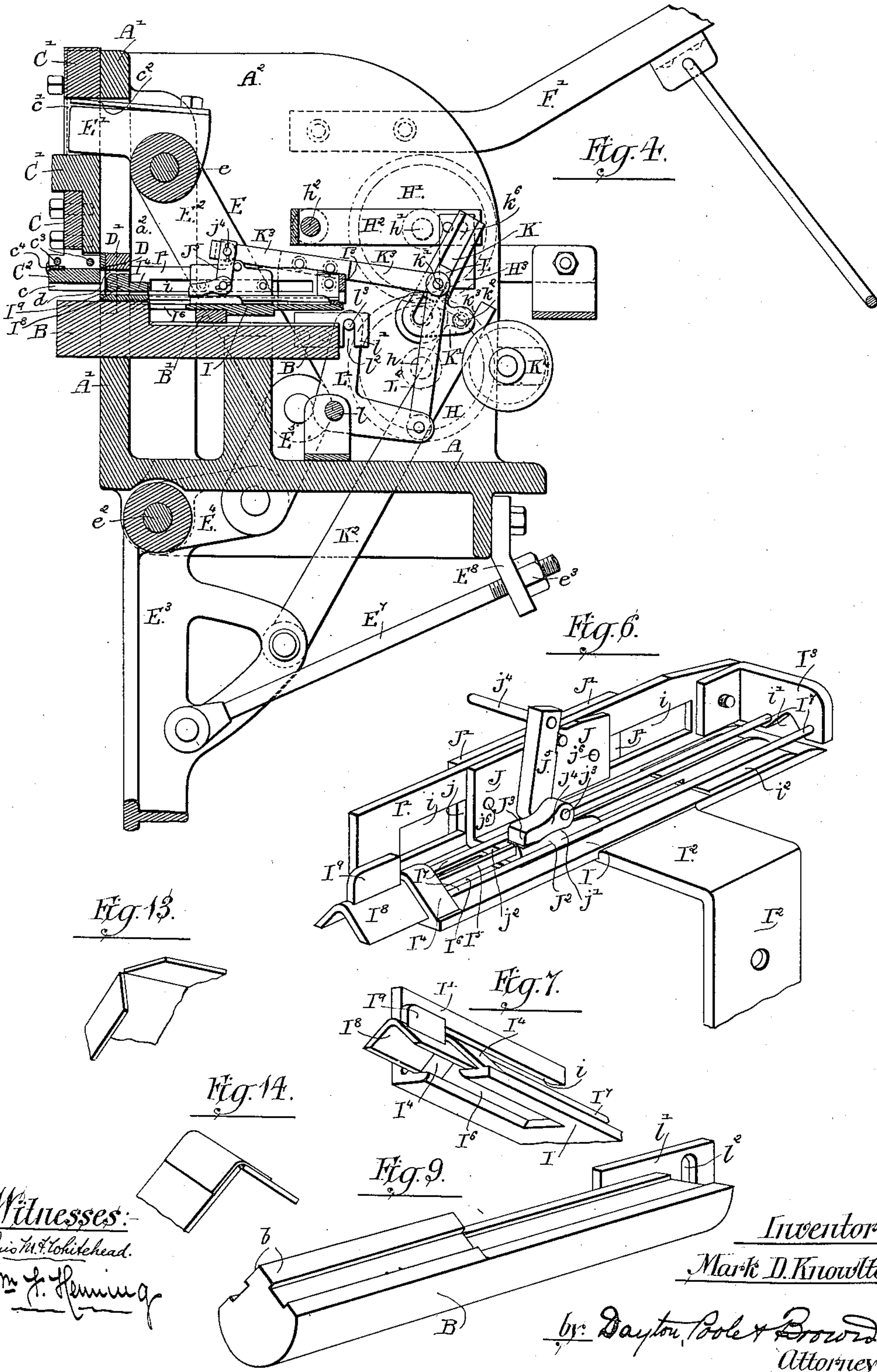
(No Model.)

4 Sheets—Sheet 3.

M. D. KNOWLTON.
BOX JOINTING MACHINE.

No. 447,955.

Patented Mar. 10, 1891.



Witnesses:

Louis M. Whitehead.

Wm. J. Hemming

Inventor:-

Mark D. Knowlton.

by: Dayton, Poole & Brown
Attorneys.

(No Model.)

4 Sheets—Sheet 4.

M. D. KNOWLTON.
BOX JOINTING MACHINE.

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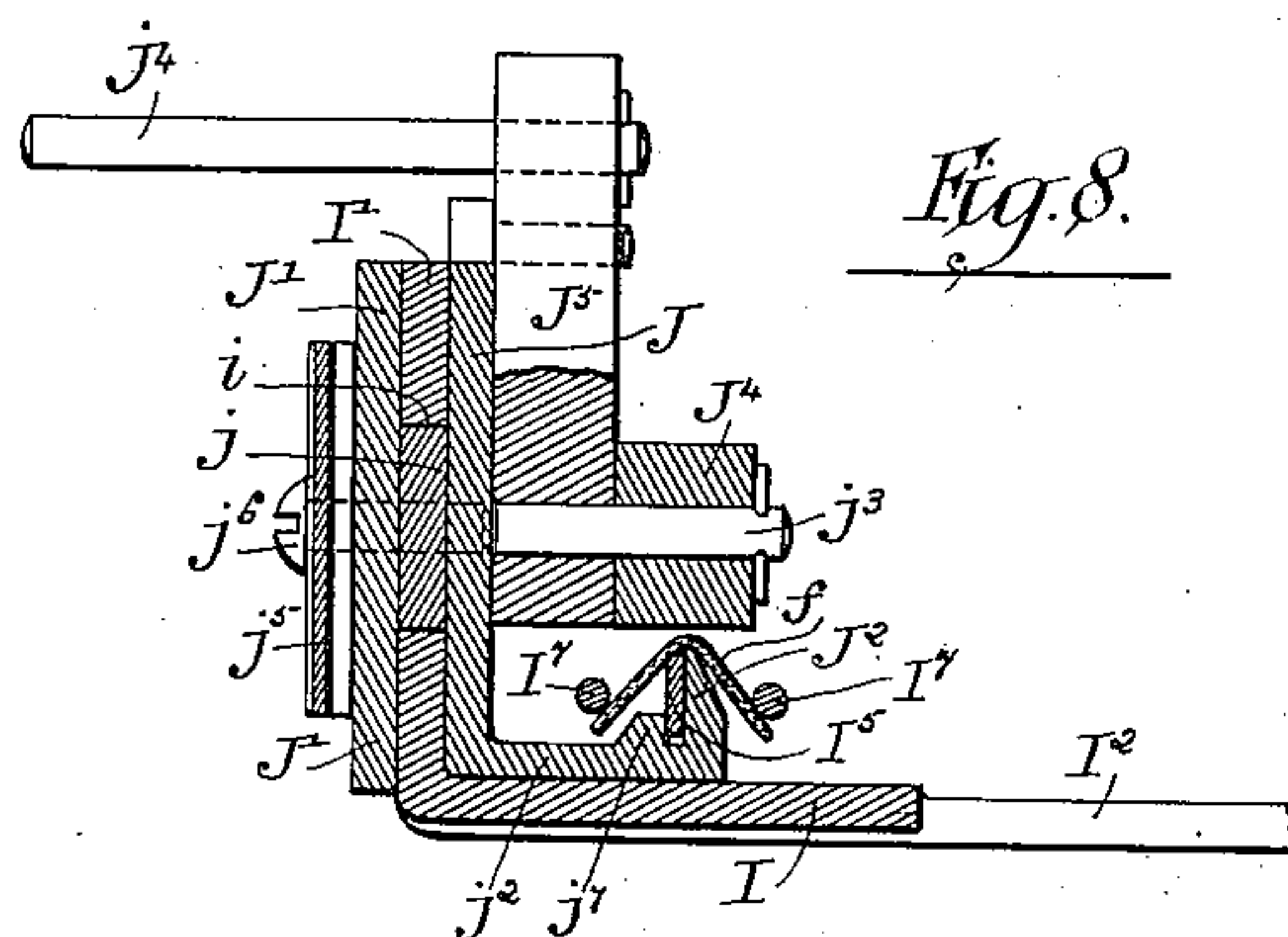


Fig. 8.

Fig. 15.

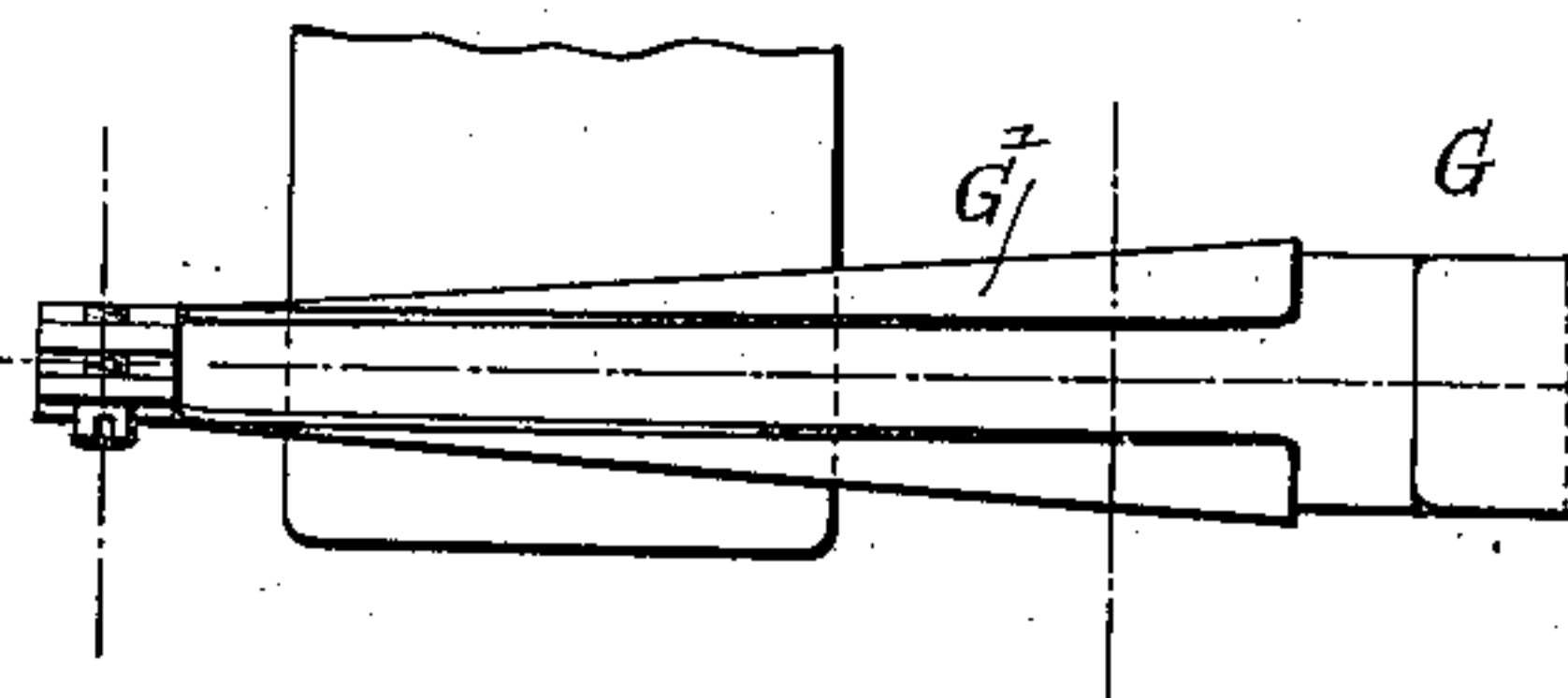
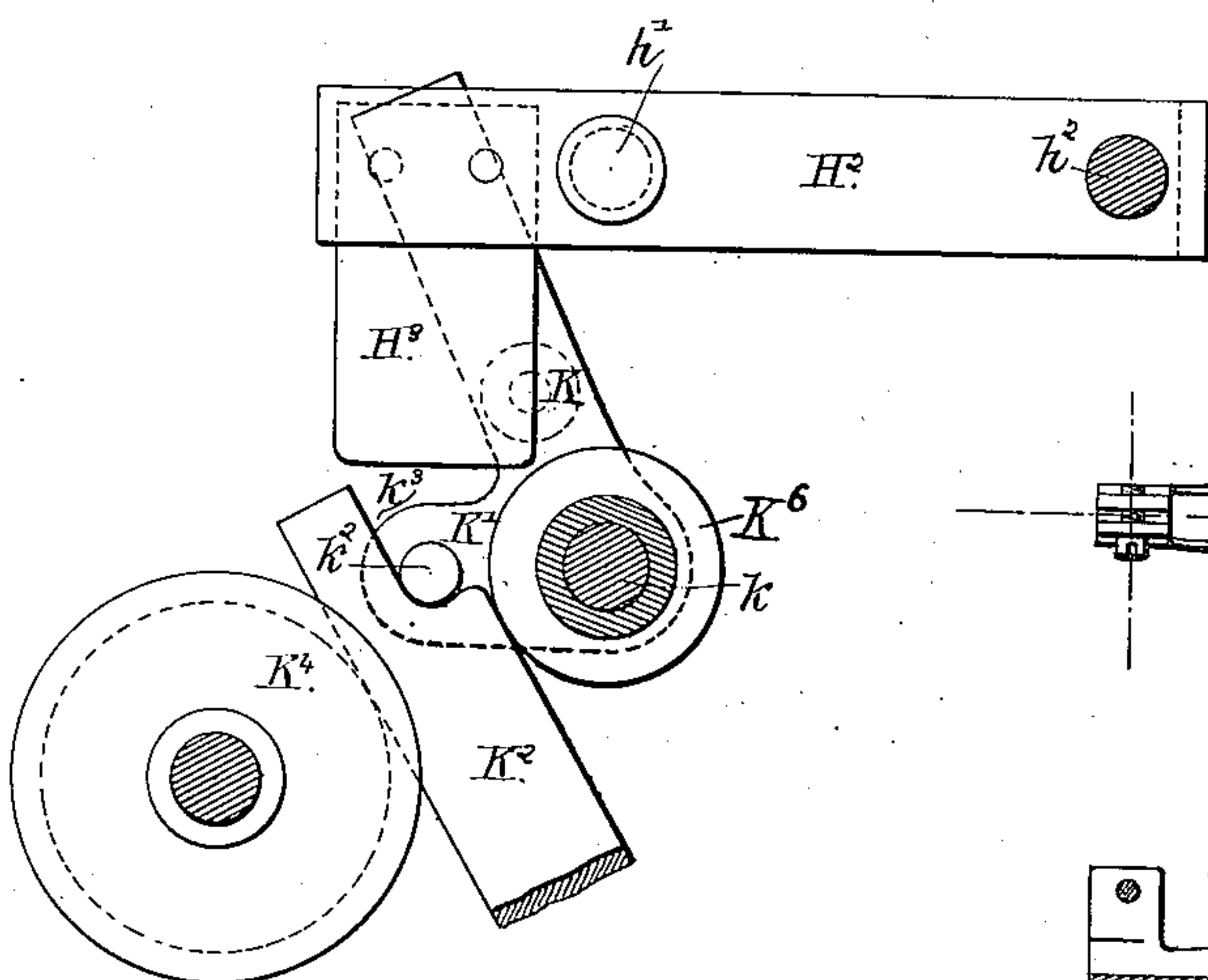


Fig. 16.

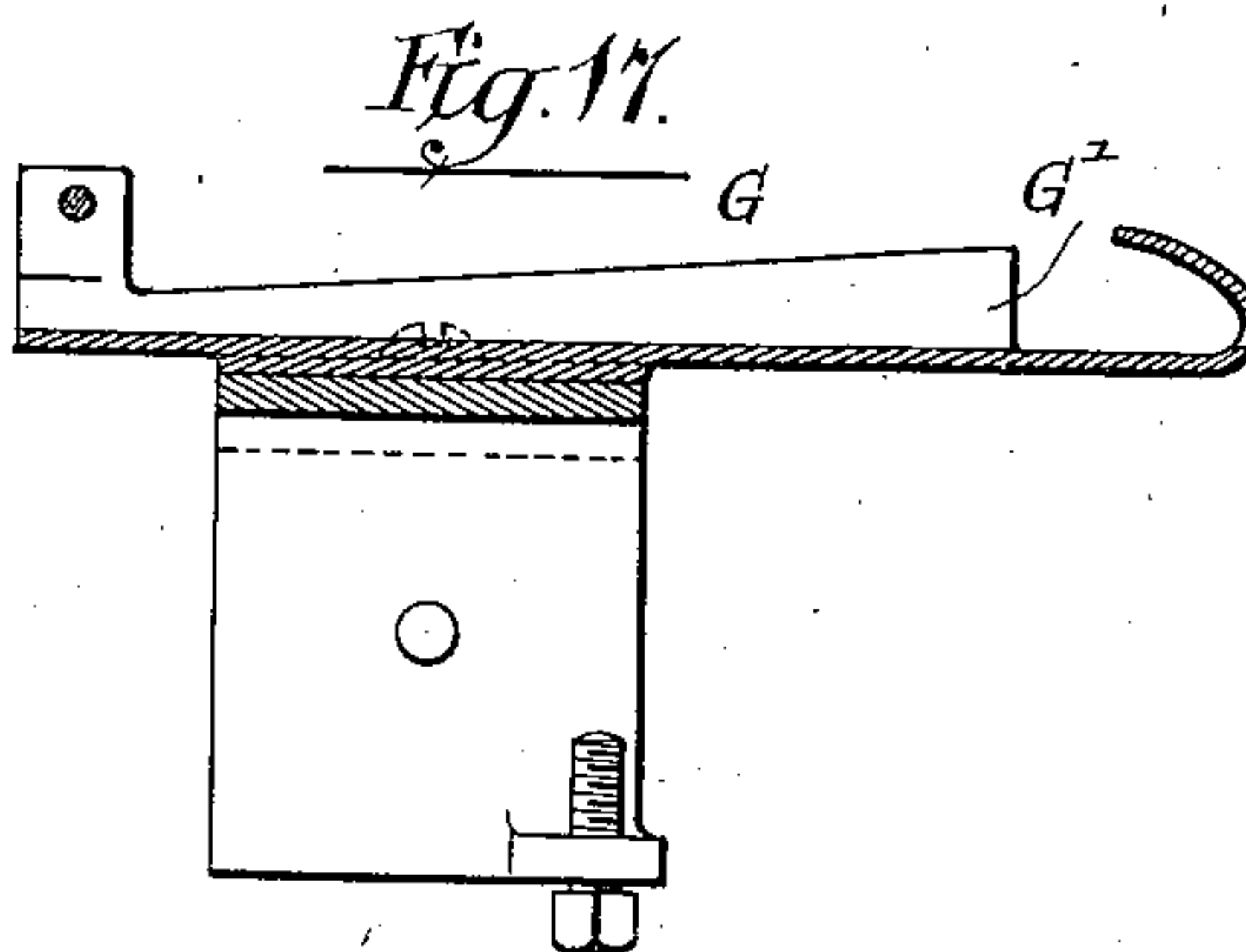


Fig. 17.

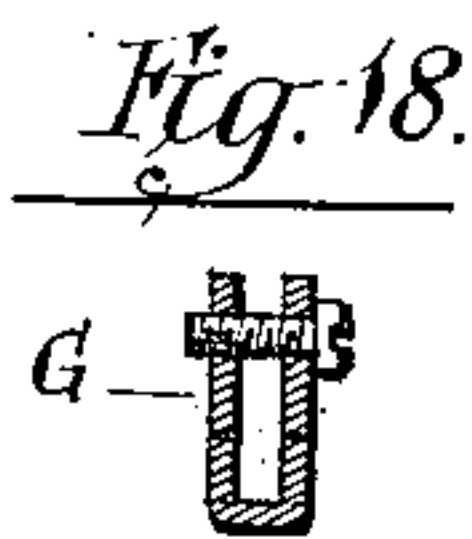


Fig. 18.

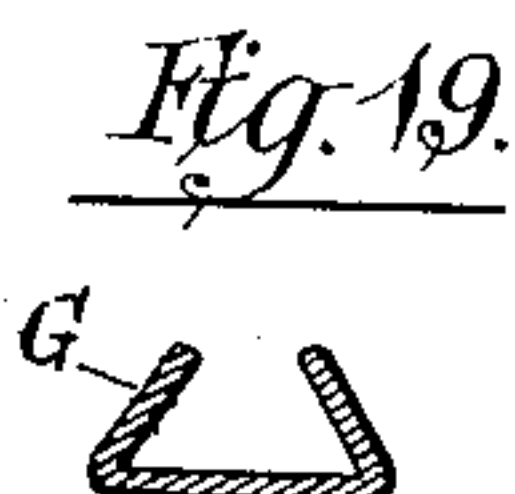


Fig. 19.

Values:-

Louis H. F. Whitehead.

Mr. J. Heming.

Inventor: _____

Mark D. Knowlton.

By: Dayton, Poole & Brown

Attorneys.

UNITED STATES PATENT OFFICE.

MARK D. KNOWLTON. OF CHICAGO, ILLINOIS.

BOX-JOINTING MACHINE.

SPECIFICATION forming part of Letters Patent No. 447,955, dated March 10, 1891.

Application filed February 14, 1888. Serial No. 223,998. (No model.) Patented in England April 6, 1888, No. 5,080.

To all whom it may concern:

Be it known that I, MARK D. KNOWLTON, of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Box-Jointing Machines, (patented in Great Britain on the 5th day of April, 1888, No. 5,080;) and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to an improved machine for making the joints in the manufacture of boxes or other articles of paper, straw-board, wood veneer, or similar material, and more particularly adapted for use in the manufacture of paper or straw-board boxes for the purpose of "setting up" or jointing the cut edges of the paper, straw-board, or wood-veneer box-blank at the corners of the box.

The invention relates more particularly to a machine organized for applying to the edges to be joined a strip or piece of paper or other material, which is caused to adhere to the parts by paste, glue, or other adhesive substance.

The invention consists in the matters hereinafter described, and pointed out in the appended claims.

A machine embodying my invention embraces as its main or essential features clamping-dies for pressing or forcing jointing-strips against or in contact with the edges of the parts to be joined after paste, glue, or other adhesive substance has been placed between the strip and the surfaces to which it is to be applied, together with means for guiding or directing to or between said dies a paper strip from which the individual jointing-strips are severed. As far as this main feature of the invention is concerned the paper strip may be fed forward to the dies either by hand or otherwise.

The machine herein shown embraces as a separate and further improvement an automatically-acting feeding device by which the paper strip is fed forward between the dies each time the latter are actuated for clamping the strip against the parts to be joined.

The particular machine herein shown em-

braces, furthermore, as an additional improvement an automatically-acting cutting device for severing the jointing strips or pieces from the continuous strip and for applying adhesive substance to said strip. The devices for applying adhesive substance are not essential in a machine embracing the main features of construction above illustrated, inasmuch as the strips may be previously coated with adhesive substance, which is allowed to dry and is moistened by steam or otherwise shortly before it is applied to the parts to be joined, or paste or glue may be applied by hand to the jointing-strips or to the parts to be joined. The employment of means for continuously applying paste or glue to the strip as it is fed to the clamping-dies is for several reasons preferred, and a machine embracing devices for this purpose is herein claimed as new, as are certain parts of the machine relating to the paste-applying devices. The machine may be employed for joining the edges of paper or straw-board articles either when the parts to be joined are in the same plane or when they are arranged at an angle with each other.

The particular machine shown is for joining the sides of straw-board boxes, and the dies are therefore made one concave and the other convex and with flat faces arranged at an angle with each other.

In the machine herein illustrated one of the clamping-dies is constructed to reciprocate in applying the jointing-strips, while the other remains immovable, and the paper strip is severed by a knife or cutter upon the machine-frame acting in conjunction with a cutting-edge of or upon the movable die. In said machine, furthermore, the non-reciprocating die or anvil-block is bodily movable or adjustable with relation to the machine-frame and the stationary cutter supported thereon, and said non-reciprocating die or anvil-block is connected with the actuating devices by which the paper is fed forward in such manner that the extent of the forward movement of the paper strip will be changed by moving the said adjustable die to correspond with the width of the sides of the box to be joined by the strip, so that a jointing-strip of the right length will in every instance be applied to the box.

The machine herein shown is furthermore adapted to be actuated by a foot-lever; but a machine embracing similar features of construction may be operated by power or by the operator acting through other means than the foot-lever.

The invention may be more readily understood by reference to the accompanying drawings, in which—

Figure 1 is a plan view of a machine embodying one practical form of my invention. Fig. 2 is a side elevation thereof. Fig. 3 is a front elevation thereof. Fig. 4 is a vertical section taken upon line 4 4 of Figs. 1 and 3. Fig. 5 is a horizontal section taken upon the line 5 5 of Fig. 2. Fig. 6 is a perspective view of the main parts of the paper-feeding devices removed from the machine. Fig. 7 is a detail perspective view showing some of the parts shown in Fig. 6 as viewed from below. Fig. 8 is a detail cross-section through the parts illustrated in Fig. 6, taken upon line 8 8 of Fig. 1. Fig. 9 is a perspective view of the sliding stationary die or anvil-block removed from the machine. Fig. 10 illustrates a stationary cutter and its supporting-plate detached from the machine. Fig. 11 is a rear elevation of the movable die and cutter. Fig. 12 is a perspective view of the same as seen from the front of the machine. Fig. 13 illustrates the cut and scored blank forming the box-body before the corners are joined. Fig. 14 shows the corners after the jointing-strip has been applied. Fig. 15 is a sectional view taken upon line 15 15 of Fig. 1. Fig. 16 is a plan view of the paper folder and creaser. Fig. 17 is a sectional view of the same. Figs. 18 and 19 are sectional views of the same.

As shown in the said drawings, the main frame of the machine is formed by an integral casting embracing a horizontal bed-plate A, a vertical part or standard A' at one end of the bed-plate, and a flat vertical side plate or web A², arranged at one side of the bed-plate and connected at its margin with the standard A'. To the bed-plate A are attached legs A³, by which the machine is supported. Upon the frame thus constructed the several operative parts of the machine are mounted or sustained.

B is a non-reciprocating die or stationary anvil-block having the form of a bar or rod arranged horizontally and supported in the standard A' somewhat above the bed-plate A. The said anvil-block B extends at its end through the exterior vertical face of the frame-standard A', and the projecting part forms the working-surface of the die or anvil. The said anvil-block B is fitted to slide longitudinally within its seat or bearing in the standard A', so that its end portion may be extended a greater or less distance from the face of the said standard. In a simple and convenient construction of the anvil-block herein shown the latter is made semicircular upon its under face and provided at its outer end with flat working-faces b b, arranged at

right angles with each other, with their meeting edges upward. The anvil-block may be held or clamped in place in any suitable manner, the means for clamping, as herein shown, consisting of a clamp-bar B', resting at its outer end against a laterally-projecting arm a of the standard A' and bearing at its inner end upon a flat surface b' at the top of the inner portion of the anvil-block. The clamp-bar B' is held against and over the anvil-block by means of a set-screw b² passing through the clamp-bar and entering the arm a near the anvil-block.

C is a movable part or reciprocating die of the clamping or pressing device, said die being arranged vertically over the end of the anvil-block B, which projects from the face of the standard A', and being provided with a V-shaped notch or recess c in its undersurface, forming the working-face of the die to engage with the oblique surfaces b b of the anvil-block. The die C is attached to a vertically-movable slide C', mounted in guides a' a' upon the standard A'. Said reciprocating die acts, in conjunction with a stationary knife or cutter D, to sever the separate jointing-strips from the long or continuous strip fed to the machine. Said stationary knife or cutter is located over the stationary die-block in such position that the said strip is fed or guided over said die-block as the strip is advanced between the dies. The cutter is herein shown as held or supported in a removable plate D', which plate is bolted to the frame-standard A', and is provided with an opening or passage d, through which the strip passes to the dies, as will hereinafter more fully appear.

The slide C', which supports the die C, is in the machine illustrated moved vertically for actuating the movable die C by the following devices:

E is a heavy and strong bell-crank lever mounted upon a pivot e, which is inserted through lugs or bearing a² a², located at the upper end of the standard A' and at the inner face thereof. The said bell-crank lever E is provided with a short horizontal arm E', which engages a recess c' in the upper part of the slide C'. Said arm E' is herein shown as provided with a flat spring c², arranged to bear upwardly against the upper wall of the opening c' to take up lost motion in the parts. Said bell-crank lever E is provided with a second arm E², which extends obliquely downward to a point near the bed-plate A.

E³ is a foot-lever pivoted at its upper end to the machine-frame by means of a pivot-pin e³, arranged near the lower end of the standard A'. To the upper end of said foot-lever is attached a rearwardly-extending rigid arm E⁴, which is connected with the lower end of the lever-arm E² of the bell-crank lever by means of connecting-plates E⁵ E⁵. When the lower end of the foot-lever E³ is thrown backwardly, the lower end of the lever E² is thrown upwardly and inwardly, and the slide C' and

upper die thereby depressed. When the foot-lever is thrown forward, on the contrary, the die is elevated. I have herein shown a bar E^7 attached to the foot-lever, sliding in a bracket E^8 upon the bed-plate A and provided with a head e^3 , as employed to limit the forward motion of the foot-lever.

The continuous strip of paper to be fed to the machine for making the joints is mounted upon a reel F , sustained upon an arm F' attached to the frame.

f in the drawings indicates the paper strip. G is a folder which acts upon said strip after the latter leaves the reel to double or crease the same in its middle, so that it will take and maintain a V shape at the time it is introduced between the clamping-dies.

H is a pasting-roller, the periphery of which is made of V shape to fit within the creased or folded lower surface of the strip, and H' is a presser-roller for holding the strip in contact with the said pasting-roller.

The paper strip is carried forward or fed to the clamping dies after leaving the pasting-roller by feeding devices acting to give an intermittent forward motion to the strip, whereby the end of the latter is carried rapidly or quickly forward between the clamping-dies and over the margin of the box sides placed over the stationary die and remains immovable while the dies are being brought together and the jointing-piece to be attached to the box is being severed from the continuous strip. The said feeding device in its main or essential features comprises a reciprocating gripper which engages and carries forward the paper strip in its forward movement and becomes released from the strip at the limit of its forward movement, so as to move backwardly without producing any corresponding movement in the strip.

The particular feature of construction herein illustrated in the feeding device and means for guiding the paper strip to the same and from said feeding device to the clamping-dies are as follows:

I , Figs. 1, 4, 5, 6, 7 and 8, is an L-shaped guide-plate upon which the main operative parts of the feeding device are sustained. Said plate I is herein shown as provided with a vertical flange I' at one of its edges, which flange is provided with a longitudinal guide-slot i , in which the reciprocating gripper is held and guided. Said guide-plate is also provided with an arm or bracket I^2 , by which it is secured to the machine-frame. The main part of the guide-plate I is arranged beneath the path of the paper strip, so that the said strip passes longitudinally over said plate parallel with the guide-slot i thereof. The said gripping device comprises a sliding plate J , arranged vertically against the plate I' , and held in place by means of a plate J' , located at the opposite or exterior face of the said plate I' , and connected with the plate J through the slot i . A filling-piece j is desirably attached to the plate J within the said slot.

J^2 is the lower jaw of the gripping device, said jaw being arranged centrally beneath the path of the paper strip and provided with a sharp or narrow bearing-edge j' to engage the inner surface of the strip at the upper part or crease of the same. The said jaw J^2 of the gripper is connected with the lower edge of the sliding plate J by a horizontal arm or plate j^2 , located adjacent to the plate I and with its upper surface a sufficient distance below the edge j' of the lower gripper to avoid coming in contact with the corner margin of the folded or V-shaped strip passing over it, Fig. 8. In the simple and convenient construction of these parts herein shown the plate J , the plate j^2 , and the gripper-jaw J^2 are formed or bent from a single piece of metal.

J^3 is the upper or movable gripper-jaw, which is arranged above the lower jaw J^2 thereof and is made vertically movable, so that it may be either engaged with or lifted free from the said lower jaw. In the particular embodiment of the invention illustrated the movable gripper-jaw J^3 is formed by or upon the end of the horizontal lever J^4 , which is mounted upon a pivot-pin j^3 , affixed in the sliding plate J , said lever J^4 being arranged horizontally and its pivot j^3 being arranged to overhang the path of the paper strip. The working-face of the said gripper-jaw J^3 is herein shown as formed by a separate piece of hard metal serrated or roughened to more positively engage the strip.

J^5 is an arm for actuating the gripper-arm J^4 , said arm J^5 being attached to and extended upwardly from the arm J^4 and having at its upper end a horizontal crank-pin j^4 .

In a device embracing the general features of construction above set forth the reciprocating part or plate carrying the gripping-jaws and the jaws themselves may be moved by any suitable actuating devices. As a simple and desirable construction of the parts however, they are herein shown as so constructed that the reciprocating gripper-carrying plate J and the gripper are driven by actuating devices engaged with the upper end of the lever-arm J^5 alone. For this purpose I provide frictional engagement between the said plate J and its guide, tending to retard the movement of the plate, so that when pressure is applied to the upper end of the arm J^5 in a direction to carry the said upper end of the arm forward the gripper-arm J^4 will first be depressed, after which a continued forward pressure upon the upper end of the arm J^5 will carry the sliding plate and gripper-jaws bodily forward. Similarly when the pressure is applied to the upper end of the lever J^5 to move the same backwardly the jaws will first be opened, and the entire gripping device will then be moved bodily backward. Any one of a great number of well-known devices may be employed for producing frictional engagement between the plate J and the guide-plate I' . The device for this purpose herein shown.

Fig. 5, comprises a flat spring j^5 , resting at its middle against the plate J' , and two screws j^3 , inserted through the ends of said spring and through smooth openings in the plate J' and having screw-threaded engagement with the plate J . The spring j^5 holds the plates J and J' in forcible contact with the opposite sides of the guide-plate I' , and by turning the screws j^3 the pressure of the spring may be adjusted as found necessary or desirable.

Devices herein illustrated for actuating the feeding mechanism are made as follows: K is a rocking lever which is pivotally supported upon a shaft k , mounted in the flange or web A^2 of the machine-frame at a point near the rear end of the machine. Adjacent to its pivotal point the lever K is provided with a rigid arm K' , with which arm is engaged a bar K^2 , the opposite or lower end of which is pivoted to the foot-lever E^3 . The rocking lever K is connected with the lever-arm J^5 of the feeding device by means of a connecting-rod K^3 , engaged with a pivot k' upon the lever K , and with the pivot-pin j^4 of the said arm J^5 . The upper end of the bar K^2 is not pivotally connected with the arm K' of the lever K , but said arm K' is provided with a stud k^2 , which engages a notch k^3 in the upper end of the said arm, and said lever is held in position for the engagement of said notch with the said stud by means of a supporting surface or abutment upon the machine-frame, herein shown as formed by an anti-friction roller K^4 . The lever K is held at the rearward limit of its movement by a suitably-applied spring, so that the forward movement only of the gripping device is given by the action of the bar K^2 and foot-lever, the rearward or return movement of the gripping device being afforded by said spring. In the particular construction herein shown in these parts the shaft k of the lever K is rigidly attached to the arm and extends through and has bearing in the frame plate or web A^2 . The said shaft, furthermore, extends outside of the web A^2 , and is provided at its outer end with a collar k^4 , to which is attached one end of a spirally-coiled spring K^5 , the opposite end of which is attached to the frame. Said spring tends to hold the rocking lever K normally at the rearward limit of its movement and acts to promptly return the gripping devices to the starting-point of the same after the bar K^2 has been drawn downwardly or retracted. The stud k^2 of the arm K' is so located with reference to the bar K^2 , that said stud will swing forward out of the notch k^3 of said arm after the arm has been lifted a short distance, and when the lever K has been swung forward a sufficient distance to give the movement in the gripping devices necessary for properly feeding the paper strip the said bar K^2 may be held from being carried forward away from the roller K^4 by means of a roller K^6 , mounted upon the shaft k , Fig. 15, or otherwise. After the notch k^3 of the bar K^2 is released from the stud k^2

the upward movement of the bar is continued as the foot-lever is thrust backward without producing any movement in the gripping devices until the clamping-dies have been brought together and the necessary pressure put upon the parts to be joined and the jointing-strip.

For applying jointing-strips in the making of boxes of different sizes it is obviously desirable that the distance to which the strip is fed forward past the cutting or severing devices at each advance movement of the feeding mechanism should be capable of variation in order that the length of the strip used upon the box may correspond with the depth of the same. In connection with the stationary die or anvil-block, which is movable bodily to afford a greater or less distance between the cutting-off mechanism and the end of the block, as hereinbefore described, I have provided a connecting mechanism between such movable anvil-block and the parts by which the feeding devices are actuated, whereby the movement of the block a certain distance will produce a corresponding change in the throw of the gripping-jaws, whereby the length of the strip fed forward at each reciprocation of the gripping-jaws will correspond approximately with the length of the exposed part of the anvil-block and the joint to be made.

Devices herein shown for the purpose above described are constructed as follows:

The pivot-pin k' , which connects the rocking lever K with the connecting-rod K^3 , instead of being immovably secured in the lever K , is adapted for longitudinal movement upon said lever. For this purpose the said pin is herein shown as mounted upon a sliding block L , engaged with a guide groove k^6 in the said lever.

L' is a bell-crank lever, which is mounted upon a pivot l , located beneath the inner end of the anvil-block or bar B and provided with an upwardly-extending arm having engagement with the block and with a horizontal arm, the free end of which is connected with the said sliding block L by means of a connecting-rod L^2 . The connection between the bell-crank lever L' and the anvil-block B is herein shown as formed by means of a plate l' , attached to the side of the said anvil-block and provided with a vertical groove l^2 , which engages a pivot-pin l^3 in the upper end of the vertical arm of said bell-crank lever. When the said anvil-block connected with the pivot-pin k' of the lever K in the manner described is thrust outwardly, said pivot-pin will be carried or moved upwardly away from the shaft of the said rocking lever K , thereby giving a greater throw to the said pivot-pin and increasing the throw of the gripping devices. When, on the contrary, the anvil-block is moved inwardly, the pivot k' is moved inwardly upon the rocking lever K , thereby decreasing the throw of said pin k' and giving a less movement in the gripping

devices and decreasing the distance through which the paper strip is fed forward at each action of the feeding mechanism.

The particular construction herein shown in the guide-plate I for guiding the paper strip *f* from the passing-roller to the gripping devices and from said gripping devices to the clamping-dies is as follows: At the rear end of the guide-plate I' is located a rigid plate I³, arranged at right angles with said guide-plate and extending over the path of the paper strip. Said plate I³ is provided in its lower edge with a V-shaped notch *z'* to engage the upper surface of the strip. Upon the end of the plate I opposite the said guide-plate I³ is located a V-shaped guide-bar I⁴, which also extends over the strip and engages the upper surface thereof. Along the upper surface of the plate I, at the central line of the paper strip, is located a longitudinal guide-strip I⁵, consisting of a narrow strand or filament of metal, the upper margin of which is arranged in approximately the same horizontal plane as the upper end of the lower gripping-jaw J², and which is constructed to engage the under surface of the paper strip within the seam or crease thereof. The purpose of this said guide-strip is to hold the paper strip accurately in position with relation to the gripping devices, so that the crease in the paper strip will come exactly over the lower gripping-jaw, and thus prevent a distortion of the strip when the same is gripped between the jaws. The said strip I⁵ is herein shown as supported by being attached to a plate *z*², which is secured to the plate I at the end of the latter at which the paper strip enters the guiding devices. At its opposite or forward end the guide-strip I⁵ is unsupported, the plate I being cut away beneath the strip at this point, so as to form an opening or recess I⁶, Figs. 4 and 7, within which the upper edge or corner of the working-face of the anvil may enter when said anvil is thrust inwardly for operating upon shallow boxes or covers. The said guide-strip I⁵ may, however, be sustained or held from lateral movement by engagement with the lower gripping-jaw J², at one side of which said strip passes. A preferred construction in these parts is illustrated in Fig. 8, in which the guide-strip is shown as beveled at one side only to give it a sharp or narrow edge, located at that face of the strip which is in contact with the gripping-jaw, while the said jaw has a similar shape, being made flat at its side in contact with the guide-strip and beveled at its opposite or outer side. By this construction the upper edges of both the strip and gripping-jaw may be made to engage the crease of the paper strip, while at the same time the said gripping-jaw may be reciprocated without interfering with the guide-strip. If found necessary or desirable, a small lug or projection *j*⁷, Fig. 8, may be placed upon the arm *j*² in position to engage the inner face of the guide-strip I⁵, thereby form-

ing with the jaw J² a notch in which the said guide-strip is held and guided. The said notch will, however, be made slightly deeper than the width of the guide-strip, so that the upper gripping-jaw will act against the lower jaw J² without thrusting said guide-strip downwardly against the bottom of said notch.

I⁷ I⁷ are two guide-rods, which are located above the guide-plate I, one at each side of the guide-strip I⁵, at such distance apart as to engage the upper surface of the paper strip near the lateral margins thereof. Said guide-rods aid in keeping the strip accurately in position with relation to the gripping-jaws of the feeding mechanism and are also of use to prevent the sides of the folded or creased paper strip from bending or curling up on account of the moisture in the paste or glue applied thereto. The said guide-bars I⁷ I⁷ may be attached to or supported from the plate I in any desired manner. As herein illustrated, they are inserted and secured to their ends in the guide-plate I³ and guide-bar I⁴. At its end nearest the clamping-dies the plate I is herein shown as provided with a V-shaped extension I⁸, adapted to enter the opening *d* of the plate D', by which the stationary cutter D is directly supported. Said plate I⁸ serves to guide the paper strip until the latter reaches the said cutter. The projection I⁸ is herein shown as provided at its top with a vertical flange I⁹, the upper edge of which rests against the top of the said opening *d*. The sides of the said projection I⁸, together with the flange I⁹, serve to hold the ends of the guide devices accurately in position with reference to the knife and the clamping-dies by their engagement with the walls of said opening *d*.

I have found that in the use of rollers H H', such as are herein shown, for applying paste to the paper strip, when the said strip is carried or moved rapidly forward by the action of the feeding mechanism described the impetus acquired by the paste-rollers as they are turned by the paper is liable to cause the said rollers to continue to turn in a manner to thrust the paper forward after the gripping-jaws have completed their forward movement. To avoid this result, I so construct the upper roller H' that it may be lifted to free it from the lower roller H, and I provide means whereby the upper roller will be automatically lifted free from the lower roller at the moment the forward movement of the gripping-jaws is terminated. When the parts are thus constructed, the paper strip is released from the paste-rollers before the latter have an opportunity to act upon the strip in a manner to carry it forward. For the general purposes above set forth the upper feed-roller may be lifted or moved by any upwardly-moving part of the machine acting against the feed-roller support at the proper time. In one practical embodiment of this part of the invention herein illustrated these parts are made as follows: The upper roller H' is mounted upon a pivot-

pin h' , secured upon one of two parallel arms H^2 H^2 , which are rigidly connected with each other and are mounted upon a rigid pivot-pin h^2 , affixed in the frame-plate A^2 . Upon the end of one of the arms H^2 is formed or attached an arm or striker H^3 , located in position to engage the stud k^2 of the rocking lever K when the said stud has nearly reached the upward limit of its movement. When the said lever K is actuated by the notched bar K^2 , therefore, the arms H^2 H^2 and the roller H' will be lifted at the moment the feeding device reaches the forward limit of its movement and said roller H' will be supported free from the paper strip until the foot-lever is swung rearwardly and the bar K^2 retracted preparatory to another and succeeding operation of the machine. The lower paste-roller H is constructed to enter a tank or receptacle H^4 , containing paste or other adhesive substance, so as to become coated upon its margin in a manner heretofore common and well understood. H^5 is a scraper arranged to fit against the V-shaped periphery of the said feed-roller to remove the surplus adhesive substance therefrom.

The cutter or shear-blade D , employed to sever that part of the jointing-strip applied to the box-walls from the main or continuous part of the strip in the manner hereinbefore stated, acts in the particular construction illustrated in connection with the cutting edge formed at the rear surface of the movable clamping-die C as the movable die descends toward the work. Any separate knife or cutter on the movable die is rendered unnecessary in the particular construction shown by making the rear face and working-surface of the movable die of hardened steel.

The stationary knife or cutter D is herein shown as made preferably of thin or sheet metal and of inverted-V shape, said cutter being secured to the plate D' by screws, the heads of which are shown. A plate M' , secured to the plate D' above said cutter, aids in holding the same in place. Said plate M' is provided with an opening m' , Fig. 10, through which the strip passes over the knife. The forward or advance edge of the cutter forms the cutting-edge thereof, and the said cutter is held up to its work by screws placed behind it or otherwise.

The movable die C may be constructed in any suitable or preferred manner to afford a suitable cutting-edge at its rear surface. In the particular construction herein illustrated the working-surface of the die is formed in a cylindrical block C^2 of hardened steel, the lower surface of which block is provided with a V-shaped notch corresponding in form with the opposing surface of the die-block B . The rear or inner end surface of the said hardened block moves in contact with the face of the cutter D , so that the edges of the notch act, in connection with the said cutter, to sever the paper strip. I have herein shown the block C as held within the head of the die by

splitting the latter vertically and inserting one or more clamp-screws c^3 for holding the split parts together. A screw c^4 , inserted in the head and overlapping the die-block C , serves to hold the guide-block from being thrust endwise out of the head and to adjust said block with reference to the stationary cutter.

In Fig. 13 is shown the cut and scored corner of a box-blank before the jointing-strip is applied to the same, and in Fig. 14 is shown the finished corner after the jointing-strip has been applied. In the operation of the machine the operator sits or stands in front of the same and places the corners of the box-blank, split and scored, as shown in Fig. 13, upon the upper surface of the anvil B below the movable die, the sides of the box being bent or held approximately at right-angles with the bottom when the blank is placed upon the anvil-block. When the corner of the blank is thus held upon the block, the foot-lever E^3 is actuated, with the result of quickly thrusting forward the end of the strip over the edges of the blank and then depressing the upper die to sever the strip and forcing it into contact with the surface of the blank. The folder G herein shown comprises a curved plate G' , which is bent into U form, with its side walls arranged at some distance apart at their rear ends, but brought together or parallel with each other at their forward ends, so as to gradually bring together the margins of the strip, thereby bending the paper strip into U shape and to then fold or crease the strip as it emerges from the folder.

It will of course be understood that a previously-prepared gummed strip may be employed in the machine shown, in which case the pasting or gluing device shown will be used merely to apply water to the strip for moistening the gum or glue thereon. Obviously means other than the particular gluing or pasting devices shown may be employed, either for applying paste or glue to the strip or for applying water to a previously gummed or pasted strip, without departure from my invention.

The machine herein shown illustrates one practical embodiment of the main features of my invention, which latter may obviously be carried out in a machine differing in its details of construction from the particular one herein shown. One of the main features of the invention is embodied in a construction embracing a clamping device and means for creasing or folding the strip before it is fed to the clamping device; and as far as this part of the invention is concerned the said clamping and folding devices may be made otherwise than in the particular manner shown, and other features of the machine illustrated may be omitted without departure from my invention—as, for instance, the paste or glue may be applied by hand instead of automatically by the machine, or the adjusting devices

for the lower clamping die or anvil may be absent.

Another important feature of construction herein illustrated embraces the connection
5 between the movable or adjustable anvil-block and the actuating devices by which the feed devices are operated, whereby the length of paper fed forward at each motion of the machine may be varied to correspond with the
10 depth of the box to cover, and as far as this feature of the invention is concerned the gripping devices may be made otherwise than in the particular manner illustrated; and the connection between the movable die-block
15 and the said actuating devices may be made otherwise than as shown. The particular machine illustrated, however, contains many novel details of construction, which in themselves are made the subjects of specific claims
20 herein.

I claim as my invention—

1. The combination, with clamping-dies having flat faces arranged at an angle with each other, said dies co-operating to press an
25 adhesive fastening-strip upon the corner of an interposed box, of a folder or creasing device operating to fold or crease longitudinally a jointing-strip, substantially as described.

2. The combination, with clamping-dies
30 having flat faces arranged at an angle with each other, said dies co-operating to press an adhesive fastening-strip upon the corner of an interposed box, of a folder or creasing device operating to fold or crease longitudinally
35 a jointing-strip, and a feeding mechanism for the strip, substantially as described.

3. The combination, with clamping-dies having flat faces arranged at an angle with each other, of a folder or creasing device op-
40 erating to fold or crease longitudinally a jointing-strip, a paste or glue applying device for rendering the strip adhesive, and a feeding mechanism for the strip, substantially as described.

4. The combination, with clamping-dies having flat faces arranged at an angle with each other, of a folder or creasing device op-
45 erating to fold or crease longitudinally a continuous jointing-strip, a paste or glue applying device for rendering the strip adhesive, a
50 feeding mechanism for the strip, and a cutting device for severing the strip, substantially as described.

5. The combination of an anvil-block and
55 an opposing movable die, said anvil-block and die co-operating to press an adhesive jointing-strip upon the corner of an interposed box, and said anvil-block being bodily movable on the machine-frame, a cutting device for sev-
60 ering the strip into suitable lengths, a feeding mechanism for the strip, embracing an adjusting device by which the movement or throw of the feeding devices may be changed, and an operative connection between the mov-
65 able anvil and the said adjusting device by which the adjusting device is controlled by

the shifting of the anvil, substantially as de-
scribed.

6. The combination, with clamping-dies having flat faces arranged at an angle with
70 each other, said dies co-operating to press an adhesive fastening-strip upon the corner of an interposed box, of a folder or creasing device operating to fold or crease longitudinally a jointing-strip, and cutters for severing the
75 strip, having angular cutting-edges, substantially as described.

7. The combination, with clamping-dies having flat faces arranged at an angle with each other, said dies co-operating to press an
80 adhesive fastening-strip upon the corner of an interposed box, of a folder or creasing device operating to fold or crease longitudinally a jointing-strip, and a stationary knife or cutter having angular cutting-edges, that one of
85 said dies which is movable being provided at the ends of its working-faces with cutting-edges acting in connection with the cutting-edges on the said stationary knife or cutter, substantially as described.
90

8. The combination, with clamping-dies having flat faces arranged at an angle with each other, said dies co-operating to press an
95 adhesive fastening-strip upon the corner of an interposed box, of a folder or creasing device operating to fold or crease longitudinally a jointing-strip, a cutting device for severing the strip, having angular cutting-edges, and a paste or glue applying device for rendering the strip adhesive, substantially as described.
100

9. The combination, with clamping-dies, of a feeding device embracing a reciprocating carrier and gripping-jaws mounted thereon and adapted to engage the said jointing-strip, and a paste or glue applying device for ren-
105 dering the strip adhesive, substantially as described.

10. The combination, with clamping-dies, of a folder or creasing device operating to fold or crease longitudinally a jointing-strip,
110 a feeding device embracing a reciprocating carrier and gripping-jaws thereon, one of which jaws is provided with a narrow edge engaging longitudinally the crease or fold of the strip, and a paste or glue applying device
115 for rendering the strip adhesive, substantially as described.

11. The combination, with clamping-dies, of a folder or creasing device operating to fold or crease longitudinally a jointing-strip,
120 a feeding device embracing a longitudinally-arranged guide-strip having a narrow edge engaging a crease or fold of the jointing-strip, a reciprocating carrier and gripping-jaws mounted on the carrier, one of said jaws be-
125 ing provided with a narrow edge arranged longitudinally of the jointing-strip and engaging the crease or fold of the same, and a paste or glue applying device for rendering the strip adhesive, substantially as described.
130

12. The combination, with an anvil-block or die adjustably supported upon the machine-

frame, an opposing movable die, and a stationary knife or cutter acting, in connection with a cutting-edge, upon the movable die, of a reciprocating feeding device embracing a carriage and gripping-jaws mounted thereon, and means for giving reciprocating motion to said feeding device, embracing a rocking lever, means for actuating the same, a connecting-rod, a pivot or stud, said pivot or stud being movable longitudinally upon the rocking lever, and operative connections, substantially as described, between the said die-block and the said pivot pin or stud, whereby the stud is moved toward or from the pivot of the lever when the anvil-block is shifted.

13. The combination, with an anvil-block or die adjustably supported upon the machine-frame, an opposing movable die, and a stationary knife or cutter acting, in connection with a cutting-edge, upon the movable die, of a reciprocating feeding device embracing a

carriage and gripping-jaws mounted thereon, and means for giving reciprocatory motion to said feeding device, embracing a rocking lever, means for actuating the same, a connecting-rod, a pivot or stud upon the said rocking lever engaging the connecting-rod, said pivot or stud being movable longitudinally upon the rocking lever, and operative connection between the said adjustable die-block and the said pivot pin or stud, embracing a bell-crank lever connected with the anvil-block and a connecting rod or bar connected with said lever and stud.

In testimony that I claim the foregoing as my invention I affix my signature in presence of two witnesses.

MARK D. KNOWLTON.

Witnesses:

M. E. DAYTON,
TAYLOR E. BROWN.